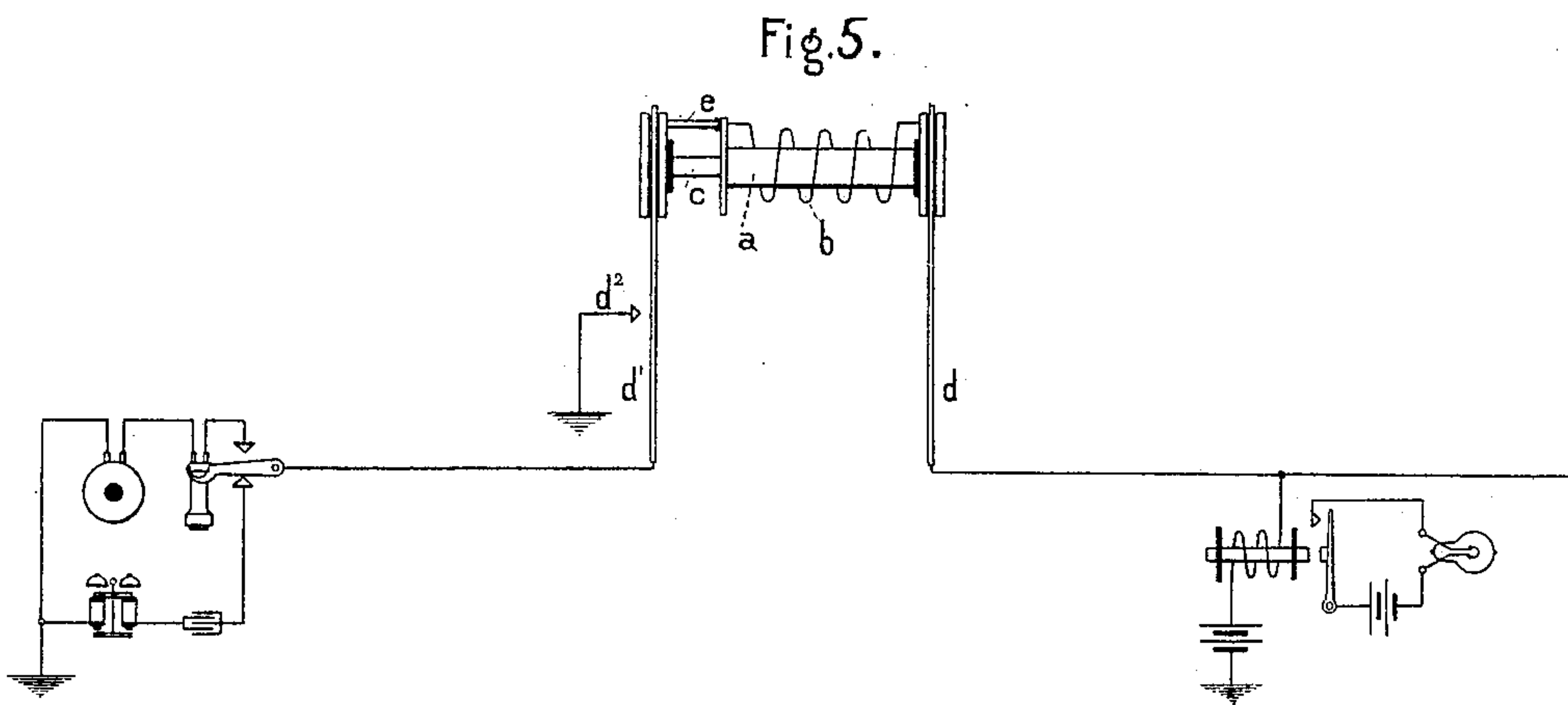
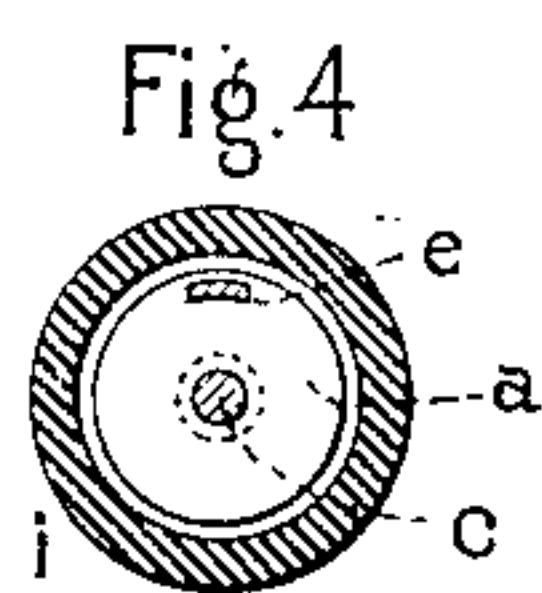
