

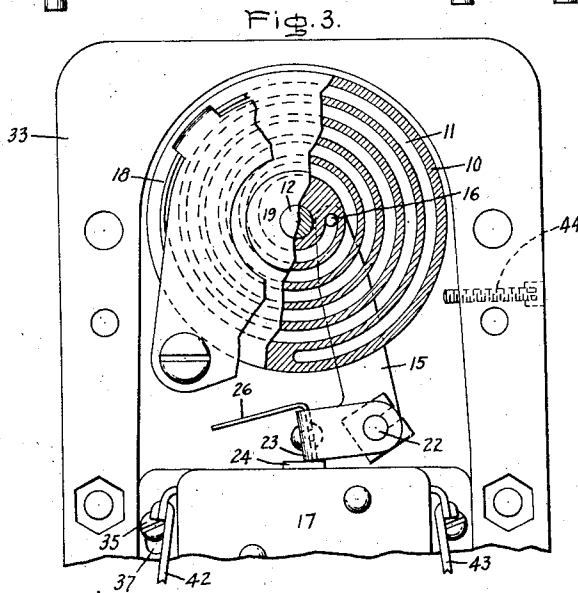
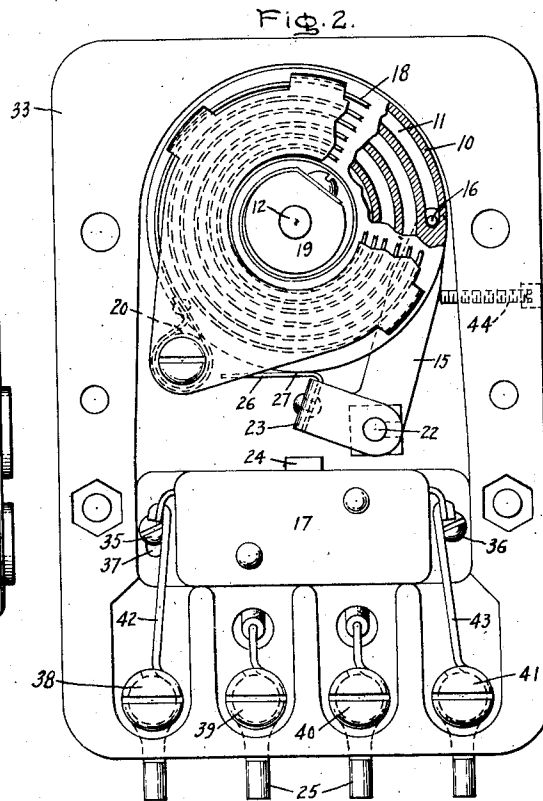
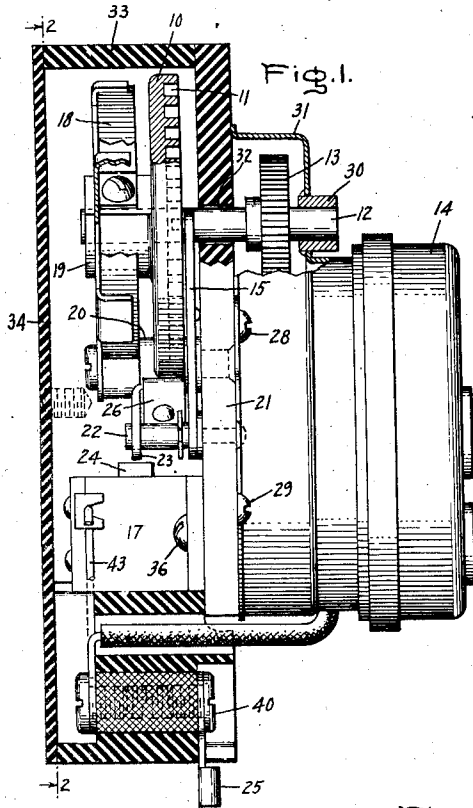
April 23, 1946.

C. E. BAZLEY

2,398,994

CONTROL DEVICE

Filed Nov. 20, 1943



Inventor:
Carl E. Bazley,
by *Harry E. Dunham*
His Attorney

UNITED STATES PATENT OFFICE

2,398,994

CONTROL DEVICE

Carl E. Bazley, Schenectady, N. Y., assignor to
General Electric Company, a corporation of
New York

Application November 20, 1943, Serial No. 511,164

4 Claims. (Cl. 200—33)

My invention relates to control devices, more particularly to control devices of the definite time motor driven type, and has for its object a simple, reliable and inexpensive definite time control device.

