

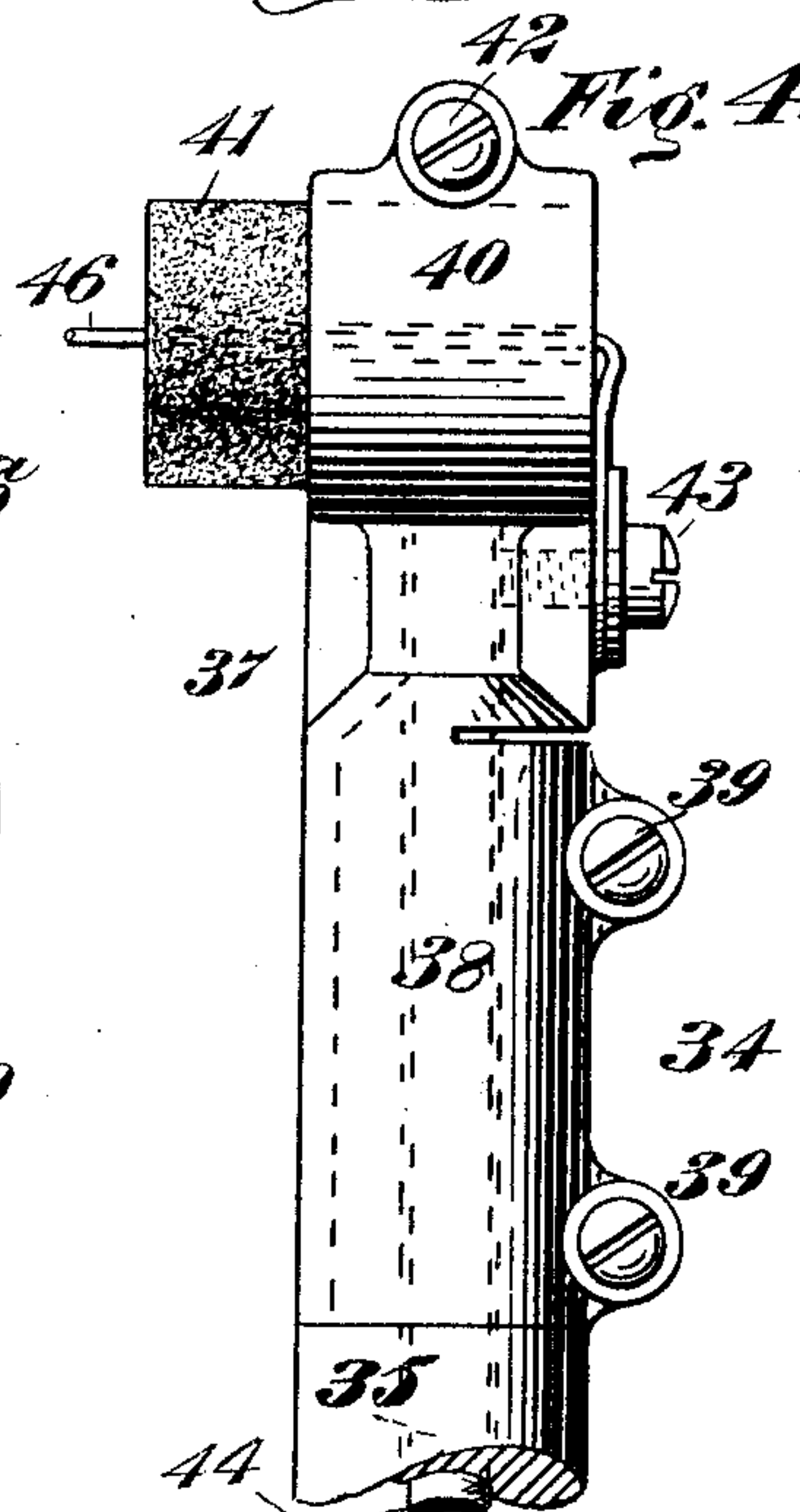