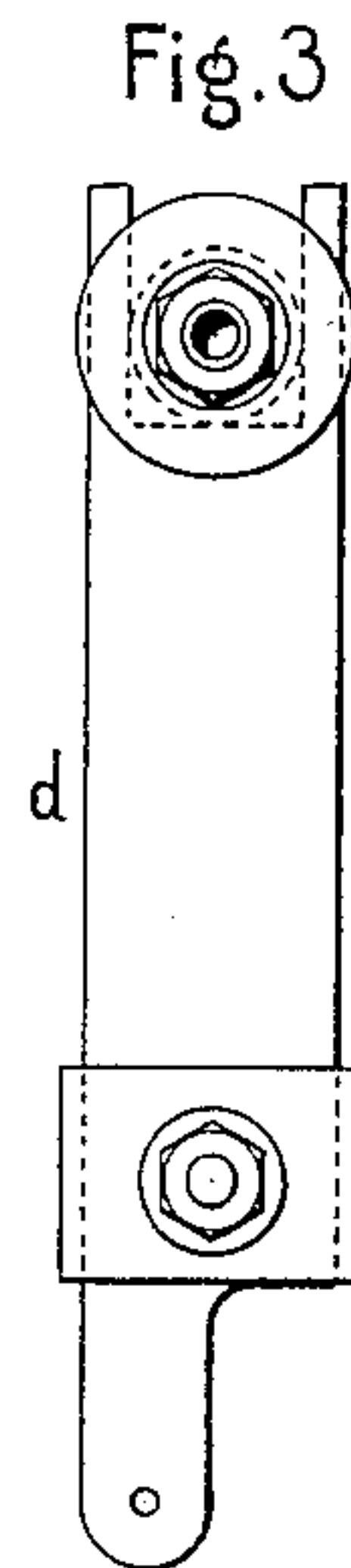
