

Dec. 22, 1925.

1,566,979

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LOCKING DEVICE FOR ZERO SETTING MECHANISMS OF CALCULATING MACHINES

Filed August 29, 1924

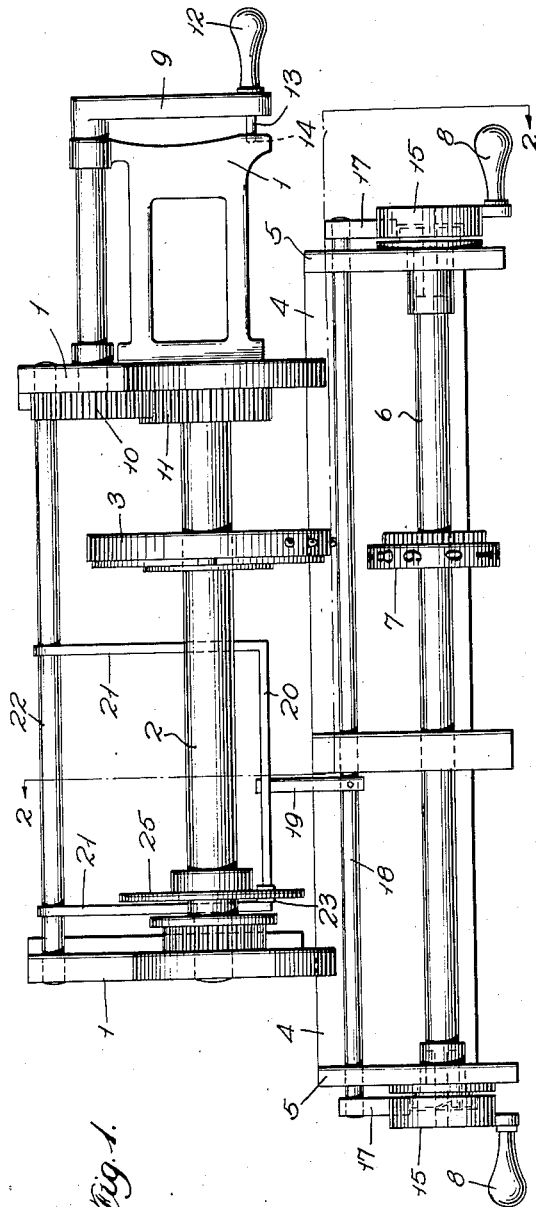


Fig. 1.

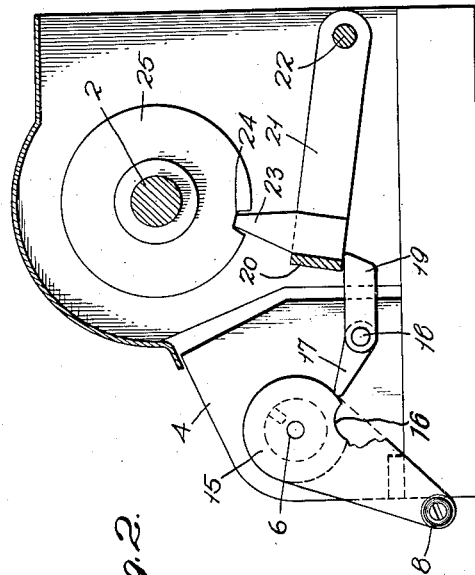


Fig. 2.

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LOCKING DEVICE FOR ZERO-SETTING MECHANISMS OF CALCULATING MACHINES.

Application filed August 29, 1924. Serial No. 734,991.

To all whom it may concern:

Be it known that I, OTTO P. SCHUMAN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Locking Devices for Zero-Setting Mechanisms of Calculating Machines, of which the following is a specification.

The invention relates to calculating machines, and relates more particularly to locking devices for zero setting mechanisms in the class of calculating machines where the values of the calculations are set on setting disks having a variable number of teeth adapted to transmit the said values to a registering mechanism which is mounted on a slidable carriage adapted to be shifted laterally along and parallel to the setting mechanism. The lateral shifting movement of the slidable carriage enables the registering elements or numeral wheels which are carried thereby, to be brought into cooperation with any of the setting disks of the setting mechanism. The registering and revolution counting mechanisms of the carriage are provided with any suitable zero-setting devices which can be operated in any adjusted or displaced position of the carriage or of the setting mechanism.

