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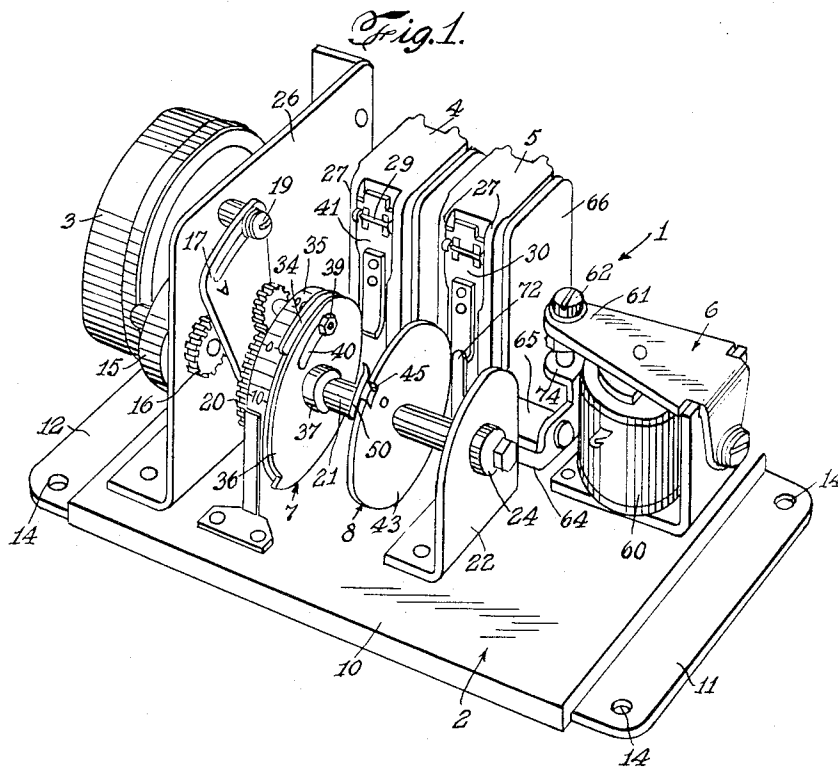
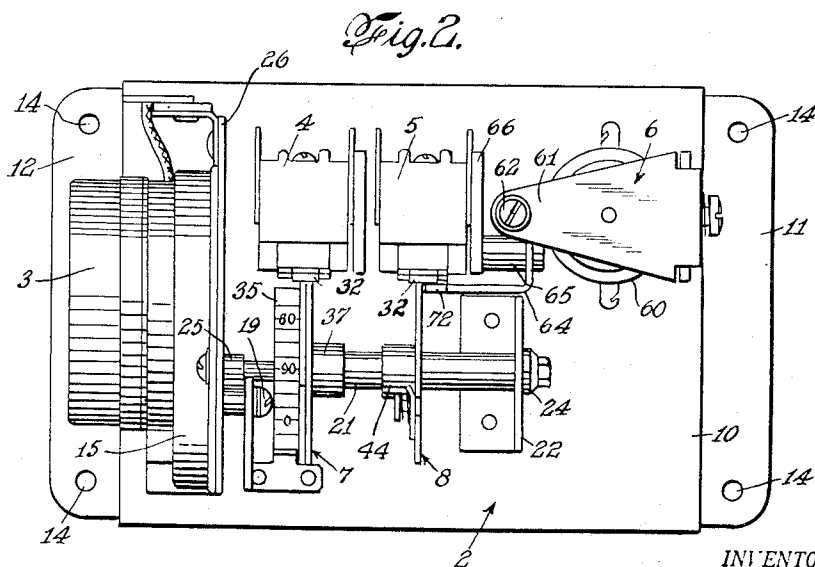
V. E. TAMBURR

