

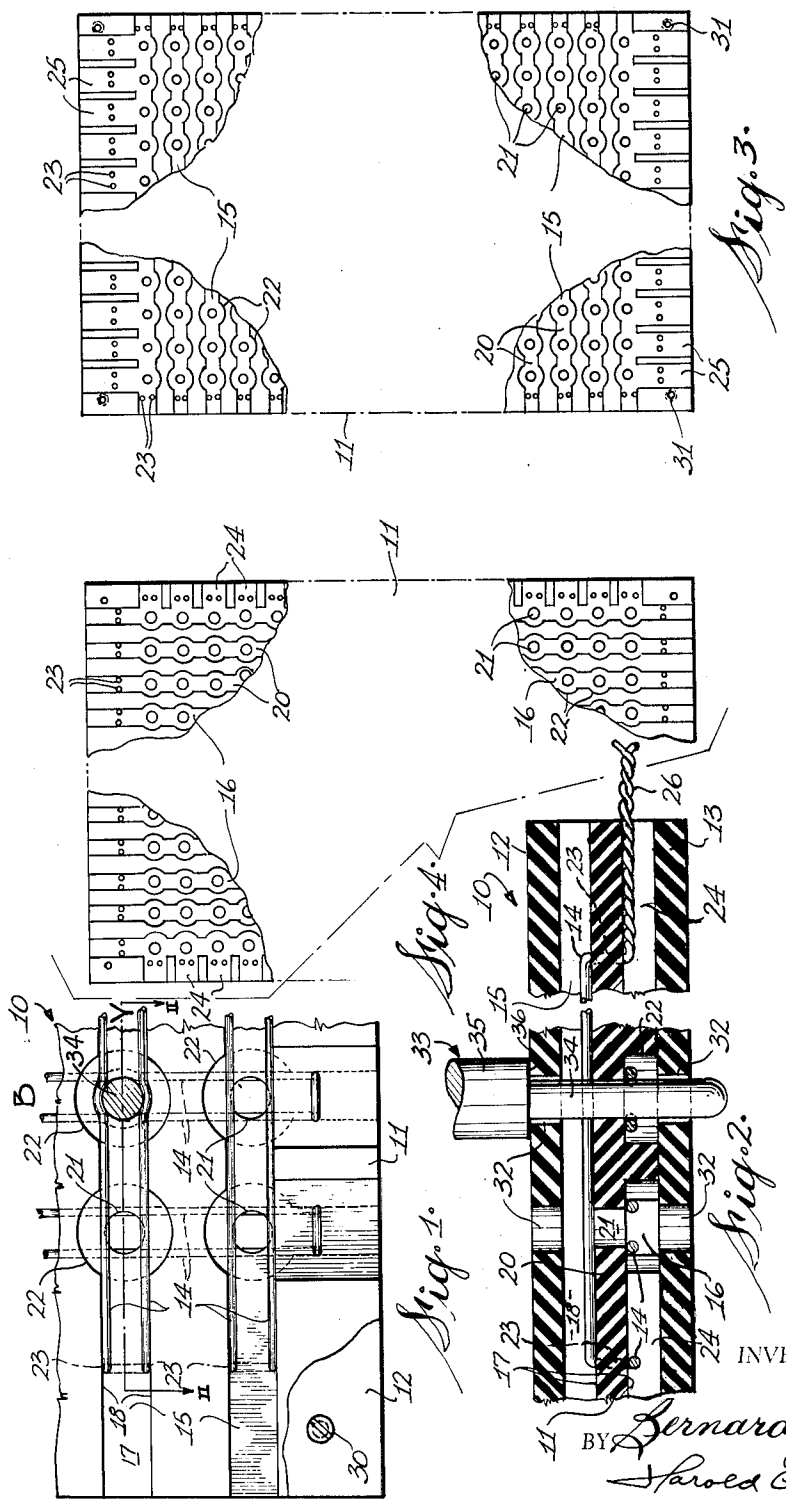
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PATCHING BOARD

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PATCHING BOARD

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This invention relates to a patching board of the type which permits interconnection of a plurality of electrical conductors in a variety of patterns.

Some of the various types of patching boards now known can only be used for permanent arrangements, and it is desirable, of course, in many installations to make a temporary set-up on the patching board. Many of the types of known patching boards, and particularly those designed to permit a temporary set-up of the board, are of complex and bulky construction, and as a result, they are costly to produce and maintain.

It is an object of the present invention to provide a patching board of simple and compact construction which permits permanent arrangements, and because the connections can be quickly changed, it can be used for temporary arrangements as well.

