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E. R. CARICHOFF.
ELECTRIC SWITCH.

(Application filed Feb. 8, 1901.)

(No Model.)

2 Sheets—Sheet 2.

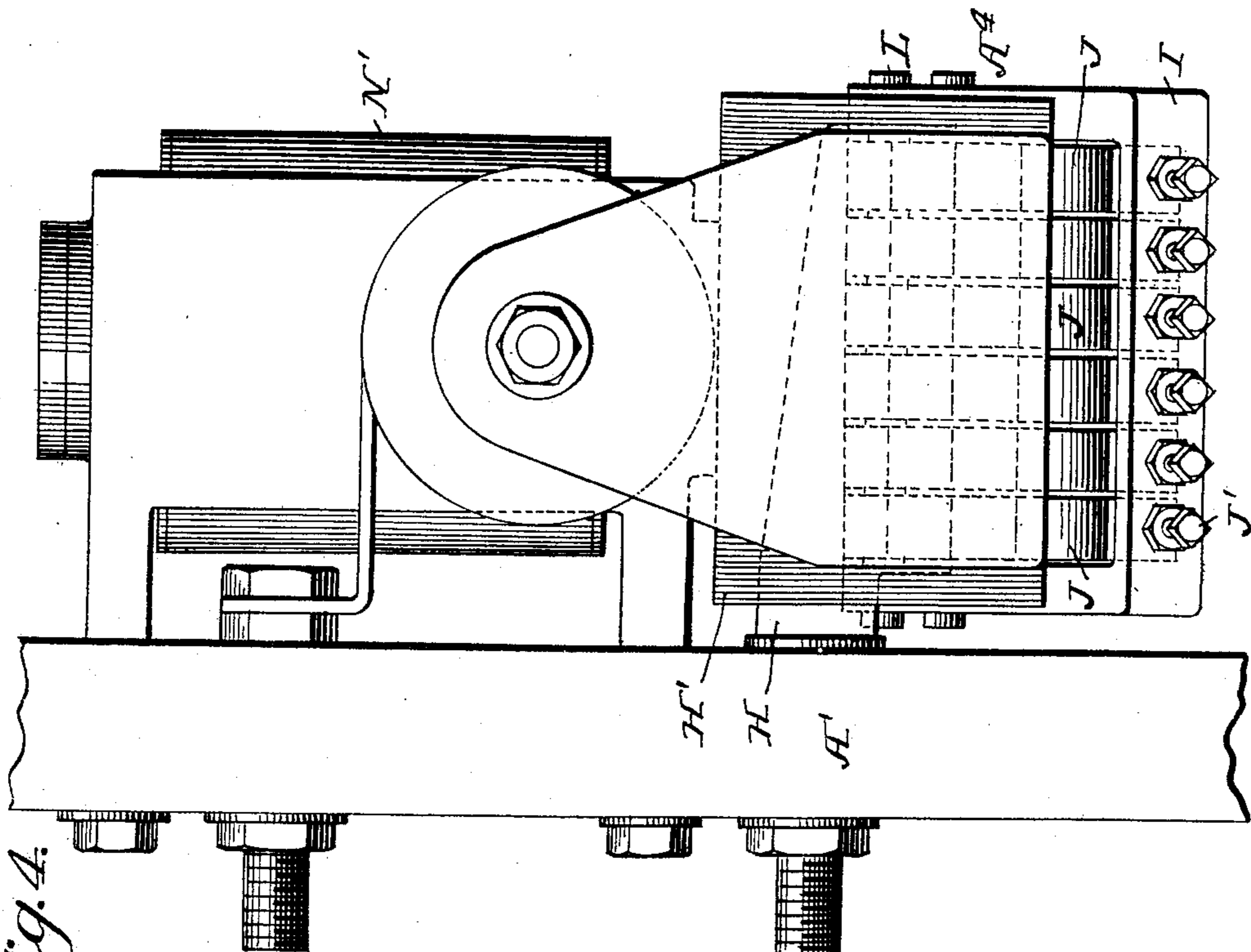


Fig. 4.

