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A.D. 1842 . . . . . N° 9235.

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**Apparatus for Making Calculations.**

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MARSTON'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, FRANCIS MARSTON, of Aston, in the Parish of Hopesay, and County of Salop, Esquire, send greeting.

WHEREAS Her present most Excellent Majesty Queen Victoria, by Her  
5 Royal Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Twenty-seventh day of January, in the fifth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Francis Marston, Her especial licence, full power, sole privilege and authority, that I, the said Francis Marston, my eñors, adñors, and assigns, or  
10 such others as I, the said Francis Marston, my eñors, adñors, or assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick-upon-Tweed, my Invention of "IMPROVEMENTS IN APPARATUS FOR  
15 MAKING CALCULATIONS;" in which said Letters Patent is contained a proviso, that I, the said Francis Marston, shall cause a particular description of the nature of my said Invention, and in what manner the same is to be performed, to be inrolled in Her said Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said in part  
20 recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

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NOW KNOW YE, that in compliance with the said proviso, I, the said Francis Marston, do hereby declare that the nature of my said Invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the Drawing hereunto annexed, and to the figures and letters marked thereon 5 (that is to say):—

My Invention relates to the construction of apparatus by combining two columns of figures arranged in two circles, the one being fixed and the other revolving, and also combined therewith a pound, shilling, and pence table, for determining the amounts when the numbers ascertained are required to be 10 reduced to pounds, shillings, or pence.

And in order that the Invention may be readily understood and carried into practice, I will proceed to explain the Drawings hereunto annexed.

## DESCRIPTION OF THE DRAWING.

Figure 1 represents a plan of an apparatus constructed according to my 15 Invention; Figure 2 shews a section thereof; and Figure 3 shews the revolving table separately. *a, a, a*, shews one of the columns of figures arranged in a circle, commencing with (1) and ascending to (100); but by the further means of other apparatus the instrument is rendered capable of calculating up to (2000), but the pound, shilling, and pence table is only 20 carried as high as (500) pence or shillings; but it will be evident, when the apparatus is fully understood, that the same is not confined to these numbers; on the contrary, if desired they may be varied; but I believe for most practical purposes the apparatus shewn will be found fully sufficient. The circle of figures *a, a, a*, is fixed to the board or surface *b, b*, and within such circle the 25 second circle of figures *c, c, c*, revolves on the axis *d*, which is carried by the under board or surface *e, e*, which is fixed to the under surface of the board or surface *b, b*, as is shewn, by screws, or by other convenient means. The revolving circle of figures *c, c, c*, is affixed to the circular board *c<sup>1</sup>*, and there are as many holes in the upper surface of the board *c<sup>1</sup>* as there are divisions on the 30 circle *c, c*, of figures, and such holes become the means of moving the circle of figures *c, c, c*, when calculating by the apparatus, as will be hereafter explained; and the radii, which divide the interior of the circle, are used to receive the pound, shilling, and pence tables, in order to resolve the value of the calculated numbers into their value in pounds, shillings, and pence; thus, the circular row 35 of figures next the row of calculating figures *c, c, c*, is a pence table, which shews the value in shillings and pence of the number of pence indicated by

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each of the figures of the circular row of figures *c, c, c*, in the same radius division of the table; the next row of figures indicate the value in pounds and shillings, supposing the numbers in the circular row of figures *c, c, c*, to indicate shillings; the next row of figures indicate the value in shillings and pence of the number in the same radius on the circular row of figures *c, c, c*, combined with the additional index plate, the use of which I will hereafter describe. In this manner the table is composed, and to such an extent, that any number of pence up to 500 is on sight resolved in shillings and pounds, and the value in pounds of any number of shillings up to 500 is in like manner ascertained at sight. *f* is a fixed point, fixed at *o* in the fixed circle of figures *a, a, a*, and on the revolving board is fixed a projecting tooth *g*, which at every revolution of the revolving circle *c, c*, moves the wheel *h* one tooth, such wheel being affixed to the axis *i*, and the wheel *h* is prevented turning, excepting when driven by the tooth *g*, by means of the spring *j*. On the upper end of the axis *i* is affixed a pointing hand, which points to the numbers on the fixed dial plate *k*, and when commencing any calculation, the 0 of the circular row of figures *a, a*, and the 0 of the circular revolving row of figures *c, c*, are brought to the position shewn in Figure 1, that is, in a line with the fixed point *f*, and then, the apparatus being used, will calculate up to (99); but on moving further, the tooth *g* will move the pointing hand one space, and thus point to (1) on the dial plate *k*, which will indicate (100), and then the revolution of the circular row of figures *c, c*, will go on, and whatever figure or figures are brought up to the fixed point *f* will read off with the addition of 100, which is indicated by the pointing hand; and when the revolving circle of figures *c, c*, has made another revolution, and the tooth *g* has actuated another tooth on the wheel, the pointing hand will indicate that 200 is to be added to the number indicated by the figure or figures on the circle *c, c*, at the fixed point *f*.

