N° 6717 A.D. 1906

Date of Application, 20th Mar., 1906—Accepted, 20th Mar., 1907

COMPLETE SPECIFICATION.

"Improvements in Calculating Machines."

I, JUDAH LOEB LEVIN, of No. 140 Division Street, in the City of Detroit, County of Wayne and State of Michigan, United States of America, Rabbi, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained, in and by the following statement:—

This invention has reference to calculating machines of the kind in which the actuation of suitable keys operates mechanism to rotate indicator wheels or drums and in which the rotation of the shafts carrying said wheels or drums is utilised to transmit movement to a train of counting wheels.

The object of my invention is to provide a machine having the mechanism and keys so arranged as to greatly facilitite the operation of the machine and so that the liability of making mistakes is reduced to the minimum the parts being so constructed as to make a very simple, compact and efficient device capable of performing both addition and subtraction.

My invention consists in the provision in a calculating machine adapted to be actuated at any denomination and in which the totalizing counter is of the Geneva type, of improved means whereby an actuated wheel is positively freed from the lock of the next lower wheel, said means being moved for each wheel by the corresponding actuating key and serving also to position and prevent overthrow of the aforesaid actuated wheel.

My invention further consists of improved means whereby the number of spaces which the indicators may be turned by any one of the operating keys may be limited, and of improved means for locking and unlocking the counting mechanism all as more particularly hereinafter described and finally pointed out in the claims.

Fig 1 is a plan view.

Fig 2 a longitudinal vertical section on the line *x*—*x* of Fig 1.

Fig 3 is a transverse vertical section on the line *y*—*y* of Fig 1.

Fig 4 a detail shewing a portion of the motion transmitting mechanism in elevation, with parts broken away.

As shown in the drawings 1 is any suitable supporting casing across which extends a series of shafts 2 supported at their ends in openings in the side plates of the frame to turn freely and secured to each shaft adjacent to the forward side of the casing is an indicator wheel or drum 3 provided with numbers from 0 to 9.

Guide bars 5 extend longitudinally of the casing at the top and near the bottom thereof and each is provided with a series of squared openings to receive vertically extending squared rods having buttons or heads on their upper ends and forming the operating keys 6. Secured on each shaft 2 opposite each key, is a pinion 7 and to engage the pinion to turn the shaft in one direction upon the downward movement of the key, a rack bar 8 is provided, said rack bar being attached at its lower end to the key by links 9 which are pivotally attached at their ends to the sides of the key rod and rack bar and at its upper end is pivotally attached thereto by the links 10 which are pivoted to the rack

[*Price 8d.*]

bar at one end and intermediate their ends to the sides of the key rod, the opposite ends of said links projecting beyond the key rod where they are connected by a pin to which one end of a coiled spring 11 is attached, the opposite end of said spring being secured to the key rod some distance below. Projecting outward from each key rod is a pin 12 in such a position that when the links are in a horizontal position holding the racks away from the keys, the upper ends of the rack bars will engage the pins which thus form stops for the racks against which said racks are normally held by the springs 11.

When the key is depressed to turn the adjacent shaft and its indicator wheel, the rack bar being held away from the key and in engagement with the stop pin, will engage the pinion and turn the same, but when said key is released and raised by the coiled spring 13 attached at one end to the guide bar 5 and at its opposite end to the lower end of the key bar, the rack will be swung on its links, by its engagement with the pinion, downward and toward the key against the action of the spring 11, sufficiently to slip by the pinion and not turn the same.

There are two rows of operating keys, each shaft having two keys, one to turn the shaft in one direction to perform the operation of addition and the other to turn the same in the opposite direction to subtract. In order to so turn the shaft in opposite directions, and in order that the keys may be placed in line with each other, one of the key rods is bent twice at right angles, extending across beneath the lower guide bar and vertically upward at the opposite side of the shaft.

