(No Model.) 2 Sheets—Sheet 1.

P. C. FORRESTER.

ADDING MACHINE.

No. 249,606. Patented Nov. 15, 1881.

Fig. 1.

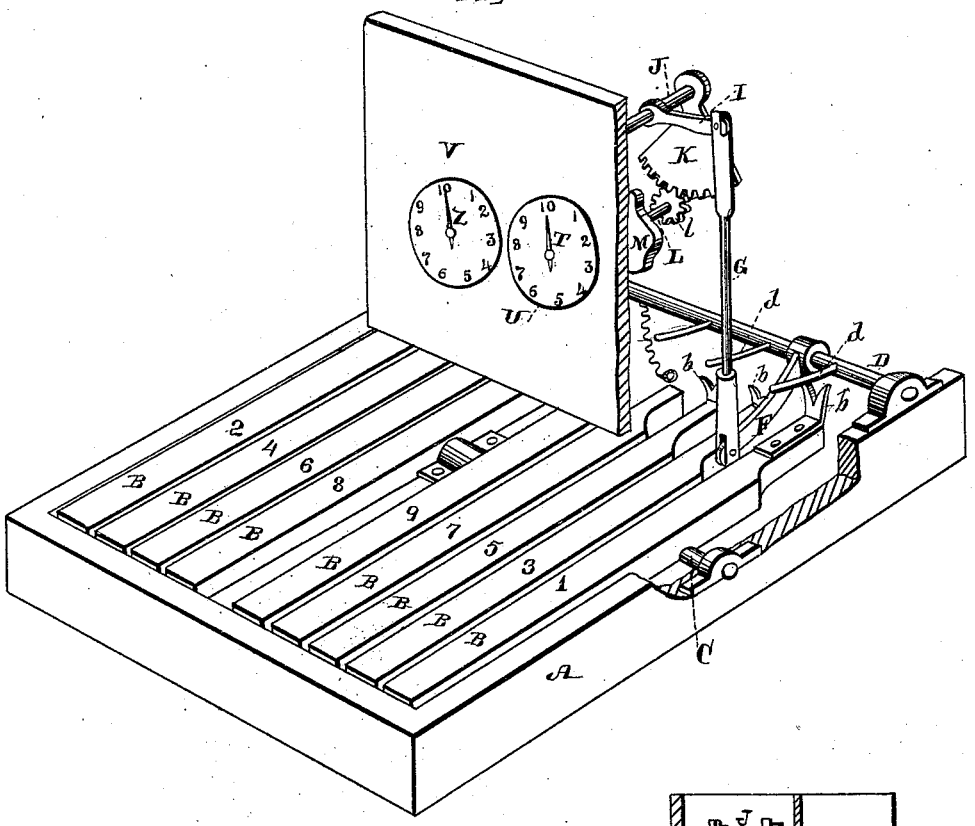
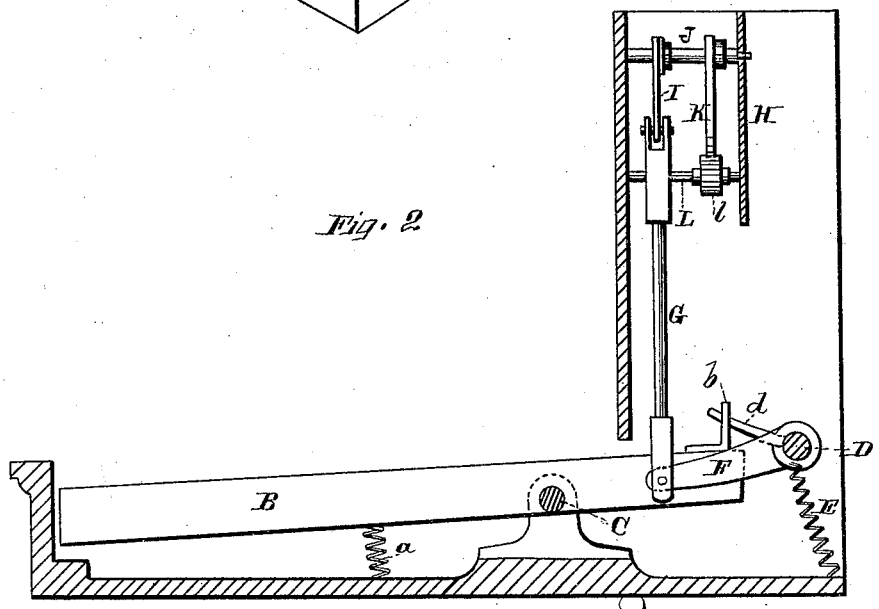


Fig. 2.



