

F. L. H. SIMS.

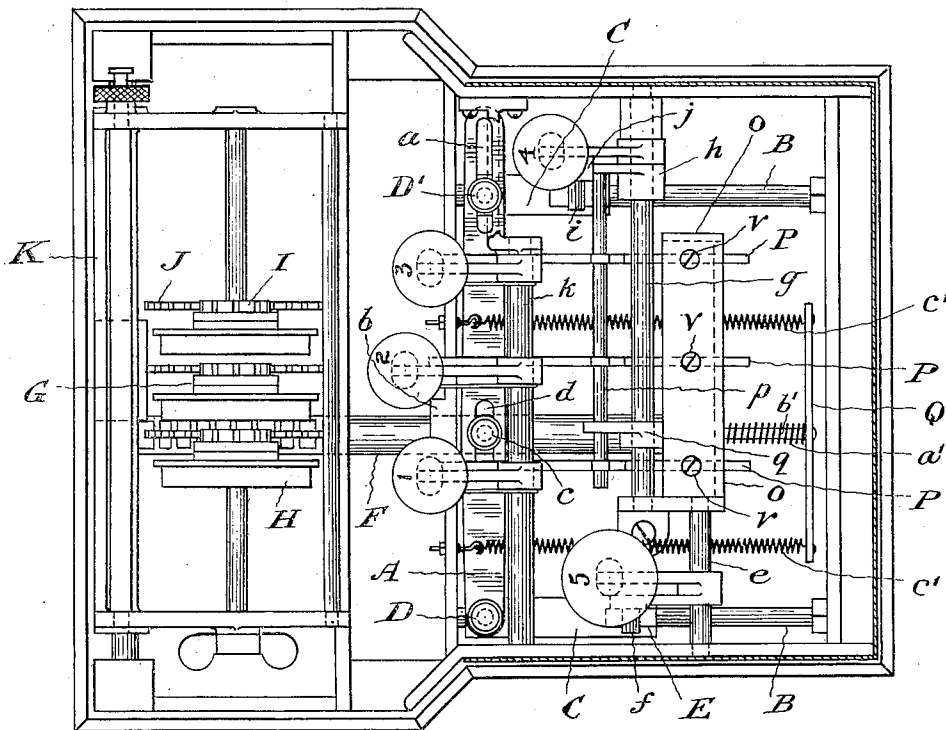
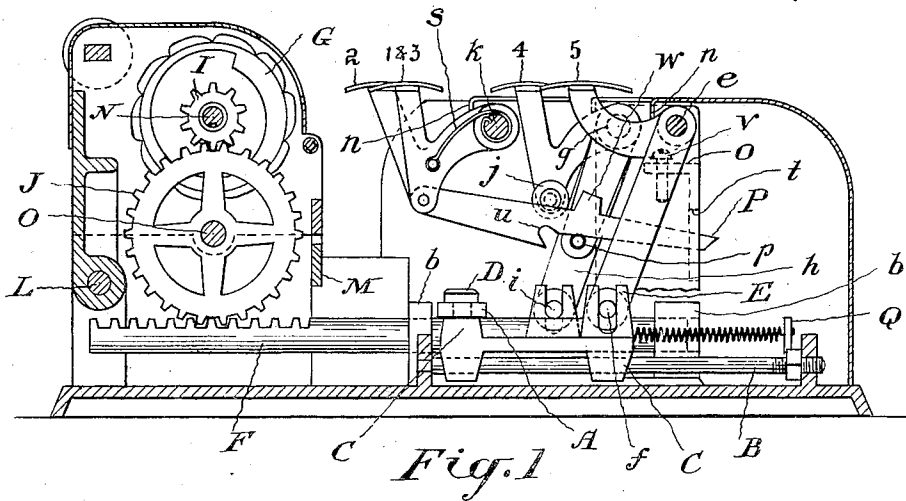
KEY OPERATED MECHANISM FOR ACTUATING, RECORDING, OR INDICATING APPARATUS
OR THE LIKE.

APPLICATION FILED OCT. 28, 1911.

1,049,929.

Patented Jan. 7, 1913.

