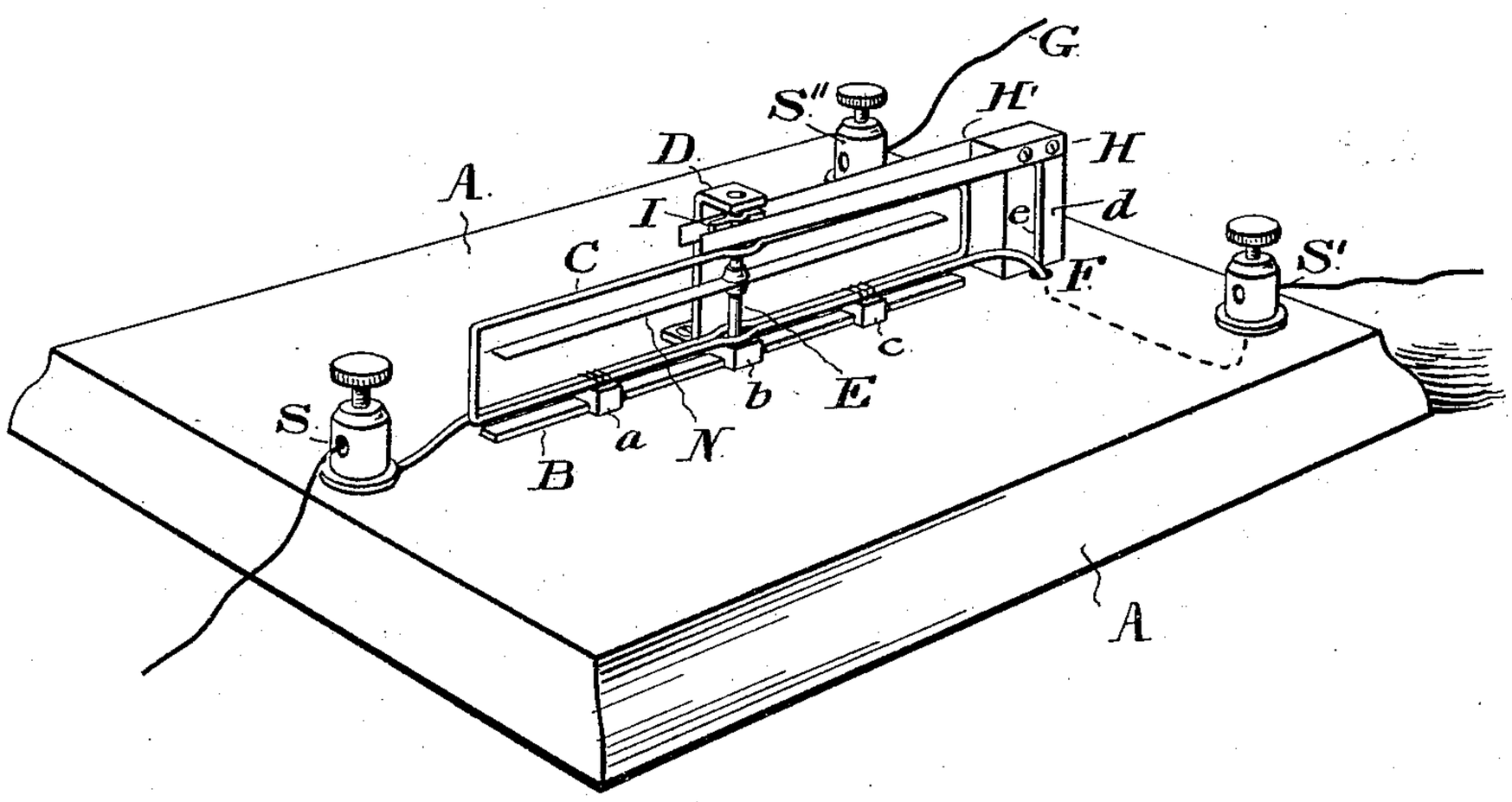
(No Model.)

A. B. DEPUY.

ELECTRIC SHUNTING DEVICE.

No. 549,501. Patented Nov. 12, 1895.

