June 12, 1923. 1,458,642

F. COLLINS

ADDING MACHINE

Filed April 21, 1921 3 Sheets-Sheet 1

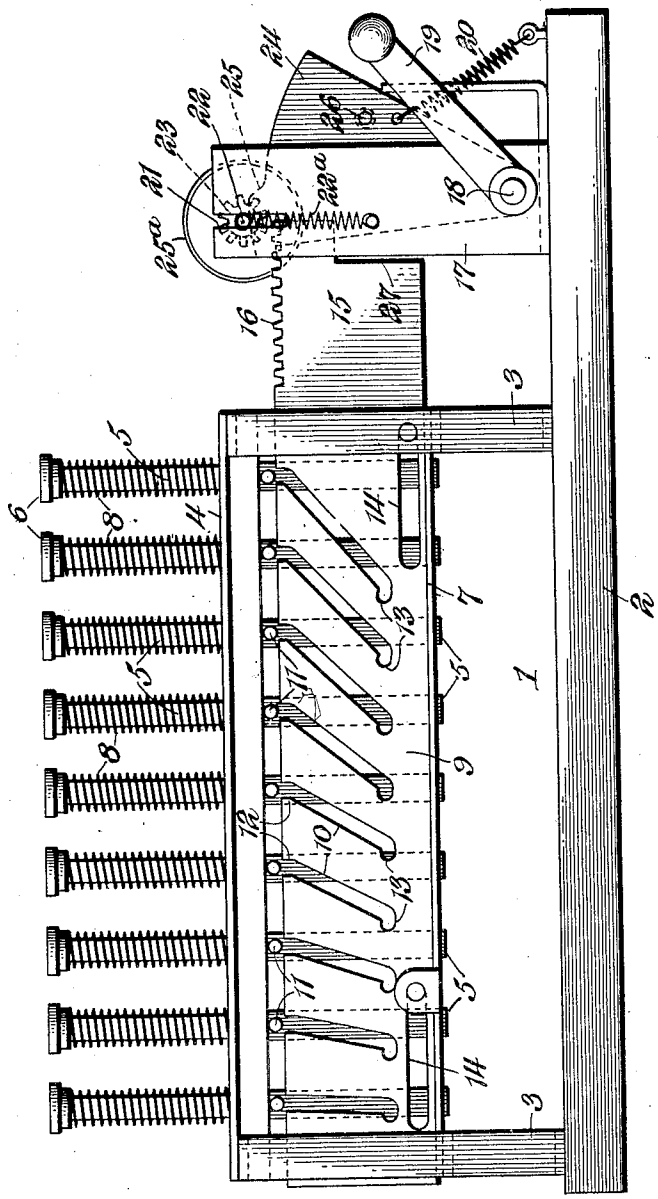


Fig. 1.

Frederic Collins,
INVENTOR,

WITNESSES

Clyde C. Ratcliff
F. T. Chapman.

BY E. G. Siggers.