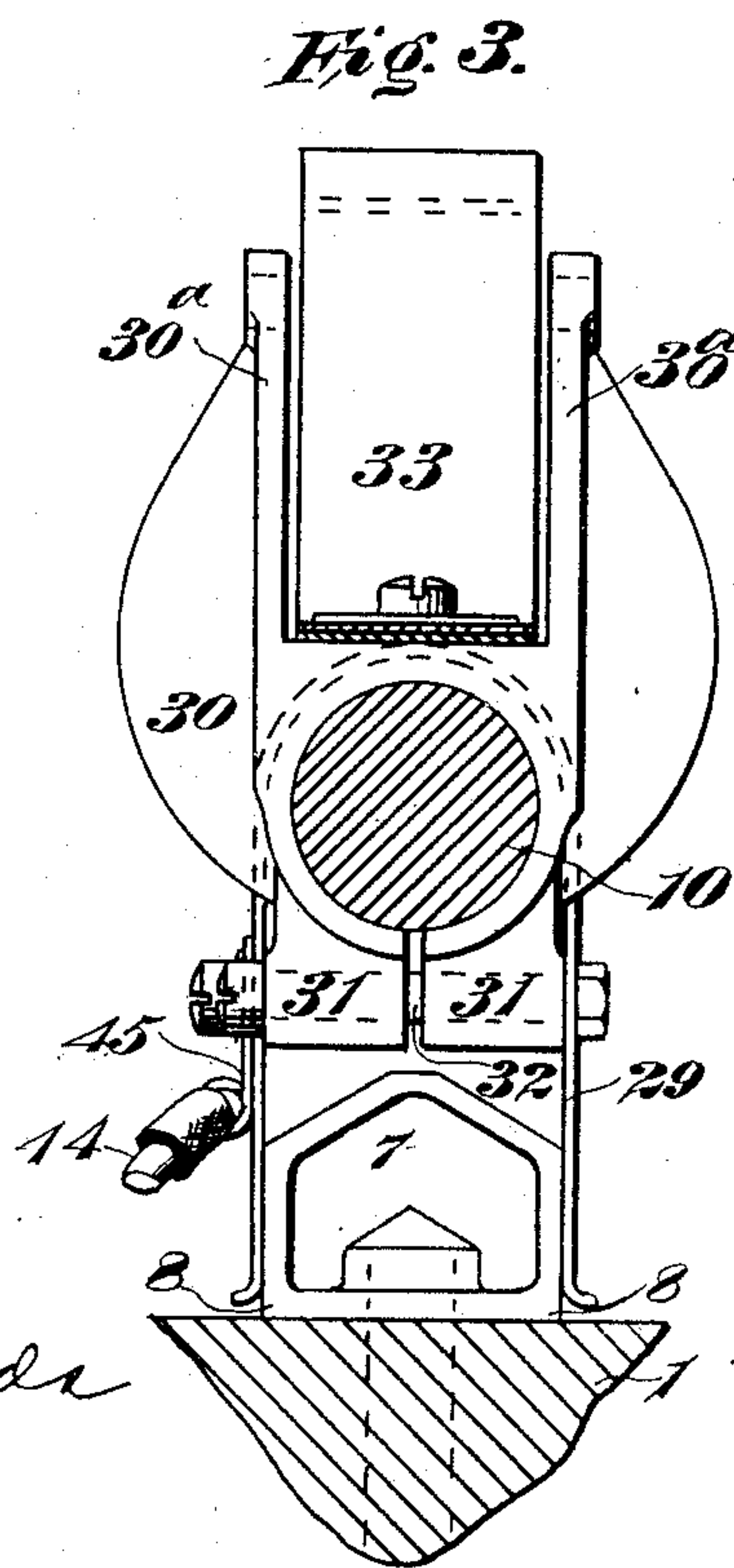
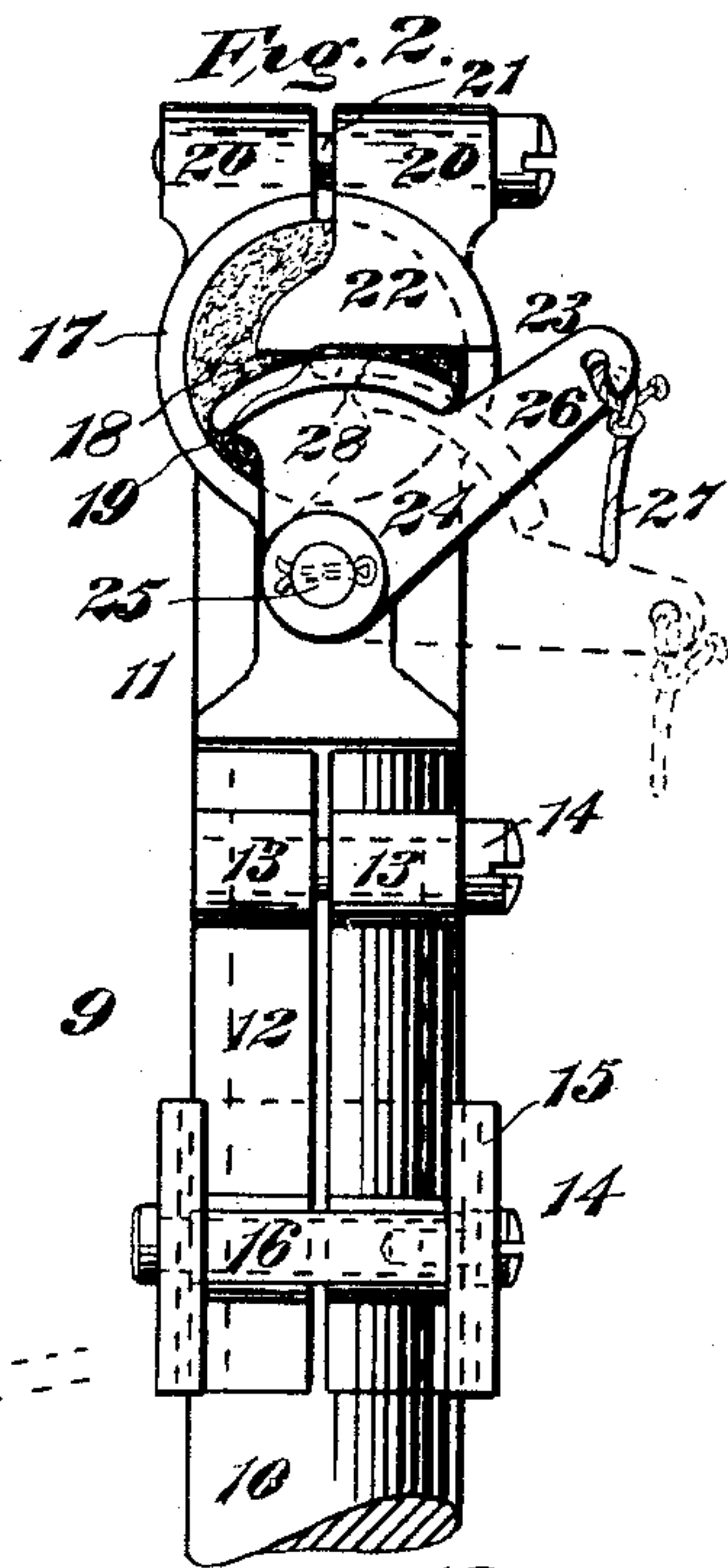
