

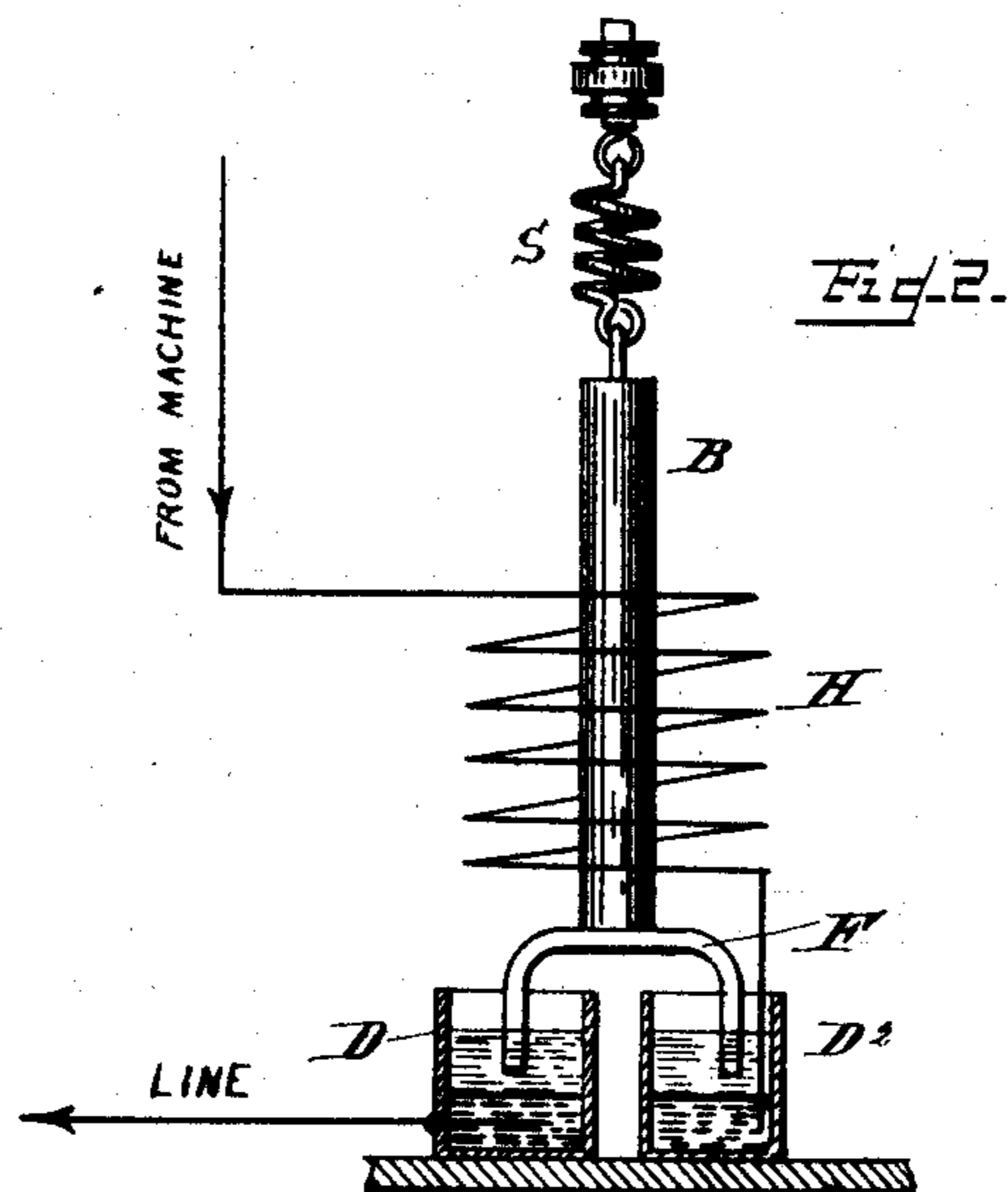
