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K. V. RUDIN

CALCULATING MACHINE

Filed March 26, 1918

Fig. 1.

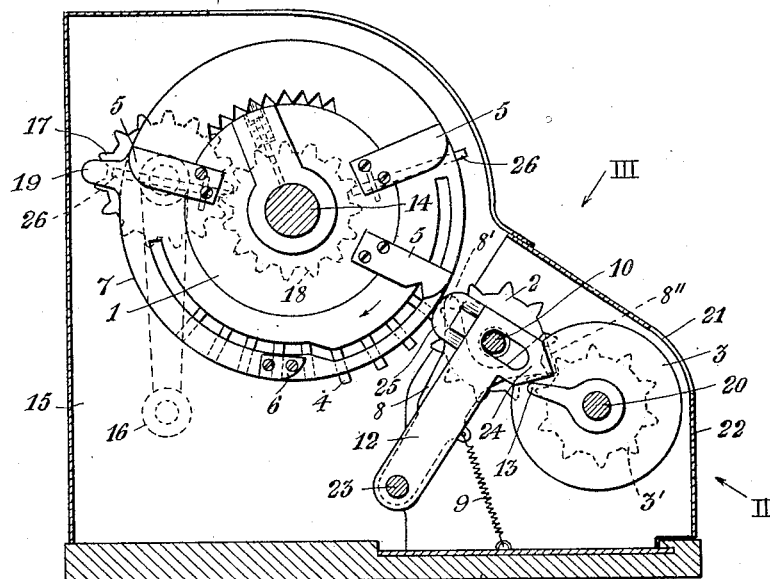


Fig. 3.

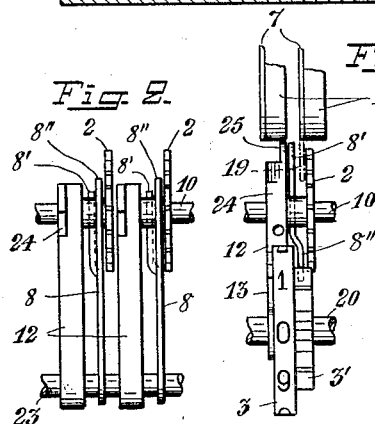


Fig. 4.

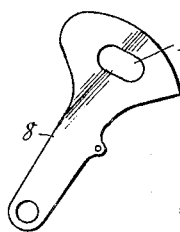
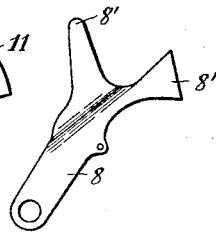


Fig. 5.



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KARL VIKTOR RUDIN, OF STOCKHOLM, SWEDEN.

CALCULATING MACHINE.

Application filed March 26, 1918. Serial No. 224,822.

To all whom it may concern:

Be it known that I, KARL VIKTOR RUDIN, subject of the King of Sweden, residing at Karduansmakaregatan 12, Stockholm, Sweden, have invented certain new and useful Improvement in Calculating Machines (for which I filed an application on in Sweden, March 17, 1917, No. 787/17), of which the following is a specification.

This invention relates to improvements in calculating machines and more particularly to that class of calculating machines in which the values of the calculations are set on setting disks having an adjustable 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 the setting mechanism, so that its registering elements or numeral wheels can be brought into cooperation with any of the setting disks of the setting mechanism. One of the objects of the invention is to lock said registering elements or numeral wheels so as to prevent the same from overthrowing.

With this and other objects in view the invention consists of the combinations of elements described hereinafter and particularly pointed out in the appended claims.

For the purpose of explaining the invention an example embodying the same has been shown in the accompanying drawing in which the same letters of reference have been used in all the views to indicate corresponding parts.

In said drawing:—

Fig. 1 is a vertical cross section of the machine illustrating the connection of the locking member with the setting and registering mechanism.

Fig. 2 is a detail elevation of some of the parts looking in the direction of the arrow in Fig. 1.

Fig. 3 is a similar view looking in the direction of the arrow III in Fig. 1, of the locking member and its adjacent parts.

Figs. 4 and 5 illustrate two embodiments of the locking member proper.

