No. 607,251. Patented July 12, 1898.

H. A. LEWIS.

FUSE HOLDER, CIRCUIT BREAKER, AND LIGHTNING ARRESTER.

(Application filed July 14, 1897.)

(No Model.)

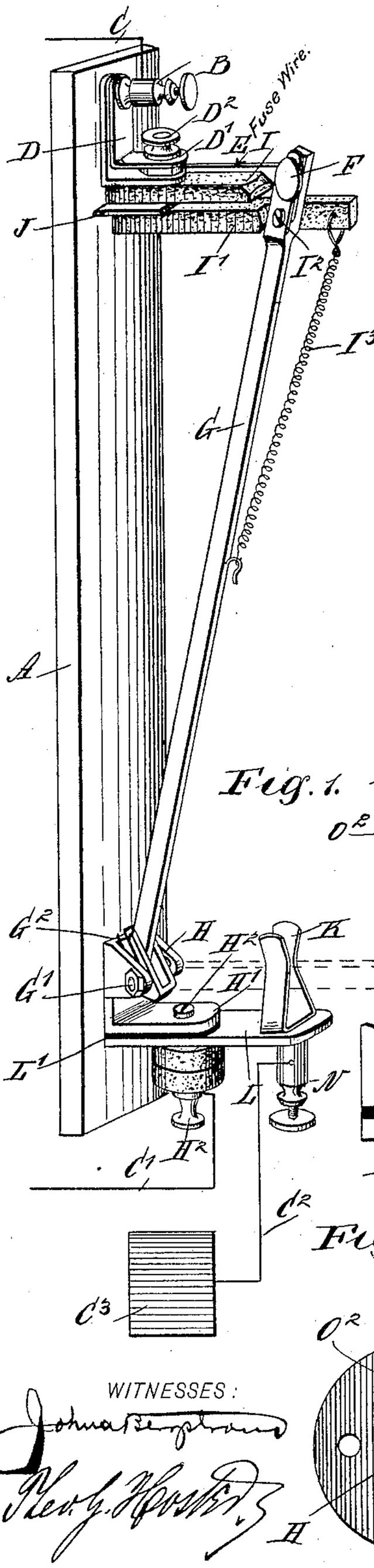


Fig. 1.