It is well known that calculating machines of the character described are likely to be damaged during the operation thereof, and especially when the crank handle of the setting mechanism shaft is rotated when the shaft carrying the registering mechanism is not in its correct position. Furthermore, in machines of this character it is of importance that the numeral wheels of the registering mechanism be returned to their zero position after each calculating operation, or otherwise a resetting of the setting mechanism and subsequent operation of the crank handle would render an incorrect or erroneous result on the registering wheels.

The object of the present invention is to provide automatic, positive and efficiently operating devices for securely locking the zero setting mechanism during operative positions of the setting disks to prevent undue damage to the machine, and further to prevent performance of the calculating operation and consequent erroneous results when the numeral wheels of the registering mechanism have not been cleared or returned to

zero position after the completion of a previous calculating operation.

A further object of the invention is to provide improved locking devices of the character described, the automatic actuation of which positively maintains the setting wheels and disks in their adjusted position during the operation of the machine, thereby minimizing the possibility of erroneous results in the values of the calculations.

A further object of the invention is to provide locking devices for the zero setting mechanism of calculating machines, which, in addition to being positive and automatic in operation, are composed of few parts which are economical to manufacture and which are capable of convenient attachment to calculating machines of the class and character described.

With such objects in view, as well as other advantages which may be incident to the use of the improvements, the invention consists in the parts and combinations thereof, hereinafter set forth and claimed, with the understanding that the several necessary elements constituting the same may be varied in proportions and arrangement without departing from the nature and scope of the invention.

In order to make the invention more clearly understood there are shown in the accompanying drawings means for carrying the same into practical effect, without limiting the improvements, in their useful applications, to the particular constructions which, for the purpose of explanation, have been made the subject of illustration.

In said drawings:—

Figure 1 is a plan view, partially diagrammatic in character, of a portion of a calculating machine embodying the present invention, and illustrating only such parts of the machine as are necessary to an understanding of the invention.

Fig. 2 is a transverse vertical sectional view on line 2—2 of Fig. 1.

Referring to the drawings, 1, 1, indicates portions of the calculating machine frame having rotatably journaled therein the usual longitudinal shaft 2 of the setting wheels and disks. The latter are indicated by the numeral 3 and as the same may be of usual or preferred construction, they have not been illustrated in detail. The longitudinally shiftable carriage is indi-

cated at 4, and between the frame portions 5 thereof is journaled the shaft or zero axle 6 carrying the numeral wheels 7 of the registering mechanism. The wheels 7 may also
5 be of the usual or preferred type and as the same do not constitute a part of the present improvements, only one registering wheel has been illustrated. The teeth of the setting wheels or disks are preferably designed
10 to engage intermediate gear wheels on the usual intermediate longitudinal shaft (not shown), and the intermediate gear wheels are designed to impart rotary movement to the gear wheels of the registering numeral
15 wheels on the zero shaft 6 when the operating crank on shaft 2 is rotated. The registering wheels 7 are loosely mounted on the shaft 6 and the latter is provided with a suitable number of pins, one for each wheel,
20 which are designed to contact with suitable projections on the wheels and thereby rotate the latter when the shaft 6 is rotated. As is well known in the art, the pins on the shaft 6 are arranged to contact with
25 and move the registering numeral wheels in such manner that a single rotation of the shaft 6 will bring all of the registering wheels into alignment at zero, and this is the usual practice prior to each calculating
30 operation, the shaft 6 being designed to be manually rotated by means of the crank handles 8, one preferably secured to each end of the shaft on the outside of the carriage frame.
35 The shaft 2 carrying the setting wheels and disks, is designed to be rotated in the usual manner in the performance of the calculating operations, by means of the crank handle 9 journaled in the machine frame 1,
40 and carrying on its inner end a gear wheel 10, the latter meshing with and adapted to rotate a gear wheel 11 on the shaft 2. The crank handle 9 is provided with the usual spring pressed operating knob 12 adapted
45 to yieldably engage a lug 13 of the handle with a recess 14 in the frame at each rotation of the crank handle, and to yieldably lock the handle in normal position, as is usual practice in machines of this character.
50 In the operation of the machine the setting disks controlling the setting wheels on the shaft 2, are adjusted to the desired position, the carriage 4 is longitudinally shifted to the desired position, and the rotation of the crank handle 9 rotates the
55 shaft 2, and the values of the calculations are transmitted from the gear wheels of the setting wheels through the intermediate gear wheels described to the registering or numeral wheels on the shaft 6, in a manner well known in the art. In order to insure
60 against the manipulation of the crank handle 9 when the setting wheels 3 and carriage 4 are in an incorrect position, with consequent possible injury to the machine;

