No. 757,971. PATENTED APR. 19, 1904.

M. SETTER.

THERMAL CUT-OUT.

APPLICATION FILED AUG. 5, 1903.

NO MODEL.

Fig. 1.

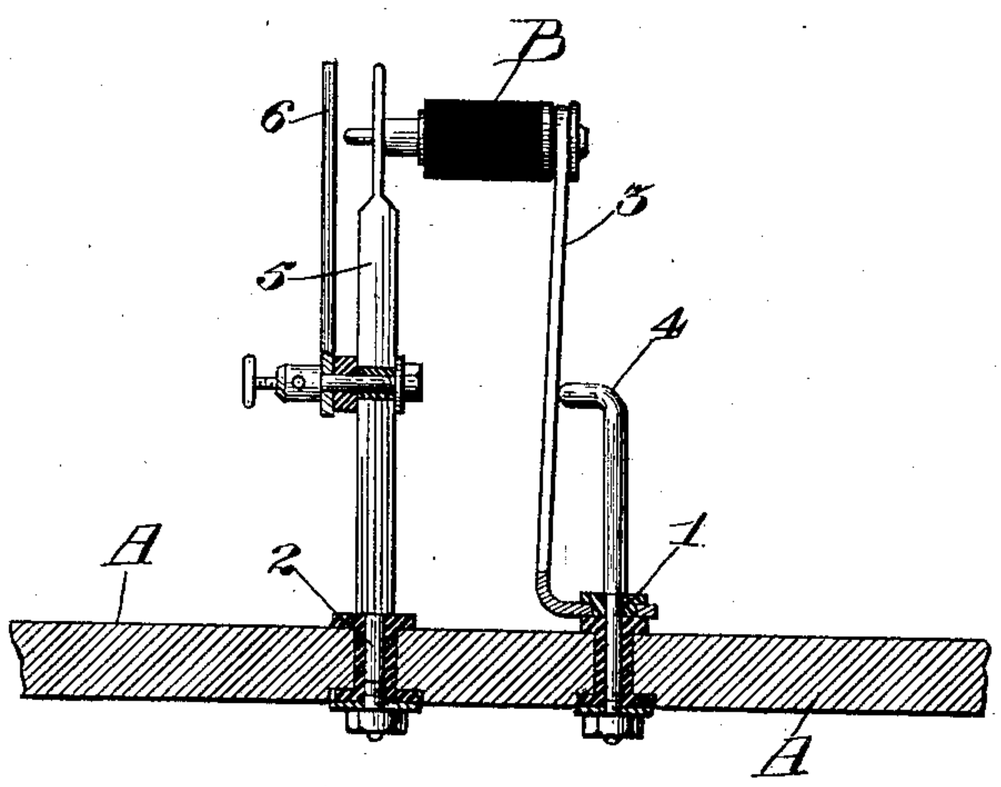


Fig. 2.

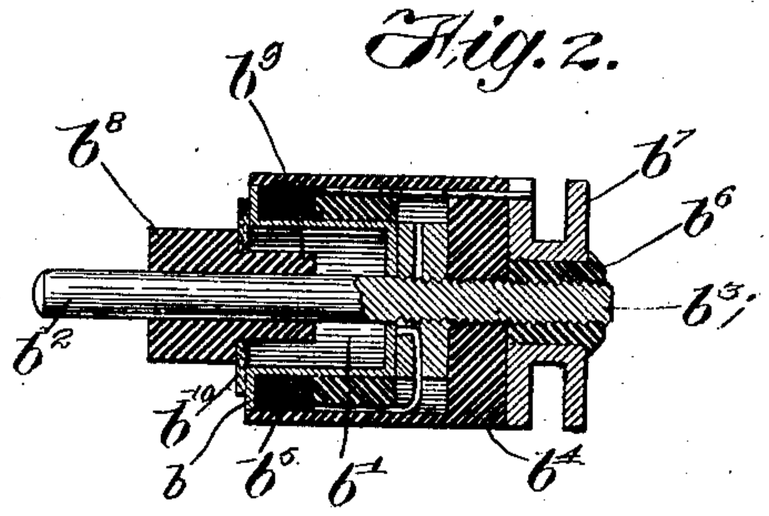
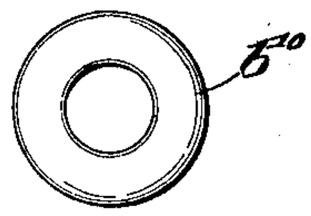


Fig. 3.



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No. 757,971. Patented April 19, 1904.

UNITED STATES PATENT OFFICE.

MICHAEL SETTER, OF CHICAGO, ILLINOIS, ASSIGNOR TO P. C. BURNS AND J. G. IHMSEN, OF CHICAGO, ILLINOIS.

