March 1, 1966 A. E. PURTILO 3,237,466

SHAFT INDEXING DEVICE

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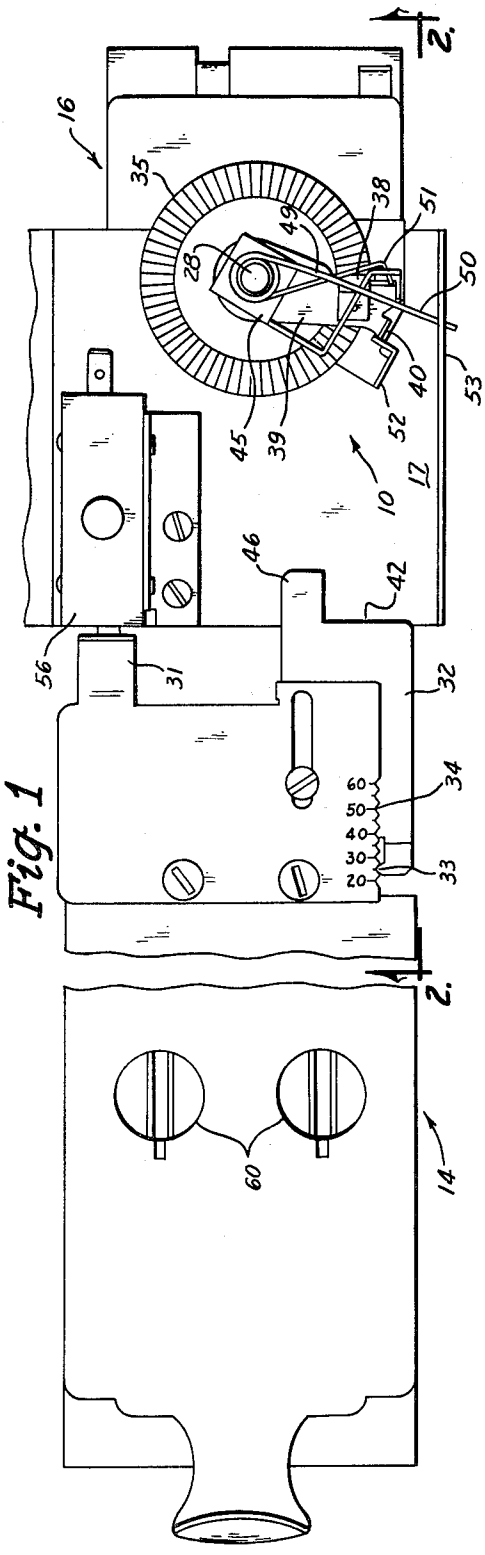


