W. J. HEINRITZ.

LIGHTNING ARRESTER.

APPLICATION FILED JULY 23, 1915.

1,179,722.

Patented Apr. 18, 1916.

2 SHEETS—SHEET 1.

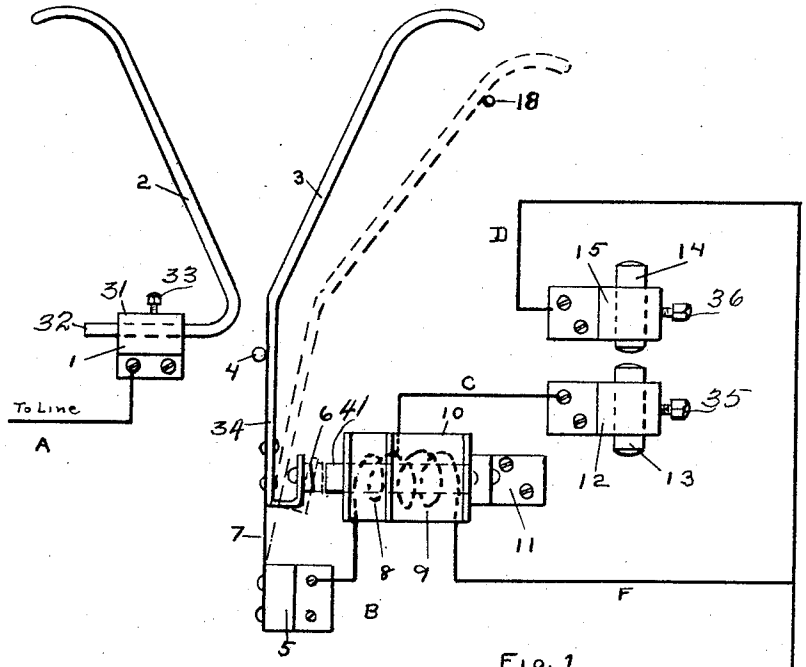


Fig. 1

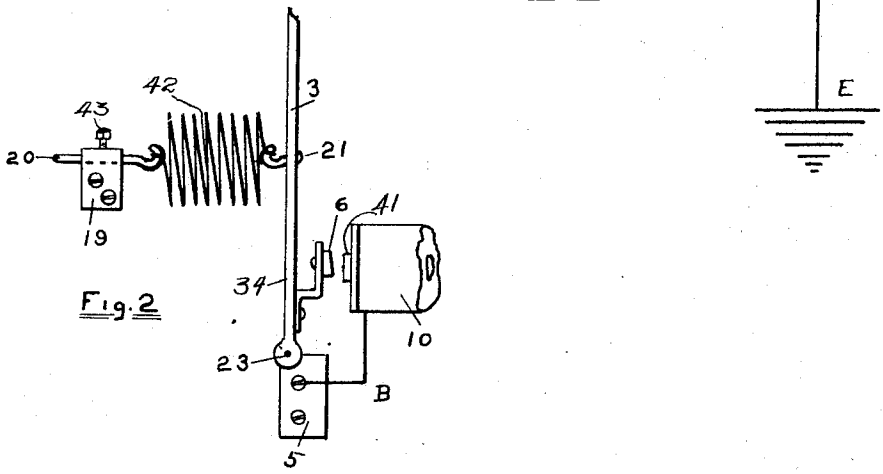


Fig. 2

Witnesses

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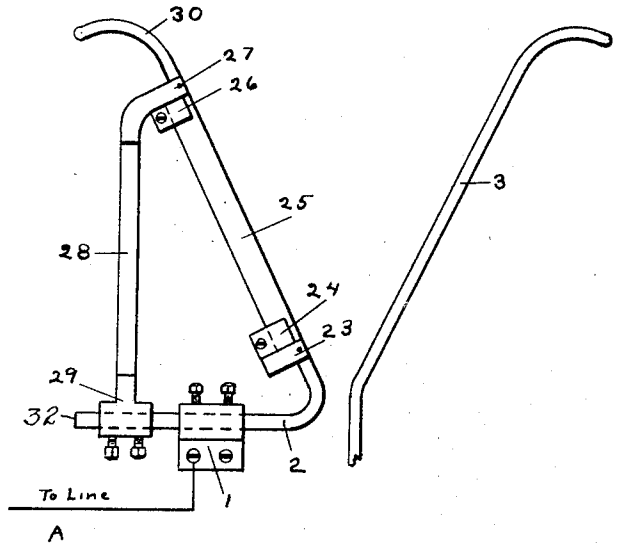


Fig 3.

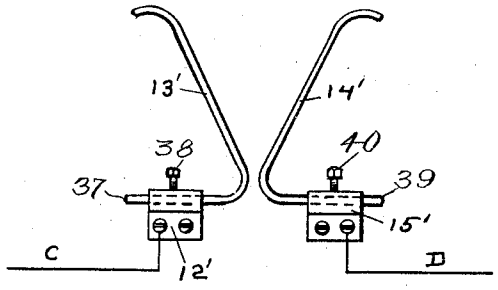


Fig 4

Witnesses

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UNITED STATES PATENT OFFICE.

