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T. O. R. DAHLBERG

2,108,476

CALCULATING MACHINE DIFFERENTIAL MECHANISM

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2 Sheets-Sheet 1

Fig. 1.

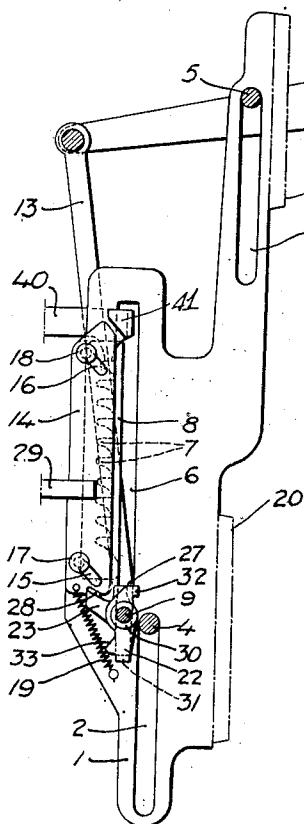
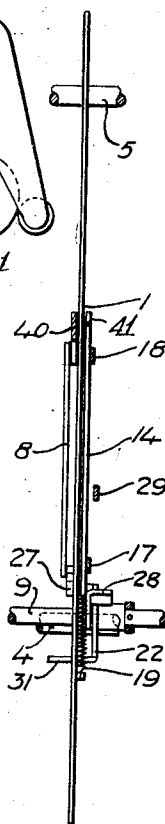


Fig. 3.



TORD OLOF RICKARD DAHLBERG
INVENTOR

By *[Signature]*
his ATT'Y

Feb. 15, 1938.

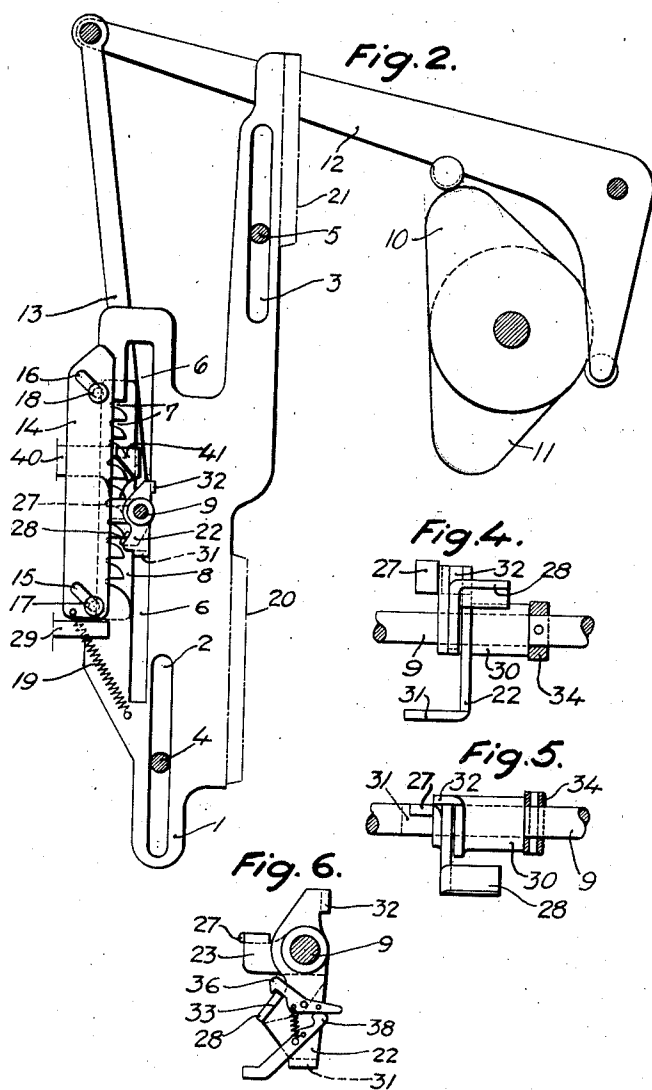
T. O. R. DAHLBERG

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CALCULATING MACHINE DIFFERENTIAL MECHANISM

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2 Sheets-Sheet 2



TORD OLUF RICKARD DAHLBERG
INVENTOR
By *Otto Munk*
his ATT'Y.

UNITED STATES PATENT OFFICE

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CALCULATING MACHINE DIFFERENTIAL MECHANISM

Tord Olof Rickard Dahlberg, Stockholm, Sweden

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2 Claims. (Cl. 235—8)

The present invention, which relates to an arrangement in calculating machines, cash registers and the like of the kind having differential setting members, or setting racks, chiefly has been made to provide for a positive functioning of the setting racks, so that, as has been common hitherto, the same will not depend upon springs, as such members may easily get out of working and jeopardize the operation and functioning of the machine.

