April 17, 1934. W. A. VAN STEENBERGEN 1,955,210

DURATION CIRCUIT OPENING SYSTEM

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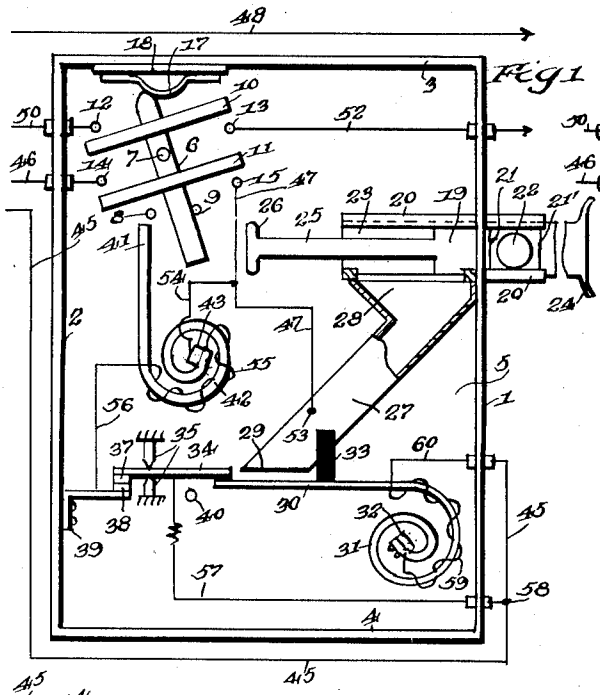


Fig 1

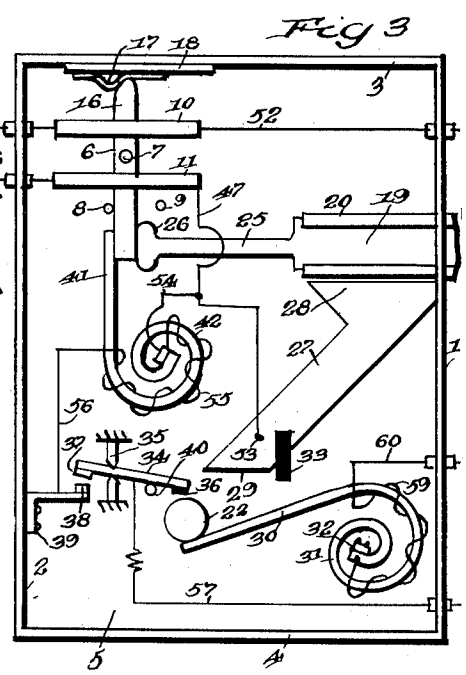


Fig 3

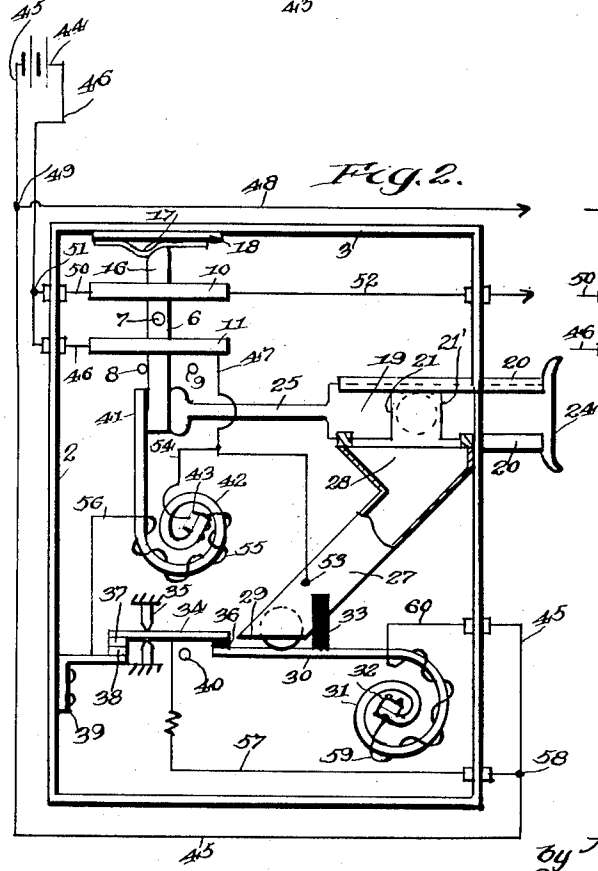


Fig. 2.

