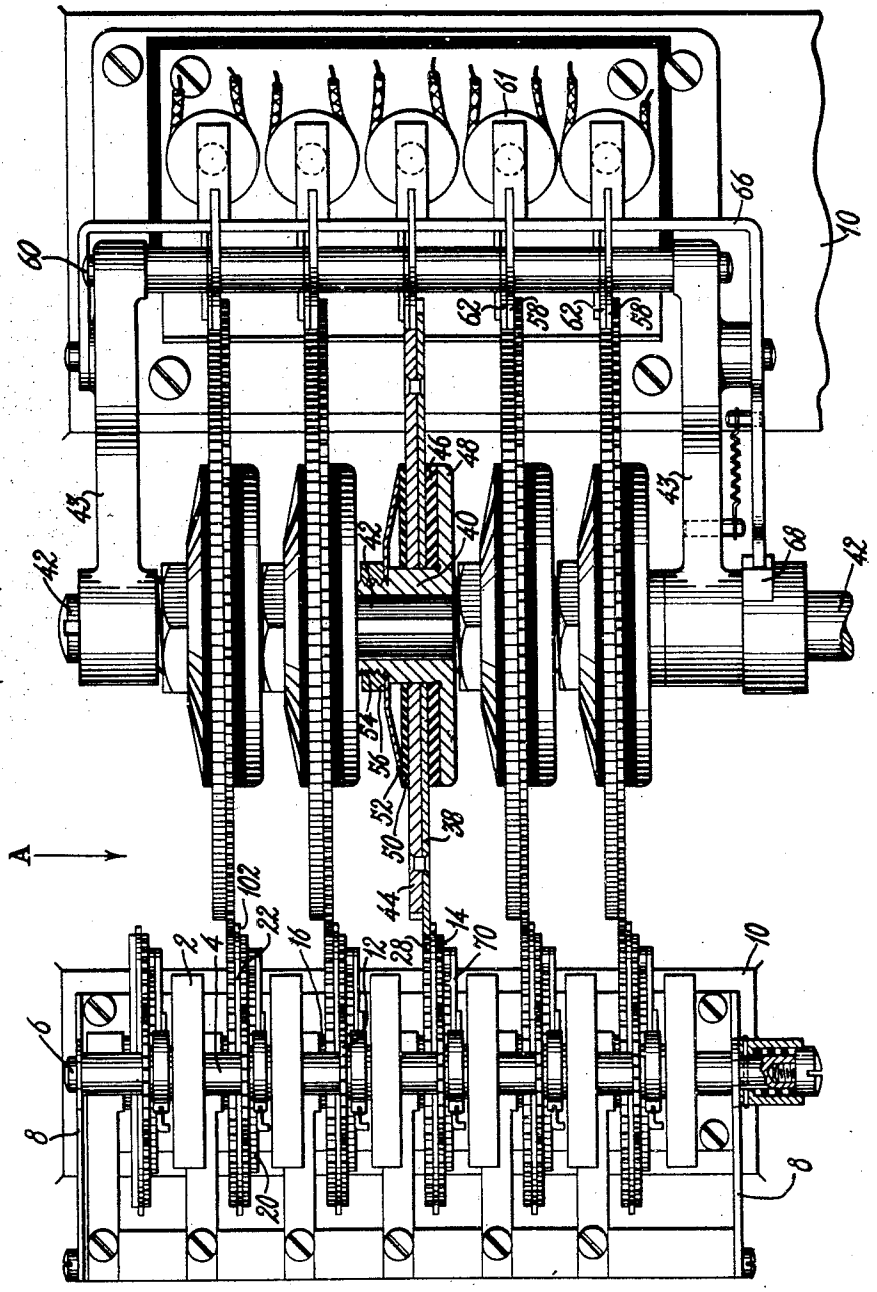
Aug. 10, 1943. C. M. SINCERBEAUX 2,326,401

