

No. 689,447.

Patented Dec. 24, 1901.

F. A. WORDEN.
ADDING MACHINE.

(Application filed Apr. 26, 1900.)

(No Model.)

Fig. 1.

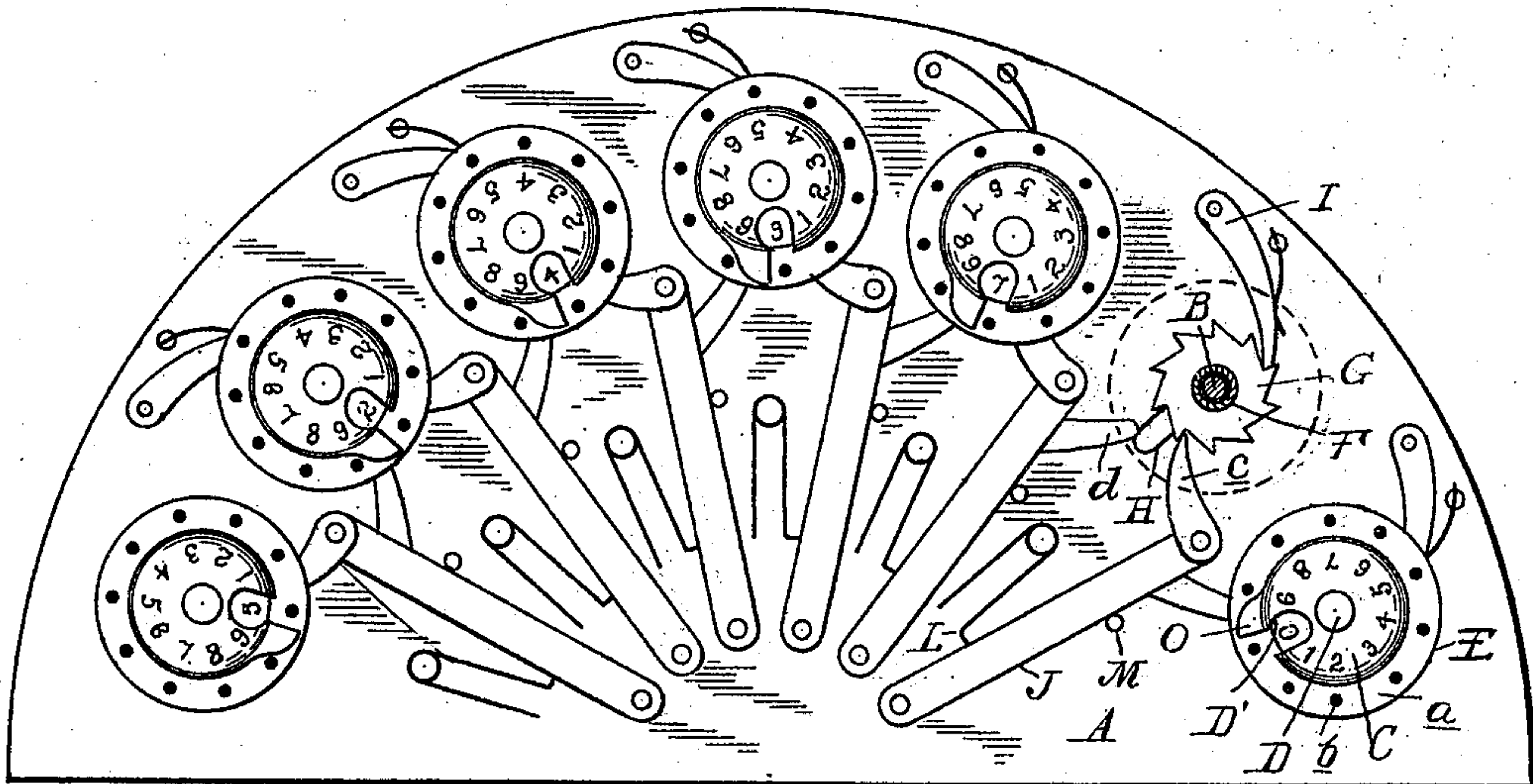


Fig. 3.

