

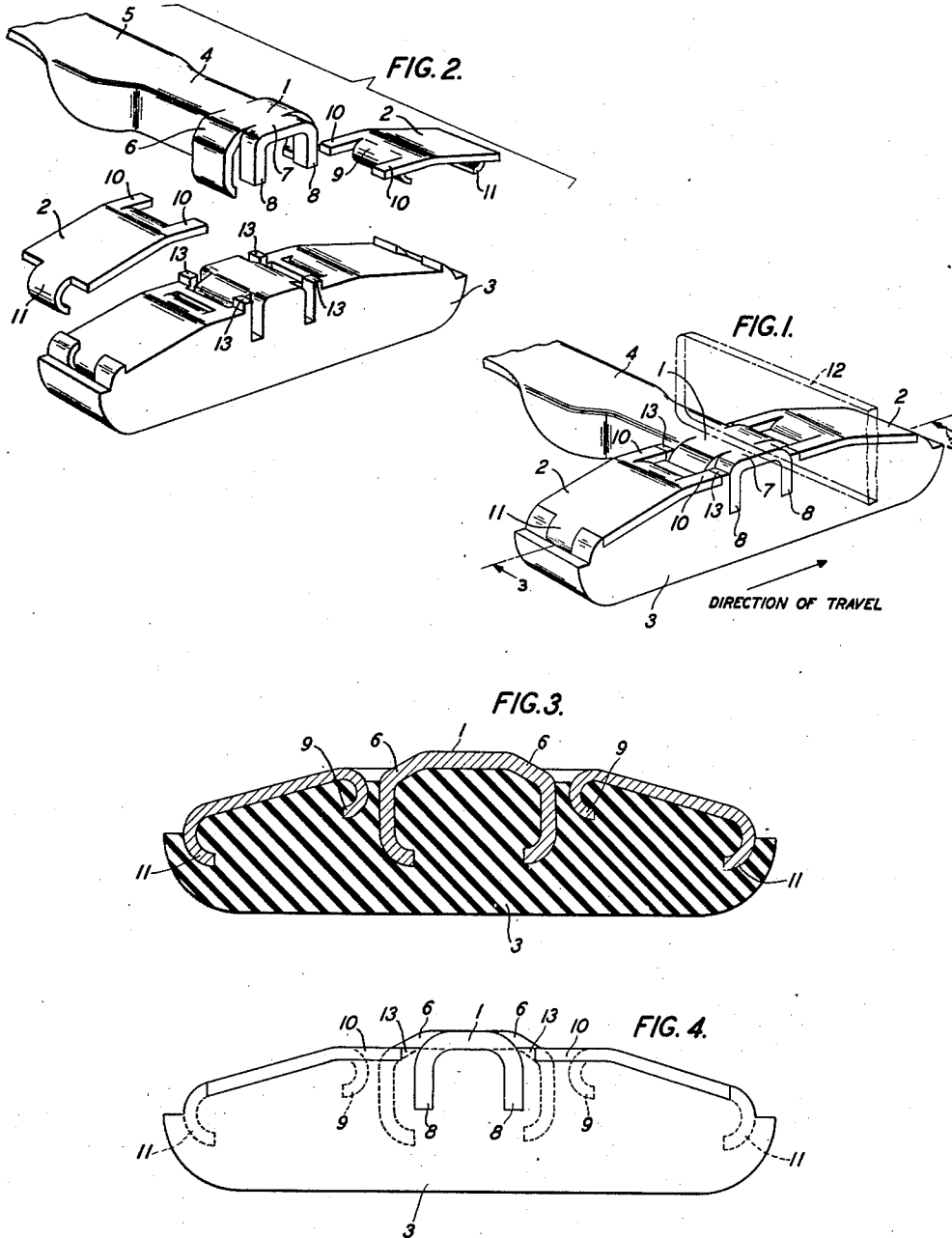
May 2, 1944.

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2,347,727

PANEL SELECTOR CONTACT SHOE

Filed Oct. 16, 1942



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2,347,727

PANEL SELECTOR CONTACT SHOE

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Application October 16, 1942, Serial No. 462,249

4 Claims. (Cl. 200—171)

This invention relates to selector brushes for automatic switches and more particularly to a contact shoe for the brush of a selector switch of the so-called panel type extensively used in automatic and semiautomatic telephone systems.

