

No. 709,232.

Patented Sept. 16, 1902.

F. A. MERRICK.
CIRCUIT BREAKER.

(Application filed Mar. 21, 1900.)

(No Model.)

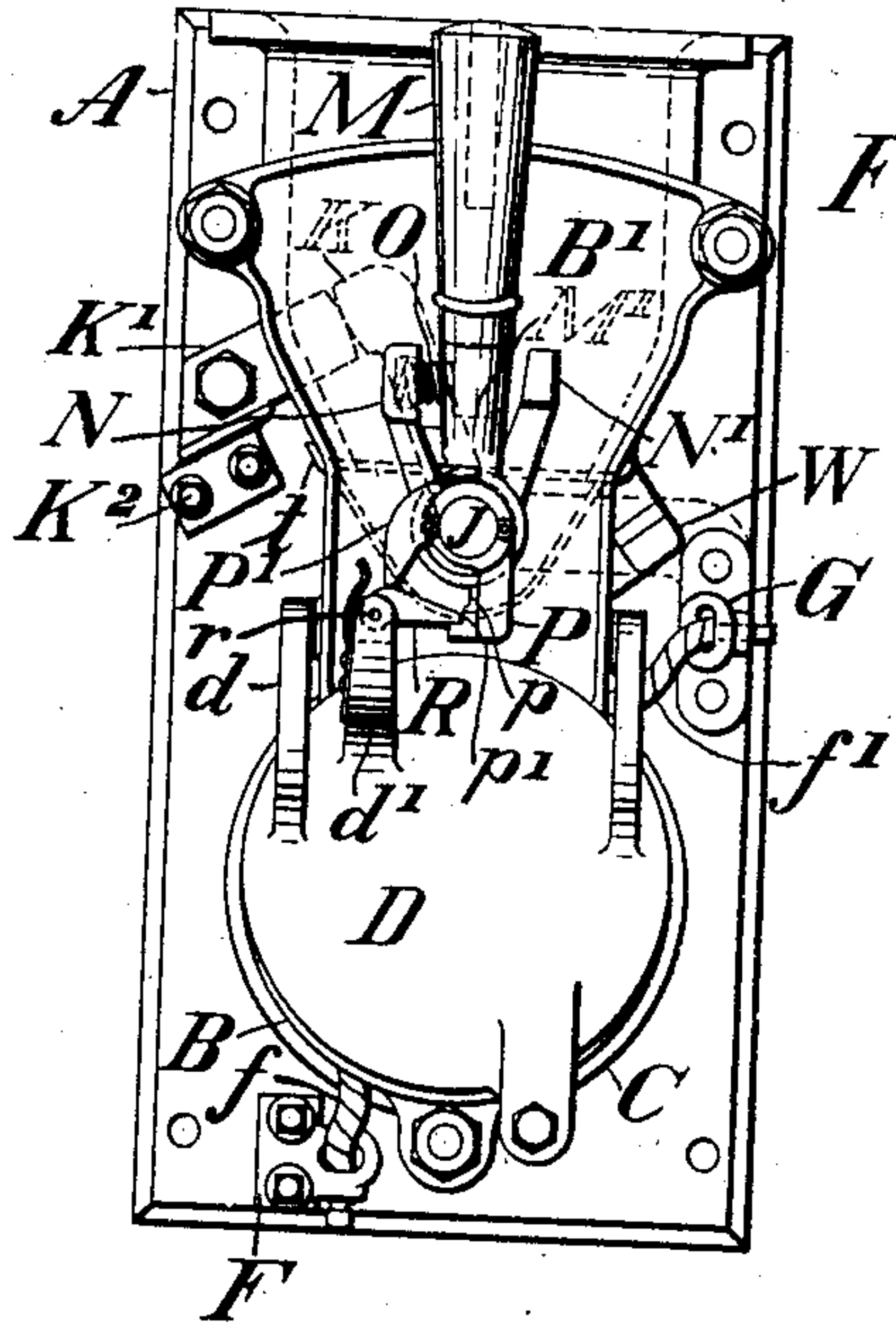


Fig. 1.

