

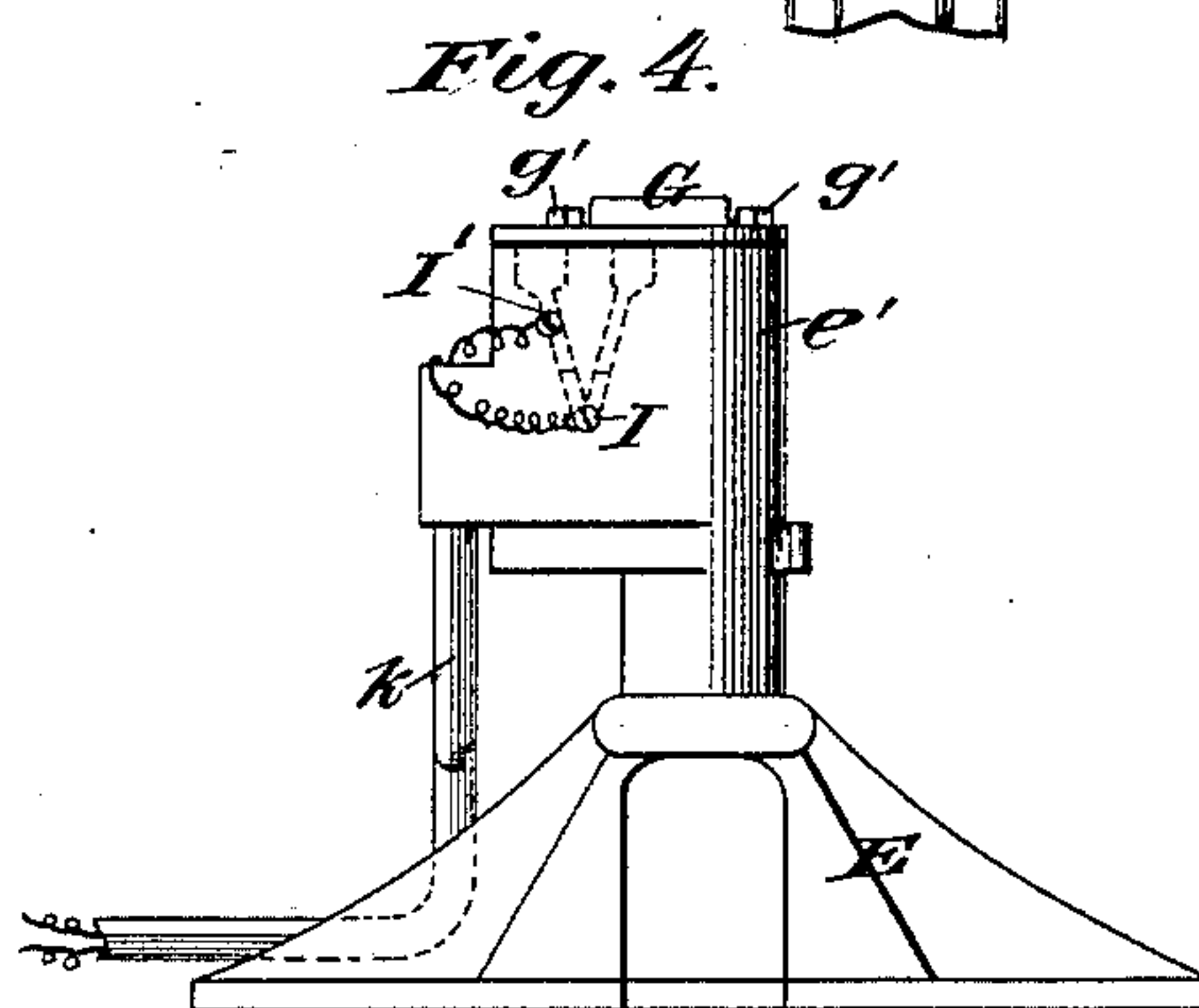
