A practical treatise of perspective on the principles of Dr. Brook Taylor

E. E. delin. et fecit Aq. Fort. R. Duppa perfecit.

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A

PRACTICAL TREATISE

OF

PERSPECTIVE,

ON THE PRINCIPLES OF

DR. BROOK TAYLOR.

BY

EDWARD EDWARDS,

ASSOCIATE AND TEACHER OF PERSPECTIVE

IN THE

Royal Academy.

Pamphilus——primus in Picturâ omnibus literis eruditus, præcipue Arithmetice et Geometrice, sine quibus negabat Artem perfici posse.

Pliny, Nat. Hist.

LONDON:

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1803.

Mr. Edwards was Born in the Year 1737
he died rather Suddenly on the 10th Decr. 1806
at his House in Windmill Street Tottenham
Court Road

See an Account of him in the Supplement to
the Gentlemans Magazine Decr. 1806 page 1245

Luke Hansard, Printer,
Great Turnstile, Lincoln's-Inn Fields.

TO THE

KING.

SIR,

AS it is principally by the patronage of Your MAJESTY that the polite Arts have been raised to their present state of prosperity in the British Empire, I am induced to hope that any the humblest attempt towards their further cultivation or improvement will not be deemed unworthy of Your MAJESTY's favour. It is from this persuasion, that I am encouraged to present to Your

MAJESTY the following Treatise, on the science and practice of Perspective.

That Your MAJESTY may long be enabled to continue to the Arts that patronage and protection under which they have hitherto flourished, and may thence derive the satisfaction which must result from private gratitude and public esteem; is the humble, but ardent wish of

Your MAJESTY'S

Most dutiful and devoted

Subject and Servant,

Edward Edwards.

P R E F A C E.

ALTHOUGH various treatiſes on the ſcience of Perſpective have been written, ſome of which have great excellence, yet it may with truth be aſſerted, that not one of them is calculated to be uſeful, or even intelligible, to ſuch artiſts as do not underſtand Euclid, yet wiſh to gain a knowledge of the ſcience, ſufficient to qualify them to conduct their works upon true principles. The defects which deſtroy the utility of thoſe treatiſes will be clearly demonſtrated, by arranging them in two claſſes, and then conſidering each under its ſpecific character. In the firſt claſs are thoſe which, by their examples, appear clear and inſtructive at the firſt view, but when examined are found deficient in ſcience and theory, and are even wanting in the explanation of the few principles which they contain. Such are the defects of the works of *Maralois*, the *Jesuit*, and of *Pozzo*.

In the ſecond claſs are thoſe treatiſes which are the beſt, and contain the trueſt principles of the ſcience; but are ſo mathematical in their ſtructure, and conſequently ſo abſtruſe to thoſe who are not verſed in the Elements of Euclid, that they contain no examples of forms or figures in Perſpective, and conſequently have nothing that can invite the eye of a practical artiſt to examine their principles.

Such

Such are the difadvantages attending the elegant work publifhed by Dr. Brook Taylor, of Cambridge, firft in the year 1715, and again, with improvements, in 1719. The fame inconveniencies attend the treatife by Mr. Hamilton, which, added to its magnitude, deters the artift from its perufal, rather than invites him to ftudy the fcience it contains.

There is alfo another work that has infinite merit, written by T. Malton, fenior, and publifhed in 1775; which contains fome excellent and mafterly examples; but he has deftroyed their utility by entangling the vanifhing points, and croffing the diagrams in fo confufed a manner, that it is almoft impoffible for a young practitioner to trace and distinguish the different figures.

Thefe faults, which are too frequent in books of inftruction, have arifen from two caufes; the firft is, that the authors of them, though perfect mafters of the fcience on which they wrote, had not acquired the art of explaining it to thofe who are unacquainted with it; they feem alfo to have forgotten, that thofe who would inftruct, muft defcend to that language for explanation, and apply thofe figures for illuftration, which are fuitable to the powers and comprehenfion of their pupil, rather than to the difplay of their own fcience and abilities.

The fecond caufe of the defects before mentioned arifes from the following circumftance; which is, that excepting *Pozzo* and *Highmore*, there is no author who has written on the fubject of Perfpective, that can be confidered as a painter; confequently they were deficient in the knowledge of the forms of objects, and thereby unable to apply their fcience to the ufes required by the artift.

Having experienced and confidered the difadvantages before mentioned, the author prefumed to think that a work might be produced, better calculated than any one that has hitherto appeared, for the fervice of thofe artifts who have neither time nor refolution fufficient to inveftigate the fcience of Perfpective, under its prefent obfcurities

and

and difficulties. Whether the following treatife, which he has attempted in conformity to his idea, will anfwer the end propofed, muft be left to the reader to determine.

The arrangement of the work is as follows:

As a preliminary apparatus, a felection of definitions and problems in geometry is given, all of which are abfolutely neceffary to be underftood by thofe who mean to practife Perfpective; they are inferted not to increafe the fize of the volume, but that the ftudent may not be compelled to feek for other books before he can make ufe of this.

After the Geometry follows the Perfpective, which is divided into fix fections;

The firft is introductory, and contains all the terms that are employed in the practice, together with their definitions, illuftrated by proper examples; the difference between the *center of the picture* and *point of fight* is defined; and the various pofitions in which objects may be difpofed to the picture: it alfo contains the rudiments of practice for lines, parallel and perpendicular, to the picture.

The fecond fection contains inftructions, with examples for drawing objects, the fronts and fides of which are *parallel* and *perpendicular* to the picture.

The third fection treats of objects, the fronts of which are *inclined* to the picture.

In the fourth fection are examples, with inftructions for delineating objects, when the planes or faces of which they are compofed are *inclined* both to the *picture* and to the *horizon*.

It muft be obferved, that the aforenamed fections contain all the practical principles neceffary for the delineation of objects in Perfpective, however their different planes may be difpofed to the eye of the fpectator.

The

The fifth ſection treats of ſhadows, in which the author has attempted to explain the leading principles of that part of the ſcience in the cleareſt manner he was able; but whatever his ſucceſs may have been, it muſt not be expected that this part can be clear and eaſy to thoſe who do not well underſtand the preceding ſections of the work; therefore the ſtudent muſt make himſelf maſter of thoſe, before he attempts ſhadows.

The ſixth and laſt ſection contains methods for facilitating operations in difficult caſes, as alſo ſome theoretic inſtructions, together with obſervations by way of praxis; all of which will be found extremely uſeful to the ſtudent.

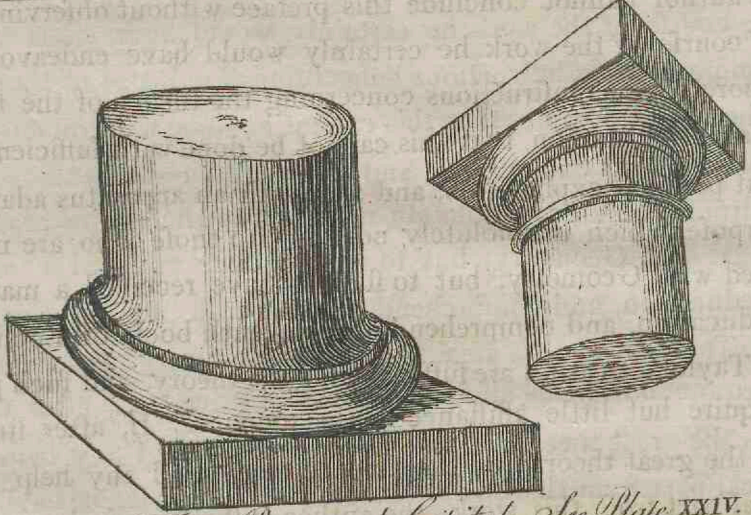
In the technical language of the ſcience, the terms adopted by Dr. Brook Taylor are united with thoſe employed by the old writers on Perſpective, by which means it is expected that the ſtudy of the ſcience will be facilitated to thoſe who chuſe to refer to the works of that great maſter and his principal ſucceſſors.

In the plates are ſelected the moſt uſeful and familiar examples, ſuch as are moſt generally wanted in the common courſe of practice, yet ſuch as will include all the poſitions in which objects may be placed to the picture or ſpectator; omitting the inclined picture, for which the ſtudent is referred to the ſenior Malton, Hamilton, &c.

Moſt of the examples are drawn to a ſcale, the uſe of which is explained in the firſt ſection, and applied in moſt of the following. This circumſtance has never before been attended to by writers on the ſubject; and therefore it may be hoped, that this will operate as an improvement, and greatly facilitate the ſtudy of the ſcience in its practical part: but the reader muſt obſerve, that the author does not mean to offer any new method of proceſs, founded on any ſuperior theory of the ſcience; he only wiſhes to teach the readieſt mode of practice, directed by the principles of Dr. Brook Taylor, whoſe writings on Perſpective are certainly the *ne plus ultra* of the ſcience, and do infinite honour to his country.

At the end of the ſixth ſection is added a Diſcourſe on the conduct and compoſition of a picture; which, if attended to, will not only help to explain the principles of Perſpective, but alſo prevent much error in the future works of thoſe artiſts who have not opportunity to enter deeply into the ſcience.

The author cannot conclude this preface without obſerving, that in the courſe of the work he certainly would have endeavoured to give more copious inſtructions concerning the theory of the ſcience, were he not of opinion, that this cannot be done with ſufficient effect without perſonal explanation, and that with an apparatus adapted to the purpoſe, which is abſolutely neceſſary to thoſe who are not acquainted with Geometry; but to ſuch as have received a mathematical education, and comprehend the eleventh book of Euclid, Dr. Brook Taylor's treatiſes are ſufficient for the theory, and ſuch perſons will require but little aſſiſtance in the practice. If, after ſtudying him as the great theoriſt of the ſcience, they find any help in the practical part from this work, the author will rejoice in having facilitated the ſtudy of a ſcience which is uſeful to the ſcholar, ornamental to the gentleman, and indiſpenſably neceſſary to the artiſt.



Tuscan Base and Capital. See Plate XXIV.

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A DISCOURSE

GEOMETRY.

DEFINITIONS and PROPOSITIONS.

A Straight Line, or right line, is that which lies evenly between its extreme points. It is evidently the ſhorteſt diſtance between them.

A plane, or plain ſurface, is that which lies evenly between its extreme boundaries, which may be one or more curved lines, or any number of right lines, not leſs than three.

It has evidently this property, that any two points being taken in it, the ſtraight line between them lies wholly in that ſurface.

If two or more ſtraight lines on the ſame plane, are ſo ſituated that they would if continued never meet, they are parallel to each other.

If they are ſo placed that they would cut each other, if continued, they are then ſaid to incline to each other, and they form, at the point of interſection, what is called the angle of their inclination. The point of interſection may be ſuppoſed in either of the lines, for it is common to both.

If

Plate 1.

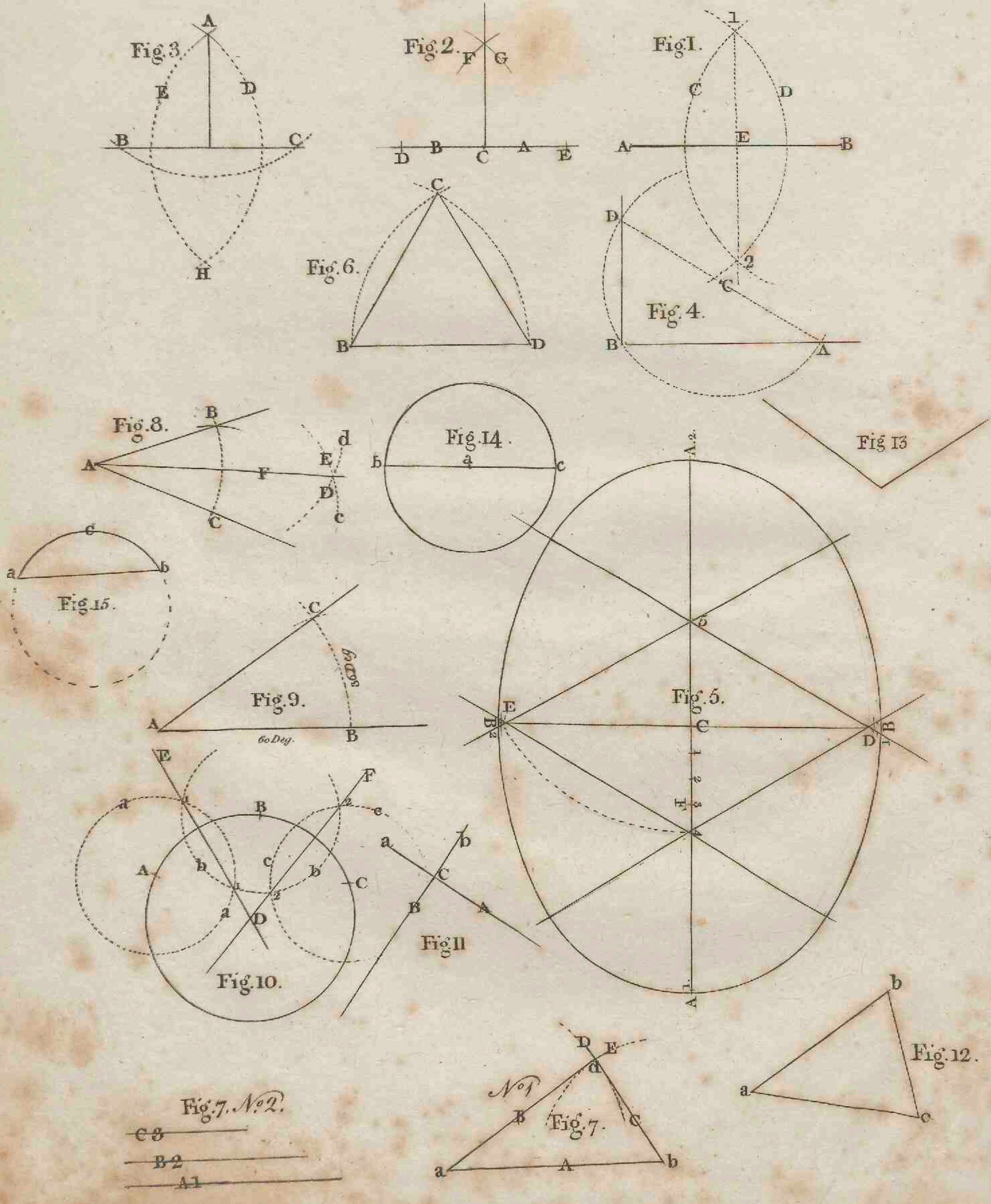


Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 7. No. 1
Fig. 7. No. 2.
Fig. 8.
Fig. 9.
60 Deg.
Fig. 10.
Fig. 11
Fig. 12.
Fig. 13
Fig. 14.
Fig. 15.

If two lines, when cutting each other, form equal angles on every ſide of them, ſuch angles are called right angles, and the lines are ſaid to be at right angles, or perpendicular to each other.

Examples of Lines.

PLATE I. Fig. 7, N° 2. The lines A 1, B 2, C 3, are parallel to each other, for if they were continued or produced they would never meet.

Fig. 8 and 9. The lines A B, and A C, are inclined to each other: the point A is their interſection.

Fig. 11. The lines A a, B b, croſs or interſect each other at right angles, therefore B b is perpendicular to A a, or A a is perpendicular to B b.

The point of interſection C may be ſuppoſed in the line A a, or in B b, for it is common to both.

Of ANGLES, that which is leſs than a right angle is called an acute angle; that which is greater than a right angle is called an obtuſe angle.

A plane figure bounded by three ſtraight lines is called a rectilineal triangle.

An equilateral triangle, is that which has all its ſides equal: it has alſo all its angles equal. Fig. 6.

An iſoſceles triangle has only two of its ſides equal to each other: the angles oppoſite to theſe equal ſides are alſo equal. Fig. 12.

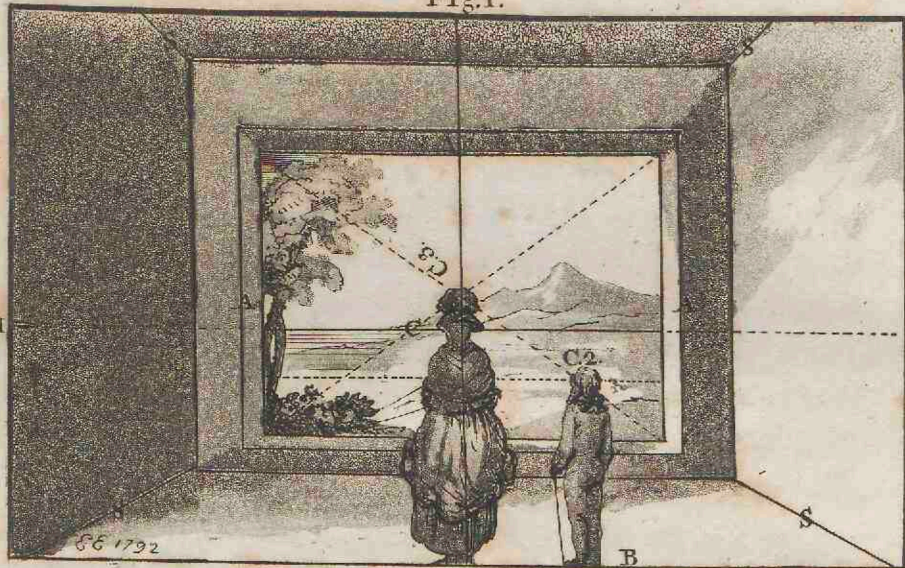
A ſcalene triangle has all its ſides unequal. Fig. 7, N° 1.

The angles of a ſcalene triangle are all unequal; of any two angles that one being the greater, which is oppoſite to the greater ſide.

The converſe of the three laſt propoſitions is alſo true; viz.

If a triangle has its three angles equal, its ſides are alſo equal.

Fig. 1.



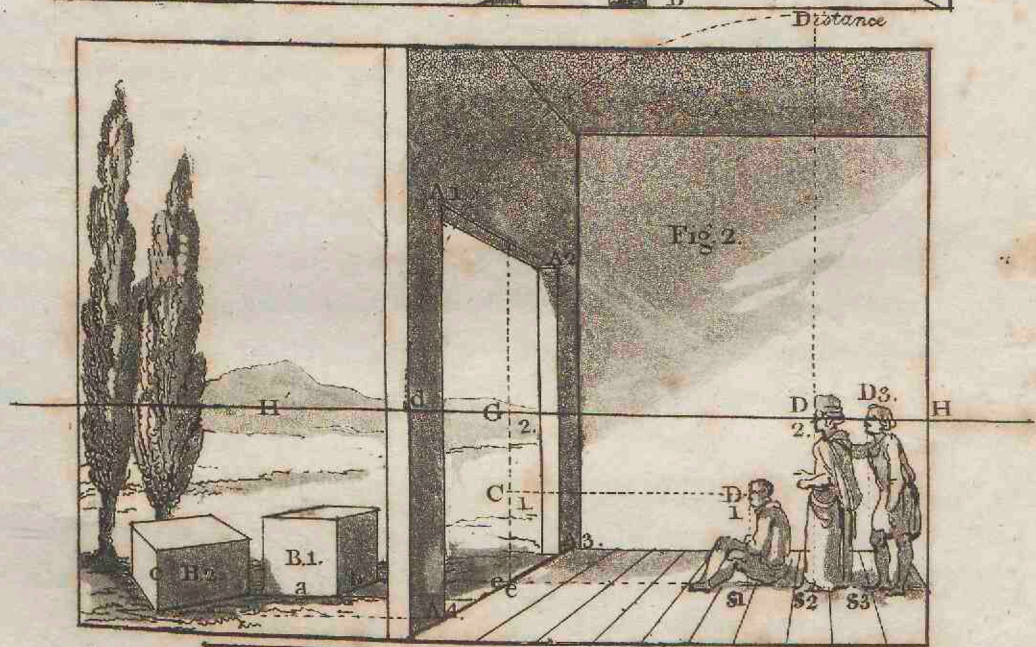


Fig. 2.

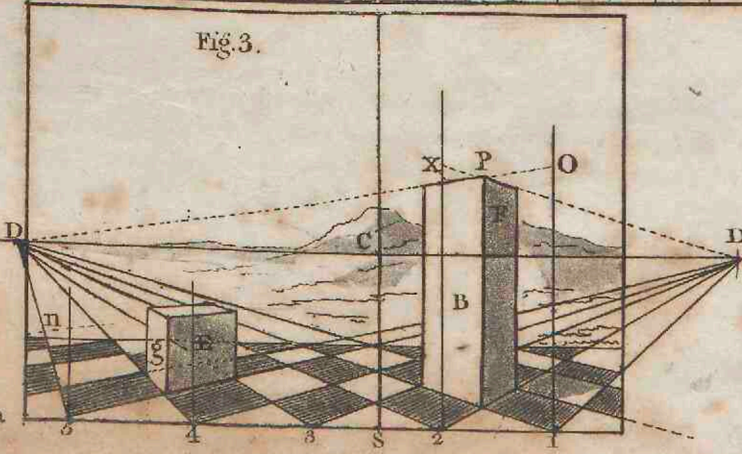


Fig. 3.

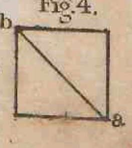


Fig. 4.

If a triangle has two angles equal, the fides oppofite to them are alfo equal. PLATE I.

If a triangle has three unequal angles, its fides are alfo unequal; of any two fides, that one being the greater, which is oppofite to the greater angle.

Examples of Angles.

The angle A B D, Fig. 4. is a right angle, as are alfo the angles of Fig. 11.

Fig. 8, is an acute angle, and the angles of the triangles, Fig. 7 and 12, are all acute.

Fig. 13, is an obtufe angle.

Having defcribed the properties of right lines and angles, it will be neceffary to fpeak of the circle.

A CIRCLE is a plain figure contained by one line, which is called the circumference, and is fuch, that all ftraight lines drawn from a certain point within the figure to the circumference, are equal to one another.

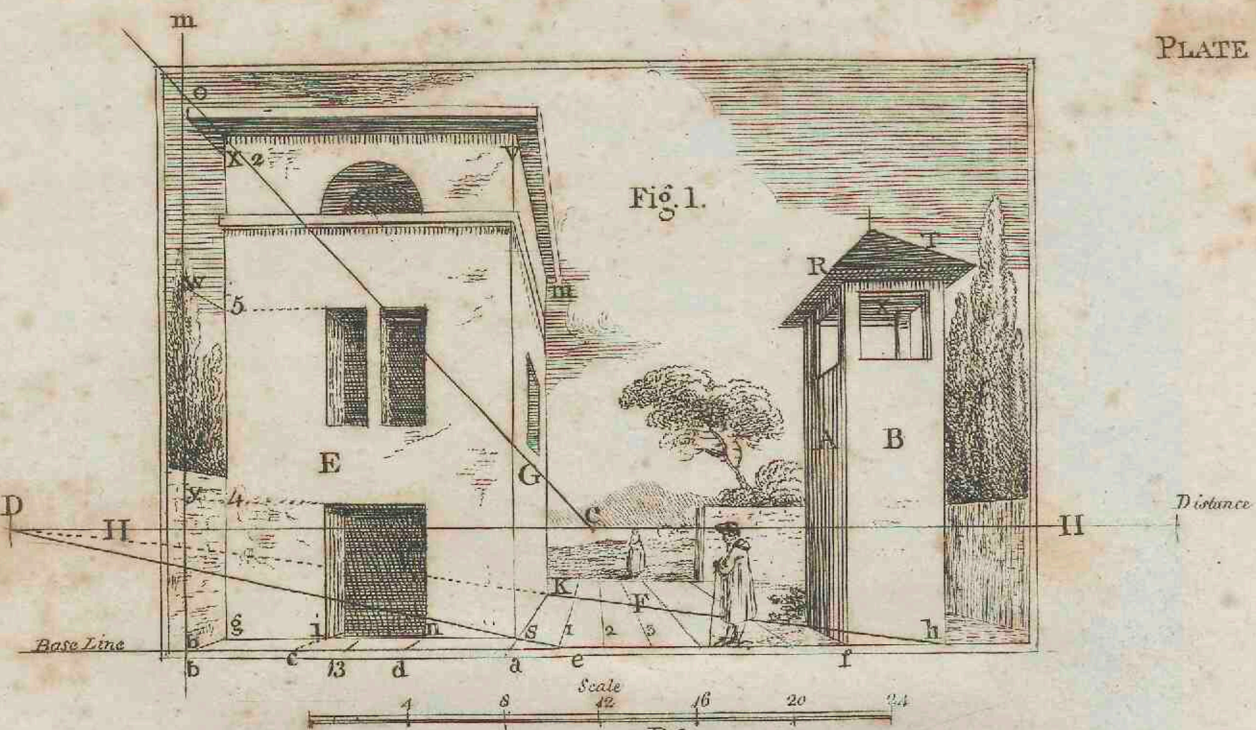
The point from which fuch lines are drawn, is called the center of the circle.

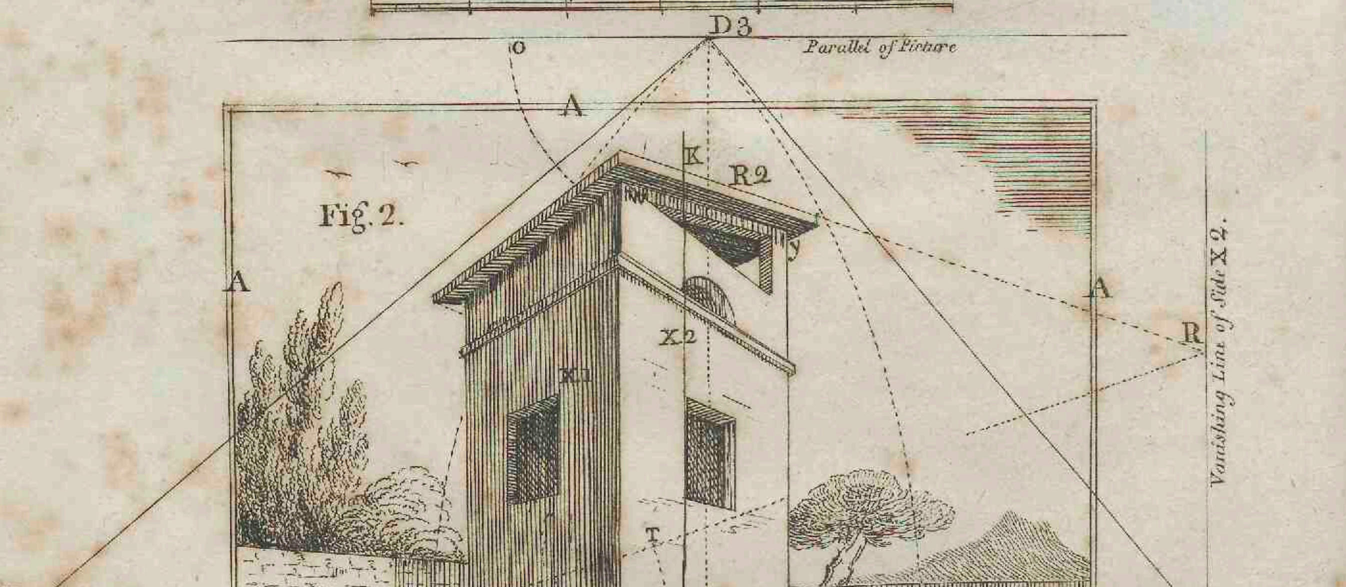
A diameter of a circle, is a ftraight line drawn through the center, and terminated both ways by the circumference.

A radius is any right line, drawn from the center of the circle to the circumference, and is equal to half the diameter.

A femicircle is the figure contained by a diameter, and the part of the circumference cut off by the diameter.

A fegment of a circle is the figure contained by a ftraight line, and any portion of the circumference it cuts off.





Publish'd by E. Edwards 1803

PLATE I. A chord of an arc is a right line, joining the extremes of that arc.

The longeſt chord that can be drawn in a circle is the diameter, which always paſſes through the center: and any portion of a circle cut off by a right line, may be conſidered as a ſegment, whether greater or leſs than a ſemicircle.

Examples.

Fig. 14, is a circle; the point, a, is its center, and the line b c is the diameter, the half of which is the radius, as from a to b, or from a to c.

The ſemicircle is that portion of the circumference which lies between the points c and b, either above or below the line b c.

Fig. 15, is the ſegment of a circle, the portion of the circumference lying between a and b, marked c, being the arc, and the line a b, the chord of that ſegment or arc.

In Fig. 15, that part of the circle expreſſed by the dotted line, is the greater ſegment; the part marked a, b, c, the leſs ſegment.

Of Planes, in the ſtudy of perſpective, it is required to have a clear and accurate knowledge.

In the theory of the ſcience, imaginary planes are of the utmoſt conſequence; and in practice, the conſideration of real planes is abſolutely neceſſary, becauſe the forms of moſt objects produced by art are compoſed of planes.

Planes may be ſituated in the ſame relation to each other as lines.

If they are ſo placed that if continued they would never meet, they are then parallel to each other:

But if they are ſo diſpoſed that they would croſs each other, they are then ſaid to incline to each other; and the line in which they meet or croſs each other, is called their interſection.

The

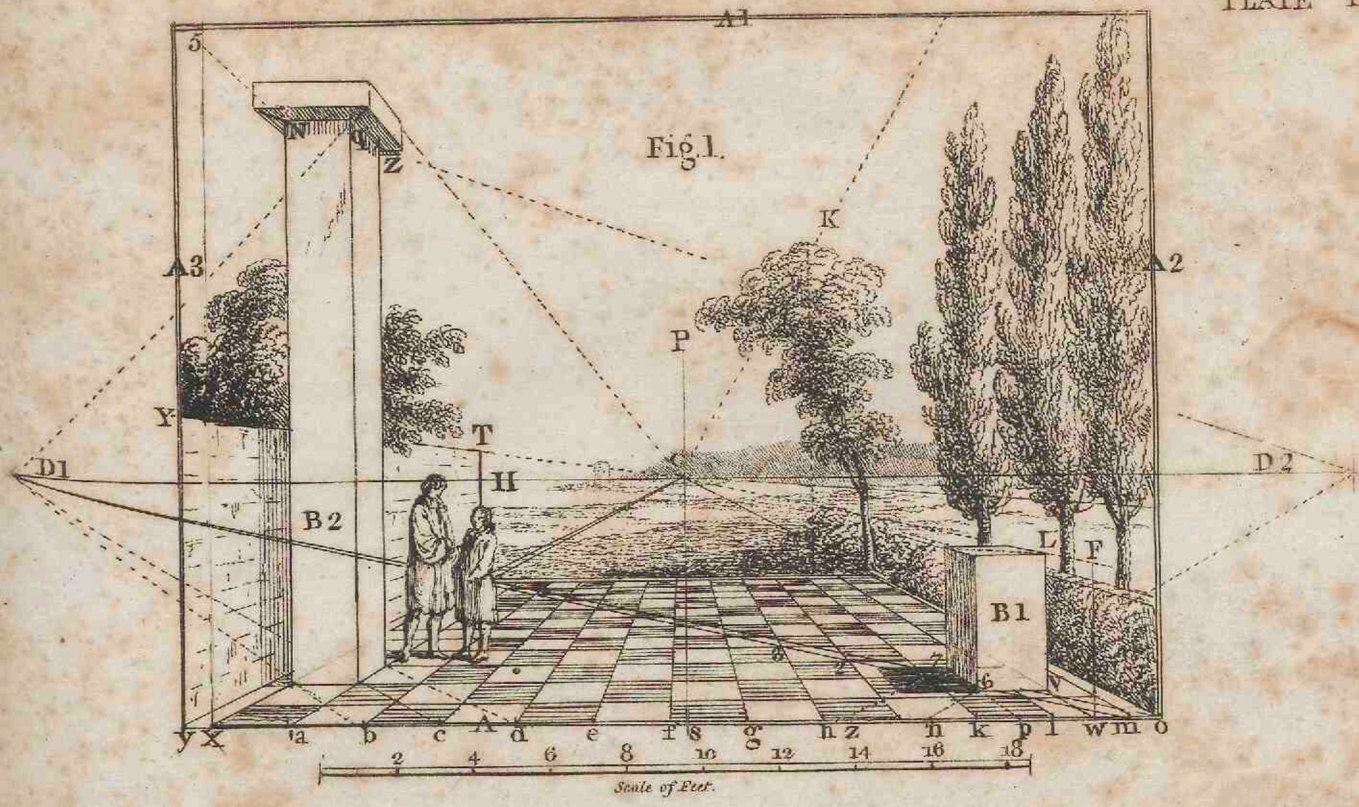


Fig.1.
Scale of Feet.

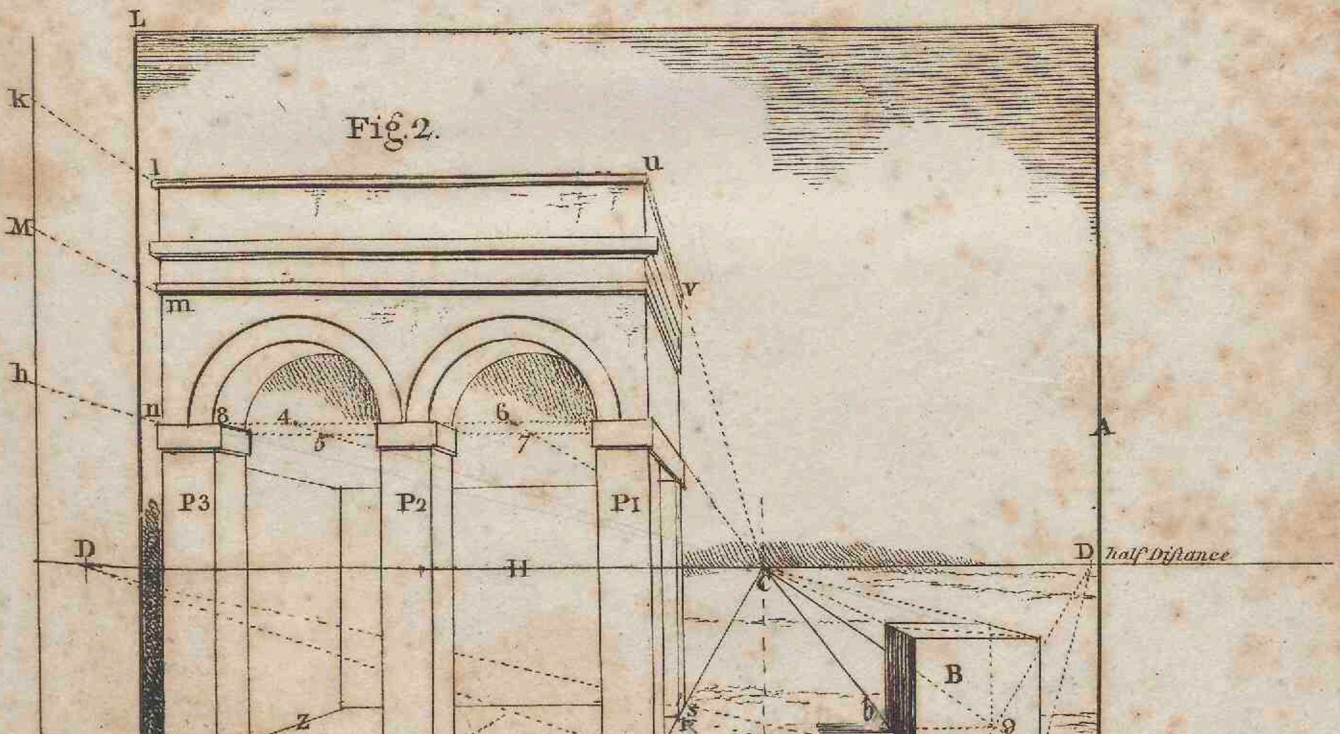


Fig.2.
half Distance

The interfection of two or more planes is a right line, and that line may be fuppofed in either of thofe planes. PLATE I.

If two planes crofs or cut each other, fo that they have equal fpaces between them, they are then at right angles, or perpendicular to each other.

Example of Planes.

Fig. 2. The faces, or fides of the block B, are planes; as alfo the faces or fides X 1, X 2, of the building R 2; and thofe planes are at right angles, or perpendicular to each other. PLATE III.

PROBLEMS.

Fig. 1. To bifect a right line. See Euclid, Problem 10, Book 1. PLATE I.

Upon either of the points A or B, in the right line A B, fix the compaffes, and with any diftention, draw an arc, as the arc 1 D 2; then with the compaffes on the oppofite point, as on B, draw another arc, as the arc 1 C 2; through the interfections 1, 2, of the two arcs, draw the right line 1 E 2, and the line A B will be equally divided or bifected in E.

Fig. 2. To erect a perpendicular from a given point in a given right line. Euc. P. 11, B. 1.

Let A B be the right line given, and C the point at which the perpendicular is to be erected.

With one foot of the compaffes on C, fet off two points at equal diftances from C, as D and E, upon the line A B.

Then with the compaffes diftended, on the points D and E, draw the arcs F and G, and from their interfection draw a right line to C, which will be perpendicular to the right line A B.

Fig. 3.

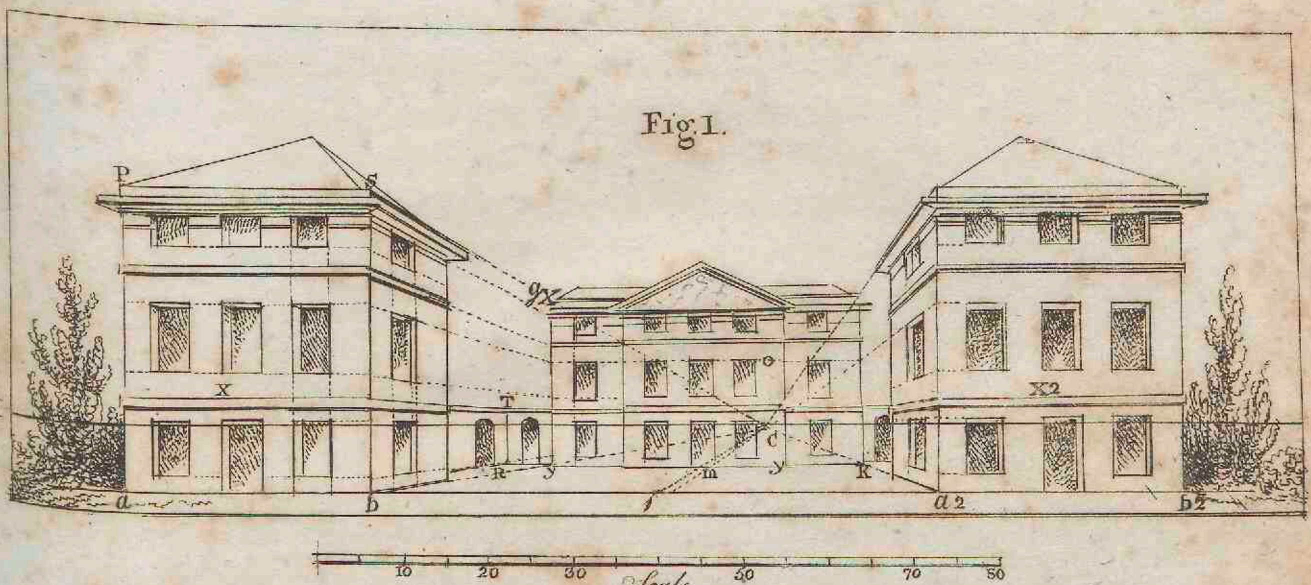
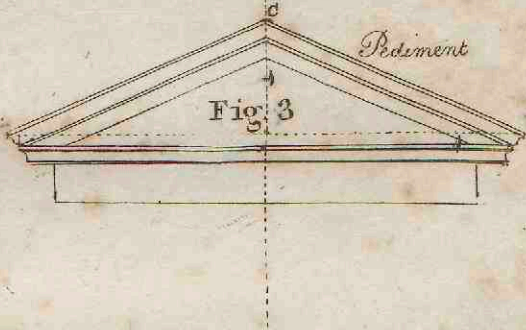


Fig. 1.
Scale
10
20
30
50
70
80


Pediment
Fig. 3

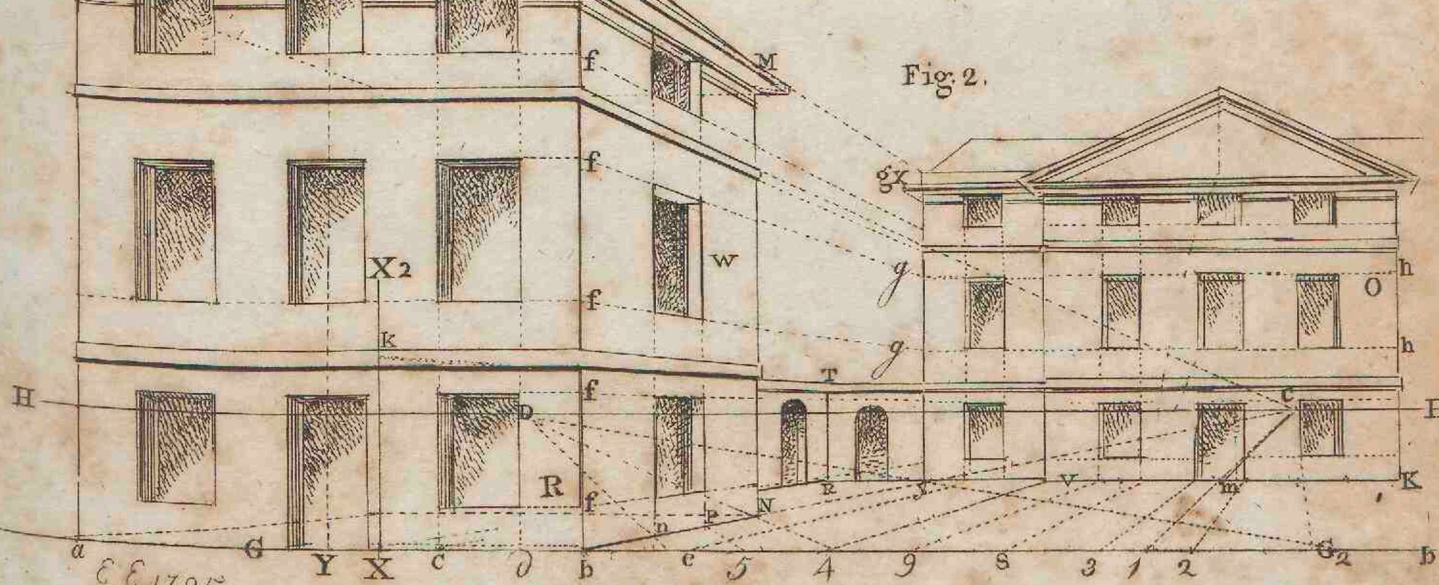


Fig. 2.
E E 1795

PLATE I. Fig. 3. To let fall a perpendicular from a given point upon a given right line. Euc. P. 12, B. 1.

The given right line is B C, and A is the point from which it is required to draw a right line perpendicular to B C.

With the compaſſes ſufficiently diſtended, and placed upon the point A, draw the arc B C, cutting the given line in the points B and C.

Then with the compaſſes on the points B and C, deſcribe the arcs A D H and A E H, interſecting each other in the points A and H.

Through the points A H draw a right line, and it will be the perpendicular required.

Fig. 4. At the extremity of a given right line, to draw a line which ſhall be perpendicular to the given line.

Let A B be the given right line, to which it is required to draw a line perpendicular at the extremity B.

Take any point, as C, out of the line A B, and with the radius C B, deſcribe the arc A B D.

From the point A draw a right line through the center C, that may interſect the arc, as at D.

From the point D, draw a line to the point B, which will be the perpendicular required.

Fig. 6. To deſcribe an equilateral triangle upon a given right line. Euclid, P. 1ſt, B. 1ſt.

Let the line B D, be the given line.

Upon the point B fix the compaſſes, and with a radius equal to B D, draw the arc D C.

Then with the compaſſes upon the point D, with the ſame radius, draw the arc B C.

From

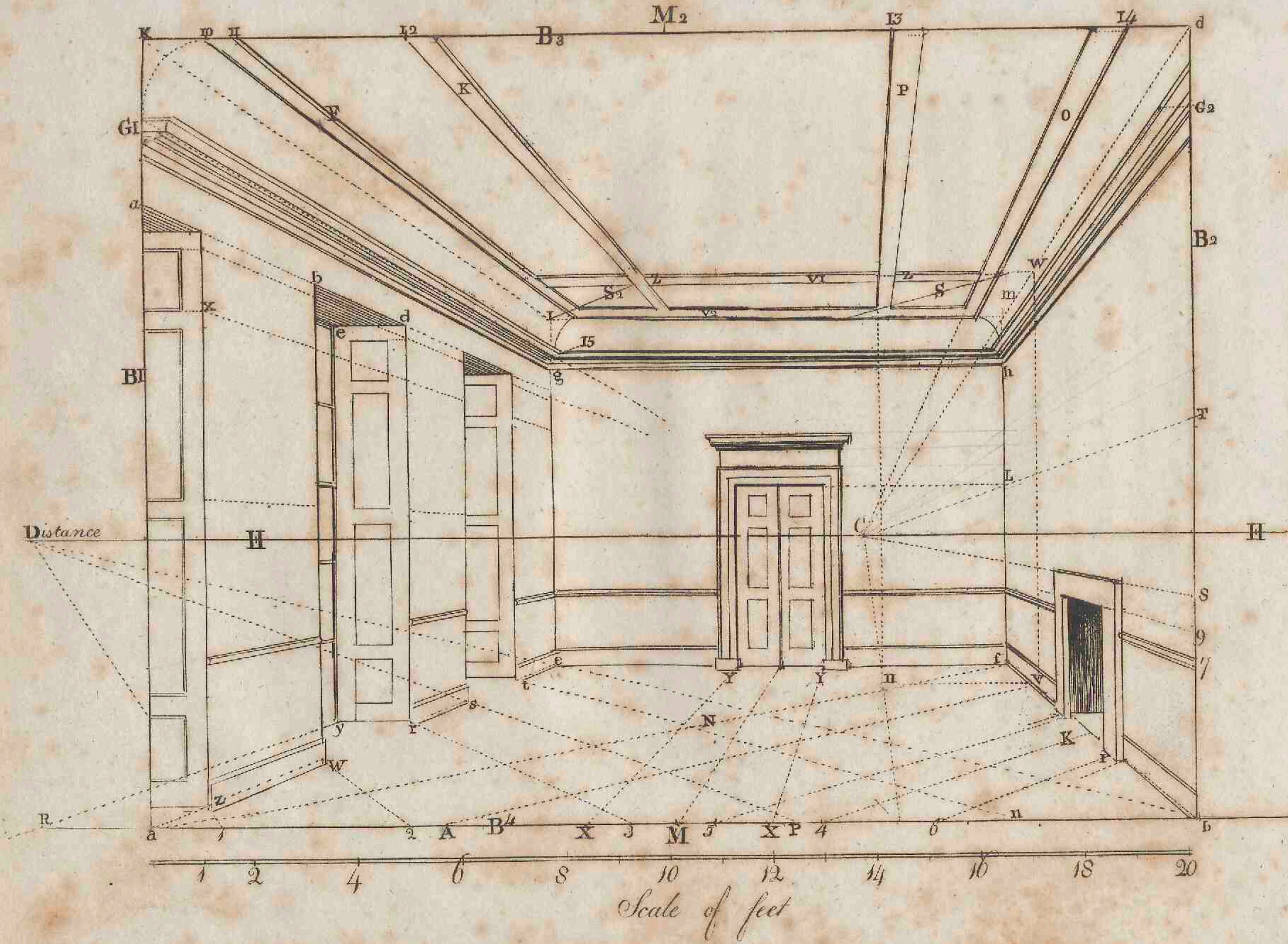


PLATE VI

From the interfection C, draw the lines C B and C D, and the triangle will be completed. PLATE I.

Fig. 7. To conftruct a triangle, the fides of which fhall be equal to three given right lines. Eu. P. 22, B. 1.

Let the given lines be A 1, B 2, C 3, Fig. 7, N° 2, and let the line A 1, be the required bafe of the triangle.

Draw the right line A, N° 1, equal to the right line A 1, N° 2.

Take the length of the line B 2 in the compaffes, and fix one foot of them on that extremity of the line upon which the fide equal to B 2 is to be placed, as on the point a, and defcribe the arc D.

Then take the length of the line C 3 in the compaffes, and with one foot upon b, the other extremity of the line A, N° 1, defcribe the arc E.

Then from the interfection of thofe arcs, draw the lines B and C, and the triangle will be completed.

Fig. 8. To bifect an angle.

Let B A C be the given angle.

With the compaffes fixed on the point A, defcribe the arc B C, then on the points B and C, defcribe the arcs D d and E e of equal radii interfecting each other.

Through that interfection draw a right line to the vertex A, and the angle B A C will be equally divided or bifected.

Fig. 10. * To defcribe an arc or circle which will touch or pafs through three given points.

Let the given points be A, B, C, through which it is required to draw an arc or circle.

* This problem is in effect the fame with the 25th of the 3d Book of Euclid, which teaches to complete a circle from a given fegment.

Upon

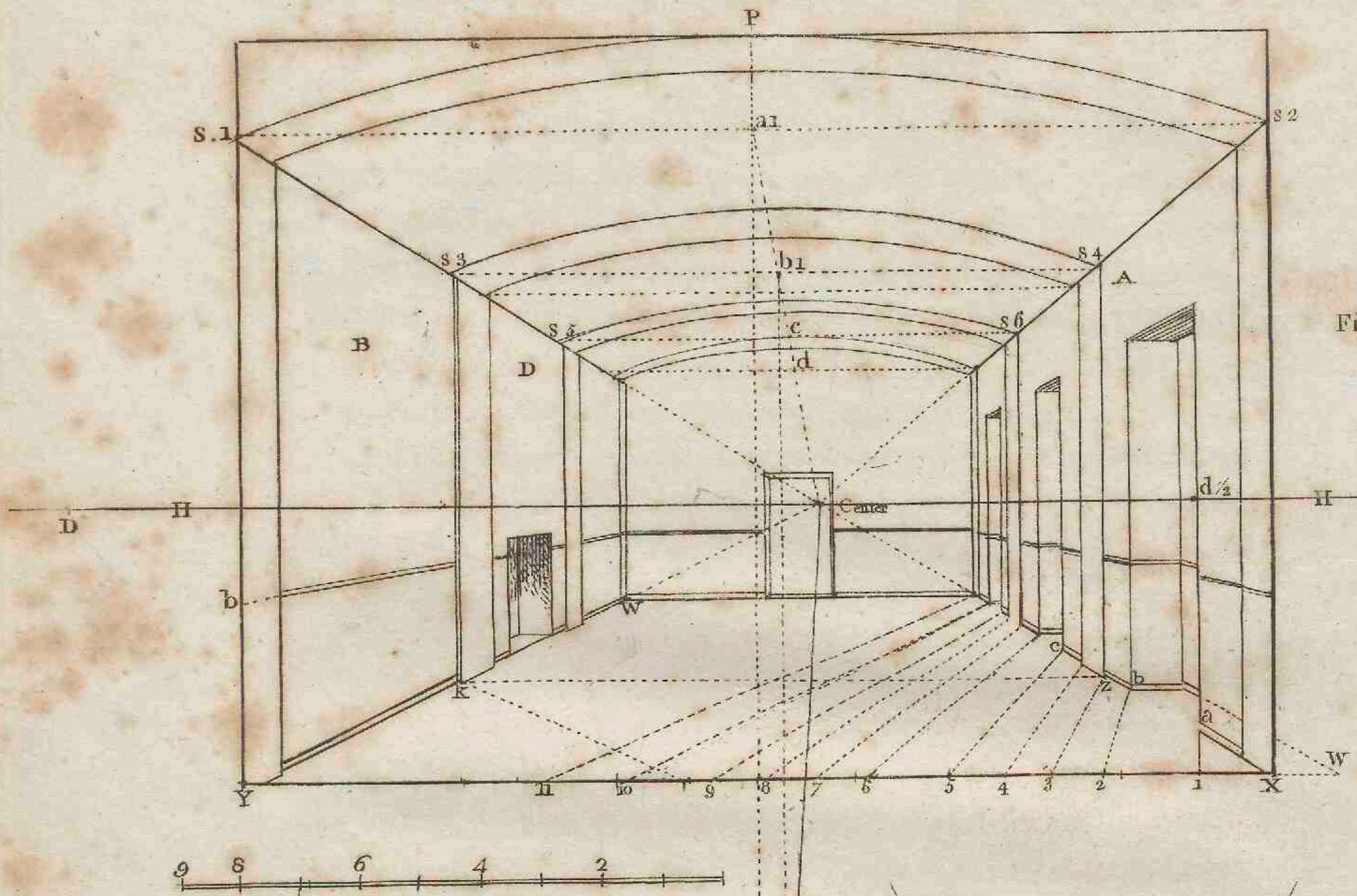


Fig. 1
P
S.1
S 2
a 1
S 3
S 4
b 1
A
S 5
S 6
c
d
B
D
H
Center
d ½
H
b
W
K
c
z
b
a
W
Y
11
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9
8
7
6
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2
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X
9
8
6
4
2

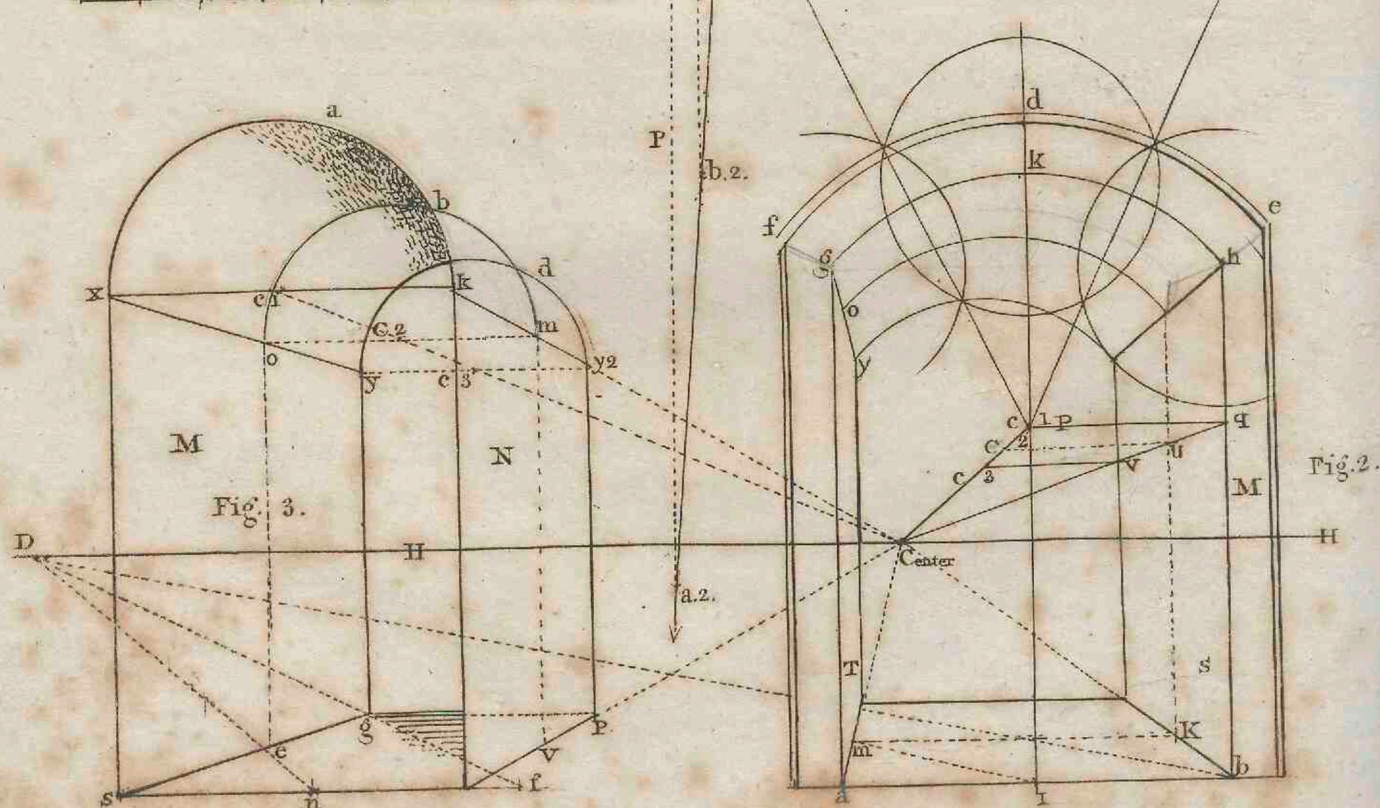


Fig. 3.
Fig. 2.
P
b.2.
a.2.
a
b
d
x
c 1
k
c.2
m
o
y
c 3
y 2
M
N
D
H
g
P
e
V
S
n
f
d
k
f
e
g
h
o
y
c 1 p
q
c 2
u
c 3
V
M
H
Center
S
T
K
m
a
I
b

PLATE I. Upon each of the points as a center, defcribe circles of equal magnitude and fufficient radii to interfect each other, as the circles a a, b b, c c.

Then through the interfections 1 1, 2 2 of thofe circles, draw the right lines D E and D F, which will interfect each other in the point D.

Then will D be the center of a circle or arc that will touch or pafs through the given points A B C.—Therefore with the compaffes upon the point D extend them to either of the points A, B, or C, and defcribe the circle required.

As no one muft hope to become mafter of the practice of perfpective who does not underftand the conftruction of angles, it will be proper to explain the procefs.

Every circle is, by univerfal confent, divided into 360 equal parts, called degrees *, each of which is again divided into 60 equal parts called minutes, and thofe again into 60 equal parts called feconds, by which degrees, minutes, and feconds, every angle is meafured. When two right lines crofs each other, they conftitute an angle, to meafure which a circle muft be drawn from the point where the lines interfect each other, as from a center cutting the right lines, and the portion of the circle which lies between thofe right lines, determines the meafure of the angle which the lines make with each other.

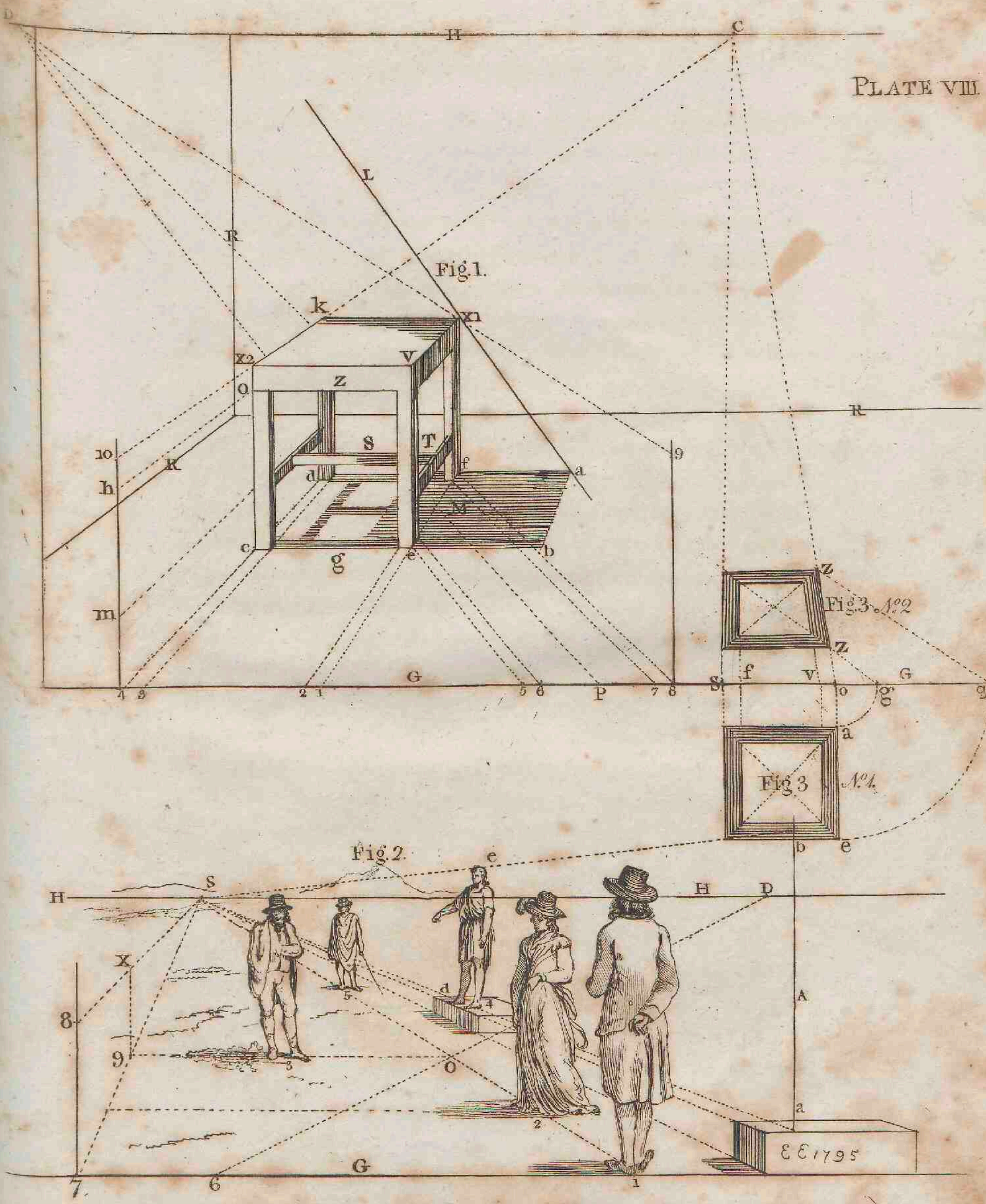
Example.

Fig. 9. The two lines A C and A B cut each other and form an angle; the meafure of which is that portion of the circle marked B C lying between the lines A C and A B.

* The meafures of angles are expreffed by the following characters:
Degrees are marked by the letter °.
Minutes by a fingle ftroke ′.
Seconds by double ftrokes ″.
Thus the following characters 36° 10′ 6″ muft be read thirty-fix degrees 10 minutes and fix feconds.

The

PLATE VIII.



The ſame proceſs determines the inclination of planes. PLATE I.

It is neceſſary to obſerve, that the ſtudent muſt not conceive a difference from the ſize of circles, for whether they are great or ſmall, the proportionate ſection continues the ſame.

When lines are to be drawn inclined to each other in a given angle, the following methods are the readieſt and moſt uſeful.

In every caſe of inſtruments, neceſſary for thoſe who ſtudy Perſpective, there is an ivory or box ruler, upon which is marked a ſcale, which is formed of double right lines parallel to each other, and diſtinguiſhed by the letters C H O, or C, for chords; it is alſo figured with a number of degrees to the amount of 90.

The uſe of this ſcale is as follows:

Suppoſe it be required to draw an angle of 35 degrees. Fig. 9, Plate I.

Fix one foot of the compaſſes on the extremity of thoſe lines upon the ſcale, which are diſtinguiſhed by the letters C H O, or C, and extend the other to the point marked 60, which is the radius of the circle.

Then having drawn one line for the baſe of the angle, as the line A B, fix the compaſſes on the point A, and draw the arc B C.

Then apply the compaſſes again to the ſame ſcale, one foot on the point C, as before, and extend the other to the figures 36, the number of degrees required.

The compaſſes thus extended, apply one foot to the point B, in the line A B, and mark off the meaſure at the point C in the arc B C.

Then from the point A draw a right line through C, as the line A C, and the required angle will be completed, A C being inclined to A B, or A B being inclined to A C, in an angle of 36 degrees.

As it ſometimes happens that there are more than one line of chords upon the ruler, it is neceſſary to take particular care that the meaſures are all taken from one line.

 There

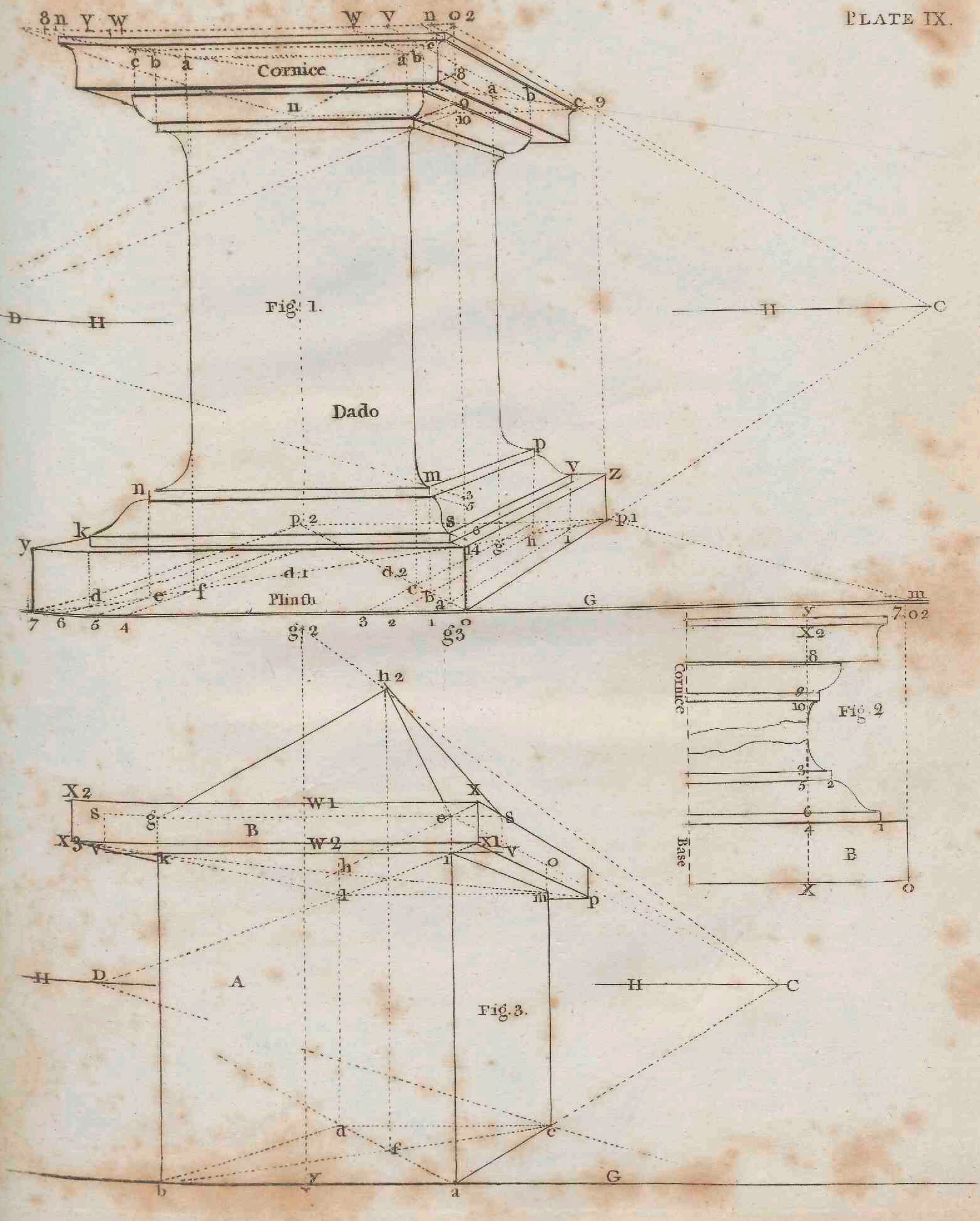

Cornice
Fig. 1.
Dado
Plinth
Fig. 2
Cornice
Base
Fig. 3.

PLATE I.

There is alſo another inſtrument called a protractor, which is ſometimes made of ivory, ſometimes of braſs: if of the former, it is a parallelogram; if of the latter, a ſemicircle. In the ſemicircular inſtrument, the baſe or ſtraight line has a point in the center, and the circular part is marked with a number of degrees upon the edge. It is the ſame with the parallelogram, one ſide being the baſe, and the other three ſides being marked with the degrees. The uſe of the forementioned inſtruments may be deſcribed as follows:

Let it be ſuppoſed that a right line is already drawn, as the line A B, Fig. 9, and it is required to draw another right line at the point A, that ſhall make a given angle with the line A B, ſuppoſe of 65 degrees.

Apply the baſe or lower edge of the inſtrument to the given line A B, ſo that the point or center, may coincide exactly with the point A in the given line, at which the angle is to be conſtructed; then at the point which is numbered 65 on the edge of the inſtrument, mark a point as C; then from the point A draw a line through C, and the required angle will be completed.

To one who is unacquainted with the principles and practice of Geometry, the following remarks will not be uſeleſs:

First. When geometrical writers refer to triangles which are marked with three initial letters, the middle letter always denotes the particular angle of the triangle to which the reference is made. Thus in referring to the triangle Fig. 12 Plate I, if it be ſaid that the angle b a c is the given angle, the point or apex a of the triangle is meant; but if the letters were arranged a c b, then the point or apex c is the angle indicated.

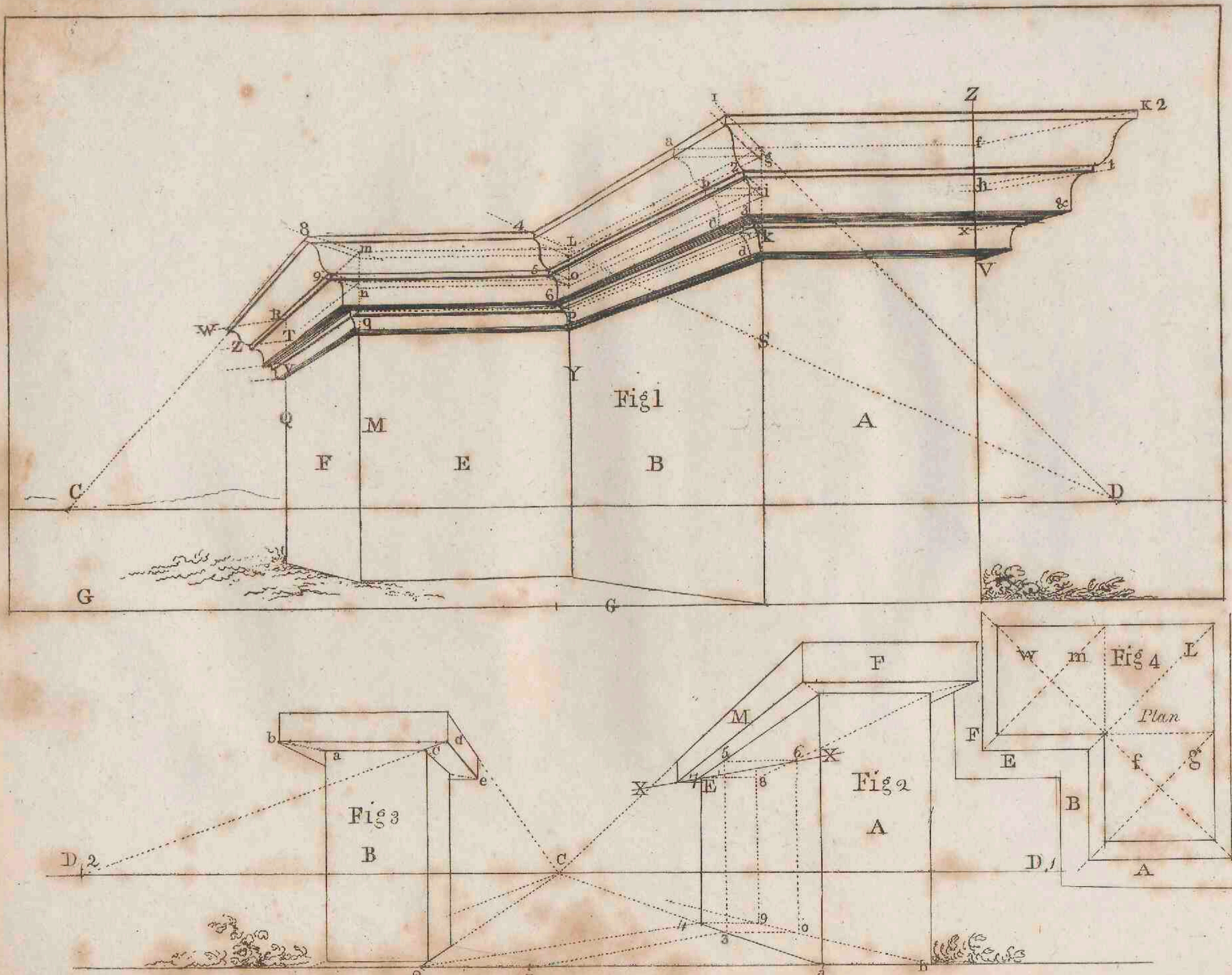


PLATE X

If any other letters are employed, the ſame rule muſt be obſerved in the application. PLATE I.

Second. When a line is ſaid to be perpendicular, it muſt be underſtood to be ſo diſpoſed in relation to ſome other line, without regard to the poſition of the plane upon which it is drawn, or its ſeeming ſituation to the natural horizon; for a line may be perpendicular to another line, yet neither of them be vertical, or as vulgarly called upright.

Thus in Fig. 11, Plate I, the line A a is perpendicular to the line B b, or the line B b is perpendicular to the line A a; yet neither of thoſe lines repreſent vertical lines, or lines perpendicular to the horizon, becauſe they are diſpoſed obliquely to the ſides of the plate upon which they are drawn.

The preceding remarks are offered as a caution to thoſe who wiſh to ſtudy the writings of Brook Taylor, Hamilton, and other authors, who often mention perpendiculars, which, by their ſituation on the print, appear to the unſcientific eye as inclined; thereby confounding thoſe who are unacquainted with this neceſſary diſtinction.

Planes have already been defined; but leſt they ſhould not be perfectly underſtood, ſome further attempts ſhall be made towards their illuſtration.

Suppoſe any ſquare room with a floor and flat ceiling, with four flat ſides; all theſe together conſtitute ſix planes, perpendicular or parallel to each other.

Where any one of the ſides meets the floor, that meeting is the interſection of thoſe two planes; and the line produced by ſuch interſection, may be conſidered as in either of thoſe planes, in the floor, or in the ſide.

 If

Fig. 1.

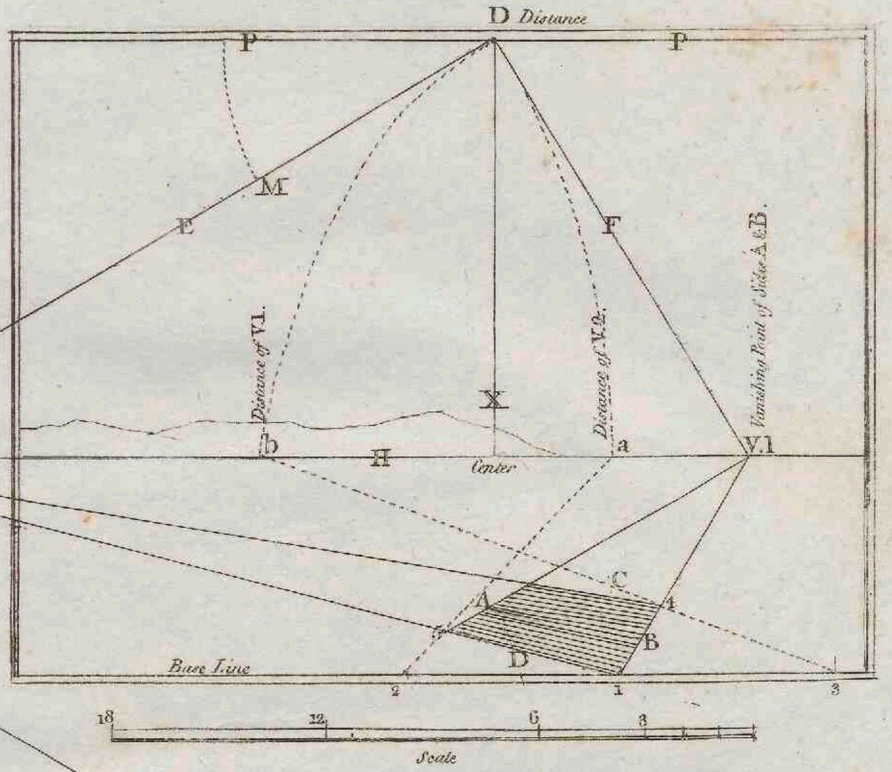


Fig. 3.

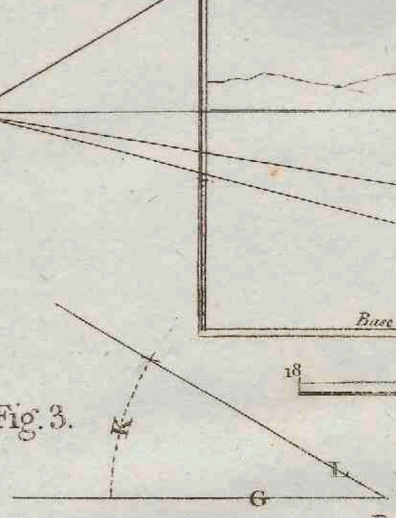


Fig. 2.

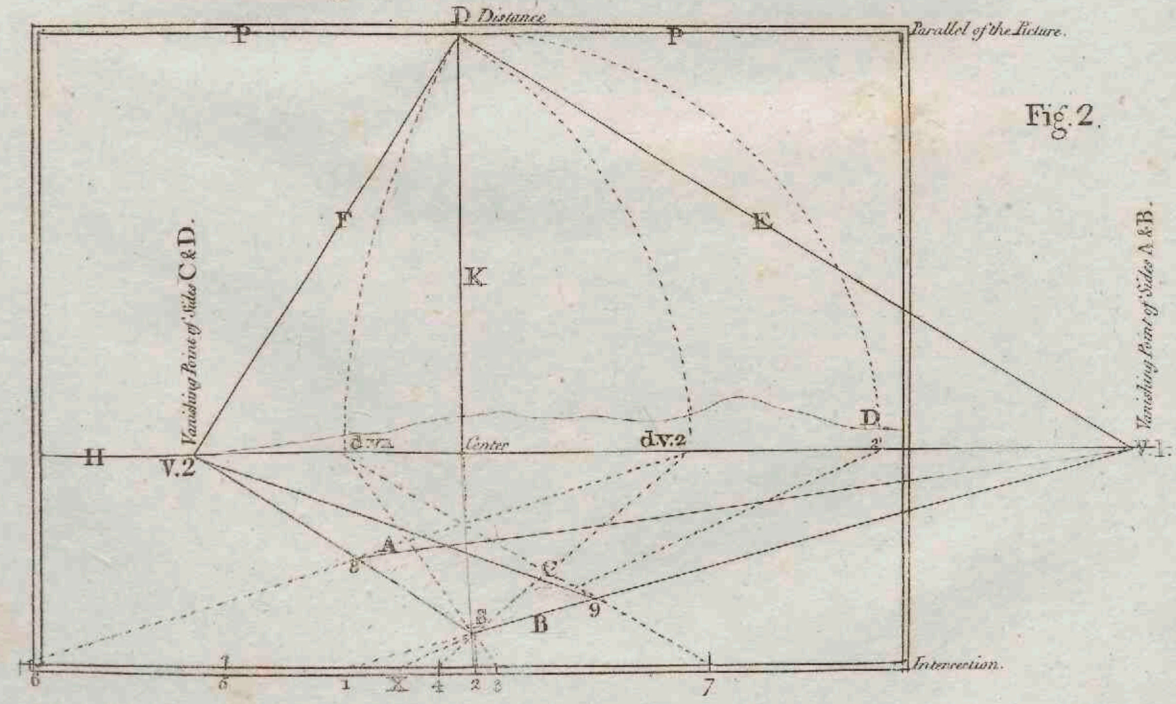


PLATE I.

If a right line be drawn upon the floor, exactly even to one of the ſides, that line will be parallel to two of the ſides, but it will be perpendicular to the other two ſides; it will alſo be parallel to the ceiling, becauſe it is in the plane of the floor which is parallel to the ceiling.

If upon any ſide of the room a right line be drawn either perpendicular or inclined to the floor, and another right line be drawn on the floor from the point where the firſt line touches the floor; both theſe lines may be conſidered as being in one plane, which paſſes through the wall and the floor,— but this may be conſidered as an imaginary plane.

The author has been the more particular on this ſubject, becauſe it is neceſſary that thoſe who wiſh to practiſe Perſpective ſhould perfectly underſtand the nature of planes, as they relate to the forms of objects; and thoſe who deſire to ſtudy the theory of the ſcience muſt not only conſider the real, but alſo the imaginary planes;—therefore the foregoing remarks are given, which will be found uſeful, eſpecially to thoſe who have not before conſidered the ſubject.

