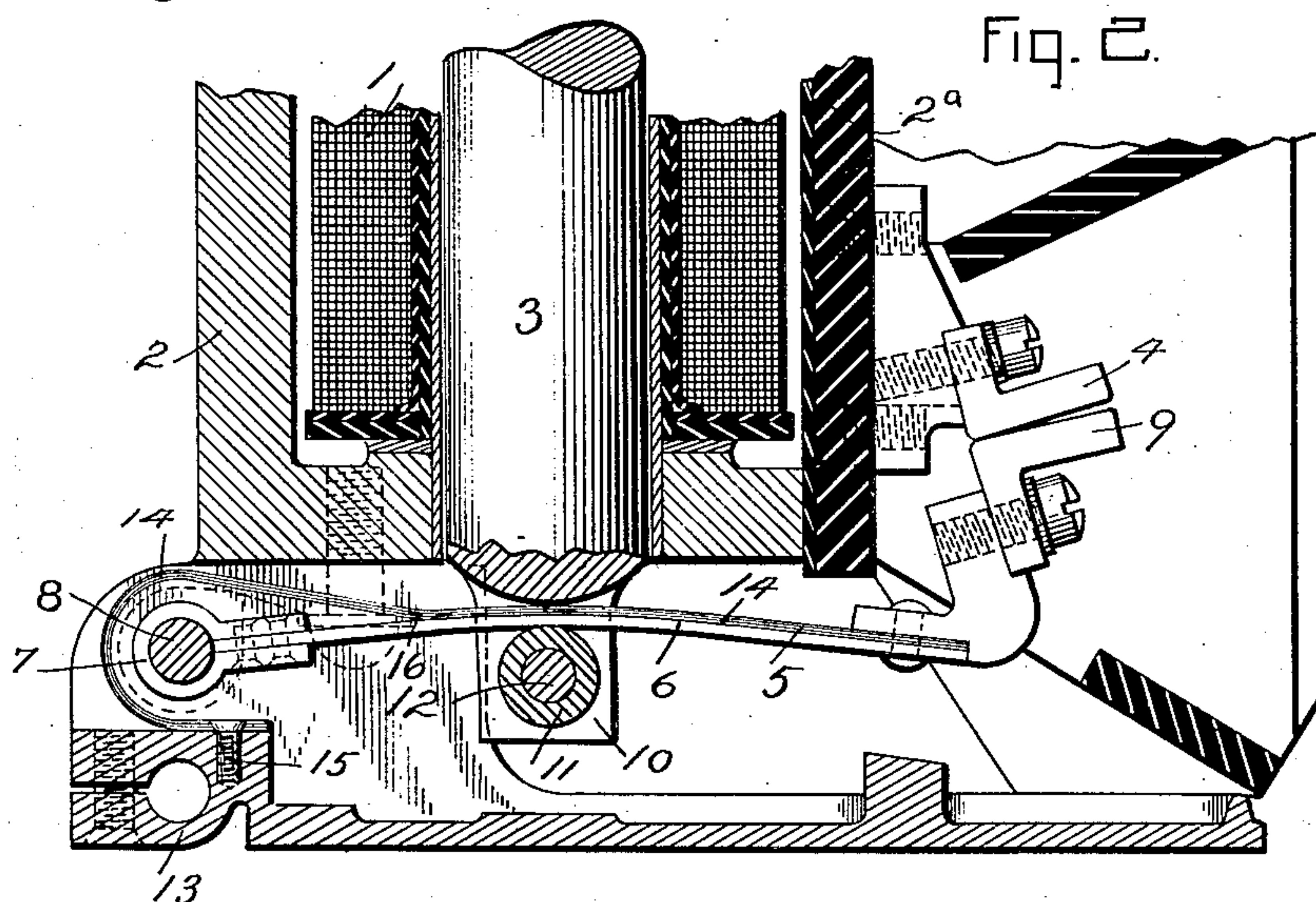
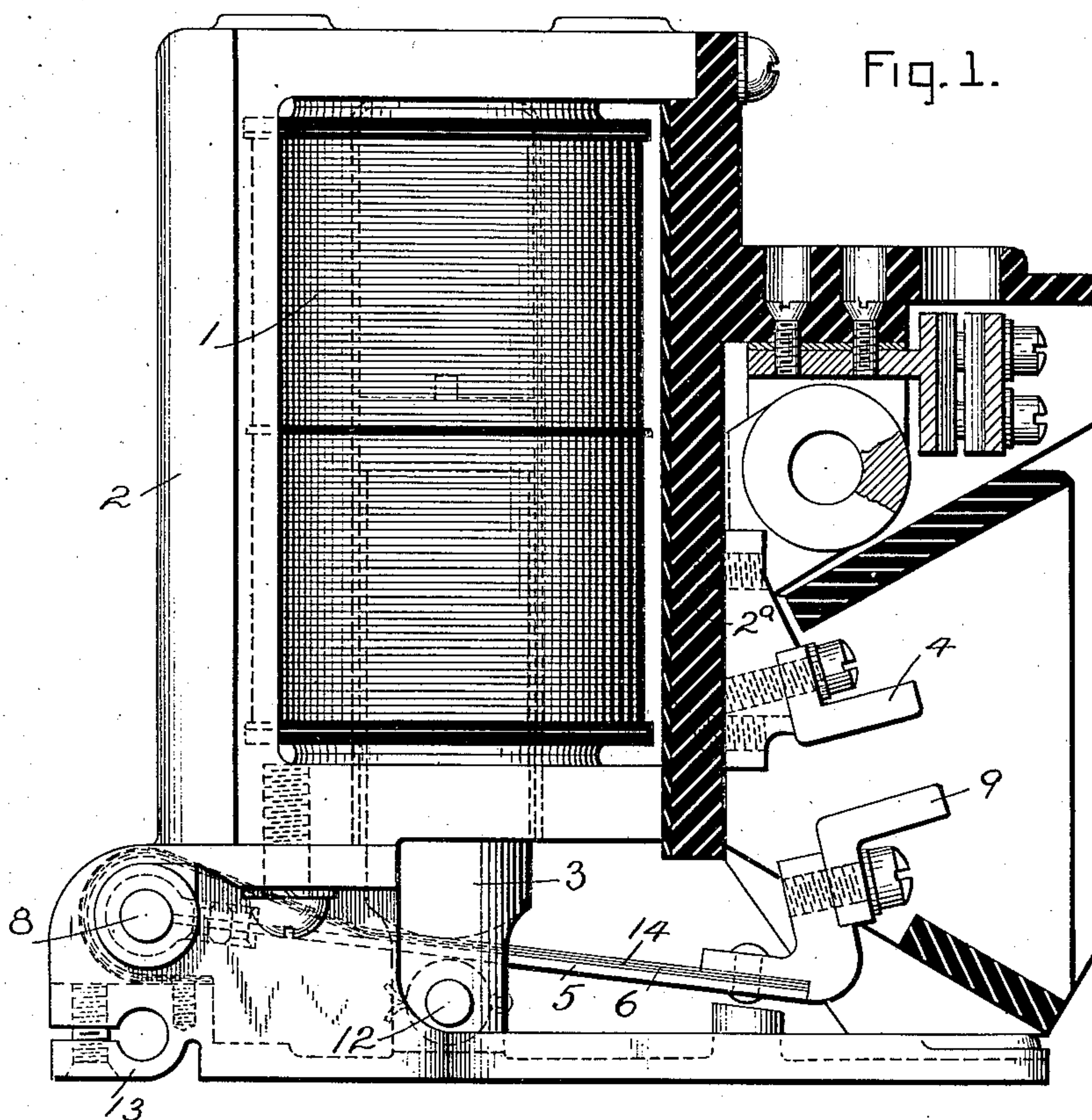


