R. REIN.

REVERSING MECHANISM FOR CALCULATING MACHINES.

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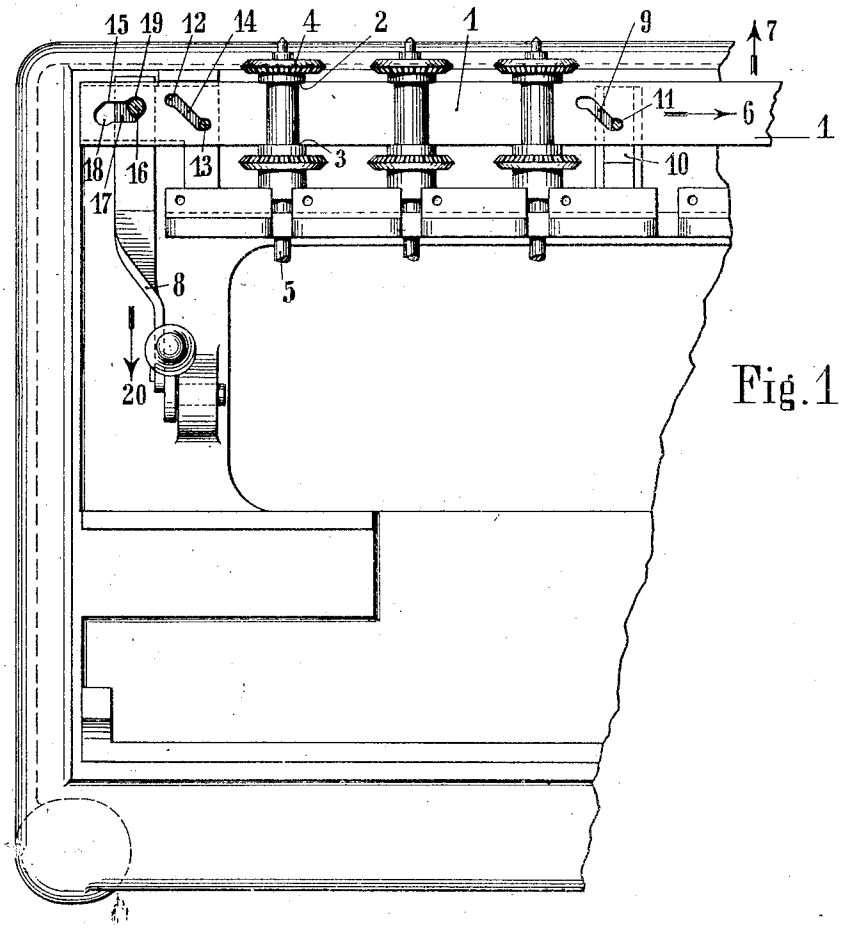
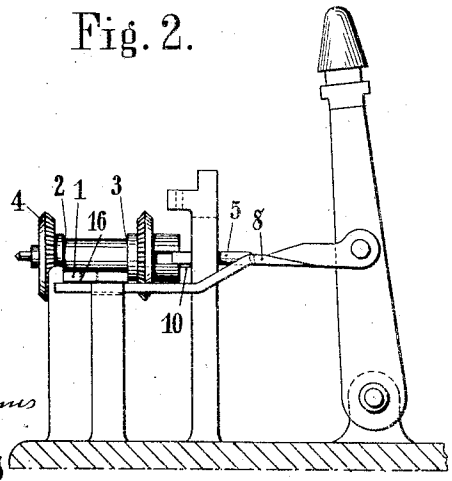


Fig. 1

Fig. 2.



Witnesses:

W. A. Williams

Harry Troy

Inventor:

R. Rein

by

Attorney.

UNITED STATES PATENT OFFICE.

ROBERT REIN, OF BERLIN, GERMANY.

REVERSING MECHANISM FOR CALCULATING-MACHINES.

957,095. Specification of Letters Patent. Patented May 3, 1910.

Application filed November 11, 1909. Serial No. 527,511.

To all whom it may concern:

Be it known that I, ROBERT REIN, a subject of the German Emperor, and residing at 19 Puttkamerstrasse, Berlin, Germany, have invented certain new and useful Improvements in the Reversing Mechanism of Calculating-Machines, of which the following is a specification.

