

UNITED STATES PATENT OFFICE

CHRISTOPHER W. MURRAY, OF TONAWANDA, NEW YORK, ASSIGNOR TO NIAGARA FALLS SMELTING & REFINING CORPORATION, OF BUFFALO, NEW YORK

CONTACT DEVICE

Application filed June 20, 1930. Serial No. 462,507.

This invention relates to improvements in contact devices for electrical switches and controllers.

In devices of this class a contact finger is mounted for resilient contact with a controller or the like. Hitherto various means have been devised for properly mounting the contact member to obtain a certain degree of what might be termed controlled resiliency. One of the principal objects of the present invention is to improve over the previous types by providing a correctly designed mounting means therefor with the object of mounting the contact finger for proper and predetermined degree of contact with the controller or switch; to provide free play for the natural resiliency of the contact finger to render the same self-aligning to prevent irregular wear of the contact point; and to provide a mounting member of simple construction whereon the contact finger and resilient members may be mounted or dismounted in a simple and efficient manner. The mounting means incorporates a number of novel features which combine with the contact finger and other members to produce other results more fully described in the accompanying specification and drawing.

In the drawing:

Fig. 1 is a perspective view of the contact finger and mounting members in disassembled relation.

Fig. 2 is a longitudinal section through the assembled contact finger and mounting means with a portion of the contact finger broken away.

Fig. 3 is a section on the line 3—3 of Fig. 2.

In the specification the numeral 1 generally indicates a contact finger assembly comprising a series of superimposed laminations or leaves 2 shouldered at 3 and having their ends engaged in a recessed portion of the wearing member or tip 4. The leaves 2 are punched at their free ends to provide a fastening hole 5, and are secured at their oppo-

site ends in the tip 4 by a clamping member 6 having a bent back portion 6a engaging in the slot 60 of the tip and maintained therein by a wedge member or suitable fastening means 7. Upwardly extending flanges 71 and 72 of the fastening means 7 are disposed transversely of the clamping member 6 and the flange 71 is confined firmly in wedging relation between the body of the clamping member 6 and its bent back portion 6a. A slot 73 in the fastening means 7 is normally disposed longitudinally of the clamping member 6 and receives an upwardly projecting guide pin 74 secured to the clamping member. The fastening means 7 is flanged, as indicated at 75, for the purpose of insuring proper guiding thereof along the edges of the clamping member 6 and leaves 2. The flanged portion of the fastening member facilitates sliding thereof upon the clamping member either by manual operation or by the application of a suitable tool thereto. Thus when the flange is in the position shown by Fig. 1 the outer end portion of the clamping member 6 and the bent back portion 6a, together with the outer end of the leaves will fit snugly within the slot 60, and the bent back portion 6a is prevented from bending farther toward the body of the clamping member when the finger is flexed. The clamping member follows the profile of the underlying leaves and terminates at a point adjacent the fastening hole 5. The leaves and clamping member are preferably of a good conductive and resilient material. A tension plate 10, preferably of steel and of a width equal to the underlying clamping member, is superimposed thereon and extends forwardly to a point in the proximity of the shoulder 3 of the leaves 2. This member, together with the clamping member 6 and the leaves 2, is punched with a pivot hole 8 and an eyelet hole 9, and are secured together as shown in Fig. 2 by a hollow rivet or eyelet 11 which is internally threaded and is adapted

to receive an adjusting screw 12 which carries a lock nut 13. The tension plate 10 between the described holes is provided with a raised portion or spring seating bead 14 having rib portions 15 extending from opposite sides thereof. The tension plate 10 and the underlying free end of the clamping member form a bridge or tension receiving device as hereinafter described.

A mounting member 15a, which is adapted to receive the contact finger, is preferably a metal stamping having a base portion 16 from either side of which upwardly extending guide portions or wings 17 and 18 are formed. One end of the base 16 is provided with a connecting hole 5a similar in size to the previously described connecting hole 5 of the leaves 2. Adjacent the hole 5a a guide stud 19 is riveted or otherwise secured to the base 16. The guide wing 17 contains an anchor slot 20 which is rectangular in shape and opens into an entry slot 21 which is also rectangular in shape, but narrower than the anchor slot. The guide wing 18 is also provided with an anchor slot 22 which is in alignment with the anchor slot 20 of the wing 17. The entry slot 23 thereof is similar to the entry slot 21 but extends laterally from the opposite side of the anchor slot 22 for purposes hereinafter more fully set forth.

The contact finger 1 is adapted to be mounted within the mounting member 15a with the pivot hole 8 loosely engaged over the guide stud 19. The holes 5 of the leaves 2 are then in alignment with the holes 5a of the base 16. The assembly is completed by the insertion of a fulcrum washer 24 between the leaves 2 and the clamping member 6. This member is rectangular in shape and contains spaced holes 5b and 8b similar in shape and disposal to the previously described holes 5 and 8 of the leaves 2. A fulcrum portion or bead 25 is provided adjacent the hole 8b and in the assembly shown in Fig. 2, is adapted to space the leaves 2 from the clamping member 6. The fulcrum washer, the leaves 2 and base 16 are secured to a suitable support A by a clamping bolt or the like B.