No. 894,645.

PATENTED JULY 28, 1908.

G. H. HILL.  
CONTACTOR.

APPLICATION FILED FEB. 9, 1906.



WITNESSES.

*W. R. Taylor.*  
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Atty.



# UNITED STATES PATENT OFFICE.

GEORGE H. HILL, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## CONTACTOR.

No. 894,645.

Specification of Letters Patent.

Patented July 28, 1908.

Application filed February 9, 1906. Serial No. 300,269.

*To all whom it may concern:*

Be it known that I, GEORGE H. HILL, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Contactors, of which the following is a specification.

The present invention relates to the construction of power-operated switches or contactors, such as are employed in systems of motor control wherein the motor controller is composed of a number of separately-actuated switches or contactors the actuating electro magnets of which are controlled by a master controller. It has long been customary to construct the movable member of such switches of heavy castings connected together by springs for the purpose of permitting the contact tips to be brought into engagement with a sliding motion and to be held together with spring pressure: This involves complicated and expensive construction.

In my prior application, Serial No. 187,287, filed Dec. 31, 1903, I have disclosed a contactor wherein the objections to the old form of contactor arm are obviated by making the movable contactor member of a single strip of spring metal rigidly supported at one end and so proportioned and arranged that proper engagement is made and maintained between the contact tips. This form of arm has the further advantage over the old construction in that, by reason of its lightness, the electromagnet is permitted to lift it more quickly when energized. It has been found, however, that in order to obtain a proper spring pressure between the contacts in this construction, the spring arm should be under tension even when the plunger is in its lowest position; thus largely eliminating the gain in rapidity of action an account of the lightness of the arm. It has further been found that the spring arm sometimes breaks adjacent its point of support after it has been operated a large number of times.

