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CALCULATING MACHINE

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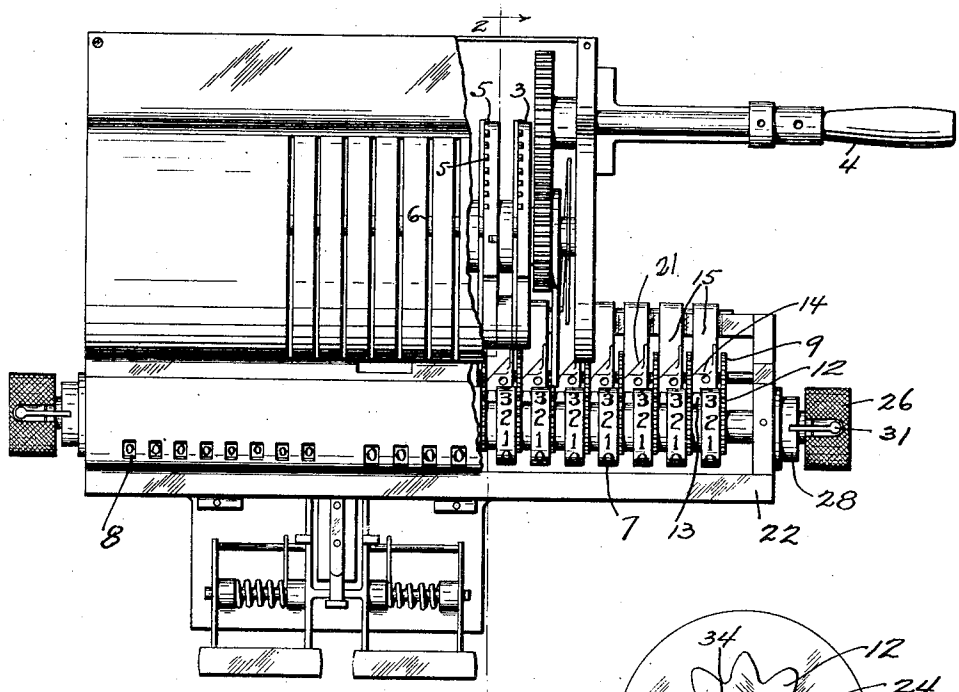


Fig. 1

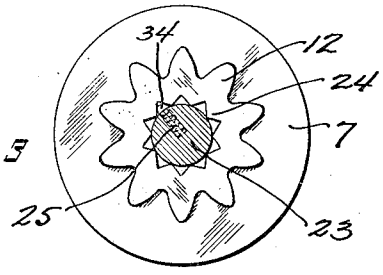


Fig. 3

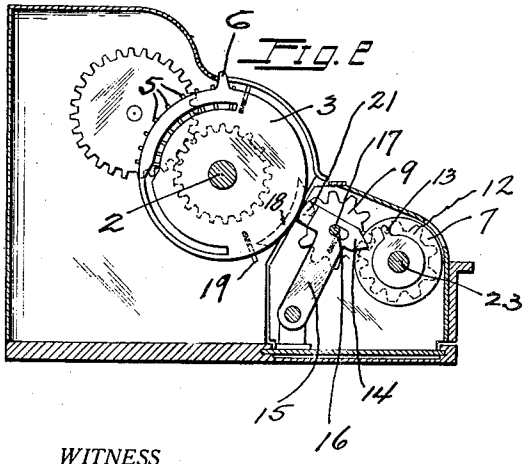
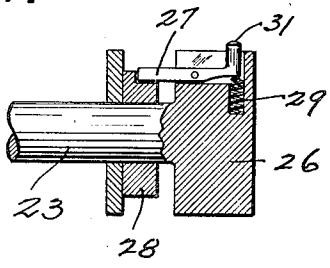


Fig. 2

Fig. 4



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UNITED STATES PATENT OFFICE

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CALCULATING MACHINE

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The invention relates to calculating machines of the type embodying a registering mechanism, comprising rotatable figure discs and relates particularly to a zero setting mechanism for returning the figure discs to zero position.