2,776,009

TIMER SWITCH

Filed Nov. 19, 1951

2 Sheets-Sheet 1



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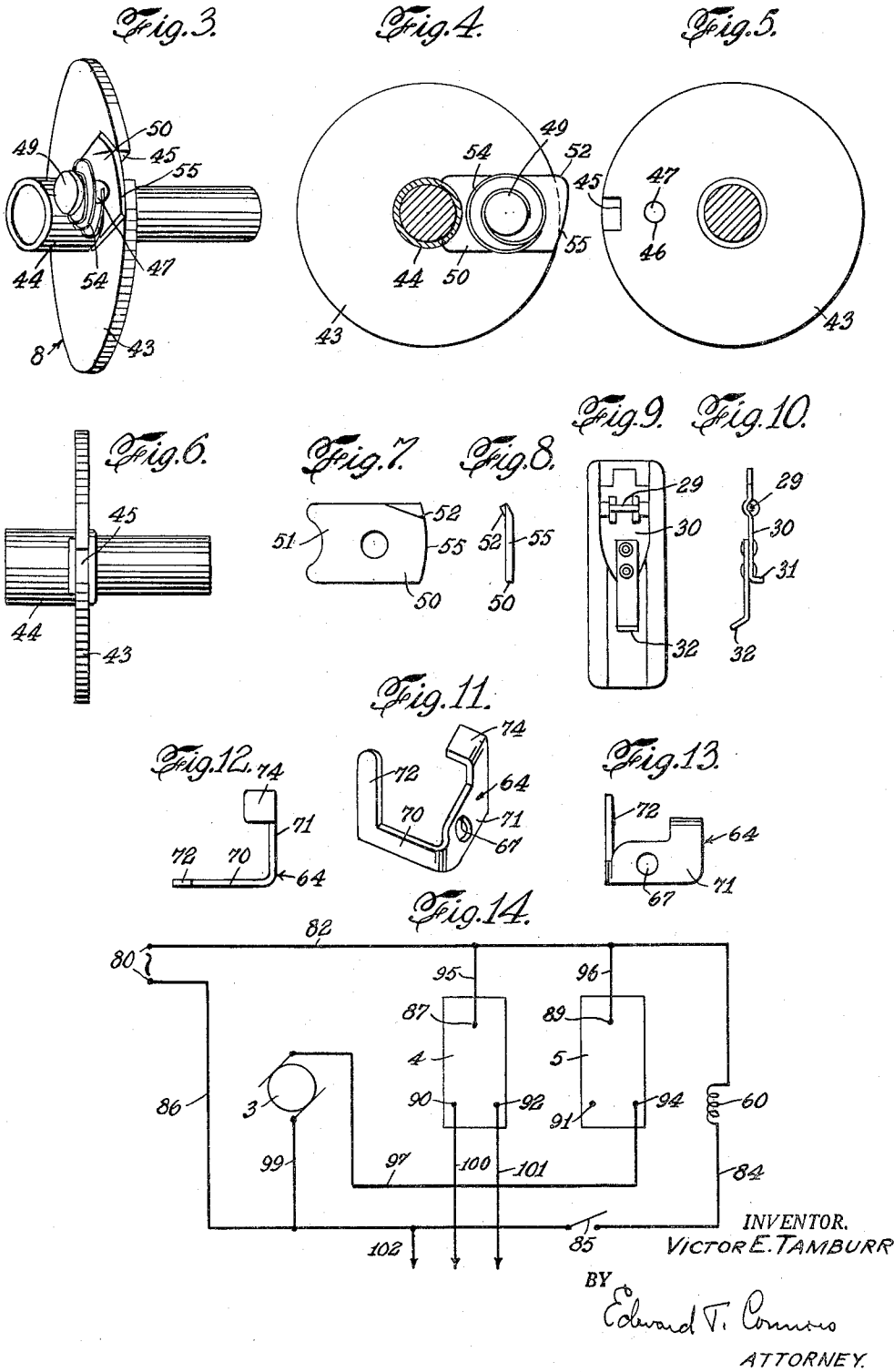
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TIMER SWITCH

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5 Claims. (Cl. 161—1)

The present invention relates to timer switches and particularly to a timer switch immediately actuable upon a momentary actuation of its starting means.

The timer switch may be used, among other purposes, for timing the discharge of a fire extinguishing fluid into a compartment either to extinguish fire therein or to provide an atmosphere incapable of supporting combustion. It is important that the timer switch positively function under such conditions, and it is also important that there need be no necessity for a prolonged closing of a relay circuit when starting. In order that the system be as dependable as possible and for easy maintenance, it is desirable that the holding circuits ordinarily required be eliminated. However, for such installations it is necessary that operation be started by a momentary push on a starting button or a flick of a switch at a remote control location.

In accordance with the invention this is accomplished by providing a timer switch in which a mechanical locking means positively holds the timer circuit closed during the operating cycle. In a preferred construction, this is done by including a switch holding cam member having a recessed portion closable by a blocking member releasable by momentary actuation of a starting means.

Another object of the invention is to provide a timer switch which is simple and economical in manufacture, positive and rapid in operation, and durable in use.

Other objects and advantages of the invention will be apparent from the following description and from the accompanying drawings which show, by way of example, an embodiment of the invention.

