

No. 697,273.

Patented Apr. 8, 1902.

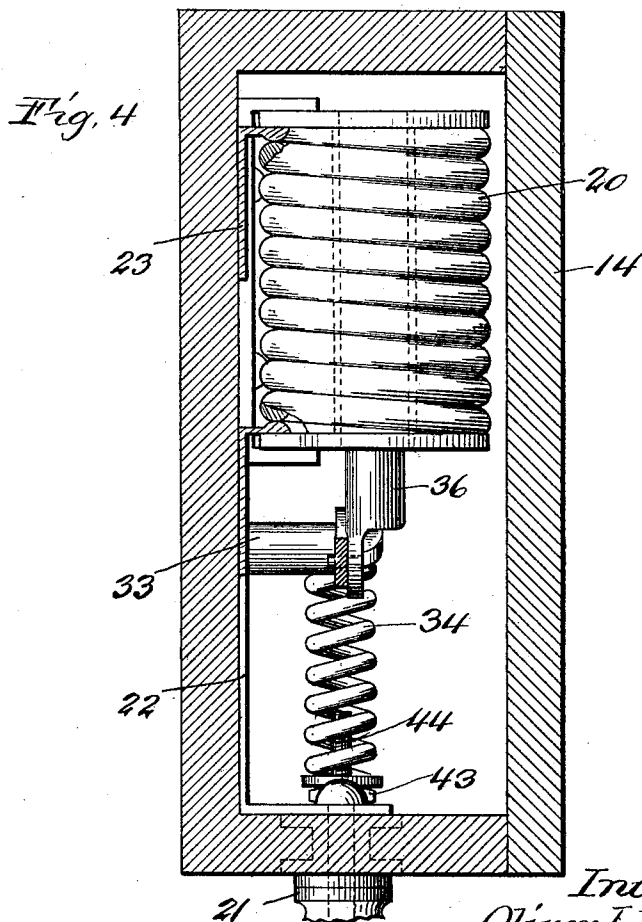
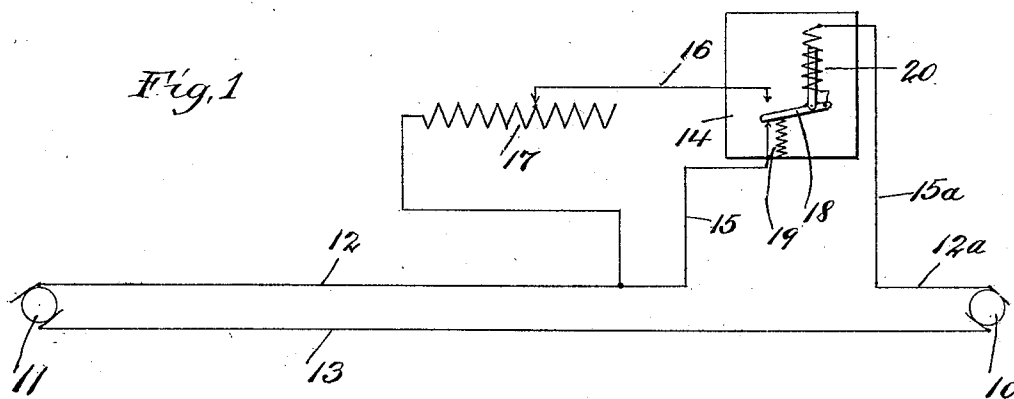
O. L. PLUMTREE.

AUTOMATIC SAFETY SWITCH FOR ELECTRIC CIRCUITS.