Fig. 1

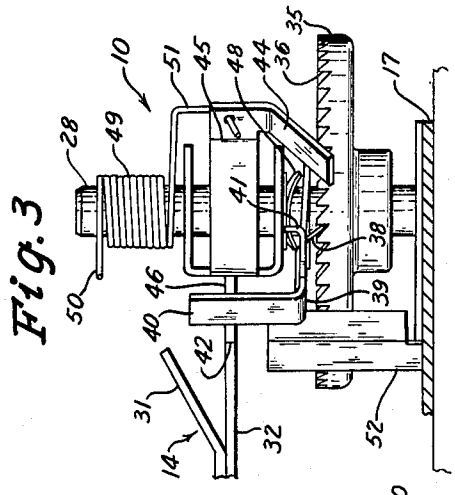


Fig. 3

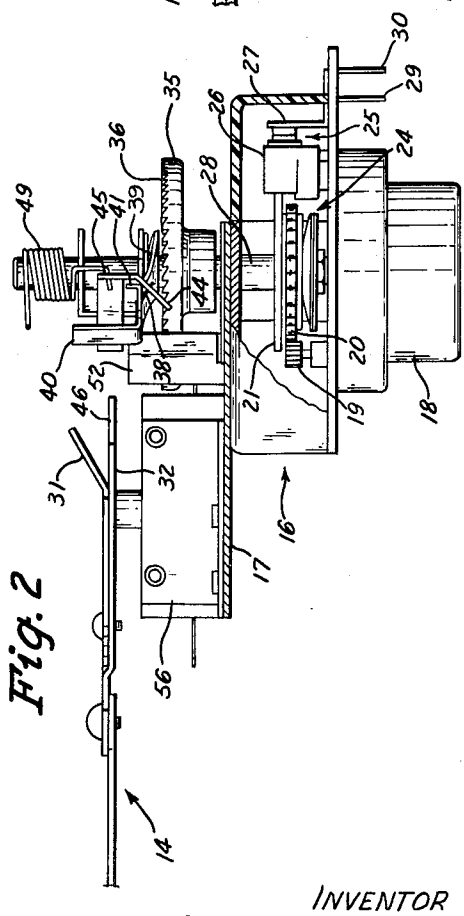


Fig. 2

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SHAFT INDEXING DEVICE

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This invention relates to indexing devices and more specifically to time accumulator means actuatable upon token insertion for initiating operation of a variable duration timing mechanism and presetting operational time thereof to a duration determined by the total value of the tokens inserted.

The use of time accumulators with variable duration timing mechanisms is particularly useful in commercial coin operated machines, such as automatic drying machines, in which a variable duration cycle or operation is desirable. In such an application the machine is preset to operate a predetermined period for each coin deposit. A time accumulator facilitates the initial deposit of a plurality of coins to effect a continuous operation the duration of which comprises the summation of the individual predetermined periods.

Prior art includes a number of time accumulators responsive to coin or token insertion for presetting the operational time of a variable duration timer to control a machine through a desired cycle of operations. The variable duration timers used in the above prior art comprise essentially the following elements: timing means for controlling duration of the cycle, switch means for interrupting operation of the machine at completion of the desired cycle, and cam means including actuating means for operating said switch means. One common form of the accumulator means used with the variable duration timers includes a ratchet for presetting the cam means to obtain a desired duration of operation. Prior art ratchet systems have tended to be complicated and have included numerous parts thus making them costly to manufacture. In addition, the nature of their construction has made them subject to wear and failure. Furthermore, they have been considered objectionable because of excessive operational noise.

It is therefore an object of this invention to provide an improved shaft indexing device useful in a variable duration timing mechanism.

It is a further object of this invention to provide an improved accumulator device for presetting the operational time of a variable duration timing mechanism.

It is a further object of this invention to provide, for a variable duration timing mechanism, a new accumulator device including a ratchet means mounted on the output shaft of the timing mechanism actuatable for rotating the timing mechanism and presetting the operational time thereof.

It is a further object of this invention to provide, for a variable duration timing mechanism, a novel manually actuatable accumulator device including a selectively engageable ratchet means mounted on the output shaft of the timing device for rotating the shaft one or more presettable time increments to establish the operational time of the timing mechanism.

It is still a further object of this invention to provide for a variable duration timing mechanism, an accumulator device including a selectively engageable ratchet means mounted on the output shaft of the timing mechanism and actuatable by a coin receiving slide member for rotating the shaft one or more presettable time increments in the direction opposite to the timing rotation to establish the operational time of the timing mechanism.

The present invention achieves the above objectives

with an accumulator mechanism actuatable by a manually operable coin slide and includes a ratchet device for rotating a conventional timer mechanism at least one presettable time increment. The timer mechanism includes a slip clutch between the drive means and the cam to permit rotation of the output shaft and cam selectively in either direction. The ratchet device includes a ratchet wheel and a pawl selectively engageable therewith. The slide member is movable for effecting engagement of the wheel and pawl and upon continued movement for effecting rotation of the timer shaft and cam through the ratchet means, in a direction opposite to the timing rotation. The ratchet device thus "backs-up" the cam to establish the starting point and the operational time of the timing mechanism. The slide member may be reactuated to rotate the cam member additional increments.

Operation of the invention and further objects thereof will become evident as the description proceeds and from an examination of the accompanying drawings which illustrate a preferred embodiment of the invention and in which similar numerals refer to similar parts throughout the several views.

In the drawings:

FIGURE 1 is a top plan view showing the timing mechanism, accumulator device, and coin slide actuator of the present invention;

FIGURE 2 is a side elevational view of the instant invention generally taken along lines 2—2 of FIGURE 1 with the timer mechanism being shown partially in section; and

FIGURE 3 is an enlarged fragmentary view of the instant invention similar to FIGURE 2 but with the ratchet means engaged.

Referring now to the accompanying drawings in detail, there is shown an accumulator device generally indicated by numeral 10 which is actuatable by a sliding member, such as manually operable coin slide 14, for presetting the start position and thus operation time of timing mechanism 16 which is mounted to bracket 17.