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ADDING MACHINE

Filed April 21, 1921 3 Sheets-Sheet 2

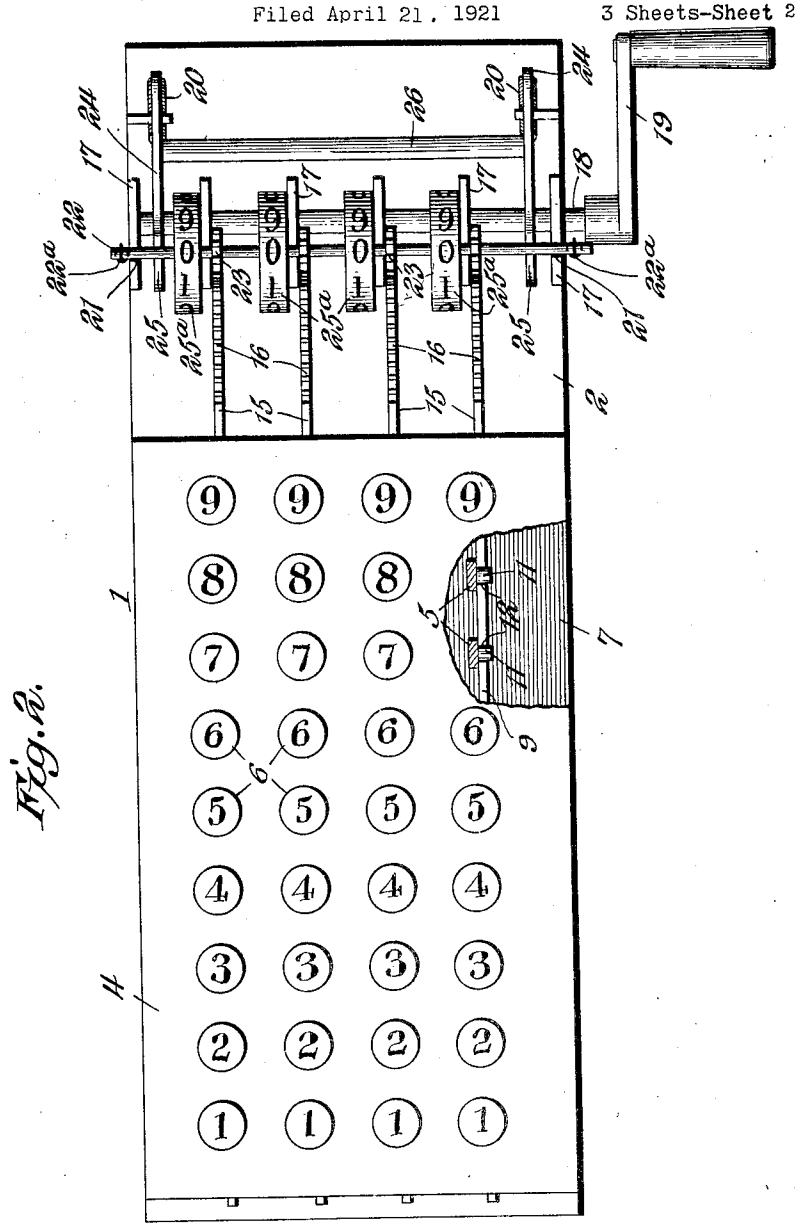


Fig. 2.

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ADDING MACHINE

Filed April 21, 1921 3 Sheets-Sheet 3

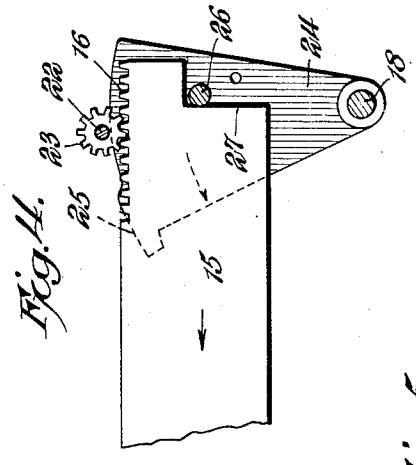


Fig. 4.

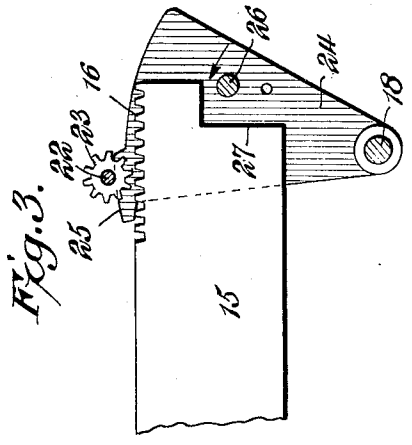


Fig. 3.

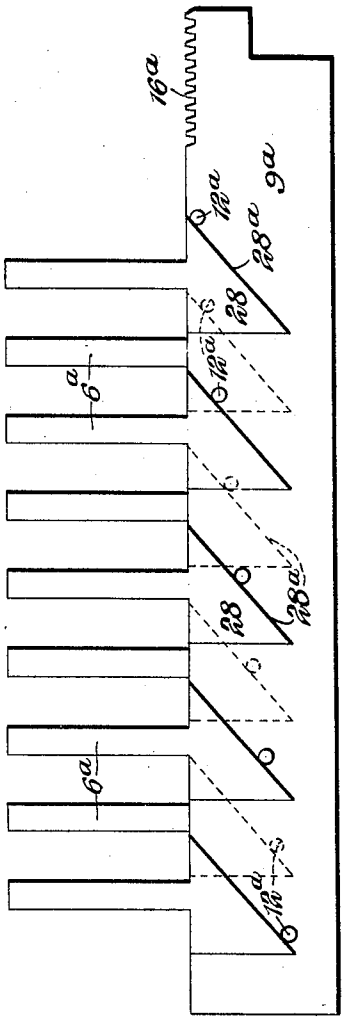


Fig. 5.