2 SHEETS—SHEET 1.



WITNESSES:

W. J. McMillan
E. P. Hall.

INVENTOR.
F. L. H. Sims
BY J. Edward Maybue
ATTORNEY.

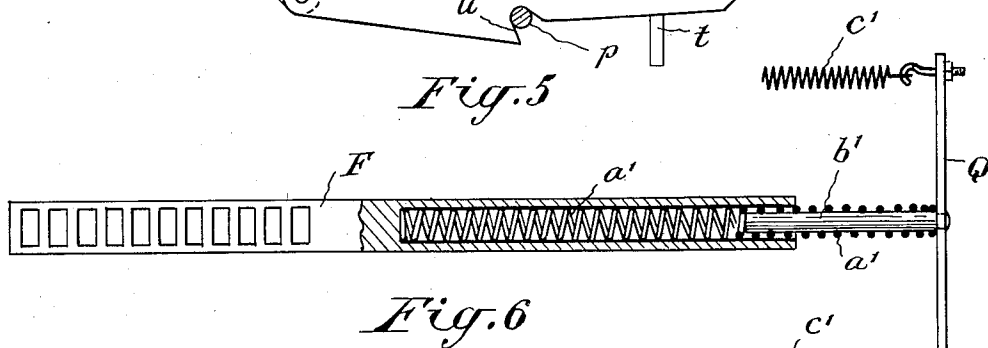
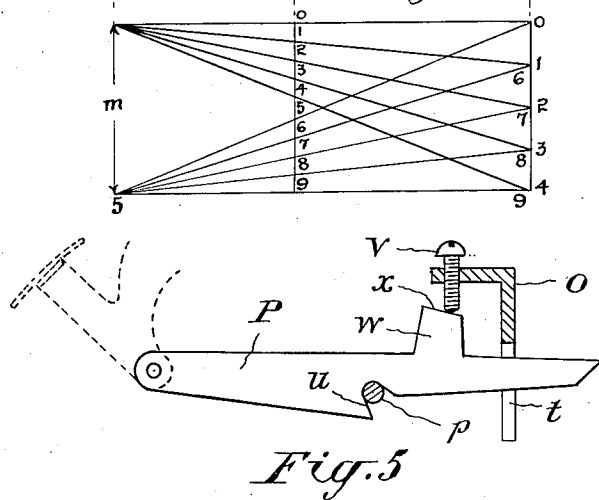
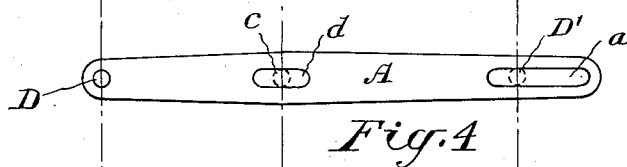
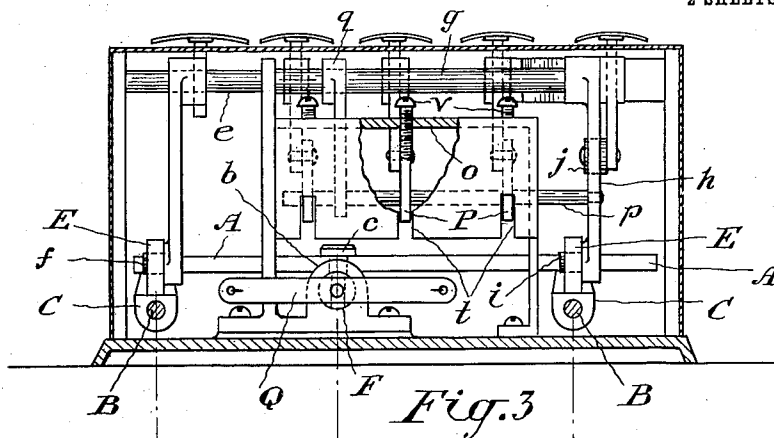
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2 SHEETS—SHEET 2.



WITNESSES:

H. G. McMillan
E. P. Hall.

INVENTOR.
F. L. H. Sims
BY J. Edward Mayhew
ATTORNEY.

UNITED STATES PATENT OFFICE.

