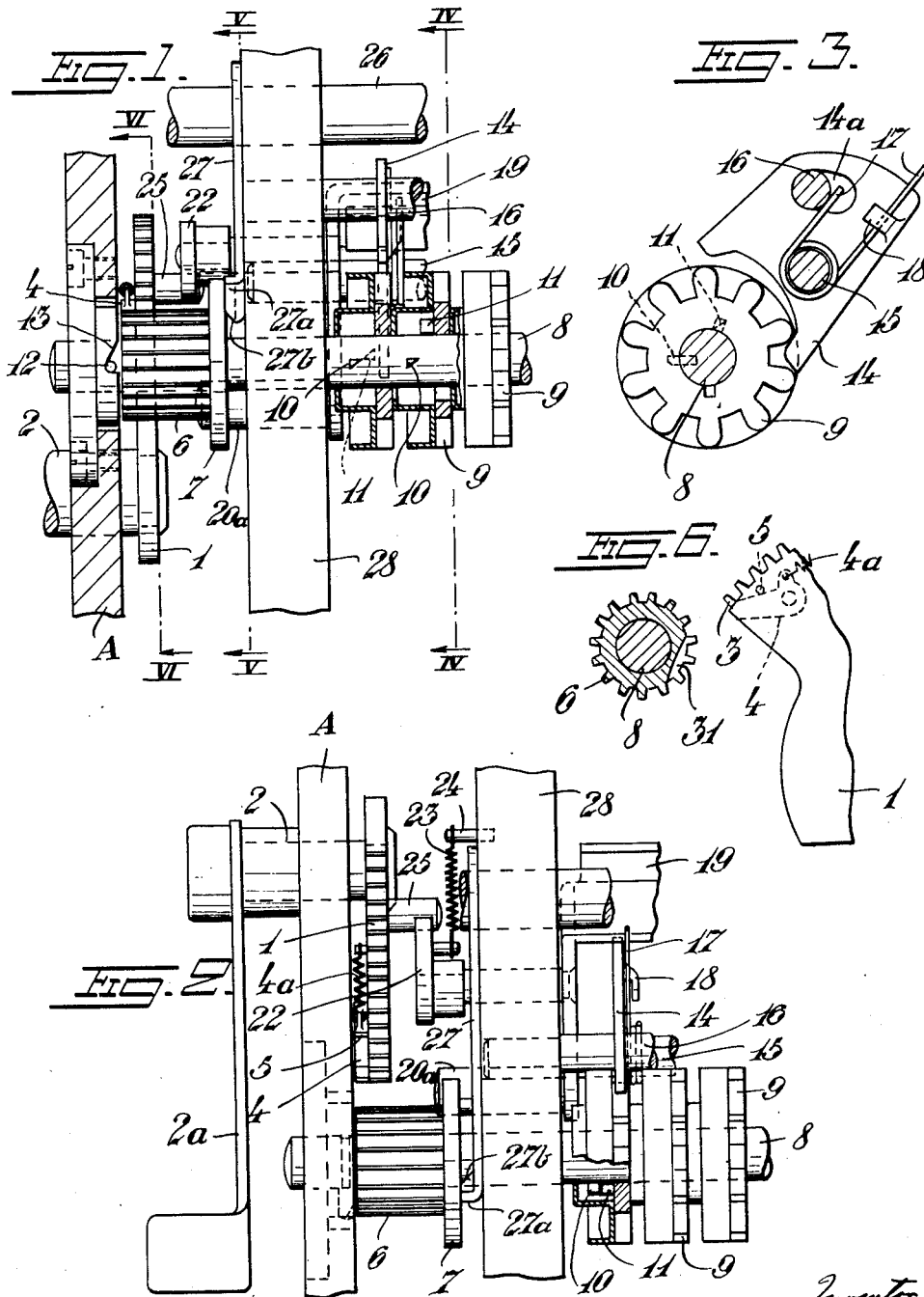


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B. CARLSTRÖM
CALCULATING MACHINE
Filed July 6, 1937