TRANSFER MECHANISM FOR ACCUMULATORS

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FIG. 1



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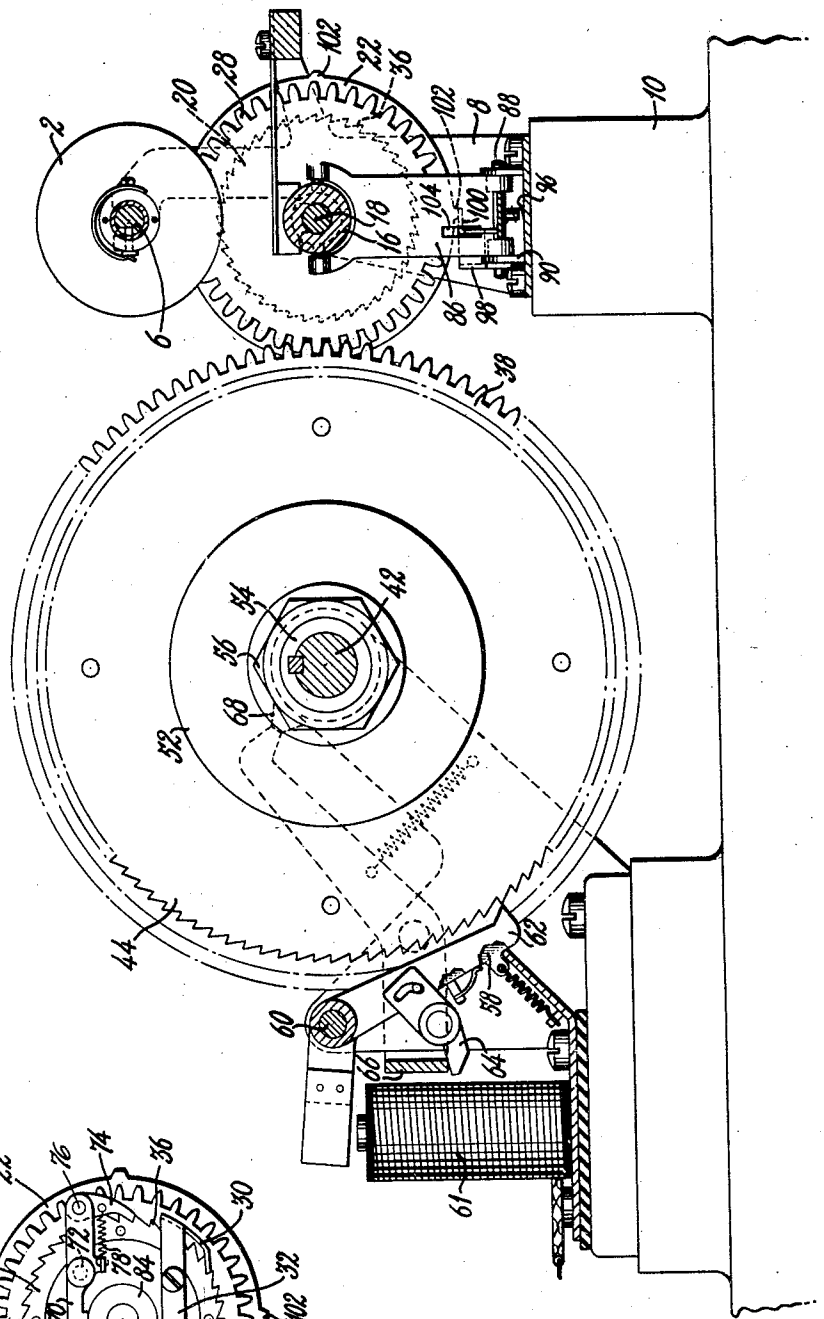