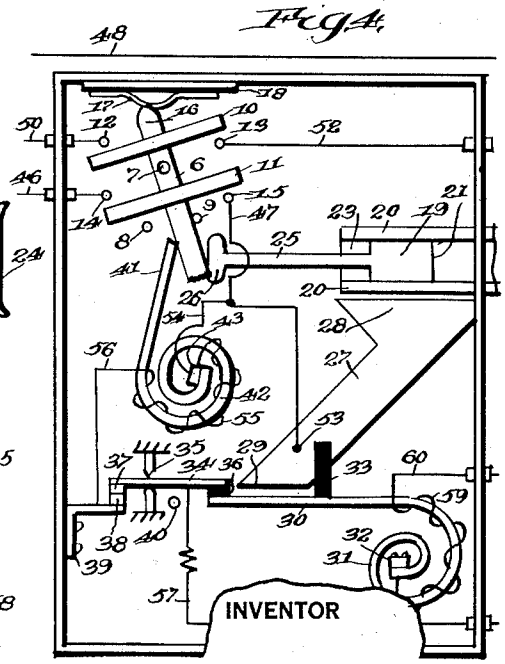


Fig 4.

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DURATION CIRCUIT OPENING SYSTEM

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5 Claims. (Cl. 194—6)

This invention relates to improvements in duration or timed systems for dispensing electrical current for short periods of time for use in washing machines, electric stoves and the many other utilities now well established.

It is a primary object of the invention to greatly reduce the cost and generally simplify devices of this character and it is a special feature to make the device capable of use either on alternating or direct current sources.

It is a feature of the invention to provide a coin or token chute of electrical conducting material and to dispose the discharge or delivery end of said chute in a novel relation with respect to a thermostatic device so that the coin or token will close a circuit through the chute and said device and thereby function both as a deposit of payment for the current and as a floating circuit closer, in which latter capacity the invention is primarily concerned.

A feature of the invention resides in the provision of machine and duration circuits having a source of current and the inter-position of a main switch in one limb of each circuit so that when the switch is closed, both circuits will be closed, and vice versa, an important feature residing in manual means for quickly closing said switch so that after payment by the purchaser, current is immediately available.

A further feature of the invention resides in a novel employment of thermostatic strips acting and actuated in such sequential relation as to afford not only a timed or duration dispensing of the current but in such a novel manner that one of said strips will automatically shift the main switch into a position to open both circuits at the termination of the prescribed period of duration.

The invention has many other objects and features which will be more fully described in connection with the accompanying drawing and which will be more particularly pointed out in and by the appended claims.

In the drawing:—

Fig. 1 is a vertical sectional view of a box-like installation of the device of my invention showing the latter in an inoperative position such as it would assume before payment is made for a duration purveyance of current.

Fig. 2 is a view similar to Fig. 1, showing how payment is delivered when the main switch is shifted to a circuit closing position.

Fig. 3 is a similar view showing the action of the duration thermostatic strip in releasing the coin and illustrating the switch opening thermostatic strip in repose.

Fig. 4 is a similar view showing how the duration strip has been restored to its initial or cold position and illustrating how such restoration actuates a circuit breaker to shift the latter into a circuit closing position to actuate the switch opening thermostatic strip.

Like characters of reference designate similar parts throughout the different figures of the drawing.

In the specific form shown, 1 indicates a box or housing in which the device is mounted, and for the purposes of this disclosure, this housing may be considered made of electrical insulated material. I will designate the left side wall by 2, and the upper and lower walls at 3 and 4, respectively, and the back wall at 5. As the structural features of the housing are not of primary importance to this invention no further description is necessary.

