

F. B. COOK.
CONTACTLESS THERMAL PROTECTOR.
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903,813.

Patented Nov. 10, 1908.

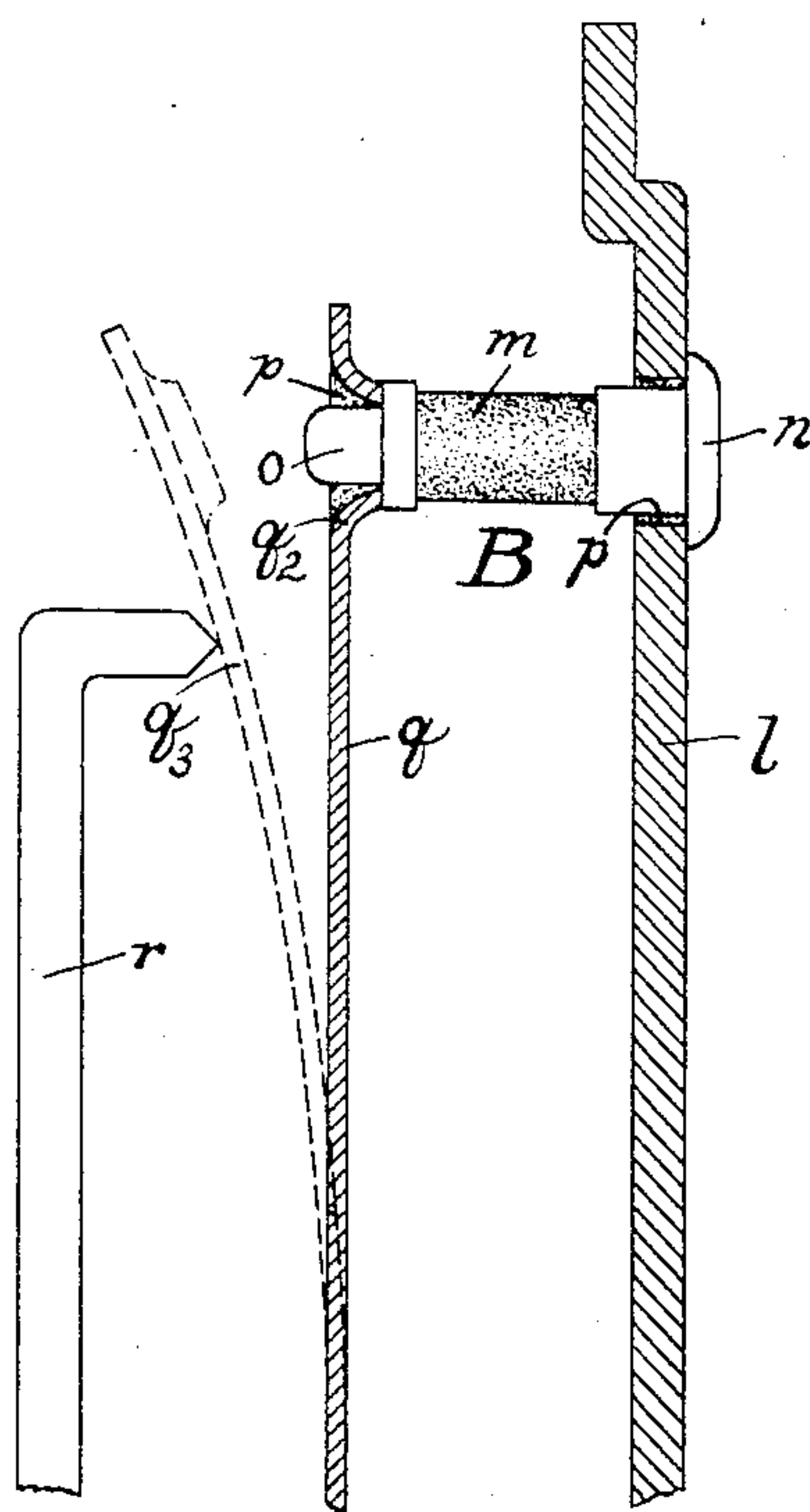


Fig. 1.

