**Rules and examples for the mensuration of masts, timber, plank, wainscot logs, and boards; for the government of the Officers of the Customs.**

G. B, BOARD OF CUSTOMS + EXCISE

1835

# RULES AND EXAMPLES

FOR THE

# MENSURATION

OF

## MASTS, TIMBER, PLANK, WAINSCOT LOGS, AND BOARDS;

FOR THE GOVERNMENT OF THE OFFICERS OF

## THE CUSTOMS.

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# *On the Sliding Rule.*

## SECTION I.

THE lines commonly employed on this Sliding Rule, are those marked with the letters A, B, C, and D, on the girt side; and with A, B, C, and E, on the reverse.

The lines A, B, and C, commonly denominated Gunter's lines, are logarithmic lines, laid down from a Scale of equal parts, of any convenient length: with these lines proportions in common arithmetic were at first resolved, by the mere application of a pair of compasses, founded upon this property, that the differences between the logarithms of the terms of equal ratios are equal.

It will be seen by an inspection of the Rule, that the lines, A, B, and C, on each side of it, are all of the same radius, or length; that they are similarly divided; and that they consist of two lines, or series of numbers, proceeding from the left hand towards the right, viz. 1, 2, 3, 4, 5, 6, 7, 8, 9, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

The line D, which is double the radius of the lines A, B, and C, has but a single line of numbers, and is marked as follows—4, 5, 6, 7, 8, 9, 10, 20, 30, and 40; consequently, the corresponding divisions and subdivisions are all exactly double in extent of those of the preceding lines A, B, C, which are termed lines of a *single radius,* with respect to the line D.

The line E is an inverted line of the same radius as the lines A, B, and C; it is generally placed upon the upper stock of the Rule, in such a manner that the divisor 144, or measuring unit, may exactly coincide with unity on the line A, which is upon the lower stock; the reverse side is usually employed in cubing the contents of solids, of which the sides are unequal.

The above description will be sufficient to explain, in general, the lines that are placed upon the Sliding Rule for Timber.

## SECTION II.

### *On the Value of the Divisions and Numbers on the Rule.*

The numbers placed upon the lines A, B, C, and E, may be regarded either as integers or decimals, or any mixed numbers whatever; for the same figures on those lines have the same decimal value, whatever may be the denomination; thus the figures 8000, 800, 80, 8, 0.8 0.08.0.008, &c. have all the same *decimal value*, upon those scales, and *which* bears a certain determinate relation to radius. It is for this reason that the values of the long divisions, where the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, are placed upon the lines A, B, and C, are said to be arbitrary.

Thus, if 1, at the commencement of the scales A, B, and C, be called unity, then 1 at the beginning of the second radius will represent 10; and 1, at the end of these scales will denote 100; but if 1, at the beginning of these lines, represent 10, then the middle unit, or 1, at the commencement of the second radius, will represent 100; and 1, at the end of these lines, will denote 1000; because the ascending scale of arithmetic is decimally divided, and in proceeding from left to right, increases in a tenfold proportion—the same remark is also applicable to the descending scale of arithmetic; for in proceeding from right to left from unity, the denominations decrease in a tenfold ratio; thus if 1, at the end of the lines A, B, and C, towards the

right hand side, represent 1, then 1, at the beginning of the second radius, will be 0.01; and 1, at the commencement of those lines, will denote 0.001, or 1000th part of unity, &c.

*Example* 1.

Suppose it were required to find the place of the number 8 on the line C.

If you call the first figure 1, the eighth digit towards the right hand will represent the number 8 required.

But if the first figure 1, be called 10, then the eighth figure, or digit, will represent 80.

Again, if the first figure 1 be supposed to represent 100, then the eighth digit will denote 800, &c.

*Example* 2.

Let it be required to find the place of the number 15 on the line C.

If the first figure 1, at the commencement of the line, be called 1, then unity at the beginning of the second radius will represent 10, and the interval between 1 and 2 being decimated, each of the longer divisions will represent a unit; consequently five of those longer divisions will denote five units; so that the fifth subdivision, reckoning from 10, will be the place where the number 15 is to be found.

The same point on the line represents also the denominations 150, 1500, &c. as well as those of 1.5, 0.15, 0.015, &c.; but then 1, at the beginning of the scale, is supposed to stand for 10, 100, 1000, &c.

*Example* 3.

Let it be required to find the place of the number 406 on the line C.

In this case, the first figure 1 on the scale is supposed to represent 10, consequently 1, at the commencement of the second radius, will be 100; then the number 4, on this radius, will represent 400; and as each tenth from 400 to 500 is subdivided into five parts, each subdivision being equal to two units, three of those subdivisions will represent six units, which being added to the number 400, determines the point where the number 406 is to be found.

*Example* 4.

Let it be required to find the number 3450 on the same line C.

Here 1, at the commencement of the scale, must be reckoned 100; then 1, at the beginning of the second radius, will be 1000; the number 2 will be 2000, and the number 3, 3000; and the interval between the figures 3 and 4 being decimated, each of the longer subdivisions will represent 100, therefore four of these divisions will represent 400; then to find the place of the remaining 50 of the given number, observe that each of the prime divisions is subdivided into five parts, consequently each of those parts will represent 20; take, therefore, lastly, two and a half of those divisions, and they will represent the number 50, the point where the number 3450 is to be found.

*Example* 5.

If it were required to find the number 18.20 on the line C.

Look for the first figure 1, at the beginning of the scale, and for the second figure 8, count eight of the longer divisions towards 2, which is the point where 18 stands; then count two centesms more for the third figure 2, = 20, and that point represents 18.20, the number required, which also stands for .1820, 1.820, 182, and 1820; but then the figure 1, at the beginning of the line, must be conceived of a different value in finding each of the above five numbers, viz. .1, 1, 10, 100, 1000, and in the same manner is the point that represents any number that may be required to be found.

## SECTION III.

*On the Enumeration of the different Gauge Points on the Sliding Rule employed in computing the superficial and solid Contents of Plank, Timber, and Masts, depending on the form of the Solid, whether it be Square, Octagonal, Hexdecagonal, or Circular, both by the Diameter and Circumference.*

1st. The Gauge Point for Superficial Measure is 12, the length being taken in feet and the breadth in inches; it is marked with a brass pin at 12, on the line A.

2nd. The Gauge Point for *Square* Timber is 12, being the square root of the divisor 144, the number of superficial inches in a square, whose side is one foot; it is marked with a brass pin at 12, on the line D.

3rd. The Gauge Point for *Octagonal* Timber and Masts, the length being taken in feet and the diameter in inches, is 13.184, being the diameter of a circle inscribed in a regular octagon, whose area is 144 square inches; it is marked upon the girt line with a brass pin at 13.184, over the word "diameter."

4th. The Gauge Point for *Hexdecagonal* Timber or Masts, the length being taken in feet and the diameter in inches, is 13.453, being the diameter of a circle inscribed in a regular hexdecagon, whose area is 144 square inches; it is marked upon the girt line with a brass pin at 13.453, over the word "diameter."

5th. The Gauge Point for *Round* Timber or Masts, the length being taken in feet and the diameter in inches, is 13.54, being the diameter of a circle, equal in area to a square, the side of which is 12 inches; it is marked upon the girt line with a brass pin, within a circle, at 13.54, over the word "diameter."

6th. The Gauge Point for *Octagonal* Timber or Masts, the length being taken in feet and the quarter girt in inches, is 10.922, being one-fourth of 43.6886, the perimeter or girt of a regular Octagon, equal in area to a square whose side is one foot; it is marked upon the girt line with a brass pin, at 10.92, over the word "girt."

7th. The Gauge Point for *Hexdecagonal* Timber, or Masts, the length being taken in feet and the quarter girt in inches, is 10.7039, being one-fourth of 42.8156, the perimeter of a regular Hexdecagon, equal in area to a square of which the side is one foot; it is marked upon the girt line with a brass pin, at 10.70, over the word "girt."

8th. The Gauge Point for *Round* Timber, or Masts, the length being taken in feet and the quarter girt in inches, is 10.6347, being one-fourth of 42.53889, the circumference of a circle equal in area to a square of which the side is one foot; it is marked upon the girt line with brass pin, with a circle, over the word "girt."

# SECTION IV.

*On the application of the different lines of numbers on the Sliding Rule to the purposes of determining the superficial and solid Contents of regular bodies.*

## I.—OF RECTANGULAR PLANE FIGURES.

### BY THE LINES A. AND B.

*Example.*

Let the length of a Rectangular Board be 24 feet, and the breadth 13¼ inches, required the content?

Set 24, the length, on the line B, to the Gauge Point 12, on the line A, then against 13¼ inches, the breadth, on the line A, is 26½, the number of superficial feet, on the line B.

## II.—OF PARALLELOPIPEDS.

### 1.—BY THE LINES C. AND D.

*Example.*

Let the length of a prismatic piece of Square Timber be 28½ feet, and the side of the square 17 inches, required its content in cubic feet?

Set 28½, the length, on the line C, to the Gauge Point 12, on the line D, then against 17 inches, the side of the square, on the same line D, will be found the number 57, on the line C, the content required.

### 2.—BY THE LINES A., B., C., AND E.

*Example.*

Let a piece of unequal-sided Square Timber be 36 feet in length, its breadth 22½ inches, and thickness 17¼ inches; QUERY—the cubical content?

Set 22½ inches, the breadth, on the line E, to 17¼ inches, the thickness, on the line C: then against 36 feet, the length, on the line A, will be found 97, the number of cubic feet required, on the line B.

