

J. T. BEECHLYN.  
 CUT-OUT FOR ELECTRICAL CIRCUITS.  
 APPLICATION FILED AUG. 17, 1908.

993,946.

Patented May 30, 1911.

3 SHEETS-SHEET 2.

Fig. 2.

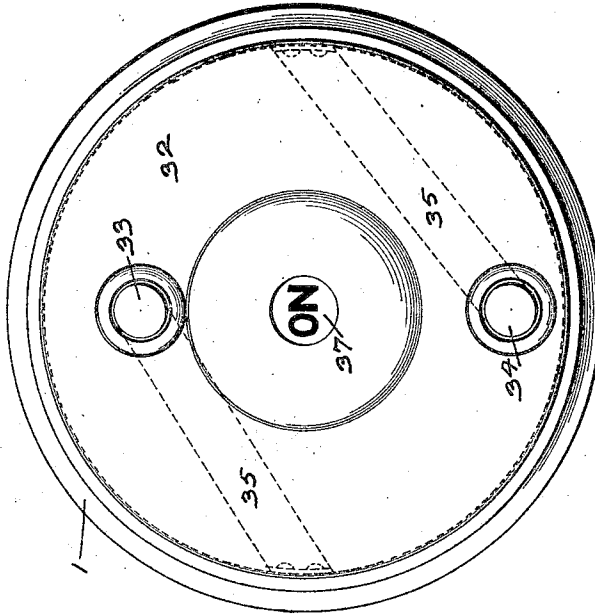
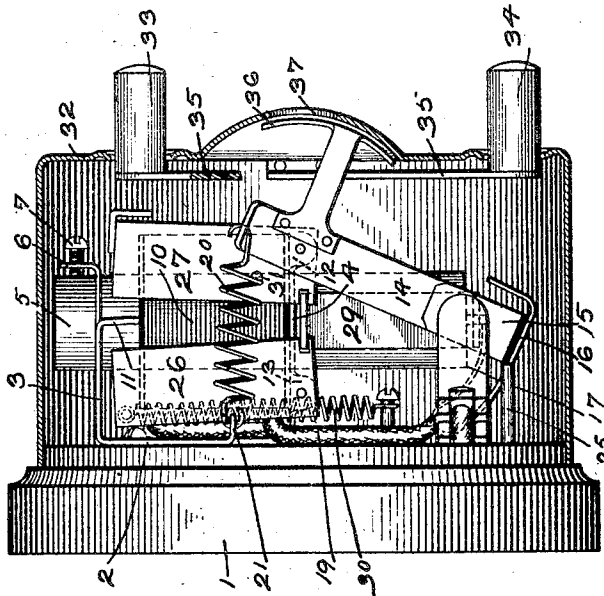


Fig. 1.



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Fig. 4.

