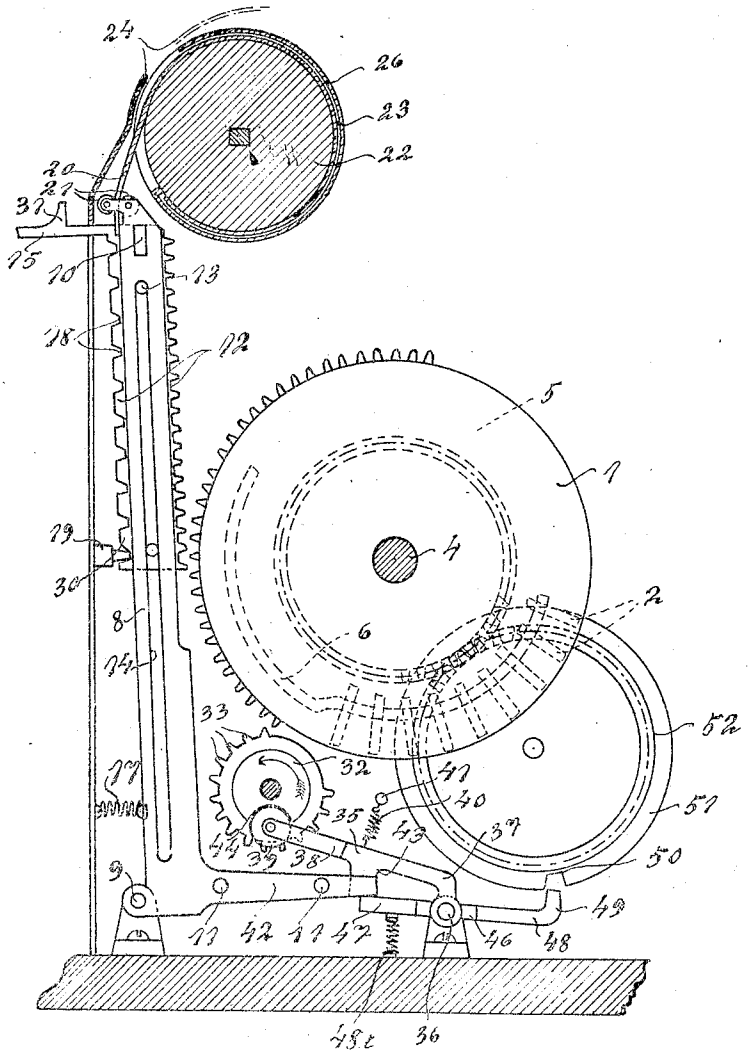
Dec. 2, 1924. 1,517,858

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CALCULATING MACHINE

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Fig. 1.



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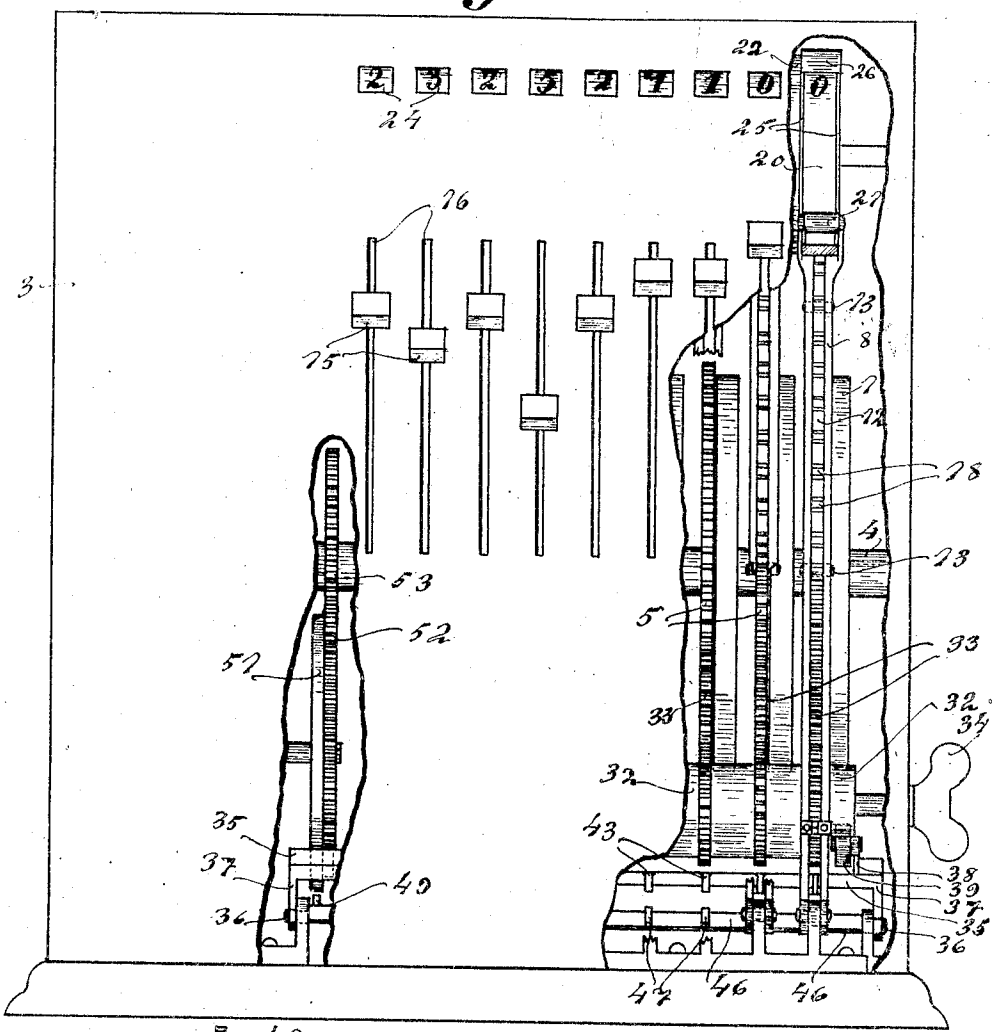
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V. J. ODHNER