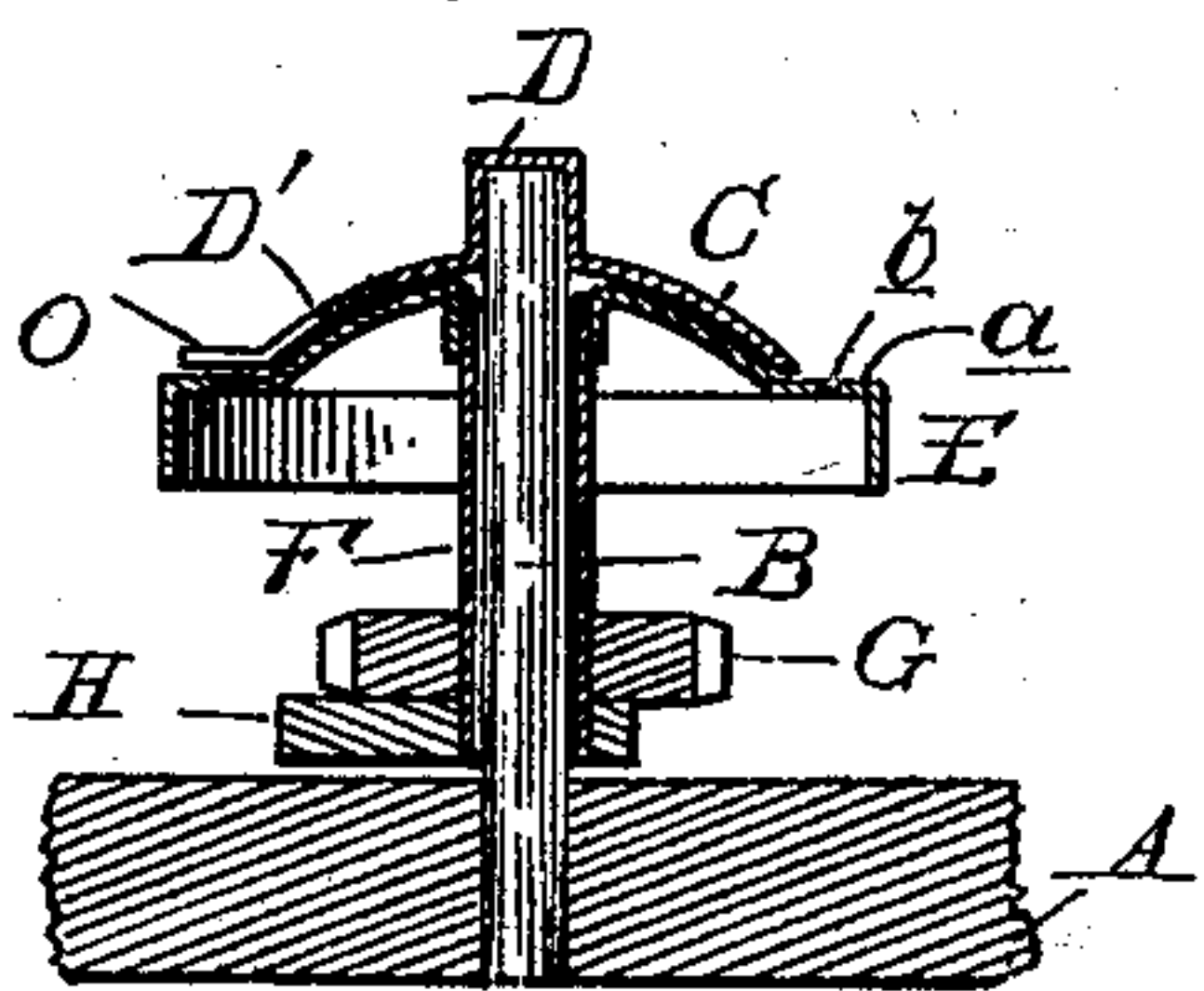