Timing mechanism 16 is a commercially available device and includes essentially timing motor 18 having a drive pinion 19, gear 20, cam 21, clutch 24, and switch 25. Cam 21 is provided with an "off" position at which a recessed portion permits pivoted movement of switch actuator 26 about a vertical axis as seen in FIGURE 2 for effecting opening of the electrical contacts 27 of switch 25. Cam 21 is fixed to shaft 28 and is driven toward the "off" position at a slow timing rate by timing motor 18 through pinion 19 and gear 20, and through clutch 24. Clutch 24 permits movement of cam 21 upon externally caused rotation of timer output shaft 28 without effecting movement of gear 20. Switch 25 includes terminals 29 and 30 for connecting said switch in the control circuit at a position which would permit termination of the operation upon operation of switch 25 for opening contacts 27.

Coin slide 14 is a commercially available device for receiving tokens or coins and permitting actuation of a machine upon receipt of proper coins or tokens. Coin slide 14 is mounted on the controlled machine for sliding movement relative thereto in response to manual actuation subsequent to the deposit of the proper token or tokens. Slide 14 includes a portion formed as an actuation ramp 31 and provides means for adjustably mounting ratchet actuating bracket 32. Bracket 32 includes a locating finger 33 engageable with one of the plurality of notches 34 for positioning ratchet actuating bracket 32 relative to slide 14. The bracket 32 is thus provided with means for adjusting the effective length of stroke which is useful in cooperation with the accumulator device as will be more fully described hereinafter.

The accumulator device 10 of the present invention in-

cludes a selectively engageable ratchet mechanism for rotating shaft 28 and thus cam 21 of timer mechanism 16. This ratchet mechanism includes a ratchet wheel 35 which is fixed to shaft 28 for rotation therewith. Ratchet wheel 35 is formed with a plurality of ratchet teeth 36 which are engageable by a pawl 38. Pawl 38 is formed as a depending finger of trigger member 39.

Trigger member 39 is rotatably mounted on shaft 28 for rotation relative thereto and is provided with an upstanding arm 40 engageable by leading edge 42 of actuation bracket 32 for advancing trigger 39 and thus pawl 38 and ratchet 35 upon movement of coin slide 14. Trigger 39 is also formed with a relatively small upstanding finger 41 which is engageable by ramp 44 of return lever 45. Return level 45 is rotatably mounted on shaft 28 for rotation relative thereto. When the unit is positioned vertically as shown in FIGURES 2 and 3, trigger member 39 and pawl 38 will be moved into engaged position by the force of gravity but in the preferred embodiment trigger member 39 is biased toward the engaged position by spring washer 48 positioned between trigger 39 and return lever 45. Return lever 45 controls ratchet engagement and is biased in a clockwise direction about shaft 28 as viewed in FIGURE 1 by spring 49 for engagement of ramp 44 with finger 41 of trigger 39. Spring 49 includes a coil portion encircling shaft 28, a first end 50 retained by an upturned flange 53 of bracket 17, and a second end 51 engaging the end of return lever 45.

The biasing action of spring 49 on lever 45 is sufficient to overcome the biasing of spring washer 48 and cause the disengagement of pawl 38 from teeth 36. To oppose the biasing action of spring 49 during the actuation operation, an extending finger 46 affixed to actuation bracket 32 or formed as a part thereof. Thus upon movement of coin slide 14, extending finger 46 engages and effects rotation of return lever 45 to permit engagement of pawl 38 with teeth 36.

Thus it may be sen that ratchet wheel 35 is rotatable in a counterclockwise direction as viewed in FIGURE 1 by manual actuation of coin slide 14. As previously indicated, rotation of ratchet wheel 35 will effect rotation of cam 21 a like amount in a like direction. Thus in response to each actuation of slide 14 cam 21 is rotated a predetermined increment in a counterclockwise direction to move the recess of cam 21 relative to switch actuator 26. Subsequent to this rotation timing motor 18 drives gear 20 and cam 21 in a clockwise direction, as viewed from the end of shaft 28 in FIGURE 1, to return the output shaft and cam 21 to the "off" position for effecting opening of electrical contacts 27 and interruption of selected circuits to terminate the operation.

