July 7, 1964 P. K. KOLETSOS ETAL 3,140,138

CONNECTOR BLOCK FOR RIBBON CABLE OR THE LIKE

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FIG. 2

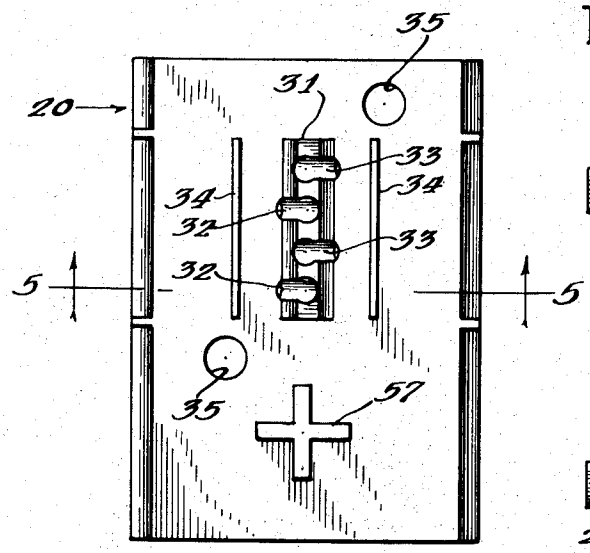


FIG. 4

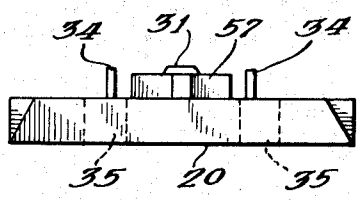


FIG. 5

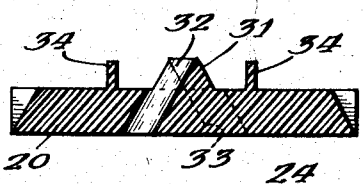


FIG. 3

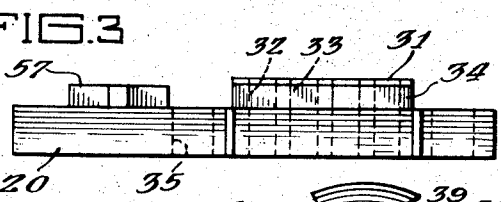


FIG. 14

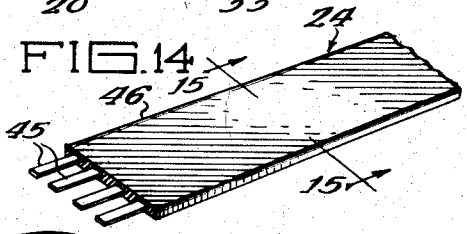


FIG. 15

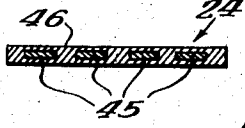


FIG. 13

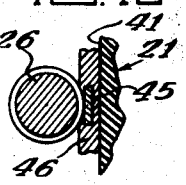


FIG. 1

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FIG. 6

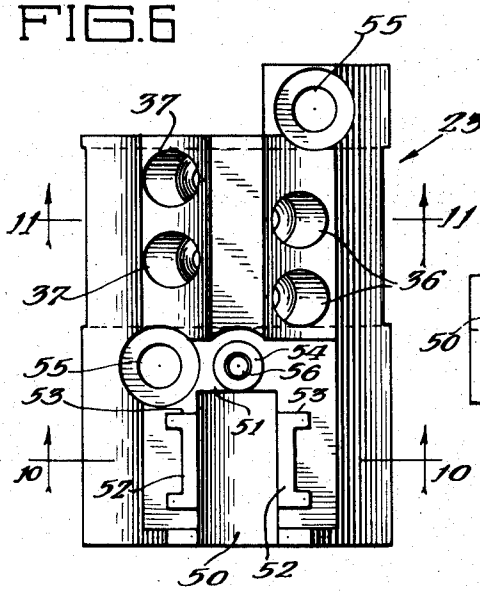


FIG. 7

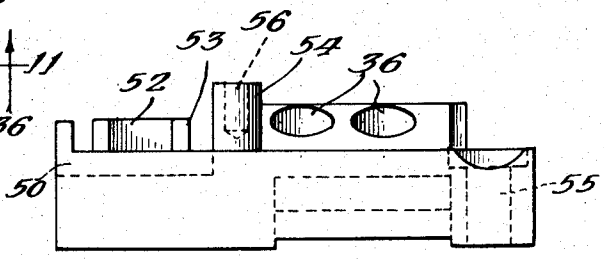


FIG. 9

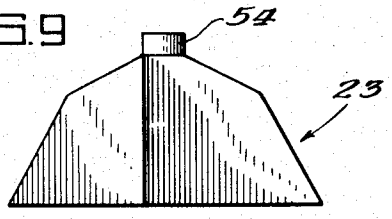


FIG. 8

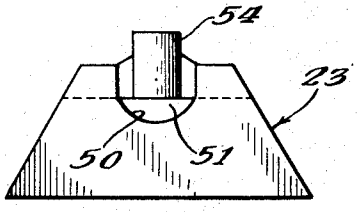


FIG. 12

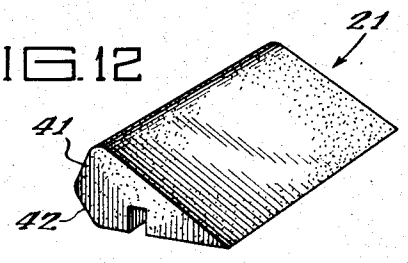


FIG. 10

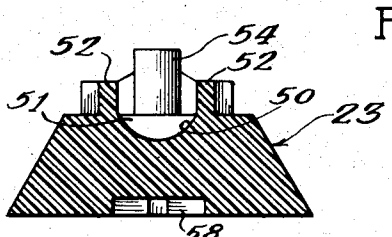


FIG. 11

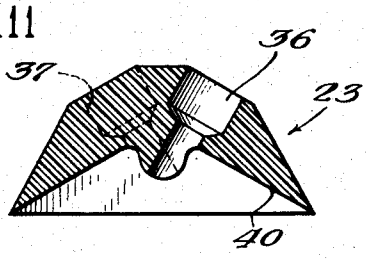
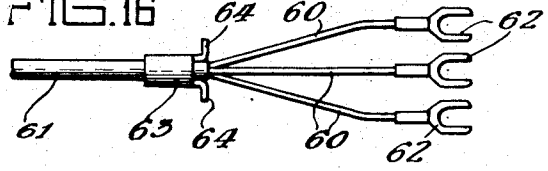


FIG. 16



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CONNECTOR BLOCK FOR RIBBON CABLE OR THE LIKE

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4 Claims. (Cl. 339—97)

This invention relates to an improved connector block for ribbon cable or the like.

Ribbon cable comprises a plurality of conductors which are arranged side by side and laminated between two sheets of plastic. The conductors are generally of rectangular cross-section. One surface of the ribbon cable may be provided with an adhesive coating so that the cable can be adhered to the wall, baseboard, or floor of a room. Due to its extreme thinness, in comparison with the usual cable of circular cross-section, it provides an inconspicuous means of running two or more conductors from one place to another in a house or other structure. If applied to the wall before decorating, the ribbon cable installation is practically unnoticeable.

However, the two ends of the ribbon cable must be connected into an electrical circuit which generally includes wires or cables of the customary circular type, and therefore terminals must be provided at each end, which may be in the form of the connector blocks of our invention.

It is an object of our invention to provide an improved connector block in which the electrical connection with the conductor of the ribbon cable is made by a screw thread which cuts through or displaces the insulation, but which does not rupture the metallic conductor.

