Dec. 21, 1943. C. W. McWILLIAMS 2,337,397

TERMINAL BANK

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FIG. 1

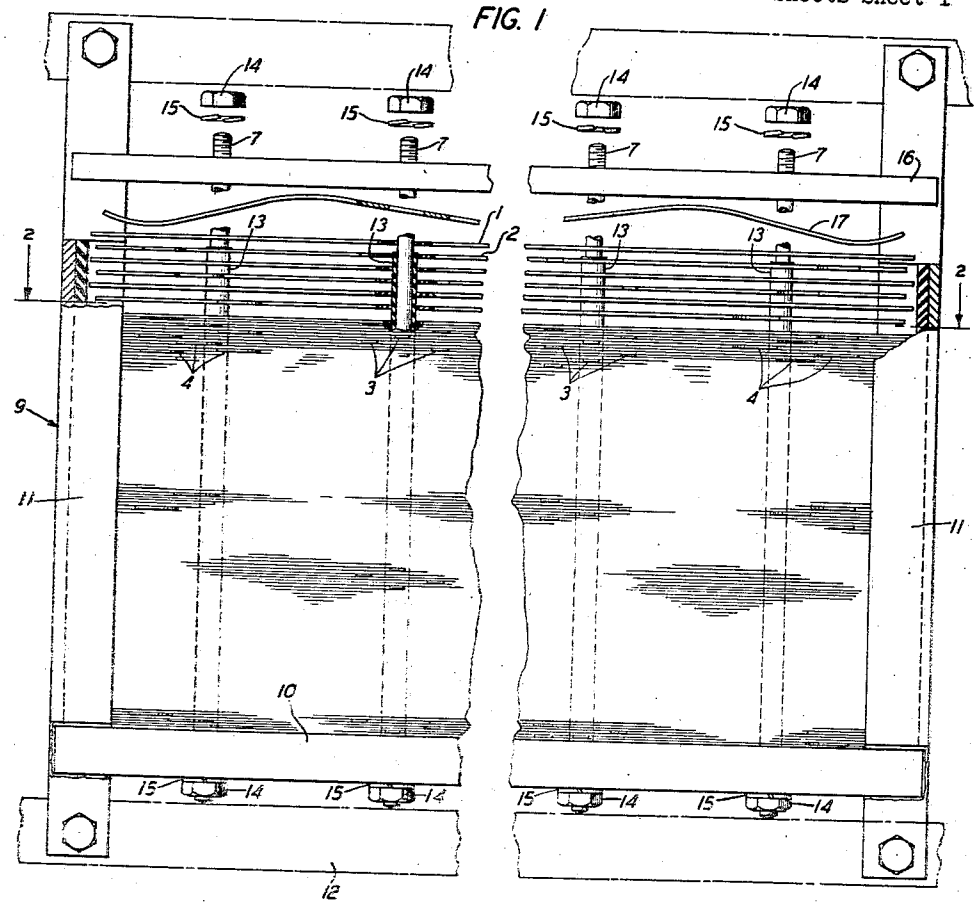
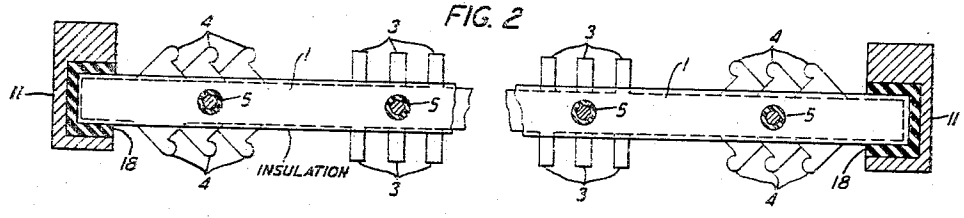