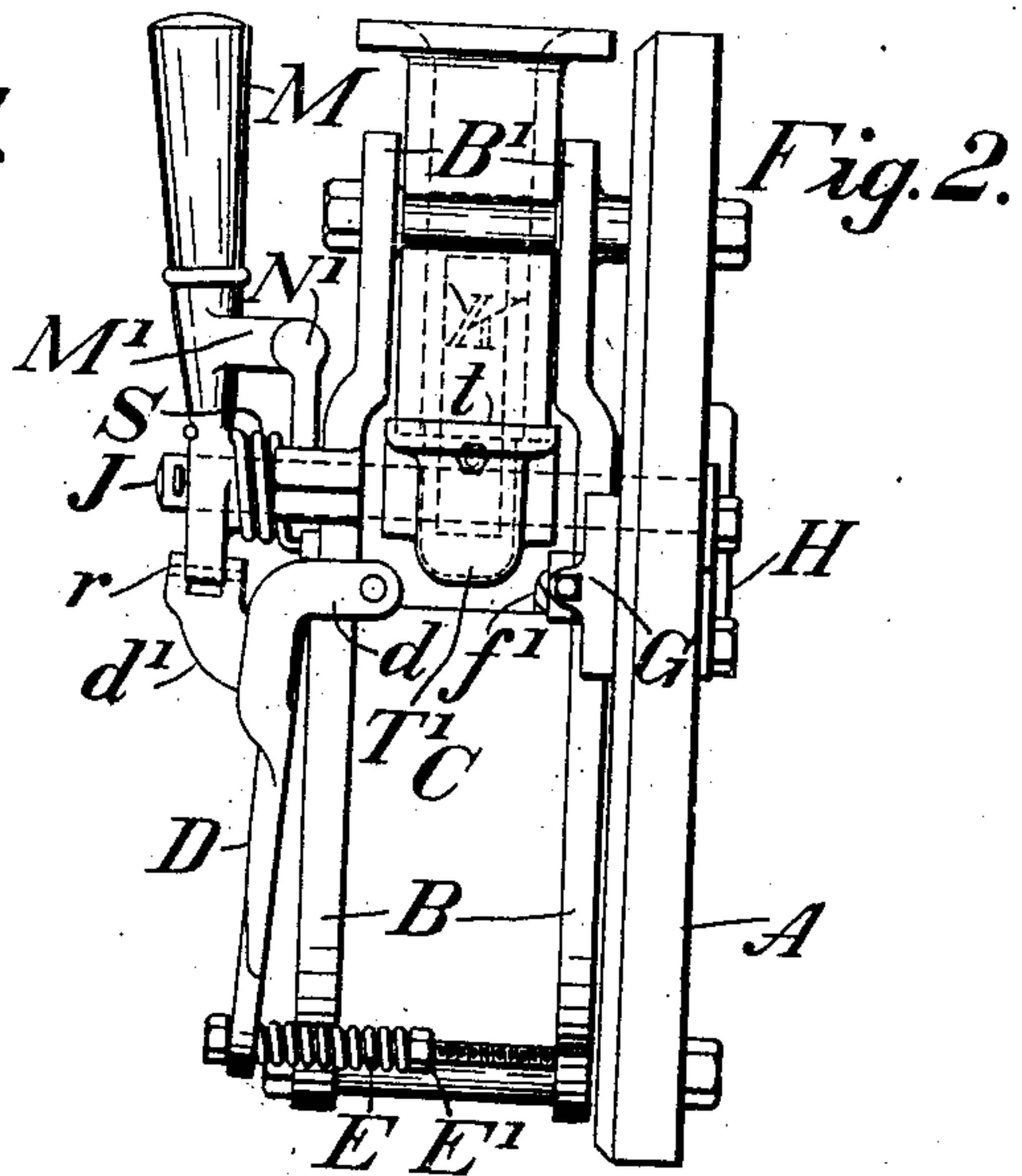


Fig. 2.