In carrying out my invention, I provide a disc member provided with a spiral groove which is driven at a predetermined low speed by an electric motor, together with a follower member moving in the groove of the disc and operated after the disc has been turned a predetermined number of times to actuate a switch. I also provide a spring biasing means for the disc member which, when the driving motor is deenergized, turns the disc back to a predetermined starting position.

For a more complete understanding of my invention, reference should be had to the accompanying drawing, Fig. 1 of which is a view partly in section of a definite time control device embodying my invention; Fig. 2 is a side view of the device of Fig. 1 with the cover removed taken along the line 2—2 of Fig. 1 looking in the direction of the arrows; while Fig. 3 is a fragmentary view similar to Fig. 2 but showing the follower member in its switch operating position.

Referring to the drawing, in carrying out my invention in one form I provide a disc member 10 provided with a spiral groove 11 in one face and mounted rigidly on a drive shaft 12 whose axis is substantially coincident with the axis of the spiral groove 11. The shaft is connected through a suitable gearing 13 to an electric driving motor 14 for operation at a suitable low speed by the driving motor. In a typical device the motor speed was 500 R. P. M. and the gear ratio 500:1, which with a five turn groove gave a maximum time of five minutes.

By means of a bell crank lever 15 provided with a portion or pin 16 at one end extending into the groove 11, the disc 10 is connected to operate an electric switch 17. As shown in Figs. 1 and 2, the disc 10 is in its predetermined angular starting position to which it is turned, when the motor is deenergized, by a flat spiral spring 18 having one end connected to a hub 19 secured to the shaft 12 and its other end connected to a post 20 secured to a stationary supporting plate 21. Thus when the motor is energized, the disc 10 is turned in a clockwise direction, as seen in Fig. 2, by the motor whereby the pin 16 is caused to move toward the left hand toward the center of the disc by the side walls of the groove. This turns the bell crank operating member 15 in a counterclockwise direction about its supporting pivot 22 and its other end 23 moves downward into engagement with an actuating button or pin 24 for the switch 17. Just before the pin 16 reaches its extreme position toward the left in engagement with the end wall of the

slot at the center of the disc, as shown in Fig. 3, the operating pin 24 is depressed far enough to operate the switch 17. The disc then continues its movement until it is brought to rest by engagement of the pin with the inner end of the slot. As the pin 16 moves nearer the center of the disc, it will be observed that its speed of movement increases, since the disc turns at a constant speed. This is an advantage in effecting positive operation of the switch.

The motor preferably is a suitable split phase type, such as an induction disc rotor type, single phase motor which can remain constantly energized on the single phase supply lines 25 indefinitely or as long as it is desired to retain the switch 17 in its operating position. When the supply lines 25 are deenergized by a suitable switch (not shown), the disc is turned back counterclockwise, as seen in Figs. 2 and 3, to its starting position, as seen in Fig. 2, in which the pin brings the disc to rest by engagement with the end wall of the slot at the periphery of the disc.

Preferably the switch 17 is a snap action type switch which is biased to a predetermined open or closed circuit position to which it returns when the bell crank 15 is moved back to its starting position and disengages the operating pin 24. For example, the switch may be of the type described and claimed in United States Patent No. 2,332,911 issued on October 26, 1943 to George M. Hausler.

I have also provided mechanical braking means for bringing the disc to rest gradually in its starting position shown in Fig. 2. This braking means comprises a spring strip 26 secured to the end 23 of the bell crank and positioned to frictionally engage the edge of the disc as the bell crank is reset. Thus, as the bell crank moves clockwise from the position shown in Fig. 3, the end of the spring arm 26 engages the edge of the disc at a predetermined angular distance from the final position of the disc. Thereafter, continued movement of the bell crank forces the arm 26 against the edge of the disc with an increasing frictional force thereby to apply an increasing braking action. Also, the point of engagement between the spring and the disc is shifted by the flexing of the spring downward toward the secured end of the spring, which also has the effect of increasing the pressure applied by the spring. Thus, as seen in Fig. 2, in the final reset position of the parts the point of engagement 27 of the spring with the disc is quite near the fixed end of the spring so that the spring applies an increased braking force not only by reason of the fact that it is bent, but also because of its decreased effective length. As a result of this braking action, the disc is brought gradually to rest in its reset po-

sition, the relative strengths of the biasing spring 13 and the braking spring 26 being selected to bring this about.

