June 17, 1930. R. C. VAN SICKLE 1,764,369

CIRCUIT INTERRUPTER

Filed May 19, 1928

Fig. 1.

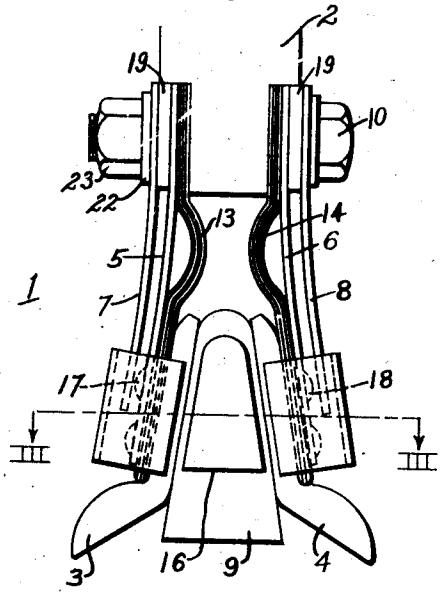


Fig. 2.

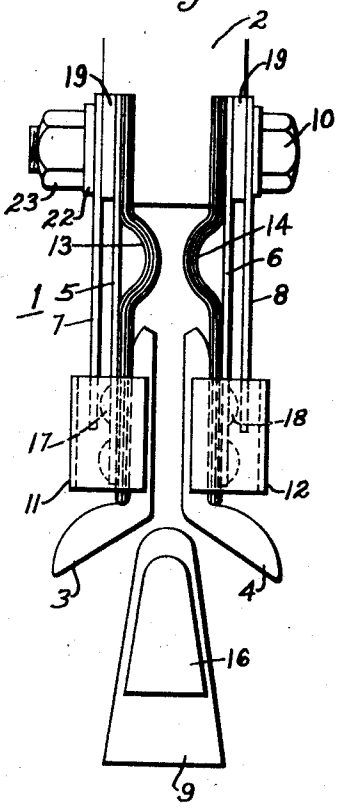
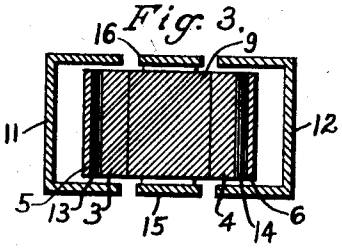


Fig. 3.



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UNITED STATES PATENT OFFICE

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CIRCUIT INTERRUPTER

RECEIVED

Application filed May 19, 1928. Serial No. 278,938.

My invention relates to circuit interrupters and more particularly to the contact members thereof.

It is well known in the electrical art that a current, when passing through parallel conductors, will produce a flux thereabout that causes the parallel conductors to be drawn toward each other.

It is one object of my invention to provide means associated with a pair of parallel contact fingers that shall act to draw them tightly against the co-operating contact surface to insure a good electrical contact therewith.

It is a further object of my invention to provide contact fingers and a bridging member with which they cooperate with means that will increase the contact pressure in a direct proportion to the amount of current flowing through the circuit.

These and other objects that may be made apparent throughout the further description of my invention are attained by means of the apparatus hereinafter described and illustrated in the accompanying drawings, wherein:

Figure 1 is a view, in elevation, of a particular form of contact member embodying my invention and shown in closed position.

Fig. 2 is a view, similar to Fig. 1 but showing the contact member in open position, and

Fig. 3 is a sectional view of the embodiment of my invention shown in Fig. 1, taken along the line III—III.

My invention comprises, in general, a contact member 1 that is supported on the end of a terminal stud 2 and comprises terminal members 3 and 4 that are supported on spring members 5 and 6 bolted to the conductor member 2 by the bolt 10. Spring members 7 and 8 are employed to bias the contact members 3 and 4 against a wedge-shaped conducting member 9 in order to make suitable contact therewith.

When this type of finger is employed on a circuit interrupter designed for heavy currents, increased pressure on the contact member must be provided in order to reduce the potential drop in the junction to a minimum. It is found that, when the spring members 5, 6, 7 and 8 are made larger and heavier in order to increase this contact pressure, the terminals 3 and 4 will lose their flexibility, and poor contact between the abutting surfaces will result. Poor contact is also experienced with terminals of this type when one of the fingers has been bent away from the other because of poor alignment or loose motion in the moving members causing the finger to be stressed beyond its elastic limit.

