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CONTROL DEVICE
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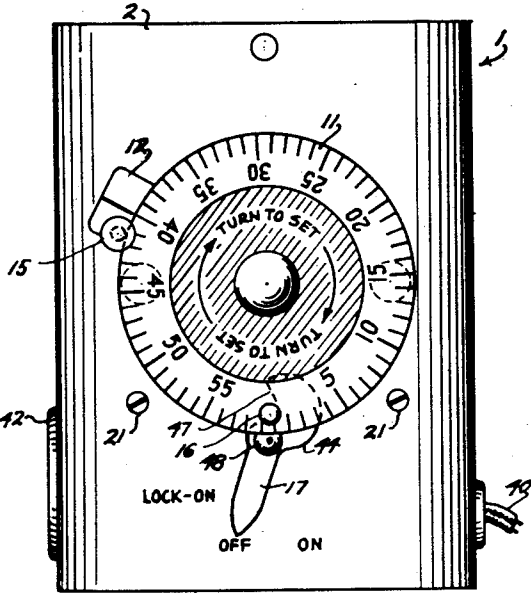
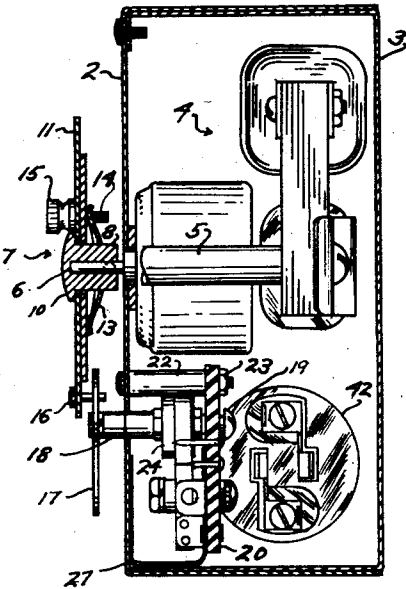
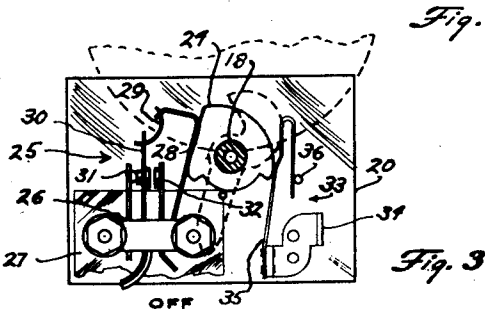
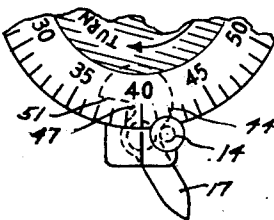
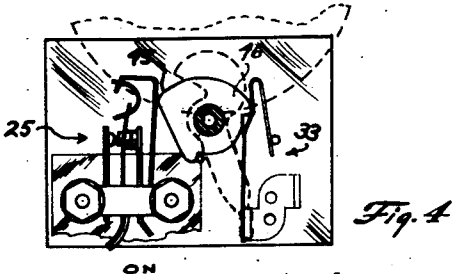
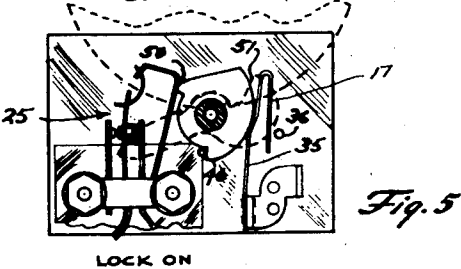
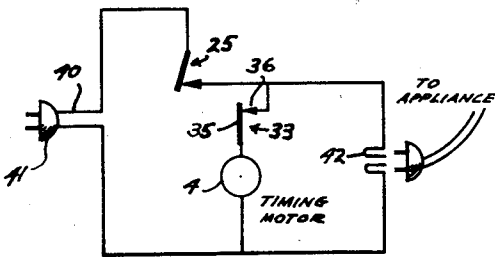


Fig. 7
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CONTROL DEVICE

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9 Claims. (Cl. 161-1)

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This invention relates to automatic control apparatus and is more particularly concerned with timers of the manual reset type. The primary object of the invention is to provide a timing mechanism which is simple and rugged in construction and which is easy to operate by the user.

A further object of the invention is to provide a timer in which the switch mechanism is operated at the end of the resetting stroke so as to eliminate the variable of the time of manual resetting.

A further object of the invention is to provide an interval timer mechanism which is adapted to be set for varying time periods or to accurately repeat predetermined periods for which the mechanism is set.