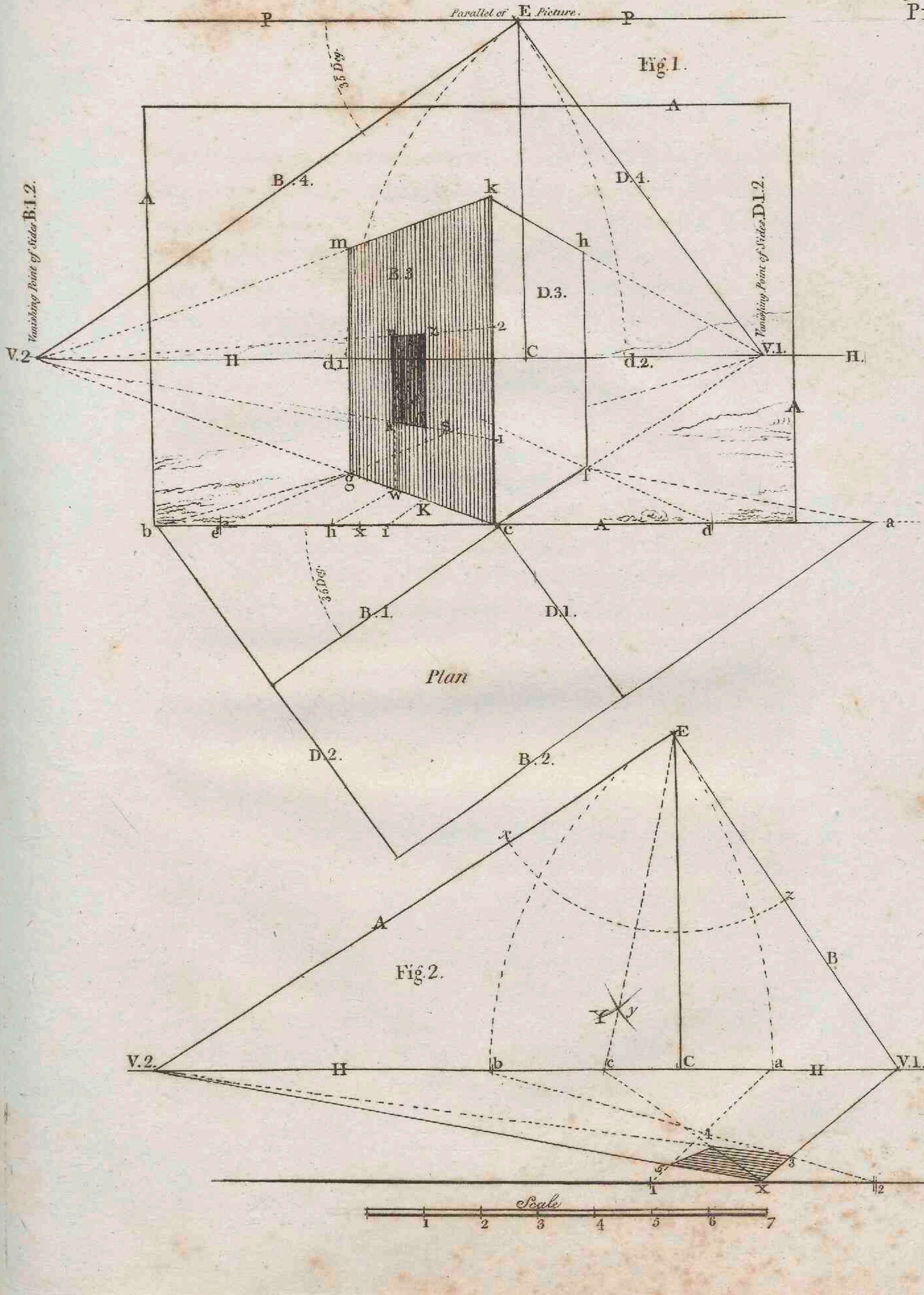
This geometrical ſection ſhall be cloſed with the beſt method of conſtructing an oval or ellipſis to any given ſize by the compaſſes; an operation which is but little known, but which is certainly very uſeful.

It is required to form an oval whoſe tranſverſe diameter is equal to the line A 1, A 2, and whoſe conjugate is equal to the line B 1, B 2, Fig. 5, Plate I. *

Draw two lines at right angles or perpendicular to each other, as the lines A 1, A 2, and B 1, B 2, and their interſection C is the center.

* By the tranſverſe is meant the longeſt diameter, and by the conjugate the ſhorteſt diameter; as the line A 1, A 2, is the tranſverſe, and the line B 1, B 2, the conjugate diameter, Plate I. Fig. 5.

From


Parallel of E Picture
P
P
Fig. 1.
35 Deg.
A
B.4.
D.4.
Vanishing Point of Sides B.1.2.
Vanishing Point of Sides D.1.2.
k
m
h
B.3
D.3.
V.2
H
d.1.
C
d.2.
V.1.
H.
S
g
w
K
b
e
h
x
I
c
d
a
35 Deg.
B.1.
D.1.
Plan
D.2.
B.2.
E
A
B
Fig. 2.
Y
y
V.2.
H
b
c
C
a
H
V.1.
1
2
3
4
Scale
1
2
3
4
5
6
7

From C the center, ſet off half the given or required meaſures of the tranverſe and conjugate diameters, as C A 1, C A 2, and C B 1, C B 2. PLATE I.

Take the ſpace from the center C to B 1, or from C to B 2, which is half the breadth of the oval, and ſet it on upon the tranſverſe diameter, from A 1 to F, then divide the ſpace between C and F into three equal parts, and ſet one of theſe parts from 3 to 4.

Take the ſpace from C to 4, and ſet it on upon the line C A 2 to 5, making C 5 equal to C 4.

Then conſtruct an equilateral triangle upon the ſpace between 4 and 5 for its baſe, as the triangle 4 D 5; conſtruct a ſimilar triangle on the contrary ſide, as the triangle 4 E 5.

Draw right lines through the points D, 5, and alſo through the points D, 4. Repeat the ſame through the points E, 4, and alſo E, 5.

Then will the points 4 and 5 be the centers for what may be called the ends of the oval, and D and E the centers for what may be conſidered as the ſides of the oval; therefore upon thoſe points with the compaſſes deſcribe the oval required, obſerving that the lines D 5, D 4, and E 4, and E 5, determine the different ſegments required.

It muſt be obſerved, that the above proceſs does not produce a true oval, but forms an excellent ſubſtitute, eſpecially as no means have yet been diſcovered by which a perfect ellipſis can be produced, except by the tramel, or by the pins and ſtring, both of which are inconvenient on canvas or paper; while the foregoing method is ſufficiently correct for any general purpoſe, and therefore will be found very uſeful to every artiſt.

The

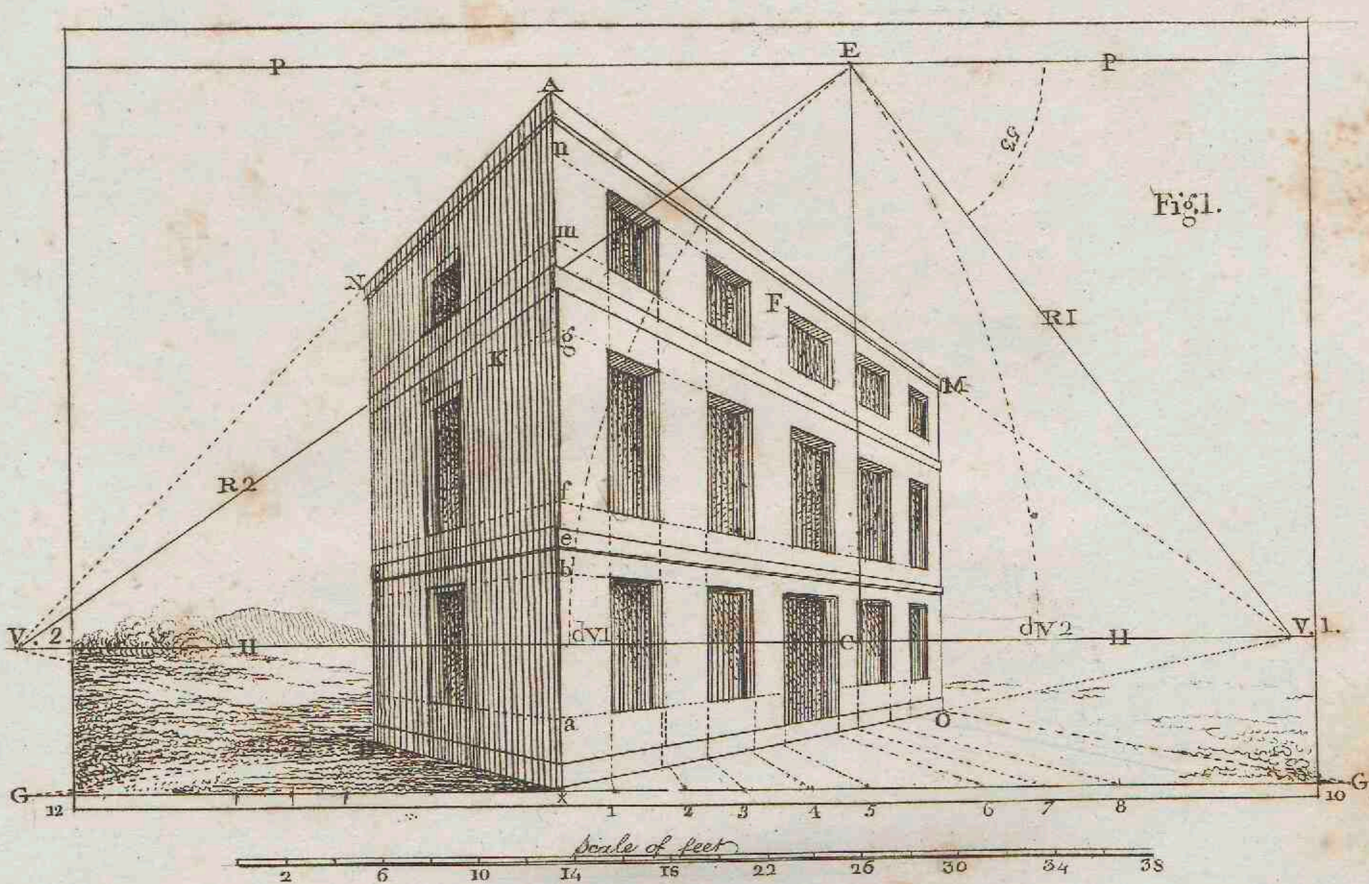


Fig1.
E
P
P
A
n
m
N
F
K
g
M
RI
R2
f
e
b
V. 2.
H
dV1
C
dV2
H
V. 1.
a
O
G
G
12
1
2
3
4
5
6
7
8
10
Scale of feet
2
6
10
14
18
22
26
30
34
38

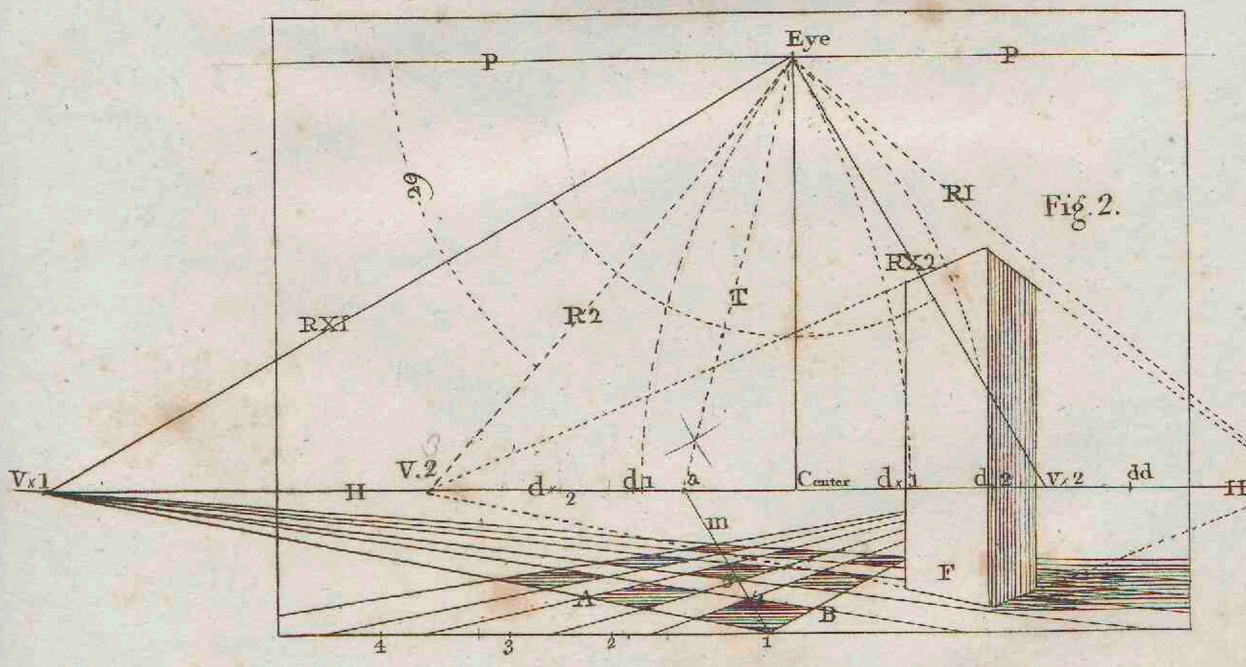


Fig. 2.
Eye
P
P
29
RI
RX2
RX1
R2
T
Vx1
V.2
H
d
d1
a
Center
dx1
d2
Vx2
dd
H
V1
m
F
A
B
4
3
2
1

Fig 3

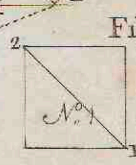

2
No. 1
1

PLATE I.

The geometrical problems given in this fection are fo effential to the artift, that every ftudent in painting, fculpture, and architecture, ought to imprefs them on his memory, fo as to execute them with facility upon every occafion, in which they may be required.

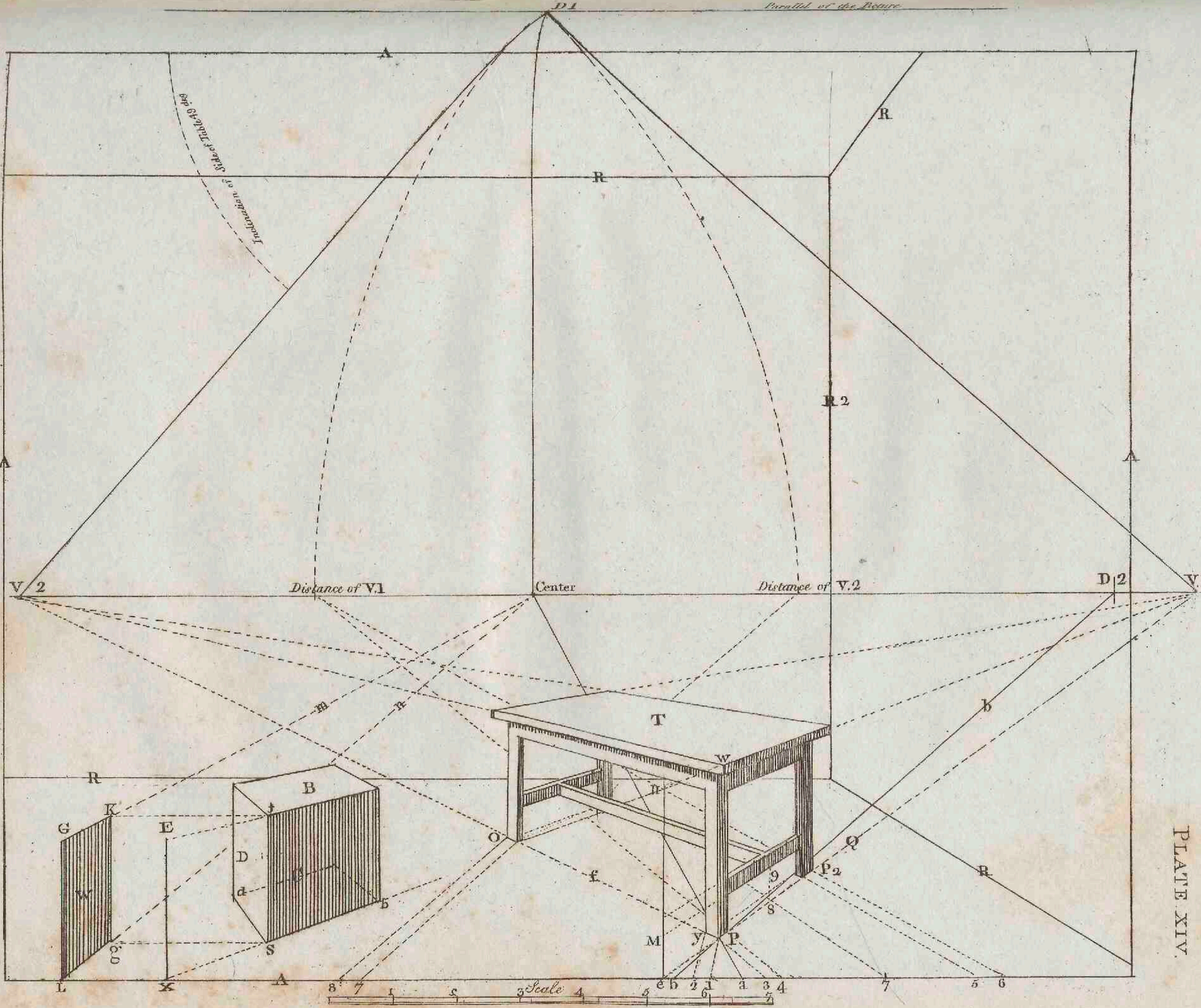

D1
Parallel of the Picture
Indication of Side of Table 49 deg
Distance of V.1
Center
Distance of V.2
V 2
V.1
D 2
R 2
Scale

PLATE XIV.

PERSPECTIVE.

The First or Introductory Section, containing Terms, Definitions, and Rudiments of Practice.

DR. BROOK TAYLOR commences his treatise on perspective in the following words: SECT. I.

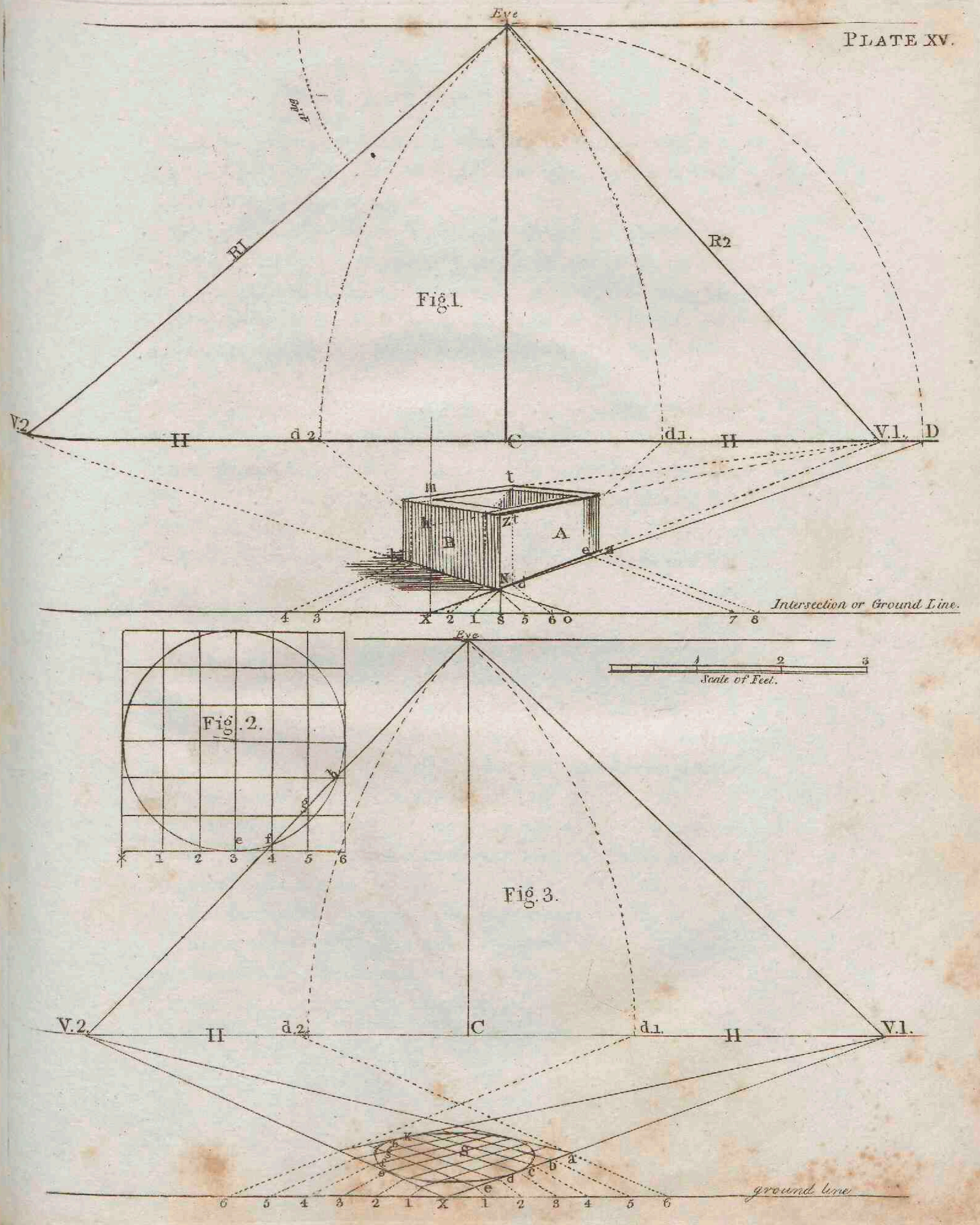
"Perspective is the art of drawing on a plane, the appearances* of "any figures, by the rules of geometry.

"In order to understand the principles of this art, we must con-"sider that a picture painted in its utmost perfection ought so to "affect the eye of the beholder, that he should not be able to judge "whether what he sees be only a few colours laid artificially, or "the very objects there represented."

This may be considered as a general definition of perspective, and probably as clear as words will admit. Yet to those who have not considered the subject, some farther explanation and illustration may be necessary.

* For the word *appearances* the doctor has suffered from the rod of the critics, who insist, that he should have employed the word *representations*; but the distinction is perhaps too trivial to deserve censure; yet it is certain that the words have very different meanings, the former implying the effect or image any object produces on the eye, but the latter, the description of that effect or image drawn upon some plain tablet, or other surface: but since the appearances are to be described, it may be considered as a metonymy, by which the effect is substituted for the cause.

The


Eye
Fig. 1.
R1
R2
V.2
H
d 2
C
d 1.
H
V.1.
D
t
B
A
Intersection or Ground Line.
X 2 1 S 5 6 0
4 3
7 8
Fig. 2.
e f
1 2 3 4 5 6
Scale of Feet.
1 2 3
Fig. 3.
V.2.
II
d.2.
C
d.1.
H
V.1.
S
a b c d e
ground line
6 5 4 3 2 1 X 1 2 3 4 5 6

SECT. I.

The ſpectator who views an object receives the impreſſion of its form upon the retina of the eye, by means of rays of light reflected from the object and coming from all points of it, in right lines to the center of the eye, forming what is called the cone of viſual rays.

If this cone of viſual rays be interſected by a tranſparent or opaque plane, that interſection, provided it can be delineated, will be the perſpective repreſentation of the appearance of the object viewed by the ſpectator.

This will be better underſtood, if it be ſuppoſed that any perſon ſtands looking through the glaſs of a window at ſome diſtant object or building; let him fix himſelf at a particular ſpot, and with his eye perfectly ſteady, trace out upon the glaſs the form of the object or building as it appears to him, and he will find then the
that
figure ſo produced will be a true perſpective repreſentation of that object or building, which, if ſkilfully ſhadowed and coloured, would not be diſtinguiſhed from the original object viewed at the ſame point or ſtation.

This experiment furniſhes the great outline of the theory of Perſpective, and the practice is founded upon it; for if the meaſures of the original object, which was viewed through the glaſs, can be obtained, together with the diſtance between the ſpectator and the window, thoſe meaſures being applied by a proportionate ſcale to certain lines drawn agreeably to the rules of the ſcience, upon a plane or flat tablet, a repreſentation will be produced ſimilar to the tracing upon the glaſs. And ſuch repreſentation will be ſo perfect, that all the lines will exactly coincide with the original object, provided it be placed at the proportionate height and diſtance; it will alſo correſpond with the tracing upon the glaſs.

From the conſideration of the practical part of the foregoing experiment, it will be evident to every ſtudent in the ſcience, that the perſpective

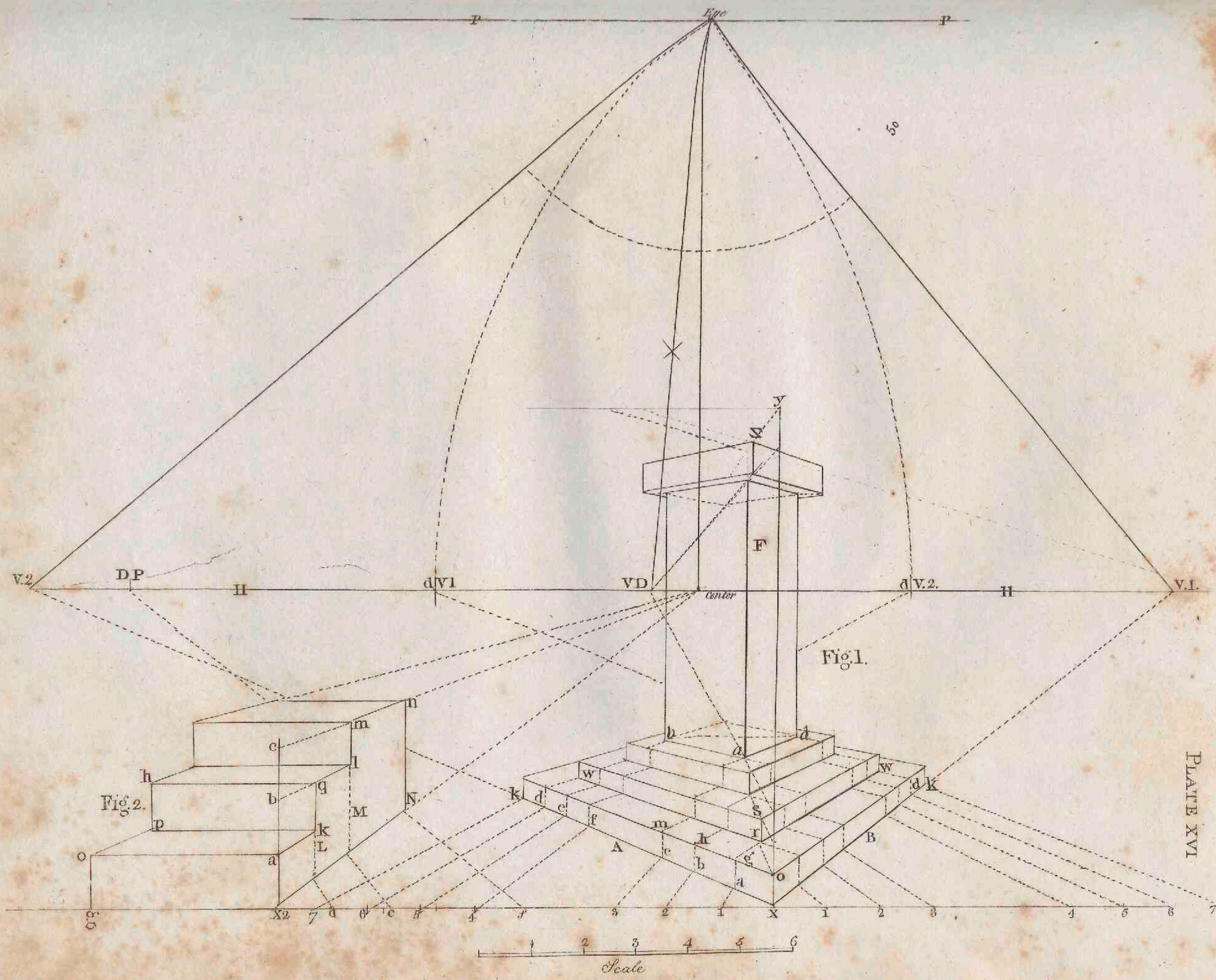


PLATE XVI

perſpective repreſentation of objects can never be truly delineated without the knowledge of their forms, their proportions, or the meaſurements of their parts. He muſt alſo conſider how the objects are diſpoſed to his view, whether their ſides or faces be parallel or inclined to the picture, or whether they be inclined both to the horizon and picture; from all which circumſtances it muſt follow, that no perſon will ever make great progreſs in Perſpective, who is unacquainted with Geometry and Architecture; for Geometry may be conſidered as the foundation of the ſcience, while architectural deſigns furniſh the beſt and grandeſt ſubjects for the application of its principles, and the diſplay of its deceptive powers. SECT. I.

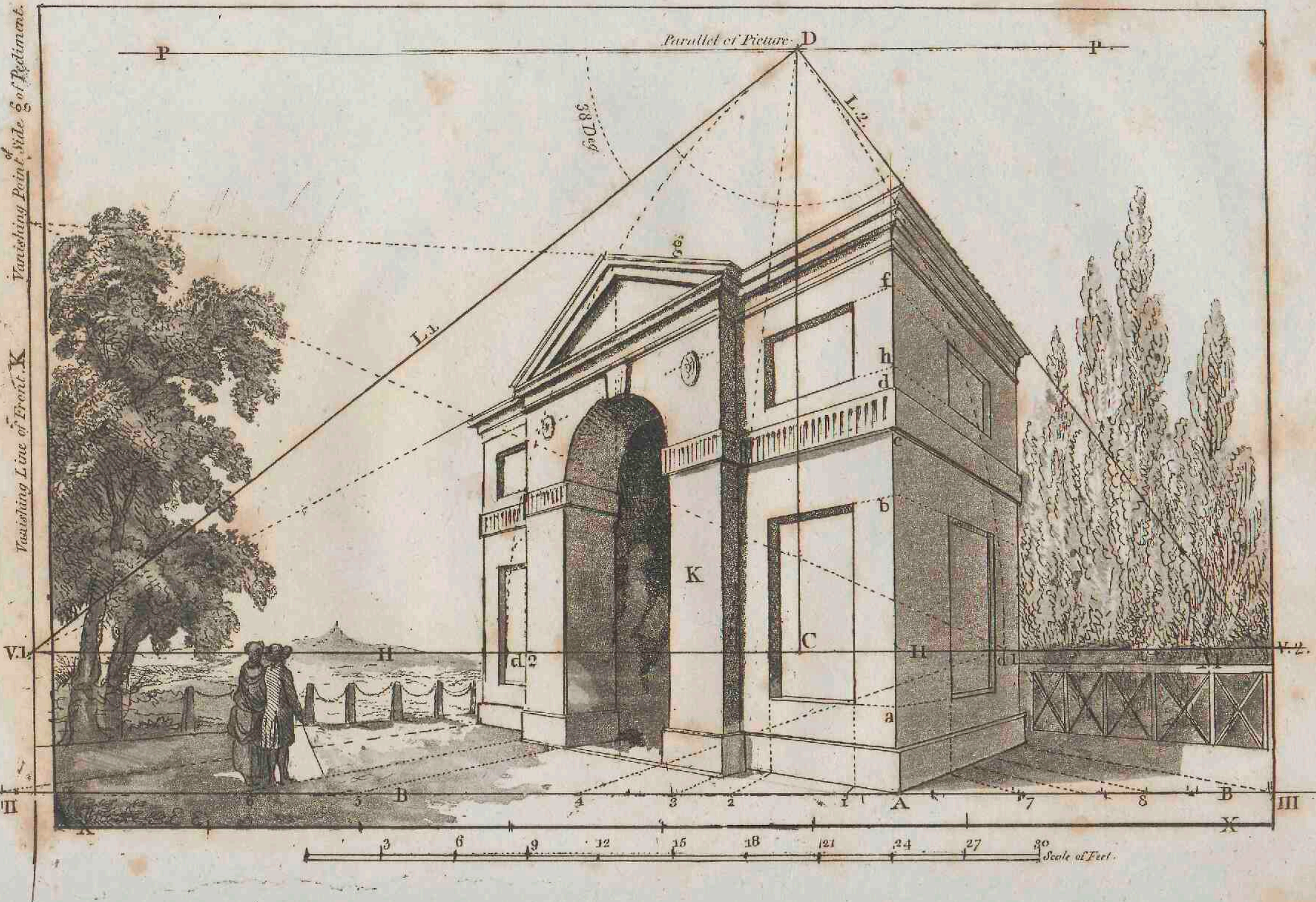
It may perhaps be objected, that the art of painting requires ſo much time and application, that the ſtudent can have but little leiſure for the ſtudy of geometry or other ſciences; but this objection can only be made by the weak and indolent, and can have no weight with him who forms a right judgment of the art; an art which is juſtly eſteemed not only for the elegance and ſublimity of its productions, but alſo for the extenſive knowledge which it requires the artiſt to poſſeſs, before he can excel in the ſuperior exertions of the pencil.

As it is the purpoſe of this introduction to prepare the reader for the following work, it will be proper here to beg his attention to the following circumſtances.

Firſt, The author has thought it neceſſary to diſtinguiſh the horizontal line, above any other vaniſhing line, contrary to the obſervation of Dr. Taylor, who, in his preface to the ſecond edition of his Principles, obſerves, that he makes "no difference between the plane "of the horizon and any other plane whatſoever;*" a circumſtance

* Vide ſimilar remarks in "The Elements of Linear Perſpective, by Edward Noble," printed for T. Davies, 1771, page 46.

PLATE XVII.



Parallel of Picture
D
P
P
38 Deg
L.1.
L.2.
Vanishing Point of Side of Pediment
Vanishing Line of Front. K
K
C
V.1.
V.2.
H
H
a
b
c
d
h
f
A
B
B
Scale of Feet

SECT. I. which very much obfcured his principles, particularly to thofe who, with no fkill in geometry, have endeavoured to improve their practice by his inftructions.

For, although the reafons he gives for his conduct are perfectly juft, namely, that "all planes, as planes, are alike in geometry;" yet the painter or defigner in Perfpective is obliged to have recourfe to this line, before he can poffibly determine any other vanifhing line in the picture. But of this more will be faid under its proper head.

Secondly, It is neceffary to obferve, that the line which in this work is called the parallel of the *picture*, is the fame with what is called by Hamilton and Malton the parallel of the *eye*, the author thought it convenient to change this term, becaufe there are many other lines in the procefs which may be confidered as parallels of the eye, while there is but one that can claim this particular diftinction.

Thirdly, All the examples and figures in the following work are drawn by the fhorteft procefs, without having their geometrical plans drawn at the bottom of the picture, or below the bafe line, at their full proportions, as was the practice with the old writers upon the fubject, and which has been abfurdly imitated by too many of the moderns, who have pretended to illuftrate the doctor's theory, the fuperiority of whofe principles renders that tedious procefs unneceffary; confequently they are better adapted to the painter's ufe; for as he muft ever find the lower edge of his canvas the extreme limits for operation, he can have no room below that boundary, to draw plans in their geometrical proportions and fituations.

In the preface, it has been obferved, that deep theory is not attempted in the following work; it is the practical part only upon which the following inftructions are employed: yet, as fome theoretical remarks muft of neceffity be made, they are chiefly difpofed in

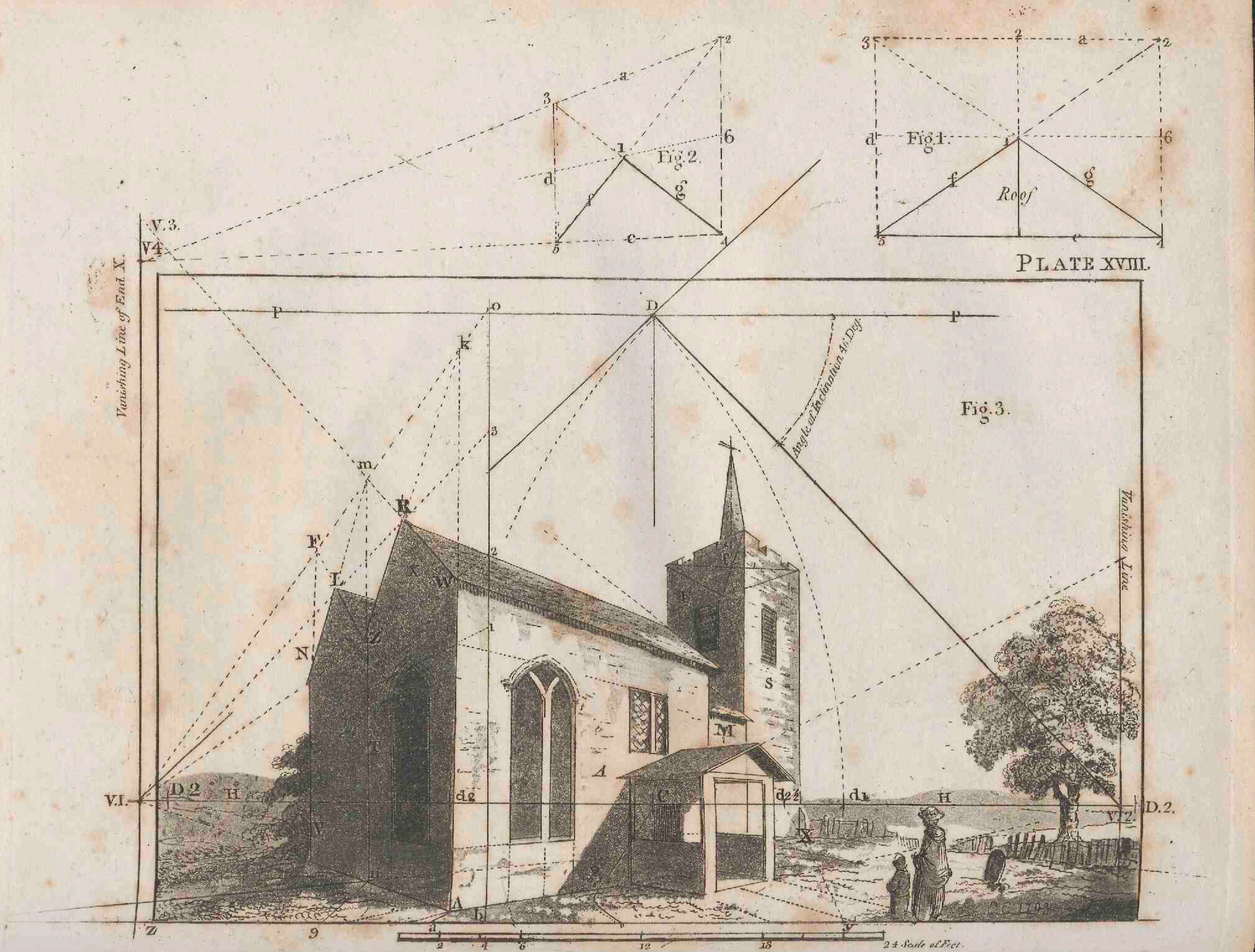


Fig. 1.
Roof
Fig. 2.
Fig. 3.
Vanishing Line of End X.
Vanishing Line
Angle of Inclination 45 Deg.
24 Scale of Feet

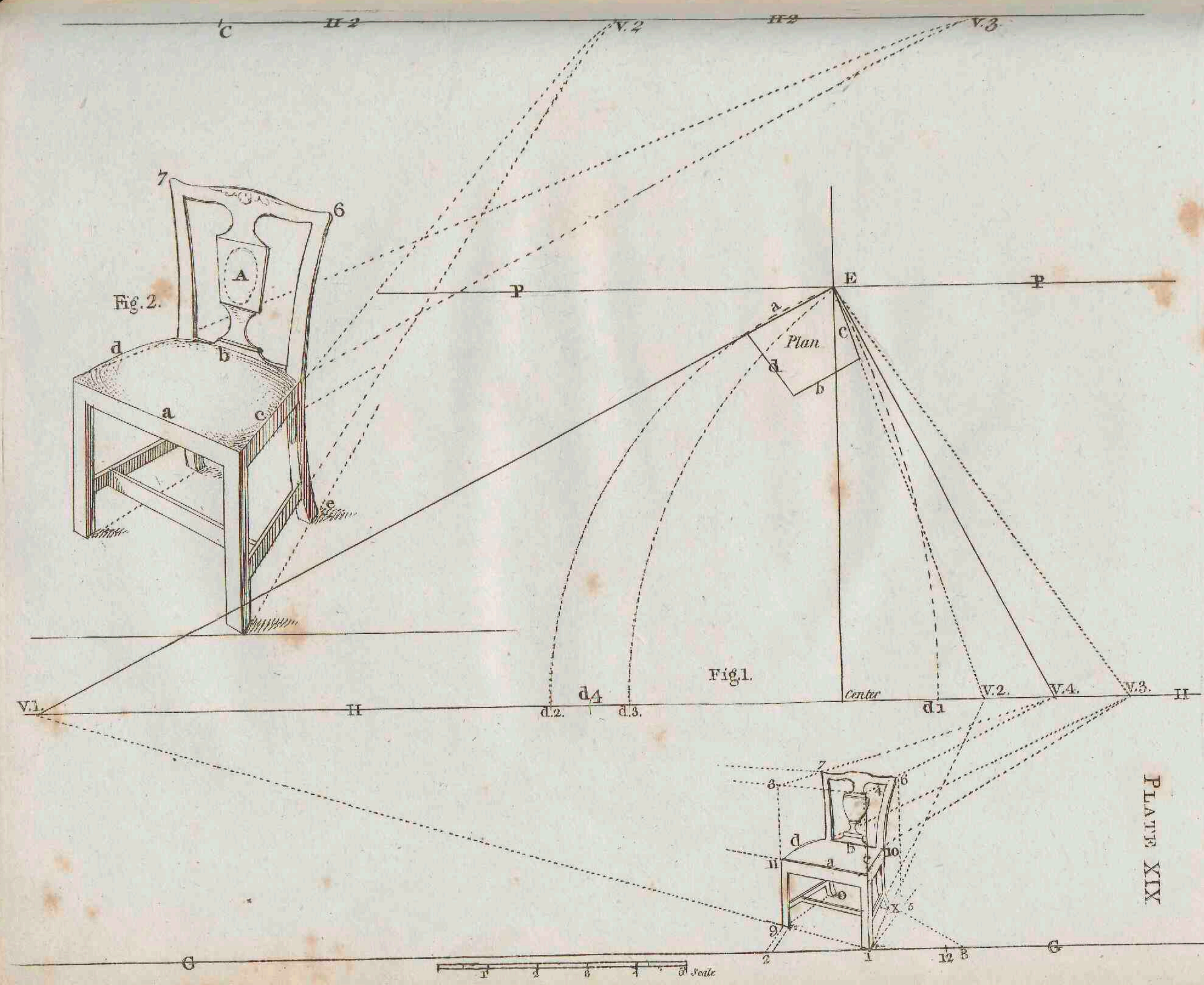
PLATE XVIII.

notes, and the ſtudent will do well to conſider them maturely, and by their aſſiſtance to form his obſervations and reflections upon the appearances of objects. Above all things, he muſt make himſelf maſter of the diſtinction between the center of the picture and the point of ſight; alſo of the *diſtance of the picture*, and the *diſtance of a vaniſhing point*; for if thoſe principles are not well underſtood, no great progreſs can ever be made in the ſcience. SECT. I.

Laſtly, The ſtudent is adviſed to copy the examples either by a larger or ſmaller ſcale, but never to the ſame ſize with the given Examples; or, he may ſelect different figures of his own choice; but above all things let him work conſtantly to a ſcale, keeping the height of the eye in due proportion to nature, and to the conſtruction of the object he means to delineate.

This introduction ſhall be concluded with obſerving, that the following Treatiſe is founded upon the theory of Dr. Brook Taylor, who firſt taught the real principles of Perſpective, or, in other words, was the firſt perſon who demonſtrated the true methods of finding the vaniſhing points, and vaniſhing lines. For the delineating of lines and planes perſpectively, in whatever poſitions the originals may be diſpoſed to the picture before him, the vaniſhing points for oblique lines were called accidental points, and they deſerved no better appellation, for they were produced by chance, without rule: hence it followed, that examples of objects, the ſides of which incline to the picture, were ſcarcely ever given by the old writers on Perſpective; and the few that may be found in their works are conſtructed by a proceſs ſo inverted, that the vaniſhing points are determined by the repreſentation of the object*, inſtead of the repreſentation being produced by the vaniſhing points.

* See the Examples in the Jeſuit's Perſpective, pages 102–111, both of which are very imperfect, particularly the example in the upper part of page 111, which is totally falſe.



C
H 2
V.2
H 2
V.3
7
6
A
Fig. 2.
d
b
a
c
e
P
E
P
a
c
Plan
d
b
Fig.1
V.1
H
d.2.
d4
d.3.
Center
d1
V.2.
V.4.
V.3.
H
7
8
6
4
d
b
10
11
a
c
o
X
5
9
G
2
1
12
8
G
1
2
3
4
5
Scale

PLATE XIX

SECT. I.

It muſt alſo be obſerved, that when the lines or planes to be repreſented were inclined both to the horizon and picture, the old writers appear to be wholly ignorant of the neceſſity, or even uſe, of vaniſhing points; and, therefore, conſtructed their examples by means of the center and diſtance of the picture only, firſt finding the repreſentations of certain points in the object, then joining thoſe points in the beſt manner they could to produce the required figure; which method ſerved them for all repreſentations of objects inclined to the picture or horizon. But this proceſs, which is extremely defective and fallacious, is at the ſame time ſo laborious and tedious, that the ſimpleſt forms require more time and trouble to compleat their repreſentations, than would ſerve to produce a very complex figure, when conducted by the Doctor's principles, which are ſo extenſive, that they apply to the inclined picture equally with the vertical, or what may be called natural picture; which conſideration leads the author to obſerve, that in the following work, there are no inſtructions given concerning the inclined picture, becauſe he does not think that ſuch can ever be of real uſe to the artiſt; and therefore recommends the works of the elder Malton and Hamilton to thoſe who wiſh to purſue the ſtudy of Perſpective beyond the inſtructions which are given in the following pages.

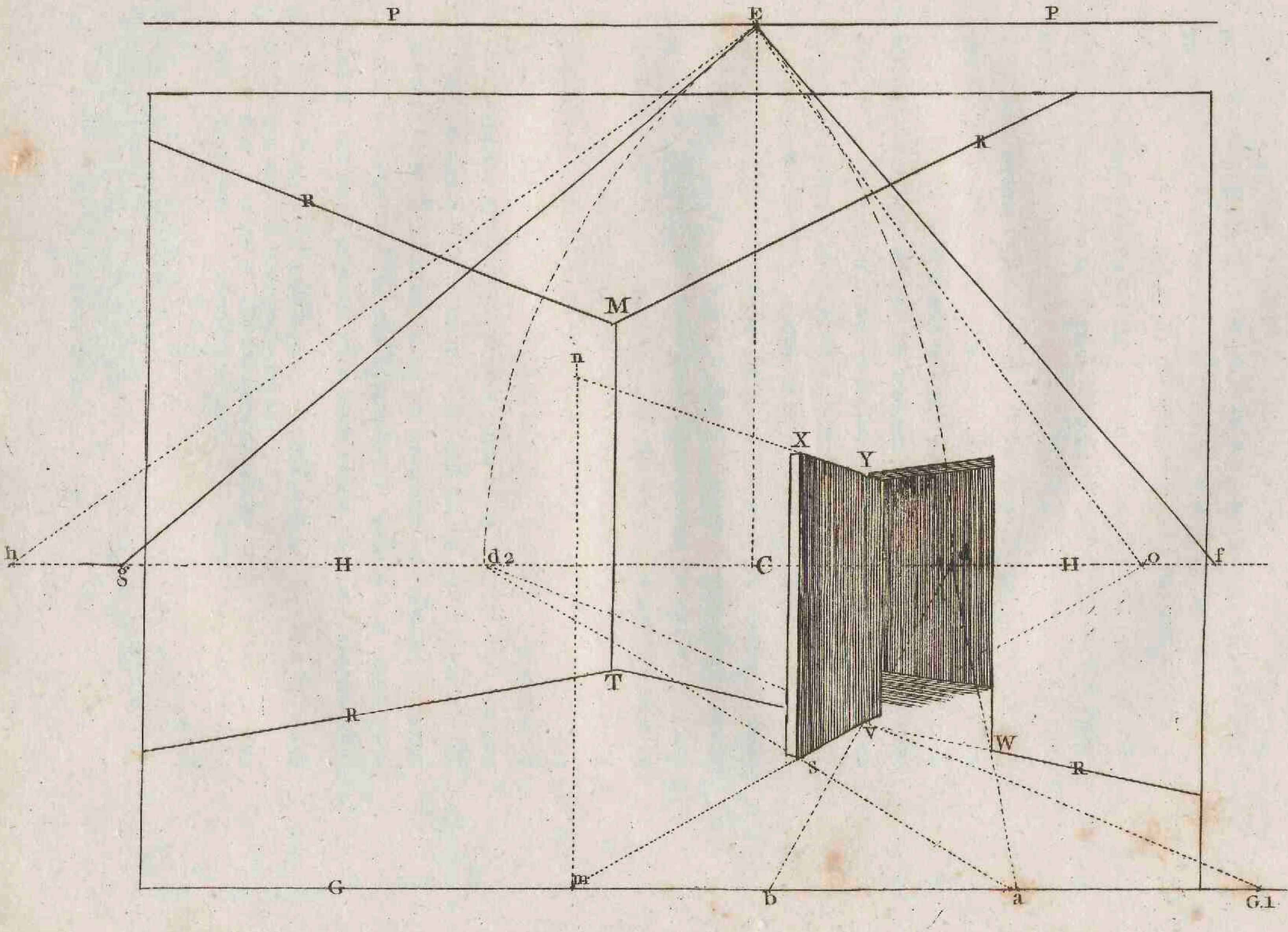


PLATE XX

PERSPECTIVE.

TERMS and DEFINITIONS.

AS no Science can be explained without the uſe of technical language, the Student in Perſpective muſt clearly underſtand the following Terms and Definitions: SECT. II.

TERMS.

1. The picture.
2. The vaniſhing points.
3. The vaniſhing lines.

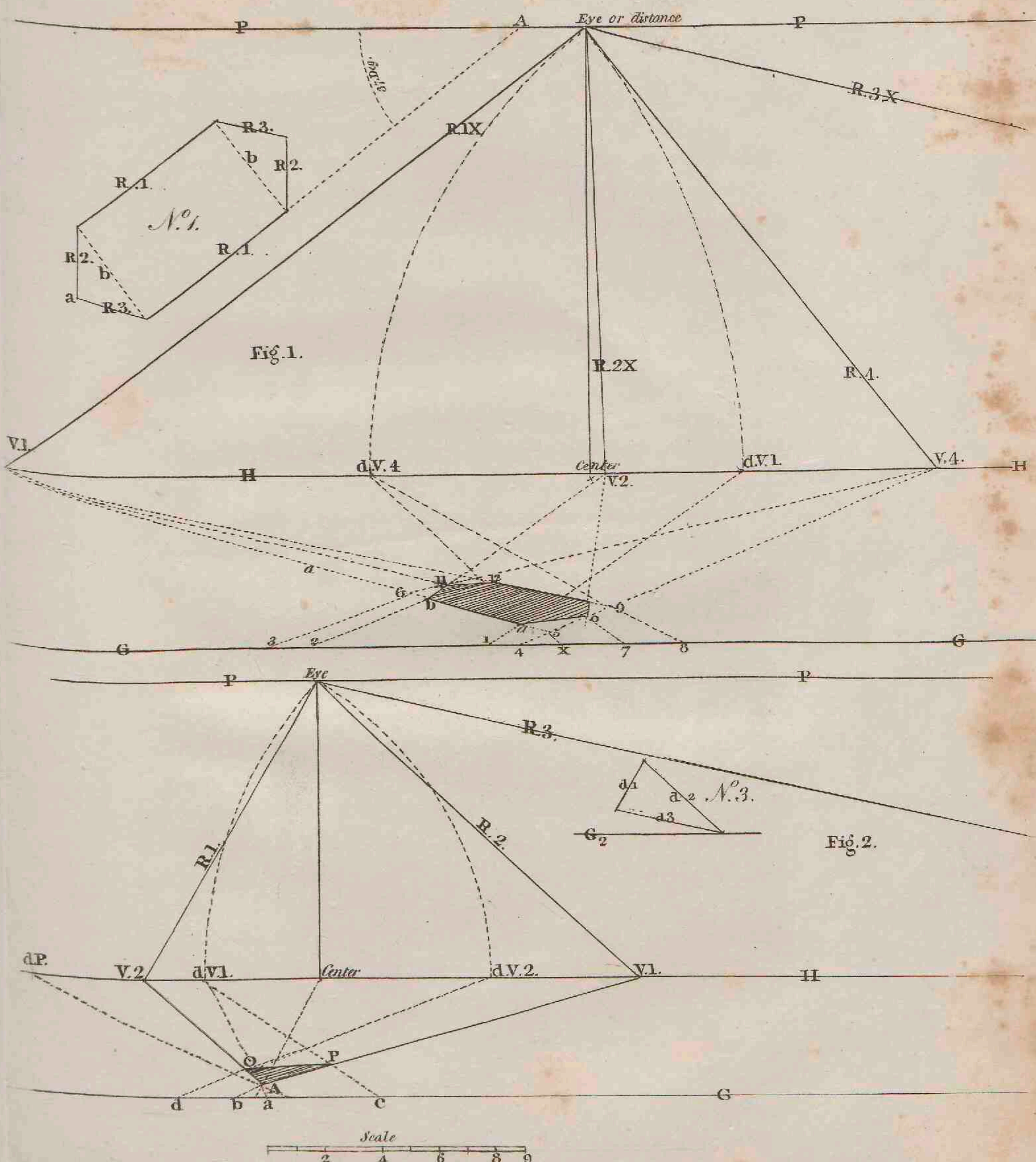
The vaniſhing points are as follow:

1. The center of the picture, commonly called the point of ſight.
2. The diſtance of the picture.
3. The oblique vaniſhing points.

The vaniſhing lines are the following:

1. The horizontal line.
2. The prime vertical line.
3. The oblique vaniſhing lines.

To


P
A
Eye or distance
P
37 Deg.
R.3X
R.1X
R.3.
b
R.2.
R.1.
No. 1.
R.1.
R.2.
b
a
R.3.
Fig. 1.
R.2X
R.4.
V.1.
H
d.V.4
Center
V.2.
d.V.1.
V.4.
H
a
6
11
12
b
9
6
d
5
G
3
2
1
4
x
7
8
G
P
Eye
P
R.3.
d1
d2
No. 3.
d3
G2
Fig. 2.
R.1.
R.2.
d.P.
V.2
d.V.1.
Center
d.V.2.
V.1.
H
O
P
A
d
b
a
C
G
Scale
2
4
6
8
9

SECT. II. To these points and lines may be added, the station point, and the base or ground line, by Dr. B. Taylor called the intersection of the picture.

DEFINITIONS.

* In the practice of Perspective, the term Picture, means the paper, canvas, or tablet, on which the representation of any object is to be drawn.

The vanishing Points.

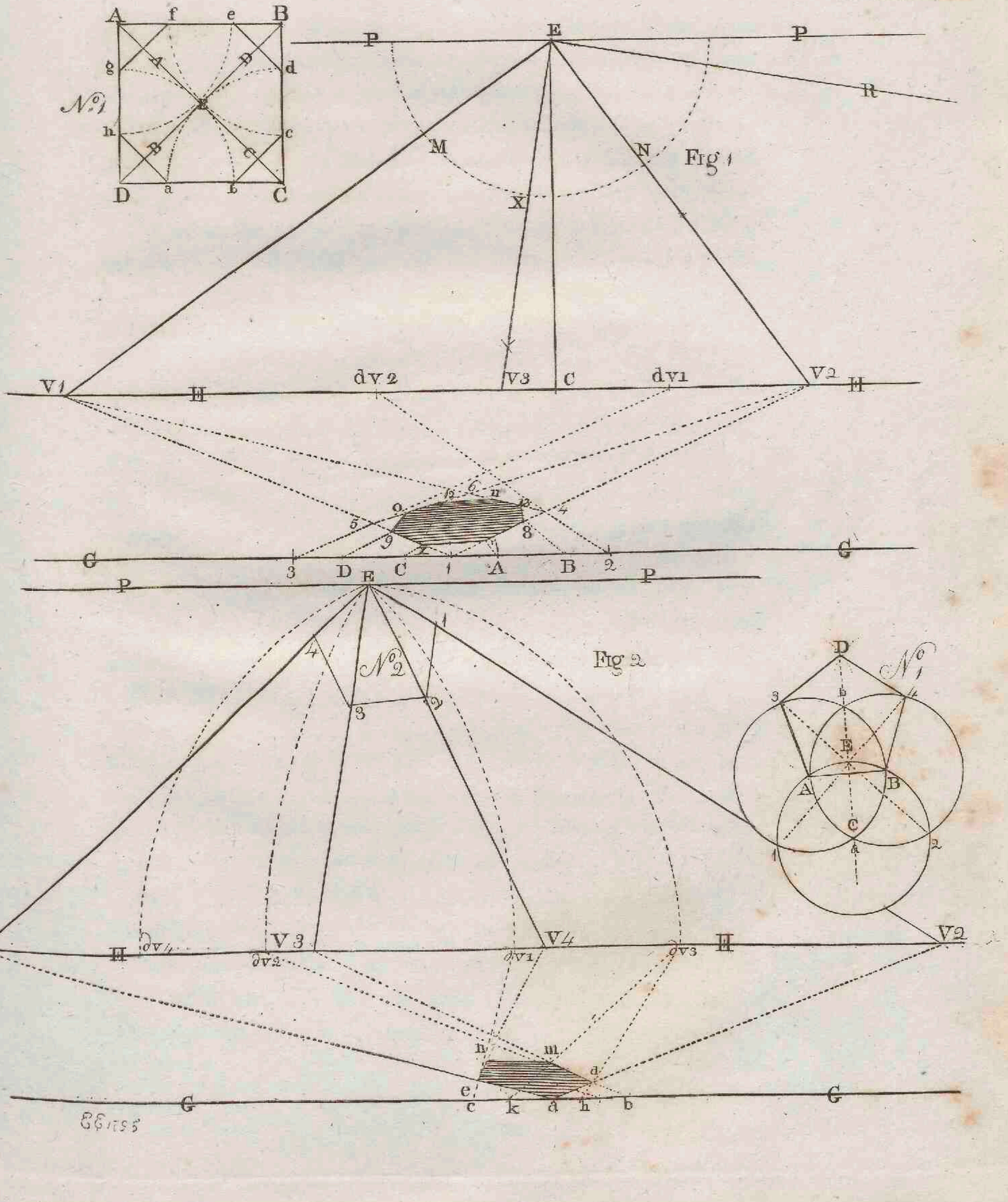
A vanishing point, is any point on the picture, in which the representations of any number of right lines, the originals of which are parallel to each other, appear to meet or concentrate.

1. The center of the picture is the first and principal vanishing point, and when the picture is vertical, or, as commonly called, upright, the horizontal line constantly passes through it. The old writers on perspective call it the point of sight.

2. The distance of the picture, or point of distance, is a point which is generally set off upon the horizontal line, either way from the center of the picture or point of sight, in the same proportionate measure that the painter or spectator is supposed to stand distant from the picture, or from the view, or object he means to represent. The old writers call it the *point of distance*; but Dr. Brook Taylor, the *distance of the picture.*

* In theory, the picture is a section of the optic cone of visual rays, made by a plane passing through that cone, perpendicular to its axis, and at any distance from its apex. In nature, it is all that quantity of objects which is comprehended in the cone of visual rays, at any one point of view. Some authors call the Picture the Perspective Table, others the Perspective Plane. See Ditton, Gravesande, Priestley, &c.

3. The


N° 1
Fig 1
Fig 2
N° 2
N° 1

3. The oblique vaniſhing points, are thoſe points to which all lines tend, which are to repreſent the appearances of original lines, ſituated obliquely, or inclined to the picture; and they may be ſituated on any part of the picture. SECT. II.

Theſe points, by the old writers on the ſubject, were called accidental points; but they knew no rules, and conſequently gave none, for finding them.

Example of vaniſhing Points:

Plate III. Fig. 1. C is a vaniſhing point, and the lines 1, 2, 3, of the pavement F, which are the repreſentations of original lines perpendicular to the picture, concentrate or vaniſh in the point C; it is alſo the center of the picture.

In Fig. 2, of the ſame plate, the points V 1 and V 2, are oblique vaniſhing points, and all the horizontal lines in the fronts X 1, X 2, of the building R 2, vaniſh or meet in thoſe points.

The vaniſhing Lines.

A vaniſhing line is, any line on the plane of the picture, in which the repreſentations of original planes, parallel to each other, appear to meet or concentrate.

1. The firſt and principal vaniſhing line, is the horizontal line, which, as before obſerved, when the picture is vertical, always paſſes through the center of the picture.

2. The next vaniſhing line, is the prime vertical line, which, like the former, always paſſes through the center of the picture, and is perpendicular to the horizontal line.

3. The oblique vaniſhing lines, like the oblique vaniſhing points, depend on the center and diſtance of the picture, and may be ſituated in any direction upon the plane of the picture. Of theſe lines,

as

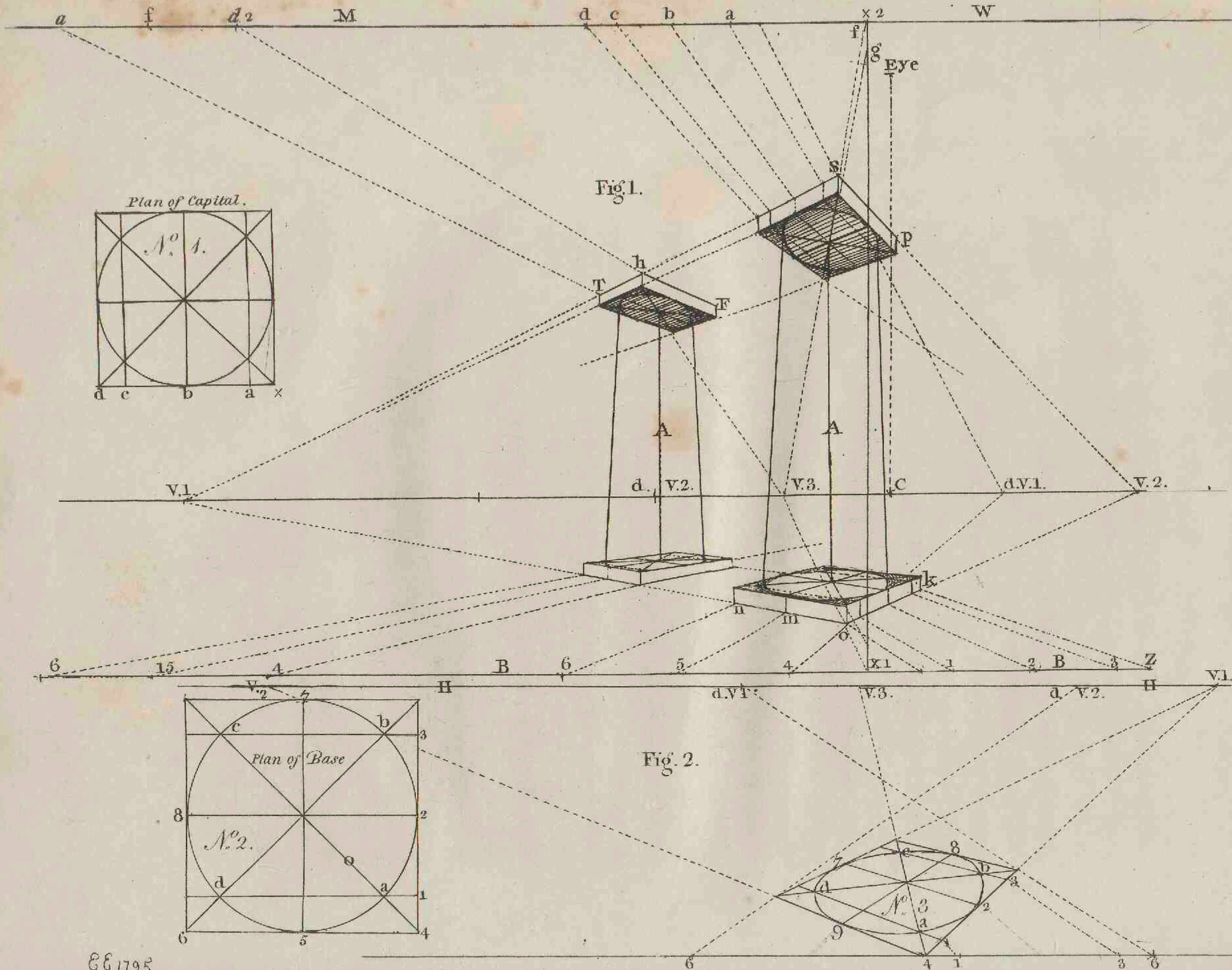


PLATE. XXIII.

EE1795

SECT. II. as of the prime vertical line, the old writers had no ideas; they never uſed them, nor ever ſpeak of them in their works.

The baſe or ground line, which is called by Dr. Brook Taylor the interſection of the picture, is that line which limits the bottom of the picture, and generally indicates the firſt appearance of the ground or plane, upon which the original objects are placed.

Example of vaniſhing Lines:

Plate III. Fig. 1. H is a vaniſhing line, and the floor F vaniſhes into it; as does the ceiling X, of the building A B. It is alſo the horizontal line.

In Fig. 2, Plate III. the line R is the vaniſhing line of the plane or face X 2, of the building. This is an oblique vaniſhing line, the ſide X 2, being oblique, or inclined to the picture; it is alſo the vaniſhing line for the ſide B of the block; for the ſides or faces of the block, and of the building, are parallel to each other, conſequently have the * ſame vaniſhing line.

C D 3, in the ſame figure, is the prime vertical line, and paſſes through the center of the picture.

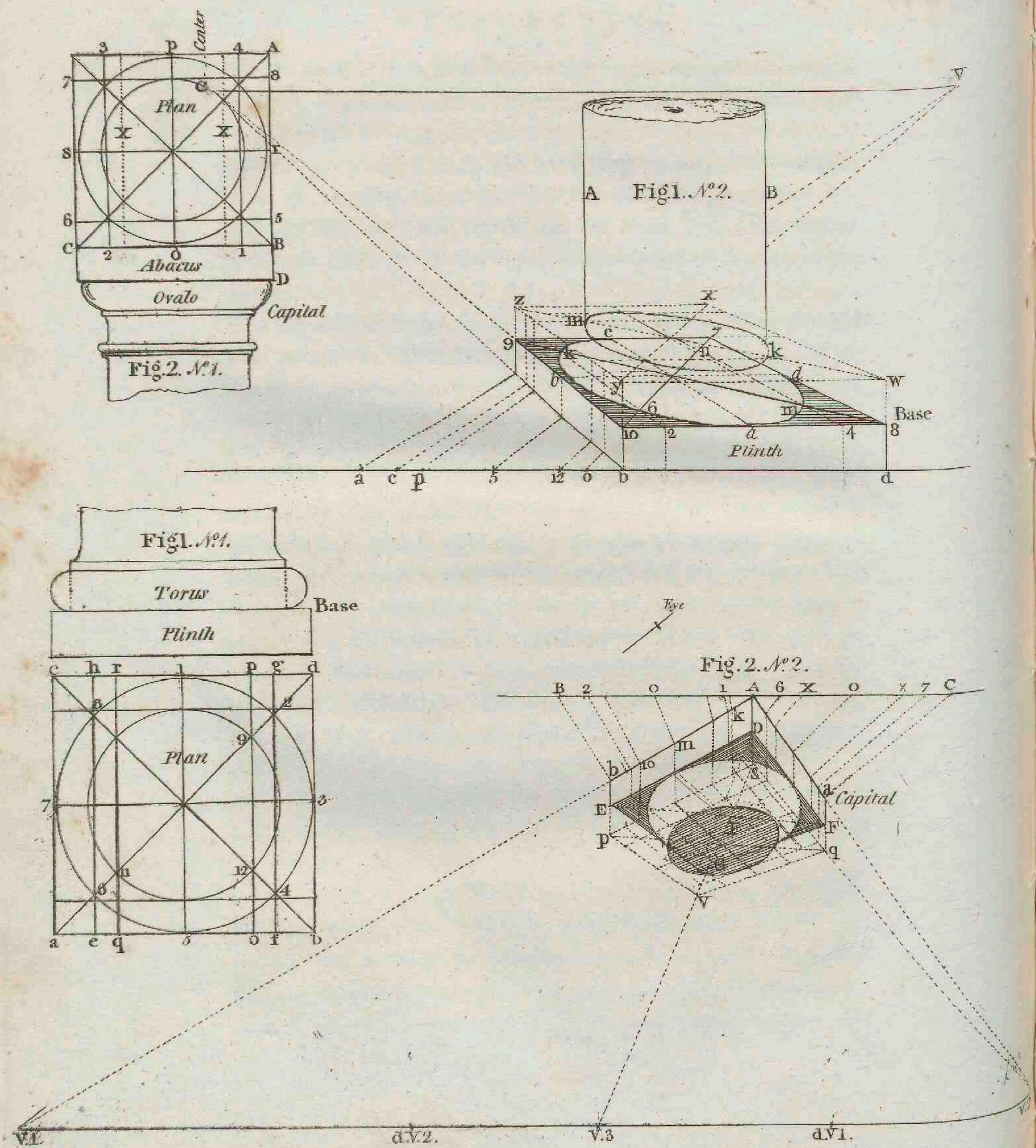
Of the Center and Diſtance of the Picture.

As it is abſolutely neceſſary to poſſeſs a clear and perfect idea of the center of the picture, as alſo of the diſtance of the picture, ſome farther explanation is here attempted, which the ſtudent muſt conſider with attention.

Dr. Brook Taylor was the firſt perſon who diſtinguiſhed the center of the picture from the point of ſight; the latter term being conſtantly employed by the old writers upon the ſubject, to expreſs what

* The repreſentations of all right lines vaniſh in points. The repreſentations of all planes vaniſh in lines.

he


Center
Plan
Abacus
Ovalo
Capital
Fig. 2. No. 1.
Fig. 1. No. 2.
Base
Plinth
Fig. 1. No. 1.
Torus
Base
Plinth
Plan
Eye
Fig. 2. No. 2.
Capital
V.1.
d.V.2.
V.3
d.V1.

he juſtly calls the center of the picture, which is a point diſtinct from the point of ſight. PLATE I.

In the two treatiſes upon Perſpective, publiſhed by him, he gives the two following Definitions:

1. "The center of the picture, is that point, where a line from "the ſpectator's eye cuts it, (or its plane continued beyond the "frame, if need be,) at right angles.

"Definition 1ſt, in firſt Edit. 1715."

2. "If from the point of ſight there be drawn a line perpendicular "to the picture, the point where that line cuts the picture is called "the center of the picture; and the diſtance between that center "and the point of ſight, is called the diſtance of the picture.

"Definition 7th, in ſecond Edit. 1718."

In practice, the center of the picture is that point which is marked upon the paper, canvas, or tablet, to indicate the point which is neareſt the eye of the ſpectator who looks at it; hence follows the Doctor's ſecond Definition, that, if from the point of ſight, or (which is the ſame thing) the eye of the ſpectator, a right line be ſuppoſed drawn perpendicular to the picture, the point where that right line cuts the picture, will be its center. But the ſtudent muſt remember, that, by the center of the picture, is not meant the center of the canvas, or tablet, as it can ſcarcely ever happen that they will coincide; for, in general, the canvas, or tablet, will not comprehend an equal, but a partial portion, of the baſe of the cone of viſual rays: therefore the center of the picture will be nearer to one ſide than the other of the tablet, or more towards the bottom than the top, juſt as the nature of the view, or diſpoſition of the objects to be repreſented, may require.

The diſtance of the picture repreſents the diſtance at which the ſpectator is ſuppoſed to ſtand, from the object or landſcape he means

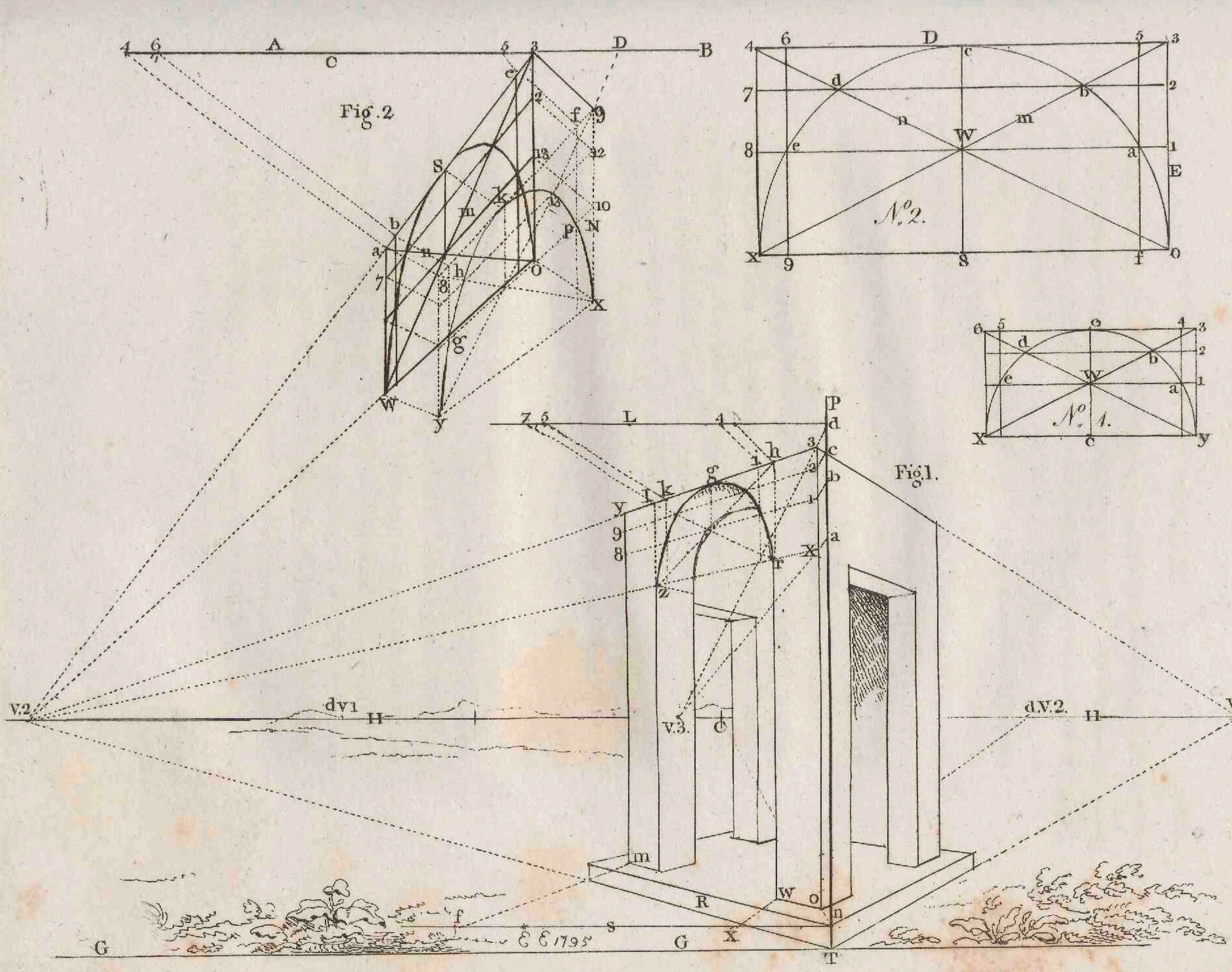


PLATE XXV

PLATE I. to reprefent; and the choice of a proper diftance is of great confequence to the beauty of the reprefentation.

It is almoft needlefs to obferve, that no object can be feen to advantage, unlefs the eye of the fpectator be withdrawn to fuch diftance as fhall admit the angle of vifual rays to comprehend the whole of the object: therefore, let it be fuppofed, the angle of vifion is equal to 45°, it will be neceffary to retire fo far from the object, fuppofe in a houfe, that the fpace between it and the eye, may be at leaft equal to the height or width of that houfe.

So alfo, in viewing a landfcape or ftreet, or the interior of a building, the ftudent may obferve, that he will not fee any object, nor any of the ground that is clofe to him; but on the contrary, his rays of vifion will meet the ground or floor, at a point or line confiderably diftant from the point on which he ftands. It is this fpace, lying between the ftation or point where he ftands, and the part of the plane or floor firft feen, that conftitutes the diftance of the picture.

By confidering the foregoing obfervations, it will be eafily underftood, that the center of the picture, and point of fight, are two diftinct points; the former being a point on the picture, the latter a point out of the picture. Both points being the extremes of a line, paffing from the eye of the fpectator to the picture, and perpendicular to it, the length of which line is the diftance of the picture.

Example, Plate II.

PLATE II. Let Fig. 1. be confidered as reprefenting the interior of a room, one of whofe fides, as A A A, is open to the country; and let the figures reprefenting the woman and boy be fuppofed two perfons, viewing the landfcape through that aperture.

The

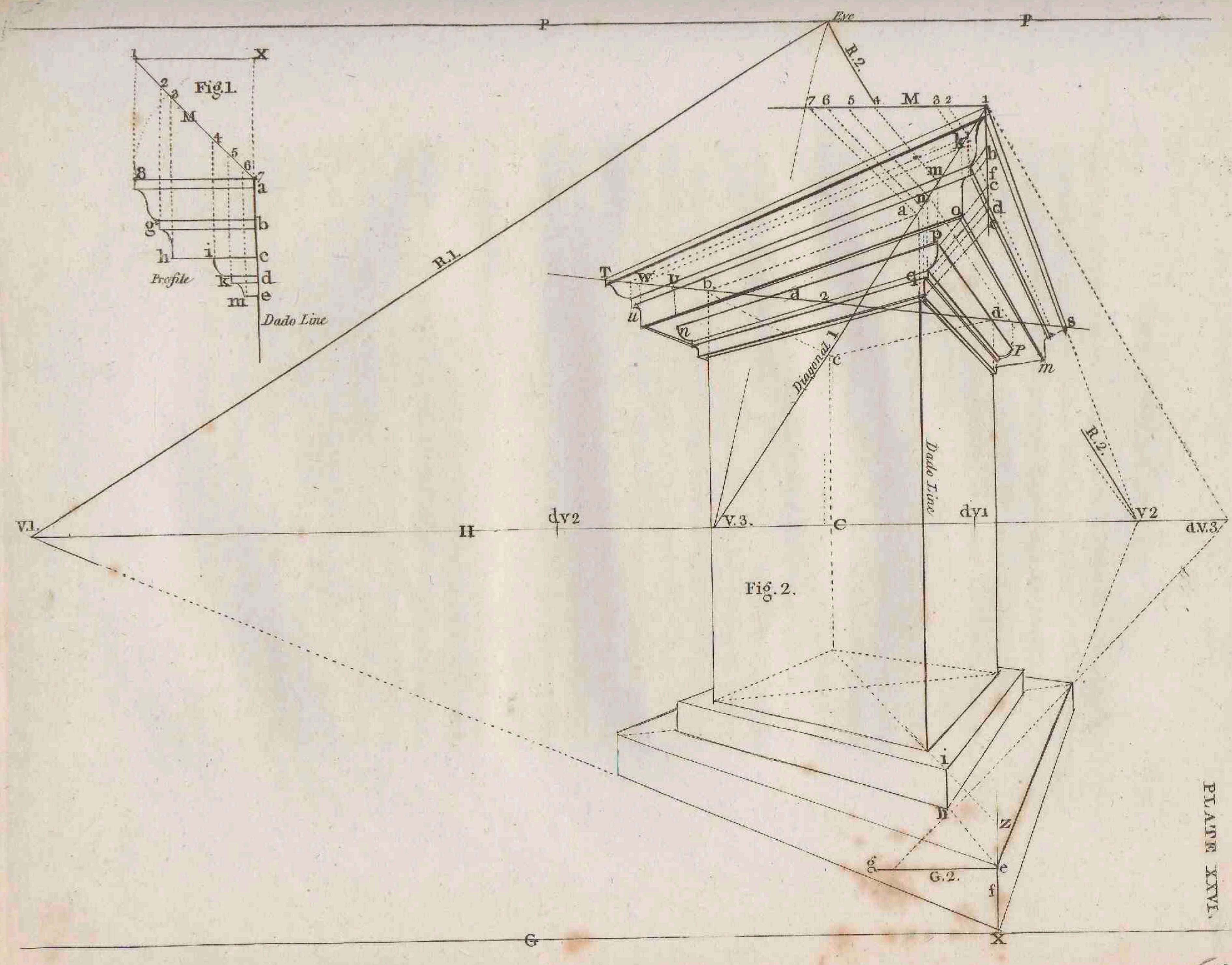

Eye
P
P
Fig. 1.
Profile
Dado Line
R.1.
R.2.
M
Diagonal 1
Dado Line
V.1.
H
dv2
V.3.
C
dv1
V2
dV.3.
Fig. 2.
G.2.
G
X

PLATE XXVI.

The aperture muſt then be conſidered as the picture, both to the woman and boy. Now the center of this *opening* is at C 3; but this is not the center of the picture, to either of thoſe perſons who are ſuppoſed to be looking at the view. For, to the woman, it is at * C, and that point muſt be conſidered as the repreſentation of a point in a line drawn from her eye perpendicular to the plane of the aperture, and interſecting that plane in that point; but to the boy, who is looking through the ſame aperture, the center of the picture is at C 2, which is very much to the right, and conſiderably lower down in the picture; for the center of every picture or view is directly oppoſite to the eye of the ſpectator, upon that plane which is ſuppoſed to intercept the viſual rays of the ſpectator. Hence it will follow, that to perſons placed in the ſituations repreſented by the figures, that the one placed in the ſituation of the woman would have a very different view from the other, placed in the ſituation of the boy. PLATE II.

To the firſt figure the horizon is elevated, to the ſecond depreſſed, becauſe it is ſhorter than the other. The firſt figure has the moſt equal and advantageous view through the aperture; the ſecond leſs on the right than on the left hand; and part of the view, which can be ſeen on the right by the woman, is concealed to the boy by the ſide of the aperture.

In Fig. 2. Plate II. the illuſtration is farther attempted; and, *to the perſon* who views the print, the ſcheme is in profile, and the center of the picture~~s~~ is at D 2, coinciding with the point of ſight of that figure, but in a tranſverſe direction.

* It is alſo the center of the picture to the perſon who views the print, for the whole of Fig. 2. is conſtructed to that center. It muſt be obſerved, that the initials are not exactly upon the points intended; as, C 3 ſhould be at the top of the bonnet of the figure, and C in the middle of the head. C 2, alſo, ſhould be in the middle of the head of the boy: but they are removed a little to the ſide, to prevent confuſion. H H is the horizontal line to the woman.

