

May 17, 1938.

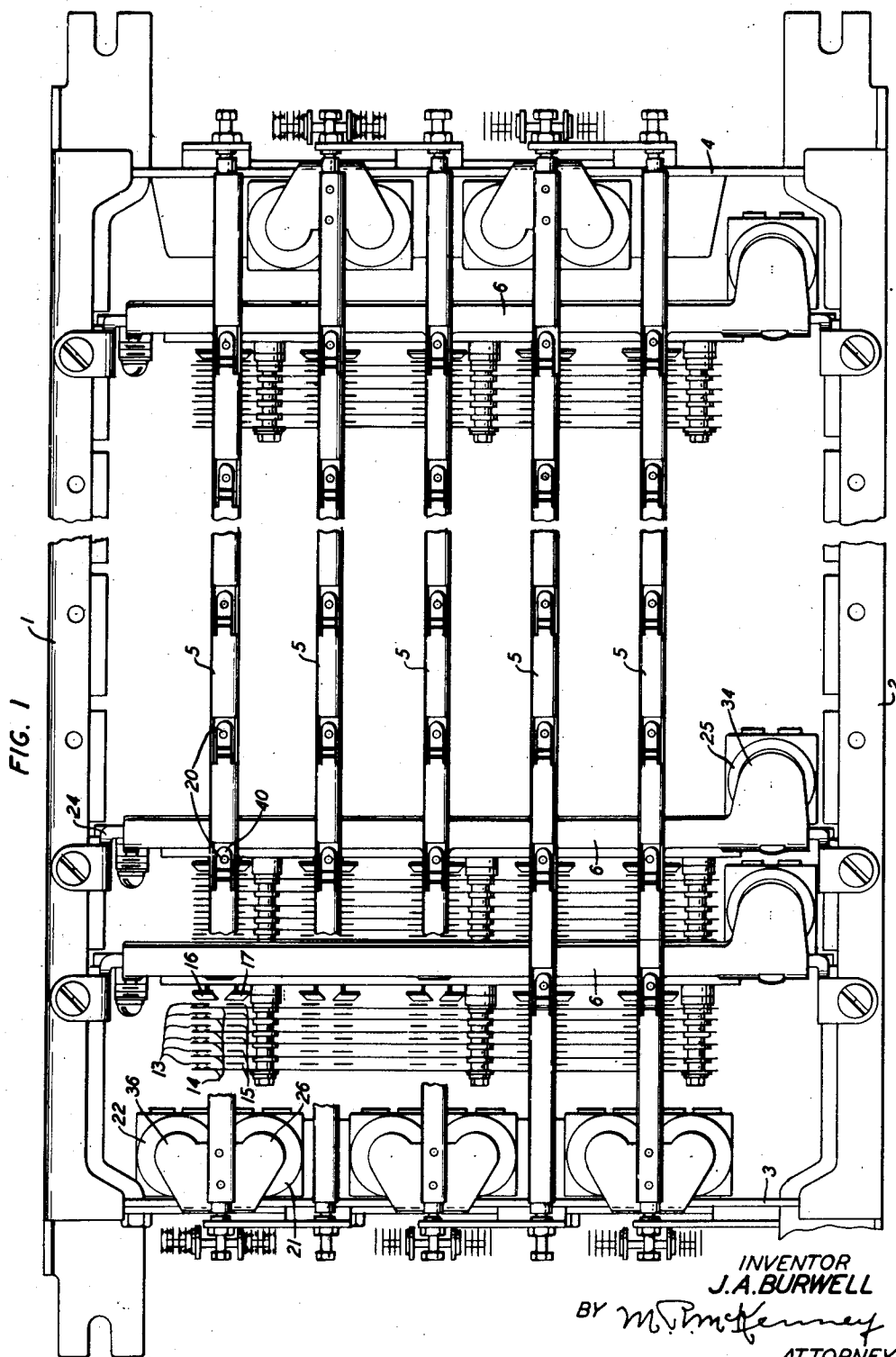
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SWITCHING MECHANISM