A contact shoe for this type of switch generally comprises a non-conducting support suitably secured to a spring mounted upon the brush rod, and a central metallic element embedded in the support for engaging the terminals of a bank over which the brush moves during a selecting operation, the metallic element of the shoe being conductively connected to the spring so as to provide circuit-completing facilities between the terminal engaged by the shoe and external control apparatus. Since the spring of a brush is pretensioned for electrical contact with an engaged terminal on the bank, and since the terminals are equally spaced away from each other by a distance slightly greater than the length of the metallic element, the shoulders of the non-conducting support are made long enough for each of them to bridge two terminals at the same time, said shoulders inclining away from the metallic element to insure that when the shoe is between terminals the metallic element of the shoe will fall within the space separating the two terminals without bridging the same, the engaging shoulder of the support coming to rest on the lower edge of the upper terminal to provide an inclined sliding surface for the shoe whereby the brush, as it moves upwards, is caused to spread out again until the contact element of the contact shoe becomes centered on the edge of the terminal.

It has been found, however, that in many instances and after long periods of operation, the lower edges of the terminals "dig" into the shoulders of the support and cause the latter, during the selection movement of the brush, to "snag" against the terminals of the bank and thereby impair operation of the "selector," that is, the brush-carrying rod.

It has also been determined that over long periods of operation the constant rubbing of the non-conducting support with the terminals over which the shoe rides causes the support to be worn down or chipped off and the substance thereof deposited upon the terminal edge, causing thereby the contamination of the latter to the detriment of the circuit to be established between the terminal and the metallic element of the shoe.

It is the object of the present invention to provide a contact shoe which, although provided with a suitable non-conducting support, presents, during the movement of the selector, an "all-metal" surface to the terminals to be engaged by the shoe, which will preserve the present sliding approach of the contact shoe to the

terminal and yet be "non-bridging" between terminals. Thus the terminals are prevented from coming into contact with the non-conducting support, with the consequence that the latter is preserved against the formation of snagging pockets and the former is protected against contamination. A contact shoe of the kind proposed also provides greater contact surface and longer spring and shoe length, the latter to afford increased brush intrusion on the terminal bank.

Referring to the drawing:

Fig. 1 shows a perspective view of a panel selector brush supporting the contact shoe of my invention with the mid-portion of the spring of the brush abridged, and with a bank terminal indicated as centered upon the contacting element of the shoe;

Fig. 2 shows an exploded view of the contact shoe the component metallic elements of which are displaced somewhat with respect to the support therefor in order to show their relationship more clearly;

Fig. 3 shows a cross section of the contact shoe taken along the line 3—3 of Fig. 1; while

Fig. 4 shows a front elevation of the contact shoe.

Referring to the figures of the drawing in which identical designations refer to identical parts, the contact shoe comprises a formed central metallic element 1 which may be integral with the brush spring 4, two brush guides 2 and a support 3 into which are secured both the element 1 and the guides 2, said support 3 being of any suitable insulating compound such as, for instance, shellac, mica, hard rubber, glass, etc.

The contact element 1 may be integral with or separate from the brush spring 4, the latter, in form and construction, being similar to the "tip" and "ring" brush spring of the typical panel selector brush shown in Patent No. 1,103,623, issued to J. N. Reynolds on July 14, 1914, except that the part which is intermediate the element 1 and the flat portion 5 thereof is bent downward on each side to give rigidity to the front part of the spring. Indeed, with the exception just noted, the brush spring structure is identical with that shown in said patent and only that part of the spring which pertains to the present invention has been illustrated, reference being made to said patent for a description of the spring, the brush assembly, its other component parts, manner of assembly and mode of operation.

The contact element 1 which, as said before, may be a part of the spring 4 itself, if stamped, for example, out of the spring stock, is formed with an inner top contact surface 1 having two side grippers 6 with beveled upper edges and in-

ward bent ends to secure element 1 firmly in the support 3 when the latter is molded around the element, and an outer top contact surface 7 narrower than surface 1 with two side rectangular portions 8 bent sharply downward to a perpendicular position with respect to said surface.

The guide pieces 2 which are symmetrical, may also be formed out of flat sheet metal into the shape indicated in Fig. 2. These pieces, however, need not have the same electrical properties as element 1 since they are merely used as guides for spreading the brush 5 as it approaches a terminal, in contrast with element 1, which is to be used for the passage of current between itself and a terminal engaged thereby. The tongue 9, formed on the inner end of the guide piece, curves downwardly and inwardly, as shown in Figs. 2, 3 and 4, while the two side portions 10 are bent slightly at the point of jointure in order that when the guide pieces are embedded in the support 3 in the position indicated in Fig. 1, the portions 10 will be approximately horizontal. The opposite end of each guide piece 2 has a portion cut away at each edge, leaving a middle flap 11 which is bent in the form of a ring to provide two surfaces for adhesion to the sides of the support 3.

