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SWITCH BANK INSULATING ELEMENT

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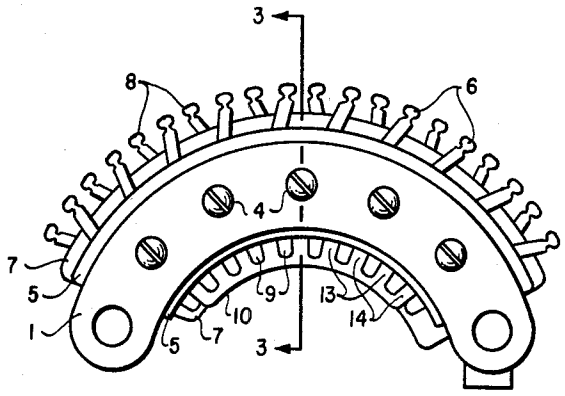


FIG. 1

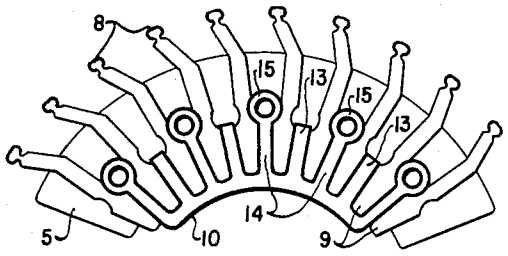


FIG. 2

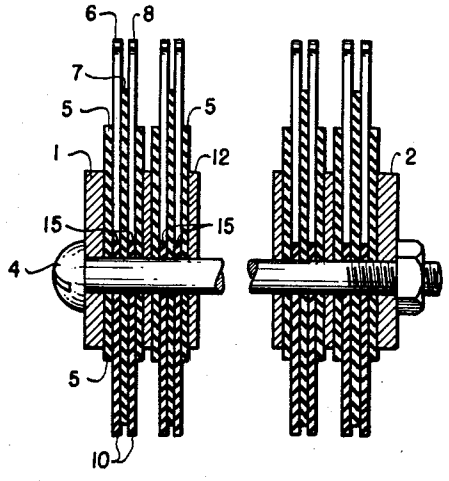


FIG. 3

INVENTOR.

FRED GIENGER

BY Wm Watts Owen

ATTY.

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SWITCH BANK INSULATING ELEMENT

Fred Gienger, Highland Park, Ill., assignor to General Telephone Laboratories, Incorporated, a corporation of Delaware

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2 Claims. (Cl. 317—112)

This invention relates in general to switch banks utilized in automatic telephone systems that extend connections by means of step-by-step operation. It is more particularly designed, although not so limited, for use in Strowger type two-motion switches used as line finders, selectors, and connectors. The object of this invention is to provide such a switch bank that may be used in modern switches requiring a greater number of terminal banks per switch, faster and more accurate extension of connections with less maintenance and adjustment, and one which is capable of manufacture with ease and economy.

The well-known Strowger switch bank is illustrated and described on pages 55 and 56 of Automatic Telephony, 2nd edition, by Smith and Campbell, published by McGraw-Hill Book Company. This type of switch bank consists of many semicircular levels of contacts. Each level consists of two rows of terminals separated from each other by a thin sheet of insulating material. The terminals in each row are radially spaced in the same horizontal plane and the entire bank is fastened with bolts.

Each switch bank is accessed by a pair of wipers mounted on a shaft which steps vertically to align the wipers with a particular level and then steps in a rotary direction to direct the wipers to a particular set of terminals on that level. This well-known step-by-step switching operation is fully explained on pages 53 to 60 of the said Automatic Telephony by Smith and Campbell.

The switch wipers are mounted in pairs and tensioned toward each other to assure positive contact with the terminals on a particular level. As the wipers rotate through the terminal bank, they spread apart as they engage the terminals and return toward each other as they pass between the terminals. This action occurs alternately until the wipers finally rest on a particular set of terminals. When the wipers are released they rotate backwards to their normal position again spreading apart and returning toward each other as they alternately engage and ride over the space between the terminals in the particular level.

Although the bank terminals are not formed from an extremely thick material, they do offer resistance to the rotary motion of the wipers that must be overcome by the stepping magnets as they impart the forward rotary motion to the wipers. This same resistance must be overcome by the restoring spring as it imparts the backward rotary motion to the wipers. The effects of this resistance on the switch are (*a*) to reduce the speed of operation; (*b*) to limit the number of wipers on a switch; (*c*) to alter the adjustment of the wipers on the shaft; and (*d*) to increase the number of broken wipers after continued use.

Rather than design stepping magnets and restoring springs of a larger capacity to overcome the wiper friction caused by the action of the wipers riding on and off the bank terminals, attempts have been made to reduce it so that the objectionable effects are minimized. A semicircular comb-like filler or insert made of insulating material was designed to fill the spaces between adjacent terminals in a row. This filler would provide a smooth surface from the first terminal to the last in a given row thereby reducing the wiper friction to a minimum. Details of such a filler are found in Patent 2,057,865 issued to R. W. Wagner on October 20, 1936.

The difficulty of using such a filler or insert was encountered in its assembly on the switch bank. Alignment of the insert between the terminals was not accurate and after being placed by the bank assembler it would be forced out of position by subsequent assembly operations compressing the layers of the bank. Manufacture of switch banks with such a filler was terminated because of the impractical effect of these deficiencies.

