

N<sup>o</sup> 4489



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COMPLETE SPECIFICATION.

An Improved Adding Apparatus.

I, CARLO FOSSA-MANCINI, Engineer, in Castelplanio (Marche-Italy), do hereby declare the nature of my said invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

5 The machine, to which I give the name of "Indispensable" consists of a certain number of rings, revolving on one horizontal axle or shaft. The annexed drawing shows the same machine in two different forms *viz.* Fig. 1 is a cross section of the machine having the shape of a trunk, Fig. 2 is a front view of the machine partly  
10 provided with a key-board mechanism. Both forms of my apparatus are characterised by the use of adding rings with wheels connecting with the respective side mechanism, as will hereafter be more fully described. In both forms eight rings  $x$  are to be seen, corresponding to eight sets of numbers and more especially the two rings on the right represent the tenth and hundredth, whereas the other six rings from the  
15 right to the left, from three to eight serve successively for the units, tens, hundreds and the units, tens and hundreds of thousands.

I have adopted this disposition as suitable for the most common exigences on a large scale, but it must be understood, that the number of rings may be increased without  
20 any inconvenience and this by virtue of the special system, by which the transfers or carryings are effected. In this machine the transfers are produced by springs, which are drawn up slowly and afterwards go off at once, without any special effort on the part of the operator. It is therefore, evident, that the operator has always to exert the same effort, whatever may be the number of transfers to be effected at the same time,  
25 in the machines of direct action on the contrary the efforts of the operator must be increased rapidly with the number of transfers, so that the number of the columns cannot be indefinitely extended, but must be very limited. It must also be understood that with suitable slight modifications my adder can be adapted to other systems of numeration, different from the decimal system, adapted in the figures of the annexed drawing without changing in any way the function of the machine. Each ring on the external  
30 surface, Figs. 2 & 4 is divided into a number of equal parts, for instance 40 or 60 (a multiple of ten) on which are written several times the number successively from 0 to 9. To each ring  $x$  is connected the apparatus executing automatically the transfer on the next ring on the left, so that for every ten numbers, through which one ring is moved, the corresponding ring on the left advances by one number. To each  
35 ring  $x$  is connected a saw toothed wheel  $a$  and a volute or ratchet disc  $q$  all the three being fixed on the same axle box and revolving on the central axle  $k$ .

In order to understand how the successive connections of the various groups and thence the transport or carryings in the addition takes place, it has to be observed,  
40 that the ring  $x$  and the toothed wheel  $a$  as shewn in Figs. 1 & 3 belong to the same group on the left whereas the volute or ratchet disc  $q$  of the same figure is connected to the group on the right. Hence in order to have the complete group of the parts fixed on the same axle box and shown in Figs. 1 & 3, one must not only consider the visible parts  $x$  &  $a$  but also the volute or ratchet disc (as the one  $q$ ) forming part of

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*Fossa-Mancini's Improved Adding Apparatus.*

the group, but not appearing on Figures 1 & 3 because it is covered by a similar piece *q* which belongs instead, as it has already been said to the group on the right. The crook *c* acts upon the upper part of the wheel *a* by means of the catch *d* and the stop *n* acts upon the lower part for the purpose of keeping the wheel *a* in the required position. The crooks *c* are mounted on one axle *j* common to all of them and the stops *n* on another axle *o* which is likewise common to all of them. The two axles *j* and *o* are parallel with the central axes *k* and contribute towards strengthening the frame of the machine and at the same time rendering the mechanism very simple. The motion of these pieces is produced by helicoidal springs *m* (Figures 1 & 3). The crook *c* slides by means of a tooth *c*<sup>1</sup>, with which it is provided on the volute or ratchet disc *q* the paddles or teeth *b* of which are rounded.

In the rotation of the ring on the right *y* when the number 0 passes through a given point, corresponding to the appearance of the same at the hole, the crook *c* after having gradually risen by means of the tooth *c*<sup>1</sup> to the top of the paddle *b* suddenly falls and the catch *d* thus effects the required advance of a tooth in the wheel *a* and also in the ring on the left.

