

Sept. 22, 1964

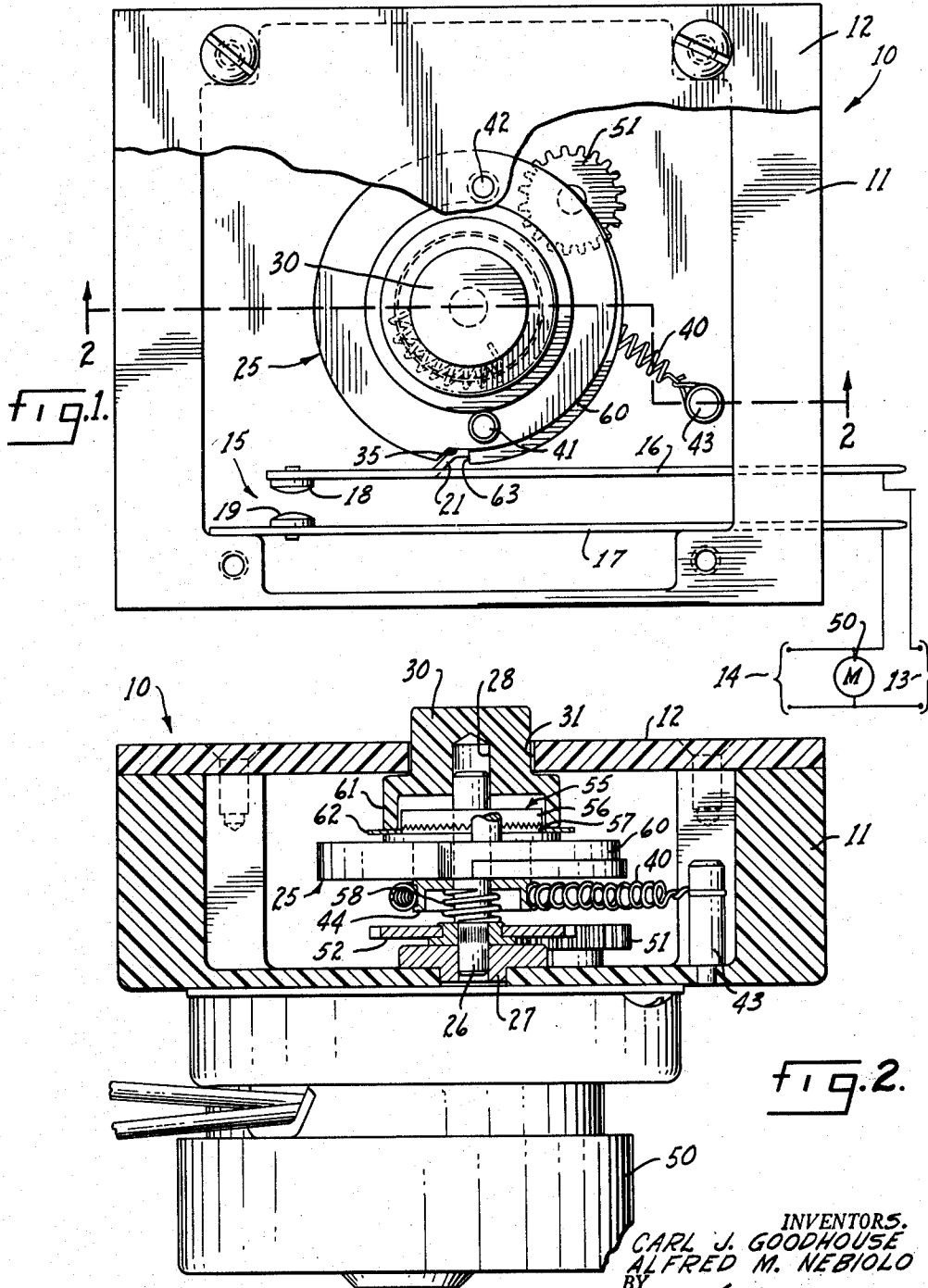
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3,150,241

