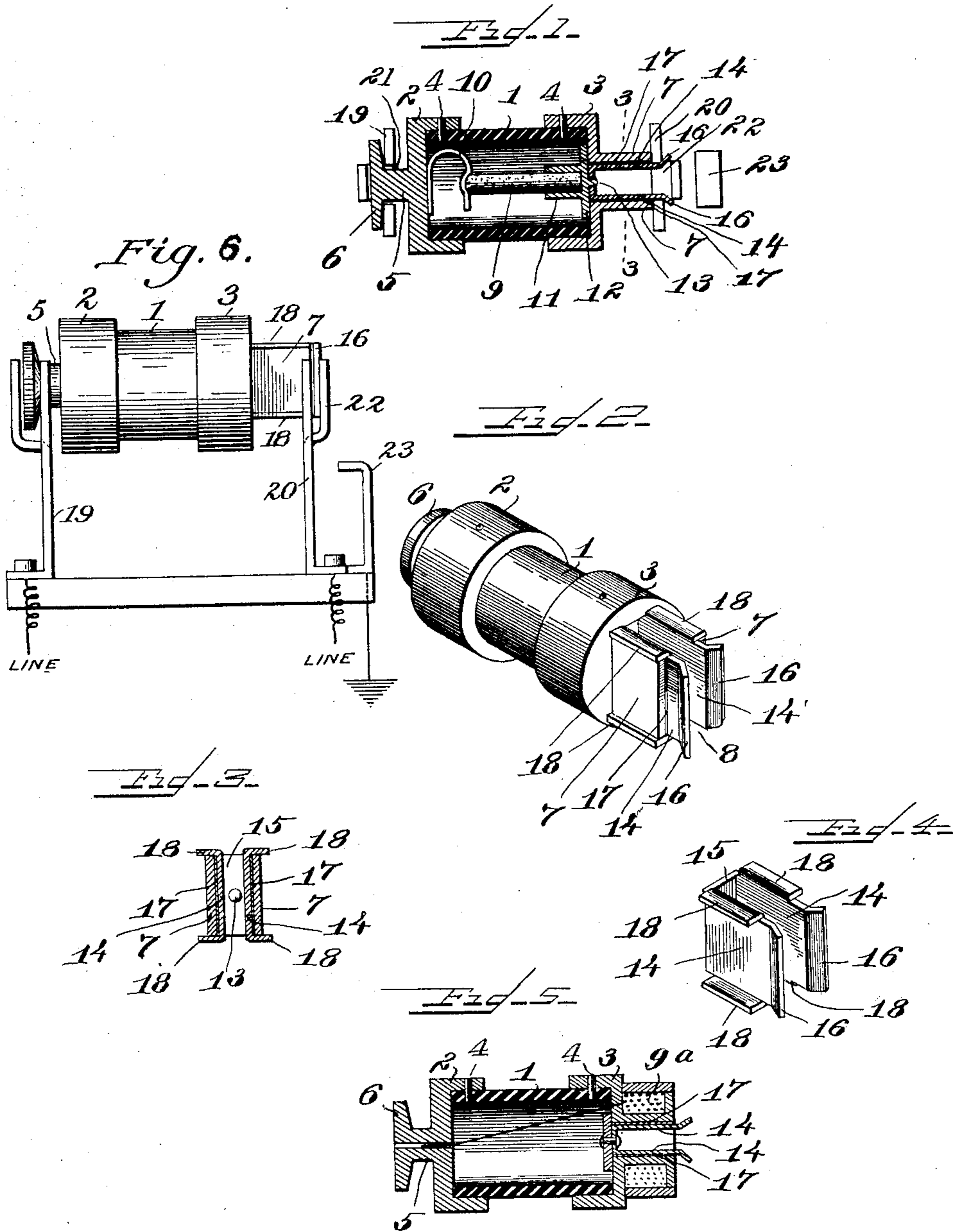


No. 744,197.

PATENTED NOV. 17, 1903.

O. C. HOFFMANN.  
THERMAL CIRCUIT PROTECTOR.  
APPLICATION FILED JAN. 19, 1903.

NO MODEL.



Witnesses—

W. Pauberschmitt  
George L. Chindahl

Inventor—

Otto C. Hoffmann  
By Luther L. Miller  
Att—

# UNITED STATES PATENT OFFICE.

OTTO C. HOFFMANN, OF CHICAGO, ILLINOIS, ASSIGNOR TO FREDRIC GREER, OF CHICAGO, ILLINOIS.

## THERMAL CIRCUIT-PROTECTOR.

SPECIFICATION forming part of Letters Patent No. 744,197, dated November 17, 1903.