In the drawings:

Figure 1 is a perspective view of a timer switch in accordance with the invention.

Figure 2 is a plan view of the timer switch.

Figure 3 is a perspective view of the timer switch control cam assembly.

Figure 4 is a view of one end of the timer switch control cam assembly.

Figure 5 is a view of the other end of the timer switch control cam assembly with the blocking member not shown.

Figure 6 is a side view of the timer switch control cam assembly.

Figure 7 is an end view of the blocking member.

Figure 8 is a side view of the blocking member.

Figure 9 is a front view of the switch and its operating member.

Figure 10 is a side view of the switch operating member.

Figure 11 is a perspective view of the actuating member starting the operation of the timer switch.

Figure 12 is a plan view of the actuating member.

Figure 13 is a side view of the actuating member.

Figure 14 is a wiring diagram of the timer switch and a circuit incorporating same.

Referring to the drawings there is shown in Figure 1

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a timer switch 1 in accordance with the invention including a mounting base 2, a synchronous timer motor 3, switches 4 and 5, a relay 6, a switch cam assembly 7, and a control cam assembly 8.

5 The mounting base 2 is preferably sturdily made of a steel stamping having its center portion 10 slightly raised with respect to its edges 11 and 12. The base 2 is perforated as indicated at 14 for the mounting thereof on a support.

10 The synchronous timer motor 3 is of the conventional type including a reduction gear assembly 15 driving a gear 16. A gear and rack assembly 17 may be changed by removing a screw 19 for the insertion of substitute assemblies having different gear ratios to engage between the gear 16 and a gear 20 carried by a main shaft 21 for the rotation of the switch and control cam assemblies 7 and 8. The shaft 21 is supported at one end by an L-shaped member 22 having an adjustable bearing means 24 positioned therein. The other end of the shaft 21 is supported by a bearing 25 carried on an L-shaped bearing wall 26 which also provides the support for the synchronous motor assembly 3 and for the gear and rack assembly 17.

25 The switches 4 and 5 may be alike and may be of the single pole double-throw snap action type totally enclosed and dust proof and may include a spring member tending to maintain the contacts in a predetermined position. A preferred switch is the "micro-switch," type W, but any other switch may be used, the casing of which may have channeled-like edges 27 to pivotally receive a pin 29 for the pivotal mounting of an operating member 30, shown in detail in Figures 9 and 10, and which includes a projecting portion 31 adapted to extend inwardly towards the switch to receive a spring if such is desired. An outwardly turned tip end 32 is adapted to engage the cam assembly as will be hereafter described. Suitable connection means may be positioned on the rear of the switches 4 and 5 for connection in an electrical circuit as illustrated in Figure 14.

40 Two switches 4 and 5 are shown although the timer may be made using only switch 5 or the base and shaft 21 may be extended to provide additional switches 4 and control cam assemblies.

45 Depending upon the service desired, the switch cam assembly 7 may be designed providing for different time intervals of switch action for each revolution of the cam assembly. An adjustable cam assembly is shown in which the main cam edge 34 is made integrally with or attached to an indicating cylinder 35. Positioned thereagainst is a second disc 36 separately journaled on the shaft 21 through bearing member 37. The peripheries of the discs 34 and 36 may be cut away for one-half of their length. The discs may then be adjustably angularly positioned with respect to each other and locked together by means of a screw and lock washer 39 secured to disc 34 and extending through a slot 40 in disc 36. By varying the angular position of the discs 34 and 36 with respect to each other, the cam shape provided by the edges of the composite discs may be varied. The edge of the switch cam 7 is adapted to engage with a switch operating member 41 to actuate the switch 4, the operating arm 41 may be made of the same construction as the operating member 30 for the switch 5.

50 The control cam assembly 8 shown in detail in Figures 3 through 6 includes a disc 43 attached in position on the shaft 21 for rotation therewith by a hub 44. The edge of the disc 43 is notched as indicated at 45 and apertured at 46 to receive a pin or stud 47 with an enlarged head 49. A blocking member 50 shown in detail in Figures 7 and 8 is made of a thin piece of material having one end 51 recessed with a curvature approxi-

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mately of the same radius as the exterior of the hub 44 for the disc 43. Outer end 52 of the blocking member 50 is flared for a purpose later to be described. The blocking member 50 is secured in position on the disc 43 by threaded or riveted engagement of the pin 47 in the opening 46. A small spiral spring 54 is engaged between the head 49 of the pin 47 and the blocking member 50 to yieldingly urge the blocking member against the side of the disc 43 so as to close the notch 45.