FREDERICK L. H. SIMS, OF TORONTO, ONTARIO, CANADA.

KEY-OPERATED MECHANISM FOR ACTUATING, RECORDING, OR INDICATING
APPARATUS OR THE LIKE.

1,049,929.

Specification of Letters Patent.

Patented Jan. 7, 1913.

Application filed October 23, 1911. Serial No. 657,203.

To all whom it may concern:

Be it known that I, FREDERICK L. H. SIMS, of 155 Dunn avenue, in the city of Toronto, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Key-Operated Mechanism for Actuating, Recording, or Indicating Apparatus and the Like, of which the following is a specification.

10 This invention is particularly applicable to adding machines, cash registers and the like, and relates to machines of the type using five keys.

In such apparatus my object is to devise 15 an arrangement in which the keys are operable by a clutching movement of the fingers instead of by a rectilinear movement or a movement curving away from the operator, so that the fingers of the hand need 20 never be taken off the keys, leaving the eye free to follow a column of figures.

A further object is to devise effective and reliable mechanism of extreme simplicity for imparting to an indicating or recording 25 device movements equal to the whole or any predetermined number of ninths of the whole movement possible, such movements being produced by actuating the keys either 30 singly or in combination with a given key.

I attain these objects by means of a mechanism which may be briefly described as follows:—A rocking bar is provided pivoted at one end on a pivot which is movable a predetermined distance in a right line so 35 that the bar may rock from at least two positions one at each end of the line of travel of the pivot. The other end of the rocking bar is also adapted to rock on a pivot movable parallel to the first and 40 through the same distance. Means for actuating, recording, indicating or the like mechanism is connected to said rocking bar intermediate its pivots, the point of connection being located four-ninths of the distance between the pivots from one of them 45 which latter is movable by the key representing the number 5. The keys representing the numbers 1 to 4 are adapted to actuate the other pivot and to move it respectively through one-, two-, three-, or four-fifths of the whole distance. As any key 50 may be actuated alone, and as the 5 key may be actuated in combination with any one of the others, the actuating means of the recorder or indicator may be moved 55 from one-ninth to nine-ninths of the whole

distance through which it is arranged to be moved. The principle of operation of the mechanism thus briefly described will be hereinafter more fully set forth and is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of my improved machine. Fig. 2 is a plan view of the same. Fig. 3 is a cross-section of the same. Fig. 4 is a plan view of the rocking bar shown in conjunction with a diagram illustrating the mode of operation of the device. Fig. 5 is an enlarged side elevation of one of the connecting rods for the 1 to 3 70 keys in its rearmost position. Fig. 6 is a sectional plan view showing the spring mechanism for returning the rack bar to its normal position.

In the drawings, like letters of reference 75 indicate corresponding parts in the different figures.

A is a rocking bar which forms the basis of the device. This bar is adapted to rock from each end, preferably through the 80 means I will now describe.

At each side of the apparatus is suitably carried a guide rod B on which a slide C is adapted to reciprocate. Each slide is provided with an upwardly projecting pivot 85 and also with a slotted lug E by means of which the slide may be moved. One end of the rocking bar is shown as pivoted on the pin D carried by the slide at the thumb side of the machine. The other pivot pin D' engages in the slot *a* formed in the other end 90 of the rocking bar A. Between the guide rods B a rack bar F is suitably guided so that it may reciprocate in a direction parallel to the guide rods B. This rack bar 95 provides means for actuating a suitable register. I show the bar as slidable in the guides *b*. The rack bar has a connection with the rocking bar which will admit of a transverse sliding movement of the rocking 100 bar relative to the rack bar. For this purpose I show a pivot *c*, projecting from the rack bar and engaging in a slot *d* formed in the rocking bar. It will be understood of course that any arrangement of slots or their 105 equivalents which will permit of the rocking bar assuming any necessary angular position relative to the slides C and the bar F will answer the purpose of my invention.

