V. J. ODHNER.

CALCULATING MACHINE.

APPLICATION FILED JUNE 9, 1910.

996,667. Patented July 4, 1911.

Fig. 1.

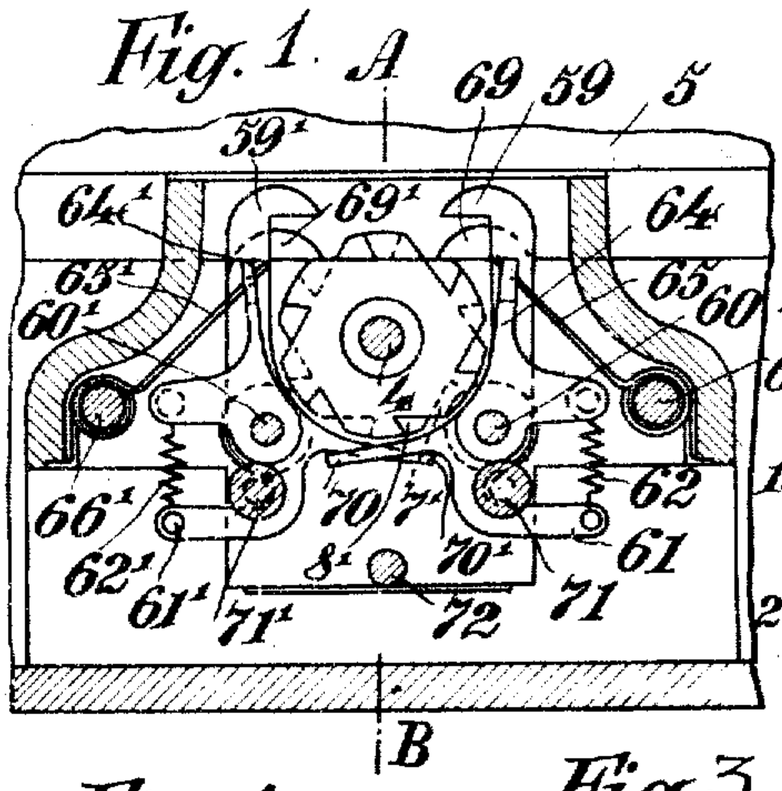


Fig. 2.

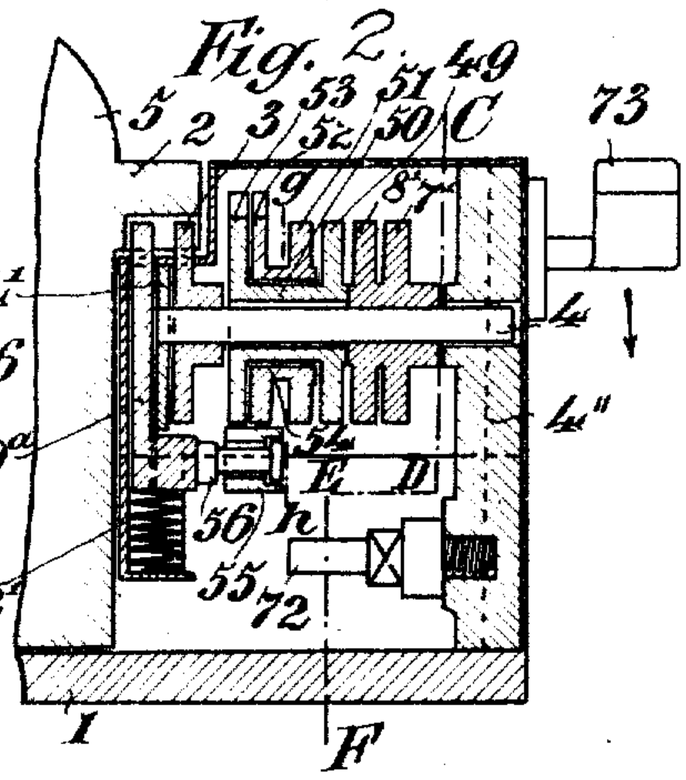


Fig. 3.