Secured to and resting upon the lower guide bars 5 between the two rows of keys, is a stop plate 14, and projecting inward over this plate from the lower end of each rack bar, is a lug 15 to engage the plate and limit the downward movement of the rack and key, the parts being so proportioned that the full movement of the key will turn the indicator wheel nine spaces or figures. Supported upon this stop plate are eight superposed longitudinally movable stop plates 16 each provided with a notch 17 opposite each lug 15 on the rack bars to permit the lug to pass, and normally held with their notches in the paths of the lugs by springs 18 attached to one end of the plates. The plates are limited in their movement by being slotted longitudinally to receive bolts 19 extending vertically upward from the stop plate 14 and to move said plates longitudinally against the action of said springs 18, bell crank levers 20 are pivoted on the frame and attached to the ends of the plates opposite those to which the springs are secured. A series of vertically movable keys 21, eight in numbers, are guided in openings in suitable brackets secured to the end of the frame and on these keys are rigid arms 22 pivotally attached to the outwardly extending arms of the bell-crank levers.

In adding a certain number, the digits of that number are indicated by pressing the keys 21 and the value of each digit or its position in the number, by pressing the operating keys, as, for instance, suppose the number is fifteen dollars and twenty five cents, the operator would first press the digit key marked "1", this would by means of the bell crank connection move the first stop plate 16 longitudinally, throwing its notches out of the path of the lugs 15 on the rack bars and thus limiting the movement of the rack bars, so that the indicating wheels could be turned but one space or number by the operating keys. The fourth operating key from the right hand end of the machine, or the key representing the tens place of the whole number or dollars would then be pressed, turning its indicating wheel one space, and when released, said key would be raised by its spring, the stop plate also being moved to its normal position by the spring 18 upon the release of the digit key. The operator next would press the digit key marked "5" and then the operating key representing units place, turning the indicating wheel of said operating key five spaces.

The cents of the number would then be added in a like manner by pressing the key marked "2", then the second or "tens" operating key marked "cents"

and the last digit of the number would be added by pressing key "5" and the first operating key.

To transmit motion from one shaft to another so that one revolution of one indicator wheel representing digits of a certain value, will turn the wheel representing those of the next highest value, one space, I provide a counting mechanism of suitable construction such as I will now proceed to describe although I am aware that it is usual in machines of the kind described to provide means whereby one revolution of one indicator wheel representing digits of a certain value will turn the wheel representing those of the next highest value one space.

A driving disk 23 having one tooth 24 on its pariphery, is secured on each shaft to turn therewith and a ratchet wheel 25 having ten teeth is formed integral with said disk or secured to the shaft at one side of the same. A driven disk 26 having ten scallops or concaves in its periphery to fit the periphery of the disk 23 on the next adjacent shaft, is also mounted upon each shaft to turn freely thereon and cut in the edge of said disk at each meeting point of the scallops is a notch 27 adapted to be engaged by the tooth 24 of the said adjacent disk, said disk being cut away slightly at each side of the tooth to permit the shoulders at each side of each notch to pass as said scalloped disk is turned. Motion thus received from the adjacent shaft is transmitted by the scalloped disk to its shaft by a pawl 28 pivoted on said disk and normally held in engagement with the ratchet 25 by a spring 29, said pawl also serving to center the fixed disk 23 relative to the scalloped disk when the fixed disk is turned by its shaft, the scalloped disk being prevented from turning by the engagement of one of its scallops with the periphery of the fixed or driving disk on the adjacent shaft. While the driving disk may always turn the scalloped disk which it engages, said scalloped disk is always prevented from turning the driving disk by the engagement of one of its scallops with the periphery of the driving disk and also by the engagement of the shoulder at one side of its notch with the end of the tooth of the driving disk when said disk is stopped with said tooth engaging one of the notches, as shown in Fig. 4.

A flanged sleeve 30 on each shaft is provided with a flange at one end carrying a pin 31 engaging an opening through the adjacent scalloped disk and adapted to project through said disk into an opening therefor in the pawl 28 on the opposite side of the disk. The pawl is rigidly held by the pin in engagement with a notch of the ratchet and thus the scalloped disk is locked thereby to the driving disk on the same shaft. The sleeve by reason of the engagement of its pin with the hole in the disk turns with said disk and to disengage the pin from the pawl to release the same, is adapted to move longitudinally of the shaft a short distance, but not far enough to disengage the pin from the disk. To so move the sleeves, operating bars 32 are supported at one end by the lower guide bars 5, one adjacent to each pair of operating keys and at their opposite ends are provided with bearing ends extending through openings in the rear side wall or plate of the supporting frame. Upwardly extending arms having forked ends 33 are fixed on said bars to engage grooves 34 in the sleeves and move the same upon the movement of the bars, and on each operating bar are laterally extending lugs 35 adapted to engage a notch 36 in the lower end of each key bar, said lugs being normally held in engagement with said key bars by flat springs 37 secured to the outer side of the plate of the frame and engaging the ends of the operating bars projecting therethrough, thus forcing the said bars endwise and moving the sleeves longitudinally of their shafts to hold the pins engaged with the pawls. The notches 36 are formed with an inclined side extending inward from the face of the key bar and downward so that when the keys are in their normal raised position with the lugs on the operating bars within said notches, and a key is depressed, the incline engaging the side of the lug, forces the operating bar longitudinally against the action of the spring 37 and thus withdraws the pin 31