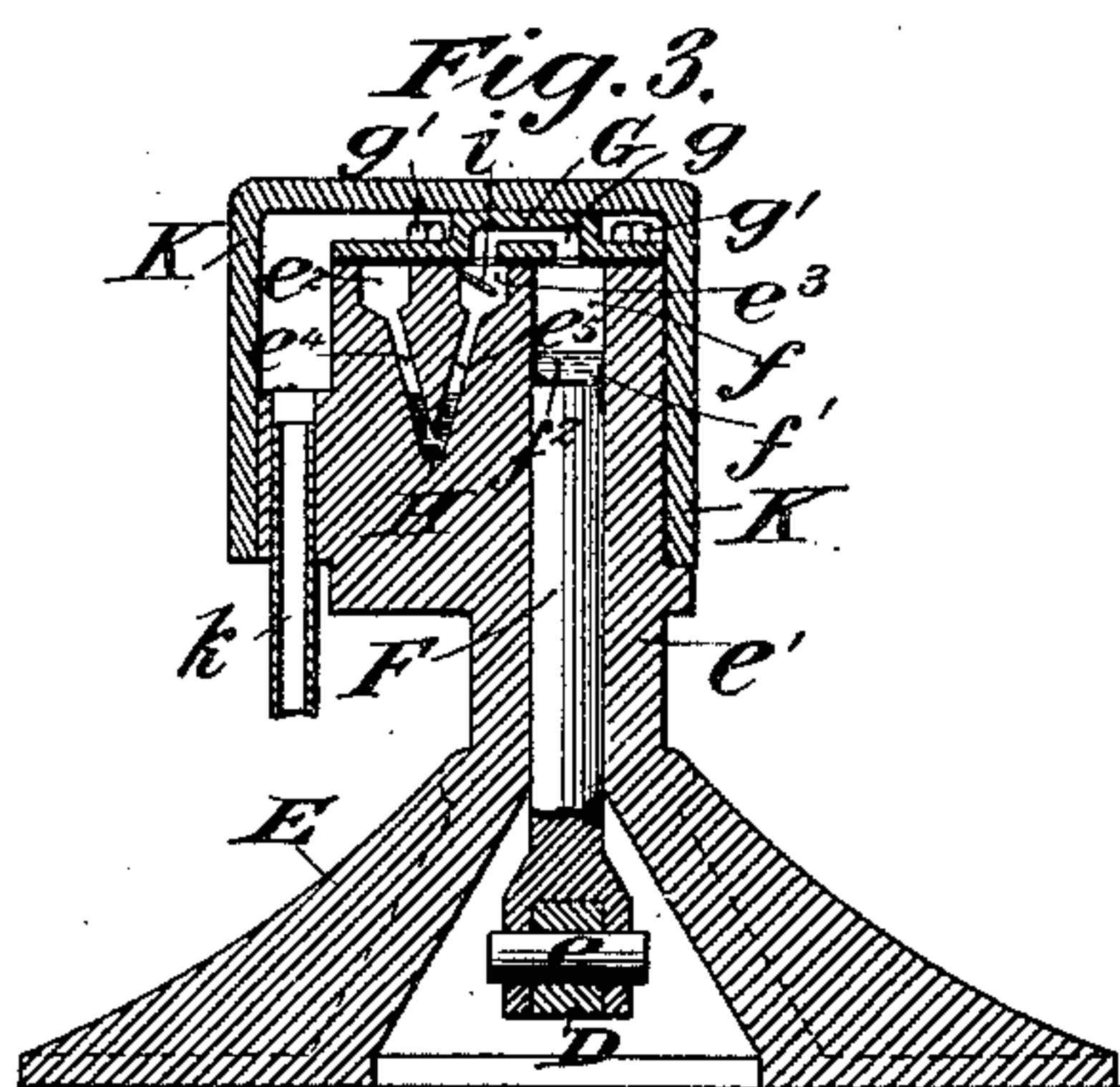
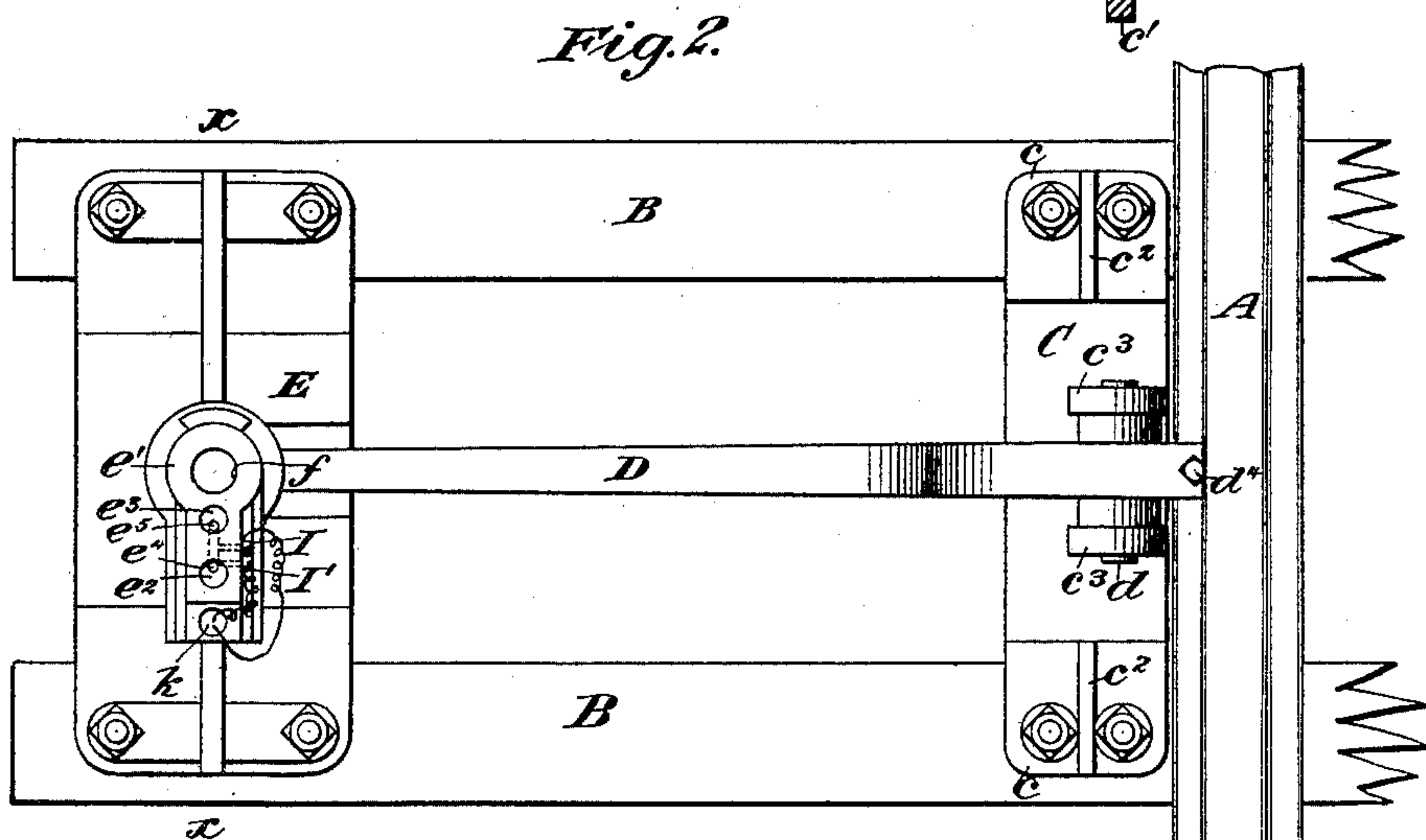