The form of the stop *n* is to be particularly observed, the front *e* of which bears only upon the point of a tooth of the wheel *a* and prolonged meets the front of the tooth *f* at  $\frac{2}{3}$  of the length of the face itself and then the stop *n* suddenly moves after  $\frac{2}{3}$  of its run, while the other one third ( $\frac{1}{3}$ ) of the moving is obtained by the push of the inclined flat *e* against the corresponding tooth of the wheel *a*, this disposition facilitates and assures the effects of the transfers. Another important particular of the stop *n* consists in the mallet *v*, joined to its farthest end. This mallet *v* retards the motion of the stop thus making its movement almost equal to that of the revolving ring, the arrest or stop being almost instantaneous.

The machine can be set in motion in two different ways, as has been already said, *viz.*: by means of a key-board or by means of a pointed rod shaped like a pointed pencil. This last way causes the rounded shape of the lid. Thence are obtained two types of the same machine, *viz.*: the one with key-board and the one trunk-shaped. We will firstly examine the former (Figures 3 and 4). In it the motion of the ring which has 60 numbers, *viz.*: 6 times the numbers from 0 to 9 is produced by means of the bar *p* and the bar *i* rigidly connected between them and pushed against by the spiral-spring *w*. The keys *t* are nine for every line of numbers have increasing heights from 1 to 9 and the relating number printed on their heads. By pressing the key *t* to the bottom, the bar *i* goes down more or less, and by a projection *r* which works in a slot formed in the lever *l* causes the catch or pawl *h* fastened to the lever *l* to slide over the wheel *a* for a number of teeth according to the number of the key pressed, but the said wheel *a* is not moved on account of the stop *n*. In the returning motion the reaction of the spring *w* on the bar *i* causes the pawl *h* by the action of the spring *s* to enter into the teeth of the wheel *a* and makes it advance to the required position. The number resulting from this operation appears in the corresponding aperture (Figures 2 and 4). It is of great importance that the motion of the wheel *a* happens on the return of the bar *i* under the action of a continual power *viz.*: that of the spring *w* and is therefore quite independent of the effort, which the operator expends on the keys *t*. In the trunk-shaped machine (Figures 1 & 2) every ring *x* is provided on its right side with 40 projections *u*. The external box, the shape of which gives the name to this type, has 8 slots *g* through which can be seen only 9 bolts for each ring, on the box on the left each slot is thus formed a zone *z* which exactly covers the ring *x* of the row of numbers corresponding to the slots *g* on the right. Marked on these zones between the bolts *u* are the numbers 1 to 9. In this case also the numbers of addition appear in the respective apertures.

## FUNCTION OF THE MACHINE.

In this machine the additions are made in an horizontal line and are added in the same line as they are read, *viz.*: from the left to the right, in order to make an

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addition in the keyboard machine, the keys corresponding to the numbers to be added are pressed to the bottom; in the trunk-shaped machine the point of the small rod or pointer is introduced into the space corresponding to the numbers to be added in the slit corresponding to the line of position of the number itself, and by  
5 pressing this rod or pointer the ring is made to turn round until the small rod or pointer has arrived at the bottom of the slit.

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:—

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## CLAIMS.

First:—An automatic adding machine characterised by the application of first, three parallel axles, to which are secured the wheel *a* of the numbers, the crooks *c* and the stops *n*. Second, of one volute or ratchet disc *g* for the gradual motion of the mechanism of transfers or carrying. Third, of a special stop *n* provided with a counter-  
15 poise *v* furnished with an inclined flat *e*, which helps the advancing of the wheel *a* and afterwards assures its stopping. Fourth, of a key-board, the heads of whose keys pass exactly through the holes in the lid and those of one column being united to one horizontal bar, which goes down more or less, according to the key pressed, but still remaining horizontal.

20 Second:—In the adding machine as claimed in the preceding claim forming slots or openings in the outer cover for the insertion of a small rod for operating the rings or wheels *x* substantially as set forth and shewn.

Dated this 28th day of February 1899.

CARLO FOSSA MANCINI.

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By George Barker,  
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Fig. 1.

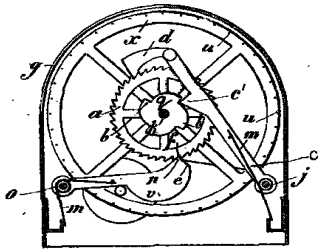


Fig. 2.