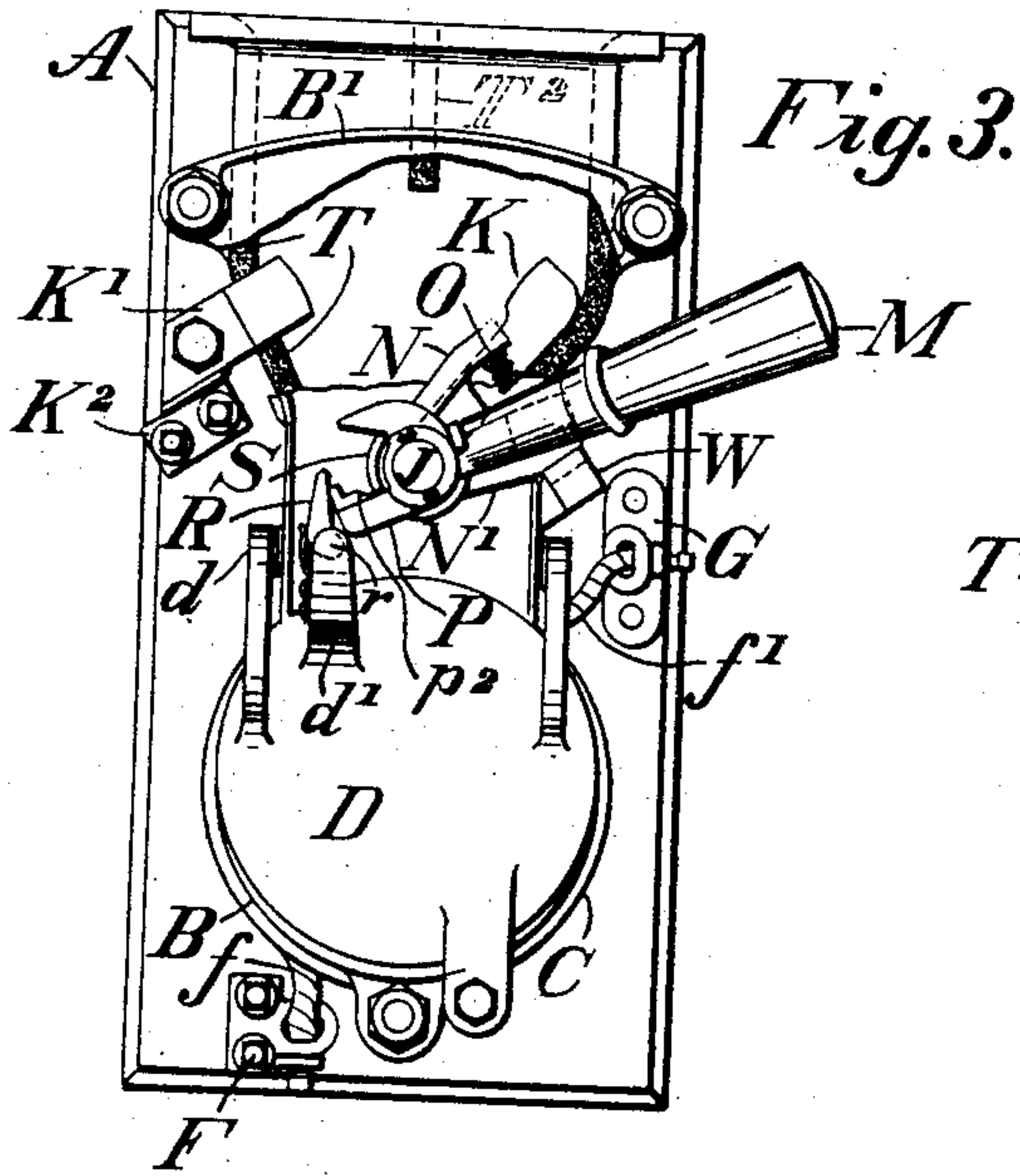


Fig. 3.