(Application filed Jan. 18, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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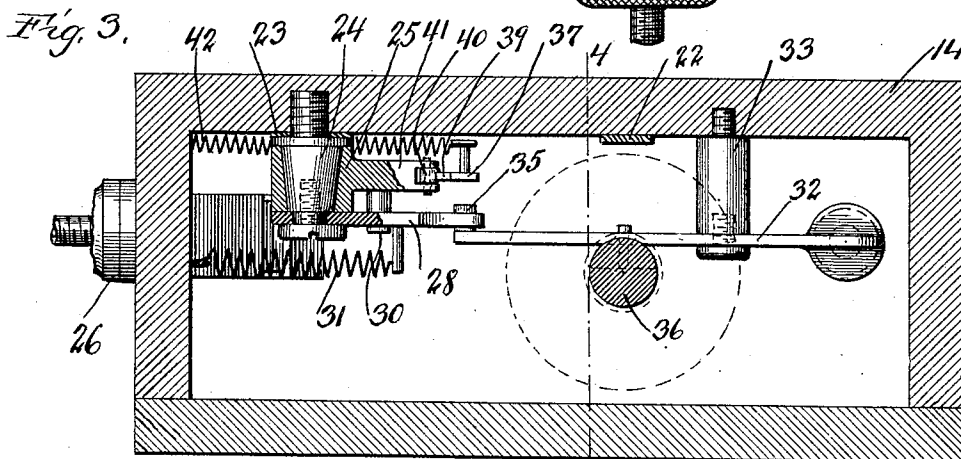
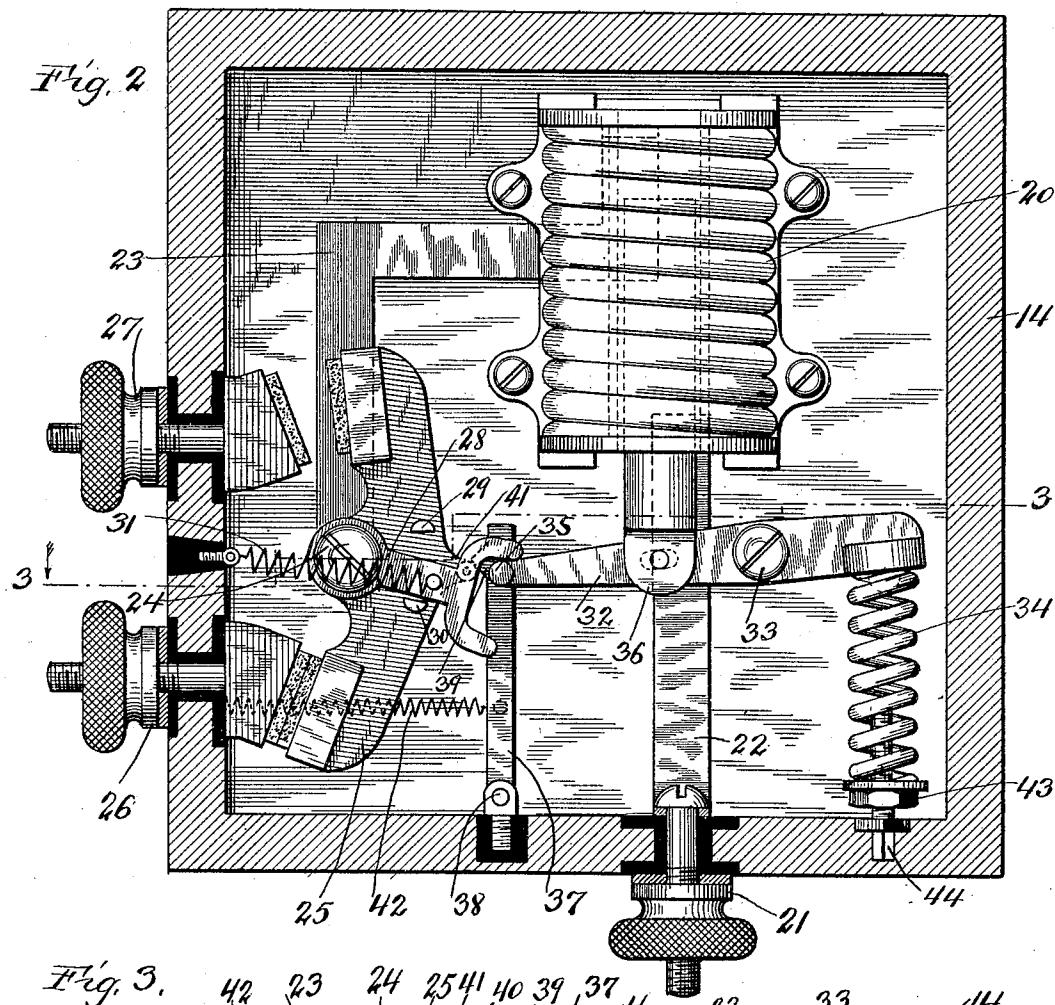
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UNITED STATES PATENT OFFICE.

