

O. P. LOOMIS.
LIGHTNING ARRESTER.

No. 424,563.

Patented Apr. 1, 1890.

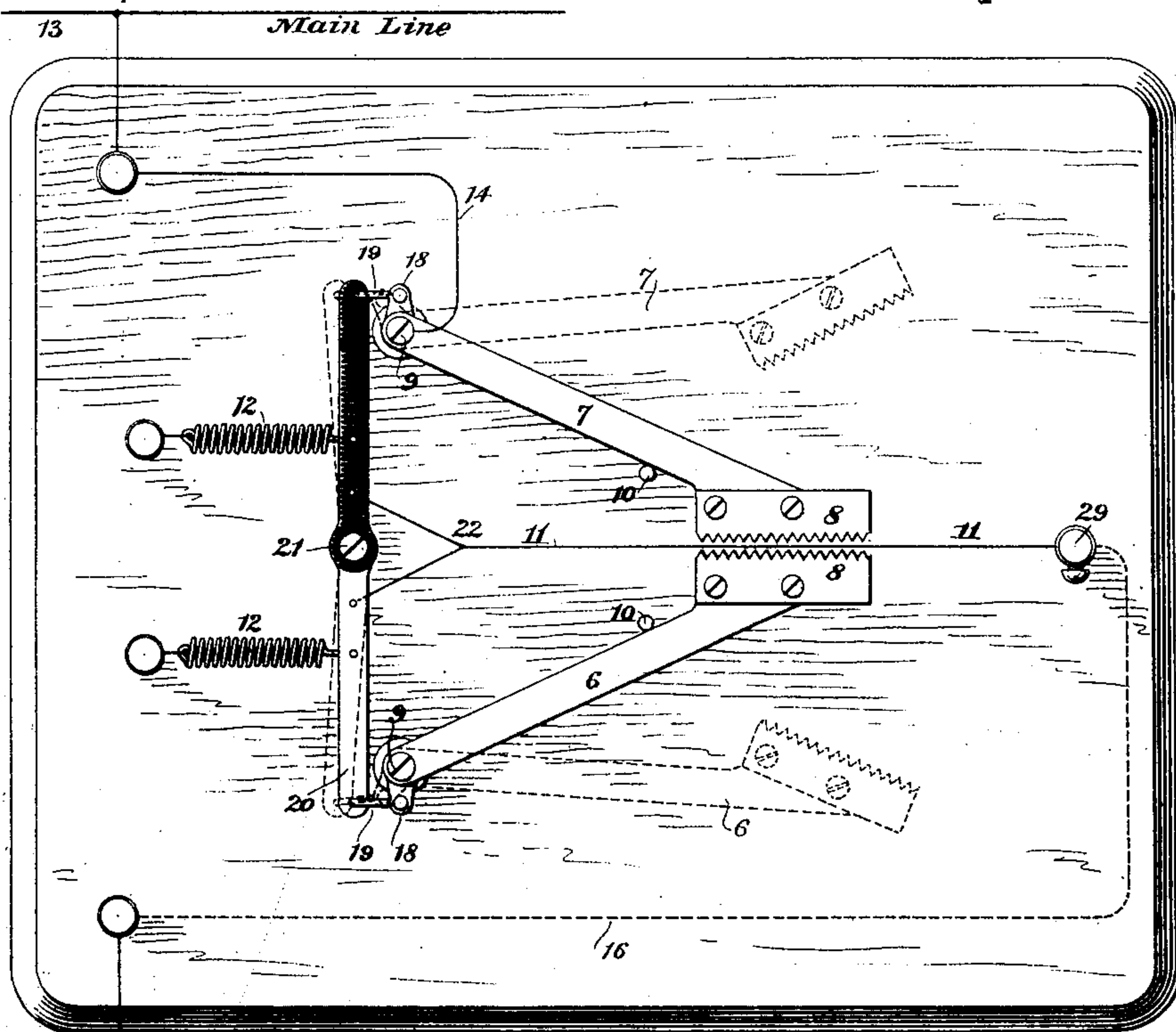


Fig. 1.