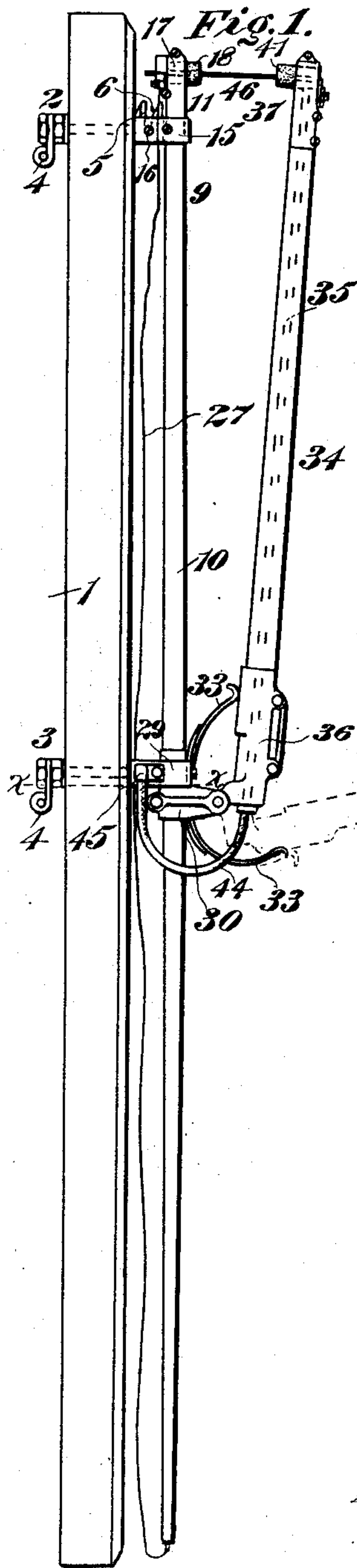
No. 622,885.

