April 15, 1958 H. GREENWALD 2,831,078

SEQUENCE SWITCH ARRANGEMENT FOR CYCLE TIMERS

Filed Oct. 3, 1956

FIG. 1

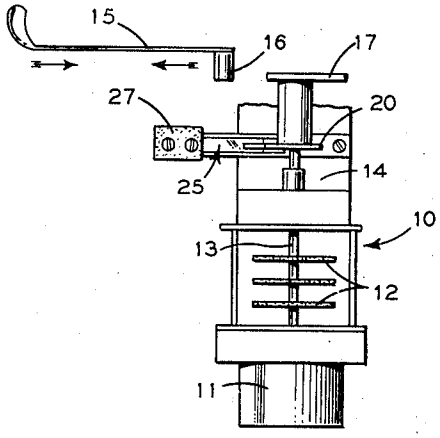


FIG. 2

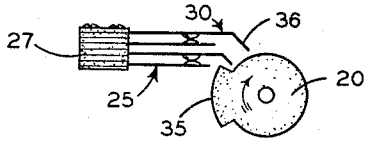


FIG. 3

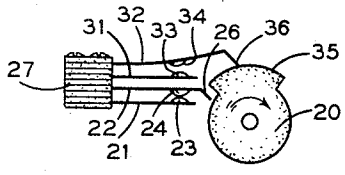
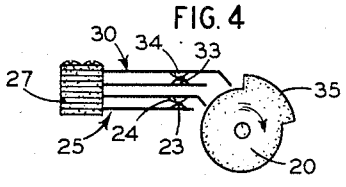


FIG. 4



INVENTOR.
Harry Greenwald
BY
Irving Deidman
ATTORNEY

United States Patent Office 2,831,078
Patented Apr. 15, 1958

2,831,078

SEQUENCE SWITCH ARRANGEMENT FOR CYCLE TIMERS

Harry Greenwald, Blauvelt, N. Y., assignor to H. Greenwald Co., Inc., Maspeth, N. Y., a corporation

Application October 3, 1956, Serial No. 613,696

8 Claims. (Cl. 200—37)

This invention relates to cycle timers for electric appliances, such as automatic washers and driers, and more particularly to a novel sequentially operated switch arrangement for a coin slide controlled cycle timer.

Conventional cycle timers include a motor driving a shaft operating one or more wafer or disk type switches which initiate, control and terminate the several functions of an appliance during an operating cycle. Initiation of the cycle is effected by turning the shaft to a "start" position at which the timer motor is energized to drive the shaft. When the shaft reaches the "stop" or "off" position, the timer motor is automatically deenergized to terminate the cycle, and re-starting can be effected only by again turning the shaft to the "start" position.

It is frequently desirable, particularly in the case of coin-controlled appliances, that a certain function be initiated only after a pre-set time delay following initiation of another function. For example, in the case of a coin-controlled washer or laundry machine, it is sometimes desirable that the supply of hot water to the washer be delayed until a pre-set time after the cycle has been started, rather than have the hot water supplied immediately at the start of the cycle.

Such special sequence of operation can, of course, be fairly easily incorporated in the timer during manufacture or assembly of the later, for example by blanking off, with dielectric material, the initial part of the wafer switch contacts controlling the initiation and duration of the function to be delayed.

However, timers with this special sequence are non-standard, and must be ordered "special." In the more usual case, the standard timer furnished with an appliance must be altered in the field to provide the desired delayed sequence. This is not only difficult to effect, due to the close clearances between the timer switches, but also frequently requires dismantling of the timer. Not only is the operation time consuming and costly, but also it is difficult to the point of impossibility to obtain the desired accurately timed relation between the starts of the two sequential functions.

A further factor, characteristic of both factory and field alteration or modification of the timer, is that the blanking out of part of the switch contacts with dielectric, reduces the "throw" of the switches to an extent where a clean and sharp make or break of the contacts cannot be obtained, with resultant relatively rapid deterioration of the contacts due to sparking.

In accordance with the present invention, the foregoing difficulties are obviated and either factory or field modification of a timer, to provide a delayed sequence, is effected in a simple, inexpensive manner and with resultant accurate setting of the time delay. More specifically, a pair of jack type switches are mounted on the timer and arranged to be sequentially operated by a rotary cam adjustably secured to the timer shaft. This cam has a sector shaped projection extending from its otherwise circular surface, arranged to engage operating arms on the two switches.

The switches are arranged so that the operating arm of one switch extends beyond that of the other, in the direction of cam rotation, by a predetermined amount. The arcuate length of the cam projection is accurately selected, with respect to the spacing of the operating arms of the switches, so as to delay the operation of the second switch for the desired pre-set time after operation of the first switch. Furthermore, the radial projection of the cam sector is made sufficiently great to effect a large "throw' of the switch contacts, thus providing a clean make and break. The switches may be connected in series with the usual timer switches controlling the two functions so that, with the cam operated switches normally open, the usual switches are ineffective to initiate the functions until closure of the cam switches. Alternatively, the cam switches could be normally closed and connected in shunting relation to the usual timer switches.

For an understanding of the invention principles, reference is made to the following description of a typical embodiment thereof as illustrated in the accompanying drawing. In the drawing:

Fig. 1 is an elevation view of a cycle timer and a coin controlled slide for initiating operation thereof, the timer including the sequentially operated switch arrangement of the invention; and

Figs. 2, 3 and 4 are plan views of the switch arrangement, illustrating three operating positions thereof.