As may be seen in Figure 4, the outer end 52 of the blocking member 50 extends outwardly with respect to the edge or periphery of the disc 43 and the trailing end of the edge 55 coincides with the periphery of the disc 43. The leading edge or outer end 52 of the blocking member 50 not only projects radially of the disc 43, but is also flared axially with respect thereto as may be seen in Figure 3.

The relay 6 is of the conventional type having a coil 60 and a pivotally mounted armature 61 with an adjustment screw 62 extending through the end thereof. The relay 6 is used to start the action of the timer and is adapted to move an actuating member 64, shown in detail in Figures 11-13. The actuating member 64 is pivotally supported by a post 65 extending from the side wall of the switch 5 or from a partition member 66 extending upwardly from the base 2. The actuating member 64 is apertured as indicated at 67 to receive a bearing pin threadedly or otherwise suitably engaged in the post 65. The actuating member 64 may be made of a stamping with arms 70 and 71 formed substantially at right angles with respect to each other. The arm 70 has an upwardly extending extension 72 of a length so that when the actuating member is in position, the end 72 will contact the outwardly extending end 32 of the operating member 30. The other arm 71 of the actuating member 64 has a turned-over end 74 of a length so as to be contacted by the adjustment screw 62 of relay 6.

Any suitable electrical connections may be made between the parts of the timer switch. In Figure 14 there is shown a diagram of connections which may be made utilizing the switch 5 as the starting means of the synchronous motor 3, while the switch 4 is used for connection to any external apparatus (not shown), such as for example, an electrically operated discharge valve of a fire extinguishing system or other device electrically controlled. As shown in the diagram, a pair of terminals 80 are adapted to be connected to a source of electric supply, a wire 82 connects supply 80 to one terminal of coil 60 of the relay 6, the other terminal of the coil 60 being connected by a wire 84 to a suitable starting switch 85 which may be of the push button type, with its other terminal connected to the supply by a wire 86. Switches 4 and 5 are of the single pole double throw type having center points 87 and 89, normally closed contacts 90 and 91, and normally open contacts 92 and 94. The center points 87 and 89 are respectively connected to the supply wire 82 by leads 95 and 96. Terminal 91 of switch 5 is not used in the diagram as shown. Normally open contact 94 is connected to one terminal of the synchronous motor 3 by a lead 97, the other terminal of the motor 3 being connected to the supply line 86 by a lead 99. Suitable leads 100 and 101 may be connected from contacts 90 and 92 to any desired outside apparatus to be controlled by the timer switch 1, a common lead 102 being connected to wire 86.

In the operation of the timer switch 1 it is connected to a source of electrical supply and push button switch 85 momentarily depressed to energize the coil 60 of the relay 6. Movement of the armature 61 causes the contact of the adjustment screw 62 with the extension 74 of the actuating member 64 to pivot the actuating member 64 against extension 32 of the operating member 30, thus, moving the tip of the extension 32 out of the notch 45 allowing the blocking member 50 to come in contact with

the side of the disc 43 so as to close the notch 45 and prevent the tip of the extension 32 from moving back into the notch 45 if the relay 6 is only momentarily energized, the inward movement of the extension 32 actuating switch 5 into the closed position. A circuit is thus completed energizing the motor 3 to rotate the shaft 21 and the cam assembly 7 and 8. As cam assembly 8 rotates the flared edge 52 of the blocking member 50 wipes against end 32 of the operating member 32 deflecting the blocking member 50 away from the disc 43 so that the extension 32 moves into the notch 45 thereby opening the switch 5 and the circuit to the motor 3. It should be noted that any override of the cam assembly 8 due to inertia is braked by the engagement of the extension 32 with the wall of the notch 45.

As thus far described, the timer switch 1 is positioned ready for a timed operation, the duration of which will depend upon the designed speed of the motor and its gear ratio with respect to the shaft 21. In this ready position it should be remembered that the blocking member 50 is held away from the disc 43 by its engagement with the side of extension 32. In starting a timed cycle of operation, the push button 85 is again depressed actuating relay 6 to pivot the actuating member 64 and move the extension 32 of the operating member 30 inwardly towards the switch 4 and out of the notch 45, thereby allowing the blocking member 50 under the action of its spring 54 to move into position against the side of the disc 43 to close the notch 45. If the push button 85 is immediately released, the actuating member 64 will fall away from extension 32 of the operating member 30, however, by reason of the movement of the blocking member 50 into position against the hub 44, a complete edge is presented for the disc 43 in that the edge 55 of the blocking member 50 is now in position against the extension 32 so as to hold the switch 5 in the closed position. The rotation of the shaft 21 then continues until the blocking member 50 is deflected as above described allowing the extension 32 to again fall into the slot 45 opening the switch 5 and completing the timed cycle. As the cam assembly 7 rotates with the shaft 21, the switch 4 is likewise actuated for the desired portion of the timed interval depending upon the set positions of the discs 34 and 36 for the control of an external device connected to the wires 100-102.