Patented Apr. 11, 1899.

H. P. DAVIS.
CIRCUIT BREAKER.

(Application filed Nov. 4, 1898.)

(No Model.)



WITNESSES:

Ethan D. Dodder
H. C. Tenner

INVENTOR

Harry P. Davis

BY

Wesley E. Carr
ATTORNEY.

UNITED STATES PATENT OFFICE.

HARRY P. DAVIS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, OF PENNSYLVANIA.

CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 622,885, dated April 11, 1899.

Application filed November 4, 1898. Serial No. 695,469. (No model.)

To all whom it may concern:

Be it known that I, HARRY P. DAVIS, a citizen of the United States, residing in Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Circuit-Breakers, (Case No. 794,) of which the following is a specification.

My invention relates to devices for interrupting electric circuits; and it has particular reference to devices of this general class that are operated automatically to open the circuits in which they are located upon the passage of a current therethrough that exceeds a predetermined critical amount.

The object of my invention is to provide a circuit-interrupting device that is equally well adapted for direct and alternating current circuits and for any voltage used in commercial service and which is simple and inexpensive in construction and effective in operation.

Modern developments in long-distance transmission of electrical energy have been such as to demand special safety devices for opening the transmission-circuits when the currents therein become excessive by reason of either short circuits or overloads. While some of the circuit-interrupting devices heretofore employed have proved reasonably efficient in connection with such comparatively low voltages as have been ordinarily utilized in practice, they are not effective in circuits carrying electromotive forces of several thousand volts, for the reason that it is inexpedient, if not impossible, to provide for a sufficient degree of separation of the terminals to break the arcs that form between them. Even where fuses have been employed as safety devices it has been found that a voltage suitable for long-distance transmission is sufficient to maintain an arc between the fuse-terminals a sufficient length of time to not only injure or destroy the terminals, but to defeat the object for which the fuse is employed. By my present invention I propose to employ a fuse as the primary safety device; but I so arrange and combine it with other devices as to insure the breaking of the arc with sufficient promptness to avoid injury to the translating

devices and to preserve the fuse-terminals from material injury.

In the accompanying drawings, Figure 1 is a side elevation of my circuit-interrupting device and a supporting-base therefor. Fig. 2 is a rear elevation of the upper end of one member of the circuit-breaker. Fig. 3 is a horizontal section on line *x x* of Fig. 1, looking upward. Fig. 4 is a side elevation of the upper end of the movable member of the circuit-breaker.

The structural details of the invention, as shown in the drawings, are as follows:

1 is a suitable supporting base or slab of non-conducting material, which in a commercial installation will usually be a marble or slate switchboard-panel.

2 and 3 are the main circuit-terminals extending from the front to the rear of the panel 1 through suitable holes bored therein, as is usual in this class of work. Additional insulation may be provided for the terminals 2 and 3 in cases where the line-voltage is so high as to make it desirable. The line-circuit is joined to the terminals 2 and 3 at the rear of the switchboard by means of suitable connecting devices 4. The front end or head 5 of the terminal 2 is provided with a wedge-shaped notch 6, opening upward, and the lower terminal 3 is provided with a head 7, having side contact-surfaces 8.