Let

See page 307

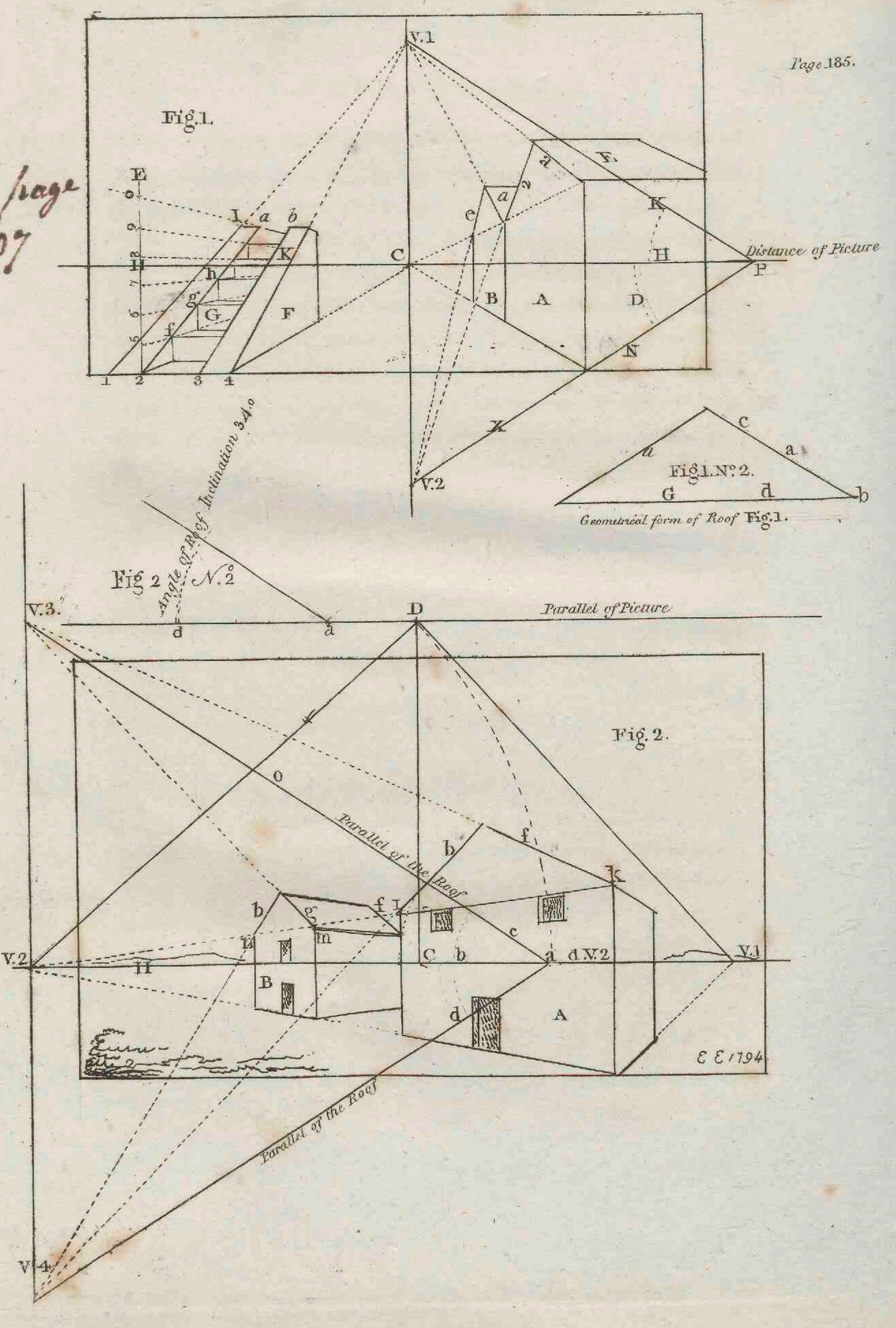


Fig.1.
E
I
a
b
K
H
h
g
G
F
f
1
2
3
4
V.1
C
V.2
a
e
B
A
D
E
K
H
N
Distance of Picture
P
Fig.1. No. 2.
Geometrical form of Roof Fig.1.
Angle of Roof Inclination 34°
Fig 2 No. 2
V.3.
D
Parallel of Picture
Fig. 2.
Parallel of the Roof
V.2
V.1
d V.2
A
B
C
V.4
Parallel of the Roof

PLATE II.

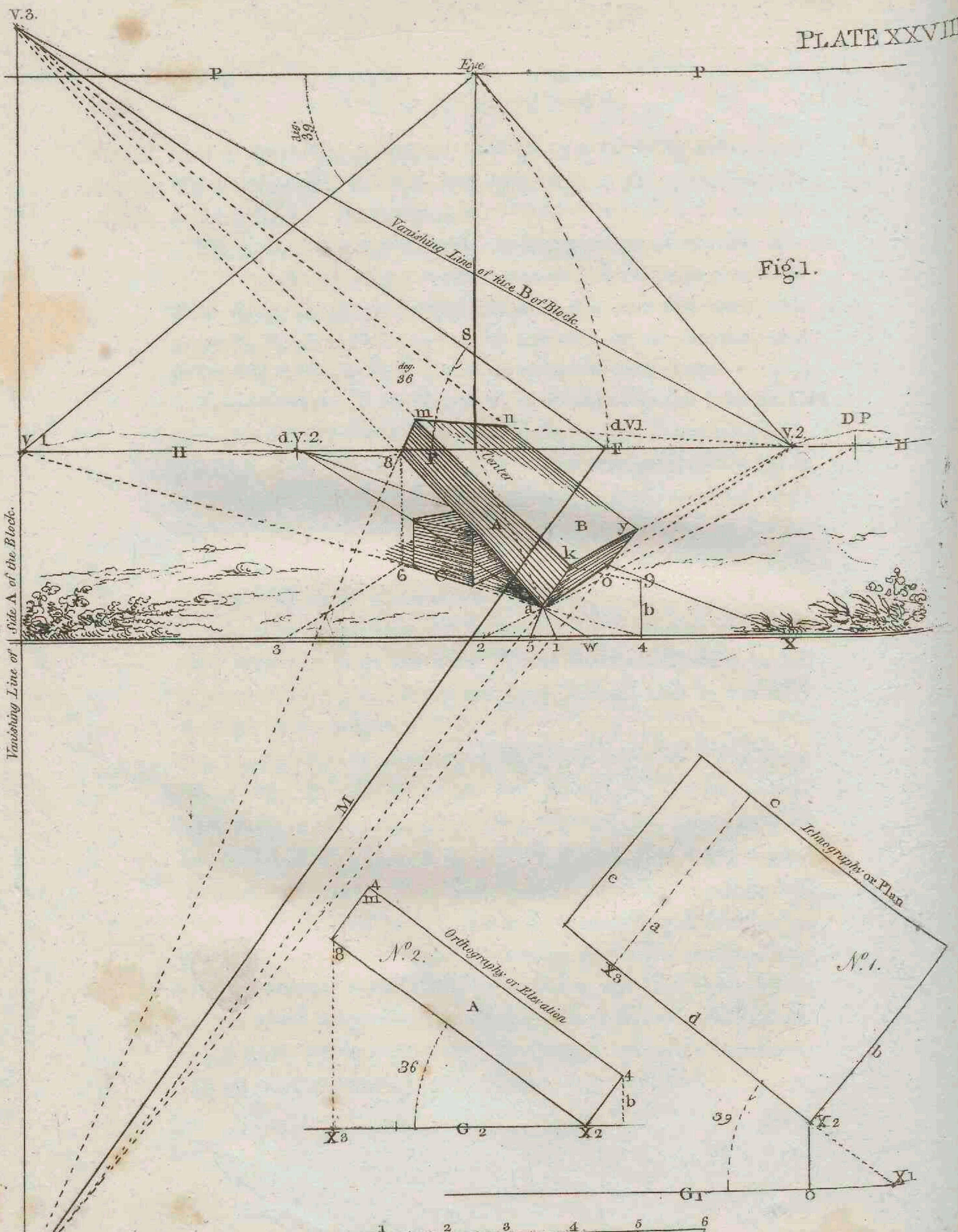
Let it be ſuppoſed that the figures D 1, D 2, D 3, repreſent three perſons looking through the aperture, A 1, 2, 3, 4, which to them muſt be ſuppoſed the picture. The eye of each of thoſe figures is the point of ſight to each of them. C 2 is the center of the picture to the perſons repreſented by D 2 and D 3; but to the figure ſitting down, whoſe point of ſight is D 1, the center of the picture is at C 1, as much below C 2, as the height of the eye of the figure D 1 is below that of the eye of the figure D 2.

The diſtance of the picture is alſo explained by this example,—for the length of the line which paſſes perpendicularly from the eye of each figure to the picture, conſtitutes the different diſtances to each different figure.—Thus the ſpace from C 1 to D 1, is the diſtance of the picture to the figure D 1; and from C 2 to D 2, repreſents the diſtance of the picture to the figure D 2. Here it will not be improper to obſerve, that at figure D 2 will be the beſt diſtance, as it may be preſumed, that the angle of viſion from that figure, will coincide with the aperture better than from either of the others; the firſt being too near, the third too diſtant.

The ſtation, point, and baſe line, or interſection of the picture, are alſo explained by theſe examples; as the line A 3, A 4, is the interſection of the picture, for it is the bottom of the aperture, and may be conſidered as the firſt place at which the figures diſcover the floor. The ſtation points are the points upon the floor, exactly perpendicular to the eyes of the figures, as S 1, S 2, S 3; or, they may be conſidered as the points upon which thoſe ſpectators ſtand.

Before the ſtudent attempts to delineate objects in Perſpective, it will be proper for him to conſider the forms of objects, and alſo their poſitions in relation to the picture.

The


V.3.
Eye
P
P
deg. 39
Vanishing Line of face B of Block.
Fig. 1.
S
deg. 36
m
n
d.V1.
V.1
d.V.2.
H
8
F
Center
F
V.2
D P
H
A
B
y
k
C
6
o
9
b
a
3
2
5
1
W
4
X
Vanishing Line of Side A of the Block.
M
c
Ichnography or Plan
e
a
X3
N.o 1.
d
b
A
m
8
N.o 2.
Orthography or Elevation
A
36
4
b
X3
G2
X2
39
X2
X1
G1
o
1
2
3
4
5
6
V.4.
EE 1794

The general forms of plans and elevations, upon which moſt of the objects of art are conſtructed, are thoſe of a ſquare and cube,* the former being compoſed of lines only, the latter of planes at right angles, or perpendicular to each other. PLATE II.

Upon theſe principles are founded the outlines of all buildings, whether plain or decorated; they not only apply to the conſtruction of the edifice, but alſo to its minuteſt furniture. Thus, drawing the repreſentations of a ſimple ſquare and cube, in true Perſpective, as viewed in all directions, is to apply all thoſe principles of ſcience with reſpect to practice, which muſt be uſed in the repreſentation of all objects, conſtructed upon the ſame geometrical principles.

But it is not enough to underſtand the form and conſtruction of the object; its poſition in relation to the picture muſt alſo be conſidered, before a true perſpective repreſentation can be attempted.—For, let it be required to draw a cube in perſpective, as placed upon a plane, it muſt be known whether any of its ſides are parallel to the picture, or whether any are inclined; for theſe different poſitions require very different proceſſes for the obtaining their repreſentations. Therefore, it is to be obſerved, that there are four different poſitions in which the ſides or faces of a cube may be diſpoſed to the picture. Theſe varieties are occaſioned, not only by the form of the object, but alſo by the poſition of the plane upon which it is ſituated; for, in the firſt and ſecond poſition, the cube is ſuppoſed ſtanding upon a horizontal plane, in the other two, as upon a plane inclined to the horizon.

* A ſquare is a ſuperficies, formed by four right lines of equal dimenſions, cutting each other at right angles.

A cube is a ſolid, formed by ſix ſquares of equal dimenſions, at right angles to each other.

The

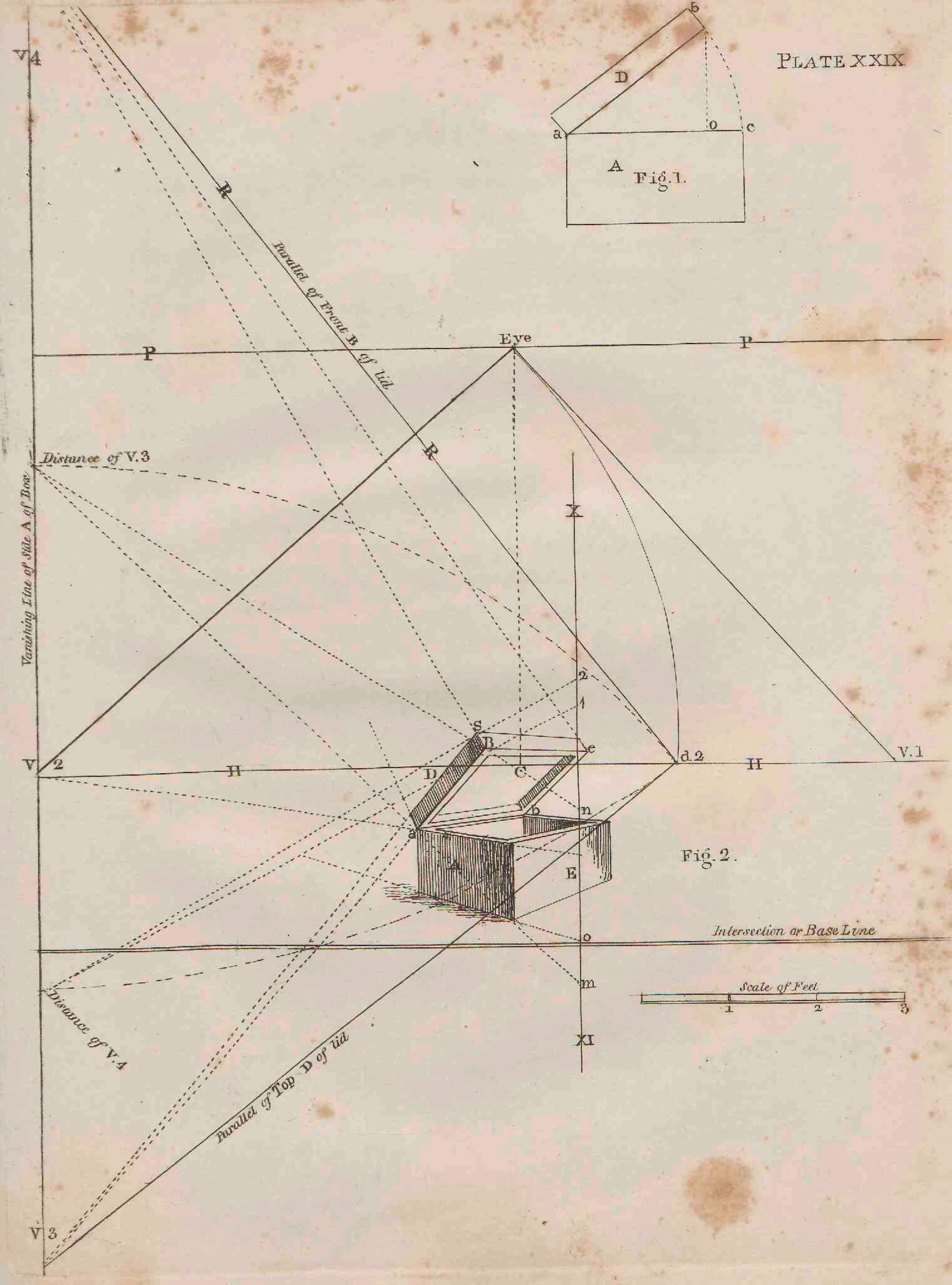

b
D
a
o
c
A
Fig. 1.
V4
R
Parallel of Front B of lid
Eye
P
P
R
Distance of V.3
X
Vanishing Line of Side A of Box
2
1
S
B
e
V
2
H
D
C
d.2
H
V.1
b
n
a
A
Fig. 2.
E
Intersection or Base Line
o
m
Scale of Feet
1
2
3
Distance of V.4
XI
Parallel of Top D of lid
V3

PLATE II. The various positions are as follows: † In the first position, two of the sides of the cube will be parallel to the picture, and the other four will be perpendicular: this position is commonly called parallel to the picture.

In the second position, two of the faces or sides will be perpendicular to the picture, and four will be inclined.

The third position will dispose two sides perpendicular to the picture, and four inclined, both to the picture and horizon.

The fourth position will dispose all the faces or sides inclined, both to the picture and horizon.

To explain these important distinctions, let Fig. 2, Plate II. be considered as an example; and let the figures D 1, D 2, D 3, be supposed spectators, looking through the apertures A 1, 2, 3, 4, as before.

Then suppose the blocks, B 1 and B 2, to be the objects which those spectators are viewing, the first parallel, the second inclined to the picture.

The block, B 1, is parallel to the picture, for the face b is parallel to the line A 4, A 3, which line represents the intersection, or base line of the picture.

But the cube, B 2, hath the sides inclined to the picture, for if the planes of those sides were continued, they would all cut or cross the intersection A 4 of the picture.

PLATE III. This is farther illustrated by the example in Plate III., in which Fig. 1. represents objects whose sides or faces are parallel and perpendicular to the picture.

† In theory, the parallelism, or inclination of any line or plane to the picture, implies the disposition of that line or plane to the axis of the cone of visual rays of the spectator, rather than to the plane of the picture; so that, to the common vertical picture, the original line that is parallel to the picture, is perpendicular to the axis of the cone of visual rays; and, contrarywise, that which is parallel to the axis of the cone of rays, is perpendicular to the picture.

 But

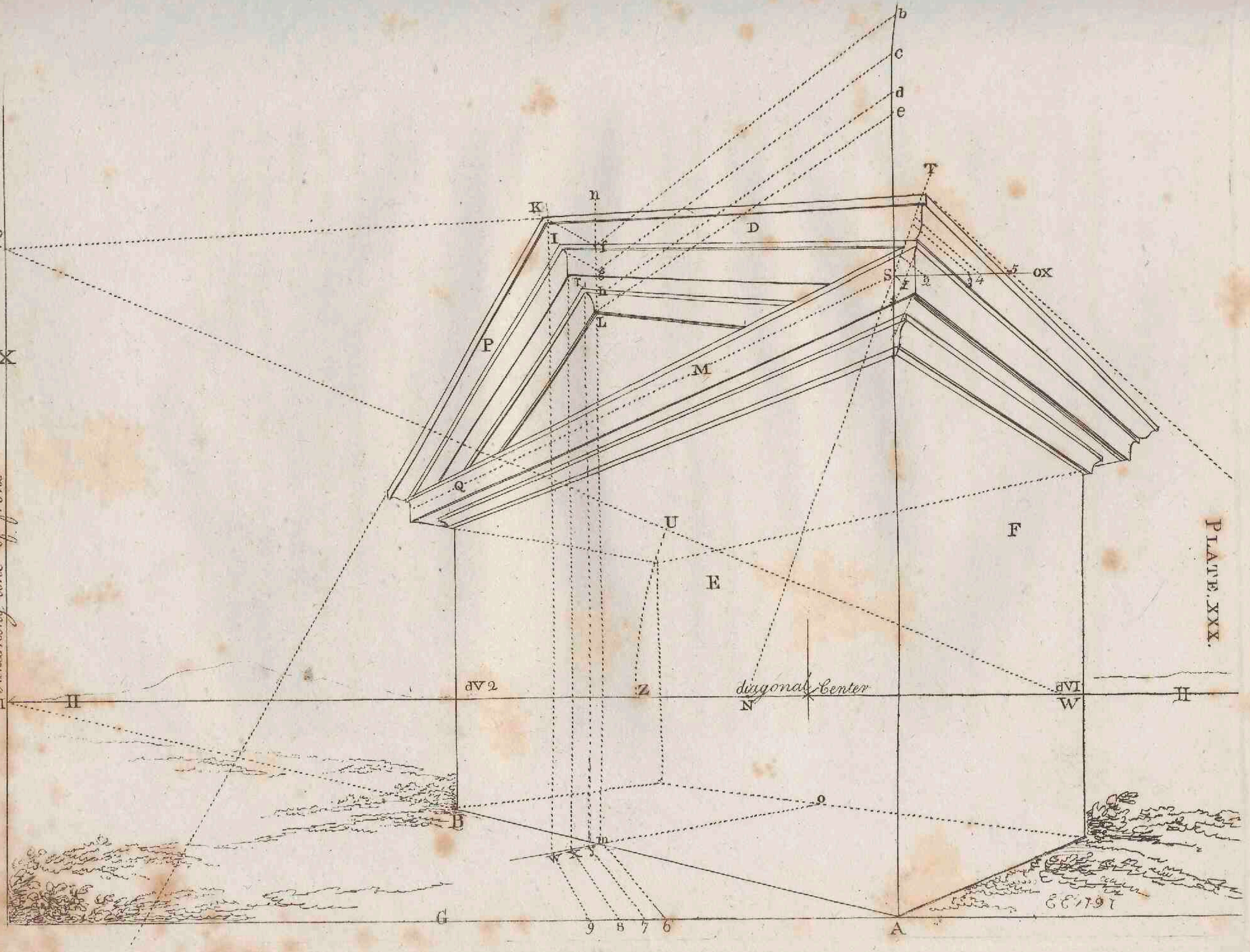

Vanishing line of front
diagonal Center
b
c
d
e
T
K
I
D
S
OX
P
L
M
Q
U
E
F
X
Z
N
W
H
B
o
G
A
9
8
7
6

PLATE. XXX.

But in Fig. 2. in the ſame Plate, all the objects have their ſides or faces inclined, or oblique to the picture. PLATE III.

In Fig. 1, Plate III. the front of the houſe E, and of the building B, are both parallel to the picture. They are alſo parallel to each other, while the ſides A and G are perpendicular to the picture, as is likewiſe the ceiling X of the turret.

In Fig. 2. of the ſame Plate, the ſides of the houſe X 1, X 2, and alſo the ſides of the block B, are inclined to the picture, while the roof R 2 of the houſe, is inclined both to the picture and to the horizon.

The two figures contained in Plate III. are to be conſidered as examples of objects diſpoſed to the picture, in the firſt and ſecond poſitions of the cube, as before deſcribed: but the roof R 2, Fig. 2, is inclined to the horizon, and, therefore, partakes of the third poſition of the cube, which will be explained in the fourth Section.

It may be obſerved, that the examples of Plate III. exhibit the repreſentations of objects, diſpoſed in all the poſitions that are generally required by the artiſt, upon the natural picture; that is, when the plane of repreſentation is perfectly vertical, and perpendicular to the axis of the cone of viſual rays; in which poſition, the repreſentation of objects that are drawn upon it will appear tolerably juſt in many different points of view; whereas, in the inclined picture, the repreſentation of objects, when drawn upon it, will appear diſtorted, offenſive, and ſometimes unintelligible in all points of view, except that by which it was conſtructed.

It is from the foregoing circumſtances that the author has before obſerved, in the Introduction, that repreſentations upon inclined pictures are of no uſe to the painter; and, therefore, no inſtructions are given in this work concerning that unneceſſary part of the ſcience.

Rudiments

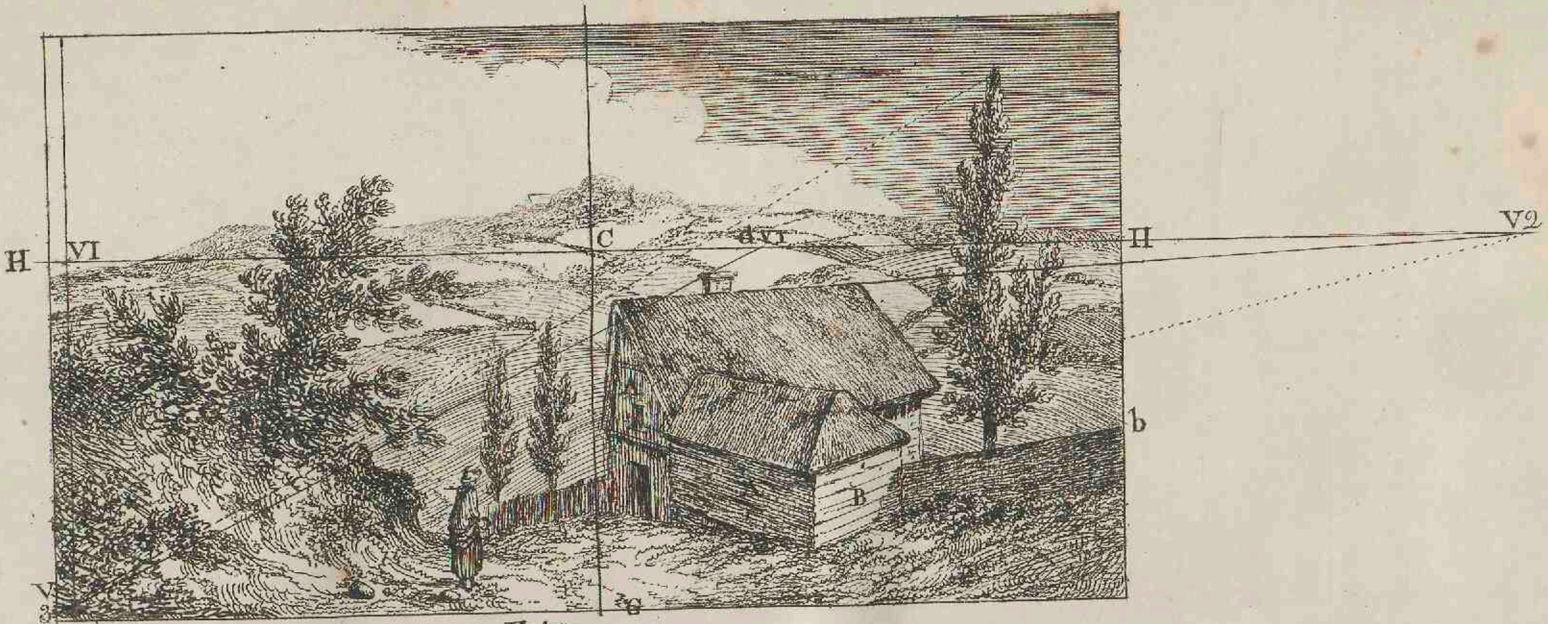


Fig 1

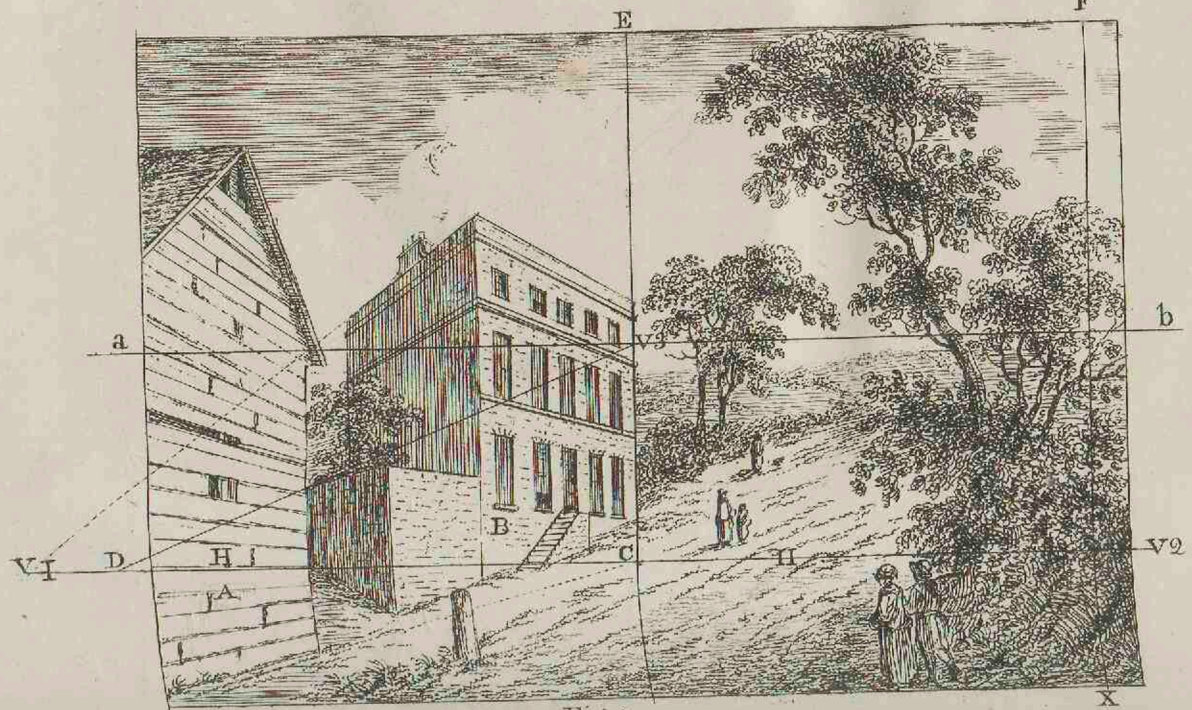


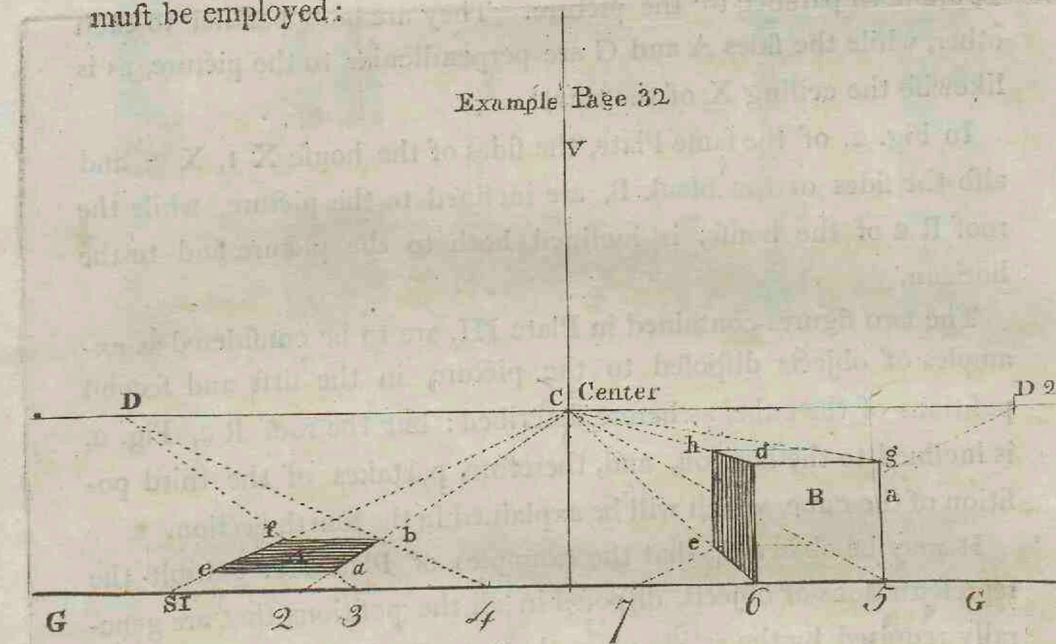
Fig 2

PLATE XXXI.

PLATE III.

Rudiments of Practice.

When objects are to be drawn in perſpective, the following proceſs muſt be employed:



1. Firſt, draw the baſe line, or interſection of the picture G G.

2. * Then, at the proper height, draw the horizontal line D D 2, parallel to the baſe line.

3. Upon the horizontal line mark the center of the picture C, commonly called the point of ſight. †

4. ‡ Through the center C draw the line V perpendicular to the baſe line.

* As the horizontal line always paſſes through the ſpectator's eye, it muſt always be ſet above the baſe line, to the ſame proportionate meaſure that the eye of the ſpectator is known, or ſuppoſed to be above the ground or plane upon which he ſtands: the natural height, as commonly allowed, is five feet ſix inches.

† It is alſo marked center.

‡ This line is called the prime vertical line. It is no farther neceſſary, when objects are to be repreſented parallel to the picture, than as a guide for all the other lines which are required to be drawn perpendicular to the horizon;—but, when the objects to be repreſented are inclined to the picture, it is indiſpenſable.

5. From

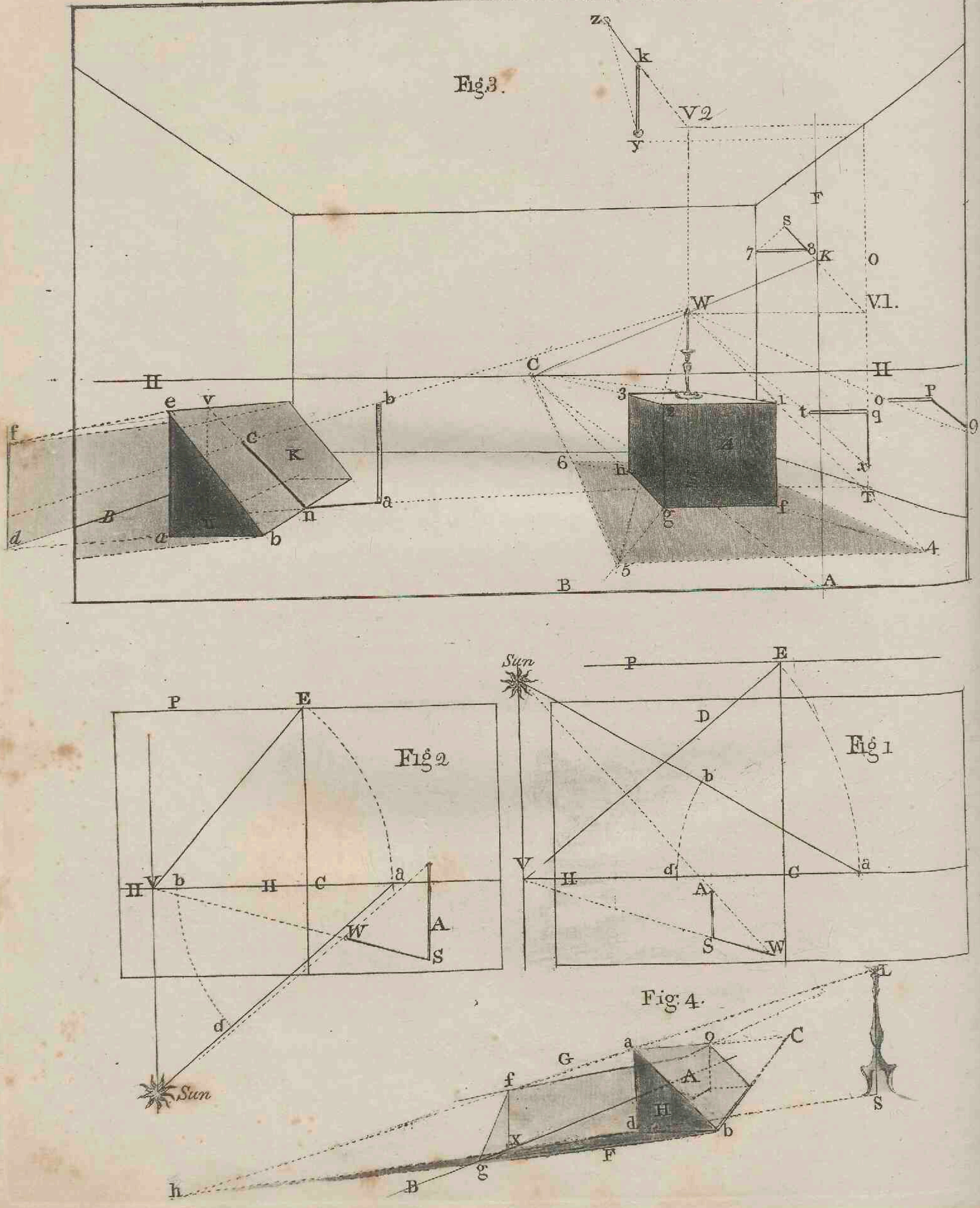


Fig. 3.
Fig. 2
Fig. 1
Fig. 4.
Sun
Sun

5. From the center of the picture C, set off on either side, or on both sides, upon the horizontal line, the points D, D 2 for the point of distance, or distance of the picture. SECT. I. Plate II.

These points and lines are absolutely necessary in all cases, and are sufficient, when the objects to be represented have their sides parallel and perpendicular to the picture; but, if their sides are inclined to the picture, additional lines are required, which will be demonstrated in the next section.

Having drawn the foregoing lines, let it be supposed, that a square is required to be drawn in perspective, as on the ground, and also a cube, of the same dimensions with the square, standing on the same ground or plane, the square A at some distance beyond the picture, but the cube B close to it.

S 1, is the seat of one of the angles of the square upon the picture, therefore, from S 1, draw a line to the center of the picture C; then take the dimensions of the square with the compasses, (any supposed space will be sufficient in the present case, without a scale), and set that space upon the base line, from S 1 to 2, and draw another line from 2 to C, then take the known distance that the square is beyond the picture, suppose it to be half the measure of one side of the square, and set it on the base line from 2 to 3, and from 3 draw a right line to D, then take the space from S 1 to 2, and set it on the base line from 3 to 4, and from 4 draw another line to D, these last lines will cut the line 2 C* at the points *a* and *b*; then draw two lines from the points *a* and *b*, parallel to the ground line, till they cut the line S 1, C in the points e f, and the representation of the square will be completed.

For the block B, proceed as follows: Suppose the point 6, the seat

* The lines S 1, C, and 2 C, are the indefinite representations of lines perpendicular to the picture, parts of which lines form two sides of the square.

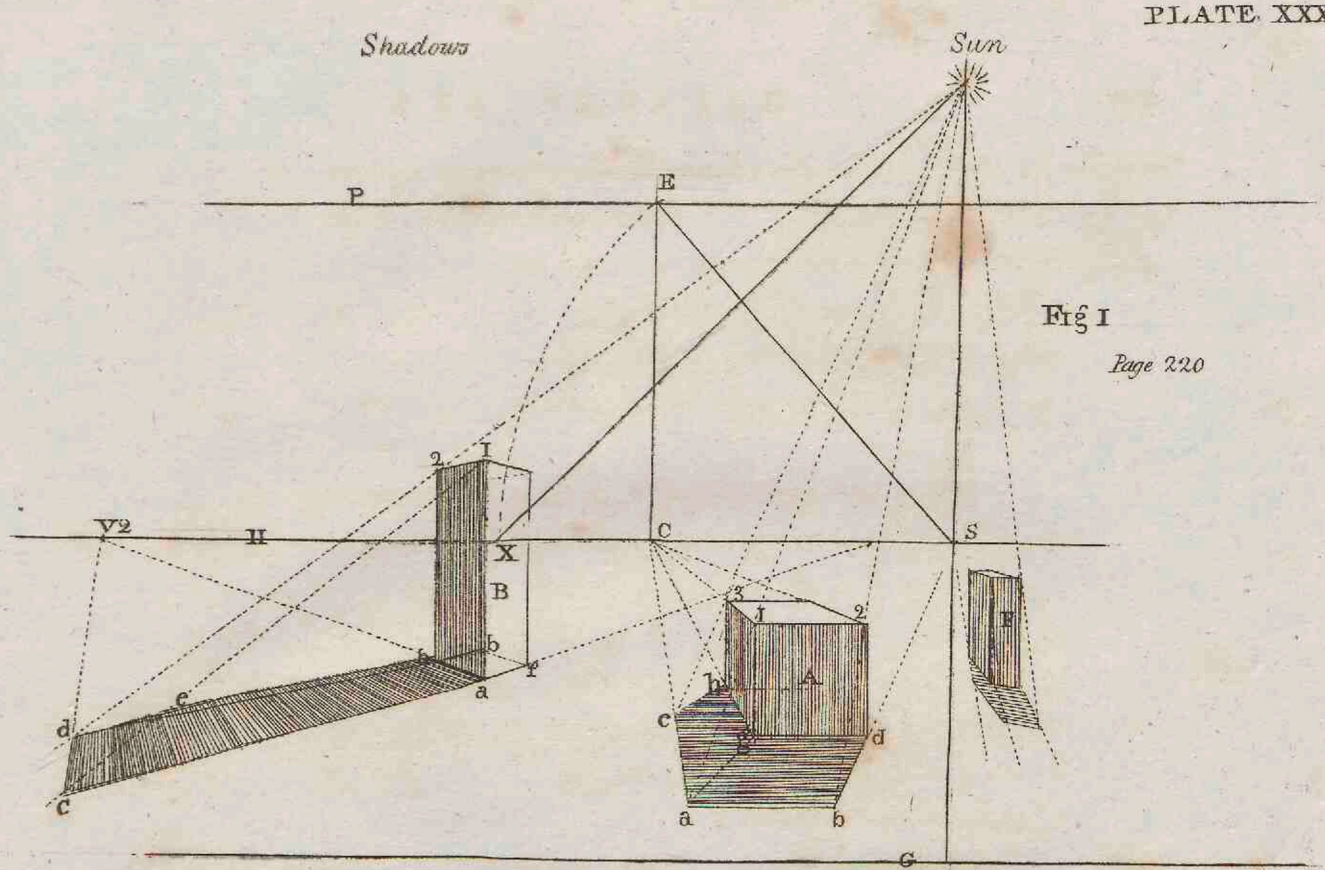


Fig I

Page 220

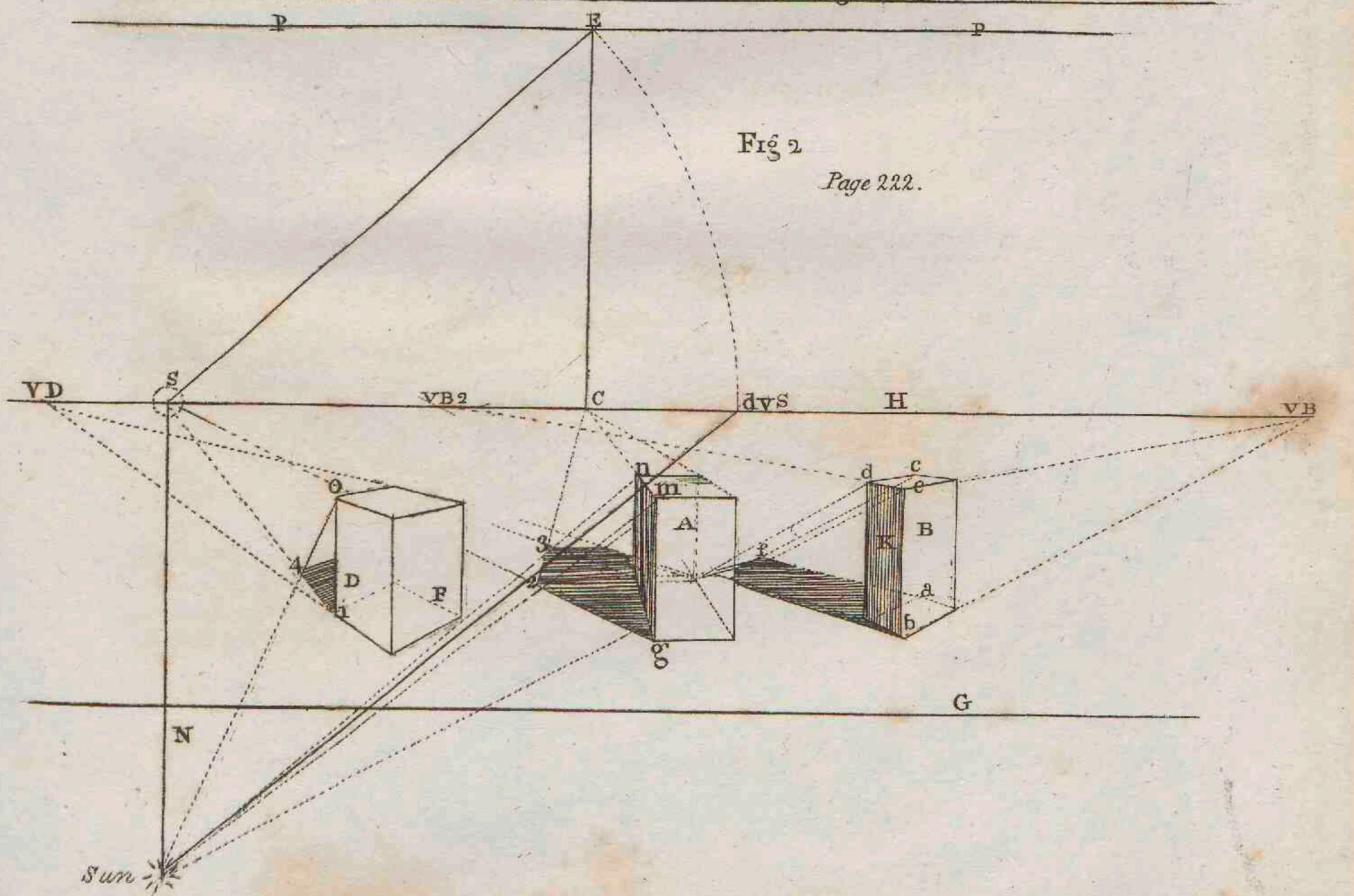


Fig 2

Page 222.

SECT. I. Plate II.

of one of the angles of the block; take the meafure of the fquare A, that is, from S 1 to 2, and fet it off from 6 on the bafe line to 5, and from 5 and 6 draw right lines to C; then fet on the fame meafure, from 6 to 7, and from 7 draw a right line to D 2; and where it cuts the line C 6, as at e, will reprefent the depth of the bafe of the cube; then from the points 6, 5, and e, draw lines parallel to the vertical line V, or (which will produce the fame effect) perpendicular to the bafe line, as a, b, e 1; then upon the line a or b, fet up from the bafe line the fame meafure as from 6 to 5, and at the point d draw a line parallel to the bafe line, cutting the other perpendicular line at g, then will the front face B of the block be formed. To complete the cube, draw lines from d and g to the center of the picture C, and where thofe lines cut the perpendicular line e h, will give another fide of the block.

At the interfection h of the vertical line e h, by the line d C, draw another line, parallel to the bafe line, joining the line g C at k, and the cube will be completed.

Thefe figures contain the practical elements of all objects that can be drawn in Perfpective, when their faces or fides are parallel and perpendicular to the picture; therefore, the ftudent will do well to confider them attentively, and to make himfelf mafter of their conftruction.

The procefs, as directed in the five different articles at the commencement of this problem, is indifpenfably neceffary, and muft be the fame in all cafes where the rules of Perfpective are employed in the reprefentations of objects, whofe faces, or fides, are parallel and perpendicular to the picture; but when the objects to be reprefented, have their faces or fides inclined to the picture, then the fifth article, which relates to the diftance of the picture, muft be different, as will be fhewn in the next fection.

The

PLATE XXXIV

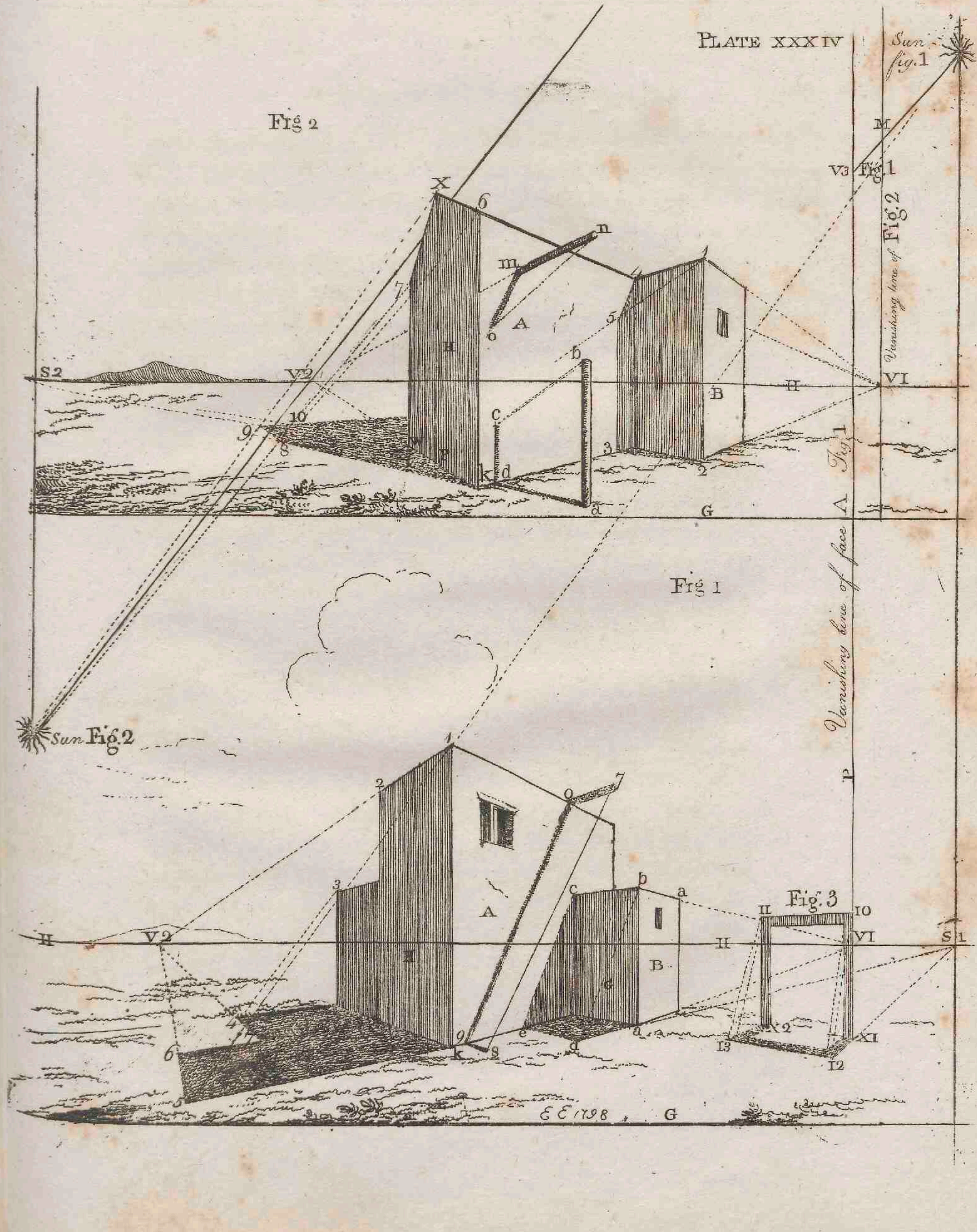


Fig 2
Sun fig.1
M
V3 Fig.1
Vanishing line of Fig.2
X
6
n
m
7
A
o
5
H
b
S2
V2
H
VI
B
10
9
8
c
3
k d
2
a
G
Fig 1
Vanishing line of face A Fig.1
Sun Fig.2
P
1
2
O
7
3
b
c
a
A
Fig. 3
II
10
H
V2
H
VI
S1
B
9
e
a
6
k
8
d
12
XI
13
12
E E 1798
G

N. B. The feat of a point upon the picture is produced by a right line drawn from any given point in the original object, perpendicular to the picture, the interfection of which line with the picture, is its feat. SECT. I. Plate II.

Example I. *Page* 32.

S 1 is the feat upon the picture of the angle e of the fquare; it is alfo the feat of f, becaufe both thofe points are in the line C S 1, which *reprefents* a line perpendicular to the picture.

Alfo in Plate III. Fig. 2, the feat of the angle p of the building upon the picture is at S, which is further explained by the geometrical plan; the angle of the building upon the ground being at O, and the line O S being perpendicular to the picture, therefore S is the feat of the point O upon the picture. PLATE III.

The feat of a point or line upon the picture, or upon the reprefentation of any plane, is further confidered in the fourth fection.

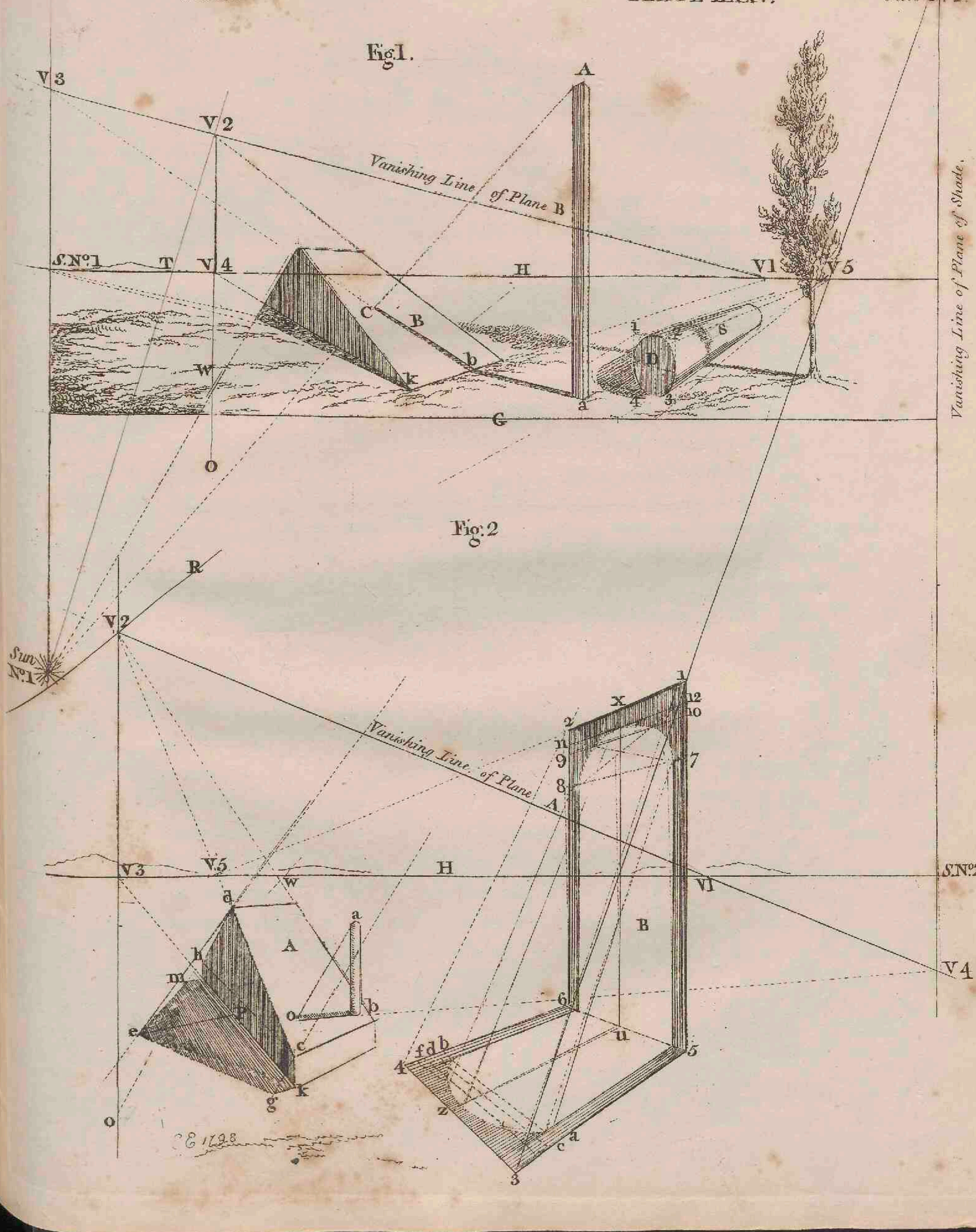
The Scale.

As no true reprefentation of any original object can be obtained, unlefs that reprefentation be drawn to a fcale, fo that all the parts may be in proportion to each other, and alfo to the original object; and as many ftudents in art are quite uninformed of the neceffary principle, it will not be improper to give fome hints for the conftruction and application of a fcale.

* Upon any part of the picture, or upon a feparate paper, draw a

* It is needlefs to obferve, that the fcale muft always be proportioned to the fize of the canvas, tablet, or paper, upon which the object is drawn.

In the example, the fcale is marked by the figures, 4, 8, 12, &c. for the fpace between every figure is intended to exprefs four feet.


Sun No. 2.
Fig. 1.
V 3
V 2
A
Vanishing Line of Plane B
Vanishing Line of Plane of Shade.
S. No. 1
T
V 4
H
V 1
V 5
C
B
b
k
W
a
D
S
i
4
3
G
O
Fig. 2
R
V 2
Sun No. 1
Vanishing Line of Plane A
1
x
12
10
2
n
9
7
8
V 3
V 5
H
S. No. 2
w
V1
d
a
A
B
h
m
V 4
6
p
e
o
b
c
u
f d b
5
4
k
g
z
o
a
c
3

SECT. I. Plate III. right line, or two lines, as in Plate III.; then, with the compaffes extended to any meafure, fuppofe one quarter, or one half of an inch, as may be moft convenient, fet on upon the lines as many of thofe equal fpaces or parts as may be neceffary, fuppofe fix; then divide one of thofe fpaces into 12 equal parts, and let the greater fpaces be confidered as feet, and the leffer as inches, by fuch fcale, not only the object muft be proportioned, but alfo the height of the horizontal line, and the place of the eye, or diftance of the picture, muft be difpofed. Inattention to thefe neceffary confiderations, has not only obfcured the inftructions of many writers on the fcience, but * alfo produced diftortion in their examples and diagrams.

In the courfe of this work, the terms given or fuppofed meafure, are fometimes employed, it may therefore be proper to explain what is meant by the author in thofe expreffions.

When any object or building already conftructed, is to be accurately reprefented in Perfpective, the meafures of all the parts of fuch original object fhould be obtained—thefe are the *given* meafures. The fame may be faid of an original fketch accurately figured, in both which cafes the meafures muft be applied by a fcale.

But when a picture or drawing is to be made of an object, in which general proportions only are required, fufficient to produce a good effect, then the meafures may be fuppofed, in fuch proportion, as may beft anfwer the intention of the artift, without regard to a fcale.

* See figure 24 in Dr. Brook Taylor's firft Treatife, which, though an elegant problem, is yet very ill drawn, and therefore not eafily underftood.
See alfo feveral of the fchemes in Noble's Perfpective.

Fig 1
Page 199.

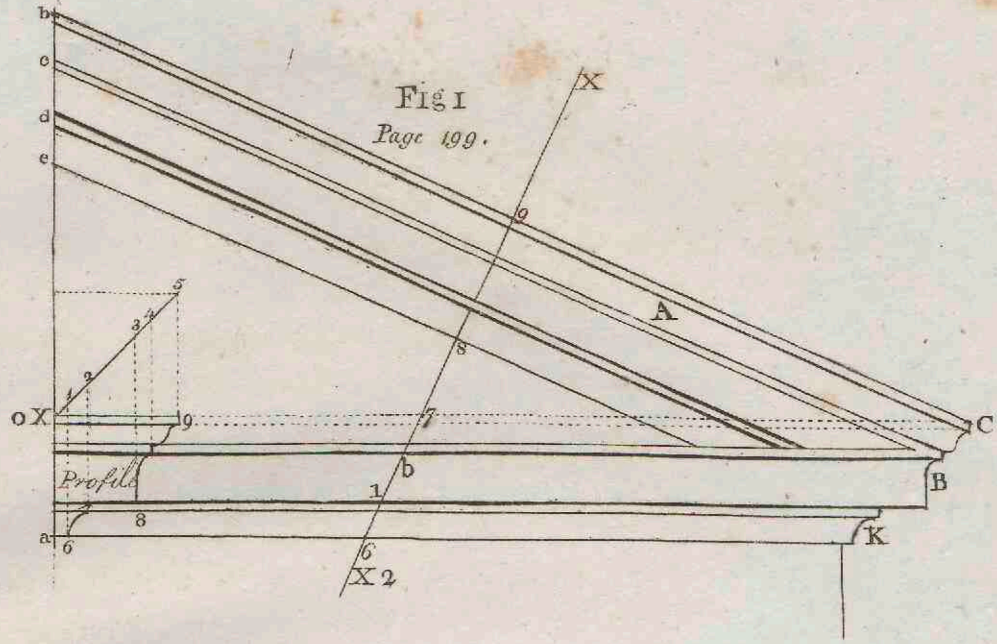


Fig 2
Page 252

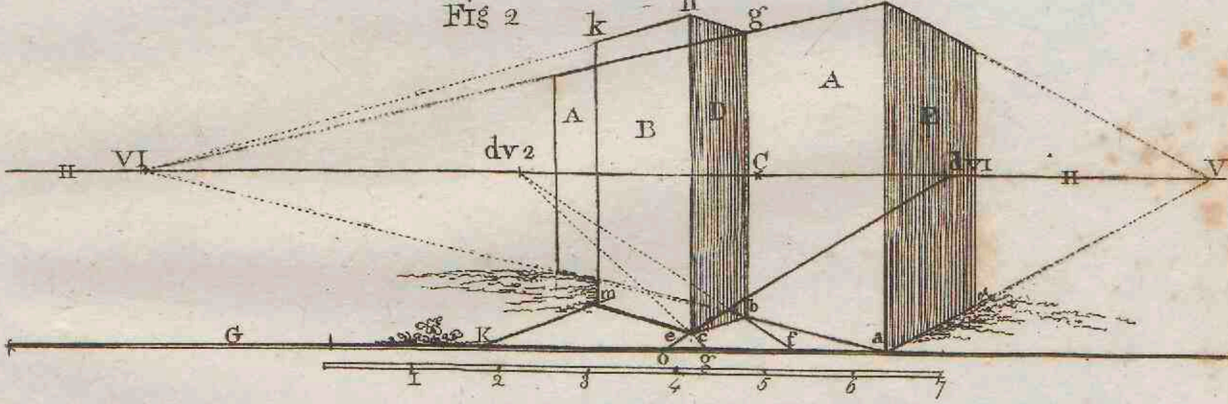
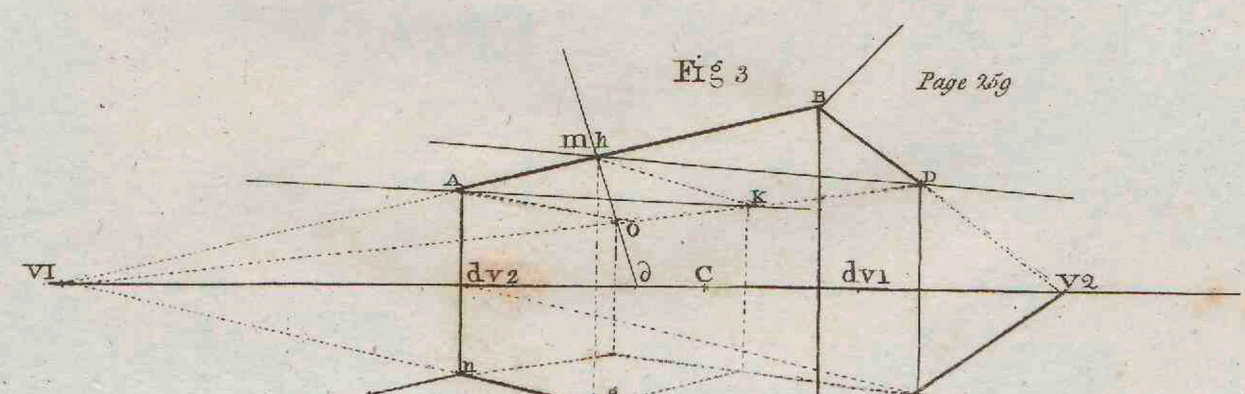


Fig 3
Page 259



SECTION II.

Containing Examples of Objects in which the Lines and Planes are parallel and perpendicular to the Picture.

Plate IV. Fig. 1.

THIS figure reprefents a pavement of fquares, upon which are placed two blocks; the fides of the fquares are each 2 feet in dimenfions.* PLATE IV.

The block, B 1, is 2 feet by 2 feet 3 inches, at the bafe, or end upon which it ftands, and 4 feet high. Its feat or fituation upon the ground, is nearly at the middle of the fecond fquare, beyond the picture; and upon part of the fifth and fixth from the ftation; which ftation may be confidered as at the point S.

The prifm or pillar, B 2, is 2 feet fquare at the bafe, and 18 feet 6 inches high; and it ftands upon the third fquare of the pavement, beyond the picture, in the firft row next the wall.

The breadth of the picture, or tablet, contains twelve fquares, with a margin of one foot breadth on each fide, which margin is alfo expreffed at the farther end, but not in front.

H is the horizontal line, which is drawn 6 feet ½ above the bafe line of the picture, which bafe line is A m. C is the center of the

* The figures in this Plate are both drawn to the fame fcale which is given under Fig. 1.

picture.

PLATE XXXVII

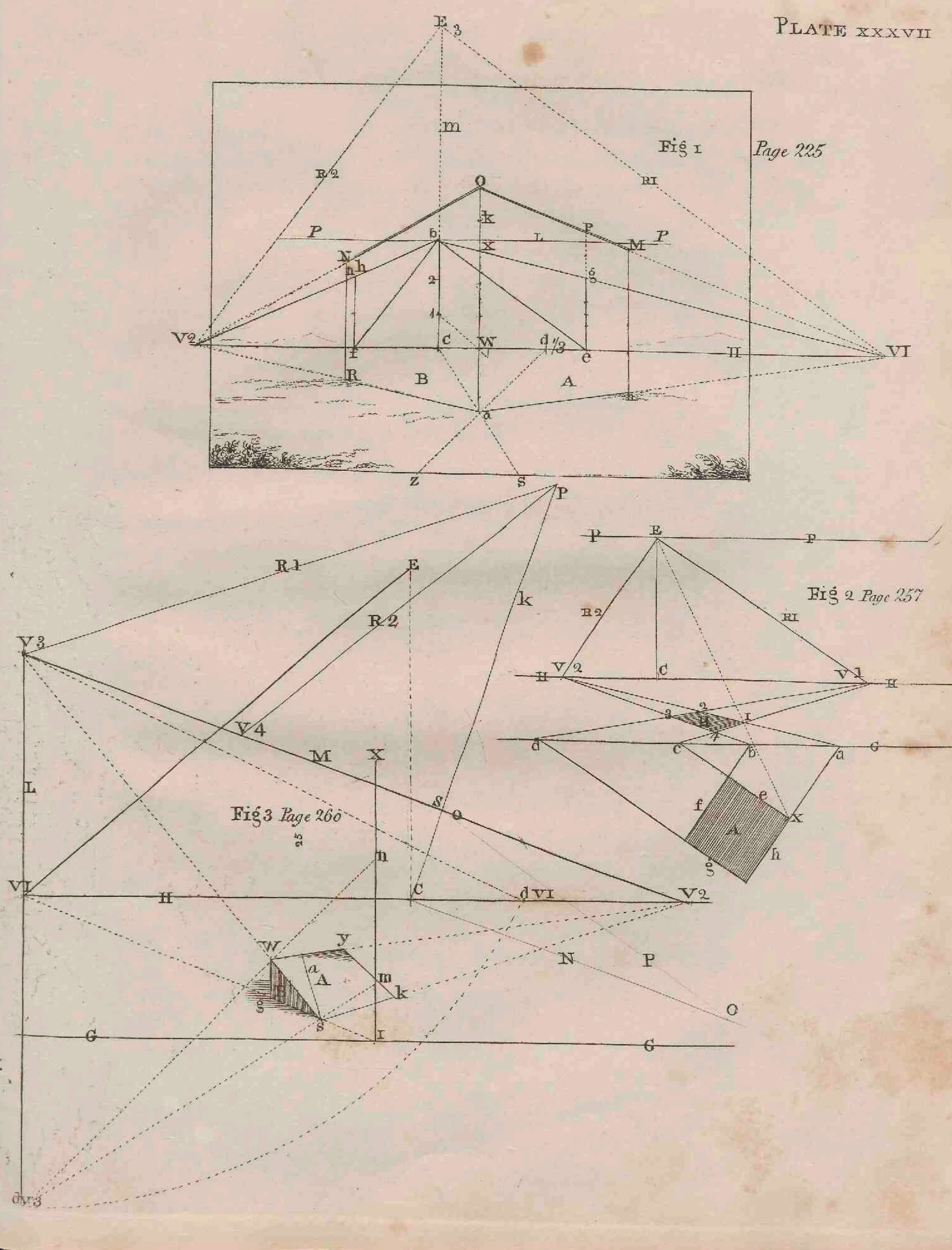


Fig 1 Page 225

Fig 2 Page 257

Fig 3 Page 260

SECT. II. Plate IV.

picture. D 1, D 2, are the points of diftance which are fet off each way from the center C, about 17 feet ½.

Procefs for the Pavement.

For the fquares proceed as follows: * Take 1 foot by the compaffes from the fcale, and fet it from either end of the bafe line, or bottom of the picture, as from y to x, and from o to m, which fpace is equal to the breadth of the margin.

Then take two feet from the fcale, and fet that meafure on the fame line from x to a, to b, to c, and continue thofe meafures to m, and from every one of thofe divifions, draw lines to the center of the picture C, and thofe lines will produce the indefinite appearances of thofe fides of the fquares which are perpendicular to the picture. From the point m in the bafe line, draw a line to the point of diftance D 1, and where that line cuts or interfects the lines which are drawn to C, will give the apparent depths of the fquares, as they recede from the picture.

Laftly, through all the points in which the line D 1 m, interfects or cuts the lines that are drawn converging to C, (as the points 2, 3,) draw lines parallel to the ground line, or bafe of the picture, and the general figure of the pavement will be obtained, which requires nothing more than to be diftinguifhed by the alternate colours of the fquares.

To reprefent the block B 1, proceed as follows:

Let the point w, be the feat of the angle V of the block upon the bafe line.

* This example is bounded by the lines A, A 1, A 2, A 3, which lines, in fubjects fimilar to this, fhould generally be firft drawn, that the whole view may be determined with certainty and elegance, particularly in a drawing. But if a picture is intended, the canvas fhould be made in proportion to the width and height required, and the bafe line drawn a little above the lower edge.

From

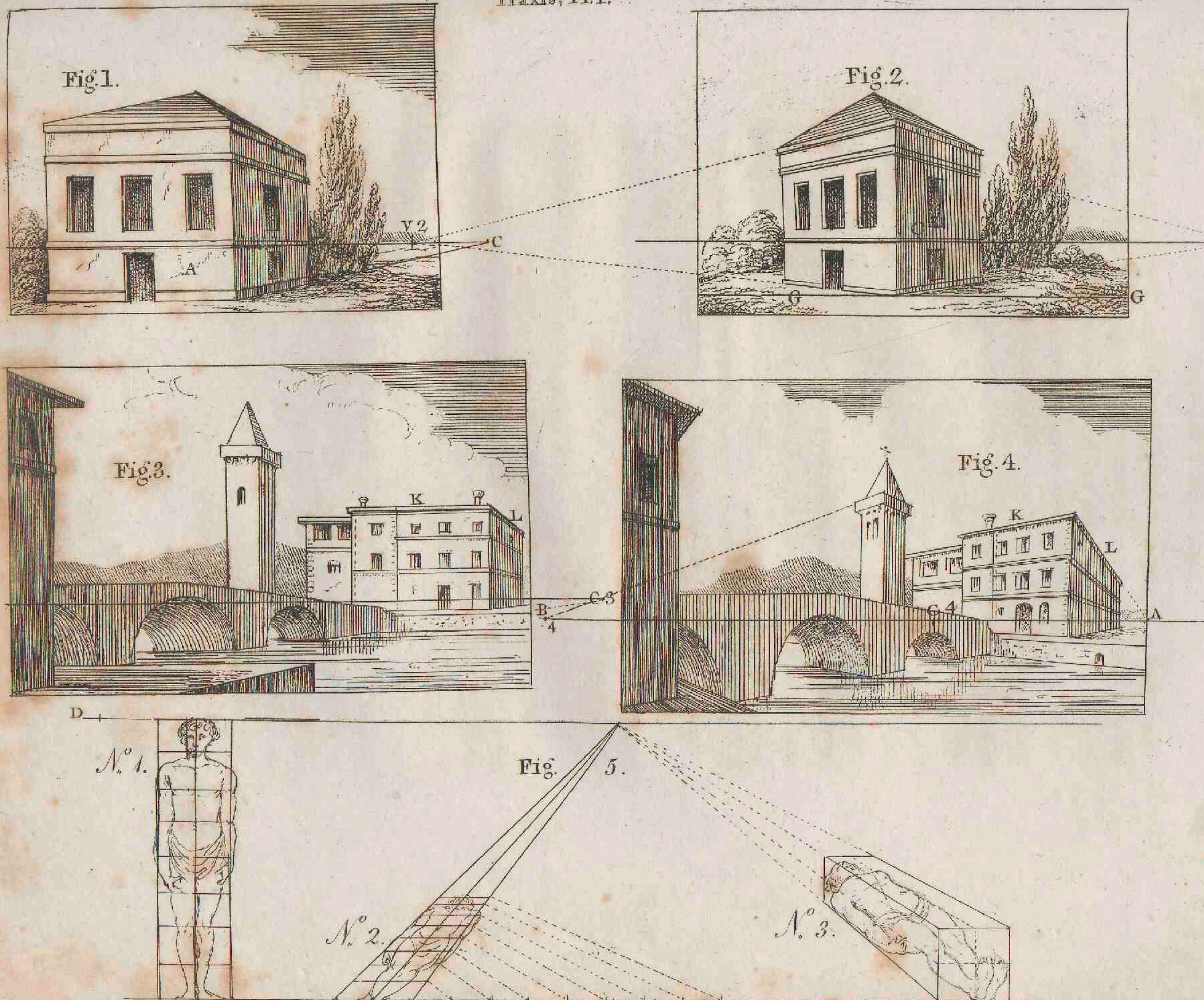


PLATE XXXVIII.

From w, ſet on upon the ground line to p, two feet by the ſcale, and draw lines to C, the center of the picture. SECT. II. Plate IV.

Then from the point p, ſet on to n the meaſure equal the diſtance which the block is beyond the picture, which, in this example, is about 2 feet four inches by the ſcale; and from n, ſet on to z in the baſe line, the meaſure of the depth of the block, nearly 2 feet; and from the points z and n, draw right lines to the point of diſtance D 2, and their interſections, with the line which is drawn from p to the center C, gives the apparent depth of the block, as at the points 6 and 7; at which points draw lines *parallel* to the horizontal line, that may interſect the line drawn from w to C, and the plan of the block will be obtained.

Complete the figure as follows: At the four angles of the Perſpective plan, draw lines perpendicular to the horizontal line, and determine their heights thus; at the point w draw a line perpendicular to the ground line, and upon it ſet up the given height of the block, four feet, as from w to F, and from F draw a line to the center of the picture C, which will interſect the angle of the block at L, and conſequently give the height required.

The priſm, or block B 2, ſtands upon one of the ſquares in the third row beyond the picture, and the ſixth, reckoning from the ſtation S towards the left: the baſe is of the ſame dimenſions with the ſquares. Therefore, at the angles of the ſquare, draw lines perpendicular to the horizon, and determine their height as follows:

At the point x in the ground line, draw a line perpendicular to the horizontal line, as the line x 5, and upon it ſet up the given height of the priſm, as from x to 5; from 5, draw a line to C, the center of the picture, which will cut the angle of the priſm at N, and determine the required height.

At the point N draw a line parallel to the horizon, which will

cut

Fig. 1.

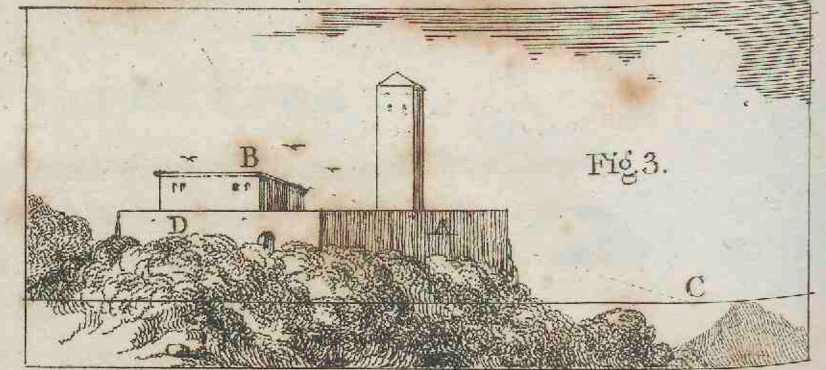


Fig. 3.

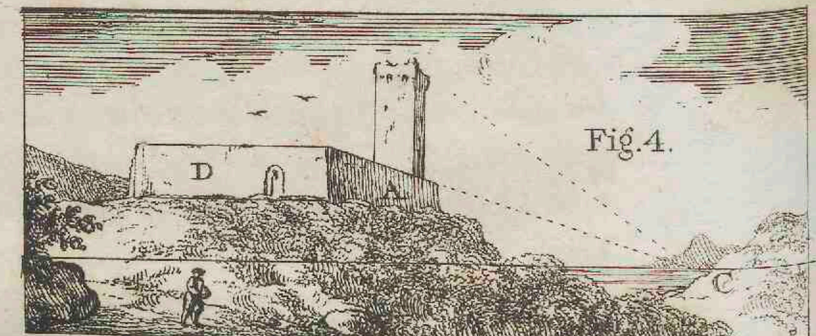


Fig. 4.

Fig. 2

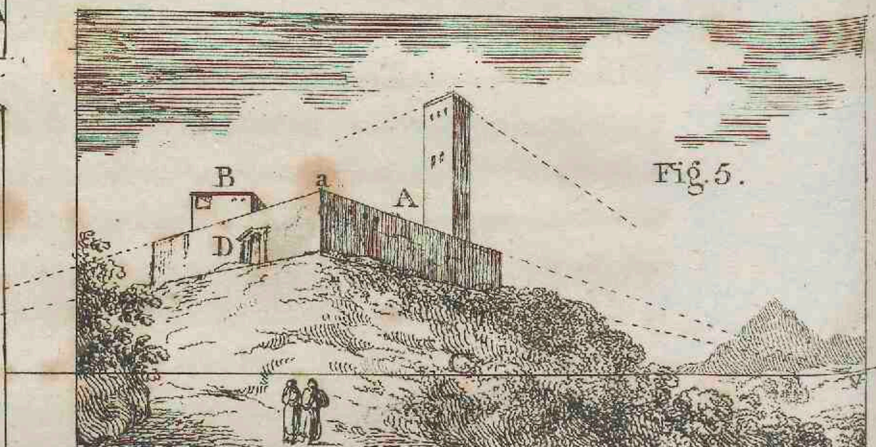


Fig. 5.

Shadows

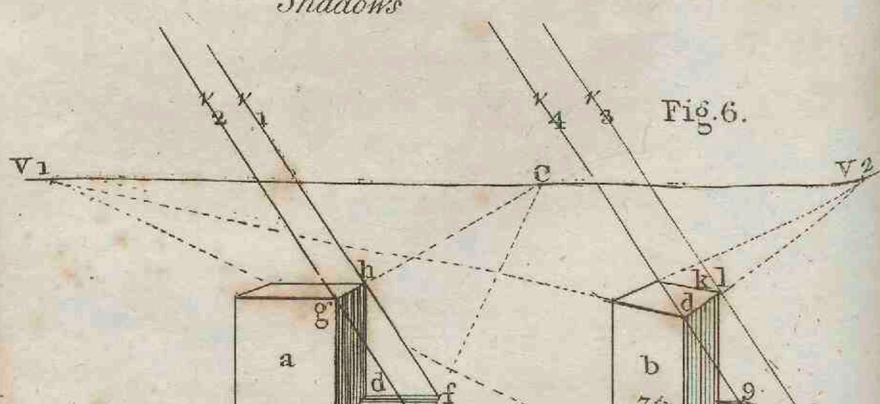


Fig. 6.

SECT. II. Plate IV. cut the other perpendicular line at q, from which draw a line to the center of the picture C, which will give the point z, and determine the height and form of the prism without the cap.*

The representation of the wall Y, T, is obtained by setting up the known height from the base line y to Y, and from Y, drawing a line to the center of the picture C; and as the wall extends to the end of the pavement, nothing more is required than to draw a line at the farther angle of the pavement perpendicular to the horizon, which will give the point T, and determine the limits of the wall.

Plate IV. Fig. 2, is an example of a building with two arches, which may be supposed as intended to contain a garden seat. Its dimensions are as follows: The height is - - 18½ feet.

Width, - - 15½

Depth, - - 8½

Height of the piers from the ground to the spring of the arch 10½

The building is three feet six inches beyond the picture.

H is the horizontal line, which is six feet above the base line of the picture. C is the center of the picture, and D the distance, which is about 17½ feet.

Let the point e, on the base line, be the seat on the picture of the angle P of the building.

From e draw a right line to the center of the picture C.

Then set on upon the base line from e to f, the distance which the object is beyond the picture, which is 3 feet 6 inches by the scale, and from f draw a line to D, and its intersection with the line drawn from

* The covering or cap of the block B 2, is omitted in these instructions, but may be seen in another part of the work. It must be observed, that the whole of the process by which the representations of these blocks are obtained, is but a repetition of that which was first taught in the rudiments, page 32.

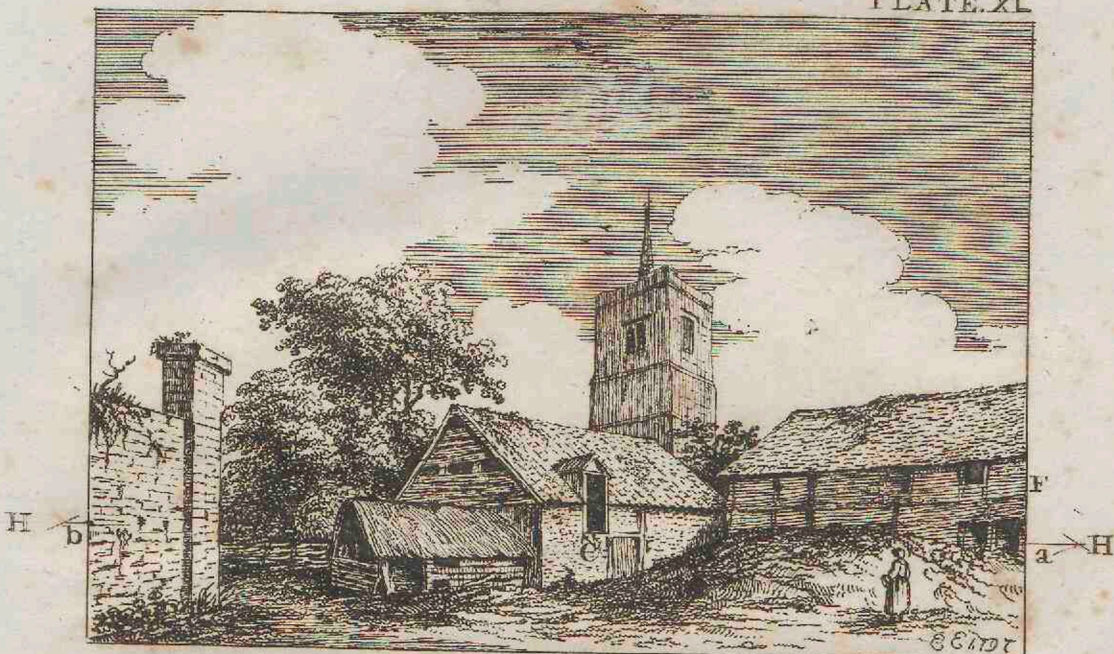


Fig. 1

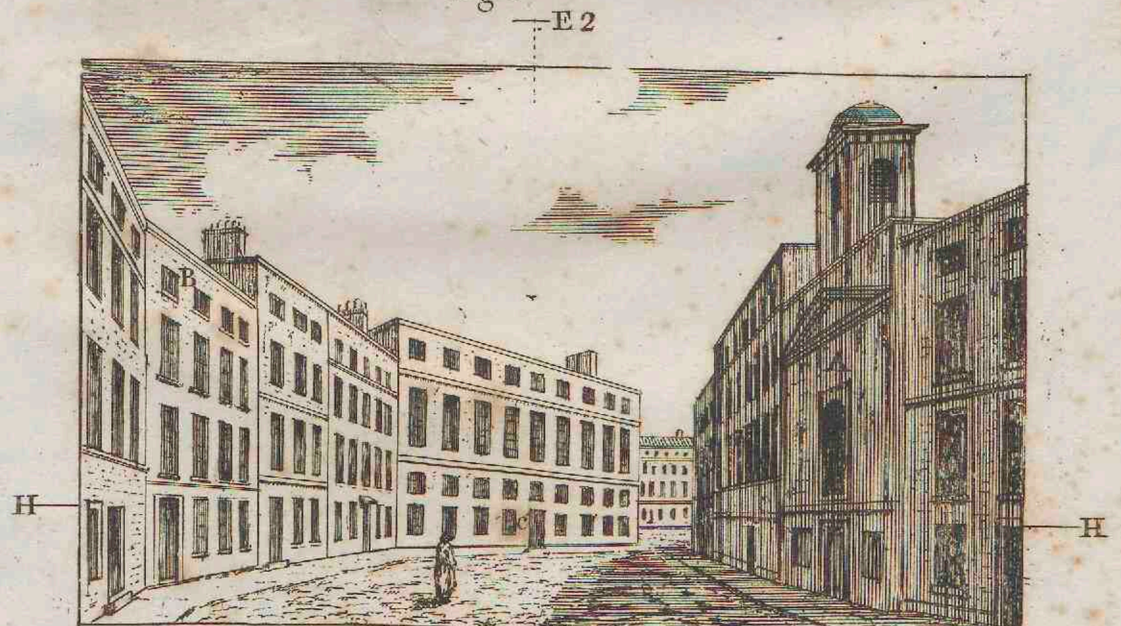


Fig. 2

e to C will be p, which reprefents the feat upon the ground of that angle of the building, which is neareft to the fpectator. SECT. II. Plate IV.

