

(No Model.)

2 Sheets—Sheet 1.

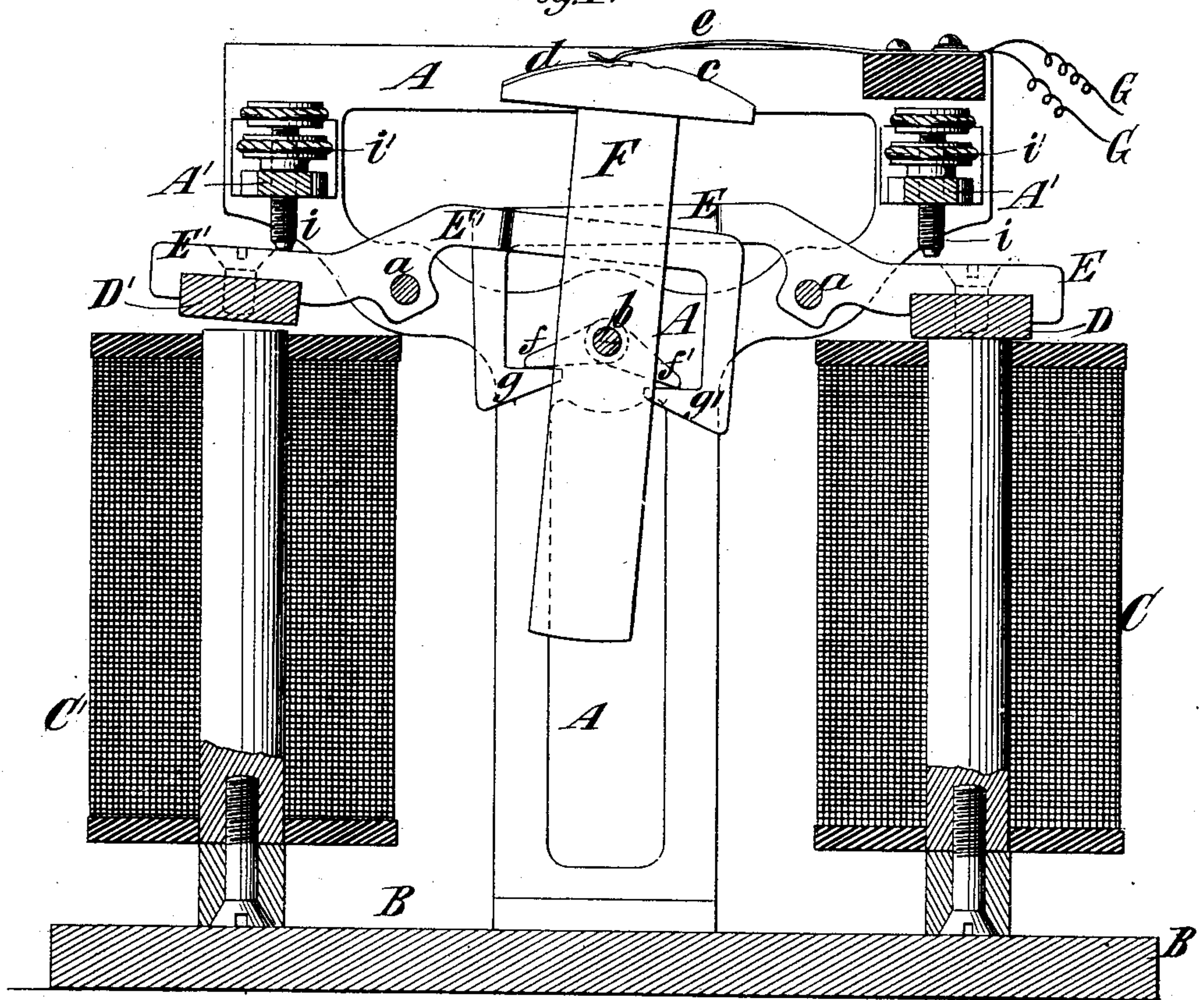
C. L. BRUNS.

