

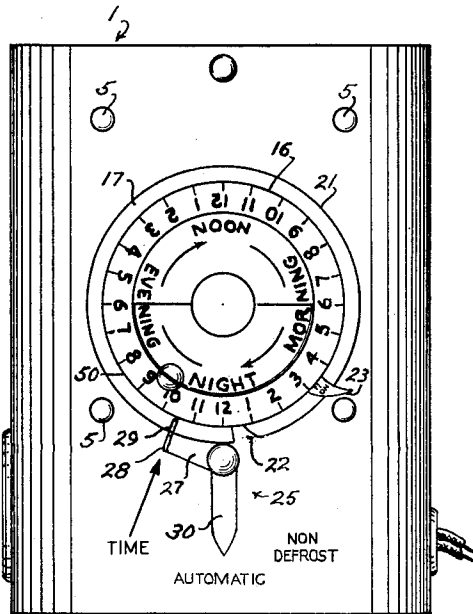
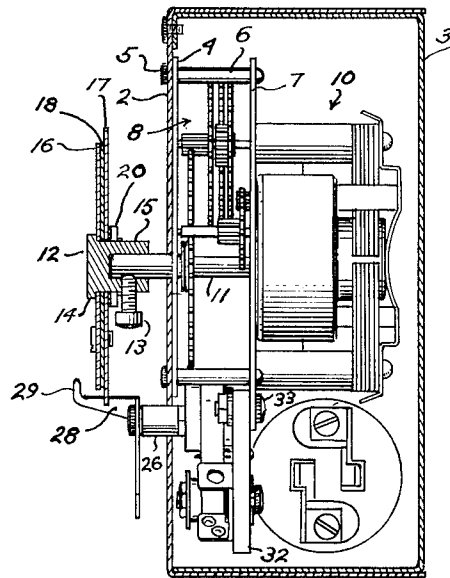
Nov. 10, 1953

J. L. HARRIS

2,658,573

CONTROL DEVICE

Filed Aug. 2, 1948



UNITED STATES PATENT OFFICE

2,658,573

CONTROL DEVICE

John L. Harris, Whitefish Bay, Wis.

Application August 2, 1948, Serial No. 42,120

6 Claims. (Cl. 161-1)

1

This invention relates to automatic control apparatus and more particularly to time controls. The primary object of this invention is to provide a time switch in which the On and Off periods are adjustable, which is simple and rugged in construction and which is easy to adjust and operate by the user.

A further object of the invention is to provide a control device of the cam operated type and which selectively can be set for automatic operation or manual operation as desired by the user.

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

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

Fig. 1 is a front elevation of a control device embodying the invention;

Fig. 2 is a side sectional view of the device shown in Fig. 1;

Figs. 3, 4 and 5 are fragmentary views of the switching mechanism in various positions assumed in operation of the control;

Fig. 6 is a fragmentary view of the dial assembly showing the provision for adjustment.

Referring to Figure 1 reference character 1 indicates generally a timer housing which may be formed of a front and side section 2 and a back and top and bottom section 3. Secured to the rear of the front section 2 is a gear train plate 4 which is held in place by screws 5, which extend through the housing member. Mounted to the plate 4 by means of spacers 6 is a rear gear train plate 7, which plate cooperates with the plate 4 in supporting the gear train generally indicated as 8. The rear gear train plate 7 also supports a synchronous motor 10 of well known construction. This motor drives the gear train which in turn drives a final shaft 11 at the speed of one revolution per day in the present embodiment of the invention. The shaft 11 extends through the housing member 2 and supports a hub 12 which is secured to the shaft by a set screw 13. The hub 12 is formed with a head portion 14 and a shank portion 15. Mounted on the shank portion and pressed against the head portion 14 of the hub are a dial 16, an "off" cam 17 and an "on" cam 18. These members are frictionally held on the hub by means of a friction spring and fastener 20. The cam 17 is generally circular in shape having a circular portion 21 and a notched portion 22. The cam 18 may be generally circular in shape but is preferably smaller in diameter than the dial 16. This cam is provided with a lobe 23 which extends beyond the circular portion 21 of the cam 17.