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Fig. 2.



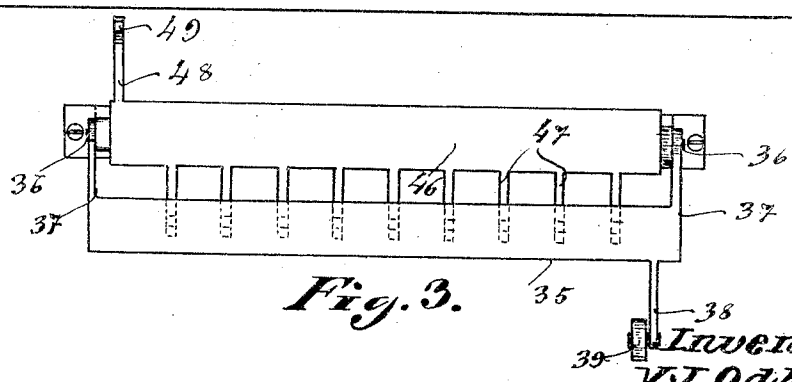


Fig. 3.

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Fig. 4.

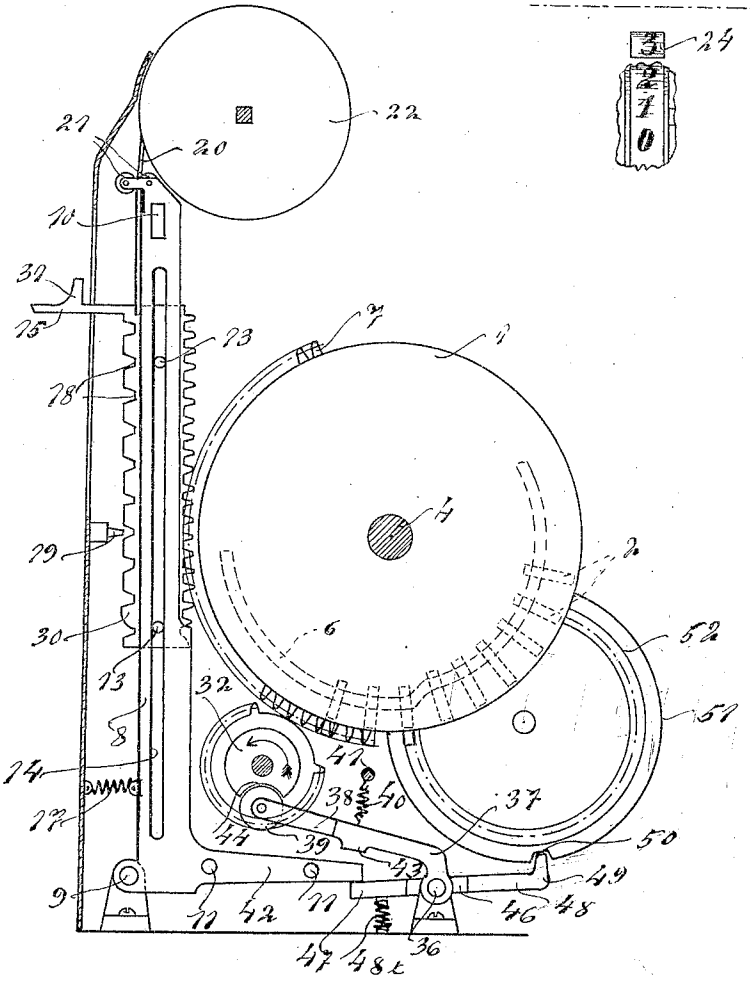


Fig. 5.