Another object of the invention is to provide an interval timer mechanism in which a single switch or control device may be operated by the timing mechanism or may be operated independently of the timing mechanism.

Other objects will appear from the following detailed description and the appended claims.

For a full disclosure of the invention reference is made to the following detailed description and the accompanying drawings in which:

Fig. 1 is a front view of the timer mechanism;

Fig. 2 is a side view, partly in section, of the timer shown in Fig. 1;

Fig. 3 is a view of the switching mechanism when the pointer is in the "Off" position;

Fig. 4 shows the switching mechanism when the pointer is in the "On" position;

Fig. 5 is a similar view with the switching mechanism in the "Lock-On" position;

Fig. 6 illustrates the operation of the pointer to the "On" position by resetting movement of the dial;

Fig. 7 is a wiring diagram.

Referring particularly to Figures 1 and 2, reference character 1 indicates generally a housing which may be of two-piece construction, including a front housing member 2 and a rear housing member 3. Located in the upper portion of the housing member 1 is a synchronous motor and gear train mechanism 4 which is of well known construction. This motor and gear train mechanism is supported on posts 5 which are secured to the front housing member 2. The synchronous motor includes a drive shaft 6 which extends through the housing member 2 and supports a hub 7. The hub 7 is secured to the shaft by a suitable set screw and is formed with a shank portion 8 and a head portion 10. This hub carries a dial 11 and a reset member 12 which is located behind the dial. The dial and reset member are pressed against the head portion 10 of the hub by means of a spring member 13 which is formed with sharp surfaces adapted to bite into the shank portion 8 of the hub. This spring member provides a friction drive between the hub and the dial and reset members. The reset member 12 carries a reset pin 14. In the embodiment of the invention shown this pin consists of the shank portion of a thumb screw having a head

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15. The head 15 as seen in Figure 1 overlaps the dial 11 so that part of the thumb screw serves to clamp the dial and reset member together.

The dial 11 is provided with a pin 16 which extends inwardly for operating a pointer 17 which is carried on a shaft 18 extending through the front of the housing member 2. The rear end of the shaft 18 receives a screw 19 which is tightly threaded into the shaft and which passes loosely through a switch mounting plate 20 of insulating material. Thus the shaft 18 is journaled in the housing member 2 and the switch mounting plate 20. The plate 20 is supported on the housing member 2 by means of suitable screws 21, spacers 22 and nuts 23.

As shown more clearly in Figures 3, 4 and 5 the shaft 18 carries a cam 24 which is arranged to operate a control device taking the form of a snap switch mechanism 25. This snap switch mechanism forms no part of the invention and is illustrated as including a base 26 which is supported on the mounting plate 20 by means of suitable screws and nuts. An insulating member 27 is mounted between the snap switch mechanism and mounting plate 20 and as shown in Figure 2 serves to provide a barrier between the switch terminals and the housing. The snap switch includes an operating beam 28 which acts as a cam follower. This operating beam supports one end of a C spring 29 the other end of which is supported by a movable contact blade 30 which is located between a stop blade 31 and a stationary contact blade 32. When the cam is in the position shown in Figure 1, the cam follower member 28 is at its far right hand position which causes the movable contact blade to assume the position in which the contacts are open. As the cam is rotated to urge the cam follower member 28 to the left, it carries the C spring 29 over center causing the movable contact blade to snap to the position shown in Figure 4, for engaging the contacts.

The cam 24 is also arranged to operate a switch 33 in the circuit of the synchronous motor. This switch is shown as consisting of a bracket 34 which is mounted on the panel 20 and which carries a switch blade 35. This switch blade is of generally U shape and is adapted at its free end to engage a pin 36 which serves as a stationary contact. It will be noted that the parts are proportioned so that when the pointer 17 is in either the position shown in Figure 3 or the position shown in Figure 4, this switch remains closed. When the pointer is moved to the position shown in Figure 5 the switch blade 35 disengages the fixed contact or pin 36 for breaking the circuit to the timer motor.

Referring to Figure 7 this figure shows the manner in which the control is wired. The cord 40 is provided with a plug 41 for attachment in a standard electric outlet. One side of this cord is connected to the timing motor 4 and to one side of the receptacle 42 which is mounted in the side of the housing. The other leg of the cord 40 is attached to the switch 25, the other side of this

switch being connected to a terminal in the appliance receptacle. The switch 33 is also connected to the switch 25 so that the current for the timing motor must pass in series through the switches 25 and 33.

