

No. 701,396.

Patented June 3, 1902.

C. A. ROLFE.  
ELECTRICAL PROTECTOR.

(Application filed Aug. 1, 1900.)

(No Model.)

Fig. 1.

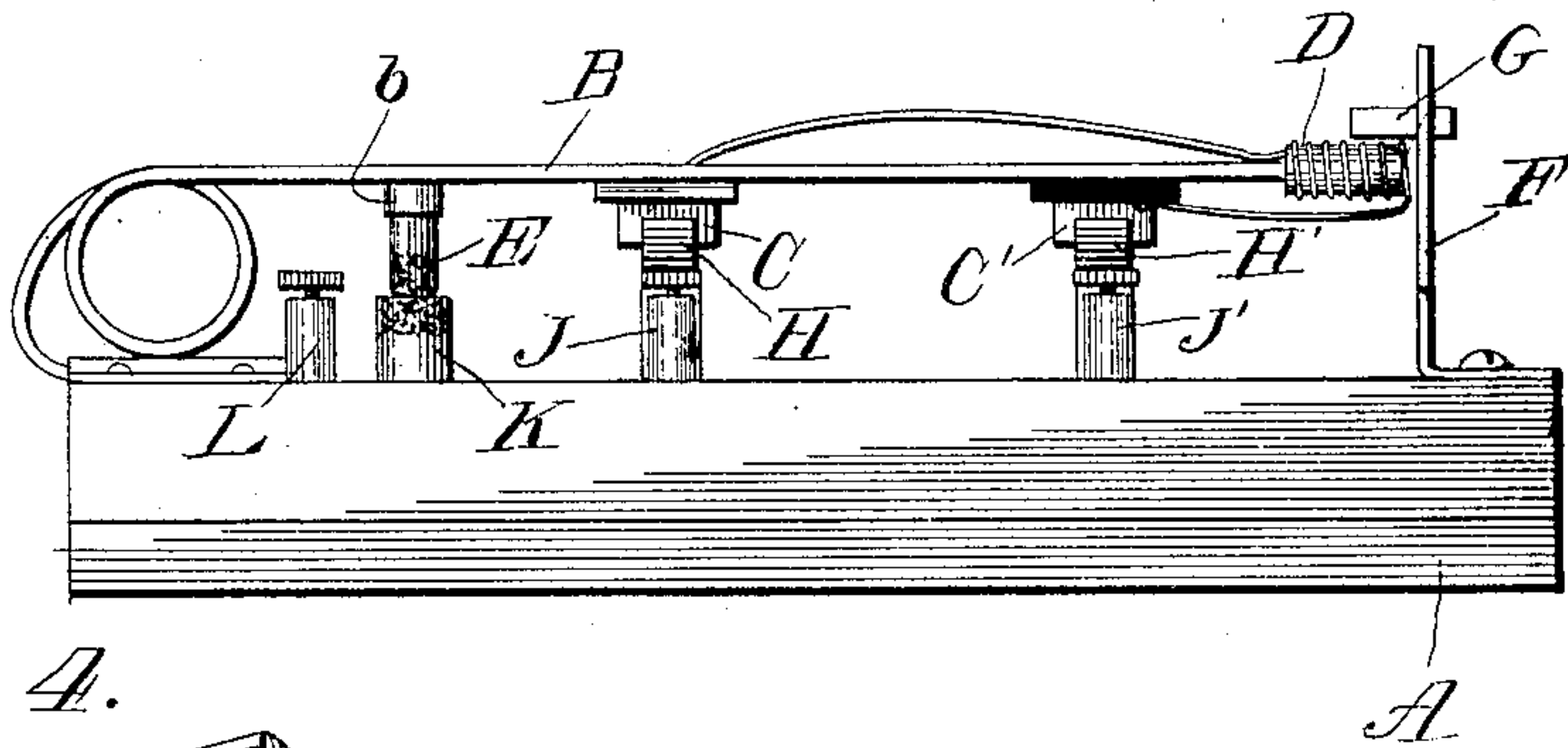


Fig. 4.

