Nov. 17, 1959 L. J. LAVIANA 2,913,048

TIMER

Filed Feb. 23, 1956

FIG. 1

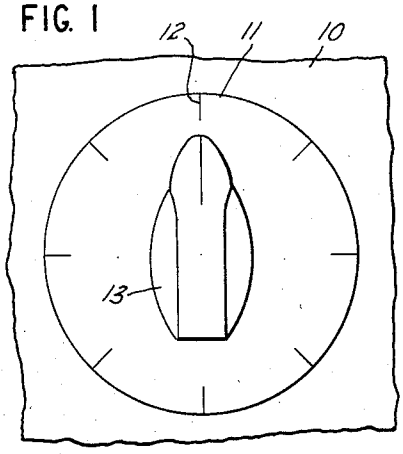


FIG. 2

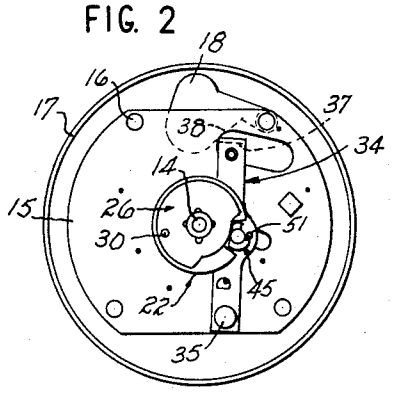


FIG. 3

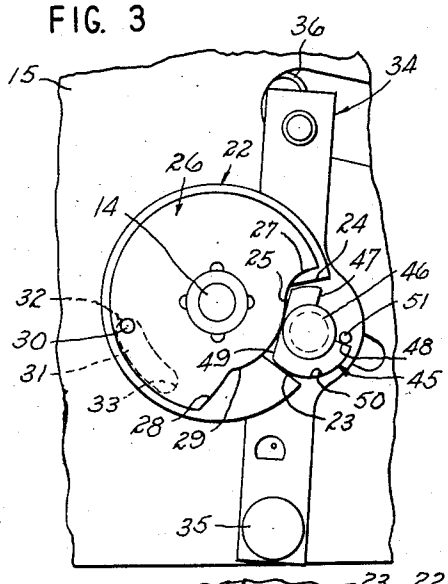


FIG. 4

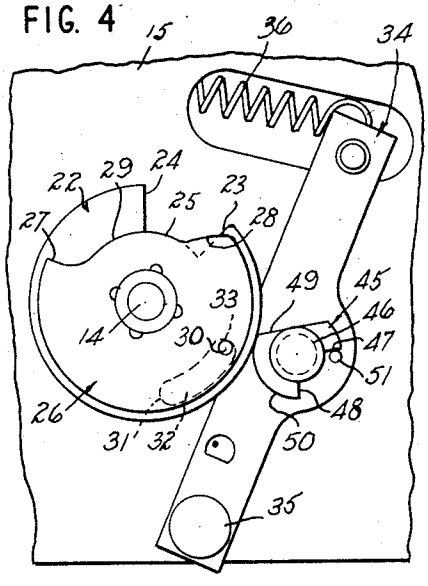
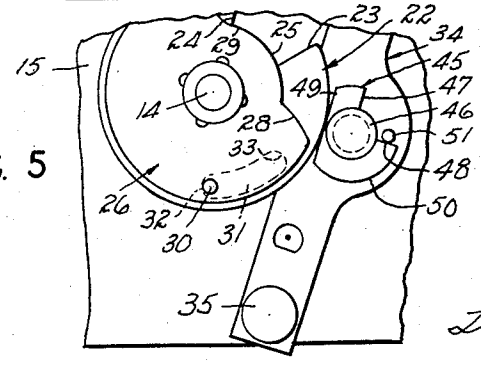


FIG. 5



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TIMER

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9 Claims. (Cl. 161—1)

This invention relates to timers of the type which are adapted to actuate an associated mechanism such as an electric switch upon the expiry of a selected time interval.

