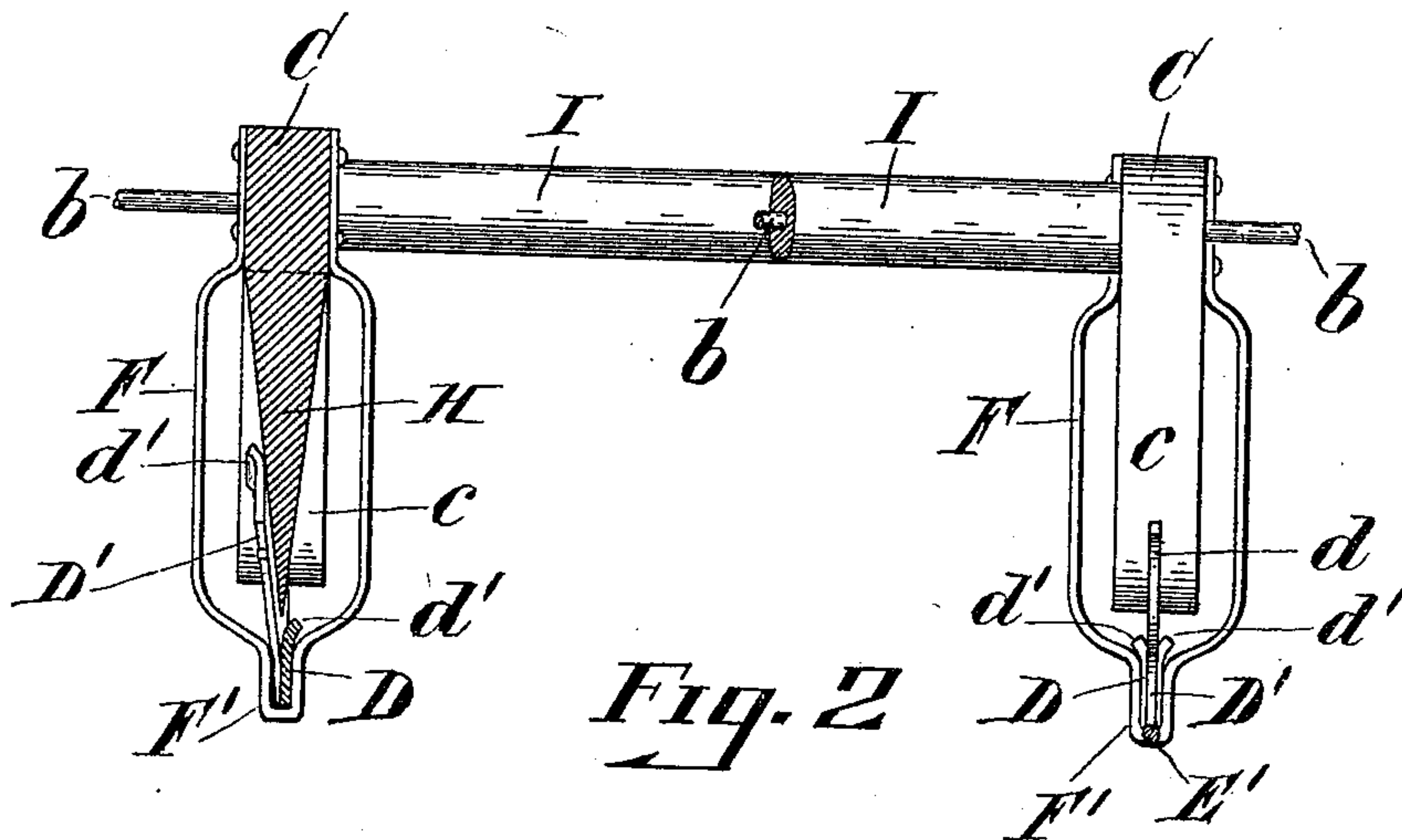