Application filed January 19, 1903. Serial No. 139,590. (No model.)

*To all whom it may concern:*

Be it known that I, OTTO C. HOFFMANN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Thermal Circuit-Protectors, of which the following is a specification.

One of the objects of this invention is the production of a circuit-protector having a fusible connection for permitting the opening of the protected circuit, also having means for automatically restoring the fusible connection, so that the protector may be used an indefinite number of times without repairs.

A further object of the invention is the embodiment of such an instrument in compact and simple form.

In the accompanying drawings, Figure 1 is longitudinal central section through a circuit-protector embodying the features of my invention. Fig. 2 is a perspective view of the circuit-protector. Fig. 3 is a transverse section on dotted line 3-3 of Fig. 1. Fig. 4 is a perspective view of the spring-fingers held normally in contact with relatively stationary ears by means of the melting of a film of solder connecting the fingers with the ears. Fig. 5 is a longitudinal central section through a circuit-protector, illustrating a modified form of my invention. Fig. 6 illustrates the circuit-protector in operative relation with circuit connections.

In the embodiment herein shown of my invention I provide a cylindrical body portion 1, formed of insulating material, and mount on said body portion the two end pieces 2 and 3, which end pieces are secured to said body portion by means of the pins 4. The end piece 2 is provided with a neck 5 and flanged head 6, while the end piece 3 has two ears 7, with an opening 8 between said ears. Within the body portion 1 and extending axially thereof is a small graphite pencil 9, bearing at one end against the U-shaped spring 10 and at its other end seated in a socket-piece 11. The socket-piece 11 has an annular base 12 and an integral stud 13 projecting from the rear side of said disk. Two integral spring-fingers 14, united by a base portion 15, lie between and contact the two ears 7, being secured to the base portion 12 of the socket-

piece by means of said stud 13, which passes through a suitable opening in the base portion 15 of said spring-fingers and is riveted down upon said base portion. The spring-fingers 14 are formed with diverging outer ends 16, and said fingers are held rigidly in contact with the ears 7 by means of films 17 of solder having a low melting-point. The spring-fingers 14 are provided at their upper and lower edges with outwardly-extending flanges 18, the purpose of which flanges is to keep the solder films 17 covered in order to prevent the escape of the solder when that metal is melted.

The protector herein illustrated is intended to be used between two springs 19 and 20, provided with slots 21 and 22, respectively, at their upper ends for receiving the neck 5 of the end piece 2 and the outer ends of the spring-fingers 14. These springs have a tendency to separate, the spring 20 being adapted to contact the ground connection 23, but held from contact therewith by the spring-fingers 14. The springs 19 and 20 form a portion of the circuit in which the instrument to be protected is placed, which circuit is completed by mounting the protector between the free ends of said springs, as shown in Figs. 1 and 6. The circuit through said protector, beginning at the spring 19, comprises the end piece 2, the U-shaped spring 10, the graphite pencil 9, the socket-piece 11, and the end piece 3, including the ears 7, the solder films 17, and the spring-fingers 14.

In the normal use of the protector the usual current passes through the circuit of said protector from the spring 19 to the spring 20. When a current of a high intensity trespasses upon the circuit, it generates a considerable amount of heat in passing through the graphite pencil 9, which heat is transmitted through the socket-piece 11, the ears 7, and the spring-fingers 14 to the solder films 17, melting said solder and permitting the spring-fingers 14 to be separated from the ears 7 by the stripping action of the spring 20 in slipping over the diverging ends 16 of said spring-fingers, thus mechanically breaking the circuit. The spring 20 immediately contacts the ground connection 23, grounding one side of the current, and the spring-fingers 14 by reason of their elasticity return to the ears 7, embed-

ding themselves in the still warm solder of the films 17. Inasmuch as the circuit is now open, the heat subsides and the solder films cool, firmly reuniting the spring-fingers 14 with the ears 7. The circuit is reestablished by flexing the spring 20 into the position shown in Fig. 1 and slipping the spring-fingers 14 into the slotted opening 22 of said spring 20.

10 In the modified form illustrated in Fig. 5 a coil 9<sup>a</sup>, of fine German-silver wire, surrounding the ears 7, is substituted for the graphite pencil 9. This wire is of high resistance and is heated when a current of any considerable intensity passes over the circuit of the protector. The application and action of this modified form of protector are the same as hereinbefore described.

It is apparent that various changes might be made in the constructions herein shown and described without departing from the spirit and scope of my invention, wherefore I desire to have it understood that I do not limit myself to the precise details herein set forth.