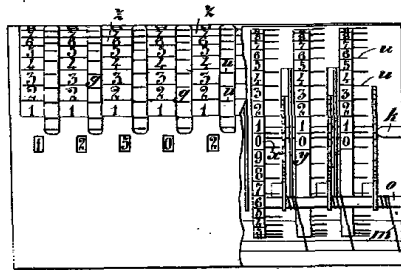


Fig. 3.

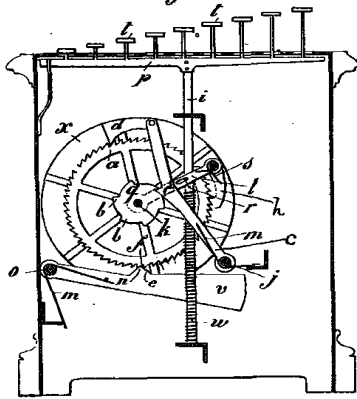
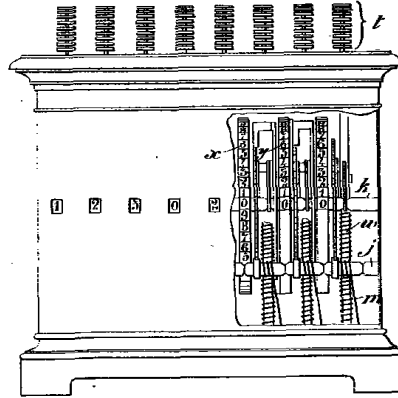
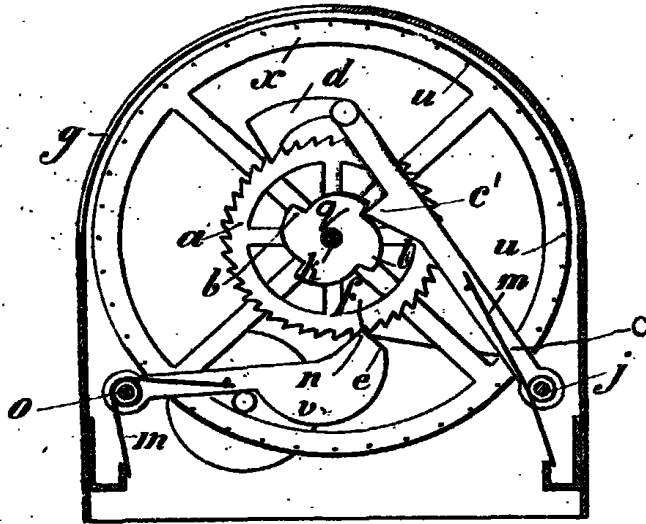


Fig. 4.



[This drawing is a reproduction of the original on a reduced scale.]