and in order to insure against the performance of calculations before the registering wheels 7 on the shaft 6 have been cleared or reset at zero through the single rotation of one or both of the clearing handles
70 8, the present invention contemplates a novel and efficient and positively operating locking mechanism between the zero shaft 6 and the setting mechanism shaft 2, which locking mechanism will now be described. 75

A pair of disks or cams 15 are rigidly secured on the registering wheel shaft 6, and are preferably formed integrally with or as a part of the clearing handles 8 at each end of said shaft. Each of the disks
80 15 is provided with a suitably disposed peripheral notch or recess 16. The recesses 16 in the disks 15 are designed to be engaged by a pair of levers or lug members 17 rigidly secured on the opposite ends of
85 a longitudinally disposed rock shaft 18, the latter being pivotally mounted in the frame 1 of the machine intermediate the shafts 2 and 6. The arrangement is such that the lugs 17 are engaged by the recesses 16 in
90 the disks 15 when the numeral wheels of the registering mechanism on the shaft 6 are in alignment in their cleared or zero position. An intermediate lever or lug member 19 is rigidly secured to the rock shaft 18,
95 and is designed to engage at its free end the longitudinal portion 20 of a bifurcated lever or U-shaped member 21 which is pivotally mounted at its inner ends on a longitudinal shaft or support 22 suitably mounted or journaled at its ends in the frame 1
100 of the machine. The pivoted lever or U-shaped member 21 is provided on its outer or longitudinal portion 20 with an upwardly extending lug or projection 23, which latter is adapted to be moved into
105 locking engagement with a notch or recess 24 on the periphery of a locking disk or wheel 25 rigidly secured at or near one end of the shaft 2. The arrangement is such
110 that the lug 23 is in alignment with to engage the recess 24 of the disk 25 when the shaft 2 and setting wheels carried thereby are in normal position, i. e., when the lug 13 of the crank handle 9 is in spring-pressed
115 engagement with the recess 14 in the frame 1.

It will be apparent that the arrangement of the locking devices described is such that in normal position of the machine, and when
120 the registering wheels are in their cleared or zero position, the lugs 17 are held in engagement with the peripheral recesses 16 of the disks 15 by the weight of the pivoted U-shaped member 21 resting upon the outer
125 end of the member 19, and in this position the upwardly projecting lug 23 is out of engagement with the recess 24 and out of the path of travel of the locking disk 25. In such disengaged position of the locking de- 130

vices, the shaft 2 carrying the setting wheels is freely rotatable by the crank handle 9 to transmit the values of the desired calculations to the registering wheels on the shaft

6. During operative positions of the machine the lugs 17 are forced out of the recesses 16 by the turning of the clearing handles 8, and the consequent downward movement of the lugs 17 rocks the shaft 18 in its bearings and the upward movement of the member 19 lifts the projection or lug 23 of the pivoted lever 21 into locking engagement with the peripheral recess or notch 24 in the locking disk 25. It will be apparent that in this latter locked or engaged position of the mechanism, the rotation of the shaft 2 and setting wheels carried thereby is effectually prevented when the clearing handles 8 have been rotated out of their normal position, damage to the machine is thereby obviated, and the setting disks are locked in their adjusted position during the performance of calculations through the manipulation of the clearing handles 8.

It will be further apparent that through the engagement of the locking devices described, errors in the values of the calculations are automatically prevented for the reason that the crank handle 9 cannot be rotated until the numeral wheels of the registering mechanism have been cleared or returned to zero by the single rotation of the clearing handles 8. In the absence of a locking mechanism of the character described, frequent errors in calculations result through the omission of the operator to return the registering wheels to zero at the conclusion of a calculating operation, the manipulation of the crank handle 9 after new settings have been performed on the setting disks before the registering wheels have been cleared, resulting obviously in incorrect values on these latter wheels.