FIG. 1.



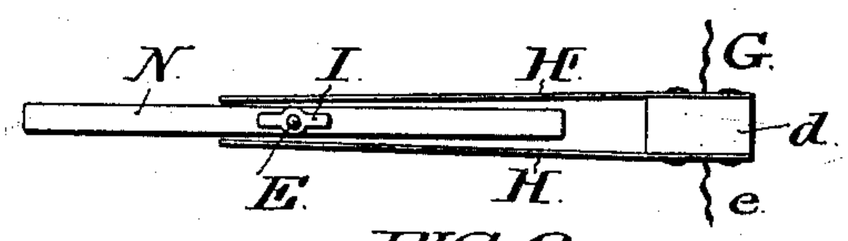


FIG. 2.

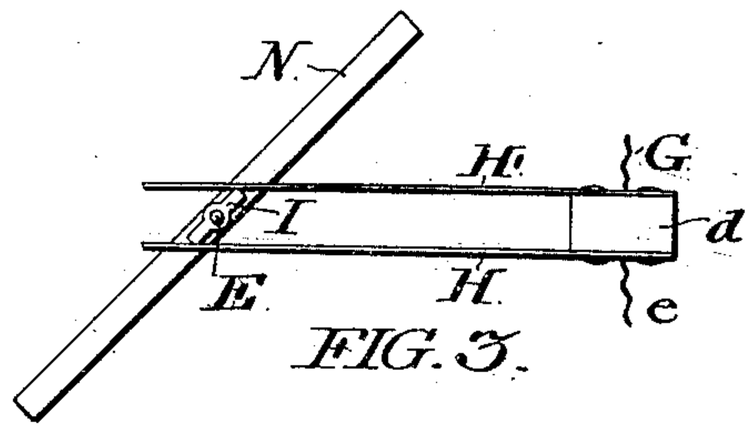


FIG. 3.

WITNESSES:

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AUGUSTUS B. DEPUY, OF CAMDEN, NEW JERSEY.

ELECTRIC SHUNTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 549,501, dated November 12, 1895.

Application filed March 19, 1895. Serial No. 542,368. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTUS B. DEPUY, a citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented a new and useful improvement in safety devices for protecting telephone, telegraph, and fire-alarm instruments from lightning and currents of high potential arising from their wires becoming crossed, of which the following is a specification.

My invention relates to improvements in that class of protectors which operate by switching or shunting the surplus current to ground without opening the main line to the instrument to be protected.

All cut-out protectors are found in practice to be more or less open to the defects of, first, slow action, so that the instrument to be protected is destroyed before it is cut out—*e. g.*, those depending on a fusible wire; second, the points of contact in the protector are not sufficiently firm and become covered with dust, so that when a heavy current passes through them an electric arc is formed, as is also the case if the contact is broken, and therefore the protector and instrument to be protected are both destroyed; third, they operate only when the current is in one direction; fourth, they throw the whole current onto any other machine in the circuit not protected and thereby increase its liability to destruction; fifth, when opened they remain so until a lineman can be secured to close them. Against all these defects my improved switch or shunt is effectually guarded, as it acts on the slightest increase of current above the normal and with a minimum of resistance. The points of contact are made reliable by rubbing together as they close. It acts whether a positive or a negative current passes over the wire. The current is shunted to ground at the protector before reaching the instrument to be protected and not thrown onto another instrument on the same line.

It operates automatically both in shunting the current to ground and restoring the circuit to its normal condition. I attain these advantages by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 represents a view of the machine in perspective; Figs. 2 and 3, views looking vertically downward, of the magnetic needle, cam, and contact springs. Fig. 2 represents the needle at rest in equipoise. Fig. 3 represents the needle deflected by an abnormal current and the cam forming a contact with the springs.

Similar letters refer to similar parts throughout the several views.