Many arrangements have been employed to assure good pressure and contact on the surface of such finger-type contacts as are here shown. These structures have, however, all proved costly and ineffective. In accordance with my invention, I employ U-shaped iron members 11 and 12, disposed about the terminal members 3 and 4 and forming a magnetic path for the flux which surrounds the flexible conducting shunts 13 and 14 when the current is flowing therethrough. Iron plates 15 and 16 are fastened to each side of the wedge member 9, and the sides thereof lie parallel to the tapering side of this member. The U-shaped iron members 11 and 12 are so mounted that the side portions thereof have their surfaces parallel to the surface of the terminals 3 and 4.

The air gaps between the U-shaped members 11 and 12 and the iron plates 15 and 16 are of the same width along their entire length because of the parallel arrangement of these iron members. By this arrangement, I obtain the same pressure between the surfaces of the terminal members 3 and 4 and the wedge member 9 when the wedge 9 is completely or only partially forced between the terminal members 3 and 4. The air gap between the iron members remains the same along the entire path of travel of the wedge member 9 so that the same pressure between the latter and terminal members 3, 4 is produced in all of its positions.

When employing my magnetic circuit, the contact member 1 is assembled in the same way as those heretofore employed in the art. The terminal members 3 and 4 are attached to the shunts 13 and 14 and the spring members 5 and 6 by rivets 17 and 18. The mag-

netic circuits 11 and 12 are next riveted to the contact members 3 and 4, and the whole assembly mounted on the contact member 2 by the bolt 10. The spring members 7 and 8, along with spacers 19 and 19, are also mounted on the bolt member 10 and all are clamped into a solid structure by a washer 22 and nut 23.

I have found that, on a pair of contact members similar to those here shown, having each air gap one-eighth of an inch wide, the force on each finger per square inch of iron cross-section is approximately $1.09\ I^2 \times 10^{-6}$ pounds. It will be evident that, when a greater force is required for a given current, the cross-section of the iron members 11, 12, 15 and 16 may be increased. By such means as will be evident, any pressure may be obtained on the working face of a contact member by properly proportioning the magnetic circuits to the current flowing in the contact

It will thus be seen that I have provided for an increased pressure on the terminal of the finger or parallel-path type contact member by employing an iron circuit surrounding the portions of the contact member that abut against cooperating contact member. By locating my iron members so that their abutting surfaces are parallel to the abutting current-carrying surfaces, the same pressure is obtained for various positions of the bridging member relative to the terminal members. This construction results in causing the contact members to produce a greater pressure on the abutting contact surfaces when a greater current is flowing in the line and this pressure increase is proportional to the increase of current until the magnetic circuit becomes saturated.

My invention is further novel in that it makes possible an increaced pressure at the abutting surfaces of the contacts by increasing the cross-sectional area of the said magnetic circuit.

It is to be understood that such changes in the form, arrangement and connection of the component parts of my invention may be made as shall fall within the scope of the appended claims.

I claim as my invention:

1. A parallel-path contact member, a cooperating member therefor and a loop of iron about the contact member and the cooperating member forming a magnetic path about the point of contact between the said members for drawing them into more intimate current-carrying relation.

2. A pair of contact members forming a parallel path for a current to be interrupted, a member cooperating therewith and a magnetic circuit formed about said members to draw the current carrying portions into more intimate engagement.

3. The combination with a pair of finger contacts and a wedge-shaped contact member cooperating therewith, of a magnetic circuit formed by iron members associated with the finger contacts and the wedge-shaped member to draw them together when current is passing therethrough.

4. The combination with a pair of finger contacts, of a wedge shaped member passing therebetween, a U-shaped magnetic circuit about each contact member and an iron member on each side of the wedge-shaped member.

5. The combination with a pair of contact members forming parallel paths for an electric current, of a conducting member movable between the fingers to complete a circuit therewith, a U-shaped member of iron about each contact finger and an iron plate on each side of the conducting member aligned with the U-shaped members.

In testimony whereof, I have hereunto subscribed my name this 14th day of May, 1928.

ROSWELL C. VAN SICKLE.