According to the present invention, there is provided a central patching board insulating panel member having opposed front and back surfaces each having at least one conductor accommodating groove therein. The groove in the front surface has a portion overlying a portion of the groove in the back surface, and the panel member has a web section separating the overlying portion of the groove in the front surface and the portion of the groove in the back surface. The web section has a peg receiving bore therethrough in communication at opposite ends with the portions of the grooves in the front and back surfaces.

Preferably, the front and back surfaces of the panel member each have a plurality of grooves therein, the grooves in the back surface extending at an angle with respect to the grooves in the front surface, whereby the grooves in the front surface cross the grooves in the back surface at a plurality of points and provide the board with a plurality of possible junction points.

More specifically, there is provided a pair of spaced tensioned conductors in each groove and extending longitudinally therealong. Each pair of conductors extends through each of the points of crossing of the grooves and across portions of each bore on opposite sides of the central axis of each bore so that when a peg of conductive material is inserted through the peg-receiving bore in the web section, it extends between and engages each wire of the pair in each groove to thereby electrically connect the pair of conductors in the groove in the front surface and the pair of conductors in the grooves in the back surface.

It is preferable to cover the front and back surfaces of the panel with a pair of cover plate members, at least one of which has peg-receiving bores axially aligned with the peg-receiving bores in the web sections of the panel member.

The invention will now be described in more detail with reference to the accompanying drawings, which show one embodiment of the invention by way of example, and in which:

FIGURE 1 is a fragmentary front view of one corner of the patching board of the present invention with a portion of the cover plate member removed for the sake of clarity;

FIGURE 2 is a cross-sectional view of the patching board taken along the line II-II of FIGURE 1;

FIGURE 3 is a fragmentary front view of the central panel member, without the conductors for the sake of clarity; and

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FIGURE 4 is a fragmentary back view of the central panel member without the conductors for the sake of clarity.

In FIGURES 1 and 2, the reference character 10 denotes generally the patching board which includes a central panel 11, front and back cover plates 12, 13 and conductors 14.

As can be best seen in FIGURES 3 and 4, the panel 11, is a rectangular plate-like member having flat front and back surfaces and four side edges. The panel 11 can be economically produced of plastic by moulding or from other materials having insulating qualities. For this purpose, a phenolic resin, NEMA Grade XXXP, is satisfactory. The front surface of the panel 11 has a set of parallel grooves 15 therein (see FIGURES 2 and 3). The grooves run perpendicularly from one side edge of the panel to the opposite side edge. The back surface of the panel 11 has another set of parallel grooves 16 therein (see FIGURES 2 and 4). It should be pointed out that the grooves have not been shown in full in FIGURES 3 and 4 for the sake of simplicity, but it is to be understood that the grooves completely occupy both the front and back surfaces of the panel 11. The grooves 16 run perpendicularly from one side edge, which is adjacent the side edge from which grooves 15 run, to the opposite side edge, and thus extend in a direction perpendicular with respect to grooves 15. Thus, each groove 15 of the set of grooves in the front surface crosses each groove 16 in the set of grooves in the back surface and therefore has portions at points spaced therealong which overlie portions of each groove of the set of grooves 16 in the back surface. Each groove in both the front and back surfaces of the panel is rectangular in cross-section, it being defined by a flat bottom surface 17 and opposed side wall surfaces 18, 18 disposed perpendicularly with respect to the bottom surface 17 and the front and back surfaces of the panel. All of the grooves are preferably of the same depth, and the sum of the depths of a groove 15 and a groove 16 is less than the total thickness of the panel so that at the points of crossing web sections 20 are formed which separate each groove 15 in the front surface from each groove 16 in the back surface (see FIGURE 2). Each web section 20 has a bore 21 therethrough which communicates at its opposite ends, of course, with a groove in both sets of grooves. Each bore 21 is centrally located with respect to a groove 15 and a groove 16, i.e., the central axis of each bore 21 intersects the longitudinal center line of one groove 15 in the front surface and one groove 16 in the back surface. Each bore 21 is counterbored at opposite ends to a depth equal to the depth of the grooves so as to provide a widened section 22 in the grooves at each bore.

At each end of each groove there is provided a pair of bores 23. Each pair of bores 23 in grooves 15 extends from the bottom surface 17 of the groove to a short groove 24 on the opposite side of the panel. Grooves 24 are in the back surface of the panel, each groove 24 being directly under the outer end of a groove 15 in the front surface of the panel 11. The grooves 24 extend in from the same side edges as grooves 15 but only extend as far as the first groove 16 as can be seen in FIGURES 2 and 4. Each pair of bores 23 in grooves 16 extend from the bottom surface 17 of the groove to a short groove 25 on the opposite side of the panel. Grooves 25 are on the front side of the panel, each groove 25 being directly over the outer end of a groove 16 in the back surface of the panel. One bore of each pair of bores 23 is close to one of the side wall surfaces 18 of the groove 15 or 16, and the other of the pair of bores 23 is spaced from the one bore and is close to the opposite side wall surface 18 of the same groove, and pref-

erably, each bore of the pair 23 is immediately adjacent a side wall surface 18 so that the plane of the side wall surface 18 is tangential to the rim of the bore.