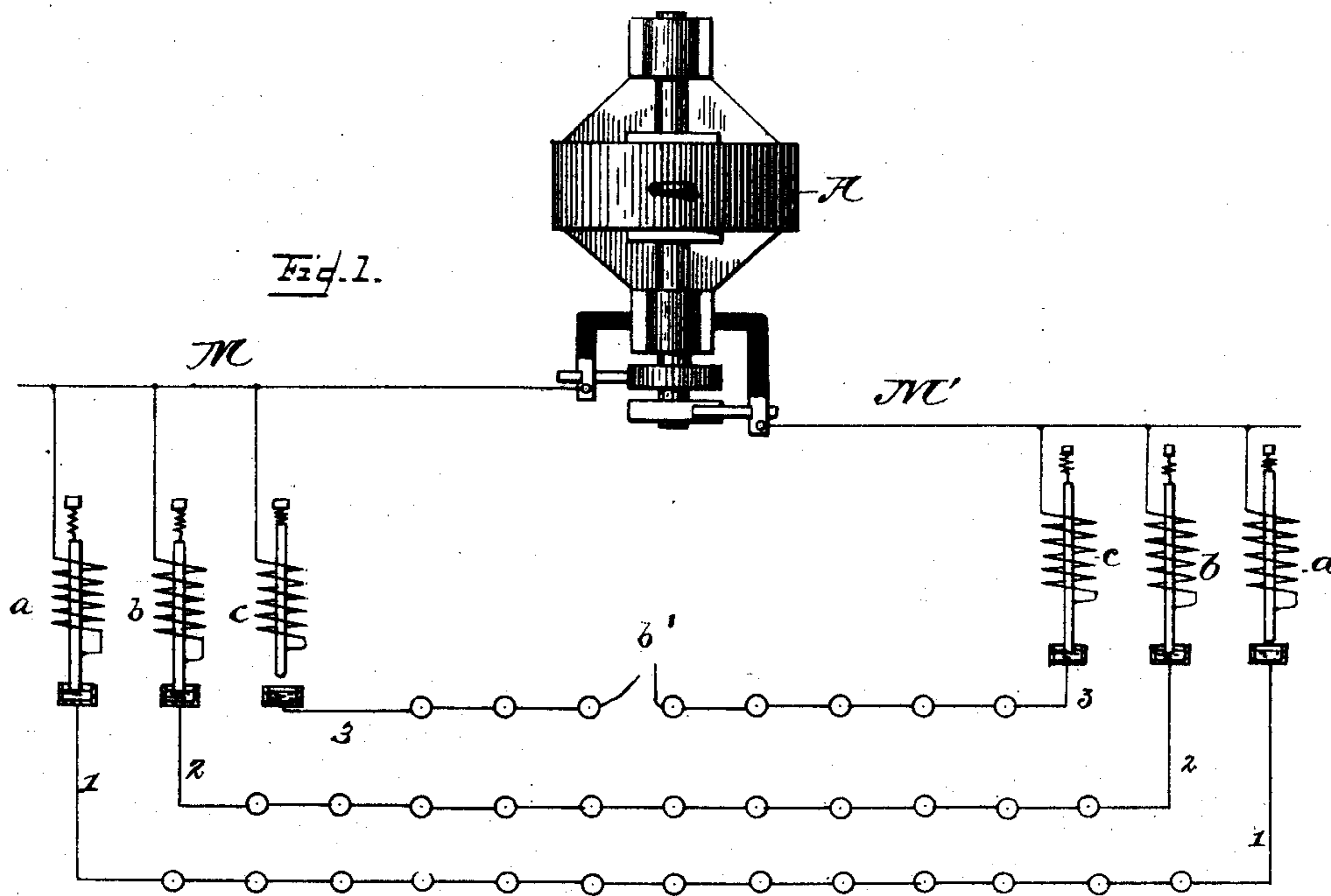
(No Model.)

