Oct. 6, 1942. H. O. SIEGMUND 2,298,236

TERMINAL BANKS

Filed Aug. 3, 1940

FIG. 1

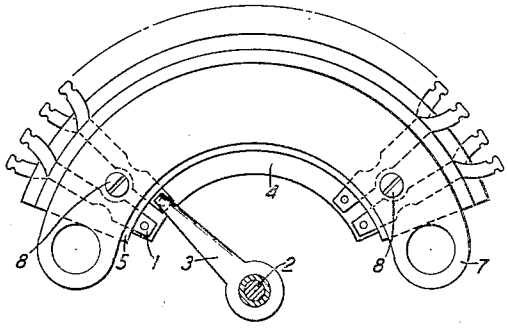


FIG. 2

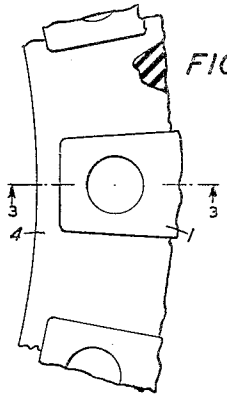


FIG. 3

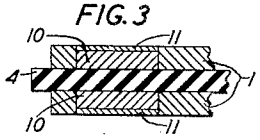


FIG. 4

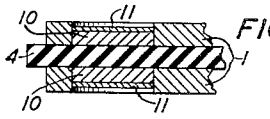


FIG. 5

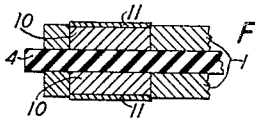


FIG. 6

FIG. 7

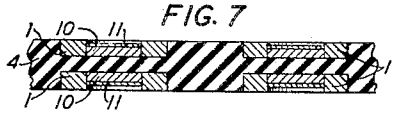
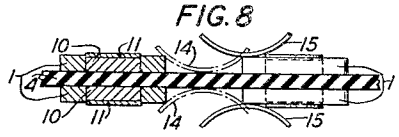


FIG. 8



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UNITED STATES PATENT OFFICE

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TERMINAL BANK

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Application August 3, 1940, Serial No. 350,427

13 Claims. (Cl. 175—306)

This invention relates to electrical switching devices and particularly to terminal banks for such switches.

The objects of my invention are to provide simple and inexpensive switching banks; to provide the terminals with improved precious metal contacting elements; to safeguard against the migration of the precious metal; and to obtain other improvements in structures of this kind.

Heretofore terminals and contact springs have been used in which inserts have been made to provide contacting elements with the inserts consisting of a base metal disc or point covered with a precious metal contacting surface protruding above the terminal or spring.

This invention relates to a terminal bank in which layers of terminals are arranged one layer on top of another and insulation material insulating one terminal from another and having a bimetallic contact insert in an aperture at the tip of each terminal comprising a precious metal contacting portion in said aperture at an exposed contacting surface of the terminal and a base metal portion in the remaining section of the aperture. By this arrangement of the terminals in the bank the precious metal contacting portion will not come in contact with the insulation for the terminals and thus migration of the precious metal is avoided.

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

Fig. 1 shows a terminal bank constructed in accordance with the applicant's invention and a brush for sweeping over the contacting surfaces of the terminals;

Fig. 2 is an enlarged top view of a section of the terminal bank showing tips of terminals and an insulating layer;

Fig. 3 is a cross-section taken on line 3—3 of Fig. 2 showing tips of a preferred form of the applicant's invention;

Figs. 4 and 5 show a similar cross-section as that shown in Fig. 3 with modified forms of the applicant's invention;

Fig. 6 is a front view of a section of two layers of terminals and the intermediate insulation layer;

Fig. 7 is a view similar to Fig. 6 of a modified form in cross-section through the tips of two terminals of two adjacent layers between the layers of terminals and insulation between the terminals;

Fig. 8 shows a front view partly in section of an arrangement of terminals and various positions of the brushes that travel across these terminals.

Referring now to the drawing and particularly the switch shown in Fig. 1, the terminals 1 are arranged radially in layers extending in a semicircle with the shaft 2 in the center having brushes 3 connected thereto and arranged to sweep over the exposed tips of the layers of terminals. These layers of terminals may be arranged so that two adjacent layers are provided with an insulation plate 4 between them as shown also in enlarged detail in Fig. 6, for example. The terminals and insulation plates may be arranged in multiple layers insulated from each other by other insulation plates, such as 5. All of these layers and terminals and insulation plates may be clamped together by means of semicircular upper and lower metal plates, the upper one of which has been shown at 7 and bolted together by means of bolts inserted at 8. The plates 5 may be cut back to expose the contacting surfaces of the terminals so that the brushes may travel freely from one terminal to another across each layer, while the plates 4 may extend towards the center of the bank beyond the inner ends of the terminals. The terminals may extend at the rear of the bank as shown in Fig. 1 for the connection of the conductors and are variously shaped to provide sufficient space between the terminals. The plates 4 may serve as bearing surface for the brushes 3 as they travel from one terminal to another.