PUSHBUTTON TIMER

Filed Dec. 2, 1959

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

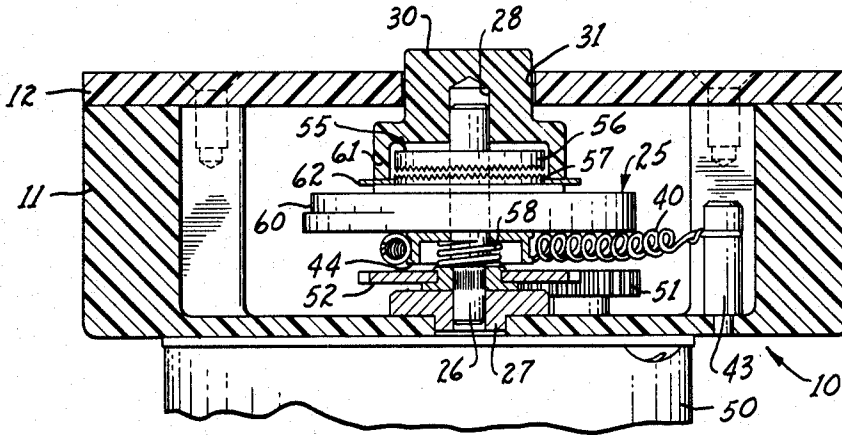


fig. 3.

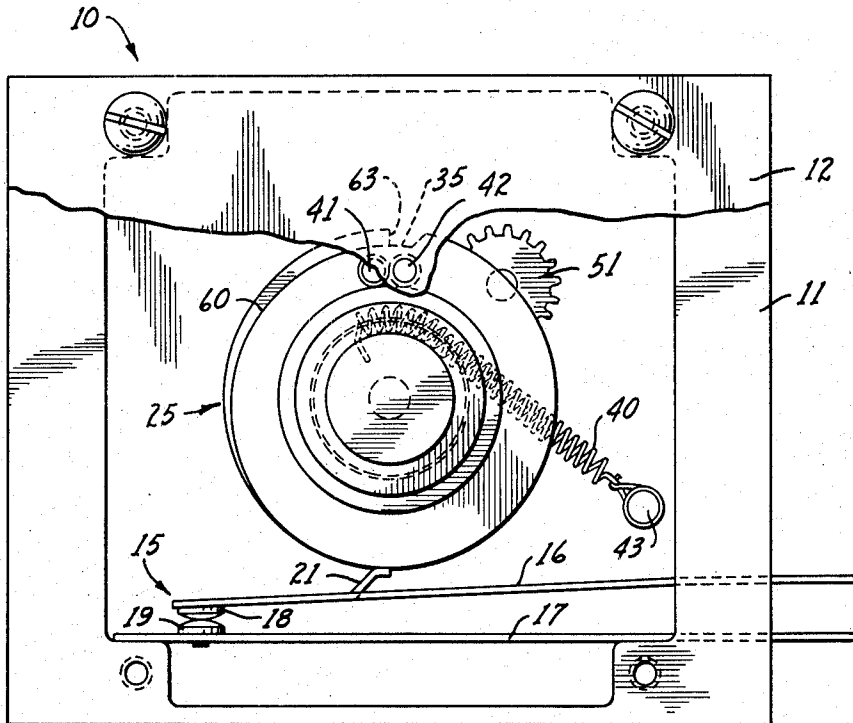


fig. 4.

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3,150,241

PUSHBUTTON TIMER

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The present invention relates to switch controlling timers and concerns more particularly a pushbutton activated timing device for controlling an electric circuit.

Many kinds of electrical equipment are normally operated for limited, predetermined periods of time. It is often desirable to control such equipment with a simple pushbutton or similar one-element control. That is, each time the button is depressed, the equipment controlled is operated through one predetermined time cycle.

It is therefore the primary aim of the invention to provide a timer which will accurately and reliably control an electrical switch for a limited period upon operation of a simple pushbutton or similar operator.

