Dec. 4, 1928. 1,693,631

H. W. WILLIAMS ET AL

CONTROL APPARATUS

Filed Dec. 3, 1926

Fig. 1.

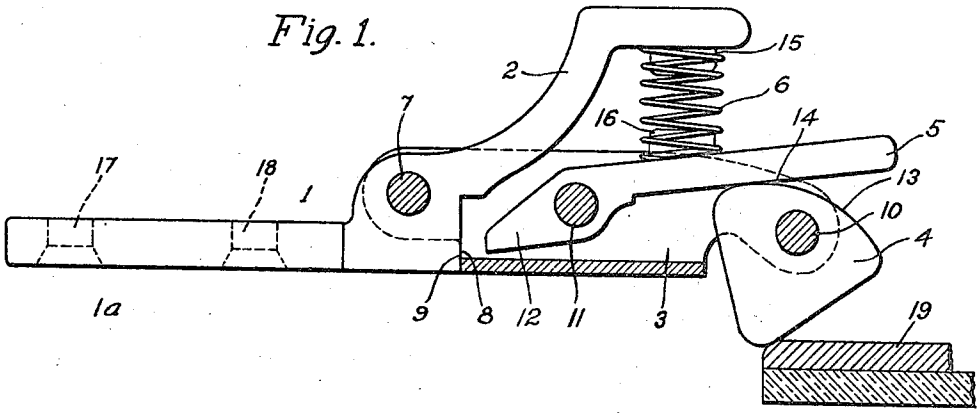


Fig. 2.

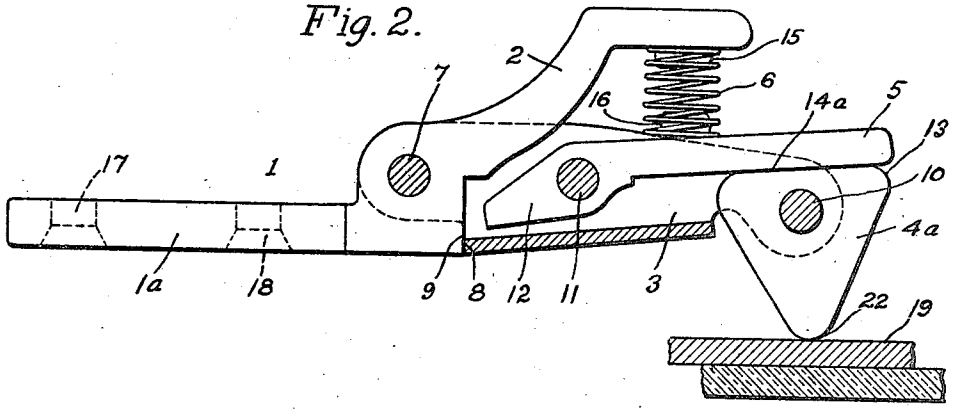
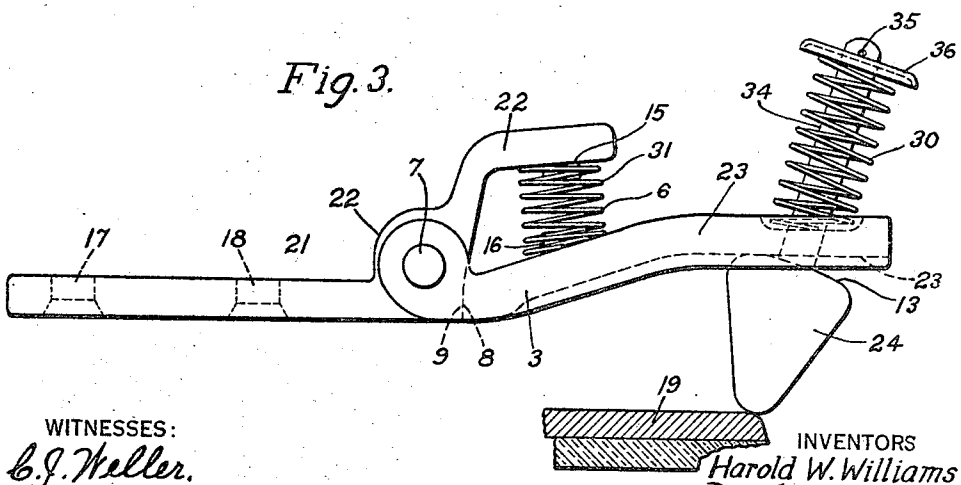


Fig. 3.



WITNESSES:

C. J. Weller.

J. E. Dickinson

INVENTORS

Harold W. Williams &

Douglas G. Boozer.

BY

Wesley G. Carr

ATTORNEY

Patented Dec. 4, 1928. 1,693,631

UNITED STATES PATENT OFFICE.

HAROLD W. WILLIAMS, OF EAST PITTSBURGH, AND DOUGLAS G. BOOZER, OF PITTSBURGH, PENNSYLVANIA, ASSIGNORS TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

CONTROL APPARATUS.