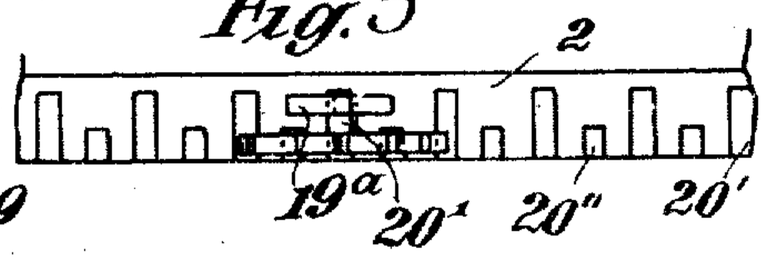


Fig. 4.

Fig. 5.

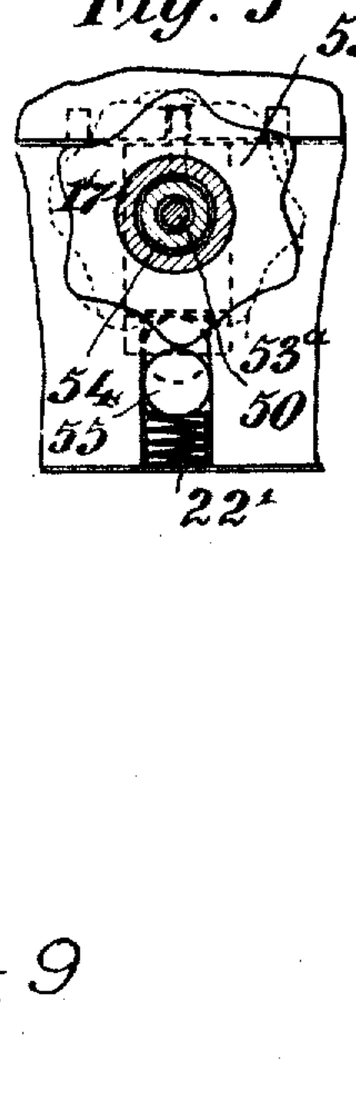


Fig. 6.

Fig. 7.

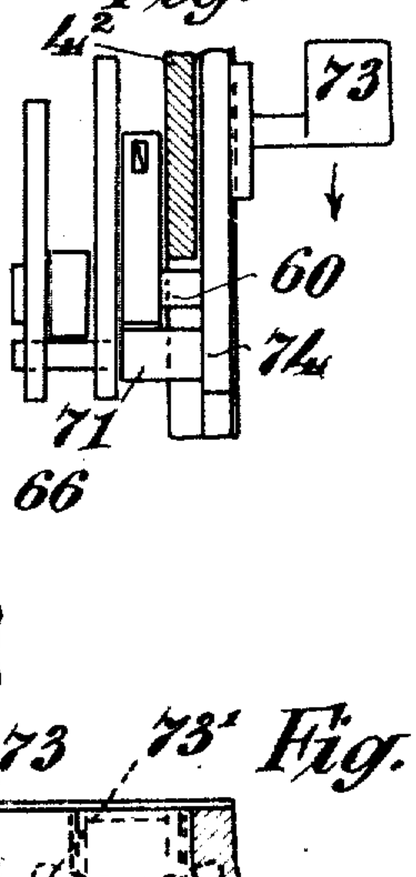
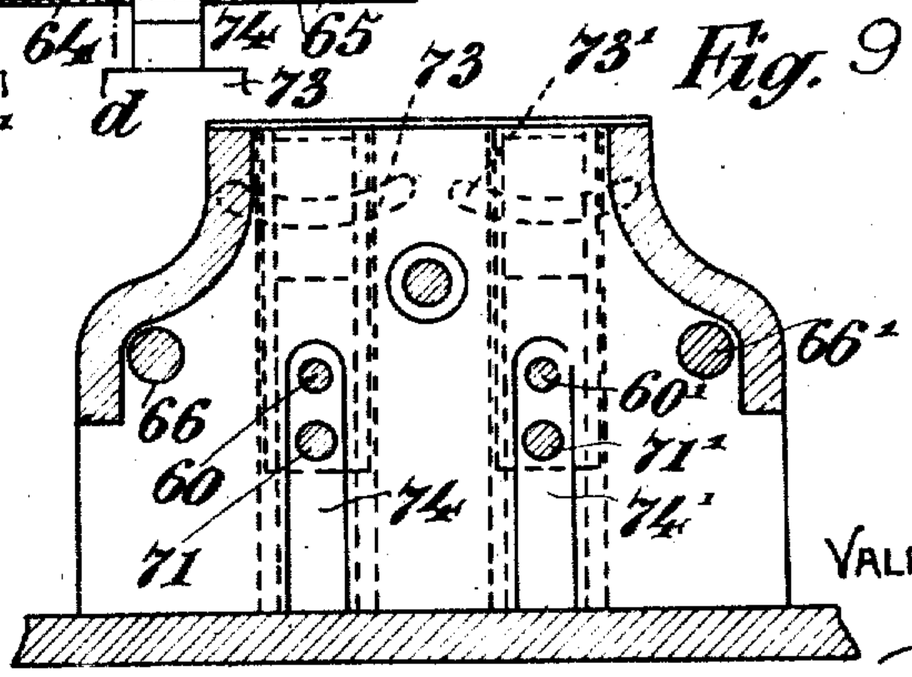