The coin slide 14 requires a predetermined, fixed stroke for actuation; however, the adjustable mounting of actuation bracket 32 provides means for varying and presetting the effective stroke, or depth of penetration, of finger 46 and leading edge 42. It is this effective stroke or depth of penetration that determines the angle of movement of ratchet wheel 35 and thus cam 21. For example, in the disclosed embodiment in which the timer speed is six hours per revolution, the bracket 32 may be adjusted to penetrate to a position for rotating the cam from an angle of approximately 20 degrees to an angle of 60 degrees to give a presettable control time of 20 minutes to 60 minutes, respectively, for each stroke.

An abutment 52 is fixed to timer mounting bracket 17 and serves as a stop for positioning trigger 93 and return lever 45 for engagement by actuation bracket 32 upon advancement of coin slide 14.

Upon the return stroke as upon withdrawal of coin slide 14, return lever 45, being biased in a clockwise direction around shaft 28, engages upstanding finger 41 to lift trigger member 39 and disengage pawl 38 from ratchet wheel 35. Continued rotation of biased return lever 45 returns trigger 39 to its normal disengaged position adjacent abutment 52. In this position the device is operable

upon insertion of additional coins or tokens to repeat the time accumulation operation. The maximum accumulation is limited to approximately one complete revolution of the cam 21. The maximum control time that may be accumulated is, therefore, the time for one complete revolution of the timer cam which in the present embodiment is six hours.

A switch 56 may be mounted on bracket 17 in a position so as to be operated by actuating ramp 31 upon movement of slide member 14. Switch 56 may be operative for deenergizing the controlled machine, the timing motor or other selected components during the time accumulating operation. This switch may, for example, be used to maintain the timing motor deenergized until the slide is returned.

The present invention may best be understood by considering operation of the device during an actual time accumulating operation. Upon insertion of proper coins or tokens in slot 60, slide 14 may be manually advanced for operating the accumulator device to preset the timing duration of timer 16. The advancement of the slide 14 having the actuating ramp 31, actuation bracket 32 and extending finger 46 effects a series of sequential operations. First, ramp 31 actuates switch 56 to interrupt selected circuits. Next, extending finger 46 engages return lever 45. Continued movement of slide 14 causes rotation of return member 45 for overcoming spring 49 to permit engagement of pawl 38 with ratchet wheel 35. Upon still further movement, leading edge 42 of actuation bracket 32 becomes engaged with the upstanding arm 40 of trigger 39 and effects rotation of trigger 39 in a counterclockwise direction about shaft 28 to advance ratchet wheel 35 a presettable increment.

Upon withdrawal of slide member 14, return lever 45 is permitted to rotate in its biased clockwise direction for engaging trigger 39 at upstanding finger 41 lifting trigger 39 to disengage pawl 38 from ratchet wheel 35. Continued rotation of return lever 45 returns trigger 39 and return lever 45 to their normal disengaged positions adjacent abutment 50. Slide member 14 and the accumulator device 10 are now in position for repeated cycling upon insertion of additional proper coins in slots 60.

It may thus be seen from the foregoing description that the present invention provides an improved accumulator device having fewer component parts operating in a new manner for presetting a timing device. The new arrangement avoids the disadvantages of prior art devices for the following reasons: the reduced number of parts assures economical fabrication; complete disengagement of ratchet pawl 38 reduces or eliminates wear and noise problems; and the arrangement of parts permits repeated actuation for accumulating the desired duration of operation. It may be seen that this new device provides a simplified and direct means for establishing the operation time of a variable duration timing mechanism.

In the drawings and specification, there has been set forth a preferred embodiment of the invention and, although specific terms are employed, these are used in a generic and descriptive sense only, and not for purposes of limitation. Changes in form and proportion of parts, as well as the substitution of equivalents, are contemplated as circumstances may suggest or render expedient, without departing from the spirit or scope of this invention as further defined in the following claims.

I claim:

1. In a device having a shaft rotatable in a first direction toward an "off" position and rotatably actuatable in a second direction from said "off" position, the combination comprising: a first ratchet member drivingly associated with said shaft; and second ratchet member engageable with said first ratchet member; abutment means; ratchet engagement control means engageable with said second ratchet member for actuating said second ratchet member in said first direction and for main-

taining said second ratchet member disengaged; means operable from a first position toward a second position for disengaging said control means from said second ratchet member to effect engagement of said ratchet members and then moving said engaged ratchet members to rotate said shaft a predetermined increment in said second direction, said last named means being further operable from said second position toward said first position for releasing said control means to engage said second ratchet member for effecting disengagement of said ratchet members and return of said second ratchet member toward said abutment means.