from the pawl, unlocking the scalloped disk from the driving disk on that shaft and permitting the said driving disk to be turned by said movement of the key, independently of the said scalloped disk. In Fig. 3, one of the keys is shown depressed to illustrate this operation.

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. In a calculating machine adapted to be actuated at any denomination and in which the totalizing counter is of the Geneva type, the provision of means whereby an actuated wheel is positively freed from the lock of the next lower wheel said means being moved for each wheel by the corresponding actuating key and serving also to position and prevent overthrow of the aforesaid actuated wheel substantially as described with reference to the drawings.

2. In a calculating machine of the kind described a series of longitudinally movable plates each connected to a digit key in such manner that it may be moved thereby into the path of all the operating keys to correspondingly limit the number of spaces which the indicators may be turned by any one of the said keys substantially as and for the purpose set forth.

3. In a calculating machine of the kind described the combination with a counting mechanism of a sleeve slidably mounted on each indicator shaft and having a pin adapted to lock the counting mechanism and means operated by the key bars to withdraw said pin, substantially as and for the purpose specified.

4. A calculating machine constructed and arranged and having its parts adapted to operate substantially as described with reference to the accompanying drawings.

Dated this 15th day of March, 1906.

WHEATLEY & MACKENZIE,
40, Chancery Lane, London, W.C.
Agents.

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LEVIN'S Complete Specification.

(3 SHEETS)
SHEET 1

[This Drawing is a full-size reproduction of the Original.]

Fig. 1.