## III.—OF CIRCLES.

*Example* 1.

Let the diameter of a circle be 17½ inches, required the area in superficial feet?

### BY THE LINES C. AND D.

Set 1, on C, to the Gauge Point 13.54, on D, then against 17½, the diameter, on D, is 1.67 superficial foot, on C.

*Example* 2.

Let the circumference of a circle be 55 inches, what will be the area in superficial feet?

Set 1, on C, to the Gauge Point 10.63, on D; then against 13¾, the quarter girt, on the same line D, will be found 1.67 superficial foot nearly, on C.

## IV.—OF CYLINDERS.

### BY THE LINES C. AND D.

*Example* 1.

Let a Cylindrical body be 24 feet in length, and 17½ inches in diameter, required its content in cubic feet?

Set 24 feet, the length, on C, to the Gauge Point 13.54, on D, then against 17½ inches, on the same line D, are 40 cubic feet, the content required, on the line C.

*Example* 2.

Let a Cylindrical body be 24 feet in length, and 55 inches in circumference, required its content in cubic feet?

Set 24 feet, the length, on C, to the Gauge Point 10.63, on D, then against 13¾ inches, being one-fourth of the circumference, on D, will be found 40 cubic feet, on the line C.

## V.—OF PRISMS IN GENERAL.

*Rule.*

$$\frac{\text{Length} \times \text{Area of the Base}}{144} = \text{the content in cubic feet.}$$

*Example.*

Let a Prism be 36 feet in length, and its sides 8 by 10 inches, which gives 80 for the area of the base, required the number of cubic feet?

EMPLOY THE LINES A. AND B.

Set 144, on the line A, to 80, the area of the base, on the line B; then against 36, the length in feet, on the line A, you will find 20 cubic feet, on the line B.

## VI.—OF PYRAMIDS.

*Rule.*

$$\frac{\text{Length} \times \text{Breadth} \times \text{Thickness}}{3 \times 144} = \text{Solidity in cubic feet.}$$

*Example* 1.

Let the area of the base be 196 inches, and the height 18 feet; required the number of cubic feet?

Set 432, on the line A, to 196, the area of the base in inches, on the line B; then opposite to 18, the height in feet, on the line A, you will find 8 cubic feet, on the line B.

*Scantlings*, or *unequal-sided Square Timber*, may be readily measured by the *Area of its Section*, which is obtained by multiplying its breadth by its depth.

*Example* 2.

Required the number of cubic feet in a Plank 24 feet long, 13 inches wide, and 3 inches thick?

Here, the area of its section being 39;

Set 144, on the line A, to 39, the area of the section, on the line B; then against 24, the length in feet, on the line A, you will find 6.5 cubic feet, on the line B.

## VII.—OF CONES.

*Rule.*

$\frac{.7854\ d^2 \times h}{3}$, or $\frac{d^2 \times h}{1.954^2}$, = the content in cubic inches.

*Example.*

Let *d*, the diameter of the base, be 14 inches, and *h*, the height, 21 inches; required the content in cubic inches?

EMPLOY THE LINES C. AND D.

Set 21, the height in inches, on C, to the Gauge Point 1.954, on the line D; then opposite to 14, the diameter in inches, on the same line D, you will find 1078 cubic inches, on the line C.

## VIII.—OF SPHERES.

*Rule.*

$\frac{d \times d^2}{1.381^2}$ = the solidity in cubic inches.

*Example.*

Let *d*, the diameter of a Sphere, be 14 inches; required its content in cubic inches?

EMPLOY THE LINES C. AND D.

Set 14, the diameter in inches, on C, to the Gauge Point 1.381, on the line D; then opposite to 14, the diameter in inches, on the same line D, will be found 1437 cubic inches, on the line C, the content required.

## SECTION V.

*An Enumeration of the different* DIVISORS *employed in Cubing the Contents of Masts and Timber, of the following Forms, numerically, viz.—*

1.—For Square Masts or Timber, the numerical Divisor 144 is the area of a square whose side is 12 inches.

2.—For Octagonal Masts or Timber, by the diameter, the Divisor is 173.823 (or more simply 174), being the square of the diameter of a circle inscribed in a regular Octagon whose area is 144 superficial inches.

3.—For Octagonal Masts or Timber, by the girt, the Divisor is 119.293 (or more simply 119.3), being the square of the fourth part of 43.68863, the perimeter or girt of a regular Octagon whose area is 144 superficial inches.

4.—For Hexdecagonal Masts or Timber, by the diameter, the Divisor is 180.94 (or more simply 181), being the square of the diameter of a circle inscribed in a regular Hexdecagon whose area is 144 superficial inches.

5.—For Hexdecagonal Masts or Timber, by the girt, the Divisor is 114.573 (or more simply 114.5), the square of one-fourth of 42.8156, the perimeter of a regular Hexdecagon whose area is 144 superficial inches.

6.—For Round Masts or Timber, by the diameter, the Divisor is 183.34 (or more simply 183), being the

square of the diameter of a circle of which the area is 144 superficial inches.

7.—For Round Masts or Timber, by the girt, the numerical Divisor is 113.0973 (or more simply by 113), the square of one-fourth of 42.53889, the circumference of a circle equal in area to a square the side of which is 12 inches.

## SECTON VI.

## MENSURATION OF WAINSCOT BOARDS.

In ascertaining the dimensions of Wainscot Boards, you are to take the length to half a foot and the thickness to an eighth of an inch, without having any regard to the breadth, including in the contents every fractional part amounting to one twelfth of a foot, according to the following Rules and Examples; observing, that a Board of 12 feet in length, and one inch in thickness, is denominated a foot of Wainscot, and so in proportion for any greater or lesser length or thickness.

*Rule.*

Multiply the number of Boards by the length in feet, and the product by the thickness in inches, then divide by twelve, and the quotient will be the number of Boards of twelve feet in length, and one inch in thickness.

*Example.*

Suppose 15 Wainscot Boards to be 13 feet in length, and $1\frac{1}{2}$ inch in thickness, what would be the number of feet of Wainscot, or the number of Boards, 12 feet long, and one inch thick.

*Operation by the Pen.*

15 boards
13 length

45
15

195
1.5 thickness

975
195

12)292.5

$24\frac{4}{12}$ feet of Wainscot.

In order to ascertain the contents of Wainscot Boards by the Sliding Rule, it will be necessary to multiply the thickness in inches by 12, and to operate according to the following

*Rule.*

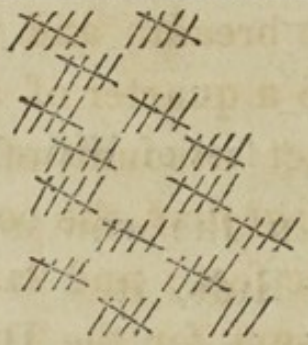
Set the number of the Boards, on the line C, to 12 times the thickness in inches, on the inverted line E; then against the length in feet, on the line A, you will find the number of feet and parts of Wainscot, on the line B.

*Example.*

Set 15, the number of Boards, on the line C, to 18 inches, being the thickness multiplied by 12, on the line E; then against 13, the length in feet, on the line A, will be found $24\frac{4}{12}$ feet of Wainscot, the content on the line B.

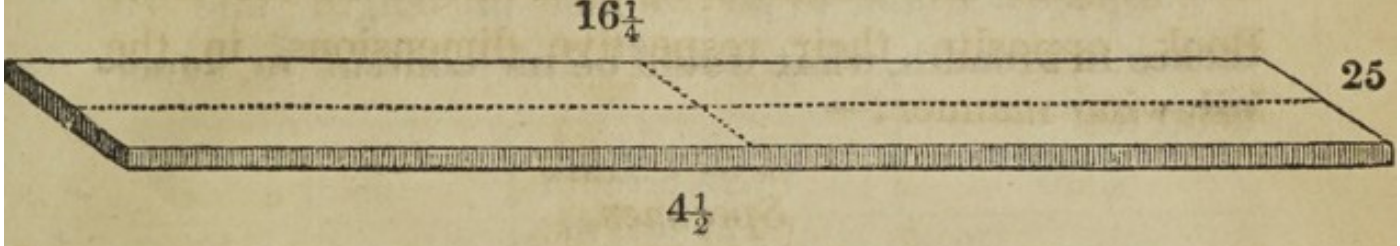
Wainscot Boards are to be assorted according to their lengths and thicknesses, and tallied in the Blue Book, opposite their respective dimensions, in the following manner:—

*Specimen.*

| Lengths | Thick. | Tallied at 1. | Boards. | Feet. |
|---|---|---|---|---|
| 13 | $1\frac{1}{2}$ |  | 15 | 24.4 |
| $7\frac{1}{2}$ | $\frac{3}{4}$ | | 20 | 9.3 |
| 9 | $\frac{1}{2}$ | | 20 | 7.5 |
| $14\frac{1}{2}$ | $\frac{3}{8}$ | | 18 | 8.1 |

73 Boards, $49\frac{3}{10}$ feet of Wainscot.

# SECTION VII.




## MENSURATION OF OAK PLANKS, &c.

In measuring Oak and other Planks, take the length to half a foot, and the breadth and thickness, at the middle of the Plank, to a quarter of an inch; keeping a separate and distinct account of each respective thickness; computing, *at first*, the contents in superficial feet; *then*, in cubic feet; and lastly, bringing the whole into one total sum for the Duty, according to the following Rules and Examples:—

*Rule Arithmetically.*

1. Multiply the breadth, in inches, by the length, in feet; divide the product by 12, and the quotient will be the content in superficial feet, which must be computed to half a foot.