While the invention has been described and illustrated with respect to specific embodiments thereof, it will be understood that other embodiments may be resorted to without departing from the invention. For example, while the notch 45 has been shown as on the periphery of the disc 43, an alternative construction may be provided in which a notch is provided on the surface of the disc suitable modification being made of the operating member 32 so as to function as heretofore described. Alternatively, another construction may be utilized in which two or more pins extend from the side of the disc 43, the space between the pins closed by a blocking member of cylindrical or equivalent construction. Likewise, while the blocking member 50 has been described as being carried by a pin on the face of the disc 43, an alternative construction for the support thereof might take the form in which the blocking member is pivotally supported about the shaft 21, being spring-urged against the disc 43 as above described. Further, while only one notch has been shown on the periphery of the disc 43, additional notches and blocking members might be provided if warranted by desired conditions. Therefore, the form of the invention as set out above should be considered as illustrative and not as limiting the scope of the following claims.

I claim:

1. An electrical circuit controller for use in a timer switch of the type in which a notched cam is rotated at predetermined speed when an electric circuit condition is established and a cam follower rides on said notched cam

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to establish said condition when it is moved out of said notch, the controller comprising a notched cam, a cam follower, and a blocking member axially mounted with respect to said notch in one position to normally overlay substantially the entire extent thereof and to define with the remaining surface of the cam a complete cam surface to hold said follower free from the notch, the cam follower operable to urge said blocking member in an axial direction with respect to said notch to allow said follower to enter said notch to change the electric circuit condition.

2. An electrical circuit controller for use in a timer switch of the type in which a notched cam is rotated at predetermined speed when an electrical circuit condition is established and a notched cam follower rides on said cam to establish said condition when it is moved out of said notch, the controller comprising a notched cam, a cam follower, a blocking member, and a guiding member for the axial support of the blocking member on the cam with respect to said notch in one position to normally overlay substantially the entire extent thereof and to define with the remaining surface of the cam a complete cam surface to hold said follower free from the notch, the cam follower operable to urge said blocking member in an axial direction with respect to said notch to allow said follower to enter said notch to change the electrical condition.

3. An electrical circuit controller for use in a timer switch of the type in which notched cam is rotated at predetermined speed when an electrical circuit condition is established and a notched cam follower rides on said cam to establish said condition when it is moved out of said notch, the controller comprising a notched cam, a cam follower, a blocking member, a guiding member for the axial support of the blocking member on the cam with respect to said notch in one position to normally overlay substantially the entire extent thereof and to define with the remaining surface of the cam a complete cam surface to hold said follower free from the notch, and a flared leading edge for the blocking member, the cam follower operable to engage the flared edge to urge said blocking member in an axial direction with respect to said

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notch to allow said follower to enter said notch to change the electrical condition.

4. An electrical circuit controller for use in a timer switch of the type in which a notched cam is rotated at predetermined speed when an electrical circuit condition is established and a cam follower rides on said notched cam to establish said condition when it is moved out of said notch, the controller comprising a notched cam, a shaft for the notched cam, a cam follower, a blocking member, a flared leading edge for the blocking member, the blocking member having a pair of inwardly directed extensions to extend about the shaft, the blocking member having an opening therethrough, a guiding pin extending from the notched cam through the opening in the blocking member for the support of the blocking member, an enlarged head for the pin limiting the axial movement of the blocking member with respect to the notched cam, and a spring yieldingly urging the blocking member towards the notched cam in notch overlying relationship to define with the remaining surface of the cam a complete cam surface to hold the cam follower free from the notch, the cam follower operable to engage the flared edge to urge the blocking member in an axial direction with respect to said notch to allow said cam follower to enter the notch to change the electrical condition.

5. A controller for use with an electric circuit, the controller comprising a disc having a notch therein, a pin carried by the disc, an apertured blocking member slideably positioned on the pin for axial movement with respect to the disc in one position to close the notch in the disc and in another position to open the notch in the disc, means forming a flared leading edge for the blocking member, and a spring yieldingly urging the blocking member into notch closing position.

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