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PATENTED AUG. 21, 1906.

C. J. KLEIN.
CIRCUIT MAKER AND BREAKER.

APPLICATION FILED AUG. 6, 1904.

2 SHEETS—SHEET 1.

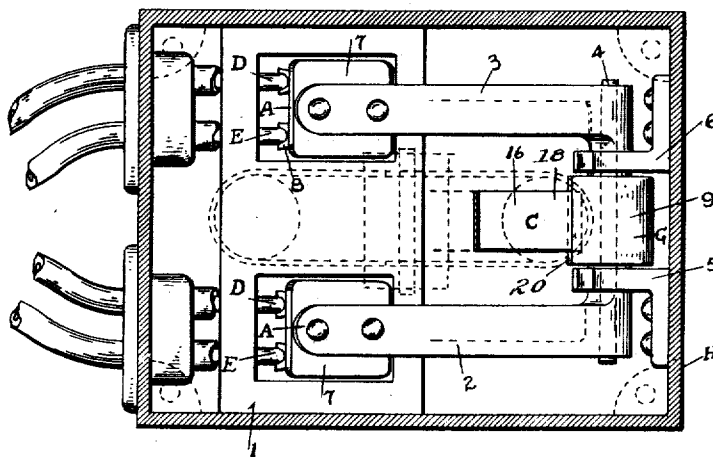


Fig. 2.

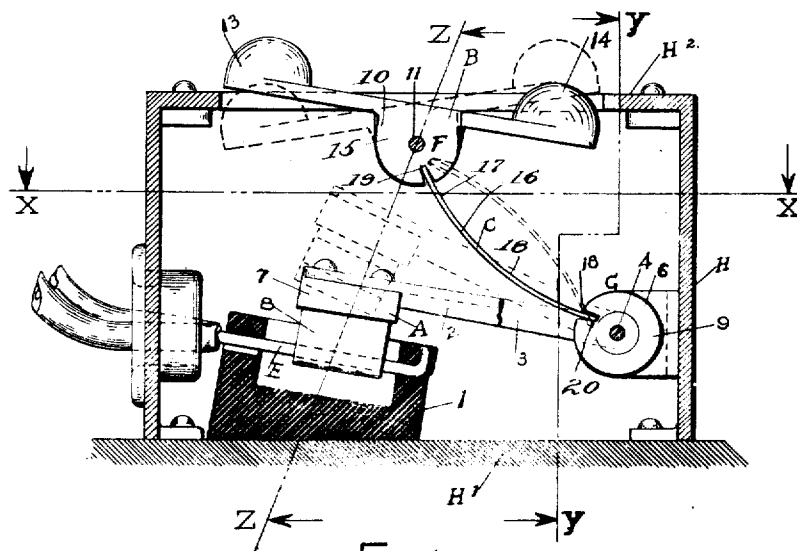


Fig. 1.

Witnesses
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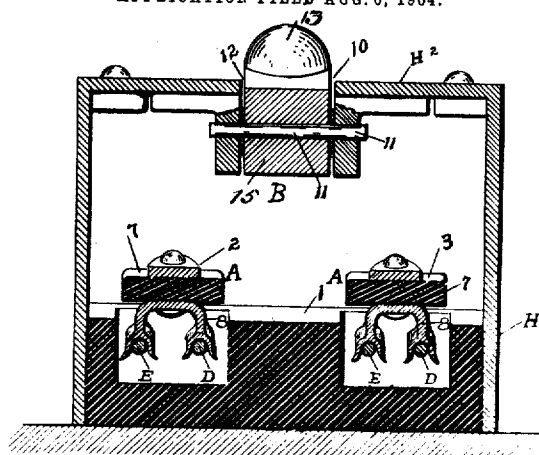


Fig. 4.