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AUTOMATIC SAFETY-SWITCH FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 697,273, dated April 8, 1902.

Application filed January 18, 1901. Serial No. 43,827. (No model.)

To all whom it may concern:

Be it known that I, OLIVER L. PLUMTREE, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Automatic Safety-Switches for Electric Circuits, of which the following is a specification and which are illustrated in the accompanying drawings, forming a part thereof.

The object of the invention is to provide automatic means for switching the current of an electric circuit through a resistance in the event of a short circuit occurring which cuts out a part of the normal resistance of the circuit. This object is secured by the construction hereinafter described, and which is illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatic view of an electric circuit provided with the improved automatic switch. Fig. 2 is a sectional view of the switch-box, showing the switch mechanism in elevation. Fig. 3 is a transverse section of the switch-box, taken on the line 3 3 of Fig. 2; and Fig. 4 is a vertical transverse section on the line 4 4 of Fig. 3.

In Fig. 1 of the drawings there is conventionally shown a generator 10, a translator, such as a motor, at 11, and the main lines 12, 12^a, and 13 of the circuit. A switch-box 14 is in the circuit, being connected with the line 12 12^a by the branches 15 15^a. A branch 16 of the circuit leads from the switch-box through a resistance-box 17 to the line 12. A switch 18 vibrates between the terminals of the branches 15 16 and is normally held in contact with the former by a spring 19, acting in opposition to a solenoid 20, which is incorporated into the circuit, but is normally of less strength than the spring. Under the influence of an excessive current the solenoid 20 will overcome the tension of the spring and throw the switch 18 over to the terminal of the branch 16, thus diverting the current through the resistance-box 17. Upon the restoration of the current to its normal volume the spring 19 again overcomes the solenoid and throws the switch 18 over to the terminal of the branch 15.

The resistance of the box 17 should be a little less than the normal resistance of the translator 11, so that while sufficient to keep the volume of current within the limit of

safety it permits it to so far exceed the normal as to increase the strength of the solenoid beyond that of the spring 19. When the translator is again brought into the circuit, so as to restore the normal resistance, the switch is thereby automatically thrown, so as to cut out the resistance-box.

In Figs. 2 and 3 there is illustrated mechanism for accomplishing the results above outlined. The branch 15^a leads to the binding-post 21, which is connected by means of the ribbon 22 with one terminal of the solenoid 20, the other terminal of which is connected by means of the ribbon 23 with a pivot-pin 24, upon which is mounted an oscillating switch-arm 25, adapted to contact alternately with the terminals of the branches 15 and 16 and which connect with the switch-box 14 by means of the binding-posts 26 27, respectively.

An oscillating lever-arm 28 swings upon the pivot 24, playing between studs 29 30, projecting from the side face of the switch-arm 25. A retractile spring 31 is secured to the arm 28 and to the side of the box 14 opposite the pivot 24, its function being to throw the lever-arm in either direction after it passes the line of the pivot, thereby insuring the quick throw of the switch-arm 25 by the contact of the lever-arm with the stud 29 or 30.

A lever 32 is pivotally mounted on a post 33, set in the side of the box 14. To this lever is secured, so as to act in opposition, a spring 34 and the core 36 of the solenoid 20. The lever-arm 28 is bifurcated, and between its branches there plays a stud 35, fixed upon the lever 32.

Under the influence of the spring 31 one of the branches of the lever-arm 28 is always in contact with the stud 35, and this stud is required to move through but a short range in order to carry the line of the spring 31 past the center of the pivot 24, and the two branches of the lever-arm 28 are spread sufficiently so that the rearward branch comes into contact with the stud 35 as the switching action is completed.

A lever-arm 37 is pivoted, as shown at 38, to one of the walls of the box 14. This lever-arm is provided with a V-shaped cam 39, which impinges against an antifriction-roller 40, carried by a stem 41, projecting backwardly centrally from the switch-arm 25, the cam 39 being held in contact with this roller by the ac-

tion of a retractile spring 42, attached to the lever and to the side of the box 14. This spring-controlled lever coöperates with the spring 31 to hold the switch-arm 25 in the position to which it was last thrown and retains it in that position until by the movement of the lever 32 the lever-arm 28 is shifted so that the spring 31 acts in opposition to the spring 42. It will be understood that the latter spring is of less strength than the former.