FIG. 2

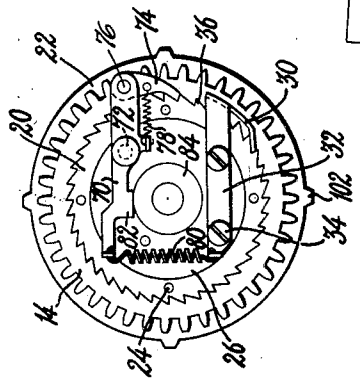


FIG. 6

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Fig. 4

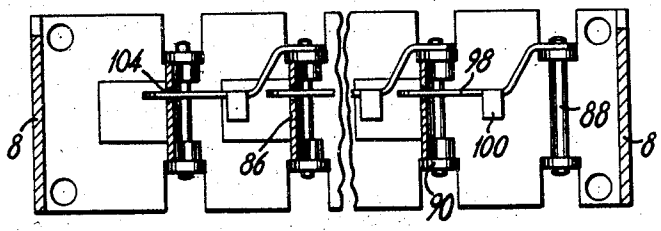


Fig. 5

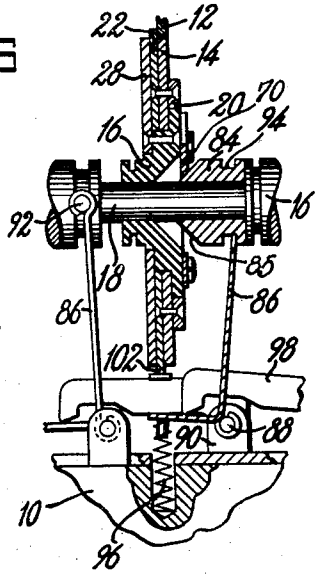
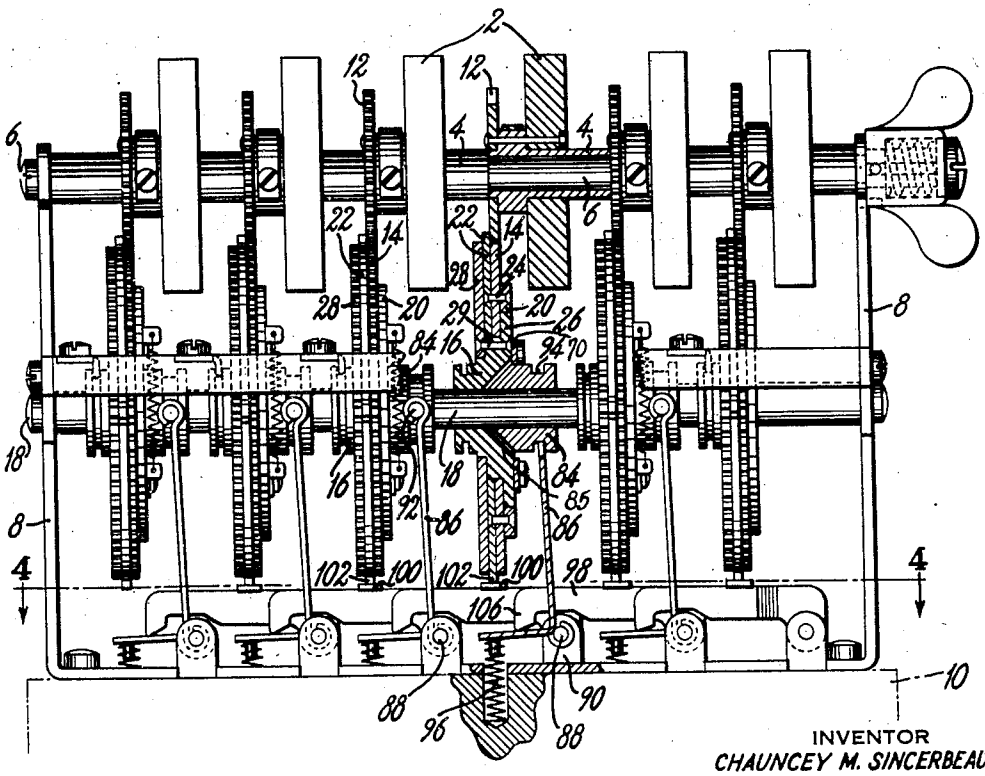


Fig. 3



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TRANSFER MECHANISM FOR ACCUMULATORS

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Application December 30, 1939, Serial No. 311,739

5 Claims. (Cl. 235—133)

This invention relates to adding and calculating machines and more particularly to a transfer mechanism for the accumulators or totalizing registers of such machines.