Fig. 6.

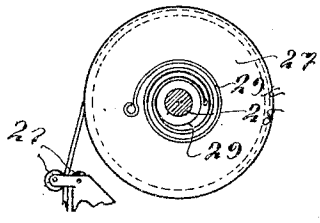
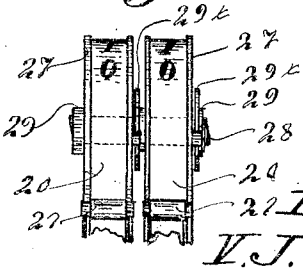


Fig. 7.



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UNITED STATES PATENT OFFICE.

VALENTIN JAKOB ODHNER, OF RASUNDA, NEAR STOCKHOLM, SWEDEN.

CALCULATING MACHINE.

Application filed January 22, 1921. Serial No. 339,268.

To all whom it may concern:

Be it known that I, VALENTIN JAKOB ODHNER, a subject of the King of Sweden, and resident of Rasunda, near Stockholm, in the Kingdom of Sweden, have invented certain new and useful Improvements in Calculating Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

The present invention relates to a mechanism for such calculating machines, which are provided with rotary adjusting discs with movable teeth, which may be shifted by means of rotary cam-discs or the like, provided with teeth or the like and which may be brought into engagement with respective movable racks, provided with teeth or the like, and the object of said mechanism is to make such machines as easily managed and above all as dependable as possible. According to my invention the racks may be moved in their longitudinal direction in a guide-way in each arm, which arm, independent of the other arms, is mounted for swinging movement about a suitable pivot, so that each rack may be separately brought into engagement with the corresponding cam-disc or respectively advanced for shifting the cam-disc and the teeth. The mechanism includes also a mechanism for bringing the cam-discs, etc., back to their initial position and a mechanism by means of which the openings in the machine-casing for reading off the figures indicating the number of the advanced teeth, may be brought near to the openings in which the result is read off, in order quickly to attain a dependable survey. All the mechanisms are, according to my invention, so combined with each other that the whole arrangement may work in an absolutely reliable way.

In the accompanying drawings is shown a convenient embodiment of my invention. Only that much of the calculating machine is shown as is necessary to explain the invention. Fig. 1 is a side view of one of the adjusting discs with its adjusting mechanism. Fig. 2 is a front-view of the machine with a portion of the casing broken away. Figs. 3, 5, 6 and 7 show certain details and Fig. 4 is a side view of an adjusting disc with its adjusting mechanism in active position.

In the drawings 1 indicates the adjusting discs with their teeth 2. The adjusting discs are fastened to an axle 4, journalled in the casing 3, said axle being rotated as usually with a crank. 5 indicates the cam-discs for adjusting the teeth, said cam-discs being rotatable on the shaft 4 and provided with slots 6. The cam-disc 5 is locked in a known way by means of a spring operated hook, which engages teeth on the cam-disc. This locking mechanism is however not shown in the drawing. The disc 5 is provided with teeth 7. In front of each adjusting disc is provided an arm 8, which is turnable on a pivot 9 in the lower portion of the standard. This arm is made of two parallel pieces of the same form, which are kept together at some distance alongside each other by means of a cross-piece 10 and pins 11. In the opening between the two side-pieces of the arm the rack 12 is placed, in such a way, that it may be moved all along the arm, being guided by said side pieces and pins 13, which are driven through the arm and which slide in slots 14 in the side pieces. In the upper end of the rack is a slot, corresponding to the crosspiece 10, in order that the rack should be able to occupy its highest position without being hindered by the crosspiece. The rack is arranged to be brought into engagement with the teeth 7 on the cam-disc.

The rack can be shifted by means of a crosspiece 15, which extends from the rack through a slot 16 in the casing and the free end of which is formed as a handle. The rack 12 is held in its inactive position by means of a spring 17, which operates upon the arm 8, and that edge of the rack, which is turned towards the casing is provided with a number of equally spaced notches 18, which are adapted to cooperate with a stop in the form of a pin 19 which is provided in the casing in order to lock the rack after each adjustment, determined by the number of the advanced teeth.