In applicant's United States Patent 934,756 a reversing mechanism for Thomas calculating machines with two counting mechanisms is described, in which special shafts for the reverse motion wheels are arranged below the reversing bars, which are turned by the reversing lever through the medium of intermediate elements. Apart from the complication of this arrangement, the latter has the disadvantage that, especially in the case of machines with large numbers of cipher places, entailing a great length of reversing bar and the arrangement of the shaft below the same, the said shaft is moved unsymmetrically and disuniformly in consequence of the one-sided action of the reversing lever. The present improvements in the reversing mechanism are designed to remove these disadvantages and at the same time to provide a much more simplified construction.

In the improved reversing mechanism, the reversing bar, instead of being displaced by means of a shaft arranged below the same and turned by means of the reversing lever, is now directly actuated by means of the reversing lever. For this purpose peculiarly shaped slots are arranged in the reversing bar, by means of which the latter slides along fixed pins let into bosses on the frame, and the reversing lever rod engages by means of a pin attached to the same in a specially formed slot near the end of the reversing bar. When the reversing lever is pushed in the one or the other direction, the reversing bar makes a double movement, namely a lateral movement to the left or right which has no effect on the reverse motion wheels, and a forward and rearward movement, by means of which the displacement of the reverse motion wheels on the counting mechanism spindles and therefore the reversal is effected. The slots in the reversing bar are so shaped that in the end positions of the reversing lever and therefore of the reversing bar, no displacements of the latter, either sidewise, forward or rearward are possible, so that the reverse motion wheels are fixed in their working positions with absolute certainty. The slots of the reversing bar, into which engage the pins screwed fast into the frame bosses, are uniformly distributed over the whole length of the same, so that the displacement and therefore the reversal takes place uniformly over the whole length of the same and with certainty, notwithstanding the one-sided actuation of the bar by means of the reversing lever.

The invention is illustrated by way of example in the accompanying drawings, in which,

Figure 1 is a plan of the improved mechanism taken immediately above the reversing bar, and Fig. 2 a side elevation thereof looking in the direction of the arrow *a* in Fig. 1.

The reversing bar 1 projects in the usual manner between the toothed wheels 2 and 3 on the hubs 4 of the reverse motion wheels, in such a manner that the latter must share the rotation of the counting mechanism spindles 5. The reversing bar 1 can therefore be freely displaced in the direction of the arrow 6 or in the reverse direction, while when it is displaced in the perpendicular direction according to the arrow 7, the reverse motion wheels 4 are also axially moved on the counting mechanism spindles 5. This displacement of the reversing bar 1 is effected by means of the reversing rod 8 in the following manner: In the reversing bar 1, are arranged a number of peculiarly shaped slots 9 into which permanently engage pins 11 rigidly fixed into the bearing bosses 10 for the reversing bar. These slots consist of two portions 12 and 13 running parallel to the longitudinal edge of the reversing bar, and an oblique portion 14 connecting them. On displacing the reversing bar to the right (Fig. 1), the portions 13 of the slots 9 first slide along the pins 11 until the latter reach the oblique portion 14 of the slots. If it be attempted to move it farther, the pins 11 will slide along these oblique portions 14 of the slots 9, the reversing bar 1 being at the same time obliged to move rearward until the pins 11 reach the straight portions 12 of the slots 9. So long as the pins 11 engage in the straight portions 12 or 13 of the slots 9, a forward or rearward displacement of the reversing bar is impossible. The movement necessary for the reversal is derived from the re-