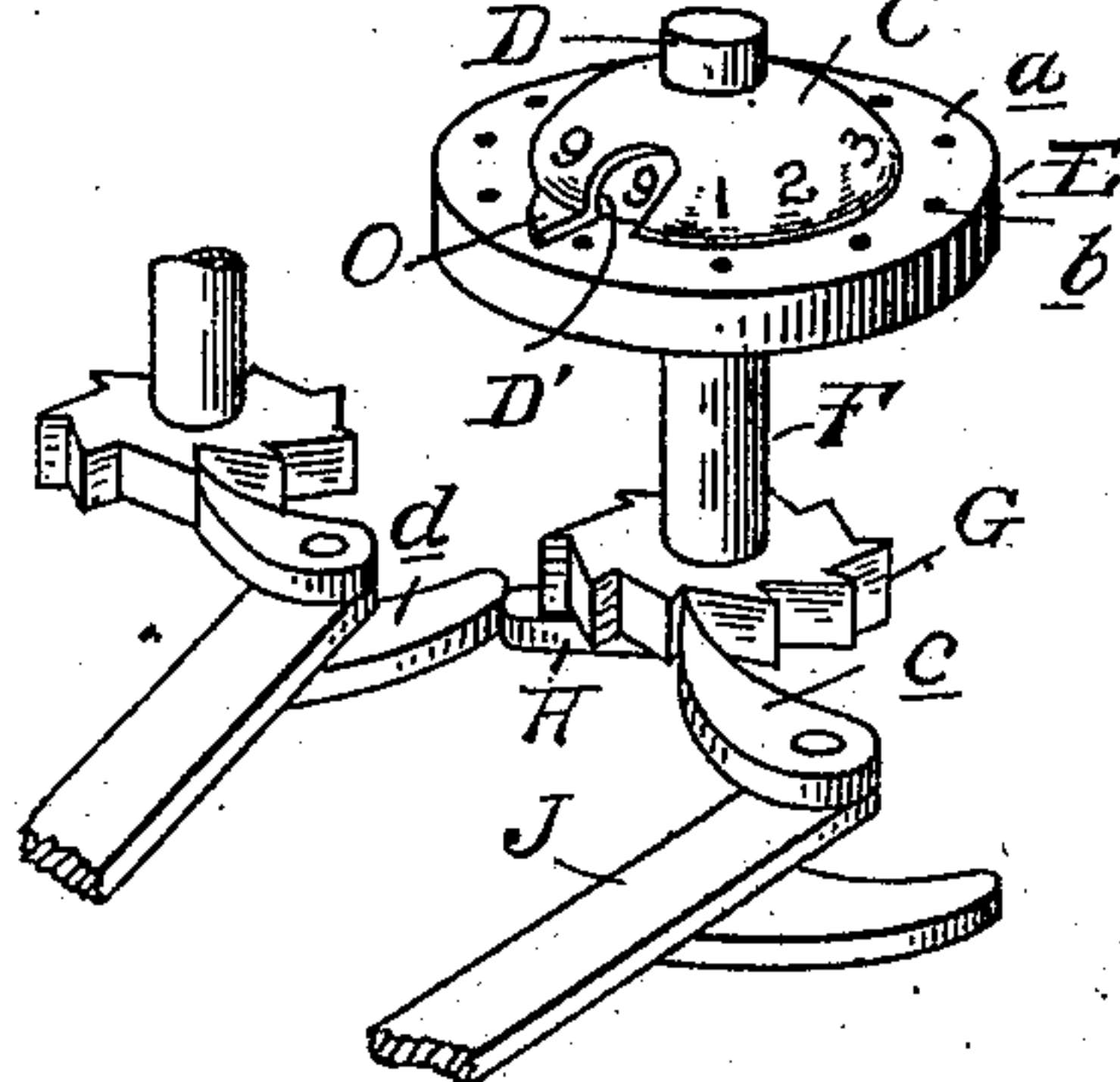