2. In order to reduce the superficial content to cubic feet, multiply the superficial content, before, found, by the thickness; divide by 12, and the quotient will be the content in cubic feet; which must be computed to a twelfth of a cubic foot.

*Example.*

Suppose a Plank to be 25 feet in length, and $16\frac{1}{4}$ inches in breadth, what would be its content in superficial feet?

16.25 breadth
25 length

8125
3250

12)406.25

$33\frac{1}{2}$ superficial feet.

Then, to find the solid or cubic content, the thickness being supposed to be $4\frac{1}{2}$ inches, proceed as follows:

33.5 the superficial content
4.5 the thickness

1675
1340

12)150.75

$12\frac{6}{12}$ cubic feet.

*Operation by the Sliding Rule.*

1. Set 25, the length in feet, on the line B, to the Gauge Point 12, on the line A; then against $16\frac{1}{4}$, the breadth, in inches, on the line A, will be found $33\frac{1}{2}$, the content, in superficial feet, on the line B.

2. To reduce this content to cubic feet, set $33\frac{1}{2}$, the superficial content in feet, on the line B, to the Gauge Point 12, on the line A; then against $4\frac{1}{2}$, the thickness, in inches, on the line A, will be found $12\frac{6}{18}$, the content, in cubic feet on the line B.

## *A Specimen of the Mode of Entering Oak Plank in the Blue Book, according to their respective thicknesses.*

| Oak Plank, $2\frac{1}{2}$ inches thick | | | | Plank, $3\frac{1}{4}$ inches thick | | | | Plank, 4 inches thick | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Marks & Numbers | Length | Breadth | Contents | Marks & Numbers | Length | Breadth | Contents | Marks & Numbers | Length | Breadth | Contents |
| A.B. | | | | A.B. | | | | A.B. | | | |
| 1 | 29 | 11 | $26\frac{1}{2}$ | 1 | 32 | $12\frac{3}{4}$ | 34 | 1 | 30 | $12\frac{3}{4}$ | $31\frac{1}{2}$ |
| 2 | 24 | $12\frac{1}{2}$ | 25 | 2 | 32 | $11\frac{1}{2}$ | $30\frac{1}{2}$ | 2 | 31 | 13 | $33\frac{1}{2}$ |
| 3 | 25 | $12\frac{3}{4}$ | $26\frac{1}{2}$ | 3 | 31 | 12 | 31 | 3 | 31 | $11\frac{1}{2}$ | $29\frac{1}{2}$ |
| 4 | $24\frac{1}{2}$ | $12\frac{1}{4}$ | 25 | 4 | 32 | 12 | 32 | 4 | $31\frac{1}{2}$ | $11\frac{1}{2}$ | 30 |
| 5 | 24 | $11\frac{3}{4}$ | $23\frac{1}{2}$ | 5 | 31 | 11 | 28 | 5 | $31\frac{1}{2}$ | 12 | $31\frac{1}{2}$ |
| 6 | $26\frac{1}{2}$ | $12\frac{1}{4}$ | 27 | 6 | $31\frac{1}{2}$ | $12\frac{1}{4}$ | 32 | 6 | $30\frac{1}{2}$ | 13 | 33 |
| 7 | $24\frac{1}{2}$ | $12\frac{1}{2}$ | $25\frac{1}{2}$ | 7 | 31 | $11\frac{3}{4}$ | 30 | 7 | 31 | $12\frac{1}{4}$ | $31\frac{1}{2}$ |
| 8 | $25\frac{1}{2}$ | $12\frac{1}{4}$ | 26 | 8 | $30\frac{1}{2}$ | 12 | $30\frac{1}{2}$ | 8 | 30 | 12 | 30 |
| 9 | 25 | $11\frac{3}{4}$ | $24\frac{1}{2}$ | 9 | $32\frac{1}{2}$ | $12\frac{1}{4}$ | 33 | 9 | $33\frac{1}{2}$ | $12\frac{1}{4}$ | 34 |
| 10 | $22\frac{1}{2}$ | $12\frac{1}{2}$ | 23 | 10 | 30 | 12 | 30 | 10 | $35\frac{1}{2}$ | $12\frac{1}{4}$ | 36 |
| 10 | Sup. | Feet | $252\frac{1}{2}$ | 10 | Sup. | Feet | 311 | 10 | Sup. | Feet | $320\frac{1}{2}$ |
| | | Thick. $2\frac{1}{2}$ in. | | | | Thick $3\frac{1}{4}$ in. | | | | Thick. 4 in. | |
| | | 505 | | | | 933 | | | | 12)1282 | |
| | | $126\frac{1}{4}$ | | | | $77\frac{3}{4}$ | | | | Cu. Feet, $106\frac{10}{12}$ | |
| | | $12)631\frac{1}{4}$ | | | | $12)1010\frac{3}{4}$ | | | | | |
| | | Cubic Feet, $52\frac{7}{12}$ | | | | cubic feet $84\frac{2}{12}$ | | | | | |

### *Totals Collected.*

| | | | | |
|---|---|---|---|---|
| 10 Planks, | $2\frac{1}{2}$ | inches, .. | $52\frac{7}{12}$ | Cubic Feet. |
| 10 do. | $3\frac{1}{4}$ | do. .. | $84\frac{2}{12}$ | do. |
| 10 do. | 4 | do. .. | $106\frac{10}{12}$ | do. |
| 30 Planks | | | $243\frac{7}{12}$ | Cubic Feet. |

Content for the Duty, 4 Loads, $43\frac{7}{12}$ Feet.

*2d.—A Specimen of the manner of inserting Oak Plank in the Blue Book, when* not classified, *but ascertained according to the method prescribed in last example, page.* 20

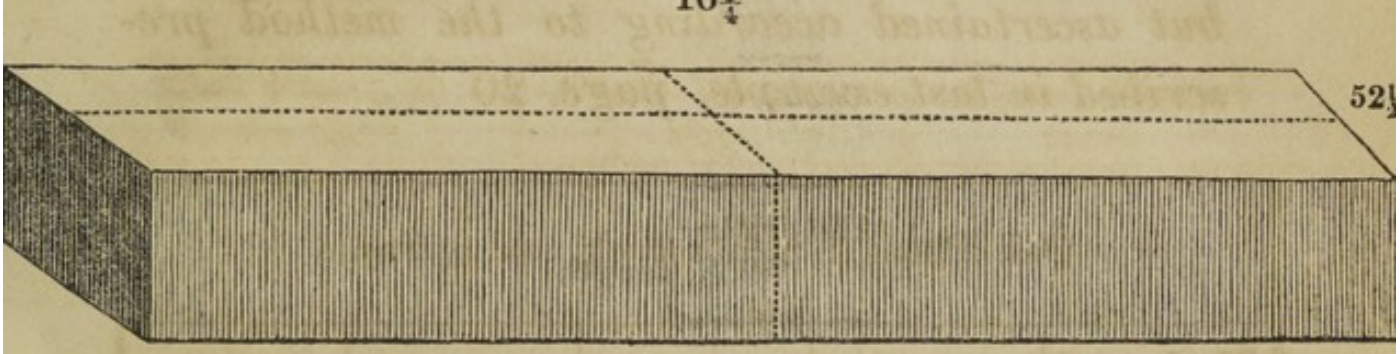
| Oak Plank, 2 inches thick, and upwards | | | | |
|---|---|---|---|---|
| Marks and Numbers | Length | Breadth | Thickness | Contents |
| A.B. | | | | Ft. 10ths |
| 1 | 30 | $13\frac{1}{4}$ | $2\frac{1}{2}$ | 6.9 |
| 2 | $31\frac{1}{2}$ | $13\frac{1}{2}$ | 3 | 8.8 |
| 3 | $34\frac{1}{2}$ | $12\frac{3}{4}$ | $3\frac{1}{2}$ | 10.6 |
| 4 | 30 | 12 | 4 | 10.0 |
| 5 | 24 | 13 | $4\frac{1}{2}$ | 9.7 |
| 6 | $28\frac{1}{2}$ | $14\frac{1}{4}$ | $4\frac{3}{4}$ | 13.3 |
| 7 | 32 | $13\frac{1}{2}$ | $5\frac{1}{4}$ | 15.7 |
| 8 | 34 | $14\frac{1}{4}$ | $5\frac{1}{2}$ | 18.4 |
| 9 | $37\frac{1}{2}$ | $15\frac{3}{4}$ | $6\frac{1}{4}$ | 25.6 |
| 10 | 35 | $14\frac{1}{2}$ | $7\frac{3}{4}$ | 27.3 |
| 10 Planks | | | Cubic Feet, | 146.3 |

Content for the Duty, 2 Loads, $46_{10}^{3}$ Feet.

N.B.—The Cubic Contents of the above Plank may be more easily computed by the "inverted" side of the Rule, as follows:

Set the thickness, on the line C, to the breadth, on the line E; then, against the length, on the line A, will be found the content in cubic feet and tenths of a foot, on the line B.

## SECTION VIII.




## MENSURATION OF EQUAL SIDED SQUARE TIMBER

In measuring square or equal sided Timber, take the length to half a foot, and the side of the square, with the callipers, at the middle of the piece, to a quarter of an inch, and compute the content to an entire foot; according to the following Rule and Example:

### *Rule Arithmetically.*

Multiply the side of the square, in inches, by itself, in inches, and the product by the length, in feet; then divide by 144, and the quotient will be the content, in cubic feet.

