

J. W. FOWLE.
SAFETY THERMAL CUT-OUT OR SWITCH.
APPLICATION FILED DEC. 5, 1907.

946,597.

Patented Jan. 18, 1910.
2 SHEETS—SHEET 1.

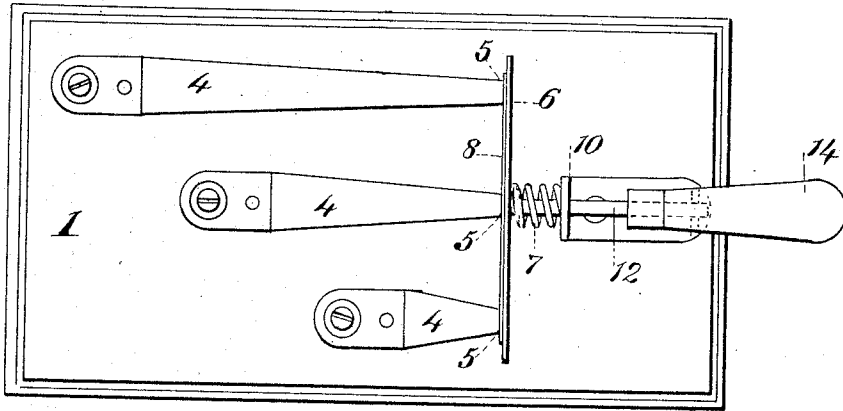


Fig. 1.

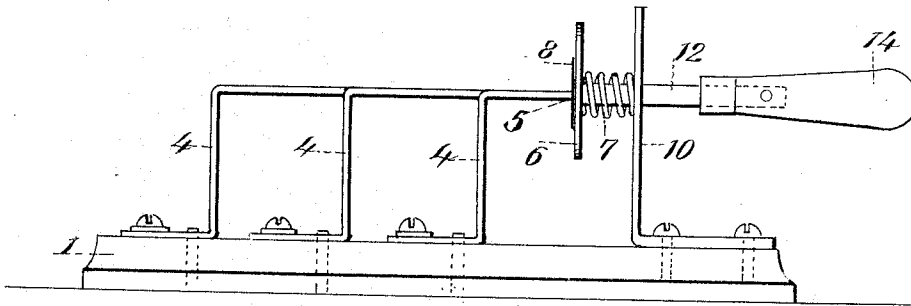


Fig. 2.

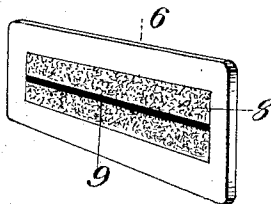


Fig. 3.

Witnesses:

V. Gladys Stowe
William John McKe

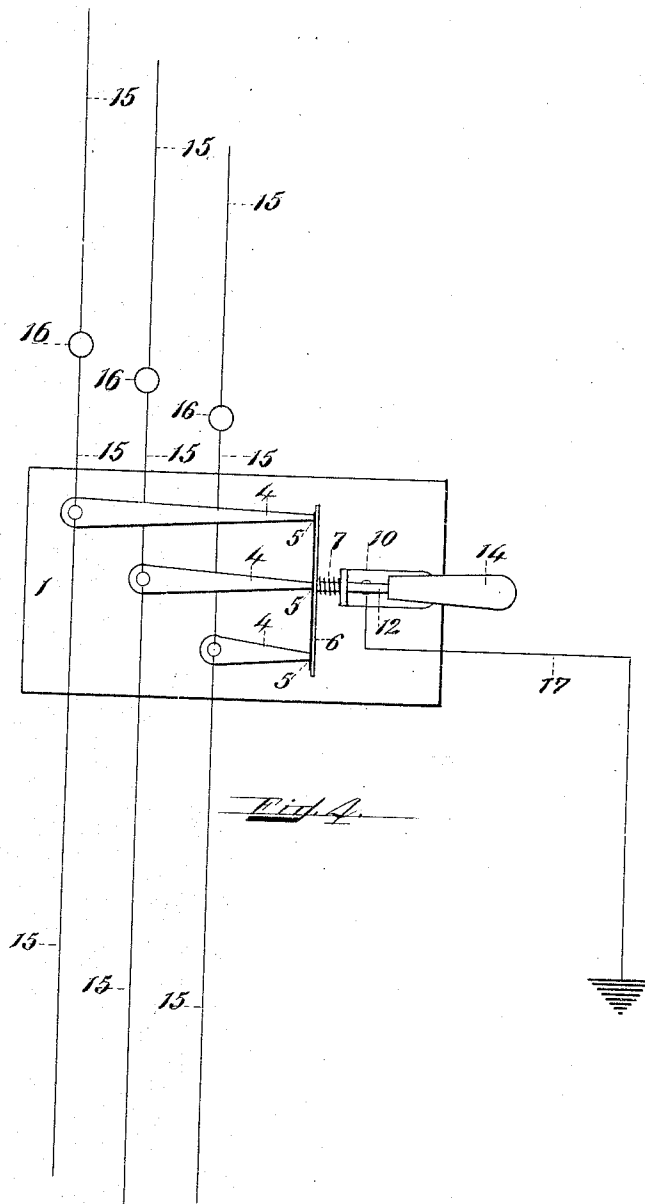
Inventor:

John W. Fowle
By his Atty
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UNITED STATES PATENT OFFICE.

