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P. HUSTA ET AL

2,318,159

PANEL SELECTOR

Filed May 31, 1941

FIG. 1

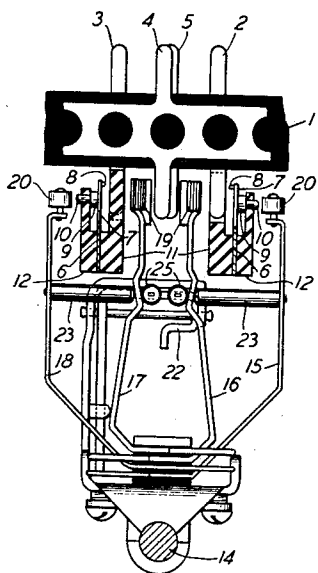


FIG. 2

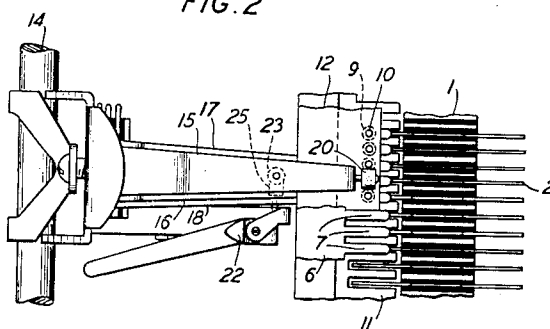


FIG. 3

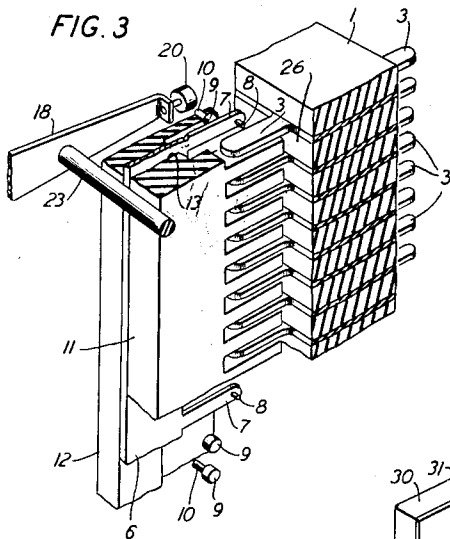


FIG. 4

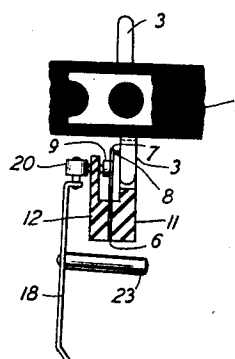
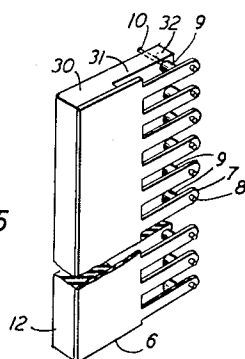


FIG. 5



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PANEL SELECTOR

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5 Claims. (Cl. 179—27.53)

This invention relates to selector switches for establishing connections in machine switching telephone systems and more particularly to a new panel terminal bank and selector switch brush set having access thereto.

Panel type selector switch frames are provided with one or more flat or panel banks of terminals with which the brush sets of a plurality of selector switches cooperate. These banks may be mounted either one above another or side-by-side. In the type of selector switch herein contemplated as the subject of the invention, the brush sets are rigidly mounted on elevator rods which are guided in supports mounted on the switch frame. It has been found, however, that due to the extensive area of the bank, there may be a tendency of the brush supporting rod or the banks to vibrate laterally and vertically with respect to each other thereby causing a movement of the brushes relative to the terminals of the banks with which they are engaged. The vibratory movement imparted to the brush rod or to the bank may be due to building vibrations or to the operation of the drive mechanism and other switches mounted on the same frame, and, if imparted to brushes which are included in an established talking circuit, may produce objectionable noise that becomes superimposed upon the speech transmission circuit. In some type of panel switches the brushes are driven at very high speeds thereby increasing the possibility of introducing vibration to the banks through the engagement of the brushes with bank terminals and through the switch frame.