### *Example.*

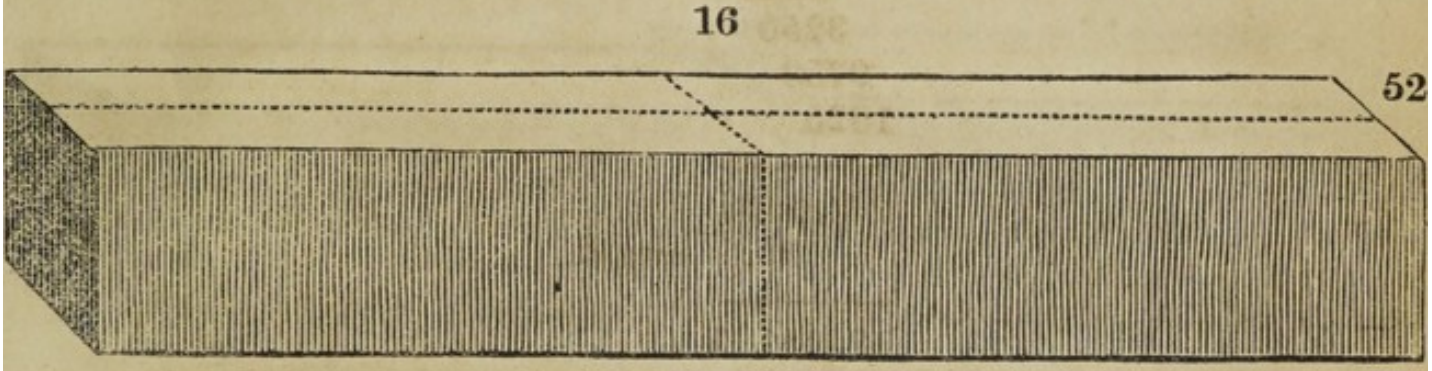
Suppose a piece of equal sided Timber to be 52½ feet in length, and 16¼ inches square, what would be its content in cubic feet?

```
    16.25 Side of the Square
    16.25
   ------
     8125
    3250
   9750
  1625
  ---------
  264.0625
       52.5  length
  ---------
  13203125
   5281250
  13203125
 ------------
144)13863.28125(96 cubic feet
  1296
 ------
   903
   864
  ----
    39
```

*Operation by the Sliding Rule.*

Set $52\frac{1}{2}$, the length in feet, on the line C, to the Gauge point 12, on the line D; then against $16\frac{1}{4}$, the side of the square, in inches, on the same line D, will be found 96, the content in cubic feet, on the line C.

# SECTION IX.




## MENSURATION OF UNEQUAL SIDED SQUARE TIMBER.

In measuring unequal sided Square Timber, take the length to half a foot, and the breadth and thickness, at the middle of the piece, to a quarter of an inch, and compute the content by the following Rule and Example:—

*Rule.*

Multiply the breadth, in inches, by the thickness, in inches, and the product by the length, in feet; then divide by 144, and the quotient will be the content, in cubic feet.

*Example.*

Let an unequal sided piece of Square Timber be 52 feet in length, 17½ inches in breadth, and 16 inches in thickness, required its content in cubic feet.

17.5 breadth
16 thickness

1050
175

280.0
52 length

5600
14000

144)14560.0(101 cubic feet.
144

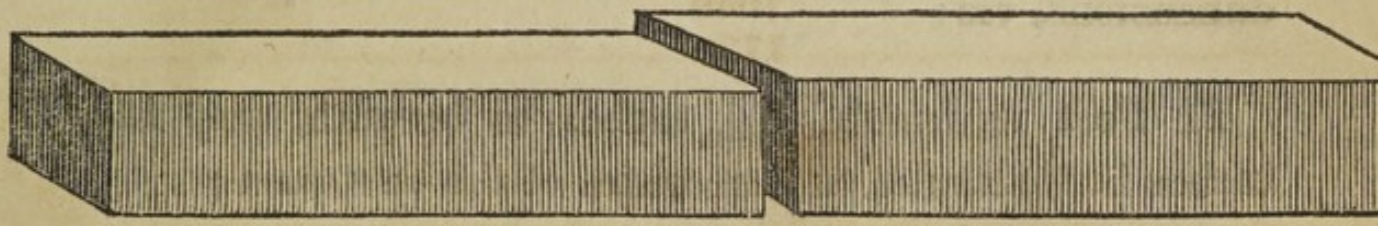
160
144

16

*Operation by the Sliding Rule.*

Set 17½, the breadth, in inches, on the inverted line E, to 16, the thickness, in inches, on the line C; then opposite to 52, the length, in feet, on the line A, will be found 101, on the line B, the content, in cubic feet.

# SECTION X.



## MENSURATION OF IRREGULAR OR UNEQUALLY HEWN SQUARE TIMBER.

If a piece of Timber should be irregular in its squareage, and be made up of different prismatic figures, like that described in the annexed diagram, which is the case with what are usually termed "double pieces," frequently imported from the British Colonies in America, particularly in such as have apparently been intended for two or more pieces, of different Sections (but which, by some neglect, had not been separated; or, when one part of a piece shall have been cut away, in order to make better stowage, or from what ever cause such defect may have arisen,) observe the following General Directions, viz.:—

Divide the piece into as many separate parts as by its shape may appear to be necessary, and as often as the original form may happen to have been altered: then proceed to take the dimensions, and compute the separate contents of each part to half a cubic foot, adding the partial contents into one total sum, for the entire content of the piece.

*Example.*

Let a double piece of Timber be of the following dimensions, viz:—

21 Feet in length, 15½ inches in breadth, and 15 inches in thickness, at the centre of the butt part;

And 25 feet in length, 14 inches in breadth, and 13½ inches in thickness, at the middle of the top part;

Required the entire content in cubic feet, by the Sliding Rule?

Set 15½, the breadth, in inches, on the line E, to 15 the thickness, in inches, on the line C; then against 21 feet, the length of the butt part, on the line A, will be found 33½, the *partial* content, on the line B. Also, set 14, the breadth, on the line E, to 13½, the thickness, on the line C, and against 25 feet, the length of the top part, on the line A, will be found the other *partial* content of 32½ cubic feet, on the line B.

Then these two contents being added together, give 66 cubic feet, the entire content of the piece.

# SECTION XI.

## MENSURATION OF FIR TIMBER.

### *Commonly distinguished as Balks, or Fir Quarters being 5 inches square, or upwards.*

1st. In ascertaining the dimensions of Balks, or Fir Quarters, 5 inches square, or upwards, take the length to half a foot, and the breadth and thickness, at the middle of the piece, to a quarter of an inch, including, in each separate content, every fractional part amounting to one-half a cubic foot, and computing the content by the sliding Rule, as follows :—

*Example.*

Let a piece of Fir Timber, or Balk, be 18½ feet in length, 6¾ inches in breadth, and 6½ inches in thickness, required its content, in cubic feet, *and half feet* ?

*Operation by the Sliding Rule.*

Set 6¾, the breadth, in inches, on the line E, to 6½, the thickness, in inches, on the line C ; then opposite to 18½ feet, the length, on the line A, will be found 6½, the content, in cubic feet, on the line B.

2d. Fir Timber, of the growth of Norway, should be distinguished as being 5, and not above 10, inches square, on account of the drawback which is allowed on this description of Timber, when used or employed in any of the Mines of Tin, Lead, or Copper, in the

Counties of Devon and Cornwall; and in cubing the dimensions, every fractional part of a solid foot, in the content of each piece, is to be neglected, keeping a separate account of the same in the Blue Book.

3d. Fir Timber, exceeding 10 inches square, must be distinguished as such, on account of its not being entitled to the Drawback, when employed in the Mines; and its contents are to be ascertained to an integral foot only, neglecting the fractional parts, as in the preceding number.

# SECTION XII.

## MENSURATION OF UFERS,

*Or Rough Balks, not hewn down to a die square, being 5 inches square, or upwards.*

In ascertaining the dimensions of Ufers, 5 inches square, or upwards, take the length to half a foot, and the breadth and thickness, at the centre of the piece, to a quarter of an inch, including in each separate content, every fractional part amounting to half a cubic foot, in the same manner as Balks, 5, and under 8 inches square.

# SECTION XIII.

## MENSURATION OF FIR PLANKS,

*Commonly denominated Thick Stuff; the same being 8 inches square, or upwards.*

In ascertaining the dimensions of this description of Wood, it is necessary to remark, that when the product of the breadth and thickness, taken at the middle of the piece, is found equal to 64, being the square of 8 it is then to be estimated as Timber, 8 inches square or upwards, taking the length to half a foot, and the breadth and thickness, at the middle of the piece, to a quarter of an inch, and including in each *separate* content every fractional part amounting to one half of a cubic foot computing the contents according to the following Rule and Example:—

### *Rule.*

Multiply the breadth in inches, by the thickness, in inches and the product by the length, in feet; then divide by 144, and the quotient will be the content in cubic feet.

### *Example.*

Let a piece of Fir Plank, or Thick Stuff, be 39 feet in length, 13 inches in breadth, and 5 inches in thickness, required its content, in cubic feet?