THERMAL CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 757,971, dated April 19, 1904.

Application filed August 5, 1903. Serial No. 168,267. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL SETTER, a citizen of the United States of America, and a resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Thermal Cut-Outs, of which the following is a specification.

My invention relates to thermal cut-outs adapted for use in protecting circuits and delicate electrical devices against abnormally strong currents.

Generally stated, the object of my invention is to provide a simple and highly efficient thermal cut-out.

A special object is to provide an improved construction and arrangement whereby the continuity of a circuit may be maintained through the medium of a couple of telescoping members held normally separated by an interposed piece of thin solder.

Another object is to provide an improved construction and arrangement whereby one of said telescoping members may be composed of fiber or some other non-heat-conducting substance, so as to obtain, as far as possible, a concentration of the heat upon the thin piece of solder.

It is also an object to provide certain details and features of improvement tending to increase the general efficiency of a thermal cut-out of this particular character.

To the foregoing and other useful ends my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a side elevation of a thermal cut-out embodying the principles of my invention. Fig. 2 is an enlarged longitudinal section of the removable heat-coil included in the construction shown in Fig. 1 and to which my invention more particularly relates. Fig. 3 is a face view of the ring of solder.

As thus illustrated, my invention comprises a suitable base A, adapted to support the springs, binding-posts, and heat-coil comprised in the construction of the cut-out. The binding-post 1 can be connected with the instruments to be protected, while the binding-post 2 can be connected with the line conductor. The spring 3 is insulated from the post 1, but normally bears against the contact 4 of said post. The rigid post or support 5 is electrically connected with the binding-post 2 and is provided with an insulated spring-contact 6. The contact 6 can be connected in any suitable manner with the ground. The heating-coil B when adjusted in place is supported by the post 5 and the spring 3. The said heating-coil as illustrated comprises a metallic body portion b, provided with a chamber b' and also with oppositely-projecting pins or small reduced portions b^2 and b^3, the latter being preferably threaded. A cap or cover of insulation b^4 is fitted over this body portion, as shown, and a heating-coil b^5 is wound on the body portion beneath the said cap. A hub of insulation b^6 is screwed upon the reduced portion b^3, and this hub in turn supports a grooved or spool-shaped metallic head b^7. A piece of insulation b^8, preferably cylindric in form, is mounted to slide on the stem or reduced portion b^2. This sliding piece of insulation is, it will be seen, preferably provided with a reduced portion b^9, and on this portion b^9 a thin ring or sheet of solder b^{10} is mounted. It will be seen that this thin piece of removable solder is interposed between the shoulder on the sliding member b^8 and the end of the body b.

When adjusted in place, the spring 3 engages the head b^7, as shown, and the stem b^2 extends through an opening in the post 5. In such position the heating-coil keeps the spring 3 in engagement with the contact 4, the compressive strain being sustained by the thin piece of solder b^{10}, owing to the fact that the slidable member b^8 serves as a shoulder to prevent the stem b^2 from slipping farther through the opening in the post 5. One terminal of the heating-coil b^5 can be secured to the head b^7, and the other terminal may be secured to the body b. In this way all currents traversing the line-circuits pass through the parts 3 and 4, the said heating-coil, the body b, and the post 5 in series. Upon the encroachment of an abnormally strong current or even of a current only slightly in excess of normal,

sometimes called a "sneak-current," the heat generated by the coil b^5 will fuse the solder b^{10}. This piece of solder gives way just as soon as it softens sufficiently to permit the pressure of the spring 3 to cause the member b^8 and the body b to act as a punch and die for the purpose of practically punching the central portion out of the solder ring. In other words, the normal tendency of the parts b and b^8 is to telescope one within the other, and it is only the thin piece of solder which normally restrains this tendency and keeps the parts in their normal positions. The solder is, it will be seen, simply a removable piece of sheet-solder, and it is preferably inserted directly between the two telescoping members. Thus the device is extremely sensitive and responsive, it only being necessary to soften the solder very little in order to allow the two members to telescope, and thereby open the circuit. It is the separation of the spring 3 and the contact 4 which opens the circuit, and the stem b^4 in engaging the spring 6 completes or closes the connection between the line side of the break and ground, thus affording a path of escape for the trespassing current. As the member b^8 is of insulation or other non-heat-conducting material, it follows that the heat generated by the heating-coil will be well concentrated upon the solder. In other words, the fiber or other like insulation prevents the heat from being dissipated through the metallic parts of the instrument.