When the clearing handles 8 are given a single rotation to clear the registering wheels 7 on the shaft 6, the lugs 17 drop into engagement with the recesses 16 in the disks 15, the projection 23 drops out of the recess 24 and out of the path of the locking disks 25, and the shaft 2 carrying the setting mechanism is again freely rotatable for the performance of subsequent calculations.

In this connection it will be observed that the peripheral notch 24 in disk 25 is provided with inclined faces as illustrated. This peculiar construction of the notch 24 tends to force the correspondingly inclined projection 23 of U-shaped locking bar 21 out of engagement with said notch when the operating crank is rotated in either direction. This action occurs provided the zero setting mechanism carried by shaft 5 is in or being moved to normal zero position. The described inclined construction and cooperation between notch 24 and projection 23 facili-

tates the operation of the machine when starting, stopping or shifting.

From the foregoing it will be apparent that the provision of the improved locking devices described, results in efficient, positive and automatic means whereby undue damage to the machine during operation thereof is prevented, and errors in the values of the calculations, resulting from the inadvertent omission to clear the registering mechanism at the conclusion of a prior calculation, are also automatically and effectually prevented.

What is claimed is:

1. In a calculating machine, in combination with a setting mechanism and a registering mechanism: a handle secured to the shaft of said registering mechanism and having a peripheral notch, a rock shaft pivotally mounted adjacent said registering mechanism, a lug secured to said rock shaft and normally engaging said peripheral notch in said handle, a lever secured to said rock shaft and adapted to engage a U-shaped lever pivotally mounted in said machine to move the latter into engagement with a peripheral notch formed in a disk of said setting mechanism, the aforesaid engagement being effected when said lug is moved out of engagement with the peripheral notch of said registering mechanism handle, whereby the setting mechanism is locked in normal position when said registering mechanism is in abnormal position, and vice versa.

2. In a calculating machine in combination with a setting mechanism and a registering mechanism: separate locking levers each pivotally mounted adjacent to and adapted to engage one of said mechanisms, said levers having engagement with one another, whereby both of said mechanisms are unlocked when they are in normal cleared position, said setting mechanism is locked against movement when said registering mechanism is in abnormal position, and said registering mechanism is locked against movement when said setting mechanism is in abnormal position.

3. In a calculating machine, in combination with a setting mechanism and a registering mechanism: a disk secured to the shaft of said registering mechanism and having a peripheral recess, a disk secured to the shaft of said setting mechanism and having a peripheral notch, a rock shaft pivotally mounted adjacent said registering mechanism, a lug secured to said rock shaft and normally engaging said peripheral recess in said disk when said registering mechanism is in zero position, a lever secured to said rock shaft, a shaft mounted in said machine adjacent said setting mechanism, a lever pivoted on said latter shaft and adapted to be moved into engagement with said peripheral notch of said disk by said lever on said rock shaft when said lug

has been moved out of engagement with said peripheral recess of said registering mechanism, whereby said setting mechanism is locked in adjusted position when said registering mechanism is in abnormal position, said lever engaging said peripheral notch being designed to contact with said lever on said rock shaft to automatically move said lug into engagement with said peripheral recess when the setting mechanism has been returned to normal position, said movement releasing the pivoted lever adjacent said setting mechanism from engagement with said locking disk to permit the actuation of said setting mechanism.

4. In a calculating machine, in combination with setting mechanism and registering mechanism and rotatable shafts therefor: a rock shaft pivotally mounted intermediate said setting mechanism, a lever secured to said rock shaft, a disk mounted on said set-

ting mechanism shaft and having a locking recess, a disk mounted on said registering mechanism shaft and having a peripheral recess, a pivoted lever operatively engaged at its free end by said first mentioned lever and having a lug adapted to be moved by the latter into locking engagement with said locking recess, and an arm mounted on said rock shaft and adapted to be rocked into engagement with said peripheral recess, whereby the rotation of said registering mechanism shaft moves said peripheral recess out of engagement with said arm and rocks said rock shaft to engage said first mentioned lever with said lug on said pivoted lever and move the same into locking engagement with said locking recess on said setting mechanism disk to prevent rotation of said setting mechanism shaft.

In testimony whereof I affix my signature.

OTTO P. SCHUMAN.