Witnesses:
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Geo. H. Strong

Inventor
Peter C. Forrester
By Dewey & Co. Attys

(No Model.) 2 Sheets—Sheet 2.

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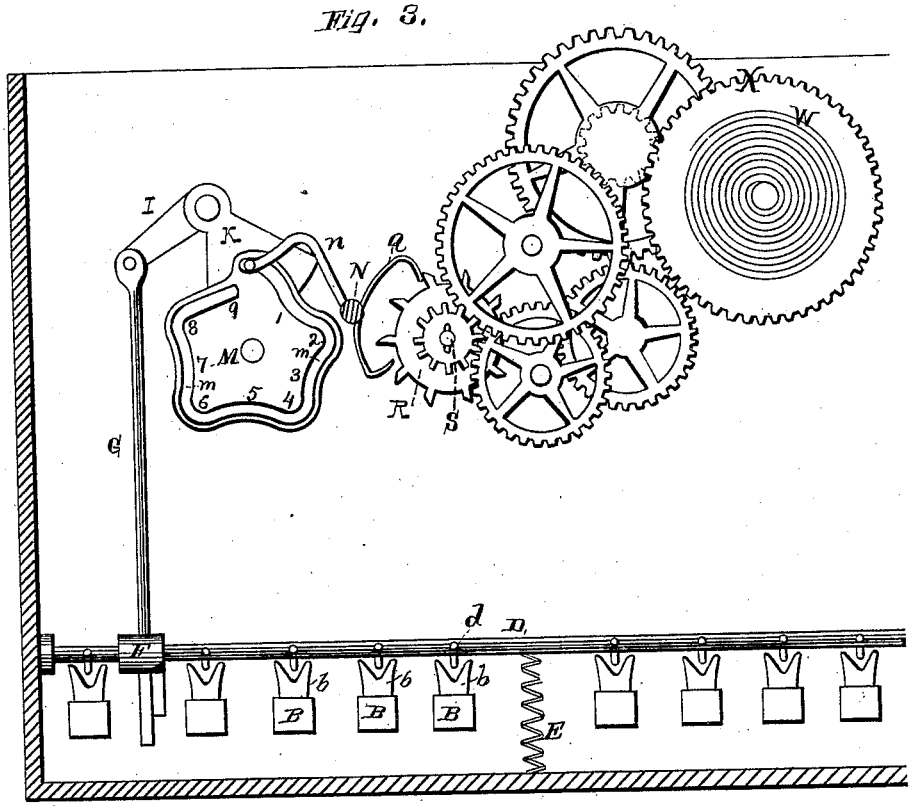
Fig. 3.



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UNITED STATES PATENT OFFICE.

PETER C. FORRESTER, OF SAN FRANCISCO, CALIFORNIA.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 249,606, dated November 15, 1881.

Application filed July 5, 1881. (No model.)

To all whom it may concern:

Be it known that I, PETER C. FORRESTER, of the city and county of San Francisco, State of California, have invented an Adding-Machine; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the class of adding-machines the design of which is to record the sums of successive figures by mechanical appliances without any other mental operation than is necessary to work the machine.

The principle of my invention is the operation of needles upon dials by means of a key-board through intermediate mechanism, whereby the escapement governing the needles is regulated to respond to the action of individual keys denoting the nine digits, all of which will hereinafter more fully appear, reference being made to the accompanying drawings, in which—

Figure 1 is a view of my invention. Fig. 2 is a longitudinal vertical section. Fig. 3 is a view of the mechanism.

