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SWITCHING MECHANISM

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FIG. 1

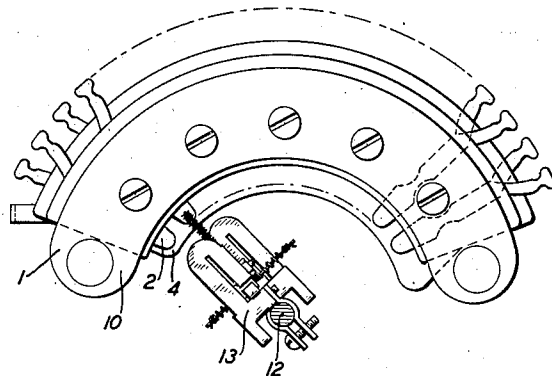


FIG. 2

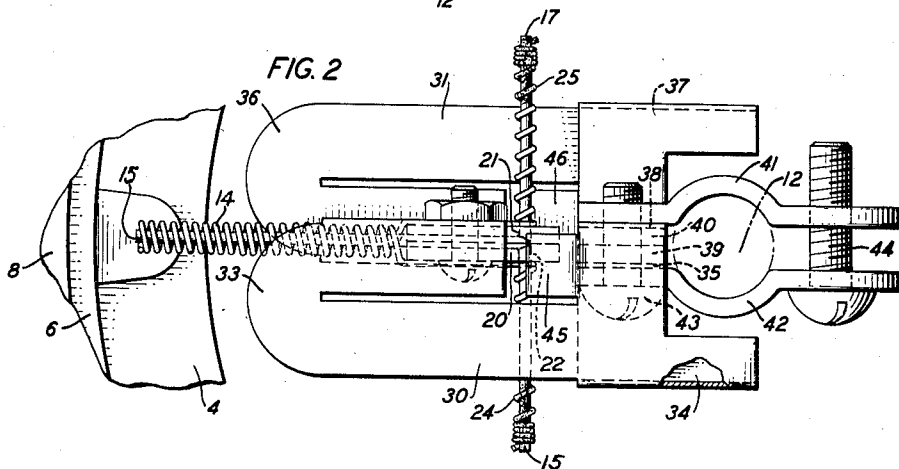
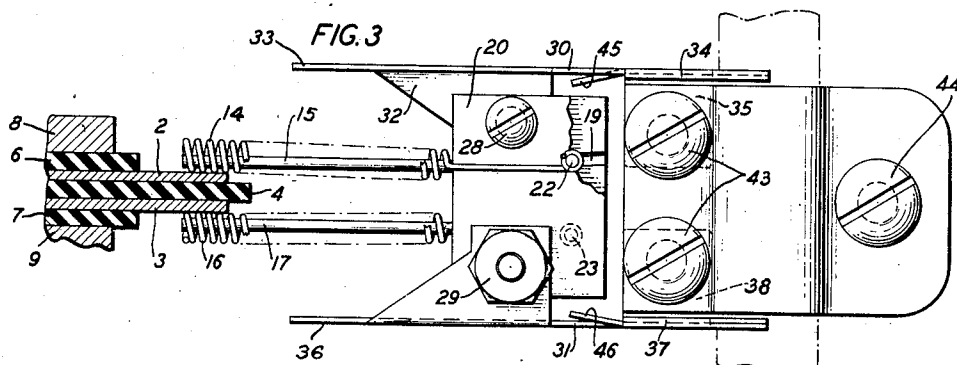


FIG. 3



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SWITCHING MECHANISM

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7 Claims. (Cl. 200—164)

This invention relates to switching mechanisms and particularly to switches employed in telephone systems for the establishing of electrical connections.

An object of the invention is to improve the operating characteristics of such switches in establishing electrical connections and to materially reduce electrical disturbances in the circuit connected by said switches.

Heretofore switches have been provided in which the brushes or wipers were actuated to travel over terminals, said wipers consisting of flexible springs having flat contact surfaces for engagement with the terminals. Such wipers are often mounted on a shaft rotated in steps to advance the wipers over succeeding terminals arranged in a semicircle. When the shaft is brought to a stop between steps there is often transmitted through the wipers vibratory disturbances at the contact surfaces between the terminals and the wipers. Such disturbances often cause corresponding electrical disturbances in the electrical circuits established between the wipers and terminals. Due to the shape of the terminals at the contact surfaces, there is also a tendency to wear irregularly and thus cause further electrical disturbances and to shorten the life of the switching mechanism.

The applicant's invention is concerned with improvements in wiper assemblies for mechanisms of this general type to overcome the above-mentioned defects and otherwise improve the operating characteristics.