Filed Oct. 6, 1936

2 Sheets-Sheet 1



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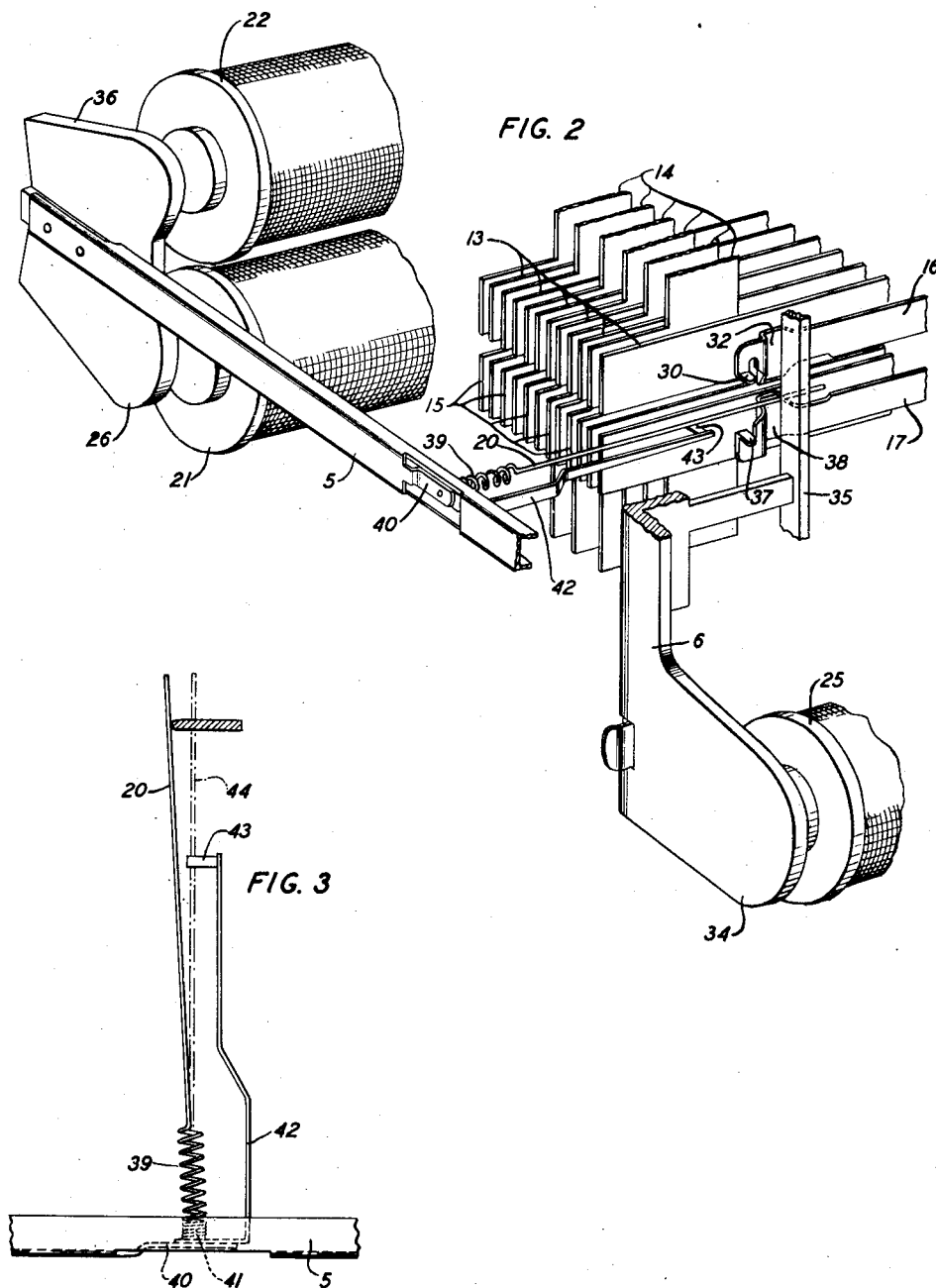
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SWITCHING MECHANISM

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6 Claims. (Cl. 179—27.54)

This invention relates to improvements in switching mechanisms and particularly to switches of the cross-bar type for use in establishing electrical connections.

It is an object of this invention to provide in a switch of this kind improvements that will cause its function to be performed with greater accuracy and reliability.