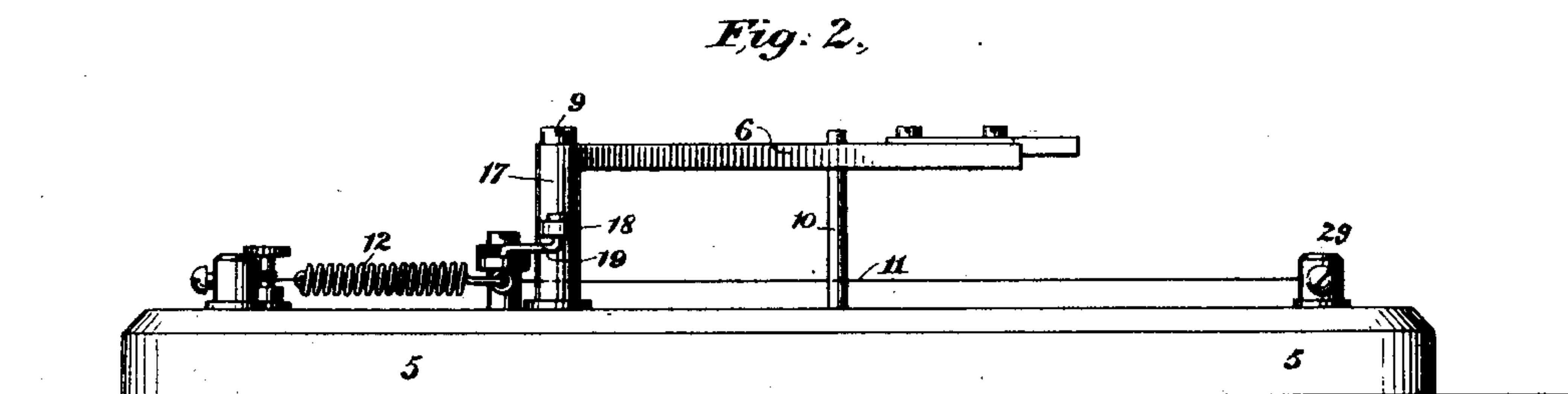


Fig. 2.

Witnesses

Geo. W. Dreck.
Edward Thorpe.

Inventor,

O. P. Loomis.
By his Attorneys
Fowler & Fowler

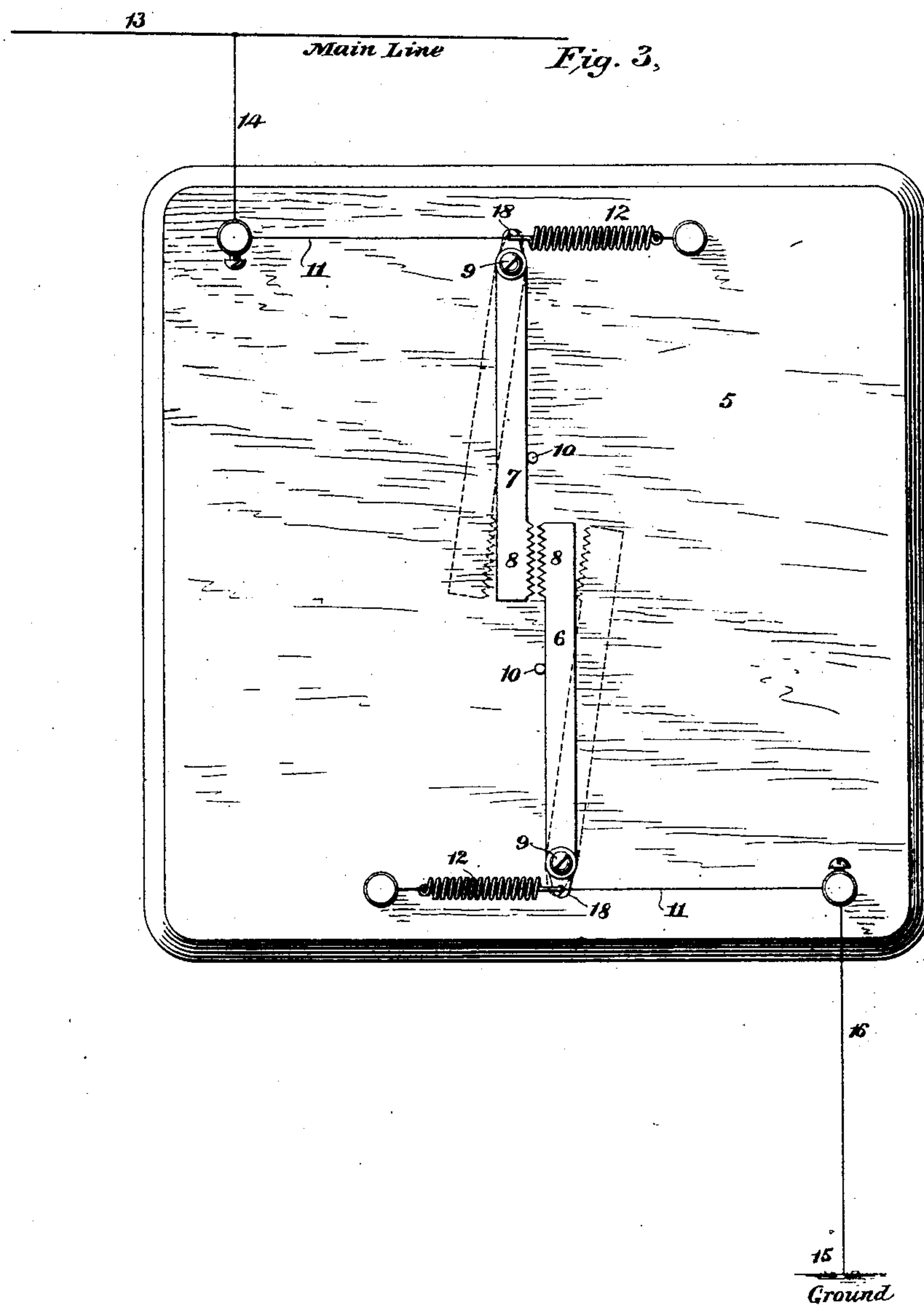
(No Model.)