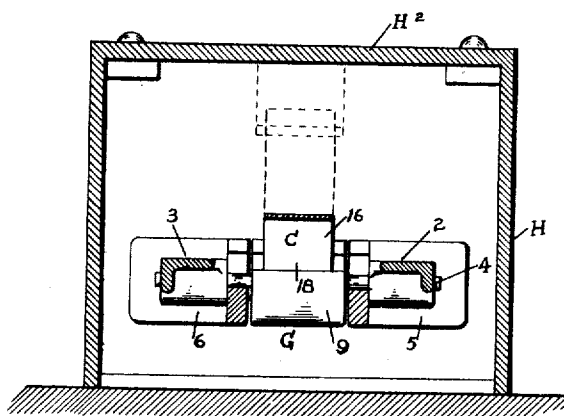


Fig. 3.

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UNITED STATES PATENT OFFICE.

CHARLES J. KLEIN, OF NEW YORK, N. Y., ASSIGNOR TO RALPH A. SCHOENBERG, OF NEW YORK, N. Y.

CIRCUIT MAKER AND BREAKER.

No. 829,162.

Specification of Letters Patent.

Patented Aug. 21, 1906.

Application filed August 6, 1904. Serial No. 219,795.

To all whom it may concern:

Be it known that I, CHARLES J. KLEIN, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented a new and useful Improvement in Circuit Makers and Breakers, of which the following is a specification.

This invention relates to electrical circuit makers and breakers; and it has for its object to provide improved mechanism or apparatus of this class which will be superior in point of simplicity and inexpensiveness of construction, positiveness of operation, compactness of form, durability, and general efficiency.

In the drawings, Figure 1 is a vertical longitudinal sectional view of a circuit maker and breaker embodying the improvements. Fig. 2 is a horizontal transverse sectional view of the same, taken upon the line *xx* of Fig. 1 looking in the direction of the appended arrow. Fig. 3 is a vertical transverse sectional view taken upon the line *yy* of Fig. 1 and looking in the direction of the appended arrow, and Fig. 4 is a detail transverse sectional view taken upon the line *zz* of Fig. 1 and looking in the direction of the appended arrow.

Corresponding parts in all the figures are denoted by the same reference characters.

Referring with particularity to the drawings, the improved circuit maker and breaker embodies a contact member A, an actuating member B, and a tension member C, interposed between the actuating member B and the contact member A and through the instrumentality of which tension member C the contact member A is actuated by the actuating member B to make or break an electrical circuit through circuit members or wires D and E, respectively. The contact member A is so operatively connected with the tension member C and the tension member C is so operatively connected with the actuating member B that when the actuating member B has been brought into operation to cause the tension member C to bring the contact member A into circuit-making position, as illustrated in full lines in Fig. 1, the members A and B are maintained positively in the positions resultant upon such actuation until the actuating member B is again brought into play to cause the tension member C to

break the contact of the contact member A and the circuit members D and E and bring the contact member A into the non-contacting position, (shown in dotted lines in Fig. 1,) which member A, together with the member B, is maintained by the tension member C in the then resulting position until the further employment of the actuating member B. The actuating member B is movably mounted, as at F, and the contact member A is movably mounted, as at G.

A preferred form of construction of the improved circuit maker and breaker above described in general is as follows: In such preferred construction for the specific purpose of setting forth the use of the improvements for the simultaneous making and breaking of two electric circuits there are shown in the drawings two circuit members or wires D and two circuit members or wires E and two contact members A, arranged and adapted for use in connection, respectively, with the two sets of circuit members or wires D and E, said sets of circuit-wires D and E being arranged in convenient proximity, as clearly shown in Fig. 2. In a convenient and compact form of embodiment of the improvements the members A, B, C, D, and E are arranged within and connected with a suitable box or casing H, at one end of which are received in an insulating-housing or chambered block 1 of insulating material the two sets of circuit-wires D and E, the latter being properly bared for direct contact by the contact members A. At the other end of the box or casing H at G are pivotally supported the contact members A, which members are carried, respectively, upon arms 2 and 3, mounted to oscillate in a vertical plane, the inner ends of said arms being fixed to the opposite ends of a rock-shaft 4, supported in suitable bearings 5 and 6, respectively, connected with the casing H. Each of the contact members A comprises a block 7 of insulating material, carried at the outer end of one of the arms 2 and 3 and a contact-piece 8 of electrical conductivity, which is fixed to the insulating-block 7 and formed to contact with and complete an electrical circuit through the circuit-wires D and E. The block 7 and the contact-piece 8 may be of any preferred suitable form to obtain the best electrical contact with the circuit-wires and enable the most desirable making and breaking of the

