

A.D. 1884, 1st JANUARY, N° 65.

**Improvements in Calculating Machines or Arithmometers.**

**PROVISIONAL SPECIFICATION.**

I **SAMUEL TATE** of N° 16 Waterloo Place Clerkenwell Close in the County of Middlesex, Engineer do hereby declare the nature of my Invention for **IMPROVEMENTS IN CALCULATING MACHINES OR ARITHMOMETERS** to be as follows:—

(Of the character described in the Specification of Letters Patent granted to  
5 C. X. T. De Colmar dated 10<sup>th</sup> February 1851, N° 13,504, and also in reference to Provisional Specification left by me at the Offices of the Commissioners of Patents dated 29<sup>th</sup> March 1881 N° 1392) by which improvements calculations of the greatest intricacy can be effected with absolute certainty and rapidity.

10 For this purpose according to the first part of my improvements the movements which take place from 0 to 9 and from 9 to 0 of the toothed cylinders is effected by means of a double incline formed on a spring fixed into the toothed cylinders which work upon another double incline formed upon the clutch by which the apparatus is greatly simplified and many parts are thus dispensed with such as the double incline springs (and screws) working on the back of centre plate.

15 According to another part of my improvements the driving of the toothed cylinders is effected by means of spur wheels arranged intermediately and driving into spur wheels fixed upon the toothed cylinders thus dispensing with shaft plummer blocks screws and bevel gearing which greatly strengthens front plate.

20 My next improvement relates to the changing from addition and multiplication to division and subtraction which is effected by means of a lever attached to the bottom of the pillar at the back of the middle plate by which a pin attached works the clutch bar in the centre which also greatly simplifies the apparatus.

**SAMUEL TATE,**

## COMPLETE SPECIFICATION.

I, SAMUEL TATE, of N<sup>o</sup> 16, Waterloo Place, Clerkenwell Close, in the County of Middlesex, Engineer, do hereby declare the nature of my Invention for "IMPROVEMENTS IN CALCULATING MACHINES OR ARITHMOMETERS" and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

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This Invention relates to improvements in calculating machines or arithmometers of the character described in the Specification of certain Letters Patent granted to C. X. T. de Colmar dated 10<sup>th</sup> February, A.D. 1851 and numbered 13,504, and also of the character described in the Provisional Specification left by me at the Office of the Commissioners of Patents on the 29<sup>th</sup> day of March A.D. 1881 and numbered 1392, especial objects of the Invention being to simplify the construction, to work such machines with great rapidity and to effect calculations of the greatest intricacy with certainty of accuracy.

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On the accompanying Drawings Fig. 1, represents a plan view of the machine with part of the front top plate, 1, cut away to show sufficient of the mechanism to illustrate my improvements connected therewith.

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For effecting the carrying from units to tens and upwards I use an improved means consisting of a lever, 2, working on its centre, 2<sup>x</sup>, and having on its upper end a double inclined head, 3, which, when struck by the pin, 4, on the index plate, 5, is pushed back causing the other end of the lever, 2, which works the clutch fork, 6, to move in the opposite direction. This clutch fork, 6, working in a slot cut in the clutch, 7, on the cylinder, 8, carries the said clutch, 7, with it so as to gear with the spur-wheel, 9, and move it one tooth forward. This movement also causes the double bevel wheels, 10, (which also move one tooth forward as they are on the same spindle as the spur wheel, 9,) to move the bevel wheel, 11, one tooth forward (if the lever, 14, is at multiplication and addition) and as the index plate, 5, is connected thereto it also is necessarily caused to show a figure higher than the one which was showing through the hole, 12, cut in the top long plate which I partly show in Fig. 3, before the action hereinbefore described took place.

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To keep the clutch, 7, in its given position, I use a double incline spring, 13, working through the cylinder, 8, upon another double incline, 13<sup>x</sup>, formed upon the clutch, 7.

This improved means hereinbefore described is more effective than the mechanism formerly used and also greatly simplifies the construction of the machine.