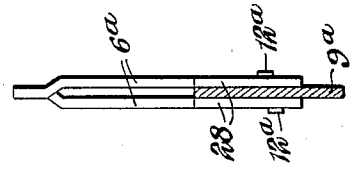


Fig. 6.

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INVENTOR,

BY E. G. Siggers
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WITNESSES

Clyde B. Ratcliff
F. T. Chapman.

Patented June 12, 1923. 1,458,642

UNITED STATES PATENT OFFICE.

FREDERIC COLLINS, OF PHILADELPHIA, PENNSYLVANIA.

ADDING MACHINE.

Application filed April 21, 1921. Serial No. 463,142.

To all whom it may concern:

Be it known that I, FREDERIC COLLINS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Adding Machine, of which the following is a specification.

This invention has reference to adding machines, and its object is to provide means whereby parts responsive to the keys of a key-board are caused to be shifted to different determined extents, and then returned to the initial position, and during the return, are put in connection with number wheels for the rotation of the latter to display accumulated amounts.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawings, but may be changed and modified so long as such changes and modifications mark no material departure from the salient features of the invention, as expressed in the appended claims.

In the drawings,—

Fig. 1 is a side elevation of so much of an adding machine as is needed for an understanding of the invention.

Fig. 2 is a plan view, with certain parts omitted, of a machine constructed in accordance with the invention.

Fig. 3 is an elevation, partly in section, of certain details of the preferred construction.

Fig. 4 is a view simliar to Fig. 3, but showing another phase of the operation.

Fig. 5 is an elevation of a modified form of the actuating mechanism.

Fig. 6 is a cross section of the structure shown in Fig. 5.

Referring more specifically to the preferred embodiment of the invention shown in the drawings, there is shown a frame or support 1, constituting part of the adding machine construction. The frame 1 is provided with a base 2, uprights 3, and a cover or plate 4, through which extend banks or columns of key stems 5, each topped with a manipulating button 6. The stems 5 are guided through the cover 4, and to and through a lower plate 7 supported by uprights 3, so that the keys are movable up and down in a straight line. Each key stem is surrounded by a spring 8, which may be of helical form, and arranged to yield to a downwardly directed force, such as may be exerted upon the key by the pressure of the human finger, the spring 8 being of sufficient strength to lift the key to hold it in normal raised position.

The keys are disposed in any desirable number of rows lengthwise of the machine, and each row of keys includes at least nine keys numbered consecutively from 1 to 9, so that the total number of keys is sufficient indication for any number desired. The digits in each row may include from 1 to 9, and also a zero, although the latter is not necessary.

Arranged longitudinally of the machine and beneath each row of keys is a plate 9, said plates 9 being spaced apart and vertical. Each plate has a series of slots 10 formed therein and extending diagonally of the plate from the upper edge. The inclinations of the slots vary in accordance with the amount of longitudinal movement which it is desired to impart to the plate. A pin 11 carried by each respective key stem 5 enters an upper open end 12 constituting the mouth of the slot; and as each key is depressed, the pin 11 causes the plate to move to a greater or lesser extent, depending on the greater or lesser angularity of slots 10. As seen in Figs. 1 and 2, the slot under the key bearing digit 9 makes the smallest angle relative the upper edge of the plate, while the slot under the units key is disposed at the greatest angle, and hence causes greatest movement of the plate.

Each slot 10 at its lower end terminates in an angle continuation 13 shaped to receive the pin 11, so that when the pin reaches the continuation 13, it will move in and lodge therein, whereby the lift of the spring 8 will tend to lock the stem 5 in its lowered position and there temporarily hold it.

The depression of a key causes the pin 11 to enter the mouth 12 of the respective slot, and in travelling downward along the slot, the plate or section 9 is urged forwardly by the cam action of the pin in the slot, with the result that the plate 9 and parts carried thereby are moved forwardly until the pin 11 lodges in the continuation 13 and

locks the plate or section against the tendency of the spring 8 to return the plate or section.

Each plate 9 is provided with guide slots 14 which may be located near the ends of the plate, but separated from each other sufficiently to permit a lengthwise movement of the plate 9 to the full extent necessary.