The principal objects of the invention are to improve the construction and mode of operation of transfer mechanisms for the totalizing registers of machines of the above classes and to produce a novel and improved transfer mechanism for effecting the transfer from a lower to a higher denomination either while the accumulator train of the higher denomination of the register is in the midst of an accumulating operation or while said train is idle except for the transfer operation.

With these objects in view, applicant has produced a transfer mechanism which is adapted to be employed in both adding and calculating machines to effect the above results and which at the same time is simple in construction and reliable in operation and may be produced at a relatively low cost as compared with prior mechanisms of this character.

The invention will be readily understood from the accompanying drawings illustrating the various features of the invention in their preferred forms and the following detailed description of the constructions therein shown.

In the drawings,

Figure 1 is a plan view illustrating an accumulator or register mechanism embodying the invention,

Figure 2 is a view partly in side elevation and partly in section of the register mechanism looking in the direction of the arrow A in Figure 1,

Figure 3 is a view in front elevation of the register mechanism with certain parts shown in section,

Figure 4 is a detail view in horizontal section taken substantially on the line 4—4 of Figure 3,

Figure 5 is a detail view in vertical section illustrating particularly the transfer mechanism of the register with certain of the parts in different positions from the position in which they are shown in Figure 3, and

Figure 6 is a detail view in side elevation illustrating particularly the transfer mechanism.

The accumulator or register mechanism illustrated in this application is particularly constructed and arranged to be embodied in a multiplying machine such as illustrated and described in the co-pending application of Samuel A. Neidich, Serial No. 311,733, filed December 30, 1939.

The register mechanism comprises a series of trains of accumulator or register wheels having substantially the same construction, arrangement and mode of operation of parts. Each of these trains includes an indicating or value wheel 2 fixed to a sleeve 4 rotatably mounted on a normally stationary shaft 6 supported in bearings in side plates 8 secured to the base 10 of the machine. Upon the sleeve 4 is fixed a gear wheel 12 meshing with a gear wheel 14 forming one member of a unit rotatably mounted on a driving hub 16 journaled on a fixed shaft 18 also supported at its ends in the side plates 8. Said unit also comprises a toothed ring 20 and a disk 22 and these three elements are secured together by a series of pins or rivets 24. The unit is held from axial movement in one direction on the driving hub 16 by means of a flange 26 on said hub 16 and is held from axial movement in the opposite direction on said hub by means of a gear wheel 28 secured to the hub by means of rivets 29 as shown in Figs. 3 and 5.

The unit is normally driven from the hub by means of a yielding driving pawl 30 (see Fig. 6) formed on a supporting plate 32 secured to the driving hub by means of screws 34. This pawl is arranged to engage the ratchet teeth 36 formed on the periphery of the ring 20 to drive the unit and the value wheels.

The driving hub 16 is itself driven by means of a gear wheel 38 meshing with the gear wheel 28. The gear wheel 38 is mounted upon a supporting sleeve or carrier 40 fixed upon a shaft 42 mounted in bearings formed on suitable brackets 43 secured to the frame of the machine and the shaft 42 is driven continuously during the multiplication of the multiplicand by the several digits of the multiplier. The gear 38 is arranged to be driven from the sleeve 40 under certain conditions through a suitable frictional driving mechanism.