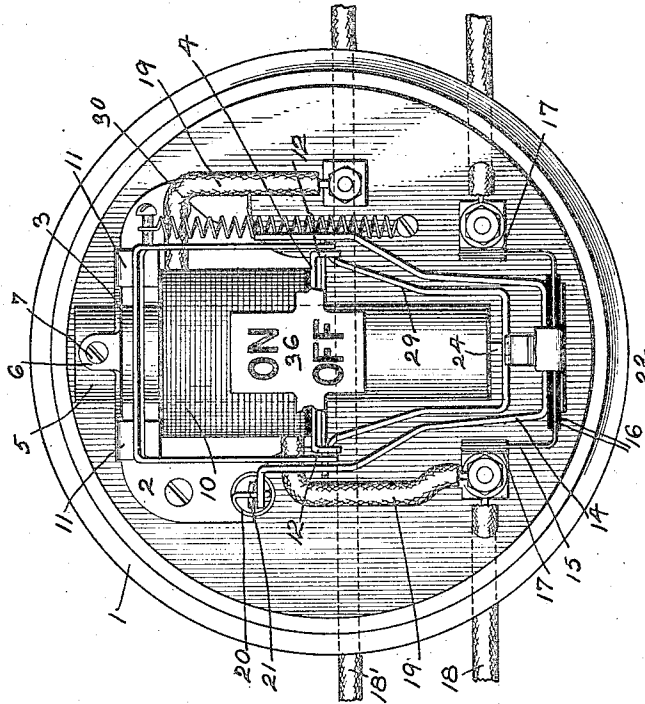
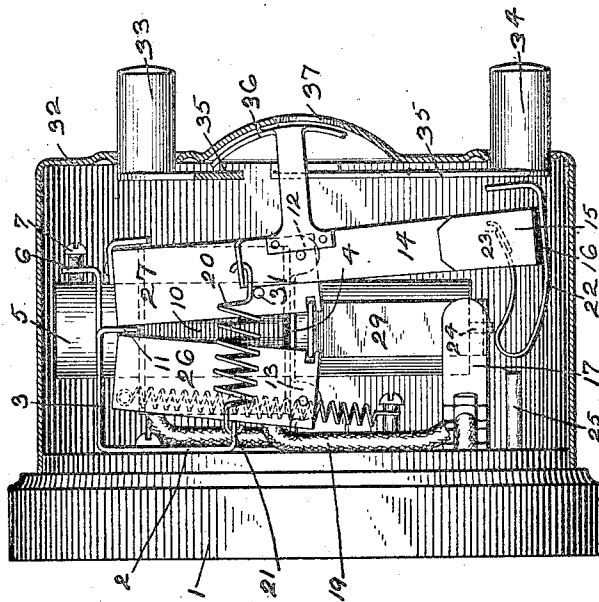


Fig. 3.



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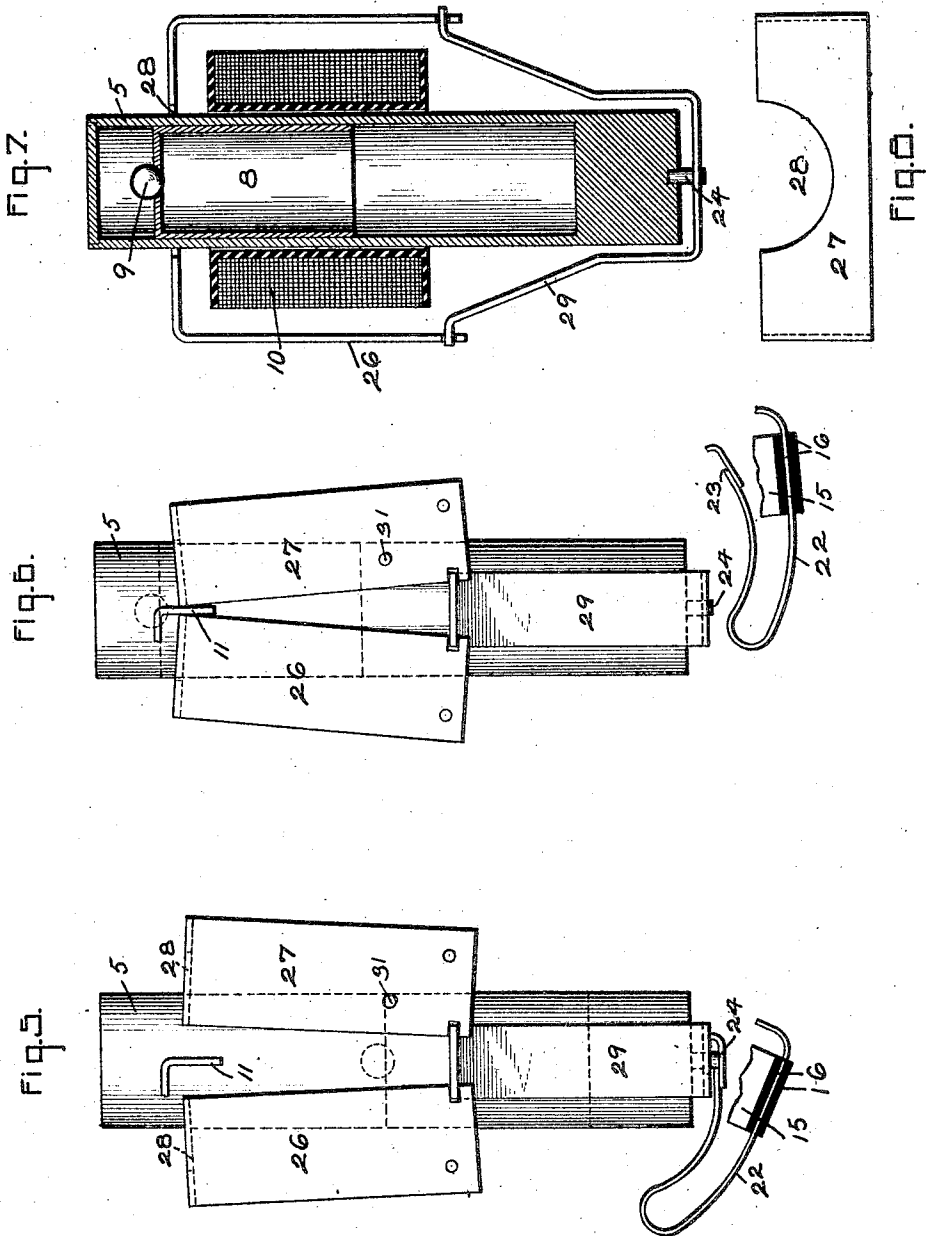
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3 SHEETS-SHEET 3.