Each plate 9 at one end has an extension 15, and a portion of the upper edge of the extension 15 is provided with rack or gear teeth 16. Extending through fixed uprights 17, supported on the base 2, and transversely of the row of sliding plates 9 is a rock shaft 18 controlled by a hand lever or arm 19 constrained to move in one direction by a spring 20.

The uprights or posts 17 at their tops are each provided with an entering slot 21 of a size freely but snugly to receive a shaft 22 carrying pinions 23 of a number corresponding to the number of longitudinal rows of keys. The shaft 22 is mounted to move up and down in the slots 21, and such movement is brought about by rockable segments 24 mounted on the shaft 18. The segments 24 each have near one corner a cam projection 25 so positioned that it may be moved under the shaft 22, and thereby raise said shaft in the slot 21 and lift the pinions 23 out of the path of the gear teeth 16, (Fig. 3) or the shaft may be permitted to drop until the pinions are in mesh with the gear teeth 16 (Fig. 4).

Mounted on the shaft 22 and individual and fast to each pinion 23 is a number wheel 25^a generally similar to the printing wheels in machines where sums are totalized and the results are printed. The present invention simplifies the adding machine structure by providing only for the display of the total without printing such total.

The segments 24 are all mounted on the shaft 18 to move simultaneously, and they are also connected by a rod 26, which causes retrogressive movement of the plates 9. When the parts are in the neutral or zero position, the plates 9 are all located toward the left end of the machine in the withdrawn or neutral position, so that the number wheels 25^a are all presented in the same position, which may be opposite a sight opening (not shown) in the machine, and therefore nothing but zeros appear at such opening. With the machine in the zero position, a chosen one of the keys 6 is depressed, thus causing a corresponding pin 11 to enter a slot 10 in the appropriate slidable plate 9, and the plate is thereupon moved to the right, in the showing of Fig. 1. Before the plate 9 is actuated, the handle 19 is so moved as to rock the shaft 18 toward the right, if not already so situated, until the cam ends 25 underride the shaft 22, thus lifting the shaft, together with the pinions 23, upwardly in the slots 21, wherefore the pinions 23 are free from engagement with the racks 16.

The forward movement of the rack bars or plates 9 due to the depression of the keys, is then ineffective on the number wheels.

When the desired number of keys has been depressed, and the corresponding number of plates 9 has been advanced, all without affecting the number wheels, the arm or lever 19 is rocked toward the left, which is in a direction to move the cams 25 from under the shaft 22, thereby permitting the shaft 22 to lower until the pinions 23 are in mesh with the rack teeth 16, the shaft 22 having a constant tendency to drop because of gravity and of springs 22^a.

Now, further movement of the lever 19 toward the left causes the bar 26 to engage the plates 9 at their ends 15, and as the pinions 23 are in mesh with the rack teeth16, the plates 9 on moving toward the left thus cause the pinions 23, then in mesh with the teeth 16, to rotate.

The number wheels now, for the first time, become active to display the accumulated amounts, which may be seen at the sight openings, and at the same time the plates 9 are unlocked from the holding action of the pins 11 lodged in the continuations 13, so that those keys rise to their normal elevated position.

It will be observed from the foregoing that the adding machine is initially inactive to display accumulated amounts and only becomes active when the parts return toward the initial or zero position, during which return movement, the number wheels are first actuated, and at which time, the parts are all restored to the non-registering position.

In Fig. 1 the rack plates 9 are actively moved by means of keys having pins traversing angularly arranged slots and tending to move the rack plates to different extents corresponding to the numbers represented by each key. The same effect is produced by the structure shown in Figs. 5 and 6. The plate 9^a having gear teeth 16^a, has key stems 6^a arranged similarly to the showing in Fig. 1, except that each stem 6^a is provided with a right triangular head terminal 28, the keys, with their terminals, being disposed on opposite sides of the plate 9^a, and pins 12^a are arranged in the path of the angle walls 28^a of the heads 28. The angle portions 28^a of the heads 28, by engaging the pins 12^a, serve to propel the plates 9^a in the proper direction for an appropriate distance. In other respects the structure of Figs. 5 and 6 is the same as Fig. 1, because of the space occupied by the heads 28, and in order to make the structure more compact, the heads 28 are arranged alternately on opposite sides of the plate 9^a.

Of course it will be understood that the described construction is not the whole of a

commercial machine; a complete machine will be equipped with a correction device and with means for resetting the figure wheels.