The present invention overcomes the said drawback and the arrangement according to the invention is substantially characterized by the fact that each setting rack is provided with a number of stationary stops, projections or the like and that one (or more) member, which serves as a driver and is carried by an element adapted to be put into a positive reciprocating motion along the stop of the respective rack, cooperates in such a manner, on one hand with adjustable stops (keys), which are known per se and disposed in the frame of the machine and corresponding to the number of stops, etc. on the rack, and on the other hand with the stationary stops etc. of the setting rack, that by one of the stops provided in the frame of the machine the member may be displaced and swung into engagement, respectively, with one of the stops of the racks, the member bringing the rack along during the whole or during part of the movement performed by the element carrying the member.

An embodiment of the invention is shown diagrammatically on the accompanying drawings in which

Figures 1 and 2 show the parts constituting the arrangement, viewed from the side and in two different positions.

Figure 3 shows the arrangement with the parts occupying the positions shown in Figure 1, but in front view.

Figures 4 and 5, on a larger scale, show some details, in front view and viewed from above, respectively.

Figure 6 shows a somewhat modified embodiment of the above mentioned details.

In the drawings only one setting rack is shown, which is indicated by 1. In the rack there are provided two guide slots 2, 3 in which move guide pins 4 and 5. In the embodiment shown one side edge of a slit 6, which is provided in the longitudinal direction of the rack, is provided with cuts 7, ten in number, which form teeth. On the rack 1 there is secured a bar 8, which together with the slit 6 forms a guide for a shaft 9. The said shaft, which extends right through the slits 6 of all of the setting racks 1, by means of cam discs 10, 11 and together with levers 12 and links 13, only one of each of the two last mentioned elements being shown in the drawings, is adapted to be put into an up and down motion. The slits 6 being in this case rectilinear also the above

mentioned motion of the shaft 9 becomes rectilinear, but the said rectilinear path of motion, without inconvenience, may be replaced by, for instance, a curved path of motion. On the rack there is further provided a laterally displaceable bar 14, which by the actuation of a helical spring 19 tends to occupy such position that its one edge portion covers the teeth formed from the slit 6.

The bar 14 is guided by pins 17, 18, which move in the guide slots 15, 16 provided in the bar. When the bar and the setting rack 1 occupy their terminal positions, shown in Figure 1, one end of the bar is able to cooperate with a stationary stop 41, which prevents displacement of the bar in its longitudinal direction and therewith also of the setting rack. 20 and 21 indicate series of teeth provided on the rack and serving to transmit the movement of the rack to other members, which are not shown in the drawings.

In the embodiment shown the member, which serves as a driver for the setting rack 1, consists of a two-armed lever 23 pivoted on the shaft 9 and one curved-back end 28 of which is adapted to cooperate with the keys of the machine and the other end 27 of which, which is curved-back in the opposite direction, is adapted to cooperate with or to enter the cuts of the slits 6 (Figures 4, 5). According to the present embodiment the lever 23 is composed of two parts, but, of course, its construction may be varied in manifold ways. In order to limit the swinging movement of the lever 23 when engaging the cuts 7 there is a special member 22 on the shaft 9, which is provided with a hub portion 30 together with, on one hand, a curved-back lug 31, which enters the guide slot formed between one edge of the bar 8 and the other edge of the slit 6, and on the other hand a second curved-back lug 32. The last-mentioned lug forms a stop for one end 27 of the lever 23, when the lever is in the position shown in Figure 1, the other lug 31 preventing the member 22 from performing a swinging movement, when the member 22, by the shaft 9, is brought along in the reciprocating motion of the latter. The surface 33 of the member 22 serves as a stop for the flanged end 28 of the lever 23, when the lever 23 occupies the position shown in Figure 2 and an annulus 34 secured to the shaft 9 prevents axial displacement of the lever 23 and also of the member 22.

In Figure 1 all parts occupy their initial positions and the imagined totalizer has been adjusted to zero. The totalizer wheels may be arranged, for example in the manner disclosed in U. S. Patent No. 1,979,387 and the key board may be constructed, for example, in the manner described in U. S. Patent No. 1,839,138. If, for instance, the totalizer wheels of the machine, which are adapted to cooperate with the rack 1 but which are not shown in the drawings, are

to be adjusted to the figure value of "five", the key marked by "five" is depressed, the said key being in the drawings indicated by 29. By turning the cam discs 10 and 11 the shaft 9 is moved upwards. During this operation the end 27 of the lever 23 is kept in the position of the bar 14 and of the slit 6 shown in Figure 1, until the end 28 of the lever 23 strikes against the key 29, by which the lever 23 is swung and its end 27 is moved to engagement with the cut 7 corresponding to the figure value of "five". At the same time herewith the end 27 of the lever 23 displaces the bar 14 sideways so that the same will occupy the position shown in Figure 2. Thus, the stop 41 does not any longer prevent the longitudinal displacement of the bar 14 and of the rack 1, respectively, and during the continued upward movement of the shaft 9 the rack 1 and also the bar 14 are moved along until the shaft 9 has reached its highest position shown in Figure 2.