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# UNITED STATES PATENT OFFICE.

JOHN T. BEECHLYN, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## CUT-OUT FOR ELECTRICAL CIRCUITS.

993,946.

Specification of Letters Patent.

Patented May 30, 1911.

Application filed August 17, 1908. Serial No. 448,795.

*To all whom it may concern:*

Be it known that I, JOHN T. BEECHLYN, a subject of the King of Denmark, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Cut-Outs for Electrical Circuits, of which the following is a specification.

This invention relates to cutouts for electrical circuits and its object is to provide a simple and reliable device for opening a circuit after a predetermined expiration of time. Such switches are useful in connection with heating appliances, some of which are liable to become overheated if left too long on a closed circuit; or with lighting appliances which one wishes to extinguish at a certain hour, as for instance in show windows; or in signaling systems, where a signal is to be changed after a certain time has elapsed; and so on.

My invention utilizes a dash-pot as the time-limiting element, but the plunger therein is not connected mechanically with any outside mechanism. The plunger is made of magnetic material, and is subjected to the influence of a magnetic field, by reason of which it is lifted slowly through the liquid in the closed dash-pot, being retarded by the usual valve. When the plunger arrives at a predetermined level, it practically closes the magnetic path of an electromagnet, and the increase in magnetic flux is utilized to effect a release of the detent which holds the switch closed and allowing it to open and break the circuit.

In the accompanying drawings Figure 1 is a side elevation of one form of my improved time switch in the closed position, the cover being in section; Fig. 2 is a front elevation; Fig. 3 is a side elevation showing the switch open; Fig. 4 is a front elevation with the cover removed; Figs. 5 and 6 show the locking and tripping mechanism, closed and open, respectively; Fig. 7 is a longitudinal section of the dash-pot, plunger and coil; and Fig. 8 is a top plan view of one of the jaws.