# ELECTRIC CIRCUIT BREAKER.

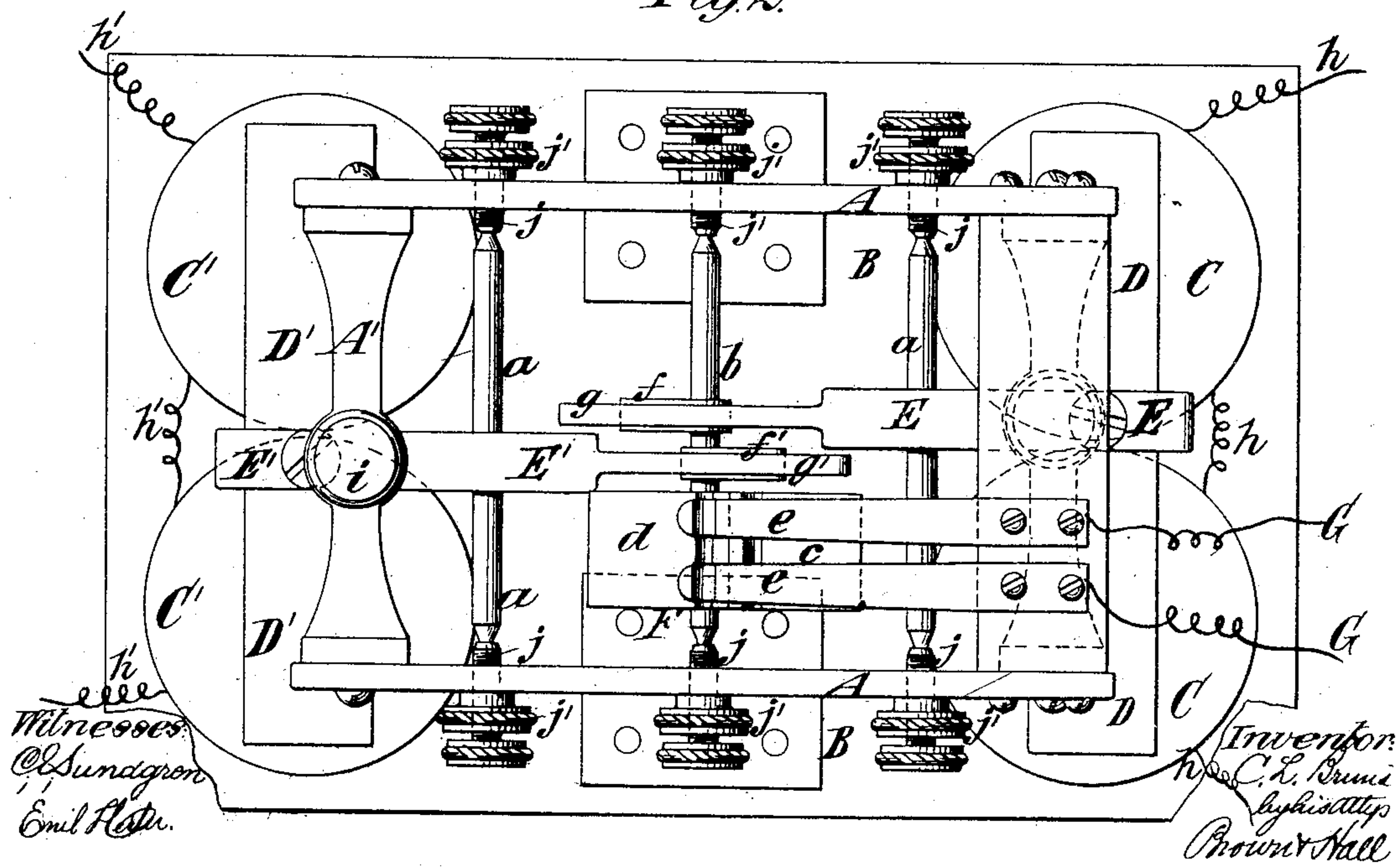
No. 329,808.

Patented Nov. 3, 1885.

*Fig.1.*



*Fig.2.*



(No Model.)

