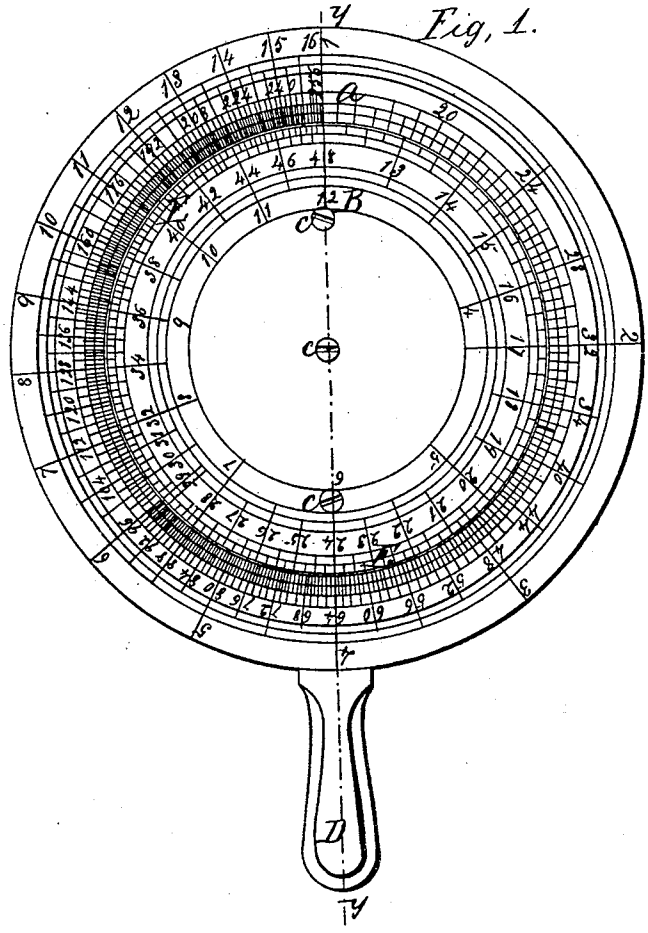
C. LITTLEFIELD.

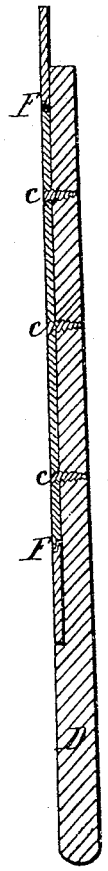
MEASURING LUMBER.

No. 80,077. Patented July 21, 1868.

Fig, 1.



Fig, 2.



Witnesses,

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United States Patent Office.

CLEMENT LITTLEFIELD, OF KENNEBUNK, MAINE.

Letters Patent No. 80,077, *dated July* 21, 1868

INSTRUMENT FOR MEASURING LUMBER.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, CLEMENT LITTLEFIELD, of Kennebunk, in the county of York, and State of Maine, have invented a new and useful Machine for Giving the Cubical Contents of Round or Square Timber, Wood, Bark, or Stone, which I call "Littlefield's Ready Reckoner and Cubical Calculator;" and I do hereby declare that the following is a full and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a plan view of my device, and

Figure 2 is a sectional view thereof at the point indicated by the red line *y y* on fig. 1.

This invention consists of an outer circle or disk, A, and an inner circle, B, of which the outer is movable, or made to revolve around the inner to any desired point by holding the handle attached to the inner circle, and moving the outer with the hand.

C C C are screws, securing the inner circle to a bar, D, on the under side of the device, which bar projects sufficiently from the periphery of the outer circle to form a handle.

The heavy circular line E indicates the line of union of the outer and inner circular plates, by means of a shoulder sunk on the periphery of the inner plate, as shown by letters F F. Both plates, on their front surfaces, are divided into feet and inches by lines marked across; the inner circle having a radius larger than the outer.

To compute the contents of a piece of timber, find the length as expressed in feet upon the outside circle; place the same over the figure 12 upon the inside circle; then, directly above the square of the stick upon the inside, will be found the cubical contents desired.

To get the cubic feet of square or round timber, the length is on the outer circle, the diameter is on the inner circle, the contents on the outer.

Examples.

Suppose a stick of timber to be twenty feet long, and eighteen inches square; required, the number of cubic feet contained.

