

(No Model.)

3 Sheets—Sheet 1.

M. D. CONNOLLY.

PROTECTOR FOR TELEGRAPHIC INSTRUMENTS.

No. 255,378.

Patented Mar. 21, 1882.

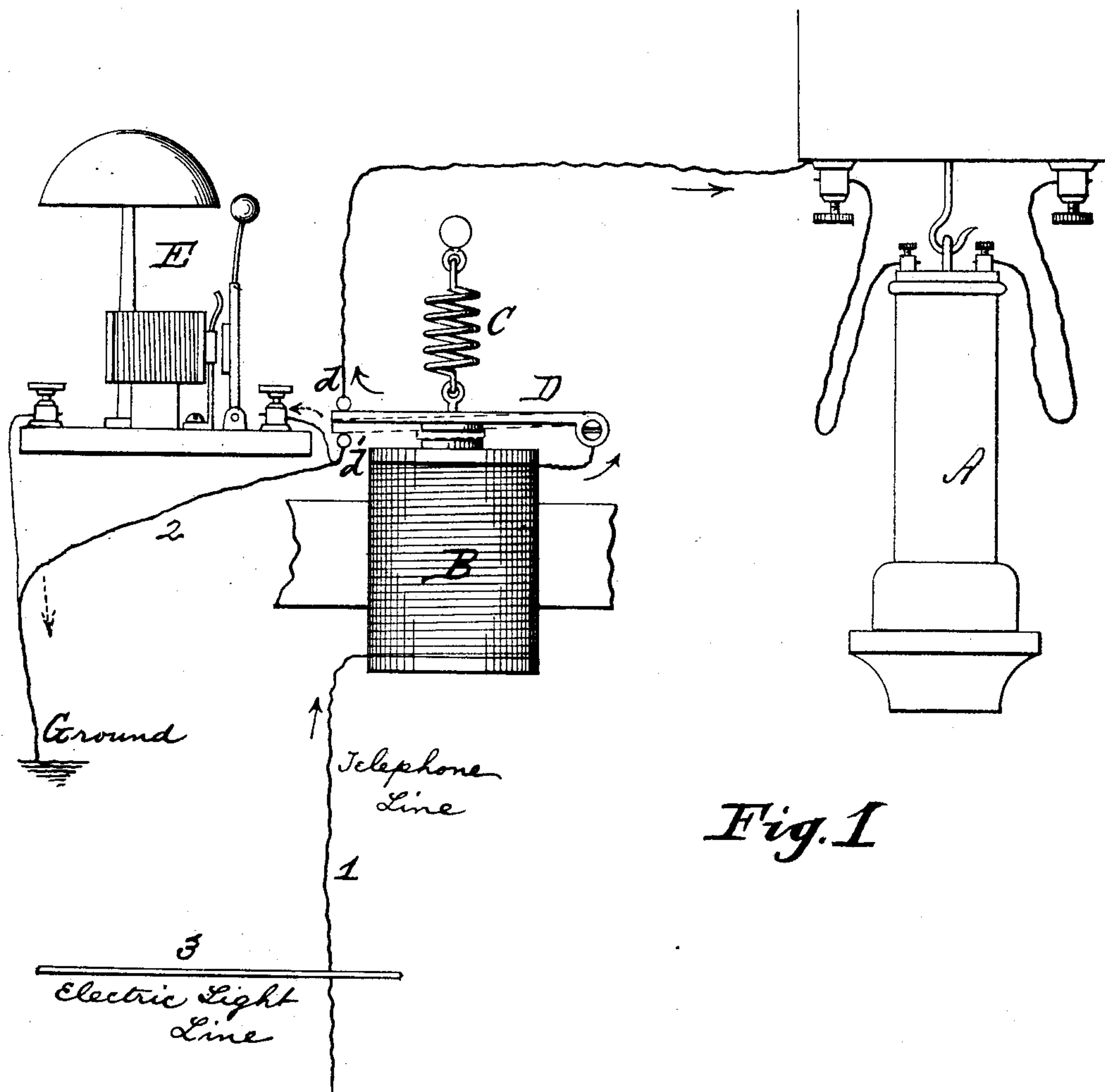


Fig. 1

WITNESSES:

L. VanStavoren
W. B. Chaffee

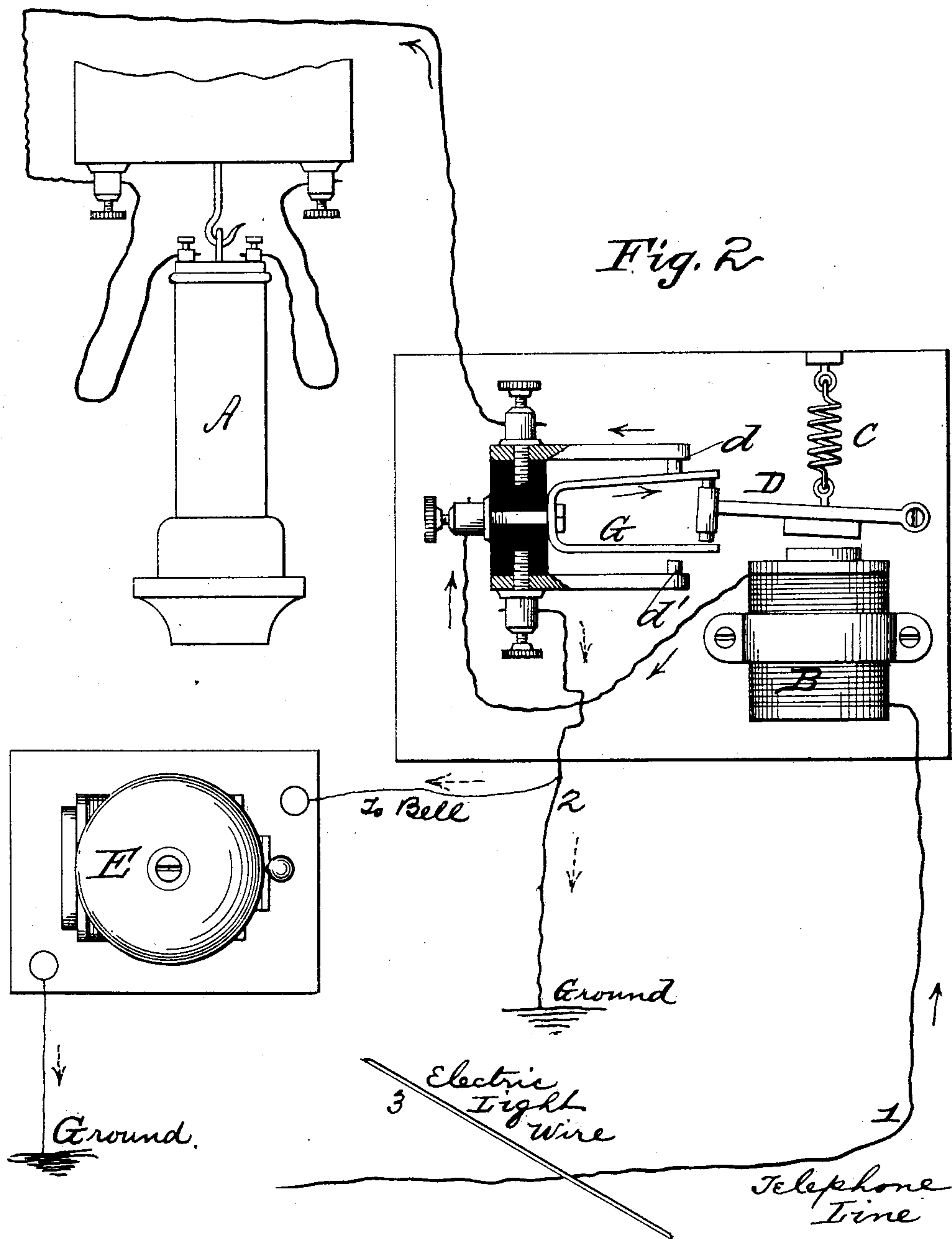
INVENTOR,

M. D. Connolly
By Connolly Bros.
ATTORNEYS

3 Sheets—Sheet 2.

PROTECTOR FOR TELEGRAPHIC INSTRUMENTS.

Patented Mar. 21, 1882.



WITNESSES:

S J Van Stavoren
W. Schaffer

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(No Model.)