Fig. 2.



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ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 689,447, dated December 24, 1901.

Application filed April 26, 1900. Serial No. 14,371. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. WORDEN, a citizen of the United States, residing at Ypsilanti, in the county of Washtenaw and State of Michigan, have invented certain new and useful Improvements in Adding-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 The invention consists in the construction of an adding-machine, and particularly in the construction and arrangement of the adding-wheels and of the carrying mechanism, and in the construction, arrangement, and
15 combination of the various parts, all as more fully hereinafter described.

In the drawings, Figure 1 is a plan view of my improved adding-machine, the top of the "tens-wheel" being cut off to show the
20 ratchet and carrying mechanism beneath. Fig. 2 is a perspective view of the tens-wheel, showing the carrying mechanism in position to carry. Fig. 3 is a vertical section through one of the posts or pins upon which the register-wheel and the ratchet are carried.

25 The parts are shown as supported upon a base-plate A. Arranged in a circular line along the edge of this plate are a series of vertical posts or pins B. At the top of each pin is a cap C, which in this case I have shown of sheet metal of substantially umbrella shape with a central cylindrical socket D engaging over and by means of which the cap is secured to the post by any suitable
35 means—such, for instance, as brazing or welding. Around the edge of this cap are marked in consecutive order figures indicating the digits, as plainly shown in Figs. 1 and 2. At the point where the cipher-sign would
40 be on the plate is an aperture D', through which the figures on the register-wheel E beneath may be seen. These figures are preferably the digits and a cipher and correspond to figures upon the outside of the cap C. The
45 register-wheel E, I preferably make of sheet metal of shape complementary to that of the cap C and having the horizontal flange a extending out beyond the edge of the cap and provided with the apertures b, one aperture
50 opposite each figure. This register-wheel is secured to the top of a sleeve F, which is journaled upon the pin B. At the lower end this

sleeve carries a ratchet-wheel G and a carrier-finger H, which preferably projects beyond the ratchet-wheel, as shown.

I represents back stop-pawls which are intended to prevent the register-wheels from turning in the wrong direction and are pivoted on the base-plate A and engage with the ratchet-wheel, as plainly shown in Fig. 1.

J represents a series of arms extending radially from the lower portion of the plate into proximity to the carrying-wheels, one for each wheel above the units-wheel. These arms J are pivoted upon the base-plate, and each is actuated by a spring L and held normally against a stop M in the position shown. At the outer end each arm carries a pawl c, extending into engagement with the ratchet-wheel, and has a portion or bracket d extending into the path of the carrying-finger H of the ratchet-wheels.

In order to operate this device, the proceeding is as follows: Suppose that six units are to be added. The operator inserts a stylus or the point of a pencil in the aperture in the flange a of the register-wheel which is opposite the number "6" upon the cap C and then turns that wheel until it registers with the stop O on the cap, which stop is placed between the "9" and the cipher-mark on the cap. This will add six units, and the desired number will be exposed through the aperture D' in the cap. Supposing that the machine started at zero, the figure "6" will be exposed through this aperture. Now if six more are to be added the operator repeats the operation described and the figure "2" will be exposed through the aperture D in the units-wheel. In order to carry to the tens-wheel during the second movement described, the carrying-finger H on the units-wheel will strike the bracket or projection d on the tens-carrying arm and will rock that arm about its pivot and through the engagement of the pawl c with the ratchet-wheel on the tens-register wheel will move that register-wheel one notch.

The difficult feature in these machines is to provide a satisfactory and certain carrying device, especially where a large number of wheels are employed, and my device is intended to overcome the objections which are present in some previous constructions—that of having

lost motion between the various wheels at the carrying-point and also the preventing of the possibility of a wheel of lower denomination being turned upon the operation of a wheel of higher denomination. In order to insure a proper carrying without lost motion, I arrange the carrying-finger H in such relation to the carrying-arm J or the bracket thereon that when the stylus is brought to a stop against the stop O when the "9" is exhibited the carrying-finger H is directly in contact with the bearing or finger upon the arm J and preferably so that the spring L of the carrying-finger is under tension slightly, so that it will hold the ratchet-wheel in direct engagement with the pawl c of the carrying-arm. The position of these parts at the carrying period is shown in Fig. 2, and it will be seen that the spring of the arm J in that position through the projection d and the carrying-finger H is holding the ratchet-wheel G directly against the pawl c of the next lower carrying-arm. In this instance the machine is shown as capable of registering up to nine million nine hundred and ninety-nine thousand nine hundred and ninety-nine. If the first six wheels indicate, for instance, nine hundred and ninety-nine thousand nine hundred and ninety-nine, there would be a direct connection without any lost motion between the parts from the carrying-finger H of the units-wheel to every ratchet-wheel of the intermediate series and to the ratchet-wheel of the millions, so that the operation of a units-wheel would positively move without any lost motion all of the register-wheels and indicate—if two were added, for instance, to the sum given—one million and one.