Application filed December 3, 1926. Serial No. 152,390.

Our invention relates to control apparatus and it has more particular relation to contact fingers.

One of the objects of our invention is to provide a contact finger for cooperating with a contact surface in a manner to permit reciprocatory action of the contact tip.

Another object of our invention is to provide a contact finger which will interrupt the circuit with a snap action, thereby reducing arcing between the contact surfaces.

Another object of our invention is to provide a contact finger in which all of the parts may be easily renewed.

A further object of our invention is to provide a contact finger of the above-described character which is not only simple and economical to manufacture but effective and reliable in operation.

Further objects of our invention will become apparent from the following description, when taken in connection with the accompanying drawing, in which

Fig. 1 is a view, in side elevation, of a contact finger embodying our invention, one side of the contact-carrying member being cut away to show the position of the parts and the contact tip being shown in its initial contact-making position;

Fig. 2 is a similar view of a modified form of our contact finger, one side of the contact-carrying member being cut away to show the actuating parts thereof and the contact tip being shown in the position it assumes when the direction of movement of the other contact member is reversed;

Fig. 3 is a view, in side elevation, of another form of our contact finger and illustrates the contact tip at the point immediately preceding interruption of the circuit.

Referring to Fig. 1, a base member or shank 1 has a contact-carrying member 3 pivotally mounted thereon for, in turn, pivotally carrying a contact tip 4. A lever 5 is pivotally mounted on the contact-carrying member 3 and is adapted to rest upon the contact tip 4. A resilient member or spring 6 is mounted between an upwardly-extending projection 2 on the base member 1 and an intermediate point of the lever 5.

The contact-carrying member 3 is pivotally mounted on the base member 1 by means of a pin 7 and is so designed that an intermediate shoulder 8 will rest upon a shoulder 9 of the base member 1 to cause the contact-carrying member to normally extend in straight-line relation with the supporting element 1*a* of the base member 1. The contact-carrying member 3, in this particular finger, is made from a piece of stamped steel and is bent to form a U-shaped element or channel member, the sides of which may be placed outside of the base member 1, while the contact tip 4 may be mounted within the sides thereof.

The contact tip 4 is made of a relatively hard material, such as steel, with flat sides which fit in between the side plates of the contact-carrying member 3, and, in side elevation, assumes the shape of a triangle, with the base and corners rounded off, or the shape of a segment of a disc. A hole is made near the base surface of the contact tip for inserting a pin 10, by means of which it is mounted near the end of the contact-carrying member 3.

The lever 5 is pivotally mounted between the side plates of the contact-carrying member 3, in the central region thereof, by a pin 11, and is adapted to rotate within a limited range determined by a projection 12 on the inner end of the lever and the base of the contact-carrying member 3. The lever thus rests upon the rounded surface 13 of the contact tip 4 and limits the degree of rotative movement of the tip. The resilient member or helical spring 6 is placed or mounted between the end of the projection 2 on the base member 1 and a point approximately midway between the pin 11 holding the lever 5 in place and the point of contact 14 of the lever 5 with the contact tip 4.

Suitable bosses 15 and 16 are provided upon the projection 2 of the base member 1 and upon the lever 5, respectively, for the purpose of holding the spring 6 in place. The contact finger, as a whole, may be mounted upon a suitable finger-board or block (not shown) by means of screws or the like inserted in the holes 17 and 18 of the base member 1 for that purpose.

In Fig. 2, a contact finger, identical with that illustrated in Fig. 1, is shown, with the single exception that, instead of the contact tip 4*a* having a circular base for making contact with the lever 5, which rests thereon, it has a plain flat surface 14*a* with rounded corners. The tendency thereof is to impart a slightly quicker snap action to the contact

tip when it is returning to its normal position.

Fig. 3 illustrates another embodiment of our invention, which comprises a base member 21 having an upward projection 22, a contact-carrying member 23 having a contact tip 24 mounted near one end thereof and springs 30 and 31 for biasing the contact tip and permitting reciprocatory action thereof. The contact tip fits in an alined groove in the contact-carrying member, as illustrated by the dotted line 33, and is provided with a pin 34, extending loosely through member 23 for receiving the biasing spring 30 which is secured to the upper end thereof by a cooperating pin 35 and washer 36. The lower end of spring 30 rests in a depression in the upper side of contact-carrying member 23. Spring 31, corresponding to previously described spring 6, is located between projection 22 and an intermediate point of member 23.

The operation of the contact finger is briefly as follows:

Let it be assumed that a cooperating contact surface 19 is provided for our contact finger (such as that shown in Fig. 1, for example) and that the surface 19 is moved to a position in which the contact tip 4 engages it. This action will cause the contact member 4 to rotate in a clockwise direction around the pin 10. In doing so, it will cause the lever 5, which rests upon the surface of the contact tip 4, to rise and thereby compress the spring 6 which is placed between the projection 2 on the base member 1 and the lever 5. The direction of the force produced by the spring 6 and the lever 5 will shift along the surface 14 of the contact tip 4 as the tip is made to rotate. The tendency thereof will be to exert a pressure between the contact tip and the sliding surface 19, which pressure will cause the contact tip 4 to snap to its normal position very rapidly, when it leaves the sliding surface, and, by doing so, reduce the possible arcing or sparking between the contact tip 4 and the contact surface 19.

