Aug. 18, 1931. M. P. CHAPLIN 1,819,675

SWITCH

Filed May 4, 1929

FIG. 1

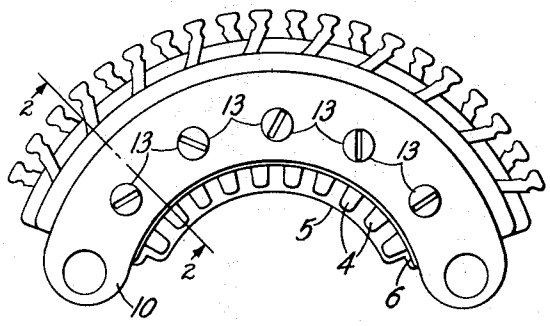


FIG. 2

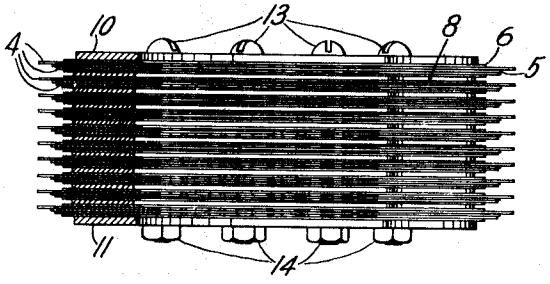


FIG. 3

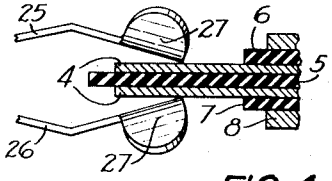


FIG. 4.

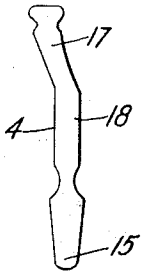
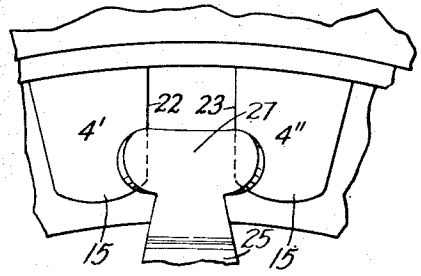


FIG. 5.



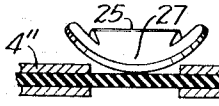


FIG. 6

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1,819,675

UNITED STATES PATENT OFFICE

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SWITCH

Application filed May 4, 1929. Serial No. 360,432.

This invention relates to automatic switches and particularly to the terminal banks for automatic switches employed in telephone systems.

The object of the invention is to improve the construction of switch terminal banks and to reduce the probability of faulty operation due to wear or to manufacturing variations.

Heretofore, terminal banks have been used, in which the terminals are constructed with their sides converging to a central point to give greater strength and durability to the bank structure. This is particularly desirable when the terminals have to be placed closely together and consequently the tips of the terminals and the space between them has to be small.

According to this invention, the terminals are constructed with radial sides and are so arranged in a bank that the sides of adjacent terminals are parallel. This is in order to permit greater manufacturing limits in the construction of the switches in which the banks are used. With bank terminals arranged in this manner, brushes traveling over the terminal surfaces will always encounter equal spacings between the terminals, even though the brushes may, for example, be slightly off-center, less accurately manufactured, or worn, which may cause them to engage the terminals further away or closer to the center of the switch. Bridging between adjacent terminals is therefore avoided regardless of such inaccuracies.

This invention has been illustrated in the accompanying drawings in which:

Fig. 1 shows a plan view of a terminal bank arranged in accordance with this invention;

Fig. 2 shows a side view and cross-section of the bank shown in Fig. 1 taken on a line 2—2 thereof;

Fig. 3 shows a fragmentary cross-section of two adjacent layers of terminals, their separating plates and side views of portions of corresponding trunks;

Fig. 4 shows a plan view of one of the terminals; and

Fig. 5 shows an enlarged fragmentary plan view of two of the terminals arranged in a bank with the tip of the usual brush for making contact therewith.

Fig. 6 shows an enlarged fragmentary front view of the brush and terminals shown in Fig. 5.

In Figs. 1 and 2 are shown layers of terminals 4 constructed in accordance with this invention arranged in a semicircle with ten terminals in each layer and with the center lines of the terminals converging to the center point. Every two layers of terminals are separated by a sheet of insulating material 5 which has its inner semicircular edge extending beyond the tips of the terminals of the two layers. Semicircular sheets of insulating material 6 and 7 are placed on the upper and lower sides, respectively, of each pair of terminals as shown most clearly in Fig. 3. Each two layers of terminals with their insulation plates 5, 6 and 7 are separated by metal plates 8 and ten groups of such layers are arranged in this bank. This structure is held together by means of a top plate 10 and a bottom plate 11 and five bolts 13. The bolts are inserted through holes in the plates 10 and 11, the insulation sheets 5, 6 and 7 and plates 8 and held in place by nuts 14.