In producing the contact shoe, the spring 4 with the element 1 affixed thereto "if made separately therefrom," and the guide pieces 2 fixed relative to each other as indicated in Fig. 1 are fixed within a fixture (not shown) including a suitable mold of support 3 into which is poured, in melted form, the non-conducting compound of which said support is made. In cooling and solidifying, the compound adheres to the undersurfaces of elements 1 and 2, and the outer surfaces of the grippers 6, the tongues 9 and the flaps 11 to form a rigid structure with the central element 1 flanked by the two guide pieces 2 to form inclined shoulders. The metallic parts of the shoe are then buffed and polished.

When the appropriate number of contact shoes are assembled as a brush structure of the type shown in the above-mentioned patent to Reynolds, and said brush is mounted on the brush carrier for operation with respect to a column of terminals in the well-known manner, a contact-shoe, if properly adjusted with respect to the terminals of the bank it will engage, will have its central contacting portion 1 in substantial alignment with the edge of the terminal, say terminal 12. When the brush carrier is moved for the selection of a terminal in the bank, the springs 4 of the brush selected for operation are tensioned against the terminals so that, between terminals, the contacting element 1 of the shoe will have a tendency to lodge between them, but the length of the shoe between the two extremes of the support 3, is not sufficient to cause it to engage the higher and lower terminals when the shoe is in the mentioned position so that, at any one time, the contact element 1 will engage the lower terminal only. When the brush moves upwards (the direction indicated in Fig. 1), the upper terminal will, in effect, follow the surface of the upper guide 2 and then one or both of the two surfaces 10 until the center portion of the terminal reaches the bevelled surface 6 of element 1. The terminal will then be lifted (cammed up) onto the surface of contact element 1 without at any time snagging or touching the insulated surfaces 13 of support 3 which lie between the edge of the surfaces 10 and the curved portions 8.

With this construction, the precise extent to

which terminal 12, Fig. 1, may relate to the contact brush shoe element in regard to "intrusion" or "parallel in" is not important. By this expression is meant the degree of parallelism which exists between the longitudinal axis of the terminal 12 and that of the brush. If the brush varies from the parallel condition within certain allowable limits, there is no possibility of the terminal engaging the insulation 13 on either side of the two portions 10 since the terminal will, in effect, follow surface 2 and the one or both of the portions 10 without engaging the insulation until the outer portion of the terminal (lengthwise) reaches the bevelled surface 6, from which point the terminal will then be lifted on to the surface of element 1.

What is claimed is:

1. A multiple brush contact shoe for a panel bank selector comprising a formed insulating support, two metallic elements imbedded in said support to provide inclined runways to the center of said support, and a central contact element imbedded symmetrically about the center of said support to provide an arcuate approach to the center of said contact element from the inner portion of each of said two metallic elements.

2. A multiple brush contact shoe for a panel bank selector comprising two metallic guides, a contact element disposed therebetween, and a formed insulating support for said guides and said contact element, whereby said guides are so disposed with respect to said contact element that a bank terminal will successively engage one of said guides and said contact element without touching said insulated support when said contact shoe is caused to move transversely with respect to said terminal.

3. A multiple brush contact shoe for a panel bank selector comprising two metallic guides each having curved ends, a contact element having curved side grippers, and a non-conducting support molded beneath said guides and said element, said support being formed with two inclined shoulders upon which said guides are fitted and held securely thereto by adherence to the surfaces of the curved ends thereof and a central platform upon which said contact element is fitted and secured to said support by the adherence thereof to the surfaces of said grippers, said element and said guides being so disposed relative to one another upon said support as to be insulated from each other and to present an all metal surface to a body moving over the surface of either guide to engage said contact element.

4. A multiple brush contact shoe for a panel bank selector comprising two metallic guides, each of said guides formed with an outer and an inner incurved end and an intermediate inclined portion, a central contact element formed with oppositely disposed side grippers having bevelled portions and inwardly curved ends, and a non-conducting support for said guides and contact element adapted to secure said contact element thereto by adherence to the surfaces of said side grippers below the bevelled portions thereof and adapted to secure said metallic guides on each side of said contact element by adherence to the inwardly curved ends thereof, whereby the inclined portions of each of said guides extend inwardly beyond the end of the bevelled surfaces of said contact element to present a continuous metallic surface to a terminal moving over said guides to engage said contact element.

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