Referring to Fig. 1, a conventional cycle timer **10** is illustrated as including a driving motor **11** for operating wafer type cycle controlling switches **12** on a rotatable shaft **13** driven by motor **11** when the latter is energized. To start the timer, shaft **13** is manually operated to the "start" position wherein motor **11** is energized to rotate shaft **13**. The motor continues to rotate shaft **13** until the shaft reaches the "stop" position at which motor **11** is automatically deenergized. During rotation of shaft **13**, switches **12** effect the desired sequence of operations such as, for example, filling a washer with water, washing the clothes, rinsing, and spin drying. The switches also shut off motor **11** at the "stop" position.

The timer **10** is arranged to be moved to the "start" position by a coin controlled slide **15** carrying a roller **16** engageable with a cam **17** on the upper end of shaft **13**. When a coin of the proper denomination is inserted in slide **15**, the slide may be pushed in to engage roller **16** with cam **17** to rotate shaft **13** to the "start" position.

As stated, it is frequently desirable that a certain time-controlled function, such as turning on the hot water, be not initiated simultaneously with starting of the timer, or with another function, but at a predetermined interval thereafter. This sequence has previously been effected by covering, with dielectric material, part of the circuit controlling contacts of wafer switches **12**. This can be effectively accomplished as a factory operation during manufacture or assembly of the timer. However, such special sequence arrangements are not usually provided for in the timers as installed at the factory but require alteration of the timer in the field. Due to the compactness and close spacing of wafer switches **12**, incorporation of the special sequence arrangements is a difficult operation to perform in the field without complete dismantling of the timer. This is not only a time consuming and costly operation but, furthermore, it is difficult to "time" the sequence precisely. In addition, both in factory installed and field modified special sequence arrangements involving alteration of wafer switch **12**, the clearance problems are such that clean making and breaking of the switch contacts cannot be attained, with resultant arcing and rapid deterioration of the contacts.

The special switch arrangement of the invention avoids these difficulties and provides a simple and simply ad-

justed special switching sequence with clean making and breaking of the switch contacts. In accordance with the invention, a special cam **20** is adjustably secured to shaft **13** and arranged to sequentially operate a pair of jack type switches **25** and **30** mounted on mounting bracket **14** of liner **10**.

Switch **25** includes spring arms **21**, **22** carrying contacts **23**, **24** respectively. Arm **22** extends beyond arm **21** and has a bent operating end **26** for coaction with cam **20**. The spring arms are secured in a dielectric mounting base **27** which also mounts the spring arms **31**, **32**, of switch **30**, carrying contacts **33**, **34** respectively. It will be noted that spring arm **32** extends somewhat beyond arm **22** of switch **25** and has a somewhat longer bent operating arm **36**.

Cam **20** has a sector shaped projection **35** extending into the path of switch operators **26** and **36**. The arcuate length of projection **35** is selected in accordance with the desired time interval between operation of switches **25** and **30**.

Fig. 2 illustrates the "stop" position of the timer. Both switches **25** and **30** are closed but the washer motor circuit has been opened by a wafer switch **12**, switch **25** also controlling operation of the washer motor. Switch **30**, in the illustrative example, controls the flow of hot water. In one typical cycle, as slide **15** is operated to start the cycle, roller **16** engages cam or finger **17** to rotate shaft **13** to the "start" position energizing timer motor **11**. In the "start" position, projection **35** opens both switches **25** and **30**. After an interval, finger **26** rides off projection **35** to close switch **25** starting the washer motor, as illustrated in Fig. 3. A pre-set time interval thereafter, finger **36** rides off projection **35** starting the flow of hot water, as shown in Fig. 4. The timer continues to operate until the "stop" position of Fig. 2 is reached, at which time a wafer switch **12** opens the circuit of timer motor **11** in the usual manner.

It will be noted that the throw of switches **25** and **30** is such as to effect a clean make and break of the contacts. The arrangement is easily incorporated in a timer and easily adjusted for precise timing.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the invention principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. In a timer controlled electric appliance having a cycle timer including a timer motor energized upon movement of the timer to a start position, a shaft rotated by said timer motor, and function control switch means operated by rotation of said shaft; means for delaying the initiation of a selected function for a predetermined time interval after initiation of another selected function, said means comprising a cam adjustably secured to said shaft for rotation therewith and having a generally circular periphery concentric with the axis of said shaft; and a pair of switches mounted on said timer and each, when operated, controlling initiation of a different function; each switch having an operator cooperable with said cam, and the operators being spaced a pre-set distance apart circumferentially of said cam; said cam having a switch operating interruption in its periphery having an arcuate extent corresponding to such predetermined time interval to operate one switch such predetermined time interval after operation of the other switch.

2. Means as claimed in claim 1 in which said switches are normally closed switches opened when the switch operators engage said interruption in the cam periphery and released to close when the operators leave the trailing end of said interruption.

3. Means as claimed in claim 1 in which said peripheral interruption comprises a sector shaped lobe projecting from the circular periphery of said cam.

4. Means as claimed in claim 1 in which said peripheral interruption comprises a sector shaped lobe projecting from the circular periphery of said cam; and said switches are normally closed switches opened when the switch operators engage said lobe and released to close when the operators leave the trailing end of said lobe.

5. Means as claimed in claim 4 in which said switches are jack type switches each having a pair of contact carrying spring arms.

6. Means as claimed in claim 4 in which said switches are jack type switches in a common mounting each having a pair of contact carrying spring arms; said operators each comprising a bent end on one switch arm extending toward said cam.

7. Means as claimed in claim 6 in which the throw of said lobe is sufficient to provide a clean and pronounced make and break of the switch contacts.

8. Means as claimed in claim 1 in which said switches are in overriding circuit relation with said switch means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,044,617	Leonard	June 16, 1936
2,073,756	Osten-Sacken	Mar. 16, 1937
2,215,414	Wilcox	Sept. 17, 1940
2,302,626	Gallagher et al.	Nov. 17, 1942
2,487,573	Meier	Nov. 8, 1949