The cam assembly above described operates a cam follower 25 which is mounted on a shaft 26 extending through the housing member 2. This

2

cam follower is preferably formed of a flat section 27 which is secured to the shaft and an out-turned portion 28 which rides the cam. This portion 28 may also include a pointer 29 which extends toward the dial for indicating the time for which the control is set. The cam follower also may include a pointer portion 30 for providing ease in manual operation.

Referring to Figure 2, the rear gear train plate 7 extends downwardly and supports a switch mounting plate 32 by means of screws 33 which extend through both plates. The plate 32 serves as a rear bearing for the shaft 26 which carries a cam 34 (Fig. 3). Mounted on the plate 32 is a snap switch mechanism generally indicated as 35. This switch may consist of a base 35 which is fastened to the plate 32 by screws 37. The switch includes a cam follower member 38 which is biased against the cam 34 and which carries the upper end of C spring 39. The lower end of the C spring 39 engages a movable contact arm 40 carrying a contact cooperating with a stationary contact mounted on a blade 41. The switch also includes a stop blade 42 for limiting the travel of the blade 40 in the opposite direction.

Also mounted on the plate 32 is a bracket 45 which carries a leaf spring 46. This leaf spring is arranged to ride the cam 34 and to bias it in a clockwise direction. The leaf spring 46 is also provided with an out-turned portion 47, the purpose of which will become apparent as this description proceeds.

The timing motor rotates the dial and cam assembly in a clockwise direction. When the notch 22 of cam 17 is rotated under the cam follower the cam follower drops off into this notch due to the biasing action of the leaf spring 46, and also due in part to the biasing action of the leaf spring 38 of the snap switch. The cam shaft thus assumes the position shown in Figure 3 in which the follower portion 38 of the snap switch is at its right hand extremity which causes the contacts of the snap switch to be open. On continued rotation of the cam and dial assembly by the motor, the cam follower rides up the sloping edge of notch 22 and rides the circular portion 21 of the cam 17. This movement of the cam follower is insufficient to operate the snap switch for the reason that the differential of operation of the switch is made wide enough to prevent it from operating at this point. Therefore this switch remains in open position. On continued rotation of the cam and dial assembly, the cam follower begins to ride up the lobe 23 of the cam 18. As the cam follower approaches the top of the slope the resulting movement of the cam 34 becomes sufficient to cause the snap switch to snap to its closed position. This position is indicated in Figure 4. On continued rotation of the cam and dial assembly, the cam follower

3

drops off the lobe 23 and returns to the circular portion 21 of the cam 17. Due to the wide differential of the snap switch, this counterclockwise movement of the cam is insufficient to operate the switch and therefore the switch remains in the closed position until the cam follower once again drops into notch 22. It will be apparent that adjustment of the cam 18 with respect to the cam 17 will vary the "on" and "off" periods within the limits of adjustment of the control.

In certain applications it is desirable to turn on the appliance controlled and to maintain such appliance on regardless of the time. For example where the timer is used for defrosting refrigerators it is desirable to prevent the refrigerator from defrosting if it happens to contain some article which must be kept at low temperature such as ice cream. When it is desired to prevent automatic defrosting, the user simply moves the pointer 30 to the position marked "non-defrost." This causes the cam 34 to assume the position shown in Figure 5. In this position the lobe 48 on the cam 34 has ridden past the out-turned portion 47 of the leaf spring 46. The biasing action of the leaf spring 46 is thus rendered ineffective and in addition the out-turned portion 47 acts as a yieldable stop for preventing return of the cam shaft to the "automatic" position. Thus the switch is maintained in the "on" position regardless of the position of the dial and cam assembly.

