

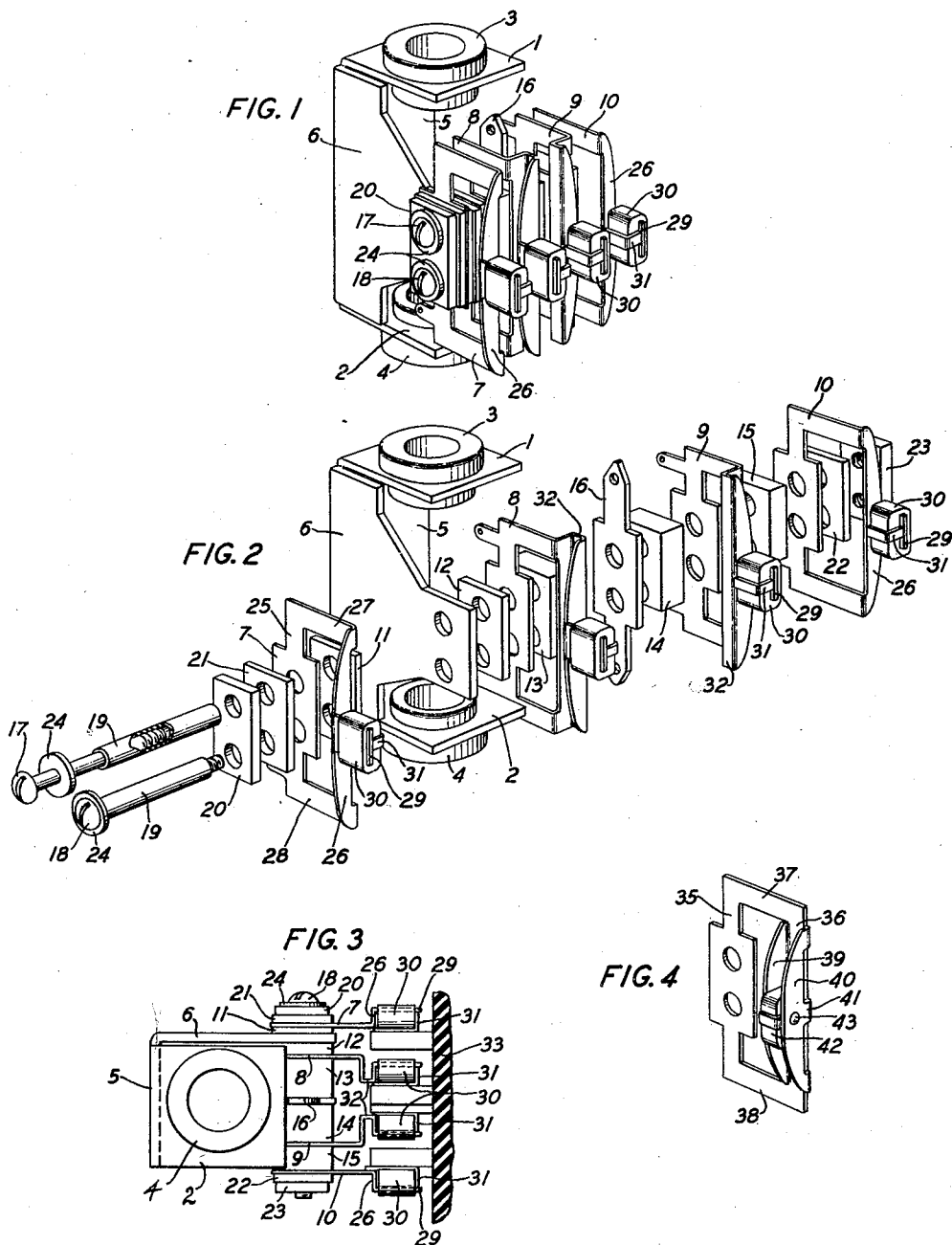
Jan. 30, 1940.

C. N. HICKMAN

2,188,659

SELECTOR SWITCH BRUSH

Filed June 21, 1938



INVENTOR
C. N. HICKMAN
BY
P. C. Smith

ATTORNEY

UNITED STATES PATENT OFFICE

2,188,659

SELECTOR SWITCH BRUSH

Clarence N. Hickman, Jackson Heights, N. Y.,
 assignor to Bell Telephone Laboratories, In-
 corporated, New York, N. Y., a corporation of
 New York

Application June 21, 1938, Serial No. 214,913

5 Claims. (Cl. 200—171)

This invention relates to a brush set for use in a selector switch and more particularly to a brush set for a selector switch cooperating with a panel bank of terminals.