2,188,748

2 Sheets-Sheet 1



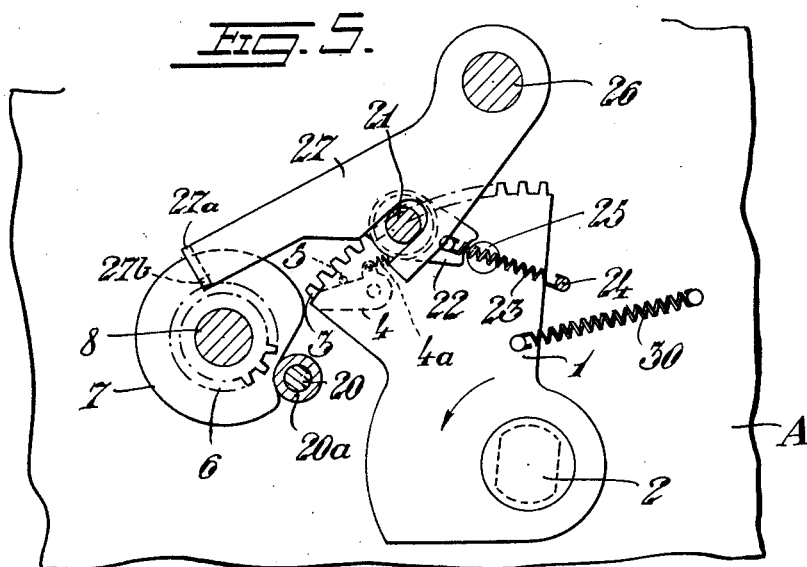
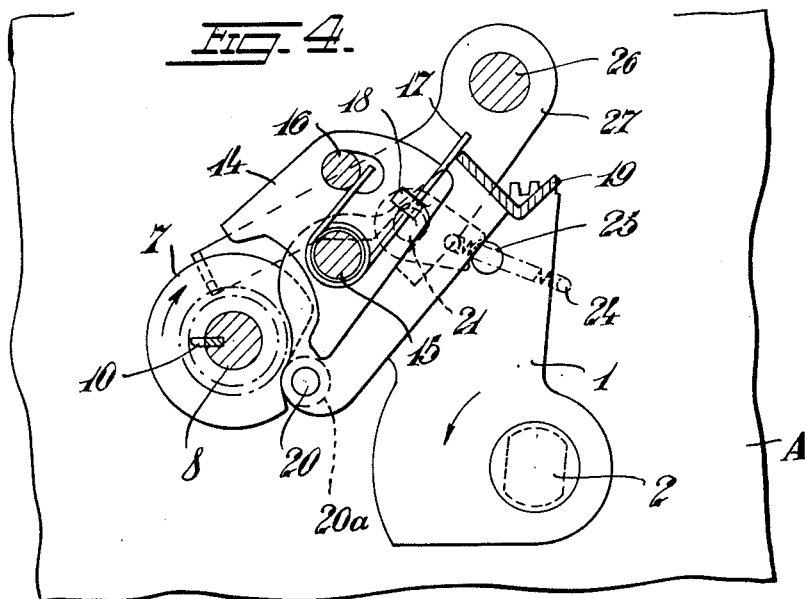
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,188,748

CALCULATING MACHINE

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10 Claims. (Cl. 235-144)

In calculating machines it is well-known to reduce or release the spring-pressure from the catches on the wheels of the totalizers or registers, before the totalizers or registers are cleared or zeroized. Due to this reduction or release of pressure, the resistance to the clearing action is low and the clearing operation is easy. The reducing or releasing means, which may be bridge-shaped, is operated by a clearing member, such as a clearing crank, wing nut, button or the like. Generally, the springs are released by a cam on the shaft of the totalizer or register wheels, which is rotated by means of said clearing member, for effecting the clearing operation.