Due to the close spacing of the conductors of the ribbon cable, it is not possible to use headed terminal screws unless they are offset from one another to avoid interference.

It is another object of our invention to provide a terminal block having an improved offsetting arrangement for the terminal screws, said arrangement being characterized by an angular offsetting of adjacent screws.

Ribbon cable has numerous applications in the arts of electrical wiring and of installation of electrical equipment, instruments, appliances, etc. By way of example, our invention is described herein with respect to the installation of telephones, but it will be understood that our invention has numerous other uses.

The incoming telephone cable or line is connected to one end of a particular length of ribbon cable by means of our improved connecting block, and the other end of the cable is connected to the hand set by a flexible circular cable, sometimes known as a "cord set," which may have three or four conductors. Our connector block also makes the connection between the ribbon cable and the cord set.

The ribbon cable is commercially available in standard lengths; in certain instances it may not be convenient or economical to use a continuous unbroken length in a given installation. Therefore, two lengths have to be spliced. Our improved connector block may also be used to splice two lengths of ribbon cable.

Occasions arise when it is desirable to install a second phone, or extension phone. This calls for a second length of ribbon cable, and a spliced connection. Our invention provides a means by which the two lengths of ribbon cable can be spliced to each other by the connector block for the first phone. In this instance, the connector block would be considered as a combined splice and terminal, otherwise known as a splice and tap.

It is another object of our invention to provide a dual purpose connector block, suitable for use as a terminal, or as a splice, or as a combination of both.

According to this aspect of our invention, the arrangement is such that each terminal screw makes electrical contact with the corresponding conductors of both ribbon cables.

It is another object of our invention to provide an offset arrangement of certain screw contacting surfaces so that a progressively tighter engagement between the screw threads of the terminal screw and the ribbon cable will occur as the terminal screw is tightened up, thus developing the required force for displacing the plastic insulation, and doing so in such a manner that the metal of the conductor will not be ruptured.

A still further object of our invention is to provide an improved terminal block in which the several parts thereof are securely and tightly held together by the action of the terminal screws alone. Thus, the effectiveness of the electrical contact does not depend upon the effectiveness of additional fastening devices, such as clamping screws or mounting screws, and furthermore the arrangement is such that the desired engagement of the parts does not depend upon the interlocking of screw threads which are subject to stripping.

Other objects, features and advantages of our invention will become apparent as the description proceeds.

With reference now to the drawings in which like reference numerals designate like parts:

FIG. 1 is a vertical cross-section showing a preferred embodiment of our invention;

FIG. 2 is a plan view of the base;

FIG. 3 is a side elevation of the base;

FIG. 4 is a left end view of the base;

FIG. 5 is a sectional view of the base taken along line 5—5 of FIG. 2;

FIG. 6 is a plan view of the cover;

FIG. 7 is a side elevation of the cover;

FIG. 8 is a left end view of the cover;

FIG. 9 is a right end view of the cover;

FIGS. 10 and 11 are vertical sections taken along line 10—10 and 11—11, respectively, of FIG. 6;

FIG. 12 is a perspective view of one of the pressure pads;

FIG. 13 is an enlarged section taken along line 13—13 of FIG. 1;

FIG. 14 is a perspective view of the ribbon cable; and

FIG. 15 is a section taken along line 15—15 of FIG. 14; and

FIG. 16 is a view of one end of a cord set.

With reference now to FIG. 1, our improved connector block comprises a base 20, a pair of pressure pads 21 and 22 mounted on the base, and a cover 23 which fits over the pressure pads 21 and 22. The two sections of ribbon cable 24 and 25 which are to be electrically connected to each other, are disposed between the pressure pad 21 and the cover 23 and between the pressure pad 22 and the cover 23, respectively. The parts 20 and 23 are held together by screws 26 and 27 which also provide the electrical connection between the cables 24 and 25, one screw being provided for each of the conductors in the cable 24.