With a machine constructed to operate on 110 the decimal system and using five keys, the pin *c* is located at a point distant from the

thumb-side pivot D four-ninths of the total distance between the two pivots D, D' at the opposite ends of the rocking bar. The machine shown is a right hand machine, the thumb of the operator's hand being adjacent the left side of the machine as he faces it. Five keys are provided for actuating the rocking bar. These are designated by the numerals 1 to 5. The thumb or 5 key is adapted to move back the pivot D at the left hand side of the machine a distance which may be designated by the letter *m* (see Fig. 4). The little finger or 4 key is adapted to draw back the right hand pivot D' the same distance *m*, while the 1, 2, and 3 keys are adapted to draw back the same pivot as the 4 key a corresponding number of fourths of the distance *m*. The result of this construction is that the rack bar may be moved any number of units of distance from 1 to 9, depending on the key or combination of keys which has been operated. The rack bar is moved back five units by actuating the 5 key operating on the left hand pivot D, and the rack bar is moved back from 6 to 9 units by operating the 5 key in conjunction with either the 1, 2, 3 or 4 keys respectively, the result being indicated in Fig. 4 on the line *x-y* projected from the pivot *c* through the medium of which the rocking bar actuates the rack bar. This diagram illustrates graphically how the proportionate movements of the rack bar are obtained by moving the rocking bar from either one or both ends in the manner described, and the underlying geometrical principle will be readily understood by any one conversant with the *Elements* of Euclid.

Before describing the constructions through the medium of which the various keys actuate the pivots D, D' I will describe the means by which the movements of the rack bar are integrated, when my device is used to operate adding mechanism.

G represents a counter or register which may be of any well-known construction, though I have devised a counter specially adapted for this machine which will be made the subject matter of a separate application. For the present suffice it to say that the counter is provided with a plurality of number wheels H, which, as in ordinary counters, will be provided with means for carrying from one numeral wheel to the next after a number wheel has moved to indicate the number 9. The important feature, as far as the present invention is concerned is that each number wheel is provided with gearing adapted to mesh with the rack bar F and that the counter as a whole is slidable to bring any desired gear train in mesh with the rack bar. I show each gear train as comprising a pinion I meshing with the gear wheel J adapted to mesh with the rack bar F. The registering mechanism is carried by

the carriage K adapted to slide on the cross bars L and M carried by the frame of the apparatus. The counter G is carried by the spindle N supported in the ends of the carriage K while the gear wheels J are carried by and are loose on the spindle O also supported in the ends of the carriage. If desired, suitable means may be provided to lock the carriage with any desired number wheel geared to the rack bar F.

The keys are connected with the slide C preferably in the following manner:— The thumb or 5 key, it will be seen, is shaped as a bell crank lever, journaled on the bar *e*, and provided at its lower end with a pin *f* engaging in the slotted lug E. The little finger or 4 key is loose on a suitably journaled rock shaft *g* to which is secured the rock arm *h* provided with the pin *i* engaging the slotted lug E of the right hand slide C. The 4 key is shaped as a bent lever and is provided at the bend with a roller *j* adapted to engage in front of the rock arm *h*. By depressing the 4 key the rock arm *h* will be operated; at the same time the rock arm is free to move independent of the 4 key for a purpose hereinafter described. The 1 and 3 keys are similarly shaped to the 4 key and are loose on the suitably-supported shaft *k*. The 2 key is of the same general shape as the 1 and 3 keys, and is also loose on the shaft *k*, but extends farther from the shaft to suit the greater length of the middle finger.

To the bend of each key is pivoted one end of a connecting rod P preferably formed as follows:— One end is pivoted to the key, the other slides in a slot *t* in the angle cross bar *o*. Intermediate their ends the connecting rods rest on the cross bar *p* extending from the rock arm *h* to a rock arm *q* also secured to the rock bar *g*. In each connecting rod P is formed a notch *u*, these notches being so located as to allow for lost motion in such a manner that a given notch will not engage the bar P until the key operating it has been depressed so far that the remainder of its movement will only rock the arm *h* through a portion of its arc of movement depending in its extent on the key operated, being $\frac{1}{4}$ in the case of the 1 key, $\frac{1}{2}$ in the case of the 2 key and $\frac{3}{4}$ in the case of the three key.