To each of the gears 38 is secured a peripherally toothed disk 44, this disk and the gear rotating as a unit when driven from the sleeve 40. The bear 38 is engaged on one side by a disk or washer 46 of suitable friction material such as rubber, this disk being interposed between the gear and a radially extending flange 48 formed on the sleeve 40. The toothed disk 44 is engaged upon its outer face by a disk or washer 50 of suitable friction material mounted on the sleeve 40 and interposed between the toothed disk and a dished spring disk 52 secured to the sleeve. This spring disk is provided with a central opening through which a reduced hub portion 54 of the sleeve passes, the disk resting against a

shoulder on the sleeve, and the disk is secured in place on the sleeve by means of a nut 56 threaded on said reduced extension.

Each of the toothed disks 44 is provided with more than eighty-one teeth. In the present construction each of these disks is provided with one hundred teeth. During a multiplying cycle, in which the several digits of the multiplicand are multiplied by one digit of the multiplier, the gear 38 and the disk 44 of each register or accumulator train in operation during said cycle, is rotated until the partial product corresponding to the particular train is entered in the value wheels and the rotation of the disk 44 and the gear 38 is then arrested to retain said partial product in said wheels until the completion of the cycle. The rotation of the disk 44 is arrested, when a particular partial product corresponding to the train in which said disk is located is registered in the value wheels, by means of a pawl 58 pivoted on a shaft 60 extending along the trains of accumulator wheels substantially parallel with the shaft 42, said pawl being arranged to engage the peripheral teeth on the disk 44 to arrest the rotation of the disk. This pawl is engaged with the toothed disk only momentarily by the momentary energization of the magnet 61 and then is disengaged from the disk. Upon the disengagement of this pawl from the disk, the disk is held from rotation during the remainder of the cycle by a holding pawl 62 pivoted on the shaft 60 at the side of the pawl 58 and arranged to be engaged with the disk by the disk engaging movement of the pawl 58. The pawl 58, the magnet 61, the holding pawl 62, the actuating and locking lever 64 for locking the holding pawl in engagement with the disk 44 and for disengaging said pawl from the disk, the bail 66 for actuating said lever, and the cam 68 for operating the bail all have the same construction, arrangement and mode of operation as the corresponding parts of the mechanism illustrated and described in the Neidich application, referred to above.

In the present construction there are two sets of value indicating numbers from naught to nine on the value wheels 2, a half rotation of each value wheel registering an addition of ten in each wheel. The ratio of the gear 14 to the gear 12 is two to one and the ratio of the gear 38 to the gear 28 is two an one half to one. Therefore, during each complete rotation of the gear 38 and the toothed disk 44 of each train of the accumulators, the corresponding value wheel will rotate through five revolutions.

The register is provided with a series of improved transfer mechanisms each of which will operate to transfer carry values or increments from the train of accumulator wheels of lower order to which it is applied to the next higher order whether the wheels of the latter accumulator train are stationary or are in rotation. Each transfer mechanism comprises a lever 70 (see Fig. 6) pivoted at 72 to the driving hub 16 and carrying a pawl 74 pivoted at 76 on the lever and acted upon by a coiled spring 78 which maintains the pawl in engagement with the teeth of the ring 20. The lever 70 is acted upon by a coiled spring 80 which maintains a contact projection 82 on the lever in engagement with an actuator 84 rotatably and slidably mounted on the shaft 18 and having a conical portion 85 for engagement with the lever. At all times except during a transfer operation the actuator 84 is located on the shaft 18 in a position remote from the driving hub 16 as illustrated in Fig. 5, the lever 70 then engaging the inner left hand portion of the conical surface of the actuator as shown in said figure. During a transfer operation, the actuator 84 is moved along the shaft 18 from the position shown in Fig. 5 to the position shown in Fig. 3. During this movement of the actuator, through the engagement of the lever 70 with the conical portion of the actuator, the lever is swung in a clockwise direction (Fig. 6) thereby turning the toothed ring 20 one tooth forwardly with relation to the driving hub and advancing the gear 14 with relation to the driving gear 28 to enter an additional one in the value wheel 2, the spring pawl 30 thereafter engaging the ring 20 at a point one tooth to the rear of its former position with relation to the direction of rotation of ring 20. This action will occur whether the driving hub is rotating or whether it is stationary.