It is, therefore, the object of the present invention to nullify the effects of the vibration due to the relative motion between the terminals of the bank and the brush springs and to improve the conductivity at the bank terminals over which the talking circuit is to be established.

In accordance with the invention, this object is attained by mounting a metallic strip adjacent to, but not in contact with, each row of terminals over which the talking circuit is to be established and by providing a brush carriage which is equipped with a roller or other suitable means for each strip that will advance thereover to press the strip against an adjacent terminal whenever the roller or said other means is positioned on a portion of the strip which is adjacent to the terminal. That portion of the strip which is opposite a terminal it is to engage may, therefore, be provided with a contact portion of precious metal, and if the edge of the terminal to be engaged by the strip is similarly provided with a

precious metal surface, the strip and the terminal row will be the equivalent of as many pairs of relay contacts as there are terminals in the row.

In accordance with one embodiment of the invention, each strip, which is preferably of spring material, is substantially equal in length to the entire terminal row, has a main body portion for support upon a suitable block or blocks, and a number of transversely extending fingers which are equal to the number of terminals in the terminal row with which the strip is to be engaged. The fingers are so spaced that when the strip is mounted adjacent the terminal row, each finger is disposed opposite to the terminal which it will engage when the roller of the brush engages the finger and, through the terminal and the engaging finger, the desired electric circuit or part thereof may then be established. Each finger is provided with a contact portion, preferably of precious metal, on the face that will engage the terminal and with a stud on the opposite face, the latter being the means through which the finger will be pressed against the terminal by the roller or other pressing element carried by the brush. Each strip may be suitably mounted between two insulating blocks, an inner one provided with a number of teeth that fit securely within the terminal spaces of the terminal rows, and an outer one provided with aligned apertures through which pass the studs that will be engaged by the brush roller to press the fingers against their respective terminals. The contacting surface of the row of terminals may thus be substantially enclosed by an outer covering, thereby aiding in keeping dirt and dust away from the terminals.

The brush which operates the metallic strips may be of any suitable form as, for instance, the one disclosed in Patent 1,161,884 granted to J. N. Reynolds on November 30, 1915, except that the springs which carry contact shoes for engagement with the outer terminal rows are each modified to carry suitable means for pressing the stud inwardly against a finger to cause the same to engage its oppositely disposed terminal. In the specific form of the invention herein disclosed by way of illustration, the means used for pressing the stud against a finger is a roller carried at the end of the brush spring but any other means may be utilized for this purpose as, for example, a semispherical knob attached to the end of the brush spring, or the brush spring by itself, if it has enough rigidity, may suffice to bring the spring of the metal strip and terminal together. Thus, the tip and ring springs of the brush, in so

far as the terminals over which the talking circuit is to be established is concerned, would not, according to this invention, form a part of such a circuit, but act merely as operators to push the metal strips opposite the tip and ring row of terminals into engagement with particular sets of terminals. The circuits would then be completed between the terminals so engaged and the metal strips.

For a more complete understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawing in which:

Fig. 1 is a plan view, partly in cross section, of a portion of a panel bank and a cooperating brush set constructed in accordance with the present invention;

Fig. 2 shows a side elevation of the brush set and terminal bank with a part of the outer support of the bank strip cut away to show the formation of the metal strip and the inner support therefor;

Fig. 3 is a perspective view of the metal strip assembly showing the manner in which the same is supported by a comb-like member inserted in the spaces between the terminals of a terminal row;

Fig. 4 is a fragmentary plan view showing the manner in which the brush roller, for example, causes the engagement of a metal strip finger with the associated terminal on the terminal bank; while

Fig. 5 is a perspective but abbreviated showing of one of the two metal strips with the formed fingers together with the contacts and studs for said fingers and the outside supporting block for the strip.