In order that the rack 1, on account of its inertia, shall not be able to continue its upward movement there is a stationary stop 40, which in the embodiment shown cooperates with the end 27 of the lever 23 thereby preventing the latter and also the rack 1 from moving past the position determined in advance. After having reached the said position the downward movement of the shaft 9 and also of the rack 1 begins, the movement of the latter in this case corresponding to five units. By the spring 19 the bar 14, when the rack has reached its lower terminal position, is caused to re-occupy its initial position. On account of the shape of the cuts 7 and of the slit 6, respectively, the lever 23 is forced to be swung back to its initial position as soon as the shaft 9, at its return to its lower terminal position, performs a movement relatively to the setting rack. Prior to or simultaneously with the rack 1 beginning its returning movement a suitable device releases the key 29, so that also the latter is returned to inoperative position. The machine may now be used again, the above described operation being repeated.

For the safe functioning of the machine it may be suitable to provide a detent mechanism on the member 22, by means of which mechanism the lever 23, when the lever is in engagement with some of the cuts 7, may be locked in this one terminal position of its own, stationary stops serving for alternately bringing the detent mechanism in and out of function. Figure 6 shows an embodiment of such detent mechanism, which consists of a catch 36 swingably mounted on the member 22, the said catch locking the lever 23 by spring actuation, when the lever, by engagement with one of the cuts 7, has been brought to the position shown in the drawings.

The said locking engagement is maintained until the shaft 9 has almost reached its upper terminal position, when a stationary stop, which is not shown in the drawings, swings the catch out of engagement with the lever 23, which thus is able to re-occupy its initial position. At this swinging movement of the catch a second spring-actuated catch 38, which also is swingably mounted on the member 22, enters into function and locks the catch 36 in inoperative position until the catch 38 near the lower initial position of the members strikes against a second stationary stop and the catch 38 is swung out of locking

engagement with the catch 36 and at the next up and down movement the above described functioning is repeated, provided a key is depressed. If, by the lever 27, the rack 1 is brought into upward movement and the movement of the shaft 9 rapidly stops, it could, if the above described detent mechanism did not exist, be thought that, due to its inertia, the rack 1 tended to continue upwards, in which case it would force the lever 23 out of its position, which would result in an incorrect adjustment of the rack. Yet, this is prevented by the detent mechanism, which, however, may be thought to be replaced by a helical spring, which tends to return the rack to initial position, but the last mentioned construction causes increased resistance, for the overcoming of which a greater driving power is required than in the case, in which the detent mechanism is used.

Of course, several embodiments may be devised within the scope of the invention and specially, the driving member and members, respectively, and also the member carrying the said members may be varied in manifold different ways, without it being necessary to abandon the idea upon which the invention is based. It has already been pointed out above that the driving member or members may be arranged displaceably instead of swingably and the carrying member need not necessarily consist of a shaft, as in the above described embodiment, but the said member may, with practically the same advantage, be replaced by, for instance, a bar. It has already been pointed out above that the path of movement of the said member need not necessarily be rectilinear.

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

1. In a key controlled calculating machine in combination with a row of key set stops, a movable actuating rack having a row of stops thereon and being provided with a slot parallel to said stop row, a shaft projecting through said slot and being guided therein, a two armed lever pivotally arranged on said shaft and means to reciprocate said shaft and lever positively along said row of key set stops, each of the latter being adapted upon depression of the corresponding key to project into the path of one arm of said lever, the lever being formed and arranged to swing upon the impact of said first lever arm against any of said key set stops into a position in which its second arm engages one of the stops on said rack, whereby the rack is carried along with said lever during a predetermined part of the latter's reciprocation.

2. A device, as claimed in claim 1, comprising further a bar arranged on said rack, and engaged by said second arm of the lever to laterally displace the bar with respect to the rack, a spring fastened to said rack and bar to keep the latter resiliently in a position in which one edge thereof covers the stops on said rack, and a stationary stop engaging said bar in its stop covering position to prevent longitudinal movements thereof, so as to permit longitudinal displacements of said rack and bar only after lateral displacement of the latter by means of said second lever arm engaging one of said rack stops.

TORD OLOF RICKARD DAHLBERG.