2 Sheets—Sheet 2.

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By his Attorneys
Horn & Horn

UNITED STATES PATENT OFFICE.

OSBORN P. LOOMIS, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE EUREKA
ELECTRIC COMPANY, OF NEW YORK.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 424,563, dated April 1, 1890.

Application filed August 19, 1889. Serial No. 321,202. (No model.)

To all whom it may concern:

Be it known that I, OSBORN P. LOOMIS, a citizen of the United States, residing at Brooklyn, Kings county, and State of New York, have invented certain new and useful Improvements in Lightning-Arresters, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to the general class of lightning - arresters having separated discharge electrodes or points, between which an arc is established upon the passage of a lightning-discharge over the arrester, which arc is subsequently broken and destroyed, in order to prevent the short-circuiting of the electric apparatus in the connected main line.

The object of my invention is to provide efficient and reliable means for automatically breaking or disrupting the arc formed between the discharge - electrodes by the discharge, thereby preventing the current of the main line being diverted therefrom and short-circuiting the apparatus in such line.

The invention essentially consists in a lightning-arrester having spaced discharge electrodes or plates relatively movable away from and toward each other, such means being controlled by the action of a thermo-motive or thermometric device actuated by the heat produced by the passage of a current over the arrester.

The invention further consists in the certain novel and peculiar constructions and arrangements of the several parts of the apparatus, all as hereinafter fully described, and then pointed out in the claims.

In the accompanying drawings, illustrating my invention, and in which like numbers of reference designate like and corresponding parts throughout, Figure 1 is a top plan view of a lightning-arrester made after the manner of my invention, the relatively-movable electrodes being shown in full lines in normal position, in which they lie nearest each other, and in dotted lines in abnormal position, in which they lie farthest from each other. Fig.

2 is a side view of the apparatus shown in Fig. 1. Fig. 3 is a top plan view of an equivalent arrangement made in accordance with the invention.

Referring to the drawings, 5 designates a base-board or bed for the apparatus, which may be made of any suitable material. Upon the board or platform 5 are horizontally pivoted a pair of discharge-electrodes 6 7, which are provided with suitable discharge-points 8, that are arranged so as to come opposite each other and leave a suitable space between them.

