

(No Model.)

A. DE KHOTINSKY.

PROTECTIVE APPLIANCE FOR ELECTRICAL APPARATUS.

No. 564,084.

Patented July 14, 1896.

Fig. 1.

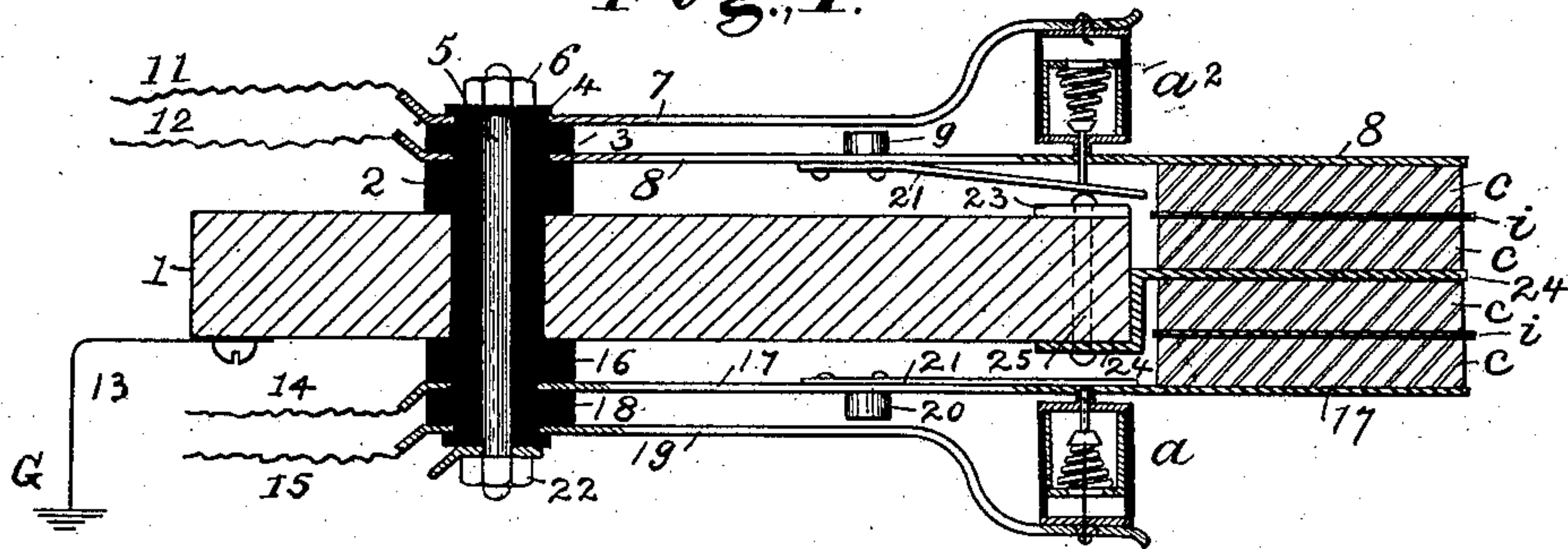


Fig. 2.

