

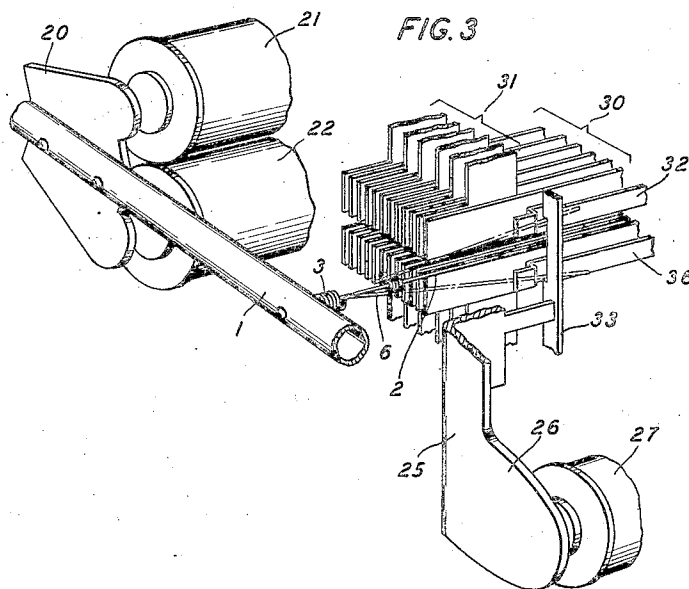
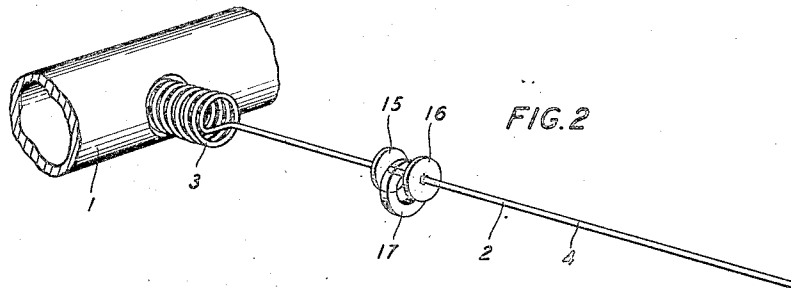
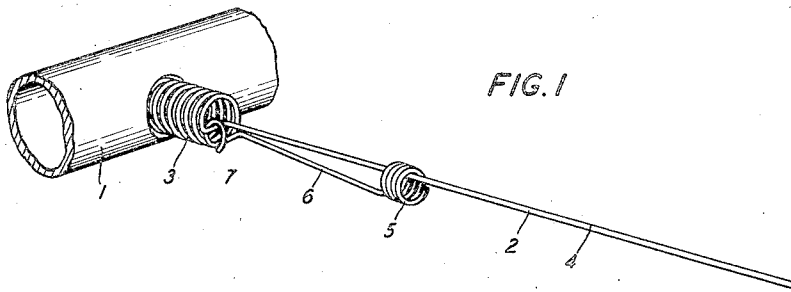
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SELECTIVE SWITCH

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SELECTIVE SWITCH

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5 Claims. (Cl. 179—27.54)

This invention relates to selective switches and particularly to improvements in automatic switches in telephone systems.

The object is to improve the construction and operation of selective switches of the cross-bar type.

The invention is applicable to selecting fingers of the general construction used in cross-bar switches of the type disclosed in the Patent 2,021,329 to J. N. Reynolds, of November 19, 1935. In such switches, sets of horizontal and vertical bars are employed to actuate sets of contacts at the cross-points of said bars. A selecting finger is mounted on each horizontal bar at each point where said bar is crossed by a vertical bar and means is provided whereby when a horizontal bar is rotated, the selecting fingers thereon are moved in a position where if a vertical bar is operated, it will, due to the position of the corresponding selecting finger, cause the operation of one set of contacts to connect with another set of contacts at the cross-point of said two operated bars.

The selecting finger in such switches usually consists of a straight comparatively stiff wire having a helically coiled portion at one end thereof. The outer end of this coil is attached to the bar in any suitable manner. The coil portion of the finger is provided to permit the free movement of the straight portion in any direction, in accordance with the particular requirements of selecting fingers for switches of this type. When a horizontal bar rotates to position the selecting fingers or release them, they have a tendency to vibrate for a short period after the bar has come to rest. This may cause false operations of the switch. For example, if after a horizontal bar has been released and soon thereafter another connection is attempted by the operation of another horizontal bar and vertical bar, the vertical bar may engage both the vibrating finger of the bar released and the finger of the operated bar and thus cause a double connection.

It is a feature of the applicant's invention to provide a means for reducing the vibratory tendencies of selecting fingers in switches of this type to prevent false operations of a switch. This may be accomplished in accordance with the preferred form of the applicant's invention by loosely suspending a weighted member on the straight portion of the selecting finger, said member having a period of vibration out of phase with the natural period of vibration of the selecting finger when actuated. This member may take the form of a helically coiled portion surrounding a part of the

straight portion of the selecting finger and having this coil anchored loosely, for example, by means of a shank and a loop with the loop engaging a loop in the helically coiled portion of the selecting finger. Another form of the applicant's invention may be a ring inserted over the straight portion on the selecting finger and loosely suspended thereon by suitable disc members secured one on each side of said ring.