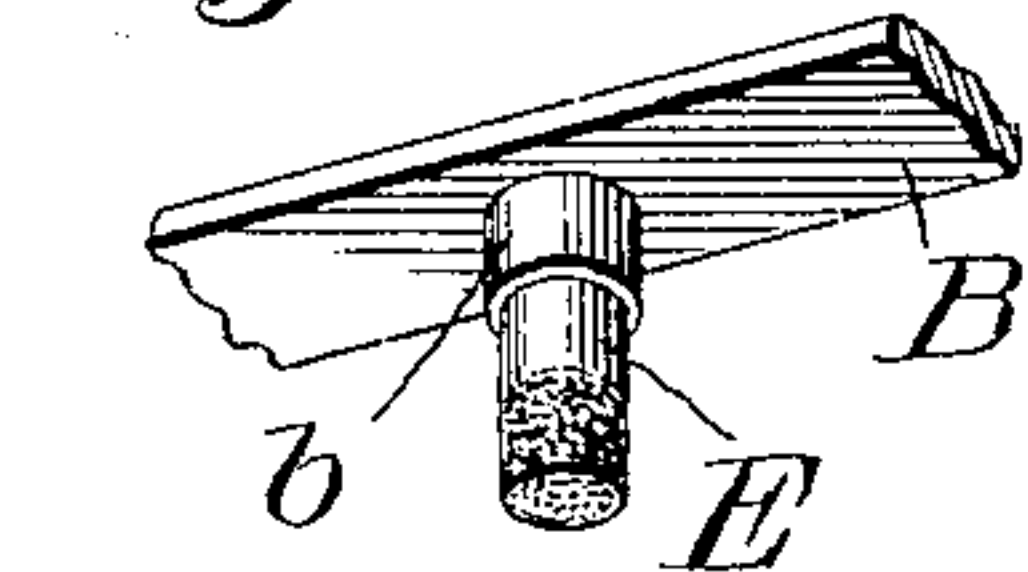


Fig. 2.