5 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 are either mounted one above the other or side by side. In some types of selector switches the brush sets are rigidly mounted on elevator rods which are guided in supports mounted on the switch frame and in other types they are slidably mounted on guide rods which are rigidly secured at their ends to end members of the frame. In either case, due to the extensive area of the banks, there may be a tendency for the brush supporting rod to vibrate laterally with respect to the face of the banks thereby causing a lateral sliding movement of the brushes on the terminals of the banks with which they are engaged. The vibratory movement of the supporting rod may be due to building vibrations imparted to the switch frame or to vibrations set up in the frame due to the operation of the other switches mounted on the frame. This vibration, if imparted to brushes which are included in an established talking circuit, is very undesirable since it may impose objectionable noise on the speech transmission circuit.

It is therefore the object of the present invention to improve the contact engagement between selector switch brushes and bank terminals whereby the introduction of noise into the speech transmission circuit extending thereover is materially reduced.

In accordance with the invention, this object is attained by constructing each brush of the brush set so as to have rigidity in the direction of brush travel over a row of terminals of the terminal bank, but to have flexibility in a direction at right angles to the contact faces of the bank terminals for insuring good contact pressure between the brush and the bank terminal and to have flexibility in a direction perpendicular to the face of the bank. For this purpose each brush comprises a brush shoe of the general type disclosed in Patent 1,161,884 granted November 30, 1915, to J. N. Reynolds supported on a spring insulatedly secured to the brush carriage. The spring support is substantially rectangular in outline with the center portion thereof cut away to form two narrow vertical arms united at their ends to two narrow horizontal arms. The spring is secured at the mid-portion of one of its vertical arms to the brush carriage and the other vertical arm

is bent at right angles to the plane of the spring to the center portion of which the brush shoe is attached. The rectangular form of the spring renders it rigid in the direction of travel of the brush shoe over the row of bank terminals, but the narrow end arms thereof render the spring resilient in such a direction as to hold the brush shoe firmly against the contact surface of a bank terminal with which it engages. The outer vertical arm of the spring to which the brush shoe is secured being bent at right angles to the plane of the spring is thus rendered resilient in a direction at right angles to the face of the terminal bank whereby the brush shoe, forced into frictional engagement with the contact surface of the bank terminal by the resilient end arms of the spring, does not tend to slide on the terminal should the brush carriage vibrate in a direction toward or away from the face of the bank.

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

Fig. 1 is a perspective view of a brush carriage having brush springs embodying the present invention;

Fig. 2 is an exploded perspective view of the brush carriage shown in Fig. 1;

Fig. 3 is a bottom end view of the brush carriage shown in Fig. 1 and a portion of the terminal bank; and

Fig. 4 shows a modified form of a brush spring. The brush carriage has been disclosed as suitable for use in a selector of the type disclosed in Patent 2,123,229, granted July 12, 1938, to W. W. Carpenter and R. F. Mallina, but it will be obvious that the invention is equally applicable to other well-known types of selector switches. The carriage comprises a substantially U-shaped frame in the arms 1 and 2 on which are positioned fiber bushings 3 and 4 by means of which the carriage is slidably supported on a suitable guide rod (not shown). The guide rod is secured at its ends to the end brackets of the switch. The vertical portion 5 of the frame is bent at right angles to form an extension 6 to which the brush springs are secured.

The brush carriage is provided with four brush springs 7, 8, 9 and 10, the brush spring 7 being supported on one face of the extension 6 and insulated therefrom by a fiber separator 11 and the springs 8, 9 and 10 being assembled on the other face of the extension 6. The spring 8 is insulated from the extension 6 by an interposed fiber separator 12 and the springs 8, 9 and 10

are insulated from each other by interposed separators 13, 14 and 15 of fiber or other suitable material. Positioned between the separators 13 and 14 is a plate 16 to the ends of which a tape belt for traversing the brush carriage may be secured. For securing the springs, separators and plate 16 in assembled position on the extension 6, screws 17 and 18 are provided, each having a sleeve 19 of insulating material thereon, which extend through aligned holes in the outer clamping plate 20, insulating separator 21, spring 7, separator 11, extension 6, separator 12, spring 8, separator 13, plate 16, separator 14, spring 9, separator 15, spring 10, separator 22 into threaded holes in the clamping plate 23. By means of the separators and the sleeves, the brush springs are completely insulated from each other and from the brush carriage. To provide a suitable bearing between the heads of screws 17 and 18 and the clamping plate 20, washers 24 are interposed between the screw heads and the insulating sleeves 19.

Each brush spring is of substantially rectangular outline and has its inner portion stamped out to form two narrow vertical arms as indicated at 25 and 26 in connection with spring 7, joined at their ends by two narrow horizontal arms 27 and 28. The arm 25 is enlarged at its mid-portion and provided with holes through which the clamping screws and insulating sleeves may extend as previously described. The arm 26 is bent at right angles to the plane of the arms 27 and 28 and is formed with a tongue 29 extending forwardly at right angles therefrom or parallel to the plane of arms 27 and 28 on which the brush shoe 30 is secured by staking or in any other desired manner. The brush shoe has a body of insulating material in one face of which a contact member 31 is embedded. The ends of the contact member are secured to the tongue 29 by solder or other suitable means.