In case it should be necessary to reverse the direction of motion of the contact surface 19 before it has completely passed under the contact tip 4, the movable contact-carrying member 3, being pivoted to the base member 1 and cooperating with the spring 6, permits the contact tip 4 to turn about its point of contact with the contact surface 22, as shown in Fig. 2, after which the contact will assume a position with respect to the sliding surface 19 similar to that taken in its initial contact-making position, but in a reverse direction, thereby reducing excessive wear on the two contact-making elements.

The operation of the three embodiments of our invention shown in Figs. 1, 2, and 3 is substantially identical. It will be further noted that the contact-making tip itself has the surfaces nearest the spring 6, such as surfaces 13, rounded off to a greater degree than the cooperating surface more remote from the spring. It will be readily understood that the reason for this is that the same pressure will be exerted upon the spring 6 by the action of the contact tip 4, through a lesser distance at point where the contact tip 4 makes contact with the lever 5, which is nearest to the point where the lever 5 is pivoted to the contact-carrying member.

While we have shown our invention in a plurality of preferred forms, it is apparent that further modifications may be made in the arrangement of the parts employed without departing from the spirit of our invention. It will be understood that we do not limit our invention to the specific apparatus illustrated, but desire that only such limitations shall be imposed as are indicated in the appended claims.

We claim as our invention:

1. A contact finger comprising a base member, a contact-carrying member pivotally mounted on said base member and carrying a contact tip pivotally mounted thereon, a lever pivotally mounted on said contact-carrying member and resting on said contact tip and a spring adapted to force said lever against said contact tip and urge said contact-carrying member toward its normal position.

2. A control finger of the sliding-contact type comprising a base member having a projecting portion, a contact-carrying member pivotally mounted on said base member and adapted to rotate in a limited arc with respect thereto, a contact tip pivotally mounted on said contact-carrying member, a lever pivotally mounted on said contact-carrying member and resting upon said contact tip and a spring placed between said projecting portion of the base member and a point near the center of said lever.

3. A contact finger comprising a base member, a contact-carrying member pivotally mounted on said base member and having a contact tip pivotally mounted thereon, a lever pivotally mounted on said contact-carrying member and resting upon said tip and a resilient member mounted between said lever and a projection on said base member.

4. A contact finger comprising a base member, a contact-carrying member pivotally mounted thereon and having a pivotally mounted contact tip, a lever pivotally mounted on said contact-carrying member and adapted to turn within a limited range to limit the amount of rotation of said contact tip and a resilient member mounted between said lever and a projection on said base member.

5. A contact finger comprising a base member, a contact-carrying member pivot-

ally mounted thereon and adapted to rest on a shoulder on said base member in substantially straight-line relation therewith, a contact tip pivotally mounted on the free end of said contact-carrying member, a lever pivotally mounted near its fixed end and a resilient member mounted between said lever and a projection on said base member.

6. A contact finger comprising a base member, a contact-carrying member pivotally mounted thereon and having a triangular shaped contact tip provided with a rounded base and corners pivotally mounted thereon near its base, a resilient member mounted between said base member and said contact tip and means adapted to cooperate therewith for exerting a force on said contact-carrying member to permit a deflection thereof and for exerting a force on said contact tip tending to maintain it in one relative position and imparting a snap-action movement to return it to said position after any deflection therefrom.

7. A contact finger comprising a base member and a contact-carrying member pivotally mounted thereon, a resilient member mounted between a projection on said base member and said contact-carrying member, a triangular shaped contact tip having a rounded base and a cylindrical shaft centrally located therein, said contact-carrying member having a hole near its free end for receiving the shaft on said tip and adapted to permit a limited rotative movement of said tip, a groove in said contact-carrying member for holding said tip in alinement with said member and a helical spring suitably mounted around the part of said shaft extending above the contact-carrying member and attached thereto to exert a tension for urging said tip to retain a normal position with respect to said contact-carrying member.

8. In a contact finger, in combination a base member, a plurality of pivotally mounted levers carried by the base member, a contact tip pivotally mounted on one of said levers and disposed to be engaged by the other lever, and resilient means interposed between the base member and the contact tip engaging lever, to bias the contact tip to a predetermined position.

9. In a contact finger, in combination a base member, a contact carrying member pivotally secured to the base member, a contact tip pivotally mounted on the contact carrying member, a lever interposed between the base member and the contact tip, and engaging said tip, a resilient member disposed between said lever and said base member, the lever and resilient member being disposed to impart a snap action to the contact tip to return it to a predetermined position.

In testimony whereof, we have hereunto subscribed our names this 20th day of November, 1926.

HAROLD W. WILLIAMS.
DOUGLAS G. BOOZER.