Dec. 12, 1967 J. K. CLARK ET AL 3,358,092

PRESETTABLE TIMER

Filed Feb. 1, 1966

FIG. 1

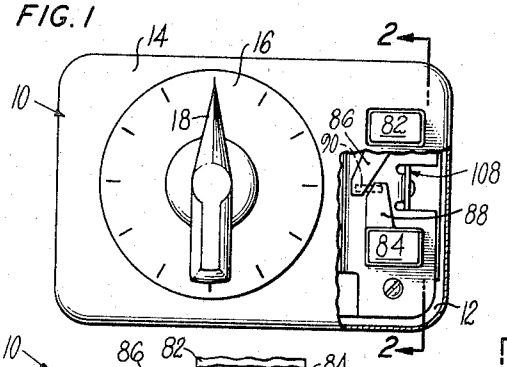


FIG. 3

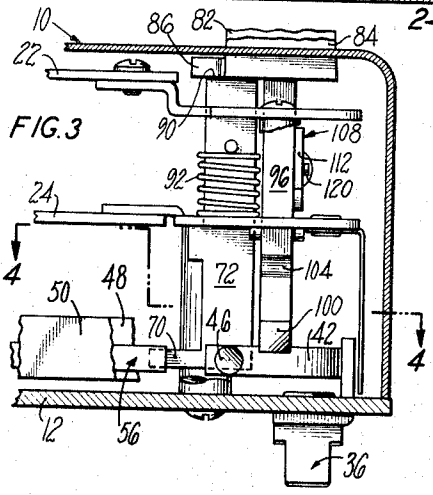


FIG. 2

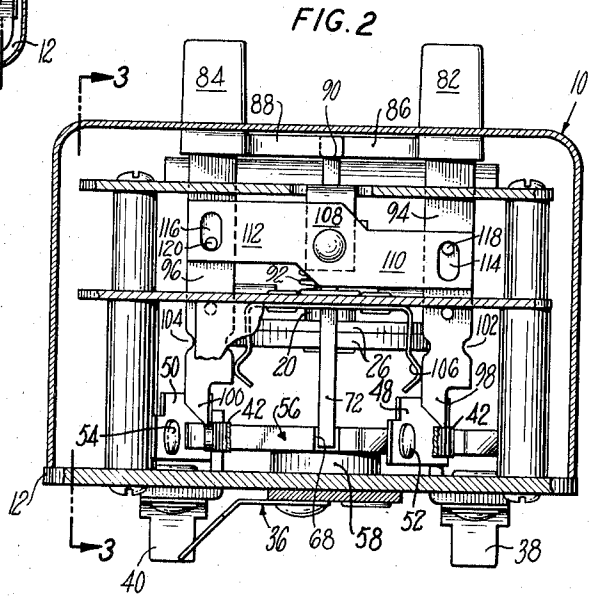
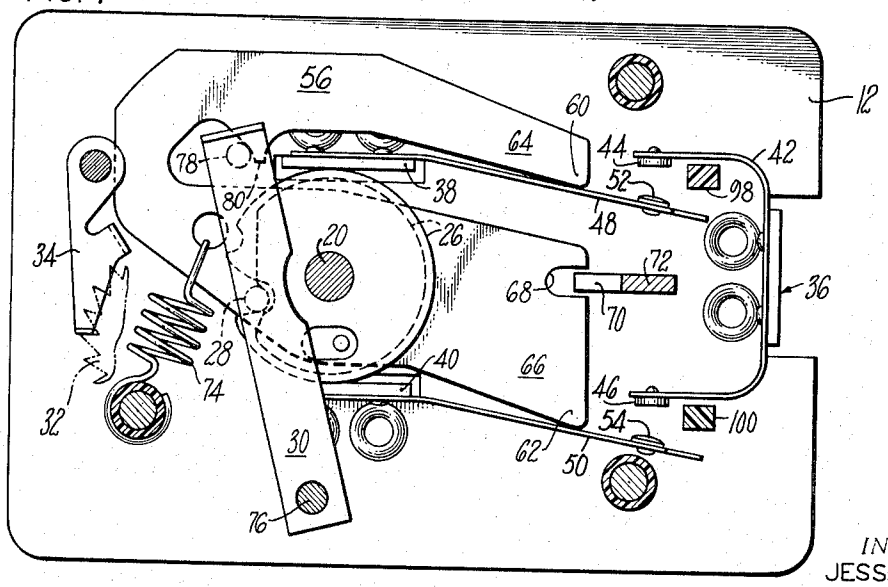