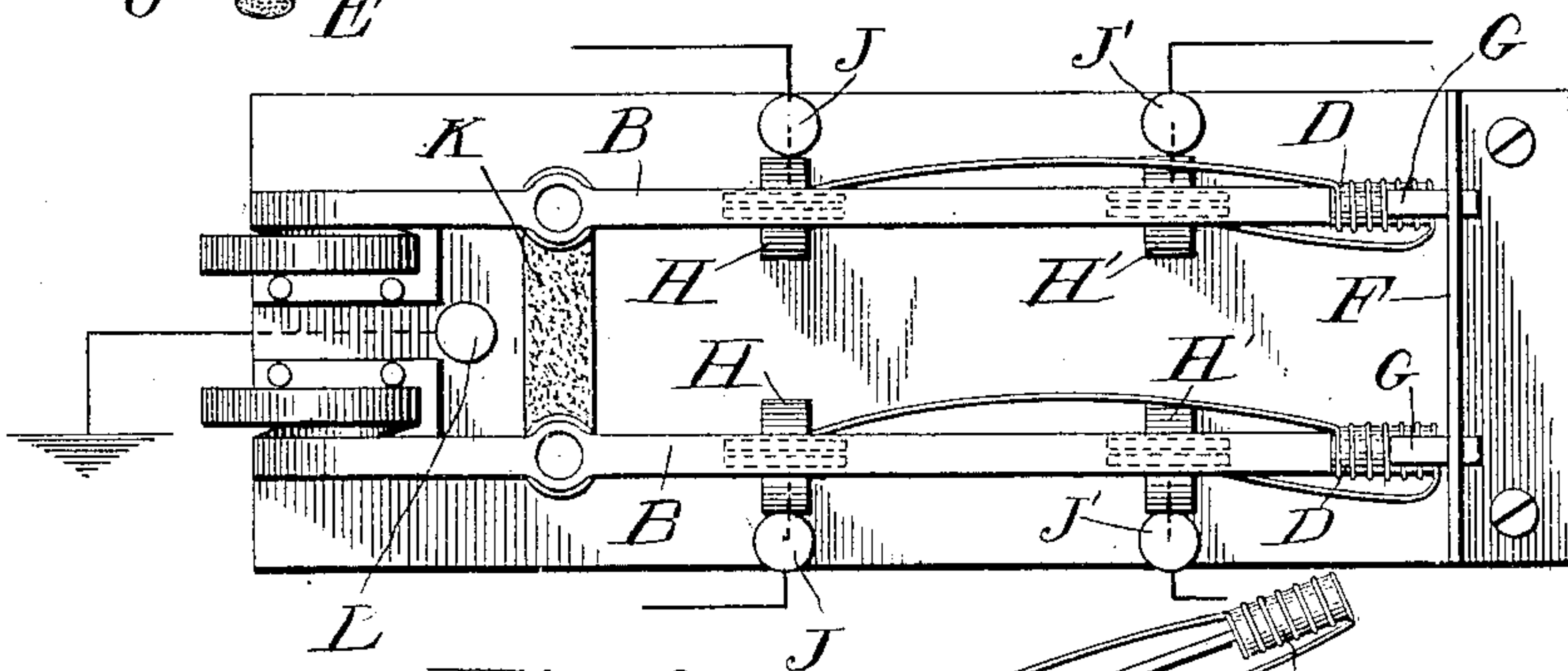
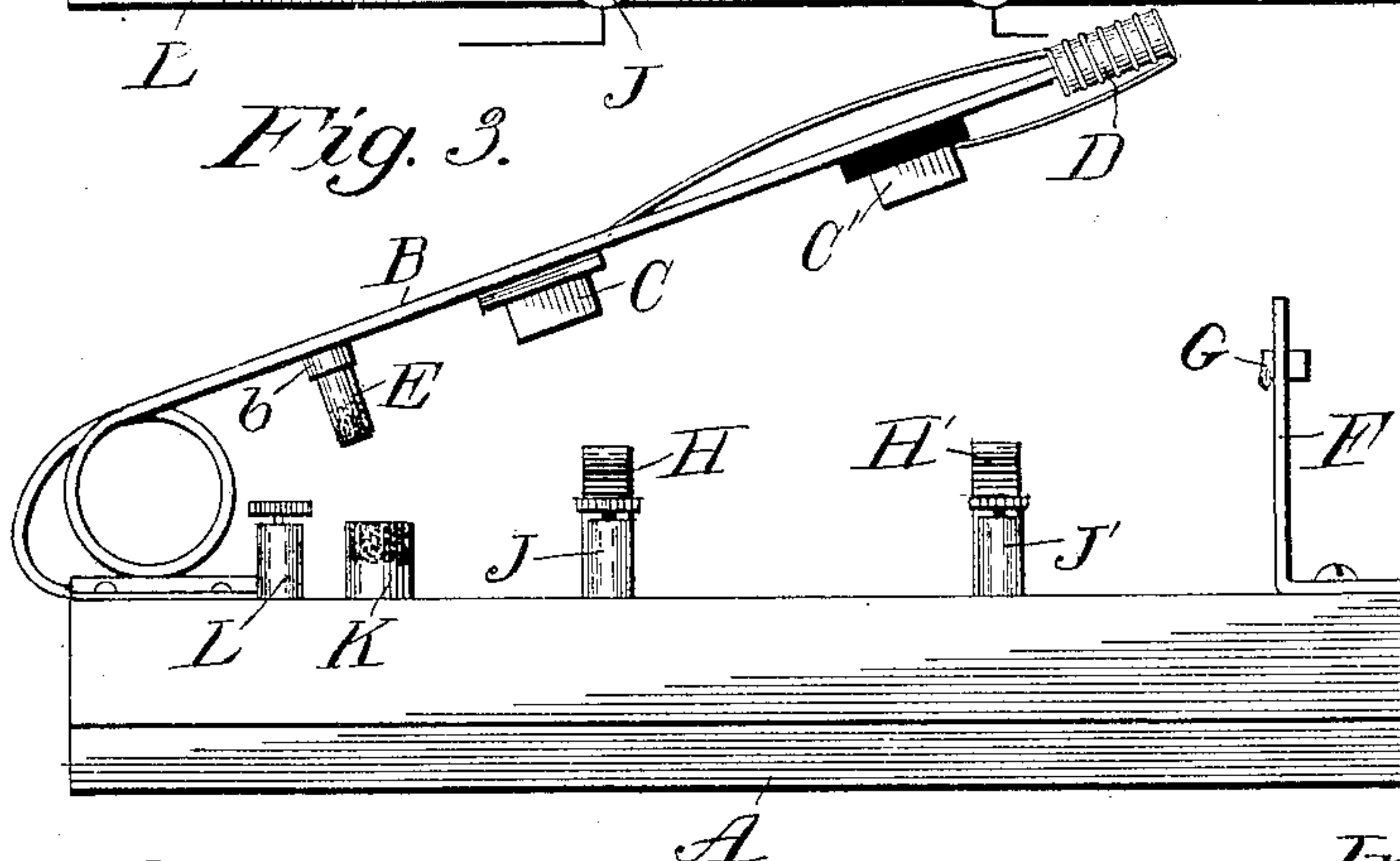