The mechanism for moving the actuator 84 from the position shown in Fig. 5 to the position shown in Fig. 3 comprises a bell crank lever 86 pivoted on a stud 88 having its ends supported in projections 90 on a bracket secured to the base of the machine, the upwardly extending arm of which lever is forked to embrace the actuator 84 and carries pins 92 secured in the respective arms of the fork which engage in a groove 94 in the actuator. The laterally extending arm of the lever 86 is acted upon by a coiled spring 96 which normally maintains the lever in the position shown in Fig. 5 with the actuator in its right hand position on the shaft 18. The lever 86 is swung in a counterclockwise direction Figs. 3 and 5 to shift the actuator from the position shown in Fig. 5 to that shown in Fig. 3 by means of a lever 98 which is pivoted upon the end portion of one of the studs 88 and is provided with a laterally extending contact projection 100 arranged to be engaged by a cam projection 102 formed on the corresponding disk 22. Each of the levers 98 extends laterally of the machine from its pivotal point beneath the disk 22 of the train of accumulator wheels corresponding to one order of the register mechanism and through an opening or slot 104 (see Fig. 4) in the upwardly extending arm of the bell crank lever 86 of the transfer mechanism of the accumulator train of the next higher order and is formed with a downwardly projecting end portion 106 arranged to engage the laterally extending arm of said bell crank.

When a value wheel 2 of one of the trains of accumulators is moving from the nine position to the naught position, the cam 102 on the disk 22 of said train engages the projection 100 on the lever 98 and depresses said lever. The depression of said lever moves the actuator 84 of the train of the next higher order to the left (Figs. 3 and 5) from the position shown in Fig. 5 to that shown in Fig. 3 thereby actuating the lever 70 and the pawl 74 to advance the gear 14 with relation to the gear 28. By this advance movement of the gear 14 the value wheel of the train of said higher order is advanced a distance sufficient to enter an additional one in said value wheel. Since the gear 14 and the disk 22 for each train of the accumulators make a quarter of a revolution for the rotation of each value wheel an angular distance corresponding to ten number spaces, there are four of the cam projections 102 formed on each disk 22 to actuate the transfer mechanism once for each

quarter of a revolution of the disk **22** and the gear **14**.

When the cam projection **102** on a disk **22** disengages the contact projection **100** on the corresponding lever **98**, said lever and the bell crank **86** are restored to initial position by the action of the spring **96**, the actuator **84** is moved back to the position shown in Fig. 5 and the lever **70** is swung back on its pivot in a counter-clockwise direction (Fig. 6) with relation to the driving hub **16** and the pawl **74** is retracted with relation to the toothed ring **20** into position to engage a tooth on said ring one tooth back of its former position.

In the construction shown, the train of accumulator wheels at the extreme right in Fig. 3 is the units train, the next train to the left the tens train and so on. These trains correspond to the train adjacent the bottom of the sheet, the next higher train and so on, in Fig. 1. There is, of course, no actuator **86**, lever **70** or pawl **74** for the units train and no lever **98** for the hundred thousands train which is incomplete, this train having no gear **38** or toothed wheel **44**. The toothed ring **20** of the units train might be fixed to the driving hub since there is no relative movement between these parts as is required in the other trains for the transfer operation. In order to employ uniform parts in the several trains, however, ring **20** of the units train is driven from the driving hub by means of a spring pawl **30** secured to said hub.

It is to be understood that, except as defined in the claims, the invention is not limited to the particular construction and arrangement of parts of the illustrated embodiment of the invention, but that the invention may be embodied in other forms within the scope of the claims.