The above described mounting properly locates the finger tip 4 of the contact finger in association with a relatively movable control or switch member C. To insure continuous resilient contact of the tip 4 with the member C a tensioning device is provided comprising a coil spring 26 adapted to engage over the bead 14 of the tension plate 10 and maintained thereon under tension by a spring stirrup 27. The stirrup comprises a dished top 28 adapted to receive the top end of the spring and is provided with a square hole 29. The spring is partially enclosed by a pair of opposed leg members 30 which depend in angular relation to the top 28 and which, at their extremities, are each provided with an angular lip 31. The spring is thus partially

enclosed at its top portion by the stirrup 27. The stirrup is depressed in slight angular disposal to the mounting member 15a to permit the lips 31 to enter the entry slots 21 and 23, whereupon the stirrup is given a slight clockwise twist and is released so that the lips 31 are entered into and locked within the shoulder of the anchor slots 20 and 22. When an extremely heavy spring is used, the square hole in the stirrup is utilized to receive a squared tool to facilitate the twisting operation.

The spring thus mounted imparts a load upon the assembled contact finger which, at its front end, is slightly raised from the mounting member by its contact with the member C. In many of the usual types of controllers and switches, recesses or air spaces are provided between the various segments thereof. To prevent undue dropping action of the contact tip 4 between such spaces, the adjusting screw 12, previously described, is provided, and may be set in relation to the base 16 at any predetermined position and locked by the lock nut 13. Thus, upward movement of the contact finger is controlled by the spring 26 and undue downward movement, by the adjusting screw 12. Compression or tension loads applied to the contact finger are directly imparted on the guide stud 19 by the steel tension plate 10, thus eliminating the possibility of undue wear on softer material of the leaves 2 at the bolt B.

The contact tip 4 is at all contact periods rendered self-aligning with the member C by the action of the bead 25 of the fulcrum washer 24 upon the overlying clamping member 6. To properly control the twisting action of the contact finger whereby chattering is prevented and proper support is attained, the contact finger between the tip 4 and the eyelet 11 is rendered semi-rigid by its connection with the clamping member 6, and between the eyelet 11 and the guide stud 19, which may be termed the flexing portion of the contact finger, the leaves are separated from the connecting member by the fulcrum washer 24. Thus, when the contact tip 4 is slightly twisted, the torque is directly applied to the leaves 2 at their resilient portion. Upon this action the leaves 2 and the overlying connecting member 6 and tension plate 10 will turn in a common direction, but, however, the load of the spring 26 on the latter member will not be applied to the flexing portion of the leaves, as the spring is supported between the bead 25 and the eyelet 11. The clamping member will accordingly roll on the bead 25 and the underlying portions of the leaves 2 being spaced therefrom will twist without interference therefrom.

What is claimed is:

1. In a contact device for controllers, a mounting member, a contact finger having a resilient portion mounted on said mounting

- member and having a semi-rigid portion extending therefrom provided with a contact tip, a tension receiving member connected to said semi-rigid portion and overlying said resilient portion, tensioning means on said mounting member acting upon said tension receiving member to load the semi-rigid portion of the contact finger, and fulcrum means spacing said tension receiving member from said resilient portion whereby torque loads applied to said tip are transferred to said resilient portion and said tension receiving member is simultaneously movable on said fulcrum means in spaced relation to said resilient portion.
2. In a contact device for controllers, a mounting member, a contact finger having a laminated portion mounted on said mounting member and extending therefrom, means connected to the extending portion of said laminated portion to render the same semi-rigid, said means having its extremity overlying the laminated portion on said mounting member, tensioning means on said mounting member connected to said extremity, and fulcrum means having a beaded portion for spacing said extremity from the underlying laminated portion.
3. In a contact device for controllers, a mounting member having guide portions each provided with a slotted portion, a contact finger mounted on said mounting member between said guide portions, a spring having an end mounted on said contact finger, a stirrup enclosing the opposite end of said spring and having portions removably supported in the slotted portion of each guide portion.
4. In a contact device for controllers, a mounting member having spaced guide portions, each guide portion having an anchor slot and an interconnected entry slot, a contact finger mounted on said mounting member between said guide portions, a spring having an end mounted on said contact finger, a stirrup enclosing the opposite end of said spring and having depending portions provided with connecting lips, said lips being entered in said anchor slots through the entry slots of said guide portion.
5. In a contact device for controllers, a mounting member, a contact member mounted on said mounting member, yieldable means connecting the mounting member to the finger for urging the finger toward the member, a spacing member having means thereon for spacing a portion of the yieldable means from the contact finger to insure flexing of the finger adjacent the spacing member, and a stud on the mounting member and engaging the finger, said yieldable means engaging the stud for limited and controlled movement thereon.
6. In a contact device for controllers, a mounting member, a contact finger comprising a contact tip, a semi-rigid portion and a resilient portion connected to the tip and extending therefrom in superimposed relation, said portions being formed with aligned orifices, a stud in said mounting member loosely entering through the orifices of said portions to retain said portions in alignment and to permit limited angular movement thereon, and resilient means on said mounting member for retaining said portions on said mounting member.
- CHRISTOPHER W. MURRAY.

80

85

90

95

100

105

110

115

120

125

130