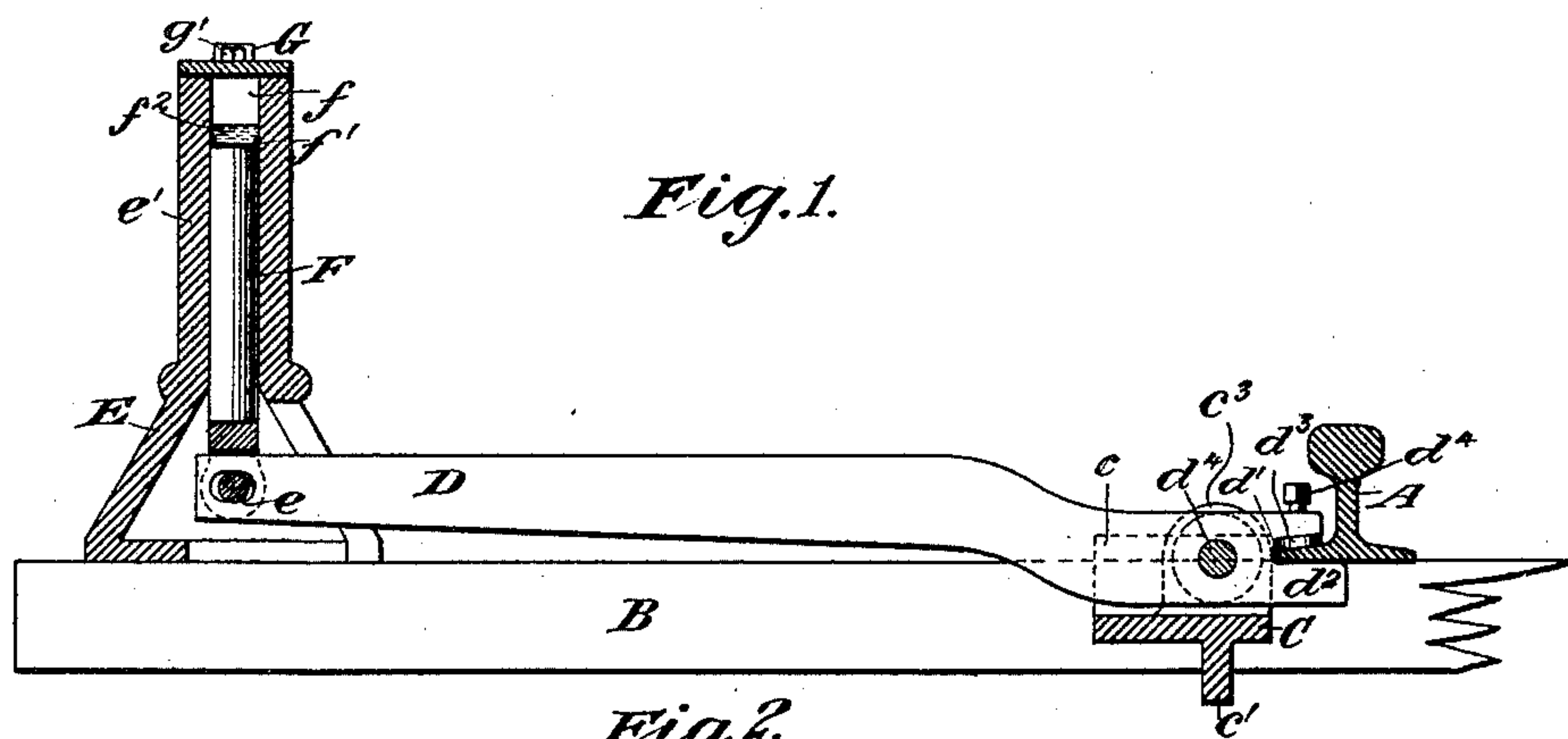
(No Model.)