2 Sheets—Sheet 1.

H. LEMP.  
SAFETY DEVICE FOR ELECTRIC CIRCUITS.

No. 421,177.

Patented Feb. 11, 1890.



Witnesses  
Ira R. Steward,  
H. Lemp.

Inventor  
Hermann Lemp.

By his Attorney

H. L. Townsend

(No Model.)

2 Sheets—Sheet 2.

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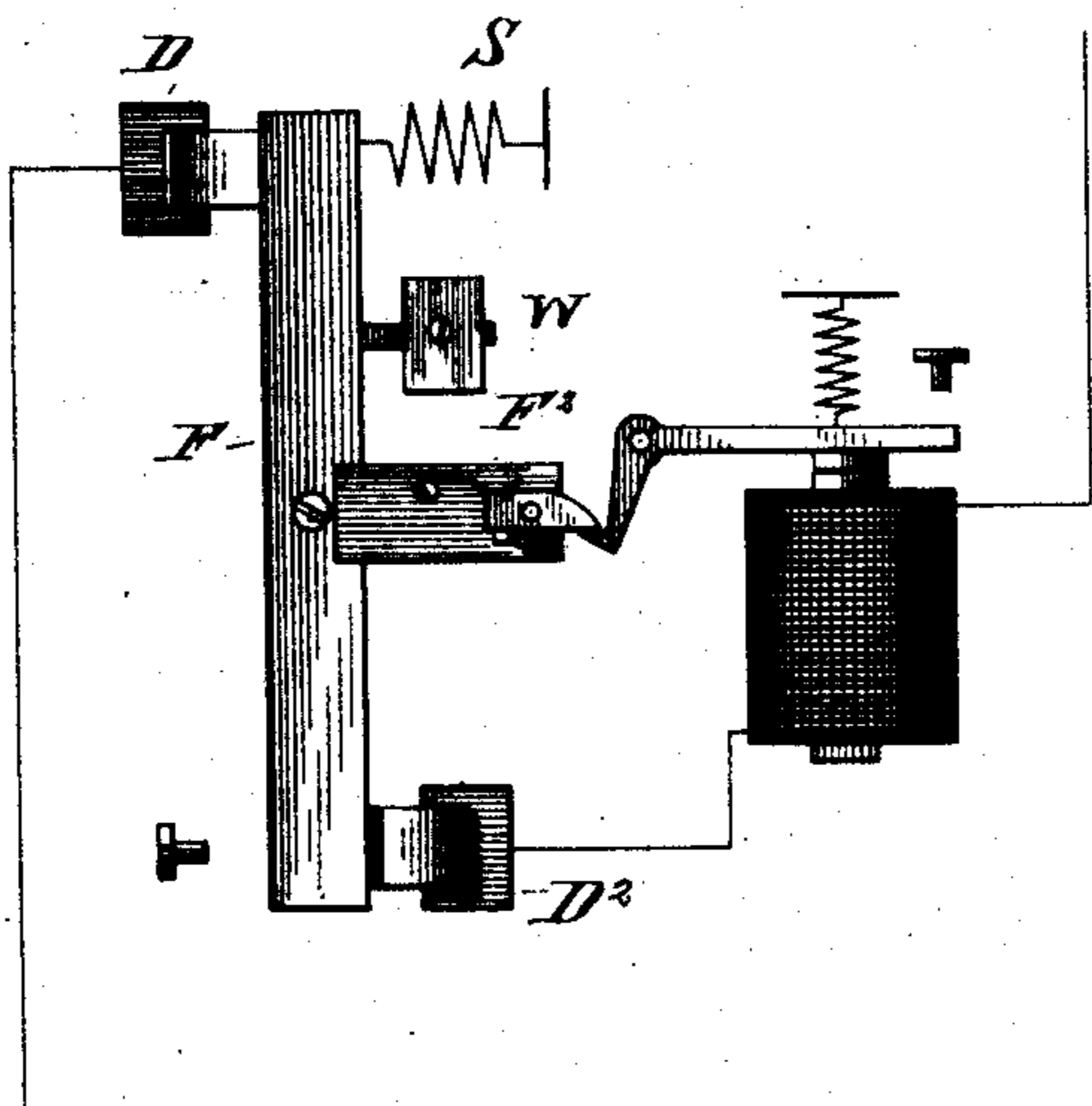


Fig 3

WITNESSES:

*L. M. Benjamin*  
*Wm. S. Capel*

INVENTOR

*Hermann Lemp*

BY

*H. C. Townsend*

ATTORNEY

# UNITED STATES PATENT OFFICE.

HERMANN LEMP, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF CONNECTICUT.