One feature of the applicant's invention is a wiper assembly in which the wiper consists of a helical coil wire and a stiffening core wire therein and in which a mounting means is provided for one or more of these wipers on the shaft consisting of two insulation plates between which the wiper stiffening cores are clamped with the coils secured to terminal ends formed from the individual cores; a clamp on the shaft and flexible flat springs connected to the plates and to the clamp to permit a slight lateral movement of the wipers.

The applicant's invention has been disclosed in the accompanying drawing in which:

Fig. 1 shows a semicircular standard terminal bank and a shaft that may be rotated and on which wipers and a wiper assembly have been shown constructed in accordance with the applicant's invention;

Fig. 2 shows this wiper assembly and wipers in an enlarged top view; and

Fig. 3 shows the same wipers and wiper assembly in a side view with a section of a terminal bank.

Referring now to the drawing, the semicircular terminal bank 1 as shown in Figs. 1 and 3 may consist of a group of layers of terminals in pairs

of layers such as 2 of an upper layer and 3 of a layer immediately underneath said upper layer of a first pair. It is usual to have a group of ten terminals in each layer and each pair of layers are insulated from each other by means of an intermediate insulation plate 4 and from other layers by intermediate insulation plates and spacers as shown in Fig. 3 in cross section and indicated with the numerals 6 and 7 for the two insulation plates and 8 and 9 for the metal spacers. In this kind of bank the number of these pairs of layers is usually ten to make a group of two hundred terminals and the bank is tied together by means of an upper and a lower plate and screws and bolts. The upper plate is shown in Fig. 1 and marked with the numeral 10. At the center of this semicircle of terminals is located a shaft 12 which may be rotated in steps by means of a ratchet wheel, armature and a magnet mechanism. The wiper assembly and wipers are indicated in Fig. 1 in general by the numeral 13. Two wipers are mounted together, with the upper wiper consisting of a helically coiled spring 14 and a stiff core wire 15 inside this coil, while the lower wiper consists of a similar helically coiled wire 16 and a core wire 17. These two core wires 15 and 17 are clamped between insulation plates 20 and 21 in grooves, as shown, for example, at 19 for the wire 15, cut in the opposing surfaces of the two plates 20 and 21. Wire 15 is bent at right angles and extends through a hole 22 in plate 20 while the wire 17 is bent at right angles in the opposite direction and extends through a hole 23 in plate 21. The helical coil 14 terminates at the base of the core wire 15 into a straight wire which is then wound around the angular extension of the core wire 15 and soldered thereto as shown at 24, while similarly the helically wound coil 16 terminates at the base of the core wire 17 into a straight wire which is then wound around the core wire 17 and soldered thereto as shown at 25. These two right angle extensions of core wires 15 and 17 therefore may serve as terminals for a line to be connected to different terminals in the switch bank. The plates 20 and 21 are clamped together by means of screws and nuts such as 28 and 29. With these screws and nuts the plates are also connected to the springs 30 and 31. Each of these springs, for example spring 30, has an angle portion 32 which is connected by screw 28 to plates 20 and 21 and a spring portion 33 which extends towards the left looking at Fig. 2 and then turns back towards the right and terminates in an end portion 34 which is bent back under the portion 33 and then bent downwardly at right angles into portion 35; similarly spring 31 is provided with corresponding portions 36, 37 and 38. The portions 35 and 38 are secured on opposite sides of two spacer plates 39 and 40 be-

tween the two clamping plates 41 and 42 by means of screws 43. These clamping plates 41 and 42 are clamped around the shaft 12 by means of the screw 44 to hold the wipers in place on the shaft 12. By this arrangement and contour of the springs 30 and 31, the two wipers consisting of the helical springs 14 and 16 and the core wires 15 and 17 may be shifted upwardly and downwardly slightly due to the flexibility of these springs. From spring 30 extends a lip such as 45 and from spring 31 extends a lip 46 which limit the upward and downward movements of the wipers, by the plates 20 and 21 contacting with these lips while moving in one direction or the other.

It should now be observed that the core wires 15 and 17 are tensioned so as to press the associated coil springs 14 and 16 to make contact with the terminals 2 and 3, respectively, and the length of these springs 14 and 16 is such that a number of coils will contact with the terminals, that is a separate connection is obtained for each turn of the wire. Furthermore, in moving the wipers from one terminal to another there is effected a rolling movement of these coil springs 14 and 16 so as to make a rubbing contact with the terminals as the wipers pass from one terminal to another. By this means the shock of contact between the wipers and terminals is also greatly reduced and due to the flexibility of the coil springs these wipers do not groove the terminals as flat ordinary wipers would do.