FIG. 2



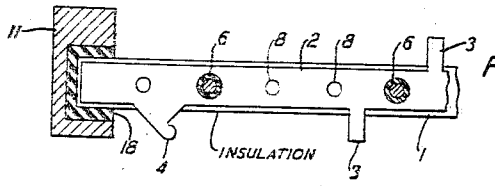


FIG. 3

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FIG. 5

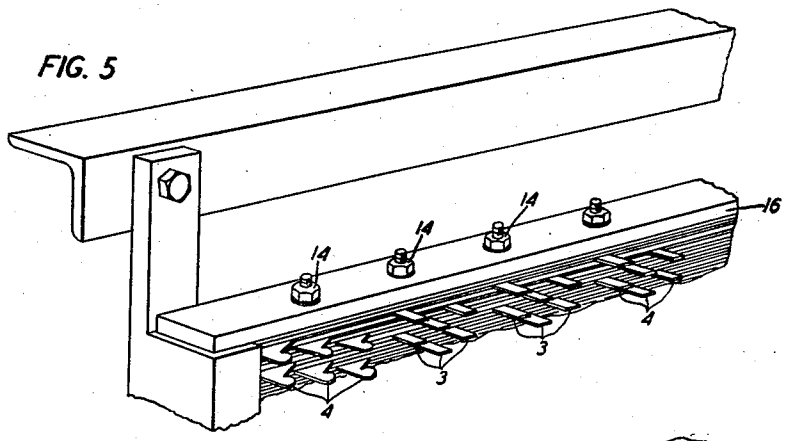
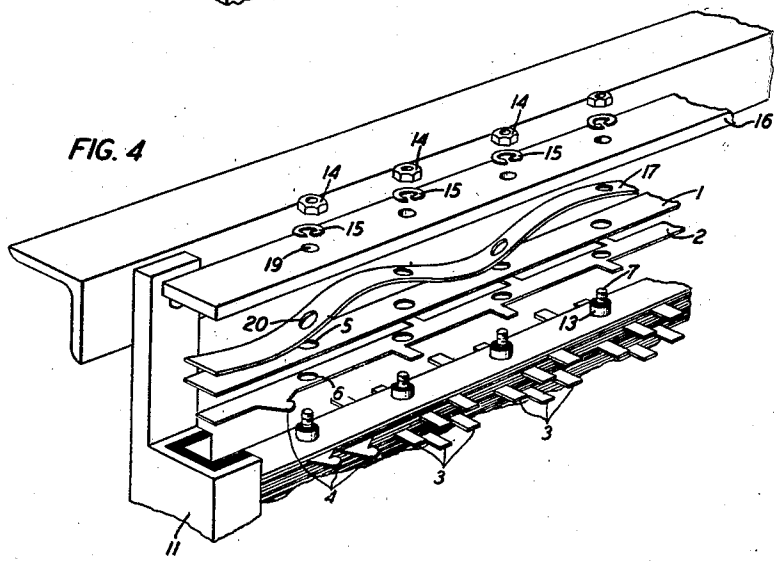


FIG. 4



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TERMINAL BANK

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Application December 3, 1941, Serial No. 421,422

3 Claims. (Cl. 175—306)

This invention relates to terminal banks and more particularly to terminal banks which are adapted for use with automatic switches of the "panel" type extensively used in automatic telephone exchange systems. Its principal object is to provide an improved bank of the above type which is simple to construct and easy to maintain and the terminals of which are uniformly and properly spaced and protected against sagging, separation and warping. To this end, a structure is formed of alternate superimposed metal terminal strips and insulating strips, the latter preferably of a hard insulating material, both the metal and insulating strips being stacked within a frame suitably adapted to secure the stack. A compression spring disposed between the uppermost insulating strip of the stack and a cross member secured to the top of the frame exerts, at all times, a moderate clamping pressure upon the stacked assembly in order to take up any slack that may result from the shrinking or warping of the insulation members thereof.

In the construction of terminal banks of the above type it has been the practice heretofore to use as insulating spacers a paper impregnated with an asphaltum compound, and the superimposed structure of strips and spacers is then placed under heat in a mechanism that compresses the bank to size, an operation during which the insulating compound is softened to produce a homogeneous, infusible, insoluble and very rigid structure. It has been found, however, that a terminal bank constructed in this way is liable, in time, to deteriorate and its usefulness to become impaired as a result of the settling, warping and separation of the various insulating layers. Moreover, in repairing a damaged bank constructed as above, say to remove a broken terminal strip, considerable difficulty is experienced and considerable expense is involved in separating the terminal from the insulating strips, it being usually necessary to ship the bank to the factory and there subject it to heat and very often chemical solvents in order to separate the spacers and terminal strips lying on top of the defective strip to be removed.

In my proposed terminal bank, two U-shaped vertical members are welded or otherwise rigidly secured to a suitable base with their channels facing each other, and a number of insulated guide rods are affixed to the base in spaced relation. In the space formed between the channels, alternate layers of insulating and terminal strips provided with apertures to pass through the rods are arranged in a stack. A crossbar is then fitted across the top of the vertical members to form, with said members and the base, a closed quadrilateral clamp that encloses the terminal stack. Between the underside of the crossbars and the uppermost insulation strip of the stack is inserted a compression spring of suitable design that exerts a moderate pressure permanently upon the stacked assembly, which insures its stability against any swelling or shrinking of the insulating strips interposed between the terminal strips.

