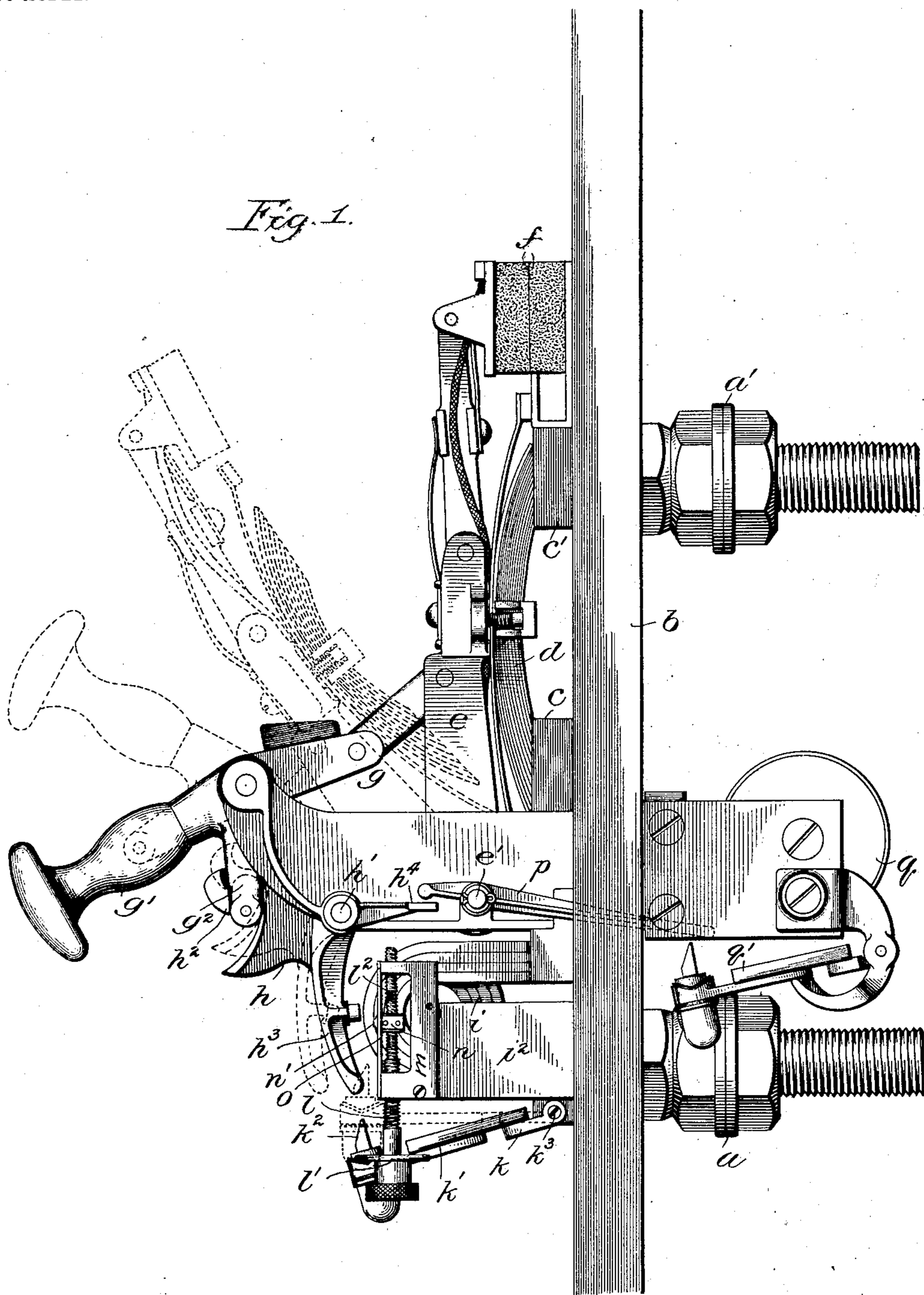


E. P. WARNER.
CIRCUIT BREAKER.

APPLICATION FILED DEC. 20, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:
Carl Payford.
John Enders Jr.