Referring, now, to the drawing, 1 represents a fragment of the panel bank more completely shown and described in the above-mentioned patent to J. N. Reynolds, and to which our invention may be adapted to apply. It comprises, when modified for use with the present invention, a plurality of stacked terminal strips each separated by a strip of insulation and the whole presenting a number of vertical rows of corresponding terminals suitably separated from each other in groups of three or four rows to the group, the rows in each group being separated from each other so that the inner brushes of a brush carriage will be permitted to move vertically between the two inner ones in the group (assuming that there will be four rows to the group) and the two outer ones of the group while said two outer ones are separated from the outer rows of adjacent groups of terminals by a distance that is sufficient to accommodate a metallic strip supported a slight distance away from the terminal row, and a roller mounted on the brush carriage that will be free to move over the strip to engage the same with the terminals in the row for electrical contact therewith. In the figures of the drawing, 2 and 3 represent back portions of typical "tip" and "ring" terminals (outer rows) of a group of terminals of a multiple bank through which a conversational circuit is established, while the central terminals 4 and 5 (inner rows) known as the "sleeve" and "hunt" terminals are for purposes of switching control.

Our invention contemplates providing an auxiliary contact member for all the tip terminals of a row and another auxiliary contact member for all the ring terminals of a row, the same being fixed with respect to the terminals

so that a vertical moving member, such as the brush, will only have the function of bringing the auxiliary contact member into engagement with the terminals of the adjacent terminal row.

Each of such auxiliary contact members comprises a metal element 6, preferably of spring material, having a length substantially equal to that of a row of terminals with whose individual terminals it is to be engaged. It is formed with a longitudinal rectangular portion from which extend at right angles a plurality of spaced fingers 7 equal in number to the terminals in the terminal row adjacent to which the element 6 is to be affixed. At the end of each finger is mounted, on the one side, a metallic contact 8 and, on the other side, a stud 9 of non-conductive material having an enlarged head which abuts against said other side of the spring with its shank portion 10 extending freely through an aperture in a supporting insulating body 12 as explained hereinafter. The disposition of the contacts and the studs on the opposite sides of the fingers will depend, of course, upon whether the element 6 is for engagement with the row of "tip" terminals 3 appearing, for instance, on the left in Fig. 1 and as detailed in Fig. 3, or for engagement with the row "ring" terminals 2 appearing in the right of Fig. 1. If the element 6 is to be affixed to the frame for engagement with the terminals of a tip terminal row, then contact 8 for each finger is disposed on the right face thereof while the associated stud is disposed on the left face. Contrariwise for the fingers of the element 6 which is to be affixed for engagement with the terminals of a ring terminal row.

The element 6 is supported on the face adjacent the terminal row of the terminals which the fingers thereof are to engage, by a comb member 11 of suitable insulating material having as many teeth as there are spaces between successive terminals in the row. Each tooth has a thickness substantially equal to the width of the terminal members 2 or 3 and a depth substantially equal to the vertical separation 25 between successive terminals in the row. This latter dimension should be such that, when the comb is fitted in the spaces between the terminals, a tight fit will be produced so as to hold the comb, together with element 6 attached thereto and another insulating member 12 attached to the opposite face of element 6, in a firm and secure position.

The comb member 11 has a rectangular portion 13 of a width slightly less than the width of the body portion of element 6, which is attached to said body portion by any suitable means that will cause the contact members 8 of the several fingers 7 to come substantially in alignment with the edges of the corresponding terminals of the terminal row into the vertical spaces of which the teeth of comb member 11 are fitted.

To the opposite face of spring element 6 is attached another insulating support 12, preferably of rectangular shape, which has an outer thick rectangular portion 30 for attachment to the face of the member 6 and an adjacent thinner portion 31 to allow clearance for the bases of the studs 9. Along its inner edge, that is, the edge nearest the terminal bank, there is provided a series of vertically aligned apertures 32 which are so disposed relative to the studs 9 that when the support 12 is firmly attached to member 6, the shank 10 of each stud will pass freely through a corresponding aperture 32 in the support 12.