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It will at once be seen on reference to Figs. 1 and 4 the action of the combination of levers, 14, and, 16, and connecting piece, 15, which I use for moving the double-bevel wheels, 10, alternately from multiplication and addition to subtraction and division or vice versa.

The advantage of having the bar, 16<sup>x</sup>, actuated from the centre as shown most clearly in Fig. 1, is that it shifts equally end for end and is a quicker and more decided motion than means formerly used.

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In Fig. 2, I show my improvements for driving the machine by means of spur wheels, 17, which are arranged upon the cylinders, 8, and are caused to run one way by means of spur wheels, 18, arranged intermediately and gearing with the spur wheels, 17, on the cylinders, 8.

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In this Fig. is also shown the spiral spring, 19, which, acting upon the indented piece, 20, above it causes it to slip into the indentations (which I have not shown)

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beneath the front top plate. 1. The principal object of this improvement is to firmly retain the pointers, 21, opposite any given fig. at which the operator may require to place them.

Attached to the centre plate, 22, Fig. 4 is an improved spring, 23, which works upon the end of the lever, 14, keeping it firmly in its position when it is shifted to its two extremities. The lever, 14, being shown in Fig. 4 at multiplication and addition.

In Fig. 3 I show an improved spring which I use for keeping the lower index plates, 24, in position. It consists of a suitably shaped piece of steel, 25 or other metal inserted through the top long plate and working upon the teeth of the lower index plates, 24. Upon the back of the said top long plate is a spring, 26, the end of which works upon the end of the steel piece, 25, tending to push it towards the lower index plate, 24.

Fig. 5, shows the other end view of the machine opposite to that shown in Fig. 4.

It will be understood that the spur wheels, cylinders, bevel wheels and the mechanism shown where the front top plate is partly cut away continues the same throughout the length of the machine and that the parts which are not described have the same action as those described in the Specification of C. X. T. de Colmar, but I do not confine myself solely to the use of spur wheels for driving the cylinders and mechanism connected therewith as bevel wheels or other driving means may be used for the same purpose with equal advantage.

Having now particularly described and ascertained the nature of my said Invention and in what manner the same is to be performed I declare that what I claim is:—

1. The improvements for driving the machine by means of spur wheels arranged upon the cylinders which are caused to run one way by means of other spur wheels arranged intermediately and gearing with the said spur wheels on the cylinders substantially as hereinbefore described with reference to the accompanying Drawings.

2. The combination of levers connecting piece and bar which I use for moving the double bevel wheels alternately from multiplication and addition to subtraction and division substantially as hereinbefore described with reference to the accompanying Drawings.

3. The improved double incline spring working through the cylinder upon another double incline formed upon the clutch which I use to keep the clutch in its given position substantially as hereinbefore described with reference to the accompanying Drawings.

Dated this 12th day of September 1884.

SAMUEL TATE,

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1884.