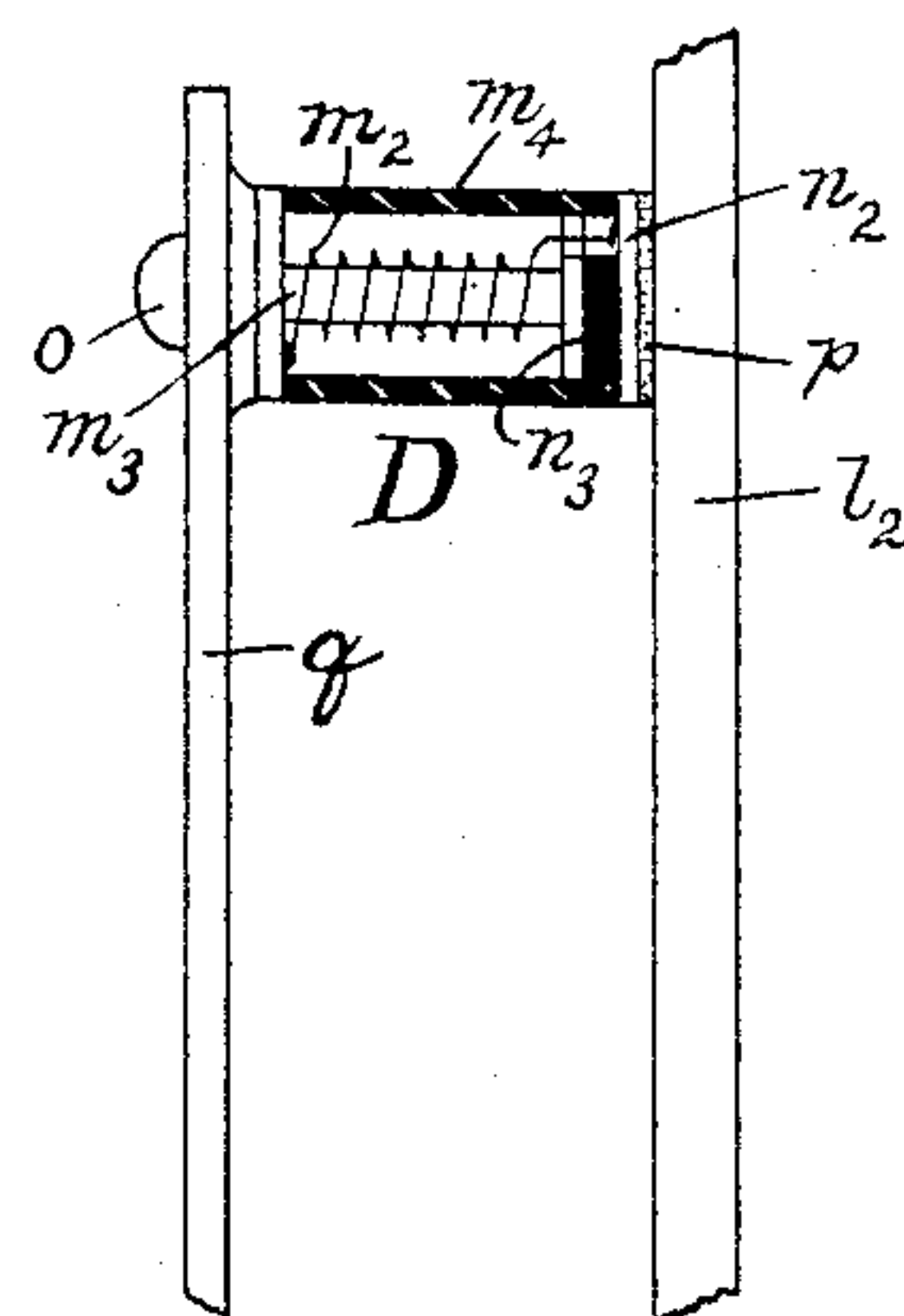


Fig. 2.

WITNESSES:

Bert G. Cable.
Frederick R. Parker.

INVENTOR.

Frank B. Cook.

UNITED STATES PATENT OFFICE.

FRANK B. COOK, OF CHICAGO, ILLINOIS.

CONTACTLESS THERMAL PROTECTOR.

No. 903,813.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Original application filed July 28, 1905, Serial No. 271,662. Divided and this application filed April 12, 1907.

Serial No. 367,859.

To all whom it may concern:

Be it known that I, FRANK B. COOK, a citizen of the United States of America, and a resident of the city of Chicago, in the State of Illinois, have invented a new and useful Contactless Thermal Protector, (Case No. 132,) of which the following is a specification, reference being had to the accompanying sheet of drawings, illustrating same.

This invention is an improvement on my United States Letters Patent No. 785,797, issued March 28, 1905, for thermal cut-out for electrical circuits, and a division of my application for Letters Patent of the United States, Serial No. 271,662, filed July 28, 1905.

My invention relates to electrothermal protectors such as are used for protecting electrical circuits and apparatus from abnormal electric currents.

The principal objects of my invention are to provide an electrothermal protector in which there are no loose contacts in the circuit, that is, a protector in which all of the contacts, either in the protector or between the latter and its mounting and operating members, are normally soldered; and to provide efficiency and simplicity of construction in such a protector.

Heretofore, it has been the practice to provide a heat coil or thermal protector which is removably mounted in the circuit which it is to protect, so that the contacts with the protector are merely pressure contacts. With this form of protector, corrosion of the pressure contacts, or dust, dirt or the like, therein, may produce an open circuit or give a contact of very high resistance.