The invention is shown embodied in a calculating machine of the type embodying toothed adjusting wheels having radially movable teeth, variable as to the number operatively projected and also provided with cam discs arranged on these wheels, and by the adjustment or rotation of the cam discs, the teeth on the adjusting wheels are brought into and moved out of operating position, the rotation of the wheels being effected by a handle which projects to the outside of the machine. The values adjusted on the toothed adjusting wheels are transmitted on the rotation of the crank handle, indirectly, by means of intermediate wheels, to the figure discs of the registering mechanism or series of figure discs, which, for the purpose of making the direct action of the units toothed adjusting wheel on the intermediate wheel of the figure discs of higher value possible, is disposed in parallel displaceable relation to the adjusting mechanism axis. The zero setting mechanism of the present invention is particularly applicable to, but is not limited in its application to, calculating machines of this type and is generally applicable to calculating machines embodying rotatable figure discs.

An object of the invention is to provide a simple and dependable zero setting mechanism.

Another object of the invention is to provide an improved form of detent mechanism for holding the figure discs in adjusted positions.

The invention possesses other advantageous features some of which, with the foregoing, will be set forth at length in the following description where we shall outline in full, that form of the invention which we have selected for illustration in the drawings accompanying and forming part of the present specification. In said drawings we have shown one form of the invention, but it is to be understood that we do not limit ourselves to such form, since the invention, as expressed in the claims, may be embodied in a plurality of forms.

Referring to said drawings:

Figure 1 is a plan or top view of one form of calculating machine embodying our invention, parts of the case being broken away to disclose the construction.

Figure 2 is a cross section taken on the line 2—2, Figure 1.

Figure 3 is a cross section through the numeral wheels on an enlarged scale.

Figure 4 is a longitudinal section through the zero setting knob.

The calculating machine shown in the drawings, and which embodies the present invention, comprises a suitable frame in which the shaft 2 of the adjusting toothed wheels 3 is journaled and which is suitably connected to the crank handle 4. Each wheel 3 carries a plurality of radially movable teeth 5, which are moved inwardly and outwardly, variable as to number, by cams arranged within or associated with the wheels. The cams are provided with projecting fingers 6, so that they may be readily moved circumferentially to vary the number of projecting teeth.

Arranged on the frame adjacent the adjusting toothed wheels, and parallel to the axis thereof, are one or more series of figure discs, in the present instance there being two series of figure discs 7 and 8, the discs 7 of one series indicating the result of the calculation and the discs 8 of the other series indicating the crank handle revolutions. The values adjusted on the toothed wheels are transferred to the figure discs 7, through the interposed toothed wheels 9 which mesh with toothed wheels 12 formed on or secured to the figure discs 7. The figure discs 7 are suitably connected by tens carrying mechanism, to cause the rotation of one disc through a complete revolution to advance the disc of the next higher denomination one point. The tens carrying mechanism shown comprises a pin or projection 13 on the side of the figure disc 7, which as the disc is rotated, contacts with the head 14 of the transfer lever 15, moving the lever backward, in

which position it is held by engagement of the detaining pin 16 with the fixed shaft 17. One transfer lever is disposed between each two adjacent figure wheels to carry tens from each wheel to the adjacent wheel of higher denomination. Each adjusting toothed wheel is provided with a cam face 18 for returning the transfer levers to normal position from their backward position. Arranged on each adjusting toothed wheel in advance of the cam face is a rocking carrying tooth 19, which, during the rotation of the adjusting toothed wheel, normally does not engage an intermediate toothed wheel 9. The rear end 21 of the head of the transfer lever is provided with a cam surface which, when the lever is in its backward position, lies in the path of the rocking tooth 19, so that, when the lever is in its backward position and the adjusting toothed wheel rotated, the tooth 19 is rocked sideways into engagement with the intermediate toothed wheel 9 of next higher denomination and advances the figure disc of next higher denomination one point.