T. H. PATENALL.

# ELECTRIC CIRCUIT CLOSING AND BREAKING DEVICE FOR RAILWAY TRACKS.

No. 462,850.

Patented Nov. 10, 1891.



Witnesses:-  
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# UNITED STATES PATENT OFFICE.

THOMAS H. PATENALL, OF RAHWAY, NEW JERSEY.

ELECTRIC CIRCUIT CLOSING AND BREAKING DEVICE FOR RAILWAY-TRACKS.

SPECIFICATION forming part of Letters Patent No. 462,850, dated November 10, 1891.

Application filed February 20, 1891. Serial No. 382,207. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS H. PATENALL, of Rahway, in the county of Union and State of New Jersey, have invented a new and useful Improvement in Electric Circuit Closing and Breaking Devices for Railway-Tracks, of which the following is a specification.

My invention relates to an improvement in circuit closing and breaking devices for railway-tracks, in which the depression of the rail under the impulse of a passing train serves to change the position of a fluent electric conductor, so as to establish or break an electric circuit for sounding an alarm, setting a visible signal, &c. Where a fluent conductor is employed—such, for example, as mercury—it is of great importance that it should be wholly inclosed against liability of evaporation, and that it should be so disposed as to render its expansion and contraction under the influence of heat and cold insufficient to unintentionally sound the alarm or set the signal.