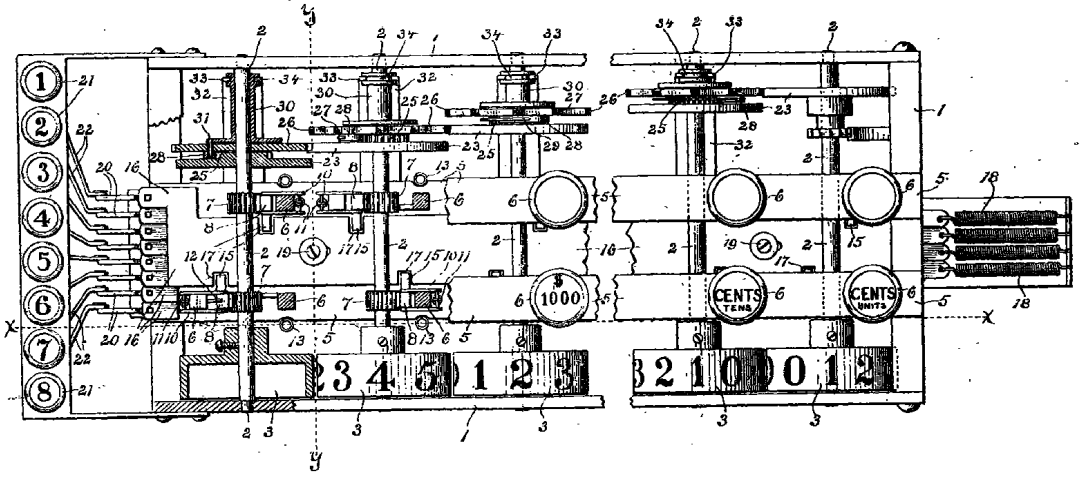

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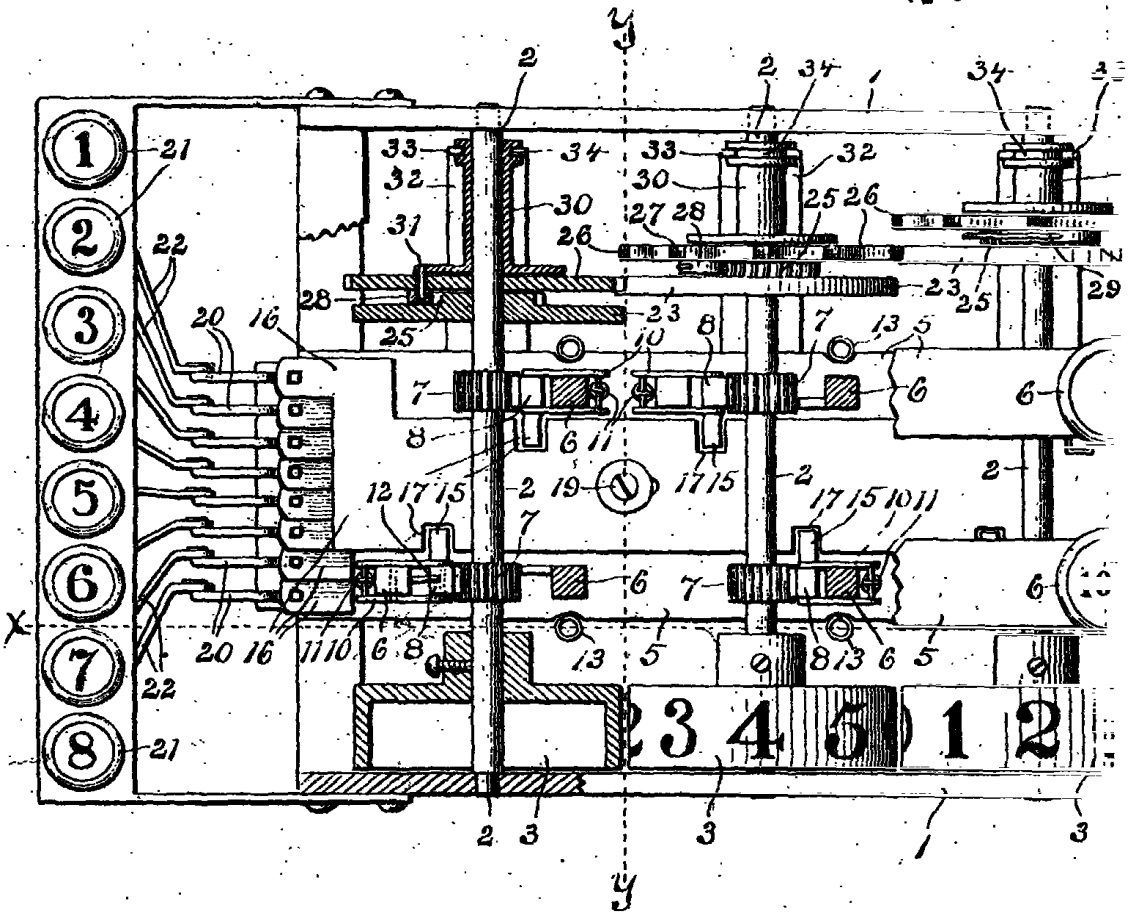
Fig. 1.



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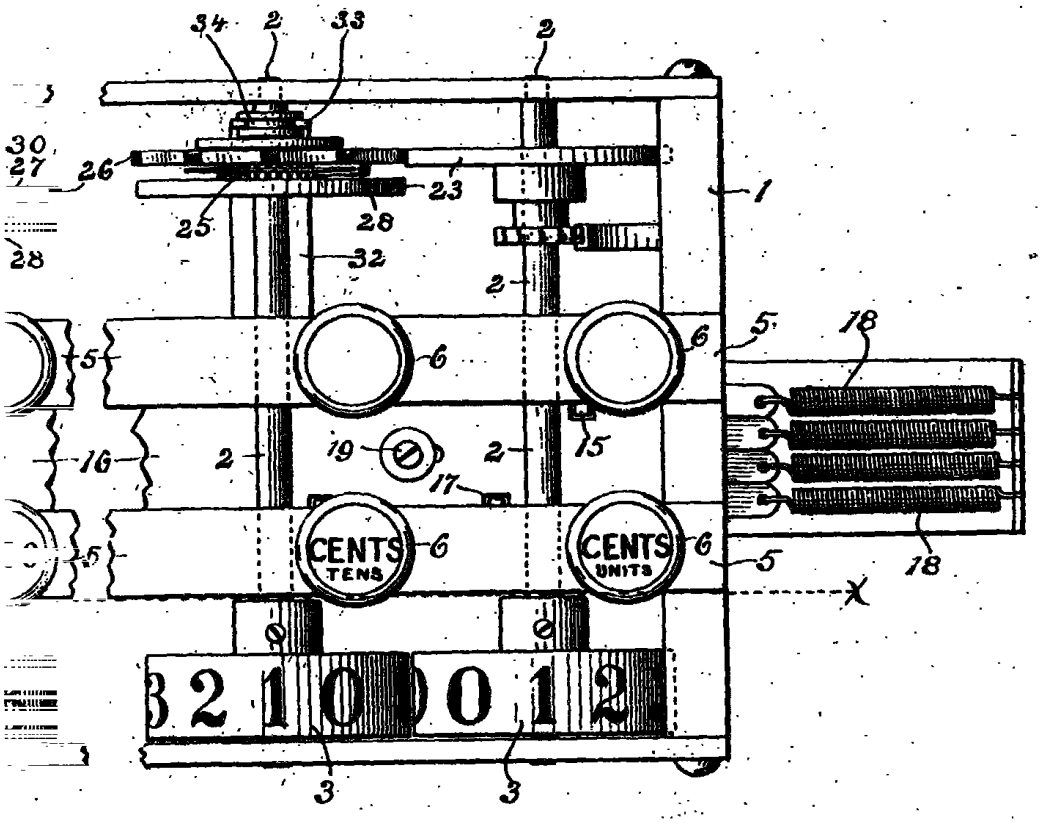