To adjustably limit the throw of the 1, 2 and 3 keys and to assist in forming a momentum check, I provide the screws *v* screwed through the cross bar *o* so that they contact with the sloping upper faces of the lugs *w* formed on the connecting rods P when the latter have reached their desired limit of travel. As each connecting rod rests on the cross bar *p*, its lug *w* cannot be forced under the screw *v* which therefore limits the rearward movement of the connecting rod, and as the face of the lug

slopes toward the set screw, a vertical adjustment of the latter regulates exactly the throw of the connecting rod. As the notch *u* is in engagement with the cross bar *p*, before the lug *w* contacts with the screw *v* and as the notch is so formed that a slight sloping shoulder *x* is provided engaging the rear side of the rod *P*, it is evident that the locking of a connecting rod *P* locks also the cross bar *p*, so that the rocking parts with which the latter is connected stop dead where moved, and the rack bar *F* is absolutely prevented from moving under the influence of momentum past the position to which it is desired to move it by the operation of the 1, 2, or 3 keys. From the constructions described, it is also evident that movement of any one of the keys 1 to 4 may take place without any movement of the others taking place.

It will be noted that, as the keys fulcrum on centers between the key buttons and the position ordinarily assumed by the knuckles of the hand, a clutching movement of the fingers serves to actuate the keys, making it quite unnecessary to lift the hand. The springs *s* engaging the keys and some suitable stationary part tend to retain the keys in their normal position as shown, in contact with the stops *n*. As the keys are all supported on transverse shafts of some length, the keys may readily be placed in any desired position to suit the hand of the person using the machine.

With a horizontally moving rocking bar it is necessary to provide spring means for returning the rack bar *F* to its normal position after it has been moved by the operation of a key, and it is also necessary that the tension should be as nearly even as possible, whether the rack bar be moved one unit of distance or nine, so that the touch of the keys may be as even as possible. I, therefore, provide a compound spring tension device, preferably arranged as follows:—The rack bar *F* is made hollow toward its rear end, and in the socket so formed is set a compression coil spring *a'*, the outer end of which engages the cross head *Q*. This cross head is guided by a stem *b'* fitting within the coil spring *a'* and the rack bar. To the ends of the cross head are connected the tension coil springs *c'*, the other ends of which are connected to any suitable stationary part of the apparatus. By this arrangement I secure the comparatively equable tension of very long springs in half the space which would otherwise be required.

From the above description it is thought that the operation of the device will be sufficiently understood. A column of figures is added by depressing *seriatim* the necessary keys to form the consecutive figures and these separate numbers are integrated by the

counter. As soon as the first column has been added, the rack which in the first place is in engagement with the unit's number wheel, is caused to operate on the tens number wheel by sliding the counter to bring the gearing of the tens number wheel into mesh with the rack. The second column is then added in the same manner as the first, and the shifting of the counter continued for each new column added. After the last column has been added the counter shows the total.

It will be understood of course that the proportions and ratios employed in locating the pivots of the rocking bar and rack bar relative to one another and in arranging for the various movements have been described as used with a decimal system and that the same principles of operation may be employed in counting and the like according to other systems, such for example as the duodecimal, with only such alterations as would be evident to any one skilled in the art in view of this specification.

What I claim as my invention is:—

1. In a device of the class described the combination of a rocking bar adapted to rock from either end; a key adapted to rock said bar on one end, keys adapted to rock said bar on the other end; and movement transmitting means connected with said bar intermediate its ends.

2. In a device of the class described the combination of a rocking bar adapted to rock from either end; keys adapted to rock said bar; and movement transmitting means connected with said bar intermediate its ends at a point unequally distant from the centers on which the bar rocks.

3. In a device of the class described the combination of a rocking bar adapted to rock from either end; means for moving either end; register-actuating means connected with said bar between its ends at a point distant from one of the centers on which the bar rocks four-ninths of the distance between the centers; and a register operable by said means.

4. In a device of the class described, the combination of a rocking bar adapted to rock from either end through the same angular distance; means for moving either end; and movement transmitting means connected with said bar between its ends at a point distant from one of the centers on which the bar rocks four-ninths of the distance between the centers.