At the point o continue the bafe line to any convenient length, as to x, and from the point e, fet on to x the whole breadth of the building, 15 feet 6 inches, and from x, draw a line to the center of the picture C.

Then at the point p, draw a line parallel to the horizon, or to the bafe line of the picture, as the line p t, which will mark the apparent width upon the ground of the front of the building.

From the point f, fet on to 3 in the bafe line, the depth of the building, 8 feet 6 inches, and draw a line from 3 to D, which will interfect the line e C in S, confequently p S is the apparent depth of the building.

Next determine the height as follows: At the points t, p, s, draw lines perpendicular to the horizon, as the lines t l, p u, and s v. Then at the point x in the bafe line, draw the line x k, perpendicular to the horizon, and from x, fet up the whole height of the building, by the fcale 18 feet 3 inches, to k, and from k, draw a line to the center of the picture C, which will interfect the line t l in l, therefore, t l is the apparent height of the building.

At l draw the line l u parallel to the horizon, and from the interfection u draw a line to the center of the picture, which will give the interfection v, confequently, the lines p t, t l, l u, u v, v s, and p s, determine the general form or outline of the building.

Then find the proportions of the piers and arches as follows:

The piers are all of the fame dimenfions, and the arches are fimilar to each other; their meafures are as follows:

The piers are each 1 foot 8 inches fquare.

The opening of the arches 5 foot 3 inches.

From the point e, which is the feat of the angle p of the building

SECT. II. Plate IV.

upon the bafe line, fet on to d, the breadth of the pier, 1 foot 8 inches, and from d to c, the width of the arch, 5 feet 3 inches; from c to d the breadth of the fecond pier, and then the fecond arch, and laftly, the third pier, obferving that thefe different proportions muft all coincide with the whole meafure of the front, as indicated from e to x. From every one of thofe points draw lines to the center of the picture C, and their interfections with the line t p will mark the apparent widths of the piers and arches, as at the points w, z, y, at which points draw lines perpendicular to the horizon, which will exprefs the faces of the piers with the apertures of the arches.

Their heights muft next be found as follows:

Upon the vertical line x k, fet up from x to h, the height of the piers, 10 feet 8 inches by the fcale, and from h draw a line to C, and its interfection with the angle of the building at n, will be the apparent height of the piers.

Then find their depths as follows: At the point f in the bafe line, fet off to g, the meafure of the depth of the piers, which, in this example, is equal to the fronts; and from g draw a line to the diftance D, and the interfection q with the line e C, will determine the apparent depth of that pier.

To determine the others, draw a line at q parallel to the bafe line, which, by interfecting the lines c C, and f C, will determine the apparent widths of the other piers, as expreffed by the point w.

The depth of the back pier is alfo found by the fame procefs, that is, by marking the meafure from 3 to 2 upon the bafe line, which meafure being transferred by a line drawn to the diftance of the picture D, will give the point r, the apparent width of the back pier.

The places and dimenfions of the fafciæ upon the upper part of the building, are determined by the fame procefs which was em-

ployed

ployed to obtain the height of the building, that is, by fetting the proper meafures upon the line x k, and transferring them to the angle of the building f l, by lines drawn to the center of the picture C, which is * fufficiently demonftrated by the points m and n. SECT. II. Plate IV.

It would be vain to attempt an explanation of the procefs neceffary for the conftruction of every fmall part of the building reprefented in this example; it is fufficient to obferve, that the thicknefs of the wall is marked upon the bafe line from x to a, which is transferred by the center of the picture C, and gives the lower line ~~y~~ z of the interior of the building.

The ftudent will clearly comprehend the conftruction of the other parts, by applying a ruler to the center of the picture C in the example, which will demonftrate the methods for meafuring all heights, and to the diftance of the picture D for all depths.

Thus the heights upon the building of the parts l, m, n, are determined by lines drawn from k, m, h, to the center of the picture C.

And the depths of the piers and building p, q, s, are found by lines drawn to the diftance of the picture D, from the meafures f, g, 3, fet on the bafe line.

Example of a Houfe whofe Front E *is parallel, and whofe Side* G *is perpendicular to the Picture.*

Fig. 1. Plate III.

The bafe line of the picture is marked by its title. H H is the horizontal line; the points of diftance are marked D, and diftance; either of which may be employed, but D is the moft convenient. PLATE III.

* The manner of finding the centers of the arches, and defcribing the archivaults, ~~vaults~~, and foffits, is given in Example F, Plate VII. Fig. 3.

SECT. II. Plate III.

The building is 2 feet beyond the picture.

The front E is 13 ½ feet wide.

The fide G is 16 feet deep.

The height 24 feet.

Let a be fuppofed the feat upon the picture, of the angle of the building neareft the fpectator.

From a, draw a right line to the center of the picture C, as the line a K.

Then from a, fet on upon the bafe line to e, 2 feet by the fcale, equal the diftance which the houfe is beyond the picture; and from e draw a line to the diftance D, which will cut the line a C at S, confequently, the point S will reprefent the angle of the building neareft to the fpectator.

From a, upon the bafe line, fet on to b, the width of the front of the building, 13 feet 6 inches; and from b draw a right line to C, the center of the picture. At the point S draw a line parallel to the bafe line, as S g, which will be the bafe line of the front of the building.

Find the depth of the building as follows:

Set on from e in the bafe line to h, 16 feet by the fcale, and from h draw a right line to the diftance of the picture D, and its interfection K, with the line drawn from a to C, will be the apparent depth of the building.

At the points S, g, K, draw lines perpendicular to the horizon, as the lines g x 2, S v, and K m.

Then find the height of the building as follows:

At b in the bafe line, which is the feat on the picture of the angle g of the building, draw the vertical line b m, and upon that line, fet up the height 24 feet to o, from which point, draw a line to C, the center of the picture, and its interfection x with the line x 2, g will be the height of the building.

At

At x 2, draw a line parallel to the horizon, as x 2, V, and from V, draw another line to the center of the picture C, which will produce the interfection m: then will the lines g, x 2, d v, and K m, reprefent the outlines of the building. It remains to find the reprefentations of the door and window, but it is not neceffary that every part fhould be minutely defcribed, which would be but a tedious repetition of the fame procefs applied to different parts; therefore, no more will be given than to find the appearance of the door, and the height of the top of the middle window, which are obtained by the following procefs: SECT. II. Plate III.

From a in the bafe line, fet on to d the width of the pier, and from d on the fame line, fet on to c the width of the opening of the door; and from thefe two points, d and c, draw lines to the center of the picture C, and the interfections n i of thofe lines, with the bafe line g s of the building, will give the dimenfions for the width of the aperture of the door; as the fpace n i is the breadth required.

Then find the height of the door as follows:

Upon the vertical line b m, fet up from the bafe line the height of the door to y, 6 feet by the fcale, and draw a line to the center of the picture C, which will interfect the angle g, x 2, of the building at 4, then from the points n i, draw two vertical lines to exprefs the fides of the door, and from 4, draw a right line parallel to the horizon, which will exprefs the top of the door.

The middle window is of the fame width with the door, confequently, the fides of the door continued upward, will produce the fides of the window, while its height is found by the fame procefs which is employed for the height of the door; the meafure being fet up upon the vertical line b m, from y to w, and transferred by the center of the picture C, to the plane E, as at the point 5, from which, a line drawn parallel to the horizon, will give the top of the window.

It

SECT. II. Plate III.

* It will be proper to confider the examples in Plate III. in relation to the planes of which the objects are compofed, and alfo to mark other circumftances, with which the ftudent in Perfpective ought to be well informed.

All the buildings in Fig. 1 and 2, Plate III. are compofed of planes, and the doors and windows are to be confidered as apertures in thofe planes; the dimenfions of which muft be found by marking their meafures on the interfections of the picture, and then transferring thofe meafures by the center of the picture, to the edges of the planes, in which thofe apertures are feated.

A Building with Wings parallel to the Picture.

Plate V. Fig. 1 and 2.

PLATE V.

Both examples in the plate muft be confidered as drawn from the fame object; Fig. 2 being an enlarged part of Fig. 1, the better to explain the procefs.

The building confifts of a center, with a fmall arcade, uniting two wings, with an area in the middle.

The fcale is adapted to the fmall example, which is half the fize of the large one; therefore, what is marked 10 feet in the fcale, muft be confidered as no more than 5 feet, when applied to the large example, Fig. 2.

The dimenfions are as follows:

The center part of the building is 66 feet wide.

The plans of the wings are 28 feet ½ fquare, and have the fame height with the center building, which is 37 feet from *a* to p, the top of the blocking courfe.

* The femicircular window, and the other parts of the building, are produced by rules, which are given in the following examples.

The

The width of the area, between the wings, is equal to the width of the center building, which is 66 feet, confequently, the whole extent of the wings and area is 123 feet in front, from *a* to b 2. Fig. 1. SECT. II. Plate V.

The area beyond the wings, is 12 feet on each fide wider than in front, fo that its width between the arcades is 90 feet.

The depth of the area from the front of the wings to the front of the center building, is 87 ½ feet.

* The height of the eye is 8 feet, and the diftance of the picture about 90 feet.

In drawing objects of this kind, proceed as follows:

Draw the ground line, or interfection of the picture, a b 2, Fig. 1, or G G 2, Fig. 2; and upon that line determine the center 1 of the whole breadth of the edifice; and from the center 1, mark half the width of the area between the wings, 32 feet each way, as at b and a 2, Fig. 1; and from b a, each way the width of the wings b a, 28 ½ feet.

Then draw the faces or fronts of the wings geometrically, as X 2, Fig. 2, and difpofe the windows and doors by their true meafures, beginning with the inward pier R, and marking off the piers and windows alternately, to the proper dimenfions, as from b to *a*, in both figures.

Having proceeded thus far, mark the height of the eye, and draw the horizontal line H H.

Then mark the center of the picture at pleafure, as at C, after which, draw the fides of the wings.

* The height of the eye is raifed two feet above the common height, for the fake of producing a more pleafing effect in the appearance of the area, than could have been obtained by the common height.

In this example it muft be obferved, that the center of the picture C, is not in the center of the building, but on one fide, as recommended in the fubfequent inftructions; by this means, the building is better explained, and appears more picturefque than it would do, if the center of the picture coincided with the middle of the door.

It

SECT. II. Plate V.

It muſt be obſerved, that in the example, Fig. 2, the plate not being ſufficiently large to contain the whole diſtance of the picture, the half only is employed; but, as the ſcale is fitted to the ſmall example, the numbers with which it is marked, correſpond with the given dimenſions, although no more than equal to half the proportion of the larger example.

Thus the diſtance of the picture is 90 feet, the half of which is 45 feet; therefore, from the center of the picture C, ſet on to D, 90 feet by the *given ſcale*, which would be no more than 45 feet, if the ſcale were proportioned to the large example, Fig. 2.

Having thus fixed the point of diſtance to half its length, continue to employ the ſame proportion and ſcale, for the meaſures of the ſides of the wings, as follows:

The plan of the wing X 2, Fig. 2, is a ſquare, each ſide 28 feet ½, therefore, take that meaſure from the given ſcale, and ſet it off from the angle b, to the point 4, on the baſe line; then having drawn a line from the angle b, to the center of the picture C, draw another line from 4 to D, and their mutual interſection at N, will mark the depth of the ſide of the wing, at which point draw the vertical line N M.

It muſt be obſerved, that the application of the half diſtance and meaſure, is only to proportion thoſe lines which repreſent lines perpendicular to the picture, not thoſe which are parallel to it; as the line b N, Fig. 2, is perpendicular to the picture, repreſenting the depth of the wing; but the fronts which are parallel to the picture, muſt be determined by the whole meaſure.

Then from the point S, in the upper angle of the front, draw a line to the center of the picture C, which will interſect the line N M, and produce the repreſentation of the outlines of the ſide of the wing.

Complete

SECT. II. Plate V.

Complete the ſide as follows:

The windows are 8 feet wide, and of the ſame height with thoſe of the front, and the piers are 10 feet 5 inches wide each.

Therefore, take 10 feet 5 inches from the ſcale, and ſet it on from the angle b to the point e, and from e to 5, the width of the window, by the ſcale 8 feet, and from 5 to 4, the width of the pier as before, and from the points e, 5, 4, draw lines to the point of diſtance, D, and the interſection of thoſe lines, with the line that is drawn from b to the center of the picture, as the points n p, will give the perſpective proportionate width of the window, at which points, draw lines perpendicular to the horizon, which will determine the width of all the windows on that ſide.

To determine their heights, continue the bottom and top lines of the windows in the front X 2, till they interſect the angle b S of the wing, as at the points f, f; and, from thoſe points, draw lines to the center of the picture C, which will determine the height of the windows in the ſide w, as marked by the example.

Having thus far determined the forms and general proportions of the wings, proceed to deſcribe the center part of the building O, which, as before obſerved, is equal to the ſpace between the wings, 66 feet.

The depth of the area, from the front of the wings, to the front of the center building, is 87½ feet, which is 57 feet more than the depth of the wing; therefore, take 57 feet from the ſcale, and ſet it upon the baſe line from the point 4 to the point G 2, and from G 2, draw a right line to the half diſtance D, and its interſection y, with the line that is drawn from the neareſt angle b of the wing, to the center of the picture C, will give the depth of the area.

At the point y, draw a line parallel to the horizontal line as v R, which will be the baſe line of the center building; then determine

SECT. II. Plate V. its breadth by continuing the fide of the other wing, to the center of the picture C, as from *a* 2, in Fig. 1, which will give the interfection k, and confequently determine the width of the center building, as y K in the fmall figure.

To find the apparent height, draw the line *g*, *g*, *g*, Fig. 2, perpendicular to the horizon, at the interfection y, and continue the line from the blocking courfe S, on the fide of the wing, to the center of the picture C, and the interfection *g* x, Fig. 1, or Fig. 2, will be the apparent height of the center building O.

Complete the general form of the front O, obferving the break where the * pediment fprings, and determine the door and windows as follows:

In the bafe or ground line, the point 1 is the middle of the extent of the whole building, confequently, it may be confidered as a point in a right line, drawn from the middle of the door; therefore, draw a right line from 1 to the center of the picture C, and its interfection, with the lower line V of the center building, will give the reprefentation of the middle of the door as at m.

Find the width of the door by fetting its real width by the fcale, 5 feet, half of which muft be marked on the ground line, each way from the point 1, as the points 2, 3. Fig. 2.

Transfer that meafure to the front of the building, by lines drawn from 3 and 2 to the center of the picture C, and the interfections of thofe lines, with the bafe line V of the center building, will give the

* To thofe who are not acquainted with the principles of architecture, it is neceffary to obferve, that all pediments have certain proportions for their height or pitch, the beft medium of which is, two ninths of its width. Thus in example, Plate V. Fig. 3. *a b* is the width of the pediment, thererefore the dotted line a b, is divided into nine equal parts, two of which are fet up from 3 to C, confequently, C is the height of the pediment, to which point, draw lines from a and b, and the general outlines of the pediment will be determined.

apparent

apparent breadth of the diſtant door, as is expreſſed in the example, Fig. 2. SECT. II. Plate V.

For the proportions of the piers and windows, purſue the ſame proceſs as for the door. Thus, upon the ground line G G 2, ſet off from 3 to 8, the width of the pier, and from 8 to 9, the width of the window; and transfer thoſe meaſures to the baſe line V m of the diſtant front, by lines drawn to the center of the picture C, and the interſections of thoſe lines, with the line V *A*, will give the apparent breadth of the windows; from which interſections, draw lines perpendicular to the horizon, which will determine the breadth of the windows.

Then find the height of the windows in the diſtant building, by continuing the lines of the tops and bottoms of thoſe which are on the ſides of the wings, as from f f, &c. to the center of the picture C, and the interſections of thoſe lines with the angles g, g, g, will mark the dimenſions required, which dimenſions muſt be transferred to the ſpaces for the windows, by lines drawn parallel to the horizon, as the lines g h, g h *.

Fig. 2. For the width of the area beyond the wings, ſet the additional meaſure, 12 feet, from b to X on the baſe line, and draw the vertical line X X 2. From the point X, draw a line to the center of the picture C, and extend the baſe line V *A*, of the center part of the building, till it interſects the line X C in the point R; and draw the vertical line R T, which will be the remote angle of the arcade, the height of which is marked from X to k, in the line X X 2, and is transferred to T by a line drawn from k to the center of the picture.

In drawing perſpective views of buildings, ſimilar to this example, it cannot be expected that all the ſmall parts ſhould be made out by

* To find the height and pitch of the roof on the wings, ſee Plate IX. Fig. 3. The pediment is alſo illuſtrated and explained in the third ſection, Plate 30.

SECT. II. Plate V. the ſtrict rules of the ſcience, yet the general form muſt be decided with accuracy; after which the ſmaller parts, ſuch as the members of the cornice, the dreſſings of the doors, windows, and other inferior ornaments, may be finiſhed by the eye, particularly in ſmall drawings; but in larger works, the ornamental parts muſt be added agreeably to the rules which are given in the ſucceeding parts of this work.

It is alſo prudent never to deſcribe the exterior view of any ſingle building as diſtant from the picture, but to draw it as commencing at the interſection of the picture; and afterwards to introduce a fore ground, as indicated in Fig. 1, where the line a b 2, is the interſection or ground line, although drawn above the lower limits of the picture; by this method, great trouble and much time will be ſaved, eſpecially when the object is inclined to the picture.

The heights and conſtructions of the roofs of the wings, are determined by the proceſs given for the example, Fig. 3. in Plate IX. the general form of that figure being exactly the ſame with the wings in Plate V.

The pediment of the center part of the building having all its parts parallel to the picture, may be drawn almoſt geometrically; eſpecially when the repreſentation is ſmall and diſtant from the picture, as in this example; but when large, thoſe parts muſt be determined by the rules given for the explanation of the figures in Plates IX. and X. which exhibit examples of mouldings parallel and perpendicular to the picture.

Interior of a Room, whoſe Sides are parallel and perpendicular to the Picture.

PLATE VI. In Plate VI. is an example repreſenting the inſide of a chamber, which may be ſuppoſed a drawing-room, finiſhed with a cove and a flat ceiling, divided into compartments.

The

The proportions are as follows:

The whole length of the room is 26 feet 3 inches.

The width 20 feet.

The height, including the cove, 15 feet.

The height of the windows 12 feet.

Their width 4 feet 3 inches.

* The width of the piers 3 feet 9 inches.

The height of the door 7 feet 8 inches.

The width 3 feet 6 inches.

The chimney 3 feet 6 inches high, by 4 feet 3 inches wide.

Before the ſtudent proceeds to operation, it will be proper for him to obſerve, that in this example, the ſpectator is ſuppoſed to be ſtanding in the room, therefore, the whole of it is not ſeen by him, becauſe a part lies behind the angle of his viſion; hence it follows, that all the firſt pier, and more than half of the neareſt window, cannot be introduced into the picture, becauſe it cannot be ſeen by the ſpectator; this muſt ever be the caſe in all interior views.

The ſpectator being prevented by the limits of the room, or building, from retiring to ſuch diſtance as would allow him to comprehend the whole within the angle of viſion; therefore, a part muſt be omitted, to produce a natural repreſentation, as in this example: yet, by the rules of the ſcience, the room might be repreſented to its full length, but ſuch repreſentation would give a falſe idea of the dimenſions, by making it appear longer than the original, an effect which ought ever to be avoided †.

The operation is as follows:

* The ſecond pier is rather leſs.

† A portion of the room, equal to 6 feet 3 inches, is omitted, as not falling into the angle of viſion.

Draw

SECT. II. Plate VI.

Draw the boundary lines, or limits of the picture, equal to the given meafures of the width and height of the room, as the lines B 1, B 2, B 3, B 4.

Then draw the horizontal line at a proper height above the bafe line, or bottom of the picture, as the line H H is the horizontal line, which is 5 feet 6 inches above the line *a*, B 4, b.

Then determine the center of the picture C, and alfo the point of diftance *, which, in this example, is 16 feet by the fcale, from C.

Having thus determined the center and diftance, draw right lines from the four angles, *a*, b, K, d, to the center of the picture C.

Then, on the bafe line, fet off from the point a, the meafure of the depth of the room, as from a to b, which, in this example, is no more than 20 feet, that meafure being as much as can be feen by a fpectator ftanding in the room.

From b, draw a right line to the point of diftance, which will interfect the line that is drawn from a to C in the point e, confequently, the fpace from a to e reprefents the vifible depth of the room.

At the point e, draw a right line parallel to the bafe line of the picture, as the line e f, interfecting the line which is drawn from the point b to C in the point f.

Then is the line e f the bafe of the farther end, and the points e f the farther angles or corners of the room.

At the points e and f draw lines perpendicular to the horizontal line, as the lines e g, and f h, which may interfect thofe lines which are drawn from the upper angles c and d, in the points I and m, which lines, with thofe before drawn, exprefs the general form of the room.

* The diftance of the picture is marked by the word *diftance*.

Then

Plate VI.

Then find the reprefentations of the piers and windows as follows:

At the point b in the bafe line, which is the point by which the apparent length of the room was determined, fet on from b to n, the depth of the fartheft pier, equal 3 feet 6 inches by the fcale; and from n, draw a right line to the diftance of the picture, and its interfection, with the line a e, as at t, gives the apparent width of the fartheft pier.

Then from the point n upon the bafe line, continue the alternate meafures of the windows and piers, as at the points P, 3, 2, 1; and from thofe points, as before directed, draw lines to the diftance of the picture, which will produce the interfections t, s, r, w, z, the apparent breadths of the windows and piers.

Then determine their heights as follows:

Upon the line B 1, fet up the meafure 12 feet by the fcale, from a to *a*, and draw a right line from *a* to the center of the picture, and from the points z, w, r, s, t, draw lines parallel to B 1, and the interfection of thofe lines, with that which is drawn from *a* to C, as at b d, will give the general forms of the fpaces for the windows.

After having determined the piers and windows, defcribe the receffes as follows:

The point a, in the bafe line, expreffes the extreme width of the room on the left of the fpectator; but the receffes extend beyond that point, nearly equal to the thicknefs of the wall of the building. Therefore, continue the bafe line from a, and fet on from a to R, the depth of the recefs equal 2 feet; and from R, draw a right line to C, the center of the picture; and from the points t, r, z, draw lines parallel to the bafe line, as the line r y in the fecond window, which line marks the apparent depth of the recefs upon the floor.

At d, draw the line d *e* parallel to the floor, and at y, draw the line

y e per-

SECT. II. Plate VI. $y\ e$ perpendicular to the horizontal line, or, which is the ſame in effect, parallel to the line B 1.

Through the point e, draw a line from the center of the picture, and the receſs of the ſecond window will be determined. *

Then proceed to determine the door as follows:

This aperture being in the middle of the chamber, divide the baſe line into two equal parts, as at M, and from that point ſet off on each ſide to X X, half its width, 1 foot 9 inches, and from thoſe points, draw lines to the center of the picture, and the interſections of thoſe lines, with the line e f, will mark the apparent width of the door at Y Y.

To determine its height, take the meaſure from the ſcale 7 feet 9 inches, and ſet it up from b to T in the line B 2, and from T, draw a line to the center of the picture C, which will cut the line f h in the point L.

At the two points Y Y, draw lines perpendicular to the horizon, for the ſides of the door; and from the point L, draw a right line parallel to the horizon, and the mutual interſections of thoſe lines will determine the appearance of the width and height of the door.

The architrave, with the frize and cornice, muſt be determined by the ſame proceſs, which produces the width and height of the door: thus the meaſures of the width of the architrave muſt be marked on each ſide of X X, in the baſe line, and transferred by the center of the picture C, to the line e f, and the height of the frize and cornice muſt be ſet above the point T in the line B 2, and transferred by the point C (which is the center of the picture) to the line f h; and from thoſe

* The other windows cannot be ſeen, the firſt being too near, and the third too diſtant.

points,

points, draw lines parallel to the horizon, which will determine the members both of the frize and cornice. SECT. II. Plate VI.

The chimney in this example has no ornament, but a plain fafcia, which furrounds the aperture.

To determine the reprefentation of the chimney aperture, proceed as follows:

Through the further angle f of the room, draw a right line from the diftance of the picture, that may interfect the bafe line, as the line f n, which paffes through f, and interfects the bafe line in the point a. Then from the point a, fet on upon the bafe line, 13 feet by the fcale, to the point 4, that being *half* the length of the room. On each fide of the point 4, fet off half the width of the aperture of the chimney, 2 feet 1 inch to the points 5 and 6, from which points, draw lines to the points of diftance*, interfecting the fide of the room in the points k i, which give the apparent width of the opening of the chimney.

For the height of the aperture of the chimney, fet up the meafure 3 feet 8 inches from the point b in the bafe line, to the point 9 in the line B 2, and draw a line to the center of the picture C.

Then from the point k and i, draw lines perpendicular to the horizontal line, and their interfections, with the line which is drawn from 9 to C, will determine the aperture of the chimney.

The height of the fur-bafe is about 3 feet 2 inches; therefore, from the lower angle b of the room, fet up that height by the fcale, from the point b to the point 7 in the line B 2, and draw a line to the center of the picture C, which will reprefent the upper line of the fur-bafe; under which defcribe the profile of the mouldings, and draw lines to C, and at the interfection of thofe lines, with the line f h,

* The point fhould lie on the right fide of the example, but is omitted, for want of fpace, on the plate; but the lines drawn from the points 5 and 6 indicate its place.

SECT. II. Plate VI. draw the returns of the mouldings at the farther end of the room, parallel to the horizontal line.

The cornice muſt be delineated by the following proceſs:

On either ſide of the room, as at G 1, or G 2, which points mark the extreme height of the cornice from the ground, draw the geometrical profiles of the mouldings, as the profile G 1, on the line B 1.

And from every angle of the projection, draw lines to the center of the picture C, producing thoſe lines forward before the profile, until they terminate in the line which expreſſes the limits of the ſides of the room, as at G 2 on the right ſide; for, as the cornice continues behind the ſpectator, no break or interruption can be ſeen.

To find the return of the cornice at the farther end of the room, determine the mitres, as at the points g and h, by drawing lines through the angles of the mouldings from the points of diſtance, as the line 15, which gives the mitre for the upper moulding, and will be a ſufficient guide for the delineation of the parts, when the repreſentation of the room is ſmall; but in large works, where great accuracy is required, the repreſentation muſt be obtained by the rules given in the laſt example of this Section, Plate X. in which is a full explanation of the proceſs for repreſenting mouldings that are parallel and perpendicular to the picture.

The cove and ceiling, with its compartments and ſoffits, are the next and laſt conſideration; but, before the proceſs is deſcribed, by which their repreſentations are obtained, it will be proper to make ſome obſervations upon their forms.

The flat part of the ceiling is divided into nine compartments, by eight ſoffits or faſciæ, thus: F, K, P, O, are the ſoffits which paſs lengthwiſe the room, and V 1, V 2, croſs the ceiling tranſverſely at the farther end; but the ſoffits at the neareſt end of the room, parallel to V 1 and

V 1 and V 2, are not feen, becaufe they lie behind the view of the fpectator. SECT. II. Plate VI.

The lines K 1, and d m, exprefs the angles where the ceiling would interfect the fides of the room, provided there was no cove. Therefore, from K, the neareft point in that interfection, fet off to the point 10, the meafure equal to the projection of the cove, 1 foot 4 inches, and repeat the fame projection at the point d, to 14, on the contrary fide.

Then divide the fpace between the points, 10 and 14, into the proper divifions, marking off upon the line M 2, the places and breadths of the foffits F K, and P O, which, in the example, are about 9 inches wide; and, from thofe divifions, draw lines to the center of the picture, as from 10, 11, 12, which lines will give the longitudinal foffits of the ceiling.

Then determine the reprefentations of the tranfverfe foffits, V 1 and V 2.

But, before the procefs is defcribed, it will be proper to obferve, that the foffit V 1, projects forward as far before the wall, at the farther end of the room, as thofe marked K and P, projects beyond the fides; confequently, the line z z, of the foffit V 1, is the fame diftance from that wall, as the point 13 is from the point d, which, in the example, is 5 feet 9 inches.

From the point of diftance, which lies on the right hand, draw the line N through the point f in the floor, that may interfect the bafe line, as at the interfection a.

From a, fet on upon the bafe line to the point A, the diftance of the inner or nearer edge of the foffit V 1, from the wall, equal 5 feet 9 inches; and from A, return a line to the point of diftance, which will interfect the fide of the room f b, in the point V, confequently, the portion of line f V upon the floor, is equal to the apparent pro-

SECT. II. Plate VI. jection of the cove, together with the compartment S, and the two soffits, V 1 and V 2, upon the ceiling.

At the point V on the floor, draw a line perpendicular to the horizon, as the line v w, and its intersection with the line m d, which is the intersection of the ceiling, with the side B 2 of the room, gives the point W.

At the point W, draw a right line parallel to the horizon, which will be the outer line of the soffit V 1, projecting forward before the farther end of the room.

The soffit V 2, is found by the same process with the former, therefore the instructions need not be repeated.

The pannels of the window shutters are determined by first drawing those of the nearest recess, and then transferring those proportions to the remote pannels, by lines drawn from the nearest, to the center of the picture, as from X to C, which sufficiently explains itself to the slightest inspection.

The pannels of the door may be determined by setting their widths upon the base line, between the points x x, and their heights upon the line B 2, and then transferring those measures to the proper place, by lines drawn to the center of the picture, in the same manner as was done for the door.

It must be observed, that those persons who understand the construction of pannels, need not apply real measures, but may proportion the parts by the eye, especially when the drawing or picture is small.

The process which is employed to obtain the true representation of the parts in this example, is the same that must determine the various features in the interior representations of all buildings, whose sides are parallel and perpendicular to the picture; for though they may be very different in appearance, yet the general principles are the

same

fame in every fpecies of architecture, feeing that all edifices are compofed of right lines, difpofed perpendicular, or parallel to the horizon.

For, fuppofe it be required to reprefent the interior view of St. Paul's, or Weftminfter Abbey, or any fimilar edifice, the firft circumftance to be determined by the artift is, the height and width of the building; to which dimenfions, the drawing or picture fhould correfpond; then the breadths or thicknefles of the piers, or columns, and alfo the fpaces between them, fhould be proportioned to each other by the fame procefs, which is given in this example, for determining the piers and windows. The heights of all the fmaller parts muft alfo be found by the fame procefs, as there can be no difference in the methods employed for obtaining their reprefentations, whether the edifice be of few parts and plain, or of fuch as are more numerous and magnificent.

N. B. In the foregoing example, the meafures for the piers and windows are arranged by the point which marks the *diftant* angle of the room upon the bafe line of the picture, as at b, from which point the meafures are continued to a. This procefs may be confidered as inverfe, becaufe the nearer angle of the chamber cannot be feen, and therefore the meafures are applied from that angle which can be feen.

In Plate VII. Fig. 1, is an example fimilar to the foregoing, but the parts are proportioned by the half diftance which lies within the breadth of the room, and confequently within the limits of the picture, as the point d $\frac{1}{2}$.

It alfo demonftrates how the meafures may be transferred from one fide to the other, fo that much trouble may be prevented, and a confufion of lines avoided.

The general meafures of the room are as follows:

The

SECT. II. Plate VI.

The width 17 feet from X to Y.

The length or depth 24 feet.

The height 17 feet.

The firſt pier a, as alſo the fartheſt pier, 2 feet 6 inches wide.

Windows 3 feet wide.

The other piers 5 feet wide.

H H is the horizontal line, and the height of the eye is about 4 feet 9 inches.

The diſtance of the picture is at D, which is by the ſcale, 12½ feet from C, the center of the picture.

From C to d ½, is exactly half the ſpace from C to D, conſequently, d ½ is half the diſtance of the picture.

Therefore, to proportion the ſpaces on the ſides of the room, take half the given or known meaſures of the parts required, and apply them as follows:

The firſt pier is only 2 feet ½ wide, therefore, take half that meaſure, 1 foot 3 inches by the ſcale, and ſet on the baſe line from X to 1, and from 1 to 2, ſet on 1 foot 6 inches, which is half of 3 feet, the width of the window; and from thoſe points, draw lines to the half diſtance, d ½, and the interſections of thoſe lines, with the line X c, as at a b, will mark the apparent widths of the piers and windows.

Continue the alternate meaſures of the piers and windows by their half proportions upon the baſe line, as marked by the points 3, 4, 5, and on to the point 11; and from every one of thoſe points, draw lines to the point d ½ as before, and the interſections of thoſe lines, with the line which is drawn from the point X to C, the center of the picture, will give the apparent ſpaces of the windows, piers, and pilaſters, with as much accuracy as if the whole meaſures were employed.

As

As it would occafion much trouble, and produce great confufion of lines, to determine all the parts required on the fide B of the room oppofite the windows, by the fame procefs which was employed to determine the parts or divifions on the fide A; thofe parts may be accurately marked by the following method: SECT. II. Plate VI.

From every one of the divifions, at the lower angles of the pilafters, draw right lines parallel to the bafe line, as the line z k, which lines will give the divifions for the parts required, as the point k is the neareft angle of the fecond pilafter on the fide B, exactly oppofite to the pilafter Z on the fide A.

The procefs which is here given, is applicable to the interior reprefentation of every building, whofe oppofite fides are fimilar to each other; for, having found by the center and diftance * of the picture, the neceffary divifions of the parts on either fide, as may be moft convenient; the parts on the oppofite are defined, by drawing lines parallel to the bafe line of the picture, from the points in the fide upon which the meafures have been before determined, to the lower line of the contrary fide, as the line K Z, drawn parallel to the bafe line X 10, determines the point K exactly oppofite the point Z, therefore, the point K is the neareft angle of the fecond pilafter, on the fide B, exactly oppofite to the neareft angle Z of the fecond pilafter, on the fide A of the room.

In this example, the full length of the room is defcribed, as from Y to W, but the effect of the whole, in confequence of fo much being fhewn, is lefs pleafing, and not fo natural, as in the foregoing example; for the fpace B, between the neareft pilafters on the left fide, appears too wide in proportion to the next fpace D, and the aperture of the chimney does not feem to be in the middle of the fides, but more remote in the room; yet, it is perfectly juft as to the rules of

* Or by the half diftance, or any other proportion.

the

SECT. II. Plate VI. the science; but it may be said, that those rules are violently forced into action, and therefore, the consequent effect is not pleasing, nor strictly just.

Of Steps parallel to the Picture.

In Plate XVI. Fig. 2, is an example of the method for determining the representations of steps, when situated parallel to the picture.

The horizontal line is H H, and G G is the base or ground line.

The center of the picture is marked center.

The distance is at D P.

The nearest step touches, or is in the plane of the picture; its width is marked X 2, g, and its height a o; through which points, the face is drawn geometrically.

At the angle X 2, mark off, on the ground line, the measure of the depth or tread of the steps, as from X 2 to d, and from d to e, and also to f.

From X 2, draw a right line to the center of the picture, as the line X 2, N, and from the points d, e, and f, draw lines to the distance of the picture D P.

At the angle X 2 of the step, draw a line perpendicular to the base line, as the line X 2, c, and upon that line, set up the heights of the steps, as many as may be required, as from a to b, to c, from all which points, draw lines to the center of the picture.

Then from the points L, M, N, draw lines perpendicular to the base line, which will intersect the lines that are drawn from a, b, c, to the center of the picture, in the points k, l, m, n, and by their mutual intersections, form the profile of the steps.

Then determine the front and tops of the steps as follows:

At

At each of the points k, l, m, n, draw lines parallel to the horizontal line, which lines will exprefs the horizontal edges ~~angles~~ of the fteps. SECT. II. Plate XVI.

From the point o, the upper and remote angle of the loweft ftep, draw a line to the center of the picture, as the line o, p, which by its interfection with the line k p, forms the tread or furface of the loweft ftep; from p, draw another line perpendicular to the horizon, as the line p h, which line, by its interfection with the line q h, will determine the front of the fecond ftep.

It is needlefs to continue the inftructions beyond what are already given, as the reprefentations of the other fteps are found by a repetition of the fame procefs, which produced the firft; and a ftrict examination of the figure, with the application of a ruler from the center, and diftance of the picture, to the different points in the object, will clearly demonftrate what is required to complete the figure. Obferving, that all the meafures for the heights or rife of the fteps muft be fet upwards upon the vertical line X 2, c, and their apparent heights determined by lines drawn from thofe points to the center of the picture, but the breadths or depths of thofe fteps are applied to the bafe line, as at the points d, e, f, from which lines are drawn to D P, the diftance of the picture, which produce the interfections L, M, N, and mark the breadth of the fteps.

Another method may be employed for the reprefentation of fteps, as fhewn in Plate XVI. which is more elegant and fimple than the foregoing, but being more fcientific, is given in the fourth Section, fee Index.

SECT. II.

Of the Reprefentations of Arches parallel to the Picture.

PLATE VII. Examples of two different kinds are given in Plate VII.

Fig. 1, and Fig. 2, are examples of arches which are the fegments of a circle.

Fig. 3, is the femicircular arch.

When the arch is a femicircle, the center will be within the limits of the arch or aperture, as in Fig. 3, where the center of the arch X, a, k, is at c 1, in the line X k, which line is the chord of the arch.

But if the arch is the fegment or arc of a circle, the center is not confined to the chord of the arch, but may lie out of the tablet or canvas, as in Fig. 1, where the centers for the foffits of the ceiling are low in the plate, as at a 2, b 2.

N. B. In Fig. 2 and 3, the center and diftance of the picture, are the fame to both figures. The center is indicated by the word, and the diftance is at D, upon the horizontal line H H.

Procefs for the Semicircular Arch, Fig. 3.

Let X k, be the chord of the arch bifected at the point c 1, which will be the center of the arch X, a, k.

Then, from the center c 1, of the arch, draw a right line to the center of the picture, upon which line the other centers muft be found, by the following procefs:

Complete the fides of the archway, as M, N, as well that which is not feen, as that which is, and then divide either fide of the arch-

way

way perſpectively*, into as many diviſions as there are ſoffits requir- ed, as at o, y, and at thoſe diviſions draw lines parallel to the horizon, which will interſect the line that is drawn from c 1, to the center of the picture, in the points c 2, and c 3, which, together with the firſt point c 1, will be the centers for the arch and its ſoffits. Therefore, with compaſſes on thoſe centers, deſcribe the ſemicircles required, as o, b, m; y, d, y 2. SECT. II. Plate VII.

Of Arches which are the Segments or Arcs of Circles.

Plate VII. Fig. 2.

Let S and T, repreſent the ſides of the aperture, which may be conſidered as the piers ſupporting the arch, and let g, h, be the width of the arch, and k, its height. PLATE VII.

By Problem the 9th in the geometrical Section, Plate I, Fig. 10, find the center c 1, of an arc, or of a circle, paſſing through the three given points g, k, h, and with compaſſes, upon c 1, as a center, deſcribe the arc g, k, h, which will be the repreſentation required.

To find the other center, proceed as follows:

Draw a line from c 1, to the center of the picture.

* By dividing a line perſpectively, is meant to divide the repreſentation of an original line, that is either perpendicular or inclined to the picture, in a given number of diviſions, repreſenting equal parts. As the line s g, is divided into two equal parts perſpectively, the part e g, repreſenting a part equal s e.

The method of dividing a line perſpectively is as follows:

The line s g, Fig. 3, Plate VII. is the repreſentation of a right line perpendicular to the picture. S f is the baſe line, H is the horizontal line, and D is the point of diſtance; therefore, upon the baſe line ſet on from the point S to n and f, two parts equal to each other, and to the given meaſures of the required diviſions; then, from the points n and f, draw lines to the point of diſtance D, and the line S g, will be divided perſpectively into portions repreſenting equal parts. The ſpace e g, being the repreſentation of a portion of the line S g, equal to S e.

SECT. II. Plate VII.

Then at the point c 1, draw the line P, parallel to the horizon, producing the point q, in the fide M, or pier of the aperture, from which point draw a line to the center of the picture, and divide that line perfpectively into the fame number of divifions, with the required foffits, as at u, v, and then transfer thofe points by lines drawn parallel to the horizon, producing the points c 2, c 3, by their interfections with the line that is drawn from the point c 1, to the center of the picture.

In Fig. 1, of the fame Plate, the ceiling is the portion or arc of a circle, but being of very faint elevation, the centers for the conftructions of the foffits lie very low on the plate.

To find thofe centers, proceed as in the foregoing figure. That is, by Problem, Fig. 10, Page 7, in the geometrical Section, find the center a 2, of an arc paffing through the points S 1, P, S 2.

The points S 1, S 2, are the extreme width of the room, and the fummits of the neareft pilafters from which the foffits fpring; therefore, at thofe points draw the line a 1, parallel to the horizon, which will be the chord of the arch, bifect this line at a 1, through which point draw the line P, P 2, perpendicular to the horizontal line, and continue it downward as to a 2.

Then from a 1 and a 2, draw right lines to the center of the picture, for the other centers muft be found in the line which is drawn from a 2 to the center of the picture.

To obtain the other centers, firft find the divifions perfpectively on the fides of the room, from which the foffits fpring, as the points S 3, S 4, S 5, S 6, and at thofe divifions draw lines parallel to the horizon, or to the floor of the room; and thofe lines will cut the line that is drawn from the point a 1, to the center of the picture, and produce the interfections b 1, c, d, from all which points draw right lines perpendicular to the horizon, and where thofe lines inter-

fect

fect the line that passes from a 2* to the center of the picture, will be the centers required for the different soffits. SECT. II. Plate VII.

In this figure, no more than two centers are given, which are a 2 and b 2; a 2 is the center for the segment S 1, P, S 2, as already shewn, and b 2, the center for the segment S 3, S 4. The rest of the centers are omitted, because the lines necessary to produce them would incumber the example, but if those which are given are well considered, the student will have no difficulty in finding the rest, only let him remember that every line in the soffit must have its own center.

In Plate IV. Fig. 2, is the representation of a building with semi-circular arches, which are drawn by compasses, the centers are found by the process taught in the preceding instructions, given for Fig. 3, Plate VII. page 66. PLATE IV.

The points 4 and 6 being the centers for the front of the soffits, and the points 5 and 7, the centers for the back line of the soffits of the arches.

Plate VIII. Fig. 1.

Which is drawn to a Scale of One Inch to a Foot.

Represents a stool situated parallel to the picture. The dimensions of which are as follows†: PLATE VIII.

The height is 1 foot 9 inches.

The width is 1 foot 6 inches.

* The line which is drawn from a 2 to the center of the picture, is the indefinitive representation of the line in which the centers for all the soffits are found, for it may be considered as the axis of the concave cylinder, of which the ceiling is a part.

† The scale is not marked on the plate, therefore the student may exert himself, by taking the proper measures from any common rule.

The

SECT. II. Plate VIII.

The depth is 1 foot 1 ½ inch.

The upper rail is 2 ½ inches broad.

The legs are 1 ¾ inch thick.

The lower rail is 4 ½ inches from the ground.

And - - - - - - 1 ½ inch broad.

Its diſtance beyond the picture is 1 foot 6 inches.

The height of the eye is 5 feet.

H is the horizontal line.

C is the center of the picture

And D is the diſtance, which is 5 feet 3 inches.

* Having determined the ſeat of the neareſt leg on the baſe line G, as at 1, ſet on the whole width of the front of the ſtool, that is 1 foot 6 inches by the ſcale, from 1 to the point 4. Then determine the diſtance at which the ſtool is placed beyond the picture, which is 1 foot 6 inches; thus from the point 1, ſet off that diſtance by the ſcale to the point 5. Then, from 5, ſet off the depth of the ſtool, 1 foot two inches, to 8. Having thus determined the meaſures of what may be called the plan of the ſtool, draw right lines from the points 1 and 4 to C, the center of the picture, and from 5 and 8, draw lines to D, the diſtance of the picture, and thoſe points in which the lines that are drawn from 5 and 8 to D, cut or interſect the line which is drawn from the point 1 to the center C, will mark the ſpace that lies between the picture and the object, and alſo the depth of the object.

Thus the ſpace between the points 1 and c, repreſents the diſtance

* The ſtool is diſpoſed as if ſtanding in a room, part of which is not ſeen. The lines R R, are the interſections of the floor with the ſides of the room, and the line R 2, is the interſection of two of the ſides which are ſeen.

Fig. 3. No. 2, is the repreſentation of a ſquare on the ſame floor, on which the ſtool ſtands, therefore the center and diſtance of the picture are the ſame with thoſe by which the ſtool is drawn.—See the explanation in the Addenda.

between

between the picture and the ſtool, and the ſpace from e to f, is the depth of the ſtool. SECT. II. Plate VIII.

Complete the plan of the object, by drawing lines parallel to the horizon, or to the baſe line, from c to c, and from f to d, then will the line c e, expreſs the apparent width of the front, and e f, the depth of the ſide.

Then find the height of the ſtool as follows:

At the point 4 in the baſe line, draw the line 4, 10, perpendicular to the ground line; and upon that line, ſet up the height of the ſtool, from 4 to 10, which is 21 inches by the ſcale; and from the point 10, draw a line to the center of the picture C.

Then from the point c, in the baſe or plan of the ſtool, draw the perpendicular line c, X 2, till it cut the line which is drawn from 10 to C, and the line c, X 2, will be the apparent height of the object, for it is the outer angle of one of the neareſt legs.

Complete the general form of the ſtool by the following method:

At the points f, d, draw lines, *perpendicular* to the horizontal line, and at the points X 2 and X 1, draw lines *parallel* to the horizontal line, as the lines X 2. V, and X 1 k.

Then from the point V, draw a line to the center of the picture C, and the mutual interſections of thoſe lines will produce the general outline of the ſtool.

Thus far it is evident, that the proceſs is the ſame with that which was employed for the ſimple form of a block, whoſe ſides are at right angles with each other, and front parallel to the picture.

There remains to find the thickneſs of the legs, and the proportions, and places, of the rails.

For the thickneſs of the legs in *front*, take the given dimenſions, 1 ½ inch, from the ſcale by the compaſſes, and ſet that meaſure upon the baſe line from 1 to 2, and from 4 to 3; and from thoſe

points.

SECT. II. Plate VIII. points draw right lines to the center of the picture C, and thofe lines will mark the apparent thicknefs, by their interfection with the line c, e.

Then for the thicknefs of the legs on the *fides* of the ftool, apply the fame meafures in the fame manner upon the bafe line, from 5 to 6, and from 8 to 7, and from thofe points draw lines to the *diftance* of the picture D, and the interfections of thofe lines with the line that is drawn from 1 to C, will give the apparent width required.

Having found the widths of two legs e and f, the others are obtained of courfe, by drawing lines parallel to the bafe line from one fide to the other.

To find the depth of the upper rail z upon the line 4, 10, mark the dimenfions of its depth, 2 ½ inches, which muft be fet downwards from 10 to h, from which point draw a right line to C, and the interfection of that line, with the angle of the ftool, will give the apparent depth of the top rail, as at o.

The fame method muft be employed to determine the place and dimenfions of the lower fide rails, the upper lines of which are marked at m, upon the line 4, 10, and then transferred to the ftool by lines drawn from that point to the center of the picture C.

The place of the ftretcher S, which paffes from rail to rail, is in the middle of the *fides* of the ftool. Therefore to find its place divide the fpace between 5 and 8 (in the bafe line) in two equal parts, as at P, and from P draw a line to the diftance of the picture D, and the interfection of that line with the line which is drawn from 1 to the center of the picture, as at M, will give its feat on the floor, or bafe of the ftool; therefore, transfer that point to the fide rail by a line drawn perpendicular to the floor, which will give the interfection T, the place of the ftretcher.

SECT. II. Plate VIII.

By duly confidering this figure, together with the explanation, it will be evident that the principles are extremely fimple, and the procefs uniform, for obtaining the true reprefentations of the different parts of any object, in proportion to their juft dimenfions: confequently, if the method employed for finding the reprefentation of the upper rail o, X 2, is well underftood, the ftudent will readily perceive that a repetition of the fame procefs will determine all the other fmall parts.

More lines might have been employed, fuch as thofe for obtaining the thicknefs of the fide rails; but they are omitted, that the figure might not be too much confufed *.

In Plate VIII. Fig. 2, is alfo given an example for determining the heights and ftations of figures, when fuch are required in a landfcape, or view of a building.

What has already been obferved in the courfe of this work muft be here repeated, namely, that the horizontal line is always drawn upon the picture, at the fame height above the bafe line, that the eye of the fpectator is known or fuppofed to be above the ground or plane of the view; therefore, if the fpectator ftand upon the fame floor or plane with the perfons that are to be *reprefented*, then the horizontal line will pafs through the eyes of all thofe figures, provided they are all of equal heights with each other, and of the fame ftature with the fpectator; but as this can rarely happen in nature, fo in the example they are of different heights, yet all of them have their heads nearly equal to the horizontal line.

Let it be fuppofed, that G is the ground line, or bafe line of the picture, and H H the horizontal line; and that the * figure

* In this Example, the line L, a, relates to the fhadows, and is explained under that fection.

The ufe of the vertical line 8, 9, is alfo explained in the Addenda.

SECT. II. Plate VIII. which ſtands on the point 1, is of the ſame ſtature with the ſpectator; then the horizontal line will paſs through the eye of that figure, as in the example.

To find the proportionate heights of the other figures which are on the ſame plane, from any point in the horizontal line, draw a right line to the baſe line, as from S to 1; and any ſpace taken between the line S 1, and the horizontal line H, will give the apparent height of a figure, in proportion to its diſtance, as at 2, 0, 5; obſerving, that the figures not being ſuppoſed ſo tall as that which is ſtanding at 1, their heads are rather below the horizon.

If it be required to determine the height of any figure at a given diſtance from the picture, proceed as follows:

At the point 1, which is the ſeat of the principal figure, ſet off on the baſe line the known diſtance of ſuch figure, as from 1 to 6; and having marked the diſtance of the picture from S to D, on the horizontal line, draw a line from 6 to D, and it will interſect the line which is drawn from 1 to S, at the point o; therefore, the ſpace between the point o and the horizontal line, will be the general height of every figure equally diſtant beyond the picture.

If it be neceſſary to transfer that height to ſome other part, *equally diſtant* from the picture, draw a right line, as from o, parallel to the ground line, as o, 3 to 9; and that line will determine the ſeat of all the figures which ſhall range parallel to the picture, at the ſame diſtance from it with the point o.

Should the figure be required to appear as ſtanding upon a ſtep, proceed as follows: Upon the ground line ſet up, from the ſeat of the figure, the height of the ſtep, and above that add the height of the

* The back figure 1, is placed upon the ground line, which is done to ſhew where the meaſure muſt be placed on the picture; but in finiſhed works it would be improper to place any figure on that ſtation; the neareſt ſhould ſtand ſomewhat beyond the picture.

figure,

ſigure, as at a, A, b; and from the ſtep a, and the upper point b, draw lines to S; and thoſe lines will determine the heights of all figures, that may be required as ſtanding upon ſteps of equal height with the firſt; the lower lines will determine the height of the ſtep, and the upper line the height of the figure. SECT. II. Plate VIII.

When the ſpectator is ſuppoſed to ſtand upon an elevation, above the plane on which the figures are ſtanding, the proceſs will be the ſame, though the appearance will differ, for the heads of the figures will then be below the horizontal line, in the ſame proportion as the horizon is above the general height of their eye. Thus, ſuppoſing the height of the horizon H H, twelve feet, then will the neareſt figure appear about half the height of the horizon, allowing ſuch figure to be ſix feet high.

To find the heights of figures, when the horizon is elevated, proceed as follows:

Suppoſe the horizon to be 10 ½ feet high, correſponding with the eye of the ſpectator, and the figure to be 6 feet high.

Let the line 7, 8, Fig. 2, repreſent the height of the figure, H the horizontal line, and S the center of the picture. Draw lines from the points 7 and 8 to the point S, and any ſpace taken between thoſe lines, will give the height required; as from 9 to x, will be the height for any figure placed at that diſtance beyond the picture ~~of~~ at the point 9.

Any two points taken at pleaſure in the horizontal line, if conſidered as center and diſtance, will give both the proportion and place of the figure, provided thoſe points are diſtant from each other in the ſame ratio with the diſtance of the picture; for nothing more is to be obtained than a ſingle vertical line, that * ſhall mark the height and ſtation of the figure, after which the reſt muſt be drawn by the hand.

* This example fully explains the proceſs, by which the hiſtorical painter ſhould proportion his figures to each other; but of this more will be ſaid in the inſtructions which are ſubjoined.

SECT. II. Plate VIII. It muſt be obſerved, that in all the examples of this work, in which figures are introduced, the horizontal line paſſes either through, or juſt above the heads, of thoſe figures; becauſe they are intended to repreſent adults nearly of the ſame ſtature with the ſpectator, who views them, ſtanding upon the ſame plane with the figures.

PLATE IV. In Plate IV. Fig. 1, there are two figures, one taller than the other; the head of the taller riſes a little above the horizontal line, the ſhorter is conſiderably below: therefore the taller may be conſidered as above ſix feet high, and the loweſt five; or it may be ſuppoſed the repreſentation of a younger perſon.

Of Mouldings parallel and perpendicular to the Picture.

PLATE IX. * As many of the leſſons in this work are compoſed of architectural forms, it is neceſſary to obſerve, that the ſtudent who is unacquainted with the principles of architecture, will labour to no purpoſe if he attempt to delineate ſuch objects, unleſs he firſt acquire ſome knowledge of that ſcience. But the limits of this work will not admit of introducing a ſeries of inſtructions for the uſe of ſuch: yet ſome hints are abſolutely neceſſary, particularly in the article of mouldings, becauſe their true repreſentation in perſpective cannot be obtained without a correct knowledge of their conſtruction. The ſtudent muſt therefore endeavour to underſtand perfectly the following explanation:

When mouldings, placed on any flat ſurface or plane, are united or joined to mouldings, which are diſpoſed upon another flat ſurface or plane, the joint of thoſe mouldings is called the mitre; and ſuch joint, or mitre, always biſects or equally divides the angle, which the planes make at their interſection with each other; hence it follows,

* See ſimilar obſervation in the elder Malton's Treatiſe, Vol. I. page 172, firſt edition.

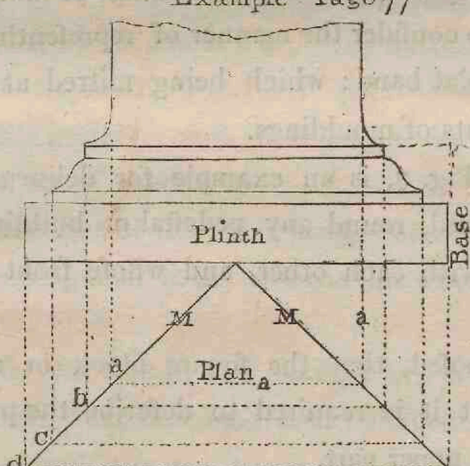
that every mitre line of a ſquare, or right angular block, makes an angle of 45 degrees with either of the ſides of the block. SECT. II. Plate IX.

When the object is a ſquare, or regular polygon, the mitre line will not only biſect the angle, but it will alſo paſs through the center of the ſquare or polygon; but if the figure be a parallelogram, or irregular polygon, the mitre will only biſect the angle, but will not paſs through the center of the figure.

It is neceſſary to attend particularly to the foregoing circumſtances, becauſe the mitre line may be found without its vaniſhing point, in the repreſentation of a ſquare, or of a polygon when regular; but when irregular, then the vaniſhing point of the diagonal muſt be found and employed.

The better to explain the foregoing inſtructions, let the under figure be conſidered as repreſenting the geometrical elevation of the baſe of a pedeſtal, together with its plan; the mouldings of which are the ſame with the baſe B, Plate IX. Fig. 1, but of ſmaller dimenſions.

Example Page 77



Below

SECT. II. Plate IX.

Below the geometrical baſe is half its plan, in which the lines a, a, a, expreſs the dado. The lines b, c, d, are the extreme projections of the mouldings, which are carried round the dado, and form the baſe. The mitre lines of two of the angles are marked M, M, upon which lines, the mouldings are united or joined together; therefore, in the perſpective repreſentation, it is neceſſary that thoſe mitre lines ſhould be drawn perſpectively, before the repreſentations of the members or mouldings can be determined.

When mouldings are to be drawn in perſpective, their geometrical profiles muſt be firſt drawn by the ſcale to the ſize required; which may be done in a detached part of the drawing, as in Plate IX. Fig. 2, or upon a ſeparate paper.

When they are diſpoſed parallel and perpendicular to the picture, the ſimple profiles, drawn upon their place, is a ſufficient guide by which to form their repreſentations; but if they are inclined to the picture, it will then be neceſſary to draw the profile with the mitre line of one angle, as will be ſhewn in the next ſection.

As a preparatory leſſon to the delineation of mouldings, it will be neceſſary, firſt to conſider the manner of repreſenting a plain projecting faſcia, or plat band: which being mitred at the angles, exhibits the rudiments of mouldings.

In Plate IX. Fig. 3, is an example for delineating a projecting faſcia, or plat-band, round any pedeſtal or building whoſe ſides are at right angles with each other, and whoſe front is parallel to the picture.

Let it be ſuppoſed, that the ſquare block or cube A is already drawn, and that it is required to deſcribe the projecting faſcia B, ſurrounding the upper part.

The horizontal line is marked H H.

C is the center, and D the diſtance, of the picture.

The

SECT. II. Plate IX.

The upper angles of the cube are e, g, o : therefore, from the points e g, ſet downwards the dimenſions or thickneſs of the faſcia, as from e to i, and from g to k.

Then draw the geometrical form or profile of the faſcia, at either of the front angles, as at e, 1, s, V, or g, k, s, V 2, on the contrary ſide.

Then determine the perſpective appearances of the ſquares e, g, h, o, and 1, k, l, m,* one above, anſwering to the upper ſurface of the block; the other below, correſponding with the thickneſs of the faſcia, as if the object were tranſparent; by which ſuppoſition the points e, g, h, o, i, k, l, m, will expreſs the angles upon the block, of the thickneſs of the plat-band, or faſcia.

Through the points e, g, h, o, and i, k, l, m, draw the diagonals, continuing them beyond the angles of the cube, as the lines e, h, i, l, and k, m.

Then, through the points s and v, which are the geometrical projections of the profile of the faſcia, draw lines from the center of the picture C, which may interſect or cut the diagonal lines e h, and i l, in the points X, X 1; which points will be the mitre angles of the *perſpective* projection required; from thoſe points draw the lines w 1, w 2, parallel to the horizon; and thoſe lines will produce the repreſentation of the front of the faſcia.

The length of the ſide of the faſcia is alſo determined at P, by the interſection of the diagonal, m k, with the line drawn from the center of the picture C to X 1.

It muſt be obſerved, that in this example the faſcia is to be conſidered as projecting forwards before the picture, ſeeing that the front of the cube or building, as a, b, g, e, is in the plane of the picture.

* It is needleſs to obſerve, that the repreſentation of theſe ſquares, muſt be obtained by the rules already taught in the firſt leſſon of this ſection.

Yet

SECT. II. Plate IX.

Yet the operation would be the fame, if the building were placed beyond the picture; nothing more being required, than to proportion the dimenfions of the fafcia to the fize of the building, and then to proceed as before.

All objects that are fquare, when their fides are parallel and perpendicular to the picture, have their diagonals vanifhing in the points of diftance: confequently, thofe diagonals can be obtained by drawing lines through the angles from the points of diftance, as the line through c and i, from the point of diftance D, or through g and k, from the other point of diftance, provided it were in the paper or tablet: but, as it will often happen that one of thefe points cannot be introduced, as is the cafe in this example; it will then be the beft method to employ the procefs here given, which is, firft to form the fquare of the dado, as if tranfparent, and then to draw the diagonals through the angles of that fquare, without regard to the points of diftance.

Plate IX. Fig. 1, is an example of a pedeftal with a bafe and cornice, whofe fides are parallel, and perpendicular to the picture.

G is the ground line or bafe line.

H is the horizontal line.

C is the center of the picture, and D indicates the diftance, which in this example is out of the plate.

Upon any feparate paper, or upon fome remote part of the drawing, defcribe the geometrical profile of the mouldings, at their given fize, as at Fig. 2, together with the line X, X 2, which is the angle of the dado.

Upon the ground line G, Fig. 1, determine the perfpective appearance of the fquare of the whole bafe, as the lines o 7, p 1, p 2.

Then from the points o, 7, p 1, draw lines perpendicular to the horizon, and determine the general form, which may be fuppofed to contain the whole of the pedeſtal, with all its mouldings, as the lines o, o 2, 7, 8, P 1, P 2, 11.

From the point o, draw a line to P 2, and from 7 draw a line to P 1, which lines will be the diagonals of the baſe: they are marked d 1, d 2.

Upon the line o, o 2, ſet up the height of the plinth o to 14, equal the height X, to 4, in Fig. 2, and complete the perſpective repreſentation of the plinth mark'd 14, y z.

Then from the point o, ſet upon the ground line the ſpace o 3, equal to X O, in the baſe of the geometrical profile Fig. 2; repeat the ſame on the other ſide from 7 to 4: then will the ſpace between 4 and 3 be equal to the given or ſuppoſed breadth of the dado; and the ſpaces from o to 3, and from 4 to 7, will be equal to the projections of all the members of the baſe beyond the dado.

Between o and 3, in the baſe line of Fig. 1, ſet off the diviſions 1, 2, 3, equal to the projection of each of the members of the baſe, as given in the geometrical pofile Fig. 2, as from 4 to 1, and from 5 to 2, which is 3 to 1, and 3 to 2, in Fig. 1; repeat the ſame at the other angle, as from 4 to 6, and from 4 to 5.

From the points 1, 2, 3, and 4, 5, 6, Fig. 1, draw right lines to the center of the picture C, and they will interſect the diagonal lines d 1, d 2, in the points a, b, c, and d, e, f, and alſo at g, h, 1; which points are the ſeats upon the ground of the projections of the mouldings of the baſe at their angles.

Then upon the vertical line o, o 2 Fig. 1, ſet up the heights of the mouldings, equal the heights of the members in the geometrical baſe Fig. 2, as from o to 14, Fig. 1, equal to X 4 in Fig. 2, and from 14 to 6, to 5, to 3, equal the ſame figures in the geometrical profile Fig. 2.

From thoſe points draw right lines to the diſtance of the picture D,

SECT. II. Plate IX.

and from the points a, b, c, in the diagonal d 2, draw lines perpendicular to the horizon; and the interfections of thofe lines with the former will determine the perfpective projections of the mouldings, as at S, m, k, n, whofe forms or profiles muft be drawn by hand where they are curved, where ftraight, by the ruler. The fame procefs muft be repeated at the other angles, obferving, that to complete the forms of the mouldings, right lines muft be drawn from thofe points parallel to the horizon, and alfo from the fame points to the center of the picture C: the former will produce the reprefentations of the front mouldings, as the lines m, n, k, s; the latter thofe of the fides m P, and S V.

Cornice of Pedeftal.

For the upper mouldings, or cornice of the pedeftal, proceed as follows:

Firft, let it be obferved, that the plinth projects beyond the cornice in Fig. 2, as much as from o 2, to n. Therefore, from the angle o 2, Fig. 1, fet off the fpace to W, equal o 2, Y, in the geometrical profile Fig. 2; then is W the feat of the upper angle x of the dado, or fhaft of the pedeftal, upon the picture.

Then from W, Fig. 1, fet on towards o 2, the projections of all the mouldings of the cornice, equal to the projections of the fame members in the profile, Fig. 2, as n, v; repeat the fame at the angle 8; and from thofe points draw lines to the center of the picture C, which will interfect the diagonals of the top in the points a, b, c.

At the angle o 2, Fig. 1, fet downwards the heights of the mouldings, equal the meafures from Y to 8, 9, 10, in the profile of the cornice No. 2, as at 8, 9, 10, in Fig. 1, and as was done in the bafe; draw lines from thofe points to the diftance of the picture.

Then

4

SECT. II. Plate IX.

Then from the points a, b, c, in the diagonal lines, draw lines perpendicular to the horizon, that may interfect the lines which are drawn from the points 8, 9, 10, to the diftance of the picture D; * and their mutual interfections will give the angular terminations of the mouldings, from which lines muft be drawn horizontally to exprefs the front mouldings, and from the fame points to the center of the picture for thofe which exprefs the mouldings of the fide; and the form or perfpective appearance of the angles of the members muft be drawn by the hand, as in the mouldings of the bafe.

In the example, Plate IX. Fig. 1, the mouldings do not project before the picture; on the contrary, the plinth touches it; confequently, the other members are beyond the picture.

It muft be obferved, that the mouldings in the example A, Fig. 1, appear exaggerated, which effect follows from the profile having too great projection in the geometrical conftruction; but this was done that the example might be more explicit.

When it is required to reprefent mouldings round any building whofe fides are parallel, and perpendicular to the picture, it will be fufficient, in moft cafes, to fketch the geometrical profile upon the part where fuch decorations are to be placed, marking the members by a general proportion to the height of the pedeftal, or building, then by the mitre lines adjufting the perfpective appearance of the profile, as directed in the foregoing examples.

Let it be particularly noticed, that in all pofitions of mouldings, whether parallel to the picture or inclined, it is the mitre lines that muft determine the true reprefentations of their projections.

* The reader will obferve, that, to avoid confufion, all the points are not diftinguifhed by marks or initials; yet the whole will be eafily underftood by tracing the example, which, if attentively examined, will explain as much as words.

 Of

SECT. II.

Plate X. *Of Mouldings, with their returns at the Angles of Planes or Walls, which are diſpoſed parallel, and perpendicular to the Picture.*

Example, Plate X. Fig. 1.

The planes A and E are parallel, while thoſe marked B and F are perpendicular to the picture. They repreſent four walls, at right angles with each other, ſurmounted by a cornice, having the returns of the mouldings agreeably to the plan, Fig. 4, which is half the ſize of Fig. 1.

The line D C is the horizontal line, C is the center of the picture, and D is the diſtance.

Firſt determine the perſpective appearance of the form of the building, by the rules already given in the preceding part of this Section; and having found the different angles marked by the letters f, g, L, m, and p, proceed as follows:

The plane or wall which is neareſt to the ſpectator is A, conſequently the neareſt angle is g i K; therefore, upon that angle, draw the geometrical profile of the mouldings or cornice a, b, c, d; and let the points g, i, K, be conſidered as the mitre points of the mouldings upon the angle of the walls A and B, for thoſe points are the ſeats of the lines which form the different members upon that angle.

Through the points g, i, K, draw right lines to the center of the picture C, which lines will interſect the line Y L, the inner angle of the planes B and E, in the points L, o, p, which will be the points for the mitres of the mouldings, at the interior angle L Y of the planes or walls B, E; for the lines which are drawn from the neareſt angle g, k, of the building, to C, transfer the geometrical heights of the mouldings from the line g, i, S, to the line L Y.

Then

SECT. II. Plate X.

Then through the points g, i, k, on the neareſt *exterior* angle, and alſo through the points L, o, p, in the neareſt *interior* angle, draw lines from the point of diſtance D, as D g 1, in the *exterior* angle, and D L 4, in the *interior* angle; repeating the ſame proceſs through the points i, K, o, P; and thoſe lines will be the mitre lines for the different members of the cornice, upon the planes A and B.

Then determine the perſpective appearance of the mouldings, by drawing lines from the center of the picture C, through the points a, b, c, of the geometrical profile, till they cut the mitre lines of both angles, as the lines C a 1, C b 2, and C c 3, which lines form the repreſentations of the *Sima Recta* and *Corona* of the cornice, upon the plane or wall B.

The front Z of the cornice muſt then be obtained by the following method:

The vertical line V f is the outer angle of the plane A, and the points f, h, x, V, are the mitre points for the mouldings upon the angle V f. Thoſe points are found by continuing the lines of the geometrical profile of the cornice to that angle; therefore, through the points f, h, x, draw lines from the contrary point of diſtance to that which was before employed, as the lines f, K 2, and h, t, and alſo through the points x and V, which lines will determine the projection of the members of the cornice upon the angle V.

Then from the points 1, 2, 3, and the other points of the perſpective profile, draw lines parallel to the horizontal line, as the lines 1 K2, 2 t, 3, &c. and alſo from the lower points.

Then find the repreſentations of the mouldings upon the plane or wall E, as follows:

From the points L, o, p, which are the ſeats of the mouldings upon the line Y L, draw lines parallel to the horizontal line, which lines

muſt

SECT. II. Plate X. muſt interſect the line M m, as the lines L m, h o, and p q; and the points of interſection m, n, q, will be the ſeats of the mouldings on the exterior angle M m of the plane or wall E.

Through the points m, n, q, draw right lines from the diſtance of the picture D, as the lines m s, n, 9, and ſo on of the reſt; and thoſe lines will be the mitre lines for the mouldings upon the outer angle M of the plane or Wall E.

Then from the points 4, 5, and 6, which points are the extreme projections of the perſpective profile of the mouldings in the inner angle, draw lines parallel to the horizontal line; and the interſection of thoſe lines with the mitre lines, as m s, and the other lines, will determine the perſpectve projection of the mouldings upon the angle M.

To complete the farther angle Q R, find the ſeats of the mitre points upon the line R Q; which is done by drawing lines from the points m, n, and g, to the center of the picture C, which lines will interſect the line Q R in the points R, T, and S; through which points draw lines from the contrary point of diſtance* to that which was before employed, and thoſe lines will be the mitre lines for the termination of the remote angle Q T.

Then from the points 8, 9, and alſo from the other points in the perſpective profile of the mouldings on the angle M m, draw lines to the center of the picture C, which lines will expreſs the upper and lower fillets of the *Cima Recta,* and their interſections with the mitre lines at w and z, will mark the projection of the mouldings upon the outer angle, the curved profiles of which muſt be drawn by hand, as muſt all the profiles of the other angles.

* Obſerve, that this point of diſtance is not in the plate, for want of room.

The

The whole of the foregoing procefs confifts in firft finding the geometrical feats of the mouldings upon the neareft angle of the building, as the points g, i, k, upon the line S, are the feats of the mouldings upon that angle ; SECT. II. Plate X.

Secondly, transferring thofe points or feats to the other angles of the building, as to the angle Y L;

Thirdly, through thofe feats drawing the diagonal lines for the mitres or joints of the mouldings, as the lines D g 1, and D i 2, in the neareft exterior angle S, and alfo the mitre lines D L 4, and D o 5, in the interior angle Y;

Fourthly, determining the perfpective reprefentation of the horizontal divifions of the mouldings, by drawing right lines from the center of the picture C, through the angles a, b, c, of the geometrical profile, till they interfect the diagonal or mitre lines, as the line 4 a, which is drawn from the point C through a, and cuts the diagonal, or mitre line D g, in the point 1; which line forms the upper line of the *Regula*, marked 1 4, above the *Cima Recta*, and, by its interfection with the diagonal D L, determines, at the point 4, the return for the fimilar member marked 4 8, which furmounts the cornice upon the plane or face E.

The foregoing will be ftill better underftood, by confidering the plan, Fig. 4, in the fame plate, which is half the dimenfions of Fig. 1. The fides A, B, E, F, of the plan, correfponding with the fame marks in the fides of the elevation, Fig. 1.

The diagonals g, l, m, in the plan, correfpond alfo with thofe in the elevation marked with the fame characters, as do thofe marked w, f.

Obferve, that the three diagonals, or mitre lines, g, L, m, are parallel to each other; therefore their reprefentations require the fame vanifhing point, which in Fig. 1. is D, the point of diftance.

The

SECT. II. Plate X.

The other diagonals w, f, crofs the former at right angles, and, therefore, their reprefentations require the contrary point of diftance for their vanifhing point; but this point is not in the example, for want of room. Could it be introduced, its place would be upon the horizontal line, equally diftant from C, upon the left fide, that the point D is on the right.

It is to be obferved, that the angle V, Z, of the cornice appears diftorted in the reprefentation, although perfectly true in conftruction; this unpleafing effect is produced by the difpofition of the object, which is fo placed, that the plane A is in the plane of the picture; confequently it follows, that all the mouldings upon that plane project forward before the picture, and produce this difagreeable effect.

In Plate X. Fig. 2, is an example for drawing diagonals or mitre lines, for the conftruction of mouldings, when * more than one point of diftance cannot be applied upon the plane of the picture.

Let A reprefent a folid pier, to which it is required to find the mitre lines, or diagonals, for the conftruction of mouldings at the fartheft angle E; the canvas or paper being too fhort to admit of the diftance D 2, which, if obtained, would be the vanifhing point for the mitre lines of the angle E.

Having drawn the pier A, E, whofe plan or bafe is a parallelogram,

* To prevent mifapprehenfions it fhould be obferved, that as there can never be more than one point of fight, fo there can never be more than one diftance of the picture. Yet, for the facility of operation, this point may have many reprefentations; it commonly has two, which are placed upon the horizontal line, one on each fide of the center of the picture, and at equal diftances from it, as D 1 and D 2, are both the reprefentations of one point of diftance, being equally diftant from the center of the picture C, Fig. 2, and Fig. 3. This is the general practice, when the Objects to be drawn have their fides parallel, and perpendicular to the picture; but in the oblique pofitions, the diftance of the picture is applied in as many different places as may be required, which will be fhewn in the next fection.

let

let the fartheſt part of the perſpective plan be reſolved into a ſquare, by the following proceſs.

SECT. II.

Plate X.

The thickneſs of the pier is a b, and the ſpace a 2, on the baſe line, is the length; therefore, from 2 ſet off the to 1, the meaſure of the thickneſs equal a b, and by the point of diſtance D 1, transfer that meaſure to the farther part of the repreſentation of the pier, as at 3, 4; and again, transfer that ſquare at the baſe to the upper part of the wall or pier, as at 7, 5, 8, 6, by the methods already taught. Then through the points 7, 6, draw a right line, which line is a diagonal of the ſquare dimenſions of the pier at the fartheſt angle; conſequently, it is the mitre line for any moulding or projecting faſcia that may be placed upon the pier; as in the example it is the mitre line upon which the projection of the plat-band M F muſt be conſtructed.

If more mitre lines be required, it will be neceſſary to draw as many ſquares as there are mouldings; which, it muſt be allowed, occaſions much trouble, that can be avoided by no other method than by laying the picture or drawing upon a long table, and then finding the proper point of diſtance, and from that point drawing the diagonals or mitre lines required. Thus the block B, Fig. 3, in the ſame Plate, being ſquare, the mitre lines are found by drawing lines through the angles a, c, from the points of diſtance D 1, and D 2.

It muſt again be repeated, that no one who is unacquainted with architecture, or who knows not the conſtruction of mouldings, can expect to ſucceed in the repreſentations of ſuch objects; nor is it poſſible to give an explanation by words or drawings ſufficiently clear for their inſtruction. Therefore, they muſt apply to the forms, and by examination make themſelves maſters of their conſtructions.

In Plate IX. Fig. 3, is an example for finding the repreſentation of what is called a hiped roof.

The proceſs is as follows: complete the plan of the building, as a,

N b, c,

SECT. II. Plate IX. b, c, d, and draw the diagonals a d, b c, and at their interſection f, draw the line f h 2, perpendicular to the horizon.

Divide the front of the building a b, on the baſe line, as at y, and draw the line y g 2, perpendicular to the horizon, and upon that line ſet up the whole height of the roof, as from y to g 2.

From g 2 draw a right line to C, the center of the picture, that will interſect the line f h 2, in the point h 2, which will mark the height of the roof upon the center line f h 2.

From the points e, g, o, draw lines to h 2, and thoſe lines will expreſs the hips or angles of the roof.

The point h 2 might alſo be obtained by the following method:

Continue the lines of either of the angles of the building, as a e, or b g, upwards, and upon either line ſet up the given height of the roof, as at g 3, from which point draw a line to the point D, the diſtance of the picture, which will interſect the line f h 2, at h 2; which is the height required.

This variety of operation is founded in the conſideration of the different poſitions in which a plane may be ſuppoſed to paſs through the center of the building; for a plane may be ſuppoſed to paſs through the center f h 2, parallel to the ſides a, c, b, d, and vaniſh in the center of the picture, which is the firſt operation; but in the ſecond, a plane is ſuppoſed to paſs through the center of the building diagonally, as the line a f d, and to vaniſh in the point D, the diſtance of the picture.

The ſtudent muſt obſerve, that in the whole courſe of this Section no other vaniſhing points are employed than the center and diſtance of the picture, which laſt point, is always placed upon the horizontal line, when the objects to be repreſented have their ſides at right angles with each other, and thoſe ſides diſpoſed parallel, and perpendicular to the picture.

But

But there is alſo another poſition of ſquare objects, in which thoſe points diſpoſed in the ſame ſituation are ſufficient; as when any right angular object has its ſides inclined to the picture in an angle of 45°; for in ſuch caſe, the diſtance of the picture, placed upon the horizontal line, is the vaniſhing point for the ſides of ſuch object; and if it be a perfect ſquare, the center of the picture is the vaniſhing point for one of the diagonals. SECT. II. Plate II.

In Plate II. Fig. 3, is an example of ſquares inclined to the picture in an angle of 45 degrees, together with a cube and block, in the ſame poſition to the picture, ſtanding upon two of thoſe ſquares.

Proceſs for the Squares.

When the center of the picture is determined, as at C, on each ſide of it ſet off the diſtance of the picture D D; then take the meaſure of the * *diagonal* of the given ſquares which is the line a b, Fig. 4, and ſet on the ground line or baſe line of the picture as many of ſuch meaſures as may be required, as 1, 2, 3, 4, 5; and from each of thoſe points draw lines to the points of diſtance D, D; and the mutual interſections of thoſe lines will produce the repreſentation of the ſquares required.

The cube E and priſm B are each ſituated upon a ſquare of the pavement; therefore, at the angles of the ſquare which forms the

* It muſt be remembered, that in all caſes ſimilar to this example, where the ſides of the ſquare are inclined to the picture in an angle of 45°, that the meaſure of the diagonal of ſuch ſquare muſt be employed, not the meaſure of the ſide of the ſquare.

To obtain the meaſure of the diagonal, it may be neceſſary to draw the ſquare geometrically, with its diagonal, to the proportionate ſize upon a ſeparate paper, or upon a a detached part of the drawing, as at Fig 4, in which the line a b is the diagonal.

As ſquares diſpoſed like the example frequently form the pavement for the exterior and interior of a building, it is proper to obſerve, that in views of particular objects, the meaſure of the diagonals of the originals muſt be taken; but in compoſitions, any proportion may be employed as ſhall be moſt agreeable to the purpoſe of the artiſt.

SECT. II. Plate II. base of each, draw lines perpendicular to the horizon, as the line P in the prism B.

Then consider where the faces of the cube or prism would intersect or cut the picture, provided those faces were continued forward. Thus the lower line in the face B of the block intersects the picture in the point 1, and the lower line of the face E of the cube intersects it at 5: therefore, at the points 1 and 5 draw lines perpendicular to the horizon, and upon those lines set up the heights required, as from 1 to o, for the block B, and from 5 to n, for the cube E; and from those points draw lines to the points of distance D, D, and they will cut the perpendicular lines that form the angles of the cube and block, and determine the heights required. Thus the line from O to D cuts the angle of the prism B at P; therefore from P draw another line to the opposite point D, and the form of the prism will be completed.

In this example the cube E and prism B are placed exactly upon two of the squares of the pavement, and therefore their bases are those squares whose dimensions are found by the figure of the pavement: but if they were not placed upon the squares, yet their bases must be found by the same process, observing, that their diagonals are parallel, and perpendicular to the picture; consequently the representations of the parallel diagonals have no vanishing point, while the representations of those which are perpendicular vanish in the center of the picture C.

The Student having gone through this section, it may be presumed that he is possessed of the leading principles of the science, and, consequently, that he will be able to comprehend the following Theorems, which may be considered as Axioms.

First, The center of the picture must never be out of the canvas or tablet.

Secondly,

Secondly, All lines whofe originals are parallel among themfelves, have one and the fame vanifhing point for their reprefentations.

Thirdly, All lines whofe originals are parallel to the picture, have their reprefentations alfo parallel to each other in the picture, confequently have no vanifhing point.

Fourthly, The center of the picture is the vanifhing point of all lines perpendicular to the picture.

Fifthly, The diftance of the picture when placed upon the horizontal line, is the vanifhing point of all horizontal lines that are inclined to the picture in an angle of 45°.

Let it alfo be remembered, that the point which is vulgarly called the point of fight, is properly the center of the picture, and therefore can only be confidered as the reprefentation of the point of fight; and this point is unique, there can be but one in the picture, although there may be innumerable vanifhing points, which are often vulgarly, but falfely, called points of fight.

The author has dwelt on the above theorems with fome prolixity, in the hope of impreffing upon the mind of the ftudent thofe principles which are the foundation of the fcience, and which muft be clearly underftood before any great progrefs can be made by thofe who wifh to comprehend the following Sections.

SECTION III.

Containing Examples of Objects, the Sides of which are inclined to the Picture.