The stationary member 9 of the circuit-interrupting device comprises a long rod 10, of wood or other suitable non-conducting material, upon the upper end of which is located a fuse-terminal 11. The lower end of this fuse-terminal is in the form of a tubular socket 12, fitting over the end of the rod 10 and split longitudinally, so that it may be clamped firmly on the rod by means of ears or lugs 13 and bolts or screws 14, passing through the same. Clamped or otherwise fastened to this tubular socket 12 is a U-shaped spring contact-piece 15, the laterally-projecting arms of which make frictional contact with the sides of the terminal-head 5 and are connected by means of a suitable pin or stud 16, this pin being of such dimensions and so located that it will enter and rest in the notch 6 of the terminal-head 5. The arms of the contact-

piece 15 and the pin 16 together constitute an eye, and since the notched terminal-head 5 is structurally and functionally a hook the stationary member of the circuit-breaker may properly be said to be fastened to the supporting-base 1 by a hook and eye.

The upper portion of the fuse-terminal 11 is provided with a tubular socket 17, in which is located a cylindrical block 18 of carbon or other substantially infusible material. This block has a central perforation 19 and is clamped in the socket 17 by means of lugs 20 and a bolt or screw 21, passing therethrough. One of the lugs 20 on the upper portion of the socket 17 is provided with a downwardly-projecting portion 22, which constitutes the stationary member of a clamping device 23, the movable member 24 designed to cooperate therewith being pivotally mounted upon a stud 25 and having a laterally-projecting arm 26, to which is fastened a cord 27, and having also a clamping plate or surface 28 in the form of an arc of a circle that is eccentric to the stud 25.

The rod 10 is provided with a contact device in the form of a U-shaped spring-contact 29, clamped thereon in such position longitudinally that the ends of the spring will make frictional contact with the sides 8 of the main-circuit-terminal head 7 when the pin 16 rests in the bottom of the fork or notch 6 of the other terminal head 5 and the rod 10 is pressed inward toward the base 1. Just below the spring-contact 29 the rod 10 is provided with a bracket 30, having a socket for the rod and being split at one side, so that it may be clamped on the rod by means of the ears or lugs 31 and the bolt 32, extending therethrough.

A leaf-spring 33, which may be either single or multiple, is fastened to the front side of the bracket 30 between its projecting arms 30^a, the spring being of such form that its upwardly-projecting end will tend to press the movable member 34 of the circuit-breaker outward, and its lower end will serve as a buffer or cushion to receive the movable member of the breaker and obviate undue shocks, as well as prevent breaking the apparatus.

The movable member 34 of the circuit-breaker comprises a hollow rod 35, of wood or other suitable non-conducting material, the lower end of which is surrounded by a suitable metal socket 36, which is split longitudinally on one side in order that it may be clamped to the rod by means of bolts, as indicated in Fig. 1. This socket is pivoted between the arms 30^a of the bracket 30, as indicated. The upper end of the rod 35 is provided with a fuse-terminal 37, the lower portion 38 of which is tubular and split along one side, so that it may fit over the end of the rod and be clamped thereto by means of bolts or screws 39. The upper end of the terminal 37 has a tubular socket 40 at right angles to the socket 38, and in this tubular socket 40 is mounted a longitudinally-perforated tubular block 41, of car-

bon or other substantially infusible material, which is clamped in the socket by means of a screw or bolt 42. The terminal piece 37 is also provided with a binding-screw 43.

The fuse-terminal 37 is connected to the spring-contact 29 by means of a flexible cable 44, one end of which is fastened to one side of said spring-contact by means of a suitable connecting device 45. The cable extends up through the longitudinal passage in the rod 35 and is connected at its upper end to the fuse-terminal 37.

A fuse 46, of such material and thickness as may be required for carrying the normal current of the system in which the circuit-breaker is to be used and at the same time so constructed and proportioned that it will be melted or fused by a current that exceeds a predetermined maximum amount, is fastened at one end to the terminal 37 by means of a binding-screw 43 and extends through the longitudinal opening in the block 41 and through the opening 19 in the stationary block 18, where it is clamped by moving the arm 26 upward, so as to bind its inner end between the stationary piece or abutment 22 and the eccentric face 28 of the movable member of the clamp 23.