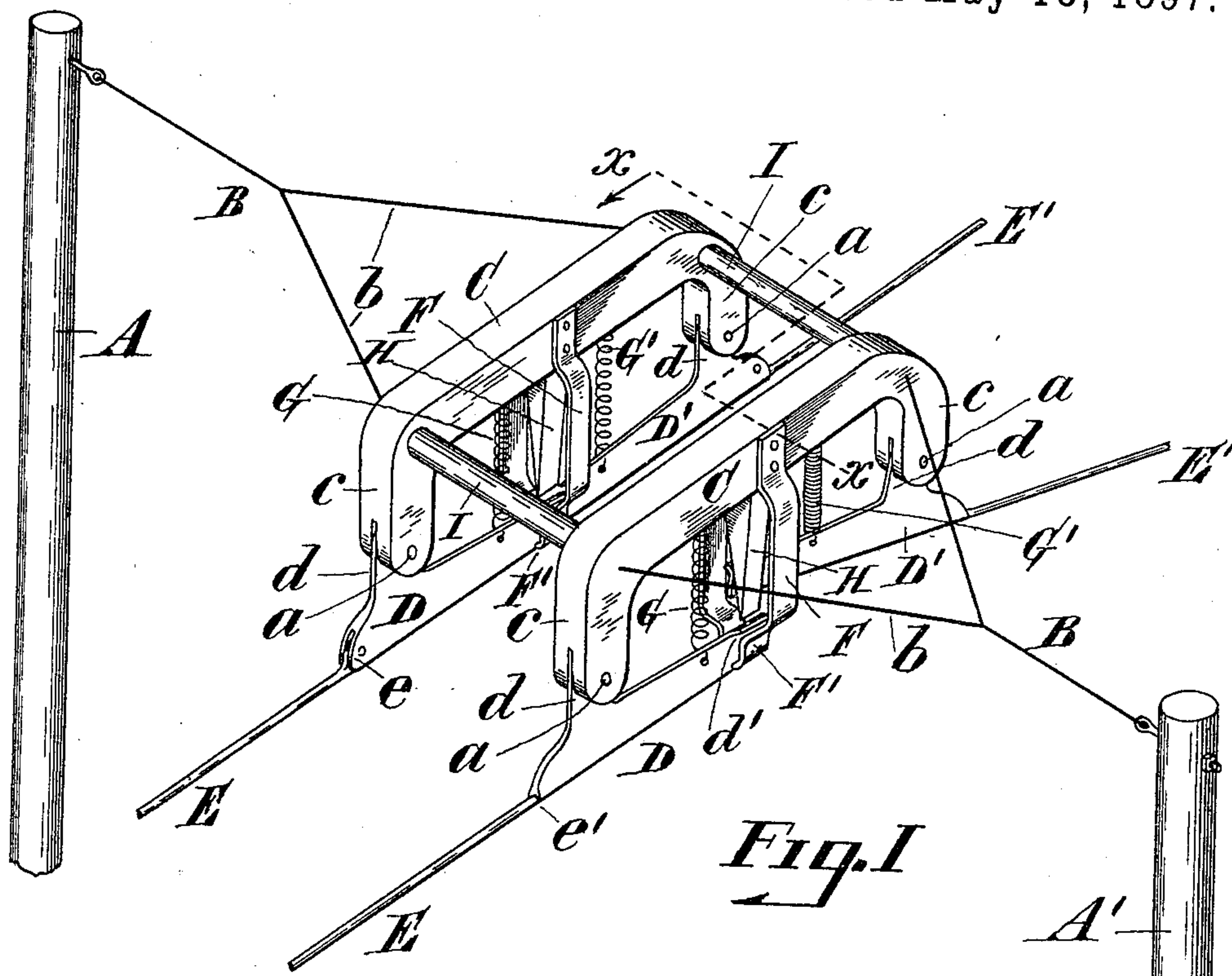