The operating parts are mounted on a base 1 of insulating material, to which is secured a metallic plate 2 and from which two parallel flanges 3, 4 project at right angles. The flanges have aligned perforations in which is fitted a cylinder 5 to serve as a dash-pot. The upper flange 3 has an upturned lug 6

through which is tapped a set-screw 7 bearing against the dash-pot and not only securing it in place but enabling it to be vertically adjusted. The dash-pot depends considerably below the flange 4, and is hermetically sealed at each end. It is filled with liquid, such as oil or glycerin and contains a hollow iron plunger 8 provided with a valve, such as the ball 9, which permits a free descent of the plunger through the liquid but causes its upward movement to be quite slow, the rate of speed depending largely upon the size of the port which the valve controls.

The upper part of the dash-pot is surrounded by a coil 10 resting on the lower flange 4 and held in place by two projections 11 from the upper flange 3, which are bent down upon the top of the spool containing the coil.

Depending from each side of the lower flange 4 is a pair of ears 12 13, and pivoted to the front ears 12 is a U-shaped switch lever 14 which hangs below the bottom of the dash-pot and carries the bridging contact-blade 15, insulated from the lever by strips 16 of mica or the like. The contact-blade coöperates with two clips 17 forming the terminals of a break in one of the line wires 18. The other wire 18' extends unbroken, and the coil 10 is connected across the two by the wire 19. The switch-lever is urged open by a spring 20 attached to its upper end and to a lug 21 on the plate 2. In order to lock the switch closed, the switch-lever carries a light resilient finger 22 provided with a shoulder 23 which snaps up behind a stationary detent 24, preferably a pin projecting from the bottom of the dash-pot. A stop 25 limits the throw of the switch-lever in closing.

The automatic tripping mechanism comprises a pair of iron jaws 26 27 whose shape is that of an inverted U. The lower ends of these jaws are pivoted respectively on the ears 13 12 on the flange 4, and their upper cross-bars contain semi-circular notches 28 adapted to fit the dash-pot so that the two jaws can close around it. The pivotal points of the jaws are located near the outer edges of the jaws, as shown in Figs. 5 and 6. The inner adjacent edges of the jaws are pivotally attached to a U-shaped strap 29 which passes under the dash-pot and is provided with a perforation which has a sliding

fit on the pin 24. The extent to which the pin projects through the strap can be adjusted by adjusting the dash-pot up or down by means of the set screw 7. The pivotal connection between the jaws and the strap is preferably made by cutting shallow saw-keys in the jaws and bending the upper ends of the strap outward to engage loosely with said keys.

10 A light tension spring 30 is attached at one end to the upper end of the rear jaw and at its lower end to the base 1, and serves to urge said jaws apart and lift the strap 29. A lug 31 on the front jaw acts as a stop for the switch lever when the latter is thrown open by the spring 20. The cover 32 carries two push-buttons 33 34 mounted on light springs 35 secured to the inner side of said cover.

20 The upper button 33 enables the operator to close the upper ends of the jaws upon the dash-pot. The lower button 34 enables the switch to be closed. An indicator target 36 on the switch lever, bearing the words "On" and "Off", coöperates with a window 37 in the cover to show the condition of the switch.

The operation is as follows: When the switch is closed, the jaws, being released from the pressure of the lever on the lug 31 will be forced apart by the spring 30 thereby lifting the strap a short distance, and allowing the pin to project far enough below it to engage the shoulder on the spring finger and thus lock the switch closed. The closing of the circuit energizes the coil, which magnetizes the jaws, but they are not attracted toward each other because of their similar polarity. The weight of the plunger has caused it to sink to the bottom of the dash-pot, but the energized solenoid coil now exerts an upward pull on it, so that, retarded by the valve, it rises slowly through the liquid; being in effect a movable core for the solenoid. Its upper end acquires a polarity opposite to that of the jaws, so that when at the expiration of the time limit, said end rises to a position between the semi-circular edges of the jaws they are strongly attracted and close upon the dash-pot when the attraction overcomes the tension of the spring 30. As the jaws snap together, the strap is forced downward, thereby pushing the spring finger off the pin and releasing the switch, which is instantly pulled open by the spring 20. The coil being now out of circuit ceases to exert any pull on the plunger, whose weight sends it quickly to the bottom of the dash-pot, the valve opening freely and permitting the liquid to pass through the plunger as it descends. In case it is desired to open the switch before the expiration of the time limit, the button 33 can be pushed in, forcing the jaws together and tripping the switch-locking devices.