I claim as my invention—

1. In a thermal circuit-protector, in combination, a fixed member; a spring; a spring-finger fixed with relation to said fixed member and tending to lie in contact therewith, which finger is adapted to hold said spring flexed, said spring tending to separate the spring-finger from said fixed member; and a solder connection between said fixed member and said spring-finger.

2. In a thermal circuit-protector, in combination, a fixed member; a spring; a spring-finger fixed with relation to said fixed member and tending to lie in contact therewith, which finger is adapted to hold said spring flexed, said spring tending to separate the spring-finger from said fixed member; a solder connection between said fixed member and said spring-finger; and a substance offering comparatively high resistance to the passage of an electric current, in proximity to said solder connection.

3. In a thermal circuit-protector, in combination, two ears; a spring-finger adapted to lie in contact with each one of said ears; a spring adapted to be held flexed by said spring-fingers and tending to separate said spring-fingers from said ears; and a fusible solder connection between each one of said ears and its spring-finger.

4. In a thermal circuit-protector, in combination, two ears; a spring; a spring-finger adapted to lie in contact with each one of said ears and to hold said spring flexed, said spring tending to separate the spring-fingers from said ears; and a fusible solder connection between each of said ears and its spring-finger.

5. In a thermal circuit-protector, in combination, two ears; a spring; a spring-finger adapted to lie in contact with each one of said ears and to hold said spring flexed, said spring tending to separate the spring-fingers from

said ears; a fusible solder connection between each of said ears and its spring-finger; and a substance offering comparatively high resistance to the passage of an electric current, in proximity to said solder connection.

6. In a thermal circuit-protector, in combination, a fixed member; a spring; a spring-finger fixed with relation to said fixed member and tending to lie in contact therewith, which finger has a projection adapted to engage said spring to hold the latter flexed, said projection also causing said spring to tend to separate said spring-finger from said fixed member; and a fusible solder connection between said fixed member and said spring-finger.

7. In a thermal circuit-protector, in combination, a fixed member; a spring; a spring-finger fixed with relation to said fixed member and tending to lie in contact therewith, which finger has a projection adapted to engage said spring to hold the latter flexed, said projection also causing said spring to tend to separate said spring-finger from said fixed member; a fusible solder connection between said fixed member and said spring-finger; and a substance offering comparatively high resistance to the passage of an electric current, in proximity to said solder connection.

8. In a thermal circuit-protector, in combination, two ears; a pair of spring-fingers having inclined outer ends, said fingers adapted to lie between said ears, each of said fingers contacting one of the ears; a fusible solder connection between each one of said ears and its spring-finger; and a spring having an opening adapted to receive the outer ends of said spring-fingers, said spring being held flexed by said fingers when the fingers are held by said solder connection but tending to separate said fingers from said ears.

9. In a thermal circuit-protector, in combination, two ears; a pair of spring-fingers having inclined outer ends, said fingers adapted to lie between said ears, each of said fingers contacting one of the ears; a fusible solder connection between each one of said ears and its spring-finger; a spring having an opening adapted to receive the outer ends of said spring-fingers, said spring being held flexed by said fingers when the fingers are held by said solder connection but tending to separate said fingers from said ears; and a graphite pencil in an electric circuit, in proximity to said solder connection.

10. In a thermal circuit-protector, in combination, a cylindrical body portion; a socket-piece therein; a graphite pencil in said socket-piece; two ears fixed with relation to said body portion; two spring-fingers having inclined projections, fixed with relation to said socket-piece and adapted to lie in contact with said ears; and a spring adapted to be engaged by said projections and to be held flexed by said spring-fingers when said fingers are held by said solder connection in contact with said ears.

11. In a thermal circuit-protector, in combination, a body portion; two end pieces insulated from said body portion; a graphite pencil within said body portion; a socket-piece for said pencil, in electric connection  
5 with one of said end pieces; a spring for electrically connecting the graphite pencil with the other one of said end pieces; two ears on one of said end pieces; a pair of spring-fingers secured to said socket-piece, said spring-fingers having inclined outer ends and adapted to contact said ears; a fusible solder connection between said ears and said spring-fingers; and a spring adapted to engage the  
10 inclined ends of said spring-fingers and to be held flexed by said fingers when said fingers

are held by their solder connection in contact with said ears.

12. In a thermal circuit-protector, in combination, two fixed members; a pair of spring-fingers adapted to lie between said fixed members, said fingers having inclined outer ends and outwardly - extending flanges at their lower edges; a fusible solder connection between said spring-fingers and said fixed members; and a spring having an opening adapted to receive the outer ends of said spring-fingers and to engage the inclined portions thereof.

OTTO C. HOFFMANN.

Witnesses:

L. I. MILLER,  
GEORGE L. CHINDAHL.