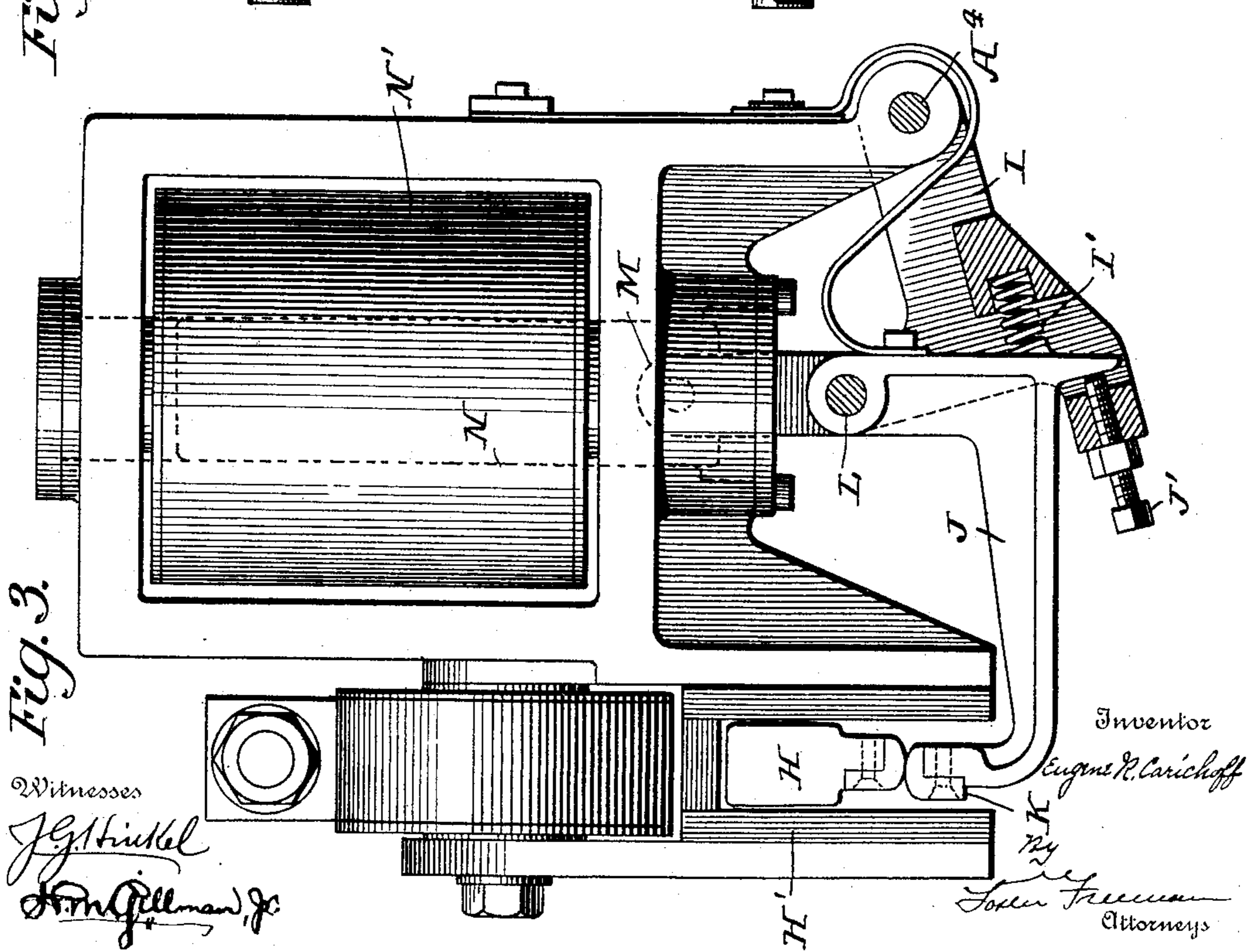


Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 706,527, dated August 12, 1902.

Application filed February 8, 1901. Serial No. 46,564. (No model.)

To all whom it may concern:

Be it known that I, EUGENE R. CARICHOFF, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

My invention relates to electric switches or circuit closers and breakers, and has for its object to improve the construction of such devices; and it consists in a switch embodying the general features of construction and arrangement of parts having the general mode of operation substantially as herein-
after more particularly set forth.

Referring to the accompanying drawings, Figure 1 is a side elevation, partly in section, of a switch embodying my invention. Fig. 2 is a plan view of the same. Fig. 3 is a front elevation, partly in section, of another embodiment of the invention. Fig. 4 is a side view thereof, and Fig. 5 is a detail showing a modification of the operating-lever.

It is a well-recognized fact that the opening and closing of electric switches is usually accompanied by more or less sparking, which tends to oxidize or burn parts of the switch and which interferes with the conductivity of the contacts of the switch. To avoid the objectionable features resulting from such sparking, it is common to employ contacts or terminals which have a sliding movement with relation to each other, which tends to clean or otherwise overcome the disadvantages arising from the sparking. Thus it is common to provide the so-called "knife-switches," in which one of the parts has a relatively long sliding movement with relation to the others after the initial contact is made and before the final contact is broken in opening or closing the switch, and this has proved more or less effective in accomplishing the results desired. In many cases, however, such switches are objectionable, and it is desirable to use what may be called "face-contacts"—that is, contacts where the adjacent faces of the switch are in practically the same plane when the circuit is closed and where, of course, it is impossible to have the

contacts slide by or beyond the initial point of contact, as in knife-switches.