The machine proper or shunt is mounted on a non-conducting table or slab A A, preferably of slate. On this slab is laid a magnetic bar B about four inches long, held in place by the hard-rubber posts *a b c* set astride it, which also support the insulated coil of coarse wire C, which passes once or more lengthwise under and over and parallel to the magnetic needle N, and is connected with the line-wire at binding-screw S, and with the telephone or instrument to be protected at binding-screw S′. A brass post D is screwed to slab or table A A and bent over rubber post *b*, so as to receive the upper socket for axis E of magnetic needle N.

E is a steel axis an inch or three-quarters of an inch long, set in sockets, preferably jeweled in rubber post *b* and brass post D, as shown in Fig. 1.

C is an insulated coil of coarse copper wire passing once or twice under and over the needle N lengthwise, as shown, and forms part of the circuit, being connected with the main line of an electric circuit at S, and with the instrument to be protected at S′ at the other end.

At F a branch wire *e* is connected with the wire of coil C and led up post *d* to flat spring H.

A post of hard rubber *d* is attached to slab or table A A at one end of coil C, and has screwed to it at the top two horizontal flat springs H H′, one on either side, which extend just beyond the axis of the needle and are two or three inches long, a quarter of an inch wide and situate about three-sixteenths of an inch apart. One of them H is connected by wire *e* with the end of coil C next the instrument to be protected. The other H′ is grounded by wire G, running down a groove in farther side of post *d* and under table A A to binding-screw S″, or in case of a metallic circuit, it may be connected with the other side of the main line instead of ground. The axis E carries a freely moving

magnetic needle N, whose poles are placed the reverse of those of fixed magnetic bar B. An elliptical piece of metal I, called a "cam," is made fast to the upper part of axis E, between the springs H and H′ and with its longer axis or diameter parallel with N. The shorter diameter of the cam is an eighth of an inch and the longer about one-quarter inch. It is of the same thickness as the width of the springs.

The instrument should be protected from dust by a tight cover.

Having thus described the construction of my shunting device, I proceed to set out its mode of operation.

The coil C, being of coarse copper wire, is of low resistance and forms no serious increase of resistance in the circuit. It forms, with the needle N, a galvanoscope. The needle N is steadied in place by the attraction of the reversed poles of bar B, which, however, is not at all a necessary part of the device. N is not disturbed by the ordinary working current on a telegraph or telephone circuit; but as soon as an abnormal current, such as might be caused by lightning or the crossing of the telephone-wire by an electric light or trolley wire, passes over the main line and circulates through the coil C, needle N is deflected to one side or the other, depending on the direction of the current, and in either case cam I is brought into contact with springs H and H′, and the current is at once grounded or sent over the metallic circuit beyond, the current taking the path of least resistance—to wit, from F by *e* to H, through cam I to H′, and thence by G to ground or the circuit beyond. The protected instrument, it will be seen, is not cut out, but the destructive current is simply shunted from it. As soon as the abnormal current ceases, N returns automatically to its position of rest, directed thereto by the pressure of springs H H′ on the sides of cam I, and by the attractive force of magnet B, when the connection is broken between the springs H H′ and cam I, and the circuit is thereby restored through the protected instrument. It will be seen that as the cam I does not normally touch the springs H H′, there are no contact-points to become dusty, that the contact when made is a rubbing one and firm, and that there is no opportunity for the formation of an electric arc.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a galvanoscope, having fixed to the axis of the needle a cam situated between two flat contact springs; the springs being connected respectively one with the coil of the galvanoscope, and the other with the ground, substantially as described.

2. The combination of a magnetic needle N, hung on an insulated axis E, coarse wire coil C, in main line of electric circuit, fixed magnet B, cam I firmly attached to axis E, flat contact springs, H, H′, attached to post *d*, and wires connecting them with main line and coil, C, and with the ground, substantially as shown.

3. The combination in an electric shunting device, of an elliptical cam attached to the axis of a magnetic needle free to move in a horizontal plane, controlled by the force of the current on the main line, with a pair of contact springs, connected respectively with the line and ground and not normally in contact with the cam, the whole so arranged as to shunt to ground, automatically, any abnormal current passing over the line, without opening the connection with the instrument to be protected, and automatically restoring the circuit to its normal condition, substantially as described.

AUGUSTUS B. DEPUY.

Witnesses:
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