In order to insure the positive engagement of the carrying mechanism as described, I may and preferably do arrange a stop O a trifle beyond the position necessary to effect any registration, so that the stylus will move the necessary distance and a slight distance beyond. This overthrow, however, is only necessary at the carrying-point, and I may therefore accomplish it by arranging the aperture a, which is beside the zero-mark on the register, slightly out of its true position, so as to effect this overthrow only when the stylus is inserted in this particular aperture.

I deem it desirable to arrange my register-wheels in the circular line described because it makes the machine very compact and enables me to arrange the carrying-arms J on radial lines which may easily be struck from the center, and also because it enables me to group the wheels in such position as to actuate it with the least possible movement and in a position which it is natural for the hand to travel.

It will be seen from the description given that nearly all the parts may be made from sheet metal stamped into the desired configuration, and thus that the machine is an extremely simple one besides being absolutely

correct in carrying, no matter how many of the wheels are being used as carrying-wheels at any one time.

What I claim as my invention is—

1. In an adding-machine, the combination of a series of register-wheels adapted to be actuated by a stylus engaging bearings in the wheel, a ratchet-wheel secured to each adding-wheel, a carrying-finger, a carrying-arm for each wheel above the units, a pawl thereon, a stop for the stylus, and means for causing the wheel to slightly overtravel when moved into position for carrying whereby the highest wheel of a number carrying simultaneously, will be the first to complete its movement and to release its carrying-arm, and the lowest of the series will be the last.

2. In an adding-machine, the combination with a series of register-wheels, of a plurality of transfer mechanisms respectively arranged between adjacent register-wheels each being adapted when actuated to slightly overcarry the wheel of higher denomination and then to disengage therefrom, whereby the highest wheel of a number carried simultaneously will be the first to complete its movement and disengage from its transfer mechanism.

3. In an adding-machine, the combination with a series of register-wheels, of a plurality of transfer mechanisms respectively arranged between adjacent register-wheels, each comprising a carrying-finger connected to the wheel of lower denomination, a ratchet-wheel connected to the register-wheel of higher denomination, and an intermediate pivotal carrying-arm having a portion extending into the path of said finger, and a pawl extending into engagement with said ratchet-wheel, said transfer mechanism being adapted to slightly multiply the angular movement of the higher wheel, and to overcarry the same before disengagement of the actuating carrying-finger from said carrying-arm whereby the highest wheel of a number carried simultaneously will be the first to be disengaged; and means for returning said register-wheels the amount of their overmovement after disengagement from the transfer mechanism.

4. In an adding-machine, a register-wheel comprising a marginal portion having bearings for the engagement of a stylus, and an inclined figured portion within said marginal portion.

5. In an adding-machine, a register-wheel comprising a marginal portion having bearings for the engagement of a stylus, and a central dome-shaped figured portion.

6. In an adding-machine, a register-wheel comprising a marginal portion having bearings for engagement of a stylus, a central dome-shaped figured portion and similarly-shaped stationary cap covering said dome-shaped portion being apertured to expose one of the figures thereon, and having an outwardly-projecting portion forming a stop for the stylus.

7. In an adding-machine, a register-wheel

5 formed of sheet metal having a horizontal marginal portion having bearings for a stylus thereon, a downwardly-projecting peripheral flange, a dome-shaped central figured portion and a centrally-depending sleeve forming a journal for the wheel.

10 8. In an adding-machine, the combination with a base of a stationary pin projecting therefrom, a register-wheel sleeved upon said pin comprising a tubular journal, a dome-shaped figured portion at the upper end of

said tubular portion and a marginal portion having bearings for a stylus; and a stationary cap of similar dome shape having an upwardly-projecting tubular portion secured upon the upper end of said stationary pin.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK A. WORDEN.

Witnesses:

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FRANK WHITMAN.