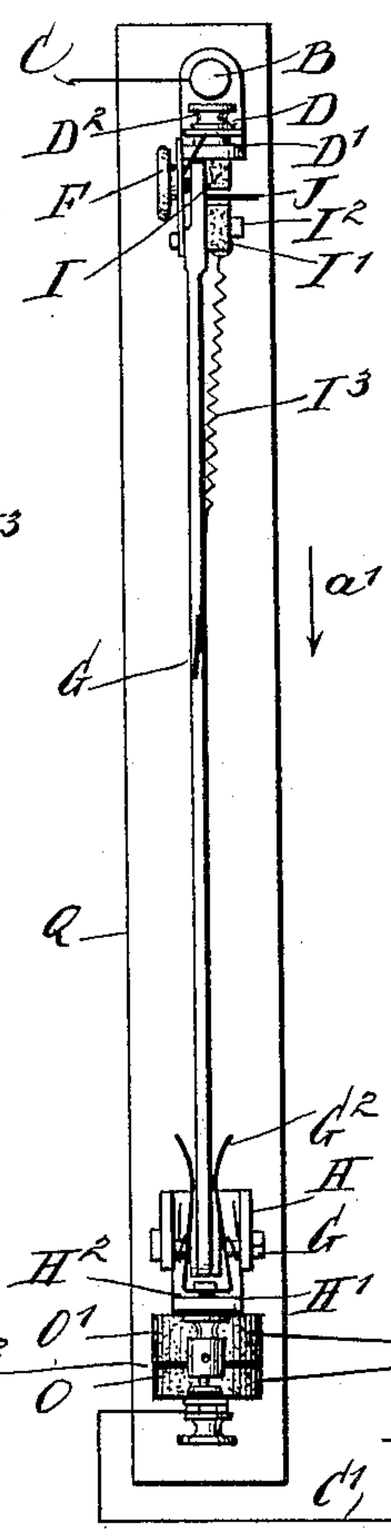
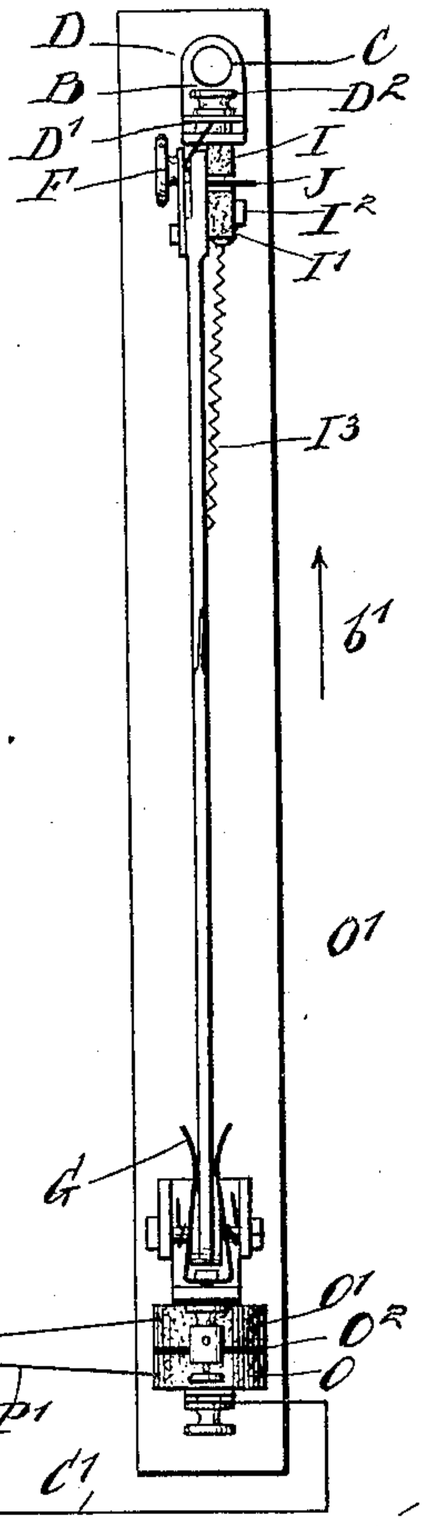


Fig. 4.