electrical circuit. The housing 1 for the circuit-wires D and E is arranged in the proper plane to permit the contact with the two sets of circuit-wires D and E of the contact members A, respectively, said contact members, with their supporting-arms 2 and 3, being preferably arranged in spaced parallel relation, as clearly shown in Fig. 2.

The shaft 4 is provided intermediate of the bearings 5 and 6 with a hub 9, at which point the operative connection of the tension member C with the contact members A is effected. The actuating member B is arranged at the top of the casing H, considering the member H' as the bottom member of said casing and the member H² as the top member of said casing, and said actuating member B comprises a pivotally-supported body 10, which is thus pivotally supported intermediate of its ends, as at 11, for oscillation within an elongated opening 12, formed longitudinally of the top member H² of the casing, said body 10 being provided at each end with a separate finger piece or button 13 and 14, respectively, by means of which buttons the body 10 may be rocked or oscillated in a vertical plane. The body 10 at its point 11 of pivotal support is formed or provided with a hub or enlargement 15, at which point is effected the operative connection of the actuating member B with the tension member C.

The tension member C consists of an elongated flat or plate spring 16, or of an elongated plate-spring the tensional influence or quality of which tends to the maintenance of said spring in a flat condition, said spring 16 bearing operatively at one end 17 in connection with the hub 15 of the body 10 of the actuating member B. The spring 16 bears operatively at its other end 18, in connection with the hub 9, upon the shaft 4. To the end of thus associating the spring 16 in operative connection with the hub 15 and the hub 9 the hub 15 is provided with a slot 19, formed radially in said hub 15 with respect to the axis of oscillation of the body 10, and the hub 9 is provided with a slot 20, formed radially with respect to the axis of the shaft 4, and the end 17 of the spring 16 is received within the slot 19, the end 18 of the spring 16 being received within the slot 20. The spring 16 is formed of a predetermined length greater than the measurement of a straight line drawn from the inner point of termination of the slot 19 to the inner point of termination of the slot 20. It results from this proportioning of the length of the spring 16 that the same can never extend in a flat plane between the hub 15 and the hub 9 and that when against its inherent resilience it is forced from a bowed or curved condition at either side of such flat plane it will assume a bowed or curved condition at the other side of such flat plane, such bowed or curved condition being proportionate to

the length of the spring 16, or, in other words, being such as required for the accommodation of the total length of said spring between the inner points of termination of the slots 19 and 20, and it is manifest that in thus forcing the flexion of the spring 16 to either side of the flat plane aforesaid the hubs 9 and 15 will follow the direction of flexion of said spring, carrying with them in pivotal movement, respectively, the arms 2 and 3 of the contact members A and the body 10 of the actuating member B. The form of the slots 19 and 20 being such as to closely or snugly receive the ends 17 and 18, respectively, of the spring 16, this movement of the contact member A and the actuating member B necessarily accompanies the said flexion or buckling of the spring 16, and it furthermore follows that as this flexion or buckling of the spring 16 may be effected by the application of force at either end of said spring the oscillation of the body 10 of the actuating member B will, because of the operative connection of the spring 16 therewith, cause the oscillation of the shaft 4 and the accompanying oscillation of the arms 2 and 3 of the contact members A. The alternate application of pressure upon the buttons 13 and 14 of the body 10 of the actuating member B will therefore cause the alternate movement of the arms 2 and 3 and the contact members A in opposite directions or for the purpose herein involved to alternately make and break contact with the two sets of circuit-wires D and E. The length of the spring 16 with respect to the shortest distance between the inner points of termination of the slots 19 and 20 thus determines the extent of buckling or flexion of the spring 16, and consequently the extent of oscillation of the shaft 4, the arms 2 and 3, and the contact member A, and the circuit-wires D and E are arranged in proper positions to receive and contact with the contact members A in the circuit-making movement of said contact members A, so that the said contact or contacts shall be maintained under positive tension of the spring 16.