These devices suffer, however, from serious drawbacks. Especially, they have relatively high frictional losses, above all in the initial stages of the motion, and for this reason the motion requires considerable force. In general, it may be said that the transmission of power from the clearing member to the register wheels is very unfavorable and inefficient in these known devices.

The chief object of this invention is to overcome such drawbacks and to effect the whole clearing or resetting operation with a minimum consumption of power and energy.

Another object of this invention is to release the catches from the spring-pressure, before the shaft of the register wheels begins its rotation for clearing purposes.

Another object of this invention is to render it possible to reduce the strength of the spring used for restoring the shaft of the register wheels in the axial direction, or even to eliminate such spring.

Another object of this invention is to restore the shaft of the register wheels positively in the axial direction, after the clearing is completed.

Another object of this invention is to lock the shaft of the register wheels against axial motion, when no clearing is to be effected.

Other objects of this invention will be evident from the following specification and claims.

One embodiment of the invention is illustrated in the annexed drawings, by way of example. Only those parts are shown which are necessary for understanding this invention.

Fig. 1 shows a front view of a device in accordance with this invention.

Fig. 2 is a plan view of the parts shown in Fig. 1.

Fig. 3 is an end view of a register wheel with its anchor catch.

Figs. 4 and 5 are sections on the lines IV—IV

and V—V, respectively, in Fig. 1. Fig. 6 is a section on the line VI—VI in Fig. 1.

The machine shown may be of the general type shown in United States Patents No. 1,927,771, 2,068,899 or 2,108,596. However, registers or totalizers are an essential part of substantially all calculating machines, including accounting machines and cash registers, and this invention is not limited to the machine set forth in said United States patents, but may be applied to many other types of calculating machines.

Referring now to the drawings, 1 indicates a toothed clearing or resetting segment, secured to a shaft 2, which may be rotated or rocked, for instance manually, by means of a suitable clearing member, such as an arm or handle 2a. The segment 1 is connected with a starting or initiating tooth 3, carried by an arm 4, which is normally pressed by a spring 4a against a pin 5 on said segment. The segment 1 cooperates with a long toothed wheel 6, which is rigidly connected with a cam 7 and also with the shaft 8 of the register or numeral wheels 9. For each numeral wheel 9 the shaft 8 has a triangular pin or projection 10 which normally is displaced axially in relation to a similar pin or projection 11 in the hub of each wheel 9. When the shaft 8 is displaced a short distance axially and also rotated, the pins 10 engage the pins 11 and rotate the wheels 9, until their zero position is attained.

When the arm 2a is rocked by hand, the segment 1 meshes with the wheel 6 and rotates the shaft 8. Simultaneously the necessary axial displacement is effected by a pin 12 secured to the shaft 8 and cooperating with a stationary oblique cam surface 13 on a part A of the machine frame.

Each wheel 9 has its separate overthrow preventing detent or latching arm 14, for instance of the anchor or escapement type. The detents 14 are journaled on a stationary shaft 15, secured to the machine frame. A second shaft 16, which is also stationary, passes through slots 14a in all of said detents, to limit their rocking motion. A torsional spring 17 is wound on the shaft 15 and one of its ends engages the shaft 16, while its opposite end engages a projection 18 of the detent 14, to press the latter against the wheel 9. That end of the spring 17, which engages the projection 18 extends beyond the detent and is in the path of motion of a releasing member in the shape of a bridge 19, rotatably journaled on the shaft 15. On this bridge the pins 20 and 21 are riveted. The pin 20 engages the cam disk 7 by means of a roller 20a while on the pin 21 a pawl 22 is rotatably journaled, which is acted

upon by a spring 23, one end of which is secured to the pin 24 on the stationary machine frame. On the segment 1 a pin 25 is secured and on its side facing this pin the pawl 22 is concave or recessed in accordance with the shape of the pin, Fig. 5.