FIG. 4



INVENTORS
JESSE K. CLARK
JAMES A. DRAGHI

BY
Lindsey, Pattman and Hayes
ATTORNEYS

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PRESETTABLE TIMER

Jesse K. Clark, Newington, and James A. Draghi, Manchester, Conn., assignors to M. H. Rhodes, Inc., Hartford, Conn., a corporation of Delaware

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The present invention relates to presettable timers and the like for controlling the duration of a desired operation. More specifically, the present invention relates to a new and improved presettable timer particularly well suited for use with switch controlled operations.

A primary object of the present invention is to provide a new and improved presettable timer of the type described adapted to control the independent initiation, duration and termination of a plurality of operations.

Another object of the present invention is to provide an improved timer for controlling multiple operations incorporating a switching mechanism utilizing a push button release for initiating both the timing mechanism and the operation to be timed.

A further object of the present invention is to provide a new and improved presettable timer for use in connection with a plurality of operations which provides for the complete and positive termination of an initial operation prior to the actuation of a secondary operation thereby preventing overlap in the timed operations and damage to the mechanisms associated therewith.

A still further object of the present invention is to provide a presettable timer of sturdy construction and reliable operation which not only will accomplish the above stated objects but will also automatically provide a reset of the associated switch mechanism upon termination of a timed operation.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application which will be indicated in the appended claims.

In the drawing:

FIG. 1 is a front elevational view, partially broken away, of a timer embodying the present invention;

FIG. 2 is an enlarged sectional view of the timer of FIG. 1 taken along the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary view, partially broken away and partially in section, taken along the line 3—3 of FIG. 2; and

FIG. 4 is a sectional view of the timer of FIG. 1 taken along the line 4—4 of FIG. 3.

Referring now to the drawing in greater detail wherein like referenced characters indicate like parts throughout the several figures, there is shown a timer of the general type described in U.S. Patent No. 3,107,539 entitled Release Mechanism for Preset Timers, issued to C. P. Cairelli. For the purpose of illustration only and so that the invention may be clearly understood the presettable timer of the present invention is described in connection with the operation of the two-circuit electrical switch suitable for use in connection with a two-speed motor. The timer, illustrated in an Off condition in all figures of the drawing, is shown to comprise an outer casing or housing 10 mounted on the generally flat base member 12 and enclosing both the clock and switching mechanisms of the timer. The front face 14 of the casing 10 is provided with a circular number dial 16 affixed thereto for assisting in the setting of the clock mechanism, which setting is accomplished by the clockwise movement of the pointer 18 to a desired position. Secured to the pointer and extending rearwardly therefrom through the

casing 10 is a main shaft or winding arbor 20. The shaft is journaled between the spaced parallel frame plates 22, 24 and is effective not only to wind the main spring of the clock mechanism but also to drive the timer cam assembly 26 whose operation is more fully described in U.S. Patent No. 2,961,989, entitled Timer Switch, issued to L. J. Laviana. In the embodiment illustrated, the clock mechanism is arranged so that clockwise movement of the pointer 18 with corresponding rotation of the main shaft 20 and cam assembly 26 causes movement of the cam follower 28 and its associated follower arm 30 (FIG. 3) away from the shaft, the follower 28 being maintained in contact with the cam assembly by a retaining spring not shown. The cooperative engagement between the escapement wheel 32 of the clock mechanism and the stop pawl 34 biased into contact therewith is not disturbed by the clockwise rotation of the shaft. Accordingly, the foregoing operation will be effective to preset the timer and maintain the clock mechanism in a spring loaded condition ready for initiation by release of the escapement wheel.