WALTER JOHN HEINRITZ, OF NORRISTOWN, PENNSYLVANIA.

LIGHTNING-ARRESTER.

1,179,722. Specification of Letters Patent. Patented Apr. 18, 1916.

Application filed July 23, 1915. Serial No. 41,526.

To all whom it may concern:

Be it known that I, WALTER J. HEINRITZ, a citizen of the United States, residing at Norristown, county of Montgomery, State of Pennsylvania, have invented a new and useful Lightning-Arrester, of which the following is a specification.

My invention relates to a novel construction of a lightning arrester of the horn gap type, wherein I employ a plurality of horns one of which is movably supported and provided with an armature arranged in proximity to a magnet and its adjuncts so that the electric current flowing to the ground is utilized to energize the magnet and thereby actuate the armature and attached horn, so as to increase the air gap which the lightning had originally overcome until such increase is sufficient to interrupt the flow of current.

In carrying out my invention, I may also provide one of the horns with a resistance as a part thereof on which the arc in ascending can follow thus adding resistance to the circuit and cutting down the arcing current.

My invention further consists in making provision so that in case of a heavy discharge of lightning, another air gap is placed between a part of the magnet winding and earth, which, if overcome, will offer another path to the current. In other words, the full number of solenoid turns will be effective in case of a small discharge of lightning only, while under a severe discharge part of the turns will be in circuit.

My invention further consists in the novel employment of a plurality of horns one of which is capable of being mechanically or manually adjusted with respect to the other horn, while the latter is capable of being automatically moved toward and from the first mentioned horn, upon the energizing of the magnet and the subsequent actuation of the armature coacting with said movable horn.

It further consists of a novel construction of a horn wherein a resistance is placed, said horn being also capable of manual adjustment if desired toward and away from the magnetically or electrically operated horn.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings one form thereof which is at present preferred by me, since the same will give in practice satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a diagrammatic side elevation of a lightning arrester embodying my invention. Fig. 2 represents a modified construction of the same wherein a coil spring is employed in lieu of the flat spring seen in Fig. 1. Fig. 3 represents a side elevation showing one of the horns as being equipped with a removable resistance rod. Fig. 4 represents a side elevation of a plurality of horns both of which are manually adjusted in their supports, which may be employed in lieu of the construction seen at the right-hand portion of Fig. 1.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, A designates the line or electrical conductor through which the lightning passes to the holder 1 which is provided with an opening 31 therein, through which the leg 32 of the horn 2 passes, said leg being secured in the desired adjusted position by means of the set screws 33 or other fastening device. The lightning being conveyed to the metal horn 2 jumps across the narrow air gap to the horn 3, the upper portions of each of said horns diverging while the lower portion 34 of the horn 3 stands substantially upright and abuts against the pin or abutment 4, said lower portion 34 being supported upon the preferably flat metal spring 7, which is secured to the holder 5, it being apparent that the lightning will pass down the member 34 and spring 7 to the holder 5 and thence through the conductor B to the solenoid 10, which is provided with windings 8 and 9, the electric current thence passing through the conductor F to the earth E.

As the current passes through the solenoid 10 it will be apparent that a magnetic field is produced which will energize the magnet 41 and draw the armature 6 which it attached to the upright member 34 of the horn 3 away from the horn 2 until the parts assume approximately the position seen in

dotted lines in Fig. 1, the pin or stop 18 limiting the right-hand movement of the horn 3 while the pin or stop 4 limits the extent of the left-hand movement thereof and definitely fixes the spacing between said horns. When the horn 3 and its adjuncts are in the position shown dotted in Fig. 1, it will be apparent that the air gap between the horns 2 and 3 has been considerably increased thus offering an increased resistance due to the increased air path introduced into the circuit, thereby causing the arc to break immediately or after traveling upward on the divergent horns 2 and 3, it being understood that the extreme right-hand position as shown dotted, which the horn 3 may assume, will depend on the amount of current flowing in the solenoid 10.

Should a great excess or unusual discharge of lightning occur, the electric current will cause a potential across the solenoid coil 10 sufficient to overcome the resistance of the air gap between the adjustable plugs or members 13 and 14, which are supported in suitable holders 12 and 15, respectively, said terminals being locked in position by means of set screws 35 and 36, respectively, or other similar fastening devices, the holder 12 being electrically connected to the solenoid coil through conductor C and the holder 15 being electrically connected to earth through the conductor D, so that another path is offered under certain conditions through said conductor D to earth E, it being apparent that as the current is flowing through the turn or turns of the coil 8 of the solenoid in the meantime the iron armature 6 will be attracted by magnetic force separating horns 2 and 3 as before explained.

It will be apparent that the air gap between the horns 2 and 3 is rendered adjustable by sliding the leg 32 of the horn 2 in the desired direction in the holder 1 and thereafter locking said leg in the desired position by means of the set screw 33 or other suitable means.

It will be apparent that the air gap between the adjustable plugs or points 13 and 14 seen in Fig. 1 can be made adjustable by moving either of said terminals toward or away from each other in their respective holders 12 or 15 and thereafter locking said plugs by set screws or other suitable means 35 and 36.