(No Model)

C. HOFF.
CIRCUIT BREAKER FOR TROLLEY WIRES.

No. 582,862.

Patented May 18, 1897.



WITNESSES

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INVENTOR

Charles Hoff,
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UNITED STATES PATENT OFFICE.

CHARLES HOFF, OF CINCINNATI, OHIO, ASSIGNOR OF ONE-HALF TO
FRIEDERICH HOFMANN, OF SAME PLACE.

CIRCUIT-BREAKER FOR TROLLEY-WIRES.

SPECIFICATION forming part of Letters Patent No. 582,862, dated May 18, 1897.

Application filed January 22, 1897. Serial No. 620,236. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HOFF, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Circuit-Breakers for Trolley and other Electric Wires, of which the following is a specification.

My invention relates to overhead trolley-wire attachments, or, more especially speaking, to a safety circuit-breaker connection whose object is to operate automatically when the wire becomes severed or broken and to instantly relieve the parted ends from the presence of any electric current, which would otherwise prove inconvenient to handle and dangerous and deadly to living creatures, and cause more or less loss by fire and in numerous other ways; and my invention consists in the novel features hereinafter fully described, and particularly pointed out in the claim.

In the accompanying drawings, Figure 1 is a perspective view of my invention, showing it applied in several forms to adjoining parallel wires, which latter constitute a metallic trolley-circuit, the same being duly mounted on a span-wire secured at its opposite ends to the tops of the customary poles. In this view the poles are shown broken off, and so, also, are the trolley-wires. My device is also shown double to accommodate both trolley-wires, one side or device being shown in operation, or as it appears when the wire to the right has parted, thus breaking the circuit in the parted portion of said wire; and Fig. 2 is a transverse section, on a larger scale, taken on the line *xx* of Fig. 1 in the direction of the arrow, but omitting the poles and showing the span-wire broken off at either side the circuit-breaker device.

A A' represent a pair of upright trolley-wire-supporting poles, and B the span-wire, secured in any desirable manner at either end to said poles. The poles are of any suitable construction and the span-wire is made with a loop *b* intermediate its ends. In this loop *b* my circuit-breaker and trolley-wire-supporting device is mounted, which device I shall now proceed to describe.

C represents a horizontal bar having down-

wardly-turned ends *c c*, the latter being duly slitted or forked and the whole preferably made integral and of vulcanized fiber or other suitable non-conducting or insulating material. At either end the bar C in the angles where it turns downward the double or loop portion *b* of the span-wire is passed for the proper support of said bar.

D D' represent a pair of levers or plates each having an upright arm *d* projecting from its upper edge near one end thereof, said arm freely engaging the slitted lower ends *c* of the bar C and pivotally connected thereto by means of pins *a*. Bar C *c c* and the levers D D' practically take the place of the customary span-wire hanger, and are arranged at the usual distances or intervals apart customary in stringing overhead trolley-lines. The ends E and E' of the trolley-wire to be supported have, preferably, a hinged or pivotal connection *e* with the outer ends of the levers D and D', respectively, the purpose for which will be made more fully apparent in the description hereinafter, but the connections may be made rigid, as seen at *e'*. (Both forms are clearly shown in Fig. 1.)

F represents an open frame whose upper ends embrace the middle of bar C and are firmly secured thereto and whose lower portion is contracted into a seat or socket F' for the accommodation of the inner ends of both levers D and D', which lap each other and lie contiguous therein, and contiguous, too, to the inner faces of said contracted socket end F', so that the current may not be interrupted nor any arcing or undue resistance be maintained at that contact-point.

G and G' represent coil-springs stretched between the circuit making and breaking levers or plates D and D', respectively, and the bar C, the stretching or expansive action thereof taking place when the said levers are in operative contact within the socket F', and the lax condition thereof being assumed when the wire has parted and the contact-lever D' raised from the said socket, as seen in Fig. 1.

H represents a wedge-shaped arm projecting downwardly from the center of the bar C and preferably formed integral therewith and of the same non-conducting material. Its sharp edge or point is directly above the line

between the two inner contact ends of levers D and D', and said contact ends are preferably provided with outwardly-flaring lips *d'*, which guide and facilitate the upward movement thereof along the surface of the non-conducting wedge, the latter preventing any wobbling of the said contact ends against the vertical side bars of the open frame F, which will ordinarily be made of sheet metal comprising a conductor of electricity, and which would otherwise complete circuit between the two contact-levers.