It is an aim of this invention to provide a timer having novel and improved means for controlling an associated mechanism such as an electric switch whereby there will be automatically provided a predetermined time delay preceding a preselected timing cycle.

It is further an object of this invention to provide a timer having control means of the type described which will accomplish the desired purpose with a minimum of parts yet which will be accurate and trouble-free over long periods of service.

Other objects will be in part obvious, and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claims.

In the drawings:

Fig. 1 is a front elevational view of a typical timer embodying this invention mounted in a panel or housing;

Fig. 2 is a rear elevational view of the switch actuator control elements of the timer of Fig. 1;

Fig. 3 is an enlarged fragmentary view of Fig. 1 with the control elements in what will be referred to as the initial position;

Fig. 4 is a view similar to Fig. 3 with the control elements in what will be referred to as the cocked position; and

Fig. 5 is a view similar to Fig. 3 in the control elements in what will be referred to as the intermediate position.

With reference to the drawings, a timer constructed in accordance with this invention is shown in Fig. 1 suitably mounted in a panel or housing **10** and is comprised of a face plate **11** provided with index markings **12** in suitable terms of time such as hours. The timer is further provided with an operating control member or knob **13** by means of which the timer may be set to any preselected timing cycle within the range of the timer.

The knob **13** is suitably connected to a main shaft and winding arbor **14**, illustrated in Figs. 2 through 5, which is in turn connected to a conventional timer driving mechanism (not shown) which drives the arbor. The arbor **14** is journaled in a back plate **15** which is suitably connected such as by screws **16** to an outer casing **17** which encloses the timer drive mechanism. In the specific embodiment, the casing **17** also serves as a bell and in combination with a clapper **18** pivotally mounted on the back plate **15** provides an audible indication of the passing of certain intervals as will be hereinafter explained in detail.

A control member or disc **22** is rotatably mounted on the arbor **14** for rotation relative thereto and is provided with a notch having radially extending sides **23** and **24** and an arcuate base **25** disposed concentrically with the axis of the arbor **14**. Also mounted on the

arbor **14** for rotation therewith is a cam member **26** provided with a notch having a generally radial side **27** and an arcuate or sloping side **28** and with a base **29** arcuately formed preferably at the same radius from the axis of the arbor **14** as is the base **25** of the disc **22**. The cam **26** is rotatively connected to the disc **22** by means of a pin **30** on the cam which extends into an elongated arcuate slot **31** in the disc.

An elongated actuator member **34** in the form of a lever or bar is pivotally mounted at one end as at **35** to the back plate **15** and extends therefrom alongside the disc **22** and cam member **26**. A spring **36** connected at one end (not shown) to the pack plate **15** is connected at its other end to the other end of the lever **34** to bias the lever in a counterclockwise direction, as viewed in Figs. 2 through 5, toward the disc **22** and cam **26**. The lever **34** is provided with means such as an overturned end or ear **37** which is engageable with an edge **38** of the clapper to move the clapper in a clockwise direction as viewed in Fig. 2 into engagement with the casing **17** as will be more fully explained hereinafter.

It is intended that there will be mounted on the rear of the back plate **15** or otherwise associated with the timer a suitable control mechanism having a control member actuated by the lever **34**. An arrangement having such a control member is clearly shown in my copending application Ser. No. 488,293, now Patent No. 2,789,168, filed February 15, 1955, entitled "Switching Assembly for Timers." Inasmuch as the control mechanism forms no part of this invention further detail therefor need not be provided.

In accordance with the invention, a follower member or roller **45** is pivotally mounted on a post **46** fixed to the lever **34** intermediate its ends. The follower **45** is in the specific embodiment circular in plan and is provided with a notch having radial sides **47** and **48**, a flat portion **49** disposed chordwise thereof and an arcuate surface extending between the flat surface **49** and notch side **47**. A pin **51** mounted on the lever **34** and engageable with the radial sides **47** and **48** of the follower limits the rotational movement of the follower to the limits shown in Figs. 3 and 4.