Having thus explained the construction of the apparatus, a few examples of the mode of using it will make the instrument still better understood.

## DIRECTIONS FOR WORKING THE CALCULATOR.

Hold the calculator in the left hand, or on a table; see that both dials are correctly set with 0 to the two indexes; then, to obtain the sum of the following figures, videlicet, 7, 3, 5, 9, 11, 13, 6, by simple addition, proceed thus: place the pointer in the hole in the disc opposite the figure 7 on the circle *a, a*, move the disc till it touches the stop *f*, then place the pointer in the hole opposite the figure 3, on the circle *a*, bring the disc down again to the stop,

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and so on with the remaining 5, 9, 11, 13, 6, when the disc *c* will shew the result, 54, at the stop.

Another example. First, observing that both dials are properly set at 0, let the numbers to be added be 61, 10, 34, 56, 72, 35, 81, 96; place the pointer in the hole opposite 61 on the circle *a*, bring the disc *c* round till the pointer is caught by the stop *f*; repeat the operation till the remaining figures are brought down, when the amount will be shewn on the calculator; thus, the arrow on the small dial will point to the figure 4, signifying 400, and the stop or index of the disc *c* at 45, giving the sum total 445.

Compound Addition.—This rule is worked in the same manner as the former, the figures opposite the stop shewing the number of pence added up, and the next line the amount in shillings. For example, supposing 85 to be the number added, on the next line will be found 7s. 1d.; or should it amount to 185 (which 100 will be recorded on the dial), on the next line will be 15s. 5d., and so on, each line giving an additional 100 up to 500, and in like manner with shillings, the value of which will be found in the yellow colored divisions.

Subtraction.—To ascertain the difference between certain figures; for example, 7 from 15, what remains? Place the pointer in the hole opposite the figure 7, bring it down to the stop *f*, and the figures 15 on the disc *c* will stand opposite to the figure 8 on the frame, which is the difference; 7 from 15, there remains 8.

Multiplication.—To find the amount of 7 times 7, place the pointer in the hole opposite the figure 7 on the circle *a*, bring it down to the stop, and repeat it seven times, and the number of the multiplicand and the product will be seen at the index, videlicet, 49.

Division.—To know how many times 16 will go in 100, place the pointer in the hole opposite the figures 16 on the circle *a*, bring it down to the stop *f*, and repeat the operation till 96 will stand at the stop, which will shew that 16 will go 6 times in 100, because it has been moved so many times before it came to 96, and there are four over, as shewn by the 100 on the disc standing opposite the figure 4 on the circle *a*.

Having thus described the nature of my Invention, and the manner in which the same is to be performed, I would have it understood that I make no claim to any of the parts separately; but what I claim is, the mode of constructing an apparatus for making calculations by combining two circular rows of figures, the one moving and the other fixed, together with the apparatus for indicating the hundreds, by recording the number of revolutions made by the revolving circle, as above described. And I also claim the combining with

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such revolving and fixed circles of figures a pound, shilling, and pence table, and it may be other tables, to give the value of the numbers obtained.

In witness whereof, I, the said Francis Marston, have hereunto set my hand and seal, this Nineteenth day of July, in the year of our Lord

5 One thousand eight hundred and forty-two.

FRANCIS (L.S.) MARSTON.

AND BE IT REMEMBERED, that on the Nineteenth day of July, in the year of our Lord 1842, the aforesaid Francis Marston, Esquire, came before our said Lady the Queen in Her Chancery, and acknowledged the Specification aforesaid, and all and every thing therein contained and specified, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

GILBERTSON, Extra.

10 Inrolled the Twenty-seventh day of July, in the year of our Lord One thousand eight hundred and forty-two.

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FIG. 1.