*Operation by the Pen.*

Inches
13 breadth,
5 thickness

65 product,
39 length,

585
195

144)2535(17½ cubic feet,
144

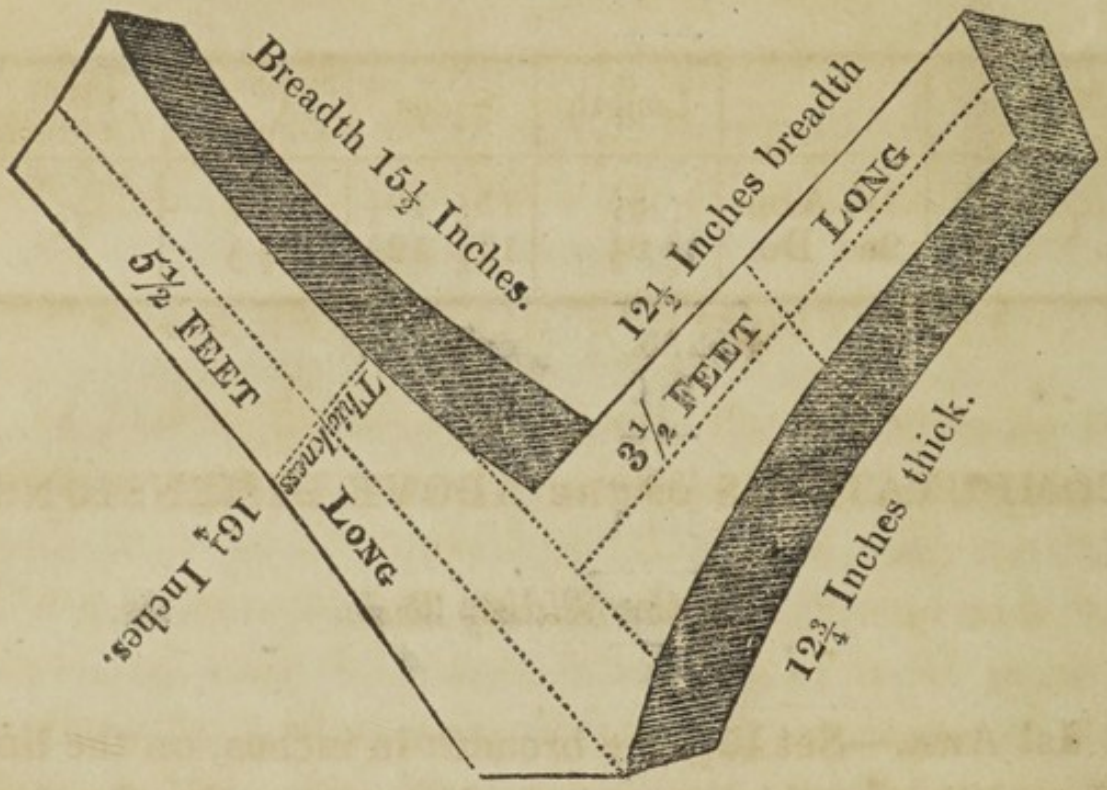
1095
1008

87 Remainder more than half a cubic foot
144

*By the Sliding Rule.*

Set 13, the breadth, in inches, on the line E, to 5, the thickness, in inches, on the line C; then opposite to 39, the length, in feet, on the line A, will be found 17½, the content in cubic feet, on the line B.

## SECTION XIV.




## MENSURATION OF KNEES OF OAK.

In the Mensuration of Oak Knee Pieces, the length of each arm is to be taken to half a foot, and the breadth and thickness, at the middle of each section, to a quarter of an inch; and when such Pieces are found to be of different forms and dimensions, each part is to be calculated separately *by itself*, including in each *separate* content every fractional part amounting to half a cubic foot; observing that although one of the arms may not be 8 inches square, yet if the other be of

that size, the whole is to be measured as Timber 8 inches square or upwards, according to the following Specimen:

| Number | | Length | Sides | Separate Content | Total Content |
|---|---|---|---|---|---|
| 1 | 1st Arm | $5\frac{1}{2}$ | $15\frac{1}{2}$ $16\frac{1}{4}$ | $9\frac{1}{2}$ | 13 |
| | 2nd Do. | $3\frac{1}{2}$ | $12\frac{1}{2}$ $12\frac{3}{4}$ | $3\frac{1}{2}$ | |

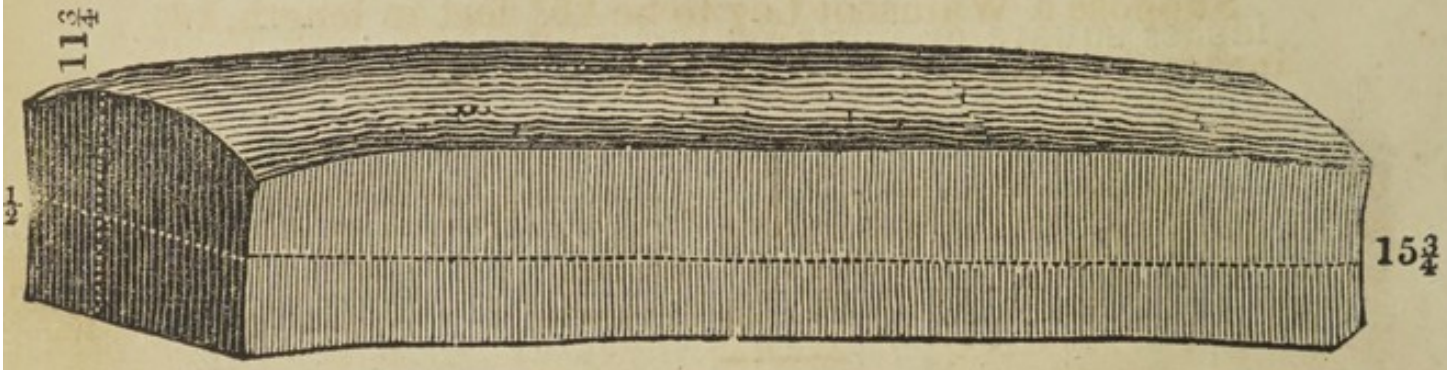
## COMPUTATIONS OF THE ABOVE DIMENSIONS,

*By the Sliding Rule.*

1st Arm.—Set $15\frac{1}{2}$, the breadth in inches, on the line E, to $16\frac{1}{4}$, the thickness in inches, on the line C; then opposite to $5\frac{1}{2}$, the length in feet, on the line A, will be found $9\frac{1}{2}$ cubic feet, the *partial* content, on the line B:

Again, for the second Arm.—Set $12\frac{1}{2}$, the breadth in inches, on the line E, to $12\frac{3}{4}$, the thickness in inches, on the line C; then against $3\frac{1}{2}$, the length in feet, on the line A, will be found $3\frac{1}{2}$ cubic feet, the other *partial* content, on the line B; which being added to the first partial content, gives 13 cubic feet for the entire content required.

## SECTION XV.




## MENSURATION OF WAINSCOT LOGS.

In measuring Wainscot Logs, the length is to be taken to a quarter of a foot, and the Bark being previously removed, the breadth and thickness, with the callipers, at the middle of the Log, to a quarter of an inch; observing, that the breadth is to be taken at the middle of the square sides, that is to say, at the centre of the mean height; and the thickness at one fourth of the breadth, in a line drawn from the circular side to its *opposite* and corresponding square side, perpendicular to the base, and which represents the mean thickness; including in each *separate* content every fractional part amounting to half a cubic foot, according to the following Rule and Example:—

*Rule.*

Multiply the breadth in inches by the thickness in inches, and the product by the length in feet; then divide by 144, and the quotient will be the content in cubic feet.

*Example.*

Suppose a Wainscot Log to be $15\frac{3}{4}$ feet in length, $14\frac{1}{2}$ inches in breadth, and $11\frac{3}{4}$ inches in thickness, what would be its content in cubic feet?

Inches.
14.5 breadth,
11.75 thickness,

725
1015
145
145

170.375
15.75 length,

851875
1192625
851875
170375

144)2683.41625(18$\frac{1}{2}$ cubic feet.
144

1243
1152

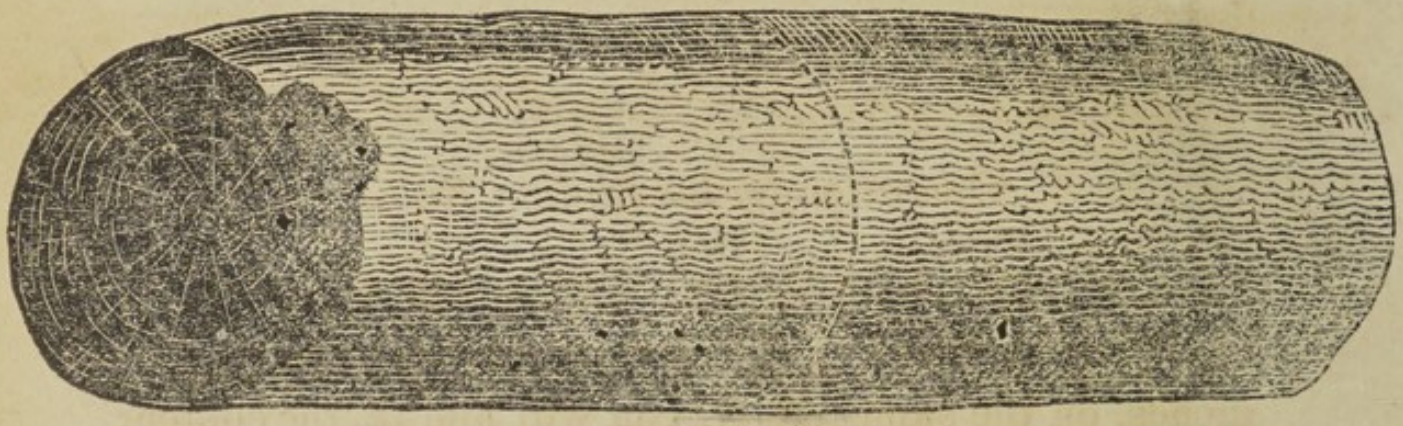
91
144

*By the Sliding Rule.*

Set $14\frac{1}{2}$, the breadth in inches, on the line E, to $11\frac{3}{4}$, the thickness in inches, on the line C; then against $15\frac{3}{4}$, the length in feet, on the line A, will be found $18\frac{1}{2}$, the content in cubic feet, on the line B.