Where the control is used as a defroster it is desirable to make it as simple and easy to use as possible. For defrosting operations it is desirable to have the defrost period set approximately at midnight and to continue as long as required for proper results. For this reason a screw 50 is provided which fits through a hole in the dial 16 and is tapped into the cam 17. This screw serves to prevent rotation of the dial with respect to the cam 17 and thus insures that the control will be set for the proper time for best defrosting results. It is also desirable to limit the adjustment of the defrost period so that the control can not be placed too far out of adjustment by the user. In order to limit the adjustment of the cam 18 this cam is provided with a notch 51 through which the screw 50 is passed. This notch limits the travel of the cam 18 relative to the cam 17 and thus insures that the defrost period cannot be set too short or too long.

From the foregoing description it will be apparent that the invention provides a simple and positive time switch mechanism in which the "on" and "off" periods can be adjusted and also in which the switch may be operated independently of the timing mechanism. While a single embodiment of the invention has been shown, it will be apparent that any changes may be made from the construction illustrated without departing from the invention. It is, therefore, desired to be limited only by the scope of the appended claims.

What is claimed is:

1. In a timing mechanism, a timing motor arranged to rotate in a single direction at constant speed, means including an adjustable cam assembly normally rotated constantly and in a single direction by said timing motor, said assembly comprising a first cam having a substantially circular portion and a notch portion, said cam assembly also including a second cam having a lobe extending beyond the circular portion of the first cam, a cam follower arranged to ride both of the cams, biasing means for said cam fol-

4

lower, and means including switching mechanism operated by said cam follower, said switching mechanism being constructed and arranged to assume a first position when the cam follower drops into the notch of the first cam and to assume a second position when the cam follower is raised off the circular portion of the first cam by the lobe on the second cam, said switching mechanism being further constructed and arranged to have a differential sufficiently wide to remain in its last position when the cam follower rides the circular portion of the first cam.

2. A timing mechanism as set forth in claim 1 in which the biasing means for the cam follower is constructed and arranged to become ineffective when the cam follower is moved outwardly beyond the range of movement provided by the lobe on the second cam.

3. A timing mechanism as set forth in claim 1 in which the cam assembly includes a dial for indicating time, one of said cams being held in fixed relationship with the dial, and the other of said cams having limited adjustment therewith.

4. In a timing mechanism, a timing motor arranged to rotate in a single direction at constant speed, a switching mechanism, an operator for said switching mechanism, means associated with said switching mechanism and operator to cause operation of the switching mechanism in a first direction when the operator is moved in a first direction to a predetermined position and to cause operation of the switching mechanism in the opposite direction when the operator is moved in the opposite direction to a second predetermined position, a first cam having a substantially uniform surface and a drop-off section, a second cam having a cam surface extending above the uniform surface of said first cam, cam follower means arranged to ride both of said cams and to operate said operator for the switching mechanism, biasing means for biasing the cam follower means against said cams, means driven by said timing motor for causing relative rotation between said cams and said follower means, said relative rotation being normally constant and in a single direction, said cams and cam follower means being proportioned so that the operator is between said predetermined positions when the cam follower means engages said uniform surface of the first cam.

5. A timing mechanism as set forth in claim 4 including manual means for moving the cam follower means to one of its positions independently of said cams.

6. A timing mechanism as set forth in claim 4 in which the biasing means is constructed and arranged to become ineffective when the cam follower means is moved outwardly beyond the range of movement provided by said second cam, whereby the control of the cam follower means by the cams may be suspended by manual movement of said cam follower means.

JOHN L. HARRIS.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,708,619	Hart	Apr. 9, 1929
1,961,417	Gains	June 5, 1934
2,053,143	Frederick	Sept. 1, 1936
2,404,210	Bechler	July 16, 1946
2,429,813	Hausler	Oct. 23, 1947
2,452,984	Blom	Nov. 2, 1948
2,529,913	Candor	Nov. 14, 1950