The object of my present invention is to provide means for accomplishing the above-described ends and to furnish a simple and effective device which shall be extremely sensitive to the vibrations of the rail and which will not be liable to get out of order.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a view of the device in side elevation, partly in section. Fig. 2 is a top plan view with the cap or guard removed. Fig. 3 is a view in transverse section through line  $x x$  of Fig. 2, showing the cap or guard in position; and Fig. 4 is a view in end elevation with the cap or guard removed.

A represents one of the rails of a railway-track supported upon cross-ties B, as is usual. In the present instance the ties B are shown as extended to a considerable distance beyond the track to form a support for the circuit closing and breaking device.

In proximity to the outer edge of the rail A there is located a base-plate C, extending between two adjacent ties B, and provided at its ends with flanges  $c$ , through which it is bolted to the ties. In practice I prefer to make the body of the plate C lower than the tops of the ties and to provide it with a lon-

gitudinal strengthening-rib  $c'$  to give it the necessary stiffness without an unnecessary weight of metal. I also provide the flanges  $c$  with strengthening-ribs  $c^2$ . The body portion of the plate C is provided with a pair of upwardly-extending ears  $c^3$ , between which a lever D is pivotally secured—as, for example, by a pivotal bolt  $d$ . The short end of the lever D, or that toward the track A, is provided with a slot  $d'$ , adapted to receive the flange at the base of the track A, as clearly shown in Fig. 1. I prefer to extend the lower jaw  $d^2$  of the said short end of the lever under the rail to a point near its center, and to make the opening  $d'$  sufficiently wide to leave room for inserting therein above the flange of the rail a seat-piece  $d^3$ , and to provide for the seating of the piece  $d^3$  firmly on the flange of the rail by a set-screw  $d^4$ , extending through the upper jaw of the short end of the lever and bearing against the said seat-piece. By this means I am enabled to form a close contact between the lever and the rail, and if the seat-piece  $d^3$  be of some slightly-yielding material there will be little or no liability of the joint between the rail and the lever working loose under the repeated jar of the passing wheels.

The long arm of the lever D extends outwardly to a pedestal E, which supports the fluent circuit-closing material and a plunger for operating it, as follows: The pedestal E is provided with a hollow base, within which the end of the lever D extends, and is there coupled to the lower end of a plunger F by means of a loose joint  $e$ , formed, for example, by bifurcating the lower end of the plunger F and pivoting the end of the lever between the branches of the bifurcated end of the plunger, leaving a sufficient amount of play to accommodate the slightly-curved path in which the end of the lever D works. The plunger F is fitted with care to the vertical bore  $f$  in the barrel  $e'$ , which rests upon or is formed integral with the pedestal E. The bore  $f$  extends through to the top of the barrel  $e'$ , and at a short distance from the upper end of the bore the said barrel is provided with a pair of sockets or chambers  $e^2 e^3$ , spaced a short distance from each other and provided at their lower ends with channels  $e^4 e^5$ , which gradually approach each other as they extend



downwardly and finally unite, so as to form a communication between the sockets  $e^2$  and  $e^3$ . A head-plate G is provided with a channel  $g$  in its under face, one end of which is in position to communicate with the bore  $f$  and the other end of which is in position to communicate with the socket or chamber  $e^3$  when the head-plate is in position. It is intended that the head-plate G shall be firmly fixed to the top of the barrel  $e'$ —as, for example, by screws  $g'$ —and that there shall be a suitable packing interposed between the head-plate and the valve, if found necessary, so as to make an air-tight connection, effectually closing all communication between the sockets or chambers  $e^2$  and  $e^3$  and the bore  $f$ , excepting through the channels  $e^4$   $e^5$  and  $g$ .

To effectually seal the joint between the plunger F and the bore  $f$ , and to provide for an easy movement of the plunger, I find it desirable to fix a feather-edge washer  $f'$  to the end of the plunger and to keep a supply  $f^2$  of some suitable lubricant on the washer within the bore  $f$ . The introduction of the washer and the lubricant is, however, not absolutely necessary to the successful operation of the device, as the joint between the plunger and the bore may be made substantially air-tight.

Within the channels  $e^4$  and  $e^5$  I locate a small amount of mercury H, which fills the cavity formed by the meeting of the two branches and extends for a short distance up each of the branches, as clearly shown in Fig. 3.