2. In a device having a shaft rotatable in a first direction toward an "off" position and rotatably actuable in a second direction from said "off" position, the combination comprising: a ratchet wheel drivingly associated with said shaft; a ratchet pawl engageable with said ratchet wheel; abutment means; ratchet engagement control means engageable with said ratchet pawl for actuating said ratchet pawl in said first direction and for maintaining said ratchet pawl disengaged from said ratchet wheel; actuator means operable from a first position toward a second position for disengaging said control means from said ratchet pawl to effect engagement of said ratchet pawl with said ratchet wheel and then moving said ratchet pawl to rotate said ratchet wheel and said shaft a predetermined increment in said second direction, said actuator means being further operable from said second position toward said first position for releasing said control means to engage said ratchet pawl for effecting disengagement of said ratchet members and return of said ratchet pawl toward said abutment means.

3. In a timing device operable for initiating and controlling a variable duration operation, the combination comprising: timing means having a rotatable output shaft; ratchet means including a first ratchet member drivingly associated with said output shaft and a second ratchet member engageable with said first ratchet member; ratchet operating means actuatable from a first position toward a second position; abutment means; and ratchet engagement control means disengageable from said second ratchet member responsive to actuation of said ratchet operating means from said first position toward said second position for effecting engagement of said ratchet members; said ratchet members while engaged being also responsive to actuation of said ratchet operating means from said first position toward said second position to effect rotation of said output shaft a predetermined increment for initiating operation of said timer and for presetting operational time thereof, said ratchet engagement control means being engageable with said second ratchet member responsive to actuation of said ratchet operating means from said second position toward said first position for disengaging said ratchet members and returning said second ratchet member toward said abutment means.

4. In a timing device operable for initiating and controlling a variable duration operation, the combination comprising: a timer having an output shaft rotatable in a first direction during timing operations and rotatable in a second direction for presetting operational time thereof; ratchet means including a first ratchet member drivingly associated with said output shaft and a second ratchet member engageable with said first ratchet member; actuator means operable between a first position and a second position; abutment means; and ratchet engagement control means disengageable from said second ratchet member responsive to operation of said actuator means from said first position toward said second position for effecting engagement of said ratchet members; said actuator means being further operable toward said second position for advancing said ratchet members while engaged to effect rotation of said output shaft a predetermined increment in said second direction, said ratchet engagement control means being engageable with said second ratchet member for effecting disengagement of said ratchet members responsive to operation of said actuator means toward said first position and for returning said second ratchet member toward said abutment.

5. In a timing device operable for initiating and controlling a variable duration operation and having accumulator means operable for presetting the duration of control thereof, the combination comprising: a timer having an output shaft rotatable in a first direction during timing operations and rotatable from an "off" position in a second direction responsive to operation of said accumulator means; a first ratchet member having a driving relationship with said output shaft; a second ratchet member movable to a first posture for engagement with said first ratchet member and rotatable for advancing said first ratchet member and said output shaft in said second direction; abutment means; ratchet engagement control means engageable with said second ratchet member for actuating said second ratchet member in said first direction and for maintaining said second ratchet member in a second posture against said abutment means and disengaged from said first ratchet member to permit unrestricted rotation of said output shaft in said first direction; actuator means operable from a first position toward a second position for disengaging said control means from said second ratchet member to effect movement of said second ratchet member to said first posture and then rotating said second ratchet member while in said first posture to effect rotation of said ouput shaft through said first ratchet member a predetermined increment in said second direction for conditioning said timer for subsequent operation and for presetting operational time thereof, said actuator means being further operable from said second position toward said first position for releasing said control means to engage said second ratchet member for effecting disengagement of said ratchet members and return of said second ratchet member to said second posture, said actuator means being reactuatable from said first position for accumulating additional predetermined increments; and means associated with said actuator means for initiating operation of said timer.