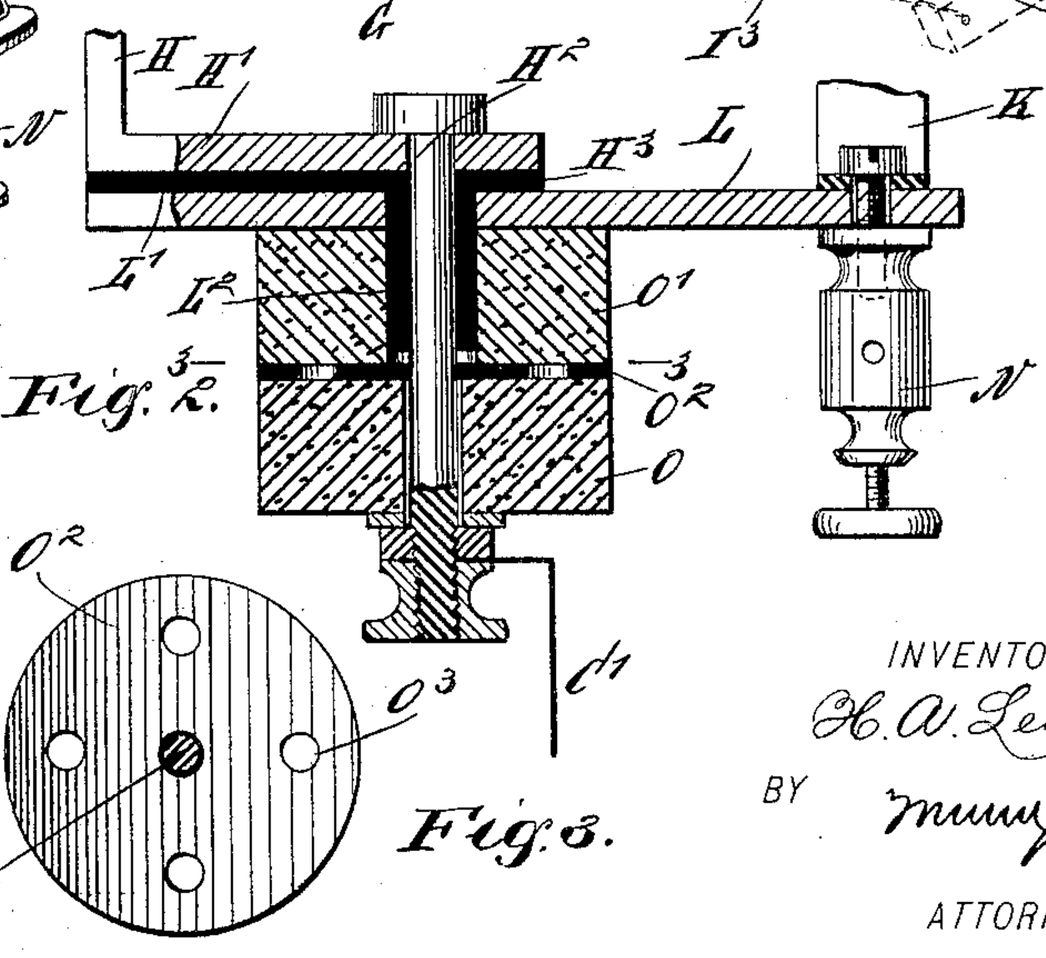


Fig. 2.

Fig. 3.

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HARRY A. LEWIS, OF NORRISTOWN, PENNSYLVANIA, ASSIGNOR OF THREE-FIFTHS TO JOHN T. DYER, OF SAME PLACE.

FUSE-HOLDER, CIRCUIT-BREAKER, AND LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 607,251, dated July 12, 1898.

Application filed July 14, 1897. Serial No. 644,532. (No model.)

To all whom it may concern:

Be it known that I, HARRY A. LEWIS, of Norristown, in the county of Montgomery and State of Pennsylvania, have invented a new and Improved Fuse-Holder, Circuit-Breaker, and Lightning-Arrester, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved fuse-holder, circuit-breaker, and lightning-arrester arranged to protect instruments, buildings, &c., from the effects of high-voltage currents produced by lightning passing into the line-wire or by other causes, the current being either passed into the ground or let out from the apparatus by a return-wire.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a perspective view of the improvement. Fig. 2 is an enlarged sectional side elevation of part of the improvement. Fig. 3 is a sectional plan view of the same on the line 3 3 of Fig. 2, and Fig. 4 is a face view of the improvement as arranged for line connections without ground connection.

The improved apparatus is provided with a base A, of wood or other suitable non-conducting material, and supporting at one end a binding-post B, receiving one end of a line-wire C. The binding-post B engages a bracket D, having an arm D′, carrying a binding-post D^2 for one end of a fuse E, connected at its other end with a binding-post F, held on the free end of a lever G, fulcrumed at G′ on a bracket H, attached to the base A, as is plainly shown in the drawings. A spring G^2 presses on the lever G, so as to swing the same away from the normally-locked position shown in Fig. 1 to the horizontal position indicated by dotted lines in the said figure whenever the fuse E is blown out, it being understood that the latter normally locks or holds the said lever G in position against the tension of the spring G^2. The bracket H is provided with an arm H′, supporting the pin of a binding-post H^2, receiving the other end of a line-wire C′, so that when the several parts are in the position shown in Fig. 1 a metallic circuit is produced in the apparatus from the wire C, post B, bracket D, binding-post D^2, fuse E, lever G, bracket H, and binding-post H^2 to the line-wire C′.

A carbon or resistance circuit is formed in the apparatus after the fuse E is blown out, and for this purpose I secure on the arm D′ a carbon I, opposite to which is placed a carbon I′ in the form of a lever fulcrumed at I^2 on the free end of the lever G. The carbon I′ is pressed on at its outer end by a spring I^3, and the two carbons are normally separated from each other by a piece of insulating material J, preferably mica, held in the base A. This piece of insulating material J extends between the inner ends of the carbons I I′, while the outer ends thereof are left free, so that when the fuse E is blown out and the lever G swings outward by the action of the spring G^2, as previously mentioned, then the carbon I′ first travels over the face of the piece of insulating material J to then drop off the outer edge thereof and into contact with the carbon I by the action of the spring I^3, swinging the said carbon outward to make contact between the two carbons I I′ on the further swinging motion of the lever G, the carbon I′ remaining in contact with the carbon I until the free end of the carbon I′ finally snaps over the end of the carbon I, the spring I^3 causing a sudden outward swinging of the said carbon I′ to separate the two carbons and to bring the carbon I′ parallel, or nearly so, to the lever G. This violent and sudden motion of the carbon I′ in breaking the contact with the carbon I breaks the circuit and scatters any burning vapor which may have been generated at the moment of breaking the contact.