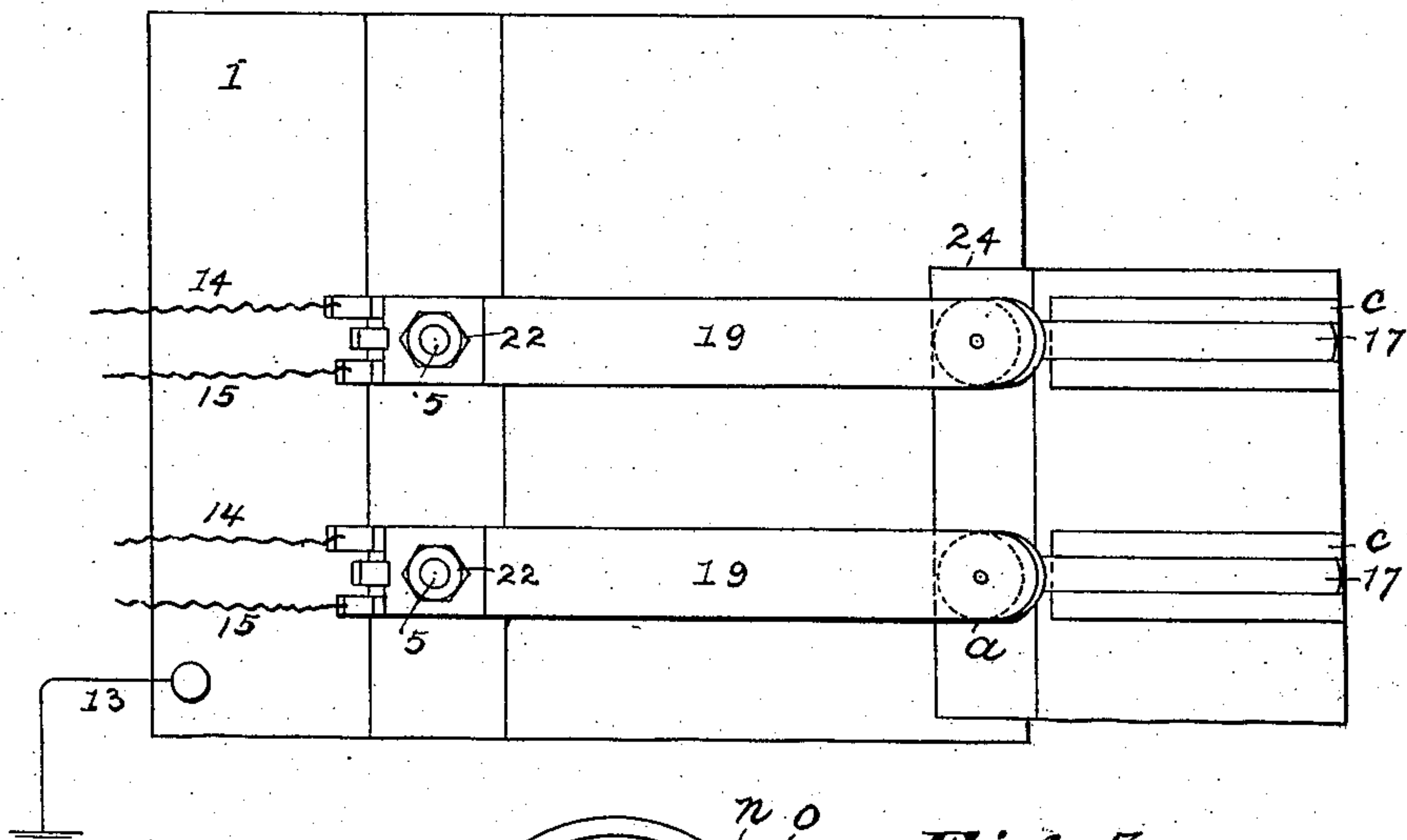
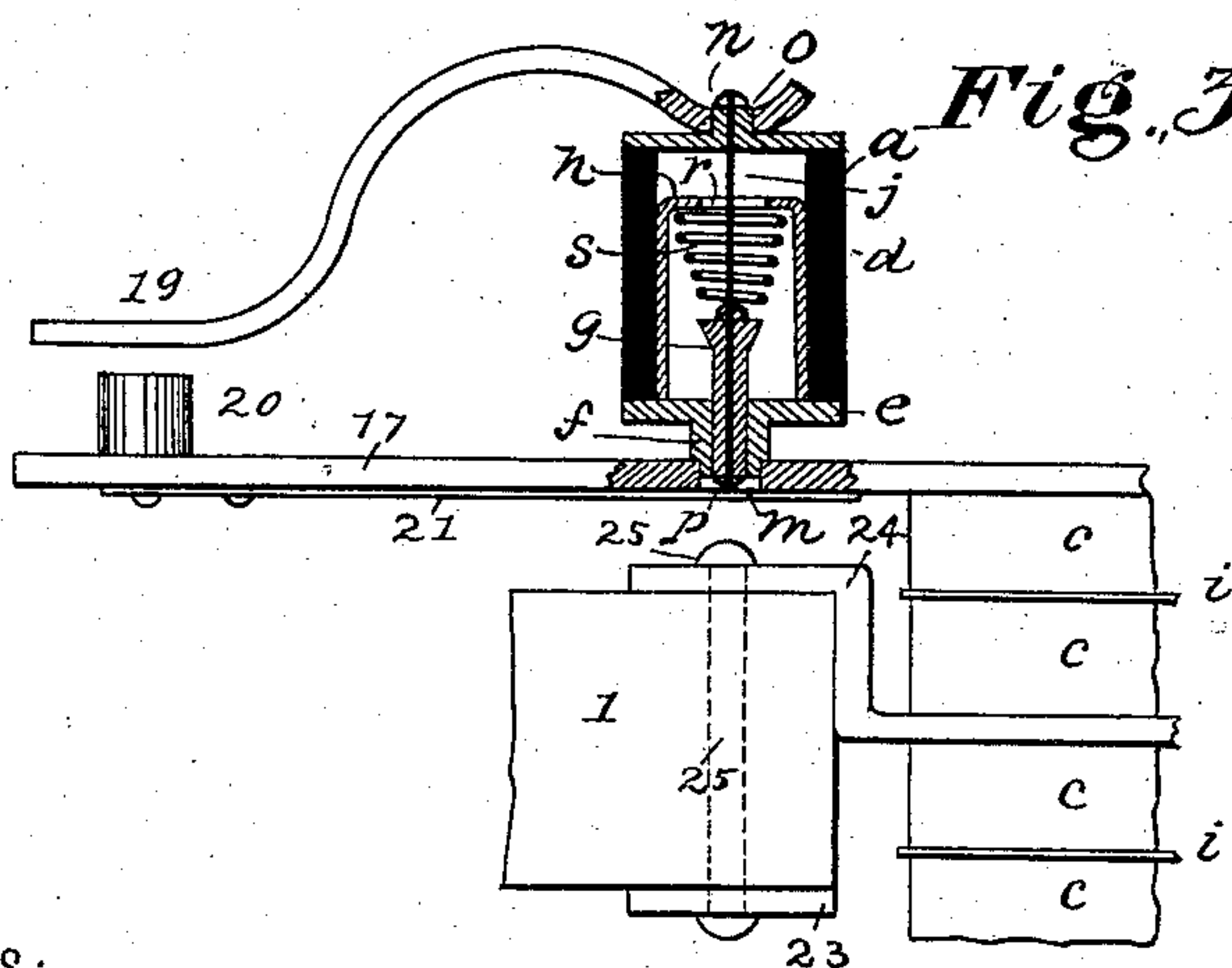