My present invention relates more particularly to switches having what I have termed "face-contacts;" and one of the principal objects of the invention is to provide a simple and effective switch whereby the contacts can have a sliding motion with relation to each other after the initial contact has been made and preferably before the final contact is broken; and other objects of my invention are to so construct and arrange the parts that what may be termed the "holding" or "bearing" points of the contacts when the circuit is closed will be at a different part of the contacts from that at which the sparking occurs in making or breaking the contact, so that there will be fresh and clean surfaces at what I have designated as the "holding" portions of the contacts, and the least possible resistance will be offered to the passage of the electric current, and a more perfect contact will be attained when the switch is closed. These features are especially applicable to switches carrying currents of relatively large volume and where there is likely to be destructive sparking in the operation of the switch.

It is evident that my invention may be employed with switches having two terminals or contacts; but I have chosen to show it embodied in a switch having a plurality of contacts for each terminal of the electric circuit. One terminal (whether of a single or a plurality of contacts) may be fixed or movable within certain limits, while the other terminal (whether of a single or a plurality of contacts) is movable into and out of contact with the first contact or terminal, and various devices may be used to operate the movable contact or terminal, as manual, electrical, mechanical, or other devices. The movable contact or terminal is supported upon a jointed carrier shown in the present instance in the form of a toggle in which there are two parts joined together, one of the parts being mounted upon a suitable support and the other part carrying the contact or contacts, and the parts are so arranged that they normally tend to assume a certain

position with relation to each other, being under the stress of gravity or other force, as a spring shown at one side of the point of jointure of the parts of the contact-carrier, and
 5 there are means for moving the carrier so as to bring the contact or contacts forming the terminal carried thereby against the contact or contacts forming the other terminal of the circuit and to further change the relations of
 10 the contacts or terminals subsequent to their initial contact. These features will be more clearly understood by reference to the specific embodiments of my invention herein-after described.

15 Referring to the embodiment illustrated in Figs. 1 and 2, there is a suitable base A, having an upright A', which may be of any suitable material, but preferably of insulating material, as slate, and supported in this up-
 20 right is a contact-carrier B', supporting the contact B, and in the present instance this contact-carrier is secured in a fixed position with relation to the upright, as by a binding-screw B², to which one of the conductors of
 25 the circuit is connected in any usual way. It is understood, of course, that the contact-carrier B' may of itself constitute a contact or terminal; but I prefer to provide a separate contact or contacts B, which can be se-
 30 cured to the contact-carrier in any suitable way, as by the screws b' b', which have contact-faces b b, the bearing portions b preferably having slightly-curved or substantially flat surfaces. The contact-carrier B' in this
 35 instance is shown as made of conducting material and as having a single binding-screw B²; but it is evident that it could be made in sections and there be a separate binding-screw for each section, as indicated in dotted
 40 lines, Fig. 2. Also mounted on the base are standards A², which may be of any suitable material and which in the present instance support a shaft A³. Mounted on this shaft
 45 A³ is one member of the jointed contact carrier or toggle, and in the present instance I have shown this member in the form of a frame C, pivotally mounted on the shaft and provided with means for connecting it with
 50 the other member D of the jointed carrier, and in the present instance I have shown a rod C' for this purpose, upon which is pivotally mounted the other member, shown in the form of a plurality of parts D D. This
 55 other member D, whether of one or a plurality of parts, carries or supports at one end a contact or contacts E, and it is so connected with the member C that it is normally under stress to preserve a certain definite relation thereto. While this may be at-
 60 tained by gravity in certain forms of the device, in the present form I have shown a spring or springs F, mounted in a recess C² in one member and bearing upon the end D' of the other member and tending to cause the
 65 portions C³ and D³ of the respective members to approach each other, and this movement may be limited by any suitable means, as by

