

No. 697,530.

Patented Apr. 15, 1902.

J. G. NOLEN.
THERMO ELECTRIC SWITCH.

(Application filed Sept. 12, 1901.)

(No Model.)

Fig. 1.

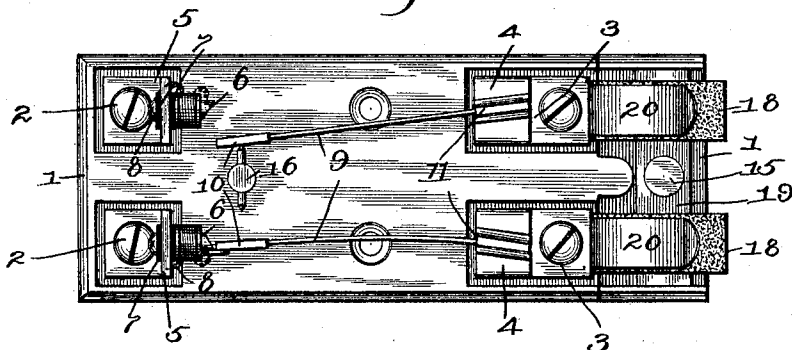


Fig. 2.

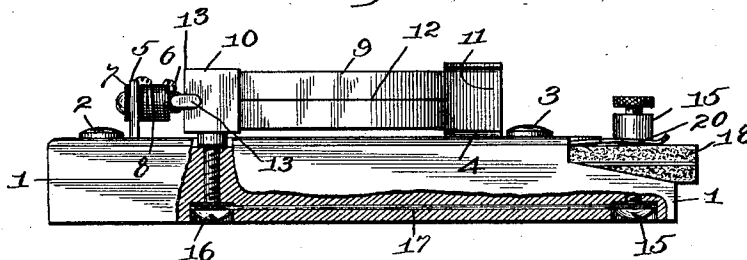


Fig. 3.

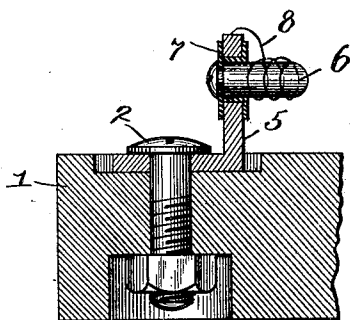
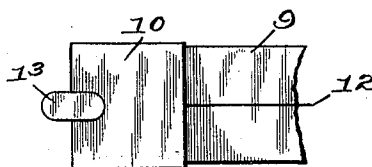


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES G. NOLEN, OF CHICAGO, ILLINOIS.

THERMO-ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 697,530, dated April 15, 1902.

Application filed September 12, 1901. Serial No. 75,143. (No model.)

To all whom it may concern:

Be it known that I, JAMES G. NOLEN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful
5 Improvements in Thermo-Electric Switches; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

10 My invention relates to improvements in thermo-electric switches. It is especially adapted to be used in connection with telephone-circuits or in circuits with other instruments wherein it becomes desirable or necessary to automatically open the circuit when
15 a current from some extraneous source has been introduced upon the said circuit, the said current being greater than the instruments are intended to carry.

20 The object of my invention is to provide a device whereby the circuit will automatically be opened and may be also grounded by the thermic effect of a current of electricity, which is larger than is designed to be carried upon
25 the said circuit.

The primary object of my invention is to automatically open the circuit containing telephone instruments and incidentally to ground the same by the operation of the device superinduced by the thermic effect of an over-charge or abnormally large current, which
30 may be introduced upon the circuit from extraneous sources either abruptly or by small successive increments until the circuit containing the telephone or other instrument becomes overburdened or supercharged to such
35 an extent as to be dangerous, whereupon the thermic effect of the excessive electric current flowing through the circuit, which has been increased beyond the normal capacity
40 of the said circuit, will cause the liberation of the spring switch-blade of the device placed in the said circuit and designed to be liberated thereby, whereupon the circuit containing
45 the said delicate instruments is opened and the circuit over which the excessive current is flowing is diverted to the ground.

In the drawings, Figure 1 is a plan view of my device. Fig. 2 is a side elevation partly
50 in section. Fig. 3 is an enlarged broken-away

detail of one of the stationary terminals. Fig. 4 is an enlarged broken-away detail of the switch-blades and fuse-support.

In all of the views the same letters and numerals of reference indicate similar parts. 55

1 is an insulating-base, upon which my device is mounted. The instrument shows a switch for each leg of the telephone-circuit. If desirable, a single switch may be used in each circuit and only one leg of the circuit
60 adapted to be thereby opened. I prefer, however, to open both legs of the circuit, especially when a metallic circuit is used.

2 2 and 3 3 are the terminals of the instrument to which the line-wires of the circuit in
65 which it is designed to be employed are connected. The terminals 3 3 have upwardly-extending spring-clips 4 4, and the terminals 2 2 are provided with upwardly-extending angle-pieces 5 5. Studs 6 6, preferably of
70 copper, are insulatedly supported in the angle-pieces 5 5 by means of the insulating bushings 7 7, which are made preferably of mica, asbestos, or like material. A small heating-coil 8 is mounted upon the stud 6 and
75 is connected by one terminal to the angle-piece 5, and the other terminal is connected to the stud 6. The stud 6 projects slightly beyond the front end of the coil 8. The usual mica-blade fuse-supports 9 9 are capped on
80 their ends by means of metallic clips 10 10 and 11 11. These clips are preferably of copper or similar metal and are joined electrically by means of a fuse-wire 12, which is designed to complete the electric circuit be-
85 tween the clips 10 and 11. The blade 9 is preferably made of an insulating material, such as mica. To the clip 10 of the blade 9 I solder a small piece of metal 13 and allow it to project beyond the end of the clip 10. The
90 soldering material which I use to unite the clip 13 with the clip 10 is adapted to melt at a low degree of temperature. A binding-post 15 is connected to the ground. A stud 16 is connected to the binding-post 15 by means of
95 the wire 17, and thereby the stud 16 is also connected to the ground.