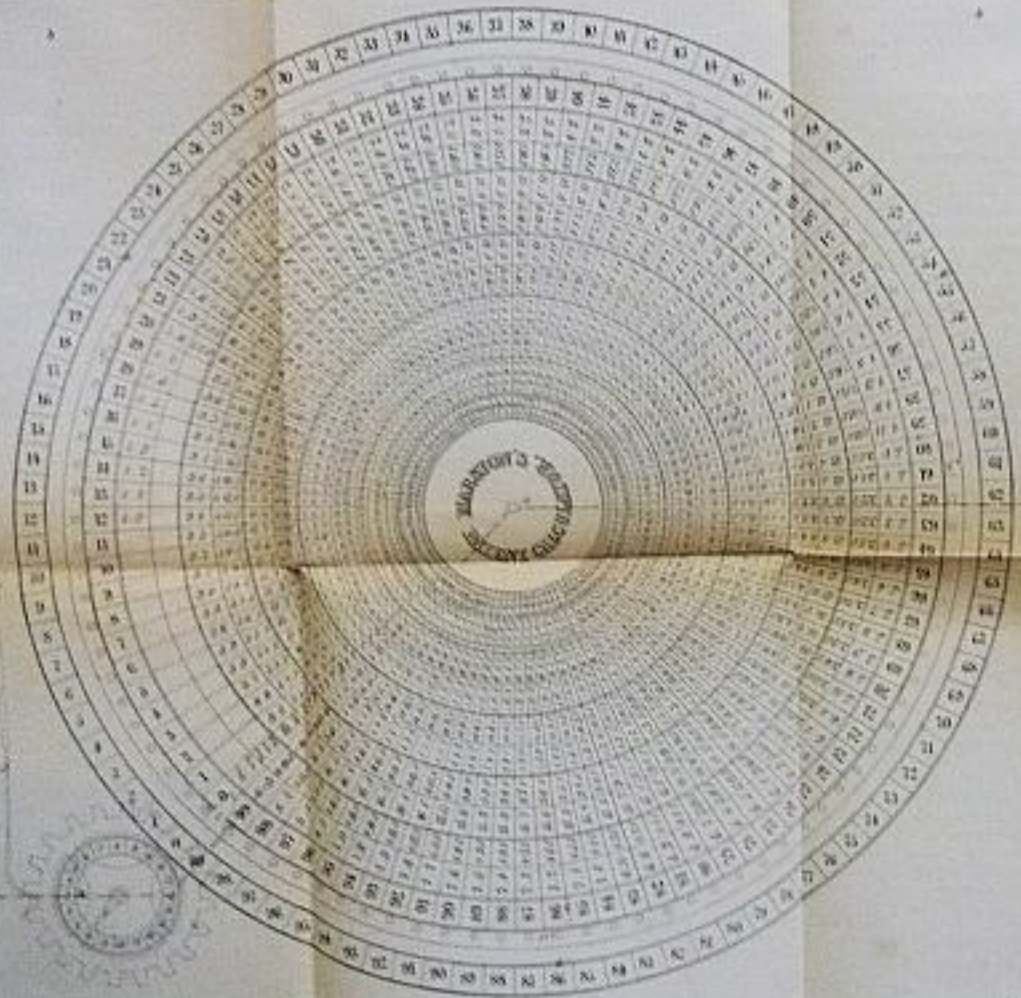
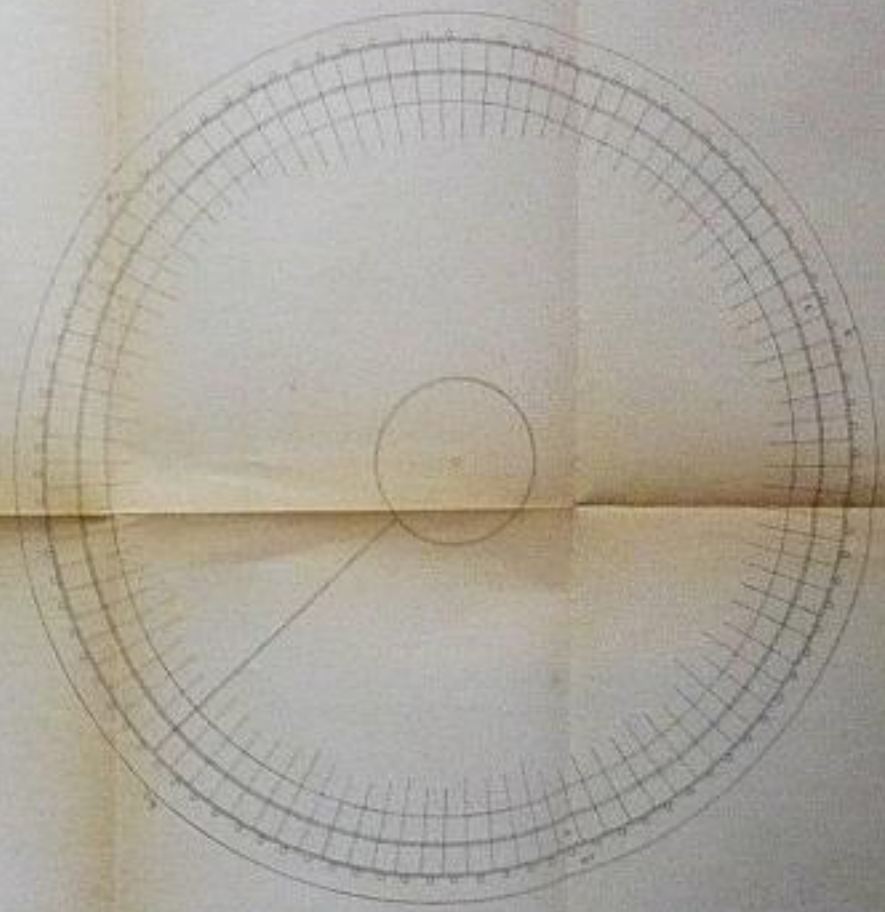


FIG. 2.



Shown in the direction of the red line in Fig. 1