The individual terminals 4 are cut as shown in Fig. 4 with the opposite edges or sides of the contact portion 15 converging symmetrically towards the tip of this portion. The middle portion 18 of the terminal 4 has its opposite edges practically parallel, while the end portion 17 of the terminal is bent to one side and arranged for receiving soldered connections to conductors. The alternate layers of the terminals 4 have their end portions 17 bent in opposite directions to evenly distribute these ends over the space available on the outer surface of the bank for soldering of the conductors.

Referring now particularly to Figs. 3, 5 and 6, in Fig. 3 is shown portions of brushes 25 and 26 contacting with opposite terminals to indicate how the tips of these brushes engage the terminals. In Figs. 5 and 6 the contact portions 15 of the terminals 4′ and 4″ are shown so arranged in the bank that their respectively adjacent edges 22 and 23 are located in parallel relation to each other. Be-

tween these edges is shown the brush 25 which has its contact tip 27 bent in a semicircular shape as shown most clearly in Fig. 6. This tip 27 when placed between the terminals will not touch the edges 22 and 23 but rest between the terminals on the insulation plate 5. When the brush is moved by suitable switching means in the usual manner the tip 27 will slide up on the terminal 4′ or 4″ depending on the direction in which it is moved. The brush 25 should be so located that when it is moved over the terminals its center line should coincide with the center lines of the terminals and hence rotate on the axis passing through the center point to which the center lines of the terminals converge. It will be noted from these enlarged views that even though the brush 25 may be less accurately manufactured or mounted so as to be slightly off center, the tip 27 will engage the terminals for approximately equal periods of time during the rotation of the brush over succeeding contact surfaces regardless of the points of the edges 22 or 23 of the terminals at which the tip leaves or engages the terminals. For example, if the brush 25 of one switch structure should be slightly shorter than the brush of another, it would simply mean that in the former case the tip 27 would engage and leave the edges of the terminals further down towards the end of the tip portions 15 than in the latter case. As the distance between the edges 22 and 23 will always remain the same no harm would result from this inaccuracy in the manufacture of the brushes. In other words the relative portions of time that the tips 26 would engage the contact surfaces of the terminals would remain the same in both switch structures. Such results could not be obtained in cases where, for example, the sides of the individual terminals are parallel. In such cases, if the brush of one switch were shorter than that of another, the periods of contact between the brush and the terminals in the former case would be longer than the periods of contact between the brush and the terminals in the latter case. It might even happen that the shorter brush when passing from one terminal to the other would bridge these adjacent terminals. This tendency of bridging is even more likely to occur when the contact tip surfaces of the brushes increase as the brushes become worn. These tendencies of changes in contacting periods and bridging of adjacent terminals are practically eliminated by having the adjacent sides of adjacent terminals parallel.

While a particular form of terminal has been shown as applied in the single type of switch bank, it is evident that terminals may be differently formed and arranged in many other bank structures without departing from the spirit of the invention, which should be limited merely by the scope of the appended claims.

What is claimed is:

1. A curved terminal bank in which sides of adjacent terminals are parallel.

2. A terminal bank for rotary switches comprising terminals having radial sides and arranged in the bank with the adjacent sides of terminals parallel.

3. A terminal bank comprising terminals so shaped and so arranged in the bank that the adjacent sides of terminals are parallel and the center lines of the terminals converge to a common point.

4. A terminal bank comprising flat terminals arranged in semicircular layers so that the side of one terminal in a layer is parallel to the adjacent side of the adjacent terminal in said layer.

5. A semicircular terminal bank having terminals so formed that the space between two terminals is of the same width as measured nearer or further away from the center of the semicircular bank.

6. A switch comprising a curved terminal bank of layers of terminals, the terminals in each layer being arranged so that adjacent sides of adjacent terminals are parallel, and a set of contact brushes arranged with one brush for each layer.

7. A terminal bank comprising terminals arranged with the center lines of the terminals converging to a central point and the sides of each terminal converging to another point on its center line and further arranged so that one side of a terminal is parallel with the adjacent side of another terminal nearest to this side and that the other side of said first mentioned terminal is parallel with the adjacent side of another terminal nearest to this other side of said first mentioned terminal.

In witness whereof, I hereunto subscribe my name this 30th day of April, 1929.

MERLE P. CHAPLIN.