Furthermore, due to the fact that the coils in the coil springs are spaced apart there is considerable longitudinal flexibility of the coil springs, thus the turns of the coils in contact with the terminals when a connection is made will remain practically stationary while the core wire and the wiper mounting consisting of the plates 20 and 21, springs 30 and 31 and the clamp members 41 and 42 may vibrate with the shaft when stopped after having been moved a step from one terminal to another. The flexibility of the springs 30 and 31 also permits lateral vibrations and irregularities to be absorbed and compensated for and thus very little, if any, of the vibrations of the shaft and wiper mountings in any direction are transmitted to the contact surfaces between the coils 14 and 16 and the terminals 2 and 3. Consequently, the noises normally produced in the electrical circuits due to vibrations in ordinary standard flat wiper arrangements under similar conditions are greatly reduced by the applicant's invention.

It is to be understood that while the applicant's invention has been described in connection with but a single embodiment as shown in the drawing, other forms of the applicant's invention may readily be made without departing from the spirit thereof.

What is claimed is:

1. In a switch, a shaft, terminal banks, wiper assemblies secured to said shaft, said shaft being operable to cause the wipers of said assemblies to engage the terminals in said banks, each of said wipers in said assemblies consisting of a helically coiled wire and a stiffening wire core therein to maintain a yielding engagement between said coiled wires and the terminals in said banks.

2. In a switch, a shaft, a terminal bank, a wiper consisting of a helically coiled wire and a straight stiffening wire therefor connected to said shaft, said straight stiffening wire fitting loosely inside of said coiled wire, said shaft being operable to cause said wiper to engage terminals in said bank.

3. In a switch, a shaft, terminal banks, wiper assemblies secured to said shaft, said shaft being movable to cause the wipers of said assemblies to engage the terminals in said banks, each of said assemblies consisting of a mounting clamp secured to the shaft, an insulation plate, two flat flexible springs secured to said plate and to said clamp, a helically coiled wire secured at one end to said plate and a straight stiffening core wire secured at one end to said plate and extending through said coiled wire.

4. In a switch, a vertical shaft, terminal banks, wiper assemblies secured to said shaft, said shaft being operable to cause the wipers of said assemblies to engage the terminals in said banks, each wiper assembly consisting of a horizontally located helically wound wiper wire with the coils slightly spaced apart enabling a longitudinal movement of the coils, a straight stiffening core wire inserted in said coils and serving to maintain a yieldable engagement between said coils and the terminals of said bank, and a mounting means for said wiper wire and core wire at one end thereof to said shaft so arranged that the wiper wire and core wire may move laterally in relation to the shaft.

5. In a switch, a vertical shaft, terminal banks, wiper assemblies secured to said shaft, the wipers of said assemblies serving to engage the terminals in said banks, each wiper assembly consisting of a clamp secured to the shaft, two insulation plates, two flat springs secured at one end to the plates and at the opposite end to the clamp, to permit vertical lateral movement of the plates, a plurality of wipers each consisting of a helically coiled wire wound with open coils to permit longitudinal movements of the coiled wire and a stiffening straight wire core therein secured at one end between said plates and extending into a terminal to which one end of the associated coiled wire is soldered while a few coils at the opposite end of the coiled wire serve as the contacting means between the wiper and the terminals in the banks with the associated core wire tensioned to press these few coils against said terminals in the banks while the wiper is traveling over said terminals.

6. In a switch, a shaft, a terminal bank, a wiper assembly secured to said shaft, the wipers of said assembly serving to engage the terminals of said bank in succession, said wiper assembly consisting of an open-wound helically coiled wire and a stiffening core wire therein, and a flexible connecting means between said wires and said shaft, a few coils at one end of the helically coiled wire serving as a connecting means between the wiper assembly and each terminal as it is advanced thereto and due to said open-wound construction of the helically coiled wire and the flexibility of said connecting means, the connection between the coiled wire and a terminal is accomplished without having the vibratory disturbances to which the shaft may be subject while stopping to land said coiled wire on the terminal transmitted to said coiled wire, thus eliminating disturbance in the circuit connection established by said coiled wire and the terminal.

7. In a switch, a shaft, terminal banks, wiper assemblies secured to said shaft, said shaft being operable to cause the wipers of said assemblies to engage the terminals in said banks, each of said wipers in said assemblies consisting of helically coiled wires wound with open coils and a wire core therein tensioned towards the terminals to press a number of coils of said coiled wires in contact therewith.

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