JOHN W. FOWLE, OF WELLESLEY, MASSACHUSETTS.

SAFETY THERMAL CUT-OUT OR SWITCH.

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Specification of Letters Patent. Patented Jan. 18, 1910.

Application filed December 5, 1907. Serial No. 405,183.

To all whom it may concern:

Be it known that I, JOHN W. FOWLE, a citizen of the United States, and resident of Wellesley, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Safety Thermal Cut-Outs or Switches.

My invention is primarily adapted for use in electric circuits more or less exposed to the liability of having the normal voltage suddenly increased, either through the breaking down of a transformer or contact with a circuit carrying a higher voltage or other well known causes. The particular instances in which such sudden increase in voltage is liable to occur are electric lighting and power circuits. I do not, however, limit myself to any particular use of my device, but desire and intend to claim my invention in the broadest possible manner. It being, however, essentially a safety device, it will remain inoperative and dormant unless and until the circuit in which it is interposed is at least partially grounded and a current is introduced of a voltage higher than that which the device in that particular circuit is designed to withstand.

My object has been to provide a safety thermal cut-out or switch which will simultaneously ground and short circuit all of the wires of the circuit in which it is interposed, upon the introduction of a sufficiently high voltage into any one of the wires of such circuit.

In the present application I have shown my invention as applied to an electric circuit employing three wires. It is customary with such a system of wiring to interpose in each wire a fusible cutout which will open the circuit if the current exceeds a definite value.

The essential features of my invention consist of a common ground for, but normally insulated from, all of the wires of the circuit, the insulation being of such character and so arranged that upon the introduction of a sufficiently high potential upon any one of said wires the insulation will be broken down and all said wires will be grounded and short circuited, thus causing the fusible cutouts interposed in said wires simultaneously to blow out, thus disconnecting the wires to be protected from the wires carrying the higher potential and thereby obviating the difficulty and danger hereinbefore indicated.

In the accompanying drawings, which illustrate my invention in its most simple form, similar numbers represent similar parts throughout the several views.

Figure 1 is a plan view. Fig. 2 is a side elevation. Fig. 3 is a detail view of the plate 6 showing the insulating material with the line of highly combustible material. Fig. 4 is a diagrammatic view of the wiring.

On base 1 are rigidly secured contacts or fingers 4, 4 which are insulated from one another either by having the base itself made of some insulating material or by any other known means.

6 is a plate attached to and supported by arm 12, which latter is supported by post 10. Post 10 is rigidly attached to base 1 and insulated from fingers 4, 4. Spring 7, which may be located between post 10 and plate 6, serves to keep plate 6 normally pressed toward the fingers 4, 4 with the tips 5, 5 of which, said plate would contact were it not for the interposition of the insulating material 8 hereinafter described. The end of arm 12 may be provided with some insulating material so as to form a handle 14. Interposed between the face of plate 6 and tips 5, 5 of fingers 4, 4 is a sheet of insulating material 8. In practice a thin sheet of oiled paper has been found to operate successfully. Such insulating material may either be attached to the surface of plate 6 or held in place between said surface and the tips of fingers 4, 4 by reason of the pressure exerted by spring 7.

In the diagrammatic view (Fig. 4) 15, 15 are the secondary wires proceeding from a transformer (not shown) to the fusible cut-outs 16, 16 thence to the respective fingers 4, 4 and from there continuing in the ordinary course of the circuit. 17 is a ground wire attached to post 10.

The operation of my invention is as follows:—Assuming my device to be interposed in the wires of an electric circuit with the insulation held in place between the face of plate 6 and the tips of fingers 4, 4 as hereinbefore stated, the current normally passing through said wires will leave the insulation on the face of plate 6 unaffected, and no current will pass from the fingers 4, 4 to the ground wire 17. Upon the introduction into any one of said wires of a current of sufficiently high voltage, the insulating material on the face of plate 6 will, by reason of said excessive voltage, be broken down op-