It is believed that the novelty and utility of the present invention will be readily apparent from the following description of operation taken in connection with the above. Prior to the setting of the timer for a preselected timing cycle, the cam **26**, disc **22** and lever **34** will be in an initial position as shown in Figs. 2 and 3 with the cam **26** in rotated position relative to the disc **22** such that the pin **30** of the cam is engaged with the end **32** of the slot **31** of the disc. To set the timer, the operating knob is manually turned in a clockwise direction as viewed in Fig. 1, resulting in a counterclockwise rotation of the arbor **14** as viewed in Figs. 2 through 5.

With reference to Fig. 3, as the arbor **14** is moved as described, the cam **26** will also be moved in a counterclockwise direction. This movement of the cam, however, will not be transmitted to the disc **22** until such time as the pin **30** reaches the end **33** of the slot **31** in the disc. The relative rotative positions of the cam and disc will be at this time as shown in Fig. 4 with the sloping side **28** of the notch in the cam overlying a portion of the notch in the disc to provide that upon further counterclockwise rotation of the arbor, the sloping side **28** will engage the curved peripheral surface **50** of the follower **45** and rotate the follower from the position shown in Fig. 3 in a clockwise direction to the position shown in Fig. 4. As the follower **45** is rotated, the lever **34** will be moved in a clockwise direction against the force of the spring **36** to permit the arcuate surface of the follower to in effect roll up onto the peripheral edge of the disc **22** and move the lever to the cocked position shown

in Fig. 4. As is apparent, the amount of pivotal movement of the lever 34 corresponds to the difference in radii of the base 29 of the cam and the periphery of the disc 22 in addition to the difference in radii of the flat portion 49 and arcuate surface 50 of the follower 45.

To complete the setting of the timer, the arbor 14 is further rotated in a counterclockwise direction to a position corresponding to the desired time setting and during this further rotation of the arbor the disc 22 will be in sliding engagement with the arcuate surface 50 of the follower to retain the follower in the position shown in Fig. 4 wherein the radial side 47 of the follower is engaged with the pin 51.

The knob 13 is then released and the clock mechanism will drive the arbor in a clockwise direction as viewed in Figs. 2 through 5, resulting in a clockwise rotation of the cam 26 from the position shown in Fig. 4. Due to the lost motion provisions of the pin and slot connection between the cam 26 and disc 22, the rotation of the cam 26 during the initial portion of the run-down of the timer will not be transmitted to the disc 22. In the specific embodiment the operating speed of the timer and the length of the slot in the disc are related to provide an interval of one hour for the travel of the pin on the cam from the end 33 of the slot to the end 32 of the slot in the disc. It is, of course, obvious that this time interval may be varied, as desired, by a varying of the length of the slot 31 relative to the operating speed of the timer.

When the cam 26 is rotated sufficiently in a clockwise direction for the pin 30 to engage the end 32 of the slot 31, the disc 22 will be rotated with the cam in a clockwise direction whereupon the frictional engagement between the peripheral edge of the disc and the arcuate portion of the follower 45 will cause the follower to be rotated in a counterclockwise direction to the position shown in Fig. 5. This movement of the follower whereby the flat portion 49 thereof is placed in engaging relationship with the periphery of the disc 22 will, because of the difference in radii of the flat surface 49 and arcuate surface 50 of the follower, result in a counterclockwise movement of the lever 34 by the spring 36 to an intermediate position as shown in Fig. 5. At this point it should be noted that it is preferred that the pin 51 be located relative to the follower 45 such that when the radial side 48 of the notch in the follower is in engagement with the pin the radius of the counterclockwise edge of the flat portion 49 will be in or slightly displaced clockwise out of alignment with the radius of the point of contact of the follower with the disc or in other words this end of the flat portion 49 will be substantially in dead center relationship relative to the pivotal axes of the follower and arbor in order to retain the lever 34 in the cocked position during the interval the cam is rotated relative to the disc and further to assure that only slight rotation of the follower in a counterclockwise direction by the disc 22 is necessary to result in the lever 34 being snapped into the position shown in Fig. 5 by the spring 36. This snap action of the lever 34 will cause the ear 37 of the lever to smartly engage the clapper 18 and cause the clapper to strike the casing 17 to provide an audible signal that the timing cycle has been initiated.