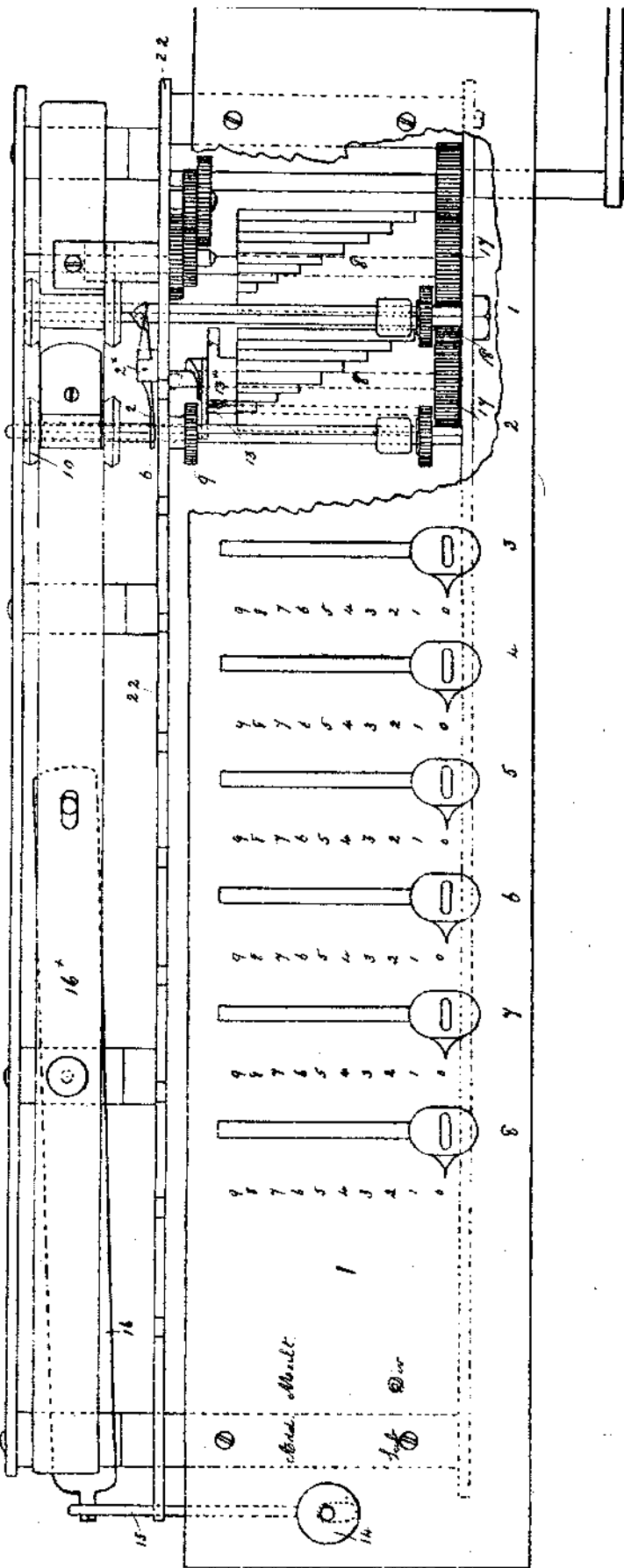
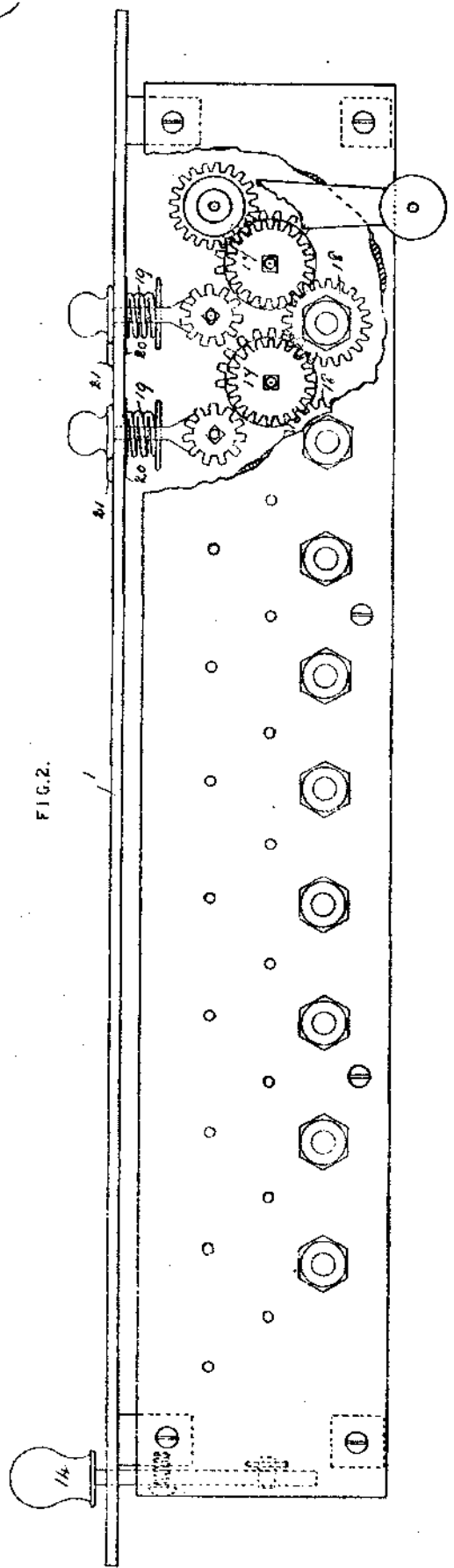


FIG. 2.