The base 20 and the cover 23 are preferably molded parts, being formed from a suitable insulating material, such as nylon. The base 20, as shown in FIGS. 2 to 5, has on its upper surface a central rib 31 which is intersected by openings 32 and 33 which are designed to accommodate the screws 26 and 27, respectively, the openings 32 being inclined downwardly to the left and the openings 33 being inclined downwardly in the opposite direction. The base surface is also provided with outer ribs 34 on which the pressure pads 21 and 22 are

mounted. The base 30 is also provided with two holes 35 which accommodate suitable mounting screws, not shown.

The cover 23, as shown in FIGS. 6 to 11, is provided with inclined openings 36 which register with the openings 32, and oppositely inclined openings 37 which register with the openings 33. As shown in FIG. 1, bushings 38 and 39 are received in the openings 36 and 37 respectively.

The pressure pads 21 and 22 are preferably formed of a slightly resilient insulating material such as neoprene, and the general shape is shown in FIG. 12. The lower part of the cover 23 is hollowed out so as to accommodate the pressure pads 21 and 22. As shown in FIG. 1, the ribbon cable 24 is confined between the lower surface 40 of the cover 23 and the pressure pad 21. The pressure pad 21, as shown in FIG. 12 is provided with an inclined upper backing surface 41 which is generally parallel to the axis of the screw 26, and a reversely inclined lower backing surface 42 which is substantially parallel to the axis of the screw 27 and also substantially parallel to the upper backing surface 43 of the pressure pad 22. The lower backing surface 44 of pressure pad 22 is substantially parallel to the axis of the screw 26 and also substantially parallel to the upper backing surface 41 of the pressure pad 21.

Although substantial parallelism exists between the backing surfaces 41 and 44, it will be noted in FIG. 1 that these surfaces are offset from each other in the longitudinal direction, which is to say, the axial direction of the screw 26. Also, the surfaces 41 and 44 are spaced from each other in the radial direction of the screw. The radial spacing is of a distance approximately equal to the diameter of the screw 26, and in any event, it is less than the combined dimensions of the screw diameter and of the thicknesses of the two ribbon cables 24 and 25.

The purpose of this arrangement is to cause the threads of the screw 26 to interfere with the cables 24 or 25, as will be pointed out below. A similar arrangement pertains with the respective backing surfaces 42, 43 and the screw 27.

The ribbon cable 24, as shown in FIGS. 14 and 15, comprises a plurality of conductors 45 of generally rectangular cross-section which are arranged in spaced side by side relationship and laminated between sheets of plastic material to provide the homogeneous insulation 46 which completely surrounds each of the separate conductors 45 and which also provides the body of the ribbon cable 24.

As shown in FIG. 13, the arrangement is such that the thread of the screw 26 displaces or cuts through the insulation 46 of the ribbon cable 24 in order to make electrical contact with the conductor 45 of the cable. A similar cooperation between the screw 26 and the cable 25 pertains at the point where the cable 25 overlies the lower backing surface 44. Thus, the metal of the screw 26 provides electrical contact between correspondingly located conductors in each of the ribbon cables 24 and 25.

In operation, the screw 26 provides the electrical connection between the number 1 conductor of each of the cables 24 and 25 in the manner pointed out above, and the oppositely inclined screw 27 provides the electrical connection between the number 2 conductor of each cable. In the embodiment shown, the base and cover are designed to accommodate a total of four screws, two being inclined in one direction like screw 26 and the other two being inclined in the opposite direction like screw 27.

When it is desired to tap the cable, the grommet of the usual circular insulated conductor is gripped between the head of the screw 26, for example, and the upper surface of the bushing 38.

The operation has been described with respect to the utility of our connector block in splicing the ends of two ribbon cables to each other, and also in connection with tapping one or more of the conductors 45 of the cable.