I have shown a main switch consisting of a switch bar 6 pivotally mounted at 7 on the back wall 5, to be shifted from circuit closing to circuit opening positions, stops 8 and 9 serving to limit movement thereof in extreme positions. The switch bar 6 is of insulating material and carries contact strips 10 and 11 adapted to make contact with terminals 12, 13 and 14 and 15, respectively, as will be clear from Figs. 1 and 2. The upper end 16 is adapted for engagement with a U-shaped spring 17, mounted on a block 18 so that when a shifting impulse is imparted to bar 6, the spring 17 will insure movement of said bar to either of the two extreme positions shown, hence, the switch is quick acting in a manner similar to a toggle switch.

Reference will next be made to a novel means for throwing said main switch into a circuit closing position to afford an immediate service supply of current.

I employ a manually actuated plunger 19 adapted to be reciprocated in guides 20 having a back portion 23, as shown in Fig. 1, and the plunger having a suitable thrust end 24. The plunger 19 and thrust end 24 are divided at 21 and 21′ so that when a coin or token 22 is interposed therebetween the proportions are such that when the plunger is forced inwardly, as shown in Fig. 2, the thrust end 24 will abut the end of the guides 20 which thereby act as a stop. Said plunger 19 has a switch actuating rod 25 provided with an enlarged head 26, for engagement with switch bar 6 to shift the latter from the open position shown in Fig. 1, to the closed position shown in Fig. 2, with the bar 6 disposed against

stop 8. In the absence of an interposed coin or token, the thrust end 24 would engage the ends of guides 20, before the plunger 19 reached bar 6 to shift the switch.

A chute 27, of electrical conducting material, is mounted so that its intake end 28, is in receiving relation to the coin or token 22, when the latter arrives at the delivery position shown in Fig. 2, so that it may drop into the chute 27, by gravity, and descend therein toward the discharge end 29. The chute 27 is proportioned so that the coin or token will not have too much play in the chute and will perform the function of closing circuit through the chute, as will hereinafter be more fully explained. Therefore, primarily, the chute is a part of a circuit, and the coin or token functions as a floating circuit closer, or as a means of closing a circuit, as hereinafter claimed.

Reference will next be made to a novel means coacting with the floating circuit closer just described.

What I will for convenience term a duration thermostatic strip has an acting end or section 30, that is substantially straight, and an actuating section 31 that is substantially spirally formed and mounted on a terminal 32, that is secured to back wall 5. A stop 33, of insulating material is mounted on chute 27, and serves to prevent section 30 from advancing beyond the position shown in Fig. 2, whereby it is in a position to electrically engage and support the coin or token 22 when the latter has descended to the position shown in that figure.

I will next describe a circuit breaker and maker which is not in the conventional form of that device but which is so designated because it performs that general function, and that designation serves to distinguish it from other portions of the mechanism.

A bar 24, of conducting material, is tiltable on knife edge fulcrums 35, disposed nearer one end of said bar than the other so that said bar will swing by gravity into a circuit opening position as shown in Fig. 3, when section 30 is retracted out of supporting engagement therewith. The longer end of said bar has a block of insulating material 36 so that it cannot close circuit with section 30. The shorter end 37 makes electrical contact with terminal 38, fixed at 39, to wall 2. A stop 40 limits movement of bar 34 in a circuit opening position.

Reference will next be made to an electrical feature which performs the function of shifting the main switch into a circuit opening position.

I provide a thermostatic strip having an acting section 41, which is substantialy straight, and an actuating section 42 which is substantially spirally formed and which is mounted on a terminal 43 that is supported on back wall 5. The free end of section 41 is disposed in a manner to engage bar 6 of the main switch and throw the latter into a circuit opening position in a manner that will hereinafter be fully described.

Reference will next be made to the circuits and the disposition of the various features in said circuits.

A source of current is indicated at 44 and limbs 45 and 46 extend from opposite poles thereof. Limb 46 is connected with terminal 14 and from companion terminal 15, lead 47 extends.