5. In a device of the class described, the combination of a rocking bar adapted to rock from either end through the same angular distance; means for rocking the bar from one end through the full distance; means for rocking the other end through either the full distance or through fourths of the whole distance; and movement trans-

mitting means connected to said bar between its ends at a point four-ninths of the distance between the centers on which the bar rocks from the center adjacent the first-mentioned end.

6. In a device of the class described, the combination of a rocking bar; pivots on which the ends of the bar are adapted to rock movable in parallel paths; a 5 key adapted to move one pivot a predetermined distance; a 4 key adapted to move the other pivot the same distance; keys representing the numerals 1, 2, and 3 adapted to move the same pivot a corresponding number of fourths of the same distance; and movement transmitting means connected to said bar between the pivots at a point four-ninths of the distance between the pivots from the pivot movable by the 5 key.

7. In a device of the class described, the combination of a rocking bar slotted near one end; a pivot slidably supported and on which said bar is pivoted at its other end; a second pivot also slidably supported to move in a path parallel to the first pivot and engaging in the aforesaid slot in the bar; a 5 key adapted to move the first pivot a predetermined distance; a 4 key adapted to move the other pivot the same distance; keys representing the numerals 1, 2 and 3 adapted to move the same pivot a corresponding number of fourths of the same distance; and a sliding bar supported between the pivots to move parallel thereto and connected to the rocking bar at a point four-ninths of the distance between the pivots from the pivot movable by the 5 key.

8. In a device of the class described, the combination of a rocking bar adapted to rock from either end; a 5 key adapted to rock one end of the bar a predetermined distance; a 4 key adapted to rock the other end of the bar the same distance; keys representing the numerals 1, 2 and 3; connections whereby said keys actuate the same end of the bar as the 4 key; and a suitably adjusted lost motion device in each connection whereby each of said keys will move the bar a corresponding number of fourths of the same distance.

9. In a device of the class described, the combination of a rocking bar adapted to rock from either end; a 5 key adapted to rock one end of the bar a predetermined distance; a 4 key adapted to rock the other end of the bar the same distance; a connection through the medium of which the said key actuates the bar, said connection being adapted to permit the bar to move independently of the key; keys representing the numerals 1, 2 and 3; connections whereby said keys actuate the same end of the bar as the 4 key; and a suitably adjusted lost motion

device in each connection whereby each of said keys will move the bar a corresponding number of fourths of the same distance.

10. In a device of the class described, the combination of a rocking bar adapted to rock from either end; keys adapted to rock said bar; a register actuating means connected with said bar intermediate its ends; a register operable by said means provided with a plurality of number wheels; and means for bringing any desired number wheel into operative engagement with the actuating means.

11. In a device of the class described, the combination of a rocking bar adapted to rock from either end; means for rocking said bar; a rack bar connected with said bar intermediate its ends; a register provided with a plurality of number wheels; gearing for independently actuating each number wheel; and means for moving any desired gear into engagement with the rack bar.

12. In a device of the class described, the combination of a key provided with a finger button, a pivot behind the button located between the button and the position occupied by the knuckles of the operator, and a connection for operating a movable part located below said button.

13. In a device of the class described, the combination of a sliding bar; means for sliding said bar in one direction; and yielding means tending to move it in the opposite direction comprising a compression spring one end of which engages the bar, a cross head engaged by the other end of the compression spring, and a tension spring engaging the cross head and a stationary part acting to compress the compression spring.

14. In a device of the class described, the combination of a key; a rock bar; a connecting rod pivotally connected with the key and resting on the rock bar, a notch being formed therein in which the rock bar may engage; a rearwardly inclined face formed on the upper side of said connecting rod; and a stationary part beneath which said face may engage.

15. In a device of the class described, the combination of a key; a rock bar; a connecting rod pivotally connected with the key and resting on the rock bar, a notch being formed therein in which the rock bar may engage; a rearwardly inclined face formed on the upper side of said connecting rod; and a vertically adjustable stationary part beneath which said face may engage.

Toronto Oct. 26th 1911.

FREDERICK L. H. SIMS.

Signed in presence of—

J. EDW. MAYBEE,

E. P. HALL.