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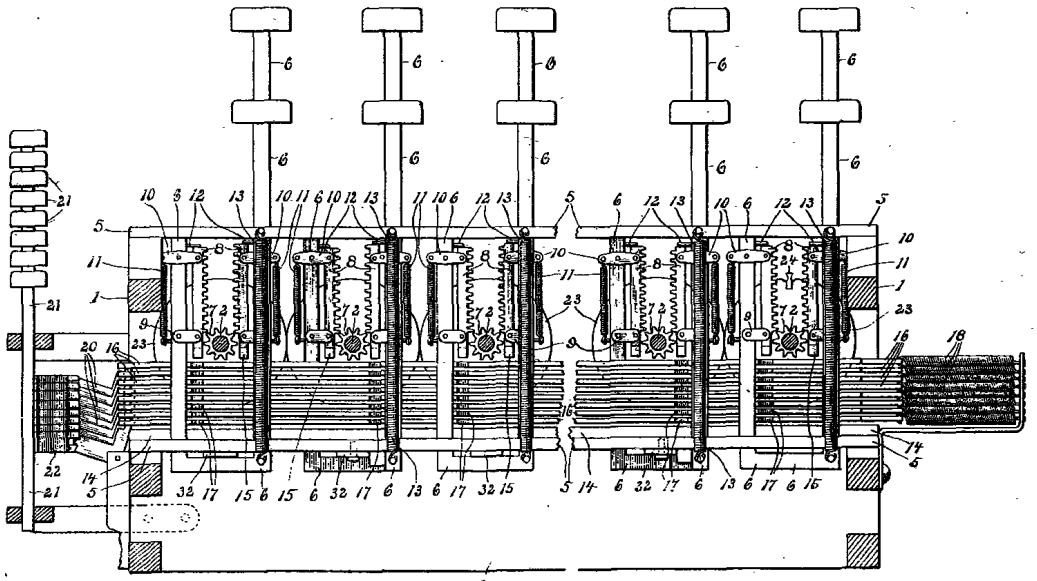

Fig. 2.