6. In a timing device operable for initiating and controlling a variable duration operation and having manually actuatable accumulator means, the combination comprising: a timer having an output shaft rotatable in a first direction during timing operations and rotatable from an "off" position in a second direction for presetting operational time thereof; a first ratchet member mounted on said output shaft for rotation therewith; a second ratchet member movable to a first posture for engagement with said first ratchet member and rotatable for advancing said first ratchet member and said output shaft in said second direction; abutment means; ratchet engagement control means engageable with said second ratchet member for actuating said second ratchet member in said first direction and for maintaining said second ratchet member in a second posture against said abutment means and disengaged from said first ratchet member to permit unrestricted rotation of said first ratchet member and said output shaft in said first direction; and actuator means manually movable from a first position toward a second position for disengaging said control means from said second ratchet member to effect movement of said second ratchet means to said first posture, said actuator means being further movable toward said second position to advance said second ratchet means for rotating said ouput shaft a predetermined increment in said second direction, said actuator means being movable from said second to said first position to release said control means to engage said second ratchet member for effecting disengagement of said ratchet members and return of said second ratchet member to said second posture, said actuator means being reactuatable for accumulating increments of rotation of said output shaft in said second direction.

7. In a timing device operable for initiating and controlling a variable duration operation and having man-

ually actuatable accumulator means for presetting the duration of control thereof, the combination comprising: a timer having an output shaft rotatable in a first direction during timing operations and rotatable from an "off" position in a second direction responsive to operation of said accumulator means; a ratchet wheel drivingly associated with said output shaft; a ratchet pawl engageable with said ratchet wheel in a first posture and movable for rotating said ratchet wheel; abutment means; ratchet engagement control means engageable with said ratchet pawl for actuating said ratchet pawl to a second posture against said abutment and disengaged from said ratchet wheel to permit unrestricted rotation of said output shaft in said first direction; actuator means manually operable from a first position toward a second position including first means for disengaging said control means from said ratchet pawl to effect engagement of said ratchet pawl with said ratchet wheel, said actuator means further including second means engageable with said ratchet pawl and movable with said actuator means from said first position toward said second position for advancing said ratchet pawl while in said first engaged posture to effect rotation of said ouput shaft a predetermined increment in said second direction and thereby preset operational time of said timer, said actuator means being further operable from said second position toward said first position for releasing said control means to engage said ratchet pawl for effecting disengagement of said ratchet pawl from said ratchet wheel and return said ratchet pawl toward said second posture.

8. In a timing device operable for initiating and controlling a variable duration operation and having accumulator means actuatable for presetting the duration of control thereof, the combination comprising: a timer having an output shaft rotatable in a first direction during timing operations and rotatable from an "off" position in a second direction for presetting operational time thereof; a ratchet wheel drivingly associated with said output shaft; a ratchet pawl positioned for engagement with said ratchet wheel; first biasing means urging said ratchet pawl toward a first posture engaged with said ratchet wheel; abutment means; ratchet engagement control means engageable with said ratchet pawl and including second biasing means for overcoming said first biasing means and actuating said ratchet pawl to a second posture against said abutment means and disengaged from said ratchet wheel to permit unrestricted rotation of said output shaft

in said first direction; and actuator means operable from a first position toward a second position for sequentially disengaging said control means from said ratchet pawl to effect engagement of said ratchet pawl with said ratchet wheel and then advancing said ratchet pawl while engaged with said ratchet wheel to effect rotation of said output shaft a predetermined increment in said second direction whereby operation of said timer and operational time thereof is preset, said actuator means being further operable from said second position toward said first position for releasing said control means to engage said ratchet pawl for effecting disengagement of said ratchet pawl from said ratchet wheel and return of said ratchet pawl toward said second posture.

9. In a device having a shaft rotatable in a first direction toward an "off" position and rotatably actuatable in a second direction from said "off" position, the combination comprising: a first ratchet member drivingly associated with said shaft; a second ratchet member engageable with said first ratchet member; abutment means; ratchet engagement control means engageable with said second ratchet member for actuating said second ratchet member in said first direction and for maintaining said second ratchet member disengaged; and means operable from a first position toward a second position for disengaging said control means from said second ratchet member to effect engagement of said ratchet members and then moving said engaged ratchet members to rotate said shaft a predetermined increment in said second direction, said last named means being further operable from said second position toward said first position for releasing said ratchet engagement control means to engage said second ratchet member for separating said ratchet members responsive to initiation of movement of said operable means from said second position toward said first position and then returning said second ratchet member toward said abutment means.

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