The discharge-electrodes 6 and 7 are pivoted at 9, so that they may be relatively moved toward and away from each other, and are so arranged that they cannot be brought into contact at their discharge ends. This may be guarded against by means of suitable stops 10. The movements of the electrodes are placed under control of a thermometric or thermo-static device 11, which is connected therewith in such manner that upon the passage of a current from the main line over the arrester the heat generated by the current in its passage will cause the device or wire 11 to lengthen by reason of being heated, and thereby move away from each other the electrodes 6 and 7, which upon the subsequent cooling of the device 11 will be allowed to return to normal position. The electrodes are acted upon each by a suitable spring 12, so arranged as to force them apart when the thermometric wire 11 is elongated. One of these electrodes is in connection with the main line 13 by means of the wire 14, while the other is in connection with the ground 15 by means of wire 16 and the device or wire 11.

Referring to the constructions shown in Figs. 1 and 2, the electrodes 6 and 7 are each formed at their pivotal ends with a sleeve 17, which incases the pivotal stud 9, so that the electrodes may be elevated a sufficient distance above the wire 11 to make it impossible for the current to leap from the electrodes to such wire. From the sleeve 17 projects a perforated ear 18, in the perforation of which takes one end of a connecting link or crank 19, the other end of which link is suitably hinged to a horizontal lever 20, both of which

latter work on a common pivot 21. The levers 20 are normally under the tension of the springs 12, which tend to draw them outwardly—that is, into the position of the dotted lines shown in Fig. 1. The lever that controls the electrode 7, which is in connection with the main line, is made, preferably, of insulating material, the purpose being to have such electrode out of metallic connection with the ground. The thermometric device 11, which consists in a fine wire, is placed between a suitable binding-post 29 and the operating-levers 20, the end of the wire adjacent such wires being forked at 22, so as to afford a suitable connection between such wire and the levers. The wire 11 is of such length normally as to hold the operating-levers in the position shown in Figs. 1 and 2, and this brings the electrodes 6 and 7 to their nearest limit of approach, as shown in full lines in Fig. 1.

Normally the discharge-electrodes 6 and 7 are sufficiently spaced to prevent the flowing of the current of the main line across such space; but under the action of a discharge of lightning the passage of the same over the arrester will produce an arc between the electrodes, the path of the current over the arrester being from the main line by wire 14, electrode 7, across the arcing-space to electrode 6 by ear 18, link 19, lever 20, wire 11, post 29, wire 16, to ground 15. The passage of the current over the fine wire 11 will heat the same, so as to elongate it and allow the spring 12 to draw outwardly the ends of the operating-lever 20, which, through means of the links 19 and ears 18, will cause the electrodes 6 and 7 to be thrown widely apart, as shown by the dotted lines in Fig. 1. The wide spacing of the electrodes disrupts or breaks the arc, and consequently interrupts the current, thereby preventing short-circuiting of the apparatus in the main line. As the wire 11 subsequently cools after the rupturing of the arc, it contracts on its length and gradually draws inwardly the operating-levers to their normal position, thus bringing the connected discharge-electrodes back into normal position ready for the reception of another discharge. By the peculiar arrangement of the construction just described I obtain such leverage as to impart to the electrodes a very exaggerated movement, which causes the discharge-points thereof to become so widely separated as to make it impossible for the current to leap across.

In the construction shown in Fig. 3 I dispense with the intermediate connection between the thermometric wire 11 and the discharge-electrodes, but do not gain such a wide separation of the same as in the before-described arrangement. In this construction the thermometric or thermo-motive wire 11 is connected to an extension or ear 18 of the electrode, which extends beyond the pivotal point of the electrode. The tension-springs 12 are also connected to the extension 18, and,

as in the previous construction, tend to normally force the electrodes widely apart by moving them from the full-line into the dotted-line positions. In this construction I also use two of the thermometric devices or wires 11, one of the same being employed with each electrode, as will be readily understood from the drawings. The operation of the apparatus in this construction is very similar to that of the other. A current flowing over the arrester by way of the wire 14, the wire 11, electrodes 7 and 6, wire 11, wire 16, to earth will cause sufficient heat in the wires 11 as to make them lengthen, thereby allowing the electrodes to be moved on their pivots by means of the springs 12 from the full-line to the dotted-line position. This wide separation of the electrodes breaks the arc formed therebetween by the discharge, and upon the cooling off of the wires 11 on the absence of the current the same will be contracted, so as to move the electrodes back into normal position. It will be observed from the foregoing description that my invention is not restricted to the specific means described, but that it is of such scope as to include many variations in the details of construction. I therefore do not confine myself to the types of apparatus herein shown and described, which embody, broadly, the principle of having separable or relatively-movable discharge-electrodes so controlled by the movements of a thermometric device that is made operative by the passage of a current over the arrester, so that the heating of such device will throw the electrodes apart and break the arc, and the cooling of the same will draw them back into normal position.