The present invention contemplates a construction wherein the advantages without the disadvantages of my prior contactor are retained, more perfect contact is secured, and the life of the contacts prolonged.

To the above end the present invention consists in the construction and organization of parts to be hereinafter described and particularly pointed out in the claims.

In the accompanying drawing, Figure 1 shows partly in side elevation and partly in section a contactor arranged in accordance with the present invention; and Fig. 2 shows in cross-section a fragment of the contactor in the closed position.

Reference being had to the drawing, 1 represents an electromagnet suitably supported in a frame 2 and having a plunger 3. A contact 4 is supported in the usual way upon a slab of insulation 2<sup>a</sup> at one side of the electromagnet.

5 is the movable member or arm of the contactor and comprises a resilient strip of metal 6 provided at one end thereof with an eye or sleeve 7 through which passes a bolt or shaft 8, thereby forming a pivotal support for one end of the arm. The contact tip 9 is carried upon the free end of the member 6; this tip being adapted to cooperate with the contact 4. The arm 6 passes through a jaw 10 in the lower end of the plunger and rests upon a roller 11 mounted upon a short shaft 12 secured to the members of the jaw. The contact tip 9 is connected to the terminal 13 by means of a group of flexible strips of copper 14; these strips being secured at one end to the tip, forming a loop about the pivotal connection of the arm and having their other end secured to the terminal, as by means of screws 15. In this way the current is carried from the tip to the terminal independently of the contact arm or its pivot, and the material and proportions of the contact arm may be selected so as to make it as light as possible and of a resiliency adapted to give the proper wiping engagement between the contact tips and to hold them together through the proper degree of spring pressure. The conductors 14 may be soldered or otherwise fastened to the member 6 between the tip and a point 16 near the point of support, thus making a compact and secure construction.

The parts are so arranged that in closing the contactor the contact 4 and tip 9 first engage at their extreme outer ends, the tip 9 then wiping across the contact 4 and rocking upon it, until finally contact is made at the inner ends or heels of the contacts and the outer ends are out of engagement with each other. In opening, the wiping and rocking action is reversed, so that the circuit is interrupted at the outer ends of the contacts. Thus the burning of the contacts and the consequent



roughening thereof due to arcing all take place at their outer ends, while the inner portions, at which the circuit is maintained when the switch is closed, remain smooth and clean. While I have shown the cooperating faces of the contacts 4 and 9 as flat, it is obvious that their particular forms are immaterial as long as they permit the wiping and rocking movement above described.

It will be seen that on account of the pivotal support of the contactor arm and its lightness substantially no resistance is offered to the upward movement of the plunger until the contact tips come into engagement with each other. This is advantageous, inasmuch as the plunger is practically without load when the pull thereon is weakest and it is permitted to operate more quickly than has heretofore been possible. At the same time the actual contact is made by a strong wiping and rocking movement and maintained with the desired pressure.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. In an electromagnetic switch, a plunger carrying a strip of spring metal hinged at its one end, a contact on its other end, a cooperating fixed contact, the engaging surface of said first named contact being inclined to the surface of the second named contact, whereby upon the operation of the switch first the outer ends of the contacts engage, and thereafter a rocking action of the first named contact brings the inner ends of the contacts into engagement and separates the tips.

2. An electromagnetic switch comprising a fixed contact, and a movable contact oper-

atively connected with a plunger by a pivoted strip of spring metal, the engaging surfaces of the contacts being inclined to each other and so shaped that the contacts first engage at their outer ends and thereafter at their inner ends through a rocking action of the movable contact.

3. In a power operated switch, a fixed contact, a movable contact member comprising a strip of spring material pivotally supported at one end and a contact tip secured to its free end, the cooperating surfaces of said tip and fixed contact initially engaging one another at their outer ends, and means engaging said strip of spring material for moving the movable contact member about its pivot and bringing the contact tip into engagement with the fixed contact and rocking it thereon until engagement takes place at the inner ends of said tip and fixed contact.

4. In a power-operated switch, a fixed contact member, a movable contact member composed of a strip of spring material pivotally supported at one end and having a contact tip at its free end, a flexible conductor arranged substantially parallel with said strip and having one end connected to said contact tip and its other end arranged in a loop about the pivot of said strip and secured to a fixed terminal, and an electromagnet having its plunger loosely connected to said strip for operating the same.

In witness whereof, I have hereunto set my hand this 8th day of February, 1906.

GEORGE H. HILL.

Witnesses:

BENJAMIN B. HULL,  
HELEN ORFORD.