posite the tip of the finger to which is attached the wire so over-charged. In order that all of the fingers 4, 4 may be simultaneously short circuited and connected to the ground I cover the insulating material on the face of plate 6 with a narrow strip 9 of some highly combustible insulating substance such as gun cotton, cellulose or similar matter, which will be ignited by the arc formed when the insulating material 8 is broken down and will insure the complete destruction of such insulating material beneath said strip 9 thus allowing the fingers 4, 4 simultaneously to come in contact with plate 6 and short circuiting and grounding the current. It is apparent, however, that the entire surface of the insulating material 8 may be covered with such highly combustible material, and in practice I have used a gunpowder paste, sometimes extending in a narrow strip across the face of the insulating material and at others covering the entire face of the insulating material. The short circuiting of the wires causes the fusible cutouts to operate, disconnecting all the wires desired to be protected (usually those within a building) from the wires carrying the higher potential (usually outside the building) and the connection to ground through plate 6 and wire 17 prevents the building wiring being raised to a dangerously high potential above the earth. It is obvious that the insulating material on the face of plate 6 should be composed of such substance that it will readily puncture or break down whenever any one of the wires of the circuit carries a higher voltage than it is desired said wire should carry. The resisting power of the insulating material is determined by the margin of safety desired to be maintained; in other words, if it be desired that the wires shall become short circuited upon the introduction of a comparatively small increase in voltage over that of the current normally carried, then the insulating material must necessarily be more readily puncturable than would be the case if it were intended that my invention were to resist a considerable increase of voltage before the insulating material should break down. There is advantage in having the insulating material consist of a thin sheet, as there is then only a slight space between the tips of the fingers 4, 4 and the face of plate 6 upon the breaking down of said insulation and a very small arc will accomplish the grounding of the circuit.

What I claim and desire to secure by Letters Patent is,

1. A safety thermal cutout or switch comprising a plurality of fingers, a contact piece, puncturable insulating material between said fingers and said contact piece, and means whereby said material will be destroyed be-

tween all of said fingers and said contact piece whenever said material is broken down between any one of said fingers and said contact piece.

2. A safety thermal cutout comprising a plurality of fingers respectively connected with the wires of an electric circuit, a contact piece connected with the ground, insulating material normally separating said fingers and said contact piece, and means whereby said insulating material will be destroyed between all of said fingers and said contact piece whenever the voltage carried by any one of the wires of said circuit exceeds a predetermined amount.

3. A safety thermal cutout comprising a plurality of contacts interposed in an electric circuit and insulated from one another, a contact plate connected with the ground, puncturable insulating material between said first mentioned contacts and said contact plate, means for holding said puncturable insulating material between said first mentioned contacts and said contact plate, and highly combustible material so placed as to destroy said insulating material between all of said first mentioned contacts and said contact plate whenever the voltage carried by any one of the conductors of said electric circuit exceeds a predetermined amount.

4. In a safety thermal cutout or switch the combination of a plurality of fingers respectively connected with the several conductors of an electric circuit and insulated from one another, a contact plate insulated from said fingers and connected with the ground, puncturable insulating material between said fingers and said plate, means whereby said material will be destroyed between all of said fingers and said plate whenever the voltage carried by any one of said conductors exceeds a predetermined amount, and means whereby said fingers and said plate will be caused to come into contact whenever said insulating material is destroyed.

5. In combination with two or more conductors of an electric circuit, fingers insulated from one another and respectively connected with said conductors, a contact plate connected with the ground, puncturable insulating material between said fingers and said plate and means for causing all said conductors to become shortcircuited and grounded whenever the voltage carried by any one of said conductors exceeds a predetermined amount.

6. The combination of a plurality of fingers each connected to a conductor in an electric circuit, a contact plate connected with the ground, means normally insulating said plate from said fingers, and means for destroying said insulation whenever the voltage carried by the conductor, to which any one of said fingers is connected, exceeds a predetermined amount.

7. In a safety thermal cutout or switch the combination of a plurality of fingers respectively connected with the several wires of an electric circuit and insulated from one another, a contact piece connected with the ground, puncturable insulating material interposed between said fingers and said contact piece, means for holding said contact piece movably in a forward position toward said fingers, and means whereby, whenever said insulating material is destroyed between one of said fingers and said contact piece, such destruction will be communicated to all points where said fingers contact with said insulating material and said material will be destroyed at such points and all of said fingers to be permitted to make contact with said contact piece.

8. The combination of a plurality of fin-

gers respectively connected to the conductors of a multiple conductive system, a conductor connected with the ground, puncturable insulating material between said fingers and said last mentioned conductor, and means for shortcircuiting and grounding all of the conductors of said multiple conductor system whenever the voltage on anyone of the conductors of said system exceeds a predetermined amount.

In witness whereof, I have hereunto set my hand, in the presence of two subscribing witnesses, this the twenty-ninth day of November, 1907.

JOHN W. FOWLE.

Witnesses:

ARTHUR P. HARDY,
V. GLADYS STOWE.