The cross-section of the terminals 1 and the insulation plate in Fig. 3 shows inserts that may be frictionally or otherwise secured in apertures in the tips of the terminals. These inserts may comprise a base metal disc 10 covered with a precious metal disc 11 which may be of silver or any other suitable metal and applied to the base metal disc 10 by welding or any other suitable method, or the base metal disc 10 may be coated with a precious metal, for example by a plating process. This layer 11 may be flush with the exposed surface of the terminal whereas the base metal insert 10 may be flush or under-flush with the opposite surface of the terminal and may or may not come in contact with the insulation plate 4. With the layer 11 flush with the exposed surface of the terminal, a highly efficient contacting means is obtained as the wiper 3 will pass smoothly and evenly across the terminal and the layer 11. It will be noted that with this arrangement of terminals and inserts the precious metal disc is separated from the insulation plate 4 by the disc 10 and by the terminal itself

so that no migration of the precious metal can possibly take place from the precious metal disc to the insulation plate 4, it being known that where a precious metal contact such as silver, for example, is placed directly in contact with insulation, such migration would take place. Thus the insulating members are preserved against the deteriorating effect of migration.

Fig. 4 shows an arrangement practically identical with that shown in Fig. 3 except that the base metal disc 10 and the precious metal insert disc 11 do not fill completely the aperture in the terminal 1 so that the upper surface of the precious metal disc 11 is under-flush with the exposed surface of the terminal and the base metal layer is flush with the opposite surface of the terminals. The under-flushing of the precious metal disc may be very slight so that the tip of a brush 3 as it sweeps across the terminals will sink into the depression formed by the under-flushing and come in contact with the precious metal disc.

In Fig. 5 a similar arrangement has been shown except that in this case the precious metal disc 11 extends slightly above the exposed surface of the terminals 1. The advantage of this construction is that dust and other high resistance material does not collect on the surface of the precious metal contact and impair its conductivity.

Fig. 6 shows an insulation plate 4 and two terminals adjacent each other on opposite sides thereof to show the relative distance between the terminals and their proportion in relation with the plate 4.

Fig. 7 is a similar arrangement as that shown in Fig. 6 except that the insulation plate 4 extends also between the terminals and is flush with the exposed surfaces of the terminals. In this case it may be of advantage to have the precious metal disc 11 under-flushed from the exposed surface of the terminals so that particles of the precious metal that may be rubbed off by the brushes 3 will not so readily be spread over the exposed surfaces of the terminals and come in contact with the insulation plate 4.

Fig. 8 shows an arrangement similar to that shown in Fig. 6 with the brushes 3 shown in dotted lines at 14 between two adjacent terminals, gliding over the insulation plate 4 and at 15 the brushes are shown in full lines in positions to engage the terminals 1.

It is evident that many other arrangements of a bank and terminals constructed in the manner of the applicant's invention may be produced without departing from the spirit thereof. Also, it will be understood that different metals, such as silver, may be used for contact surfaces and that any suitable base metal or other material may be used as the remaining part of the insert.

What is claimed is:

1. In a terminal bank, layers of terminals arranged adjacent each other, insulation material covering one side of each layer of terminals, a bimetal contact insert in an aperture at the tip of each terminal comprising a precious metal contacting portion in said aperture at the contacting surface of the terminal and a base metal portion in the remaining section of the aperture.

2. In a terminal bank, layers of terminals arranged one layer on top of the other, layers of insulation material between the layers of terminals, each layer of insulation material extending to cover completely one side of the tips of each layer of terminals, a bimetal contact inserted in an aperture at the contacting tip of each terminal, each contact comprising a precious metal member facing the contacting surface of the terminal and a base metal member facing the adjacent insulation layer at the opposite side of the terminal.

3. In a terminal bank, layers of terminals arranged in layers adjacent each other, layers of insulation material between the layers of terminals, each layer of insultion material extending to cover completely one side of the tip of each layer of terminals, a contact comprising a precious metal member and a base member secured in an aperture at the contacting tip of each terminal so arranged that the outer surface of the precious metal member faces the contacting surface of the terminal and the base member faces the opposite surface of the terminal in contact with the adjacent layer of insulation.