## SAFETY DEVICE FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 421,177, dated February 11, 1890.

Application filed June 14, 1889. Serial No. 314,252. (No model.)

### *To all whom it may concern:*

Be it known that I, HERMANN LEMP, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Safety Device for High-Potential Electric Circuits, of which the following is a specification.

My invention relates to electric safety appliances for use in connection with electric lines or circuits carrying currents of dangerously-high tension and having a series of translating devices in a complete metallic circuit leading from one pole to the other of the generator.

The object of my invention is to afford effectual protection against damage or injury to persons or animals from contact or connection with any portion of the metallic circuit in case of breakage of the same at any point. I am aware that it has been heretofore proposed to place in one pole of an electric circuit a disconnecting appliance controlled by a magnet charged over the electric circuit and adapted to open such circuit when the conducting-line is broken and the broken ends drop into the street or into position where they may be touched or come into contact with any one.

My invention consists, essentially, in the combination, with a series of translating devices placed on an electric conducting-wire leading from one pole to the other of a source, of an automatic disconnecter at each terminal or pole of the metallic portion of the line-circuit, including the translating devices, and an electro-magnet for each disconnecter, each electro-magnet being normally charged over the line-circuit and adapted to free or cause the operation of the disconnecter in case the line breaks. The disconnecter may be an electric-circuit breaker of any suitable or proper description, combined with a retractor adapted to throw the same into circuit-opening position. The action of the retractor may be restrained normally by means of the charged electro-magnet in the line-circuit acting directly or indirectly upon such disconnecter. By a "retractor" I mean any mechanism or device which will move the disconnecter from a position where the con-

nection of the source with the line is closed to a position where such connection will be opened. The controller-magnet which is placed in the normal connection may act in various ways, as is well understood by electricians. Some of the ways are illustrated in the accompanying drawings.

My invention likewise consists in an improved form of disconnecting appliance combined with a retractor and solenoid or electro-magnet in the manner to be hereinafter more fully described.

In the accompanying drawings, Figure 1 is a diagram illustrating the application of my invention to electric lines or circuits supplied in multiple from suitable mains and each carrying translating devices in series. Fig. 2 is an enlarged side elevation of the disconnecter and electro-magnet. Fig. 3 is a plan of a modification.

Referring to Fig. 1, three lines 1 2 3 are indicated, each deriving electrical energy from a source, such as mains M M', that are charged by a dynamo-machine A, or other suitable generator. Each line 1 2 3 contains a number of translating devices, as shown, in series.

At the points *a b c* are shown the disconnecting and controlling devices of my invention. These disconnectors are applied in the connection of the lines with the source of energy, as indicated, and normally preserve the connection; but should any line, as line 3, break at a point *b'* the disconnecter will automatically and immediately come into action and sever the connection of the line 3 with the source, such as the main M or M'. A construction of disconnecter or switch suitable for the purpose is shown in Fig. 2 enlarged, where F is a fork or piece of copper or good conducting material adapted to dip into two mercury-cups D D<sup>2</sup> to complete the connection 3. The cups D D<sup>2</sup> are in the circuit between the source and the line, and the mercury in each is preferably covered with oil, so as to insure a quick break and good subsequent insulation.

H indicates the coils of an electro-magnet, the core B of which is constructed in any suitable manner. The disconnecter F is carried by said core, as indicated.

S is a spring, which operates as a retractor to lift the core, and thereby operate the disconnecter, so as to sever the connection of the line and source. The coils H of the electro-  
5 magnet are in the normal circuit with the line and are charged by the current passing over the same.