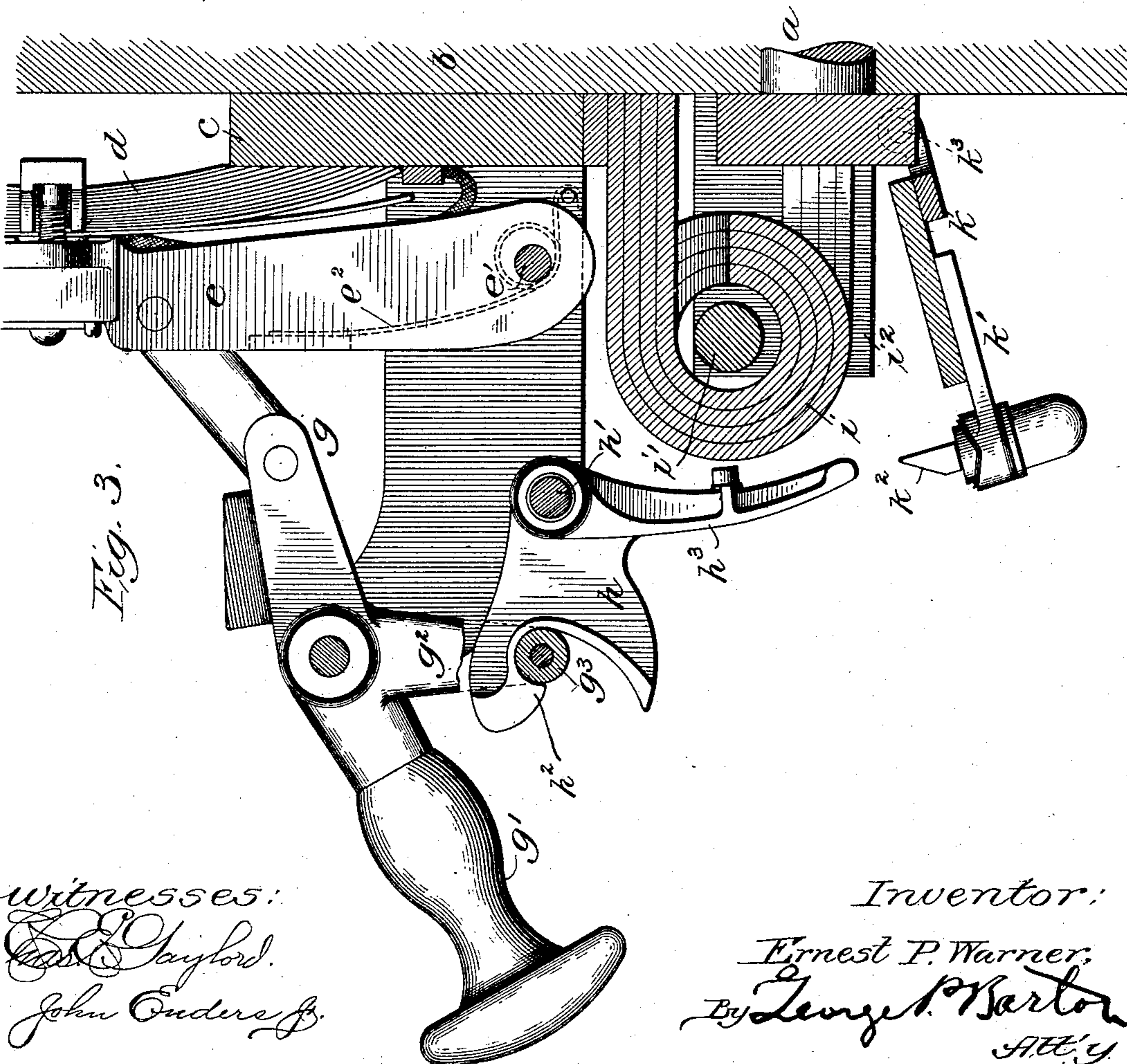
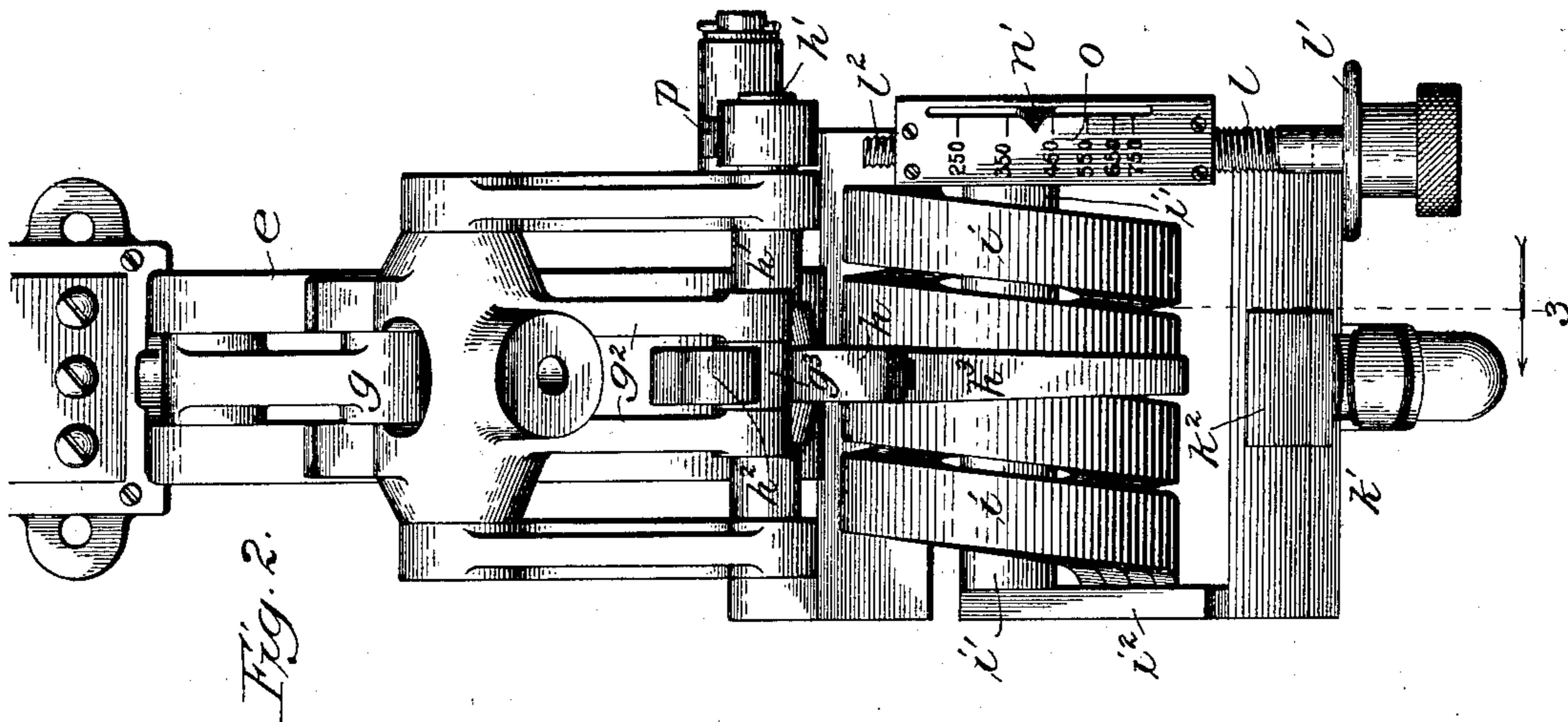
Inventor:
Ernest P. Warner,
By *George P. Barton*
Att'y