# SECTION XVI.

Girt 32 Inches.



Length 17 Feet.

## MENSURATION OF ROUND WOOD LOGS,

### 8 *Inches Square or upwards.*

(See Round Masts.)

In ascertaining the dimensions of Round Wood, or Timber, the length is to be taken to half a foot, and the diameter, or quarter girt, to one-fourth of an inch; observing, that if such pieces of Round Wood be either 9 inches in diameter, or 7 inches in quarter girt, they would be equal in solidity to a square piece of the same length, the side of which is 8 inches; at which squareage they are rated as Timber: and the content is to be computed in cubic feet, according to the following examples.

*Example* 1.

Let a piece of Round Wood be 17 feet in length, and $11\frac{1}{2}$ inches in diameter, required its content in cubic feet?

*Operation by the Sliding Rule.*

Set 17, the length in feet, on C, to the Gauge Point 13.54, on the line D; then against $11\frac{1}{2}$, the diameter in inches, on the same line D, you will find 12, the content in cubic feet, on the line C.

*Example* 2.

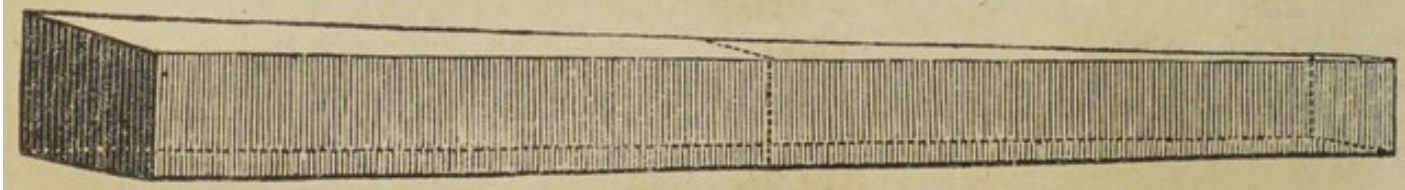
Suppose a piece of Round Wood to be 15 feet in length, and 32 inches in circumference, what would be its content in cubic feet?

*Operation by the Sliding Rule.*

Set 15, the length in feet, on the line C, to the Gauge Point 10.635, on the line D; then opposite to 8 inches, the quarter girt, on the same line D, there will be found 8, the content in cubic feet, on the line C.

# SECTION XVII.

18½ Inches Square.



Length 60½ Feet.

## MENSURATION OF SQUARE MASTS, AS TIMBER.

In ascertaining the solidity of square or equal sided Masts, take the length to half a foot, and the side of the square, at the middle section of the piece, to a quarter of an inch, and compute the content according to the following Rule and Example.

*Rule.*

Multiply the square of the side in inches, by the length in feet, divide by 144, and the quotient will be the content in cubic feet.

*Example.*

Suppose an equal sided Mast to be 18½ inches square, and 60½ feet in length, what would be its content in cubic feet?

Inches.
18.5 side of the square.
18.5

925
1480
185

342.25
60.5 length

171125
2053500

144)20706.125(143 cubic feet.
144

630
576

546
432

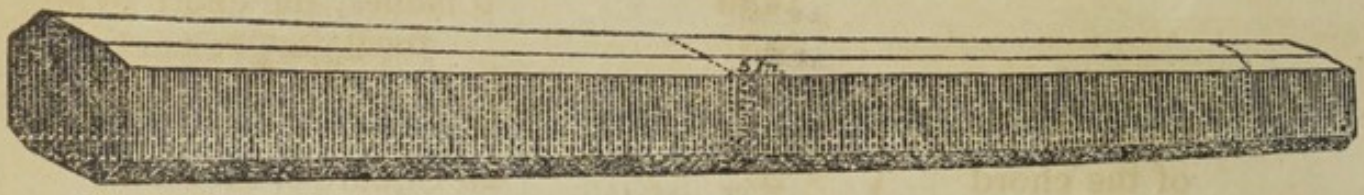
114

*Operation by the Sliding Rule.*

Set 60½, the length in feet, on the slide, to the Gauge Point 12, on the girt line; then against 18½ the side of the square in inches, on the girt line will be found 143, on the slide, the content in cubic feet.

# SECTION XVIII.

Side of the Square 18½ Inches, chord of Angle 5 Inches.



Length 70 Feet.

## MENSURATION OF IRREGULAR SQUARE MASTS.

In ascertaining the dimensions of Masts similar to that represented by the annexed figure, the length is to be taken to half a foot, the sides of the square, with the callipers, at the middle of the Mast, to a quarter of an inch, and also the chord of the defect at the angles; computing the content in cubic feet, according to the following Rule and Example.

*Rule.*

Multiply the breadth in inches by the thickness in inches, and from the product subtract the square of the chord of the defective angle; then multiply the remainder by the length in feet, divide the product by 144, and the quotient will be the content in cubic feet.

*Example.*

Suppose an irregular square Mast to be 70 feet long, the side of the square 18½ inches, and the chord of the defective angle 5 inches, what would be its content in cubic feet?

| | | |
|---|---|---|
| | Inches. | |
| | 18.5 side | |
| | 18.5 do. | |
| | 925 | |
| | 1480 | 5 inches, the chord of |
| | 185 | the defective angle |
| | 342.25 | 5 |
| Deduct the square of the chord | 25. | 25 Square of the chord |
| | 317.25 | |
| | 70 length | |

144)22207.50(154 cubic feet
144

780
720

607
576

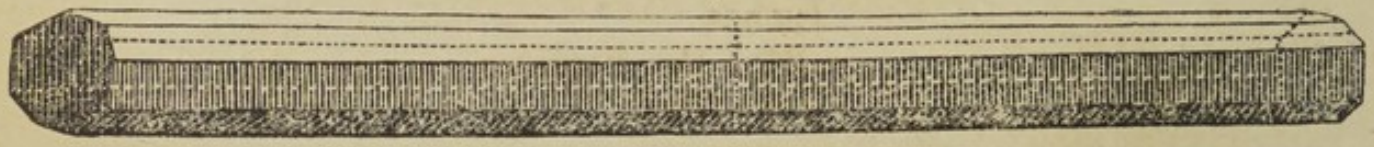
31
144

*Operation by the Sliding Rule.*

Set 70, the length in feet, on the line C, to the Gauge Point, 12, on the girt line; then against 18½, the side of the square in inches, on the same girt line, will be found 166 on the slide; also against 5, the chord of the defective angle in inches, there will be found on the line C, the content of 12 feet, which being subtracted from that of 166, leaves the remainder of 154 cubic feet for the true content of the mast.

# SECTION XIX.

Diameter $20\frac{1}{2}$ Inches.



Length $70\frac{1}{2}$ Feet

## MENSURATION OF OCTAGONAL MASTS BY THE DIAMETER.

In ascertaining the dimensions of Octagonal Masts, take the length to half a foot, and the diameter at the middle of the Mast with the callipers, to a quarter of an inch; and then compute the content to an entire foot, neglecting fractions, according to the following Rule and Example.

*Rule, Arithmetically.*

Multiply the square of the diameter in inches, by the length in feet; then divide the product by 174, and the quotient will be the content in cubic feet.

*Example.*

Suppose an Octagonal or eight sided Mast, to be $70\frac{1}{2}$ feet in length, and $20\frac{1}{2}$ inches in diameter, what would be its content in cubic feet?

*Operation by the Pen.*

Inches.
20.5 the diameter
20.5 ditto

1025
4100

420.25
70.5 length

210125
2941750

174)29627.625(170 cubic feet
174

1222
1218

47

*By the Sliding Rule.*

Set $70\frac{1}{2}$, the length in feet, on the slide or line C, to the Gauge Point 13.184 on the girt line: then against $20\frac{1}{2}$, the diameter in inches, on the same girt line, will be found on the slide, 170, the content in cubic feet.

## SECTION XX.

(Diagram same as last Section.)

## MENSURATION OF OCTAGONAL MASTS, BY THE CIRCUMFERENCE.

In ascertaining the dimensions of Octagonal Masts, the length is to be taken to half a foot, and the circumference or girt, at the middle of the Mast, to an inch, from which the content is to be computed in cubic feet, according to the following Rule and Example.

### *Rule.*

Multiply the square of the quarter girt in inches, by the length in feet, then divide the product by 119, and the quotient will be the content in cubic feet.

### *Example.*

Let an Octagon Mast be 72½ feet in length, and 74 inches in girt, required its content in cubic feet?