Thus it is evident that by the arrangement described the apparatus normally has a metallic circuit, and when the fuse is blown out then shortly thereafter a resistance or carbon circuit is formed. This circuit is broken suddenly by the action of the movable carbon, as above described, the free end of the lever G moving away from the fuse-carbon,

so as to insure a complete breaking of the circuit. The lever G, when swinging into an outermost position, makes a connection with the ground, so that any electricity remaining in the apparatus is quickly discharged without danger of injuring the instruments in offices or buildings and the like. Now in order to make this ground connection I provide contact-plates K in the shape of a fork having spring members, and into which swings the lever G, as indicated in dotted lines in Fig. 1. The contact-plates K are held on a plate L, supported from the arm H′, but insulated therefrom by an insulation L′, as is plainly shown in Fig. 2. The arm L carries a binding-post N, connected by a wire C^2 with the ground C^3 to discharge the electricity after the circuit is broken and connection is made between the lever G and the contact-plates K, as above mentioned.

When a ground connection is not available, then I make the following arrangement: On the pin of the binding-post H^2 is held a block of carbon O, insulated from a similar block O′ by a piece of insulating material O^2, preferably mica, having openings O^3 for allowing a current to pass from the carbon O to the carbon O′, the latter being insulated on the pin of the binding-post H^2 by a piece of insulating material H^3, extending from the insulation L′, as is plainly shown in Fig. 2. Now two instruments Q Q′, as described, are used when no ground connection is available, and the carbon O of the instrument Q is connected by a wire P with the carbon O′ of the instrument Q′, and the carbon O of the instrument Q′ is connected by a wire P′ with the carbon O′ of the instrument Q. Now in case a current of high voltage passes into the instrument Q through the line-wire C then the current passes through the instrument in the direction of the arrow *a*′, as above described, and finally passes from the carbon O through the perforations O^3 to the carbon O′ and by the wire P′ to the carbon O of the other instrument Q, and as this carbon O is on the binding-post H^2 the current goes through the instrument in the inverse direction in which it enters the instrument Q—that is, it passes through the line-wire C in the direction of the arrow *b*′. Thus the instruments C^4 are connected by the wires C′ with the two instruments Q Q′ and are completely protected.

It is to be understood that the connection between the instruments Q Q′ by the wires P P′ is shorter than that by way of the telephone and telegraphic instruments, as the excessive current will find a path through the perforations O^3 and cross by the corresponding wire P or P′ from one instrument to the other and out through the line. It will be observed that the openings O^3 are so located as to compel the current to pass through the interior of the carbons O O′ instead of merely over the surface thereof, as in the ordinary construction of lightning-arresters. It will be further observed that the stem of the binding-post H^2, through which all currents must pass, is surrounded entirely by the carbons O O′, so that an excessive current will readily find its way to said carbons. In case an excessive current passes through the line-wire C into the instrument Q′ then the same operation is repeated, only that the current passes by the carbon O′ and the wire P to the carbon O of the instrument Q and to the binding-post H^2 thereof, to then pass through the instrument Q in the inverse direction of the arrow *a*′ to the line-wire C of this instrument. It will be observed that the line-circuit passes through the carbons O O′, and for this reason the direction of the current is not changed when an excessive current passes through the perforations O^3. In the usual devices constructed for this purpose there is a change of direction of current in each case when a high-tension current passes to the earth or to another instrument. In my present arrangement, with the carbons surrounding the line conductor H^2, any high-tension discharge will pass readily to the carbon O′ and to the parts connected therewith.