It should be noted that the pointer 17 is provided with a cam surface 44. For repeat operation of the control the operator loosens the thumb screw 15 and sets the reset member on the dial for the timing desired and retightens the thumb screw. The operator then rotates the reset member 12 in a clockwise direction as far as it will go and releases the reset member immediately. As the reset member approaches the end of its stroke the stud 14 engages the cam surface 44 of the pointer 17 and by a camming action causes the pointer 17 to rotate clockwise to the position shown in Figure 6. In this position the stud 14 has reached the bottom of the cam surface which prevents further rotation of the reset member. During the reset movement of the reset member the dial rotates therewith and thus carries the pin 16 on the dial a certain angular distance away from the pointer 17. Therefore the action of the reset member provides a predetermined angular relationship between the dial pin 16 and pointer 17 for each adjustment of the reset member 12 with respect to the dial.

At the end of the resetting stroke the pointer 17 assumes the "On" position as shown in Figure 6 which causes the switch parts to assume the position shown in Figure 4. It will be noted in Figure 4 that a lobe 45 on the cam has caused the switch 25 to close and that a lobe 46 on the cam still holds the switch 33 closed. The outlet receptacle for the timer is therefore energized for operating the appliance controlled by the timer. Also, the timing motor 4 is placed into operation at the end of the resetting stroke. The timing motor now operates in a counterclockwise direction causing the pin 16 on the dial to approach the operating portion 47 of the pointer. It will be apparent that a counterclockwise rotation of the pin 16 after engagement with the pointer 17 will cause rotation of the pointer from the "On" position to the "Off" position. The parts are arranged so that as the zero position on the dial passes the center of the shaft 18, the snap switch 25 opens for breaking the circuit to the appliance and to the timing motor. Thus the timer remains stationary until it is again operated manually. It will be apparent that this construction serves to provide for repeat operations in which the control may be set for a certain timing and provide this timing for any number of operations.

The control may also be operated independently of the reset member 12 when the operator desires a different timing for each operation. In this case the dial is merely rotated so that the timing on the dial is indicated by the dot in the center of the screw 48 which fastens the pointer to the shaft 18. After the dial is set in this manner the pointer 17 is operated from "Off" to "On." It will be apparent that the timing motor will be energized and operate the pointer back to its "Off" position at the end of the set time.

In certain cases it is desired to turn on the controlled appliance and to have the appliance stay on until manually turned off. When such operation is desired the user rotates the pointer to the position marked "Lock-On." The parts then assume the position shown in Figure 5 in which a lobe 50 on the cam causes the switch 25 to reclose, thereby energizing the appliance. At

this time the cam lobe 46 is disengaged from the switch blade 35, therefore permitting this switch blade to disengage the stationary contact 36 for breaking the timer motor circuit. The timer, therefore, is not in operation and the appliance will stay on indefinitely. While it is not absolutely essential, it is preferable to design the cam and switch blade 35 so that the motor switch 33 opens before the switch 25 recloses in the "Lock-On" position. This prevents any possibility of the pointer 17 being left in an intermediate position in which the motor runs in the "Lock-On" position.

It should be noted that the pointer 17 is formed with a projection 51 which serves as a stop for the pin 16 on the dial even when the pointer is in the "Lock-On" position. This feature maintains the proper relationship between pin 16 and stud 14 with respect to the pointer so that the control is always in operating condition. It will be apparent that if the projection 51 were not present, it would be possible to move the dial so that the pin 16 gets on the wrong side of the pointer. If the pointer 17 were then returned from the "Lock-On" to the "Off" position the control would not be operative until the parts are rearranged in proper relationship. The design of the pointer 17 avoids the possibility of such an occurrence.

From the foregoing description it will be apparent that the present invention provides a simple and positive timing mechanism which is easy to understand and use on the part of the operator. It will also be apparent that the invention provides for repeat operations at the same setting by the use of the reset member 12. Also independently set operations may be obtained by first setting the dial to the timing desired and then operating the pointer from "Off" to "On." It will further be apparent that the invention provides a simple arrangement for turning on the controlled appliance independently of the timing mechanism. It will also be noted that the mechanism is completely foolproof in that the parts cannot be moved out of proper operating relationship.

While a single embodiment of the invention has been shown it is obvious that many variations in structure and application may be made without departing from the scope of the invention. It is, therefore, desired to be limited only by the scope of the appended claims.

What is claimed is:

1. In a timer mechanism, the combination of, timer motor means, a switch, means including an operator for said switch constructed and arranged to move the switch from a first position to a second position and then back to its first position as the operator moves in a single direction, actuating means operated by the timer motor means for actuating said operator in a direction to move the switch from its first position to its second position; means for setting the actuating means for a predetermined period of time, and means operated by the setting means at the end of its setting stroke for actuating said operator in a direction to move the switch from its second position to its first position.