*Operation by the Pen.*

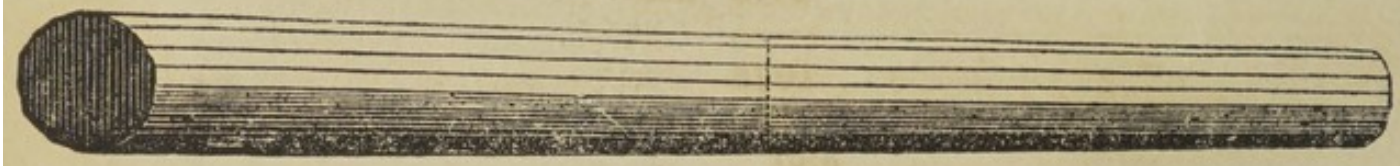
```
  4)74   inches girt
  ----
  18.5  inches quarter girt
  18.5
  ----
   925
  1480
   185
  ----
  342.25
   72.5  length
  ------
  171125
   68450
  239575
  ------
119)24813.125(208  cubic feet, the content required
  238
  ---
  1013
   952
  ---
    61
```

*Operation by the Sliding Rule.*

Set $72\frac{1}{2}$, the length in feet, on the slide, to the Gauge Point, 10.922, on the girt line; then against $18\frac{1}{2}$, the quarter girt in inches, on the same girt line, will be found on the slide, the content of 208 cubic feet.

# SECTION XXI.

Diameter 21½ Inches.



Length 82½ Feet

## MENSURATION OF HEXDECAGONAL OR SIXTEEN SIDED MASTS, BY THE DIAMETER.

In ascertaining the dimensions of Masts, hewn down to sixteen sides, the length is to be taken to half a foot, and the diameter with the callipers, at the middle of the Mast, to a quarter of an inch; and the content is to be computed in cubic feet according to the following Rule and Example:

*Rule.*

Multiply the square of the diameter in inches, by the length in feet; then divide by 181, and the quotient will be the content in cubic feet.

*Example.*

Suppose a Mast of a Hexdecagonal form to be 82½ feet in length, and 21½ inches in diameter, what would be its content in cubic feet?

*Operation by the Pen.*

Inches.

21.5 in the diameter
21.5 ditto

1075
215
430

462.25
82.5 the length

231125
92450
369800

181)38135.625(210 cubic feet
362

193
181

125
181

*By the Sliding Rule.*

Set 82½, the length in feet, on the line C, to the Gauge Point 13.453, on the girt line; then against 21½, the diameter in inches, on the same line, or line D, will be found on the slide, 210 feet, the cubic content.

# SECTION XXII

68 Inches Girt.

Length 74 Feet.

## MENSURATION OF HEXDECAGONAL MASTS BY THE CIRCUMFERENCE.

In ascertaining the dimensions of Hexdecagonal, or sixteen sided Masts, the length is to be taken to half a foot, and the girt, at the middle of the Mast, to an inch; from which the content is to be computed in cubic feet, according to the following Rule and Example:

*Rule.*

Multiply the square of the quarter girt, in inches, by the length in feet, then divide the product by 114.5 and the quotient will be the content in cubic feet?

*Example.*

Suppose a Mast to be 74 feet in length, and 68 inches in girt, what would be its content in cubic feet?

*Operation by the Pen.*

```
4.)68 girt
---
  17 inches quarter girt
  17
---
 119
 17
---
 289
  74 length
---
1156
2023
----
114.5)21386.0(186 cubic feet the content
 1145
-----
 9936
 9160
-----
  7760
  6870
-----
   890
```

*By the Sliding Rule.*

Set 74, the length in feet, on the slide, to the Gauge Point, 10.70, on the girt line; then against 17, the quarter girt in inches, on the same girt line, you will find 186 cubic feet, on the slide, the content required.

# SECTION XXIII.

Diameter 20½ Inches.

Length 80½ Feet.

## MENSURATION OF ROUND MASTS BY THE DIAMETER.

In ascertaining the dimensions of Round Masts, the length is to be taken to half a foot, and the diameter, with the callipers, at the middle of the Mast, to a quarter of an inch; from which the content is to be computed to an entire foot, according to the following Rule and Example:

*Rule.*

Multiply the diameter in inches, by itself in inches, and the product by the length in feet; then divide by 183, and the quotient will be the content in cubic feet.

*Example.*

Suppose a Round Mast to be 80½ feet in length, and 20½ inches in diameter, what would be its content in cubic feet?

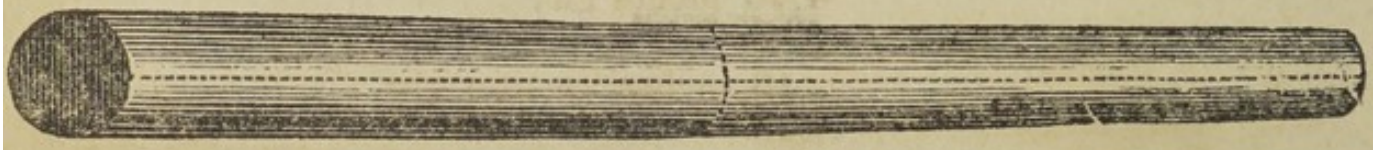
```
   20.5 the diameter
   20.5 ditto
  ------
   1025
  4100
 ------
 420.25
   80.5 length
 ------
 210125
3362000
 ------
183)33830.125(184 cubic feet
  183
 ------
  1553
  1464
 ------
   890
   732
 ------
   158
  ----
   183
```

*Operation by the Sliding Rule.*

Set 80½ the length in feet, on the slide, to the Gauge Point, 13.54, on the girt line; and against 20½, the diameter, in inches, on the girt line, will be found on the slide 184, the content in cubic feet.

# SECTION XXIV.

76 Inches Girt.



Length 80 Feet.

## MENSURATION OF ROUND MASTS, BY THE CIRCUMFERENCE OR GIRT.

In ascertaining the dimensions of Round Masts, the length is to be taken to half a foot, and the circumference, or girt, at the middle of the Mast, to an inch; observing that a numerical fourth of the entire circumference is to be taken for the quarter girt; from which dimensions proceed to compute the content to an integral foot, neglecting fractions, according to the following Rule and Example.

*Rule.*

Multiply the square of the quarter girt in inches, by the length, in feet; then divide the product by the divisor, 113, and the quotient will be the content, in cubic feet.

*Example.*

Let a Round Mast be 80 feet in length, and 76 inches in circumference, required its content in cubic feet?

*Operation by the Pen.*

4)76 inches girt

19 inches, quarter girt
19

171
19

361
80 Feet Length

113)28880(255 cubic feet, the content
226

628
565

630
565

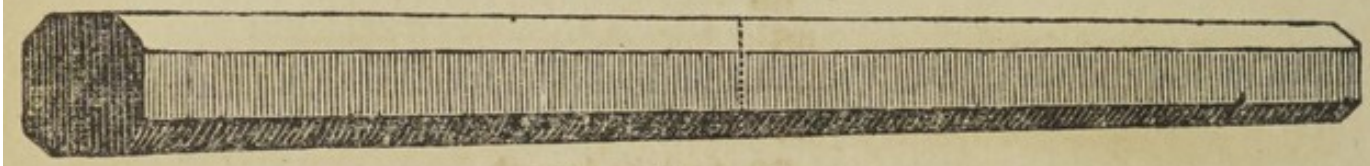
65

*By the Sliding Rule.*

Set 80, the length in feet, on the slide, to the Gauge Point 10.63, on the girt line; then against 19, the quarter girt in inches, on the girt line, will be found on the slide 255, the content in cubic feet.

# SECTION XXV.

24 Inches Diameter.



Length 70 Feet.

## MENSURATION OF IRREGULAR ROUND MASTS.

In ascertaining the dimensions of irregular Round Masts, the length is to be taken to half a foot, and the square and circular diameters, with the callipers, at the middle of the Mast, to a quarter of an inch; adding those two dimensions together, and taking the half sum for the mean diameter; computing the content according to the following Example:—

*Example.*

Let an irregular Round Mast be 70 feet in length, the diameter of the square sides 22 inches, and that of the circular sides 24 inches: required the content in cubic feet?

*Operation by the Pen.*

Diameter of the square sides 22 inches
Diameter of the circular do. 24

2)46 sum

23 half sum

Inches
23 half sum
23

69
46

529
70 feet in length

183)37030(202 cubic feet
366

430
366

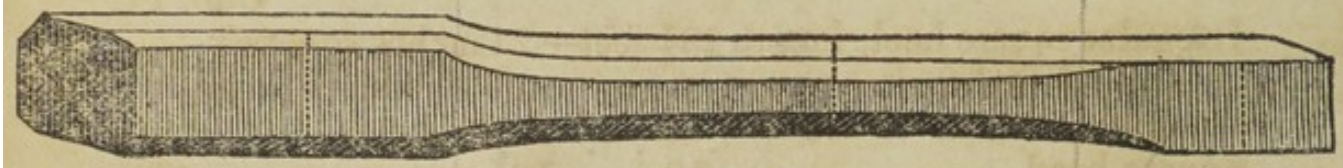
64
183

*By the Sliding Rule.*

Set 70, the length in feet, on the slide, or line C, to the Gauge Point 13.54 on the line D; then against 23, the half sum of the square and circular diameters, in inches on the girt line, there will be found 202, the content in cubic feet, on the slide.