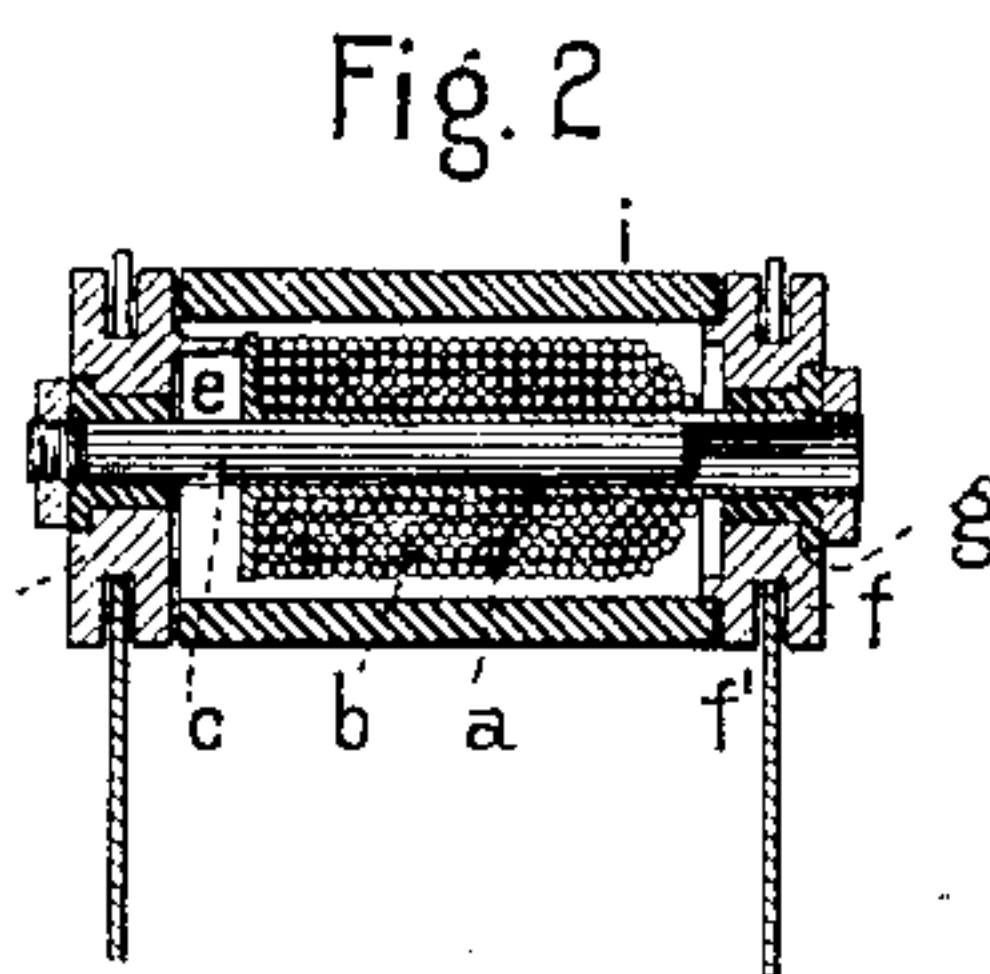
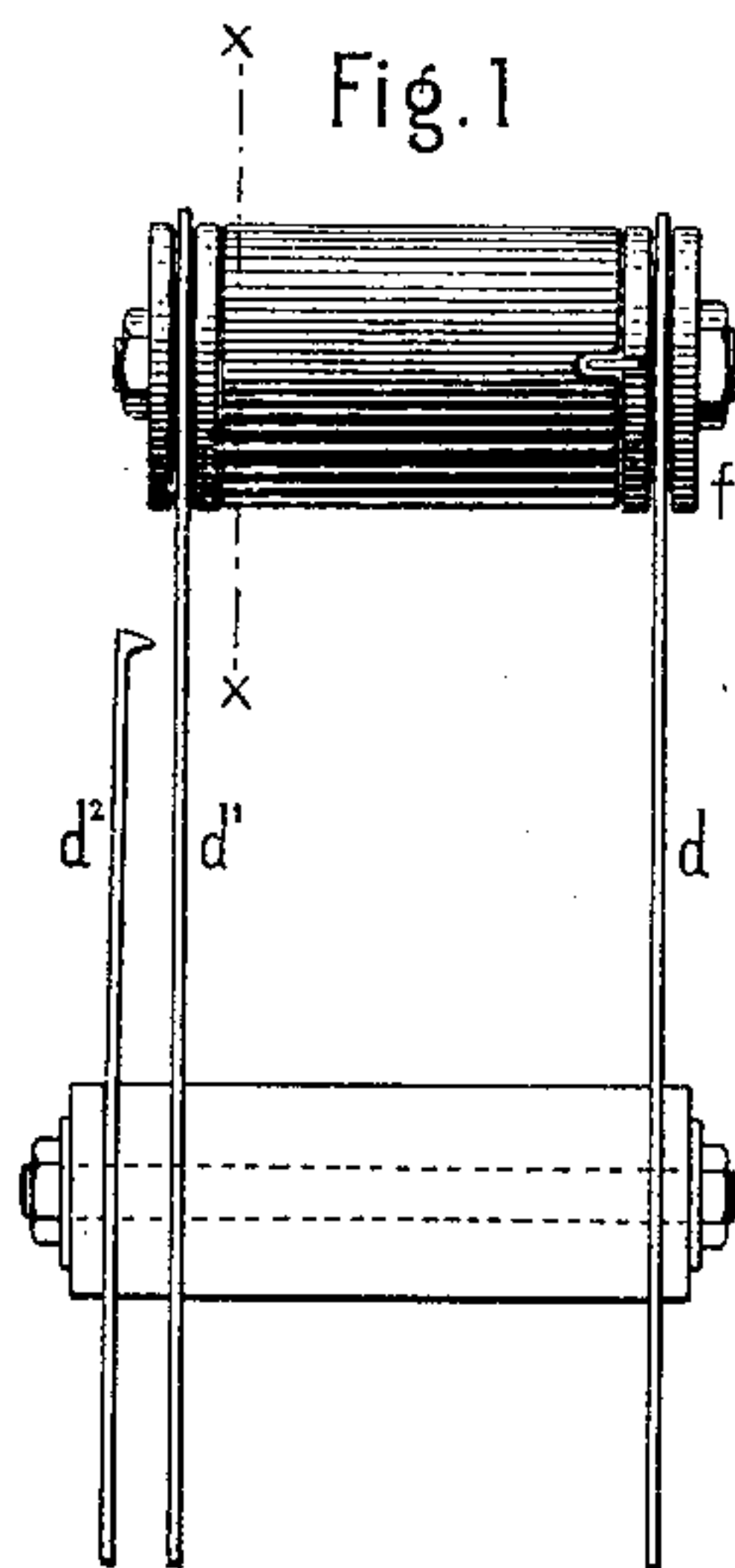