The figure discs with their associated transfer levers, intermediate toothed wheels and attached toothed wheels, are preferably mounted in a displaceable carriage 22 for the purpose set forth. The figure discs 7 are mounted side-by-side on a shaft 23 mounted in the carriage which shaft is rotatable for the purpose of resetting the figure discs to zero. Each figure disc 7 is provided with a central aperture, the surface or boundary of which is mutilated. The mutilated inner surface of the annular disc 7 is preferably serrated, being provided with a plurality of regularly spaced angular teeth 24, the number of the teeth corresponding to the number of regularly spaced figures on the figure disc. The apices of the teeth lie in a circle and preferably contact with the shaft 23. Disposed in the shaft at each disc is a steel ball 34 pressed outward against the serrated surface by a spring 25. As the figure disc is rotated, the ball rolls over the toothed surface and is reciprocated by the teeth and gives the figure disc a step-by-step rotation, acting as a detent to hold the figure disc in proper adjusted position.

The shaft 23 is provided on its end with a suitable knob or button 26 and is normally held against rotation by a latch 27 pivoted to the knob and engaging in a depression or seat in the collar 28, secured to the carriage. The latch is normally held in locked position by a spring 29 disposed below the button 31 which projects from the knob 26. By grasping the knob, the button is depressed, releasing the latch and permitting the shaft to be turned. Rotation of the shaft causes the displaced figure discs to be rotated to zero position. The spring 25 behind the ball 34 is of sufficient strength to cause the disc to rotate with the shaft. When the disc reaches zero position, the pin or projection 13 engages the head 14 of the transfer lever 15 and is stopped thereby, although the rotation of the shaft may be continued. All of the displaced discs are, therefore, rotated to zero position by the rotation of the shaft and when any disc reaches zero position its further rotation is prevented by the transfer lever.

We claim:

1. In a calculating machine, a normally stationary rotatable shaft, a plurality of spring pressed balls carried by said shaft and partially extending from the surface thereof, a plurality of annular figure discs rotatably mounted on said shaft provided on their inner faces with a plurality of regularly spaced teeth, a disc being associated with each ball and each ball being adapted to seat between any two successive teeth on the associated discs to cause a step by step movement of the discs with respect to the shaft and to hold the discs in any one of a plurality of adjusted positions, calculating means adapted to rotate the discs with respect to the shaft in performing a calculating operation, a transfer lever associated with each disc and adapted to cooperate with the associated calculating means, a projection on each disc arranged to cooperate with the associated transfer lever to move the transfer lever when the disc is moved by the calculating means, and means for rotating the shaft to rotate the figure discs and to move the projections into contact with the transfer levers, the yielding contact of the balls and the discs being sufficient to cause rotation of the shaft to rotate the discs to bring the projections into contact with the transfer levers, but being insufficient to move the transfer levers so that the levers serve to stop rotation of the discs by the shaft.

2. In a calculating machine, numeral wheels, aligning means therefor, means for positively driving said wheels, means comprising the aligning means for releasably driving said wheels, and a resiliently latched member engageable by said numeral wheels when under either drive, said member being capable of being moved by said wheels when under positive drive, but acting to arrest said wheels in zero position when under frictional drive.

3. In a calculating machine, numeral wheels having transfer lugs, means for positively driving said wheels, means for frictionally driving said wheels, and a member having spring means for retaining it in position to be engaged by a transfer lug, said spring means being so proportioned that the member will be moved on engagement with the transfer lug when the wheels are under positive drive, but will act to arrest the numeral wheels in zero position when they are under frictional drive.

4. In a calculating machine, numeral wheels, means for aligning the numeral wheels in their several registering positions, means comprising resiliently latched members engageable by said numeral wheels to effect tens carrying, means comprising the aligning means for driving the numeral wheels toward zero, and means comprising the said latched members for arresting the numeral wheels in zero position.

5. In a calculating machine, numeral wheels, means for positively driving said wheels, means for frictionally driving said wheels, and a resiliently latched member engageable by said numeral wheels when under either drive, said member being capable of being moved by said wheels when under positive drive, but acting to arrest said wheels in zero position when under frictional drive.

6. In a calculating machine, numeral wheels, a plurality of selective driving means for said numeral wheels having different driving strengths, and means responsive to the driving strength of the effective drive for determining whether said wheels will be arrested at a common registration.

7. In a calculating machine, numeral wheels, selective frictional and positive driving means therefor, and means controlled by the character of the effective drive for determining whether said wheels will be arrested at a common registration.

In testimony whereof, we have hereunto set our hands.

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