Let A represent a frame-work, having an upright portion and a key-board resembling somewhat an upright-piano. Upon the key-board are keys B, having their fulcrum upon a shaft, C, as shown. For convenience I have placed four keys upon one side of a dividing-line and five on the other. The keys represent each number up to nine, and are so properly designated, from which it will be seen that I prefer to place the odd numbers on one side and the even on the other, following in this arrangement nothing but convenience, deeming it easier to rapidly pick out each number when thus divided. Under each key is a small spring, *a*, which forces it up after being pressed down. In the upright portion of the frame, near the lower part, is journaled a shaft, D, to which are secured projecting pins *d*, there being nine in all, one for each key, and projecting toward and over each key. Upon the rear ends of the keys are forked arms or lifters *b*, in the forks of which the projecting pins *d* lie when said keys are pressed down in front so that their forks are raised to meet the pins.

E represents springs, which hold the shaft in its proper position—that is, with the pins about horizontal.

The operation thus far is as follows: If any key be pressed down in front its rear end is raised and its forked arm engages with and presses up the pin, and thus turns the shaft D. When the key is released its spring *a* causes it to return, and the shaft D, being released, will turn back, being drawn by its spring E. The shaft D is therefore a rocking or oscillating shaft.

Attached to the shaft D, near one end, is a downwardly-inclined crank-arm, F, to the end of which an upright rod, G, is pivoted. H represents a plate supported from and parallel to the front of the frame A by end posts or supports. The top of the upright rod G is pivoted to a crank-arm, I, secured upon a horizontal shaft, J, journaled in the frame and in the plate H.

Upon the shaft J is secured a gear-segment, K, the teeth of which engage with a pinion, *l*, upon a shaft, L, journaled between the frame and plate H. The shaft L carries a peculiar plate, M, an enlarged view of which is shown in Fig. 3. It has five points, and the lines joining said points are concaved, as shown. In one side is a groove, *m*, around the edge following the contour thereof and closed at both ends, so that said groove is not continuous, though nearly so. This groove may, therefore, be divided into a series of lowest points and of highest points, or of depressions and elevations, the former being at the middles and the latter at the points. For a more perfect understanding of the purpose of the plate I have marked it as follows, and will explain the reason as I proceed: Beginning, therefore, with the first depression, I mark it 1; elevation following, 2; next depression, 3, and so on, numbering the last depression 9. It will be perceived the starting-point or first elevation I have not numbered.

N is a shaft, carrying the bent rod *n*, the end of which fits within the groove *m* of the plate M, and is adapted to move in said groove as the plate is turned, thus following the contour of the groove. Upon the same shaft N is the double arm escapement Q, engaging with the escapement-wheel R upon a shaft, S. Upon the same shaft S, which extends through the front of the frame, is a dial-finger, T, upon a dial, U. This dial is divided into units, commencing at zero and running through nine.

Now, suppose the rod G is lifted, it turns the shaft J, and, through the gear-segment K and pinion *l*, turns the plate M. If it be lifted a little, so that the plate M turns one side, the rod *n* will follow the groove *m* down to one depression and to one point or elevation. In doing this it releases the escapement twice, once at the depression marked 1 and once at the elevation marked 2, because in traveling in said groove it rocks the shaft N, so that one arm of the escapement releases the escapement-wheel to move half a tooth, and on the return-rock causes the other arm to release the wheel the other half tooth. This allows the dial-finger T to move one space. The dial-finger is moved by clock-work, as hereinafter shown. It takes two movements of the shaft N and double arm to allow the escapement-wheel to move one tooth. These two movements are obtained by causing the shaft to rock forth and back by means of the bent rod *n* traveling in the groove *m*. As the rod goes down in the depression 1 of the groove the shaft rocks down, and as it goes up to the following elevation the shaft rocks up, and the two together allow the escapement to score one. It is obvious that if I turn the plate M only just far enough to rock the shaft N down and then turn it back again the shaft N must rock up, because the rod *n* returns to an elevation in the groove *m*. This being the case, I utilize the return of the plate M and make it score an equal number as in its forward movement, thus always bringing it back to the start.