Thus it will be seen that the main switch is interposed in one limb of what I will term the duration circuit. A machine circuit has a limb 48, connected at 49, with limb 45. The remaining limb 50, of said machine circuit, is connected at 51, with limb 46, of the duration circuit. Said limb 50, is connected with terminal 12, which closes circuit through switch strip 10, with terminal 13, and lead 52 extends from terminal 13 to the machine or device for which current is purchased, the conductors 48 and 52 leading to such machine, not shown.

Reference will next be made to the duration circuit and its connections.

Lead 47 extends to chute 27 with which it is connected at 53. A lead 54 extends from 47 to terminal 43. The switch actuating thermostatic strip has a heating coil 55 that is extended about the spiral portion of said strip and connected with terminal 43, and the remaining end of said coil is connected by lead 56, with terminal 38, of the circuit breaker.

Bar 34, of the circuit breaker, is connected by a lead 57, with limb 45, at 58. The duration thermostatic strip has a heating coil 59, disposed about the spiral section thereof and one end of said coil is connected with terminal 32, and the other end is connected with limb 45 by a lead 60. By forming the thermostatic strips with spiral portions, the heat generated by the coils not only affords a quicker responsive action but also an action of greater power and extent. In other words, the straight sections of said strips move to a greater extent and in less time than if the heat from the coils was applied to the straight sections.

The operation will next be described.

When the parts are in the Fig. 1 position, the main switch is open, as shown, and of course both circuits are likewise open. If a purchaser desires current, he will deposit a coin or token between the ends 21 and 21', when the plunger is withdrawn to the Fig. 1 position, and then push the plunger into the Fig. 2 position. This action performs the dual function of shifting the main switch into the circuit closing position shown in Fig. 2, by reason of the thrust imparted by the head 26 against bar 6, thereby forcing the latter against stop stud 8. If the quick acting type of switch is used, as shown, an initial thrust moving the upper end 16 passed the high point of spring 17, will result in the latter moving the switch bar 6 to a final extreme position. At any rate, and this is important, the main switch is closed, or in a circuit closing position, and current is immediately available, as the action of forcing the plunger inwardly, also delivers the coin or token to the chute and the coin instantly descends in the chute by gravity into contact with the section 30, of the duration strip, which closes egress of the coin from the chute.

I will now trace the flow of current through the duration circuit as a result of movement of the parts to the Fig. 2 position, it being understood that the flow of current through the machine circuit out limb 48 and back through limb 52, will be immediate, just as soon as the main switch has been moved to the Fig. 2 position.

As the chute 27 is of conducting material, and likewise the coin or token 22, circuit is immediately closed through the chute and coin to section 30 of the duration strip, which is also included in the circuit. Therefore, current will flow from limb 46, through strip 11 to lead 47, which connects with chute 27, and through chute 27 and coin 22 to section 30, mounting block 32 thereof, and out through heating coil 59, to limb 45 and back to the source of current 44. However, at the short momentary period when the parts are in this position, current will flow from

lead 57 through bar 34, contacts 37 and 38, lead 56 and through heating coil 55, to block 43 and through lead 54 back to lead 47, because the connection is in parallel relation. Thus, as will presently appear, current does not flow through heating coil 55 long enough to be effective in actuating the acting end 41, of the main switch actuating thermostatic strip.

However, this is only a short period because just as soon as the coil 59 heats the duration strip, the latter begins to descend, as shown in Fig. 3, and at the slightest movement downwardly of section 30, bar 34 tilts toward stop 40, and contacts 37 and 33 are broken so that the coil 55 has no current and consequently the actuating end 41 cannot restore the main switch. Further, the block 36, whereby section 30 engages bar 34, is of insulating material.