The plural circuit switch incorporated in the timer of the present invention advantageously acts to prevent the inadvertent closing of both circuits at the same time thereby protecting an associated mechanism, such as a two-speed motor, from the damage which would result if both circuits were permitted to be energized simultaneously. As shown, the switch includes three electrical terminals secured to the base member 12, i.e., a central terminal, generally designated 36, and a pair of separate connecting terminals 38, 40 adapted for association with different circuits of the two-speed motor. The central terminal 36 is provided with a fixedly positioned U-shaped conductor bar 42 carrying a pair of contact buttons 44, 46 adjacent its free ends while the separate connecting terminals 38, 40 are each provided with flat, individual, spring-like contact blades 48, 50 which carry complementary contact buttons 52, 54 for cooperating with the contact buttons 44, 46, respectively, on the central terminal 36.

Secured to the base member 12 and spaced forwardly therefrom is a bifurcated switch cam 56 for controlling the opening and closing of the two sets of contact buttons. The cam is pivotally mounted on the cam stud 58 which in the embodiment shown is coaxially aligned with the main winding shaft 20. The cam includes a pair of shoulder portions 60, 62 formed in the cam legs 64, 66, respectively, which portions act against the leaf spring contact blades 48, 50 to move the buttons 52, 54 out of contact with their complementary buttons 44, 46 or to permit contact therebetween. Leg 66 of the control cam 56 is further provided with a peripheral notch 68 on the end thereof adjacent shoulder portion 62 for receiving the protruding foot 70 of the plunger latch 72 and cooperating therewith to maintain the cam 56 immobile subsequent to the presetting of the clock mechanism. The cam 56 is further provided with a drive spring 74 for continuously biasing the cam in a counterclockwise direction about its pivot point.

As shown in FIG. 4 the follower arm 30 is mounted at one end for pivotal movement about the pin 76 and carries on its free end a control cam driving pin 78 which abuts the flange-like portion 80 of the cam leg 64, the portion 80 protruding into the bifurcating slot of the cam. As the timer is preset and the timer cam assembly 26 moves clockwise driving the arm 30 outwardly from the shaft 20, the pin 78 moves away from the flange 80 permitting the cam 56 to rotate counterclockwise about its pivot point under the influence of the drive spring 74. However, as mentioned hereinbefore the foot 70 of the plunger latch 72 cooperates with the notch 68 of the control cam to prevent the counterclock-

wise movement thereof. Accordingly, even though the clock mechanism is set, the shoulders 60, 62, acting against the leaf spring contact blades 48, 50, continue to prevent the closing of either circuit of the switch so long as the latch 72 holds the cam 56 against further movement under the bias of its drive spring 74.

In accordance with the present invention the plunger latch 72 is actuated to release the switch cam 56 by the independent action of either of the push buttons 82, 84 which protrude through the front face 14 of the casing adjacent the circular number dial 16. As best shown in FIG. 1 the push buttons 82, 84 are provided with laterally extending fingers 86, 88 which contact different portions of the top surface 90 of the plunger and act against that surface to depress the latch 72 against the bias of its return spring 92.

Extending rearwardly from the push buttons and securely affixed thereto are a pair of elongated, generally rectangular switch rods or levers 94, 96 provided with tapered free end portions 98, 100 positioned adjacent the contact buttons on central terminal 36. The tapered end portions 98, 100 although terminating below the top surface of conductor bar 42 nevertheless permit closure of the respective circuits so long as the levers are not depressed. Each of the levers additionally are provided with a pair of indentations 102, 104 which cooperate with the detent spring 106 to hold the lever in its depressed condition during the timed operation. Mounted intermediate the levers for pivotal movement is an interconnecting armature, generally designated 108, comprising integral, axially offset arm portions 110, 112 provided with elongated slots 114, 116 for receiving the side pins 118, 120 protruding from the levers 94, 96. The pin and slot arrangement provides a lost motion interconnection between the switch levers which facilitates the independent depression of the levers during initiation and termination of the timed operation.