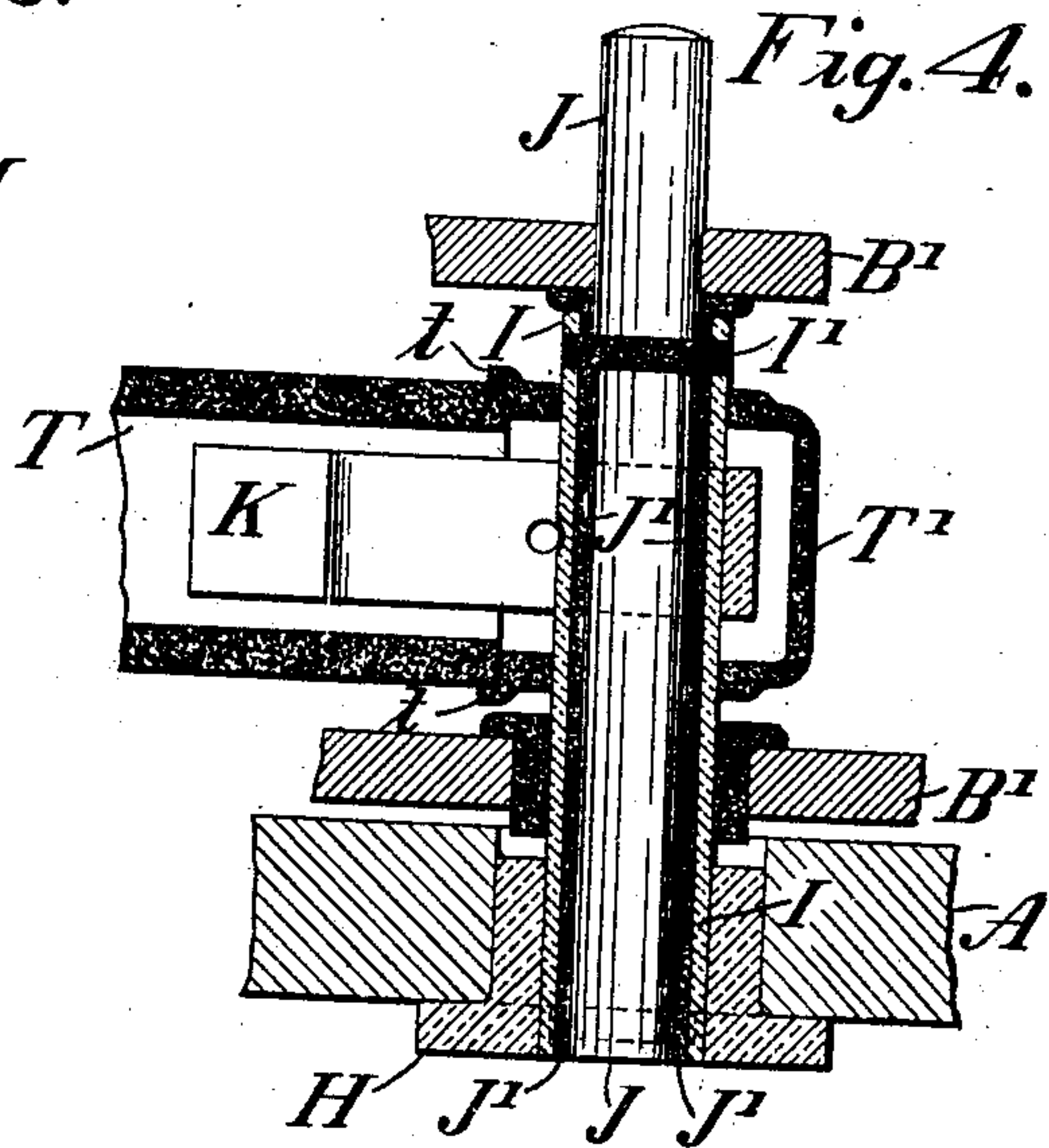


Fig. 4.

WITNESSES:

E. M. Powell.
M. E. Sharpe

INVENTOR

F. A. Merrick,
BY
Geo. H. Parmelee,
his ATTORNEY.

UNITED STATES PATENT OFFICE.