From the above it is manifest that the rocking or oscillation of the body 10 of the actuating member B by application of pressure alternately to the buttons 13 and 14 will cause the alternate flexion or buckling of the spring 16 into oppositely-bowed conditions and the simultaneous movement of the contact members A alternately into and out of position of contact with the circuit members or wires D and E. Furthermore, it is manifest that after the flexion or buckling of the spring 16 into either of its oppositely-bowed conditions the contact member A and the actuating member B will be maintained in the positions assumed in their movements accompanying such flexion or buckling until by ensuing flexion or buckling of the spring 16 by the

actuating member B the alternate positions of the parts and members are permitted.

The operation, advantages, and method of use of the improvements in circuit makers and breakers will be readily understood from the foregoing description, taken in connection with the drawings and the following statement.

The casing H with its contents, comprising the members and features of the improvements, including the circuit members or wires D and E, are adapted for installation in any preferred manner and in connection with any related electrical apparatus. When one or both of the two sets of circuit members or wires D and E is or are electrically connected with any desired and suitable apparatus, the condition of circuit through the same may be established and controlled by the manual manipulation of the actuating member B by means of the finger-pieces 13 and 14, the depression or inward movement of the finger-piece 14 bringing the members into the positions shown in full lines in Fig. 1, in which positions of the members and features closed electrical circuits are established and maintained through the two sets of circuit members or wires D and E. The depression of the finger-piece 13 results in bringing the members and features into the positions indicated in dotted lines in Fig. 1, and when the members and features are in such latter positions open electrical circuits are caused to exist through the two sets or series of circuit members or wires D and E. The bowing or lateral deflection of the spring 16 of the tension member C, resultant upon depression of either of the finger-pieces 13 or 14, as above stated, maintains the members and features in the positions assumed consequent upon such respective depressions of said finger-pieces, the end portions 17 and 18 of the spring 16 being caused to occupy positions jointly in a plane in one instance at one side of the pivotal centers of the actuating member B and the shaft 4 and in the other instance in a plane at the other side of such pivotal centers and such end parts 17 and 18 of the spring 16, when the latter is in bowed condition, bearing under tension, respectively, upon the hubs 15 and 9.

The application of force upon one end of the spring 16, constituting the tension member C, causes a quick and positive flection of said spring and a consequent quick and posi-

tive make or break of the electrical circuit with all the well-known attendant advantages. The spring 16 is necessarily but slightly bowed from its longitudinal extension in a flat plane, and thus its inherent resilience is not overtaxed, weakening of such spring being thus substantially obviated.

The direct operative connection of the actuating member B and the contact member or members A through the instrumentality of a tension member such as the spring 16 dispenses with the use of any purely power-transmitting devices with their attendant loss of motion and lack of positiveness of operation. It will also be noted that the members and features of a device comprising the improvements are simple and inexpensive in construction and that none of the same are liable to be subject to material wear and tear, with the possible exception of the spring 16, which may readily be substituted for after extended use by a fresh spring element.

I do not desire to be understood as limiting myself to the specific construction, relative arrangement and association of members and features as herein disclosed and set forth, but reserve the right to vary the same in adapting the improvements to varying conditions of use without departing from the the spirit of the invention or the terms of the following claim.

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

Apparatus of the character described, comprising a pivotally-supported contact member for making and breaking an electrical circuit; a pivotally-supported actuating member; and a tension member consisting of an elongated spring operatively connected at its ends respectively with said contact member and said actuating member adjacent to the points of pivotal support of said contact member and said actuating member; said spring being permanently buckled and arranged to be buckled oppositely by said actuating member to force said contact member into varied pivotal positions.

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

CHARLES J. KLEIN.

Witnesses:

P. I. BLAKESLEE.

J. H. CLEARY.