Place the figure 20 on the outer circle over the figure 12 on the inner circle; find figure 18 on the inner circle, and opposite will be 45 cubic feet, the answer.

For round timber, stick twenty-five feet long, twenty inches in diameter. In Maine, sixteen inches diameter of sound timber is considered equal to twelve inches square; therefore, place the figure 25 on upper circle over 16 inches on the inner; then find the figure 20 on the inner circle, and opposite is 39 feet, the contents.

For unequal-sided timber, stick thirty feet long, fourteen by twenty inches. To get the mean proportion, place the figure 30 on the outer circle opposite figure 20 on the inner, then find 14 on the outer, and opposite will be $16\frac{3}{4}$, the mean proportion; then place 30 over 12, as for square timber, and find $16\frac{3}{4}$ on the inner, and opposite is $58\frac{5}{12}$ feet, the answer.

For scaling round logs for board-measure, stick eighteen feet long, and seventeen inches diameter; required, the number of feet of boards. Place 18 inches in the outer circle over 19 inches in the inner, then find figure 17 on the inner, and opposite will be 229 feet, the quantity of boards in the log.

To find how large a square can be hewn from a round stick, stick thirty inches in diameter, place the figure 30 on inner circle under figure 24 on the outer, then find figure 12 on the outer circle, and opposite will be $21\frac{1}{4}$ inches, what the stick will square.

Wood, bark, and stone can be measured in the same manner.

The principle by which I arrange the figures upon the tables is called the logarithm of numbers, and of which I make no claim, for it has been known for my years.

My device consists in adapting logarithms to a circular movable form, and thereby rendering it practical, convenient, and correct.

I will first explain the manner of arranging the figures on a straight line, as by that means my device will be more readily understood.

The first point to be settled is, how far shall the calculations be carried. On the drawings, in this case, I go as far as 256, which is sufficient for the measurement of timber, stone, and the like.

In this case, I take thirty-seconds of an inch for my divisions. Now, the logarithm of 256 is 2408.24. This, divided by 32, gives $75\frac{8}{32}$; therefore the scale should be $75\frac{8}{32}$ inches in length.

I will now commence to mark off the scale. 1 is at the end. The logarithm of 2 is 301.03. Now, the distance on the scale from 1 to 2 must be 301.03 thirty-seconds of an inch, which will be $9\frac{13}{32}$. Take this distance in the dividers, and measure from the end, and it will give the place on the scale for 2; then the same from 2 to 4, from 4 to 8, 8 to 16, 16 to 32, 32 to 64, 64 to 128, and 128 to 256. This gives the above numbers and their places upon the scale, thus: 2, 4, 8, 16, 32, 64, 128, 256

Now, I will find the place for 3. The logarithm of 3 is 477.12; this is $14\frac{29}{32}$ inches; so I commence that distance from the end. I then take the above distances from 1 to 2, and this will give the place for 6, then 12, 24, 48, 96, 128, and 192.

To find the place for 5, I take its logarithm, which is 698.97, making $21\frac{27}{32}$ inches from the end. Then take the same distances as from 1 to 2, and this will be the place for 10, 20, 40, 80, 160, &c. I proceed in this way until all the numbers are upon the board or scale. This explains the outer circle shown on the drawings.

The figures upon the inner circle are obtained upon the same principle as the foregoing, except that the divisions are just double the distance, (say, from 1 to 2 is 602.06,) and will form a line of squares and roots with the outer circle thus:

Upper or outer line or circle, 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225, 256.

Lower or inner line or circle, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16. This is divided, so as to give cubical measure.

To apply the foregoing to a circular form, I construct a wheel sixteen feet in diameter, and then make the divisions on a thin straight batten. I then bend this batten around the periphery of the wheel. This forms an arm of eight feet from the centre of the wheel. I make the wheel thus large, to give such a radius as to enable me to make the measurements and divisions correct as I come towards the centre. This could not be well done on a small wheel, as the divisions would necessarily be too minute.

What I claim as my invention, and desire to secure by Letters Patent, is—

The application of logarithms to a circular movable form, with a double radius mathematically divided, so that one part works in conjunction with the other, substantially as and for the purposes specified.

CLEMENT LITTLEFIELD.

Witnesses:

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