Fig. 3.



WITNESSES:

Rever Lewis
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INVENTOR

Achille de Khotinsky
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UNITED STATES PATENT OFFICE.

ACHILLES DE KHOTINSKY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE
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PROTECTIVE APPLIANCE FOR ELECTRICAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 564,084, dated July 14, 1896.

Application filed May 5, 1896. Serial No. 590,301. (No model.)

To all whom it may concern:

Be it known that I, ACHILLES DE KHOTINSKY, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Protective Appliances for Electrical Apparatus, of which the following is a specification.

In providing means for the protection of electrical apparatus from the destructive effects of abnormal currents it is well understood that separate and distinctive devices must be used to guard against the different classes of such currents.

Protective appliances of one kind, in which an air-gap in the grounded branch is the distinctive feature, are used to guard the apparatus in the circuit from high-potential charges or discharges. Ordinary fuses and tube-inclosing fuses are employed to afford protection against currents of great strength or volume, and for abnormal currents of low potential and relatively weak, which are usually denominated "sneak currents," and which, if persisting for a considerable time, gradually raise the temperature of the fine wires of the helices of the instruments, it is common to employ in the circuit a fine wire of some metal or alloy which will melt or soften and open the circuit sometimes, also grounding it before the said helices are heated to a dangerous degree.

The present invention relates to appliances of the latter class, *i. e.*, those which are used for the purpose of protection against so-called "sneak currents," which are dangerous to switchboard-wires and telephone apparatus, not so much by reason of their strength as of the tendency to gradual heating and smoldering in concealed or inaccessible places to which they give rise and to damage attributable to such tendency.

In this invention a short rod or filament of carbon is inserted in the circuit of each main conductor and is held by means of spring-pressure under longitudinal or tensile strain, which filament becomes volatilized or disintegrated when an abnormal current traverses the line, and thus opens the circuit and permits the spring which held it in tension to bring into operation means for grounding the conductor.

The invention as embodied for practical use consists of a cylindrical tube of insulating material provided with metal ends or covers, through one of which extends a hollow metal pin, between whose head and an abutment on the interior of the said tube is compressed a spiral spring. The carbon rod or filament extends axially through one of the said metal ends, the tube, and the hollow pin and is soldered to the said metal end and to the pin, so as to hold the spiral spring compressed and itself under longitudinal or tensile strain. The device thus assembled is placed between the free ends of the conductor terminal springs, so that the rod or filament is continuous with the circuit, the hollow metal pin being in juxtaposition with a grounding spring and plate, and when the carbon rod or filament becomes volatilized the spiral spring forces the pin and grounding-spring into contact with the grounding-plate.

Experience has shown that it is undesirable to employ a section of fusible alloy under tension in a way similar to that in which the carbon filament is mounted, owing to its tendency to cold flow; that is to say, the fusible wires or ribbons which have been commonly used are comparatively soft and ductile and under tensile strain or pressure stretch and elongate and spread.

The gases produced by the volatilization of the carbon rod or filament are not of a character to produce or perpetuate an arc between the terminals, as is frequently the case with fusible wires, but when they are "blown" open the circuit directly.

In carrying out the invention I prefer to describe it in association with a telephone-switchboard system, and make reference to the accompanying sheets of drawings, in which—

Figure 1 is a cross-section of a grounded iron plate forming a part of a conductor distributing-frame, to which the protective appliance of the entering circuits are attached. Fig. 2 is a side view of the same; and Fig. 3 is a sectional view, enlarged, of the invention.