As will be appreciated the depression of either lever will cause the free end thereof to be interposed between the conductor bar 42 and the contact blade of the connecting terminal and, since the width of the interposed lever is greater than the combined widths of the complementary contact buttons, closure of the circuit associated with that lever will be prevented. The finger of the push button being depressed will act against the top surface of the plunger to force it downwardly against the bias of its return spring, causing the foot 70 of the plunger to slide out of the notch 68 releasing the cam 56 for counterclockwise rotation by its drive spring 74. The counterclockwise movement of the shoulders 60, 62 permit the contact buttons 52, 54 to approach their respective contact buttons 44, 46 until interrupted by the depressed free end portion of a switch lever. Additionally, as the switch cam 56 moves counterclockwise it contacts the stop pawl 34 causing the pawl to move out of contact with the escapement wheel 32 thereby initiating the timing operation simultaneously with the closure of one of the operating circuits.

Advantageously the operation being timed may be switched at any time during the movement of the clock mechanism. This is accomplished by merely depressing the second push button causing the free end of the lever associated therewith to move between the contact blade and the conductor bar thereby opening the circuit. As the lever moves downwardly the interconnecting armature causes the initially depressed lever to move upwardly a sufficient amount to permit closure between the contact buttons previously held open. However, it is a feature of the present invention that the free ends of the levers be tapered so as to cause a momentary period during which both circuits are open thereby preventing damage to the mechanism being controlled by the timer.

As the clock mechanism is driven by the main spring it causes the winding arbor 20 and the associated cam assembly 26 to rotate in a counterclockwise direction moving the pointer 18 to the OFF position. The notch of the cam assembly is thereby brought into register with the cam follower 28, permitting movement of the follower arm 30 toward the shaft 20 under the influence of its retaining spring. The pin 78 moving with the arm 30 contacts flange 80 and drives the switch cam 56 in a clockwise rotational direction, permitting the pawl 34 to engage the escapement wheel 32 and stop the operation of the clock mechanism. At the same time the shoulders 60, 62 of the switch cam act against the contact blades of the separate terminals, opening the circuit and stopping the operation being timed. The notch 68 of the cam registers with the foot 70 of the plunger permitting the plunger to move forwardly under the bias of its compressed return spring 92. It will be appreciated that the forward movement of the plunger 72 pushes the depressed button outwardly whereby the entire mechanism is automatically ready for another sequence of operation. Additionally, since the plunger is free to move within the notch of the cam any subsequent depression of the pushbuttons will be ineffective in initiating another operation until the timer is reset, the latch automatically moving the push buttons forwardly to their OFF position.

As will be appreciated from the foregoing description the present invention provides a new and improved timer switch adapted to control the initiation, duration, and termination of a plurality of independent operations. This presettable timer additionally provides a switching operation which utilizes a multiple push button release for initiating the timing operation while at the same time preventing any overlap in the operation of the plural circuits associated therewith.

As will be apparent to persons skilled in the art, various modifications and adaptations of the structure above described will become readily apparent without departure from the spirit and scope of the invention, the scope of which is defined in the appended claims.

We claim:

1. A presettable timer including a switch assembly having a control member movable to initiate and terminate timed operation; a latch preventing movement of the control member and being releasable to permit movement of the member with simultaneous initiation of a timed operation and at least a pair of operating levers, means mounted on each lever so as to independently release the latch, said levers being associated with different operations to be timed whereby the action of one of said levers against the latch releases the control member and simultaneously initiates the operation associated with the actuation of that lever.