Cross-bar switches to which the present invention may be applied are well known in the art and a switch of this type is illustrated in the Patent 2,021,329 to John N. Reynolds of November 19, 1935. In such cross-bar 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 into a position where if the 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 fingers in such switches usually consist of a straight, comparatively stiff wire having a helically coiled portion at one end thereof. The other 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 kind. When the horizontal bar rotates to position the selecting fingers or to release them, they have a tendency to vibrate for a short period after the bar has come to rest. This may cause false operation 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. In the applicant's Patent 2,039,630 granted May 5, 1936 an arrangement has been disclosed for reducing this vibratory tendency of the selecting fingers to prevent false operation of the switch.

It is a feature of the applicant's present invention to provide an improved means for reducing these vibratory tendencies of selecting fingers in switches of this kind to insure proper operations of such switches. This may be accomplished in accordance with the applicant's present invention by providing a comparatively stiff arm secured to the bar adjacent each finger. This bar is provided with an angular extension that

normally engages the associated finger so that when the finger is released, or when the bar is rotated to move it, it will on its return to normal strike the projection which prevents the finger from vibrating. The projection is of such length that when the finger is actuated it will not be interfered with by the projection when the rod to which it is attached operates to select a succeeding connection on the switch.

The invention has been illustrated in accompanying drawings in which:

Fig. 1 shows a front view of the cross-bar switch structure disclosed in the above-mentioned patent provided with damping means constructed in accordance with the applicant's invention.

Fig. 2 shows a fragmentary perspective view of a horizontal bar with a selecting finger arranged with a damping means in accordance with the applicant's invention with two rows of contact sets and a portion of a vertical bar; and

Fig. 3 shows the detail construction of a finger and its associated damping arm.

Referring now to the drawings and particularly to Fig. 1, the switch structure on which applicant's invention may be applied may consist, as disclosed in this figure, of a frame consisting of members 1, 2, 3 and 4, five horizontal bars 5 and a series of ten vertical bars 6, the first, second and last of the latter bars only having been shown in full, with their corresponding horizontal and vertical rows of contact strips. The first horizontal row is marked 13 and the first vertical row is marked 14, while the second horizontal row is marked 15. A so-called actuating spring for the connecting of the horizontal contacts 13 to the vertical contacts 14 is shown at 16 and the actuating spring for connecting the horizontal contacts 15 with the vertical contacts 14 is shown at 17. The first or upper horizontal bar 5 may be rotated to cause the associated selecting finger of the group marked 20 to select the upper row of horizontal contacts 13 by the operation of the magnet 21 and to select the second row of horizontal contacts 15 by the operation of magnet 22. The vertical operating bars 6 may be rotatably guided on frame members 24 and be actuated by magnets 25 to cause them to establish connections as will be hereinafter described in detail. The members 24 are secured to the upper and lower horizontal frame members 1 and 2 while the horizontal bars are pivotally supported between frame members 3 and 4. For a complete description and further details of this switch structure, reference may be had to the above-mentioned patent to J. N. Reynolds.

The operation of this switch structure may be described in connection with the perspective view shown in Fig. 2. For example, if the horizontal

bar 5 is operated by magnet 21 acting on the armature 26, the selecting finger 20 will be moved upward to engage a projection 30 on the upper actuating spring 16 and come to rest in a position in front of the U-shaped portion 32 with the finger practically in the center of this spring 16. If now the vertical bar 6 is operated by a magnet 25 acting on armature 34, the angularly projecting operating member 35 which is located in front of the U-shaped portion 32 will press the selecting finger 20 against the actuating spring 16. This spring in turn is pressed against the corresponding group of horizontal contacts 13 which now contact, respectively, with vertical contacts 14. The vertical bar now holds this connection while the selecting bar 5 is returned to normal. The selecting finger 20 is held between the actuating spring 16 and the member 35 and is thus prevented from slipping away from this position when the horizontal bar is returned to normal, or during subsequent movement of this bar. Similarly, if the bar 5 is rotated in the opposite direction by having the magnet 22 act on the armature 36, the selecting finger 20 will be moved downward to engage the projection 37 on the actuating spring 17 and will be placed opposite the corresponding U-shaped portion 38 of this spring. Then when the vertical bar 6 and its member 35 are operated, the selecting finger 20 will be pressed against the actuating spring 17 which in turn will act on the second horizontal row of contacts 15 to cause them to engage, respectively, with the vertical contacts 14. The horizontal bar will then be returned to normal leaving the selecting finger engaged until the bar 6 is released when the finger will be released and spring 17 and contacts 15 restored to normal.