In lieu of the employment of the adjustable plugs 13 and 14 and their adjuncts, as seen in Fig. 1, I may if desired employ a small horn gap construction of the type seen in Fig. 4, the horn or terminal 13′ in Fig. 4 which corresponds to the member 13 in Fig. 1 being provided with a leg 37 which is adjustably secured in the holder 12 by means of a set screw, as 38, corresponding in location and function to the set screw 35 seen in Fig. 1. In like manner the horn 14′ seen in Fig. 4 which corresponds to the terminal 14 seen in Fig. 1, may have its leg 39 adjustably supported in the holder 15′ and secured in position by the set screw 40, which corresponds in function and location to the set screw 36, seen in Fig. 1.

When the horn type construction seen in Fig. 4 is employed in lieu of the construction seen in Fig. 1, it will be apparent that the current will flow from the coil 8, Fig. 1, through conductor C to the holder 12′ seen in Fig. 4, thence to the horn 13′ across the air gap to the horn 14′, seen in Fig. 4, and thence through the holder 15′ and conductor D to earth.

While I have shown the horns 13′ and 14′, Fig. 4, as being adjustably mounted in their respective holders 12′ and 13′ in said figure, it will be apparent that said horns 13′ and 14′ could if desired be made integral with their holders 12′ and 15′ respectively.

In the construction seen in Fig. 2, I have shown the lower vertical portion 34 of the horn 3, as being pivotally or movably mounted at the point 23 of the holder 5, the construction of the solenoid 10, the magnet 41 and armature 6 being the same as already described with respect to Fig. 1. In Fig. 2 the flat spring 7 is replaced by a coil spring 42, said coil spring being attached to hook 20 slidably or adjustably mounted in the holder 19 and held in position by means of the set screw 43, while the other end of said spring is secured to the hook 21 which is attached to a suitable portion of the horn 3, it being apparent that the tension of the spring 42 can be readily adjusted by moving the hook member 20 with respect to its holder 19 according to requirements.

It will be apparent that the horn 2 can be made out of a solid metallic conductor or if desired, as shown in Fig. 3, said horn can have a section cut out and a removable stick resistance made of clay carbon composition or the like inserted in metal holders 24 and 26.

23 designates the metallic connection between the horn 2 and the holder 24, while 27 designates not only the connection between the horn 30 and the holder 26, but also acts as a part of the standard for supporting the upper part of the horn, 28 designating an insulator or nonconductor, the lower portion 29 of which is adjustably mounted on the leg 32 of the horn 2.

In the construction seen in Fig. 3, it will be apparent that in case the lightning arc should ascend after passing across the air gap between horns 2 and 3 and follow the horns in said construction, it will ascend the resistance rod 25 automatically inserting a resistance in the circuit and thus decrease the arc. It will be apparent that in the construction seen in Fig. 3, stops 4 and

18 which control the spacing between the horns may be employed, said stops being also applicable to the construction seen in Fig. 2.

It will now be apparent that I have devised a novel and useful construction of a lightning arrester which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have, in the present instance, shown and described a preferred embodiment thereof, which will give in practice satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

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

1. In a lightning arrester, a plurality of horns, one of said horns being mounted on a fixed support and the other of said horns being movably supported, an armature attached to the last mentioned horn, a magnet coacting with said armature, a solenoid for said magnet, a connection from said solenoid to the support for said last named horn, a connection from said solenoid to earth, in combination with a pair of spaced plugs, a conductor leading from said solenoid to one of said plugs, a conductor leading from the other of said plugs to earth, and means for adjusting the spark gap between said plugs.

2. In a lightning arrester, a horn support, a horn having a leg adjustably mounted in said support, a second horn mounted on a vibratory support, an armature carried by said last mentioned horn, a solenoid, a magnet therein juxtaposed to said armature, a connection from said vibratory support to said solenoid, a connection from said solenoid to earth, in combination with a pair of members having an air gap between them, connections from one of said members to said solenoid, and connections from the other of said members to earth.

3. In a lightning arrester, a pair of horns, means for magnetically operating one of said horns, a resistance 25 for the other of said horns, the latter having a lower deflected leg, a holder for said resistance, and an insulator 28 extending from said last mentioned horn to said lower deflected leg of said latter horn.

4. In a lightning arrester, a pair of horns, means for magnetically operating one of said horns, a deflected leg 32 on the other of said horns, means for adjustably supporting said leg, a resistance 25 for said adjustable horn, a holder 26 for said resistance, and a member 27 forming a connection between said horn and holder.

5. In a lightning arrester, a pair of horns, means for magnetically operating one of said horns, a deflected leg 32 on the other of said horns, means for adjustably supporting said leg, a resistance 25 for said adjustable horn, a holder 26 for said resistance, and a member 27 forming a connection between said horn and holder, in combination with an insulator 28 secured to said member 27, and having its lower end adjustably mounted on said leg.

WALTER JOHN HEINRITZ.

Witnesses:
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R. STUART WHITE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."