IN this ſection will be ſhewn the true methods of drawing in perſpective, right lined objects or figures, the ſides or faces of which are inclined to the picture.

As this ſection is founded upon a *problem of Dr. Taylor, which may be conſidered as the teſt of the ſcience, the author will attempt, in as familiar a manner as the ſubject will admit, to explain and demonſtrate the true methods of finding the vaniſhing points of lines which are inclined to the picture only; and the Student will do well to make himſelf throughly maſter of this ſection, for when he underſtands this clearly, he may conſider himſelf as poſſeſſed of the maſter-key to all the difficulties of the ſcience.

When various original lines are parallel, and perpendicular to the picture, the center of the picture and the point of diſtance are the only vaniſhing points that are neceſſary to their delineation; as has been ſhewn in the foregoing ſection. But when the original lines are

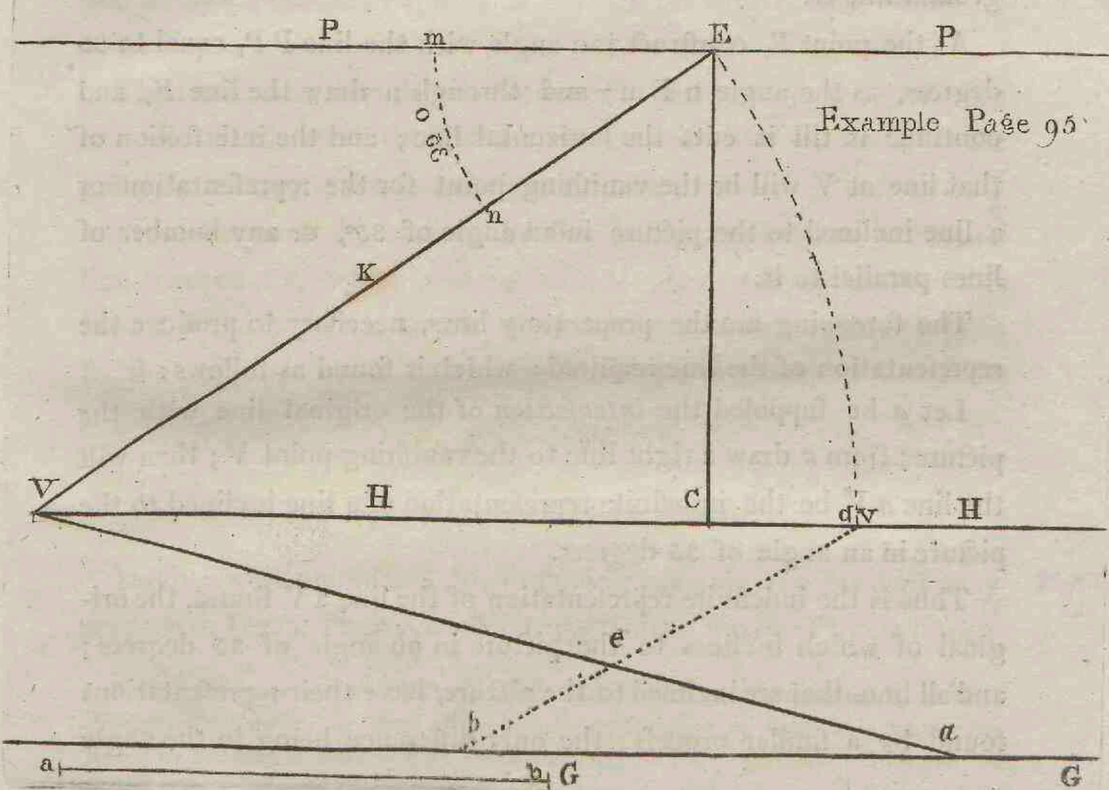
* See Def. 5, Brook Taylor's firſt edition, 1715; and Def. 17, ſecond edition, 1719.

diſpoſed

SECT. III.

difpofed obliquely, or inclined, to the picture, in any other angle than 45 degrees, then the vanifhing points of thofe lines muft be found after the *center* and *diftance* of the picture are fixed. But for this purpofe it is abfolutely neceffary to know, or to fuppofe, the angle which * the original line makes by its inclination to the picture.

Let it be fuppofed that the reprefentation of a line is to be drawn in perfpective, the original of which is inclined to the picture in an angle of 35 degrees; proceed as follows:



Draw the ground line, or interfection of the picture, G G; then

* By original line, or original object, is meant fome real line or object, of which that in the picture is only the reprefentation.

the

SECT. III. Plate

the horizontal line H H, at its proper height above the ground line.

Determine the center of the picture C, and through it draw the prime vertical line C E, perpendicular to the horizontal line.

Having drawn these lines, upon the vertical line mark the point E, *at the same proportionate distance from C, as the spectator is supposed to stand from the picture.

Through the point E draw the line P P parallel to the horizontal line, which line is the parallel of the picture, for it is parallel to the ground line G.

At the point E, construct †an angle with the line P P, equal to 35 degrees, as the angle n E m; and through n draw the line K, and continue it till it cuts the horizontal line; and the intersection of that line at V will be the vanishing point for the representation of a line inclined to the picture in an angle of 35°, or any number of lines parallel to it.

The foregoing are the preparatory lines, necessary to produce the representation of the line required; which is found as follows:

Let *a* be supposed the *intersection* of the original line with the picture; from *a* draw a right line to the vanishing point V; then will the line *a* V be the indefinite representation of a line inclined to the picture in an angle of 35 degrees.

Thus is the indefinite representation of the line a V found, the original of which inclines to the picture in an angle of 35 degrees; and all lines that are inclined to the picture, have their representations found by a similar process; the only difference being in the angle

* The point E is the same point which, in the foregoing section, is placed upon the horizontal line, and is the distance of the picture, and generally marked D. It is the different disposition of this point which constitutes the great difference in operation between lines which are inclined to the picture, and those which are perpendicular to it.

† See the instructions for constructing angles, in problem 9th of Geometry.

m E n, which muſt always be made equal to the angle that the original line makes with the picture *. SECT. III. Exa.

When it is required to cut off from the indefinite repreſentation of a line, a portion equal to a given meaſure, the following is the proceſs:

Let the line a b, which is below the baſe line GG, be equal to the meaſure which is required to be cut off from the line *a* V. Fix one point of the compaſſes upon the vaniſhing point V, and take the length of the line V E, which bring down upon the horizontal line to the point d v; then is d v the diſtance of the vaniſhing point V †.

Then take the length of the line a b with Compaſſes, and with one foot fixed upon the point *a*, in the baſe line G, mark off the point *b*, making *a b* equal the given line a b.

From the point *b*, draw a right line to the point in the horizontal line marked d v, which will interſect the line *a* V in the point c: then will the ſpace *a* c be the repreſentation of a line equal in length to the original line a b, and inclined to the picture in the given angle 35°.

A Square inclined to the Picture.

Having well conſidered the foregoing example, the Student may proceed to Fig. 1, Plate XI. which repreſents a ſquare of 6 feet dimen- PLATE XI.

* Here it may be obſerved, that what is ſo much inſiſted upon in this treatiſe, namely, the difference between the center of the picture and the point of ſight, may be demonſtrated by this diagram; for C is abſolutely the center of the picture, whereas the point of ſight is only repreſented by the point E.

The above proceſs is, in the opinion of the author, the moſt elegant and ſimple that can be employed: but there is alſo another method, ſomewhat different in practice, though the ſame in theory, which ſhall be ſhewn hereafter.—See Addenda, Plate XXXVII. Fig. 2.

† This point is by Dr. Prieſtley called the meaſuring point. See his Treatiſe, page 39.

SECT. III. Plate XI. fions, the fides of which, D and C, are inclined to the picture in an angle of 30 degrees.

The height of the eye is 6 feet, and the diftance 11½ feet.

Determine the center of the picture as marked, through which draw the horizontal line H, and the prime vertical line * X D; and upon that line fet up the diftance 11½ feet, as from the *center* to D, which is the diftance.

Through the diftance D draw the line P P, parallel to the horizontal line H, which line is the parallel of the picture.

At the point D conftruct the angle P D M, equal to the given inclination of the object to the picture, as thus: from the point D, (which is the reprefentation of the eye) draw a right line which fhall make the given angle 30 degrees with the line P P; and the interfection of that line with the horizontal line, as at V 2, will be the vanifhing point required.

Through the eye D draw another right line as F, perpendicular to the line D E, and its interfection with the horizontal line, will give the other vanifhing point, as V 1.

Having thus found the two vanifhing points, find the diftances of thofe vanifhing points as follows:

Take the lengths of the radials, or lines D V 1, and D V 2, by the compaffes, and mark thofe lengths on the horizontal line, as from V 1 to b, the length of the line F, and from V 2 to a, the length of the line E; then will b be the diftance of the vanifhing point V 1, and a the diftance of the vanifhing point V 2; and they are fo written in the example.

Having determined the vanifhing points and their diftances, draw the neareft fides of the fquare; that is, from the point 1 in the bafe line, which is the feat of the angle of the fquare upon the picture, draw lines

* The prime vertical line is always perpendicular to the horizontal line.

to

to the vanishing points V 1 and V 2, as the lines B and D, which are the indefinite representations of the sides D and B of the square. SECT. III. Plate XI.

By the points a and b proportion the representations of the sides of the square, thus: take the given measure of the square in the compasses, 6 feet by the scale, and set each way on the base line from 1 to 2 for the side D, and from 1 to 3 for the side B. Observe that the angle 1 of the square touches the picture, and therefore is its seat upon the picture.

From 2 draw a right line to a, and where it cuts the line drawn from 1 to V 2, as at 5, will give the proportion of the side D of the square.

Repeat the same process from 3 to b, and the intersection 4 of the line which is drawn from 1 to V 1, will give the proportion of the side B of the square.

From 5 draw a right line to the vanishing point V 1, and from the point 4 draw a right line to the vanishing point V 2, and the representation of the square A B C D will be completed *.

When the object is represented as removed beyond the picture, the process is somewhat different from that employed in the foregoing example. The difference of appearance is shewn in Fig. 2 of Plate XI. where the parallelogram A B C D is removed beyond the picture. The process is as follows:

Let it be supposed that the angle of the parallelogram nearest to the picture is at the distance of 2 feet beyond it.

Draw the horizontal line H, and determine the center of the pic-

* Observe that the dimensions of the square are formed by drawing lines from the measures placed on the base line, to the *distance* of the vanishing point; as from 2 to a; but the figure is afterwards formed by drawing from the point 5 to the vanishing point itself, as to V 1. This must be strictly attended to.

SECT. III. Plate XI.

ture; draw the vertical line K, and upon it ſet up the diſtance of the picture, as at D, which is alſo marked diſtance.

From the center bring down the diſtance of the picture to the horizontal line, as at D 2, which is the length of the line K, from the word *center* to D.

Let the point 2 upon the baſe line, or interſection of the picture, be conſidered as the ſeat of that angle of the parallelogram which is neareſt to the picture. From the point 2 draw a right line to the center of the picture.

Then from the point 2 ſet on upon the baſe line or interſection, 2 feet by the ſcale, as from 2 to x, and from x draw a right line to the diſtance of the picture D 2, and it will interſect the line that is drawn from 2 to the center, in the point S; then is S the place upon the ground, or horizontal plane, of the neareſt angle of the parallelogram.

It is not neceſſary to repeat the proceſs for finding the vaniſhing points V 1 and V 2, that being fully explained in the foregoing figure. It needs only to be obſerved, that the ſides of the object have the ſame inclination to the picture with thoſe of the former, only reverſed: therefore, from the point S draw right lines to the vaniſhing points V 1 and V 2, and cut off the dimenſions of the parallelogram, as follows:

Bring down the diſtances of the vaniſhing points upon the horizontal line, as in the foregoing example, as d v 1, and d v 2.

Then draw a right line from the point d v 1 through the point S, till it cuts the baſe line, as at the point 3. From 3 ſet off the meaſure of the ſide B upon the baſe line to 7, and from 7 return a line to d v 1, which will cut the line that is drawn from S to the vaniſhing point V 1, in the point 9; then will the ſpace between S and 9 be the repreſentation of the ſide B of the figure.

Then find the repreſentation of the longeſt ſide, thus, from the point d v 2 draw a right line through S, till it cuts the interſection of the picture, as at 4.

Then

Then from 4 fet on upon the interfection line, the meafure of the longeft fide D of the figure, twelve feet to 6, and return a line to d v 2, which will interfect the line that is drawn from S to the vanifhing point V 2, in the point 8 : confequently, the fpace between the points S and 8 reprefents the longeft fide of the parallelogram.

From 8 draw a line to the vanifhing point V 1, and from 9 draw a line to the point V 2; and the perfpective appearance of the parallelogram A B C D will be completed according to its meafure, 12 feet by 6 feet, and 2 feet beyond the picture, to which its fhorteft fides are inclined in an angle ot 30 degrees.*

In the example, page 96 of this Section, may alfo be feen the method of cutting off a portion of a line, as follows:

d v is the diftance of the vanifhing point V, for it is the length of the line V E, fet off from V, upon the horizontal line H, to d v.

The required length or portion of the line to be reprefented is then fet on upon the ground line G, from *a* to b, and a line drawn

* As it is of the utmoft confequence that the ftudent fhould clearly comprehend thefe figures, before he proceed to the following, it may be neceffary to make fome further obfervations.

In the firft place, both the examples are bounded by two lines, which are to be confidered as the limits of the picture; the inner line at the bottom is the bafe line, or interfection of the picture, as expreffed by the terms, Fig. 1 being marked bafe line, Fig. 2 interfection; which various appellations have been employed by different authors to exprefs the fame line.

The loweft of the upper lines marked P P is the parallel of the picture, as written in Fig. 2. This line may fall within or beyond the upper limits of the picture, as in many of the following examples; for it is not limited by the dimenfions of the tablet or canvas, but depends upon the *diftance* of the picture. It is always drawn through the point D, which is the diftance of the picture, fet upon the prime vertical line, from the center of the picture.

The vanifhing points are alfo one within, and the other beyond, the limits of what may be confidered in the example as the canvas or tablet. As this will generally be the cafe, it will be neceffary to have the paper longer than the intended dimenfions of the drawing; or it may be laid upon a drawing board of fufficient length to contain the vanifhing points.

If a canvas, it may be laid flat upon the floor, or placed againft the wall, and the vanifhing points found and employed as above directed. See Addenda, Plate 37.

SECT. III. Plate XI. from b to d v, &c. cuts the indefinite reprefentation at c: confequently, the fpace *a* c reprefents the length required.

In the three foregoing leffons are contained the moft effential principes of this fection, for they demonftrate the methods of finding the vanifhing points for all horizontal lines that are inclined to the picture; therefore the ftudent is again advifed to confider thofe examples with attention, obferving that the firft is of a line only; the next of a figure or plan formed of four lines horizontally fituated; and the third is fimilar to the fecond, with the additional circumftance of being placed beyond the picture.

Rudiments of the Perfpective Delineation of a Houfe inclined to the Picture.

PLATE XII.

Fig. 1, Plate XII.

Let B 3, D 3, be fuppofed the fhell of a fmall houfe, with one window, the fide B 3 being inclined to the picture in an angle of 35 degrees, and the dimenfions as follows:

The length of the fide B 3, - -	4 feet 10 inches.
The depth of the fide D 3, - -	3 feet 9 inches.
The height - - - - - - - -	5 feet 9 inches.
The height of the eye - - -	3 feet.
The diftance of the picture - -	6 feet.

Let the lines A, A, be fuppofed the boundaries of the tablet or canvas.

Determine the center of the picture C, and the diftance E, which is 6 feet, by the fcale.

Through the eye draw the parallel of the picture, which is the right line fo marked, parallel to the horizontal line, and marked P P.

At

SECT. III. Plate XII.

At the eye E, conſtruct an angle, with the parallel of the picture, of 35 degrees, equal to the inclination of the ſide B 3 of the object to the picture. In other words, draw the right line E B 4 through E, making the given angle 35 degrees with the line P P, and cutting the horizontal line at V 2, which will be the vaniſhing point for the ſide B 3 of the building.

Through the point E draw the line D 4 perpendicular to the line B 4, and its interſection V 1 with the horizontal line will be the vaniſhing point of the ſide D 3 of the building.

Having found the vaniſhing points V 1, and V 2, bring down their diſtances to the horizontal line, that is, take the lengths of thoſe lines from the points V 1 to E, and alſo from V 2 to E; and mark them on the horizontal line, as at d 1 and d 2.

Thus are the vaniſhing points and their diſtances found.

Having determined the point c in the baſe line of the picture, as the point where the angle of the building is placed; from that point draw right lines to the vaniſhing points V 1 and V 2, which will give the *indefinite* repreſentations of the baſe lines of the ſides of the building, as c f V 1 and c g V 2.

Then cut off the dimenſions of thoſe ſides as follows: with the compaſſes take the given length of the ſide B 3 from the ſcale, 4 feet 10 inches, and ſet it on the baſe line of the picture from c to e and alſo by the meaſure from the ſcale 3 feet 9 inches, and ſet it from c to d; from e draw a right line to d 2, which will interſect the line that is drawn from c to V 2 at g; and a right line drawn from d to d 1 will interſect the line that is drawn from c to V 1, in the point f: then will c g repreſent the lower line of the ſide B 3 of the building, and e f the lower line of the ſide D 3.

Then raiſe the ſides by the following proceſs:

At the point c, which is the neareſt angle of the building, draw the

SECT. III. Plate XII. the right line c k perpendicular to the horizontal line H H, and at the points f and g draw f h and g m parallel to c k.

Upon the line c k fet up the given height of the building, 5 feet 9 inches; and from the point k draw right lines to the vanifhing points V 1 and V 2, and their interfections with the vertical lines drawn from f and g will form the fides of the building, as the interfections at c, k, f, h, produce the fide D 3, and the interfections c, k, g, m, produce the fide B 3.

Thus will the general form of the object be completed, in which figure is comprehended the rudiments of almoft all objects that fall within the notice of the painter or architect; becaufe the general principles of fuch objects require, that their fides fhould be at right angles with each other, or, as vulgarly called, fquare.

To find the reprefentation of the window or aperture, proceed as follows:

Upon the angle of the building c k, fet up the meafure of the height from the ground to the fill or bottom of the window, as from c to i; and above that point the height of the window, from i to 2; and from thofe points draw lines to the vanifhing point V 2.

Then fet off the width of the pier on the bafe line from c to n, 1 foot 10 ½ inches, and from n to h the width of the window, 1 foot.

Then from the points 1 and h draw right lines to d 2 the *diftance* of the vanifhing point V 2, and the interfections of thofe lines with the line drawn from C to V 2, as at K w, will give the apparent width of the window.

At the points K w draw lines parallel to c k, which will interfect the lines which are drawn from the points 1 and 2, and produce the apparent dimenfions of the window, as z n h o.

If the window or aperture is placed in the middle of a fide, as in

 this

this example ; its width and place may be found by another proceſs : Thus, divide the ſpace between c and e on the baſe line, into two equal parts, which will give the middle X ; then from that point on the baſe line ſet off, on each ſide, half the meaſure of the breadth of the window, as from X to n, and on the other ſide from X to h, and draw lines from thoſe points to the diſtance of the vaniſhing point d 2, and finiſh the aperture as before. SECT. III. Plate XII.

In this and the three preceding examples, the ſtudent muſt pay particular attention to the proceſs by which the true dimenſions of the repreſentations of objects are obtained. For this purpoſe let him note, that after any vaniſhing point is determined, then the diſtance of that vaniſhing point muſt be employed to meaſure or proportion the parts of ſuch line as is drawn to that vaniſhing point.

Thus, when the vaniſhing point V 2 is found, then the length of the line or radial B 4 (which is drawn from E to V 2) muſt be laid down on the horizontal line, as from V 2 to d 2. then will d 2 be the point for dividing or meaſuring all the proportions which may be required in the line or lines which vaniſh into V 2.

The plan which is below the interſection or baſe line, ſhews the geometrical ſituation of the object to the picture. It is further explained in the Addenda.

N. B. The dimenſions which are given to this example may probably be thought frivolous; but let what is called one foot be conſidered as four, and the proportion will be found equal to the purpoſe for which it is intended ; and as the ſcale is by this means leſs confuſed than if more divided, the ſtudent will have leſs trouble in the operation.

The manner of obtaining the appearance of the thickneſs of the wall, which is ſeen through the aperture, is not explained in this example, to avoid a confuſion of lines ; it will be ſhewn hereafter.

SECT III.

Example for drawing a House, of which the Front F *and Side* K *are inclined to the Picture.*

Plate XIII.

Plate XIII. Fig. 1.

The front F is inclined 53 degrees to the picture.

The dimensions of the house are as follows :

The height - - - - - - - - - - - - -	29 feet.
The width of the front - - - - - - - - -	33 feet.
Depth - - - - - - - - - - - - - - - -	22 feet.
From the ground to the top of the lowest window	9 feet.
Bottom of the upper window - - - - - -	12 feet.
Height of the middle window - - - - - -	17 feet.
From the top of the middle window to the bottom of the upper - - - -	4 feet.
Height of the upper window - - - - - - -	4 feet.
Width of the windows - - - - - - - - -	3 feet.
Door of the same height with the windows, width	5 feet.

The height of the eye is 6 feet, and the * distance of the picture 23 feet. That is, from the base line G, to the horizontal line H, is 6 feet by the scale; and from C, the center of the picture, to E which is the distance, is 24 feet.

Let G G be the base line, and C the center of the picture, and E the place of the eye, or distance of the picture: H is the horizontal line passing through C, the center of the picture, as before observed.

The vanishing points are V 1 and V 2; they are determined by

* The distance of the picture, in this example, is rather too short, not being equal to the height of the building; but it was chosen thus to shew the consequence of such errors, as from this cause the lines A M, A N, and all their parallels, rake or slope too much.

the

SECT. III. Plate XIII.

the ſame proceſs which was employed in the preceding example, R 1 being the radial producing the vaniſhing point of the front F of the houſe, and the radial R 2 producing the vaniſhing point of the ſide K of the houſe.

The diſtances of thoſe vaniſhing points are d V 1 and d V 2.

Let X be the interſection of the angle of the building with the picture; or, in more familiar language, ſuppoſe it the corner of the building, at which the picture begins.

At the point X draw the the line X A perpendicular to the horizon, and by the ſcale ſet up the whole height 29 feet from X to A.

From the points X and A draw right lines to V 1, the vaniſhing point for the front of the houſe.

Then from X ſet off upon the baſe line the whole length of the front of the building 33 feet, to the point 10, and draw a right line to d v 1, that will interſect the line drawn from X to V 1, in the point o, which will give the *apparent* depth of the front F. Draw a line from the point o perpendicular to the baſe line, or to the horizontal line, till it interſects the line drawn from A to V 1, as at M, and the face of the front F will be determined.

Repeat the ſame for the end or ſide K; then from X draw a right line to V 2; then ſet on the baſe line, from the point X to 12, the depth of the building 22 feet by the ſcale, and from 12 draw a right line to d v 2, and its interſection with the line drawn from X to V 2 will give the apparent depth at D. At that point draw a right line perpendicular to the horizon, and where it interſects, at N, the line that is drawn from A to V 2, will give the perſpective appearance of the ſide K of the building.

To find the dimenſions and places of the door and windows, proceed as follows:

SECT. III. Plate XIII. For their heights, upon the line X A, ſet up the meaſures of the faſciæ and windows, as at a, b, e, f, g, m, and n; and from thoſe points draw lines to V 1, which is the vaniſhing point for the front F.

Then find their breadths, as follows: upon the baſe line G, from the point X ſet off the width of the outer pier, as from X to 1, from 1 to 2 for the window; and continue the ſame alternate meaſures of piers and windows with the door, till the ſpace between X and 10, in the baſe line G, is filled with the meaſures of thoſe different parts.

From every one of thoſe points 1, 2, 3, 4, &c. draw right lines to the point d v 1, which is the diſtance of the vaniſhing point V 1, and where thoſe lines interſect the line drawn from the angle X to V 1, will give the apparent widths of the piers, windows, and door, upon the front F; from which interſections draw lines perpendicular to the horizon, as is ſhewn in the example.

To find the breadth of the window in the ſide K, the ſame proceſs muſt be employed as was practiſed in the front F; ſetting the meaſures of the pier and window from the point X towards 12, as at 9, 11, on the baſe line, and from thoſe points drawing lines to d v 2, which will give the interſections on the line X V 2; which interſections are the places for the windows of the ſide.

* Many lines are omitted in this figure, to prevent confuſion, for it is preſumed that thoſe which are given at the firſt diviſion of the windows in the front F, are ſufficient to demonſtrate the whole, ſeeing that the other parts are obtained by a repetition of the proceſs already deſcribed; nor was it thought neceſſary to deſcribe the proceſs for obtaining the vaniſhing points V 1 and V 2, becauſe it has been repeatedly given in the four preceding examples of this ſection. It is ſufficient to obſerve,

* The methods for obtaining the projections of the faſciæ are not given in this example: they are explained in a ſucceeding Part of the Work. See Index.

that

that the line or redial R 1 inclines to the line P P, which is the parallel of the picture, in an angle of 53°, which is equal to the inclination of the front F of the building to the picture : confequently the line R 1 produces tbe vanifhing point V 1 ; and, as the fide K is at right angles or perpendicular to the front F, the radial R 2 is drawn at right angles or perpendicular to the line R 1, thereby producing the vanifhing point V 2. SECT. III. Plate XIII.

Of the Diagonal when Oblique or inclined to the picture.

In drawing the forms of regular fquares, it is often neceffary to find the reprefentations of the * diagonals of thofe fquares, particularly when mouldings are to be delineated round a fquare or right angular block or fhaft, in which cafe the vanifhing point of the diagonal will be required.

Therefore, in Fig. 2. Plate XII. an example is given for finding the vanifhing point of the diagonal of a fquare. Plate XII.

† Let it be fuppofed that the reprefentation of the fquare 1 x 3 4 is already drawn; that C is the center of the picture ; that E is the eye, and that V 1 and V 2 are the vanifhing points of the fides of the fquare : it is required to find the vanifhing point of the diagonal.

Bifect the angle A E B, of the radials A, B ; and the line E Y, which bifects the angle, will interfect the horizontal line at c, which interfection is the vanifhing point required.

Left the foregoing inftructions fhould not be clearly underftood, they fhall be repeated in a more explicit manner.

* Diagonal is a right line drawn acrofs a parallelogram, or other quadrilateral figure, from the vertex of one angle to that of its oppofite. Some authors call it the diameter, and others the diametral of a figure. The line X 4, fig. 2, is the perfpective reprefentation of the diagonal.

† As the procefs for finding the reprefentation of the fquare was given in the foregoing figures, it is unneceffary to repeat the fame for this diagram.

After

SECT. III. Plate XII. After having found the radials A and B, with the compaffes, on the point E (which is the eye) defcribe the arc x, z; and then with the compaffes on the points x, z, defcribe the arcs y Y. Then from E draw a right line through the interfections of Y, y, till it cuts the horizontal line at c, which will be the vanifhing point for one diagonal of every fquare, whofe fides vanifh into the points V 1 and V 2: therefore from X, the neareft angle of the fquare, draw a right line to d, and the reprefentation of a diagonal will be produced, as the line X 4 is a diagonal of the fquare X 4, 3, 5.

N. B. The ftudent muft obferve that the line which is called the parallel of the picture is not drawn in this diagram; but this makes no difference, for the angle of inclination, which the fides of the object make with the picture, may be found by means of the vertical line, as follows:

Every angle that is lefs than a right angle hath its complement, which added to the given angle, produces the contents of a right angle, which is 90 degrees. Thus to an angle of 30 degrees the complement will be 60, which added together produces 90, the meafure of a right angle. The complement of an angle of 40 degrees will be 50, and the fame ratio of the reft.

The parallel of the picture and the prime vertical line are always drawn at right angles with each other; and as the radial producing the vanifhing point makes a given angle with the parallel of the picture, it muft follow, that the angle produced by fuch radial and prime vertica line will be the complement of the primary angle produced by the *radial* and parallel of the picture.

Therefore, if an original line is inclined to the picture in an angle of 35 degrees, its parallel radial will be inclined to the prime vertical plane in an angle of 55 degrees, thefe two quantities added together producing 90°, equal a right angle.

4 This

This is demonſtrated by the example, page 95, where E L is the vertical line, and P P the parallel of the picture. SECT. III.

The angle m E n, is 35 degrees, formed by the parallel of the picture P, and the radial K, the complement of which is the angle n E L, formed by the radial K and the prime vertical line L, which is an angle of 55°.

Therefore, it is evident that if an angle be conſtructed with the prime vertical line L, at the eye or diſtance E, equal the complement of the inclination of the original line with the picture, which in this example is 35 degrees, the radial K will be produced, and conſequently the interſection V, which is the vaniſhing point, will be the ſame as if obtained by the angle m E n, made with the parallel of the picture P P *

Of Squares inclined to the Picture.

In fig. 2, Plate XIII. is an example of a pavement of ſquares inclined to the picture. Plate XIII.

There is alſo a repreſentation of a ſquare block F, whoſe ſides incline to the picture, but with different inclinations to that of the ſquares; conſequently there are four vaniſhing points in the example, two for the ſquares of the pavement, and two for the ſides of the block.

Thoſe for the ſquares or pavement are marked V 1, V 2, and thoſe for the block, marked F, are V 3 and V 4.

All the vaniſhing points are found by the proceſs already deſcribed, every radial being drawn through the eye, with the ſame inclination

* Dr. Prieſtley, in his Treatiſe on Perſpective, employs the above proceſs for determining the vaniſhing points of lines inclined to the picture. Vide Sec. iii. page 18 of his work.

to

SECT. III. Plate XIII.

to the parallel of the picture P, as the sides of the original objects incline to the picture.

The side A of the pavement inclines to the picture in an angle of 29°; consequently the other side B inclines in an angle of 61.°

The side F of the block inclines to the picture in an angle of 50°, the side G 40°.

This figure is given for two purposes; the first, to demonstrate (what must ever be particularly remembered by the student in perspective) that when the representations of many objects are to be delineated in one picture, they are all governed by one and the same center and distance of picture, though there may be an infinite number of vanishing points for the representations of those objects.

The second purpose of this figure is to shew the method of representing a pavement of squares, when their sides are inclined to the picture; in which case their true representations are best obtained by the following process:

Suppose the sides of the squares to be inclined to the picture in an angle of 29°.

Through the eye draw the radial R X 1, making the given angle with the line P P, which will produce the vanishing point V 1.

At the eye draw the radial R X 2 perpendicular to R X 1, producing the vanishing point V 2.

Then find the vanishing point of the diagonal of the square, as follows:

Bisect the right angle formed by the two radials R x 1 and R x 2, by the method employed in Fig. 2 of plate XII. (see page 110) which will give the line T, intersecting the horizontal line in the point a, which will be the vanishing point for one diagonal of all the squares of the pavement.

Upon

Upon a feparate paper, or remote part of the picture, draw the reprefentation of the original fquare geometrically, at its proper dimenfions, by the fcale, as at Fig. 3, No. 1, together with its diagonal, as the line 1, 2.

Determine the point in the bafe line, where it is intended that the angle of one of the fquares fhall touch the picture, as at the point 1; from which point draw a right line to a, the vanifhing point of the diagonal, as the line 1 a.

Then take the length of the diagon 1 2 in the geometrical fquare Fig. 3, and fet it upon the bafe line from the point 1 to 2 and 3, and continue thofe meafures for as many fquares as may be required; and from every point, as from 1, 2, 3, draw lines to the point d d, which is the diftance of the vanifhing point of the diagonal 1 a; and the interfections of thofe lines with the diagonal, at the points 4, 5, will determine the perfpective dimenfions of the diagonals of the fquares, as they recede from the picture.

Through the points 4 and 5 draw lines from the vanifhing points of the fides of the fquare, as the points V 1 and V 2, and the reprefentations of the fquares will be completed.

Another method may alfo be employed, as follows: determine the point 1 for the angle of the fquare which touches the picture; from which point draw right lines to the points V 1 and V 2, the vanifhing points of the fides of the fquares.

Then from the point 1 fet off both ways the meafures of the fides of the fquares, and from thofe meafures draw lines to the diftances of the vanifhing points; and the lines fo drawn will interfect the lines A and B in the proportionate meafures required; through which divifions draw lines to the vanifhing points V 1 and V 2, and the reprefentations of the fquares will be completed.

In this problem it will be neceffary to obferve, that fquares can be fituated in no other pofitions to the picture only, than the following:

Q First,

SECT. III.

First, The sides parallel and perpendicular to the picture. Example, Plate IV. Fig. 1.

Plate XIII. Secondly, The sides inclined to the picture in an angle of 45°. Plate II. Fig. 3.

Thirdly, Inclined to the picture in any other angle than 45 degrees. Plate XIII. Fig. 2.

In the first position, the diagonals of the square are inclined to the picture in an angle of 45°, and consequently have the distance of the picture, when placed upon the horizontal line, for their vanishing points.

In the second position, one diagonal is parallel to the picture, and the other perpendicular; therefore the latter vanishes in the center of the picture.

In the third position, both the sides, and also the diagonals, vanish in oblique vanishing points, as has just been demonstrated.

Table inclined to the Picture.

Plate XIV. Fig. 1.

Plate XIV. Example of a table, of which the front o P is * inclined to the picture in an angle of 49 degrees.

The dimensions of the table are as follows:

The length - - - - - - - - - - - -	5 feet 9 Inches.
The breadth - - - - - - - - - -	3 feet 9 inches.
The height - - - - - - - - - - -	3 feet 3 inches.
The thickness of the legs about - - -	0 feet 3 inches.

* In this example the objects are supposed to be standing in a room. The limits of the picture are the lines marked A. The center of the picture is marked by the word center, and the lines marked R are the intersections of the sides of the room with the floor and ceiling, and the line marked R 2 is the intersection of the two sides which are seen: the others are not seen, not being within the angle of vision.

The

SECT. III. Plate XIV.

The height of the eye is ſix feet and one inch, and the diſtance of the picture about nine feet five inches.

Determine the center and diſtance of the picture, and draw the parallel of picture as before directed.

Find the vaniſhing points v 1 and v 2, by the methods already explained in the foregoing examples.

In this example the table is ſuppoſed at a diſtance beyond the picture; therefore the firſt part of the proceſs is to find the perſpective ſeat upon the floor, of the angle P of the neareſt leg, which proceſs is explained in Plate XI. where the angle S of the parallelogram A B C D, Fig. 2. is removed beyond the picture: but that the ſtudent may not be obliged to refer back to that example, the proceſs ſhall be here repeated.

Let a in the ground line, be the *ſeat* of the angle of the leg upon the *picture*. From a, draw a line to the center of the picture: then from a ſet off on the ground line the meaſure of the diſtance at which the leg is from the picture, as at b, which is one foot. The diſtance of the picture, D 1, being firſt brought down upon the horizontal line to D 2, draw a right line from b to D 2; and its interſection with the line drawn from a to the center of the picture, will give the perſpective ſeat P, which will be the angle of the neareſt leg of the table.

Having thus found the point P, draw lines from that point to the vaniſhing points V 1 and V 2; which lines will be the indefinite repreſentations of the outer ſides of the legs of the table.

Then cut off the length and breadth of the table, by the following method:

Through the point P draw right lines, from the points marked diſtance of v 1 and diſtance of v 2; and continue thoſe lines until they cut or interſect the baſe line, as in the points 1 and 3.

 Then

SECT. III. Plate XIV.

Then from the two points 1 and 3, fet off upon the bafe line the meafures of the front and end of the table: thus from 1 to 8, for the extent of the legs in front, and from 3 to 6 for the extent of the legs on the fide; that is, from 1 to 8 five feet nine inches, and from 3 to 6, three feet nine inches.

From the point 8 in the bafe line, draw a right line to the point marked diftance of v 2; and where that line interfects the line which is drawn from the angle P of the leg of the table to v 2, as at o, will give the apparent limits of the front legs of the table.

Then from the point 6 in the bafe line, draw a right line to the point marked diftance of v 1; and its interfection with the line drawn from P to v 1, as at P 2, will mark the extent of the legs for the width of the table.

Having thus obtained the general extent of the leg of the table, as at the points P, P 2, o, draw lines from thofe points perpendicular to the horizon, which lines will be the angles of the legs of the table.

Then find the height of the table as follows:

Continue the line which is drawn from v 1 through P, until it cut the ground line at e; and at that point draw the line M perpendicular to the horizontal line.

Upon that line fet up the height of the table 3 feet, as at the point 11, and from that point draw a line to the vanifhing point v 1; and the interfection of that line with the vertical line, which is drawn from P, as at the point w, will be the required height of the table.

For the thicknefs of the legs, take the meafure three inches, and fet it on the bafe line from 1 to 2, for the front of the neareft leg, and from 8 to 7, for the diftant leg. From 2 draw a right line to the diftance of v 2, which will give the apparent breadth at y; from 7 draw a line to the diftance of v 1, which will give the apparent breadth of the farther leg at s.

The

The ſame proceſs muſt determine the breadth of the legs at the end of the table, the meaſures being ſet on the baſe line from 3 to 4, and from 6 to 5, and lines drawn from thoſe points to the diſtance of v 1, which by their interſection with the line drawn from b in the baſe line to the vaniſhing point v 1, will give the apparent width of the legs at the end of the table. SECT. III. Plate XIV.

Then find the place and breadth of the rail at the end, with the ſtretcher in the middle, as follows:

Upon the vertical line M, ſet up from the baſe line the height of the bottom of the rail above the ground, and above that the meaſure of the breadth of the rail, and transfer thoſe points by lines drawn to the vaniſhing point v 2; and the * interſections of thoſe lines with the angles of the legs will mark the apparent dimenſions and place of the neareſt rail.

The ſtretcher being exactly in the middle between the legs, divide the ſpace between the points 3 and 6 in the ground line (which ſpace is the real breadth of the legs at the end) into two equal parts at 7; and from the middle draw a right line to the diſtance of v 1; and its interſection 8 with the line drawn from P to v 1 will give the middle of the end of the table. Transfer that interſection by a line drawn perpendicular to the horizon, and it will cut the rail at the point 9; from which point deſcribe the ſtretcher †, by drawing lines to the vaniſhing point v 2, which will give the form of the ſtretcher uniting with the farther rail.

* The point e is the interſection of the end of the table with the baſe line of the picture. that is, if the end P P 2, be conſidered as a plane continued towards the picture, it will interſect the picture in the line M; which line alſo cuts the interſection or baſe line of the picture in the point e.

† It muſt be obſerved in this example, that although the general form of the objects is ſimple in its principles; yet it requires ſo many lines to define all the parts with accuracy in perſpective, that if every line were given, the diagram would be rendered ſo confuſed, as rather to puzzle than inſtruct the ſtudent: therefore let him reflect, that the ſame proceſs which gives the height of the rail muſt be repeated to obtain its breadth; nothing more being neceſſary than to add the meaſure above, and transfer it by the vaniſhing point V 1.

The

SECT. III. Plate XIV. The projection of the top of the table is obtained by the fame process, by which mouldings are delineated in the example given in Plate XVIII. therefore the ftudent is referred to that for farther inftruction.

In this plate is alfo an example of a block B, the fides of which have the fame inclination to the picture with thofe of the table: confequently the fides C and D are parallel to the front and end of the table, and therefore have the fame vanifhing points.

This example is given to demonftrate the different methods of determining the height of any object, the plan of which is fuppofed to be already drawn, in perfpective.

The firft method is the fame with what is generally employed through this work, and is as follows:

Through the angle S of the plan of the block, draw a right line from the vanifhing point V 1, that may interfect the bafe line of the picture, as at X; at which point draw the line X E, perpendicular to the bafe line, and upon that line fet up from X to E the height of the block, and transfer that height to the angle of the object, by drawing a right line from E to the vanifhing point V 1, which will mark the height at t.

The apparent height may alfo be obtained, by taking at pleafure any point in the horizontal line, from which draw a right line through any angle of the plan, as b or S, till it interfect the bafe line; at which interfection draw a line perpendicular to the bafe line, and upon that perpendicular line fet up the height, and transfer it back by a line drawn to the *fame* vanifhing point, whence the firft line was drawn; and the interfection of fuch line with a line drawn at the angle S, or b perpendicular to the horizon, will give the apparent height required.

Another method may alfo be employed, as at Fig. 8, as follows: SECT. III. Plate XIV.

At any point in the bafe line taken at pleafure, as at L, draw a line perpendicular to the bafe line, as the line L N, upon which line fet up from the bafe line the required height of the object, as from L to G.

Then from the points L and G, draw lines to any point in the horizontal line. In the example they are drawn to the center of the picture, as the lines marked m and n, which lines are to be confidered as the indefinite reprefentations of the upper and lower edges of a plane, of which the height G L is equal to that of the object, the reprefentation of which is required.

Then transfer the required height, as follows:

At the neareft angle S of the plan of the block, draw a line parallel to the horizontal line, that may interfect the line L n, as at the point g, at which point draw the perpendicular g K; then is the line g K equal to the apparent height required.

From the point k draw the line k t, parallel to the horizontal line, which will cut the vertical angle of the block at t, and confequently determine the height.

Or the height of the line, g K may be taken with compaffes, and applied from S to t, which will give the height required.

This laft given procefs for determining the heights of objects may be employed to avoid a number of lines, as the operation may be performed on a different paper, or detached part of the fame tablet; taking care that the height of the eye and diftance of the picture be the fame as employed in the general arrangement of the other objects in the picture.

SECT. III.

Plate XV.

Box without Lid inclined to the Picture.

Plate XV. Fig. I.

This example is preparatory to the figure in Plate XXIX. in the next or fourth ſection, and repreſents a box, the ſide of which, B, is inclined to the picture in an angle of 41 degrees.

The front A - - - - -	2 feet 8 inches.
The ſide B - - - - - -	2 feet 2 inches.
The height - - - - - -	1 foot.
The thickneſs - - - - - - -	$3\frac{1}{2}$ inches.

It is about 9 inches beyond the picture.

The height of the eye is 2 feet, ſo that the box may be ſuppoſed ſtanding on a table, the ſurface of which is 2 feet below the eye of the ſpectator.

C is the center of the picture, and the diſtance which is marked by the word eye, is 4 feet 10 inches.

Proceſs.

Draw the radial R 1 from the eye, making the given angle with the parallel of the picture 41 degrees, which is the inclination of the ſide B to the picture.

Draw the radial R 2, perpendicular to R 1, and the interſections of thoſe lines with the horizontal line H H, will give the points V 1, V 2, which are the vaniſhing points for the ſides of the box.

Then determine the diſtance of the box beyond the picture; for which purpoſe, ſuppoſe S to be the ſeat of the angle of the box upon the picture. From the point S draw a line to the center of the picture C, and from S on the ground line ſet off to x, by the ſcale, the diſtance of the angle of the box from the picture, which is 9 inches.

Then

Then bring down the diſtance of the picture to the horizontal line, as at D, by the ſame proceſs that hath been ſhewn by Fig. 2, Plate XI. at the beginning of this ſection. SECT. III. Plate XV.

From x draw a right line to D, and where that line interſects the line which is drawn from S to C, as at N, that point will be the place of the angle required, or the repreſentation of its ſeat upon the ground.

From the point N, draw lines to the vaniſhing points V 1, V 2; and cut off on thoſe lines the dimenſions of the box, by the following method:

Upon the horizontal line bring down the diſtances of the vaniſhing points, as at d 1, d 2, by the methods already directed.

Then from d 1, in the horizontal line, draw a right line through the angle N of the box, till it cuts the interſection or ground line of the picture at 1.

Repeat the ſame from d 2 through N, till it cuts the ground line at 5.

Then take the meaſure of the ſide A, 2 feet 8 inches by the ſcale, and ſet off on the ground line from 5 to 8; and alſo the meaſure of the ſide B, 2 feet 2 inches, and ſet off from the point 1 to 4; and from thoſe points draw lines to the points d 1, d 2, and where thoſe lines interſect the lines that are drawn from the angle of the box N, to the vaniſhing points V 1, V 2, thoſe interſections will give the apparent dimenſions of the box, as at a and b.

Thus the lines drawn from 5 and 8 to d 2, produce the dimenſions of the ſide A at a N; and the lines drawn from 1 and 4, to d 1, produce the ſide B at N b.

Then find the thickneſs of the box as follows:

For the ſide A ſet off the meaſure 3 ½ inches, * from 5 to 6, and alſo from 8 to 7 in the interſection or ground line.

* Three inches and half is too great a thickneſs for ſuch conſtructions, but is given for the better demonſtration of the figure—One inch would be ſufficient.

SECT. III. Plate XV.

For the ſide B ſet off the ſame meaſure from 1 to 2, and from 4 to 3; and from thoſe points draw lines to d 1 and d 2, and their interſection with the baſe lines of the box will give the thickneſs, as at c d on the face A gives the thickneſs for the ſide B and its oppoſite, as the ſimilar interſections on the ſide A indicate the thickneſs on the ſide B and its oppoſite.

Then find the height of the box as follows:

Continue the lower line of the ſide A, by a line drawn from the vaniſhing point V 1, till it cuts the interſection or baſe line at x, at which point draw a line perpendicular to the interſection or ground line, as the line m x, upon which ſet up the height of the box 1 foot by the ſcale to h, and from h draw a line to V 1, which line will interſect the lines that are drawn perpendicular to the ground line at the angles N a, and give the upper angle z of the box; from which point draw lines to the vaniſhing points V 1 and V 2, which will form the two ſides A and B.

Transfer the thickneſs which is found at d and e in the lower line of the box, to the upper edge, as at t, and from that point and thoſe which are ſimilar, draw lines to the vaniſhing points V 1 and V 2, and the thickneſs of the top of the box will be expreſſed.

It muſt be obſerved, that the proceſs employed for finding the thickneſs of the ſides of the box, is equally applicable and proper to determine the thickneſs of the walls of a houſe or other building *.

Of Circles in Perſpective.

In Plate XV. Fig. 3, is an example for delineating circles in perſpective.

* In the next Section this leſſon is continued, the box being completed with the addition of a lid—See Plate XXIX.

First

SECT. III. Plate XV.

First draw the circle geometrically at its full fize on any other paper and then circumfcribe that circle with a fquare, as in Fig. 2.

Divide the fides of the circumfcribing fquare into any number of equal parts, fuppofe fix; and at thofe equal divifions draw lines, which may divide the large fquare into a number of fmaller fquares, producing a reticulation, as in the example Fig. 2.

In this example the fquare which circumfcribes the circle is inclined to the picture; confequently oblique vanifhing points, with their diftances, are employed in the conftruction of the figure.

Having determined the center of the picture and its diftance, and alfo the oblique vanifhing points V 1 and V 2, by the rules already demonftrated; draw the perfpective fquare S, and afterwards divide it into as many fmall fquares, perfpectively, as are contained in the geometrical fquare, Fig. 2: As thus, take the meafures of the fmall fquares 1, 2, 3, 4, 5, 6, on the fide of the geometrical fquare, Fig 2, and transfer them on the ground line each way, from X, as indicated by the figures 1, 2, 3, 4, &c.; and from thofe points draw lines to the points d 1 and d 2, which are the diftances of the vanifhing points for the fides of the fquare, which lines will produce the interfections a, b, c, d, e, upon the fides of the reprefentation of the large fquare S; from which interfections draw lines to the vanifhing points V 1, V 2, and the great fquare S will be divided into the fame number of fmall fquares perfpectively, with the geometrical fquare.

The perfpective appearance of the circle muft then be finifhed by hand, which can be completed by no other method than comparing the reticulations of the perfpective fquare S, with thofe of the geometrical one Fig. 2, and then drawing the appearance of the circle through thofe points in the fquare S, which correfpond with thofe in Fig. 2. Thus the points e, f, g, h, k, in both figures correfpond with

SECT. III. Plate XV. each other; consequently, those in S are the guides for the required representation.

This process is so plain, that a steady examination of the figure will render further explanation unnecessary. It must be observed, that if the circle is circumscribed by a square, whose sides are parallel, and perpendicular to the picture, the process is nearly the same; the center of the picture being the vanishing point for the sides of the square; in which case the distances of the vanishing points are not required.

Pedestal with Steps inclined to the Picture.

Fig. 1, Plate XVI.

PLATE XVI. In this example there are three steps, each of which is 6 inches in the rise, and 1 foot in the tread *.

The face F of the pedestal and steps are inclined to the picture in an angle of 50 degrees.

The height of the eye, or horizontal line is 6 feet.

The center of the picture and place of the eye are marked.

The distance of the picture is about 11 feet.

H H is the horizontal line.

G G is the intersection or ground line of the picture.

P P is the parallel of the picture, to which the line or radial R inclines 50°, producing the vanishing point V 1.

V 1, V 2, are the vanishing points.

d v 1, d v 2 are the distances of those vanishing points. V D, is the vanishing point of the diagonal.

* By rise is meant the thickness of the step, or its height from the ground, which is seldom more than 6 inches, generally less.

By the tread is meant the flat part, on which the foot falls, which is seldom more than 12 inches, unless the building to which they approach is large.

4 The

The vanifhing points and their diftances are found by the methods already explained.

The point X is the neareft angle of the loweft ftep, which touches the picture.

Therefore from X draw lines to the vanifhing points V 1, V 2, as the lines A and B, and at the point X draw the line X Y perpendicular to the bafe line G G 2.

Upon the line X Y fet up the height of the neareft ftep, as from X to o, fix inches by the fcale; and from the point o draw lines alfo to the vanifhing points V 1 and V 2.

Then will the lines which are drawn from the points X and o to the vanifhing points, reprefent the indefinite appearance of the firft or loweft ftep.

Proceed to find the length of the firft or loweft ftep, as follows:

From X fet off on the bafe line each way to the points 7*, the length of the loweft ftep 8 feet 10 inches by the fcale, and from thofe points draw lines to the points d v 1 and d v 2, which are the diftances of the vanifhing points; and the interfections of thofe lines with the lines A and B of the fteps, as at K K, will determine the apparent length each way of the loweft and longeft ftep.

Then proceed to reprefent the tread or furface of each ftep, as follows:

From the angle X of the loweft ftep, fet off each way the dimenfions of the horizontal furface or tread of the ftep, which in the example is one foot †; and repeat that meafure as often as there are fteps required: as from X to the points 1 2 3 each way; outward from the point X for the neareft angles, and for the farther extreme

* Obferve that the marks of reference are the fame on both fides of the fteps, becaufe the procefs is the fame on both fides.

† That is, 1 foot from the point g to r.

of

SECT. III. Plate XVI.

of each ftep, from the point 7, the fame meafure inward; that is, one foot from the point 7 to 6, to 5 and 4.

From thofe points draw right lines to the points d v 1, d v 2, which will interfect the line A in the points a, b, c, and d, e, f; at which draw lines perpendicular to the horizon, as the lines a g, b h, c m, at the near angle of the ftep; and alfo lines in the fame direction from the points d, e, f, at the fartheft angle of the ftep; as in the example.

Then determine the neareft angle or corner of the *fecond* ftep, as follows:

V D, is the vanifhing point of the diagonal of the object; therefore from o, which is the upper angle of the loweft ftep, draw a line to V D, and at a, draw the vertical line a g; then from g draw a line to V 1, and the interfection of the lines o V D, and g V 1, at q, will give the feat of the angle (or as vulgarly called, the corner) of the fecond ftep at q.

Having found the point q, which, as before obferved, is the loweft point of the angle of the fecond ftep, draw the vertical line q r: Then upon the line X Y fet up the height of the fecond ftep, as from o to P, and transfer that meafure to the line q r by a line drawn from P, to the vanifhing point V D, of the diagonal; and the height of the fecond ftep will be obtained by its interfection at r with the line q r.

From q and r draw lines to the vanifhing points V 1, V 2, as was done in the firft ftep, which will exprefs the fides of the fecond ftep; then cut off the length of the fecond ftep, as follows:

From the point 6 in the bafe line, which is the meafure of the length of the fecond ftep, draw a line to the vanifhing point V 1, which will interfect the bafe line of the loweft ftep in the point d, at which point draw a vertical line that may interfect the *upper* line of the loweft ftep;

ſtep; from which interſection draw a right line to the vaniſhing point V 1, and it will interſect the loweſt line of the ſecond ſtep in the point w, conſeqnently the point w is the extreme length of the ſecond ſtep. SECT. III. Plate XVI.

If the inſtructions given for obtaining the proportions and forms of the two lower ſteps are well underſtood, there will be little difficulty in obtaining the proportion of the third, and of the baſe of the dado of the pedeſtal; for a repetition of the foregoing proceſs is all that is neceſſary, even if there were many more ſteps to be deſcribed.

There wants nothing to complete the figure but to find the height of the pedeſtal, for its thickneſs is determined by the tread of the third ſtep; becauſe that ſtep ſurrounds the baſe of the pedeſtal, which is defined by the angles marked *a b d.*

Therefore to find the height, draw the vertical angles of the dado or ſhaft of the pedeſtal, from the points *a b d,* which are found in the upper ſtep, by the ſame proceſs that determined the lower ſteps.

Then upon the vertical line X Y ſet up from X in the baſe line, 9 feet 6 inches to Y, and from that point draw a line to the diagonal vaniſhing point D V; and the interſection of that line with the angle of the pedeſtal will give the height required, as at the point z. From the point z draw lines to the vaniſhing points V 1 and V 2, which will determine the form of the ſhaft or dado of the pedeſtal. The method for determining the crown or covering of the pedeſtal is given in the Addenda.—See Index.

In the courſe of the foregoing operation, let it be obſerved, that in marking the meaſures for the *treads* of the ſteps, which determine their ſituations within each other, thoſe meaſures are applied outwardly on the baſe line from X, and inwardly on the ſame line from 7; and the ſpace between the points 3 and 4 is the breadth of the

dado

SECT. III. dado or shaft of the pedestal. It must also be particularly noticed, that the proportions of the treads of the steps are obtained by lines drawn

Plate XVI. to the *distances of the vanishing points*; but the lines which produce the *forms* of the steps must be drawn to the *vanishing points*.

A Garden Seat.

Plate XVII. In Plate XVII. is an example for a building with a pediment, which may be considered as adapted to contain seats or other accomodations in a garden.

The center of the picture is C, the distance or eye is D.

H H is the horizontal line.

P P is the parallel of the picture, as written.

L 1 is the radial or parallel of the front K of the building, which is inclined to the picture in an angle of 38°.

L 2 is the radial or parallel of the sides of the building, which are perpendicular to the front.

* B B is the base line.

The vanishing points are V 1 and V 2, determined by the radials L 1, L 2 (as before taught, Page 95); and d 1, d 2 are the distances of those vanishing points.

After having studied the instructions and practised the rules which are given in the preceding part of this Section, particularly those of the Example of a house inclined to the picture; the student will not require to have them repeated here, for the construction of

* In all architectural representations, it will ever be the most convenient practice, to place the object immediately upon the base line; as in this example, in which the point A is the intersection of the picture, or seat of the angle upon the base line. And after the representation of the building is obtained, to add as much space below as may make the whole appear pleasant to the eye, as the line X X was added at pleasure, after the the object was finished.—This method will save a great deal of trouble, yet be equally true, as if the building had been drawn at the same apparent distance from the line X X as it now appears.

this

this figure is produced by the ſame proceſs which was employed in that example, with the addition of the pediment; for the conſtruction of which, inſtructions are given in the next Section. SECT. III. Plate XVII.

Yet it may be proper to obſerve, that the heights of the ſunk pannels, and of the fluted faſciæ, are determined by ſetting up their dimenſions from the point A, upon the angle of the building A f, as at the points a, b, d, h, and from thoſe points drawing lines to the vaniſhing points V 1 and V 2; which lines determine the heights of the required parts.

The breadths of thoſe parts are found by ſetting their meaſures upon the baſe line B B, from the angle A to the points 1, 2, 3, 4, and c, on the left ſide, and from the ſame angle to the points 7, 8, and III, on the right ſide, and from every one of thoſe points drawing lines to the *diſtances* of the vaniſhing points; as thoſe on the left ſide are drawn to the point d 1, which is the diſtance of the vaniſhing point V 1, and thoſe on the right are drawn to the point d 2, which is the diſtance of the vaniſhing point V 2.

The rails or paliſadoes, marked M, at the back of the building, are parallel to the front and back; conſequently have the ſame vaniſhing point with the front, which is V 1.

The line of poſts and chains is parallel to the ends or ſides of the building; conſequently has the ſame vaniſhing point with the ends, which is V 2.

The figures of the man and woman are ſuppoſed of equal heights with the ſpectator who views the building; therefore the horizontal line of this example paſſes through the eyes of thoſe figures.

The ſcale by which the building is drawn, is given at the bottom of the print; therefore the ſtudent who conſiders this example may eaſily obtain the meaſures of all the parts; and it will be a good practice for him to purſue the following method:

SECT. III. Plate XVII.

Take with the compaffes the different fpaces which are figured upon the bafe line, and then apply the compaffes, fo extended, to the fcale, and the real dimenfions will be known. Thus B B is the bafe line, upon which the fpace between 4 and 5 is equal to the real width of the door or aperture: therefore take that fpace in the compaffes, and while fo extended apply them to the fcale, and it will give 9 feet, which is the meafure.

The fame procefs will determine the heights of the different parts, taking the dimenfions at the angle of the building upwards from A, as from thence to the top is 24 feet by the fcale.

It muft be obferved, that no drawing of an object of this kind can be made with truth but by meafurement.—If it is a view of a building already conftructed, the meafures muft be obtained from the original object: but if it is only a defign for fome future edifice, the geometrical fketch muft firft be made, and the meafures figured, by which the perfpective drawing muft be regulated.

A Church inclined to the Picture.

Plate XVIII. Fig. 3.

PLATE XVIII.

Is a view of a country church, of which the fide A is inclined to the picture in an angle of 46 degrees.

All the fides of the building are at right angles with each other.

The center of the picture is C, which is in the middle of the horizontal line, reckoning from the fides of the picture.

D is the diftance of the picture, on the prime vertical line.

The vanifhing points are V 1 and V 2; and d 1, d 2, are the diftances of thofe vanifhing points.

1 The

The roof is divided into two parts, and the line T Z is in the fame plane with the fide S of the bell tower; while the fide U of the tower is parallel to the end X T of the church, as are alfo the fides of the porch. SECT. III. Plate XVIII.

D 2 is the diftance of the picture, brought down to the horizontal line: it is employed to find the point A, which is the feat of the neareft angle of the building upon the ground; which point A is determined by the procefs which is employed in example Fig. 2, Plate XI. Page 99.

The point A being found, from that point, draw the lines which form the bafe of the building, to their different vanifhing points, as A v 1, A v 2.

Then find the height of the wall, as at the point W, which is in the angle of the walls of the fide and end.

For which purpofe, continue the line which is drawn from V 1 through A, till it cuts or interfects the bafe line, as at the point b, at which point, draw the line b o perpendicular to the horizon; and upon that line fet up the known or fuppofed height of the wall, as from b to 2, which is 18 feet by the fcale; and from 2 draw a line to V 1, and it will mark the apparent height of the wall by its interfection at W.

It is fcarcely neceffary to give a minute detail of the procefs for obtaining every line in the reprefentation of the object, as fuch inftructions would be no more than a repetition of the foregoing leffons.

Yet, as the general form of the building is rather complex, it might by fome be thought unintelligible without further explanation, particularly concerning the receding or remote parts of the object.

It muft then be obferved, that the building is compofed of two parts or divifions, the further and longer part of which may be called the chancel, and is connected with the bell tower.

SECT. III. Plate XVIII.

* To find the appearance of what may be called the chancel, that is from T to S, including the tower, proceed as follows:

Suppofe the line T n already determined by the rules before given, and confider T as dividing the building, at the part equal the chancel's width, and in the fame plane with the face M and S; then from n draw a line to the vanifhing point V 2, as n X.

Then through the point n draw a line from d 2, which is the diftance of the vanifhing point D 2, that may cut or interfect the bafe line at 9; and from 9 fet upon the bafe line the meafure of the whole length of the church 60 feet, and from that point draw a line to the fame diftance d 2 of the vanifhing point, which will determine the apparent length of the building. The height of the fpire is determined as follows: ~~at~~ through the four angles of the tower draw diagonals, and at their interfection draw a line perpendicular to the horizon, which will be the center, and find its height upon that line by the foregoing rules.

In the example the roof of the church is divided into two parts, each of which has the fame inclination to the horizon; which inclination is determined without vanifhing points, by the following method:

Suppofe the ridge R of the roof to be fix feet higher than the angle W of the wall.

The line o b is the interfection of the picture by the plane of the

* As in this example the plate is not long enough to admit the whole meafure of the length of the church, the half may be ufed, with the half diftance, as follows: V 2 is the vanifhing point of the fide *A* A of the church, and d 2 is the diftance of that vanifhing point; therefore divide the fpace between V 2 and d 2 in half or two equal parts, as at d 2 $\frac{1}{2}$; then from d 2 $\frac{1}{2}$ draw a right line through n, which may interfect the ground line, as at z; then from z fet on half the meafure of the length of the Church, 28 feet to y, and thence draw a right line to d v $\frac{1}{2}$, and its interfection with a line a drawn from n to V 2 will give the apparent length of the church with equal truth as if the whole meafure had been employed.

end T X continued, forward and the point 2 in that line is the height of the wall upon which the roof refts; therefore, from 2 to 3 fet up the height 6 feet, and from 3 to 0, 6 feet alfo; which is double the height of the roof from 2 to 0; at each of thofe points draw lines to the vanifhing point V 1; then continue or produce the line A W, which is the neareft angle of the wall to k, and the line n T, to m, and the farther angle to F. Then draw the diagonals W m, Z k, N m, and Z F; and the pitch or form of the roof will be determined by the lines W R Z and Z L N. SECT. III. Plate XVIII.

Demonftration.

The points W k Z m reprefent the four angles of a parallelogram, feen obliquely, the bafe of which is W Z, equal the chord or fpan of the roof required; and R, which is the center of the parallelogram, marks the apex or fummit of the roof, the perfpective appearance of which is produced by the fcalene triangle W, R, Z.

The procefs for obtaining the reprefentation will be better underftood by confidering the diagrams marked Fig. 1 and Fig. 2 in the fame plate.

The firft fhews the geometrical form of the roof, the line 45 being the chord or fpan, and the point 1 the apex or fummit of the roof.

Upon the line 34, as a bafe, a parallelogram is conftructed, whofe height is twice that of the roof; confequently the diagonals 25, 34, of the parallelogram coincide with the inclined furfaces of the roof.

It muft be obferved, that the vanifhing point V 4, by which Fig. 2 is drawn, is to be confidered as in fome horizontal line, and correfponds with the point V 1 in Fig. 3.*

* All the lines and points in Fig. 1, and Fig. 2, are marked by fimilar letters and figures, by comparing which the ftudent will eafily comprehend the procefs.

This

SECT. III. Plate XVIII.

This procefs is more eafy in theory than what is employed in the firft example of the next Section. Yet both produce the fame effect; and as it may frequently happen that the vanifhing point for the inclined planes of the roof may lie above the limits of the canvas or tablet, the method here given will, in general practice, be found the moft convenient.

A Chair inclined to the Picture.

PLATE XIX.

Plate XIX. contains examples for drawing a chair in Perfpective, when the front is inclined to the picture.

The form of chair reprefented in the example is by workmen called a baluster back, parlour chair; and the ftudent muft obferve that in general, all modern chairs are conftructed upon the principles of this example; that is, the back of the feat is narrower than its front; confequently the feat and general plan of the chair are trapeziums, of which two fides are parallel to each other, as a and b, Fig. 1 and 2; while the other two are inclined to each other, as c and d. By this form of the original object, it is abfolutely neceffary to find *three* vanifhing points, for the delineation of the chair feat and rails; a fourth muft alfo be employed to facilitate the operation.

The meafures of the chair are as follows:

The height of the feat is 18 inches.

The width of the front of the feat, 25 inches.

The width of the back of the feat, 19 inches.

The depth of the feat from the front to the back, as from a to b, 19 inches.

The height of the back above the feat, 18 inches.

The width of the top of the back is the fame with the front of the feat.

The

The height of the eye or horizontal line is 5 feet. SECT. Plate XIX.

The diftance of the picture is 8 feet 5 inches.

H H is the horizontal line, G G is the interfection or ground line, and the center of the picture is marked by the word.

Procefs, Fig. 1.

Determine the center of the picture, and likewife the diftance or place of the eye, as E, and draw the parallel of the picture P P, as in the foregoing examples.

At the eye E draw the plan a b c d of the feat of the chair, by the fcale; difpofing the front a with the fame inclination to the *parallel* of the picture P P, as the original is fuppofed or known to incline to the *picture*.

Continue the line a, which expreffes the front, till it cut the horizontal line at V 1; the point V 1 will be the vanifhing point for the front and back of the chair, for they are parallel to each other. Then continue the line c of the plan, till it interfects the horizontal line at V 2; then will V 2 be the vanifhing point of the fide c of the plan of the chair.

Through the point E draw another line parallel to the fide d of the plan, till it interfect the horizontal line, as at V 3, and V 3 will be the vanifhing point of the fide d of the chair.

Thus are the three vanifhing points obtained, V 1 for the front and back of the chair, V 2 for the fide c, and V 3 for the fide d.

Find the vanifhing point V 4, by drawing a line at E perpendicular to the line E V 1, and its interfection at V 4 will be the vanifhing point for lines perpendicular to the front of the chair.

After having determined thefe vanifhing points, find their diftances by the foregoing rules; as d 1 is the diftance of V 1, d 2 the diftance

SECT. III. Plate XIX. tance of V 2, d 3 the diſtance of V 3, and d 4 the diſtance of V 4.

Having thus obtained the vaniſhing points and their diſtances, proceed as follows:

Suppoſe the point 1, Fig. 1, in the ground line, to be the point at which the angle of one of the front legs touches the picture.

At 1 draw the perpendicular 1 c, and upon that line ſet up the height of the ſeat 18 inches by the ſcale; and from the bottom and top of the leg, that is from 1 and c, draw lines to the vaniſhing point V 1. Then on the baſe line ſet off from 1 to 2 the width of the front of the chair 2 feet 1 inch, and from 2 draw a line to d 1, which is the diſtance of the vaniſhing point V 1; and the interſection at 9 will be the apparent width of the front of the chair. Draw the front with the rail and breadth of the legs by the foregoing rules, as in the Example of the table, Plate XIV. Page 114.

Then from the upper angles of the front draw the ſide d to the vaniſhing point V 3, and the ſide c to the point V 2.

This will be better underſtood by inſpecting the large example Fig. 2; where the front and back, a and b, are both drawn to one* vaniſhing point, they being both parallel to each other; while the ſide c is drawn to the point V 2, and the ſide d to the point V 3; becauſe thoſe ſides incline to each other.

Determine the depth of the ſeat as follows:

The vaniſhing point of the ſide c of the chair ſeat, Fig. 1, is V 2. Therefore, from the angle 1 draw a line to V 2, and cut off a portion of that line equal the depth of the ſeat; for which purpoſe ſet the meaſure of the ſide d or c (being both equal in dimenſions) upon the ground line, from 1 to 12, and from 12 draw a line to the point

* The vaniſhing point for the front and back a and b, Fig. 2, are out of the plate, for want of ſpace.

d 2,

SECT. III. Plate XIX.

d 2, which will give the interfection x, and determine the apparent depth of the feat upon the ground; which meafure muft be transferred to the point 10, by a line drawn perpendicular to the horizon, which will produce the interfection 10.

Having obtained the point 10, the reprefentation of the feat of the chair is formed by drawing a line from that point to the vanifhing point V 1; a portion of which line is b, which reprefents the back of the feat. Then find the reprefentation of the back, as follows:

Continue upwards the angle of the front and neareft leg, as from 1 to 4; and from the point 1 fet up the whole height of the chair back, 3 feet 2 inches by the fcale; and from the point 4 draw a line to the vanifhing point V 1, which will interfect a line drawn upwards through the angle of the other front leg, in the point 3; then from the points 3 and 4 draw lines to the vanifhing point V 4, and find the point 6, which is the upper angle of the back, as follows:

From the point 1 draw a line to the vanifhing point V 4, and fet upon the bafe line from 1 to 8 the meafure of the depth of the back, with its *inclination; and from the point 8 draw a line to d 4, which will give the interfection 5; from which point draw a line perpendicular to the horizon, to interfect the line drawn from the point 4 to the vanifhing point V 4, as at 6; from which point draw a line to the vanifhing point V 1, which will produce the interfection 7: then will the line b, which is the back edge of the feat of the chair, together

* By inclination muft be underftood the bend or flope of the back; which, in the kind of chair reprefented by the example, declines backward from the feat; by which circumftance the top of the back is further from the front rail a of the feat, than the back rail b.

The beft way to obtain the meafure of the depth of the inclination of the back, is to place the chair againft the fide of a room, and meafure from the front of the feat to the wall. In the example, the difference is about 3 ½ inches; the depth of the feat being 19 inches, and fpring of the back, or back feet, 23 ½ inches, expreffed by the points 12 and 8 in the ground line G, Fig. 1.

SECT. III. Plate XIX. with the points 6 and 7, be the principal guides for the delineation of the back of the chair; which, with the back feet, muſt be drawn by hand; for in all complex forms compoſed of curved lines, like the example here given, the rules of perſpective can only give points of direction, by which the curves muſt be completed by hand.

In this example, many of the lines that are neceſſary for the completion of the object are omitted, as their number would appear ſo complex as to render the figure unintelligible; but the whole will be clearly underſtood, if thoſe which are given are well examined, for they are the eſſential, and govern the reſt.

The Student muſt pay particular attention to this figure, becauſe it is the firſt of this Treatiſe in which the ſides of the object are *not* at right angles with each other. But of this further notice will be taken hereafter. He muſt alſo obſerve, that the whole form of the object is contained in a parallelepiped, the angles of which are marked as follows: 1, x, 9, 0, conſidered as the baſe, and 3, 4, 6, 7, as the top.

This muſt ever be the proceſs when objects are compoſed of curvilinear forms, ſuch as the back and baluſter marked A, Fig. 2, together with the back feet; for thoſe parts muſt be drawn by hand, through points which determine the extreme angles, or principal parts of the required forms.

The Example, Fig. 2, is given to ſhew the object at large, more particularly to demonſtrate the direction of the ſides of the object to their vaniſhing points.

The horizontal line for this figure is marked H 2, and the vaniſhing points for the ſides of the chair are V 2 and V 3, which correſpond with the points V 2 and V 3 in Fig. 1.

The vaniſhing points for the front and back are beyond the limits of the plate, as before obſerved.

The

The thicknefs of the legs, the place and dimenfions of the fide rails, together with the ftretcher, are determined by the fame procefs, which was employed in the example of the Table, Plate XIV. SECT. III. Plate XIX.

The baluster A of the back muft be drawn by hand; to affift which, find the perfpective reprefentation of the middle of the back of the chair, together with as many points as may ferve as guides to direct the delineation of the fmaller forms; after which the whole muft be finifhed by hand, as already obferved.

Door inclined to the Picture.

Plate XX.

Is an example for determining the apparent width of an open door, when inclined to the picture. PLATE XX.

This figure is intended to fhew the procefs by which a door may be reprefented in true proportion to the aperture, after the other parts of the room are finifhed; and therefore may be confidered as extremely ufeful to the artift, who wifhes to reprefent an open door, the dimenfions of which may correfpond with a given aperture in any pofition fuited with the compofition of his picture.

Let it be fuppofed, that the fides of the room and the aperture for the door are already drawn, and * that R R, R R, reprefent the upper and lower lines of the fides of the apartment, and that the points V, W, mark the apparent width of the opening of the door—g is the vanifhing point of the fide C Y of the room, and d is the diftance of that vanifhing point. Obferve that this point is in the fhade, therefore rather obfcure.

Firft find the real width of the aperture, by the inverfe procefs, as follows:

* In this problem it is affumed that the center and diftance of the picture are already determined: C is the center, and E is the eye or diftance of the picture.

 Confider

SECT. III. Plate XX.

Confider the width of the aperture of the door as a given portion of the line T W V, the vanifhing point of which, as before obferved, is g, and its diftance d.

From d draw right lines through W and V, till they cut the ground line G, G 1, at a and b: then will the fpace between a and b reprefent the real width of the aperture.

Having thus obtained the real width of the aperture, proceed as follows:

At the point V, which is in the line of the door upon which it is hinged, draw a right line at pleafure, as may beft fuit the circumftances required in the picture; and continue that line, till it cut or interfect both the ground line and the horizontal line, as the line V S, which interfects the ground line at the point m, and the horizontal line in the point o: confequently the line m S V o is the indefinite reprefentation of the face of the door, and o is its vanifhing point.

* From o draw a line to the eye or diftance E, and bring down the length of that line to the horizontal line, as at d 2, which will be the diftance of the vanifhing point o.

Thus is o the vanifhing point of the loweft line of the face V X of the door, and d 2 is its diftance: therefore, from d 2 draw a right line through V, till it cut the ground line or interfection of the picture, as at G 1; then take the width of the door, which has already been found at a b, and fet it on from G 1 to a; and from *a* draw a right line to d 2; and its interfection S with the line of the face of the door, which is drawn from m to o, will give the apparent width of the door.

It is prefumed that the ftudent has already made fuch progrefs before he attempts this problem, that after having obtained the point S, he will be able to complete the reprefentation of the door without

* The line O E is the radial parallel to the original of face S X V of the door; and the length of every radial is the diftance of the vanifhing point produced by that radial; therefore d 2 is the diftance of the vanifhing point o.

further

SECT. III. Plate XX.

further inſtructions; becauſe, all that follows has been already explained. Therefore it will be ſufficient to obſerve, that the vaniſhing point for the thickneſs of the door at S, is h, the interſection of its parallel radial with the picture: ſo that to find the true dimenſions of the thickneſs of the door, the diſtance of the vaniſhing point h muſt be brought down to the horizontal line, the dimenſion of the thickneſs marked on the * ground line, and transferred to the door, as before.

In this example the proceſs, which may be conſidered as the natural order of operation, is reverſed; for inſtead of finding the points V W, by their places a b firſt given, on the ground line or interſection of the picture; the repreſentation of the opening of the door, as V, W, are firſt given, or ſuppoſed, and afterwards their places found upon the interſection of the picture, as at b, a.

Again, the line S V of the face of the door being drawn out at pleaſure, as may beſt ſuit the deſign of the artiſt, the vaniſhing point of that line, and the diſtance of that vaniſhing point muſt afterwards be found. Therefore, inſtead of firſt drawing the radial E O, making the ſame angle with the parallel of the picture, which the door is required or known to make with the picture; the radial muſt be drawn from O to E, becauſe O is the vaniſhing point already determined by the poſition of the line m S V. Here it will be proper to remark, that if nothing more were required than to cut off a portion of the line m S V, the radial O E need not be drawn; becauſe the diſtance from O to E, taken by the compaſſes, is ſufficient to determine the diſtance of the vaniſhing point O: but, as it is neceſſary to find the vaniſhing points for the thickneſs of the door, the line O E

* The diſtance of the vaniſhing point h is not marked, and other lines are omitted, that the figure might not be too much confuſed.

The perpendicular line m n is the line upon which the real height of the door is marked; which being transferred by the vaniſhing point o, marks the apparent height of the door at X.

muſt

SECT. III. Plate XX. must be drawn, that the line E h may be drawn perpendicular to O E, thereby to obtain the vanishing point h, which is the vanishing point for the thickness of the door at S X.

As the instructions and observations given in this Example may be considered as a scholium upon the preceding part of the Section, it will be very advantageous to the student to understand it clearly, and also to consider the following Corollary. The line V Y is the line upon which the door is hinged; therefore, the point V, which is upon the floor, may be considered as the center, round which the lower line S V of the door revolves, producing a circle, all the radii of which are equal the original of the line S V. Hence it follows, that this problem may also be considered in effect the same with that which is given by Dr. Brook Taylor in his first edition, Prob. 12, Example 3, Page 24, which teaches to complete the representation of a circle from the representation of one given radius.

For suppose the line V W the given representation of a radius, and V the center of the required circle; then will the line V S represent a second radius; consequently, all the other radii may be determined by a repetition of the same process, by which the line V S was obtained; and as the circle passes through the extreme of its radii, the points S and W may be considered as two points in the perspective representation of the periphery of a circle, the rest of which remain to be found.

Of the Polygon and Triangle.

PLATE XXI.

Plate XXI.

In this plate are two examples, one of which may be called an oblong hexagon, the other a triangle, in perspective, both of which have all their sides inclined to the picture.

In drawing the perfpective appearances of objects fimilar to thefe examples, the readieft way of finding their vanifhing points, is to draw their geometrical forms in fome part of the canvas or paper; difpofing the fides with the fame inclination to the parallel of the picture, as thofe of the original object. SECT. III. Plate XXI.

Let the hexagon, Fig. 1, be fuppofed fo fituated that one of its longeft fides inclines to the picture in an angle of 37 degrees.

After having determined the center * of the picture, and its diftance, as at the words center and diftance, draw the horizontal line H, and the parallel of the picture P P, as in the foregoing examples. This being done, draw the geometrical figure of the hexagon, No. 1, in fuch difpofition that the fides R 1, R 1, fhall incline to the parallel of the picture P P, in an angle of 37 degrees, which is the inclination that the original object makes with the picture. Through the eye draw the radial R 1 X, parallel to the fides R 1, R 1, of the geometrical plan No. 1; and the point where that line interfects the horizon, as at V 1, will be the vanifhing point for the projection of the reprefentation of the lines R 1, R 1, in the geometrical plan, No. 1.

Again, through the eye draw the radial R 2 X parallel to the original lines R 2, R 2, in the geometrical plan No. 1; and the interfection of the radial R 2 X with the horizontal line H, will be V 2, which will be the vanifhing point for two of the fides of what may be called the ends of the hexagon.

The other radial R 3 X is drawn in the fame manner through the eye, parallel to the fides R 3, R 3, of the geometrical figure No. 1, and would, if continued, cut the horizontal line, and produce a third vanifhing point; but the angle of the radial R 3 being but little

* The center of the picture is marked by the word, and the mark X, but V 2, clofe to it is a vanifhing point, produced by the radial R 2 X.

inclined

SECT. III. Plate XXI. inclined to the picture, the interfection will not be in the paper; therefore, it is neceffary to find * the vanifhing point V 4, which is for lines perpendicular to the *radial* R 1 X, or which is the fame thing, to lines perpendicular to the lines R 1, R 1, in the geometrical plan No. 1.

Having thus obtained the vanifhing points V 1, V 2, V 4, and the diftances d V 1, d V 4, proceed as follows:

Let the point *a* be found in the perfpective reprefentation, by the rules given in example, Fig, 2, Plate XI, page 99; from the point *a* draw a line to the vanifhing point V 1, which line may be confidered as the indefinite reprefentation of that longeft fide of the hexagon which is neareft to the picture.

From the point d V 1, which is the diftance of the vanifhing point V 1, draw a right line through *a*, till it cuts the bafe line at 1; and then fet off the meafure of the fide, as from 1 to 2, in the bafe line, which is equal to one of the longeft fides of the hexagon, No. 1; and from 2 draw a right line to d V 1, which will interfect the line a b at b: confequently, the portion of line between a and b will be the perfpective reprefentation of one of the longeft fides of the hexagon neareft the picture.

Having thus obtained the neareft fide of the hexagon, find the perfpective reprefentation of the oblong or parallelogram which contains the whole figure, as 5, 9, 6, 12.

For this purpofe, on the geometrical figure, No. 1, draw the lines b b through the interfections which the fhorteft fides of the hexagon

* In drawing this kind of figures, the great bufinefs of the artift is to contrive that they may be executed with the feweft vanifhing points poffible.

In this figure three vanifhing points are employed, which are V 1, V 2, V 4.—But V 4 is not a vanifhing point of any one of the fides of the figure, but is a vanifhing point of lines at right angles with the fides R 1, of No. 1; for as the vanifhing point of the fides R 3 would lie at a great diftance beyond the limits of the paper, it is neceffary to find fome other point which may fupply the want of it.

make

make with the longest. Then take the projection of the angle from b to a, and apply that measure on the ground line G G from 2 to 3, and from 1 to 4; from these points draw lines to d V 1, and they will intersect the line b a, in the points 5 and 6; from which points draw lines to the vanishing point V 4. Having drawn these lines, find the breadth of the parallelogram: for which purpose draw a right line from d V 4 through the point 5, till it intersect the base line at x; and set off from x the whole breadth of the hexagon by two equal divisions, as at 7 and 8; and from those points draw right lines to d v 4, the distance of the vanishing point v 4; and they will produce the intersections 5, o, 9: from which intersections draw lines to the vanishing point V 1, which will give the sides and longest diameter of the parallelogram which circumscribes the hexagon.

Complete the hexagon, as follows—From the point b, * draw a right line to the vanishing point V 4, and its intersection with the opposite side of the hexagon will give the point 12.

Draw right lines from o and b, to the vanishing point V 2, and join the points *a*, o, and 11, 12, by right lines; and the hexagon will be complete.

Triangle inclined to the Picture.

Plate XXI. Fig. 2, is an example of a triangle, the sides of which are inclined to the picture.

Having determined the center of the picture, with its distance, draw the horizontal line, and the parallel of the picture P P.

Then draw the triangle, No. 3, in any part of the paper or canvas, so that the sides may make the same inclination with the parallel of the picture P P, which the sides of the original is known to make with the picture.

* This line is not marked, to avoid confusion.

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Plate XXI.

Through the eye draw lines parallel to the original lines d 1, d 2, d 3, in No. 3, which parallel lines will be R 1, R 2, R 3, producing the vaniſhing points V 1, V 2 : but the vaniſhing point which would be produced by R 3, falls beyond the limits of the paper, but is not required in this diagram.

Having found the vaniſhing points V 1 and V 2, with their diſtances d v 1, and d v 2, determine the place of the angle A, as already directed in the foregoing example; the point d P being the diſtance of the picture, brought down to the horizontal line, then from ~~that~~ the point A draw right lines to V 1 and V 2, which will be the indefinite repreſentation of two ſides of the triangle.

Through the point A, draw right lines from d V 1 and d V 2, which ſhall cut or interſect the ground line at a and b ; from which points ſet off the meaſures of the ſides of the triangle, as from a to c, equal the ſide d 2 in No. 3, and from b to d, equal the ſide d 1 in the geometrical triangle, No. 3.