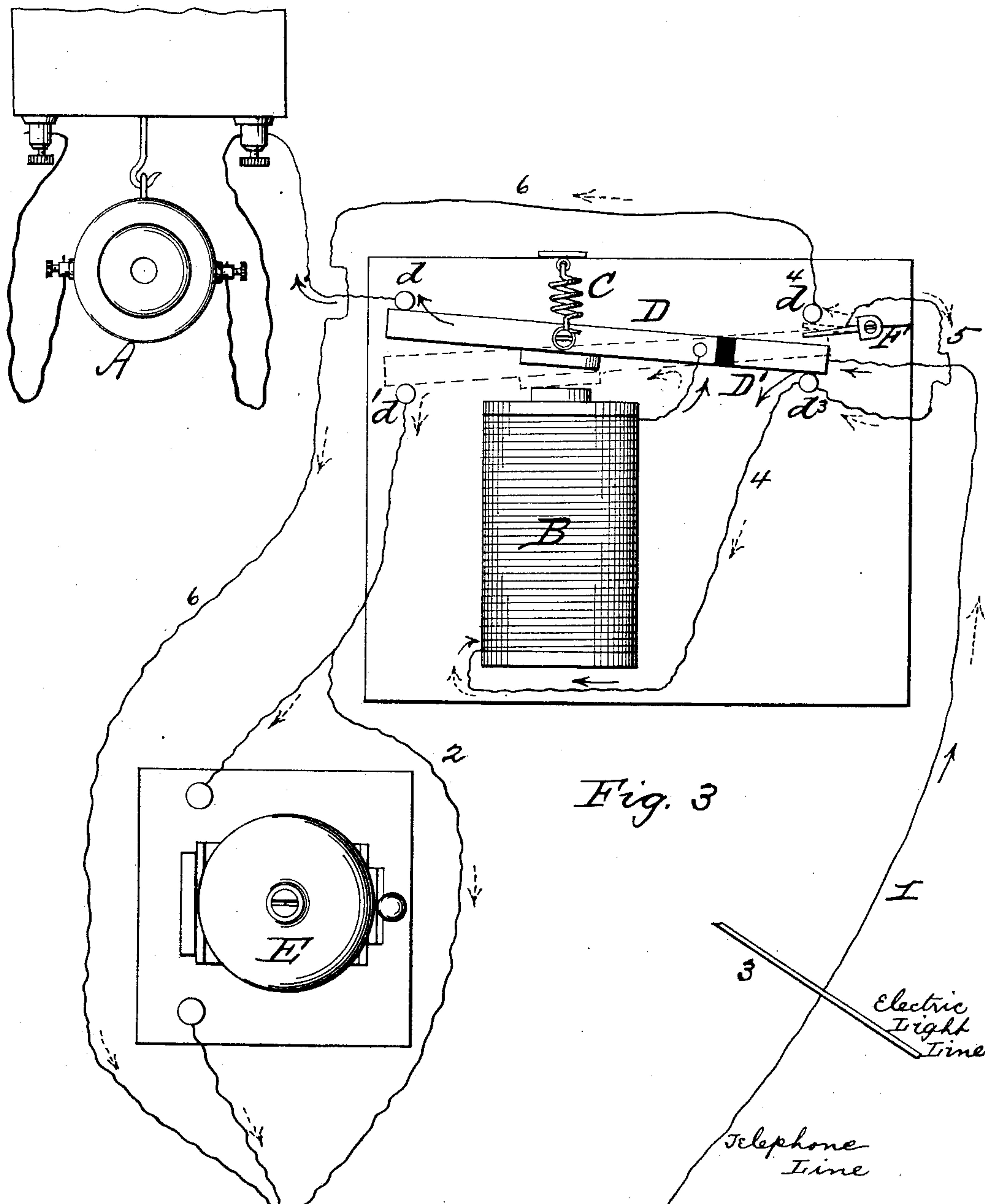
3 Sheets—Sheet 3.

M. D. CONNOLLY.

PROTECTOR FOR TELEGRAPHIC INSTRUMENTS.

No. 255,378.

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WITNESSES:
S. Vanstavoren
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Ground

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UNITED STATES PATENT OFFICE.

M. DANIEL CONNOLLY, OF PHILADELPHIA, ASSIGNOR TO CHARLES S. BRADFORD, JR., OF WEST CHESTER, PENNSYLVANIA.

PROTECTOR FOR TELEGRAPHIC INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 255,378, dated March 21, 1882.

Application filed January 21, 1882. (No model.)