The figures for reading off the number

of the advanced teeth are provided on a flexible band 20 of steel which is attached to the upper end of the rack and which runs between two guiding rollers 21 in the arm 8 and through a slot 23 provided in a fixed round or nearly round member 22, the figures of the band being visible through an opening 24 in the casing. The band is sufficiently flexible to permit it to slide through the slot 23 at the upward and downward movement of the rack, but at the same time it is also sufficiently rigid to prevent it from buckling or folding between the rollers 21 and the point where it enters the said slot, and for this reason the band will uniformly follow the movement of the rack in its entirety. Consequently, just the figure which corresponds in each separate case to the position of the rack will be visible in the opening 24. The member 22 which is stationarily supported in the upper portion of the case 3 near to figure-discs (not shown in the drawing) is provided with as many slots as there are set-discs in the machine. Each slot is provided with lateral guide flanges 25 and the portion of the slot lying behind and below the opening 24 is covered by a cover plate 26. By means of the above described arrangement for moving the figures the advantage is gained that the openings in the casing for these figures may be provided near to the openings where the result of the calculating operation is read off, whereby a survey of all openings for the figures is quickly and reliably obtained.

Figs. 6 and 7 show a modified arrangement for taking up the figure-bands. According to this arrangement the one end of the band is fastened to a disc 27, which is rotatably placed on an axle 28, which is stationarily supported in the casing 3. Each disc is kept in its given position on the axle by means of discs 29 attached to each side of said axle. The band is rolled on and off of the disc 27 against the action of a spiral spring 29*, connected with the disc 27 and fastened to the disc 29.

The described adjusting mechanism works as follows. When adjusting the teeth of the disc 1, a finger is pressed downwards against the handle 15. Because the portion 30, which at the top bounds the lowest notch 18 in the rack 12 is bevelled off upwards as a wedge, the arm 8 is swung inwards against the action of the spring 17, so that the rack will engage the teeth 7 of the cam-disk and at the same time the rack is moved downwards. Evidently the mechanism must be so adjusted that the lateral movement of the rack in the beginning is greater than its vertical movement, so that the engagement may not be rendered impossible. After this is done it is only necessary to move the rack downwards while pressing slightly inwards in order to get the desired number of teeth of the set-disc 1 advanced, which number at the same time is read off in the opening 24. To each position of the cam-disc 5 relative to the teeth 2 corresponds a notch 18 in the rack and a figure on the band 20. The movement of the rack inwards is limited by a projection 31 on the handle 15 which projection when the rack is shifted slides along the casing at the side of the slot 16. The movement of the rack up and down is limited by the slots 14 and the pins 13. Evidently the rack cannot be moved unless it is swung forward, so that the pin 19 is disengaged from the slot which catches the pin and the rack is engaged with the teeth 7. Any movement of the rack when it is disengaged from the teeth, as well as its disengagement in a position, which corresponds to a tooth not fully advanced, can not take place. As soon as the desired number of teeth are advanced the handle 15 is disengaged and the rack is automatically swung back acted upon by the spring 17 in order not to prevent the successive rotation of the adjusting discs.

In order to prevent any wrong adjustment it is convenient to retract all the adjusting discs 1, and the racks 12 to the initial position immediately after each calculating operation. For this purpose a rotatable roll 32 is journalled under and alongside the adjusting discs and said roll is opposite each cam-disc 5 provided with a toothed segment 33 around the greatest portion of its periphery. When the roll is rotated these toothed segments will engage the teeth of the corresponding cam-discs 5 as soon as they do not hold their initial position. The roll is rotated for example with a winged nut 34. The number of the teeth of the segments 33 is so chosen, that the engagement between the teeth of the segments and the cam-discs will cease at the same instant the cam-discs occupy their initial position. Thus the segments will not prevent the rotation of the adjusting discs. In order that the cam-discs 5 should take along with them respective racks when they return to the initial position the machine is provided with a member, formed as a movable bar 35, which is located alongside the arms, and by automatically operating the latter, when the roll is rotated each rack 12 will be brought into engagement with the corresponding cam-disc 5 before being retracted. Said bar 35 is movable around two pivots 36 in the machine-standard which are provided in arms 37 (Fig. 3) projecting from the bar. The bar is furthermore provided with another arm 38 on the opposite side, the free end of which is provided with a friction-roller 39. This roller is pressed against the roll 32 by means of a spring 40, which is fastened to