Where an open circuit is employed and the object is to close the circuit by the depression of the rail, I locate one of the points of contact I in contact with the mercury at the lower ends of the two branches  $e^4$  and  $e^5$  and the other contact-point I' in position to engage the mercury when it shall have been forced out of its normal position up the branch  $e^4$ . It is obvious that if a closed circuit were employed and the purpose of the depression of the rail were to break the circuit the two contact-points might be located in contact with the mercury when in its normal position, and so that when thrown out of its normal position it would expose one of such contact-points.

Over the upper end of the channel  $e^5$ , within the socket or chamber  $e^3$ , I locate a shield  $i$ , the purpose of which is to prevent the mercury under the impulse of the compressed air in the socket or chamber  $e^2$  from flying suddenly upwardly into the channel  $g$  as the rail A assumes its normal position.

The operation is as follows: As the train depresses the rail A and with it the short end of the lever D, the long end of said lever will lift the plunger F, and will thereby compress the air within the upper portion of the bore  $f$ , and such compressed air will act through the channel  $g$ , socket  $e^3$ , and channel  $e^5$  upon the mercury in said last-named branch-channel and cause it to rise in the opposite channel into engagement with the contact-point I',

and thereby close circuit. As soon as the rail A returns to its normal position the mercury will again assume its normal position in the two branches  $e^4$  and  $e^5$  and the circuit will thereby become broken. As the mercury is confined within a space wholly shut out from the external air, there will be no liability of its evaporation, nor will there be any possibility of access thereto of dust or dirt or any foreign substance. Furthermore, because of the small quantity of mercury employed in the cavity at the juncture of the two branches, the effect of heat to expand the mercury will cause it to rise a comparatively short distance, so that the contact-point I' may be located within such convenient proximity to the surface of the mercury as to render it necessary to force it but a short distance to establish the circuit, and at the same time prevent unintentional closing of the circuit by the effects of heat.

The device is extremely simple, composed of few parts, and these so arranged as to render their wear very slight, and thus the device is capable of standing for a long time in perfect working order without attention.

In order to guard against any disturbance of the head-plate G or of the wires which lead from the contact-points I I', I provide a cap or guard K, which fits down over the top of the barrel, as shown in Fig. 3, and I also provide a pipe  $k$  for conducting the wires from the space within the cap or guard K downwardly to the bottom of the pedestal E and away to the point at which the electric energy is to be applied.

What I claim is—

1. The combination, with a reciprocating plunger under the control of a railway-rail, of a receptacle for a fluent electric conductor, said receptacle having separated branches, one of which is in communication with an air-chamber at the end of the plunger through an inclosed channel, and contact-points located in position to engage the fluent conductor, substantially as set forth.

2. The combination, with an air-chamber, a reciprocating plunger adapted to compress the air within the chamber, and a lever adapted to connect the plunger with a railway-rail, of a receptacle for a fluent electric conductor having separate branches extending upwardly therefrom, one of the branches being in communication with the said air-chamber and both branches, together with the receptacle, being closed against communication with the outside air, and contact-points located in position to engage the fluent conductor, substantially as set forth.

3. The combination, with a receptacle for a fluent electrical conductor, comprising channels extending downwardly toward one another and merging into one at the bottom, and contact-points exposed at intervals within the channels, of an air-chamber in communication with one of the channels, a closure for the channels and one end of the air-chamber,



a reciprocating plunger closing the other end of the air-chamber, and means for connecting the plunger with the rail, substantially as set forth.

- 5 4. The combination, with a receptacle for a fluent electrical conductor, comprising sockets or chambers having at their lower ends branches which converge and merge into one, and contact-points located at intervals within  
10 the branches, of an air-chamber, a head-piece forming a closure for the sockets or chambers and air-chamber and provided with a channel forming a communication between the air-chamber and one of the sockets or cham-  
15 bers, a shield extending partially across one of the sockets or chambers, a reciprocating

plunger forming a closure for the other end of the air-chamber, and means for connecting the plunger with a railway-rail, substantially as set forth.

- 20 5. The combination, with the operating-lever and its support, the end of the lever toward the rail being provided with a recess for the reception of the flange of a railway-rail, of an adjustable seat-piece located with-  
25 in the recess and means for forcing the seat-piece toward the flange of the rail, substantially as set forth.

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Witnesses:

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