Fig. 8.

Fig. 9.



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CALCULATING-MACHINE.

996,667. Specification of Letters Patent. Patented July 4, 1911.

Application filed June 9, 1910. Serial No. 566,079.

To all whom it may concern:

Be it known that I, VALENTIN JACOB ODHNER, a subject of the King of Sweden, and residing at St. Petersburg, Russia, have invented certain new and useful Improvements in Calculating-Machines, of which the following is a specification.

My invention relates to mechanism in calculating machines for moving the carriage carrying the calculating disks.

In calculating machines comprising a movable carriage carrying the calculating disks, when multiplying with units of a high order or dividing by the same the carriage must be moved each time one place to the right or left, according in each instance as the cipher in question belongs to the higher or lower order.

A primary object of my invention is to provide simple mechanism for moving the carriage. To this end, I provide two displacement keys which each engage by means of a pawl in one of two notched disks having oppositely directed teeth, with which is connected a pinion meshing with a rack. When a displacement key is depressed, the pinion is rotated in the one or other direction and the carriage moved correspondingly to the right or left. This arrangement has the advantage that for moving the carriage in the one or other direction only one pressure in one direction, namely only downwardly, is necessary, so that the carriage can be moved very rapidly and without appreciable exertion.

It might happen that if a key be depressed too rapidly the carriage is accelerated and passes the next position before the key has returned into its normal position and has released the bolt, in order to lock the carriage. I preferably avoid this by connecting with each of the two keys used for moving the carriage two pawls, of which the one retricts the bolt of the carriage, when the key is moved, and releases the same again as soon as the carriage has been started moving by the other pawl, so that the bolt automatically locks the carriage after the latter has been displaced one place.

Some illustrative embodiments of my invention are represented by way of example in the accompanying drawings, wherein;—

Figure 1 is a section on the line C—D—E—F in Fig. 2 as seen from right to left, Fig. 2 is a vertical section in the plane A—B in Fig. 1, the pawls and levers having been removed; Fig. 3 shows a rack used for moving the carriage, and Fig. 4 the arrangement of the levers and pawls for moving the carriage to the right into the extreme positions; Fig. 5 is a section in the plane *g*—*h* in Fig. 2; Fig. 6 shows the arrangement of levers on the pawls; Fig. 7 is a section in the plane *c*—*d* in Fig. 8, Fig. 8 a top plan view of the levers and pawls and Fig. 9 a section on the line C—D—E—F in Fig. 2 seen from left to right.

Referring to the figures, the rack 2 is secured to the casing 5 of the carriage of the machine, some distance above the base 1. The pinion 3 is secured on an axle 4 journaled in standards 4′ and 4″. On this axle are also secured two notched disks 7′, 8′ integral one with the other and having oppositely-directed teeth. In addition, this axle carries a loose bushing 50 which, on the one hand, is formed as a ratchet wheel 49 having teeth like those of the ratchet wheel 7′, and, on the other hand, as a cam-wheel 53. On the neck of this bushing 50 is a loose similar member 54 which, on the one hand, is formed as a notched disk 51 having teeth similar to those of the notched disk 8′ and, on the other hand, as a cam-wheel 52. Under the two cam-wheels 52 and 53 is a roller 55 revoluble on a journal 56 of a bolt 19^b. In the normal position of the carriage the top end of this bolt snaps into one of the lower cavities 20′ in the rack 2.