1 represents a vertical iron plate constituting that part of the distributing-frame to

which the circuits entering a telephone central office are connected before they terminate at the switchboard. The protective appliances, one for each circuit-conductor, are attached to this plate on each side thereof and opposite each other, and the plate is connected to ground *G* by the wire 13. As the protectors are constructed alike, I will refer to the lower one in Fig. 1. The conductor enters by wire 14 and unites with flat spring 17, and the circuit continues through the protector by spring 19 and wire 15 to the switchboard. The springs 19 and 17 are separated from each other and from the plate 1 by the insulating-rings 18 and 16, and the springs 7 and 8 of the protector on the opposite side of plate 1 are likewise separated from each other by the insulating-rings 3 and 2. A bolt 5 passes through the rings and plate, and by means of nuts 6 and 22, provided with insulating-washers under them, secures all of the springs and rings to the plate. Between the springs 17 and 19 is located the protector *a*. It comprises a short non-conducting tube *d*, a metal cover *b* therefor at one end, provided with a short hub *n*, which enters a hole in the spring 19, and a similar cover *e* at its other end, also provided with a hub *f*, having a shoulder which rests upon the edge of a hole *m* in the spring 17, while its end of smaller diameter enters the said hole, and a carbon rod or filament *j*, one end of which projects through the cover *b* and is attached thereto by a drop of solder *o*, while its opposite end passes through a hole in the axis of the metal pin *g*, and extends slightly beyond it, being attached thereto by a drop of solder *p*. A metal tube *h*, fitting tightly inside the tube *d*, is open at one end and closed at the other with the exception of an opening *r*, through which the filament *j* passes. A spiral spring *s* is compressed between the head of the pin *g* and the annulus end of the cylinder *h*.

The non-conducting button 20 prevents the springs 17 and 19 from coming into contact when the protector *a* is removed or displaced.

23 and 24 are metal plates secured to the opposite sides of the plate 1 by means of pins 25. The plate 24 extends from the plate 1 to form a support and ground connection for the pairs of carbon *c c*, which are separated by mica sheets *i* and held to the face of the said plate by means of the springs 8 and 17.

The protective device *a* being complete, that is, the filament *j* soldered at each end and the spring *s* thereby held compressed and inserted between the springs 17 and 19 and kept in place by the entrance of the hub *n* in the hole in the spring 19 and by the hub *f*, projecting into the hole *m* in the spring 17, the operation is as follows: When a dangerous current of the character described traverses the line for a sufficient length of time, it causes the carbon filament to become vola-

tilized or to break down, opening the circuit 11 and 12, (see protector *a*², Fig. 1,) and the spring *s* reacts and forces the pin *g* against the spring 21 and depresses it into contact with the plate 23, grounding the conductor 12.

The filament is so proportioned that it is volatilized or destroyed by the passage through it of any current strong enough to injure in any way the apparatus for the protection of which the device is designed.

Having fully described my invention, I claim—

1. In a protective appliance a rod or filament of carbon forming a part of the circuit and held by a spring in tensile or longitudinal strain and means as set forth whereby the circuit is opened and grounded when the rod or filament is volatilized or disintegrated.

2. A protective appliance consisting of a rod or filament of carbon forming a part of the circuit, holding between its ends a compressed spring, and means as set forth whereby the circuit is grounded when the rod or filament is volatilized, or disintegrated, substantially as set forth.

3. A protective apparatus composed of two line-conductor terminal springs, a grounded plate, and a device between said springs consisting of a rod or filament of carbon forming a part of the circuit, and held by a spring in tensile or longitudinal strain, and means for grounding the line conductor, actuated upon the volatilization of the said rod or filament.

4. A protective apparatus composed of two line-conductor terminal springs, a grounded plate, and a circuit-opening device between the said springs, consisting of a rod or filament of carbon forming a part of the circuit and held by a spring in tensile or longitudinal strain, with means for grounding the line conductor upon the opening of the circuit consisting of a spring-impelled pin attached to the said rod or filament.

5. A protective apparatus composed of two line-conductor terminal springs, a grounded plate, and a device between the said springs consisting of a cylindrical tube of insulating material provided with metal ends or covers through one of which extends a hollow metal pin between whose head and an abutment on the interior of the said tube is a compressed spiral spring, and a carbon rod or filament forming a part of the circuit soldered to one of the metal ends and to the said pins, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 1st day of May, 1896.

ACHILLES DE KHOTINSKY.

Witnesses:

GEO. WILLIS PIERCE,
JOSEPH A. GATELY.