From c draw a line to d V 1, which will interſect the line that is drawn from A to V 1, in the point P; and from d draw a line to the point d V 2, which will interſect the line drawn from A to V 2, in the point O: conſequently, the line A P repreſents the ſide of the triangle equal d 2, in the geometrical figure No. 3; and A O the ſide equal d 1, in the ſame geometrical figure. Complete the triangle by drawing the line O P.

It is almoſt needleſs to obſerve, that having obtained two ſides of any triangle, the third is found of courſe; therefore two vaniſhing points are ſufficient.

In all ſolid figures, of which the plans or baſes are polygons or triangles, the elevations are conſtructed by the ſame vaniſhing points which produce the plans : therefore, if the foregoing examples con-

cerning

cerning folids, the fides of which are at right angles with each other, are well underftood, there need no further inftructions concerning the conftruction of buildings, the bafes of which are polygons or trapeziums, for the fame methods are employed in both cafes. Thus, if a folid were required to be reprefented upon the triangle Fig 2, nothing more is neceffary than to draw lines at the different angles A O P, perpendicular to the horizon; then to determine the heights of the neareft line in the object, and from the point fo found drawing lines to the vanifhing points of the fides; which points are V 1, and V 2.

SECT. III.

Plate XXI.

Octagon and Pentagon. Plate XXII.

PLATE XXII.

Fig. 1, and Fig. 2, are examples for drawing the octagon and pentagon in perfpective, when their fides are all inclined to the picture.

Before any inftructions are given for finding the vanifhing points, it will be neceffary to inform the ftudent (particularly if unfkilled in Geometry) of the readieft methods of drawing thofe forms geometrically. *

The octagon being the fimpleft, fhall be firft given.

To draw a regular octagon in a *fquare* of any given dimenfions, the following is the procefs:

Draw the fquare, Fig. 1, No. 1, of the given fize; and at the points 1, 2, 3, 4, draw the diagonals A C, B D.

Then with a radius equal to half the diagonal, that is with compaffes on the point C or D extended to E, which is the center of the fquare, draw the femicircles a d, g b, cutting the fides of the fquare at the points a c, and g b. Repeat the fame at the angles A and B, producing the points e, h, and f, c; draw right lines from b to c, from a to e, from f to g, and h to a; and the octagon will be completed.

* Thefe problems do properly belong to the firft fection; but they are placed here, that the ftudent might not have the trouble of turning back, before he could proceed with the perfpective part of the diagrams.

SECT. III. Plate XXII.

For the regular pentagon, the fides of which are of given dimenfions, the following are the methods of operation.

Draw the line A B, Fig. 2, No. 1, equal to the given dimenfions of one of the fides of the pentagon.

Upon the points A and B draw two circles, the radii of which are equal to the line A B, and they will interfect each other at the points a and b; through a and b draw a right line, as C D.

With the radius equal to the given line A B, on either of thofe points, mark the point a on the line C D; and upon that point defcribe the circle 1 2, A B, producing the point E.

Through the points 1 2 and E draw right lines, till they cut the upper circles in the points 3 and 4; on the points 3 and 4, with the radius A B defcribe the arcs D, and join the points A 3, B 4, D 3, and D 4, by right lines; and the pentagon will be complete.

Plate XXII. Fig. 1. Procefs for the Perfpective reprefentation of the octagon, the fides of which are inclined to the picture.

Having drawn the horizontal line H H, and the parallel of the picture P P, as before directed; draw the radial E V 1, making the fame inclination with the parallel of the picture P P, that the fide of the original object makes with the picture.

Thus the line E V 1, makes an angle of 35° with the parallel of the picture P P, and produces the vanifhing point V 1.

Perpendicular to the line E V 1, draw the line E V 2, producing by its interfection with the horizontal line, the vanifhing point V 2.

Bring down the diftances of thofe vanifhing points to the horizontal line, as at d V 1, and d V 2.

Thefe points being determined, draw the perfpective reprefentation of the circumfcribing fquare, as follows:

Let 1 be fuppofed the angle of the fquare, touching the interfection or bafe line of the picture G G. From 1 draw lines to the vanifhing points

points V 1 and V 2, and fet off on the bafe line the dimenfions of the circumfcribing fquare; that is, from 1, to 2 and 3 on each fide, equal to the fide A B or C D of the original geometrical fquare, No. 1.

SECT. III.

Plate XXII.

From thofe points draw lines to the diftances of the vanifhing points d v 1 and d v 2, and the interfections 4 and 5 will be the perfpective appearances of the angles of the circumfcribing fquare.

Complete the perfpective fquare 1 4 5 6, by a line drawn from the point 4, to the vanifhing point V 1, and from the point 5 to the vanifhing point V 2.

Find the vanifhing point V 3, of lines producing the fides of the octagon, which lines are parallel to the diagonals of the given circumfcribing fquare, as b c, g f, and d e, h a, in Fig. 1, No. 1.

Bifect the angle M E N, and draw a right line from the eye E, through X, which by its interfection with the horizontal line, will give the vanifhing point V 3, the vanifhing point for one of the diagonals of the perfpective fquare, Fig. 1, which circumfcribes the reprefentation of the octagon.

From the point 1 in the bafe line (which is the neareft angle of the circumfcribing fquare) fet off the meafures which may determine the interfections of the fides of the octagon with that fquare, as follows:

From either of the angles of the fquare No. 1 as from C, take, with the compaffes, the fpace c b, or C c, and apply that meafure from the point 1 in the bafe line, Fig. 1, on each fide, as to A and C; from A draw a right line to d V 2, and from C to d V 1, which will interfect the perfpective fquare at the points 7 and X; alfo fet the fame meafures from the points 2 to B, and from 3 to D.

From B draw a line to d v 2, and from D draw alfo a line to d v 1, which lines will produce the interfections 8 and 9.

Then from the points 8 and 9, draw lines to the vanifhing point V 3, which lines will form the reprefentations of two fides of the octagon as 8 11 and 9 o.

From

SECT. III. Plate XXII.

From the points 7 and X draw lines alſo to the vaniſhing point V 3, which will give the interſections 12 and 13. Join the points 7 and X, as alſo 12 and 13, by right lines, and the perſpective appearance of the octagon will be completed.*

It is needleſs to obſerve, that the ſides x 7, and 11, 12, are parallel to each other, conſequently, have the ſame vaniſhing point; which point would be produced by the radial R, if it were contiuued till it interſected the horizontal line; but as this point falls out of the limits of the paper, it cannot be conveniently employed.

The Pentagon. Fig. 2, Plate XXII.

Suppoſe the center of the picture C, with the eye or diſtance E, the horizon H H, and the parallel of the picture P E P, as before directed.

At the eye E, draw the regular pentagon No. 2, geometrically, with one of its ſides at the ſame inclination to the parallel of the picture P E P, that the original inclines with the picture.

Continue the ſides E 1 and E 4, till they interſect the horizontal line; alſo draw right lines from E through the angles 2 and 3, till they interſect the horizon; all which interſections will give the vaniſhing points V 1, V 2, V 3, and V 4, the vaniſhing points for four of the ſides of the pentagon.

After having found thoſe vaniſhing points, bring down their diſ tances, as d v 1, d v 2, &c.

Let a in the ground line G G, be ſuppoſed the angle of the pentagon, which touches the picture. From a, draw lines to V 1, and V 2,

* When a regular octagon is ſo ſituated that one of its ſides is parallel to the picture, there will be no occaſion for any other vaniſhing points than the center and diſtance of the picture, as commonly employed in the ſecond ſection: for in ſuch a ſituation, the ſides of the octagon, which are inclined to the picture, may be conſidered as parallels to the diagonals of a circumſcribing ſquare; conſequently, are inclined to the picture in an angle of 45 degrees. Therefore, the points of diſtance placed on the horizontal line will be the vaniſhing points of thoſe ſides of the octagon, which are inclined to the picture.

which

which will be the indefinite reprefentations of two fides of the pentagon. From the point a, fet off on the ground line the length of one fide, as from a to b, equal A B or A 3 in the geometrical figure No. 2, and draw a line from b to d v 2; and the interfection d will give the apparent length of one of the fides of the pentagon, as from a to d.

SECT. III. Plate XXII.

Repeat the fame procefs from a to c equal the meafure of a fide, and from c draw a line to d v 1, which will give the interfection e, and determine a fecond fide of the figure: from d draw a line to the vanifhing point v 3, and from e to v 4, which will produce the indefinite reprefentation of two other fides of the pentagon.

Then determine the length of thofe fides, as follows:

Draw a right line from d v 3, through d, till it interfects the ground line, as at h; and from h fet off the length of a fide to k, and draw a right line from k to d v 3; and its interfection m will give the length of the fide d m.

For the fide e n, repeat the fame procefs, by means of the vanifhing point d v 4.

Having obtained the points m, n, join them by a right line, which will form the fifth fide, and complete the pentagon.

In the foregoing problems, it is directed to draw the form of the polygon required at the eye or diftance; but it muft be obferved, that the reprefentation may be obtained, if one fide only is drawn in the given inclination to the picture; after which lines muft be drawn at the eye, making fimilar angles with the firft given line, which the different fides of the polygon make with each other; which lines will produce the vanifhing points, by their interfections with the horizontal line. But this procefs, though elegant and fcientific, is not fo ready and ufeful to the artift as the one here given. But fhould any one defire to purfue this part of the fubject, he will find it amply treated by Hamilton and Malton: the latter in his firft volume, Book iii. Plate XIII.

As

SECT. III. Plate XXII. As edifices are very feldom conftructed upon the plan of any polygon, except that of the octagon, the foregoing inftructions will be fufficient for the artift in all cafes whatever, for the vanifhing points of the fides, as alfo the dimenfions of thofe fides are all determined by the fame procefs which is employed in the four preceding examples.

Of Circles and Semicircles in Perfpective, Plate XXIII.

As it may be prefumed that the ftudent has already made himfelf mafter of the rules, by which the vanifhing points of *horizontal* lines inclined to the picture are found; no directions are given for that part of the procefs in the fucceeding examples of this Section, but the center of the picture and vanifhing points are indicated, as already determined. For it muft be evident to the flighteft obfervation, that the lines which are called the parallel of the picture, and the parallel of the eye, are of no ufe after the vanifhing points are found; therefore, thofe lines are omitted in the following examples, to prevent the confufion which would otherwife neceffarily refult from their number.

In the following examples and inftructions, the application of circles and femicircles in the reprefentations of columns and arcades is fhewn, particularly when they are inclined to the picture.

In a foregoing leffon, Plate XV, Page 122, the manner of obtaining the reprefentation of a circle was fhewn; which was done by reticulating the geometrical figure by a number of right lines, and afterwards throwing that reticulation into perfpective: which method is very eafily underftood, and is perhaps the beft when the circle to be reprefented is large; but when required of moderate fize, it will be more convenient to employ fewer lines; at moft, no more than will produce by their interfections eight given points, as in Plate XXIII. Fig. 2; which figure is obtained by the following procefs.

First draw the circle, No. 2, at full size; after which inclose it in a * square. SECT. III. Plate XXIII.

At the angles of the square draw the diagonals a c, b d, and through the center draw the diameters, 2, 8, and 5, 7, parallel to the sides of the square; which diagonals and diameters intersect the circle in the points 2, 8, 5, 6, and a, b, c, d, producing eight regularly disposed points in the periphery of the circle.

Parallel to either diameter, draw two right lines, that may pass through the points, in which the circle is intersected by the diagonals, as the lines 1 d, 3 c.

It must be observed, that it is indifferent to which diameter these lines are parallel; because they are only required to indicate the seat of the points a, b, and c, d, upon one side of the square, as the points 1, and 3, which would be just as convenient in operation, if they were upon the base of the square, as upon the side.

Having thus completed the geometrical figure, No. 2, proceed to the perspective representation at No. 3.

The line G G is the base or ground line; and the line H H is the vanishing line of the plane in which the circle is situated, or in other words, it is the horizontal line.

V 1 and V 2 are the vanishing points of the sides of the square; and d v 1, d v 2 are the distances of those vanishing points. V 3 is the vanishing point for the diagonal of the square a c; which may or may not be employed by the artist, as he shall find convenient.

Determine the appearance of the square, No. 3, in perspective; which is done by applying the measures equal to those of the geometrical square, No. 2, on each side of the point 4, upon the base line; as to 5 and 6; and then determine the square as in the former lessons;

* Euc. B. iv. Prop. 7.

SECT. III. Plate XXIII.

by lines drawn to the vaniſhing points, and to the diſtances of thoſe vaniſhing points, as in the firſt leſſon of this ſection, Page 97.

After the repreſentation of the ſquare is obtained, draw the diagonals a c, b d; which muſt be drawn through the points or angles of the ſquare.

At the point X, where thoſe diagonals interſect each other, draw right lines from the vaniſhing points V 1 and V 2 through that interſection, and thoſe lines will repreſent diameters of the circle, touching the ſquare in the points 2, 7, 8, 9.

Having thus prepared the repreſentation of the ſquare, No. 1, with the diagonals and diameters; find the points a, b, c, d, in thoſe diagonals, which may indicate four points in the periphery of the ellipſis; which is to be the repreſentation of the circle required.

For this purpoſe the following proceſs muſt be employed:

At the angle 4 of the repreſentation of the ſquare, ſet upon the baſe line the ſpace 4 1, equal 4 1 in the geometrical ſquare No. 2; and from 5 to 3 the ſame ſpace; and transfer thoſe points to the repreſentation of the ſide of the ſquare, as at the points 1 and 3, by the *diſtance* of the vaniſhing point d v 1; and from 1 and 3 draw lines to the vaniſhing point V 2, and thoſe lines will interſect the diagonals in the points a, d, b, c; which are the points required. Through thoſe four points, and the points 2, 7, 8, 9, making eight points, draw the repreſentation of the circle by hand, in the beſt manner poſſible.

It muſt be obſerved, that the method here given, together with that of the Example in Plate XV, are the beſt adapted for the uſe of the artiſt: but of the two the latter is the moſt elegant.

There is alſo a method, which is extremely elegant, given by Dr. Brook Taylor, in page 24 of the firſt edition of his Linear Perſpective: but the diagram, Fig. 22, is not ſufficiently clear, nor is the proceſs adapted to the painter's uſe.

Of

SECT. III. Plate XXIII.

Of the Shafts of Columns.

Plate XXIII.

The foregoing diagrams being clearly underſtood, the ſtudent may proceed to the following leſſon, which ſhews the manner of repreſenting the ſhafts of columns when ſtanding in a row.

Fig. 1, repreſents the rudiments of two columns; the centers of which are in a right line; the vaniſhing point of which is V 1.

The other vaniſhing point is V 2; for as the plinth and abacus of every column are perfect ſquares, ſo the vaniſhing points of their ſides are the vaniſhing points of lines at right angles with each other.

Therefore V 1 is the vaniſhing point for the fronts, and V 2 the vaniſhing point for all the ſides of the plinths; and as every abacus is parallel to the plinth, ſo V 1 and V 2 are the vaniſhing points for the fronts and ſides of thoſe abaci.

The line B B is the baſe line.

H H is the horizontal line.

C is the center of the picture.

And the eye is marked by the word.

V 3 is the vaniſhing point of one of the diagonals of the plinths, as alſo for one diagonal in each of the abaci.

Let o be ſuppoſed the ſeat upon the ground of the neareſt angle of the plinth of the firſt column, and let the line X 1, X 2, be conſidered as the interſection of the picture by a plane paſſing through the diagonal of the plinth and abacus of that column; therefore, it will be the line upon which the height of the column muſt be determined.

From the point o draw a right line to V 1, which line will expreſs the indefinite repreſentation of the *fronts* of all the plinths that may

SECT. III. Plate XXIII.

be required; from o draw alſo a right line to V 2, which will produce the indefinite repreſentation of the *ſide* of the neareſt plinth.

Then determine the apparent breadths of thoſe plinths as follows:

From the point d v 1, which is the diſtance of the vaniſhing point V 1, draw a right line through o, till it interſects the baſe line of the picture, as at 4; and repeat the ſame proceſs from d v 2, which will give the interſection A.

From thoſe two points determine the forms of all the plinths that may be required, as follows:

Upon a ſeparate paper, or remote part of the picture, draw two circles, the diameters of which ſhall be equal to the lower and upper diameters of the ſhafts of the intended columns, as at No. 1 and No. 2; and circumſcribe thoſe circles each with a ſquare, and draw the diagonals and ordinates, as was done in the caſe of the circle Plate XXII. page 153.

Then take with the compaſſes the dimenſions of the lower diameter of the ſhaft, equal to the line from 4 to 6 in No. 2, and apply it upon the baſe line B, Fig. 1, from the point 4 to the point 6, and alſo from A to the point Z.

From the point 6 draw a right line to the point d v 1, which is the diſtance of the vaniſhing point V 1; and its interſection of the line which is drawn from o to V 1, as at n, will give the apparent breadth of the front of the plinth of the firſt column.

Then from the point Z draw a right line to the point d v 2, which is the diſtance of the vaniſhing point V 2; and its interſection with the line that is drawn from the point o of the plinth to the point V 2, will determine the depth of the plinth of the ſame column, as at k.

Then ſet up the height of the plinth upon the line X 1, X 2; and transfer that height by the vaniſhing point V 3 of the diagonal, as has been already taught in the example of the ſteps, Plate XVI. Page 125, and complete the form of the plinth. SECT. III. Plate XXIII.

Then upon its upper ſurface find the repreſentation of a circle, the diameter of which ſhall be equal to the diameter of the loweſt part of the ſhaft of the required column; which muſt be done by the ſame proceſs which was employed to obtain the repreſentation of the circle Plate XXII.

N. B. The diameters are found by means of the points 2 and 5 in the baſe line; from which points lines are drawn to the points d v 1 and d v 2, as before directed; and the ordinates which determine the interſections of the circle by the diagonals of the ſquare, are found by means of the points 1 and 3 in the baſe line, by the ſame proceſs with the former.

Then determine the height of the neareſt column, and alſo the repreſentation of its abacus; as follows:

The line X 1, X 2, as before obſerved, is the interſection of the picture by the diagonal plane, ſuppoſed to paſs through the angles of the plinth and abacus of the neareſt column. Therefore, upon that line ſet up the whole height of the column, as from X 1 to X 2; and at X 2 draw the right line M W, parallel to the horizontal line.

Then from the point X 2 draw a right line to the diagonal vaniſhing point V 3; and in that line find the point S, the neareſt angle of the abacus of the neareſt column.

But here it will be neceſſary to obſerve, particularly to thoſe who do not underſtand architecture, that the perſpective arrangement of columns in rows muſt be conducted by the diſtance between their centers or axes, rather than between their ſhafts; which diſtances muſt be determined as follows:

The points 4 and 6, as alſo 14 and 16, in the baſe line B, Fig. 1, mark the breadths of the plinths of the two columns; and the points

SECT. III. Plate XXIII. points 5 and 15 mark the middle of thofe plinths: and as it is neceffary to find the middle of the abaci of both columns, the points 5 and 15 in the bafe line B, muft be transferred to the line M W, as the points b f, which ftand exactly over the points 5 and 15.

Thefe points may be obtained by drawing lines perpendicular to the horizon, from the points 5 and 15 in the bafe line, till they interfect the line M W in the points b and f; or they may be obtained by the following procefs:

Take with the compaffes, the fpace between the points X 1 and 5 in the bafe line, and fet it on upon the line M W, from the point X 2 to b; and alfo from b, fet on to f the dimenfions, equal to the fpace from 5 to 15 in the bafe line B; which laft meafure is equal to the diftance between the centers or axes of the columns.

Then find the reprefentation of the abacus of the neareft column, as follows:

From the plan of the capital No. 1, take with the compaffes half the dimenfions of either of its fides, as from b to d, or from b to X; and apply that meafure upon the line M W, from the point b each way, as to d and P, and from the point P draw a line to the point d v 1; and its interfection with the line that is drawn from X 2, to the diagonal vanifhing point V 3, will determine the angle of the abacus of the neareft column, as at S. Then from the point S draw a right line to the vanifhing point V 1, as the line S T; which line may be confidered as the indefinite reprefentation of the upper edges of the fronts of the abaci for all the columns that may be required.

Then determine the reprefentation of the abacus of the fecond column.

At the point f, in the line M W, fet off half the breadth of the abacus each way to *a* and *d*; and from *a* and *d* draw right lines to the point

point d v 1, which will produce the interfections T and *h* in the line S V 1; which points determine the apparent breadth of the abacus of the fartheft column.

Then determine the fide of each abacus, for which purpofe proceed as follows:

Through the point S, which is the angle of the neareft, draw a right line from the point d v 2, which is the diftance of the vanifhing point V 2, that may interfect the line M W, as at the point *k*; and from the point *k*, fet on to *m* the depth of the abacus, equal to the fpace between d and X in the plan No. 1; and from m draw a right line to d v 2, which will give the interfection P, in the line S v 2: confequently, the fpace S P, is the apparent depth of the neareft abacus.

After what has been taught in the former part of this fection, it is unneceffary to continue inftructions for obtaining the reprefentation of the abacus of the fecond column; it will be fufficient to obferve, that a right line drawn from the angle P to the vanifhing point V 1 will determine the apparent breadth of the fecond abacus, as at F, and of as many more as might be required.

After having obtained the reprefentations of the plinths and abaci, find the ellipfes or reprefentations of circles; one upon the upper furface of each plinth, and alfo one on the under furface of each abacus. And by the affiftance of thofe ellipfes defcribe the fhafts of the columns, as follows:

From the points which reprefent the centers of the ellipfes in the plinths, draw right lines to the centers of the ellipfes in the abaci, as the lines *A A*; which lines will reprefent the axes of the columns.

Then obferve where the ellipfes in the plinths are interfected by the diagonals that are *leaft inclined to the picture*; and from thofe points draw right lines to the points in the abaci, in which the upper ellipfis is interfected by the diagonal that is neareft to parallel with

SECT. III. Plate XXIII. with the picture: and thofe lines which in the example are marked y y, will be the apparent boundaries of the fhaft; which will have the full effect, if fhadowed with fkill.

Obferve, that the line *A*, which indicates the axis of the column, is of ufe to direct the artift in drawing the lines y y, which exprefs the outlines of the fhafts; for the latter lines muft incline equally on both fides to the line *A*, which reprefents the axis of the column.

In re-confidering this example, the ftudent muft obferve, that the chief purpofe of the foregoing operation is to obtain the reprefentation of two circles, in two planes parallel to each other; which planes are the upper furface of the plinth, and the under furface of the abacus. Thefe circles reprefent the lower and upper extremes of the fhaft of the column; confequently, both thofe circles, though of different dimenfions in their diameters, muft have both their centers in one right line; which right line is the axis of the fhaft of the column. And it muft be particularly noticed, that the meafures which determine the lower diameters and the intercolumnations, muft be arranged by firft finding the reprefentations of the feats upon the ground of thofe centers or axes; which muft ever be at equal diftances from each other, both at their lower and upper extremes; while the fpace between each abacus is greater than that between each plinth: therefore, when the point 5, in the bafe line, is determined, the point b, in the line M W, muft ftand exactly over it, and thofe two points muft govern all the reft in the difpofition of the columns.

It cannot be improper to obferve, that the foregoing inftructions direct a procefs which the author confiders as attended with the leaft trouble, and as being the moft convenient for the artift; becaufe it does not require a plan to be drawn out upon the ground plane: a method which is always inconvenient, and frequently impracticable

to

to the painter. It muft alfo be noticed, that the proportions employed in the example do not accord with thofe given by *Vignola* and other architects, but are more conformable to the ancient columns of Pæftum, which were purpofely felected that the example might be more explicit, as the procefs muft ever be the fame, fuppofing the height of the column to confift of ten, or only of two diameters. SECT. III. Plate XXIII.

The Tufcan Bafe and Capital.*

Plate XXIV.

Fig. 1, No. 2, is for the bafe, when the plinth is difpofed with its fides parallel, and perpendicular to the picture. PLATE XXIV.

In drawing objects like the given examples, it will be the fhorteft procefs to draw the geometrical elevations, and alfo the plans of the parts, as in Fig. 1, No. 1, which reprefents the Tufcan bafe with its plan beneath.

Having drawn thefe at their proper dimenfions (which may be done upon any feparate paper) draw upon the plan the diagonals a d, and b c; after which draw the ordinates or right lines f g, e h, paffing through the points where the diagonals interfect the circle of the torus, as at 2, 4, 6, 8.

Again draw the right lines o p, and q r, which muft pafs through the fmall circle, in the points where it is interfected by the diagonals. Draw the diameters 1 5, 3 7, and the lines 2 8 and 4 6, which are tangents to the fmall circle, afcertaining its dimenfions or breadth.

* Of the examples, one is parallel to the picture, and the other oblique or inclined; and to thofe who have ftudied the former part of this fection, there can be no difficulty in the 2d figure, for it is evident that the procefs for defcribing the parts is the fame in both figures; obferving that in the firft the center and diftance of the picture are the points employed; whereas in the fecond oblique vanifhing points and their diftances are ufed.

SECT. III. Plate XXIV.

The geometrical elevation of the baſe, together with its plan, being thus prepared, let the line a b d, Fig. 1, No. 2, be conſidered as the baſe line, C the center of the picture, and V the diſtance.—d b is the breadth of the plinth, which being always ſquare, ſet off the ſame breadth from b to a, and determine the perſpective appearance of its form, by the rules given in the ſecond Section.

Having completed the plinth, upon its upper ſurface draw the diagonals, as from the angle 8 to 9, and from 10 to 7.

Then interſect thoſe diagonals by lines correſponding with the lines f g, e h, in the plan Fig. 1, No. 1; which muſt be done as follows:

From the angles 10 and 8 of the plinth, Fig. 1, No. 2, mark the points 2 and 4, equal to the ſpaces from b to f and a to e, in Fig. 1, No. 1; and from the points 2 and 4 draw lines to the center of the picture C; and thoſe lines will interſect the diagonal lines in the points 6, k, and m, n.

Divide the upper line of the plinth at the point *a* in half, and perſpectively on the receding ſide at *b*, and draw the diameters *b d* and *a c*. By which proceſs eight points will be obtained upon the ſurface of the plinth, which will ſerve as guides for the delineation of the ellipſis, which includes the general form of the perſpective appearance of the ſeat of the *Torus*.

After having drawn the lower ellipſis, proceed to form the upper one, which conſtitutes the lower part of the ſhaft of the column.

It muſt be obſerved, that in this example the torus and the liſtel united, are equal in their heights to the height of the plinth; conſequently, they may be contained in a ſquare of equal thickneſs with that which forms the plinth.

Therefore draw the upper ſquare perſpectively, as expreſſed, by

4 the

the upper lines w, x, y, z; and upon its upper furface defcribe the ellipfis, which forms the lower part of the fhaft of the column. SECT. III. Plate XXIV.

It is not neceffary to give further inftructions for finding the upper ellipfis,* as it is fufficient to obferve, that the fame procefs, which was employed to defcribe the lower, muft be repeated to produce the upper; and all that can be done by the rules of perfpective, is to find as many ellipfes as will affift the artift in drawing the members of the bafe by hand, whether their numbers be equal, or more than are contained in the given example. It muft be obferved, that when the upper ellipfis is determined, the lines which mark the fhaft of the column, as the lines *A* and *B*, muft be drawn perpendicular to the horizontal line, from the points k, m, in the diagonal line W Z. See obfervations in the Addenda.†

Fig. 2, No. 2, is an example for the Tufcan capital, *inclined* to the picture.

Fig. 2, No. 1, is the geometrical elevation and plan of the capital, which, as in the foregoing example, muft be fo drawn before the perfpective reprefentation can be attempted.

In the plan Fig. 2, No. 1, the outer circle is the extreme of the ovalo, and the inner circle G ‡ the dimenfions of the fhaft at the neck of the column.

* The letters o and q in the bafe line Fig. 1, No. 2, correfpond with the letters o, q: in the bafe of the plan, they mark the dimenfions of the upper ellipfis.

† The examples here given are of the Tufcan bafe and capital, which are compofed of few members, abftracted from the plinth, while the other orders are compofed of many: but as all their members are difpofed parallel to each other, they can only be determined by the reprefentations of a greater number of parallel circles, the largeft of which, upon the upper furface of the plinth, fhould reprefent the extreme dimenfions of the torus, and the fmalleft, the thickeft and loweft part of the fhaft. In the capital, the largeft circle fhould reprefent the upper part of the ovalo, and the leaft circle the higheft and fmalleft part of the fhaft, juft above the aftragal.

‡ The lines for the liftel and the aftragal are omitted, both in the plan Fig. 2, No. 1, and alfo in Fig. 2, No. 2, to prevent a confufion of lines in the example.

SECT. III. Plate XXIV.

The geometrical plan and elevation being drawn, let the line V 1, V 2, Fig. 2, No. 2, be the horizontal line, and the points V 1, V 2, the vanifhing points for the inclined fides of the abacus, and d v 1, d v 2, the diftances of thofe vanifhing points. V 3 is the vanifhing point for the diagonal.

The point A is the angle of the abacus, touching the picture: therefore at A draw the right line A B C parallel to the horizontal line.

From A draw lines to the vanifhing points V 1, V 2, which will be the indefinite reprefentations of the upper edges of the abacus.

Upon the line B C fet off from the point A the lengths B and C of the inclined faces of the abacus, equal B C in Fig. 2, No. 2; and draw lines to d V 1 and d V 2, the diftances of the vanifhing points; which lines will produce the interfections a, b, the upper angles of the abacus.

The thicknefs of the abacus is A D, equal B D in Fig. 2, No. 2; from which dimenfions complete the reprefentation of the abacus, by the methods which are given in the preceding inftructions.

Then proceed to find the reprefentation of the circle, which expreffes the upper part of the ovalo, upon the abacus.

Obferve, that the right lines 1 4, 2 3, Fig. 2, No. 1, are ordinates paffing through the points where the circle of the ovalo is interfected by the diagonals, and o p, r s are the diameters marking the extent of the ovalo upon the abacus.

Therefore, upon the line B A C, Fig. 2, No. 2, fet the meafures of the fpaces 1, 0, 2, from A, either way equal 1, 0, 2, in the lower line of the plan, Fig. 2, No. 2; at the points D, E, and F, draw the diagonals of the under furface of the abacus, as the lines D G and E F.

From the points 1, 0, 2, Fig. 2, No. 2, draw lines to the diftance of the vanifhing point d V 1, and they will interfect the abacus at the points k, m, n; which points muft be transferred to the lower line of the abacus; and from thofe points draw lines to the vanifhing point V 2, which lines will reprefent two ordinates interfecting the diagonals

diagonals and alſo the edges of the abacus, producing points through which the ellipſis muſt be drawn, which ſerves as a guide for the repreſentation of the upper part or periphery of the ovalo, which muſt be drawn by hand. SECT. III. Plate XXIV.

After having obtained the repreſentation of the large or upper circle which repreſents the ovalo, find the repreſentation of the ſmall one, which is equal to the diameter of the neck of the column.

For this purpoſe obſerve, that the lines 5 6 and 7 8 in the plan Fig. 2, No. 1, mark the dimenſions of the full extent of the ſmall circle; and the dotted lines X, X, are the *ordinates which mark the points in which the diagonals are interſected by the ſame circle, which, as before obſerved, is the upper diameter of the ſhaft.

Therefore, below the ſquare of the abacus A D, Fig. 2, No. 2, conſtruct the repreſentation of another ſquare p q s v, equal in thickneſs to the height of the ovalo and liſtel in the geometrical capital Fig. 2, No. 1; and upon the under part of that ſquare produce the repreſentation F of the circle, which indicates the upper diameter of the ſhaft; which repreſentation muſt be obtained by the ſame methods which were employed for the delineation of the greater ellipſis or upper circular appearance of the ovalo.

When theſe two ellipſes are obtained, they muſt be conſidered as the boundaries of the ovalo and liſtel of the capital, and conſequently the guides to direct the artiſt in completing the delineation of the capital, which muſt be done by hand.

After the foregoing inſtructions have been conſidered, it will be evident to the painter, that no methods can be employed by which the baſes and capitals of columns may be delineated with mathematical

* In the line A B, Fig. 2, No. 2, the points 6, 7, 0, correſpond with the points 6, 7, 0, in the geometrical plan Fig. 2, No. 1; which points are transferred from the line A C, by the point d V 2, ſo as to produce the ordinates for the conſtruction of the ellipſis F.

certainty;

SECT. III. Plate XXIV. certainty; particularly thoſe of the Ionic, Corinthian, and Compoſite Orders: therefore, they who are engaged in that line of art, in which the repreſentations of ſuch objects are required, will do well to provide themſelves with ſmall models of ſuch parts of the principal orders, about four or ſix inches diameter, and work from them.

Yet the ſtudent ſhould conſider and copy the examples here given; for by ſo doing he will acquire the principles which muſt guide him in the repreſentation of ſuch objects, which are ſo intricate in their forms, that, although they cannot be decidedly drawn by the rules of perſpective, yet they can never be elegantly delineated by thoſe who poſſeſs not a competent ſkill in that ſcience.

Leſt it ſhould be objected, that the foregoing inſtructions are too conciſe, it muſt be obſerved, that they ought not to be ſtudied without a previous acquaintance with the foregoing parts of this Section, as well as of the ſcience of architecture itſelf: for although the principles of conſtruction be as ſimple as any problem in the ſcience; yet the figures are compoſed of ſo many repetitions of ſimilar forms, that to offer more explicit examples than are here given, would produce ſuch confuſion as to render them unintelligible; and what are given will be better underſtood by attending to the following obſervations.

All the members of the Tuſcan and Doric capitals, as alſo their baſes, together with the baſes of the other orders, are compoſed of circles: therefore, all that can be done is to obtain the perſpective repreſentations of as many ſquares as may contain ellipſes expreſſive of the different members required; which ſquares ſhould be diſpoſed parallel or obliquely to the picture, as may be neceſſary; each of thoſe ſquares muſt then be divided by two diagonals, two diameters, and two ordinates,

nates, the latter interfecting the diagonals in the fame points in which the diagonals are interfected by the circle; by which procefs eight points are obtained, through which an ellipfis is drawn by hand, part of which will reprefent the line of moulding required.

SECT. III. Plate XXIV.

For the reprefentations of the capitals of the other orders, as of the Ionic, the Corinthian, and Compofite, the author forbears to attempt any examples; becaufe their forms are fo extremely complex, that no intelligible or fatisfactory inftructions can be given upon fuch intricate fubjects. This is acknowledged by the fenior Malton in his firft volume, who yet has given examples of the Ionic and Corinthian capitals in his XXII Plate: but as if refolved to render difficulties totally unintelligible, he has fo entangled the lines of conftruction, that no patience can unravel the web of his diagrams; confequently, no artift can receive much, if any affiftance from his inftructions upon this fubject.

The only procefs that can afford any affiftance to the artift, is to defcribe a fquare in perfpective, that may contain the abacus, and through the angles of fuch fquare to draw the diagonals that fhall direct the pofition of the volutes. Then below the abacus find the reprefentations of two circles, that may ferve as guides for the difpofition of the leaves or acanthi, if the capital be Corinthian or Compofite: and this is the moft that can be done by way of correct arrangement; the reft muft depend upon the eye and hand of the painter, who fhould procure models of fuch capitals, and difpofe them in proper fituations, efpecially if the work be large in which the reprefentations of fuch ornaments are required.

As it would be improper to give finifhed examples of the objects, entangled with all the lines that are neceffary for their conftruction, the finifhed reprefentations are given at the commencement of this

work,

SECT. III. Plate XXIV. work, drawn to the fame dimenfions with thofe given in Plate XXIV; the bafe, as before obferved, having the plinth *parallel*, and the capital having the abacus *inclined* to the picture.

Of Arches which are in Planes inclined to the Picture.

Plate XXV.

PLATE XXV. The reprefentations of arches which are inclined to the picture are eafily obtained, by thofe who underftand the manner of reprefenting the circle, for the procefs is nearly the fame in both cafes, but with this additional circumftance, that it is neceffary to reprefent the thicknefs or foffit of the arch; and therefore the exterior proportions by which the femi-ellipfis, that reprefents the arch in the front, are obtained, muft be transferred to the interior of the piers, thereby to obtain the reprefentation of that femicircle which lies within, and determines the thicknefs of the arch.

Let Fig. 1, Plate XXV. reprefent a fmall building, fitted to contain a garden feat, with an arch in front; which front is inclined to the picture.

H H is the horizontal line.

C is the center of the picture.

G G is the bafe line.

V 1 and V 2, are the vanifhing points for the front and fides of the building; and d v 2 is the diftance of the vanifhing point V 2.

V 3 is the vanifhing point of the diagonal or mitre line.

T is the angle of the ftep or plinth, which touches or interfects the picture.

Although the general form of this example differs but little from many of the foregoing, yet part of the procefs for obtaining the principal lines fhall be repeated.

The

SECT. III. Plate XXV.

The point T, as before obferved, is the interfection of the ftep with the picture: therefore, at the point T draw the line T P perpendicular to the bafe line G G; and upon that line fet up the height of the building, as from T to d; and from T, upon the fame line, the height of the ftep, as at n. At the point n draw the line n S parallel to the horizontal line.

Then the line S n, may be confidered as the bafe line, becaufe it is in the plane of the horizontal furface of the ftep or plinth: therefore, all the meafures for the width of the building, together with that of the plinth, may be applied upon that line.

Having completed the reprefentation of the ftep or plinth R, which muft be done by the method already taught in the conftruction of fteps, page 124, proceed to the reprefentation of the body of the building; for which purpofe determine the point o, which is the loweft angle of the neareft pier, upon the ftep.

This point is obtained by drawing a line from the angle n of the ftep, to the point V 3, which is the diagonal vanifhing point; and then cutting off the portion n o, by the fame procefs that was employed to obtain the point S, the neareft angle of the reprefentation of the parallelogram, Fig. 2, Plate XI.

Having obtained the point o, draw a line from the point d V 2 through o, till it interfects the line S f, as at P; and from P fet on to f the meafure of the width of the front of the building, and from f return a line to the point d V 2, which will interfect the front in m; confequently the fpace m o is the width required.

To thofe who have confidered the inftructions contained in the foregoing part of this Section, it will be unneceffary to continue a repetition of what has been already taught; therefore let it be fuppofed that the general form of the object is completed, except the arch, for the reprefentation of which proceed as follows:

Z Upon

SECT. III. Plate XXV. Upon any part of the paper, or upon a detached piece, draw a ſemicircle, whoſe diameter is equal to the chord of the required arch, as at No. 1, and circumſcribe that ſemicircle with the parallelogram 3 6 X y.

Then draw the diagonals 3 X and 6 y, and through the center W, draw the diameters a e and c o.

Through the points in which the diagonal lines cut the ſemicircle, as b and d, as alſo through the center W, draw right lines parallel to the longeſt ſides of the parallelogram, as the lines b d and a e.

Then through the points in which the ſemicircle is interſected by the longeſt diameter a e, draw the right lines a 4 and e 5, parallel to the ſhorteſt ſides of the parallelogram; and the lines ſo drawn will interſect the ſides of the parallelogram in the points 1, 2, 4, 5; which points, when transferred to Fig. 1, will be the guides for the delineation of the perſpective repreſentation of the arch. To complete which, proceed as follows:

At the point d, Fig. 1, which, as before obſerved, marks the extreme height of the arch at the interſection of the diagonal of the building with the picture, draw the line d L parallel to the horizontal line; which line muſt be conſidered as the interſection of the plane of the top of the building with the picture.

The line o 3, is the angle of the building, the apparent height of which is found by drawing a right line from the point d to the diagonal vaniſhing point V 3, which gives the interſection 3; from which point a line drawn to the vaniſhing point V 2, produces the indefinite repreſentation of the top of the front.

The lines which repreſent the apparent breadths of the piers in Fig. 1, when continued upwards, interſect the line 3 y in the points h, l; conſequently the ſpace h l is the repreſentation of a line inclined

to

to the picture, equal the line 3 6 in No. 1, which line is equal the chord of the arch, the reprefentation of which is required.

Therefore, through the points h, l, draw lines from the point d V 2, which may interfect the line d L in the points 6 and 7.

Then with compaffes take the fpace from 3 to 4, in the line 3 6 No. 1, and fet that meafure from 6 to 4, and from 7 to 5, in the line L d, Fig. 1; and from the points 4 and 5 draw lines to the point d V 2, and they will interfect the upper line of the building in the points i and k; draw alfo a line from the point L to the point d V 2; which will give the interfection g, the middle of the crown of the arch.

Then determine the height of the arch as follows:

Take with the compaffes the radius or femidiameter of the arch; or, which is the fame thing, the meafure of the fhorteft fides of the parallelogram No. 1, and fet it downwards on the line d T, Fig. 1, from the point d to a; and divide that fpace into as many fmall parts as there are divifions in the line 3 y, No. 1; that is, transfer the fpaces marked 3, 2, 1, in No. 1, to the line d T in Fig. 1, as from d to c, equal 3 2, and from c to b, equal 21; and from the points a, b, c, draw lines to the diagonal vanifhing point V 3; and they will interfect the angle of the building in the points x, 1, 2; and from thofe points draw lines to the point V 2, the vanifhing point of the front of the building.

Then from the points i, k, draw lines parallel to the vertical angles of the building, or, which is the fame in effect, perpendicular to the horizontal line; and thofe lines will interfect the line 1 8 in the points t and u; which two points are in the femi-ellipfis that forms the reprefentation of the arch.

At the points h and l draw the diagonals h z, and l r; and the interfections of thofe lines with the line 2 9 will give two additional points for the delineation of the arch; which, together with the

points

SECT. III. Plate XXV. points g r and z produce seven points; through which a curve line drawn by hand will be the representation of the outer line of the arch.

It next follows to determine the thickness or soffit of the arch; which requiring many lines, is given at greater magnitude in Fig. 2, and No. 2, the better to explain the process.

Example, Fig. 2, in the same Plate.

Of the Method by which the Soffit or thickness of an Arch is determined.

The center of the picture, together with the vanishing points and their distances, are the same with those employed in the foregoing Example.

The geometrical figure, No. 2, shews the arch at full size, which being inclosed in a parallelogram, the diagonals m and n are drawn, together with the diameters 1 8 and c s, as was done in No. 1 of the foregoing Example.

The diagonals intersect the semicircle in the points b and d, and the diameters in the points a, e, and c.

Through the points b, d, right lines are drawn parallel to the longest sides of the parallelogram, as the lines 1 8 and 2 7; and through the points a and e lines are drawn parallel to the shortest sides of the parallelogram, as the lines 5 f and 6 9.

It must be observed, that those lines are drawn for the purpose of marking the projections or seats of the points a, b, c, d, e, in the semicircle, upon the different sides of the parallelogram which contains the semicircle.

Fig. 2 is the perspective representation of No. 2.

The line o 3 being similar to the line h r in Fig. 1, must be con-

 sidered

fidered as the inner line in the front of the neareft pier continued upwards, the height of which is equal the femidiameter of the arch, the reprefentation of which is required.

At the point 3 draw the line A, parallel to the horizontal line, and from the point 3 fet off to 4 the meafure of the chord or breadth of the arch, equal the line 3 4, in No. 2.

From the points 0 and 3 draw lines to the vanifhing point V 2, and from the point 4 in the line A draw a line to d V 2, which is the diftance of the vanifhing point V 2; and the interfection of the latter line with the line that is drawn from 3 to V 2, as at the point a, will determine the breadth of the arch.

At the point a draw the line a W parallel to the line 3 0, and the trapezium, which muft contain the reprefentation of the arch, will be completed; the angles of which are 3 0 a W.

It is unneceffary to continue the inftructions for the reprefentation of the front of the arch, the procefs being the fame with that before employed in Fig. 1, and which will be eafily underftood by comparing the latter Example with the former; the only difference to be obferved is, that the arch in the firft Example is diftant beyond the picture; whereas that in the fecond Example has the angle 0 3 touching the picture; which circumftance occafions a flight variety in the operation, which hereafter will be noticed. In the mean time it will be proper to proceed to the conftruction of the thicknefs or foffit of the arch, which is determined by the following procefs:

From the point 3 draw a right line to the vanifhing point V 1, as the line 3 9.

Then continue the line A, which is drawn parallel to the horizontal line, from the point 3 towards B, as far as may be thought neceffary.

Then from the point 3, which marks the height of the arch, fet off

SECT. III. Plate XXV. off by the compaffes the meafure of the foffit or depth of the arch, as from the point 3 to D; and from D draw a line to the point d V 1, the diftance of the vanifhing point V 1, which will interfect the line that is drawn from 3 to V 1 in the point 9: then is the line 3 9 equal the apparent thicknefs of the foffit.

At the point o draw a line to the vanifhing point V 1, and at the point 9 draw the line 9 X parallel to the line 3 o.

Then from the point 9 X draw lines to the vanifhing point V 2, and from the points a and W draw lines to the vanifhing point V 1, which will produce the reprefentation of a fecond trapezium, which muft inclofe the femi-ellipfis, reprefenting the inner outline, which determines the breadth or foffit of the arch.

The angles of the inner trapezium are at the points 8, 9, y, x; therefore, through thofe points draw the diagonals 8 X and 9 y.

Then transfer the points which are in the top and neareft fide of the firft or front trapezium, to the top and neareft fide of the fecond or inner one.—Thus, from the points 1 and 2 draw lines to the vanifhing points V 1, which will interfect the neareft fide of the inner trapezium, in the points 10 and 12; and from the points e S b in the top of the neareft, draw lines to V 1, which will interfect the top of the inner trapezium in the points f and k.—The third interfection, which is near the point 8, is not marked, to prevent confufion.

From the points 10 and 12 draw lines to the vanifhing point V 2, and at the points f and 8 draw lines parallel to the line 9 X, which is the fide of the remote trapezium; and the mutual interfections of thofe lines will produce the points by which the femi-ellipfis muft be drawn, that will exprefs the depth or inner edge of the foffit of the arch.

As it is not poffible to mark or figure every point neceffary to indicate the curvature of both the femi-elliptical lines, by which the arch is reprefented, without producing confufion; the points neceffary for

for the *inner one* only are marked; as at P, 13, k, h, g, X, and y, in Fig. 2; and in the Example Fig. 1, the *outer* ſemi-ellipſis only is marked by the points neceſſary for its conſtruction, as the points r, p, u, g.

SECT. III. Plate XXV.

As it impoſſible to avoid the appearance of intricacy and labour in the conſtruction of the Examples, the ſtudent will do well to conſider them attentively, ſo that he may perfectly comprehend the principles of their conſtruction and thereby be enabled to employ the leading lines when required, without regard to the minuter diviſions, which may be omitted.

By the preceding inſtructions, together with the Examples of Plate XXIII. are ſhewn the methods for obtaining the repreſentations of circles and ſemicircles, whether the planes in which they are ſeated are inclined or perpendicular to the picture; and the whole of the proceſs conſiſts in determining the perſpective repreſentations of certain given points in the original circle or ſemicircle, and then drawing the required repreſentation through thoſe acquired points.

The ſame method muſt alſo be employed to obtain the repreſentations of all other kinds of arches, as the Gothic, the Elliptic, and the Catinarian; as alſo for the repreſentations of all objects compoſed of curved lines, ſuch as ſemicircular and compound pediments, with every other variety that can be required in curvilinear figures: and although theſe rules cannot enſure juſt or pleaſing repreſentations, without aſſiſtance from the hand of a ſkilful artiſt; yet if theſe general hints are not underſtood and applied in a certain degree, no one muſt hope to produce the repreſentations of curved lines in architecture, but what will be diſtorted and unpleaſant to the eye.

Of

SECT. III.

Of Mouldings inclined to the Picture.

Plate XXVI. In Plate XXVI. is an example of a pedeſtal * with its cornice, which is inclined to the picture.

C is the center of the picture.

H is the horizontal line.

G is the ground line or baſe line.

The eye or diſtance is marked *Eye.*

P P is the parallel of the picture.

V 1 and V 2 are the vaniſhing points, found as before directed;

And d v 1, d v 2, are the diſtances of thoſe vaniſhing points.

V 3 is the vaniſhing point of the diagonal of the dado of the pedeſtal; conſequently, it is the vaniſhing point for the mitres of the mouldings, and d V 3 is the diſtance of that vaniſhing point.

The lines f, at the bottom, and f 1, at the top of the pedeſtal, are both parts of the ſame line, which is the interſection of the picture by the angle of the loweſt ſtep and cornice; or in other words, it is the line in which thoſe parts touch the picture.

Firſt determine the repreſentation of the ſteps and dado of the pedeſtal, as follows: X is the ſeat upon the ground of the angle of the loweſt ſtep; therefore, ſet up from that point the height of the firſt ſtep to e, and complete the general form of the whole ſtep, by drawing lines to the vaniſhing points V 1 and V 2.

At the point e draw the line e g parallel to the ground line.

Then from e to g ſet on the depth of the mitre or diagonal of the

* To this, as alſo to ſome of the following Examples, there is no annexed ſcale; becauſe the mouldings are drawn at their given ſize upon the Plate: therefore, the ſteps and dado are drawn in proportion to thoſe mouldings.

The diſtance of the picture is rather too ſhort in this Example, which is ſo diſpoſed, the better to demonſtrate the proceſs.

ſtep

ftep *, and from g draw a right line to d V 3 (the diftance of the diagonal vanifhing point) and the interfection at h will give the feat of the angle of the fecond ftep.

Complete the fecond ftep by the methods given in Example Plate XVI. page 126, as alfo the dado of the pedeftal; which dado is terminated at the top in the points a, *b*, c, d.

Through thofe points draw the diagonals marked *Diagonal* 1 and d 2.

Obferve, that a, is the apparent height of the dado of the pedeftal, including the fteps and cornice; which height is obtained by fetting up the real meafure from X in the bafe line to 1 upon the line f, and from 1 drawing a line to V 3, the vanifhing point of the diagonal, which line interfects the angle of the dado at a, and gives the required height.

After having thus prepared the pedeftal, proceed to the cornice, as follows:

Upon any remote part of the drawing, or upon any feparate paper, draw the geometrical profile of the mouldings, at their true dimenfions, by a fcale, as at Fig. 1; above which draw the fquare X 1 8 7, each fide equal to the projection of the upper line 7 8 of the cornice: at the point 7 draw the line 7 M 1, which will be the diagonal or mitre line of the cornice.

Parallel to the line e 7, which is marked dado line (and correfponds with the line fo marked in Fig. 2.) draw lines from every projection of the members, as from g, h, i, k, m, that may interfect the mitre line M in the points 2, 3, 4, 5, 6; which points will exprefs the projections of the various members at their joints or mitres.

Having thus prepared the geometrical profile, Fig. 1, which is the guide for the perfpective reprefentation, proceed as follows:

At the point 1, Fig. 2, which projects equally with the lower ftep,

* That is, the fpace between the upper angle of the firft ftep and the lower angle of the fecond ftep; the former marked e, the latter h.

SECT. III. Plate XXVI. draw the line 1 M parallel to the horizontal line, upon which ſet on from the point 1 the following ſpaces, 1, 2, 3, 4, 5, 6, 7, equal to the ſimilar points in the mitre line M of the geometrical profile Fig. 1; then from thoſe points draw lines to the diſtance of the vaniſhing point d V 3; which lines will interſect the ſpace upon the diagonal line that lies between the points 1 and a; which interſections mark the *projections* of the different mouldings, as at the points k, m, n, a.

Then upon the line f 1, Fig. 2, ſet downwards the *heights* of all thoſe members, as at the points b, f, c, d, e, equal the ſame points in the dado line of the geometrical profile Fig. 1.

From the points a 2, b, c, d, e, draw lines to the diagonal vaniſhing point V 3.

Then from the points k, m, n, a, in the diagonal line, draw lines perpendicular to the horizon, which will interſect the lines that are drawn from the points b, f, c, d, e, to the diagonal vaniſhing point V 3 in the points ; which points determine the angles of the profiles of the mouldings, the curved parts of which muſt be drawn by hand, and the right lined parts by the ruler.

From the points o, p, q, draw lines to the vaniſhing points V 1, V 2, which will determine the appearances of their different faces.

Then find their terminations or projections at the angles S and T, as follows:

Transfer the points k, m, n, a, to the diagonal line S T, by lines drawn from all the points marked k, m, n, a, to the vaniſhing points V 1, V 2, till they interſect the diagonal line S T in the points b, u, w; from which points draw lines perpendicular to the horizon, that may interſect the lines that tend to the vaniſhing points, as at *m*, *P*, and *n*, *u*; which points are the projections of the different members at thoſe mitre angles, and which muſt be completed by the ſame proceſs employed at the angle O 1.

In examining this figure it will eaſily be ſeen, that the projection

or

of the mouldings are firſt marked upon the mitre line, by transferring their meaſures, which are marked upon the line M, by means of the point d V 8, which is the diſtance of the mitre line.

It muſt be obſerved, that in this diagram, as in the others, the occult or dotted lines are no more than acceſſary lines, which, though abſolutely neceſſary for the production of the figure, are uſeleſs after it is finiſhed. Of theſe ſome are wanting. They are omitted to avoid confuſion: but the ſtudent will eaſily comprehend the whole, if he carefully examines thoſe which are given, and above all comparing them with ſome real mouldings, which he would do well to procure for the purpoſe; for, without being well acquainted with their real conſtruction, it is impoſſible to delineate them with accuracy.

It is needleſs to obſerve, that if mouldings were required at the baſe of the pedeſtal, they muſt be produced by the foregoing proceſs reverſed; which will eaſily be underſtood by turning up the example, and ſuppoſing a b to be the loweſt line of the baſe of the dado.

In cloſing this Section it will be proper to obſerve, that it contains a ſelection of Examples, which the author conſiders as being the moſt uſeful to the artiſt, at the ſame time that they illuſtrate the moſt elegant and ſimple principles of the ſcience, as far as relates to objects which have their ſides diſpoſed obliquely or inclined to the picture.

But the figures, which are particularly recommended to the conſideration of the ſtudent, are the following:

The ſquare and parallelogram, Plate XI. the repreſentations of the houſes, Plate XII. and XIII. the table, Plate XIV. together with the chair, and pentagon, Plates XIX. and XXII. all of which are of the utmoſt conſequence to the artiſt who wiſhes to attain perfection in his deſigns and pictures: therefore, thoſe Examples are recommended to his particular attention and conſideration.

To the foregoing obſervations it is neceſſary to add the following caution.

SECT. III. Plate XI.

Let it ever be remembered that the reprefentations of thofe horizontal lines, which produce the appearances of the fides or faces of right lined figures, are conftantly drawn to the vanifhing points; but the meafures, or proportionate divifions of thofe lines are determined by drawing lines from the points which mark the real meafures on the bafe line, to the diftances of thofe *vanifhing points*, to which the reprefentative lines are drawn. Thus, in the parallelogram Plate XI. Fig. 2, Page 100, the line S 8, which expreffes the indefinite reprefentation of the fide D, is drawn to the vanifhing point V 2; but the length or required portion of that line is determined by drawing a line from the point 6 in the bafe line, to the point d V 2 in the horizontal line, which gives the interfection 8; after which the fide A is formed by drawing a line from the point 8 to the point V 1, which is the vanifhing point of lines, the originals of which are at right angles with thofe reprefented by lines drawn to the vanifhing point V 2.

The above caution is the more earneftly recommended to the ftudent, becaufe the author has found by long experience, that the young practitioner is more apt to forget, or miftake this part of the procefs, than any other in the operation.

It cannot be improper to obferve, by way of conclufion, that as the old writers on the fcience of Perfpective knew nothing of oblique vanifhing points, fo were they confequently ignorant of their diftances: from which circumftance it followed, that they never could proportion the reprefentations of objects inclined to the picture by juft meafures: which defect may be feen in the Jefuit's Perfpective, in which the reprefentation of a houfe inclined to the picture, given in the upper Example of page 111 is falfe, owing to the want of thofe points.

END OF THE THIRD SECTION.

SECTION THE FOURTH.

Containing Examples, the Lines and Planes of which are inclined both to the Picture and Horizon.

IN this Section inſtructions are given for the repreſentations of objects, the component lines or planes of which are inclined both to the picture, and to the horizon.

Before the ſtudent proceeds to inveſtigate the ſubject of this Section, it will not be improper for him to re-conſider the principles laid down in the ſecond and third preceding Sections.

The ſecond treats of objects, the lines and planes of which are *parallel*, and *perpendicular* to the picture.

The third, of objects the lines and planes of which are *inclined* to the *picture*.

And then the following, or fourth Section, which treats of objects compoſed of lines and planes which are inclined to the *picture*, and alſo to the *horizon*.

By conſidering the principles contained in this and the foregoing Sections, the ſtudent will eaſily perceive, that lines and planes may be diſpoſed in all the following directions;

First, Parallel, }
Secondly, Perpendicular, } to the picture;
Thirdly, Inclined, }
Fourthly, Inclined, both to the picture, and to the horizon.

The

SECT. IV. These are all the varieties in which lines or planes can be disposed to the picture, or in other words, to the eye of the spectator.

To familiarize these distinctions, let it be supposed, that a house, whose plan is * oblong or square, be so disposed to the eye of the spectator, that the lowest line of the base and the upper line of the blocking course of one of its sides, appear perfectly parallel to each other: then is that front parallel to the picture; consequently, the sides are perpendicular to it, combining the first and second position of lines and planes.

Or, let it be supposed that the same building be seen by the spectator from such a station, that the lower lines of the base, and the upper lines of the blocking course, on both the sides, appear to approach each other: then are the sides of that building inclined to the picture; which is the third position of lines and planes.

Again, suppose the same building, as seen in the foregoing situation, be covered with a sloping or inclined roof; then will the lines and planes of such roof be inclined, not only to the picture, but also to the horizon.

Example, Plate III. Fig. 1 and 2.

PLATE III. In Fig. 1, the fronts B and E of the buildings are parallel to the picture, and the sides A and G are perpendicular to it, uniting the first and second positions of lines and planes.

In Fig. 2, the sides X 1, X 2, are inclined to the picture, and the roof R 2 is inclined to the horizon; consequently, the line R 2 of the roof † has a double inclination, being inclined both to the picture, and also to the horizon.

* An oblong hath all its angles, right angles, but has not all its sides equal. Simpson, Defin. 31st.

In

SECT. IV. Plate III.

In Fig. 1, the building A B has a roof, the planes of which are all inclined to the horizon: but it muſt be obſerved, that two of thoſe planes, although inclined to the horizon, are yet perpendicular to the picture, as the plane R, and its oppoſite; while the front plane T, and its oppoſite are inclined to the picture as well as to the horizon.

As the inſtructions contained in this Section cannot be intelligible to thoſe who do not underſtand the nature and conſtruction of vaniſhing lines, it will be neceſſary to beſtow particular attention on this abſtruſe part of the ſcience, and to conſider the ſubject in a more theoretic view, than has been hitherto employed in this Treatiſe.

By the general conſtruction of objects of art, the lines and planes of which they are compoſed are ſeldom inclined to the horizon, though they are frequently ſo ſituated to the picture; therefore it is ſeldom neceſſary to employ any other vaniſhing line than the horizontal line.

But when the line or plane to be repreſented is inclined to the horizon as well as to the picture, then other vaniſhing points, not in the horizontal line, muſt be found; and it muſt be remembered, that in moſt caſes the vaniſhing line of an inclined plane cannot be determined, unleſs the vaniſhing points of two right lines in that plane are firſt found.

Example.

In Plate III. Fig. 2, the houſe T has its ſides or planes inclined to the picture, while the roof is inclined to the horizon.

The tops and bottoms of the windows and doors are horizontal; therefore they vaniſh in the points V 1 and V 2, which points are in the horizontal line, or in what is called the vaniſhing line of horizontal planes.

But

SECT. IV. Plate III.

But the lines of the roof in the ſide X 2, which are inclined to the horizon, vaniſh in the point R; which point is in the vaniſhing line of the plane or ſide X 2 of the building.

When a vertical plane is inclined to the picture, there is no great difficulty in finding its vaniſhing line; but when an original plane is inclined both to the picture and to the horizon, the proceſs for determining its vaniſhing line is more intricate and abſtruſe.

In the firſt caſe, nothing more is neceſſary than to find the *vaniſhing point* of any horizontal line in the inclined plane, and through that point draw a right line perpendicular to the horizontal line; which will be the vaniſhing line ſought *.

Example, Plate III. Fig. 2.

V 2 is the vaniſhing point of all horizontal lines in the *vertical* plane or ſide of the houſe X 2, found by the methods taught in the preceding Section; therefore, through V 2 draw the line V 2 R, *perpendicular* to the horizontal line H, and it will be the vaniſhing line ſought, and it is ſo marked: vaniſhing line of ſide X 2.

PLATE XXVII.

Again, in Plate XXVII. Fig. 1, C is the center of the picture, and the vaniſhing point of all the horizontal lines in the planes or fronts of the houſes A, B; therefore, through the point C draw the right line V 1, V 2; which will be the vaniſhing line of the fronts A and B.

In Fig. 2, of the ſame Plate, V 2 is the vaniſhing point of all horizontal lines in the fronts of the houſes A and B; which fronts are inclined to the picture; and the line V 3, V 4, which is drawn

* Every vaniſhing line is parallel to its original plane; therefore the horizontal line in the picture is parallel to the plane of the earth. And as every vertical plane is perpendicular to the horizon; ſo the vaniſhing lines of vertical original planes are, in the picture, perpendicular to the horizontal line.

through the point V 2 perpendicular to the horizontal line H, is the vanifhing line of the fronts A and B. SECT. IV. Plate XXVII.

Rudiments of Planes inclined to the Horizon.

In Plate XXVII. which is the firft Plate of the fourth Section, are two Examples, in which lines are inclined to the horizon, as in the roofs of the buildings A, B, Fig. 1 and 2, and in the floping edges of the walls F, G, Fig. 1.

It muft be obferved, that in Fig. 1, the lines a 2 and b 2 are in the plane of the fronts of the houfes A and B; which plane is vertical and *perpendicular* to the picture.

In Fig. 2, the lines a b, c d, are, like the former, in the plane of the fronts A, B; but the vertical plane in which they are feated is *inclined* to the picture: confequently, the line V 3, V 4, is the vanifhing line of that plane.

The fronts A and B, in Fig. 1, being perpendicular to the picture, the *vanifhing line* of thofe fronts is the prime vertical line, which is drawn through C, the center of the picture, perpendicular to the horizon, as the line V 1, V 2*.

The prime vertical line being drawn, and the lower parts of the houfes completed by the rules which are given in the firft Section, proceed as follows:

At the diftance of the picture (which is fo marked) upon the horizontal line conftruct an angle†, equal to the known pitch of the roof, as the angle H P K, Fig. 1, equal to c b d, Fig. 1, No. 2; and continue the line *P K* till it cuts the prime vertical line at V 1:

* As the center of the picture is the vanifhing *point* for all lines perpendicular to the picture, fo the prime vertical line, by paffing through the center of the picture, is the vanifhing *line* of all planes perpendicular to the picture.

† For the conftruction of the angle, fee the inftructions page 9.

SECT. IV. Plate XXVII.

then will V 1 be the vanishing point for the lines a and *a* of the roofs.

To find the other vanishing point V 2, below the horizontal line, construct the angle H P N, equal to the angle c d e in No. 2, and continue the line P N till it cuts the prime vertical line at V 2, which will be the vanishing point for the lines in the roofs marked 2 and e.

The sloping edges or tops of the walls, or blocks G F, having edges, I K, with the *same inclination* to the horizon with the pitch of the roofs, and their sides G and F being perpendicular to the picture, have the same vanishing point V 1, with the lines a and *a* of the roofs.

The vanishing *points* of all lines are in the vanishing *line* of the plane in which those lines are seated. Thus the lines of the roofs, windows, and doors in the fronts of the houses A and B, Fig. 2, have their vanishing points in the line V 3, V 4; that being the line in which the plane A B vanishes.

To complete the forms of the roofs, draw lines from the angles of the buildings to the vanishing points V 1, V 2, alternately; and those lines will produce the perspective representations of the roofs.

The vanishing points V 1, V 2, may be found by another process, as follows:

In any part of the paper or canvas, as may be most convenient, draw the form of the roof or pediment geometrically, as Fig. 1, No. 2, with its base G parallel to the horizon.

Then through the point D, which is the distance of the picture, draw the lines K and X parallel to the lines a, *a*, in Fig. 1, No. 2; and the lines K, and X, will produce, by their intersections with the prime vertical line, the vanishing points required, as at V 1 and V 2 in Fig. 1.

In

In Fig. 2, the fronts and ſides of the buildings A and B are inclined to the picture; therefore their forms, except the roof, are produced by the rules given in the foregoing Section. SECT. IV. Plate XXVII.

C is the center of the picture, D is the eye or diſtance, V 2 is the vaniſhing point for all the horizontal lines in the fronts A and B of the houſes, the lower parts of which are drawn by the rules given in the third or foregoing Section.

Through the vaniſhing point V 2 draw the line V 3, V 4, perpendicular to the horizontal line, and at d V 2, which is the diſtance of the vaniſhing point V 2, conſtruct the angle b a c, equal to the angle of the pitch of the roof in Fig. 2, No 2; draw the line from d V 2 through c, till it cuts or interſects the vaniſhing line V 2 in the point V 3: then will V 3 be the vaniſhing point for the lines f and g of the roofs.

To obtain the vaniſhing point V 4, at the point d v 2 conſtruct the angle b a d, *below the horizontal* line, ſimilar to the angle b a c; and draw the right line a d, continuing it till it interſects the line V 3, V 2, in the point V 4: then will V 4 be the vaniſhing point for the lines b, b.

Having found the vaniſhing points V 3, V 4, finiſh the roofs by drawing lines from the angles of the buildings k, l, m, n, to the vaniſhing points V 2, V 4; and the objects will be completed.

Roof inclined to the Horizon.

In Plate III. Fig. 2, is an Example of a building, the ſides of which incline to the picture, with a * roof inclined alſo to the horizon. PLATE III.

It is not neceſſary to give inſtructions for the delineation of the body of the building, ſuch having been repeatedly given in many

* The ſpecies of roof given in this Example is common in Italy.

SECT. IV. Plate III.

parts of the foregoing Section; therefore the following instructions will be confined to the roof, that being the only part of the Example which belongs to this Section.

The points V 1 and V 2 are the vanishing points of the sides X 1 and X 2 of the building; which sides are vertical or perpendicular to the horizon: therefore, through the point V 2 draw the line V 2 R, perpendicular to the horizon; which line will be the vanishing *line* of the side of the house X 2, as it is marked in the Example.

At the point d 2 in the horizontal line (which is the distance of the vanishing point V 2) construct an angle equal to the known inclination of the roof to the horizon, and draw a line from b 2 till it intersects the vanishing line of the side X 2, as at R; then will R be the vanishing point for the inclined lines of the roof R 2.

The lines of the roof on the side X 1 are all horizontal; consequently, they vanish in the point V 1.

Having determined the vanishing point for the inclination of the roof, draw lines from the point V, and determine its form by the rules which are given in the foregoing Section, and in the next Example of this Section.

It may perhaps be objected, by those who are not skilled in the science, that the lines R 2 of the roof, do not rise, but, on the contrary, sink towards the horizontal line, and therefore do not produce the desired effect. To this it must be replied, that when original lines are very much elevated above the eye, their representations will ever appear to approach the horizon, whether they are inclined or parallel to it;—and those who erroneously suppose the contrary, have only to correct their opinions by examining objects of forms similar to that which is represented in the given Example.—Some additional observations will be made upon this circumstance in the consideration of views of acclivity and declivity.

Block

SECT. IV.

Block with double Inclination.

Plate XXVIII.

In Plate XXVIII. is an Example of a block, which is inclined both to the picture and alfo to the horizon.

It is inclined to the picture in an angle of 39°, and to the horizon in an angle of 36 degrees.

No. 1, fhews the geometrical plan of the block, as fituated to the picture;

G 1 being the interfection of the picture with * the orginal plane. The line from o to X 2 indicates its diftance beyond the picture.

X 2 is the *feat* of the neareft angle of the block on the *original plane*, and o the feat of the fame angle upon the *picture*.

No. 2, is the geometrical elevation of the block, fhewing its fituation to the *horizon*; the line G 2 indicates the original plane, or ground, upon which the block is placed; X 2 is the angle upon which it refts, expreffive of the fame angle X 2 in No. 1, and of a in the perfpective reprefentation.

In the plan No. 1, the lines b and c exprefs the full length of the block; but the line 3 a marks the feat of the line c on the ground, or original plane, when the end c of the block is elevated.

In the Example Fig. 1, H H is the horizontal line.

P P is the parallel of the picture.

The center of the picture is marked by the words.

The point D P is the diftance of the picture, brought down on the horizontal line, and V 1, V 2 are the vanifhing points for the fides, agreeably to their inclination to the *picture*; and

d V 1, d V 2 are the diftances of thofe vanifhing points.

The vanifhing points V 1, V 2, as alfo the figure of the block C, on

* By original plane is meant, the ground or plane upon which the block refts.

which

SECT. IV. Plate XXVIII. which the inclined one refts, are found by the procefs which has been taught in the foregoing Section. The feats of the angle a is alfo found by the methods which have been fhewn by Fig. 2, Plate XI. See inftructions, page 100.

V 1 is the *point* in which all the horizontal *lines* vanifh, which are inclined to the *picture* in an angle of 39 degrees; confequently, the *vanifhing line* of a vertical plane, which is inclined to the picture in a fimilar angle, will pafs through that point *.

Therefore, through V 1 draw the line V 3, V 4, perpendicular to the horizontal line H H.

Then find the vanifhing point V 3, as follows:

At the point d V 1, which is the diftance of the vanifhing point V 1, conftruct an angle with the horizontal line, equal to the inclination of the block to the horizon, 36 degrees, as the angle S F P.

Continue the line F S till it interfects the vanifhing line V 1, in the point V 3: then will V 3 be the vanifhing point for all the lines which are inclined to the horizon, both in the upper face B of the block, and alfo in its parallel face beneath.

The block being fquared (fo called by workmen) the fides A and o, are confequently perpendicular to the face B; therefore find the vanifhing point of lines perpendicular to the face B, as follows:

At the point d V 1 draw the right line M, perpendicular to the line S F, and it will interfect the vanifhing line V 1, V 3, in the point V 4: confequently, V 4 will be the vanifhing point for the angles of the fides o and A of the block.

* It muft follow, that the vanifhing line of all vertical planes, which are equally inclined, will pafs through the fame point, perpendicular to the horizontal line, feeing that every vertical plane is perpendicular to the horizon. The face A of the inclined block, and of C, the under block, are both in one plane, whofe vanifhing line is V 3, V 4.

Now the angles or edges of the inclined block muft be confidered as *lines inclined to the horizon*, in a vertical plane, which is inclined to the picture: therefore, the vanifhing points muft be fomewhere in the vanifhing line of the plane in which thofe lines are feated.

1 Having

SECT. IV. Plate XXVIII.

Having thus found the vaniſhing points, complete the figure, as follows:

From the point a draw lines to the vaniſhing points V 1, V 2, V 3, and V 4, as in the Example.

Then from the point d V 1 draw a right line through the point a, till it interſects the ground line at 5.

Then from the point 5 ſet off to 3 the meaſure of the ſeat of the line a 8, equal to the ſpace x 2, x 3, in the orthography No. 2, and from 3 draw a line to the point d V 1; and its interſection 6 with the line which is drawn from a to the vaniſhing point V 1, will be the perſpective ſeat, upon the ground, of the elevated angle 8 of the block.

From 6 draw a right line perpendicular to the horizon, and it will produce the interſection ´8, which will give the apparent length of the ſide A of the block.

Through the points a and 8 draw right lines to the vaniſhing points V 4, which will produce the angles m 8, and k a.

Then determine the apparent thickneſs of the block, as follows: —Continue the line which is drawn from V 1, through a, till it interſects the ground line at 4, and at that point draw the line 4 9 perpendicular to the ground line.

The line b 4, in No. 2, gives the height of the angle 4 of the block above the ground; therefore, take the length of the line b 4, and transfer it to 4 9 in Fig. 1, and from the point 9 draw a right line to the vaniſhing point V 1, and it will interſect the line which is drawn from V 4 through a, and produce the point k, the neareſt angle in the face B of the block A B.—From k draw a line to the vaniſhing point V 2.

Then determine the breadth of the block, as follows:

V 2 is the vaniſhing point for the end k y, and d V 2 is the diſtance

SECT. IV. Plate XXVIII. diſtance of that vaniſhing point: therefore, draw a right line from d V 2, through the angle a, till it interſects the ground line at w. Then take the meaſure of the width of the block, 3 feet 6 inches, by the ſcale, or equal to the length of the lines a or b, in the plan No. 1, and ſet it on the ground line from w to x; and from x draw a right line to d V 2, which will interſect the line that is drawn from the point a to the vaniſhing point V 2, in the point o, making the line a o equal the apparent width of the block.

Through o draw a right line from the vaniſhing point V 4, producing the interſection y.

Having thus obtained the points a, k, and y, from thoſe points draw lines to the vaniſhing point V 3, and from k m draw alſo lines to the vaniſhing point V 2; and the repreſentation of the inclined block will be completed.

That the ſtudent may with more certainty underſtand the conſtruction of theſe figures, it will not be improper to add ſome obſervations to the foregoing inſtructions.

The point X 2 in No. 1, is the ſame with X 2 in No. 2; while the point X 3 in No. 1, may be conſidered as the point 8 in No, 2; at the ſame time obſerving, that from X 2 to X 3 in No. 1, is the ſame length as from X 2 to X 3 in No. 2.

The real length of the block is from the line b to e in No. 1; but as it reſts upon the line b, having the oppoſite ſide elevated equal to the height, the line which is drawn from the point X 3 to 8 in No. 2, it follows, that the whole length of the block, from the line b to e, covers no more of the ground than is expreſſed by the line drawn from X 2 to X 3 in both figures.

Therefore X 3 in No. 2, is called the ſeat of the point 8, and the line from X 3 to 8, is called the ſupport of the point 8; while the line drawn

drawn from X 2 to X 3 in No. 2, is called the ſeat upon the original plane of the line X 2, 3, in the original object. SECT. IV. Plate XXVIII.

As in Figure 1, there are ſome points marked which are not alluded to in the foregoing inſtructions, it will be proper to explain them in this place.

The point a, Fig. 1, which is the angle of the block B upon the ground, is the ſame point which is expreſſed by the points X 2, both in the plan and elevation No. 1 and No. 2. It is obtained by the proceſs which hath already been given, but which ſhall be here repeated.

Fig. 1. The ſeat upon the picture, of the point a, is at the point 1, and its diſtance beyond the picture is equal to the length of the line from 0 to X 2 in No. 1.

Therefore, from the point 1 draw a right line to the center of the picture; then take the diſtance of that point from the picture, 1 foot by the ſcale, or equal to the line 0 x 2, in No. 1, and ſet it on the baſe line from 1 to 2, and from 2 draw a line to the diſtance of the picture D P, which will interſect the line that is drawn from 1 to the center of the picture in the point a; conſequently a is the perſpective repreſentation of the neareſt angle of the block, which touches the ground.

Obſerve, that D P is the diſtance of the picture brought down to the horizontal line; by the ſcale it is 6 feet; it is the ſame meaſure from the center with the point marked *Eye.*

In this Example, there is a line marked vaniſhing line, of face B of block. This vaniſhing line is found as follows:

V 2 is the vaniſhing point for the lines k y and m n, which are inclined to the picture only; and V 3 is the vaniſhing point for the lines k m and n y, which are inclined to the horizon and alſo to the picture: now all theſe lines are in one plane; conſequently, a line drawn through the vaniſhing points of thoſe lines, will be the vaniſhing line of the face B.

 Box

SECT. IV. Plate XXIX.

Box with open Lid.

Plate XXIX. Fig. 2, contains an Example of a box with the lid open, every ſide of which is inclined to the picture, and the lid inclined alſo to the horizon.

The lower part of the figure is given in Fig. 1, Plate XV. in the third or foregoing Section, that this part of the Example might not be incumbered with an exceſs of lines: therefore, having drawn the lower part A E by the inſtructions before given, proceed to complete the lid as follows:

Fig. 1, repreſents the geometrical profile of the box with the lid open—A, being the body of the box, and D, the lid.

In Fig. 2, the horizontal line is marked H H.

C is the center of the picture, V 1 and V 2 are the vaniſhing points for the ſides of the box, as found in Fig. 1, Plate XV.

Through the vaniſhing point V 2, draw the line V 3, V 4, perpendicular to the horizontal line, which will be the vaniſhing line for the ſides A and D of the box and lid.

At the point o, which is the interſection of the ſide of the box with the ground line, draw the vertical line X, X 1, which muſt be conſidered as the interſection of the ſide A of the box, with the picture.

Find the vaniſhing points for the ſide D, and alſo for the front B of the lid, as follows:

Bring down the diſtance of the vaniſhing point V 2 to the horizontal line, as at d 2, as was done for finding the meaſure of the lower part of the box in Plate XV.

At the point d 2, conſtruct an angle with the horizontal line, equal to the angle of inclination of the lid of the box with the horizon; or, which is the ſame thing, draw a line through the point d 2, parallel

SECT. IV. Plate XXIX.

to the lid of the box, Fig. 1, till it cuts the vaniſhing line V 2 at V 3: then will V 3 be the vaniſhing point of the lid of the box, which is inclined to the horizon.

At the point d 2 draw another line perpendicular to the line d 2, V 3, till it interſects the line V 2, V 3, at V 4; then will V 4 be the vaniſhing point for the angles B S, a, and e of the lid of the box.

Having found the vaniſhing points V 3, V 4, bring down the diſtances of thoſe points into the vaniſhing line V 2, as is marked at their points.

Thus, with the compaſſes upon the point V 4, take the length of the line or radial R R to the point d 2, and mark it upon the vaniſhing line V 2, as at the point marked diſtance of V 4.

Then repeat the ſame at the point V 3, which will give the point marked diſtance of V 3.

Having thus found the vaniſhing points and their diſtances, proceed to form the lid as follows:

Through the angle a of the box draw a right line from the vaniſhing point V 3, as the line a B, which will repreſent the lower line of the ſide of the lid.

From the diſtance of the vaniſhing point V 3, draw a line through the angle of the box, at which the lid is hinged, as at a, and continue the line till it interſects the line X, X 2, as at m;—then from m ſet up on the line X, X 1, the meaſure of the ſide of the lid to n, equal the meaſure a c in Fig. 1; and from n draw a right line to the diſtance of V 3; and the interſection of that line with the line a B will give the apparent dimenſion of the ſide of the lid of the box, as at B.

Having thus found the point B, which is the outer angle of the lid, from B draw a line to the vaniſhing point V 1, as the line B c.

Then from the point V 3 draw a line through the further angle b of the box, till it cuts the line which is drawn from B to V 1; and

 the

SECT. IV. Plate XXIX.

the interfection of thofe lines at e will produce the general form of the infide of the lid.

* From the points B, e, and a, draw lines to the vanifhing point V 4, which will give the angles of the thicknefs of the lid.

To obtain the thicknefs of the lid at thofe angles, proceed as follows:

From the diftance of the vanifhing point V 4, draw a right line through the point B till it cuts the line X, X 1, in the point 1; then from 1 fet up to 2 the meafure of the thicknefs of the lid equal b c, Fig. 1; and from the point 2 draw a line to the *diftance* of V 4;—and its interfection with the line which is drawn from B to the vanifhing point V 4, as at S, will give the apparent thicknefs of the lid.

Complete the general form of the lid, by drawing lines from the points B and S to the vanifhing point V 3, and alfo from the angle S to the vanifhing point V 1; after which the interior thicknefs of the lid muft be found.

The thicknefs of the border of the lid correfponds with the thicknefs of the lower part of the box: therefore, having found the thicknefs of the lower part, as directed in the explanation of Fig. 1, Plate XV. the upper part muft alfo be conftructed by the affiftance of that thicknefs which is already found.

For which purpofe continue the interior lines of the fide A, and its oppofite, till it cuts the back line of the box a, b, and through thofe points draw lines from the vanifhing point V 3, which lines will give the thicknefs of the fides of the lid; after which find the thicknefs of the front and back of the lid, as follows:

† At the points m and n on the line X, X 1, fet on the meafure of the thicknefs

* It is almoft needlefs to obferve, that the angles a, b, e, B, of the lid coincide with the angles of the lower part of the box, when it is fhut down.

† Neither the points which are propofed from m and n, nor their interfections on the lid, are marked on the figure; fome others are alfo omitted, that the diagram might not be too

thicknefs of the lid, as from m towards o, and from n towards E; and from thofe points draw lines to the diftance of the vanifhing point V 3; and thofe lines will interfect the line of the lid a B, and mark the thicknefs both of the front and the back of the lid. SECT. IV. Plate XXIX.

From thofe points of interfection draw lines to the vanifhing point V 1, and they will give the appearance of the interior dimenfions of the thicknefs of the fides of the lid.

It muft be obferved, that there are three vanifhing points abfolutely neceffary for the conftruction of the lid, they are V 1, V 3, V 4.

V 1 is the vanifhing point for all thofe lines in the lid which are *parallel* to the horizon, and V 3, V 4, for thofe which are *inclined* to the horizon.

The vanifhing line of the fide of the box, which is marked in the Plate by its appellation, is the vanifhing line in which all the vanifhing points for the lines in the fide D of the lid, and alfo of the fide A of the box, muft be found; for the lines a B and D S muft be confidered as being all in the fame plane with the fide A.

Thus V 2 is the vanifhing point for the lines in the fide A, which are parallel to the horizon, and V 3 and V 4 for thofe which are inclined to it.

It is found thus: The radial or line that paffes from the eye to V 2 is parallel to the original of the fide A, and cuts the picture at V 2. Now this radial muft be confidered as a line in a vertical plane; confequently, fuch vertical plane will cut or interfect the picture in the line that is drawn from V 3 to V 4. But this plane cannot be applied in operation; but as it is known to be a vertical plane, its interfection will be *perpendicular* to the horizon; therefore, the line

too much confufed. For the author is convinced that the reft will be eafily difcovered, provided thofe which are given are properly underftood by the ftudent: but fhould there be any difficulty, let him apply a ruler or ftraight edge to the different points and lines and he will foon find out their direction and ufe.

V 3, V 4,

SECT. IV. Plate XXIX. V 3, V 4, is drawn through the point V 2, *perpendicular* to the horizontal line H H.

By the term *interfection* is commonly meant the ground line, or bafe line of the picture; but the the term is equally applicable to other lines in the diagram; for if any original plane, whether vertical, inclined, or horizontal, be produced or continued forward to the picture, the line in which fuch plane cuts it will be the interfection; and it is upon fuch line that all meafures muft be applied, to determine the proportionate magnitudes of the parts in the plane producing that interfection.