As shown in Fig. 3, the selecting finger 20 is secured by means of a coil 39 in which it terminates to a cut-out portion 40 on the bar 5 in any suitable manner. One method of fastening this coil to the member 40 is to provide a stud 41 on the member 40 on which the coil 39 is screwed or wrapped. The damping member 42 is, as noted in this figure, secured between the coil 39 and the member 40 to the bar 5. This damping member 42 is provided with an angular projection 43 which normally engages the finger 20. It is immaterial whether this projection 43 engages the finger on the upper and lower sides as its thickness is such that it will not interfere with the proper locating of the finger 20 between the actuating springs 16 and 17 in normal position. It is also short enough so that it will not interfere with the free movement of the finger when it has been actuated by the rotation of the bar 5 in one direction and the other. In Fig. 3 the normal position of the finger 20 has been shown in dotted line at 44 and the actuated position in full line as shown in this figure where it has been moved by means of the member 35. It will readily be seen that this damping member 42 associated with finger 20 serves to return the finger quickly to normal position with very little vibration when the vertical bar is returned to normal as the finger 20 will strike the projection 43 as soon as it is released. That is, the projection 43 is so located in relation to the finger 20 that it will tend to quickly damp the natural vibratory tendency of the finger 20.

What is claimed is:

1. A selecting means for automatic switches

comprising a selecting finger having a comparatively stiff straight portion and a helically coiled portion, a support for said finger at the outer end of the coil portion and a comparatively inflexible damping arm secured at one end to said support and having an angular projection at the other end normally engaging the straight portion of the selecting finger to dampen the natural vibratory tendency of said finger when actuated.

2. A selecting means for automatic switches comprising a flexible selecting finger, a rod, a comparatively inflexible damping arm having an angular projection at one end thereof normally engaging one end of the selecting finger, and means for adjustably securing the other end of said selecting finger and damping arm to said bar.

3. A selecting means for automatic switches comprising a flexible selecting finger, a support for said finger, adapted to move the finger from a normal position to an actuated engaged position, a comparatively inflexible damping member secured to said support having an angular projection normally engaging the selecting finger to dampen the natural vibratory tendency of said finger when it is returning to normal from an engaged position, said projection being of such length as not to interfere with an actuated finger if the damping member is moved by the support while the selecting finger is engaged.

4. A selecting means for automatic switches comprising a selecting finger having a comparatively stiff straight portion and a helically coiled portion, a comparatively inflexible damping member having an angular projection at one end normally engaging the straight portion of the selecting finger to dampen the natural vibratory tendency of said finger when actuated, a rod, and means for adjustably mounting the selecting finger and the damping finger together on said rod.

5. In a cross-bar switch, horizontal and vertical bars, contact strips at each intersecting point of said bars, a selecting finger associated with each horizontal bar at each point where said horizontal bar is intersected by a vertical bar for the selection of a contact set when the associated bar is rotated in either direction and a vertical bar is actuated, an arm projecting from each horizontal bar at each selecting finger, each arm having an angular projection normally engaging the associated selecting finger, said projection being of such form and length that it will normally engage the associated selecting finger as the horizontal bar to which they are attached is rotated in either direction, and so that this projection will not interfere with an engaged finger, when the horizontal bar is subsequently rotated to make succeeding contact selections in the switch, but will engage its associated selected finger when said finger is released to dampen the natural vibratory tendency imparted to said finger on its return to normal.

6. A selecting means for automatic switches comprising a rod, a flexible selecting finger attached to said rod, means for rotating said rod to place said finger in its operative position, a damping arm for said finger for dampening the vibrating tendency of said finger in the direction of its operative position, said arm having one end normally engaging the finger and the other end secured to said rod.

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