In this present invention it is my intention to provide a protector in which there are no pressure contacts, and thus do away with the objectionable features of the latter. Consequently I provide a protector in which all of the contacts in the protector or between the latter and its cooperating members, are soldered. When the protector operates, certain soldered parts separate and thus open the circuit through the device.

I will more particularly describe my invention by reference to the accompanying drawings, in which,—

Figure 1, is a side elevation of the protector of the invention, with portions shown in cross-section; and Fig. 2 is a similar view of a modified form of the invention.

Like characters refer to like parts in the several figures.

B is preferably a piece of graphite or carbon, plated with metal at its ends over the portions *o* and *n* and turned away at *m* to adjust the resistance thereof to any desirable value. In making this element B the whole piece of resistance material may be electroplated all over, with copper or any suitable metal, and the portion *m* turned down to remove the portion of the plating at *m* and adjust the resistance of B to the desired value. The plated end portions *o* and *n* of B are then soldered to the metallic members *q* and *l* by heat-susceptible material *p*, preferably a low-melting-point metallic solder. The solder *p*, at *n*, may, if desired, be a hard solder, as this joint in this construction of my invention is not required to open when the device operates.

An abnormally large current of electricity passing through the element B for a short length of time, heats same and thereby softens the solder *p* at *o* and allows the spring member *q* to separate from the element B and take the position *q*₂ of Fig. 1, preferably against the ground plate *r*. This operation of the protector opens the circuit through same and preferably switches the objectionable current to earth.

The portion *n* of B is preferably enlarged to provide a suitable bearing surface to rest against member *l*. Spring *q* is preferably formed into a thimble at *q*₂ to provide a suitable surface to be soldered to the end portion *o* of B.

When it is desired to set the protector to operative position, the spring *q* is pressed from the position *q*₂ to the position *q* and soldered to the portion *o* by easily-fusible solder *p*, as shown in Fig. 1. This soldering may be accomplished by a soldering iron, by automatic means, or in any desired manner. When the spring *q* is soldered to the portion *o* it is put under tension so as to operate to the position *q*₂ when the solder *p* at *o* is softened. When the spring *q* is soldered to the portion *o*, it is pressed to operative position without in any way putting the device or apparatus under binding or buckling stresses which are found in other forms of protectors when the apparatus is set, and which greatly reduce the efficiency of the operation of such devices.

It will be readily seen in my present invention, that when spring q operates it moves in exactly the opposite direction from which it was moved to set the device, and hence there is no binding of the parts when the device operates and the latter is not under unnecessary stresses while set.

In Fig. 2 I have shown a modified form of protector in which the heat-producing winding m_2 takes the place of the carbon or graphite rod B. A metallic plate n_2 is soldered to the support l_2 by solder p and is rigidly secured to spool m_3 but insulated therefrom by an insulating disk n_3 . Winding m_2 is connected in circuit with spool m_3 and plate n_2 . An insulating shell m_4 incloses the winding m_2 . The operation of the device is similar to that of the device of Fig. 1. The insulating disk n_3 being placed between spool m_3 and plate n_2 , confines the greater part of the heat to the end o of spool m_3 and hence this end unsolders when the device operates, and the other end does not. Then again the heavy part l_2 conducts and radiates more heat from its solder joint p than spring q does from the solder joint at o , with the same degree of heating, and this fact also tends to keep the joint between n_2 and l_2 from opening when the device operates.

If it is desired to open the circuit through the protector for testing purposes the spring q may be unsoldered from the portion o in any suitable manner.

I do not wish to limit this invention to the particular details of construction herein shown, as many modifications may be made therein without departing from the scope of the appended claims.

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

1. An electrothermal protector of the char-

acter described, comprising a heat cartridge, a metallic support for the cartridge to which the latter is soldered, an operable spring member having a thimble thereon near one end thereof, a portion of the heat cartridge extending through the said thimble and being soldered therein with easily-fusible solder, the said soldered contacts eliminating all pressure contacts from the circuit, an abnormally large current in the cartridge softening the said easily-fusible solder and releasing the said thimble and spring member from the cartridge, substantially as described.

2. In electrical protective apparatus, the combination of a metallic support, a spring member, a piece of graphite having a head at one end, plated with metal on each end, and being cut away between the plated end portions to provide any desired resistance therein, a hole in the metallic support through which the plated head end of the graphite is soldered, and a thimble formed on the said spring member through which the other end of the graphite is inserted and soldered to hold the spring member under tension, the said soldered contacts eliminating all pressure contacts from the circuit, an abnormal current in the graphite softening the solder and thereby releasing the spring member and thimble from the graphite, substantially as described.

As inventor of the foregoing I hereunto subscribe my name in the presence of two subscribing witnesses, this 10th day of April, 1907.

FRANK B. COOK.

Witnesses:

FREDERICK R. PARKER,
F. W. PARDEE.