E. P. WARNER.
CIRCUIT BREAKER.

APPLICATION FILED DEC. 20, 1902.

NO MODEL.

2 SHEETS—SHEET 2.



witnesses:
Edw. C. Gaylord.
John Enders J.

Inventor:
Ernest P. Warner,
By George P. Barton
Att'y

UNITED STATES PATENT OFFICE.

ERNEST P. WARNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 736,041, dated August 11, 1903.

Application filed December 20, 1902. Serial No. 135,982. (No model.)

To all whom it may concern:

Be it known that I, ERNEST P. WARNER, 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 Circuit-Breakers, (Case No. 71,) of which the following is a full, clear, concise, and exact description.

My invention relates to an automatic circuit-breaker for circuits carrying heavy currents, and has for its objects, first, to provide improved tripping mechanism whereby the circuit may be automatically opened when the current reaches a predetermined value regardless of whether such value is reached suddenly or by gradual changes; and, second, to provide an improved adjusting mechanism and an indicator therefor by which the device may be set as desired for operation by currents of different values, the adjustment being indicated directly upon a scale of wide or open divisions.

I will describe my invention particularly by reference to the accompanying drawings, and the features or combinations which I regard as novel will be defined by the appended claims.

Figure 1 is a view in elevation of my improved automatic circuit-breaker. Fig. 2 is a front view of the tripping mechanism and associated parts, the handle of the switch being removed. Fig. 3 is a detail side elevation, partially in section, of the automatic tripping mechanism shown in Fig. 2.

The same letters of reference are used to designate the same parts wherever they are shown.

The circuit-breaker consists in general of a spring-actuated switch-lever adapted when released to open the circuit with which it is associated, a magnet included in the circuit in question, and tripping mechanism controlled by the magnet for releasing the switch-lever.