the bar and to a pin 41 located above the bar. A smaller arm 42 extends from the arm 8 and the arm 42 is located under the bar 35 and may be brought to engage a projection 43 located at the underside of the bar. That portion of the roll 32 over which the roller 39 slides when the roll is rotated, is provided with a depression or recess 44 to partially receive the roller 39 and in which the roller is held by means of the spring 40 when the roll is not operated. This mechanism is so arranged that when the arm 42 rests against the projection 43, the rack is in its inactive position, locked by the pin 19. As soon as the roll 32 is rotated, which is done by means of the winged nut in the direction of the arrow, in order to bring the cam-discs etc. back to their initial position, the roller 39 is brought out of the recess 44, the bar is swung down, depressing the arm 42 and bringing the rack 12 into engagement with the teeth 7. The roll 32 constitutes a cam which, during rotation operates against the roller 39. Instead of the above mentioned portion of the roll a special cam-disc of the same form and attached to the shaft of the roll may be used. All the toothed segments 33 occupy such a position relative to the recess 44 that the bar is completely depressed, and the rack 12 engages the teeth 7 before the toothed segments engage the same. Fig. 4 shows the operation of the adjusting mechanism. The rack is in that position, which corresponds to three advanced teeth.

In order to prevent the shifting or movement of the racks 12 into mesh with the gear teeth 7 unless the set-discs 1 with the cam-discs 5 are in the zero-position, the machine is provided with another bar 46, which is journalled between the arms 37 of the bar 35. Said bar 46 is provided with a number of arms 47 corresponding to the number of adjusting discs, which arms extend for some distance below the bar 35 and end about opposite the respective projections 43, so that the end of each arm 42 will be located between the projection 43 and the arm 47. By means of a spring 48 all the arms 47 are pressed against respective arms 42. Another arm 48 extends from the opposite side of the bar and the end of this arm is bent to form a hook 49, which in a certain position is adapted to enter a notch 50 in a round disc 51, rotatably supported at the side of the one extreme adjusting disc 1. This disc is by means of two gears 52, 53, which engage each other, connected with the shaft 4, so that this movement is transferred to the disc 1. Both the gears 52 and 53 have the same number of teeth. If the hook 49 is brought into engagement with the recess 50 of disc 51, which can be done only when the adjusting discs are in their zero-position, the disc 51 and shaft 4 are evidently locked and also the adjusting discs. This is done either when the rack 12 is brought into engagement with the teeth 7 or when the roll 32 is rotated, because in both cases the arm 42 engages and depresses the bar 46 and swings up the hook 49. If on the other hand the adjusting discs are not in the zero-position, the circular portion of the disc 51 is presented to the hook 49 and the bar 46 locks both the rack 12 and the roll 32 in the inactive position by pressing the arm 42 up and the roller 39 into the recess 44.

Thus by the above described adjusting mechanism the accurate operation of the machine is insured.

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

1. In a computing machine, rotatable adjusting disks, movable teeth carried by said disks, toothed cam disks arranged to shift said teeth, independently movable pivoted arms having guideways means tending to maintain the pivoted arms in normal position, and racks movable longitudinally in said guideways and engageable with the teeth of the cam disks, said racks being separately movable into engagement with the cam disk associated therewith and respectively movable for shifting said cam disk.

2. A computing machine as claimed in claim 1 in which the rack is provided with a plurality of notches corresponding to the respective positions of the cam disk, and a stop member adapted to enter the notches to lock the rack in inoperative position, the lowermost notch having a beveled wall adapted to co-act with the stop member to effect movement of the rack into operative relation with the cam disc coincident with initial movement of the rack.

3. A computing machine as claimed in claim 1, characterized by the provision of means for returning the racks, cam discs and adjusting discs to initial position, said mechanism comprising a plurality of gear segments arranged adjacent the cam discs, and means co-acting with said segments to move the racks into engagement with the respective cam discs prior to the return of the latter to initial position.

4. A computing machine as claimed in claim 1, characterized by the provision of means actuated by the rack supporting arms to lock the several adjusting discs in zero position.

5. A computing machine as disclosed in claim 1 characterized by the provision of a flexible indicating element attached to each rack and actuated thereby to indicate the

extent of movement of the rack, and spring actuated supporting means for the indicating element.

6. A computing machine as claimed in claim 1 characterized by the provision of a flexible indicating element attached to each rack and actuated thereby to indicate the extent of movement of the rack, and a relatively stationary roller receiving the indicating element when the rack is retracted, and means to guide the indicating element whereby the latter is caused to coil upon the receiving means.

In witness whereof I have hereunto signed my name.

VALENTIN JAKOB ODHNER.