What is claimed is:—

1. In an adding machine, a manually operable key, a rack bar movable in one direction by depression of said key, a number wheel, a pinion adapted to be engaged by the rack bar for rotating the number wheel, and operator controlled means for holding the pinion out of the path of the rack bar until after the rack bar has been moved by the key, said operator controlled means when moved permitting engagement of the rack bar with the pinion, and means carried by the operator controlled means for engagement with the rack bar to return said rack bar to its initial position, during which movement the number wheel is turned to an extent determined by the movement imparted to the rack bar by the key.

2. An adding machine, comprising keys, reciprocable members responsive in one direction to the keys, means for propelling the key responsive means in the opposite direction, means active only when one of the keys is depressed for holding the key temporarily in that position and also temporarily preventing return movement of the key responsive means, number wheels, and means for connecting the reciprocable members to the number wheels on the return movement of the reciprocable members, whereby to rotate the number wheels, and, at the same time, to return said reciprocable members and the keys to their initial positions.

3. In an adding machine, manually operable keys, reciprocable members responsive in one direction to the keys, rotatable number wheels movable in and out of engagement with the reciprocable members, manual means for restoring the reciprocable members to the first or initial position, and, at the same time, coupling the number wheels with the reciprocable members to cause the restoration of the reciprocable members and the actuation of the number wheels simultaneously.

4. In an adding machine, reciprocatory rack bars, actuating keys for the rack bars, rotatable number wheels, pinions fast to the number wheels, and manually operable means for moving the number wheels out of the path of the rack bars when the latter are actuated by the keys, and for subsequently restoring them into mesh with the rack bars, whereby to actuate the number wheels through the racks and pinions when the rack bars are moved in the reverse direction to that in which they are actuated by the keys.

5. In an adding machine, reciprocable members, actuating keys for propelling the reciprocable members in one direction, number wheels initially unresponsive to the movement of the reciprocable members in one direction, means for coupling the number wheels to the reciprocable members on the movement of the latter in the opposite direction, and pinions fast to the number wheels to be engaged by the rack bars on the return movement of the latter, whereby to cause rotation of the number wheels and the return of the keys and reciprocable members to the first or initial position.

6. In an adding machine, reciprocable rack bars, each with a series of slots transverse to the length of the bar and progressively sloping to different extents, with each slot terminating in an angle extension in the direction of the length of the bar, a key associated with each slot to propel the bar a distance characteristic to the slot, a number wheel associated with each rack bar, and means timed to couple the rack bars and the number wheels for the actuation of said number wheels by the return of the bars to the initial position.

7. In an adding machine, reciprocable members, manipulating keys for moving the reciprocable members in one direction to different extents to represent correspondingly different numbers, number wheels, each of like compass, and normally out of engagement with the reciprocable members, manually operable means for setting the number wheels into active connection with the reciprocable members, and manually operable means for causing the return of the reciprocable members toward zero or neutral position, and simultaneous actuation of the number wheels in accordance with the displacement of the reciprocable members when actuated by the keys.

8. In an adding machine, key responsive reciprocable members with the keys active to said members in one direction only, number wheels individual to the reciprocable members, and manually operable means for causing the coupling or uncoupling of the reciprocable members and number wheels with the coupling and uncoupling means timed to disconnect the number wheels from the reciprocable members when the keys are operated, to subsequently couple them, whereby the operation of the keys is inactive to the number wheels and the subsequent operation of coupling the number wheels and reciprocable members will bring about the restoration of the keys to the normal or first position, and also the rotation of the number wheels to different extents.

9. In an adding machine, reciprocable members, manipulating keys for moving the reciprocable members in one direction, said reciprocable members having transverse slots inclined to differing degrees with re-

lation to the length of the reciprocable members, with each slot terminating in a short extension in line with the direction of travel of the reciprocable member, propelling keys engaging the slots and entering the terminal extension to temporarily lock the reciprocable members at one limit of their travel, rotatable number wheels individual to the reciprocable members and normally disconnected therefrom, and manually operable means for connecting the number wheels and reciprocable members after the latter have been actuated by the keys, to cause the coupling of the number wheels and the reciprocable members and the restoration of said reciprocable members to the first or zero position with the consequent rotation of the number wheels to display accumulated amounts.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature.

FREDERIC COLLINS.