In the device shown in the drawings, a a' are the terminals by which the current enters and leaves the device. Two metallic contact-plates c c' are mounted upon the insulating base-plate b and connected, respectively, with the terminals a a' . Said plates are adapted to be spanned by a heavy lami-

nated copper brush d , carried by the switch-arm e , pivoted at e' to the frame of the device. Supplemental contacts f are provided for taking the arc when the circuit is broken in accordance with a well-known practice. A lever mechanism g is provided for forcing the copper brush d into engagement with the contact-plates c c' against the tension of said brush and spring e^2 , coiled about pivot e' . An insulating-handle g' is provided for the lever mechanism, whereby the same may be manipulated, and a projecting arm g^2 , attached to the lever mechanism, is provided with a roller g^3 upon its end, which is adapted to be engaged by the hook h^2 of a detent-lever h , pivoted at h' to the frame of the machine. In Fig. 3 the hook h^2 of the detent-lever is shown in engagement with the roller g^3 at the end of the lever-arm g^2 , whereby the lever mechanism is held in position to maintain the brush d in engagement with the contact-plates c c' . A slight movement of the detent-lever h , however, in a clockwise direction about its pivot h' will bring the end of the hook to one side of the center of the roller g^3 , and the lever g^2 , being under strong tension, will be released and fly out, the parts taking the position shown in dotted lines in Fig. 1, whereby the circuit between contact-plates c c' is broken.

The actuating-magnet consists of a heavy copper coil i , connected, as shown, between the contact-plate c and the terminal a , said coil having a core i' with pole-pieces i^2 i^2 .

To trip the detent-lever h , an arm h^3 is provided for said lever in position to be engaged by the beveled face k^2 of a trip k' , carried by the armature-lever k of the magnet i . Said armature-lever k is pivoted at k^3 and normally rests upon the flange l' of an adjusting-screw l in position to be attracted by the poles i^2 i^2 of the magnet. When the current in coil i attains the required strength, the armature is drawn up, moving the trip k' in a direction toward the pivot of detent-lever arm h^3 . The end of said arm h^3 , which is in the path of the trip, rides up the inclined face k^2 thereof, so that the detent-lever is moved upon its pivot to release the lever mechanism with a very slight exertion of force. The detent is thus tripped when the armature is attracted,

even though the movement of said armature be very gradual. The detent-lever mounted on the pivoted shaft or trunnion h' of the detent-lever h may carry an extra arm h^4 , adapted to be engaged by a pivoted lever p , arranged to be actuated by the armature q' of a magnet q , connected in bridge across the mains. This, however, forms no part of my invention and need not be particularly described.

In order to adjust the device to open the circuit upon any desired strength of current, the adjusting-screw l is provided, carrying the flange l' , upon which the armature k normally rests. By screwing up the screw l the armature is brought nearer to the magnet-poles $i^2 i^3$, so that less magnetic force is required to move it from its position of rest. The main shank of the adjusting-screw has right-hand threads and is screwed into the framework m . A portion l^2 of the shank of said screw is provided with reverse or left-handed threads, and this portion does not engage the stationary framework, but serves to move a traveling nut n , which may carry indicator n' , moving over a scale o . As the adjusting-screw is turned to raise or lower the flange l' and the armature resting thereon the nut n is moved in the same direction as the flange and at double the rate. The distance on the scale traversed by the indicator is thus

double the distance through which the flange l' is moved, so that a scale of wide or open divisions may be employed.

Having thus described my invention, I claim—

1. In a circuit-breaker, the combination with a switch-lever, of the detent-lever for setting the same, having the arm h^3 , a magnet i having an armature-lever k and a trip k' carried thereby, said armature-lever being pivoted so as to move the trip toward the pivot of the lever-arm h^3 , the trip being provided with an inclined face k^2 upon which the detent-lever arm is adapted to ride, whereby the switch-lever may be released with slight force.

2. The combination with the adjusting-screw l and the framework in which the same is screwed, said screw having a free reversely-threaded portion, of a nut carried upon said reversely-threaded portion and arranged to be moved thereby to and fro with relation to a scale as the screw is turned, whereby the adjustment of said screw is indicated directly upon the scale.

In witness whereof I hereunto subscribe my name this 11th day of July, A. D. 1902.

ERNEST P. WARNER.

Witnesses:

FREDERICK A. WATKINS,
EDWIN H. SMYTHE.