As long as coin 22 is in engagement with chute 27, current will flow through section 30, and the heating coil will continue to actuate the duration strip and cause the section 30 to descend. However, just as soon as section 30 has descended far enough so that the coin 22 is free from chute 27, then the circuit will be broken and coil 59 will not impart any heat. However, the section 30 will continue to descend for a slight distance after the coin 22 has been released from the delivery end 29, of chute 27, but just as soon as the duration strip loses its heat and cools, or begins to cool, it will slowly return toward the Fig. 2 position and will be arrested by stop 33, which is of insulating material.

It will now be clear that while section 30 of the duration strip is descending and returning, the purchaser is getting current through the machine circuit consisting of limbs 43 and 52, and the circuit to heating coil 55 of the switch actuating thermostatic strip 41, is open and just as soon as the coin 22 leaves chute 27, the heating coil 59, will be inoperative, as previously stated. Thus, during a large part of the downwardly movement of section 30, and during all of its return movement, coil 59 will be inoperative and consequently the duration purveyance of current will be controlled by the action of the duration strip, as a thermostatic device, and hence the control will not be primarily electrical.

Now as the section 30 cools and returns from the Fig. 3 position, toward the Fig. 4 position, it will restore bar 34, from a circuit opening positon to a circuit closing position and current will flow in a manner which I will next describe.

From lead 57, current will flow to bar 34, thence through contacts 37—38 to lead 56, and then through coil 55, to support 43, and out through lead 54 to line 47. This will energize coil 55 and heat the thermostatic strip so that the acting end 41 will move to the right of Fig. 2, and shift the main switch from the circuit closing position shown in Fig. 2, to the circuit opening position shown in Fig. 4. This will of course open both circuits and shut off the supply of current. As the acting thermostatic strip cools, after the circuits have been opened, it will be restored to the Fig. 2 position so that the bar 6 will be free to be shifted again into a circuit closing position. The switch operating strip is so formed, and the heating coil is so calculated, that the end 41 will re-coil very quickly so that in the event a purchaser wanted immediately to deposit another coin for more current, this could be done and the end 41 would yield to the thrust of the plunger.

While I have for convenience referred to the duration circuit as one complete circuit, it will be seen that it specifically consists of two circuits, or one circuit that can be broken into sequential sections, or in other words, into sections that sequentially operate, first, the duration section and then the switch operating section.

It will also be clear that I have provided thermostatic strips that operate sequentially in the performance of their respective functions, the duration strip acting initially and the switch operating strip acting secondly.

I next desire to point out precisely why I use thermostatic strips instead of solenoids or any other form of electrical device in the performance of the heretofore explained functions and why said thermostatic strips are especially advantageous and so particularly adapted for the service to which they are subjected in this device.

At this point, I desire to point out that I have invented a timed acting device that does not necessitate a clock movement. I desire to point out the advantage of an electrically heat stimulated thermostatic strip over a solenoid. In the first place, a solenoid, irrespective of the winding, is essentially a quick acting device and not adapted for a time duration acting device. Further, a solenoid must initially be wound either for alternating or direct current. In addition, a solenoid, to perform the service required, would be too large for a compact device.

It is one of the primary objects of this invention to provide a device of this character that can be hooked up to the usual one hundred and ten volt circuit irrespective of whether it is alternating or direct current, without changing the wiring or necessitating any alteration whatever. This device has a range, in an alternating current, of twenty five to one hundred cycles, and on direct current of one hundred to one hundred and thirty volts. It is important to note that electrically, my device works on a heating basis rather than on a motion or propulsion basis. These heat stimulated thermostatic strips are adapted to perform this particular timed function, and are much cheaper to make and more reliable in operation than any other electrical device known to me.

It is believed that the drawing and description will serve fully and completely to describe this invention and while I have herein shown and described one specific form thereof I do not wish to be limited thereto except for such limitations as the claims may import.