Fig. 3.



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# UNITED STATES PATENT OFFICE.

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## ELECTRICAL PROTECTOR.

SPECIFICATION forming part of Letters Patent No. 701,396, dated June 3, 1902.

Application filed August 1, 1900. Serial No. 25,541. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES A. ROLFE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electrical Protectors, (Case No. 3,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to devices for protecting fine wires and delicate instruments from damage by lightning, sneak-currents, and unduly strong currents, such as power and lighting currents. In instruments of this kind it is customary to have the circuit maintained normally in a closed condition by the instrument so long as current is small or the normal strength, but to have it opened automatically upon the intrusion upon the line of either a sneak-current or a strong and powerful current or lightning.

The principal object of my invention is to provide a simple, practical, and effective construction of protector of this kind having certain principles of novelty in operation as well as in construction.

To the attainment of the foregoing and other desired ends my invention consists in matters hereinafter set forth.

In the accompanying drawings, Figure 1 is an elevation of a circuit-protecting device embodying my present invention. Fig. 2 is a plan of the same. Fig. 3 is a side elevation of the same in an operated condition, and Fig. 4 is a view of a detail of construction.

In the device illustrated in the drawings I provide an insulating-base A, which can be of any suitable material, such as porcelain, slate, or the like. At the left hand of this base I secure a pair of strong springs B B, which extend from the left-hand end of the device longitudinally over the base A to nearly its right-hand end. These springs B B are made of conducting material, such as steel or brass, and are so constructed that they tend to fly upwardly, as shown in Fig. 3, and to maintain such an upwardly-sprung position. Each spring B carries a pair of contacts C C', suitably secured to its under side at some distance apart from one another. Each spring

also carries at its right-hand end a coil of fine wire D, whose ends are secured to the contacts C C'. The forward or right-hand contacts C' C' are insulated from the springs B B, so that each coil of wire D forms a part of the circuit. Each spring also carries a carbon pencil or block E, arranged between the contacts C C and the secured ends of the springs. The carbons E E, it will be seen, are electrically connected with the opposite sides of the line through springs B B by reason of the fact that the contacts C C on the latter are not insulated therefrom.

The insulating-base A is provided at its right-hand end with a transversely-extending wall or strut F, and this is provided with two sticks or masses G G of material which is normally hard under ordinary temperature, but which will fuse or melt or soften when heated above ordinary temperature—such material, for example, as wax. These sticks G G are arranged above the ends of the springs B B and hold the same normally in depressed or lowered positions. The base A is also provided with two pairs of spring-jaws H H', adapted to receive the contacts C C', respectively, on the springs B B. The contacts H H' are understood to be connected in the opposite sides of the circuit to be protected. To such end the base A is also provided with binding-posts J J J' J', the binding-posts J J being connected with the spring-jaws H H and adapted for connection with the line, and the binding-posts J' J' being connected with the spring-jaws H' H' and adapted for connection with the instrument. The base A is also provided with a carbon block or strip K, arranged in position below both of the carbons E E on the springs B B. This carbon K is understood to be connected to ground, as by the binding-post L and a suitable ground connection extending from said binding-post. The carbons E E and K have their adjacent and opposing portions coated with an adhesive and permanent insulation in accordance with the inventions of my copending applications, Serial No. 723,645, filed July 13, 1899, for lightning-arrester, and Serial No. 19,294, filed June 6, 1900, for electrical protector. This insulating material preferably consists of shellac and pow-



dered glass, the carbons being dipped into the shellac and then into powdered glass before the shellac has hardened, so that the glass sticks to it.