The pair of conductors in each groove whether it be in the front surface or the back surface of the panel are formed from a single length of wire. A gold-plated beryllium wire is desirable for this purpose since it resists oxidation and thus permits better connections. As can be seen in FIGURES 1 and 2, the pair of conductors in each of grooves 15 are formed by the length of wire passing from one of the grooves 24 at the edge of the board up through one of a first pair of bores 23 to the grooves 15, extending along the groove 15 adjacent one side surface 18 thereof to its opposite end, looping through a second set of bores 23, extending back along the same groove 15 adjacent the opposite side surface 18 thereof, and passing back through the other of the first pair of bores 23 to the groove 24. The initial tension may be applied to the wire by simply twisting the free ends of the wire in groove 24 together as shown at 26 in FIGURE 2. The pair of conductors 14 in grooves 16 are provided in exactly the same manner, but the twisted free ends of the wire in each of grooves 16 are located in grooves 25 along another side edge of the panel. Each electrical lead of the leads to be connected by the patching board may be soldered directly to one of the twisted ends of the wire to thereby electrically connect each lead to a pair of conductors 14 in one of the grooves in the patching board.

As indicated above, the bores of the pair of bores 23 are immediately adjacent side wall surfaces 18 of the grooves 15 and 16, and therefore the pair of conductors 14 in each groove are held, when the wire is initially tensioned as explained above, in close proximity if not in engagement with the side wall surfaces 18 as shown in FIGURES 1 and 2. The spacing between the pair of conductors 14 in each groove is less than the diameter of the bores 21, i.e., the width of the groove 15 or 16 less twice the diameter of the wire is less than the diameter of each bore 21, so that both conductors of the pair of conductors 14 extend across a portion of each bore 21 communicating with the grooves on opposite sides of the central axis of the bore.

As indicated above, a front cover plate 12 is secured to the front of panel 11 for covering all of the grooves 15 with the conductors 14 accommodated therein. The cover plate 12 is detachably secured to the panel by screws 30 (see FIGURE 1) passing through holes in the corners of the covers of the plate and threaded into tapped holes 31 in panel 11 (see FIGURE 3). The cover plate 12 has a plurality of bores 32 therein which axially align with bores 21 when the plate 12 is secured to panel 11. The bores 32 may be slightly larger than the bores 21 to avoid the necessity of close manufacturing tolerances. The back cover plate 13 is secured to the back surface of the panel 11 in the same fashion and may be identical to front cover plate 12. Both cover plates have the same outer dimensions as the panel 11 and are moulded from the same insulating material as the panel 11.

A patching peg 33 for connecting the conductors 14 in one of grooves 15 to the conductors 14 in one of the grooves 16 is of very simple construction. The peg 33 includes a cylindrical stem portion 34 made of a conducting material and of a diameter to snugly fit in the bores 21. The outer end of stem 33 is preferably rounded as shown in FIGURE 2 to facilitate the separation of the conductors 14 when the peg is being inserted into the patching board. The peg 33 further includes a handle portion 35 of greater diameter than the bores 32 so that it defines a shoulder 36 for engagement with the outer surface of the cover plate 12, the stem 34 being long enough to project through the thickness of at least the cover plate 12 and panel 11 when shoulder 36 is in engagement with the cover plate 12.

Since the conductors 14 in each groove extend across

bore 21 and the stem is substantially the same diameter as bore 21, the stem must spread each pair of tensioned conductors when it is inserted into a bore, as shown in FIGURE 1, so that a good electrical connection is formed between each pair of conductors and the stem 33. The difference between the diameter of the counterbores forming the widened sections 22 in the grooves and the diameter of the bores 21 is sufficiently great that the conductors have ample room to spread when the pegs are inserted. Therefore, assuming in the case of the example shown in FIGURE 1, the pair of conductors 14 in the groove 15 second from the bottom is connected to a lead Y and the pair of conductors 14 in the groove 16 second from the left is connected to a lead B, the insertion of a peg 33 as shown would electrically connect lead Y to lead B through the stem 34 of the peg. Of course, by utilizing a plurality of pegs in a board having several grooves in the front surface of the panel and several in the back surface as shown in FIGURES 3 and 4, hundreds of different patterns of interconnections can be set up.