It is the purpose of this invention to provide an insulating element which may be easily assembled, accurately aligned, and permanently fastened as an integral part of the switch bank to fill the spaces between adjacent radially spaced terminals in the rows of a particular level of the switch bank.

The invention is illustrated by the accompanying drawing in which Figure 1 is a top view of a switch bank which embodies the present invention.

Figure 2 is the top view of a bottom row of terminals in a level using the improved insulating element. Each alternate tooth of the insulating element is extended with an eyelet at the extreme end for fastening to the bank bolts.

Figure 3 is a cross section of the switch bank at line 3—3 of Fig. 1.

Essentially, a switch bank is made up of a number of levels of contacts separated from each other by metallic spacers **12** and by insulating strips **5**; supported at the top and bottom by clamping plates **1** and **2**; and fastened firmly together by means of bolts **4**. Each level is made up of the following elements. Just below plate **1** is a semicircular strip of a hard insulating material **5**, then a row of radially spaced terminals **6**. In the same plane as the row of terminals **6**, filling the spaces between them at the wiper contact ends **9** and fastening to the bank bolts **4** by means of eyelets **15**, is the insulating element **10** made of a soft flexible material which acts as a filter or insert to provide a smooth riding surface for the wipers across an entire level. Immediately below the terminal-filler layer is another strip of insulating material **7** which is between and separates the two rows of terminals **6** and **8** forming a bank level. Below this layer of insulation **7** is another layer of radially spaced terminals **8** and a similar cooperating insulating element **10** with projections **13** and **14** lying in the spaces between terminals. The bottom layer of the level is another strip of insulation **5** again separating the contact terminals **8** from the next spacer **12**.

The soft flexible insulating element **10** is clearly shown in Figure 2 with the outside and alternate ones of the finger-like projections **14** made longer and containing an eyelet **15** to fasten the element securely to the bank bolts **4**. One material which has been found to have excellent insulating qualities and in addition offers inherent lubricating qualities is Insurok T–805. Its strength and flexibility make it especially adaptable for manufacture and use as the insulating element **10**. The entire element **10** is the same thickness as the terminals **6** or **8** and coplanar with them in a given row. The projections **13** and **14** fill all the space between the wiper contact ends **9** of the terminals **6** and **8** from the first to the last terminal in a row. Once assembled and tightened in the switch bank, the filler **10** is rigidly fastened to the bank and with the terminals **6** or **8** provides a smooth surface across an entire row which virtually eliminates wiper friction as the switch wipers traverse a particular level. In addition, the material at the eyelet portion **15** of the insulating ele-

ment fills the space around the bolts 4 and in between the terminals 6 and 8 to provide better support for the entire bank when clamped together.

With a switch bank as just described in use, switches may now be designed with banks of larger capacity and as many as six sets of wipers without changing the power of the stepping magnets and restoring springs. There is no fear of wipers becoming maladjusted or broken due to an improperly aligned filler between terminals, or a filler that has fallen out of place. Perfect alignment and positive security is insured by the eyelets 15 cooperating with the bank bolts 4 and the rows of contacts become a more homogeneous switch bank when clamped together because of the additional support from the material of filler 10 surrounding the bank bolts 4.

In addition to the reduction of wiper friction, the insulating element inserted between adjacent terminals acts as a filler to close a space that previously accumulated dust and other foreign particles which hampered wiper motion unless frequently cleaned. The use of a softer, more flexible insulating material provides a certain amount of lubrication to the wipers which makes it exceptionally well adapted for this use in a switch bank. By reducing dust and providing lubrication, the use of my invention in a switch bank will allow faster switch operation with a minimum amount of maintenance required.

I have explained in detail the essentials of my invention and that which I believe is subject to protection by Letters Patent is described in the following claims.

What I claim is:

1. A bank of contacts for use in a switch having a pair of wipers for engaging the contacts of the bank, said bank having a pair of rows of radially spaced apart contacts, a series of insulating strips, one between the rows of contacts and others on opposite sides of said rows, and a series of bolts for clamping the elements of the bank together, additional strips of insulating material each having a portion extending along the ends of a row of contacts and having a series of projecting fingers extending between the contacts of the row to fill the spaces between adjacent contacts and between the other series of insulating strips, each of said strips formed of self-lubricating material to materially reduce the friction of a wiper traversing the flat plane formed by the alternate fingers and contacts, and circular openings in the ends of certain of said fingers through which said bolts pass and whereby all of said strips and said contacts are immediately and positively aligned and further are securely clamped immovably when the bolts are tightened.

2. In a switch bank, a level adapted to be traversed by a wiper, said level comprising an insulating base, a plurality of equi-spaced conducting contacts residing on said base, each of said contacts having a spade shaped end, an elongated central portion and a terminal end, the central portion of each of said contacts having arcuate side cutouts, means for providing a level surface for the travel of a wiper across said contacts comprising a comb-like filler having a base and a plurality of teeth extending therefrom, each of said teeth shaped to fit snugly between two of said contacts, said teeth lying in the path of travel of a wiper, said teeth having inherent lubricating quality to aid the smooth travel of a wiper across said teeth and the spade-shaped end of said contacts, certain of the teeth of said comb having circular eyelets at the outward extremity of said teeth, said eyelets having a circular outer contour to mate with the side cutouts in said contacts to maintain said contacts properly aligned in the plane of travel of a wiper, said eyelets adapted to encircle bank bolts for retaining said filler and said contacts permanently in place.

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