Thus in Fig. 2, Plate XXIX. the fide A of the box, if continued or brought forward, cuts the picture in the line X, X 2; therefore, that line is the interfection of the picture by the fide A of the box, equally fo with that which is produced by the ground or plane upon which it ftands, and which in the Example is marked *interfection* or *bafe line.*

It muft be remembered, that the interfection of every plane is parallel to its vanifhing line. Thus the line commonly called the ground line or bafe line, is parallel to the horizontal line: therefore the vanifhing line of any plane may be confidered as the horizontal line, and the interfection of that plane as the ground line.

Demonftration.

Turn the Example Plate XXIX. fo that the words *vanifhing line of fide A of box*, may ftand in the regular order; then confider that line as the horizontal line, and the line X, X 1, which is parallel to it, as the Bafe line: the point V 2 is the center of that vanifhing line, and the points V 3 and V 4 are vanifhing points for lines in the plane A or fide of the box; and the length of the line which is drawn

drawn from V 2 to the point marked *Eye,* is the diſtance of the vaniſhing line of the ſide A of the box. SECT. IV.

Of the Pediment on a Building, the Front of which is inclined to the Picture.

PLATE XXX.

Example, Plate XXX.

This figure, although not abſtruſe in theory, is difficult in practice. It is extremely uſeful to the painter and architect, yet the perſpective arrangement cannot poſſibly be underſtood without a previous acquaintance with the principles of architecture; nor ſhould it be attempted until the ſtudent has well conſidered the Examples already given of mouldings ſituated in the different directions of parallel and inclined to the picture, as demonſtrated in Examples, Plates IX. X. and XXVI.

As it is neceſſary that the ſtudent ſhould have a clear and accurate knowledge of the architectural form of the pediment, before he attempts to draw it in perſpective, it will be neceſſary for him to underſtand its geometrical conſtruction; for which purpoſe the Example Fig. 1, Plate XXXVI. is given.

This Figure repreſents half the cornice and pediment, which ſurmounts a building, and is exactly ſimilar in conſtruction to the Example in Plate XXX.—It is drawn by the following proceſs:

Firſt determine the breadth of the erection or building, upon which the cornice is placed, and then draw the mouldings or members with their projections or profiles, as A B; which in the Example conſiſts of a cima recta A, the faſcia or corona B, with the cavetto K, beneath.

The

SECT. IV.

Plate XXX.

The ſtudent muſt obſerve, that when there is a pediment, the cima recta is omitted in the execution of the horizontal part of the cornice, and is only admitted upon the inclined or ſloping part, called the pediment; yet it muſt be marked in the drawing, as is done in the Example by occult lines; becauſe, if this member be not deſcribed, the inclined parts cannot be determined *.

After having drawn the cornice, with the projection of its members, divide the whole length from C to the other extreme, into nine equal parts; and having drawn the line a b, perpendicular to the line o X C, and in the center of the pediment; ſet up from the point O, two of the nine parts, as from O to b: then is b the ſummit or apex of the pediment: therefore from b draw a right line to the extreme of the cornice C, and the line b C will be the upper edge of the inclined part of the pediment.

Then determine the breadth of the members of the inclined part, as follows:

Draw a right line perpendicular to the upper raking line b C of the pediment, as the line X, X 2, and continue it through the cornice, as at 6, 7; then take by compaſſes the depths of the horizontal mouldings of the cornice, as they appear upon the line X, X 2, from 7 to b, to 1, and to 6; and transfer thoſe meaſures from the upper raking line b C of the pediment *downwards* upon the line X, X 2, from 9 to 8, which gives the whole depth of the inclined members of the pediment; which muſt be again divided by the ſame proceſs for the ſmall members: through which diviſions, draw lines parallel

* In the Example no more than half the pediment is given; but the intire general form of a pediment may be ſeen in Plate V. Fig. 3, where the whole length of the upper horizontal member a b, is divided into nine equal parts, two of which are ſet up for the height from 3 to c. It may be conſidered as more geometrical to obſerve, that the inclination of the raking members of a pediment form angles of 24° with the horizontal part; but this proportion is ſometimes varied, as circumſtances may require.

to

to the line b c, and the geometrical form of the pediment will be completed. SECT. IV. Plate XXX.

Process for the Perspective Representation.

Draw the geometical form of the pediment upon a separate paper, as Fig. 1, Plate XXXVI.

Then determine the general form of the building perspectively, as A B, Plate XXX. the vanishing lines and points for which are as follows:

The base line is marked A G.

H H is the horizontal line.

C is the center of the picture; which is marked Center.

V 1 is the vanishing point for the front A B; and d V 1 is its distance.

The vanishing point of the side F is out of the plate; but its distance is marked d V 2.

N is the vanishing point for the mitre line; but its distance is out of the plate on the left hand.

The vanishing line of the front A B is marked by its title; it passes through the vanishing point V 1, perpendicular to the horizon; in which line the point V 3 is the vanishing point for the raking or inclined members D of the pediment; which point is determined by the rules given for the Example Fig. 2, Plate XXVII.

The other vanishing point for the members, which may be considered as the declining part P, is out of the plate, equally distant from the point V 1, with the point V 3, but below the horizontal line.

These vanishing points being determined, and the front and sides being drawn according to the rules given for Figs. 1 in Plates XII. and XIII. Pages 102 and 106, consider the points S and Q as the upper angles in the front of the edifice, round which the mouldings are disposed; the profile of which in the nearest angle T, must

SECT. IV. Plate XXX. be drawn by the procefs given in Page 177, for the Example in Plate XXVI. therefore, by the fame methods complete the horizontal mouldings M and the angle T.

The line A S being the angle of the building, and S the point which terminates its height without the pediment, continue the line A S to any convenient height, and fet up from S to b the whole height of the pediment, equal the height from O X to b, in Fig. 1, Plate XXXVI.

Then from b fet downwards towards S the depths of the different members c d e, equal to the geometrical meafures b, c, d, e, in Fig. 1, Plate XXXVI.

Find the point m, which is the middle of the bafe line of the building, and through m draw the line w o, tending to the vanifhing point of the fide F, which is out of the plate.

Then from d v 2, which is the diftance of the fore-mentioned vanifhing point, draw a right line through the point m, and continue it till it interfects the ground line at the point 6; from which point fet on upon the bafe line the projection of the mouldings, as to 7, 8, 9, equal to the projections of the geometrical profile, marked with fimilar letters, Fig. 1, Plate XXXVI. and from the points 7, 8, 9, draw lines to the point d V 2, that may interfect the line w o in the points w, x, y; from which points draw lines perpendicular to the horizon, as W K, X I, y r, and m n.

Note, the line m n reprefents the middle of the front A of the building; confequently, the point f is the fummit of the pediment upon the face of that front.

From the points b, c, d, e, In the line A B, draw right lines to the vanifhing point V 1; which lines will interfect the line m n, in the points f, g, h, and L; through which points draw right lines from the vanifhing point of the fide F of the building (but which, as be-

fore

fore obferved, lies out of the plate) that may interfect the perpendicular line W K, and the other perpendicular lines in the points K, I, r, L, which points determine the projection of the mouldings of what may be called the apex of the pediment. SECT. IV. Plate XXX.

Therefore, from the vanifhing point V 3, draw lines through the points K, I, r, L, to the various angles of the mouldings in the profile T, which will exprefs the members of the inclined part D of the pediment.

Again, from the fame points K, I, r, L, draw lines to the vanifhing point * of the declining part P. of the pediment, which will complete its form.

It muft be obferved, that the contour of the curved mouldings at the angle of the pediment, muft be drawn by hand; for any attempt to delineate them by rule would be vain and ufelefs.

This Example is given as the laft which can be ufeful to the artift; therefore this Section fhall be clofed with it, together with fome obfervations upon up-hill and down-hill views; their conftructions being founded upon the principles contained in this Section.

It is unneceffary to apologize for omitting the regular folids, feeing that they are of no ufe to the artift, and are at beft no more than curious inquiry. Yet if any one fhould chufe to ftudy their

* This vanifhing point lies below the horizontal line, in the vanifhing line of the front E, at an equal diftance from the point V 1 with the point V 3; how thefe points are obtained, has been already fhewn; yet the procefs fhall be here repeated.

V 1 is the vanifhing point of all the horizontal lines in the front E of the building, and the line X paffes through it perpendicular to the horizon: confequently, it is the vanifhing line of the front E of the building. The point d V 1 is the diftance of that vanifhing line; therefore at the point d V 1 conftruct an angle on the line H H, equal to the inclination of the pediment to the horizon, as the angle U W I Z, and the line W U continued, will interfect the line X in the point V 3, which is the vanifhing point required.

The lower vanifhing point for the declining part of the pediment P, may be found by making the fame angle at the point d V 1, but below the horizontal line; though it will be fufficient to take the meafure from V 1 to V 3, and fet it downwards from V 1 on the line X, continued below the ground line.

SECT. IV. Plate XXX. conſtruction, he will find ample inſtruction in the elaborate Work of Mr. Hamilton, and ſome good diagrams in the elder Malton's Treatiſe, which will gratify the curioſity of thoſe who chuſe to purſue the ſtudy of Perſpective through all its intricacies. Yet they will by no means improve the artiſt in the uſeful part of the ſcience, beyond what may be acquired by the problems of this and the foregoing Sections.

Of the Repreſentations of Up-hill and Down-hill Views.

In terminating the inſtructions for the laſt Example, which treats of a pediment, whoſe front is inclined to the picture; it was obſerved, that all which is neceſſary to the artiſt in the ſcience of Perſpective, was concluded by that problem; but as ſome hints concerning up-hill and down-hill views were alſo promiſed in that concluſion, it will be proper to offer ſome inſtructions, which muſt be conſidered as elementary principles for the conduct of the artiſt in the delineations of up-hill and down-hill views in landſcape. At the ſame time it muſt be remarked, that this ſubject is among the many which Dr. Brook Taylor ſays, muſt be aſſiſted "by a good judg-"ment, founded on much obſervation; it being difficult to bring "every thing to exact mathematical conſtruction, at leaſt ſo as to "be convenient for practice*." On this account nothing more than general hints can be offered, which the artiſt muſt apply to his uſe as occaſion may require; at all times paying attention to the following circumſtances:

Firſt, The poſitions of planes, whether inclined to the horizon or declining from it, cannot eaſily be diſtinguiſhed from each other by

* See his firſt edition, 1715, page 31, of Linear Perſpective.

the

SECT. IV. Plate XXX.

the ſpectator, unleſs ſome vertical object or horizontal plane intervene, by which a compariſon of their poſitions can be made; for if it were poſſible that a deſcending plane or declivity could be ſeen without the horizon, it would not ſtrike the eye of the ſpectator with any other effect than that of being perfectly horizontal; the ſame equivocal appearance takes place alſo in the caſe of the aſcending plane or acclivity.

It is not neceſſary to offer a geometrical demonſtration of this fact, as common obſervation will prove the truth of the aſſertions, however paradoxical they may at firſt ſight appear.

Secondly, All buildings and edifices of every kind muſt have their *elementary* parts perfectly vertical and horizontal, otherwiſe they will fall, or be uſeleſs by their conſtruction *.

Thus a houſe built upon the declivity of a hill, muſt have its walls vertical, and the floors perfectly horizontal, together with the tops and ſills of the windows, and the ornamental faſciæ of the front; yet the ground or plane upon which the building ſtands, may be inclined to the horizon, either aſcending or deſcending.

Thirdly, Although declining or deſcending planes have their remote parts below thoſe which are neareſt to the ſpectator's eye, yet do thoſe remote parts, when repreſented upon the picture, appear higher, or above thoſe which are neareſt to the picture. Thus the deſcending part of a flight of ſtairs, when repreſented upon the picture, will have the loweſt ſtep marked above the repreſentation of that which is the neareſt and higheſt †, and this will ever be the appearance when the eye of the ſpectator is above the *declining* plane. On the contrary, when an *inclined* plane is above the eye of the ſpectator, then the

* There are ſome buildings which are pyramidical, others conical in their exterior forms; yet ſuch muſt have their baſes perfectly horizontal.

† See an excellent Example of a ſtaircaſe, in Malton's Treatiſe on Perſpective, Plate XXXI. where this effect is well illuſtrated.

fartheſt

SECT. IV. Plate XXX. farthest or highest part of the original plane will in the representation often fall below the part which expresses the nearest and lowest parts of such inclining plane. It is thus in Example, Fig. 2, Plate III. in which the house C, X 2, has the roof R inclined to the horizon, the farthest part of which, at the point W, is in the original object much higher than the nearest part marked Z; yet in the representation upon the picture, the highest part w is below the angle Z, which in the original object is the lowest.

The author has given these remarks, because it is necessary that the student and artist should impress their minds with these important facts, though they may not perfectly understand the theory by which such phenomenæ are produced.

In the process for drawing views, where the general face of the country is nearly horizontal, the ground line or base line should be first of all determined, and then the horizontal line should be drawn at a certain height, equal to the height of the eye of the spectator, above the ground upon which he stands; but in drawing down-hill views, it will be proper to draw the horizontal line first, and then determine the base or ground line below it; and this course of operation is founded on the following circumstances:

When a spectator stands upon the declivity of a hill, and looks directly forward, he cannot see any part of the declining plane, but such as will be at a much greater distance from his station, than if the plane upon which he stood were perfectly horizontal*; consequently the portion of the picture will be greater below the horizontal line in the down-hill view, than in that which represents the level country.

* It is for this reason that the difference of process is recommended: for in all other views, it should be the invariable practice of the artist first to mark the ground line or base line of the picture, and then the horizontal line, at the proper height above it.

Operation

Operation for the down-hill View.

Plate XXXI. Fig. 1.

First draw the horizontal line H H, so disposed upon the paper or canvas, as may best correspond with the apparent height of the horizon, in the natural view; and determine the center of the picture, C.

Then find the vanishing points of the sides of the various buildings which may be required in the view, by the process directed in the Third Section, Page 97, as the points V 1 and V 2; which are the vanishing points of the sides A and B of the house; observing, that all its sides or faces are inclined to the picture.

Through the vanishing point V 1, draw the vertical line V 1, 3, which will be the vanishing line of the sides A A of the building.

Bring down the distance of the vanishing point V 1, to the horizontal line, as at d V 1, and at that point construct an angle with the horizontal line, *but below it*, equal to the known or supposed declination of the ground, and draw a right line, as the line M, which being continued will cut the vertical vanishing line V 1, at the point V 3; consequently, V 3 is the vanishing point for the declivity of the hill.

These points being obtained, let all the constructive lines of the house, and barn, be determined by the vanishing points V 1, V 2, which being in the horizontal line, are the vanishing points for all the horizontal lines in the sides of those buildings which are inclined to the picture: but the fences or walls b and d, have their upper edges parallel to the hill upon which they stand; therefore, they vanish in the point V 3. And as the three trees are in a line parallel to the fence, and are all supposed of equal heights with each other; their

SECT. IV. Plate XXXI. their heights are determiued by drawing a line from the fummit of the neareft, to the vanifhing point V 3.

Of the afcending or up-hill View.

Plate XXXI. Fig. 2.

This Example contains two buildings, a barn, marked A, and a houfe, marked B; the former hath the fide A, perpendicular, and the latter hath its fides B E, inclined to the picture.

Procefs.

Draw the horizontal line at the common height above the bafe or ground line, and let C be the center of the picture.

As the hill in this Example is fuppofed to be a regular afcending plane, the bafe or lower line of which is parallel to the picture, proceed as follows:

Through the center of the picture C, draw the prime vertical line E C, and let D, upon the horizontal line, be the diftance of the picture.

At the point D draw a line, which fhall make the fame inclination with the horizontal line, that the hill or afcending plane is known or fuppofed to make by its afcent with the natural horizon, and the interfection of fuch inclined line with the prime vertical line, as at V, determines the vanifhing point for lines that exprefs the direct afcent of the hill.—Therefore, through V draw the line a b parallel to the horizontal line, then will the line a b be the vanifhing line for the up-hill or afcending plane *.

The houfe or building B, inclines to the picture, and V 1, V 2 are

* The angle V D C is equal to the angle which the afcent of the hill makes with the horizon; confequently the line D V is parallel to the acclivity of the hill.

the

the vaniſhing points of all the horizontal lines in the ſides of that building; which vaniſhing points are found as directed in the foregoing Section. See Plate XIII. Page 106. SECT. IV. Plate XXXI.

Through the point V 2, draw the vertical line X F, and its interſection with the line a b (which is the vaniſhing line of the aſcending plane) will give the vaniſhing point for all thoſe lines which are in the aſcent of the hill, parallel to the front B of the houſe, which is inclined to the picture.

It would be an endleſs taſk to attempt further directions for delineating the ſmaller parts of the foregoing figures, nor would it be uſeful, ſince thoſe who underſtand the preceding, together with the former part of this Section, will eaſily comprehend the principles upon which aſcending and deſcending views are delineated: and it muſt be again repeated, that without ſuch preparatory knowledge, the moſt minute and accurate inſtructions cannot be underſtood by the ſtudent. Yet the following obſervations will be found uſeful to thoſe who are but little informed in the ſcience.

In all deſcending views, although there may be no riſing ground after the hill terminates upon which the ſpectator ſtands; yet the level plane that lies below will appear to aſcend or riſe towards the horizontal line, which paſſes through the eye of the ſpectator. This phenomenon hath ſometimes deceived intelligent perſons, who, viewing diſtant objects from elevated ſtations, have ſuppoſed that thoſe objects ſtood upon elevated ground, when in fact they were upon the loweſt that could be ſeen in the view.

On the contrary, when a ſpectator approaches aſcending ground, he is often ſtruck with the idea of its being leſs elevated than it really is; but this deception is cauſed by the plane of the aſcent paſſing through the eye of the ſpectator, by which circumſtance the elevation cannot eaſily be perceived.

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These last observations may be considered as theoretic, and the student will do well to consider them with attention, and to compare these precepts with the appearances of nature, which in this case, as in all others, will furnish him with the best Examples for his study and consideration.

END OF THE FOURTH SECTION.

SECT. V.

SECTION THE FIFTH.

Of Shadows.

IT was not originally the author's intention to give any inſtructions in this work relative to ſhadows, becauſe it ſeldom happens that the painter is required to repreſent the determined ſhadows of the buildings, which form the back ground of his picture: for this reaſon ſome writers on the ſcience of Perſpective have omitted to give any rule concerning ſhadows.—* One in particular has the following obſervation: "The geometrical or perſpective knowledge of ſhadows "is of very little conſequence to a painter: it is eaſily underſtood, "when we have learned that of objects."

Although there is much truth in this remark, yet, in the painting of ſcenes, and in executing perſpective drawings of architecture, the correct repreſentations of the ſhadows will ever be required; it was therefore thought neceſſary to add this Section, that the work might not be conſidered as imperfect by thoſe who ſhould require inſtructions upon the ſubject of ſhadows.

* The Practice of Painting and Perſpective made eaſy, by Thomas Bardwell, Painter, quarto. The patent for this work is dated in January 1756. There was a ſecond edition 1773.

SECT. V. It muſt be obſerved, that however eaſy the conſtruction of ſhadows may appear to thoſe who underſtand the ſcience of Perſpective, according to * Dr. Brook Taylor's principles, yet they will be found extremely difficult by thoſe who do not clearly comprehend the nature of vaniſhing lines, particularly thoſe of planes inclined to the horizon.

For this reaſon it is abſolutely neceſſary, before the ſtudent engages in the ſtudy of the problems contained in Plates XXXIV. and XXXV. that he ſhould well conſider the problem given in Fig. 3, Plate XXXVII. which teaches the conſtruction of the vaniſhing line of an inclined plane, together with the methods of determining its center and diſtance; all which ſhould be clearly underſtood before any attempts are made to repreſent ſhadows, as caſt or projected upon planes inclined to the horizon.

In this Section no inſtructions are given for the repreſentation of the objects whoſe ſhadows are required, as ſuch would only be a repetition of what has been already given in the foregoing Sections; and would alſo produce great confuſion in the Examples.

Of Shadows.

Shadows may be conſidered as of two kinds; thoſe of art, and thoſe of nature.

1. The ſhadows of art are thoſe which are produced by the torch, lamp, or candle.

2. Thoſe of nature are produced by the ſun.

* It is worthy of obſervation, that the advantage of the Doctor's principles over all others is in no inſtance ſo clearly demonſtrated as in the conſtruction of ſhadows, particularly thoſe which are caſt upon inclined planes; for no other methods can determine ſuch repreſentations with truth and certainty: an inconteſtible proof of that great writer's ſuperiority in the ſcience of Perſpective.

In

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In the firſt, the luminary muſt always be *repreſented, or its place indicated on the picture; and as the rays of light diverge every way from the luminary, the ſhadows of all objects, which are thus illuminated, muſt be repreſented as diverging from a point in *all directions* upon the picture.

In the ſecond, the rays of light are parallel to each other, in our ſyſtem, in conſequence of the immenſe diſtance of the luminary; therefore the ſhadows of objects produced by the ſun's rays are in nature projected or caſt in a parallel direction only; yet in the picture they muſt be repreſented as diverging from, or converging to a point, unleſs the ſun's rays be parallel to the picture, in which caſe the ſhadows of vertical lines will be parallel to the picture.

In repreſenting ſhadows as produced by the ſun's rays, it is abſolutely neceſſary to conſider with attention the direction of thoſe rays; for there are three different relations in which they may be diſpoſed to the picture, or, in other words, to the eye of the ſpectator.

The firſt is when the ſun's rays are parallel to the picture, or, as ſometimes called, in the plane of the picture; in which caſe the ſhadows of all right lines that are *vertical* or *perpendicular* to the horizon, will be parallel to the baſe line or interſection of the picture. Example, Plate VIII. Fig. 1, and Plate XL. Fig. 6.

The ſecond is when the ſun is *behind the picture*, or its body *before the ſpectator*; in which ſituation the ſhadows of all right lines that are vertical will be caſt or projected forward towards the ſpectator. Example, Plate XXXIII. Fig. 1, and Plate XXXIV. Fig. 1.

The third is when the ſun is *before the picture*, or its body *behind the ſpectator*; for then the ſhadows of all right lines that are verti-

* In repreſentations of candle-light ſubjects, a fine effect may be produced by concealing the luminary; but to ſuppoſe it out of the picture will render it unintelligible, and therefore ſhould never be attempted.

cal

SECT. V. cal will be projected *from* the spectator. Example, Plate XXXIII. Fig. 2, and Plate XXXIV. Fig, 2.

To the foregoing observations the following may be added, which may be considered as Theorems.

Theorem 1st.

The shadow of every *right line*, when cast or projected by the sun upon a plane, is a right line, unless the line is parallel to the ray of light, and perpendicular * to the plane of projection; for in that case the shadow will be no more than a point.

Theorem 2d.

The shadow of a *plane* is also a right line, whenever the original plane producing that shadow is parallel to the sun's rays, and perpendicular to the plane of projection; but if oblique to either, the shadow will then be a trapezium.

Theorem 3d.

The shadows of all right lines, when projected upon planes that are parallel to them, have the same vanishing points with the lines themselves. Thus the shadow lines c f and 8 9, vanish into the same points with the lines g, h and k 1 which are the original lines producing those shadows. Plate XL. Fig. 6.

To determine the Representations of Shadows, when the Sun's Rays are parallel to the Picture.

Plate XL. Plate XL.

Suppose the block a, to be already drawn, with the face or side a, parallel to the picture.

In this and the following Example the shadows are projected towards the right side of the spectator; therefore continue the lower

* By the plane of projection is meant any plane upon which the shadow is cast or projected.

line

line of the block from 3 to e, and at the upper angle g draw the line v 2, making the fame inclination with the horizontal line that the fun's rays are known to make with the natural horizon; and the interfection at e will determine the fhadow of the face a, upon the ground. From e draw a line to C, which is the vanifhing point of the fide of the block; and then draw the line v 1 parallel to v 2, which will determine the fhadow of the other angle. The line v 1 may be omitted, provided a line be drawn from the farther angle d parallel to the line 3 e, till it interfects the line e f, at f.

Block b, Fig. 6.

The block b has all its fides inclined, while the fun's rays are parallel to the picture; therefore at the neareft angle 5, draw the line 5 6 parallel to the bafe line, and through the upper angle d, draw the the line v 4 with the fame inclination to the horizontal line that the fun's rays incline to the natural horizon; and its interfection at 6 will determine the length of the fhadow of the neareft angle of the block.—From the point 6 draw a line to the vanifhing point V 2, which is the vanifhing point of the fhadowed fide of the block. Then draw v 3 parallel to v 4, which will give the interfection 8, and from 8 draw a line to the vanifhing point V 1; and from the point 7 in the indicated * plan of the block, draw a line parallel to the bafe line, which will give the interfection 9. Thus will the lines be obtained, which form the boundaries of the required fhadow.

In the Example the inclined line v 4, which reprefents a ray of the fun, paffes through both the points k and d of the block, and thereby marks the fhadows of both thofe points on the ground by one line only, as at 9. But this is an accidental circumftance, for had the object been more or lefs oblique to the picture, it might then have been

* It is frequently neceffary to find the perfpective reprefentation of the *plan* of the object, without which the fhadow cannot be completed.

neceffary

SECT. V. Plate XXXIX.

necessary to draw another ray through k; but as the line producing the required ſhadow is vertical, a line drawn parallel to the baſe of the picture from the point 7, which is the remote angle of the plan of the block, will be the ſhadow required, as the line 7 9; and therefore a third ray would be ſuperflous.

PLATE VIII.

In Plate VIII. Fig. 1,

Is the Example of a ſtool, the ſhadow of which is projected upon the floor, by rays parallel to the picture.

The line L a, indicates one ray of light, to which the others are all parallel.

At the points c e and d f, which are the fronts of the legs of the ſtool, draw lines parallel to the baſe line of the picture, and continue them as far as may be ſuppoſed neceſſary.

Then at the upper angles of the ſtool, as at V and x 1, draw lines parallel to the given ray L a; and thoſe lines will interſect the line c e at b, and the line d f at a; which two points being joined by a right line, will give the ſhadow of the edge of the ſtool V, x 1, upon the floor, expreſſed by the line b a *.

It muſt be obſerved, that the thickneſs of the upper frame of the ſtool is to be comprehended in the ſhadow.

The thickneſs of this rail is marked at o, from x 2; therefore, through o draw a right line parallel to the given ray L a, which line will produce the point g; from which point draw a line to the center of the picture C, and the outlines of the ſhadow of the upper ſurface of the table will be determined.

* Let it be obſerved, that if either of the points a or b, be found, the ſhadow of the whole line will be determined by drawing a line from C, the center of the picture, through a or b: for as C is the vaniſhing point of the edge V x 1, of the ſtool, it muſt alſo be the vaniſhing point of the *ſhadow* of that edge, ſeeing that they are parallel to each other, and conſequently have the ſame vaniſhing point. Theorem 3, page 214.

For

For the ſhadows of the ſide rail and ſtretcher, the ſame proceſs muſt be employed with that already taught, which it is unneceſſary to repeat, as the ſtudent will readily underſtand the conſtruction, by laying a parallel ruler to the line L a, which repreſents the given ray, and then moving it to the different points from which the ſhadows are projected in the Example. SECT. V. Plate VIII.

Rudiments of Shadows, when the Sun's Rays are inclined to the Picture.

Plate XXXII. PLATE XXXII.

Fig. 1 is an Example for demonſtrating the method of drawing the ſhadow of a vertical line, as projected or caſt upon the ground, when the ſun is *before the ſpectator,* or which is the ſame thing, *behind the picture.* A, is the vertical line or rod, the ſhadow of which is required upon the ground.

H is the horizontal line.

C the center of the picture.

The line P E, is the parallel of the picture.

* In this Example the ſun's rays incline to the picture in an angle of 39°.

Therefore at the point E, which is the eye, draw a right line which ſhall make the given angle with the parellel of the picture P E, equal 39°, as the angle P, E, D.

Continue the line E D till it cuts the horizontal line, as at V, then is V, the vaniſhing point in the horizontal line of all the ſhadows

* The ſtudent muſt pay particular attention to the diſpoſition of the ſun's rays, both in their inclination to the picture and alſo to the horizon; as the vaniſhing points cannot be found without conſidering this double inclination.

 that

SECT. V. Plate XXXII. that can be projected upon the ground, or horizontal plane; the ſun's rays being inclined to the picture in the given angle 39 degrees.

Through the point V draw a line perpendicular to the horizon, as the line V Sun.

Then find the elevation of the ſun's rays as follows:

Bring down the diſtance of the eye E, from the vaniſhing point V to the horizontal line, as at a, at which point make an angle *above* the horizontal line, equal the ſun's elevation; which in this Example is 36°, as the angle b, a, d. Continue the line a d till it interſects the vertical line V, which interſection will be the place of the ſun, as is marked in the Example by the word, and V is its ſeat upon the horizon.

The foregoing operation being completed, let S A be ſuppoſed a rod, placed in the ground perfectly vertical, or in other words perpendicular to the horizon.

From the point V draw a right line through the point S, which is the ſeat of the rod, and continue it as far as may be thought neceſſary.

Then from the point of the ſun draw another right line to the point A, the top of the rod, and continue it till it interſects the line V S in W, then will the line S W repreſent the ſhadow of the rod S A.

Fig. 2, in the ſame Plate, is an Example repreſenting the ſhadow when the ſun is *before the picture*, or which is the ſame thing, *behind the ſpectator.*

H is the horizontal line.

C the center of the picture.

The line P E the parallel of the picture.

First determine the inclination of the ſun's rays to the picture, as in the former Example, as the angle P E V.

Then find the inclination of the ſun's rays to the horizon, which in this Example is 49°.

Bring down to the horizontal line, the diſtance of the eye from the vaniſhing point V, as the point a, the ſame as in the foregoing Example.

Through the point V draw a line perpendicular to the horizon, and at the point a, conſtruct an angle *below* the horizontal line equal the ſun's elevation *above* the horizon, as the angle b a d, and continue the line a d, till it interſects the vertical line V at the point marked ſun.

The points V, and ſun, being thus found, let A S be ſuppoſed the vertical rod whoſe ſhadow is required.

From the vaniſhing point V draw a right line to the bottom or ſeat of the rod S, then from the top of the rod draw another right line to the point ſun, which will interſect the line H S at W; then is S W the ſhadow of the vertical rod A S, the ſun being behind the ſpectator.

The two foregoing Examples demonſtrate the firſt principles of ſhadows projected by the ſun, when his rays are inclined to the picture; and it muſt be obſerved, that in each there are two vaniſhing points employed. The firſt repreſents the place or body of the ſun, the ſecond its ſeat upon the horizontal line, which in both Examples are marked V and ſun.

In the firſt Example, the ſun is ſuppoſed before the ſpectator, on his left hand; and conſequently is ſeen in its real place: * but in

* As this Problem, and ſome of the following, may appear confuſed by having the ſun's body repreſented below the horizon, and even out of the picture, it may be proper, for the ſervice of the ſtudent, to attempt ſome further explanation.

SECT. V. Plate XXXII. the fecond, the fun is fuppofed behind the fpectator, on his right hand, and therefore cannot be feen; for this reafon, its place is tranfpofed below the horizon on the *left hand* of the fpectator, and thereby becomes a vanifhing point for the rays that pafs from the fun.

Of Shadows of Prifms or Blocks upon the Ground or horizontal Plane.

Plate XXXII. Fig. 1.

In this Example the fun is *behind* the picture, or *before* the fpectator; its place is marked by the word Sun; the procefs for finding which fhall be again repeated.

H is the horizontal line.

G the ground line, or bafe of the picture.

In this cafe, as in many of the Problems of the foregoing Sections, the plane of the picture muft be confidered as extended, not limited.

In the next place it muft be remembered, that vanifhing points may fall in any part of the picture, either above or below the horizon, as may be required; all which circumftances have been already fhewn in the fecond and third Sections of this Treatife.

When the fun is behind the fpectator, he cannot be feen, as already obferved, yet his imaginary reprefentation may be obtained, which will be the vanifhing point of his rays.

Suppofe a fpectator to ftand at fome diftance from a plane perfectly vertical, which may be confidered as a tablet for a picture; the fun behind him on the right hand, then imagine a ray of light to pafs from the fun through the eye of the fpectator, the line fo paffing would interfect the picture, and produce a point upon the picture, on the *left hand* of the fpectator, and *below* the horizon; this point will then be the vanifhing point for *all* the rays that proceed from the fun, feeing that thefe rays being parallel among themfelves, have one and the fame vanifhing point. Thus Dr. Brook Taylor's note is as follows: "When the original luminous point is behind the fpectator, fo that it cannot have any "real reprefentation on the picture its imaginary reprefentation (which is as it were the "fhadow of the fpectator's eye on the picture) muft be on the contrary fide of the "plane to the point whofe fhadow is fought." Vide page 32, firft edition.

Mr Hamilton calls the tranfprojected image of the luminary a projecting point at an infinite diftance behind the directing plane. See his Stereography, or complete Body of Perfpective, Book v. Page 210.

P the

SECT. V. Plate XXXII.

P the parallel of the picture.

C the center of the picture.

E the eye.

At the point E, draw the line E S, making the fame angle with the parallel of the picture P, that the fun's rays are known or fuppofed to make with the picture, and at the interfection S draw the line S Sun, perpendicular to the horizon.

Bring down the length of the line S E to the hoaizontal line, as at the point X.

Then at the point X draw the line X *fun*, making the fame angle with the horizontal line H, that the fun's rays are known or fuppofed to make with the natural horizon; which will interfect the vertical line S in the point marked fun, which is its place upon the picture; and S is its feat upon the horizontal line.

The block or cube A, hath its fides parallel and perpendicular to the picture; therefore the fide 1 3 vanifhes in C, the center of the picture.

S being the feat of the fun on the horizontal line, draw right lines from S through the lower angles d g h, as the lines S d b, S g a, S h e; and from the point *Sun* draw right lines through the upper angles 1 2 3 of the block, that may interfect the former lines at the points a b c; which points determine the extent of the fhadow. Join the points a b c, by right lines, and the fhadow of the block A will be determined.

Obferve, that C being the center of the picture and the vanifhing point of the upper angle 1 3 of the block A; the *fhadow* of that line, which is the line a c upon the ground, vanifhes alfo in the point C.

The fhadow of the block B is produced by the fame procefs; that is, by drawing right lines from the point S, through the lower angles

a b d,

SECT. V. Plate XXXII. a b d, and then determining the length of thofe lines, by drawing right lines from the *Sun* through the upper angles 1 2, which will produce the points c, d, and e.

But as V 1 and V 2 are the vanifhing points of the fides of the block B, the lines c d and d e vanifh in thofe points: therefore, having found the point c, which determines the length of the fhadow of the vertical line 1 a, from the point c draw a line to the vanifhing point V 2, and from the point d draw a line to the vanifhing point V 1, and the form of the fhadow will be completed.

There need no further directions concerning the block F, as fuch would be but a repetition of the foregoing inftructions.

Fig. 2, in the fame Plate, is an Example of fhadows when the fun is *before* the picture, or *behind* the fpectator.

H is the horizontal line.

G the ground line.

P the parallel of the picture.

C the center of the picture.

At the point E (which is the eye) draw the line E S, making the fame inclination with the line P P, which the fun's rays make with the picture; and the point S will be the reprefentation of the feat of the fun upon the horizontal line.

At the point S draw a right line perpendicular to the horizontal line, but below it, as the line S N.

Bring down the length of the line S E, from the point S to the horizontal line, as at the point d v s, and from that point draw a right line making the fame inclination to the horizontal line (but below it) that the fun's rays are known or fuppofed to make with the natural horizon, as the line d v s, *Sun*; then will the point marked *Sun*, be the tranfprojected image of the fun upon the picture, and S its feat upon the horizontal line.

Therefore,

Therefore, to defcribe the fhadows of the block B upon the ground, draw lines from its lower angle a b to the point S, which is the vanifhing point for the fhadows upon the ground of all the vertical lines that compofe the forms of the blocks or prifms. SECT. V. Plate XXXII.

The fame procefs is employed for the fhadows of the blocks A and D. From the lower angles of which lines are drawn to the point S, as from the angle g in the block A to S, and from the angle i in the block D to S. Then from the upper angles of the fame blocks, as from c d e in the block B, from m n in the block A, and o in the block D, draw lines to the point marked *fun*, and the length of the fhadows will be determined by the points 1, 2, 3, 4.

The methods for finding the reprefentation of the fun's image, together with its feat upon the horizontal line, having been given twice in the foregoing Examples, that part of the procefs is omitted in the following inftructions, the place of the fun being marked at pleafure, and the ftudent may obferve that he is at liberty to place the image of the luminary in any part of the picture that he thinks will produce the beft effect, without attending to precife rules for its difpofition; at the fame time remembering, that the greateft elevation of the fun's rays in fummer may be taken at 60, and the loweft in winter at 24 degrees.

Shadows, Plate XXXIV.

PLATE XXXIV.

Fig. 1, is the reprefentation of a building inclined to the picture, with a part B, projecting beyond the general front A. The fhadows of the building are projected upon the ground, and alfo in part upon the face A; the fun being *before* the fpectator or *behind* the picture.

The place of the luminary is marked *Sun*, Fig. 1, near the top of the plate; and its feat upon the horizon is marked S 1.

The

SECT. V. Plate XXXIV.

The point V 1, is the vaniſhing point of the fronts A and B, and V 2 is the vaniſhing point of the ſides G and H of the building.

Firſt find the ſhadow upon the ground of the projection G of the building, as follows:

The point S 1 is the ſeat of the ſun upon the horizon, conſequently it is the vaniſhing point for the indefinite repreſentations of the ſhadows of all lines that are perpendicular to the ground.

Therefore, from that point draw right lines through the lower angles of the building, as from S 1, through the angle a, and alſo through the angle k; and continue thoſe lines as far as may be thought neceſſary.

Then determine their lengths as follows:

From the point marked *Sun*, Fig. 1, which repreſents the luminary, draw right lines through the upper angles of the building, as at the points b, 1, 2 3, 7; and continue thoſe lines till they interſect the former lines in the points d, 5, 7, 4; which points terminate the length of the ſhadows upon the ground.

From the points d, 5, and 7, draw lines to the vaniſhing point V 2, and the outlines of the ſhadows upon the ground will be determined.

The line c e, upon the front A, is the ſhadow of the projecting line c b; it may be obtained by drawing a right line from c to e, but it will be more elegantly determined by the following proceſs:

The point V 1 is the vaniſhing point of all the horizontal lines in the fronts A and B, and A is the front upon which the ſhadows of the line c b, and alſo of the projecting rod o 7, are projected.

Therefore draw a right line through V 1 perpendicular to the horizontal line, as the line P V 3; which line is the vaniſhing line of the fronts A and B, as expreſſed in the Example.

Then from the point which repreſents the luminary, marked *Sun*,

Fig. 1.

Fig. 1, draw a right line to the vaniſhing point V 2, which will interſect the vertical vaniſhing line P, in the point V 3.

Then is V 3 *Fig.* 1, the vaniſhing point for the delineation of the ſhadows of all lines perpendicular to the plane A, as the lines c b and o 7, both of which are perpendicular to the front A.

From the point V 3 draw a right line though the point c, which line will interſect the baſe line of the building in the point e: conſequently the line c e repreſents the ſhadow of the line c b.

The ſhadow of the projecting rod o 7, is chiefly upon the front A of the building, part of it upon the ground.

To obtain this ſhadow, draw a right line from the vaniſhing point V 3 Fig. 1, through the point o, as the line o 9, and at the point 9 draw a line from the vaniſhing point V 2, as the line 9 8; then determine the length of the ſhadow at the point 8, by drawing a right line from the luminous point marked *Sun* 1, *Fig.* 1, through the end 7 of the rod, till it interſects the line 9 8 in the point 8, which terminates the ſhadow.

After having determined the ſhadows of the preceding figure, it will ſcarcely be neceſſary to give minute inſtructions for the conſtruction of the ſhadow of Fig. 3: it will be ſufficient to obſerve, that lines drawn from the point S 1 through the lower extremes of the ſtandards, as at X 1 and X 2, will mark their ſhadows upon the ground; the lengths of which muſt be determined by drawing lines from the luminous point marked *Sun*, *Fig.* 1, through the points 10, 11; the interſections of which lines at 12, 13, will determine the lengths of the ſhadows; and lines drawn from the point 12 to the vaniſhing point V 2, will determine the ſhadow of the bar 10—11, as repreſented by the points 12—13 upon the ground.

The building A B, Fig. 2, in the ſame Plate, is ſimilar to the former; but the ſun is *before* the picture, or *behind* the ſpectator. The

SECT. V. Plate XXXIV.

point marked *Sun, Fig.* 2, is the tranfprojected image of the luminary, and S 2 is its feat upon the horizon.

The vanifhing points for the fronts and fides of the building, are V 1 and V 2.

To obtain the fhadows which are projected upon the ground, proceed as follows:

Through the middle of the fide H of the building draw the vertical line P X: X being the extreme point of the ridge of the roof, and P its feat upon the ground.

From the points k, P, W, draw lines to S 2; which lines may be confidered as the indefinite reprefentations of the fhadows of the angles and center line of the fide H of the building.

Then through the points 7, X, 6, draw right lines from the point marked *Sun, Fig.* 2; and the interfections of thofe lines with the former, which were drawn to S 2, as at 8, 9, 10, will determine the lengths of thofe fhadow lines.—Join the points 8, 9, 10, by right lines, and from the point 10 draw a line to the vanifhing point V 1; and the contour of the fhadow of the end H of the building, as alfo of its further fide, will be determined.

Then proceed to defcribe the fhadow of the projecting part B, on the front A, as follows:

From the lower angle 2 draw a line to the point S 2, which will interfect the bafe line of the front A, in the point 3; at which point draw a line parallel to the line 1 2, and from 1 draw a line to the point Sun, No. 2, which will give the interfection 5. Join the points f and e by a right line, and the outline of the fhadow of the projecting part will be determined; 2 3 being the part which is projected upon the ground, and 3 5 4 that which is projected upon the face of the building.

The fhadow of the vertical rod a b is partly upon the ground, and partly

partly upon the front A of the building; to obtain which draw lines from a, the baſe of the rod, to the point S 2, which will give the interſection d. Draw the line d c parallel to the rod a b, and determine its height by drawing a right line from the top b of the rod, to the point marked *Sun*, *Fig.* 2; and the interſection c will determine the height of the ſhadow of the vertical rod a b, upon the plane or front A of the building. SECT. V. Plate XXXIV.

Laſtly, find the ſhadow of the rod m n, which projects from the wall A, as follows:

This rod is perpendicular to the plane A, and parallel to the end H, and alſo to the horizon; therefore V 2 is its vaniſhing point. And the ſhadow is caſt or projected upon the plane A; which plane is inclined to the picture.

Now the vaniſhing point for all horizontal lines in the plane A is V 1; therefore, through that point draw a right line perpendicular to the horizontal line H, as the line V 1, M; which line is marked *vaniſhing line of the face A, Fig.* 2.

Continue that line upwards as far as may be thought neceſſary; and then from the point marked Sun, Fig. 2, draw a right line through the vaniſhing point V 2, till it interſect the vaniſhing line V 1, M; and that point of interſection will be the vaniſhing point for the indefinite ſhadows of all lines that are perpendicular to the fronts A and B; or, in other terms, to planes which vaniſh in the line V 1, M.

From the vaniſhing point produced by the foregoing proceſs (which point is not in the Example, for want of ſpace in the Plate,) draw the right line m o through the point m, which is the baſe of the rod m n, or its interſection with the plane A. Then from the point marked Sun, Fig. 2, draw a line to the point n of the rod; and

SECT. V. Plate XXXV. the interfection with the former line, as at o, will determine the length of the fhadow; confequently m o is the fhadow of m n.

Of Shadows upon inclined Planes.

Plate XXXV. Fig. 1 and 2,

Are Examples for the delineation of fhadows upon inclined planes, as alfo upon the ground or horizontal plane.

Fig. 1, the firft Example, is when the fun is *before* the picture, or *behind* the fpectator.

Fig. 2, the fecond, when the fun is *behind* the picture, or *before* the fpectator.

H is the horizontal line, and G the ground line, in both Examples.

A a, Fig. 1, is an upright or vertical rod, and it is required to defcribe its fhadow upon the block B, whofe face is inclined to the horizon.

The tranfprojected place of the fun is marked *Sun, No.* 1: therefore from that point draw a line perpendicular to the horizontal line H, which will produce the interfection S, No. 1; which muft be confidered as the feat of the luminary upon the horizontal line. and confequently is the vanifhing point for the fhadows, upon the ground, of all lines that are vertical or perpendicular to the horizon. Thus the fhadows of all the vertical lines in the rod A a, which are caft or projected upon the ground, vanifh in S, No. 1. But before any part of the fhadow is defcribed upon the ground, it will be proper to find the vanifhing point for that part of the fhadow which is projected upon the inclined face of the block B, and which is found as follows:

 The

The line V 1, V 2, is the vaniſhing line of the inclined plane B; therefore produce or continue it from V 2 to V 3. SECT. V. Plate XXXV.

Then continue the line that is drawn from Sun, No. 1, till it cuts the vaniſhing line V 1, V 2, in the point V 3: then is V 3 the vaniſhing point for the ſhadow of the rod A a, when caſt or projected upon the inclined face B, as alſo for all ſhadows that might be projected upon ſuch inclined plane by any vertical line whatever.

Having thus found the vaniſhing points, determine the ſhadow as follows:

From the bottom of the rod a, draw lines to the point S, No. 1, which will repreſent the portion of ſhadow, a b, upon the ground, interſecting the baſe of the block at b: from the point b continue the ſhadow upon the inclined face, by drawing lines to the vaniſhing point V 3.

Then from the top of the rod A, draw a right line to the point *Sun, No.* 1, which will give the interſection C, and determine the apparent length of the ſhadow; the part from a to b repreſenting the portion which falls upon the ground or horizontal plane, and the ſpace from b to C the portion which is projected upon the face of the block or inclined plane B.

The ſhadow of the block B, upon the ground, is obtained as follows:

Draw the line d e, from the middle of the baſe to the apex or interſection of the two inclined planes, which conſtitute the form of the block.

From the point d draw a right line to the vaniſhing point S, No. 1, and from e to *Sun, No* 1, producing the interſection X; which is the ſhadow upon the ground of the point e of the block.

From the points k and n in the baſe of the block, draw lines to the

SECT. V. Plate XXXV.

the point X, and the contour of the ſhadow of the block upon the ground will be determined.

The ſhadow of the cylinder S, upon the ground, is determined as follows:

Circumſcribe the baſe D by the perſpective repreſentation of a ſquare, and draw the diagonals and diameters 1, 2, 3, 4, &c.; then find the ſhadows of thoſe points upon the ground, and thoſe points of ſhade muſt be the guides to direct the artiſt in deſcribing the contour of the ellipſis, that will expreſs the required ſhadow. But this will be better explained in the Example B, Fig. 2, in the ſame Plate.

The ſhadow of the tree is obtained by drawing lines from the root or lower part, to the point S, No. 1, the ſeat of the ſun upon the horizontal line, and then determining the length by a line drawn from its ſummit to the tranſprojected repreſentation of the luminary marked Sun, No. 1.

In Fig. 2, of the ſame plate is the repreſentation of an inclined plane A, which may be conſidered as the roof of a houſe, the ſhadow of which is projected upon the ground, together with a vertical rod a b, the ſhadow of which is projected upon the roof or inclined plane A. H is the horizontal line, and G the baſe or ground line.

In this Example the ſun is ſuppoſed behind the picture, or before the ſpectator, and its image is marked *Sun*, No. 2, in the upper part of the Plate, and its ſeat on the horizontal line is S, No. 2.

The line V 1, V 2, is the vaniſhing line of the inclined face A, and V 1 and V 3 are the vaniſhing points of the baſe of the block A, Fig. 2.

For the ſhadow of the block upon the ground, the proceſs is the ſame with that of the preceding Example. It is obtained by drawing

ing a line from the ſeat of the luminary S, No. 2, through the point P, and another from the point *Sun*, No. 2, through the point d, which will interſect the line that is drawn from P in the point e. Then transfer the points c and h to g and m, by lines drawn from the *Sun*, No. 2, and join the points e, g, and e and m.

It is almoſt unneceſſary to obſerve, that the line k g, which is the ſhadow of k c, is obtained by drawing a line from S, No. 2, through the angle k of the baſe, and marking the length k g by a line drawn from the point marked *Sun*, No. 2.

Then find the ſhadow of the vertical rod or ſtick a b, as follows:

Continue or produce the line which is drawn from *Sun*, No. 2, to S, No. 2, till it cuts or interſects the vaniſhing line of the face A of the block, as at V 4; which will be the vaniſhing point for the ſhadow of all vertical lines that may be projected upon the inclined plane A.

Therefore from the vaniſhing point V 4 draw a right line through the bottom of the rod b, as the line b o; then draw another right line from the *Sun*, No. 2, through a, the top of the rod, till it cuts the former line at the point o, which determines the length of the ſhadow; therefore b o is the ſhadow of a b.

It muſt be obſerved, that the ſhadow of every right line, which is inclined to the plane of projection, muſt in all caſes be determined by the foregoing proceſs, which is founded on the following theory.

The vaniſhing point of the ſhadow of every right line is always in the vaniſhing line of the plane upon which that ſhadow is caſt or projected.

Thus the ſhadows, upon the *ground*, of all the lines which compoſe the objects in Plate XXXV. have their vaniſhing points in the horizontal line, and thoſe ſhadows which are caſt upon the *inclined*

planes

SECT. V. planes have their vaniſhing points in the *vaniſhing lines* of thoſe inclined planes.

Plate XXXV. Thus in Fig. 1, Plate XXXV. that part of the ſhadow of the rod a A, which is projected on the ground, has its vaniſhing point in the horizontal line at S, No. 1; while that part of the ſhadow which is caſt on the block B, vaniſhes in the point v 3, which is the *vaniſhing line* of the plane B, which line is indicated by its title.

The ſhadows upon the ground of the inclined lines k e n, which form the upper angles of the ſide of the block B, Fig. 1, Plate XXXV. and alſo the ſhadows of the ſimilar parts of the block A, Fig. 2, in the ſame Plate, may all be obtained by the following proceſs, which is the moſt elegant that can be employed.

Example 1ſt.

When the ſun is before the picture, or behind the ſpectator, Fig. 1, Plate XXXV.

The point V 2 is the vaniſhing point of the inclined line e k, whoſe ſhadow is required upon the ground.

Through the point V 2 draw a right line to the point which expreſſes the luminary marked *Sun,* No. 1, which will interſect the horizontal line in the point T, the vaniſhing point for the *ſhadow* of the line e k, as alſo for all lines parallel to it.

From the point k draw a line to the vaniſhing point T, which will be the indefinite repreſentation of the ſhadow required.

The ſhadow of the line e n is determined as follows:

The line V 2, V 4, is the vaniſhing line of the ſide d e of the block.

Continue the line V 2, V 4, downwards below the horizon, as far as may be thought neceſſary, as to o; then continue the line e n till it cuts the vaniſhing line V 2, o, in the point W, which is the vaniſhing point of the line e n.

From

From the point marked Sun, No. 1, draw a right line through the point w, and continue it till it interfects the horizontal line; which interfection will be the vanifhing point for the fhadow upon the ground, of the line e n. SECT. V. Plate XXXV.

No. 3 in the fame Plate reprefents an elliptical arch, the fhadow of which is projected upon the ground, but as it is prefumed that the perfpective reprefentation of the arch, is already drawn by the rules given in the foregoing Treatife, no other inftructions are here given than fuch as relate to the fhadow.

The luminary and its feat, are the fame with the former Example.

Through the points 5 and 6, which are the outer extremes of the bafe of the plane through which the arch is perforated, draw right lines from the point S, No. 2, which is the feat of the luminary; then from the point *Sun*, No. 2, draw lines through the upper angles of the plane containing the arch, as the points 1, 2, as alfo its center x; and continue thofe lines till they interfect the former in the points 3, 4, and z; and draw the line 3 4 tending to the vanifhing point V 5, that being the vanifhing point of the plane in which the arch is difpofed.

Having thus found the fhadow of the plane which contains the arch, proceed to defcribe the fhadow of the arch as follows:

The lines or ordinates 7 8, 9 10, 11 12, together with the diagonals, being neceffarily drawn for the purpofe of obtaining the perfpective reprefentation of the arch, transfer thofe points by lines drawn through them from the *Sun*, No. 2, till they interfect the outline of the fhadow which is upon the ground, as at the points a b, c d, e f; and alfo draw the diagonals, which will produce a reticulation, the interfecting points of which muft be the guide for the conftruction of the outline of the ellipfis that reprefent the fhadow of the arch.

SECT. V. Plate XXXV.

As it is not poſſible to give more minute inſtructions for the delineation of the ſhadow, without rendering them obſcured by their intricacy, it will be ſufficient for the artiſt to conſider the Example with attention, and he will eaſily perceive that the proceſs conſiſts in finding the ſhadows of a certain number of points in the arch of which the ſhadow is required; and by the aſſiſtance of thoſe ſhadowy points deſcribing the ellipſis repreſenting the ſhadow required.

Thus the point 3, upon the ground, is the ſhadow of the angle 1, and a is the ſhadow of the point 7, as c is of the point 10, and ſo on of the reſt.

From theſe points lines are drawn to the vaniſhing point V 3, through which lines, diagonals are drawn, which produce points of interſection that muſt direct the form of the ſhadow required.

It muſt be noticed, that the ſhadows of all curved lines are obtained by the ſame proceſs which is employed to determine the perſpective appearance of circles and curves, as given in Plate XXIII. Therefore if the ſhadows of curved lines are to be deſcribed accurately, the ſhadow of the *reticulation* which determines the perſpective appearance of ſuch curves; muſt ſerve as the guide for the delineation of ſuch ſhadow. Although it muſt be confeſſed that the proceſs is attended with ſuch infinite trouble, as renders it almoſt improper for the attention of the artiſt; it will therefore be enough for him to employ ſome general rules, which, with a good eye, will determine with ſufficient accuracy all that will be neceſſary for his purpoſe.

Of Shadows projected by the Torch or Candle.

Before any inſtructions are given upon this ſubject, it will be neceſſary to make ſome obſervations upon the conſtructions of ſuch ſhadows; there being great difference in the manner of delineating

thoſe

thofe which are projected by the candle or torch, and thofe projected by the fun.

Their fpecific or natural diftinctions have been already noted in the commencement of this Section; which diftinctions occafion a very material variation in the procefs.

In the reprefentations of candle-light fubjects, the luminary fhould always be reprefented, or its place indicated in the picture; for if it fhould be fuppofed behind the fpectator, the piece will not with certainty exprefs whether it be intended for torch-light or day-light, otherwife than by the diverging direction of the fhadows. See Note, Page 213.

The ftudent muft obferve that in all the foregoing Examples, wherein the fun is the luminary, the feat of that luminary is the interfection of the *plane* of its rays with the *vanifhing line* of the plane of projection: but in the cafe of the torch or lamp the feat of the luminary is always *in the plane* of projection: therefore the feat of the candle or torch muft be found perfpectively before any reprefentation of fhadow can be attempted; it will therefore be proper to give fome directions how the feat of the luminary fhould be determined.

The feat of the luminary, upon the plane of projection, is the point in which a right line fuppofed to pafs from the luminous point *perpendicular* to that plane cuts it, which point is the feat required.

Thus in Fig. 3, Plate XXXII. the point W is the wick of the candle, and the point S is its feat upon the floor. The line W S, being perpendicular to the floor or plane of projection. Plate XXXII.

Again, the point V 1 is the feat of the wick upon the right hand wall of the room; the right line which is drawn from the wick W perpendicular to that wall, producing the interfection V 1.

It muft be remembered, that the regular courfe of operation re-

 quires

SECT. V. Plate XXXII. quires that the ſeat of the luminary be firſt found, either upon the walls or upon the floor of the interior of the building, and then the repreſentation of the wick is determined by the ſeat.

The ſeat and luminous point of the candle muſt be determined by meaſure, as follows:

In the firſt place, the diſtance of the luminary from one of the ſide walls muſt be known or ſuppoſed, as from V 1 to W.

Secondly, its diſtance beyond the picture, as from A to S.

Thirdly, its height above the floor, as from S to W.

The meaſures of theſe diſtances being known, or ſuppoſed, ſet off upon the baſe line from the repreſentation of the interſection of the wall with the picture, the meaſure equal the diſtance of the candle from the wall, as to A.

Then from A ſet on upon the ſame line to B, a meaſure equal the diſtance of the candle *beyond* the picture.

From A draw a right line to the center of the picture C, and from the point B draw a right line to the diſtance of the picture D, and the interſection S will be the *ſeat* of the luminary upon the floor.

At A and S draw right lines perpendicular to the floor, as A F and S W.

Upon the line A F ſet up the meaſure equal the known height of the wick of the candle above the floor, as at *K*; and from *K* draw a right line to the center of the picture C, which will interſect the right line S W in the point W; conſequently that interſection is the luminous point required.

The ſeat of the wick W, upon the wall, is at V 1, which is determined as follows:

From the point S, which is the ſeat of the luminary upon the ground, draw the line S T parallel to the horizontal line; which line interſects the lower angle of the room in the point T.

 At

At the point T draw the line T O perpendicular to the horizontal line, and from the wick or point W, draw a line parallel to the horizontal line, and its interſection with the line T O determines the ſeat of the luminary upon the ſide wall, as at V 1.

It is unneceſſary to continue inſtructions for determining the point V 2, which is the ſeat of the luminary upon the ceiling, as a repetition of the foregoing proceſs is all that is required.

Fig. 3, Plate XXXII. is the repreſentation of a room containing various objects, the ſhadows of which are produced by the light of a candle; ſome being projected upon the floor and others upon the ſides of the room.

H H is the horizontal line.

C, the center of the picture.

W is the luminary, or wick of the candle.

S, the ſeat of the luminary upon the floor.

To obtain the ſhadow of the table or block *A*, upon the floor, proceed as follows:

From S, which is the ſeat of the candle or luminary upon the floor, draw right lines through the lower angles of the block f, g, h; continuing them as far as may be thought neceſſary.

Then from the wick or luminous point W draw right lines through the points 1, 2, 3; which are the upper angles of the block, and their interſections with the lines that are drawn from the ſeat S, through the lower angles, will give the points 4, 5, 6; marking the extremes of the ſhadow required.

Join the points 4, 5, by a right line; and from 4 and 5 draw lines to the center of the picture C, and at the point 6 draw a line parallel to the horizon, and the outlines of the ſhadow of the block upon the floor will be determined; which requires only to be filled up with ſhade to complete the repreſentation.

The

SECT. V.

Plate XXXII.

The ſhadows of the rods upon P, q, 8, upon the wall T, are produced as follows:

V 1 is the ſeat of the luminary upon the wall O.

Therefore from V 1 draw right lines through the points P, q, 8, which are the ſeats or inſertions of the different rods upon the wall; then from the luminary W draw lines through the extremes of thoſe rods, as at o, t, 7, which will interſect the preceding lines in the points 9, *x s*; then will 9 p, be the ſhadow of the rod 7 p, while 8 *x* is the ſhadow of T 8, as q s is the ſhadow of o q.

For the ſhadow upon the ceiling of the ſuſpended rod y k:

V 2 is the ſeat of the luminary upon the ceiling; therefore through k (which is the ſeat or end of the rod y k, that is inſerted into the ceiling) draw a right line from V 2 and continue it; then from the luminary W, draw a right line through y that may interſect V 2, k, in the point z; then is k, z, the ſhadow of k, y, upon the ceiling.

Then find the ſhadow of the vertical rod a b, upon the inclined face of the block K, for which purpoſe draw a right line from S, the ſeat of the luminary upon the floor, through a, till it interſects the baſe line of the block at n, continue the line till it cuts the baſe line of the back part of the block, as at u; then at u draw the perpendicular line u v, and from n draw a right line to v; then will n v be the indefinite ſhadow of the rod a, b, upon the plane K; therefore determine its apparent length by drawing a right line from the wick of the candle W, through the top of the rod b, till it interſects the line n v, as at c, then is a n the length of the ſhadow of a b, upon the ground; and n c the continuation of the ſame ſhadow upon the inclined plane K.

The ſhadow of the block K upon the ground, and upon the wall H, muſt be determined by the following proceſs:

The line *B* is the interſection of the ſide of the room with the floor.

Therefore

Therefore through the point *a* at the bottom of the block, draw a line from S, the feat of the luminary, that may interfect the line *B*, as in the point *d*; at the point *d* draw the line *d* f perpendicular to the floor or horizon; then through the point e, which is the upper angle of the prifm, draw a right line from the luminary or wick of the candle W that may interfect the line d f, as in f.

SECT. V. Plate XXXII.

Then from the point f draw a line to the center of the picture C, which line will be the upper boundary of the fhadow upon the wall.

☞ It muft be obferved, that to determine the true reprefentation of the fhadow of the inclined line b e, requires more fpace than is contained in the Example; therefore the procefs is demonftrated in Fig. 4 of the fame plate, as follows:

Let C be the center of the picture, and let the line B be confidered as the lower edge of the fide of a room interfecting the floor.

The luminary or wick of the candle is marked L, and S is its feat upon the floor.

It is required to reprefent the fhadow of the block A upon the floor F, and on the wall G.

The line a d is the perpendicular angle of the block, and is the line by which the fhadow is chiefly determined; therefore from S, the feat of the luminary, draw a right line through the point d, and continue it as far as may be thought neceffary.

Then from the point L, which is the luminous point, draw the right line L h, which will interfect the line that is drawn through d in the point h.

Join the points b and h by a right line, and the triangle b d h, will be the fhadow upon the ground of the triangle H, which forms the neareft end of the block or prifm.

If the fhadow of the block was required upon no other plane than the ground, a line drawn from the point h to the center of the picture

SECT. V. Plate XXXII. ture C, would determine ſuch ſhadow. But in the Example a part of the ſhadow is alſo caſt upon the wall or ſide G of the room; which muſt be defined by the following proceſs:

The line d h cuts the line B, which is the interſection of the wall with the floor in the point x; therefore at x draw the line x f perpendicular to the floor.

Then from the luminary L draw a right line through a, and its interſection of the line x f, will determine the height of the ſhadow; therefore the line d x repreſents the ſhadow of the line or angle d a of the block upon the floor, and the line x f the continuation of ſhadow upon the wall.

Then as the line b g, repreſents the ſhadow of the inclined line b a upon the floor, its interſection g, with the line B, terminates that ſhadow upon the ground; therefore join the points g f by a right line, which will complete the ſhadow of the inclined line a b, both upon the floor and likewiſe upon the wall. And further to complete the ſhadow of the block or priſm, draw a right line from f to the center of the picture C, and the whole of the ſhadow will be defined, as demonſtrated by the Example.

General Rules and Obſervations concerning Shadows.

In the repreſentations of ſhadows the artiſt ſhould be careful not to make them too hard or abrupt at their terminations; becauſe every ſhadow terminates by what is called a penumbra, which is the faint and indiſtinct tranſition from the obſcure to the illuminated part of the plane upon which ſuch ſhadow is projected. Nor ſhould the ſhadow be too dark, for it muſt be remembered that ſhadows projected by the ſun are ſoftened by the ſurrounding rays, and by the general diffuſion of light through the atmoſphere. It is from this circumſtance that ſhadows produced by the light of a torch or candle,

dle, are darker than thofe projected by the fun; although the light is lefs forcible by the former than the latter agents; hence it follows, that fhadows in candle-light pictures muft, in the language of painters, be reprefented heavier or lefs tranfparent than in thofe of day-light.

It muft be obferved that decided fhadows, as produced by the fun's rays, muft never be introduced into works of the higher claffes of art; on the contrary, they fhould be defcribed as produced by a diffufion of light introduced from fome particular part, or through fome aperture. This has been the practice of all the great mafters, and therefore needs no other recommendation than a reference to their examples.

In landfcapes of the compofite kind, it is not neceffary to give decided fhadows, except in the buildings, which fhould at leaft not be falfe; but all the other objects are fo complex, that they almoft defy the rules of the fcience: and therefore the artift fhould atone for that deficiency by a particular attention to the chiarofcuro of his picture.

In all cafes where the pofitive fhadows of the objects are required, either in the drawing or picture, the outlines of thofe objects fhould be completely finifhed, before the fhadows are attempted; otherwife the confufion of lines will render the work unneceffarily laborious and intricate.

In views of ftreets or reprefentations of particular buildings, the fhadows fhould be accurately, yet tenderly, determined; and as true to nature as poffible; for which reafon the artift fhould chufe that time of day in which the fun is fo fituated as to produce the greateft beauty of effect, with the beft demonftration of the parts.

SECT. V.

The fame rules apply equally to the local view or landfcape, the fhadows of which fhould always be determined from nature, for which reafon it will ever be proper to define the outlines of the fhadows from their natural appearance.

Thefe inftructions cannot be better concluded than by obferving, that many views have been drawn, yet fo falfe in the fhadows, that much of their fimilitude has been loft; a defect which followed in confequence of the inattention of the artifts who drew them; for having drawn the outlines upon the fpot, they afterwards added the fhadows by their memory and imagination; a practice which can never be juftified by the productions of thofe by whom it has been adopted.

END OF THE FIFTH SECTION.

SECTION THE SIXTH.

Containing Examples, with Inſtructions for facilitating Operations, in ſome Caſes of Difficulty; together with Obſervations, as a Praxis for illuſtrating the Principles of the Science.

IN ſome of the plates which belong to this work there are examples, or figures, which are not explained in the Sections to which thoſe plates belong; becauſe it was apprehended that ſuch explanations would produce confuſion in the mind of the ſtudent, by diverting him from the regular and progreſſive order of inſtruction. SECT. VI.

It was therefore thought proper to ſubjoin a few pages, in which ſome uſeful inſtructions and obſervations might be given, that ſhould explain thoſe figures; ſome of which illuſtrate particular caſes in practice, as others exemplify principles of the theory, which ought to be underſtood by thoſe who ſtudy Perſpective.

In moſt of the treatiſes that have been written on the ſcience of Perſpective, the authors have illuſtrated their inſtructions by Examples, in which the geometrical plans are drawn below the baſe line or interſection of the picture, as a neceſſary preparation to the conſtruction of the perſpective repreſentations which are to be delineated.

This method is not confined to the inferior, but is alſo practiſed by the ſuperior writers upon the ſubject; yet it may be queſtioned, SECT. VI. whether this circumstance has not obstructed rather than promoted the study of the science.

It has already been observed in the Introductory Section *, that the painter can never have room or space below the base line of his picture to draw geometrical plans; consequently, all the diagrams which are so constructed, must appear to the uninstructed student as totally inapplicable in practice, and therefore unfit for his purpose; seeing no space in the canvas can correspond with that part of the Example which represents the original plane.

To shew the process by which such diagrams are constructed, a few Examples are given in the plates, and explained in this Section, which will assist in illustrating the principles of the science; and also demonstrate how easily the practical rules can be employed by the artist in all cases, without the trouble of drawing the geometrical plan of the object he wishes to represent.

Example of a Square.

Plate VIII. Plate VIII. Fig. 3. No. 1. No. 2.

These figures, No. 1 and No. 2, must be considered as one Example for drawing a square in Perspective, according to the methods employed by most of the former writers upon the subject.

In this Example it is supposed that a square is to be drawn upon the same floor or plane on which the stool, Fig. 1, is standing; and that one of its sides is parallel to the picture. The same center and distance is employed both for the stool and the square.

H, is the horizontal line. G, the ground line or intersection of the picture. C, the center of the picture. And D, its distance.

* Page 18.

The

Plate VIII.

The dimenſions of the ſquare are as follows:

The ſides are 10 inches.

The border, 1 inch and half broad; therefore the inner ſquare is 7 inches on each ſide; and it is 4 inches beyond the picture.

Proceſs.

Below the baſe line G draw the ſquare at the proportionate ſize by the ſcale, as at Fig. 3, No. 1, and equally diſtant below the baſe line, as the original object is beyond the picture.

Then continue the ſides of the ſquare till they cut or interſect the ground line G, as at S, f, V, o; then on the point o, with the compaſſes extended to the point a, deſcribe the arc a, g; and from o to e deſcribe the arc e, P; which will give the diſtances which the angles a and e of the ſquare are beyond the picture. Draw lines from the points S, f, V, o, to the center of the picture C; and from the points g and P draw lines to the diſtance D, and the interſections at Z, Z will give the exterior dimenſions of the ſquare perſpectively.

In this operation it is evident, that all the labour which is employed upon the geometrical ſquare, Fig. 3, No. 1, which in the Example lies below the baſe line, or interſection of the picture, is uſeleſs to the painter, as it cannot be employed upon the canvas. If it be ſaid that ſuch proceſs might be performed on a ſeparate paper, and then transferred to the canvas, we may obſerve, that ſuch an operation would only increaſe inſtead of diminiſhing the labour; every particle of which will be ſaved by the following proceſs:

Determine the ſeat of the angle a of the ſquare upon the picture, as at o, then by the ſcale ſet off, upon the baſe line G, 10 inches, the meaſure of the ſide of the ſquare, which is parallel to the picture; as from o to S; and within that meaſure ſet the breadths of the border, as S, f, and V, o; from which points draw lines to the center of the

picture

SECT. VI. Plate VIII.

picture C, then from o ſet off 4 inches to g, the known diſtance of the ſquare beyond ~~that~~ the picture, and from g to q 10 inches by the ſcale, the meaſure of the ſide of the ſquare which is perpendicular to the picture; and from the points g and q draw lines to the point of diſtance D, and the interſections of thoſe lines at Z, Z, will give the apparent depth of the ſquare. At the points Z, Z, draw lines parallel to the baſe line, and the outline of the ſquare will be completed.

In Plate XII. Fig. 1, which belongs to the third Section: the Example there given, together with the inſtructions Page 103, demonſtrate the *readieſt* and *beſt method* of finding the vaniſhing points of objects whoſe ſides, or faces, are *inclined* to the picture.

But there is another method which is generally uſed and taught by the authors * who have written upon the ſcience, for which reaſon it ſhall alſo be given here.

The method is as follows:

Below the baſe line A, a, b of the picture, draw the geometrical plan B 1, D 1, B 2, D 2; with the ſide B 1, making the ſame angle, with the baſe line A a, which the original object is known or ſuppoſed to make with the picture.

Thus if the longeſt ſide of the object inclines to the picture in an angle of 35 degrees, let the line B 1, in the plan, be drawn, making an angle of 35 degrees, with the baſe line a, A, b.

Having completed the geometrical plan, continue, or produce, the ſides B 2, D 2, ~~and C~~, till they cut or interſect the baſe line, as at a and b, which are the interſections of the ~~other~~ ſides B 2, D 2.

Then having determined the center of the picture C, and the diſtance or eye E; through E draw the right line B 4, parallel to B 2, a,

* See Malton ſenior, Plate 12, Fig's. 59 and 60. Alſo Highmore, Plate 4, Fig's. 19 and 20. Kirby, Book II. Plate 2, 3, and 4; with many others.

in

in the plan, and alfo the right line D 4 parallel to D 2, b; and the interfections of thofe lines with the horizontal line, as at V 1 and V 2, will be the vanifhing points required. SECT. VI. Plate ~~VIII.~~ XII

Having thus found the vanifhing points V 1 and V 2, find the perfpective plan, as follows:

From the angle C, which touches the bafe line, draw right lines to the vanifhing points V 1 and V 2; then from the interfection a, draw a right line to V 2, and from b draw a line to V 1, and the interfections of thofe lines will produce the perfpective appearance of the plan *.

In this procefs the diftances of the vanifhing points are not employed to cut off portions of the reprefentative lines. For the interfection of the original lines with the picture a, b, c, being found, it follows, that the reprefentations of thofe originals, which are the lines drawn from the points a, b, c, to the vanifhing points, do, by their mutual interfections with each other, produce the reprefentation required.

When the object to be reprefented is fituated beyond the picture, the procefs differs not in effect from the foregoing; but as there is a material variation in the appearance, it cannot be improper to add a third Example of a fquare *placed beyond* the picture, with its fides inclined to it, as in Fig. 2, Plate XXXVIII. which is produced by the following procefs: Plate XXXVIII.

H H is the horizontal line:

C, the center of the picture:

E, the eye or diftance:

P P, the parallel of the picture.

* This is perfectly confonant to Dr. Brook Taylor's Theory; who obferves, that the reprefentation of a line is part of a line, paffing through the interfection and vanifhing point of the original line. See the Doctor's Treatife, Prop. 1, of firft Edition; and Theorem 3d of the fecond Edition.

At

SECT. VI. Plate XXXVIII. At the proportionate diſtance below the baſe line G, draw the geometrical ſquare A to the proper ſize by the ſcale, with the ſides inclined to the baſe line G, d; making the ſame angles with it, as the ſides of the original object are known to make with the picture.

Continue the ſides e, f, g, h, of the geometrical ſquare A, till they interſect or cut the baſe line, as at the points a, b, c, d.

Through the eye E, draw the right line R 1, parallel to the line g, d, and R 2 parallel to a, h; which lines will cut the horizontal line in the points V 1 and V 2; conſequently V 1 is the vaniſhing point for the ſide h and f, and V 2 is the vaniſhing point for the ſides e and g of the ſquare.

Therefore from the points a, b, in the baſe line, draw lines to the vaniſhing point V 2, and from the points c, d, draw lines to the vaniſhing point V 1, and the perſpective repreſentation of the ſquare will be completed by the interſections of thoſe lines, as at 1, 2, 3, 4.

It muſt alſo be obſerved, that the perſpective repreſentation of the ſquare, may be obtained by one vaniſhing point only, as follows:

Let V 1 be the only vaniſhing point to which lines are drawn from d and c, which lines are the indefinite repreſentations of the two ſides e, g, of the ſquare.

From every angle of the geometrical ſquare A, draw lines to the eye E, and their interſections with the lines d v 1, c v 1, will determine the angles of the perſpective repreſentation of the ſquare, as the line from x to E gives the point 1; and the other points 2, 3, 4, may be obtained by the ſame proceſs, which will eaſily be underſtood by applying a ruler to every angle of the geometrical ſquare A from the point E.

Plate XII. By examining this diagram, as alſo that in Plate XII. Fig. 1, where the plan is marked, it will be eaſily ſeen that this proceſs cannot be employed with advantage by the artiſt; ſeeing that it is attended with additional trouble compared with the ſimple proceſs by the meaſures, as given in Plate XI. and that great ſpace is required at the bottom of the tablet. Yet it will be particularly uſeful to illuſtrate the leading principles of the ſcience; therefore let the Fig. 2, Plate XXXVII. be conſidered as a diagram repreſenting three different planes, as follows: SECT. VI. Plate XXXVII.

G d, is the ground line or interſection of the picture; and all the part of the Figure which lies below that line, muſt be conſidered as the ground upon which the ſquare A is placed, and which is to be repreſented upon the picture.

H H is the horizontal line, and all the ſpace which lies between that line and the ground line G d, is the part of the picture, which includes all that can be ſeen between the commencement of the view, and the horizon.

The ſpace between the lines H H and P P, repreſents the horizontal plane, paſſing through the eye of the ſpectator; upon which plane the operation is performed, by which the vaniſhing points are found.

This will be better underſtood if the diagram be folded in the following manner:

Let the ſpace that lies below the ground line G d, be folded *back* at the line G d, and laid flat upon a table; then let the ſpace which lies between the lines H H and P P be folded through the line H H and brought forward, while the ſpace between the lines G d and H H is placed vertically or upright upon the table; then will that part which lies upon the table expreſs the ground with the object beyond the picture, the ſpace between the lines H H and G d, the part of the picture upon which the object is repreſented, and the part between the lines H H and P P, the parallel plane to the horizon; all of which by ſuch diſpoſition will be properly placed: in which ſituation if lines or threads were paſſed from the angles of the ſquare

SECT. VI. Plate XXXVII. A to the eye E, thofe lines or threads would pierce or pafs through the points 1, 2, 3, 4, in the vertical plane which reprefents fo much of the picture as ftands between the bafe line G d and the horizontal line H H. The former being the line where the ground is firft feen, and the latter the boundary at which it appears to terminate *.

The ftudent muft obferve, that the planes when difpofed as above directed, muft be confidered as in their natural pofitions; but as in thofe pofitions the neceffary operations cannot be performed, they are all laid flat or brought into one plane only; by which means the points, lines, and interfections are determined with eafe and accuracy.

Of the Station Point.

As no perfect reprefentation in perfpective can be obtained unlefs the fituation of the original object be known, and its apparent pofition juftly determined upon the picture, it will be neceffary to confider this circumftance with fome attention.

Some obfervations have already been made concerning the ftation in page 29, to thofe it will be neceffary to add the following:

The ftation is always in a line perpendicular to the picture, which line is in the fame vertical plane, and alfo parallel to the *radial* which produces the center of the picture.

Plate II. Thus in Fig. 2, Plate II. the eyes of the fpectators D 2, D 3, are in the horizontal line H H; and the center of the picture to thofe fpectators is C 2; their ftations are the points upon which they

* The Example of the fquare given in Fig. 3, Plate XII. may in the fame manner be folded at the bafe line A a, and the plan laid back: the part between that line and the horizontal line H H, placed erect or vertically; while the part between the horizontal line and the parallel of the picture muft be brought forward, all the planes and lines will then be in the proper fituation.

ftand,

ſtand, and are in a line that interſects the picture at e; which line is *perpendicular* to the picture and *parallel* to the line D 2, C 2; which is the radial producing the center of the picture. SECT. VI. Plate II.

Therefore C 2 is the center of the picture to the figures D 2, D 3, and C 1 is the center of the picture to the figures D 1, and e is the repreſentation upon the picture of the *ſtations* of all thoſe figures.

The method in practice of finding the ſtation on the picture is by drawing a right line through the center of the picture, perpendicular to the horizontal line, till it cuts or interſects the baſe line of the picture; which interſection is the ſtation point.

Example.

In Plate IV. Fig. 1, C is the center of the picture, through which the line C P is drawn perpendicular to the horizon, interſecting the baſe line at S; therefore S is the ſtation point upon the picture. Plate IV.

To diſpoſe the Object upon the Picture proceed as follows:

In Example, Plate IV. Fig. 1, the block B 1 is two feet ſix inches beyond the picture, and eight feet ſix inches from the ſtation point S, to the right of the ſpectator. Therefore from the ſtation point S ſet off the meaſure upon the baſe line, eight feet ſix inches to the point p; and draw a line to the center of the picture C. Then from p ſet off with the compaſſes two feet ſix inches to the point n, equal the diſtance which the object is *beyond* the picture; and from n draw a line to the point of diſtance D 2, and it will interſect the former line at 6, which point determines the place of the angle of the block. The ſame proceſs muſt invariably be employed for the determination of the ſituation of all objects, whether their faces be inclined or parallel to the picture; for in all caſes nothing more is

SECT. VI. required than to obtain the repreſentation of the *point* or *angle* 6, after which the form of the object is to be completed by the rules taught in the inſtructions given in the firſt, ſecond, and third Sections of this work.

In drawing the perſpective repreſentation of a building, it will often be found inconvenient to place it beyond the baſe line of the picture, as obſerved in a former part of this work*; becauſe the meaſures are not ſo eaſily tranferred to the object as when the angle of the building touches the baſe line or interſection of the picture.

But it frequently happens that there are projecting parts which advance beyond the general line of the front, as in the Example of the garden building, Plate XVII. where the center part containing the arch projects. In which caſe either the main body muſt be thrown back beyond the baſe line, to leave room for the projection, or the projection muſt be added by the inverſe proceſs, after the general form of the building is determined. The latter method being the moſt convenient, ſhall be explained by the Example, Fig. 2,

Plate XXXVI. Plate XXXVI.

In this Figure it may be ſuppoſed that the building A A, is already drawn, touching the ground line or interſection of the picture at a.

At the point b it is required to add the projecting part B D to the front A A.

The ſide D of the projection required, is parallel to the end E of the building; conſequently it has the ſame vaniſhing point, which is V 2.

Therefore through b, the point of union, draw a right line from V 2; which will determine the baſe of the ſide D, as the line b c.

The diſtance of the vaniſhing point V 2 is d v 2; therefore from d v 2 draw a line through b that ſhall cut the baſe line, as in f.

From f ſet off to p on the baſe line, the meaſure of the depth of

* See Note, page 128.

the

the fide D, by the fcale 1 foot, and return a line from g to d v 2; which will give the interfection c, the depth required.

Then determine the breadth of the front B, as follows:

The face B, of the projection, is parallel to the front A; therefore draw a line from the point c to the vanifhing point V 1, and cut off a portion of that line equal to the required breadth of the projection.

From the point d v 1 draw a line through c, which may interfect the bafe line G in the point o, and from the point o fet on upon the bafe line two feet by the fcale, to the point K; and from K draw a line to d v 1, which will interfect the line that is drawn from the point c, to V 1, in the point m; then is the line c m the reprefentation of the bafe of the front of the projection B D.

Complete the general form of the projection as follows:

At the points b, c, and m, draw lines perpendicular to the horizon.

Then through the interfection o, draw a line from the vanifhing point V 2, which will produce the point h; from which point draw a right line to the vanifhing point V 1; and the form of the projection will be completed.

The foregoing inftructions are founded on the fame principle, and teach the fame procefs with that which is given in page 139, and Plate XX. by which the open door is determined in its meafures by the inverfe procefs; which may be employed in thofe cafes where the reprefentations of projecting parts are to be added, that fhall correfpond in dimenfions to a part or fide of a building, the general form of which is previoufly determined.

Of the Diftance and vanifhing Points when beyond the Limits of the Tablet or Picture.

The ftudent, in confidering the foregoing Sections, may probably be perplexed to apply the rules which are there given for difpofing the

SECT. VI. the place of the eye, and the confequent vanifhing points; feeing that in moft of the Examples, thofe points lie beyond the boundaries of the tablet or picture; and therefore he may be inclined to object that thofe rules are inconvenient, if not wholly ufelefs to the painter.

To obviate the inconveniences above-mentioned, Dr. Brook Taylor firft, and fome of his fucceffors after him, have given methods which may be employed, upon particular occafions, by thofe who wifh to acquire a perfect knowledge of the fcience of Perfpective; and to be acquainted with the beft methods of facilitating the courfe of operation in difficult cafes; of which the two following are the moft ufeful, and therefore the beft calculated for the fervice of the artift.

Cafe the firft.