A terminal bank constructed in the manner briefly described above has a number of advantages. First of all, by eliminating the compression and heating steps required in the manufacture of the conventional bank, the cost of manufacturing the bank is appreciably reduced and, second, the repair of the bank is considerably facilitated by the fact that successive insulation and terminal strips, not adhering to each other, may be easily pulled out of the stack by simply removing the top crossbar and the spring thereunder.

The above and other objects of the invention are fully set forth in the following description and claims, and will be more readily understood by reference to the accompanying drawings in which:

Fig. 1 is a front elevation of the terminal bank, foreshortened lengthwise by the removal of the central portion thereof with the top portion exploded to show more fully the relative position of the different insulating and terminal strips, and the position of the compression spring in relation to the stacked terminal assembly and the top crossbar;

Fig. 2 is a section taken along the section line 2—2 of Fig. 1 exposing to view an insulating strip, the protruding terminal projections and wiring lugs of the terminal strips showing thereunder;

Fig. 3 shows a portion of one of the terminal strips directly underneath the insulation strip shown in Fig. 2 and lying upon another insulation strip directly beneath;

Fig. 4 is a perspective exploded view of the top portion of the near end of the bank showing the manner in which the strips are stacked and the manner in which the compression spring and the crossbar are disposed thereon; and

Fig. 5 shows the dissociated parts of Fig. 4 assembled and fitted as the upper near portion of the bank.

The terminal bank of my invention comprises an appropriate number of superimposed layers

of insulation strips 1 of any suitable insulating medium such as, for instance, hard sheet rubber, substantially rectangular in shape with regularly spaced holes 5 provided therein, and interposing terminal strips 2 a portion of one of which is shown in detail in Fig. 3. The terminal strips, which may be readily stamped by a punch press, each have a plurality of regularly spaced projections 3 in opposite sides to serve as terminals to be engaged by movable brushes or other contact members having access to either side of the bank.

These projections 3 are spaced differently for three groups of strips (if the terminal bank is to serve for a movable brush equipped with three contact making elements). The strips of one group which is to serve as the "tip" terminal row will have their projections 3 regularly spaced in accordance with the separation to be provided between the different brushes, but the projection that will be accessible to the "tip" contact element of the brush at the extreme left of the bank will, of course, be nearest to the closest of the wiring lugs 4. The strips of the second group of terminals which is to serve as the "sleeve" terminal row will have their projections 3 regularly spaced as above, but the projection which will be accessible to the contact element (or elements) of the sleeve brush at the extreme left of the bank will be to the right of and adjacent to the projection reserved for the tip. The strips of the third group of terminals which is to serve as the "ring" terminal row will also have their projections 3 regularly spaced as above, but the projection which will be accessible to the contact element of the ring brush at the extreme left of the bank will be to the right of and adjacent to the projection reserved for the sleeve. Corresponding projections on the same strips are correspondingly spaced to preserve the same relative distance for all groups of projections when a strip from each group is stacked one upon the other in the order required to present terminal exposure to the selecting brushes having access thereto.

Each metal terminal strip 2 is provided with a wiring lug 4 at either end for the connection of wires thereto, and the strips are further provided with suitable openings 6 which align with openings 5 of the insulating strips when both insulating and terminal strips are alternately stacked one upon the other. The terminal strips may also have other openings, such as openings 8 for example, to reduce their body and their electrostatic capacity.

The strips 1 and 2, in the required number to form a bank, are assembled in superimposed relation within a frame 9, the latter comprising a base 10 to which is welded or otherwise secured at the ends thereof two U-shaped inwardly facing channel members 11, said members being suitably bolted to a floor supporting member 12. The base 10 is provided with a suitable number of openings through which pass the upright end-threaded rods 7, each enclosed by an insulating bushing 13. The holes 5 and 6 of the insulating and terminal strips 1 and 2, respectively, have a slightly larger diameter than the diameter of a bushing 13 and are so located that when the strips are stacked within the frame, the bushings (as well as the enclosed rods) will pass through the aligned holes. The rods 7 are tightly secured to the base 10 by nuts 14 and are held in tightened position by interposed lock-washers 15. The inner sides of each of the channel members 11 are lined with formed insulation 18 which extends to the base 10 and is of a thickness that leaves a rectangular groove sufficiently wide for the ends of the strips to slide therethrough.