The length of each shank is such as to present an exposed portion on the outer face of support 12 which is slightly greater in length than the distance separating the end of contact 8 with the edge of the terminal to be contacted thereby so that, when the shank is pressed inwardly by pressure exerted by the roller 20 or some other suitable means, its tip is practically flush with the surface of support 12 and the finger 7 will be flexed inwardly to cause the engagement of the contact 8 with the edge of the terminal.

The spring member 6 is thus held supported by the two insulating units 11 and 12, and the assembly of the three so formed is placed in position on a terminal row of the frame by wedging the teeth of the comb member 11 firmly within the spaces between the terminals. When so placed in position, the assembly for the "tip" terminal row will have the member 6 to the left of the row, (looking from the front of the frame) so that the point of electrical engagement between the contact portion 8 of a spring 7 and a terminal 3 will be made on the left edge of the terminal when the spring is pushed inwardly by pressing upon the exposed portion of the shank 10 of a stud 9 on the left outer surface of member 12, as shown in Figs. 3 and 1. On the other hand and as shown in Fig. 1, the assembly for the "ring" terminal row will have the member 6 to the right of the row, (looking from the front of the frame) so that the point of electrical engagement between the contact portion 8 of a spring 7 and a terminal 2 will be made on the right edge of the terminal when the spring is pushed inwardly by pressing upon the exposed portion of the shank 10 of a stud 9 on the right outer surface of member 12.

Any suitable structure may be employed for the movable brush carriage of the switch, that shown involving a longitudinal moving shaft 14 on which is mounted, as already stated, a plurality of insulated spring arms 15, 16, 17 and 18. The inner arms 16 and 17 are provided at the outer ends thereof with brush structures which consist of shoes of insulating material 19 having their inner surfaces slightly curved. In these curved faces, near the center thereof, are placed inserts of conducting material which may be formed as continuations of the spring arms 16 and 17, respectively, or of separate strips of conducting material electrically secured to said arms in any desired manner.

The outer springs 15 and 18 may be provided at the outer ends thereof with rollers 20 or semi-spherical knobs. Each of the rollers, if used, revolves around an axle mounted upon the inner end of each spring so that, when the brush is actively engaged by the operation of the trip lug 22 of the tripping device of the brush selecting mechanism (not shown), which lug projects rearwardly in a position to be engaged by said tripping device, springs 15 and 18 are released to cause the surface of the separate rollers to bear directly upon the exposed portion of the shank 10 of a stud 9. In the normal or unengaged position of the brush carriage, the rollers 25 engage the inner surfaces of springs 16 and 17 and since the outer springs 15 and 18 each carry a stud of insulating material 23 whereby the two springs 15 and 16 and 17 and 18 are held in spaced relation, the brushes 19 are kept out of engagement with the terminals of their respective series while rollers 20 are kept out of contact with the exposed portion of the shanks 10 of studs 9. When, however, the trip

lug 22 is engaged by the tripping device and the brush shaft 14 is moved upward, the rollers 25 will be moved and springs 15, 16, 17 and 18 will be released to engage the metallic portion of the shoes of brushes 19 of springs 16 and 17 with a terminal in each of their respective terminal rows and to engage rollers 20 of springs 15 and 18 with the tips of shanks 10. Since the shank 10 of each stud 9 is free to move within the aperture 32, and since the base portion of stud 9 abuts against a corresponding finger 7, the pressure exerted by a roller 20 upon shank 10 is such that the finger 7 will be pressed inwardly until its contact portion 8 engages the side of the terminal 3 as clearly shown in Fig. 4. Thus, a vertical movement of the brush shaft causes the rollers 20 to produce a horizontal movement of each of the fingers 7 engaged by said rollers whereby said fingers engage, in succession, the edge of each of the terminals in the terminal row disposed opposite to them. As the brush shaft continues its upward movement and the rollers 20 successively engage the different shanks 10 in the line of travel, the associated springs 7 are first caused to engage the oppositely disposed terminals and then caused to disengage them when the roller has passed on and upward out of engagement with a corresponding shank. When the brush shaft stops on any group of terminals, each roller 20 will press against the shank 10 of the stud 9 adjacent the terminal in the group until contact is established between the contact portion 8 of the spring and the terminal. An electric current may then be established through the terminal and the finger 7 engaging it, the current passing through the body portion of member 6, outwardly through the external portions of the circuit network and back (if it is a talking circuit of a telephone connection) through the member 6 serving the second terminal row, the finger 7 thereof engaging the terminal of the group in the row, the terminal itself and thence to outside apparatus.