18 18 are the usual static-discharge plates, the lower plate resting upon the ground-strip
100 19, which is connected to the binding-post 15,

the upper plate being in contact with the clip 20, which completes the connection to the terminal 3. The plates are separated by the usual insulating material, such as paper, mica, &c.

5 The spring-clips 4 4 are inclined inwardly toward a radial point common to both.

The blade 9, with its accompanying clips 10 and 11 and the fuse 12, is an article of ordinary commerce and may be purchased in the market. After the clip 13 has been soldered to the device the blade 9 is placed in position, one end being inserted in the clip 4, the engaging piece 13 being placed in the position shown in the lower portion of Fig. 1, where the piece 13 is held by the projecting end of the stud 6. The line-terminals of a telephone-circuit are joined to the terminals 3 3, and the instrument-terminals are joined to the terminals 2 2 of the device. When both of the fuse-supporting blades are in the position shown in the lower portion of Fig. 1, the circuit is completed from the terminals 3 through the fuse-wires 12, the clips 10, the engaging pieces 13, the studs 6, through the coils 8, through the upright 5 of the terminal 2. This path is of sufficient carrying capacity to accommodate the current that may be necessary in and to the operation of telephone apparatus. Should it happen, however, that a current of greater strength than the telephone instruments and apparatus are able to carry should pass over the circuit in which they are contained, then such surplus current will sufficiently heat the coil 8 to melt the low-fusing solder which joins the engaging piece 13 to the clip 10, when the blade 9 will be liberated. The resilience of the mica blade will cause it to make contact with the stud 16, as shown, and thereby ground the line-terminal and open the circuit communicating with the telephone instruments between the stud 6 and the clip 10, thus protecting the telephone instrument or such other devices as may be designed to be protected by my device from the effects of an overcharge of electricity. This feature of my device is designed to be brought into action when the current is very gradually increased, known in the art as "sneak-current," to the effect of which the ordinary fuse-wire is hardly susceptible. Should the current be increased to any abnormal extent suddenly, then the fuse-wire 12 is sufficient to protect, and in that event it would become disintegrated and by that means the circuit would be opened.

My device contains three means for protecting and guarding delicate electrical apparatus—first, the ordinary fuse-wire, which is designed to be melted when an excessive current is suddenly introduced upon the circuit; second, the means which I have just described—that is, the thermo-electric device, which is designed to be operated by the gradual increase of the current to an abnormal degree; third, by the static discharge, as

when lightning enters the circuit it will abruptly discharge itself between the plates 18 and the ground through the insulating medium instead of passing through the electric instruments containing self-induction and other impeding effects.

The blade 9 is the resilient insulating-support, designed to carry the fuse 12, and by the effect of its resiliency it automatically opens the circuit when the fusing metal between the clips 10 and the engaging piece 13 is melted, after which if the extraneous current continues to increase to an abnormal degree the fuse 12 will be melted and the disastrous results of the overcharge of current will thereby be entirely averted.

Having described my invention, what I claim as new and useful, and desire to secure by Letters Patent of the United States, is—

1. In a thermo-electric switch the combination with a base of a resilient, insulating fuse-support, a fuse carried thereby, metallic terminals on said support to which said fuse is joined, a means for holding said support under strain and thereby preserving the integrity of the circuit in which said device is placed, and a thermo-electric device adapted to release said fuse-support and thereby open said circuit, substantially as set forth.

2. In a thermo-electric switch the combination with a base of a mica blade provided with metallic terminals, a fuse-link connected to said terminals, a spring-clip for supporting one end of said mica blade, an engaging piece soldered to the metallic terminal of the other end of said mica blade, a stud adapted to be heated by a current of electricity, a coil surrounding said stud and in circuit with said fuse-link, the arrangement being such that said mica blade is under tension when said engaging piece is in contact with said stud, and will be moved away from said stud when the solder joining said engaging piece with said fuse-terminal has been melted, substantially as set forth.

3. In a thermo-electric switch the combination with a base of a resilient, insulating fuse-support, a fuse carried thereby, metallic terminals on said support to which said fuse is joined, a spring-clip for holding one end of the said support, a stop-piece soldered to the other end of said support, a fixed electric terminal against which said stop is adapted to bear, and a means for heating said terminal and melting the solder between said stop and said support, whereby the support is displaced by virtue of its inherent resilience, and the circuit thereby opened, substantially as set forth.

4. In a thermo-electric switch the combination with the base 1 of a clip 4 of an insulating spring-blade fuse-support having a fuse 12 and terminals 10 and 11 joined thereto, a removable stop 13 soldered to the terminal 10, a fixed electrical terminal 6 against which

said stop is adapted to rest and a heating-coil 8 adapted to heat the terminal 6 and the stop 13 so as to melt the solder that holds the stop 13 to the clip 10 when an abnormal ; current is flowing over the coil 8, substantially as set forth.

In testimony that I claim the foregoing as

my own I affix my signature in presence of two witnesses.

JAMES G. NOLEN.

In presence of—
FORÉE BAIN,
M. F. ALLEN.