The cam and disc will be rotated together in a clockwise direction until the follower 45 rides over the radial side 23 of the disc whereupon the spring 36 will again urge the bar 34 in a counterclockwise direction to move the follower 45 into the notches provided in the disc and cam whereupon the flat portion 49 will again be engaged with the base of the notches in the position shown in Fig. 3, thus prohibiting further rotation of the cam and operation of the timer.

From the above, it should be obvious that such a device whereby the control lever 34 is first moved to a cocked position such as shown in Fig. 4 and then upon the passing of a predetermined time interval moved to an intermediate position as shown in Fig. 5 and further, upon completion of a preselected timing cycle moved further in the same direction to an end or starting position shown in Fig. 3, is particularly advantageous when used with a switching mechanism of the general type described in the copending application referenced above or in connection with other types of control mechanisms wherever it is desired to place an electrical circuit in a de-energized condition for a predetermined time, then in an energized condition for a preselected time interval, and then to de-energize the circuit. It is further realized that the condition of the circuit is not particularly important in that any three degrees of circuit condition could be accomplished with a suitably designed switching mechanism.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. In a timer, a movable control member mounted for movement in opposite directions and driven in one direction by the timer, an actuator mounted for movement relative to the control member, a follower pivotally mounted on the actuator and provided with an eccentrically contoured periphery engageable with the control member in rolling contact, the follower being rotatable by the control member upon movement thereof in said one direction to provide a first movement of said actuator relative to the control member, and means to provide a second movement of said actuator relative to said control member at a predetermined position of said control member.

2. In a timer having a driving mechanism, a rotatable control member mounted for movement in both directions, means connecting the control member to the driving mechanism to provide movement of the control member in one direction including means to delay movement of the control member in said one direction for a predetermined interval following initiation of operation of the driving mechanism, an actuator member mounted for movement relative to the control member and provided with a pivotally mounted follower having an eccentrically contoured periphery engageable with the control member, a portion of the periphery of the follower being engageable in rolling contact with the control member during movement of the control member in said one direction whereby the actuator will be moved relative to the control member, means on said control member to provide additional movement of said actuator member relative thereto in response to continued movement of said control member in said one direction and into a predetermined rotated position, and means to engage said portion of the follower periphery with the control member in response to movement of said control member in a direction opposite said one direction of the control member.

3. In a timer having a driving mechanism, a rotatable control member mounted for rotation in both directions and driven by the driving mechanism in one direction, an actuator member mounted for movement relative to the control member and having a follower engageable with the control member pivotally mounted thereon, the control member being contoured to cooperate with said follower to provide movement of the actuator member relative thereto at a predetermined rotated position of said control member, the follower being provided with

a curved surface engageable in rolling contact with said control member to provide rotation of the follower upon initial movement of the control member in said one direction, a flat surface on the follower adjoining said curved surface and engageable with the control member upon rotation of the follower member thereby whereby said actuator member will be moved relative to said control member, and means to position said follower in curved surface engagement with said control member in response to rotation of said control member in the direction opposite said one direction.

4. In a timer, a clock motor, a rotatable control disc, means for driving the disc by the clock motor including a lost motion connection, an actuator mounted for movement in a plane parallel to the plane of the control disc, a follower mounted for limited pivoting movement on the actuator and engageable in rolling contact with the periphery of the control disc, and means biasing the actuator toward the disc, the periphery of said follower being eccentrically dimensioned to provide a first movement of the actuator in response to initial rotation of the control disc by the motor, said disc having a notch for receiving the follower at a predetermined rotated position of the disc to provide a second movement of the actuator.