When the objects have their component lines and planes *parallel* and *perpendicular* to the picture, and the canvas or tablet is too narrow to contain the full diftance.

Cafe the fecond.

When the objects have their component lines and planes inclined to the picture, in confequence of which both the *diftance* and the *oblique vanifhing points* fall beyond the dimenfions of the canvas.

Procefs for the firft Cafe.

In the firft, where the diftance of the picture is laid down on the horizontal line, and the canvas or tablet proves too narrow to receive it; take half or a third of the diftance, and in the fame ratio employ the meafures for the proportion of the given figure.

Thus if the diftance is 20 feet, and the meafure of the line is 6 feet, if half the diftance 10 feet is employed; take half the meafure of the original line 3 feet, and the effect in the reprefentation will be the fame as if the greater dimenfions were employed.

Example,

Example, Fig. 2. Plate IV.

Plate IV.

Suppofe the block B is to be reprefented in perfpective, and the canvas or tablet be limited by the line marked A, in which cafe there will be no room to employ the whole diftance, which is about 18 feet.

The cube is 4 feet fquare, and about 4 feet beyond the picture.

The feat on the picture of the neareft angle of the cube is at 1; therefore fet on upon the bafe line 4 feet, from 1 to 3; and draw right lines from 1 and 3 to C, the center of the picture.

Then take *half* the *diftance* of the picture, and fet it on the horizontal line from C to *D*, that is 9 feet, being the half of 18 feet.

Then cut off the proportion of thofe indefinite lines, which are drawn from 1 and 3 to C, as follows:

The cube is 4 feet beyond the picture; therefore take half the meafure, which is 2 feet, and fet it on from 1 to 2; and from 1 and 2 draw right lines to *D*, and the interfections of thofe lines, with the line which is drawn from the point 3, to the center of the picture C, as at the points 8 and 9, will give the perfpective dimenfions of the bafe of the cube, and alfo of its diftance beyond the picture.

If any other proportion was employed, as one-third or one-fourth, the effect would be the fame.

Procefs for the fecond Cafe.

Plate XXXVII.

In Plate XXXVII. Fig. 1, an Example is given of the outlines of a building, the fides of which are inclined to the picture; confequently the lines O M and O N, as alfo the lines a P, and a R, tend to the vanifhing points, which being beyond the limits of the tablet, cannot be employed; but it is required to draw thofe lines, for which purpofe the following procefs muft be employed.

Let

SECT. VI. Plate XXXVII.

Let A B reprefent two faces of a building whofe fides are inclined to the picture, the upper lines of which are O M and O N, which tend to the vanifhing points V 1 and V 2; but are drawn without the affiftance of thofe points.

The center of the picture is C, the eye is at E, the horizontal line is H.

Find the point a, which is the feat upon the ground of the neareft angle of the building, by the procefs already given *, and draw the vertical line a o, which will be the neareft angle of the building †.

The prime vertical line is C E, and the fpace between C and E is the diftance of the picture; but it muft be particularly obferved, that upon this occafion the whole diftance cannot be employed, becaufe the angles when conftructed at E, fubtend fo much, that the vanifhing points produced by thofe angles are out of the picture; therefore a lefs, but proportionate diftance is employed, which in this Example is one-third.

Suppofe the real diftance of the picture to be thirty feet, take ten feet, which is one-third, and fet it up from C to b, and fuppofe b to be the diftance of the picture‡.

At the point b draw the line *P P*, parallel to the horizontal line, and, confider that line as the parallel of the picture; then draw the line b, e, making the fame angle with the parallel of the picture, that the fide A of the object makes with the picture; which in this Example is 36°, and draw the line b, e, which will produce the point e, by its interfection with the horizontal line.

* In Page 99, Fig. 2, Plate XI.

† The point S is the feat of the point a, upon the picture, and the fpace between S and Z is equal to one-third of the diftance of the point a, beyond the picture.

‡ The ftudent, who is not a proficient in the fecond and third fections of this work, muft not attempt the folution of the problems which are here given, for they can never be underftood by thofe who have not purfued the ftudy progreffively.

SECT. VI. Plate XXXVII.

At the point e draw the line e P, perpendicular to the horizontal line H.

Then divide the ſpace between C and b, into three equal parts, as is marked in the Example, and take two of thoſe parts, and ſet up from e to g, then will the line e g be two-thirds in height of the line C b.

Draw a line from b through g, and it will tend to the vaniſhing point V 1.

Then find the line O M as follows:

O is the upper angle of the building, which was found by the methods given in the former ſections; and a O is the angle formed by the two ſides A, B, which line is interſected at x by the line b g.

Therefore divide the ſpace between W O, in the line a O, into any number of equal parts, ſo that the ſpace between x O, may be to that between W x, in a given ratio; which in the Example is as 3 to 2. Then divide the ſpace between e g, in the line e p, in the ſame ratio with the line W x, which is three equal parts; and from g ſet up to p two of thoſe parts, and draw a line from O through p, and it will tend to the vaniſhing point V 1.

The ſame proceſs repeated will produce the line N O, as follows:

Draw the line b f perpendicular to the line b e, which will interſect the horizontal line in the point f.

At the point f draw the vertical line f h; and from f ſet up to h two parts, equal two parts in the vertical line C b*, and draw the line b h.

Continue the line b h till it interſects the neareſt angle O a of the building, as at k.

* Obſerve that the ſpace between C and b muſt be divided into the ſame number of equal parts by which the ſpace C b is proportioned to the whole diſtance of the picture, as C 1 : C b :: C b : C E; that is, C 1 is to C b in the ſame proportion as C b is to C E. And theſe proportions muſt be particularly attended to, otherwiſe the operation will not be correct.

 Divide

SECT. VI. Plate XXXVII.

Divide the ſpace between w and k in the line a O, into any number of parts equal k O; as in this Example it is as 4 to 1.

Then divide the ſpace between f h in the line f N into four equal parts, and ſet up one from h to N, and draw a line from O through N, and it will tend to the vaniſhing point V 2; therefore O M and O N are the lines required, which repreſent the upper horizontal lines of the building.

To obtain the lines a P and a R, which repreſent the baſe lines of the building, proceed as follows:

Make the ſpace between the point *S* P in the ſame ratio to *S* M, as the ſpace between the points a W is to W O; and from a, draw a right line, through P, which will alſo tend to the vaniſhing point V 1, and repreſent the lower line of the ſide A of the building. The lower line a R of the ſide B muſt be determined by a ſimilar proceſs.

It muſt be confeſſed that this proceſs, though elegant and ſcientific, is yet ſo tedious and laborious, and requires ſo many lines, that no artiſt can be expected to practiſe it. It will be far more prudent to place the drawing or picture in ſuch ſituation as may admit of introducing the vaniſhing points, as directed in the third ſection. But if the work is very large, as in a ſcene, it will be beſt to make a ſmall drawing to a proportionate ſcale, and transfer the ſmall, by regular meaſures, to the large work required.

Of the Diagonal or Mitre Line.

As it is often inconvenient or almoſt impoſſible to introduce the vaniſhing points for the diagonals or mitre lines, by which mouldings are to be repreſented upon the remote angles of a building, it will be proper to give an Example to demonſtrate how ſuch mitre lines may be drawn without the aſſiſtance of vaniſhing points.

Example

Plate XXXVI.

Example, Plate XXXVI.

The front A B, n E of the building A D, Fig. 3, is inclined to the picture, and it is required to draw the diagonals or mitre lines h D and A K; the vaniſhing points of thoſe lines not being within the limits of the tablet or canvas.

Let n repreſent the farther angle of the baſe, and A the upper angle of the fartheſt end of the building.

From the front A cut off a portion of the line A B, equal to the dimenſions of the depth of the building, as from A to h, equal B D; by the following proceſs:

The vaniſhing point of the lines A B and n E, in the front of the bulding C, is V 1, and its diſtance is d v 1; therefore through the farther angle n, draw a line from the point d v 1 that may cut the baſe line, as at e.

Then from e ſet on upon the baſe line to f, the meaſure of the depth of the building, equal the ſpace from E to F in the baſe line; and from f draw a line to the diſtance of the vaniſhing point d v 1, which will interſect the baſe line of the building at g, conſequently the ſpace n g is equal F H, perſpectively determined.

At g draw a line perpendicular to the horizon, as the line g h, and from h, draw a line to the vaniſhing point V 2.

From D, which is the remote upper angle of the depth of the building, draw a line to the vaniſhing point V 1, and it will interſect the line drawn from h to V 2 in the point K.

Thus will the line A h repreſent the front, and the line o K the back of a ſquare, the ſides of which are repreſented by the lines h K and A o; all of which are equal in dimenſions to the depth of the building repreſented by the line B D; therefore through the points A K and h o draw right lines, which will be the diagonals required, as ſhewn in the Example.

SECT. VI. Plate XXXVI. The line m D is the mitre line for determining the projection of the mouldings at the remote angle D of the building; it is found by marking off a portion of the line A B from B equal to the line B D, which is the depth of the building.

It must be observed, that the principle upon which the foregoing process is founded, is to resolve the upper part of the building into two regular squares, whose sides shall be equal to the *depth* of such building; then through the opposite angles of those squares to draw right lines, which will represent the diagonals or mitre lines required.

To cut off or proportion the Dimensions of Lines, when inclined both to the Horizon and to the Picture.

Although this process has been already given in the representation of the lid of the box, Plate XXIX. and page 194; yet, as that Example may appear confused to the student, it was thought necessary to repeat those instructions and give an Example, in which fewer lines being employed, both the diagram and the instructions may be more intelligible.

Plate XXXVII. In Plate XXXVII. Fig. 3, is the representation of a block, of which the face A is inclined to the horizon *, while the side B is inclined to the picture.

C is the center of the picture.

E, the eye or distance.

H, the horizontal line.

G, the ground line or base line.

V 1 is the vanishing point for the line g S.

V 2, the vanishing point for the line S k.

d v 1 is the distance of the vanishing point V 1.

* The angle of inclination in this Example is 26 degrees.

Let

Let it be ſuppoſed that the whole of the object is determined except the inclined face A, to repreſent which proceed as follows:

Through the point V 1 draw the vertical line L, and continue it below the ground line G, as far as may be thought neceſſary.

At the point d v 1, conſtruct an angle with the horizontal line, equal the inclination of the face A of the block, to the horizon. Continue the line which forms the angle till it cuts the line L in the point V 3, which will be the vaniſhing point for the inclined lines S W and k y of the face A of the block.

Let S be ſuppoſed the neareſt angle of the baſe of the block; therefore draw the lower lines S k and S g, to their vaniſhing points, and cut off their dimenſions by the methods already given in the third Section, Page 99, Plate XI. Fig. 2.

Continue the line g S, from the vaniſhing point V 1, till it cuts the ground line of the picture at I; and at I draw the line I X parallel* to the line L, which line is to be conſidered as the interſection of the ſide B of the block, with the picture.

At the point V 3 take with compaſſes the length of the radial from V 3 to d v 1, and mark that length upon the line L downward, as at the point d v 3; which is the diſtance of the vaniſhing point V 3.

Then from the point d v 3 draw a line through the angle S of the block, which may cut the line I X in the point m; from which point ſet up to n the meaſure of the inclined face of the block, and draw a line to the point d v 3, which will give the interſection w. Then is S W the meaſure of the inclined face of the block, which was required.

The foregoing proceſs will be better underſtood by conſidering the figure as follows:

Turn the diagram round, and ſuppoſe the line L to be the hori-

* The line X I, being the interſection of the picture, by the ſide B of the block, muſt be parallel to the line L, becauſe that is the vaniſhing line of the ſide B.

zontal

SECT. VI. Plate XXXVII. zontal line, and the line I X the ground, or bafe line; for the line L is the vanifhing line of the fide B of the block, and the line I X is the interfection of the fide B with the picture; and as the lines S W and S g are both in the plane, whofe vanifhing line is L, the vanifhing points of thofe lines muft be in the line L, they are V 1 and V 3; and as the line I X is the interfection of the picture by the plane B, all the lines in that plane which incline to the horizon and vanifh into the line L, may be proportioned by the meafures applied to the line I X.

To find the Center and Diftance of a vanifhing Line. Fig. 3.

The line M, which is drawn from V 3 to V 2 is the vanifhing line of the inclined face A of the block, found as directed in the fourth Section *.

The center of the picture is C, and E is its diftance.

From the point C draw a right line *perpendicular* to the vanifhing line M †, and continue it as far as may be thought neceffary; obferving that it interfects the vanifhing line M in the point *S*, which point is the center of that vanifhing line. Its diftance muft then be determined as follows:

At the point C draw a right line parallel to the vanifhing line L, as the line N O.

Then with compaffes take the diftance of the picture; that is the fpace from C to E, and fet it upon the line N from C to O.

Then from the point O draw a line to the point *S*, as the line P, then is the length of the line P (or, which is the fame thing) the fpace between the points O and *S*, the diftance of the vanifhing line M.

* See page 193, Plate XXVIII.

† By the procefs given in page 6, and Plate I, Fig. 3.

If

If it were required to reprefent lines upon the inclined face A of the block, it would then be neceffary to employ the diftance of the vanifhing line M, in which cafe take the length of the line O *S*, and fet it up from *S* to P, upon the line K; then is S the center of the vanifhing line M, and P* is its diftance. SECT. VI. Plate XXXVII.

Then fuppofe the line S *a* is to be drawn upon the furface A, inclining to the fide S W of the block, in an angle of 20°.

From the point P draw the right line R 1 to the vanifhing point V 3, which line will be the radial parallel to the original line S W; therefore at the point P, draw another right line, making the fame inclination to the line R, but within it, as the original line of S *a* is known or fuppofed to incline to the fide S W, as the line R 2; and its interfection V 4 with the vanifhing line M, will be the vanifhing point required. Therefore from any point in the lower part of the face A of the block, draw a line to the point V 4, and it will be the reprefentation of a line inclined to the fide S W, in an angle of 20 degrees.

The foregoing problems, which are demonftrated by Figure 3, Plate XXXVII. do properly belong to the fourth Section, but being intricate and abftrufe, it was thought better to give them detached from the Examples of that Section, which are wholly practical; yet, in their prefent appearance too much incumbered with lines, to admit of any addition, that might produce confufion in the mind of the ftudent.

* The point P may be confidered as the eye of the fpectator, equally with the point E, for if the various planes reprefented in the diagram, were folded and raifed in the proper pofitions, the points O, P, and E, would all coincide or meet each other; the demonftration of which has been attempted by Profeffor Cowley, Mr. Kirby, and the fenior Malton; all of whom have been more attentive and fuccefsful in their theoretic demonftrations than in their practical inftructions; but as fuch demonftrations cannot be underftood by thofe who are unacquainted with the principles of Geometry, the author of this Treatife has not attempted to give fuch fchemes or figures which would be unintelligible without the help of a mafter.

It

SECT. VI. It is alſo to be obſerved, that theſe problems muſt be conſidered in the following order:

Firſt, the method for determining the meaſures of lines inclined to the horizon.

Secondly, the proceſs for finding the center and diſtance of the vaniſhing line of an original plane inclined to the horizon. And,

Thirdly, determining the vaniſhing points of lines in a plane inclined to the horizon.

Obſervations by way of Praxis.

In the foregoing Treatiſe the author has endeavoured to inſtruct the ſtudent in the practical part of the ſcience of Perſpective; but, leſt he ſhould not be perfectly underſtood in thoſe eſſential points, the *center* of the picture, and the *diſpoſition* of the object to the picture, he has ſubjoined ſome obſervations as a Praxis, containing Examples of errors, with their corrections; which will at one view demonſtrate more than can be explained by more prolix inſtructions, given in any other form.

The Examples which are employed, although few in number, exhibit errors that are very generally committed, even by thoſe who pretend to be ſkilled in Perſpective. But in making this remark, the author by no means wiſhes to expoſe or condemn the works of any living artiſt, he only ſeeks to inſtruct; and has therefore referred for proof to the works of thoſe only, who can no longer be injured by cenſure nor benefited by praiſe.

Plate XXXVIII. or 1ſt of Praxis, Fig. 1 and 2.

Plate XXXVIII. Repreſent two ſmall houſes or villas, ſeen in different directions. In the firſt the face A is parallel to the picture, and the center of the picture is at C, which is out of the limits of the tablet.

This diſpoſition is extremely improper, becauſe no perſon would ftand to view the building, and look at the point C, for in that cafe the houfe would only make a part of the view, but could not be the object at which the fpectator was looking.

SECT. VI. Plate XXXVIII.

In Fig. 2 the center of the picture falls on the building at C, which is the juft pofition; and the fides of the objects are all inclined to the picture. This will ever be the appearance when the moft natural and direct view is taken of fuch a building, as is reprefented in this Example.

In Mr. Kirby's folio Treatife of the Perfpective of Architecture, is an Example exhibiting the fame defect with that given in Fig. 1. It is a view of Whitehall Chapel, the front of which is parallel to the picture; confequently the fpectator cannot be confidered as looking at the building, but at fome other object; and therefore is no more than a part of a view, the whole of which is not feen.

Fig. 3 and Fig. 4.

Reprefent views of objects fimilar to each other. The banks of a river with a bridge, Fig. 3, is an improper, and Fig. 4, a proper choice of the view.

To underftand thefe Figures perfectly, it muft be remembered, that all bridges are conftructed at right angles with the banks; to which they form a mutual communication: confequently if the banks be defcribed as parallel to the picture, the bridge will be perpendicular to it.—Such is the difpofition of thofe objects in Figure 3; but this Example exhibits a very improper choice of view, for the center of the picture, or what is called the point of fight, is at C 3 out of the tablet or picture; confequently the fpectator is not looking at the bridge, but at fome object, which is not comprehended in the view or picture.

SECT. VI. Plate XXXVIII. In Figure 4, the center of the picture is over the fartheſt arch of the bridge at C 4; conſequently within the limits of the tablet; and all the objects are oblique to the picture, which is perfectly juſt and natural; for let it be ſuppoſed, that a painter ſtanding on either bank means to delineate the view of a bridge, he will certainly look at the bridge; conſequently the *axis* of the cone of viſual rays will not be parallel to the bridge, as in Fig. 3, but will interſect it obliquely, as in Fig. 4; and thus all the objects which compoſe ſuch a view, will have the ſides oblique or inclined to the picture.

It is true that the rules of Perſpective are not violated in the Examples Fig 1. and Fig. 3; but the principles by which they are ap-applied is falſe, occaſioned by the improper diſpoſition of the center of the picture; or, as it is improperly termed, the point of ſight.

The foregoing obſervations are intended principally to exemplify the proper and improper diſpoſition of the center of the picture. It will in the next place be neceſſary to make ſome remarks upon the frequent inattention to the oblique vaniſhing points.

Plate XXXIX. In Plate 2 of Praxis, are three Examples, Fig. 3, 4, 5; which are different repreſentations of the ſame object: which may be conſidered as a walled town, ſituated upon an eminence, conſiderably above the eye of the ſpectator.

Of theſe Examples Fig. 3 is falſe and abſurd;

Fig 4 is improper, though not falſe;

Fig 5 is its perfect and juſt delineation.

In each of theſe Examples the walls A and D are at right angles with each other; but in Fig. 3 * the ſide of the wall A, which by

* The Example, Fig. 3, is extracted from a work of great merit in other reſpects.—The ſame faults are to be ſeen in the views of Iſrael Sylveſter, and many other maſters, although their works have great beauty and taſte in their execution.

conſtruction

conſtruction is inclined to D, and which is indicated to be ſo by its ſhadow; does not vaniſh into any point, but is abſurdly drawn in one continued right line with the ſide D, parallel to the picture. Now this can never be the true appearance, unleſs the eye of the ſpectator were in the ſame plane with the upper lines of the walls, in which caſe the horizontal line would alſo coincide with the upper edges of the walls, provided they were horizontal in their conſtruction.

In Fig. 4 the ſide A of the building vaniſhes in C, which by the form of the object is determined to be the center of the picture; but the error of this Example is, that the center of the picture is too near the edge or limits of the tablet, which is improper, ſince the eye of the ſpectator would in ſuch view comprehend as much ſpace to the right of C, as is repreſented on the left, provided the country were open; which is ſufficiently indicated by the ſpecies of landſcape. Yet this Example is true as far as relates to the rules of Perſpective, but, as before obſerved in the Examples, Fig. 1 and 3 of Plate 1, of Praxis, the center of the picture is improperly diſpoſed; or rather confounded with ſome other vaniſhing point, and the ſpectator does not look at the object.

Fig. 5 is juſt, for the following reaſons:

The walls A and D are known to be inclined to each other, and the ſides of the tower are parallel to thoſe walls. The building B hath its ſides parallel and perpendicular to the picture. C is the center of the picture; or in other words, it is the point in the view at which the ſpectator is looking; it is alſo the vaniſhing point of all lines perpendicular to the picture; therefore it is the vaniſhing point of the ſide of the building B, which is perpendicular to the picture.

 The

SECT. VI. Plate XXXIX. The oblique vaniſhing points might be found, if neceſſary, by the rules given in the third Section, but when a view of the kind here given is to be drawn, the following method will be ſufficiently correct; eſpecially when the objects which are to be deſcribed lie remote or inacceſſible.

Draw the principal lines of the buildings as they appear to the eye, and then correct them by the following proceſs:

Draw a right line as nearly as poſſible, in ſuch ſituation upon the picture or paper as ſhall correſpond proportionally with the height of the horizon, in the natural view, as V, C, Fig, 5.

Having drawn the tops of the walls A and D, Fig. 5, apply a ruler to the line A, and mark where it interſects the horizontal line, as at V, then will V be the vaniſhing point of all lines parallel to the top of the wall; therefore by this point adjuſt the other lines, repeating the ſame proceſs for the ſide D.

Theſe conſiderations ſhould be carefully attended to, as they relate to a very material point, in which the uninformed artiſt is moſt likely to err; for it almoſt conſtantly happens, that thoſe who are but imperfectly acquainted with the rules of Perſpective, do not diſcern the difference between the parallel and inclined poſitions of the objects, but do in general deſcribe a long line of diſtant buildings as parallel to the picture, when in fact it is inclined.

There are ſome artiſts who have aſſerted that parallel lines have the beſt and grandeſt effect in the picture, but this is ſurely a moſt erroneous opinion, and thoſe who have adopted it muſt have been deceived by the following circumſtances; when the objects are diſtant, the inclination of their ſides to the picture appears ſo indefinite and feint, that their obliquity is not perceived by thoſe who are not verſed in Perſpective; therefore let ſuch perſons conſider the form or plan of the object, and remember, that unleſs

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it be a ſingle wall parallel to the picture, that in all other caſes ſome of the ſides will vaniſh in a point in the horizontal line; conſequently no ſuch building can appear like Fig. 3, but muſt always be drawn either as Fig. 4 or Fig. 5. SECT. VI. Plate XXXIX.

Plate XXXIX. or 2d of Praxis.

In the following diſcourſe ſome directions are given concerning the compoſition of a whole length portrait; particularly in thoſe parts where the rules of Perſpective are required; and it is there directed, that, "In every portrait the center of the picture ſhould "always fall ſomewhere in the figure."

The better to explain this precept, and to demonſtrate the errors which are too often committed, two Examples are given.

The firſt, Fig. 1, is correct. The ſecond, Fig. 2, is falſe.

In Figure 1 the center of the picture is at C, under the left breaſt of the figure, and the horizon is conſequently juſt above the elbow; the pavement, the table, and all the other objects in that Example have their *conſtructive lines* parallel and perpendicular to the picture; therefore all thoſe lines which are perpendicular to the picture vaniſh into C, which is the center of the picture, vulgarly called the point of ſight.

Let Fig. 1 be compared with Fig. 2, and it will ſcarcely be required to point out the errors of the latter, in which all is confuſion and abſurdity. In the Example, Fig. 2, by the abſurd arrangement of the objects in the back ground, *two points* of ſight are indicated in one picture; one by the direction of the lines in the pavement, the other by the figure itſelf. Again, the block or pedeſtal upon which the figure is leaning, hath its top vaniſhing into ſome point not in the picture; therefore, the real form of this object cannot be known, for by its repreſentation it is not explained. The column or pilaſter

it

SECT. VI. Plate XXXIX.

is alſo falſe and indefinite; yet, it would not be difficult to produce Examples of theſe inexplicable errors.

In Fig 2, the horizon is as low as the knees, which diſpoſition makes the figure in this Example appear taller than the other Fig. 1, although of the ſame ſize; from which circumſtance the painter will do well to remember, that by diſpoſing the horizon higher or lower, he will make the figure appear taller or ſhorter; and therefore it ſhould be diſpoſed agreeably to the ſtature of the perſon repreſented.

After having expoſed the faults which are exhibited in this Example, it may be uſeful to the ſtudent to explain what ſhould have been the conſtruction of this ſketch, allowing the horizon to be placed as low as is here repreſented. Let it then be ſuppoſed that a whole length portrait is to be placed ſo high, that it will be neceſſary to draw the horizon as low as the knees of the figure; in ſuch caſe the center of the picture *would fall either upon one of the knees, or between them; becauſe the place of the eye of the ſpectator (commonly called the point of ſight) would not only be in the figure which is looked at, but muſt alſo fall in the horizontal line. This being premiſed, the ſide lines of the pavement ſhould converge or vaniſh into that point, as they do in Fig. 1. The top of the block *a*, would alſo vaniſh, or be drawn down to the ſame point; the ſide of the block next the figure ſhould alſo be deſcribed, becauſe it would be ſeen in nature: in ſhort, the lines in this Example ſhould follow the direction of Fig. 1, becauſe the objects are of the ſame ſpecies. The only difference of the whole is, that the parapet wall in Fig 1 is omitted in Fig. 2; becauſe it would have concealed the landſcape, and the

* By the diſpoſition of the various objects in this Example, the knees are the only part of the figure to which a line drawn from the ſpectator's eye, perpendicular to the picture, could cut or interſect it; conſequently the center of the picture muſt be there. See Brook Taylor, Def. 1ſt. Edition 1ſt.—See alſo page 25 in this Treatiſe.

curtain

curtain is introduced, as is commonly done by thoſe who wiſh to conceal an awkward corner of their canvas. SECT. VI.

Plate XL. or 3d of Praxis. Plate XL.

In this Plate are two Examples which may be conſidered as illuſtrations of thoſe kinds of ſubjects, in which the ſimple rules of Perſpective may be applied in a general way.

* Fig. 1 is a view of the back part of a village, in which the various objects are differently diſpoſed to the picture.

The horizontal line is indicated at the ſides of the print by the letters H, H; which line is raiſed ſomewhat above the figure of the woman; thereby indicating, that the ſpectator ſtands upon ground more elevated than what is ſeen in either view.

The faces or ſides of the wall and pier A, Fig. 1, are perpendicular, and their returns parallel to the picture; conſequently the vaniſhing point for their conſtruction is the center of the picture, which is at C.

The church tower ſtands obliquely to the ſpectator; therefore all the horizontal lines which compoſe its form, are drawn to points in the horizontal line, and if any of the ſides of the other buildings are parallel to the tower, they will alſo vaniſh in the ſame points; which is the caſe with the barn, whoſe ſide F vaniſhes in b, the vaniſhing point of one ſide of the tower.

Theſe points need not be determined by ſtrict rule, but having made the ſketch from nature, as correct as the eye can decide, lay a ruler to any one of thoſe lines, as the top of the parapet or the upper line of the windows, and continue ſuch line till it interſects

* In views of this kind, it is ſcarcely poſſible that the objects ſhould be ſituated in more regular order than is repreſented in this Example; the ſtudent is therefore adviſed to conſider it with attention.

the

SECT. VI. Plate XL.

the horizontal; and that interfection will be the point, which muft determine all the lines in that fide of the tower.

The fame procefs muft be repeated for the other fide of the tower and the other objects of the view.

Example 2d, Plate XL.

The fecond Example, Fig. 2, reprefents the view of a ftreet, which appears curved, being compofed of many buildings, all of which are inclined to the picture in different angles, except thofe marked A and B. The horizontal line is indicated by the letters H, H, as in the former Example, and is raifed to the top of the doors of the neareft buildings.

The center of the picture falls near the door of the fartheft building at C.

The building A, which reprefents a chapel, and its oppofite B, are parallel to each other, they are alfo perpendicular to the picture; therefore their vanifhing point is C, the center of the picture.

The ftudent muft obferve, that though the general form of the ftreet appears curved, yet the fronts of all the houfes are planes; confequently all the horizontal lines in thofe fronts are right lines, which vanifh in fome point in the horizontal line; therefore when views like this Example are to be delineated, let the general form be firft drawn out, as correctly as poffible by the eye, after which lay a ruler to the upper or lower line of the building, and draw a right line that fhall interfect the horizontal line, as the upper line of the building E, when continued, cuts the horizontal line at C; therefore C is the vanifhing point for all the lines which reprefent horizontal lines in the front of that building; and alfo of that which is parallel to it, marked B on the oppofite fide of the ftreet.

It muft be obferved, that if the ftreet were built in a ftraight line, the center of the picture would then be the vanifhing point for deli-

6 neating

neating the fronts of all the buildings, as it would be abfurd to attempt a view of a ftreet fo built by any oblique vanifhing point. Therefore if a view be taken of a ftraight ftreet, or the interior of a building of great length *, let the center of the picture be the vanifhing point of the fides of the ftreet, or of the building; for this will produce the moft natural and pleafing effect. SECT. VI. Plate XXXVII.

Of Figures forefhortened.

In the quarto edition of Mr. Kirby's Perfpective † there is an Example, "to put the human figure into Perfpective," as forefhortened.

In the inftructions explaining the procefs he obferves, that "it is "impoffible to give rules for putting the human figure correctly into "Perfpective;" and he is certainly right. Yet having made the affertion, it is matter of furprize, that he fhould not only attempt an impoffibility, but alfo give an Example, which is entirely erroneous. For his diagram, which is a copy from A. Boffe ‡, does not demonftrate how the figure itfelf can be drawn in perfpective, but only how the *picture* of a figure may be abbreviated or forefhortened.

The procefs is as follows:

Firft, the outline of the figure is drawn; after which it is reticulated, as at No. 1, Fig. 5, Plate XXXVIII.; the reticulation is then thrown into Perfpective, as at No. 2, C being the center of the picture, and D its diftance; and the forefhortened outline is drawn by the help of the abbreviated articulation. Plate XXXVIII.

To prove the error of his diagram, it is neceffary to obferve, that

* Portland Place and the interior of Weftminfter Abbey are two excellent Examples for the ftudent's confideration, and will demonftrate the propriety of the inftructions here given.

† See Plate XX. Book 2d, of his quarto work.

‡ Moyen de Pratiquer la Perfpective, Paris 1653, fmall octavo.

 by

SECT. VI. Plate XXXVIII. by the laws of the ſcience it is impoſſible that the perſpective *repreſentation* of any *ſolid* figure, as ſeen in one direction, can by abbreviating or foreſhortening the plane of ſuch perſpective projection, produce the true appearance of the ſame object, as ſeen in another direction; therefore his ſcheme is wrong, allowing the poſſibility of applying rules for the delineating of foreſhortened figures *.

After having cenſured Mr. Kirby's attempt, it may very naturally be expected that ſome obſervations and inſtructions ſhould be given, which may both juſtify the cenſure and alſo direct the artiſt in the beſt poſſible methods of applying rules (if any can be given) for the foreſhortening of figures. For this purpoſe the Figure 5, No 3, in Plate XXXVIII. is offered, in which Example the Figure is conſidered as contained in a parallelepepid, which is divided into cubes, equal in dimenſions and number, to ſome determinate proportion of the body, as repeatedly contained in the whole. Theſe diviſions will give lines and points, when diſpoſed perſpectively, by which the contour may be determined; but it is only the maſterly hand, the correct eye, and the profound knowledge of the artiſt that can render it when completed worthy of notice.

As it is evident from the foregoing obſervations, that the rules of Perſpective can afford the artiſt little aſſiſtance in foreſhortening his figures, it may not be improper to make ſome obſervations and give ſome hints, abſtracted from the rules of the ſcience, which may aſſiſt him in this difficult taſk.

Firſt, it muſt be obſerved, that foreſhortened figures are ſeldom introduced but in horizontal ceilings, or in vertical pictures placed at a great height above the ſpectator; in both which the figures are ſuppoſed to be placed upon horizontal planes, above the eye.

Secondly, it muſt be conſidered, that if a man be laid down upon

* Mr. Kirby's diagram is the foreſhortened *picture* of a figure, not the *figure* foreſhortened.

 a horizontal

a horizontal plane, as upon the floor, with his limbs diſpoſed as ſtanding; ſuch figure, when viewed by a ſpectator placed at the feet of the figure, with his eye raiſed above the plane of its ſurface, will exhibit the ſame appearance as would be produced by a man ſtanding aloft when viewed by a perſon who ſtood below.

This ſimilarity of appearance will follow by the laws of viſion; for in both caſes the original figure, although very differently ſituated with reſpect to the natural horizon, may yet be diſpoſed in the ſame direction to the axis of the cone of viſual rays, or angle of viſion of the ſpectator.

Therefore the artiſt may aſſiſt himſelf greatly by diſpoſing living models upon the floor of his ſtudy, and ſetting their limbs in the actions required; taking care to elevate his eye above the plane upon which his model is placed, ſo as to produce the deſired appearance.

Another method is ſaid to have been practiſed by Michael Angelo, and other old maſters; which was to caſt or model ſmall figures in wax in the actions required, and then ſuſpend them aloft, and from thoſe to make the neceſſary ſtudies. A ſmall lay figure, will be a very good model for the ſame purpoſe, and an excellent guide for the general diſpoſition and appearance of the limbs, in all ſituations and actions.

In concluding this Section, which is the laſt of the Perſpective, it cannot be improper to ſubjoin the following obſervations.

The artiſt who ſhall think proper to conſult this work, in hopes to improve himſelf in the ſcience of Perſpective, muſt pay particular attention to the ſecond and third Sections; becauſe they contain Examples conſtructed upon principles which conſtitute the baſis of the ſcience, and furniſh the means of practice in all thoſe caſes that are conſtantly required by the painter.

 Yet

SECT. VI

Yet it may be neceſſary to remark, that in the courſe of his examination of thoſe Sections, he may obſerve that the diſtance of the picture in ſome of the Examples, is rather too ſhort; this defect in ſome of the Plates, follows from the want of greater ſpace; but in others it was ſo diſpoſed, in the hope of rendering the Example more explicit, as in the caſe of Plate XXVI. where the diſtance of the picture is much too ſhort; by which circumſtance the object appears rather diſtorted, but at the ſame time it is by that circumſtance rendered much more intelligible than if the Example had been more elegant in appearance.

And here it will be proper to obſerve, that the artiſt ſhould pay particular attention to the diſtance of the picture; becauſe an improper choice of diſtance will produce very unpleaſing effects. It cannot therefore be improper to reconſider this ſubject, and to add ſome additional inſtructions illuſtrated by the Example of an edifice, whoſe magnitude and grandeur render it a fit ſubject for the conſideration of the artiſt who ſtudies Perſpective.

Suppoſe that it be required to produce a perſpective view of the exterior of St. Paul's Cathedral, it ſhould be conſidered whether the repreſentation of the edifice only, or a view of the building and place, are to be drawn as they ſtand; for theſe are two very diſtinct caſes; and therefore require different principles for their production.

If a view of the building only be required, as in the firſt caſe, the diſtance of the picture ſhould correſpond with the dimenſions of the object, either to its length or height; which in the given Example is about 500 feet: therefore the diſtance of the picture ſhould at leaſt be the ſame; and the ſtation may be ſuppoſed at the pleaſure of the artiſt, as ſhall produce the beſt effect to the whole.

In the ſecond caſe, if a view of the edifice, *as it ſtands*, be required,

quired, it ſhould be remembered that there is no ſtation to be found but what is too near to comprehend more than a partial view, in which the upper part riſes above the angle of viſion of the ſpectator; conſequently the repreſentation, if drawn ſtrictly juſt, could not comprehend the whole height of the building, but about two-thirds only, the reſt ſhould be ſuppoſed as above the picture; but as ſuch a partial repreſentation will ſeldom pleaſe, it may be prudent to add the upper part by the rules of the ſcience.

Yet here it muſt be obſerved, that ſuch addition will exhibit the upper lines of the building as inclined, or raking, too much to be pleaſant to the eye; but ſuch unpleaſing appearance is not to be attributed to any defect in the ſcience, but rather to a circumſtance that may juſtly be termed the neceſſity of the caſe, which demands that more ſhould be repreſented than can be ſeen at one point of view.

The foregoing circumſtance, together with other ſimilar difficulties, which ſometimes occur in the practice of Perſpective, often draw forth the cenſures of thoſe who are unſkilful in the ſcience; but ſuch may reſt aſſured, that the rules of Perſpective, as taught by Dr. Brook Taylor in his principles, are perfectly juſt, being founded on the laws of viſion, ſupported by geometrical demonſtration, therefore not to be condemned by thoſe who from inability and indolence neglect thoſe ſtudies, which are neceſſary to form the correct critic, or the maſterly artiſt.

END OF THE PERSPECTIVE.

A

DISCOURSE

ON THE

APPLICATION OF

THE SCIENCE OF PERSPECTIVE

IN THE

COMPOSITION OF A PICTURE,

AND

OTHER WORKS OF ART.

DISCOURSE, &c.

THE ſtudy of Painting has ever been ranked among the nobleſt exertions of human genius; for to excel in this art, requires a mind ſufficiently vigorous to combine the ſtudy of nature with a knowledge in many ſciences, the union of which is neceſſary to direct and mature the talents of a Painter.

The common obſtruction which has impeded many artiſts in their progreſs towards perfection, is their great neglect of all thoſe preparatory ſtudies which are neceſſary to the accompliſhment of a painter: for moſt ſtudents, and too many teachers in the art, deem it ſufficient to copy art; and then without any reference to, or aſſiſtance from thoſe ſciences, by which we are taught how to examine nature, and to ſelect her beauties, directly apply themſelves to the vulgar imitation of her various forms, with no better guide than an eye undirected, and a mind uninformed.

With ſuch an imperfect education, no works can be produced but ſuch as will be weak and deficient: hence it follows, that the pictures of many painters, although poſſeſſing merit in the execution of particular parts, are yet very faulty in the compoſition of the whole.

In the hope of preventing ſuch defects in the future works of art, and in order to explain and apply the rules and inſtructions contained in the foregoing Treatiſe, the following is written; which, if properly conſidered, will inſtruct the ſtudent in painting, not only how to avoid errors and miſtakes in the perſpective arrangement of his pictures, but will alſo teach him how to attain truth and elegance in his compoſitions.

But before the ſtudent can derive any advantages from the inſtructions which are here offered to him, he ſhould be capable of drawing the human figure with correctneſs, ſupported by an accurate anatomical knowledge of the conſtruction of the bones and exterior muſcles; and he muſt alſo poſſeſs more than a ſuperficial acquaintance with architecture. He ſhould not only be able to draw the different orders of columns, and to diſcriminate their critical diſtinctions, but alſo be capable of applying them with propriety in all their different arrangements of colonades, arcades, porticos, and whatever other conſtructions his picture may require; conſtantly diſpoſing them by a regular plan, and to proportional dimenſions, as ſhall be directed hereafter.

To theſe he muſt add a competent knowledge of Perſpective, at leaſt ſo much of the ſcience as will direct him to conduct his background, and diſpoſe the various objects in his pictures with propriety and truth *.

Thus qualified, he may proceed to the compoſition of a picture, in which he muſt always regulate his work by the following reflections: Let him ſuppoſe that the canvas or tablet on which he intends to paint, is the proſcenium of a theatre, whereon ſome dramatic ſcene is to be exhibited; that the figures he paints are the perſonæ dra-

* A painter ſhould alſo learn the principles of Practical Geometry, with ſome of its Elements.—See Preface to Dr. Brook Taylor's ſecond edition, page 10, 11, and 12.

matis,

matis, the back ground and decorations are the fcenes, and himfelf a fpectator, viewing the action from the beft ftation or point of view that can be chofen.

After having felected a fubject, and determined that particular point of time which will afford the moft interefting fcene of the fact to be reprefented, it is the common practice, and perhaps the beft, to make fmall fketches of the general ideas; then of the particular groupes: and laftly, to make a determined fketch of the whole, with the back ground and decorations fuitable to the ftory, and correfponding with the age and country in which the event was tranfacted. This fketch fhould be made to the fame proportionate meafures, in all its parts, with thofe of the intended picture; and every part fo thoroughly confidered and determined, as to require no material alteration in the fubfequent progrefs of the work.

In the execution of fuch fketches, the firft confideration is the fize and fituation of the principal figure, for the magnitude of all the other objects in the picture muft be governed by, and be fubfervient to it. When this is determined, the next confideration is the height of the horizontal line, (or, which is the fame thing, the height of the fpectator's eye) and this muft be regulated by the following reflections. If the painter fuppofes himfelf to ftand and view the action on the fame ground or plane upon which the figures of the picture are placed, the horizontal line will then pafs through the heads of fome of the ftanding figures, it will even coincide with the eye of one of them. If he fuppofes himfelf elevated or ftanding upon a plane or ground above that on which the figures are placed, the horizontal line will then be above the figures; but if he fuppofes himfelf fitting down, or ftanding upon ground, or on a plane below that upon which the figures are placed, the horizontal line will then fall below the heads of the ftanding figures. Yet, let it be remembered, that all thefe various difpofitions of the horizontal line muft be governed by the magnitude and intended fituation of the picture.

The Center of the picture, or what has been vulgarly called the point of fight, is the next confideration; and this fhould always be difpofed within the canvas, the nearer to the middle of the horizontal line the better, reckoning from the fides of the picture upon that line. As precept and inftuction are beft enforced and illuftrated by example, the ftudent will receive infinite advantage from examining the works, and confidering the conduct of Nicolo Pouffin, who, in the compofition of his pictures, is a model of perfection.

In the works of that great mafter, efpecially the Seven Sacraments, which are particularly recommended upon this occafion, he will obferve the following circumftances, which will corroborate the advice above given.

Out of the feven, two reprefent tranfactions in the open air, they are the Baptifm in Jordan, and Chrift's Charge to Peter. In the former, the height of the fpectator's eye, and confequently the horizontal line, is confiderably higher than the heads of the figures; the fpectator being fuppofed to be elevated above them. In the Charge to Peter, the horizontal line paffes through the heads of all the figures, except that of Chrift, which is the principal, and who is elevated above the reft; by which circumftance the confequence and dignity of his perfon are much increafed. And by this difpofition of the horizon it is clearly demonftrated, that he who views the picture is fuppofed to ftand on the fame ground with the figures.

* In the other five pictures, the horizontal line paffes through the

* The reader is requefted to obferve, that no examples are here quoted, but fuch as are to be procured in prints.

Of the Seven Sacraments there are two fets, one large, engraved by Pefne, the other fmall, by Audran; the latter only is referred to.

heads

heads of the figures, as well in thofe fubjects where they are reprefented fitting, as in thofe in which they are reprefented ftanding, the former being elevated on couches, which are raifed upon a floor above that on which the fpectator is fuppofed to ftand.

It has already been obferved, that the difpofition of the horizontal line muft in many cafes be governed by the form and fituation of the picture: hence it follows, that in large pictures, where the heights are confiderably greater than the widths, and which are to be placed in elevated fituations, it will be neceffary to place the horizontal line below the heads of the figures.

And this practice hath been general with the great mafters in moft of thofe pictures which they painted for altars, refectories, and fuch fituations as were raifed above the common height of the eye. Thus, in the * Death of St. Peter, martyr, by Titian, which was at Venice, the horizontal line paffes below the middle of the figures; by which circumftance, the picture acquires a grandeur which it would have loft by a more elevated difpofition of the horizon. As in this cafe other examples are unneceffary, it will be proper to proceed to a more particular confideration of the center of the picture.

It has been already hinted in this Difcourfe, and ftrongly infifted upon in the foregoing Treatife, that this point fhould always be placed in the middle of the horizontal line, reckoning from each fide of the canvas. Yet it may, and frequently has been placed, nearer to one fide than the other; but it is very feldom that any advantage is gained by fuch difpofition; nor can it be confidered as perfectly natural, for let the painter refer to the theatrical idea before alluded to, and he will readily agree that no man will prefer a fide view if he can procure a central feat.

* Of this picture there are many prints, but the beft is by Le Febre.

1 This

This precept is alſo confirmed by the example and conduct of Pouſſin, who has generally placed the center of his picture as near the middle of the canvas as poſſible, as may be ſeen in the Sacraments above mentioned; yet, in the * Peſt or Fall of Dagon, he has placed the center of the picture rather towards one ſide of the tablature.

Tintoret, in his picture of the † Marriage in Cana, hath placed the center of his picture in the middle of the table at which Chriſt and the company are ſeated, and which is very much to the left of the tablature; but by this diſpoſition he has deſtroyed the grandeur of his picture, and made that part which ſhould have been the principal ſubject, nothing more than an epiſode.

Raphael, in the Heliodorus, and in the School of Athens ‡, has kept the center of the picture in the middle of the tablature; and Paul Veroneſe hath conſtantly and very wiſely done the ſame in all his great refectory pictures. The obſervance of this rule cannot be too ſtrongly enforced; for if it be not clearly underſtood, and carefully practiſed, no picture can be perfect.

It has already been obſerved, that the height or ſize of the principal figure is the firſt object that muſt be determined in the picture, and that the height of the horizontal line muſt be governed by it. This muſt alſo determine the magnitudes of the other figures, and of the architectural decorations, with whatever other objects are neceſſary to the compoſition; all of which muſt be diſpoſed and proportioned by their relation to this figure. Yet let it be remembered, that by the principal figure is not meant the largeſt, nor even that which

* The print is engraved by Step. Picart.

† Engraved by Volpato in the Schola-Italica Pitturæ, publiſhed by Mr. G. Hamilton at Rome, 1773. No. 23.

‡ Of theſe works, which are in the Vatican, there are prints by different engravers. Of the Heliodorus there is a fine etching by Carlo Maratti.

may

may neceſſarily be the moſt conſpicious, but that which repreſents the hero of the drama, or principal actor in the ſcene; hence it follows, that wherever this figure is placed (and his ſituation muſt be determined the firſt) all the reſt are to be attendant on and ſubſervient to him. Their magnitudes muſt be proportioned by his, agreeably to the rules and inſtructions which are given and explained in the foregoing Treatiſe: remembering at the ſame time, that no preciſe rule can be given for the magnitude of the principal figure in proportion to the tablature; for that muſt be left entirely to the taſte and ſkill of the artiſt; only let him cautiouſly avoid bringing this figure too forward, nor let him remove it too very far back on the ground plane. Theſe inſtructions will be better underſtood by the ſtudent if he will but examine and conſider the print from Le Seur's Sick Alexander, taking the potion from his phyſician Philip *. In that moſt admirable compoſition Alexander is the principal actor, and his phyſician the ſecond; yet upon examination it will be found, that the principal figure is by no means the largeſt, but the contrary: for the only figures in the piece which are ſmaller, are the repreſentations of two attendants in the back ground—the boys that are waiting are ſmaller, in conſequence of their youth only; but the two friends in the foreground are by much the largeſt figures in the piece. It is needleſs to obſerve, that all theſe figures take their proportions from that of Alexander; for as he is the chief actor, and conſequently the principal figure in the piece, the others neceſſarily take their dimenſions from him.

In the diſpoſition and arrangement of the figures let the ſtudent be particularly careful that their ſituation on the picture be well accounted for, and perfectly conſiſtent with their ſtation on the ground plane, upon which they are ſuppoſed to ſtand; that their feet, al-

* The print is by Benoiſt Audran.

though

though concealed, may yet be traced from thofe parts of their bodies which are feen; for fince it is impoffible that more than one man can ftand on one point, it muft follow, that no heads ought to be introduced in thofe parts of the picture where bodies cannot be fuppofed to correfpond with them. This caution is not ufelefs, for however inconfiftent and abfurd the practice may be, there are too many artifts who feem to indulge in the conftant commiffion of this grofs error, as if determined to facrifice nature and truth to empty fhew and gaudy falfhood.

It is not a pleafant truth, yet it muft be obferved, that not every one of the old mafters can be acquitted of this charge: and for the fake of demonftrating the fault, one inftance fhall be felected, which is from * Dominichino, in his Martyrdom of St. Sebaftian; in which he has by no means kept the figures in their † proper places; for the group of crouching figures on the right hand of the print are crammed fo clofely together at their heads, that the neceffary fpace for their bodies cannot be found. Similar faults may be feen in the works of Pietro da Cortona, Carlo Cigniani, and others of their clafs in art, but never in the works of Raphael or Pouffin; on the contrary, in the pictures of both thofe mafters, every remote part is defined with the utmoft precifion, as may be feen in the Murder of the Innocents, engraved by Mark Antonio, in which very fmall parts of the extremities are defcribed, they being neceffary to the completion of the back figures.

Although the figures are the firft and principal concern of the painter in all hiftorical compofitions, yet he muft remember that there are many attendant ornaments and decorations, which are abfolutely

* The print is engraved by Nicholas Dorigny; and the picture is now in the Carthufians church of Tirmini at Rome.

† The remark here made is not intended as a general charge againft that great mafter, whofe compofitions are fuperior to moft and equal to the beft mafters that Italy has produced.

neceffary

neceſſary to the perfecting of the piece; all of which ſhould be introduced and diſpoſed with great care and judgment.

It is almoſt needleſs to remark, that in nature there are but two ſituations in which any tranſaction can be ſuppoſed to happen, the one in the open air, the other within doors, either in the ſtreets or fields, or in ſome chamber, temple, or other edifice.

In theſe different ſituations, buildings and architectural decorations are eſſential parts of the back ground; all of which parts muſt correſpond in their ſtyle with the age and country in which the ſcene is exhibited.

The ſtyle of architecture being determined, all the buildings, whether exterior or interior, but eſpecially the latter, muſt be conducted in their deſign by a regular plan, to which the leading parts ſhould be conformable; and thoſe leading or principal parts ſhould conſtantly be diſpoſed parallel to the picture, ſcarce ever obliquely or inclined to it. This advice deſerves the artiſt's particular conſideration, for all oblique or inclined arrangements of buildings in the back ground, though perfectly natural, do, by their angular ſituation, interfere with the figures, produce an unpleaſing effect, and deſtroy the ſimplicity and grandeur of the picture. Here again the precepts are illuſtrated by the examples of Pouſſin in his Sacraments, and by Raphael in his Heliodorus, School of Athens, and Cartoons *.

In all theſe moſt excellent compoſitions the architecture and buildings are arranged parallel to the picture; the interior architecture is diſpoſed by a regular plan, and every one of the five in-door ſubjects of the Sacraments exhibits a part of a chamber, or of a chapel, with ſuch accuracy, that the whole deſign, might be completed, and a building erected, from either of the prints, which would produce the pureſt and moſt elegant ſpecimen of architecture.

* Of the Cartoons there are prints by Dorigny, Griblin, &c.

In the School of Athens, by Raphael, the general lines of the building are parallel and perpendicular to the picture, and the figures are difpofed on two planes or floors: to the upper floor, there is an afcent by four fteps. From which circumftance it will be proper to obferve, that whenever fteps are neceffary, they muft be proportioned to the height of the figure; and this proportion muft be determined by admeafurement, as follows:

Suppofe the height of the human figure to be taken at fix feet, and the height of a ftep fix inches *; in this cafe the height of the ftep will be one-twelfth part of the height of the man; therefore in the reprefentation upon the picture, the ftep fhould be proportioned to the figure in the fame ratio: that is, if a figure be reprefented as ftanding upon or very near a ftep, the height of the latter fhould be one-twelfth part of the former. Yet it muft not be fuppofed that the foregoing proportion is to be invariably maintained throughout the picture; for as men are of different ftatures, fo fhould the figures in a picture be of different heights: therefore let the height of the neareft ftep be proportioned to the neareft figure, and continue the fame height perfpectively to all the fteps that may be required in the picture.

In the fame manner all thofe objects which muft neceffarily be introduced, and which may be ftyled the furniture of the picture, fuch as altars, feats, tables, and other utenfils, muft be proportioned to the figures by the fame methods that are ufed in the arrangement of fteps. And here the ftudent muft remember, that all fuch objects may be difpofed in any direction to the picture, either parallel or inclined, provided they are not very large, for then they muft conform to the general direction of the building. This will be better underftood by referring again to the example of Raphael, in the laft-

* See Page 124.

mentioned

mentioned picture, where the figure of Epictetus is leaning on a block, which is situated obliquely to the picture.

Lastly, let the painter be careful to avoid the too common, but improper practice, of introducing in the back ground scraps of columns, pedestals, and other confused indeterminate indications of decorations, which are not connected with, nor necessary to the construction of the building, merely for the purpose of producing what some unskilful artists call Effect, but which are only calculated to destroy the harmony of the piece; for such fragments not only produce a bustle and confusion in the composition, but totally destroy that tranquil simplicity which constitutes elegance, and produces grandeur *.

In the foregoing instructions, there is no part which is useless, or which ought to be neglected by the artist, who means to produce a perfect composition; it will therefore be proper to recapitulate briefly those instructions, and to consider them as axioms from which the student must never depart.

First.

The horizontal line must always correspond with the supposed height of the spectator's eye, which ~~would~~ should generally be in the same horizontal plane with the eye of some of the figures in the tablature.

Secondly.

The center of the picture, or what is vulgarly called the point of sight, should always be placed exactly opposite the station in which the spectator is supposed to stand, and view the piece; and this disposition should always be as near the middle of the horizontal line as possible.

* Of all the examples that may be produced, none can surpass the beautiful composition of the Last Supper, by Leonardo da Vinci, at Milan. In simplicity, correct arrangement, and solemnity of disposition, it is a model for imitation.—A most excellent print has lately been engraved from this picture by Morgani.

Thirdly.

The * figures ſhould be proportioned to each other by the given rules, and their ſtations on the floor or plane of ſituation, ſhould be accounted for with accuracy.

Fourthly.

The architecture and buildings, eſpecially the interior repreſentations, ſhould always be diſpoſed parallel to the picture; which will conſequenly give the center of the picture, for the vaniſhing point of the returning ſides of thoſe buildings.

Fifthly.

The architecture in all caſes ſhould be proportioned to the figures, and conſtructed from a regular plan, ſo that the parts ſeen ſhould indicate conſiſtency, uniformity, and connexion with the parts not ſeen.

Theſe rules are ſo abſolute, that the ſtudent may be aſſured, if they are not ſtrictly attended to, his figures will appear to be jumbled together like paſteboard puppets, his buildings and architecture will be falſe and incongruous, and ſerve only to evince his want of ſkill and poverty of taſte.

The preceding rules and inſtructions, although directed to the ſtudent in Hiſtoric painting, apply with equal force to the painter of Portraiture; and therefore it may be thought unneceſſary to offer any advice upon the ſubject of portrait painting. But as too many profeſſors in that branch apply themſelves ſo much to the painting of a head, that they ſcarcely conſider or underſtand any other part of the picture, it will not be uſeleſs or improper, to allot a ſmall portion of this Diſcourſe to the conſideration of thoſe parts of a portrait

* The beſt way to determine the magnitude and ſtation of the back figures will be, to ſketch out the whole of their outlines over the figures that ſtand before them.

which

which require the aſſiſtance of Perſpective, and the decorations of architecture.

The three-quarter portraits, containing nothing more than the head and ſhoulders of the figure, little need be ſaid with reſpect to that, becauſe the canvas is too ſmall to admit of ornaments; conſequently they ſhould be omitted rather than introduced. But the whole-length portrait demands conſideration, becauſe it requires as much back ground as any ſingle figure can claim; therefore ſome directions ſhall be given, which, if well conſidered by young artiſts, will at leaſt prevent the repetition of thoſe faults which have been too often committed even by men of talent and ability.

In whole-length portraits the diſpoſition of the horizontal line ſhould be carefully attended to. The general practice is to place it low, but this produces very bad effects, for it gives the figure a gigantic appearance, and alſo conveys the idea of its being placed on an eminence on purpoſe to be looked at.

It has been repeatedly remarked, both in the foregoing Treatiſe and in this Diſcourſe, that the horizontal line conſtantly marks the height of the ſpectator's eye *who views the picture*; conſequently the ſpace between that line and the eye of the figure in the picture is equal to the height of the eye of the ſitter, above that of the painter or ſpectator who looks at it; therefore when the horizon is very much depreſſed, it indicates a neceſſity of looking upwards to the picture, by which the bad effects before mentioned are produced; to prevent which, the horizon ſhould never be below the knees of the figure, if ſtanding, and if ſitting, never below the waiſt.

There are but two reaſons for depreſſing the horizon. The firſt and beſt is the intended ſituation of the picture, which, it may be preſumed, is to be elevated; the ſecond is the deſire of keeping the head and ſhoulders of the figure clear of thoſe parts of the back

ground

ground which might otherwife interfere with the face. Yet Titian, in a portrait of a child of the Strozzi family *, hath carried the horizon through the eye of the figure; and Vandyke never depreffed the horizon of his portraits fo low as the moderns have done. Surely the practice of thefe great men is authority fufficient to enforce thefe precepts.

The next confideration is the difpofition of the center of the picture, which is of the utmoft confequence in a whole length portrait; and though the horizontal line hath been mentioned firft, yet in ftrict theoretical order it is the center of the picture, which is the firft and principal guide in the arrangement of all the objects in the back ground of every picture.

† In a whole length portrait, the center of the picture fhould always fall fomewhere in the figure, if it be fingle; but if a group, it will be more properly difpofed by placing it between the figures: for as it is abfurd to fuppofe that the fpectator looks at any other object in the picture than that of the *reprefentation of the perfonage*; it muft confequently follow, that the center of the picture, or what is vulgarly called the point of fight, will conftantly fall fomewhere in the figure, or in the middle of the group. But nothing is more common than to fee portraits accompanied by objects in the back ground, the fides of which are fuppofed to be perpendicular to the picture, yet having thofe fides drawn to points out of the canvas; thereby producing diftortion in thofe objects, and abfurdly indicating two points of fight to one picture.

The above inftructions will be more enforced, when it is remembered, that all the architectural decorations of the back ground fhould be conftantly difpofed parallel to the picture, and this for the

* There is a print of this by Valpato in the Schola Italica before mentioned.

† See Plate XXXIX. Fig. 1. Fig. 2.

reafons

reaſons before aſſigned in the preceding part of this Diſcourſe: and all oblique diſpoſitions are to be avoided, unleſs the figure is repreſented as ſitting on a chair or ſtool, for then the ſides of ſuch ſeats will generally require to be inclined to the picture; and conſequently thoſe ſides muſt vaniſh in points, which are out of the canvas.

As theſe rules are to be conſidered as infallible, it will not be improper to repeat them in a ſummary way, that the ſtudent may impreſs them on his mind, as never to be forgotten or neglected.

First.

The horizontal line ſhould never be depreſſed below the knees of the figure.

Secondly.

The center of the picture muſt always be ſomewhere in the figure, if ſingle; if a group, nearly in the middle.

Thirdly.

All the objects which are introduced into the back ground of a portrait, ſhould be diſpoſed parallel to the picture; or, if a ſeat or pedeſtal muſt of neceſſity be inclined, that inclination ſhould be as little as poſſible; and all the architectural decorations ſhould be clearly defined and arranged by ſome plan agreeably to the inſtructions already given concerning hiſtorical compoſition.

Although the ſcience of Perſpective be equally neceſſary to the Landſcape painter as to the other profeſſors of art, yet it muſt be confeſſed that in a landſcape, where there are no buildings, or ſuch only as are extremely diſtant, there ſeldom needs any application of its rules. This aſſertion, however paradoxical it may appear, is yet true; which the following obſervations will evince. All the objects of nature are ſo complex in their forms, that they can never be reduced to mathematical deſcription; while moſt of the works of art being formed by lines and planes upon geometrical principles, are capable of being defcribed and demonftrated by the fcience of Perfpective; becaufe that fcience is alfo founded in geometry: hence it follows, that trees, rocks, and mountains, which may be ftyled the natural materials of a landfcape, cannot be fubjected to the rules of Perfpective; while edifices and buildings, which are conftructed by human art, can never be accurately defcribed without a very competent knowledge of the fcience. But when it is admitted that it would be vain and fruitlefs to attempt drawing a tree by the rules of Perfpective, let it not be therefore inferred, that the fcience is ufelefs to a landfcape painter; for without a good general knowledge of its rudiments, he will never be able to compofe a good landfcape, even if the fcene fhould be of that kind in which no buildings are required.

Before any inftructions are offered on this head, it will be proper to confider landfcape as divided into two claffes; the firft being the open profpect of the country, the fecond the interior views of towns: the former of thefe comprehending the poetic compofition, and the local profpect of nature; the latter including the reprefentation of a particular building, or of a number of edificies collectively, the laft of which may be called ftreet views.

With regard to the poetic or compofite landfcape, no pofitive rules can be given for the difpofition of the horizontal line, or of the center of the picture; their fituations depend on the tafte and judgment of the artift. But as fome general hints may be ufeful to the ftudent, the following are given:

The height of the horizontal line fhould always be fuited to the ftyle of the compofition, whether it be heroic or fylvan; and its place muft be determined by the fpecies of objects which conftitute the picture. Thus if the landfcape confift chiefly of rock and mountains, it will admit of an elevated horizon; but if the compofition be chiefly of trees, then the horizon muft be lowered; for rocks and mountains require an elevated ftation, whence they may be feen to advantage; but as the largeft trees appear but diminutive when viewed from a great elevation, they confequently require that the fpectator fhould view them from a low fituation to make them appear lofty and important in the picture. The practice here recommended is confirmed by the example of Rubens, in his landfcapes; and alfo by thofe of Fouquier and Artois. The former mafter kept his horizon high, by which means he gave an air of grandeur to his pictures, although the objects of which they are compofed are feldom very interefting or dignified. The two latter delighted chiefly in woody or fylvan fcenes, which abound with trees; and the horizons of their pictures are always low, and confequently give great dignity to the objects of which their pictures are compofed.

In local views the height of the horizon muft always be governed by the form or character of country where the view is taken; and it will often be neceffary to keep it lower in real profpects, than can ever be allowed in compofition; becaufe in the former the likenefs is to be preferved, and the detail or features are to be expreffed; but in the latter, elegance and grandeur muft be the chief purfuit of the artift.

To thefe obfervations the following general rules may be added, which will be equally applicable to all the various ftyles of landfcape. Firft, the horizontal line fhould never be raifed above the middle of the tablature or canvas. Secondly, it fhould never be depreffed below the proportion of one-third of the height of the picture, except in views taken in very flat countries, where it will often be neceffary to keep it as low as one-fourth. Thirdly, the center of the picture fhould always be in the middle of the horizontal line, if poffible; but, as before obferved, its difpofition depends much on the tafte of the artift.

 Thefe

These general rules can never be difpenfed with by thofe who mean to tread the paths of landfcape painting; but the artift who devotes his talents to the reprefentation of buildings, or town views, where ftreets and edifices are united, muft not content himfelf with thefe fuperficial maxims: he muft make himfelf a perfect mafter of Perfpective, and alfo of the principles of architecture; without which he cannot expect to attain excellence. To affift the ftudent who may chufe that department, the following inftructions are written:

If the picture is high, yet narrow, it may be as low as one-fourth or one-fifth.

The town or ftreet view muft be drawn with the ftricteft attention to the forms and dimenfions both of the ground and of the buildings, which form the profpect intended to be reprefented; and the better to attain truth, fome kind of fcale fhould be employed, and a few general meafures taken or affumed.

The artift fhould alfo chufe his ftation at a point which is not too remote from common notice, and he fhould carefully avoid all unnatural elevations of the horizon.

But when it is recommended to employ a fcale, it is not meant that real meafures fhould be applied, for in many cafes it will be impoffible to obtain them; therefore he muft remark, with great attention, the proportion which the various objects in the view bear to each other, and compare thofe to the height of fome human figure, which fhould be early introduced into the fketch for that purpofe.

To explain thefe precepts more forcibly, let it be fuppofed that fome particular ftreet or place is to be reprefented; the artift muft then conduct his work by the following confiderations. When the ftation is determined, let him well confider whether the place or object requires to be drawn on a paper or a canvas wider than it is high; or on the contrary, whether it will not be better defcribed by the propor-

tion

tion of greater height then width; for inattention to theſe circumſtances will deſtroy the truth of the repreſentation, ſeeing that a narrow ſpace, with lofty buildings, can never be properly repreſented in a picture that has leſs height than width.

When the ſize and proportion of the drawing or picture is determined, let him next ſketch or indicate the principal or the neareſt building in the place; and let him remember, that by the magnitude of this prime object, whether it be near or diſtant, he muſt, as by a ſcale, proportion every other object in the picture.

The horizontal line muſt then be determined, and drawn at its *juſt height*, agreeably to the proportion of the building which is firſt ſelected; and this line ſhould remain till the whole of the architecture and building are defined. It will be a good method to determine the place of this line by the height of ſome door, gateway, or other aperture in the building firſt choſen, of which the meaſures may, if neceſſary, be eaſily obtained.

In drawing views of ſtreets and places it may appear needleſs to give inſtructions for the diſpoſition of the center of the picture, ſince nothing but great unſkilfulneſs in the ſcience of Perſpective, or the moſt careleſs inattention to nature, can miſlead the artiſt in the diſpoſition of this point. Yet there are ſo many abſurd examples to be ſeen, where this point is miſplaced, and often confounded with ſome oblique vaniſhing point, that it is neceſſary to make this a ſeparate article of inſtruction; and therefore it will be found illuſtrated and more fully explained in the Praxis which precedes this Eſſay*.

The diſpoſition of the objects to the picture, whether oblique or parallel, or whether a combination of buildings both oblique and parallel, muſt be well conſidered; for in ſome views the parallel ſituation will be the beſt; in others the oblique; but in moſt there will be a combination both of parallel and oblique fronts in all directions.

* See page 264.

 Upon

Upon ſuch an occaſion it is not to be expected that the artiſt can obtain the angles at which thoſe fronts are inclined to the picture; therefore he muſt content himſelf with ſketching thoſe inclined fronts by the eye, and then carefully follow the direction of any one line in thoſe fronts, which, when drawn to the horizon, will give vaniſhing points; and thoſe aſſumed vaniſhing points muſt ſerve him for the conſtruction of the reſt of the building.—See note in Plate XL.

When the view of a ſingle building is to be drawn, the firſt conſideration is the ſtation whence the view is to be taken, and that ſtation ſhould always be choſen which will unite the moſt picturesque appearance with that which is moſt generally known: for ſince the repreſentation of a particular building, or the view of any particular place, may be conſidered as a portrait, that reſemblance will be the moſt ſtriking which is drawn from that ſtation at which it is moſt commonly ſeen.

If the building be formed of one maſs, or has its parts united, like St. Paul's, or moſt of the cathedrals in England, the oblique view muſt be choſen; but if the building be formed with wings, or compoſed of detached parts, like Greenwich Hoſpital, the parallel ſituation will generally be the beſt.

In all interior views the ſtation is confined to ſome particular ſpots, and the parallel ſituation to the picture is that which ſhould generally be preferred, for it produces the moſt explicit deſcription of the building, both in its general form, and in the detail of its parts.

The height of the eye muſt be carefully attended to in all views, whether exterior or interior, particularly in the latter; and falſe or imaginary elevations ſhould never be admitted: or if any liberties are taken, they ſhould be in proportion to the height of the building.—For farther inſtructions on this head the ſtudent is referred to the foregoing Treatiſe.

These

Thefe inftructions cannot be complete without obferving, that all architectural fronts in ftreet views muft be carefully proportioned by the general rules of the orders of which thofe fronts are compofed: and the artift muft not affect to defpife the application of the compaffes and the ruler; for without their affiftance it will be impoffible to delineate fuch objects with truth and correctnefs. And thofe painters who do not underftand architecture, fhould never attempt fuch works without the affiftance of fome architect to direct them.

Although this Effay be chiefly intended to affift the ftudent in Painting, yet it may not be improper to affign fome part of it to the fervice of the Architect and Sculptor; to them, therefore, the following obfervations are addreffed.

The Architect fhould always be poffeffed of the fcience of Perfpective, and that in no trifling degree; for by its affiftance he will be enabled to determine with himfelf, and to demonftrate to others, the future effects of his defigns and drawings, whenever he is employed to erect buildings.

But the practice of making geometrical or orthographical drawings, is by cuftom fo firmly eftablifhed among the architects, that little hope can be entertained of introducing any other mode of drawing their defigns. Yet, in confequence of this general practice, many able men have found themfelves deceived when they faw thofe defigns executed; while their difappointment was no more than a natural effect of the eftablifhed practice: for in the orthographical or geometrical drawing, all the parts are defcribed equally prominent and vifible, as well thofe which recede as thofe which project; but in the building, the parts which recede will appear lower than thofe which project; they will even be fometimes concealed, if viewed from certain points;

which

which circumſtance leads to another obſervation, that will encourage the architect in the practice and ſtudy of Perſpective.

All public buildings, particularly thoſe in towns, are generally placed on ſome particular ſpot or ſituation; conſequently, they can be ſeen only from particular ſtations. The architect will therefore do well to examine and conſider thoſe ſtations or points of view from which his building will be ſeen, and then conduct the deſign of the exterior elevation of his edifice accordingly. Yet all the precaution here recommended will be uſeleſs to him, who does not underſtand Perſpective, or who will not practiſe it.

It may be objected that making Perſpective drawings would be attended with too much trouble, and be inconvenient to the workman; becauſe he could not, without equal ſkill in the ſcience, be able to find out the meaſures of the parts by the ſcale; but this objection will vaniſh, when it is obſerved, that in the compoſition of great works every method ſhould be practiſed which can enſure ſucceſs: and that the making ſome additional ſketches or drawings in Perſpective, although the minute parts are not determined by the abſolute rules, will be ſufficient; eſpecially, if thoſe ſketches are of the parts of which there may be any doubt concerning their future effect; and in many caſes this will ſave the expence of a model. Another ſtrong recommendation to this practice is, that an architect labours under a diſadvantage not known to the painter, which is, that he cannot alter or correct his works after they are finiſhed; and therefore it is more particularly incumbent on him to guard againſt errors or miſtakes by all the means in his power.

But ſhould the advice here given be ſlighted, in what relates to the deſigns being drawn perſpectively, yet let the architect be aſſured, that he who is maſter of the ſcience will poſſeſs reſources by which he will be enabled to diſpoſe particular parts of his buildings with ſuch art, as may produce very ſtriking and uncommon effects*. It is true, that there are no examples of ſuch artificial effects to be ſeen in this country, and but few in others, except in Theatres. Yet ſuch are by no means impracticable; therefore this hint is offered, which may be greatly improved by the ſkilful architect, who is maſter of Perſpective; but which will be uſeleſs to him who is ignorant of it.

After having thus ſtrongly recommended the ſtudy of Perſpective to the Architect, it will be proper to give ſome inſtructions in what manner it ſhould be applied.

When the exterior elevation of a building is to be drawn, the ichnography or plan muſt be conſidered, and muſt direct the ſituation of the object to the picture. If the parts of the building are connected, or of one maſs, like the Cathedral of St. Paul or the Manſion Houſe, the oblique or inclined poſition muſt be choſen; but if it conſiſts of many parts, like Greenwich Hoſpital, or with wings, like the Queen's Palace, then the parallel ſituation will generally be the beſt; obſerving never to place the center of the picture in the center of the building, but to diſpoſe it more on the one ſide than the other; by theſe means the repreſentation will be more natural, more explicit, and more pictureſque than if the center of the picture and the center of the building were to coincide. The height or place of the horizon muſt alſo be diſpoſed agreeably to the ground on which the future building is to be erected, and all fictitious or imaginary points of view are to be cautiouſly avoided: in ſhort, the architect muſt conduct his drawing by the ſame principles and practice

* In the Cathedral of Canterbury, there is ſomething of the kind here indicated, though it may be preſumed to be more the effect of accident than of intention in the architect. It is the part behind the high altar, where the tomb of Becket formerly ſtood; this part, when viewed from the entrance of the choir, has a moſt beautiful effect.

that

that are recommended to the painter of views. It is, therefore, needleſs here to repeat the inſtructions which have been already given.

A few remarks addreſſed to the Sculptor ſhall conclude theſe inſtructions, and very few are neceſſary; becauſe it is ſeldom that he will require to apply the rules of Perſpective to his works; it is only in the conſtruction of the baſſo relievo that he may ſometimes aſſiſt his art by the rules of that ſcience. But in this great caution is neceſſary, leſt he ſhould, by an improper introduction of Perſpective repreſentations, deſtroy the effect he means to produce.

The beſt mode of conducting the compoſition of a baſſo relievo is by a proceſſional arrangement of the figures; ſuch as may be ſeen in the Antique baſſo relievos, where all the figures range upon one line, without any additions of back ground or diſtance, as may be obſerved in thoſe noble works * which are upon the arches of Titus and Conſtantine; and which have ſerved as examples to Polidoro da Caravaggio, in his admirable Chairo-ſcuro paintings; all of which are corroborative proofs of the propriety of the conduct here recommended. The ſuperior advantages of the lineal over every other diſpoſition in Sculpture, will be ſeen and clearly underſtood, if the artiſt will but examine three baſſo relievos in Weſtminſter Abbey, and compare their different effects together. The monument of Sir Iſaac Newton, and alſo that of Mr. Thynne, have each a baſſo relievo upon them, in which the figures are ranged proceſſionally, without back ground or diſtance: both theſe have their proper effect. But on the monument of the Duke of Argyle, there is a baſſo relievo upon the plinth or pedeſtal, in which an attempt is made to repreſent the interior view of a building; but the effect does not anſwer the deſign of the ſculptor: for as the materials do not admit a diſtinc-

* Theſe works are at Rome. Prints from them may be ſeen in the Admiranda Romanorum, and in the Icones et Segmenta Illuſtrium, &c. a Franciſco Perrier, commonly called Perrier's Antiquities.

tion

tion of colours, nor produce a gradation of ſhadows, the diſtance is entangled with the foreground, producing an indiſtinct jumble of objects, almoſt unintelligible, and abſolutely without effect.

Although the ſculptor be thus cautioned againſt the introduction of Perſpective views in the back ground, yet he muſt remember, that in every baſſo relievo, the rules of that ſcience muſt direct him in proportioning his figures: he muſt be careful not to make the back figures larger than thoſe on the foreground, but proportion them to each other by the rules given in the foregoing Treatiſe. And all ſeats, altars, and other neceſſary ornaments, muſt in general be diſpoſed parallel to the face of the baſſo relievo: in ſhort, the work ſhould be conſidered as a carved picture, diveſted of a back ground, and therefore the conſtruction muſt be conducted by the ſame general laws which govern the painter in the compoſition of an hiſtorical picture; with this particular caution, that the horizon muſt always be below the heads of the figures, whether the diſpoſition of the work, when finiſhed, is to be above the eye or below it.

Having finiſhed the inſtructions, which this Diſcourſe was intended to convey, it may be proper finally to caution ſtudents in the different departments of art, againſt that preſumption which may lead them to ſlight, or neglect, the foregoing precepts. But ſhould any one, affecting ſuperior genius, diſregard the advice which has been given in the preceding pages, he will ſoon find himſelf miſerably deceived; and ſo far will he be from producing compoſitions equal to the maſters whoſe works have been ſelected as examples, that on the contrary his productions, though they may be ſupported for a ſhort time by friendly partiality, or faſhionable folly, will yet become defpifed and neglected; the juft and inevitable fate of all attempts in art, wherein fcience, and judgment, are wanting.

The following belongs to the FOURTH SECTION, but being by accident omitted is here given.

Of Afcending Stairs.

In Plate XXVII. Fig. 1. is an example reprefenting two walls F, G, parallel to each other, and perpendicular to the picture; the upper lines of which are inclined to the horizon.

This figure alfo demonftrates the beft and readieft method of obtaining the reprefentation of afcending Stairs, the fronts of which are parallel to the picture; the procefs as follows:

Having drawn the lines 2 a, and 3 b, with the proper inclination to the horizon*, and at the diftance from each other equal the breadth of the Stairs; draw the line 2 E, perpendicular to the bafe line, upon which line fet up the height of the fteps, as many as may be required, as marked by the points 5, 6, 7, 8, &c.

Then from every one of thofe points, draw lines to the center of the picture C, which lines will produce the interfections f, g, h, &c. in the inclined line 2 a, which points indicate the nofeings or angles of every ftep.

Therefore, at thofe points, defcribe the upper angle of every ftep by drawing lines parallel to the horizon, from the inclined line 2 a, to its oppofite 3 b, which lines will reprefent the upper angles of the fteps, the reft will be eafily underftood by infpecting the diagram.

The ftudent muft obferve that the inclined lines 2 a and 3 b, are to be confidered as in an inclined plane, which paffes through the nofeings or angles of the fteps; confequently, the nofeing or outer

* See inftructions, page 186.

angle of every ſtep is determined in its projection by the lines 2 a and 3 b.

It is alſo to be obſerved, that for the general uſe of the painter, the inclined lines 2 a and 3 b may be drawn to repreſent any inclination to the horizon from 22 to 25 degrees: but the architect who ſhould wiſh to repreſent aſcending ſteps, muſt firſt draw the geometrical profile of the ſubject according to their meaſures, by which the inclination of the flight muſt be determined.

The above proceſs is more convenient and ready, than that which is given in page 64, Plate XVI.

LIST of PLATES.

Thofe who fhall chufe to bind the Plates with the Letter Prefs, will find that the beft difpofition will be to place them as paged in the above Lift.

INDEX to the PERSPECTIVE.

A List of those Publications on Perspective, to which References have been made in the foregoing Treatise; arranged in the Order they were published.

1. Perspectivum Pictorum, et Architectorum, Andreæ Putei,* e Societate Jesu Romæ, 1693. A Second Part, 1700, two Vols. Folio.

A Translation of the First Part of the above Work was published in London 1707, 1 Vol. Folio. The Plates engraved by Strut. The Roman edition is in Latin and Italian; the London, Latin and English.

2. A Treatise of Perspective, demonstrative and practical, by Humphry Ditton. London, 1712.

3. Linear Perspective; or, a New Method of representing justly all Manner of Objects, &c. by Brook Taylor, LL.D. and R.S.S. London, 1715. Octavo.

4. New Principles of Linear Perspective;† or, the Art of Designing on a Plane the Representations of all Objects, &c. by Brook Taylor, LL.D. and R.S.S. London, 1719. Octavo. *This is a Correction and Improvement of the former.*

5. An Essay on Perspective, written in French, by William James Gravesande, LL.D. professor of mathematics and astronomy at Leyden, F.R.S. *Translated by E. Stone,* 1724.

6. The Practice of Perspective; or, an Easy Method of representing Natural Objects. Written in France, by a Jesuit of Paris; translated by E. Chambers,‡ 1726. 1st Edit. Quarto.

7. Stereography;

* Andrew Pozzo.

† This was revised, corrected, and re-published by John Colson, M.A. and F.R.S. Lucasian Professor of Mathematicks in the University of Cambridge. London, 1749.

‡ Author of the Dictionary.

7. Stereography; or, a Complete Body of Perfpective, &c. by J. Hamilton, F. R. S. 2 Vols. Folio. London, 1738. *Moft commonly bound together.*

8. The Practice of Perfpective; or, Dr. Brook Taylor's Method of Perfpective made eafy, by Jofhua Kirby. Ipfwich, 1754. Quarto. —*Mr. Kirby alfo publifhed a Folio Treatife, entitled, The Perfpective of Architecture.*

9. The Practice of Perfpective, on the Principles of Dr. Brook Taylor, &c. by Jofeph Highmore. London, 1763. Quarto.

10. The Theory of Perfpective demonftrated, &c. by John Lodge Cowley. London, 1766.

11. A Familiar Introduction to the Theory and Practice of Perfpective, &c. by Jofeph Prieftley, LL.D. F.R.S. London, 1770. Octavo.

12. The Elements of Linear Perfpective demonftrated by Geometrical Principles, by Edward Noble. London, 1771. Octavo.

13. *A Complete Treatife on Perfpective, in Theory and Practice, by Thomas Malton. London, 1775. Folio.

* A Quarto Volume was lately publifhed on Perfpective, entitled, The Young Painter's Maul-Stick. London, 1800. By James Malton, youngeft Son to the above-named Thomas.

FINIS.

Luke Hanfard, Printer,
Great Turnftile, Lincoln's Inn Fields.

ERRATA.

Page 16. line 13. *for* then the figure, *read* that the figure.
23. — 14. *for* the lines, *read* the horizontal lines.
27. — 25. *for* pictures at, *read* picture is at.
30. — 13. *for* apertures, *read* aperture.
43. — 9. *for* line y, *read* 7.
43. — in the note, *for* archivaults, vaults, *read* archivaults and ſoffits.
44. — 12. *for* s, *read* S.
51. — 19. *for* b to x, *read* X.
57. — *for* points, *read* point.
62. — 21. *for* x, *read* X.
65. — 2. *for* angles, *read* edges.
71. — 12. *for* tho, *read* the.
75. — 22. *for* of the point, *read* at the point.
82. — 5. *for* carved, *read* curved.
83. — 13. *for* example F. Fig. 1. *read* example Fig. 1.
88. — 20. *for* d 2, *read* D 2.
101. — 8. *for* A B C E, *read* A B C D.
132. — 13. *for* at the four angles, *read* through the four.
133. — 1. *for* T X continued, *read* T X 1 continued forward.
146. — 10. *for* that point, *read* the point A.
× 168. — 17. *for* E, *read* F.
183. — 2. *for* muſt obſerved, *read* muſt be obſerved.
223. — 20. *for* may taken, *read* may be taken.
238. — 1. *for* Rods upon P q s, *read* Rods P q s upon the wall.
— — 7. *for* o T 7, *read* o t 7.
246. — 2. *for* that picture, *read* the picture.
246. — 25. *for* ſides B 2 D 2 and C, *read* B 2 D 2.
246. — 26. *for* of the other ſides, *read* of the ſides.
247. — 3. *for* Plate VIII. *read* Plate XII.
247. — *for* Plate XXXVIII. *read* Plate XXXVII.
248. — 24. *for* points 1, 2, 3, 4, *read* points 2, 3, 4.
250. — 22. *for* eye, *read* eyes.
252. — 29. *for* from f ſet off to g, *read* ſet off to p.
259. — 28. *for* therefore the points, *read* therefore through the points.
291. — 20. *for* would, *read* ſhould.
300. — 7. after Plate, add XL.

N. B. Inſtead of Addenda, in two or three places, *read* Section VI.