Referring to Figs. 1, 2, rotary shaft 14 is mounted in a pair of side walls 15 of the casing of the machine. The said shaft is operatively connected with the machine crank 16 through spur gears 17 and 18, and it carries a plurality of setting disks 1 each of which is provided with nine radial slots. Within the latter radially shiftable teeth 4

are located which with lateral noses engage in a cam slot formed in a cam disk 7 loosely mounted on the shaft 14. By rotating the said cam disk on the shaft 14 by means of a handle 19 any desired number of the teeth 4 can be shifted into a position beyond the periphery of the setting disks. The number of the teeth shifted beyond the periphery of the setting disks represents the value to be introduced in the calculation in each column of the registering mechanism. In front of the said setting disks, the whole of which may be termed the setting mechanism, numeral wheels 3 are loosely mounted on a shaft 20 disposed parallel to the shaft 14. Each of the said numeral wheels is provided at its circumference with the numerical characters from "1" to "9" and the "0" sign, and one of the said characters of each column of numeral wheels is at a time displayed through a peep hole 21, made in a cover 22, which is common to all the numeral wheels. Each of the numeral wheels has a spur gear 3' secured to its side which is provided with ten teeth, and the latter are in mesh with the teeth of a transmission wheel 2 which is loosely mounted on a shaft 10 disposed parallel to the shaft 20 of the numeral wheels. The said transmission or intermediate gears 2 which are mounted on the same axis 10 are located in the plane of the radially shiftable teeth 4 of the setting disks 1, and when rotating the said disks 1 by means of the machine crank 16 the teeth 4 mesh with the teeth of the transmission wheel 2 so as to advance the same. Thereby also the numeral wheels are advanced a distance which corresponds to the number of teeth 4 projected into their operative positions beyond the periphery of the setting disks 1. In order to transmit a certain number to the numeral wheels 3 the operator sets the said number on the setting disks 1, whereupon he rotates the crank.

Carrying means are provided between consecutive numeral wheels which shift a numeral wheel forward or backward the distance corresponding to one value, if the numeral wheel of the next lower order passes from its "9" position into its "0" position, or vice versa. Rocking levers 12 having the form of hammers are used for this purpose, which levers are loosely mounted upon a shaft 23 disposed parallel to the axis of the registering mechanism, and which ex-

tend with their free upper ends to points adjacent to the gear wheels 2. Each of the numeral wheels is provided with a pin 13 which strikes the head 24 of the hammer 12 so as to rock the latter, when the numeral wheel passes from its "9" position into its "0" position, and vice versa. Thereby a cam surface 25 of the rocking lever 12 is thrown into the path of a laterally shiftable tooth 26 of the cooperating setting disk 1. Upon rotation of the setting disk 1 the cam face 25 shifts the tooth 26 laterally and into mesh with the teeth of the transmission or intermediate gear wheel 2 cooperating with the numeral wheel of the next higher order. Thereby the said numeral wheel 3 is advanced the distance of one value. As, for the purpose of performing additions or subtractions, or multiplications or divisions, the crank can be turned either to the right or to the left, two teeth 26 and cam faces 25 are provided; only one of which is operative when turning the crank in one direction. At the end of the carrying operation cam faces on the setting disks rock the levers 12 into their normal positions shown in Fig. 1.

In machines heretofore in use the numeral wheels or the transmission or intermediate gears have been locked by means of detents or rocking levers which prevent the said wheel from overthrowing. Said detents or rocking levers must, however, be actuated by heavy springs so as to mesh with the numeral wheels or the intermediate gear in a reliable way. By said springs, however, a heavy motion of the machine is caused.

The object of the improvements is to provide a locking device, whereby the locking can be effected without or by means of weak springs. For that reason the locking members are arranged by the side of the intermediate gears or transmission wheels in such a way that the locking members and the intermediate gears have a common or nearly common point of contact with the registering elements or the numeral wheels.

Referring to Figs. 1 to 5, there are arranged between the setting mechanism and the registering mechanism locking pawls 8, which latter are disposed in such a manner in relation to the numeral wheels of the registering mechanism so as to mesh with the said wheel by means of their own weight. As illustrated in Fig. 1 the pawls 8 are hereby arranged by the side of the transmission or intermediate gear 2, and have together with said gears a common or nearly common point of contact with the numeral wheels.

As illustrated in Fig. 5, the locking pawls 8 are suitably formed as a fork, whereby the one shank 8' meshes with the shoulders 5, 6 of the setting mechanism, and the other shank 8'' meshes with the teeth of the

spur gear 3'. Further each of the pawls 8 is actuated by a weak spring 9, which only serves for maintaining an elastical engagement between the locking pawls and the numeral wheels.