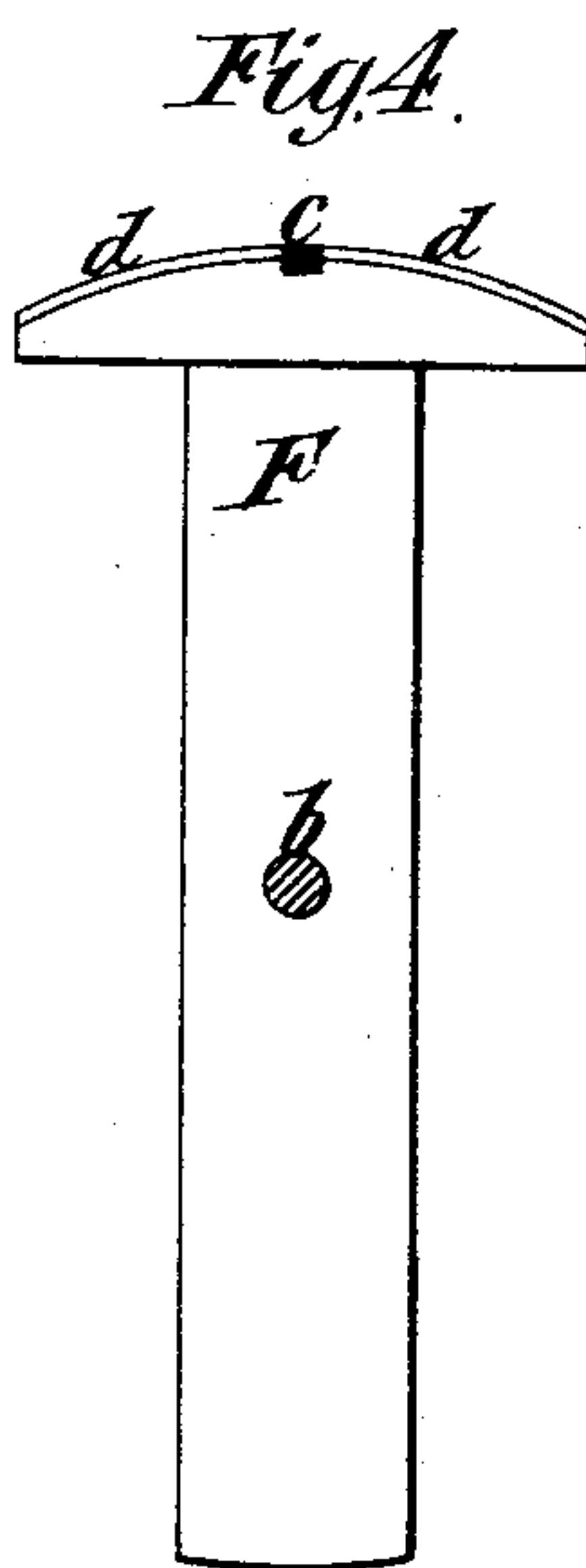
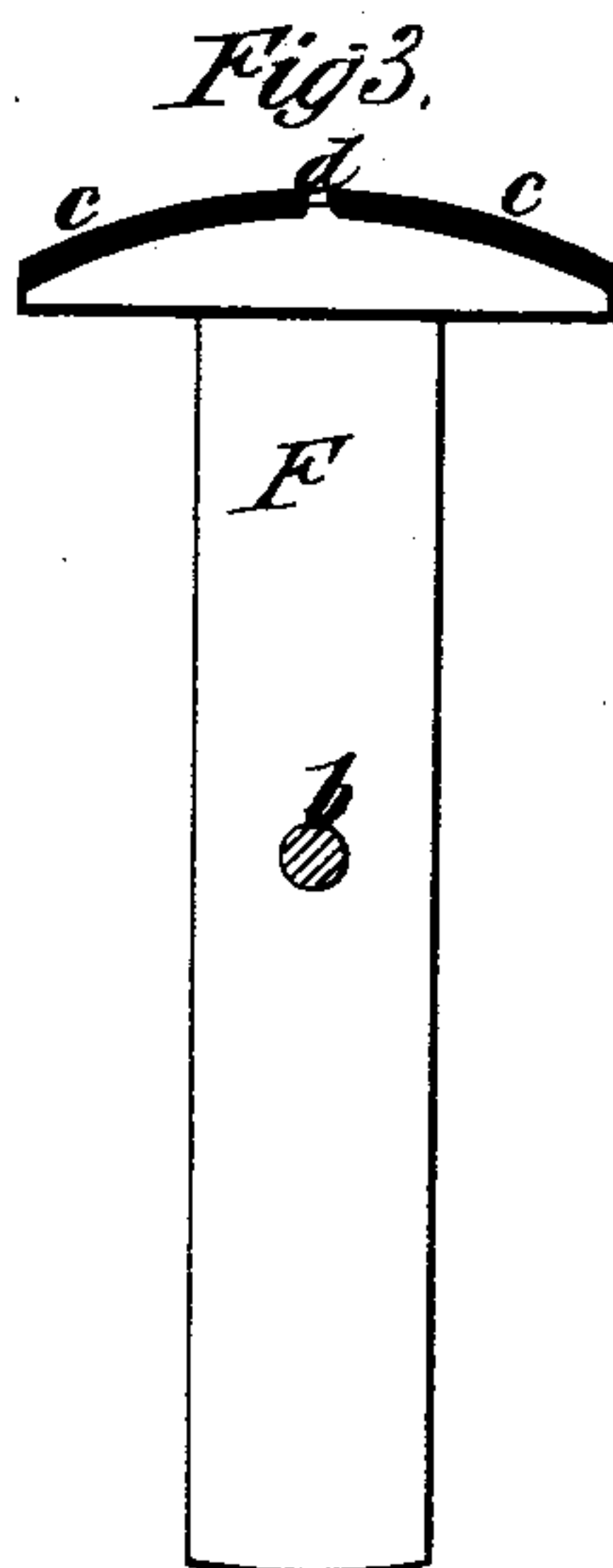
2 Sheets—Sheet 2.