To all whom it may concern:

Be it known that I, M. DANIEL CONNOLLY, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Protector for Telephonic, Telegraphic, and Signaling Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification, in which—

Figures 1, 2, and 3 are plans or diagrams illustrating the construction and relative arrangement of devices constituting my invention.

My invention has for its object to provide means for protecting telephonic, telegraphic, and other electric signaling instruments from injury by contact with their lines of lines for conveying electric light or other similar powerful currents of electricity.

My invention consists of a device or apparatus to be located in the circuit of a telephonic or telegraphic line, which device, while it cannot be operated by an ordinary signaling or telegraphic current, will be worked so as to change circuit to ground whenever an electric light or similar powerful current is sent over said telephonic or telegraphic line, a portion of the latter current being diverted to maintain the energization of a magnet and to ring an alarm-bell.

My improvement comprises an electro-magnet and armature with front and back stops, the back stop being in line-circuit and the front stop in ground-circuit. The armature is normally held retracted against the back stop by a strong spring which ordinary signaling-currents are inadequate to overcome; hence the line-circuit is normally by way of the back stop to and from the telephone, telegraphic, or signaling instrument. When a powerful current, such as is used for electric lighting or similar purposes, gets on the line the retracting power of the armature-spring is overcome, the armature instantly attracted and drawn against its front stop, thus changing line-circuit to ground, cutting out the telephone, telegraphic, or signaling instrument, and saving the latter from injury by such powerful current.

In the ground or shunt circuit is located an electric bell, which, when circuit is made to ground, as described, is caused to ring by the current taking that direction, thereby giving notice of the interference of lines, so as to have the same corrected. To prevent injury to the bell, which might result if the entire current of an electric-light line were permitted to pass to and remain on it, the ground-circuit is split or divided, so that only sufficient current will pass to the bell to operate it, the remainder of such current going directly to ground. So, too, to prevent the switching-magnet from possible injury by the maintenance through it for any considerable time of the passage of a too powerful current, the circuits and operative parts may be arranged, as hereinafter fully specified, so that as soon as the armature is attracted to its front stop a part of such current will be diverted to ground in advance of the magnet, allowing only enough current to go by way of the latter to energize it sufficiently to keep the armature attracted against its front stop. When the interference of lines is corrected the apparatus automatically restores itself, so as to establish normal line-circuit.

Referring to Sheet 1 of the accompanying drawings, 1 represents a telephone-line to which my invention is applied, A being a telephone on said line which is sought to be protected.

B represents an electro-magnet in line-circuit, which magnet should be wound with coarse wire and in but few convolutions, so as to have only slight resistance.

D is the armature of said magnet, having a back stop, *d*, and a front stop, *d'*. The armature is normally held against the back stop, *d*, by a strong spring, C, whose retractile power cannot be overcome by any ordinary signaling or telegraphing current, such as is designed in the regular working of the line to be sent over it. From the back stop, *d*, a line-connection leads to the telephone A or other signaling or telegraphing instrument, and from the front stop, *d'*, there is a connection or shunt-circuit, 2, to earth. Line 1 leads into the magnet B, thence to armature D by the way of back stop, *d*, thence to telephone. It remains so as long as armature is unattracted away from back

stop, d . Should an electric-light line, 3, make contact with telephone-line 1, and current of the former thus find transit over the latter, it will energize magnet B, so that armature D 5 will be attracted against front stop, d' , thus diverting circuit from telephone to ground. In such ground-circuit is located an electric bell, E, (preferably one of the vibrating order,) which will be rung as soon as such diversion of circuit is effected, thus giving notice of the interference of lines in order that the fault may be corrected. Such a bell (as well as the protecting devices hereinbefore and hereinafter described) may be located at the central office, 15 (where the lines pertain to an exchange system,) as well as at the other terminal of each line. When the protecting devices are used in connection with telegraph-lines, or with telephone-lines not in an exchange system, they 20 should be located at each terminal of such lines. To protect the bell from injury that might result (particularly to its contact-points) from allowing the full force of the current to pass to it, such bell is in a branch of the ground-circuit, the connections being so regulated as to resistance that only sufficient current will pass to the bell to operate it without injury, the main body of such current proceeding direct to ground. Injury might result to the 30 switching-magnet B if the full current of the interfering lines were suffered to continue traversing it for any considerable length of time. To avoid the possibility of injury from such cause I have devised and shall now describe the construction and arrangement whereby, as soon as the armature D is attracted, as already described, the line-circuit in advance of the magnet is split or divided, so as to send the major part of the current direct to ground, only 40 enough of such current passing to the magnet to energize it without injury. To provide for this condition the devices are constructed and arranged with respect to connections and circuits as shown on Sheet 3 of the drawings.