Having explained the nature and object of the invention and having specifically described a construction embodying the invention in its preferred form, what is claimed is:

1. An accumulator mechanism comprising two adjacent accumulator trains of different orders each having a number wheel and driving mechanism for the number wheel for entering numbers therein, the train of higher order having coaxially rotating driving and driven members of which the driven member is drivable faster than the driving member and the train of lower order having a wheel rotating coaxially with said driving and driven members, an accelerating device movably mounted on one of said members of the train of higher order to rotate therewith and held stationary with relation to said member during the normal accumulating operation, a cam carried by said wheel of the train of lower order and connecting mechanism between the cam and said accelerating device for moving the accelerating device of the train of higher order with relation to the member on which it is mounted to impart additional movement to the number wheel of said train to transfer an increment thereto.

2. A totalizer mechanism comprising two accumulator trains of different orders each having a number wheel and driving mechanism for the number wheel for normally entering numbers therein, the train of higher order having coaxially rotating driving and driven members of which the driven member is rotatable faster than the driving member and the train of lower order having a wheel rotating coaxially with said driving and driven members, an accelerating device movably mounted on one of said members of the train of higher order to rotate therewith and normally held stationary with relation to the same during the normal accumulating operation, an actuating device arranged to rotate about the axis of said wheel of the train of lower order and drivably connected for rotation therewith and connections operated by said actuating device for moving said accelerating device of the train of higher order with relation to the member on which it is mounted to impart additional movement to the number wheel of the train of higher order to transfer an increment thereto.

3. An accumulator mechanism comprising two adjacent accumulator trains of different orders each having a number wheel, driving mechanism for the number wheel for entering numbers therein, the train of higher order having coaxially rotating driving and driven members and driving connections therebetween for driving the driven member from the driving member during the normal accumulating operations, constructed to allow the driven member to be rotated faster than the driving member, a transfer mechanism comprising a lever pivoted on one of said members, a pawl carried by said lever and arranged to engage teeth on the other of said members, means for holding the lever from pivotal movement with relation to the member on which it is mounted during a normal accumulating operation, the train of lower order having a rotary member rotating coaxially with said driving and driven members, means rotating coaxially with said driving, driven and rotary members and driven rotatively by the rotary member of the train of lower order and connections operated by said means for swinging the lever with relation to the driving member of the train of higher order to advance the driven member with relation to the driving member of the latter train to enter an increment in the corresponding number wheel.

4. A totalizer mechanism comprising two adjacent totalizer trains, each having a number wheel and a single driving train for driving said number wheel, the train of higher order having coaxially rotating driving and driven members, a pawl fixed to the driving member for engaging ratchet teeth on the driven member for driving the corresponding number wheel during a normal accumulating operation, a transfer mechanism comprising a lever pivoted on said driving member, a pawl carried by the lever and arranged to engage the ratchet teeth, means for holding the lever from angular movement with relation to the driving member during normal totalizing operations, the train of lower order having a rotary member rotating coaxially with said driving and driven members, means rotating coaxially with said driving and driven members and driven rotatively by said rotary member of the train of lower order and connecting mechanism between said means and said lever for swinging the lever with relation to the driving member of the train of higher order to advance the driven member with relation to the driving member of the latter train to enter an increment in the corresponding number wheel.

5. An accumulator mechanism comprising two adjacent accumulator trains of different orders each having a number wheel and driving mechanism for the number wheel for entering numbers therein, the trains of said orders having coaxially rotating driving members and driven members driven respectively from said driving

members and rotating coaxially therewith, the driven members being drivable ahead of the respective driving members, an accelerating device movably mounted on one of said members of the train of higher order to rotate therewith, means for holding said device substantially stationary with relation to the member on which it is mounted during a normal accumulating operation, means rotating coaxially with said driving and driven members and driven by the driven member of the train of lower order and connections between said means and said accelerating device for moving the accelerating device with relation to the member on which it is mounted to advance the driven member of the train of higher order with relation to the driving member of said train and thereby enter an increment in said train.

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