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ELECTRIC CIRCUIT BREAKER.

No. 329,808.

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Witnesses:

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Inventor:

Christopher L. Brun  
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# UNITED STATES PATENT OFFICE.

CHRISTOPHER L. BRUNS, OF BERGEN POINT, NEW JERSEY.

## ELECTRIC CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 329,808, dated November 3, 1885.

Application filed August 21, 1885. Serial No. 174,950. (No model.)

*To all whom it may concern:*

Be it known that I, CHRISTOPHER L. BRUNS, United States Navy, of Bergen Point, in the county of Hudson and State of New Jersey, have invented a new and useful Improvement in Electric Circuit Breakers or Relays, of which the following is a specification.

My improved instrument may be employed in any situation where it is desired to close and break an electric circuit or to establish and disestablish the continuity of an electric conductor; but it is especially useful and intended for establishing and disestablishing the electric continuity of two rail-sections insulated from each other in an electric railway-signal system such as is shown and described in my application for United States Letters Patent, Serial No. 173,236, filed August 1, 1885.

The object of my invention has been to provide an instrument in which the moving parts shall be so balanced that but little power beyond that necessary to overcome friction shall be required to move them, which is destitute of springs, and does not require adjustment after being once set or adjusted, and which is of such construction that it will not be likely to get out of order, nor liable to have its moving parts displaced by vibrations or jars.

The invention consists in novel features of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical section of my improved instrument. Fig. 2 is a plan thereof, and Figs. 3 and 4 are side elevations of one part of the instrument, illustrating slight modifications of my invention.

Similar letters of reference designate corresponding parts in both figures.

A designates the side frames, which, as shown, are connected by cross-rails or stretchers A', and are secured to a base, B. At opposite sides of the center are arranged two magnets, C C', each shown as having two coils and operating upon armatures D D'. The two armatures D D' are attached to and carried by two levers, E E', which are fulcrumed at a, and arranged side by side in reversed positions. Between the two magnets is a rocker, F, fulcrumed or centered at b, and having its upper arc-shaped or segmental

portion composed in part of non-conducting material c, and in part of a metal plate or other conducting material, d.