FRANK A. MERRICK, OF JOHNSTOWN, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 709,232, dated September 16, 1902.

Application filed March 21, 1900. Serial No. 9,527. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. MERRICK, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented a new and useful Improvement in Circuit-Breakers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

10 This invention has relation to circuit-breakers of that class which automatically operate to open an electric circuit when the volume of current passing therein from any cause exceeds a certain predetermined maximum and is designed to provide a simple and efficient instrument in which auxiliary or shunt contacts are dispensed with and the injurious effects of arcs formed when the circuit is broken are reduced to a minimum.

20 With these objects in view my invention consists in the novel construction, arrangement, and combination of parts, all as hereinafter described, and pointed out in the appended claims.

25 In the accompanying drawings, forming a part of this specification, Figure 1 is a front elevation of a circuit-breaker embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a detail view showing the operative parts at the upper portion of the instrument in the positions they occupy when the circuit is broken, and Fig. 4 is a detail sectional view showing the parts through which electrical connection is made with the 35 movable contact.

The letter A designates a backing or support of insulating or refractory material, such as slate.

40 B is a magnet-core upon which is wound a coil C of coarse wire and which is formed with somewhat massive substantially parallel upward polar extensions B'.

45 D is an armature hinged or pivoted at *d* and normally held away from the outer end of the magnet by the action of a coil-spring E, having a tension-adjusting nut E'.

As thus far described the construction is similar to that described and claimed in my

application for patent, Serial No. 1,883, filed January 18, 1900.

50 F designates a terminal block to which one of the circuit-wires is connected and from which the current passes by the lead *f* to the coil C. From the coil C the current passes by the connection *f'* to a binding-post or clamp 55 G. This post or clamp extends through the support A and is electrically connected at the back of the instrument with a bearing or journal block H, which is of brass or other good conducting material. This block H is 60 set into the support A, and fitted to turn neatly therein is a tubular piece I, also of good conducting material.

J is a shaft one end portion of which enters the tube I and whose opposite end portion is provided with suitable bearings in the outer pole extension B', through which it projects to receive a handle M. J' designates insulating material between said shaft and the interior surface of the tube I. Pins I', 70 of insulating material, unite said shaft and tube, whereby they rotate together, as hereinafter described.

K is the movable contact of the instrument, rigidly but removably clamped to the tube I. 75

K' is the fixed contact, which is removably secured to the terminal block K², to which the other circuit-wire is connected. As these contacts must carry and break the entire current in the circuit they are made somewhat 80 massive and capable of being readily removed and replaced when necessary.

The handle M above referred to is loosely mounted on the shaft J and actuates said shaft through the medium of the projecting 85 arms N N', rigidly secured to the shaft and designed to be engaged by a projecting lug M' on the shank of the handle. Interposed between said lug and the arm N is a short stiff coil-spring O. The hub portion of the 90 handle is provided with a forked or slotted lug whose arms are designated as P and P', respectively. On the arm P is a latch projection *p*, having a shoulder *p'*, designed to be engaged by the beveled end of a latch device R, pivoted at *r* to a lug *d'* on the arma- 95

ture D. Leading up to the shoulder p' is a beveled surface p^2 .

S is a stiff coil-spring which is coiled around the shaft J between the handle M and the pole extension, one of its ends being secured to said extension and the other end to the handle.

The latch device above described is in general similar to that described and claimed in my said application, Serial No. 1,883.

T designates insulating material which surrounds the contacts K K' for the purpose of protecting the adjacent metal parts from the action of arcs formed at the contacts. In order to confine such arcs as far as possible within the limits of the insulation and prevent largely any appearance of the same at the top of the instrument, I seal the bottom of the inclosure formed by the insulation by means of a cup T', of similar material, which is hung on the shaft J and is formed with a flange t at its upper portion to receive the insulation T. In this manner and by the arrangement above described for conducting the current into the movable contact I prevent air-drafts through the insulation, and thereby prevent to a considerable extent the blowing of arcs above the top of the insulation, they being extinguished by the action of the strong magnetic field generated by the magnetic circuit of the coil C through the pole extensions B', between which the contacts are placed. This action is also greatly facilitated by the provision of a division-plate T², of insulating material, against whose edge the arc is blown by the action of the magnetic field, said plate being fully described and claimed in the joint application of myself and J. D. Forrer, filed November 9, 1899, Serial No. 736,353.