5 From the foregoing it will be seen that in its normal condition the device is in the position shown in Fig. 1—that is to say, both of the springs B B are held so that their contacts C C C' C' are engaged by the jaws H H  
10 H' H' by means of the ends of the springs being held down by the fusible or softenable sticks G G. In this condition both sides of the line are closed through the spring-jaws H H H' H', contacts C C C' C', and coils D D  
15 of fine wire. When an unduly strong current traverses the line, the coils B B, or one of them, becomes heated to such an extent as to soften or fuse one or both of the sticks G G. As a result one or both of the springs  
20 B B will instantly and automatically fly upwardly, and thereby withdraw its contacts C C' from the cooperating spring-jaws and open one or both sides of the circuit. Also in the normal condition of the instrument the carbons E E are so close to the ground-carbon  
25 K as to allow lightning to discharge between one or both of the former and the latter, and thereby relieve the line of lightning charges. When the instrument operates by the operation  
30 of either one or both of the springs B B, the corresponding carbon or carbons E E are withdrawn or separated from the ground-carbon K a sufficient distance to prevent further discharge of lightning between the same.  
35 This is well illustrated in Fig. 3. As a result the lightning - arrester is made inoperable upon the operation of the corresponding circuit-breaking device and damage to the line or to the ground connection or to the protective instrument by heavy lightning discharges  
40 is prevented.

As a matter of further and specific improvement the line-carbons are secured to the springs B B by having cup-shaped sockets  
45 stamped into the springs to receive the carbons. This makes perfect contact between the springs and carbons and is at the same time an exceedingly practical manner of making a tight joint for holding the carbons.

50 The device I have shown in the drawings and have particularly described hereinbefore is a practical and satisfactory embodiment of my invention; but I do not by any means consider that it is the only physical structure  
55 embodying the invention, and hence I do not wish to be considered as limiting myself in this patent to the exact structure shown and described.

By way of showing the broader features  
60 of the invention I may point out that the coil of wire D is a heat concentrating or producing or generating device and that it may of course be replaced by any other device having a similar function or property; also, that the  
65 block or mass G of wax or similar material is a heat-responsive device and may be similarly

replaced by any other device having the corresponding property of responsiveness to heat. I may further point out that these two devices—the heat-generating device and the  
70 heat-responsive device—are structurally distinct entities and normally separable devices in contradistinction to being comprised and involved in one and the same physical structure in such a way that they cannot be separated  
75 without impairing the integrity of that structure. Regarding this feature I may here remark that by thus making these heat-generating and heat-responsive devices structurally distinct or separate from one another  
80 I am enabled to make each one by itself, and so am not hindered and inconvenienced by having to make a single composite structure embodying both devices. Furthermore, when  
85 the heat-responsive device is operated in a structure embodying this my present invention only that device need be replaced. The heat producing or generating device remains unimpaired and uninjured. Hence the cost  
90 of repairing the device after operation is the smallest possible. I may further point out regarding the broad features of my invention that the springs B B are power devices and are of course capable of replacement by any  
95 other style of spring or any other style of power device. I may further state that the contacts C C', cooperating with the jaws H H', comprise or form means controlling the circuit, and of course other means of this kind  
100 can be substituted for them.

From the foregoing it will be seen that my invention is capable of embodiment in structures having very diversified constructions both in matters just mentioned and any others  
105 not particularly specified. It will also be seen that in the structure shown and particularly described certain modifications can readily be made without departing from the invention.

What I claim as my invention is— 110

1. The combination with structurally-separate heat-generating and heat-responsive devices of a power device upon which the heat-generating device is mounted and the means  
115 for controlling the circuit operable by the power device, substantially as set forth.