Cavities 20″ are cut between the cavities 20′ in order to form a rack 2 in mesh with the pinion 3. Two teeth of this pinion correspond to a displacement of the carriage 5 one place.

The bolt 19^b is constantly pressed upward by a spring 22′; consequently the roller 55 is always pressed against the peripheries of the cam-wheels 52, 53. In the position shown in Fig. 5 the roller 55 is pressed downward by the cam-wheel 53.

Pawls 59, 59′ located at the two sides of the plane A—B coact with the teeth of the notched disks 7′, 8′ and pawls 69, 69′ with the teeth of the ratchet wheels 49, 51. The pawls 59, 69 and 59′, 69′ are mounted on axles 60, 60′, respectively. These axles are secured on slides 74, 74′ carrying keys 73, 73′. Each of the pawls 59, 59′ has a knee-shaped extension 61, 61′ to each of which the one end of a spring 62, 62′ is attached; the other end of spring 62 is secured to a pin 67 provided on a projection on an an-

gle lever 63, 64. This angle lever is rigidly connected with the axle 60 and is held in its normal position (Figs. 1, 4 and 6) by a spring 65 on a fixed rod 66.

A transverse pin 71, which like the axle 60 is arranged on the slide 74, serves as support for the knee-shaped extension 61 of the pawl. It simultaneously also serves as abutment for an abutment arm 75 of the pawl 69 (Fig. 4) which is connected by a spring 75′ with the pin 67. The pawl 39 has, in addition, an arm 70 which lies against a pin 72 when the pawl moves. In order to keep the pawls at a definite distance from one another a sleeve 68 is provided on the axle 60.

The pawls 59′, 69′ are arranged in an exactly similar manner, like parts having the same reference characters and indices.

This form of my apparatus operates as follows:—As soon as the key 73 is pressed by a finger, the slide 74 descends (Figs. 7 and 9) and with it the axle 60 and pin 71 which, on their part, drive the pawls 59, 69, downward. During the first phase of the movement of the key the pawls 59, 69 do not yet coact with their notched disks 7′, 49, which consequently remain stationary. The top end of the bolt 19ᵇ has snapped into the rack 2 and consequently locked the carriage. Only the spring 65, which serves for returning the key into its initial position, is subjected to strain during this phase of the motion. During the second phase of the movement the pawl 69 presses on a tooth of the notched disk 49 and rotates it one tooth. The cam-wheel 53 is thereby rotated the same angle, as it is integral with the disk 49, and moves out of the position 53ᵃ shown in dotted lines in Fig. 5 into the position 53 shown in full lines, the roller 55 being pressed downward and the bolt 19ᵇ withdrawn from the gap 20′. When the key is depressed still farther, the notched disk 59 abuts against the tooth of the notched disk 7′ and rotates it one tooth, the pinion 3, which is secured on the same axle 4 as that on which the notched disk 7′ is secured, being rotated two teeth and in this manner moving the carriage 5 one place. At the beginning of the third phase of the movement the extension 70 of the pawl 69 lies against the fixed pin 72 and thereby causes the pawl 69 to rock so that it releases the notched disk 49. The notched disks 7′, 49 rotate a small distance together, namely until the cam of the cam-wheel 53 has left the roller 55. Owing to the spring 22′ the latter tends to rise at once and thereby to allow the bolt to snap in, which, however, it cannot do because at this moment the end of the bolt is not opposite a gap 20′ in the rack, so that the carriage is moved during this phase of the movement. Only quite at the end of this third phase does the end of the bolt snap into the corresponding gap in the rack and lock the carriage. Owing to the action of the spring 65 the slide 74 is lifted with the two pawls 59, 69 when the key is released. Then, owing to the action of the spring 62, the pawl 59 jumps over one tooth of the notched disk 49 into its initial position and, owing to the action of the spring 76, the pawl 69 jumps over one tooth of the notched disk 7′ into its initial position. When the key 73′ is depressed the pawls 59′, 69′ coact with the notched disks 8′, 51 in like manner and cause the carriage to move one place in the opposite direction.

The apparatus can also be made so that the rack 2 remains immovable while the entire device comprising the pinion 3 is displaceable.