I have shown in the several views a pair of my hanger devices for use on a double-trolley line or metallic circuit, both devices being alike except for the difference in the wire connections at the outer ends of the contact-levers, which have hereinbefore been referred to. The pair of devices is connected together by means of cross-bars or tubes II, made of non-conducting material, and through which the loop portions of the span-wire pass, as more distinctly shown in Fig. 2. It is obvious that one or a pair of my devices may be used with equal facility to suit either a single-trolley ground-circuit or a double-trolley or metallic circuit.

In the operation of my device (which, it will be seen, is automatic) the breaking or parting of a wire between hangers instantly causes the contact-lever D', as seen in Fig. 1, to freely swing on its pivot and break contact with the companion lever D, which latter remains intact in socket F'. The same parting also causes the contact-lever D in the next hanger to swing from contact with its companion lever D', which latter remains intact in its socket F'. The circuit-breaking action is instantaneous, and the broken wire becomes absolutely "dead" at once, owing to both the gravity or weight of the falling severed wire, and also the retractile action of the springs G' and G of the said respective levers D' and D. The hinge-joint connections *e* now come into play when it is desired to handle the severed ends and make due repairs or to move the severed portions to one side till repairs can be made. The flexible connections thus provided permit the said parted wires to be freely handled without materially altering the upward released position of the contact-levers against their respective wedges, or, in fact, moving them at all, the strength of the said springs also aiding materially to keep the released levers up from circuit-contact. In the rigid connections *e'* the handling of the wire is apt to cause the contact inner ends of the released levers to lower or descend away from their wedges into engagement with the companion unreleased levers or against the side bars of frame F, which would complete the circuit and give the broken ends dangerous electric life that it is my object to avoid in the employment of my invention herein.

It is obvious that as soon as a wire becomes parted all electric life between the hangers

at either side the break becomes instantly extinct and the parted ends may be handled with impunity without danger of any shock or injury whatever, and repairs in reuniting the ends and the like are facilitated, especially with the hinge connection form seen at *e* in Fig. 1. It will be seen, too, that the hinged contact-levers D and D' practically form automatic switches or cut-outs for the wires.

While my device renders perfect safety to both human beings and animals passing or standing beneath the lines, it also saves much loss to current itself in the instantaneous breaking of the circuit in the severed hanging portions of the wire, and also prevents any deleterious effects otherwise to the machinery, either in the generating-station or on the cars themselves. The tension of the wires, when intact in operating position, serves to hold the inner ends of the levers in intimate contact within the socket F'.

The device is also of invaluable use on other lines than trolley-wires where high currents are used—such, for instance, as electric light and power, fire-alarm, and general signal service. It is also efficacious where there may be imperfect wires, defective or bad insulation, owing largely to long or hard use, all of which are well protected against for the benefit of both life and the economical use of the current and machinery and ready repair of the severed lines. It is obvious, too, that the auxiliary springs G G' could be dispensed with, but not conveniently, as they insure the positive parting or separation of the contact-levers when the wire breaks and augment or expedite the separation, so as to break the circuit immediately or instantly and before the parted ends of the wire can touch any objects below.

I claim—

A safety circuit-breaker device or hanger for trolley and other electric wires, composed of a suitable main bar or frame having downwardly-turned forked ends; a pair of contact levers or plates swung in said forked ends toward each other and having their inner flared ends lying normally contiguous and completing circuit within an open socket-frame hung from said main bar or frame; a pair of auxiliary coil-springs stretched between the said bar and the inner ends of the contact-levers; and a pendent wedge or guide at the center of the main bar or frame; the said wire being suitably attached or connected to the respective outer, projecting ends of the contact-levers, and the whole supported, constructed, and adapted to operate automatically, substantially as and for the purpose specified.

In testimony of which invention I have hereunto set my hand.

CHARLES HOFF.

Witnesses:

JOHN E. JONES.

FRED. HOFMANN.