To establish the connection with the line the disconnecter and core are depressed by  
10 hand, so as to close the circuit through the disconnecter F, thus charging the electromagnet, and allowing at the same time current to pass over the circuit. The disconnecter is held out of operation by the power  
15 of the magnet. Should the line be interrupted, as would occur on rupture, as indicated at  $b'$ , the magnet being discharged will immediately permit the retractor to move the disconnecter into the position indicated in Fig.  
20 2, thus disconnecting the line-wire from the source.

As will be seen, an automatic disconnecter is introduced between each pole or terminal of the portion of circuit including the series  
25 of translating devices and the source. By thus placing a disconnecter at each side of the series of translating devices included in a portion of line or circuit liable to break and come into contact with extraneous objects I  
30 insure absolute safety from damage by current passing from the dynamo, whereas if the disconnecter were applied at one end only of the portion of line containing such translating devices a break of line and operation  
35 of such disconnecter would still leave the portion of line at the opposite side of the break still connected to the dynamo and liable to do damage to any one touching it.

While the form of apparatus hereinbefore  
40 described is a simple and effective one, I do not limit myself to that special construction, and in all cases it will be understood that the disconnecting or switch device itself is capable of endless variation.

Another form of mechanism that may be used is illustrated in Fig. 3, where the disconnecter is shown as a lever F, bearing contact-springs at opposite ends, which normally make connection with the plates D D<sup>2</sup>, so as  
50 to complete the connection between the line and its source over the lever F. The controller-magnet H has an armature which normally engages with a detent-arm F<sup>2</sup>, connected with the disconnecter F. In the position of the parts shown the magnet H being  
55 charged holds the disconnecter F from operation by the spring S or weight W by engagement of the detent F<sup>2</sup> with the end of the armature-lever for magnet H. On interruption of the line at any point the magnet  
60 H loses its power and its retractor moves the armature away from position where it will hold the detent F<sup>2</sup>, thus permitting the disconnecter to operate.

65 It will of course be understood that the retractors for the disconnecter-magnets, Figs. 1 and 2, are adjusted so that while any of the

translating devices are in circuit, or while the line is in use and current flowing over the same, the magnets will overcome such re- 70 tractor and the interruption will only take place on interruption of the circuit through the translating devices. In the same way it will be obvious that the retractor of the controller-magnet, Fig. 3, would be adjusted in 75 the same manner to cause an interruption of the circuit at the points of the switch or disconnecter only on an interruption of the circuit of the controller-magnet at another point.

My invention is adapted for use on circuits 80 carrying alternating electric currents, as well as upon continuous-current circuits.

I am aware that it has been before proposed to apply a disconnecter in one of two main wires leading from opposite poles of a gen- 85 erator and adapted to supply electric devices in multiple, and I do not therefore wish to be understood as claiming, broadly, the use of a disconnecter operating in the manner before described. 90

What I claim as my invention is—

1. The combination, substantially as described, of a source of current of dangerously-high tension, a series of translating devices in a metallic line circuit or connection 95 leading from one pole to the other of the source and liable to breakage, disconnectors placed, respectively, between the two poles or terminals of such line and the electric source and normally held in closed-circuit 100 position, and two controller-magnets—one for each disconnecter—placed in the charged-line circuit leading from the source through the translating devices and between opposite poles of the source and opposite terminals of 105 the series of translating devices, respectively, and retractors tending to operate the disconnectors and adapted to cause the circuit to open when the conducting-line is broken at any point in the series of translating devices. 110

2. The combination, substantially as described, with an electric line fed with currents of dangerously-high tension and liable to make dangerous connection if broken, of a circuit closer and breaker included in the 115 connection between the source and such line, a movable magnet-core sustaining one member of such circuit closer and breaker, a coil surrounding such core and placed in the line-circuit, whereby the core may be held in po- 120 sition to close the circuit, and a spring from which the core depends and which is applied in the manner described to lift the core and break the connection between the source and line when the line-circuit fails or breaks, so 125 as to interrupt the flow of current in the magnet-coils.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 11th day of June, A. D. 1889.

HERMANN LEMP.

Witnesses:

JOHN W. GIBBONEY,  
DANIEL M. BARTON.