*Fig. 1.*



*Fig. 3.*

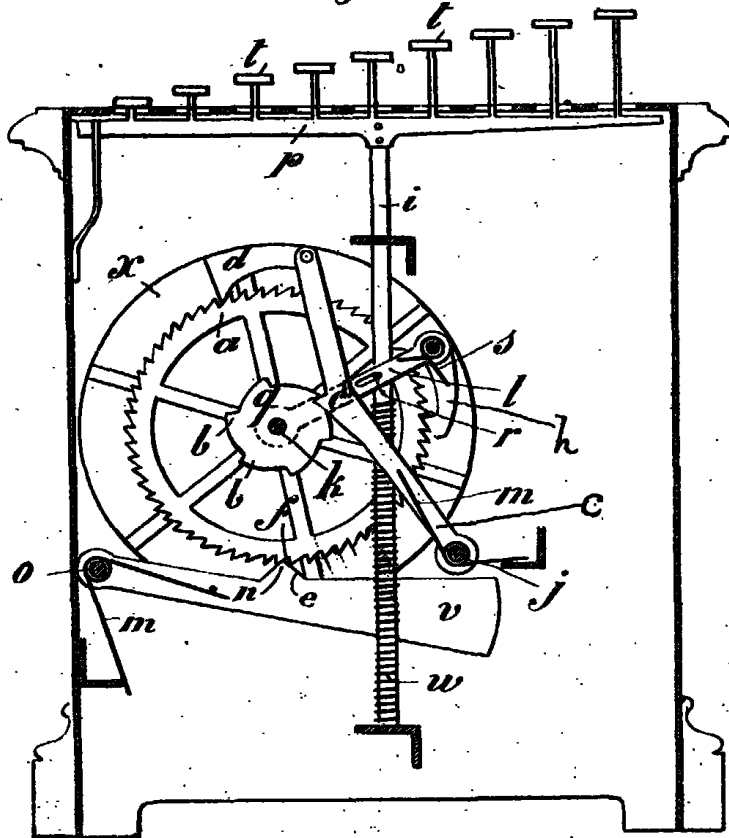


Fig. 2.

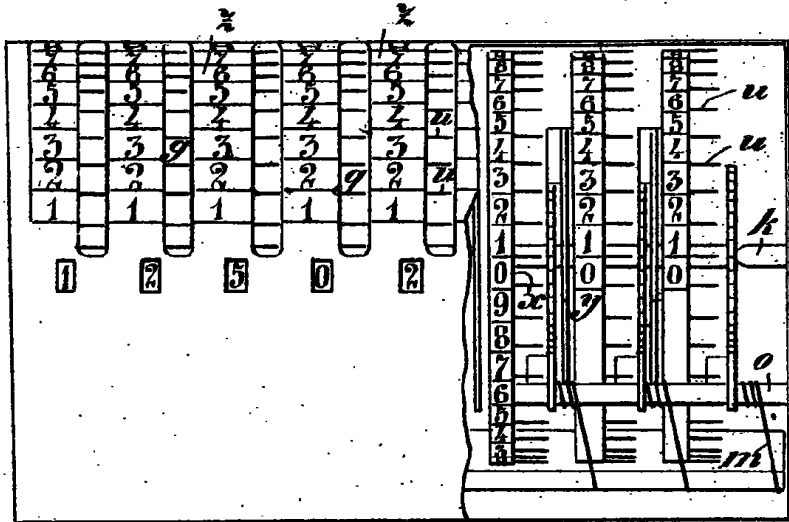
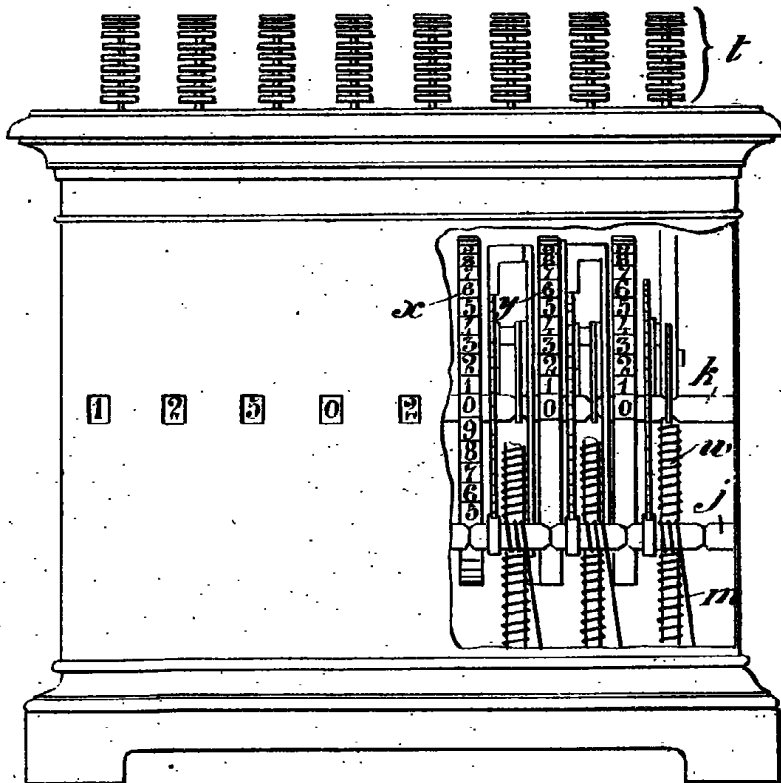


Fig. 4.



[This Drawing is a reproduction of the Original on a reduced scale.]