G G designate the two wires or conductors wherein electric continuity is to be established or broken, and which terminate in spring contact-fingers e e, arranged side by side, and bearing on the top of the rocker F. It will be obvious that when the spring-fingers e are in contact with the metal plate d, as shown in the drawings, the electric continuity through the wires G is established, or the circuit is closed; but when the rocker is shifted so that the spring-contacts e rest upon the non-conducting surfaces c of the rocker, the electric continuity of the wires G is interrupted, or the circuit is broken. Of course a like result would be obtained by dispensing with one of the spring-contacts e, and connecting the wire G thereof with the metal plate d. The rocker F is provided near its fulcrum b with toes or cams f f', extending in opposite directions, and the levers E E' are provided with hooks g g', which engage the toes or cams f f'. Each lever E or E' has at one end an armature, D or D', and at the other end a hook, g or g'.

From the above description the operation of the instrument will be readily understood. The two magnets C C' are connected by wires h h' in two different circuits. When the magnet C is energized, its armature D will be drawn down, and by raising the hooked end of the lever E and the toe or cam f, on which it acts, will swing the rocker F into the position shown in the drawings, and establish electric continuity through the spring-contacts e and the wires G. When the magnet C' is energized, the armature D' will be drawn down, thereby raising the hooked end g' of the lever E' and the toe or cam f', on which it acts, and thereby the rocker E will be swung into the reverse position to that shown, and interrupt electric continuity through the contacts e and wires G, or break the circuit through them.

I have here shown adjusting-screws i, provided with jam-nuts i', which form stops to limit the upward movement of the levers E E' and the extent of movement of the rocker F. These screws are only needed to set or adjust the instrument before any use, and are not to be afterward adjusted. Pins projecting downward from the stretchers A' to a deter-



mined distance, and there soldered fast, would therefore answer every purpose necessary for the screws *i*.

The fulcrums *a b* of the levers *E E'* and rocker *F* may be supported in any suitable manner. I have here shown pivot-screws *j*, in which the fulcrums have conical bearings, and which are provided with jam-nuts *j'*, so that they may be set to permit the free movements of the levers.

It will be seen that the instrument is very simple, having no delicate adjustments, and no parts liable to get out of order, nor any springs. The levers *E E'* always balance each other, as the armature end of each must rise when the corresponding end of the other is drawn down; hence there is little resistance to overcome beyond that due to friction, and the moving parts will not be displaced by vibrations or jars.

It will be understood that the length of movement given the head or top of the rocker *F* may be regulated as desired by varying the distance of movement of the armatures, the length of the arms of the armature-levers, the length of the cams or toes *f f'*, and the length or height of the rocker *F*. The force of magnetic attraction varies as the square of the distance, and hence by properly proportioning the above conditions there can be obtained, by a very slight movement of the armatures, a very considerable movement of the rocker.

In lieu of providing the rocker with a broad metallic plate, *d*, as shown, it may have its top entirely of non-conducting material, with a very narrow contact-strip, *d*, extending across it, as shown in Fig. 3; or it may have a metallic top, *d*, so as to maintain the circuit nor-

mally closed, and a narrow strip or line, *c*, of non-conducting material, as shown in Fig. 4, which will break the circuit when it passes the contacts. The instrument may thus be adapted either for closing or breaking a circuit instantaneously, and for an infinitely short space of time.

When thus constructed, the instrument can be used for purposes of instantaneous photography, and for ordnance purposes for use in electro-ballistics.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a circuit-breaker, the combination, with a rocker and contacts, whereby the electric continuity of the circuit is established or interrupted, of electro-magnets on opposite sides of said rocker, reversely-arranged levers, each carrying at one end an armature for one of said magnets, and having a hook at the other end, and toes or cams on the rocker, with which the hooked ends of the armature-levers engage, substantially as herein described.

2. The combination, with the rocker *F* and its contacts, whereby electric continuity is established or interrupted, of the magnets *C C'*, the levers *E E'*, carrying armatures *D D'* at their one end and hooked at their other end, *g g'*, the toes or cams *f f'* on the rocker, and stops for limiting the upward movement of the armature-levers, substantially as herein described.

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Witnesses:

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