4. In a terminal bank, layers of terminals, layers of insulation material between the layers of terminals, each layer of insulation material extending to cover the tips of the terminals except a contact surface thereof, a contact comprising a precious metal member and a base metal member secured in an aperture at the tip of each terminal so arranged that the precious metal member protrudes from the exposed contacting surface of the tip and the base metal member extends flush with the opposite surface of the terminal in contact with an insulation layer.

5. In a terminal bank, layers of terminals, layers of insulation material between the layers of terminals, each layer of insulation material extending to cover completely one side of the tips of each layer of terminals, a contact comprising a precious metal member and a base member secured thereto and inserted in an aperture at the tip of each terminal so that the precious metal member is slightly under-flush with the exposed surface of the tip of the terminal and the base member extends flush with the opposite surface of the terminal.

6. In a terminal bank, layers of terminals arranged one layer on top of another, layers of insulation between the layers of terminals, each layer of insulation material extending to cover completely one side of the tip of each layer of terminals, a contact comprising a precious metal coating applied on a base metal foundation inserted in an aperture at the tip of each terminal so that the precious metal serves as the contacting surface at the exposed side of the tip while the base metal foundation is under-flushed with the opposite surface of the terminal so as not to come in contact with the adjacent insulation layer.

7. In a terminal bank, layers of terminals arranged one layer on top of the other, insulation material enclosing each layer of terminals except a contacting surface of each terminal, a contact insert comprising a precious metal layer applied on a base metal foundation and inserted in an aperture at the contacting surface of each terminal so that an exposed surface of the precious metal layer serves as a contact surface for the terminal and the base metal foundation extends flush with the opposite surface of the terminal in contact with the insulation material applied to this surface.

8. In a switching terminal bank, layers of terminals arranged one layer on top of the other in pairs of layers, insulation material between the two layers of each pair of layers of terminals,

insulation spacers between adjacent pairs of layers of terminals leaving the tips of the terminals exposed, a contact insert in an aperture in the tip of each terminal comprising a precious metal layer arranged in said aperture so as to serve at the contacting surface of said terminals and a base metal foundation arranged in the remainder of the aperture.

9. In a switching terminal bank, layers of terminals arranged one layer on top of the other, material for insulating said terminals from each other, a contact insert comprising a layer of precious metal applied on a layer of base metal frictionally inserted in an aperture in each terminal so that the precious metal layer may serve as a contacting surface and the base metal layer filling the remainder of the aperture to engage the insulation material.

10. In a terminal bank, layers of terminals arranged one layer on top of the other, layers of insulating material between the layers of terminals, each layer of insulation material extending to cover completely one side of the tips of each layer of terminals, a bimetal contact inserted in an aperture at the contacting tip of each terminal, each contact comprising a precious metal member facing the contacting surface of the terminal and a base metal member facing the adjacent insulating layer on the opposite side of the terminal, said base metal member serving to prevent particles of said precious member from migrating into said insulation layer.

11. In a terminal bank, layers of terminals arranged one layer on top of the other, layers of insulation material between the layers of terminals, each layer of insulation material covering the lower side of a layer of terminals, a precious metal contact inserted in an aperture at the contacting tip of each terminal, said precious metal contacts being slightly over-flush with the upper contacting surface of the terminals, a base metal insert in each aperture interposed between the precious metal contact and the insulation layer covering the under-side of the terminal, said base metal insert serving to protect the associated precious metal contact against migration of particles therefrom into the insulation layer covering the under-side of the terminal.

12. In a terminal bank, layers of terminals arranged adjacent each other, each terminal having a tip for contact purposes and a perforation in said tip, intermediate layers of insulating material engaging the terminals of each terminal layer and covering one of the surfaces of each terminal at its contact tip, and a bimetallic contact element inserted in the perforation of each terminal tip, said contact element comprising a precious metal section resting in said perforation and presenting a contact area in the exposed surface of the associated terminal tip and a base metal section interposed between said precious metal and the associated layer of insulating material to prevent the precious metal from migrating into the body of said insulating material.

13. In a terminal bank, layers of terminals arranged adjacent each other, each having an aperture extending through the terminal near its tip, a sheet of insulation material covering one side of each layer of terminals, a base metal insert in each aperture contacting with the sheet of insulation material covering the one side of each layer of terminals, a precious metal contact inserted in each aperture serving as the electrical contacting surface for the associated terminal and having its exposed contacting surface slightly below the exposed surface of the associated terminal, the depressions formed in the terminals by said precious metal contacts serving to prevent any detached particles of the precious metal from spreading out over the exposed surfaces of the terminals and insulation material, said base metal insert serving to prevent particles of the precious metal from entering the insulation material.

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