On a stationary shaft 26 an arm 27 is rotatably journaled which has a slot through which the pin 21 passes. The free end of this arm has a shoulder 27a, one end of which has an oblique or bevelled surface 27b, Figs. 1, 2 and 5. The shoulder 27a is placed between the stationary machine frame 28 and the end of the cam disk 7.

The device described acts as follows:

For clearing or resetting the numeral wheels, the toothed segment 1 is first rocked in the direction of the arrows in Figs. 4 and 5 by means of the arm 2a. Before the teeth of this segment engage the toothed wheel 6, and consequently before the rotary motion of the totalizer shaft 8 begins, the rocking motion of the segment 1 causes the pin 25 to engage the concave lower surface of the pawl 22 which is consequently rocked and forced to follow the pin 25. Consequently, the pin 25 and the pawl 22 moved by it form together temporarily a knee joint, which is straightened by the rocking of the segment 1. In other words, the centre lines of the shaft 2, and pins 25 and 21 will tend to come into the same plane. The pressure exerted by the pin 25 acts consequently via the pawl 22 directly on the pin 21, thus causing the bridge 19 to be lifted, so that the springs 17 are lifted from the projections 18 of the detents. The detents 14 are consequently released from the spring pressure, before the rotation of the clearing totalizer shaft 8 has begun. The initiating tooth 4 rests against the pin 5 and cannot be rocked aside, and is, moreover placed laterally of the fixed teeth of the segment 1, as shown in Fig. 2. Upon the continued rocking motion of the segment 1 said tooth 4 will engage the teeth of the wheel 6 laterally of the recess 31 and rotate this wheel. Successively the other teeth of the segment 1 will engage the wheel 6 and rotate the same for the clearing action. Because the numeral wheels 9 are released from the pressure of the springs, they can be cleared or zeroized with a minimum consumption of energy, when now the shaft 8 is rotated by the wheel 6 and simultaneously is displaced axially by the pin 12 and the oblique cam surface 13.

When the segment 1 has been rotated a certain angle, the pawl 22 is disengaged from or slips off the journal 25 and returns to its position of rest, as shown in Fig. 5, by the action of the spring 23. Consequently, the bridge 19 is no longer kept in its raised position by the pin 21 and tends to fall down. However, this is prevented by the fact that the pin 20 with its roller 20a is now on the highest part of the cam disk 7, that is, on that part thereof which is most remote from the centre of the shaft 8. Thus, the pin 20 keeps the bridge 19 in its raised position. After the shaft 8 has been rotated one complete revolution or 360°, the roller 20a moves into the recess of the cam disk 7 and the bridge 19 is restored to its position of rest shown in Fig. 4, by the combined action of gravity and of the springs 17. Under the action of said springs the detents 14 now again engage the numeral wheels 9 which now all show zeros. When the toothed segment 1 has finished its rocking motion in the direction of the arrow,

the operator releases the arm 2a. The spring 30 now restores the segment 1 to its position of rest shown in Fig. 5. During this return motion of the segment 1 its fixed teeth pass through the recess 31 of the wheel 6 so that said wheel remains unactuated during the return motion. The pivoted arm 4 carrying the initiating tooth 3 will be rocked downwardly by the corresponding teeth of the wheel 6 and also leaves said wheel unactuated. It is, however, to be observed that when the arm 2a is manually pressed down for the clearing action in the direction of the arrows in Figs. 4 and 5, the initiating tooth 4 rests against the pin 5 and cannot be rocked aside. Consequently, this tooth 4, which is placed laterally of the fixed teeth of the segment 1, as shown in Fig. 2, meshes with the corresponding teeth of the wheel 6 at the side of the recess 31 and rotates that wheel such an angle that the fixed teeth of the segment 1 will engage the unrecused part of the wheel 6 and rotate the same, as stated above.