No. 638,424.

Patented Dec. 5, 1899.

C. E. SCRIBNER.  
THERMAL PROTECTOR.  
(Application filed Mar. 22, 1897.)

(No Model.)



Witnesses:

*J. H. C. Barnes*  
*John W. Sinclair*

Inventor:

Charles E. Scribner.

by *Bartholomew Brown* his Atty<sup>s</sup>

# UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN  
ELECTRIC COMPANY, OF SAME PLACE.

## THERMAL PROTECTOR.

SPECIFICATION forming part of Letters Patent No. 638,424, dated December 5, 1899.

Application filed March 22, 1897. Serial No. 628,586. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Thermal Protectors, (Case No. 447,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention is an appliance for use with telephone-lines to protect the instruments therein from abnormally strong currents accidentally present in the line. It is designed to be operated by such currents and is intended when actuated to break the line-circuit.

The thermal protector commonly in use in telephone-lines comprises a small coil of wire in the line-circuit, a rigidly-supported body of metal in contact with the coil or spool of wire, a second body of metal in contact with the first and secured to it by a readily-fusible solder, and switch-springs or circuit connections controlled by the second-mentioned piece of metal, the action of the protector in changing the circuits being dependent upon the fusion of the solder through the heat generated in the coil by an abnormal current.

This type of protector is described in general in Patent No. 441,066, to H. V. Hayes, dated November 18, 1890, while a form of it, in which the protector acts to break the line-circuit when brought into operation, is described in a patent, No. 544,368, to F. R. McBerty, dated August 13, 1895. In the invention of the latter patent the heating-coil, the two bodies of metal in contact therewith, and the solder securing these parts together are included serially in the circuit, the aim being to maintain normally a continuous metallic circuit through the device and to provide a point wherein the circuit may be interrupted without the agency of switch-contacts. In order that solder fusible at suitably low temperature may be employed, it is desirable that the separable parts be secured together in such a way that the stress on the solder or other fusible conducting cement may be in the nature of a shearing stress rather than a direct tension, inasmuch as the cement

is likely to yield when subjected to a continued tensile stress. It is common, therefore, to wind the heating-coil upon a tubular spool of copper, which constitutes one of the separable bodies, the other being a pin projecting deeply into the tubular opening of the spool and secured therein by solder. The operation of this device, however, involves a wide range of movement of the separable parts, such as is in many cases impracticable in a protective appliance for telephone-switchboards.

The present invention is allied to protectors of the type described. Its object is to greatly reduce the range of movement essential in the operation of the device, while retaining in general the present structure of the protective appliance.

It consists in the combination, with the spool, the winding thereon, the body secured to the spool by fusible cement, and the means for separating these parts when the cement is melted, of a secondary pair of separable bodies or surfaces, conducting fusible cement uniting these bodies or surfaces, and means for subjecting them also to the heat of the coil and for separating them simultaneously with the movement of the first-mentioned parts. In this device the circuit connection is made through the secondary surfaces mentioned, the mechanical strain being borne by the spool and pin, as before. Thus the separation of the circuit-breaking surfaces may be accomplished with a range of movement much less than would be required to separate the pin and the spool.

An incidental advantage of the invention consists in the ability to employ a non-conducting fusible cement to unite those parts which bear the tensile strain.