5. In a timer, a clock motor, a driving disc adapted to be set manually in one direction and to be driven in the opposite direction by the clock motor, a control disc coaxial with the driving disc having a pin and slot connection therewith, an actuator mounted for movement in a plane parallel to the plane of the control disc, a follower mounted on the actuator for limited turning movement having eccentric edge portions for engagement sequentially with the edge of the control disc, one of said edge portions being engageable in rolling contact with the control disc, and means biasing the actuator toward the control disc, said control disc having a notch for receiving the follower at a predetermined rotated position of the control disc and said driving disc having a cam surface engageable with the follower during movement of the driving disc in said one direction for disengaging the follower from the notch and turning the follower to a predetermined rotated position wherein said one edge porition is in control disc engagement.

6. In a timer having a driving mechanism, a rotatable control member movable in opposite directions and driven by the driving mechanism in one direction, an actuator member mounted for movement relative to the control member and having a control member engageable follower pivotally mounted thereon, the follower being provided with a curved surface and an adjoining flat surface on the periphery thereof sequentially engageable with the control member, said curved surface being engageable in rolling contact with the control member on initial rotation of said control member by the driving mechanism to rotate the follower into flat surface engagement with the control member, means operable during rotation of said control member in the direction opposite said one direction to position said follower with said curved surface in control member engagement and with the radius of the junction of said curved surface and said flat surface being disposed in substantial alignment with the radius of the point of contact of said curved surface with the control member, and means on the control member to provide movement of said actuator member relative to the control member at a predetermined rotated position of the control member.

7. In a timer, a driving mechanism, a rotatable disc member driven in one direction by the driving mechanism, an actuator member mounted for movement relative to the disc member, means on the disc member operative at a predetermined rotated position of the disc member to position the actuator relative thereto in a first position, a pivotally mounted roller on the actuator member provided with a chordwise directed portion on the periphery thereof, means to engage an arcuate peripheral portion of the roller immediately adjacent one end of said chordwise directed portion with said disc member to position said actuator member in a second position relative to the disc member, and manually operative means to rotate the disc member in an opposite direction from said one direction to a preselected rotated position, said roller being slidably engaged with the disc member during rotation thereof in said opposite direction and rotatably engaged therewith upon initial movement of the disc member in said one direction whereby the chordwise directed portion of the roller will be engaged with the disc member to provide movement of the actuator member to a third position relative to the disc member.

8. In a timer having a driving mechanism, a rotatable disc provided with a recess and connected to the driving mechanism for rotation thereby in one direction, an actuator member mounted for movement relative to the disc, a follower member mounted on the actuator member and provided with a curved surface and an adjoining flat surface on the periphery thereof sequentially engageable with the disc, said follower being receivable in said recess at predetermined rotated position of the disc with said flat surface facing the bottom of the recess, cam means to move the follower out of said recess and rotate it into curved surface engagement with the disc, means to limit the rotation of the follower into curved surface engagement to substantial alignment of the radius of the point of junction of said curved and flat surfaces with the radius of the point of contact of said curved surface with said disc member, and means urging the follower into rotative engagement with the control member whereby on initial movement of said disc member in said one direction the follower will be rotated into flat surface engagement with the disc member.

9. In a timer having a driving mechanism, a rotatable cam member driven by the driving mechanism in one direction and rotatable relative thereto in the other direction, a rotatable disc mounted coaxially of the cam member and drivingly connected thereto by lost motion means, the disc extending radially beyond the periphery of the cam member, an actuator member mounted for movement transversely of the axis of the cam member and disc and provided with a pivotally mounted follower having a curved surface and an adjoining flat surface on the periphery thereof, means providing a notch on the periphery of the cam member and disc for reception of said follower at a predetermined rotated position of the cam member and disc with the flat surface of the follower facing the bottom of the notches, the notch on the cam member having a sloping side engageable with the curved surface of the follower to cam the follower out of the notches and rotate it into curved surface engaging position with the periphery of the disc when the cam member is moved in said other direction, the follower being rotatable by the disc member upon initial movement thereof in said one direction to move the flat surface of the follower into engagement with the periphery of the disc, and means urging the actuator member toward the axis of the cam member and disc.

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