What I claim as my invention is—

1. A thermal cut-out comprising a couple of telescoping members, one of said members being composed of fiber or other suitable non-heat-conducting material, a removable piece of thin solder interposed between said members to keep them normally separated, a spring tending normally to telescope the members one within the other, and a heating-coil adapted to soften said solder upon the passage of an abnormally strong current, and to thereby allow said spring to telescope the said members.

2. A thermal cut-out comprising a couple of telescoping members whereof one is of non-heat-conducting material, a removable piece of solder interposed between said members to keep them normally separated, a stem on which said non-heat-conducting member is adapted to slide, a metallic support through which said stem projects and against which said non-heat-conducting member bears, a spring tending normally to telescope said members and adapted to keep the non-heat-conducting member pressed tightly against said support, a heating-coil associated with said solder and adapted to soften the latter and thereby allow said members to telescope one within the other upon the passage of an abnormally strong current, a switch adapted to be opened by said spring when the solder softens, and another switch adapted to be closed by said stem when the solder softens.

3. A thermal cut-out comprising a metallic body portion provided with oppositely-extending stem portions, a heating-coil wound on said body portion, said body portion being provided with a chamber, a piece of insulation secured to one of said stems, a metallic head on said piece of insulation and connected with said heating-coil, the other terminal of said coil being connected with said body portion, a second piece of insulation mounted on the other of said stems and adapted to slide thereon, so as to telescope within the body portion, a thin ring of solder interposed between said body portion and said sliding piece of insulation, a spring engaging said head, a support against which the said sliding piece of insulation is held by said spring, a contact normally engaging said spring, and another contact normally out of engagement with the stem upon which the said sliding piece of insulation is mounted.

4. A thermal cut-out comprising two parts adapted to slide one upon the other, one of said members being of non-heat-conducting material, a removable piece of thin solder interposed between said members to normally prevent relative movement between the same, a spring-switch held normally closed by said solder, a heating-coil associated with said solder, and a support against which said non-heat-conducting member bears, said support thereby sustaining the normal pressure of said spring-switch.

5. A thermal cut-out comprising a normally closed spring-switch, means including two relatively sliding members for keeping said switch closed, one of said members being of non-heat-conducting material, and including also a removable piece of solder interposed between said members, and a heating-coil associated with said solder and adapted to be connected in series with said spring-switch.

6. A thermal cut-out comprising a couple of telescoping members, one of said members being composed of fiber or other suitable non-heat-conducting material, a removable piece of thin solder interposed between said members to keep them normally separated, a spring tending normally to telescope the members one within the other, and a heat-concentrating member adapted to soften said solder upon the passage of an abnormally strong current, and to thereby allow said spring to telescope the said members.

7. A thermal cut-out comprising a couple of telescoping members whereof one is of non-heat-conducting material, a removable piece of solder interposed between said members to keep them normally separated, a stem on which said non-heat-conducting member is adapted to slide, a metallic support through which said stem projects and against which said non-

heat-conducting member bears, a spring tending normally to telescope said members and adapted to keep the non-heat-conducting member pressed tightly against said support, a heat-concentrating member associated with said solder and adapted to soften the latter and thereby allow said members to telescope one within the other upon the passage of an abnormally strong current, a switch adapted to be opened by said spring when the solder softens, and another switch adapted to be closed by said stem when the solder softens.

8. A thermal cut-out comprising a metallic body portion provided with oppositely-extending stem portions, a heat-concentrating member wound upon said body portion, said body portion being provided with a chamber, a piece of insulation secured to one of said stems, a metallic head on said piece of insulation and connected with said heat-concentrating member, the other terminal of said coil being connected with said body portion, a second piece of insulation mounted on the other of said stems, and adapted to slide thereon so as to telescope within the body portion, a thin ring of solder interposed between said body portion and said sliding piece of insulation, a spring engaging said head, a support against which said sliding piece of insulation is held by said spring, a contact normally engaging said spring, and another contact normally out of engagement with the stem upon which the said sliding piece of insulation is mounted.

9. A thermal cut-out comprising two members adapted to slide one upon the other, one of said members being of non-heat-conducting material, a removable piece of thin solder interposed between said members to normally prevent relative movement between the same, a spring-switch held normally closed by said solder, a heat-concentrating member associated with said solder, and a support against which said non-heat-conducting member bears, said support thereby sustaining the normal pressure of said spring-switch.

10. A thermal cut-out comprising a normally closed spring-switch, means including two relatively sliding members for keeping said switch closed, one of said members being of non-heat-conducting material, and including also a removable piece of solder interposed between said members, and a heat-concentrating member associated with said solder and adapted to be connected in series with said spring-switch.

Signed by me at Chicago, Cook county, Illinois, this 30th day of July, 1903.

MICHAEL SETTER.

Witnesses:

A. F. DURAND,

WM. A. HARDERS.