The invention has been illustrated in the accompanying drawing in which:

Fig. 1 shows a perspective of a horizontal bar and a selecting finger provided with damping means in accordance with the preferred form of the applicant's invention;

Fig. 2 shows a similar perspective of a modified form of damping means in accordance with the applicant's invention; and

Fig. 3 is a perspective of a portion of a cross-bar switch having a selecting finger provided with a damping means in accordance with the preferred form of the applicant's invention as disclosed in Fig. 1.

Referring now to the drawing and particularly to Fig. 1, 1 is a part of a horizontal bar to which is attached a selecting finger 2 comprising a coiled portion 3 secured to the bar 1 and a straight portion 4. The coiled portion 3 provides flexibility in selecting fingers of this kind. The damping means is mounted on the portion 4 and consists of a coiled part 5 surrounding portion 4 of the finger, a shank 6 extending toward the coiled portion 3 of the finger and a loop 7 anchored in the first coil of portion 3. This vibrating member has a natural period of vibration which is out of phase with that of the finger 2 so that when the finger 2 is moved suddenly by the rotation of bar 1 the vibratory tendency of the member 2 will be dampened.

Fig. 2 shows the same kind of selecting finger as 2 in Fig. 1 secured to the horizontal bar 1. To the straight portion 4 is secured two discs 15 and 16 adjacent each other and between them is loosely suspended a ring 17. These discs serve to hold the ring in place. In this case the natural period of vibration of the ring 17 is out of phase with that of the finger 2 and, consequently, the ring serves to dampen the vibratory tendency of the finger when moved from one position to another.

Fig. 3 shows how the selecting finger 2 may be applied in a cross-bar switch of the type disclosed in the above-mentioned patent. A portion of the horizontal bar 1 is shown having a butterfly armature 20 which may be operated upon

by magnet 21 or 22 to rotate the rod 1 in opposite directions. A portion of a vertical bar 25 has been shown with an armature 26 operated upon by a magnet 27 to rotate the bar 25. Sets of contact making strips have been shown. The horizontally located strips 30 are movable while the vertically located strips 31 are stationary. A set of strips 30 may be moved towards the left to contact respectively with intermediate strips 31. If the horizontal bar 1 is rotated in a counter-clockwise direction the selecting finger 2 will be moved upward to a position as shown in dotted lines and thereby be placed between a special spring 32 and a contact operating arm 33 secured to the armature 25. Then when the vertical bar 25 is rotated, in a counter-clockwise direction the arm 33 will press the finger 2 against the spring 32 which, in turn, will operate on the upper set of strips 30 to cause them to contact with strips 31. The horizontal bar may then be returned to normal position while this particular finger 2 remains clamped between the spring 32 and arm 33. The bar 1 may then be used for initiating other connections. When the connection is to be released between the upper set of strips 30 and strips 31 the vertical bar 25 is released thereby permitting the finger 2 to return to the position shown in full lines. On the other hand if the horizontal bar 1 is rotated in a clockwise direction the finger 2 will be placed between the special contact spring 36 and the arm 33. Thus when the vertical bar is rotated as before the lower set of strips 30 will contact with the vertical strips 31.

It will therefore be seen that the damping means on finger 2 serves to restore the finger quickly to normal position with very little vibration when the vertical bar is returned to normal. Without this damping means false connections may occur. For example, in a case where if another connection is being established while finger 2 is returning to normal, this finger may be operated upon by another vertical bar unless the vibration of the finger is quickly dampened.

What is claimed is:

1. A selecting finger for automatic switches having a comparatively stiff straight portion and a helically coiled portion, a support for said finger at the outer end of said helical portion, means for operating said support to move said finger between two positions, and means mounted on said finger for damping the natural vibrations set up in said finger after it has been moved from one position to another.
2. A selecting finger for automatic selecting switches having a comparatively stiff straight portion and a helically coiled portion, a support

for said finger at the outer end of the helically coiled portion of said finger, means for moving said support to swing said finger between two positions and a member loosely suspended on the straight portion of said finger of such weight that its natural period of vibration is out of phase with the natural period of vibration of said finger to dampen the vibratory tendency of said finger when actuated.

3. A selecting finger for automatic switches having a comparatively stiff straight portion and a helically coiled portion, a support for said finger at the outer end of said coiled portion, means for moving said support to swing said selecting finger with the supporting point as the pivotal center, a wire having a helically coiled portion and a straight portion, the straight portion extending in line with the axis of the coiled portion of the finger and a loop at the end of the straight portion, said wire being mounted on the straight portion of the selecting finger with the coil surrounding it and the loop anchored in a coil of the coiled portion of the selecting finger nearest the straight portion thereof, to counteract the natural vibratory tendency of the finger after having been moved.

4. A cross-bar switch having horizontal and vertical bars, horizontal and vertical contact sets at each cross-point of said bar, a flexible selecting finger on each horizontal bar connected at each point where said bar is crossed by the vertical bars, means responsive to the movement of one horizontal bar and consequent displacement of the selecting fingers thereon and the movement of a vertical bar for actuating the selecting finger on the horizontal bar at the crossing point of said vertical bar to effect operation of a set of contacts at said crossing point to connect with the contact of the other set at said crossing point and means associated with the selecting fingers for reducing the vibratory movement of said selecting fingers operative when the associated horizontal bar is actuated.

5. A selecting finger for automatic selective switches having a comparatively stiff straight portion and a coiled portion, supporting means for said finger at the end of the coiled portion of said finger, means for moving said support between two positions to displace said finger from one position to the other, a circular member loosely suspended on the straight portion of said finger of such weight as to have its natural period of vibration out of phase with the natural period of vibration of said finger when operated to dampen the vibratory tendency of said finger after the supporting means has come to rest.

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