In operating the machine the setting disks rotate the numeral wheels by means of the teeth 4 and the transmission or intermediate gears 2 and under the action of the locking pawl 8. In order to lock the numeral wheels at the end of a calculation operation the shoulders 5, 6 are so arranged that, when the last of the teeth 4 in direction of the arrow in Fig. 1 has passed the teeth of the transmission or intermediate gear 2, that shoulder, which is just on the point of engaging the pawl 8, Fig. 1, engages said pawl so as to lock the numeral wheel in a reliable manner. Hereby the numeral wheels are prevented from overthrowing even if the latter are speedily rotated during violent rotation of the machine crank.

It is to be noted that the locking pawl also may have the form illustrated in Fig. 4, whereby the shaft 10 of the transmission or intermediate gears 2 serves to govern the pawl in passing through the opening 11.

The operation of the machine is as follows:—

Referring to Fig. 1 a calculation operation has been performed in the direction indicated by the arrows. The last of the projecting teeth 4 is just on the point of leaving the teeth of the transmission or intermediate gear 2. The shoulder 5 being behind the last (first) tooth 4 prevents the pawl 8 from being moved outwards from its position illustrated in Fig. 1 and prevents also thereby in connection with the pawl 8 a further rotation of the gear 2 or the numeral wheel 3, a movement which otherwise might easily occur in the case of very rapid rotation.

It is evident that the arrangement can be modified in many various ways without deviating from the principle of the invention.

What I claim is:—

1. In a calculating machine, the combination with a setting mechanism including setting discs having shoulders, intermediate gear wheels and a registering mechanism, of locking members arranged to be actuated by said shoulders mounted on the setting discs and at predetermined times to lock the registering mechanism, said locking members being arranged by the side of the intermediate gear wheels in such a manner that the locking members and the intermediate gear wheels have an approximate common point of contact with the registering mechanism.

2. In a calculating machine, the combination with a setting mechanism including setting discs having shoulders, adjust-

able teeth provided on the same, curve discs actuating said teeth, intermediate gear wheels and a registering mechanism, of locking members arranged to be actuated by said shoulders on the setting discs and at predetermined times to lock the registering mechanism, said locking members being arranged by the side of the intermediate gear wheels so that the locking members and the intermediate gear wheels have an approximately common point of contact with the registering mechanism.

3. In a calculating machine, the combination with a setting mechanism including setting discs having shoulders, adjustable teeth provided on the same, curve discs actuating said teeth and also said shoulders, intermediate gear wheels and a registering mechanism, of locking members arranged to be actuated by said shoulders of said setting discs and said curve discs, and at predetermined times to lock the registering mechanism or numeral wheels, said locking members being arranged by the side of the intermediate gear wheels so that the locking members and the intermediate gear wheels have an approximately common point of contact with the registering mechanism or said numeral wheels.

4. In a calculating machine, the combination with a setting mechanism including setting discs having shoulders, intermediate gear wheels, and a registering mechanism, of locking members arranged to be actuated by said shoulder of the setting discs and at predetermined times to lock the registering mechanism, said locking members being arranged by the side of the intermediate gear wheels so that the locking members and the intermediate gear wheels have an approximately common point of contact with

the setting and the registering mechanisms.

5. In a calculating machine, the combination with a setting mechanism having setting discs provided with shoulders, adjustable teeth provided on the same, curve discs actuating said teeth and also provided with shoulders, intermediate gear wheels and a registering mechanism, of locking members arranged to be actuated by said shoulders and at predetermined times to lock the registering mechanism, said locking members being arranged by the side of the intermediate gear wheels so that the locking members and the intermediate gear wheels have an approximately common point of contact with the setting and the registering mechanisms.

6. In a calculating machine, the combination with a setting mechanism having setting discs provided with shoulders and also with adjustable teeth, intermediate gear wheels, curve discs actuating said teeth and also having shoulders, a registering mechanism of locking members arranged to be actuated by said shoulders of said setting discs and said curve discs, and at predetermined times to lock the registering mechanism or numeral wheels, said locking members being arranged by the side of the intermediate gear wheels so that the locking members and the intermediate gear wheels have an approximately common point of contact with the setting and registering mechanism or said numeral wheels.

In testimony whereof I affix my signature in presence of two witnesses.

KARL VIKTOR RUDIN.

Witnesses:

FRITZ E. HALLIN,
G. V. IOPRISEE.