Upon such return motion of the segment 1 under the action of the spring 30, the pin 25 engages the pawl 22 from below and pivots it counterclockwise until the pin passes the end of the pawl, whereupon the pawl is then returned by the spring 23 to the position shown in Fig. 5.

When the pin 21 is lifted by the pin 25 acting through the pawl 22, as described above, also the arm 27 is lifted a corresponding distance as a result of the engagement between the pin 21 and the slot in said arm. This causes the shoulder 27a of the arm 27 to be rocked beyond the periphery of cam disk 7 and hence out of the axial path of the cam disk 7 when the latter is displaced to the right in Figs. 1 and 2 together with the shaft 8, as described above. Thus, the axial motion of the shaft 8 to the right in Figs. 1 and 2 is unhindered during the clearing action. After the clearing action has been completed, the pin 21 together with the bridge 19 are rocked downwards again, as described above, into their position of rest, and the pin 21 will rock the arm 27 downwards into its lowermost position or position of rest again. During this motion the oblique surface 27b acts upon the adjacent end surface of the cam disk 7 and positively moves the shaft 8 axially back into its extreme left position, as shown in Figs. 1 and 2. Because the shaft 8 is restored axially to the left chiefly through the action of gravity on bridge 19, aided by springs 17, it is consequently not necessary during the axial motion to the right of said shaft to stress a spring of sufficient strength to return the shaft unaided, and consequently the clearing is effected at a lower frictional loss and more easily than was heretofore possible.

It is to be observed that in the extreme left axial position or position of rest of the shaft 8, as shown in Figs. 1 and 2, said shaft is locked against axial motion by the shoulder 27a of the arm 27. When during the calculating operations the numeral wheels 9 are rotated on the shaft 8 in well-known manner, they will tend to rotate the shaft 8. Through the pin 12 and the oblique surface 13 such rotary tendency is transformed into a tendency to displace the shaft 8 axially, but in accordance with this invention the shoulder 27a effectively and safely locks the shaft against such axial displacement during all calculating operations. In contrast hereto it was

heretofore necessary to use a strong spring for axial restoring motion of the shaft 8, because also in the position of rest the spring must overcome the tendency to axial displacement mentioned above and hold the pin 12 against the lower end of the oblique surface 13, during the calculating operations. Such strong restoring spring has the obvious drawback that the clearing must be effected against the strong spring pressure and requires a comparatively great force. In accordance with this invention such drawbacks are eliminated in a simple and efficient way, while the safety of operation is further increased.

In this patent the expression "totalizer wheels" is also intended to cover intermediate wheels, which in certain cases have spring-pressed catches.

It is not necessary to use any spring around the shaft 8 for returning the shaft axially to its original position. It is only essential that the spring releaser is moved by the zeroizing member to its effective or releasing position, before the rotation and the axial displacement of the zeroizing or clearing shaft begins.

What I claim is:

1. In a calculating machine, in combination, a rotatable shaft, a totalizer wheel mounted for rotation on said shaft, means on said shaft for clearing said wheel, an overthrow-preventing detent, a spring pressing said detent against said wheel, releasing means for said spring, a clearing member, a releasable coupling between said clearing member and said shaft for rotating the latter for clearing operations, and an additional coupling between said clearing member and said releasing means to actuate the latter, before said first-mentioned coupling becomes effective.
2. In a calculating machine, in combination, a shaft, a register wheel rotatably mounted on said shaft, a projection on said wheel, a projection on said shaft, a clearing member, a coupling between said clearing member and said shaft for rotating said shaft and for displacing said shaft axially to bring said projections into engagement, an overthrow-preventing detent for said wheel, a spring normally engaging said detent, releasing means for said spring, and a knee-joint between said clearing member and said releasing means to actuate the latter upon the actuation of said clearing member, before said shaft is coupled to said clearing member by said coupling and begins its rotation for the clearing.
3. In a calculating machine, in combination, a shaft, a register wheel rotatably mounted on said shaft, a projection on said wheel, a projection on said shaft, a clearing member, a toothed segment rigidly connected with said clearing member, a toothed wheel on said shaft for engagement with said toothed segment for rotating said shaft and for displacing said shaft axially to bring said projections into engagement, an overthrow-preventing detent for said wheel, a spring normally engaging said detent, releasing means for said spring, and a knee-joint between said clearing member and said releasing means to actuate the latter upon the actuation of said clearing member, before said toothed segment has actuated said toothed wheel.
4. In a calculating machine, in combination, a rotatable shaft, a totalizer wheel mounted for rotation on said shaft, projections on said shaft and said wheel, a clearing member for rotating