In stacking the strips, an insulation strip 1 is positioned atop of the channels 11 between the grooves thereof and passes over the bushings 13 until it comes to rest on the upper surface of the base 10. This is followed by one of the terminal strips 2 which, of course, will come to rest upon the insulating strip beneath it. The next strip will be an insulating strip which is followed, in turn, by a terminal strip. Thus alternate insulating and terminal strips are stacked one upon the other between the two grooves formed by the upright channel members 11, and when the desired numbers of strips 1 and 2 are stacked within the frame 9, a compression spring 17 is placed upon the stack. This spring may be of any shape but preferably corrugated in form, with a length and width substantially equal to those of an insulating strip 1 and provided with openings 20 which, when the spring lies on top of the terminal stack, align with the openings 5 and 6 of the insulating and terminal strips, respectively, to permit the passage therethrough of the insulated bushings 13 and the enclosed rods 7. The spring is then compressed into a position that will exert a moderate pressure upon the stacked assembly by the clamping cross member 16 which is rectangular in shape, of a length that will cause it to be supported on top of the channel members 11 and provided with regularly spaced openings 19 which are aligned with openings 6, 5 and 20 for the passage of the insulated bushings 13 and the enclosed rods 7, the length of each bushing being sufficient to cause the upper end thereof to just clear the upper surface of the clamping cross member 16 and cause thereby the upper threaded ends of the rods 7 to protrude thereover. The cross member 16 is then tightened into position by the nuts 14 threading over the rods and held in a tightened position by the interposed lock-washers 15, as shown in Fig. 5.

The spring 17 exerts a moderate clamping pressure upon the entire terminal stack and thereby insures stability of assembly by preventing any lateral or sideways displacement of the terminal strips 2 should the insulating strips 1 shrink or warp. If the spring 17 were not provided and the insulating strips should shrink, then, although the terminal stack might originally be tight-fitted under the clamping cross member 16 when first assembled, yet any shrinking or swelling of the insulation strips that might occur thereafter would loosen the terminal strips, cause them to move sideways by the slackness or pressure and thereby cause them to lose their vertical alignment. Hence by providing a compression spring between the underside of the crossbar 16 and the top of the terminal stack, a moderate pressure is applied to the stack that will counteract the effect of any change in the insulating strips.

If it is necessary to remove a defective insulating or terminal strip and replace the same by a new one, it is only necessary to lift the cross member 16 and spring 17 off the stack by removing the upper nuts 14 and lock-washers 15 and lift out of the stack the pile of insulating and terminal strips resting upon the strip to be removed and replaced. The new strip is then inserted in the position previously occupied by the defective one, and all the other strips, in appropriate alternation, are then stacked upon it in the

manner described, after which the spring 17 and cross member 16 are fitted to the top of the stack and tightened into position by the nuts 14.

While I have described my invention in connection with its specific application to a particular type of terminal bank, it is to be understood that various other applications and embodiments thereof may be made by those skilled in the art without departing from the spirit of the invention as defined within the scope of the appended claims.

What is claimed is:

1. A terminal bank comprising in combination a base, two upright U-shaped members supported upon said base one at each end thereof with the channels of said members facing each other, a plurality of formed terminal strips and insulating strips disposed in alteration for slidable insertion within the channels of said U-shaped members to form a stack, and yieldable clamping means secured to the top of said U-shaped members for holding the stack in a condition of stability.

2. A terminal bank comprising in combination a base, two upright U-shaped members supported upon said base one at each end thereof with the channels of said members facing each other, a plurality of formed terminal strips and insulating strip disposed in alternation for slidable insertion within the channels of said U-shaped members to form a stack, clamping means secured to the top of said U-shaped members, and means interposed between said clamping means and the top of said stack for exerting a pressure on said terminal stack in the stacking direction to maintain the stability of the stack.

3. A terminal bank comprising in combination a base, two upright U-shaped members supported upon said base one at each end thereof with the channels of said members facing each other, a plurality of rods having threaded ends secured to said base, sleeves of insulating material surrounding said rods, a plurality of formed terminal strips and insulating strips arranged in alternation, each of said strips being provided with openings for the passage of said rods therethrough and each adapted for slidable insertion within the channels of said U-shaped members to form a terminal stack, a clamping cross member supported on the top of said U-shaped member and provided with openings for the passage therethrough of threaded portions of said rods, a compression spring having openings for the passage therethrough of said rods, said compression spring being disposed between the top of said terminal stack and the under-surface of said clamping cross member, and nuts threaded to said rods for holding said clamping cross member in position whereby said compression spring exerts a pressure on said terminal stack in the stacking direction.

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