2. In a timer mechanism, the combination of an electric timer motor, load switching means for a controlled appliance, said switching means having a first position and a second position, said switching means also being arranged to control the timer motor, to de-energize the same when the switching means is in the second position,

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means including an oscillating operator for the switching means constructed and arranged to move the same from its first position to its second position and back to its first position as the operator moves in a single direction, means for limiting the travel of said operator to provide two end positions therefor, and actuating means adapted to be driven by the timer motor for moving the operator from one end position to midposition for moving the switching means from its first position to its second position.

3. In a timer mechanism, the combination of an electric timer motor, load switching means for a controlled appliance, said switching means having a first position and a second position, said switching means also being arranged to control the timer motor, to de-energize the same when the switching means is in the second position, means including an oscillating operator for the switching means constructed and arranged to move the same from its first position to its second position and back to its first position as the operator moves in a single direction, means limiting the travel of said operator to provide two end positions therefor, setting means for setting the actuating means for a predetermined period of time, and means operated by the setting means for actuating said operator from midposition to one end position as the setting means approaches the end of its setting stroke, and means operated by the timer motor for returning said operator to an intermediate position at the end of the timed period.

4. In a timer mechanism, the combination of an electric timer motor, load switching means for a controlled appliance, said switching means having a closed position and an open position, said switching means also being arranged to control the timer motor, to energize the same when the switching means is in the closed position, means including an operator for the switching means constructed and arranged to move the same from its closed position to its open position and back to its closed position as the operator moves in a single direction, from a first position through an intermediate position to another position, and means operated by movement of the operator from said intermediate position back to its first position for de-energizing said timer motor, even though said switching means is closed.

5. In a timer mechanism, the combination of, a first shaft, timer motor means for rotating said first shaft in one direction, a second shaft, an operating member carried by said second shaft, switching means controlled by rotation of said second shaft, means including a pair of spaced abutments carried by said first shaft, said operating member having a portion extending between said abutments so that one abutment rotates the operating member in one direction and the other abutment rotates the operating member in the opposite direction, means for retaining the operating member in the position to which it is last moved, manual means for moving said abutments, and slip friction drive means interposed between the timer motor means and the abutment means for permitting motion of the abutment means by the manual means.

6. In a timer mechanism, the combination of, an electric timer motor, a load switch, a cam shaft arranged to be rotated in one direction by the timer motor and to be rotated manually in the opposite direction, cam means on the shaft for controlling said load switch, said cam means being constructed and arranged to provide an

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intermediate position of the shaft in which the load switch is open, while closing said load switch upon movement of the shaft in either direction from said intermediate position, a second switch, circuit connections including said load switch and said second switch in series for controlling said timer motor, and means operated by said shaft on movement from said intermediate position in said one direction for opening said second switch, whereby the load switch is closed without operation of the timer motor.

7. In a timer mechanism, the combination of, an electric timer motor, a shaft arranged to be rotated in one direction by the timer motor and to be rotated manually in either direction, a load switch, a motor switch, means operated by said shaft for operating both of said switches, said last mentioned means being constructed and arranged to provide an intermediate position of the shaft in which the load switch is open and the timer motor de-energized, to close the load switch and open the motor switch when the shaft is moved in said one direction from said intermediate position, and to close both of said switches when the shaft is moved in the opposite direction from said intermediate position.

8. In a timer mechanism, the combination of, a first shaft, an electric timer motor for rotating said first shaft in one direction, a switch shaft, a load switch and a timer motor switch operated by rotation of said switch shaft, an operating member carried by said switch shaft, means including a pair of spaced abutments carried by said first shaft, said operating member having a portion extending between said abutments so that one abutment rotates the operating member in one direction and the other abutment rotates the operating member in the opposite direction, means for retaining the operating member in the position to which it is last moved, manual means for moving said abutments, and slip friction drive means interposed between the timer motor means and the abutment means for permitting motion of the abutment means by the manual means.

9. In a timer mechanism, the combination of, a first shaft, timer motor means for rotating said first shaft in one direction, a switch shaft, an operating member carried by said switch shaft, switching means controlled by rotation of said second shaft, means including a pair of spaced abutments carried by said first shaft, one of said abutments being spaced from the first shaft a distance to cause it to come into line with said first shaft to provide a stop therefor, said operating member being provided with a cam surface adapted for engagement with said one abutment for causing rotation of said switch shaft in one direction as said one abutment approaches the same, the other of said abutments being arranged to engage said operating member for rotation of the switch shaft in the opposite direction.

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