As mentioned previously, cover plates 12 and 13 can be identical. Therefore, excluding the wire, only two different parts must be manufactured to produce the patching boards of this invention, namely cover plates and panels. Moreover, both parts can be produced from the same material by a simple moulding process.

The side wall surfaces of the grooves prevent the pair of conductors 14 from splaying out, but each counterbore allows the conductors 14 to be forced apart by the stem 34 of the peg. This insures that a good contact is made between the conductors and the stem and also that the stem is firmly gripped by the conductors. Therefore, unlike many known types of patching boards, solid pegs can be used instead of spring or bowed pins, and since solid pegs can be made smaller in size, this permits closer spacing of the crossing points of the two sets of grooves which results in a more compact board. For example, the board according to the present invention having a 16 by 16 matrix may be as small as 4½ by 4½ inches.

Another important feature of the device of the present invention is that no close tolerances must be observed during production. Since the pegs inserted into the board are gripped between a first pair of conductors extending in one direction and also between a second pair of conductors extending in a direction disposed at right angles with respect to the direction of the first-mentioned pair, the pegs are tightly held by the conductors so that the size and location of the bores 21 are not critical. The bores 32 in the cover plates can be made larger than the bores 21 as indicated above to avoid close manufacturing tolerances. Moreover, the amount of tension initially applied to the conductors by the twist 25 is not important since the conductors 14 in each groove are constrained by the side wall surfaces 18 of the grooves and the insertion of a peg increased the tension because the conductors must spread around the peg.

Since the pegs are held in the board by the tensioned conductors, they can be easily removed by simply pulling on the handle portion 35 and then inserted at a different junction to change the pattern of the interconnections. Therefore, the patching board can be used equally as well for a permanent or temporary arrangement.

I claim:

1. A patching board comprising a rectangular insulating panel member having side edges and flat opposed front and back surfaces, said front surface having a plurality of parallel grooves therein extending in a direction at right angles with respect to one of said side edges, said back surfaces having a plurality of parallel grooves therein extending in a direction at right angles with respect to the grooves in the front surface, each groove being defined by a flat bottom surface and opposed flat side sur-

faces disposed perpendicularly with respect to said bottom surface and said front and back surfaces, each groove in the front surface crossing at longitudinally spaced points the grooves in the back surface, the bottom surfaces of the grooves in the front surface being separated from the bottom surfaces of the grooves in the back surface at the points of crossing by web sections, said panel member having a pair of wire receiving bores at each end of each groove extending from the bottom surface of the groove to the opposite surface of the panel member, one bore of each pair being adjacent one side surface of the groove and the other bore of the pair being spaced from said one bore and adjacent the opposite side surface, a length of conductor wire for each groove having its free ends extending from the groove through one pair of the bores, each length of wire extending along the groove juxtaposed one side surface and being looped through the pair of bores opposite the pair of bores receiving the free ends of the wire and back along the groove juxtaposed the other side surface to present a pair of spaced conductors in each groove, the free ends of the wire being wound together at the surface of the panel member opposite to the groove containing the conductors to maintain the pair of spaced conductors under tension, each web section having a peg receiving bore therethrough communicating at opposite ends with one groove in the front surface and one groove in the back surface, each peg receiving bore having its central axis passing between the pair of conductors in each groove with which it communicates and having a diameter greater than the distance between the conductors of one pair, each groove being enlarged in width around each peg receiving bore so that the distance between each side surface of the groove and the bore

is greater than the diameter of one conductor, a pair of plate members secured to the panel member and covering said front and back surfaces, said plate members having a plurality of peg receiving bores therethrough of a diameter at least as great as said peg receiving bores in said web sections, each bore in each plate member being axially aligned with one peg receiving bore in said web sections, and a plurality of peg members for reception in said axially aligned peg receiving bores, each peg member including a conductor engaging, cylindrical stem portion formed of conducting material and of a diameter to snugly fit in the peg receiving bores in the web sections, and a handle portion connected to said stem and defining a shoulder for engaging one of said plate members when said stem projects through one of the peg receiving bores in said web sections and the bores in said plates aligned therewith.

2. A patching board as defined in claim 1, wherein said conductor wire is a gold plated beryllium copper wire.

References Cited by the Examiner

UNITED STATES PATENTS

261,187	7/1882	Vail	317—112
424,995	4/1890	Owen	317—112
840,537	1/1907	Weir	339—18 X
2,922,135	1/1960	Hoberg et al.	339—18
3,021,498	2/1962	Spillar	339—18
3,027,534	3/1962	Deakin	339—18
3,151,923	10/1964	Bell et al.	339—18

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