versing rod 8 by means of a special slot 15 provided in the reversing bar into which engages a pin 16 rigidly fixed to the reversing rod 8. The slot 16 also consists of three portions, namely a middle straight portion 17 and two end portions 18 and 19, of which the end portion 19 runs obliquely backward and the end portion 18 obliquely forward. The horizontal length of the oblique end portions 18 and 19 corresponds exactly to the lengths of the horizontal portions 12 and 13 of the slots 9. When therefore for example in the position shown in Fig. 1, the reversing bar 8 is displaced in the direction of the arrow 20, so as to be set, for instance for subtraction, the pin 16 slides along the oblique portion 19 of the slot 15 and thereby forces the reversing bar to move to the right, since it cannot at first take part in the rearward displacement of the reversing rod 8, as the pins 11 engage in the straight portions 13 of the slots 9. This displacement to the right takes place until the pins 11 reach the oblique portions 14 of the slots 9, the pin 16 simultaneously entering the straight portion 17 of the slot 15. If the reversing rod 8 be now further displaced rearward, the reversing bar must now share this movement since it is positively coupled with the reversing rod 8 by reason of the pin 16 resting against the edges of the straight portion 17. As this rearward motion of the reversing bar 1 takes place, the reverse motion wheels 4 are axially displaced on their spindles 5 into the corresponding position of subtraction or addition. Simultaneously with this rearward displacement is combined a lateral displacement of the reversing bar 1, since the pins 11 reach the oblique portions 14 of the slots 9 and slide along the same. The rearward displacement of the reversing bar 1 lasts until the pins 11 reach the straight portions 12 of the slots 9, while the pin 16 enters the oblique portion 18 of the slot 15. The rearward displacement of the reversing bar 1 in the direction of the arrow 20 ceases at this instant and thereupon only a lateral displacement takes place, in consequence of which the pins 11 pass to the end of the portions 12 of the slots 9 and thereby secure the reversing bar against accidental displacements either rearward or forward. By pushing the reversing lever in the opposite direction, the reversing bar can be brought back into the opposite end position, and the reverse motion wheels can be set for addition or subtraction.

The obliquity of the slots and the proportion ratio between the length of the oblique portions and that of the straight portions may be designed as desired according to the necessary amount of forward or rearward displacement and the lateral displacement serving to secure the bar. The slots and pins may be interchanged, namely, the slots may be provided in the bosses and the pins on the reversing bar.

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

1. In a machine of the class described the combination of a shaft, a pair of reversing wheels mounted on the shaft, a shiftable bar mounted between the reversing wheels, a support for said bar, a pin and an angularly disposed slot formed between the reversing bar and its support, an operating rod cooperating with the reversing bar, a pin and a horizontally disposed slot formed between the reversing bar and the operating rod, whereby the movement of the operating rod will move the reversing bar in two directions and shift the position of the reversing wheels.

2. In a reversing mechanism for a calculating machine, the combination of reversing wheels, a reversing bar disposed between the reversing wheels, and having slots which at their ends are straight and at their center incline, pins fitting in said slots, an operating bar, a pin and slot formed between the operating bar and the reversing bar, whereby when the operating bar is moved a backward and forward motion will be imparted to the reversing bar to shift the position of the reversing wheels simultaneously.

3. In a reversing mechanism for a calculating machine, the combination of a plurality of reversing wheels arranged in connected pairs, a reversing bar fitting between the pairs of reversing wheels and formed with slots having end straight portions and intermediate oblique portions, stationary pins engaging the slots, said reversing bar being also formed with a slot having oblique ends and an intermediate straight portion an operating bar, and a pin extending therefrom and engaging the last mentioned slot, whereby when the operating bar is moved, forward or backward an endwise movement will be imparted to the reversing bar.

4. In a reversing mechanism for a calculating machine, the combination of a plurality of reversing wheels arranged in connected pairs, a reversing bar fitting between the pairs of reversing wheels, supporting means for said bar, pins and slots formed between the reversing bar and the supporting means each of said slots having end straight portions and an intermediate oblique portion, an operating rod, a pin and a slot formed between the operating rod and the reversing rod, said latter slot having end oblique portions and a straight intermediate portion, whereby when the operating rod is moved, the reversing bar will be moved backward or forward and endwise.

5. In a calculating machine, the combination of a plurality of connected gears, a reversing bar fitting between the plurality of connected gears, an operating rod, means cooperating with the operating rod and the reversing bar for moving the latter forward or rearward and laterally when said operating bar is moved to shift the position of the reversing gears and lock the reversing bar in either of its extreme positions.

6. In a calculating machine, the combination of a series of connected pairs of reversing gears, a reversing bar located between the series of pairs of reversing gears, an operating rod coöperating with the reversing bar, means between the reversing bar and the operating rod to impart initial and final lateral movements to the reversing bar when the operating rod is moved, and means for imparting rearward or forward and further lateral movements to the said reversing bar between the initial and final movements of said bar, the forward or rearward movement of the reversing bar shifting the reversing gears, and the initial and final lateral movements of said bar unlocking and locking said bar.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT REIN.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.