I do not here claim what is shown and also shown and claimed in another application of mine executed and filed upon even date herewith, Serial No. 321,201, since such matter is claimed in said latter application.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A lightning-arrester having separated discharge electrodes or points that are both movable to break the arc formed therebetween, a thermometric device connected to and controlling the movements of each of said electrodes to effect the breaking of the arc and made operative by the heat produced by the passage of a current over the arrester, for the purpose set forth.

2. A lightning-arrester having separated discharge points or electrodes that are movable to break the arc formed therebetween and provided with springs tending to normally move the electrodes away from each other, a thermometric device made operative by the heat from the passage of a current over the arrester and normally holding the electrodes in position against the action of the said springs, for the purpose set forth.

3. A lightning-arrester having separated movable discharge points or electrodes and

springs for normally tending to move them away from each other to break the arc formed therebetween, and a wire in the circuit of the arrester and connected intermediate a fixed point and the said movable electrodes and holding the same against the action of the springs, whereby upon the passage of a current over the arrester the heat generated thereby in the said wire may cause the same to elongate and allow the springs to move the electrodes widely apart, substantially as and for the purpose set forth.

4. A lightning-arrester having a pair of separated and movable discharge electrodes or plates, one of the same being connected to the main line and the other to ground, each electrode having a pivoted operating-lever connected therewith by a suitable link or hinged connection, springs normally tending to move the said electrodes away from each other, and a thermostatic wire in connection with the ground and attached between a fixed point and the operating-levers of the electrodes and in circuit with one of the latter, whereby upon the passage of a current over the thermostatic wire the same may lengthen under the influence of the heat produced therein and allow the springs to move apart the discharge-electrodes, substantially as and for the purpose set forth.

5. A lightning-arrester having a pair of pivoted discharge electrodes or plates movable away from and toward each other and permanently separated, one of said electrodes connected to the main line, each electrode having a pivoted operating-lever connected thereto by means of a hinge-connection, springs tending to normally throw the discharge-electrodes widely apart, and a thermostatic wire connected to ground and forked or branched at one end and attached between a fixed point by its single end and the said operating-levers, respectively, by the branches of the forked end, the said wire being in circuit with the other electrode, the said wire normally holding the operating-levers against the action of the springs and releasing the same when elongated by the influence of the heat of a current passing over the wire, substantially as and for the purpose set forth.

6. A lightning-arrester having a pair of permanently-separated discharge-electrodes

7 and 6, pivoted so as to be movable away from and toward each other and arranged oppositely, one of said electrodes connected to the main line and the other to ground, springs normally tending to move the electrodes apart, and a thermostatic wire 11 in the ground-connection and attached between a fixed point and the electrodes and normally holding the same against the action of the spring, substantially as and for the purpose set forth.

7. A lightning-arrester having a pair of pivoted discharge plates or electrodes 7 and 6, permanently separated and movable away from and toward each other, one of said electrodes connected to main line and the other to earth, each electrode having attached thereto an extension or ear 18, a pivoted attaching-lever 20, connected by a link to the said extension or ear, springs normally tending to force the electrodes widely apart, and a thermostatic wire 11 in the ground-connection and attached between a fixed point and to the respective operating-levers 20, and normally holding the electrodes against the action of the said springs, substantially as and for the purpose set forth.

8. A lightning-arrester having a pair of pivoted discharge electrodes or plates 67, permanently separated and connected one to earth and the other to the main line, and provided each with an extension or ear 18, a pair of operating-levers pivoted to a common point 21 and connected by their ends to the ears 18 by means of links 19, springs 12, tending to normally move the operating-levers so as to throw the electrodes widely apart, and a thermostatic wire 11, located in the ground-connection and attached between a fixed point and the respective operating-lever 20, and normally holding the same against the action of the springs 12, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand and seal, this 12th day of August, 1889, in the presence of the two subscribing witnesses.

OSBORN P. LOOMIS. [L. S.]

Witnesses:

AND. J. PROVOST,
WILLIS FOWLER.