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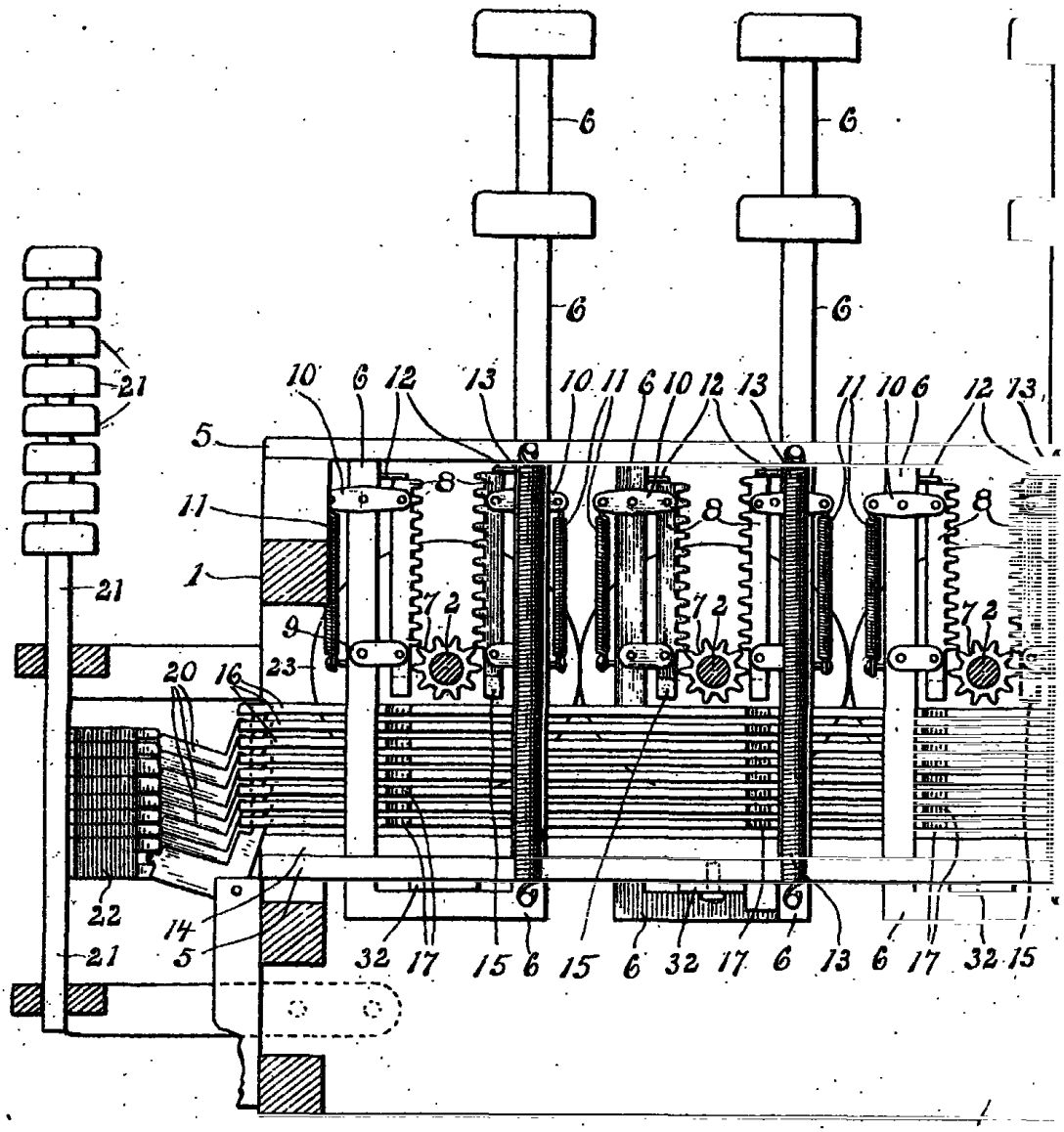