axially to bring said projections into engagement for clearing operations, an overthrow-preventing detent for said wheel, a spring normally engaging said detent, releasing means for said spring, a pin on said clearing member, a pawl rotatably journaled on said releasing means in the path of motion of said pin, and a rotatable arm operatively connected with said clearing member to cause said pin to move said pawl and said releasing means to release said spring before said shaft begins its rotation under the action of said clearing member.

5. A calculating machine as claimed in claim 4, in which said pawl is concave on its surface facing said pin and has a restoring spring.

6. In a calculating machine, in combination, a rotatable shaft, a totalizer wheel mounted for rotation on said shaft, means on said shaft for clearing said wheel, an overthrow-preventing detent, a spring pressing said detent against said wheel, releasing means for said spring, a clearing member, a first releasable coupling between said clearing member and said shaft for rotating the latter for clearing operations, a second coupling between said clearing member and said releasing means to actuate the latter, before said first-mentioned coupling becomes effective, a cam disc on said shaft, and a pin on said releasing means engaging said cam disc to keep said releasing means during a part of the clearing action in its operative position, to which it has been previously moved by said clearing member by means of said second coupling.

7. In a calculating machine, in combination, a rotatable shaft, a wheel mounted for rotation on said shaft, projections on said shaft and said wheel, a clearing member operatively connected with said shaft to rotate the same and also to displace the same axially to bring said projections to engage each other for the clearing, an overthrow-preventing detent for said wheel, a spring normally pressing said detent against said wheel, releasing means for said spring, a knee-joint between said member and said releasing means to actuate the latter immediately upon the actuating of said clearing member, before the latter begins to rotate said shaft, a cam disc on said shaft, and a pin on said releasing means engaging said cam disc to keep said releasing means in its operative position, after it has been moved there by said clearing member by means of said knee-joint.

8. In a calculating machine, in combination, a rotatable shaft, a totalizer wheel mounted for rotation on said shaft, means on said shaft for clearing said wheel, an overthrow-preventing detent, a spring pressing said detent against said wheel, a releasing means for said spring, a rotatable arm, a pin-and-slot connection between said releasing means and said arm, and a disk on said shaft normally engaged by said arm to lock said shaft in its position of rest, when no clearing is effected.

9. A calculating machine as claimed in claim 8, in which said arm has an oblique surface adapted to engage said disk for restoring said shaft to its position of rest.

10. In a calculating machine, in combination, a rotatable shaft, a toothed wheel secured to said shaft, a totalizer wheel rotatably journaled on said shaft, projections on said shaft and said totalizer wheel, an overthrow-preventing detent for said totalizer wheel, a spring normally engaging said detent, a releasing bridge for said spring, a pawl rotatably journaled on said

bridge, a rotatable clearing arm, a toothed segment rigidly secured to said clearing arm and adapted to engage said toothed wheel upon manual actuation of said clearing arm, means under the control of said clearing arm for moving said shaft axially to bring said projections into engagement for clearing operations, a pin on said segment for co-operation with said pawl, to actuate said pawl and said releasing bridge to release

said spring before said shaft begins its rotation under the action of said clearing arm, a rockable lever, a pin and slot connection between said lever and said bridge, and a disc on said shaft, said lever having an oblique surface adapted to engage said disc for restoring said shaft axially.

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