a stop or set screw D². One terminal of the electric circuit may be connected to the binding-post C¹, as indicated in Fig. 1, or there
 70 may be a number of circuits connected to each of the parts D by means of binding-screws D¹, as indicated in Fig. 2. Some suitable means must be provided for operating the movable contact-carrier, and in the present instance I
 75 have shown a rod G, connected to the member C and having collars g g, and this may be operated by hand or any mechanical or electrical device. The contacts B and E are preferably so arranged that when they are brought
 80 into initial contact, as shown in full lines in Fig. 1, the first contact will not be at the common center of the two contacts, but will be at the side of a vertical line passing
 85 through their two centers, and when the movable contact-carrier is moved farther the parts will assume the positions indicated in dotted lines, and this will result in causing the
 90 contact E to rotate slightly and to move over the surface of the contact B toward the right and away from the initial points of contact
 95 between the contacts, so that what may be termed the "holding-points of contact" are away from the initial points of contact, and this is the result of a sliding or lateral and
 100 rotating movement of the contact E along the face of the contact B, so as to present a new or clean surface for the holding-points of contact in contradistinction to the initial points
 105 of contact. When the circuit is to be broken and the movable carrier is moved so as to separate the contacts, the first action will be a rotating and sliding outward of the contact
 110 E along the face of the contact B, due to the tendency of the members of the movable carrier to assume a certain relation to each other, as under the influence of the spring F
 115 in the present instance, and then the circuit is broken by the entire separation of the contacts, and the sparking (if any occurs) will
 120 be at a point away from and at one side of what has been defined as the "holding-points of contact." It will be seen that the members C and D constitute a toggle-acting carrier, and, in fact, the members are the two
 125 levers of a toggle, one of the members, as C, being pivoted, as on the shaft A³, while the other member, as D, has a bearing on the contact B, and the point of union of the two members at the rod C' is moved, as by the
 130 rod or handle G, and this point of union is preferably located out of a right line extending between the contacts B and E and the shaft A³, and therefore a true toggle action is obtained and also a sliding and a ro-

135 tating action of one contact upon the other, both on making and breaking the circuit.
 In the embodiment illustrated in Figs. 3 and 4 the general principles of construction are the same, and the terminal H, which may
 140 consist of one or more contacts, is mounted on the upright A', and in the present instance is surrounded by insulating material H'. The movable carrier in this instance is composed

of two members I J, I being pivotally mounted on a shaft A⁴ and the member J carrying a contact K, and the two members are pivotally united by a shaft L. There is a spring I',
 5 mounted on the member I and holding the member J under stress, and there is an adjusting-screw J' for limiting the relative motion of the parts in one direction, and in this instance the movable carrier is operated by a connection M with the core N of a solenoid N'.

In the modification shown in Fig. 5 the parts are substantially the same as in Figs. 3 and 4, except that the shaft L is arranged below a line passing through the points of contacts H and K and the shaft A⁴, while in Fig. 3 this shaft is arranged above such line. The result of this change of pivot is that instead of contact K sliding inward over the face of
 15 the contact H and toward the shaft L as the said shaft is moved upward the contact K slides outward over the face of the contact H as the shaft L is moved upward.

These constructions are sufficient to enable
 25 those skilled in the art to utilize my invention and accomplish the results desired, and it will be seen that my invention is not limited to the particular details of construction or arrangement of parts set forth, it only being
 30 necessary that the parts shall be such and so arranged that they will carry out the general mode of operation described.

It will be seen that in all cases the movable contact-carrier when operated to close the
 35 circuit will first initially close the circuit between one of the contacts and a portion of the other at what I have defined as the "initial points of contact," and that a further movement of the movable carrier will cause
 40 one contact to bodily rotate slightly about the other contact and to slide over the face of said contact clear of the portion of the same upon which circuit was initially closed to present a fresh surface, which shall be the
 45 holding-points of contact, and when the circuit is broken the reverse movement takes place, and the result is that there is always a fresh clean surface on the adjacent faces of the contacts which will present the least op-
 50 position to the passage of the electric currents between or through them. It will be seen that the springs interposed between the members D and the carrier C also tend to soften the blow when the contacts E and B are brought
 55 together and likewise permit all the contacts E to make good connection with contact B.

Without limiting myself to the particulars described, what I claim is—

1. An electric switch or circuit-closer comprising a contact constituting one terminal of a circuit, a second contact constituting the other terminal of the circuit, and a movable
 60 jointed contact-carrier supporting the said second contact, means for moving said carrier to initially close the circuit between the second contact and a portion of the first contact, and means for subsequently rotating

the second contact bodily about the first contact on the face of the same, and simultaneously therewith sliding said second contact
 70 along the face of the first contact to a new portion of the face of the same entirely clear of the portion of said face upon which circuit was initially closed, substantially as described.