An important object of the invention is to provide a timer of this type which is simple in design and inexpensive to manufacture.

With more particularity, it is an object to provide a timer as characterized above which permits the use of standard switch contact arms without danger of arcing or contact fluttering.

It is also an object to provide a timer of the above type which operates a switch for a predetermined interval that can be quite accurately determined.

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings in which:

FIGURE 1 is a side elevation showing a timer constructed in accordance with the present invention with a portion of the timer case broken away to expose the interior parts;

FIGURE 2 is a section taken approximately along the line 2—2 of FIG. 1;

FIG. 3 is a section similar to FIG. 2 showing the parts in an alternate operating position; and

FIG. 4 is a view similar to FIG. 1 showing the parts in an alternate operating position.

While the invention will be described in connection with a preferred embodiment, it will be understood that we do not intend to limit the invention to that embodiment. On the contrary, we intend to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

Turning now to the drawings, there is shown a timer 10 embodying the invention and including a frame in the form of a cup-like housing 11 enclosed by a cover plate 12. In the illustrated embodiment, the timer 10 is shown arranged to control the application of elective power from a source connected to input terminals 13 to a set of output terminals 14 (see FIG. 1).

In order to control the electric circuit, the timer 10 is provided with a switch 15 including a pair of contact arms 16 and 17 carrying contacts 18 and 19, respectively. The arm 16 is formed with a lug 21 and is preferably made of resilient material.

For opening and closing the switch, the contact arm

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16 is mounted in the housing 11 so that the lug 21 is biased toward a switch operator which, in the preferred embodiment, is a cam wheel 25 journaled on a shaft 26. One end of the shaft 26 is rotatably supported in a bearing 27 mounted in the timer housing 11, and the other end is piloted in a cylindrical hole 28 formed in a pushbutton 30. The pushbutton 30 serves as the operator for the timer 10 and is slidably mounted in an aperture 31 formed in the timer cover plate 12.

Under normal static conditions, the contact arm lug 21 is received in a depression 35 formed in the periphery of the cam wheel 25 so that the switch 15 is not operated (see FIG. 1). In the illustrated embodiment, the switch 15 is open when in its normal non-operated condition.

Upon depression of the pushbutton 30, the lug 21 on the switch contact arm 16 is brought from the depression 35 to the periphery of the cam wheel 25 and the cam wheel is rotated from its normal position (FIG. 1) to a starting position (FIG. 4). With the lug 21 on the periphery of the cam wheel, the switch 15 is operated, i.e., closed. From its starting position, the cam wheel is driven back through a predetermined timed interval to its normal position whereupon the lug 21 again drops into the depression 35 and the switch 15 is restored to its normal open condition. The switch 15 thus remains operated for the time interval during which the lug 21 rests on the periphery of the cam wheel 25.

To establish the starting position for the cam wheel and to move the cam wheel from its normal position to the starting position, a tensioned spring 40 is arranged to urge the wheel in a clockwise direction (in FIGS. 1 and 3) so as to bring a stop pin 41 carried by the cam wheel into engagement with a stop pin 42 mounted on the timer cover plate 12. The spring 40 is anchored at one end to a pin 43 mounted in the timer housing 11. The opposite end of the spring 40 is wrapped about a pulley-like member 44 secured to the cam wheel 25. With the cam wheel in its normal, FIG. 1 position, the interengagement of the contact arm lug 21 with the depression 35 holds the cam wheel in position against the force exerted by the tensioned spring 40.

For returning the cam wheel 25 from its starting to its normal position during a predetermined time interval, a timing motor 50 is mounted on the timer housing 11 and is drivingly coupled to the shaft 26. The output shaft of the motor carries a pinion 51 which is in meshing engagement with a gear wheel 52 secured to the shaft 26.