## SECTION XXVI.

Side of Square 24 Inches  Diameter 25 Inches  Side 18½



23½ Feet  30 Feet  10 Feet

## MENSURATION OF BOWSPRITS.

In ascertaining the dimensions of Bowsprits, the length is to be taken to half a foot, and the diameter, or side of the square to a quarter of an inch, at the middle of the piece; and, when a Bowsprit is found composed of different figures, the content of each part is to be computed separately, to half a cubic foot, by the rules prescribed for the mensuration of Masts, according as the separate sections may happen to be square, octagon, hexdecagon, or circular.

*Example.*

Suppose a Bowsprit to be made up of the following figures,—1st, an irregular square heel, 23½ feet in length, the side of the square 24 inches, and the chord of the angle 3 inches; 2nd, *an octagonal middle*, 30 feet in length, and 25 inches in diameter; and 3rd, a square head, 10 feet in length, and the side of the square 18½ inches, required the content in cubic feet?

## *Computations.*

| | | | | Cub. Ft. |
|---|---|---|---|---|
| Irregular square heel, length 23½ feet—24 inches square<br>Angle 3 inches .. .. .. .. | | | | 93 |
| Octagon Middle .. | 30 | 25 diameter | | 107½ |
| Square head .. | 10 | 18½ square | | 23½ |
| | | Total content .. | | 224 |

# SECTION XXVII.

Square heel. Octagon. Round. Squ. head.

## MENSURATION OF TOP MASTS.

In ascertaining the cubic contents of Topmasts, and all other sorts of Masts, composed of different figures, you are to observe the directions given in the article for Bowsprits.

*Example.*

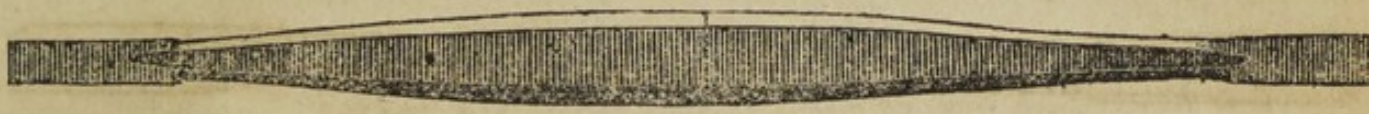
Suppose a Topmast to be made up of the following figures, viz: a square heel 9 feet in length, and 18 inches square; an octagonal part 16 feet in length, and 16½ inches in diameter; a round part 14 feet in length, and 15 inches in diameter; and, lastly, a square head 6 feet in length, and 12 inches square; what would be its entire content in cubic feet?

*Computations.*

| | Length | Inches. | Cub. Ft. |
|---|---|---|---|
| Square heel .. | 9 feet .. | 18 square .. | 20 |
| Octagon .. | 16 .. | 16½ diameter .. | 25 |
| Round .. | 14 .. | 15 do. .. | 17 |
| Square head .. | 6 .. | 12 square .. | 6 |
| | | | 68 |

# SECTION XXVIII.

Middle. Diameter 20¼ Inches.



Length 86½ Feet.

## MENSURATION OF SHIPS' YARDS.

In ascertaining the contents of Yards, you will observe, that the largest lateral dimension is at the middle, and that they taper regularly, or nearly so, from the centre to the extremities of the Yard Arms*:

You are, therefore, to take either the diameter or girt, at the fourth part of the whole length, to a quarter of an inch, if the dimension be a diameter, and to a whole inch, if it be a girt; and length to half a foot: you are then to proceed to compute the contents according to the following Rule and Example, for a round Yard; observing, that when you meet with Yards of

* But, strictly speaking, the Yard is not composed of two frustrums of a cone, or any other regular solid, rebutting each other at the middle of the piece; but it approximates, in some degree, to a solid of equal resistance; so that, in fact, it is a figure not made up of straight lines, but curved lines, which approach, very nearly, to the nature of the Parabola; and for which reason the lateral dimensions, whether diameter or girt, taken at the "quarter section," is somewhat less than the "true mean dimension."

different figures, you are to compute their contents by the several Rules and Examples laid down for the mensuration of Masts of each respective form.

*Rule, Arithmetically.*

Multiply the square of the diameter in inches, by the length in feet, divide the product by 183, and the quotient will be the content in cubic feet.

*Example.*

Let a Round Yard be 86½ feet in length, and 20¼ inches in diameter at the quarter section, what would be its content in cubic feet?

20.5 inches.
20.

4100
86½ length.

24600
32800
2050

183)354650(193 cubic feet.
183

1716
1647

695
549

146
183

*Operation by the Sliding Rule.*

Set 86½, the length of the Yard in feet, on the slide, to the Gauge Point 13.54, on the girt line; then opposite to 20¼, the diameter in inches, on the same girt line, will be found the content of 193 cubic feet on the slide.

N.B. The content of an octagonal Yard, such as is represented by the diagram at the head of this article, and of the same dimensions as the preceding, would be 204 cubic feet.

# SECTION XXIX

## GENERAL DIRECTIONS.

It is customary in the Timber trade, in London, to mark the solid and superficial contents of Masts, Timber, and Plank, with Roman characters; but as this practice has not been generally adopted by the Revenue at the Out Ports, a Table of those characters is here subjoined, commencing at unity, and ending at 100; all higher contents are usually marked in common figures.

### TABLE.

| 1 | 11 | 21 | 31 | 41 | 51 | 61 | 71 | 81 | 91 |
|---|---|---|---|---|---|---|---|---|---|
| — | — | — | — | — | — | — | — | — | — |
| 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| I | XI | XXI | XXXI | XXXXI | XXXXXI | XXXXXXI | XXXXXXXI | XXXXXXXXI | XXXXXXXXXI |
| II | XII | XXII | XXXII | XXXXII | XXXXXII | XXXXXXII | XXXXXXXII | XXXXXXXXII | XXXXXXXXXII |
| III | XIII | XXIII | XXXIII | XXXXIII | XXXXXIII | XXXXXXIII | XXXXXXXIII | XXXXXXXXIII | XXXXXXXXXIII |
| IIII | XIIII | XXIIII | XXXIIII | XXXXIIII | XXXXXIIII | XXXXXXIIII | XXXXXXXIIII | XXXXXXXXIIII | XXXXXXXXXIIII |
| V | IX | XXV | XXXV | XXXXV | XXXXXV | XXXXXXV | XXXXXXXV | XXXXXXXXV | XXXXXXXXXV |
| VI | IIX | XXVI | XXXVI | XXXXVI | XXXXXVI | XXXXXXVI | XXXXXXXVI | XXXXXXXXVI | XXXXXXXXXVI |
| VII | IIIX | XXVII | XXXVII | XXXXVII | XXXXXVII | XXXXXXVII | XXXXXXXVII | XXXXXXXXVII | XXXXXXXXXVII |
| VIII | IIIIX | XXVIII | XXXVIII | XXXXVIII | XXXXXVIII | XXXXXXVIII | XXXXXXXVIII | XXXXXXXXVIII | XXXXXXXXXVIII |
| VIIII | IIIIIX | XXVIIII | XXXVIIII | XXXXVIIII | XXXXXVIIII | XXXXXXVIIII | XXXXXXXVIIII | XXXXXXXXVIIII | XXXXXXXXXVIIII |
| X | XX | XXX | XXXX | XXXXX | XXXXXX | XXXXXXX | XXXXXXXX | XXXXXXXXX | XXXXXXXXXX |

Not any allowance is to be made in taking the dimensions, or in computing the contents of any Timber or Plank, on account of rotten or unsound parts in the wood.

If a piece of Timber or Plank delivered out of a ship by the Tidewaiter, should by any means drift away, or sink, before its admeasurement, the Measurer or Tidewaiter is, without loss of time, to acquaint the Boat Officer on the station; and to take an average content, and insert the same in his Blue Book, distinguishing the number of the piece by an asterisk, or other mark.

As soon as the contents of all measurable articles of wood imported in any ship to which the Measurer may be appointed, shall have been ascertained, and the full duties paid, he is to insert in the Tidewaiter's Book the number of pieces of each description which have passed his examination, adding thereto the initials of his name; and when he shall have ascertained the contents of the measurable articles of wood imported in any ship to which he may be appointed, and which are to be secured under bond, he is to enter the same, together with the name of the ship, master, and voyage, in the Locker's Journal; taking his receipt for the custody thereof in his Blue Book. And he is also to observe, with respect to Timber and Plank which are not bonded, that when the quantity expressed in his Warrant or Order shall have been discharged, he is immediately to acquaint the Boat Officer, and Importer, with the same; and is not to permit a further unshipment until such entry shall have been made.

He is to measure and make a return in his Blue Book, of all Timber Ends which may have been taken on board, or cut off for stowage, when the cubic content shall amount to one foot.

When a piece of Timber or Plank is crooked or curved, the length is not to be taken on the concave or hollow, nor on the convex or arched side of the piece, but on a line which is *intermediate* between the two.

The Measurer is frequently to examine the Sliding Callipers, in order to ascertain that they are not strained by using, and that the distance between the Claws corresponds with the Index on the Arm; he is also frequently to examine the Iron Rule or Scale, which, from continual wear and rust, diminishes in length; and as soon as he shall discover any defect from such cause, he is immediately to discontinue the use of it, until it shall have been repaired.

In taking the Circumference or Girt of Masts or Timber, a small cord is to be passed round the middle of the piece, applying the entire circumference, so ascertained, to a rule, graduated with inches, and taking for the quarter girt a numerical fourth of the whole.

# HAND-IN-HAND

# BUILDING ASSOCIATION

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Rules and Regulations

Enrolled under 6th & 7th Wm. IV., Cap. 32