It will be understood that, while the disc is moved at a relatively slow speed by the driving motor by reason of the high ratio speed reducing gear 13, the disc in turning several revolutions in response to the force of the biasing spring 18 would be accelerated to a relatively high speed by the time it reached its reset position if suitable braking means were not provided. In such case, the disc and other moving parts connected to it would be brought very suddenly to rest by the engagement of the pin 16 with the end wall of the groove.

As shown, the motor 14 is secured by suitable screws, two of which 28 and 29 are shown, to one side of the supporting plate or member 21. The shaft 12 is mounted in a bearing 30 in a metal housing 31 secured to the motor, and passes through a clearance hole 32 in the supporting plate 21. Preferably, as shown, the supporting plate 21 is made from a suitably molded, electrically insulating material with a side wall 33 and a bottom cover 34 for enclosing the operating mechanism.

The switch 17 enclosed in a suitable casing made of electrically insulating material is secured to the plate 21 by means of screws 35 and 36. A slot 37 is provided for the screw 35 in the support for the switch whereby the switch and the operating pin 24 can be adjusted with relation to the operating bell crank 15. Thus by loosening the screws 35 and 36, the switch can be adjusted about the screw 36 of the pivot as desired and then secured by again tightening the screws. By means of this adjustment the operation of the switch can be made to occur with a minimum desired operating movement of the pin 24 in a downward direction. It will be understood that the adjustment will preferably be such that the switch will be operated just prior to the final angular position of the disc, as shown in Fig. 3.

On the lower end of the electrically insulating support and housing for the device are provided quickly detachable connectors 38-41, by means of which the motor is connected in its supply circuit and the switch is connected in the circuit thereby controlled. Thus the connectors 39 and 40 are connected by suitable conductors to the terminals of the motor, while the connectors 38 and 41 are connected by conductors 42 and 43 to the terminals of the switch 17.

I have also provided means for adjusting the time of operation of the device comprising a screw 44 which is mounted in the side wall of the casing just opposite the bell crank 15. The full maximum time interval of the device heretofore described can be decreased by turning this screw 44 inward so that it will be engaged by the bell crank and the bell crank brought to rest before the pin 16 engages the end wall of the slot. In such case, the disc is brought to rest by engagement of the inner side wall of the slot with the pin before the disc has returned to its full reset position. Therefore, when the motor is energized for the timing interval, the time is shortened by the decreased angular distance that the disc has to travel before operation of the switch.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I therefore

contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent in the United States is:

1. A control device comprising a disc provided with a spiral groove on one side, means rotatably mounting said disc, driving means connected to drive said disc in a predetermined direction at a predetermined low speed, biasing means connected to said disc to turn said disc in the opposite direction for return rotation of said disc to a predetermined starting position, an operating member having a portion extending into said groove, and a switch actuated by said operating member when said disc is turned from said starting position by said driving means.

2. A control device comprising a disc provided with a spiral groove on one side, means rotatably mounting said disc, driving means connected to drive said disc in a predetermined direction at a predetermined low speed, biasing means connected to said disc to turn said disc in the opposite direction for return rotation of said disc to a predetermined starting position, an operating member having a portion extending into said groove, a switch actuated by said operating member when said disc is turned from said starting position by said driving means, and braking means for said disc actuated by said operating member to bring said disc to rest gradually in said starting position.

3. A control device comprising a disc provided with a spiral groove on one side, means rotatably mounting said disc, a motor connected to drive said disc in a predetermined direction at a predetermined low speed, a biasing spring connected to said disc to turn said disc in the opposite direction for return rotation of the disc to a predetermined starting position, a bell crank having a portion at one end extending into said groove, a switch in position to be operated by the other end of said bell crank when said disc is turned by said motor, and a spring arm on said other end of said bell crank in position to engage the edge of said disc when said disc is turned back to said starting position thereby frictionally to brake said disc to rest.

4. A control device comprising a support, a driving motor secured to one side of said support, a shaft extending through an aperture in said support, a speed reducing gearing connecting said shaft to said motor for a predetermined low speed operation of said shaft in a predetermined direction, a disc secured to said shaft on the other side of said support, said disc being provided with a spiral groove, a biasing spring connected to said disc to turn said disc in the opposite direction for return movement of said disc to a predetermined starting position, a switch operating member mounted on said support adjacent said disc extending in parallel relation with said disc, a projection on the end of said member extending into said groove, said projection being adjacent the end of said groove at the periphery of said disc when said disc is in said predetermined starting position whereby when said motor is energized said disc is turned to move said projection toward the center of said disc and thereby move said member, and a switch mounted on said support adjacent said disc operated by said member when said disc is turned by said motor.

CARL E. BAZLEY.