The cam wheel 25 is releasably coupled to the shaft 26 by a clutch 55 which, in the preferred embodiment, is a face clutch having opposed toothed elements 56 and 57 secured, respectively, to the shaft 26 and the cam wheel 25. A spring 58 bears against the member 44 and thus urges the toothed members 56, 57 into gripping engagement.

In accordance with the invention, the cam wheel 25 is formed with a cam surface 60 extending from the bottom of the depression 35 to the periphery of the cam wheel, and the pushbutton 30 is arranged to both open the clutch 55 and shift the cam wheel axially so as to bring the switch arm lug 21 from the depression 35 onto the cam surface. In the preferred embodiment, the cam surface 60 has a spiral configuration and opens into one side of the depression 35. Thus, when the cam wheel 25 moves axially between its FIG. 2 and FIG. 3 positions,

the contact arm lug 21 slides easily from the depression 35 onto the spiral surface 60 so as to free the cam wheel for rotation under the urging of the tensioned spring 40. Rotation of the cam wheel cams the lug 21, and thus the contact arm 16, downwardly in FIGS. 2 and 3 so as to operate the switch 15 by closing the contacts 18, 19.

The pushbutton 30 is formed with an annular shoulder 61 which bears against a washer 62 that is interposed between the pushbutton and the cam wheel. Depression of the pushbutton 30 against the resistance of the spring 58 shifts the cam wheel 25 axially and thus simultaneously performs two functions. First, the clutch element 57 is moved out of engagement with the cooperating element 56 so that the clutch 55 is opened. Second, the lug 21 on the contact arm 16 is brought out of the depression 35 and onto the spiral cam surface 60. As soon as the lug 21 clears the depression 35 and the clutch 55 is opened, the cam wheel 25 is freed so that the spring 40 can rotate the cam wheel to its starting position wherein the pins 41 and 42 are in abutment. This results in operation of the switch 15 and closing of the contacts 18 and 19.

The motor 50 is connected in series with the contacts 18 and 19 (see FIG. 1) so that upon operation of the switch 15 the motor 50 is energized to drive the shaft 26 and hence the clutch element 56. Therefore, as soon as the pushbutton 30 is released so as to allow the spring 58 to re-engage the clutch 55, the driven clutch element 56 begins driving the cam wheel 25 in a counterclockwise direction (in FIGS. 1 and 4) back toward its normal position. At the end of the predetermined time interval required to drive the cam wheel from its starting position to its normal position, the lug 21 will again drop into the depression 35 so as to restore the switch to its normal open condition, whereupon the motor 50 will be de-energized and operation of the timer will cease.

It will be appreciated that since the cam wheel 25 is moved axially to initiate the timing cycle, the lug 21 is moved sideways from the depression 35. It is thus possible, as an important feature of the invention, to provide the depression 35 with a sharp right-angled drop-off 63 from which the lug 21 drops as the cam wheel 25 moves to its normal position. The sharp right-angled drop-off 63 results in substantially instantaneous restoration of the switch 15 to its normal condition as the lug 21 drops from the periphery of the cam wheel into the depression 35. In this way, the duration of the timing cycle can be accurately predetermined even though the timing motor is arranged to rotate the cam wheel at a very slow speed.

Furthermore, since the contacts 18 and 19 are opened suddenly upon movement of the lug 21 past the right-angled drop-off 63, it will be appreciated that the contacts open cleanly without arcing or fluttering. It is therefore possible to use a conventional switch construction employing relatively simple and inexpensive contact arms such as the arms 16 and 17. Operation of the switch 15, that is closing of the contacts 18 and 19, is likewise performed quite quickly since the tensioned spring 40 snaps the cam wheel 25 from its normal to its starting position and the lug 21 is quickly and positively cammed by the spiral surface 60 so as to move the contact arm 16 and operate the switch.

It will be understood by those skilled in the art that the stop pin 42 may be adjustably mounted, if desired, so that the starting position of the cam wheel 25 can be varied to produce switch operating intervals of various selected lengths. As this is a common expedient in such timers, the pin 42 has been shown in the illustrated construction as being fixed so as to simplify the disclosure and facilitate an understanding of the invention.