2. An electric switch or circuit-closer comprising two contacts, a contact-carrier supporting one of the contacts, and means for operating the same to initially close the circuit between the contact supported by the
 80 carrier and a portion of the other contact, and means for subsequently rotating the contact supported by the carrier bodily about the other contact on the face of the same and simultaneously therewith sliding said contact
 85 supported by the carrier along the face of the other contact to a new portion of the face of the same entirely clear of the portion of said face upon which circuit was initially closed, substantially as described.

3. An electric switch or circuit-closer, comprising a circuit-terminal having a contact-piece, another circuit-terminal having a second contact-piece, a toggle-acting contact-carrier for the second contact, means for moving
 95 said carrier to initially close the circuit between the second contact and a portion of the first contact, means for subsequently sliding the second contact along the face of the first contact to a new portion of the face of the same
 100 entirely clear of the portion of said face upon which circuit was initially closed, and means for maintaining the circuit closed upon said new portion of the face, substantially as described.

4. An electric switch or circuit-closer, comprising two contacts, a contact-carrier for one of the contacts including two members joined together and normally under stress applied
 110 by means acting at one side of the point of jointure tending to hold the members in certain relations to each other, and means on one of the members for limiting the relative movement of the members in one direction, substantially as described.

5. An electric switch or circuit-closer, comprising two contacts, a contact-carrier for one of the contacts including two members joined together, one of which members is
 120 pivotally mounted and the other of which members supports a contact, and means acting at one side of the point of jointure tending to hold the members in certain relations to each other, and means on one of the members for limiting the relative movement of
 125 the members in one direction, substantially as described.

6. An electric switch or circuit-closer, comprising two contacts, a contact-carrier including two members joined together and a
 130 spring interposed between the members to one side of the point of jointure tending to hold them in certain relations to each other, and means on one of the members for limiting the

relative movement of the members in one direction, substantially as described.

7. An electric switch or circuit-closer, comprising two contacts, a contact-carrier including two members joined together, a spring interposed between the members at one side of the point of jointure tending to hold them in certain relations to each other and to soften the blow when the contacts come together, and a stop to limit such tendency, substantially as described.

8. An electric switch or circuit-closer, comprising two circuit-terminals, a toggle-acting carrier for one of the terminals, means for moving said carrier to initially close the circuit between one of the terminals and a portion of the other, means for subsequently sliding said terminal along the face of the other to a new portion of the face of the same entirely clear of the portion of said face upon which circuit was initially closed and means for maintaining the circuit closed upon said new portion of the face, substantially as described.

9. An electric switch or circuit-closer comprising two contacts, one of which is relatively fixed and the other movable, a contact-carrier for said movable contact, including two members, one of which is pivotally mounted and the other of which supports a contact, means for moving said carrier to initially close the circuit between the movable contact and a portion of the relatively fixed contact, and means for subsequently sliding the second contact along the face of the first contact to a new portion of the face of the same, entirely clear of the portion of said face upon which circuit was initially closed and means for maintaining the circuit closed upon said new portion of the face, substantially as described.

10. An electric switch or circuit-closer comprising two contacts, one of which is relatively fixed and the other movable, a contact-carrier for said movable contact including two members one of which is pivotally mounted and the other of which supports the contact, electromagnetic means for moving said carrier to initially close the circuit between the

movable contact and a portion of the relatively fixed contact means for subsequently sliding the movable contact along the face of the relatively fixed contact to a new portion of the face of the same entirely clear of the portion of the said face upon which circuit was initially closed, substantially as described.

11. An electric switch or circuit-closer, comprising a plurality of relatively fixed contacts constituting one terminal or terminals of an electric circuit, a plurality of movable contact-carriers or contacts constituting the other terminal or terminals of the electric circuit, each of said contact-carriers being pivoted to a movable member, means for moving said contact-carriers to initially close the circuit between the movable contacts and portions of the relatively fixed contacts, means for subsequently sliding the movable contacts along the faces of the relatively fixed contacts to new portions of the faces of the same entirely clear of those portions of said faces upon which circuit was initially closed, and means for maintaining the circuit closed upon said new portions of the faces, substantially as described.

12. An electric switch or circuit-closer comprising two contacts, one of which is relatively fixed and the other movable, a contact-carrier for the movable contact, means for operating the same to initially close the circuit between the movable contact and a portion of the relatively fixed contact means for subsequently sliding the movable contact along the face of the relatively fixed contact, to a new portion of the face of the same entirely clear of the portion of said face upon which circuit was initially closed, and means for maintaining the circuit closed upon said new portion of the face, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EUGENE R. CARICHOFF.

Witnesses:

H. R. MARSDEN,
E. W. MARSHALL.