I claim:—

1. In apparatus for laterally moving the carriage in a calculating machine, the combination, with a toothed rack, of a shaft, a pinion secured on the shaft in mesh with said rack, a pair of notched disks having oppositely-directed teeth secured on the shaft, two pawls adapted to coact with the notched disks and rotate the same in opposite directions, and two movable keys each coacting with one of said pawls.

2. In apparatus for laterally moving the carriage in a calculating machine, the combination, with a toothed rack, of a shaft, a pinion secured on the shaft in mesh with said rack, a pair of notched disks having oppositely-directed teeth secured on the shaft, two pawls adapted to coact with the notched disks and rotate the same in opposite directions, a bolt normally entering into said rack and preventing said pinion rotating, two movable keys each coacting with one of said pawls, and means operated by said keys for removing said bolt from the rack when one key is depressed.

3. In apparatus for laterally moving the carriage in a calculating machine, the combination, with a toothed rack, of a shaft, a pinion secured on the shaft in mesh with said rack, a pair of notched disks having oppositely-directed teeth secured on the shaft, two pawls adapted to coact with the notched disks and rotate the same in opposite directions, a bolt normally entering into said rack and preventing said pinion rotating, two movable keys each coacting with one of said pawls, and means operated by said keys for removing said bolt from the rack when one key is depressed, said bolt being removed from the rack before one of said notched disks is rotated when one of said keys is depressed.

4. In apparatus for laterally moving the carriage in a calculating machine, the combination, with a toothed rack integral with the carriage, of a shaft mounted on the base plate of the machine, a pinion secured on the shaft in mesh with said rack, a pair of

notched disks having oppositely-directed teeth secured on the shaft, two pawls adapted to coact with the notched disks and rotate the same in opposite directions, and two movable keys each coacting with one of said pawls mounted on the base plate.

5. In apparatus for laterally moving the carriage in a calculating machine, the combination, with a toothed rack, of a shaft, a pinion secured on the shaft in mesh with said rack, a pair of notched disks having oppositely-directed teeth secured on the shaft, a pair of pawls adapted to coact with and rotate the notched disks in opposite directions, a spring-pressed bolt normally entering into said rack and preventing said pinion rotating, a second pair of notched disks having oppositely-directed teeth mounted free to rotate on said shaft, means operated by the latter notched disks for removing the bolt from the rack, a pair of pawls adapted to coact with and rotate the latter pair of notched disks in opposite directions, and two movable keys each operatively connected with one of said pairs of pawls.

6. In apparatus for laterally moving the carriage in a calculating machine, the combination, with a toothed rack, of a shaft, a pinion secured on the shaft in mesh with said rack, a pair of notched disks having oppositely-directed teeth secured on the shaft, a pair of pawls adapted to coact with and rotate the notched disks in opposite directions, a spring-pressed bolt normally entering into said rack and preventing said pinion rotating, a second pair of notched disks having oppositely-directed teeth mounted free to rotate on said shaft, each of the latter notched disks having a cam-wheel integral therewith adapted to coact with and remove the bolt from the rack, a pair of pawls adapted to coact with and rotate the latter pair of notched disks in opposite directions, and two movable keys each operatively connected with one of said pairs of pawls.

7. In apparatus for laterally moving the carriage in a calculating machine, the combination, with a toothed rack, of a shaft, a pinion secured on the shaft in mesh with said rack, a pair of notched disks having oppositely-directed teeth secured on the shaft, a pair of pawls adapted to coact with and rotate the notched disks in opposite directions, a spring-pressed bolt normally entering into said rack and preventing said pinion rotating, a second pair of notched disks having oppositely-directed teeth mounted free to rotate on said shaft, each of the latter notched disks having a cam-wheel integral therewith adapted to coact with and remove the bolt from the rack, a pair of pawls adapted to coact with and rotate the latter pair of notched disks in opposite directions, and two movable keys each operatively connected with one of said pairs of pawls, each of the pawls of the second pair having an arm, and a stop pin adapted to coact with the arms of the latter pawls and hold the same out of engagement with the appertaining notched disks in the lowest position of the pawls.

8. In apparatus for laterally moving the carriage in a calculating machine, the combination, with a rack, and a spring-pressed bolt normally entering into the same, of a cam-member coacting with the bolt for removing the same out of, and allowing the same to return into, the rack.

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

VALENTIN JACOB ODHNER.

Witnesses:

M. BREITFUSS,

W. KLEINMAN.