It will also be appreciated that the timer 10 is quite simple in design and hence well suited for economical high-volume production. The economy and utility of the timer 10 is greatly enhanced by its ability to utilize a

simple spring arm construction without danger of contact arcing or fluttering.

We claim as our invention:

1. A timer for operating a switch comprising, in combination, a shaft drivingly coupled to a timing motor, a cam wheel journaled on said shaft, clutch elements releasably coupling said cam to said shaft, an operator associated with said cam wheel for axially sliding the wheel on said shaft so as to release said clutch, a switch operating arm biased against the periphery of said wheel, said arm having a lug normally received in a depression formed in said wheel, means tending to rotate said wheel toward a stop so that upon release of said clutch the cam wheel is rotated to a starting position against the stop, said wheel having a camming surface adjacent said notch whereby the lug is brought onto said surface from said depression when the wheel is slid axially to release the clutch, said camming surface extending from said depression to the periphery of said cam wheel so that rotation of the wheel to said starting position when the clutch is released brings the lug to the periphery of said wheel and causes the arm to operate said switch, and means for energizing said motor when said switch is operated to drive said cam wheel when said clutch is engaged until said lug drops into said depression to restore the switch.

2. A timer for operating a switch comprising, in combination, a shaft drivingly coupled to a timing motor, a cam wheel journaled on said shaft, face clutch elements releasably coupling said cam to said shaft, a pushbutton operator associated with said cam wheel for axially sliding the wheel on said shaft and thus separating said face clutch elements, a switch operating arm biased against the periphery of said wheel, said arm having a lug normally received in a depression formed in said wheel, means tending to rotate said wheel toward a stop so that upon release of said clutch the cam wheel is rotated to a starting position against the stop, said wheel having a spiral surface adjacent said notch whereby the lug is brought onto said surface from said depression when the wheel is slid axially to separate the clutch elements, said spiral surface extending from said depression to the periphery of said cam wheel so that rotation of the wheel to said starting position when the clutch is released brings the lug to the periphery of said wheel and causes the arm to operate said switch, and means for energizing said motor when said switch is operated to drive said cam wheel when said clutch elements are engaged until said lug drops into said depression to restore the switch.

3. A timer for operating a switch comprising, in combination, a timing motor, a switch operator, clutch elements releasably coupling said operator to said motor, a pushbutton associated with said switch operator for shifting the operator so as to release said clutch, a switch operating arm biased against the periphery of said switch operator, said arm having a lug normally received in a depression formed in said operator, means urging said operator toward a stop so that upon release of said clutch the switch operator is moved to a starting position against the stop, said operator having a camming surface adjacent said notch whereby the lug is brought onto said surface from said depression when the operator is shifted to release the clutch, said camming surface extending from said depression to the periphery of said operator so that movement of the operator to said starting position when the clutch is released brings the lug to the periphery of said operator and causes the arm to operate said switch, and means for energizing said motor when said switch is operated to drive said switch operator when said clutch is engaged until said lug drops into said depression to restore the switch.

4. In a switch actuating timer having a switch operating lug controlled by a rotatable cam wheel that is biased from a normal angular position toward a starting angular position and is driven by a timing motor back from the starting position to the normal position, the improve-

ment comprising, in combination, mounting the cam wheel for axial movement and providing a spiral surface on said cam wheel extending from the periphery of said wheel to the bottom of a depression having a right-angled drop-off formed in the periphery of the wheel to receive said lug, so that said wheel can be shifted axially to move the lug from the depression to the spiral surface where it is cammed to the periphery of the wheel without passing over the right-angled drop-off.

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References Cited in the file of this patent

UNITED STATES PATENTS

1,831,605	Porter	Nov. 10, 1931
2,374,590	Dunham	Apr. 24, 1945
2,792,059	Mathews	May 14, 1957
2,925,478	Yamasaki	Feb. 16, 1960
2,937,247	Laviana et al.	May 17, 1960