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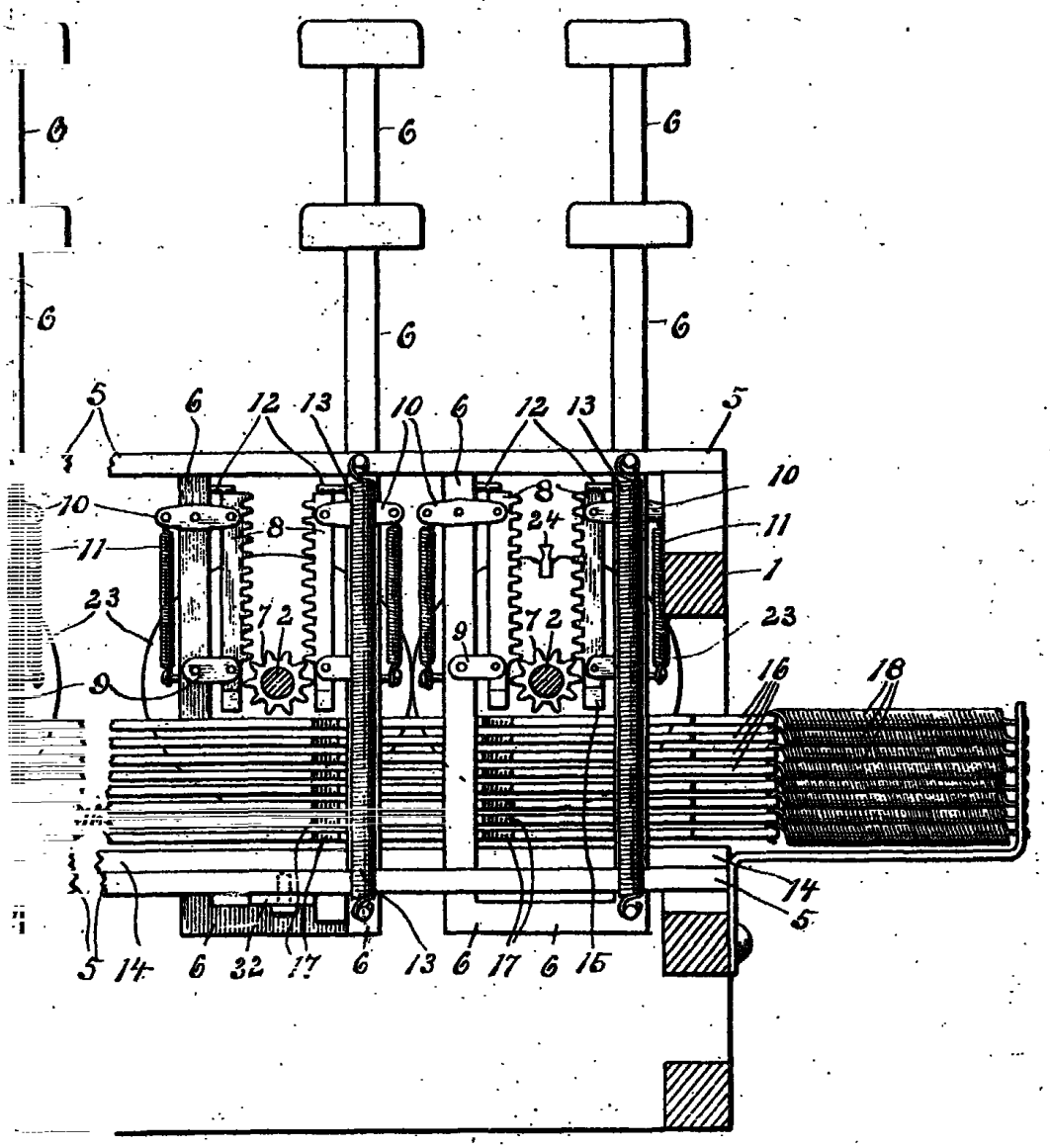

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Fig. 4.

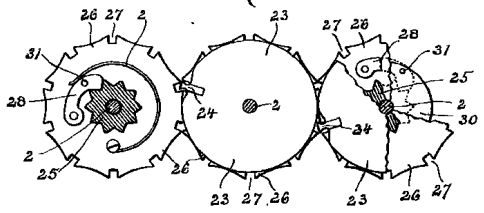

Fig. 3.