The invention is shown in the attached drawings, wherein—

Figure 1 is a side elevation of the protective appliance and its mounting. Fig. 2 is a central longitudinal section. Fig. 3 is an end elevation. Fig. 4 is a transverse section on line  $xx$  of Fig. 1. Fig. 5 is a diagrammatic representation of the essential parts, showing their arrangement in a line-circuit.

The elements of the device are the thin spool  $a$ , preferably of copper, carrying a winding  $b$ , which constitutes the heating-coil, the



pin *c*, projecting deeply into the tubular opening of the spool and secured therein by solder or other easily-fusible cement, springs *d* and *d'*, the former attached to spool *a* and the latter fixed to the pin *c*, and a small contact-piece *e*, secured to the face of spool *a* by means of fusible conducting solder or cement.

The electrical circuit through the device includes the heating-coil *b*, a portion of the spool *a*, and the contact *e*. The mechanical strain of springs *d* and *d'* tending to withdraw the pin *c* from the spool *a* and to separate the contact *e* therefrom is borne by the comparatively large section of fusible cement uniting the pin and the spool. The spring *d'* is furnished with an anvil *d*<sup>2</sup>, upon which it is designed to bear when the spring is released by the fusion of the cement and which is connected to earth.

In the manufacture of the device one end of the spool *a* is mechanically secured in a head *f*, having a peripheral groove *f'*, the spool being insulated from the head by means of a bushing *g* in the head. The pin *c* is fixed in a similar grooved head *h* and is likewise insulated therefrom. The grooves in the heads are adapted to engage the forked extremities of springs *d* and *d'* and to make electrical connection with them. This construction permits the protective appliance as a whole to be readily removed from or replaced in its mounting. The contact-piece *e* is a thin projection formed integral with the head *h* and extending toward the spool *a* to meet the flange thereof. The spool, the pin, and the contact-piece are inclosed in a tubular covering 8, preferably of insulating material. One terminal of the winding *b* is fixed to the head *f*, the other being in connection with the spool *a*. An abnormally large current traversing the winding *b* heats the spool *a*, and thus causes the fusion of both the cement holding the pin *c* in the spool and that maintaining the circuit between contact *e* and the spool *a*. The melting of the cement between the spool and the pin *c* permits the springs *d* and *d'* to separate and draw the pin outward in the spool, at the same time separating the contact *e* from the spool, and thus breaking the circuit between the separated surfaces. The spring *d'*, impinging upon its anvil *d*<sup>2</sup>, grounds one portion of the line. This may in practice be that portion extending to the substation.

I claim as the invention—

1. The combination with two separable bodies, an easily-fusible cement uniting them,

a conductor forming part of an electric circuit wound upon one of said bodies, one of said bodies being insulated from the conductor, of two other bodies or surfaces, mechanically associated one with each of said first-mentioned bodies and united by fusible conducting-cement, said last-mentioned bodies being serially included in the said circuit, as described.

2. The combination with two bodies longitudinally movable with relation to each other, means tending to separate them, an easily-fusible cement uniting them along a surface parallel with the direction of stress, of two electric contact-pieces having a line of contact transverse to the direction of movement of said bodies, easily-fusible conducting-cement uniting said contacts, a conductor forming a portion of an electric circuit placed near said bodies and said contact-points to heat them, said contact-points being included in series with the said conductor, substantially as described.

3. In combination in a thermal protector, a tube of metal and a conductor wound thereon adapted for inclusion in the circuit to be protected, a pin projecting into the tube, and easily-fusible cement securing the pin in the tube, springs attached to the tube and to the pin tending to withdraw the pin from the tube, a contact-piece connected with the pin, said contact-piece being soldered to the end of the tube, the spool, the solder, and the contact-piece being included in the circuit to be protected; whereby the springs are released and the contact-piece is separated from the tube when the conductor is heated by current in it, as described.

4. In a thermal protector, the combination with a spool of metal, a coil of wire wound thereon, a pin soldered in the tubular opening of the spool, a head secured to the spool, a head secured to the pin, and springs engaging the heads tending to withdraw the pin from the spool, of a stud projecting from said last-mentioned head and soldered to the flange of the spool, the circuit through the protector including the winding on the spool, the spool, the solder, and the stud, substantially as described.

In witness whereof I hereunto subscribe my name this 22d day of February, A. D. 1897.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,  
LUCILE RUSSELL.