It is to be observed that any vertical or lateral vibration of the brush carriage relative to the terminals will not be communicated to the springs 7 and to the terminals engaged thereby to produce any variation of resistance in the circuits established therethrough, since such vibration can only cause a vertical or lateral displacement of the rollers 20 which, while being so displaced, will not vary the pressure they exert upon the shanks 10, thereby producing no variation in the pressure with which the springs 7 engage the terminals contacting with the springs. Thus the current through the terminals and springs will be invariable notwithstanding the vibration of the brush.

While we have described our invention in connection with its specific application to a specific terminal bank and associated moving brush carriage, it is to be understood that various other applications and embodiments thereof may be made by those skilled in the art without departing from the spirit of the invention as defined within the scope of appended claims.

What is claimed is:

1. In a selector switch adapted for use in telephone switching systems, the combination of a plurality of terminals, a conducting strip formed with as many fingers as there are terminals in said plurality of terminals, said strip being positioned adjacent to said terminals but normally out of engagement therewith and having each finger oppositely disposed to a terminal, and a

mechanical device adapted for progressive movement with respect to said fingers whereby the operation of a finger by said mechanical device causes said finger to engage the oppositely disposed terminal.

2. In a selector switch adapted for use in telephone switching systems, the combination of a plurality of aligned terminals, a conducting strip formed with as many fingers as there are terminals in said plurality of terminals, a support for said conducting strip adapted for insertion between said terminals whereby said strip is held in parallel alignment with said terminals but normally out of engagement therewith, and whereby each finger of said strip is disposed opposite to a terminal, and a mechanical device adapted for progressive movement with respect to said fingers whereby the operation of a finger by said mechanical device will cause said finger to engage the oppositely disposed terminal.

3. In a selector switch, a plurality of aligned terminals, a conducting strip formed with as many fingers as there are terminals, a stud for each finger disposed on one side at the end thereof, the studs of said fingers being in substantial alignment, a support for said strip comprising an inner comb like member having teeth dimensioned for insertion in the spaces between said aligned terminals whereby said strip is held in parallel alignment with said terminals and whereby each finger of said strip is disposed opposite to a terminal and an outer member having as many aligned apertures as there are studs through which said studs freely pass to protrude on the outer surface of said member, and a roller adapted for movement over said studs whereby the engagement of a stud by the roller causes

the associated finger to be pressed into contact with the oppositely disposed terminal.

4. In a panel selector switch, the combination of a plurality of rows of aligned terminals, a conducting strip for each row disposed in parallel thereto but normally out of engagement therewith, an elevator rod, and a roller for each strip carried by said elevator rod, said rollers being adapted for concurrent movement with respect to their associated strips for bringing each strip into engagement with successive corresponding terminals in the associated row.

5. In a selector switch, a plurality of rows of aligned terminals, a conducting strip for each terminal formed with as many fingers as there are terminals in a row, a stud for each finger disposed on one side at the end thereof, the studs of the fingers in each strip being in substantial alignment, a support for each strip comprising an inner comb like member having teeth dimensioned for insertion in the spaces between the aligned terminals of a row whereby said strip is held in parallel alignment with said terminals and whereby each finger of said strip is disposed opposite to a terminal and an outer member having as many aligned apertures as there are studs through which said studs may freely pass to present a portion thereof to the outer surface of said member, and a roller for each strip, said rollers being adapted for concurrent movement over the studs of the associated strips whereby the engagement of a stud by a roller pushes the associated finger into contact with the oppositely disposed terminal.

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