The forked arms or lifters *b* upon the rear end of each key are so set that they can only move the rocking shaft D a certain distance. Thus the arm belonging to the key marked 1 is so low that it does not touch the pin *d* of the shaft until the key is nearly down to its limit, and then it raises it enough to cause plate M above to turn from the start as far as the depression marked 1, and this, as before explained, causes the escapement to score one-half. When the key is released the shaft D is rocked back by its springs E and causes the plate M to return, and the escapement is allowed to score the other half, thus causing the dial-finger to record one. When I touch key 2 its lifter rocks the shaft D sufficiently to turn the plate M from the start down to and past depression 1 up to elevation 2, thus scoring two halves, or one, and on return of the shaft and plate M the other one, thus recording two. The lifters continue to be thus adjusted through all the units. When key 9 is pressed down the shaft D is rocked so far that the plate M turns around past all the depressions and elevations, scoring nine halves, and on the return the other nine halves, making eighteen movements, and recording nine units on the dial-plate. The numbers here shown indicate the principle.

My escapement-wheel has ten teeth; but I could have one with twenty and reduce the motion in other ways. If any change be made in proportion it can be regulated to suit. The principle is in the adjustment of the keys to operate the escapement substantially in the manner shown.

The number of wheels might be reduced by forming the irregular groove *m* in the gear-segment K and directing the bent rod *n* therein. The principle would remain the same.

Upon the face of the frame A is another dial-plate, V, with numbers denoting tens, and the relation existing between the two dial-plates is the same as is found in gas-meters, cyclometers, and similar instruments.

W represents the motor-spring, adapted to be wound up as a clock. The shaft on which it is carries the large gear X, from which motion is transmitted through appropriate gears to the dial or escapement-shaft S and to the shaft which operates the dial-finger Z of the dial-plate recording tens. This system of wheels I have not deemed it necessary to particularly set forth, because it is the mechanism of any ordinary clock, and will not require the exercise of invention to comprehend. It is sufficient to say that for every ten units recorded on the dial-plate U one ten is recorded on dial V. The same principle will apply to a dial adapted to record hundreds.

Now, I use the device for adding as follows, given a column of figures like this for example:

2 3
5 6
8 9

I press the key 9, and the first dial records 9; then press key 6, and the finger goes around to 5, while the other dial records 1; then press key 3 and the finger indicates 8, thus showing from both dials that 18 is the sum of the first row. Put down 8, then move the dial-finger to zero again. The second dial-finger is adapted to be turned by simply moving it around with the hand, it being upon a loose sleeve and moved by friction in a manner well known. The first finger can be run around quickly by the keys; then, having one to carry, touch key 1, then 8, 5, and 2 in succession, and the first dial-finger will indicate 6 and the second 1. Put down 16. That by the side of the 8 will give the result—168.

In short columns the device is not as useful as in long ones. When the latter have to be added the time taken in turning the dials after each row is not noticeable.

Although I have described the lifters upon the ends of the keys as being simply metal forks, it is obvious that I could improve upon them by making them adjustable by set-screws, so that each could be set to move the rocking shaft with accuracy.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an adding-machine having a dial-plate and indicator adapted to be moved by clock mechanism and an escapement, the oscillating plate M, with its groove *m* for releasing said escapement, when arranged substantially as herein set forth.

2. In an adding-machine having dial-plates

and indicators adapted to be moved by clock mechanism and an escapement, the oscillating plate M, with its groove *m* for releasing said escapement, in combination with the means for oscillating said plate, consisting of the pinion *l*, segment K, crank I, upright rod G, crank F, rocking shaft D, with its pins *d*, and removable keys B, with their adjusted lifters *b*, when arranged substantially as and for the purpose herein described.

3. The keys B, with their adjusted lifters *b*, rocking shaft D, with its springs E and pins *d*, crank F, upright rod G, crank I, shaft J, gear-segment K, pinion *l*, shaft L, plate M, with its groove, bent rod *n*, shaft N, escapement-arms Q, escapement-wheel R, dials U and V, with their dial-fingers, in combination with clock mechanism for moving said dial-fingers, the whole forming an adding-machine when arranged and used substantially as herein described.

In witness whereof I have hereunto set my hand.

PETER C. FORRESTER.

Witnesses:
WM. F. BOOTH,
J. H. BLOOD.