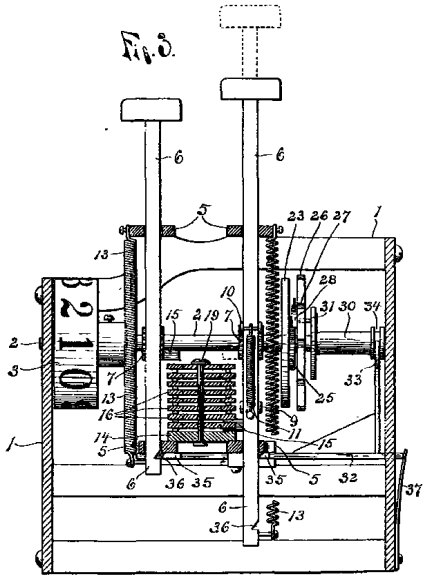

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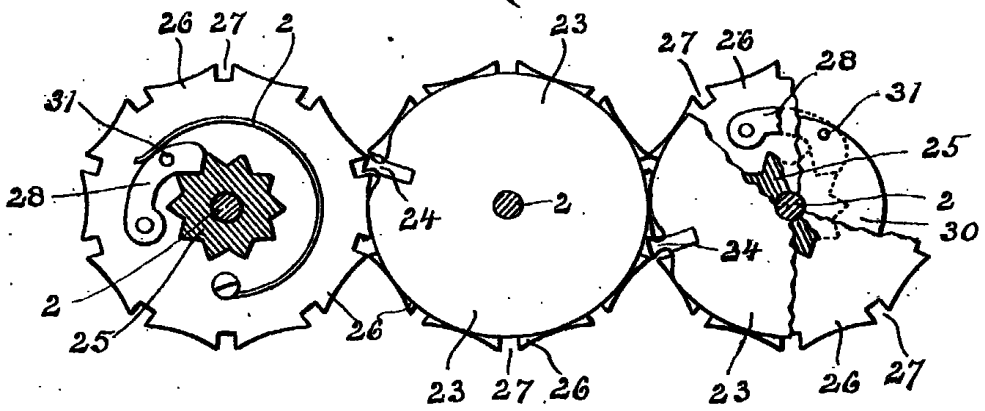
Fig. 4.



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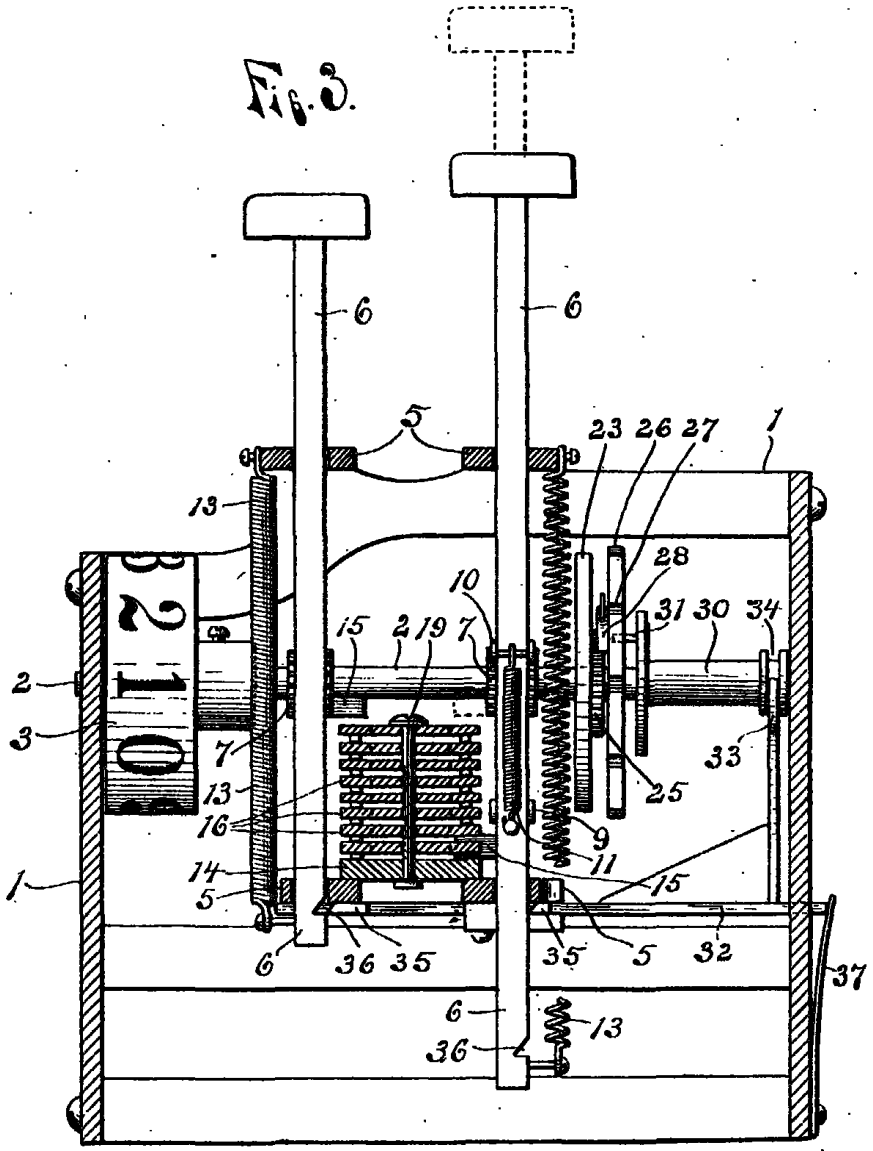

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