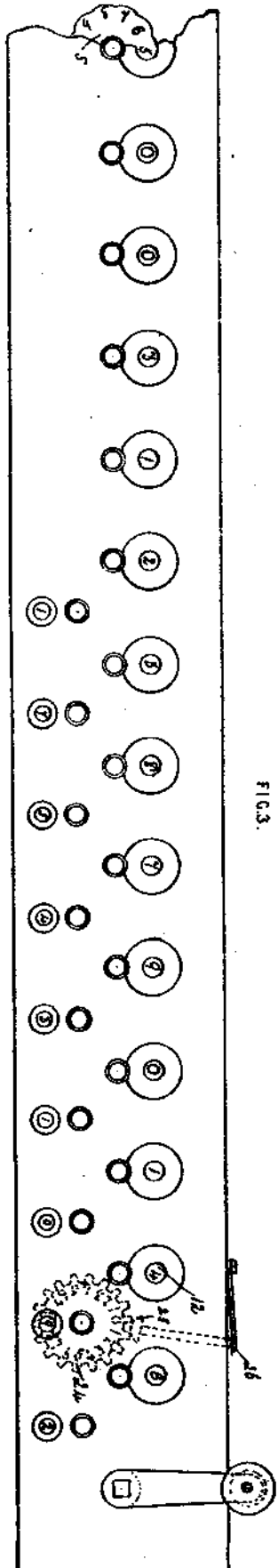


FIG. 3.

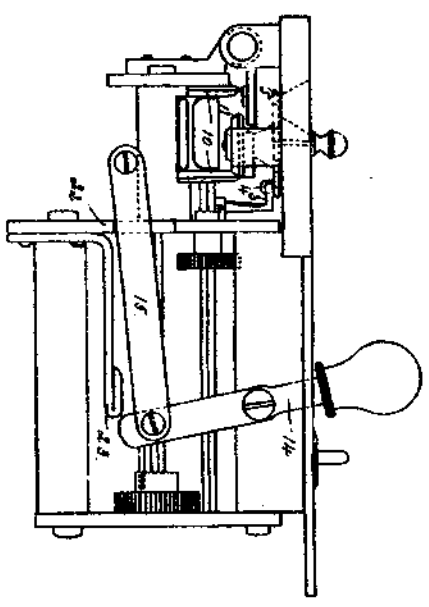


FIG. 4.

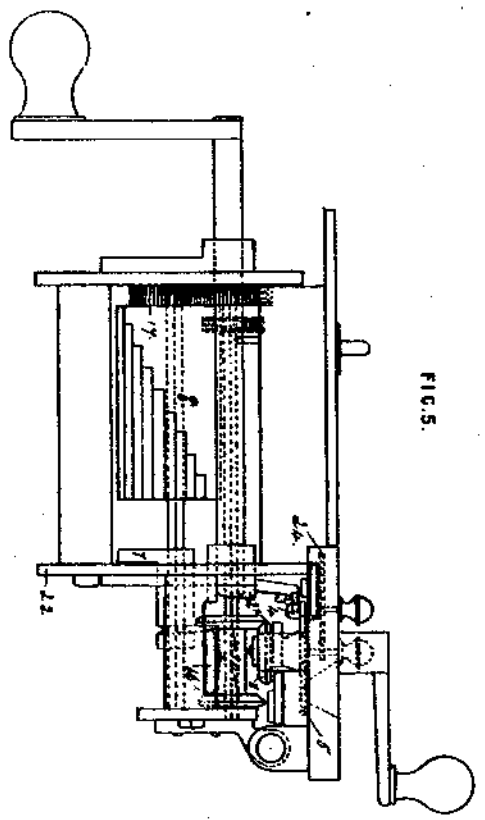


FIG. 5.