The length of fuse employed may obviously be anything desired within a considerable range, provided it is strong enough to hold the movable member of the circuit-breaker in position in opposition to the action of the spring 33.

The operation of the device is the same in principle whether the carbon blocks be held in actual contact or at a considerable distance apart, the only means for holding the movable member of the breaker in any elevated position being the fuse 46 and the means for clamping its ends.

The portion of the rod 10 projecting below the lower circuit-terminal 3 is employed in order that the circuit-breaker may be located at such a distance above the floor that its movable member will not descend low enough to strike the heads of persons who may chance to be beneath when the circuit-breaker opens and at the same time be readily detached and replaced by a person standing upon the floor when it is desired to insert a new fuse.

The cord 27, attached to the arm 26 of the movable member 24 of the clamp 23, is provided in order that the circuit-breaker may be readily opened by hand from a safe distance in case the fuse should fail to work or if for any other reason it is desired to interrupt the circuit otherwise than automatically.

It will be understood from the foregoing description that the device will be useful and effective in connection with either direct or alternating current circuits and with any voltage suitable for commercial use.

The device is admirably adapted to the purpose for which it is intended by reason of its simplicity of construction and the facility with which it may be removed from its nor-

mal position and replaced therein and also by reason of the ease and rapidity with which the fuse may be inserted in operative position.

5 While I have illustrated and described specific details of construction, I desire it to be understood that the form and dimensions of parts and in general that minor details of construction may be varied within considerable limits without departing from the spirit and scope of my invention, and hence I desire it to be distinctly understood that I do not intend to limit my claims to what is specifically shown and described any further
10
15 than limitations may be imposed by the terms employed or by the state of the art.

I claim as my invention—

1. A circuit-breaker comprising two hinge-connected members, one of which has contact-pieces, in combination with stationary circuit-terminals the heads of which are in position to be engaged by said contact-pieces and with means for so supporting the circuit-breaker as to prevent downward or lateral displacement, but permitting ready removal
20
25 when moved upwardly.

2. The combination with a suitable base-plate having stationary circuit-terminals, of a detachable circuit-interrupting device having a hook-and-eye connection with one stationary terminal-head and frictional connection with both stationary terminal-heads.
30

3. The combination with a supporting-base, of a circuit-breaker, a stationary member having a detachable frictional and hook-and-eye connection with said base, a movable member hinged at one end to the stationary member, and a fuse connecting the ends of the two members opposite the hinge and constituting
35
40 the sole means for supporting the movable member in operative position.

4. A circuit-breaker comprising a stationary member having a substantially infusible terminal-block, a hinged movable member
45 having a substantially infusible terminal-

block at its free end, and a fuse normally interposed between the two terminal-blocks.

5. A circuit-breaker comprising a non-conducting rod having a perforated carbon block at one end, a movable member hinged or pivoted to said rod, and having a perforated carbon block at its free end, a fuse extending through the two carbon blocks and means for clamping its ends to the respective terminals.
50

6. A circuit-breaker comprising a detachable, but normally-stationary, member having a carbon terminal-block and an adjacent fuse-clamp, a movable member hinged or pivoted at one end to the stationary member and provided with a carbon terminal-block and a binding or clamping device at its other end, and a fuse interposed between said carbon blocks and fastened in position by the said clamping devices.
55
60

7. A circuit-breaker comprising a hinged or pivoted member having a carbon terminal-block and a fuse-clamping device, in combination with a stationary member having a carbon terminal-block and a fuse-clamping device, and a cord attached to the movable member of the last-named clamping device for releasing the fuse to open the circuit.
65
70

8. The combination with a supporting-base provided with circuit-terminals, of a circuit-breaker stationary member removably attached to and supported by said terminals and provided with a carbon terminal-block, a movable member hinged or pivoted at one end to said stationary member and provided with a carbon terminal-block at its outer end and a fuse interposed between said carbon blocks.
75
80

In testimony whereof I have hereunto subscribed my name this 2d day of November, 1898.

HARRY P. DAVIS.

Witnesses:

WESLEY G. CARR,
H. C. TENER.