45 The armature D is made with an insulated piece or attachment, D' , to which line leads before proceeding to the magnet B, and this tail-piece has a front stop, d^3 , and a back stop, d^4 .

50 From the front stop, d^3 , against which the tail-piece makes contact when the armature is in its normal retracted position, a connection, 4, leads circuit to the helix of magnet B, proceeding thence to telephone, as already set forth and as shown.

55 Between the back stop, d^4 , and tail-piece D' is an insulated spring, F, standing, when armature D is in its retracted position, out of contact with said back stop and tail-piece. A 60 branch connection, 5, leads from this spring to front stop, d^3 , and from the back stop, d^4 , another connection, 6, leads direct to ground. When the magnet B becomes energized by a powerful current and the armature D attracted the tail-piece D' leaves front stop, d^3 , and presses spring F against back stop, d^4 . The

circuit now is by line 1 to tail-piece D' , and by spring F and back stop, d^4 , over connection 6 to ground. The branch 5 will divert and carry sufficient current to magnet B to energize the 70 latter enough to retain armature D in its attracted position, so as to maintain the parts and circuits, as just described, so long as the abnormal current continues.

75 Instead of current proceeding by the way of armature D, the construction and arrangement of devices shown in Fig. 2, Sheet 2, may be adopted as a modification of or substitute for the arrangement shown in Sheet 3. In this case a U-shaped spring, G, is arranged, as 80 shown, between the front and back stops of the armature and pressed into contact with one or the other of said stops, accordingly as the armature is retracted or attracted. The spring G is insulated at its base g , and the line leads 85 to it, instead of to armature D, from the helix of magnet B. When the armature D is held retracted, circuit is to the magnet B, thence to spring G, thence by way of back stop, d , to telephone or telegraphic instrument. When 90 armature is attracted circuit is from magnet B to spring G, to front stop, d' , and thence to ground, a branch in the latter leading to a bell, E, as already described.

95 I am aware that a device for arresting lightning, involving the use of a magnet with an armature-lever, whereby circuit is changed from line to ground whenever the line becomes overcharged with atmospheric electricity, has been already made and used. Such device, however, 100 is intended for protection against an instantaneous and transitory overcharge—such as lightning effects. My device, however, while it will serve as a lightning-protector, is mainly intended for protection against powerful currents 105 from dynamo-electric machines, which currents will be permanent or continuous, so long as the contact of lines hereinbefore mentioned remains. Inasmuch as a permanent or long-continued current will produce results that an instantaneous or transitory current will not, my improvements involve the division of the overcharge, so as to utilize part of it for retaining the energization of the switching-magnet, the surplus going harmlessly to ground. So, too, 115 inasmuch as the crossing or contact of lines is a fault which may be corrected if it announce itself, I provide a bell in a shunt-circuit for making such announcement, such bell being arranged to ring on until the lines are separated. It is manifest that a provision of this kind is practically a necessity in exchange systems pertaining to telephones, in order that subscribers may be instantly notified of the fact that their lines have been shunted or broken, 125 and it is equally manifest that the provision of a bell for announcing an instantaneous overcharge from lightning would be valueless. Hence I do not broadly claim a lightning-protector for changing circuit from line to ground; 130 but

What I claim as my invention is as follows:

1. The combination, with a device for protecting telephonic, telegraphic, and signaling instruments from injury by abnormal powerful currents of electricity, such device comprising means for changing normal line-circuit to ground, of an electric bell in the ground circuit or branch thereof, substantially as and for the purpose set forth.

2. The combination, with the electric magnet B and armature D, having front and back stops, d d' , and spring C, of insulated attachment or tail-piece D' , with front and back stops, d^3 d^4 , and spring F, the latter being in

normally-open circuit with front stop, d^3 , whereby when armature D is attracted a division of the working current is effected, part going through the magnet to maintain the energization of the latter and part going direct to ground, as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 20th day of January, 1882.

M. DANL. CONNOLLY.

Witnesses:

S. J. VAN STAVOREN,
CHAS. F. VAN HORN.