2. The timer of claim 1 wherein the switch assembly includes at least two switches movable between open and closed positions, each switch having associated therewith one of said operating levers adapted to prevent closure thereof, said levers being interconnected and adapted for independent alternate actuation whereby simultaneous closure of more than one switch is prevented.

3. The timer of claim 1 wherein the switch assembly includes at least two switches movable between open and closed positions, each switch having associated therewith one of said operating levers provided with a free end portion movable to prevent closure of the switch associated therewith, said levers being interconnected by pivotal means facilitating independent alternate actuation of each lever whereby simultaneous closure of more than one switch is prevented.

4. The timer of claim 1 wherein the switch assembly includes at least two switches movable between open and closed positions, said control member including means for driving the switches to an open position, each switch having associated therewith one of said operating levers for preventing simultaneous closure of more than one switch, said levers being interconnected and adapted for independent alternate actuation.

5. The presettable timer of claim 1 wherein the switch assembly includes at least two switches movable between

open and closed positions, said control member comprising a rotatable member bifurcated to include a pair of shoulders operative to drive the switches to an open position.

6. The timer of claim 1 including control member drive means for driving the control member and permitting latch controlled movement thereof; a central terminal; a plurality of independent terminals adapted for movement between an open and closed position with the central terminal; means operative to move the independent terminals to an open position, said operating levers being movable to prevent movement of the independent terminals to closed position, said levers being interconnected by an armature provided with lost motion interconnecting means for independent alternate actuation of each lever whereby simultaneous closure of more than one independent terminal is prevented.

7. The timer of claim 1 including timing means movable into and out of an OFF condition; control member drive means responsive to the timing means for driving the control member upon movement of the timing means into the OFF condition and permitting latch controlled movement while the timing means is out of the OFF condition; a plurality of movable electrical contact points operatively responsive to the control member for movement between open and closed positions, each of said points having one of said operating levers associated therewith, said levers being adapted to prevent movement of the points to the closed position, said levers being interconnected by an armature mounted for pivotal movement and provided with lost motion interconnecting means for independent alternate actuation of each lever.

8. The timer of claim 1 including timing means movable into and out of an OFF condition; control member drive means responsive to the timing means for driving the control member upon movement of the timing means into the OFF condition and permitting latch controlled movement while the timing means is out of the OFF condition; a central terminal having at least two contact points; a pair of independent terminals provided with contact points complementary to the points of the central terminal and movable between an open and closed position therewith, said control member including a pair of shoulders operative to move the independent terminal contact points to an open position upon movement of the timing means into the OFF condition, each set of points having associated therewith one of said operating levers provided with a tapered free end portion movable adjacent complementary contact points to prevent movement of the points to the closed position, said levers being interconnected by an armature mounted for pivotal movement and provided with lost motion interconnecting means for independent alternate actuation of each lever whereby simultaneous closure of both sets of contact points is prevented.

9. The timer of claim 1 including timing means provided with a cam assembly movable into and out of an OFF condition; a cam follower; control member drive means operatively connected to the cam follower for driving the control member upon movement of the cam assembly into the OFF condition, said drive means permitting latch controlled movement of the control member while the cam assembly is out of the OFF condition, said switch assembly including a central terminal having at least two contact points; a pair of independent terminals provided with contact points complementary to the points of the central terminal and movable between open and closed positions therewith, said control member including a pair of shoulders operative to move the independent terminal contact points to an open position upon movement of the cam assembly into the OFF condition, each of said central terminal contact points having associated therewith one of said operating levers provided with a tapered free end portion movable adjacent the contact point to prevent closure thereof with the complementary point of the independent terminal, said levers being interconnected by an armature mounted for pivotal movement and provided with lost motion interconnecting means for independent alternate actuation of each lever whereby simultaneous closure of both sets of contact points is prevented.

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BERNARD A. GILHEANY, *Primary Examiner.*

H. SPRINGBORN, *Assistant Examiner.*