It is known that the display upon the switchboard during the prevalence of electrical disturbance in the instrument is the work of the excessive currents seeking a shorter path than that through the telephonic and telegraphic instruments, and it is for this that ground connections are used in such offices.

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

1. A circuit-breaker, comprising a movable arm, means adapted to be released by a high-tension discharge, for normally holding said arm stationary, a stationary contact, a contact held movably on said arm, a stationary insulation normally engaged by said movable contact and separating it from the stationary contact, and means for connecting the stationary and the movable contact in an electric circuit, substantially as described.

2. A circuit-breaker, comprising a stationary contact adapted for connection with an electric circuit, a movable arm likewise adapted for connection with the circuit, a stationary insulating-block normally engaged by the movable contact and separating it from the stationary contact, and means adapted to be released by a high-tension discharge for normally holding the movable contact stationary, said contact when released, being arranged to move first into engagement with the stationary contact, and then away therefrom, substantially as described.

3. The combination of the stationary contact adapted for connection with an electric circuit, a movable arm likewise adapted for connection with the electric circuit, a conducting connection adapted to be interrupted by a high-tension discharge and extending from said arm to the stationary contact, a contact loosely mounted on said arm to move relatively thereto, and a stationary insulation

normally engaged by said movable contact and separating it from the stationary contact, substantially as described.

4. The combination of the fixed contact, the movable circuit-breaking arm, the fuse connecting said arm and contact, and the contact held movably on the said arm and adapted to engage the fixed contact when the fuse melts or breaks, substantially as described.

5. A device of the class described, provided with a circuit-breaker comprising a spring-pressed lever connected with one end of the line-wire and arranged for connection by a fuse with the other end of the line-wire, a fixed carbon connected with the line-wire, a movable carbon carried by the lever, and stationary insulating material separating the carbons in their normal position, substantially as shown and described.

6. A circuit-breaker, having a movable arm adapted for connection with the circuit, a stationary contact, a metallic connection adapted to be interrupted by a high-tension discharge and normally connecting the said contact and arm, a high-resistance contact carried by said arm and normally out of engagement with the stationary contact, but adapted to be thrown against it when the arm is released by the severing of said metallic connection, and a third electric contact adapted to be engaged by the released arm at the end of its movement, substantially as described.

7. A circuit-breaker, having a movable arm adapted for connection with the circuit, a stationary carbon-contact likewise adapted for connection with the circuit, a metallic connection adapted to be severed by a high-tension discharge and normally connecting the said contact and arm, another carbon-contact carried by said arm and normally out of contact with the stationary carbon-contact, but adapted to be thrown against it when the arm is released by the severing of said metallic connection, and a third electric contact adapted to be engaged by the released arm at the end of its movement, substantially as described.

8. A device of the class described provided with a spring-pressed lever connected with one end of a line-wire, a fuse connection for the free end of the lever and the other end of the line-wire, a fixed carbon connected with the line-wire at the fuse connection, a carbon pivoted on the said lever and pressed on by a spring, and an insulation between part of the said carbons when the lever is in a normal position, substantially as shown and described.

9. A device for receiving an excessive current, consisting of two resistance-blocks insulated from each other and apertured at their central portions, a line-connector passing through the apertures of the blocks, one block being electrically connected with the line-connector and the other insulated therefrom, and a short-circuiting connection leading from the insulated block, substantially as described.

10. A device for receiving an excessive current, consisting of two resistance-blocks apertured at their central portions and separated from each other by an insulator having a central aperture and a series of perforations between said aperture and the edge of the insulator, a line-connector passing through the central apertures of the blocks and insulator, one block being electrically connected with the line-connector and the other insulated therefrom, and a short-circuiting connection leading from the insulated block, substantially as described.

11. The combination of two circuit-breakers one located in the entrance line-wire and the other in the exit line-wire, a connection between said circuit-breakers, the instrument or instruments to be protected being included in said connection, a resistance-block on each circuit-breaker in permanent electrical connection with said connection to the instrument, another resistance-block located adjacent to the first-named block but insulated therefrom so as to afford a path only for high-tension currents, and an electrical connection from the insulated resistance-block of each circuit-breaker to the other, connected, resistance-block of the other circuit-breaker, substantially as described.

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Witnesses:
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W. MCGEATHERY.