The springs 7 and 10 are similarly constructed. The two inner springs 8 and 9 are identical in form and similar to spring 7, except that the arm 26 of each spring is first bent at right angles to the plane of the spring and then bent outwardly and backwardly on itself in a U-shape as indicated by the numeral 32. The springs 7 and 10 and 8 and 9 are assembled as most clearly shown in Fig. 3 with their arms 26 extending in opposite directions in order that the brush shoes carried thereby may be properly spaced apart for engagement with rows of terminals of the terminal bank 33.

The rectangular shape of each brush spring provides rigidity in the direction of travel of the brush shoe over a row of bank terminals or vertically as viewed in Figs. 1 and 2, and the narrow end arms 27 and 28 provide sufficient resiliency in a direction at right angles to the contact surfaces of a row of terminals as viewed in Fig. 3 to insure that the contact member 31 of the brush shoe will be pressed into a firm contact with the contact surfaces of the bank terminals. The arm 26 of each spring being bent as shown at right angles to the plane of the arms 27 and 28 affords a support for the brush shoe carried thereby which is flexible in a direction at right angles to the face of the bank as viewed in Fig. 3 whereby if there is a relative lateral movement between the guide rod on which the brush carriage is supported and the face of the terminal bank or between the brush carriage and the face of the bank, the arm 26 will flex without causing the brush shoe to follow the lateral movement

of the brush carriage. The brush shoe is thus maintained in firm engagement with the bank terminal upon which it is resting whereby noise from a contact over a brush which may be included in a talking circuit is eliminated or substantially reduced.

As an alternative construction, the brush spring may be formed as shown in Fig. 4 with two vertical arms 35 and 36 joined at their ends by the horizontal arms 37 and 38. The arm 35 is provided with an enlarged central portion by means of which the spring is supported on the brush carriage and the arm 36 has its inner and outer edges bent at right angles to the plane of the arms 37 and 38 to form parallel members 39 and 40. The members 39 and 40 are joined only at their points of juncture with the arms 37 and 38 and by the cross member 41 whereby they have lateral flexibility. The brush shoe 42 is supported on the cross member 41 between the members 39 and 40 and is held in position by a rivet 43 extending therethrough and through the members 39 and 40.

What is claimed is:

1. A brush for sliding engagement with the contact faces of the terminals of a terminal bank comprising a contact shoe and a frame of spring material for supporting said shoe, said frame being rigid in the direction of travel of said shoe over the terminals of the bank and flexible in a direction at right angles to the contact faces of the terminals and also in a direction at right angles to the face of the bank.

2. A brush for sliding engagement with the contact faces of the terminals of a terminal bank comprising a contact shoe and a frame of spring material for supporting said shoe, said frame having a rear member for attachment to a brush carriage, laterally extending end members rigid in the direction of travel of said shoe over the terminals of the bank, but flexible in a direction at right angles to the contact faces of the terminals and a front member to the center of which said shoe is secured, flexible in a direction at right angles to the face of the bank.

3. A brush for sliding engagement with the contact faces of the terminals of a terminal bank comprising a contact shoe and a frame of spring material for supporting said shoe, said frame having a rear member for attachment to a brush carriage, laterally extending end members rigid in the direction of travel of said shoe over the terminals of the bank, but flexible in a direction at right angles to the contact faces of the terminals and a front member to the center of which said shoe is secured bent at right angles to the plane of said end members whereby it is rendered rigid in a direction at right angles to the contact faces of the terminals but flexible in a direction at right angles to the face of the bank.

4. A brush for sliding engagement with the contact faces of the terminals of a terminal bank comprising a contact shoe and a frame of spring material for supporting said shoe, said frame having a rear member for attachment to a brush carriage, end members lying in the plane of said rear member and extending forwardly therefrom having rigidity in the direction of travel of said shoe over the terminals of the bank and flexibility in a direction at right angles to the contact faces of the terminals, a front member joining the forward ends of said end members and bent at right angles to the plane thereof whereby said front member has flexibility in a direction at right angles to the face of the bank and a con-

tact shoe supporting tongue bent at right angles from the central portion of one edge of said front member to which said shoe is secured.

5 5. A brush for sliding engagement with the contact faces of the terminals of a terminal bank comprising a frame of spring material, said frame having a rear member for attachment to a brush carriage, end members lying in the plane of said rear member and extending forwardly
10 therefrom having rigidity in the direction of

travel of the brush over the terminals of the bank and flexibility in a direction at right angles to the contact faces of the terminals, a front member joining the forward ends of said end members having its edges bent at an angle to the plane thereof to form substantially parallel ribs having flexibility in a direction at right angles to the face of the bank and a contact shoe supported between said parallel ribs. 5

CLARENCE N. HICKMAN, 10