65 When this switch is installed in connection

with a heating device, such for instance as a flat iron, it fulfils the same requisite as a thermostat. In other words it eliminates all danger from fire due to leaving the flat iron with the current turned on, it effects a regulation of the heat, as an excessive temperature cannot develop within the usual time limit of the switch, say ten or fifteen minutes; it reduces the operating expenses, as the iron is liable to become too cold rather than too hot, by reason of the shutting off of the current. The switch, however, opens with a sharp audible sound, so that the operator is warned and can be ready to close the switch again if the iron begins to get cool. On account of its sturdy construction and permanent stationary mounting, the operation of this time-switch is positive and reliable, and inasmuch as it can be substituted for the ordinary line switch it does not greatly increase the cost of the heating outfit. Moreover, it can be applied to existing installations with a minimum of labor and expense.

What I claim as new and desire to secure by Letters Patent of the United States, is,

1. A time switch comprising an electromagnet coil, switch tripping mechanism containing movable magnetic elements disposed in the field of said coil, a core movable longitudinally of said coil to vary the effect of the magnetic field on said magnetic elements, and means for retarding the movement of said core.

2. A time switch comprising an electromagnet coil, switch tripping mechanism containing operative elements polarized by said coil, a core movable longitudinally of said coil into and out of proximity to said elements and polarized by said coil opposite to the polarity of said elements, and means for retarding the movement of said core.

3. A time switch comprising a dash-pot, a magnetic plunger movable therein, an electromagnet coil surrounding said dash-pot, and switch tripping mechanism provided with movable elements arranged in the field of said coil and responsive to variations of the magnetic flux produced by movement of said plunger.

4. A time switch comprising a dash-pot, a magnetic plunger therein provided with a check-valve to retard upward movement, an electromagnet coil concentric with the upper portion of said dash-pot, movable magnetic jaws adapted to close upon the upper end of said dash-pot, and switch tripping mechanism actuated by said jaws.

5. A time switch comprising a dash-pot, an electromagnet coil surrounding said dash-pot, two iron jaws pivoted to close upon the upper end of said dash-pot, a magnetic plunger movable in said dash-pot into and out of proximity of said jaws, a strap suspended from said jaws, a switch lever and a

detent therefor adapted to be released by the movement of said strap.

6. A time switch comprising a spring-opened switch-lever, a locking device for holding said switch closed, a tripping mechanism for releasing said locking device, a coil adapted to be connected in circuit by said switch, a movable core adapted to close the magnetic path of said coil, means for retarding the movement of the core, and means responsive to the flux in said path for actuating the tripping mechanism.

7. A time switch comprising a dash-pot, a magnetic plunger movable longitudinally thereof, an electromagnet coil surrounding said dash-pot and adapted to be energized upon closing said switch, and magnetic switch tripping mechanism so pivoted that said plunger moves into and out of proximity thereto to vary the effect of the magnetic field thereon.

8. A time switch comprising a plate having two perforated flanges, a dash-pot held in the perforations, a magnetic plunger in said dash-pot, a coil surrounding said dash-pot and supported on one of said flanges, two jaws pivoted to the lower flange and having notches adapted to close upon said dash-pot, a spring for urging said jaws open, a switch-lever adapted to connect said coil in circuit pivoted to the lower flange and carrying a spring finger, a detent to engage said finger, and a strap carried by said jaws for releasing said finger from said detent.

In witness whereof, I have hereunto set my hand this fourteenth day of August, 1908.

JOHN T. BEECHLYN

Witnesses:

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HENRY O. WESTENDARP.