The difference between the strength of the spring 34 and that of the solenoid 20 may be varied by adjusting means applied to the spring. For this purpose I show the spring as reacting expansively between the lever 32 and a nut 43, running upon a threaded stud 44, set in one of the walls of the box 14. If the normal current is of constant volume, the adjustment may be safely made very fine, so that the tension of the spring 34 but slightly exceeds the strength of the solenoid. If for any reason it becomes necessary to change the volume of current permanently, the tension of the spring 34 is correspondingly adjusted.

While I have shown and described and desire to protect a particular form of automatic switch mechanism, I desire it to be understood that the scope of my invention is such as to include any form of automatic switch mechanism which will be actuated by variations in the volume of current.

While I have shown a solenoid for controlling the switch, it will be understood that any form of electromagnet having a movable armature may be used.

I claim as my invention—

1. As an article of manufacture, an automatic switch mechanism for branch electric circuits comprising a pair of terminals, a switch-arm oscillating between the terminals, a spring for oscillating the arm, and an electromagnet and a spring acting in opposition to throw the switch-oscillating spring, the electromagnet being incorporated into the circuit to be controlled and being normally weaker than the spring.

2. As an article of manufacture, an automatic switch mechanism for branch electric circuits comprising a pair of terminals, a switch-arm oscillating between the terminals, a spring for oscillating the switch-arm, a lever to which one end of the spring is attached, and an electromagnet and a spring acting in opposition to move the lever so as to throw the switch-oscillating spring, the electromagnet being incorporated into the circuit to be controlled.

3. As an article of manufacture, an automatic switch mechanism for branch electric circuits comprising a pair of terminals, a switch oscillating between the terminals, and an electromagnet and a spring acting in opposition to oscillate the switch, the electromagnet being in circuit with the switch and having a terminal for connection with the main wire of the circuit to be controlled.

4. In an electric switch, in combination, a pivoted switch-arm having projections thereon, a lever adapted to play between the projections and engage the same alternately, a spring the free end of which is connected to the lever and adapted to travel past the pivot of the switch-arm to throw the switch-arm, and an electromagnet and a spring acting in opposition to move the lever so as to throw the switch-oscillating spring, the electromagnet being in circuit with the switch and having a terminal for connection with the main wire of the circuit to be controlled.

5. In an electric switch, in combination, an oscillating switch-arm having studs or shoulders on opposite sides of its pivot, an arm swinging on the same pivot with the switch-arm and between the studs or shoulders, a retractile spring attached at one end to the swinging arm and having a fixed anchorage for its outer end back of the pivot, a stem projecting from the switch-lever oppositely from the anchorage of said spring, a V-shaped cam engaging such stem, and a spring of weaker tension than the before-named spring for holding the cam to the stem.

6. In an electric switch, in combination, a pivoted switch-arm, a lever mounted on the pivot of the switch-arm, a spring connected to the lever and adapted to move past the pivot of the arm to throw the same, means for actuating the lever to throw the spring, and a spring-actuated lever adapted to hold the switch-arm when thrown.

7. In an automatic switch mechanism for a divided electric circuit, in combination, an electromagnet and an oscillating switch-arm both in the main circuit, a pair of branch terminals with which the switch-arm alternately engages, a pivoted lever, a retractile spring for oscillating the switch-arm and attached to the lever and having an anchorage beyond its fulcrum, a lever, 32, attached to the armature of the electromagnet for imparting initial movement to the lever for throwing the switch-oscillating spring, and a spring acting upon the lever 32 in opposition to the electromagnet.

8. In an automatic switch mechanism for a divided electric circuit, in combination, an electromagnet and an oscillating switch-arm both in the main circuit, a pair of branch terminals with which the switch-arm alternately engages, a pivoted lever, a retractile spring for oscillating the switch-arm and attached to the lever and having an anchorage beyond its fulcrum, a lever 32, attached to the armature of the electromagnet for imparting initial movement to the lever for throwing the switch-oscillating spring, a spring acting upon the lever 32 in opposition to the electromagnet, and a spring-actuated lever adapted to hold the switch-arm when thrown.

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