I claim:—

1. In a duration circuit opening system, a machine cicuit, a duration circuit, a source of current for both of said circuits, a quick acting main switch interposed in one limb of each of said circuits, a delivery chute of electrical conductive material included in said duration circuit and having a delivery end and adapted to receive a floating circuit closer, a manually operable plunger for shifting said main switch into a position to close both of said circuits and deliver said floating circuit closer into said chute, a duration thermostatic strip closing egress from the delivery end of said chute when said strip is cold and in a normal position and adapted to engage and support said floating circuit closer in said chute in a circuit closing position, said strip having a heating coil electrically connected with said strip and included in said duration circuit to energize said coil and actuate said strip to release said floating circuit closer from said chute after said floating circuit closer has closed the duration

circuit through said chute with said strip, a main switch opening thermostatic strip adapted to open said main switch and having a heating coil electrically connected with said main switch opening thermostatic strip and included in said duration circuit, and a circuit breaker in said duration circuit between said strips and normally held in a circuit closing position by said duration strip when the latter is in a normal position and opening said circuit breaker to cut out said switch opening strip when said duration strip is actuated to release said floating circuit closer from said chute, said duration strip returning said circuit breaker to a circuit closing position when said duration strip is restored to normal to thereby energize the heating coil of said switch opening strip and actuate the latter to open said main switch.

2. In a duration circuit opening system, a machine circuit, a duration circuit, a source of current for both of said circuits, a main switch interposed in one limb of each of said circuits, a delivery chute of electrical conducting material in said duration circuit and having a delivery end and adapted to receive a floating circuit closer, a manually operable device for shifting said main switch into a position to close both of said circuits and deliver said floating circuit closer into said chute, a duration thermostatic strip closing egress from said delivery end of said chute when said strip is cold and adapted to engage said floating circuit closer in said chute in a circuit closing position, said strip having a heating coil electrically connected with said strip and included in said duration circuit to energize said coil and actuate said strip to release said floating circuit closer from said chute after said floating circuit closer has closed the duration circuit through said chute with said strip, a main switch opening thermostatic strip adapted to open said main switch and having a heating coil electrically connected with said main switch opening thermostatic strip and included in said duration circuit, and circuit breaking means in said duration circuit operated by said duration strip for cutting out the heating coil of said switch opening strip when said duration strip is actuated and cutting in the heating coil of said switch opening strip when said duration strip has returned to a normal position.

3. In a duration circuit opening system, a machine circuit, a duration circuit, a source of current for both of said circuits, a main switch interposed in one limb of each of said circuits, manual means for shifting said main switch into a position to close both of said circuits, a duration thermostatic strip having a heating coil, a main switch opening thermostatic strip having a heating coil, a circuit breaker between said strips and included in said duration circuit, said circuit breaker being held in a circuit closing position by said duration strip when the latter is cold and releasing said circuit breaker to open said circuit when said duration strip is actuated, said manual means releasing a circuit closer for closing said circuit through said duration strip to actuate the latter through its coil and then open the duration circuit to permit said duration strip to be restored, and said duration strip upon restoration to its initial position serving to move said circuit breaker into a circuit closing position to energize the heating coil of said switch opening strip and actuate the latter to move said main switch into a circuit opening position.

4. In a duration circuit opening system, a machine circuit, a duration circuit comprising duration and switch opening sections, a source of current for both of said circuits, a main switch interposed in one limb of each of said circuits, an electrically heat energized duration thermostatic strip in said duration section of said duration circuit, mechanism for moving said switch into a circuit closing position and releasing a circuit closer for closing said duration section to energize said strip and cause the latter to open said switch opening section of said duration circuit, an electrically heat energized switch opening thermostatic strip in said switch opening section, and means actuated by restoring movement of said duration strip for closing the circuit through said switch opening section of said duration circuit to energize said switch opening strip for throwing said main switch into a circuit open position.

5. In a duration circuit opening system, a duration circuit comprising duration and switch opening sections and a source of current, a main switch interposed in one limb of said circuit, an electrically heat energized duration thermostatic element in said duration section, an electrically heat energized switch opening element in said switch opening section, means for closing said main switch and causing a circuit closer to close said duration section to cause said duration element to open said duration section, and means actuated by restoration of said duration element for closing said switch opening section to cause said switch opening element to open said main switch.

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