To set the instrument, the parts being in the position shown in Fig. 3 the handle is moved from its position against the cushioned stop W over to the left to the position shown in Fig. 1, thereby compressing the spring S and also the spring O, causing the latter to act upon the arm N to rotate the shaft J and engage the contacts K K'. As the handle is moved to this position the arm P' engages the latch device R and forces it into engagement with the shoulder p' on the arm P, which locks the handle. The circuit through the instrument is now from the terminal block F, through the coil C, to the post or clamp G, to the block H, tube I, movable contact K, fixed contact K', to terminal block K². When for any reason the current exceeds the predetermined maximum, the action of the coil C upon the armature overcomes the resistance of the spring E. The armature then moves inwardly and, owing to the fact that it is pivoted a considerable distance back of the latch R, the latter is given a downward movement at its pivoted end in such a manner as to throw its point onto the beveled surface p^2 , and thereby release the handle. The latter is immediately thrown

over against its stop W by the action of its spring S and in this movement engages the arm N'. This turns the shaft J and separates the contacts, and the spring O forms a cushion to check the movement of the shaft.

It will be observed that by reason of the indirect connection between the handle and the shaft J there is insured a positive engagement of the contacts. This would be difficult to obtain were the handle fast to the shaft, owing to the necessity which would exist for causing the contacts to engage each other at precisely the same time that the latch device came into locking engagement with the handle, and the difficulty would become greater as the contacts became more or less burned or worn away. The present arrangement also provides for a quicker separation of the contacts, as the momentum of the handle at the time it engages the arm N' is sufficient to give a very quick movement to the shaft J. The shaft J being insulated from the parts which carry the current, the handle is also effectually insulated. The circuit may be broken arbitrarily at any time by a light blow on the armature D sufficient to disengage the latch device.

I do not wish to limit myself to the details of construction and arrangement which I have herein shown and described, as these may be varied considerably without departing from the spirit and scope of my invention as set forth in the following claims.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a circuit-breaker, a chamber of insulating material, a fixed contact extending into said chamber through a wall thereof, a loosely-mounted shaft extending through said chamber and carrying a cooperating contact, a handle for manually actuating said shaft in one direction, a spring for actuating the shaft in an opposite direction, and an electromagnetically-controlled latch device for normally restraining the action of said spring, the magnet of said device having extended pole-pieces which embrace the said chamber to produce a magnetic field therein.

2. In a circuit-breaker, the combination of a fixed contact, a movable contact, a shaft to which the movable contact is fixedly secured, said shaft having two arms or projections thereon, a handle loosely sleeved on said shaft between the said arms or projections, and arranged upon movement to engage one or the other thereof, a spring interposed between the said handle and one of the arms or projections, a latch engaging the said handle, a spring for actuating said handle when the latch is released, and electromagnetic means for releasing said latch.

3. In a circuit-breaker, the combination of a pair of separable cooperative contacts, a shaft, a sleeve secured to said shaft and insulated therefrom, one of the contacts being fixedly secured to said sleeve, and a bearing

in which said sleeve is journaled, said bearing forming a part of the circuit through the instrument.

4. In a circuit-breaker, the combination with
5 a pair of separable coöperative contacts, of an inclosure therefor formed of insulating material, and having a separable portion closing its lower end, together with means for producing a magnetic field within said inclosure.
10 5. In a circuit-breaker, the combination with a pair of separable coöperative contacts, an inclosure of insulating material inclosing said

contacts at the sides and underneath the same, and formed in separable upper and lower sections, and a shaft extending through the lower 15 of said sections and carrying the same and also the movable contact.

In testimony whereof I have affixed my signature in presence of two witnesses.

FRANK A. MERRICK.

Witnesses:

B. M. SMITH,
H. W. SMITH.