2. The combination with structurally-separate heat-generating and heat-responsive devices of a power device upon which the heat-generating device is mounted and means for  
120 opening the circuit upon the generation of heat in the heat-generating device sufficient to operate the heat-responsive device, substantially as described.

3. The combination with a base of a spring  
125 secured thereto and having an arm adapted to swing upwardly, a heat-generating device mounted upon the end of said spring, a support arranged at the end of the spring and provided with a heat-responsive device adapted  
130 to cooperate with the heat-generating device and positioned over the spring so as to



hold the same against the upward movement, and circuit-controlling means operable by the spring upon its release, substantially as described.

5 4. The combination with a base of a spring secured thereto and having an arm adapted to swing upwardly, a heat-generating device mounted upon the end of said spring, a support arranged at the end of the spring and  
10 provided with a heat-responsive device adapted to cooperate with the heat-generating device and positioned over the spring so as to hold the same against the upward movement, and means for breaking the circuit operable  
15 by the spring upon its release, substantially as described.

5 5. The combination of a base, a spring secured to the base and having an arm adapted to swing upwardly, a coil of fine wire mounted  
20 upon the end of said spring-arm, a support secured to the base and provided with a mass of heat-responsive material which is arranged above the coil of fine wire so that the generation of heat in the latter will soften or melt  
25 the mass of heat-responsive material, and means for controlling the circuit upon the release of the spring.

6. The combination of a base, a spring secured to the base and having an arm adapted  
30 to swing upwardly, a coil of fine wire mounted upon the end of said spring-arm, a support secured to the base and provided with a mass of heat-responsive material which is arranged above the coil of fine wire so that the genera-  
35 tion of heat in the latter will soften or melt the mass of heat-responsive material, and means for opening the circuit upon the release of the spring.

7. The combination of a spring provided  
40 with contacts and also provided with a coil of fine wire connected with said contacts; contact-jaws cooperating with said contacts; and a heat-responsive device arranged to hold the spring in the position in which its contacts  
45 engage the contact-jaws, and associated with the coil of fine wire on the spring so that the generation of heat in the latter operates the heat-responsive device and allows the same to release the spring.

50 8. The combination of a spring carrying a contact; a contact-jaw cooperating with said contact; a heat-generating device; and a heat-responsive device cooperating to hold the spring in the position in which its contact en-  
55 gages the contact-jaw, and to release the

same upon the generation of heat in the heat-generating device.

9. The combination of a spring carrying a pair of contacts, and having a coil of wire arranged at its free end; contact-jaws cooperating 60 with the contacts carried by the spring; a stick or block of fusible or softenable material held in position to engage the coil of wire at the end of the spring, and to release the spring upon generation of heat in said 65 coil.

10. The combination of a pair of cooperating electrodes; a spring upon which one of said electrodes is mounted; means whereby the spring is held in position to maintain its 70 electrode normally separated from but in close proximity to the other electrode; and means for releasing the spring so as to allow it to operate and separate its electrode widely from the other electrode. 75

11. The combination of a pair of electrodes, a spring upon which one of said electrodes is mounted; a circuit-breaking device arranged to maintain the circuit normally closed and to open the same upon the passage therein 80 of an unduly strong current, the said circuit-breaking device being also arranged to hold the spring normally in position to maintain the electrode thereon normally away from but in close proximity to the other electrode, and 85 to separate the same widely upon its operation to break the circuit.

12. The combination of a spring carrying a pair of contacts, one of which is insulated from the spring, and the other of which is 90 connected electrically therewith; a heat generating or concentrating coil of wire carried at the end of the spring and connected with said contacts; a carbon electrode also carried by the spring; a ground electrode cooperating 95 with the carbon on the spring; a stick or mass of fusible or softenable material engaging the coil of wire on the spring so as to hold the same in a lowered condition normally, but to release the same upon the passage in 100 the coil of an unduly strong current; and a support for said stick or mass of fusible or softenable material.

In witness whereof I hereunto subscribe my name this 26th day of July, A. D. 1900.

CHARLES A. ROLFE.

Witnesses:

A. MILLER BELFIELD,  
HARVEY L. HANSON.