In a terminal type of application, one of the ribbon cables will be missing, and the object is to provide means for connecting the grommets of the circular conductors to the conductors 45. This is the same as the tapping operation pointed out above; the presence of the second cable 25 is not necessary in order to afford good electrical connection between a screw 26 and that part of the first or third conductor 45 which overlies the upper backing surface 41, or between a screw 27 and a second or fourth conductor 45 which overlies the lower backing surface 42.

One end of the cover 23 may be provided with a cylindrical recess 50 for receiving the end of a circular cord set cable. The embodiment shown herein has been designed specifically for use with telephone hand set cords, which is a commercial item well known in the art. As shown in FIG. 16, this may consist of three or four insulated conductors 60 which are enclosed in a circular jacket 61 of insulating material. The end portion of the jacket is stripped to expose the three or four insulated conductors 60, and a sheet metal grommet 62 is applied to the end of each of the separate conductors. The semicylindrical recess 50 is adapted to receive the end portion of the jacket; the separate conductors of the cord set extend beyond the end wall 51 of the recess 50 for connection with one or the other of the screws 26, 27. The end of the cord set jacket is generally provided with a tension takeup in the form of a collar 63 having outwardly projecting tabs 64. In the cover embodiment herein shown, the upper surface is provided with lugs 52 having end surfaces 53 over which the tension tabs 64 may be hooked. Some hand set cords will have a tension hook instead of the tension tabs, and to this end, a circular pillar 54 is provided for cooperation with the tension hook.

The cover may also be provided with holes 55 which register with the holes 35 in the base 20 to receive suitable mounting screws so that the connection block may be secured to a baseboard or the like. The entire assembly may be provided with an outer casing, not shown, and to this end the pillar 54 is drilled and tapped at 56 to receive the screw which holds the casing in place.

As shown in FIGS. 2, 3 and 4, the base 20 is provided with a locking lug 57, which may be in the form of a cross, as shown, and which fits into a similarly shaped recess 58 (FIG. 10), formed in the overlying surface of the cover, in order to facilitate alignment of the parts during assembly.

The grommet 62 shown is of the open or "spade" type, but the cover 23 is designed to accommodate various types of grommets and tension take-ups, or the stripped conductor 60 can be gripped directly between the head of the terminal screw 26 and the bushing 38.

The connector block may be made with any desired number of terminal screws 26 so as to accommodate ribbon cable having a greater or lesser number of conductors 45 than the number shown.

An important feature of the invention is that the shank of the screw 26 is aligned by means of the housing 38, providing a cantilevered screw mounting. Therefore in a terminal type of application, where, for instance, the ribbon cable 24 overlies the backing surfaces 41 and 42, but no ribbon cable overlies the backing surfaces 43 and 44, a clearance between the surface 44 and the screw 26 will not relax the engagement between the screw 26 and the ribbon cable 24 at the point where it overlies the surface 41. In other words, the arrangement does not require two ribbon cables in order to assure a tight fit.

The first few threads of the screw 26 may be tapered, or cut as lead threads, in order to provide a gradual penetration or displacement of the insulation 46 as the screw is tightened up.

In the alternative, the upper and lower backing surfaces may be inclined in the downward direction slightly toward the axis of the respective bushings 38, 39. This is

particularly desirable with respect to the lower backing surfaces **42**, **44** in those situations wherein the pressure pads **21**, **22** are formed of a material which is not very resilient, such as when the pressure pads are molded integrally with the base **20**. In such instances, the parts may be made to close tolerances and the lower backing surface inclination will slightly flex the screw so that the upper shank portion is urged more firmly in engagement with the upper backing surfaces, and so as to provide the gradual penetration or displacement with respect to the cable overlying the lower backing surfaces.

Also, it is desirable to displace the openings **32**, **33**, or to incline them slightly, away from the axis of the respective bushings **38**, **39**, so as to provide a slight binding of the screws **26**, **27**, as they are tightened up. This provides a screw locking effect which maintains the parts tightly engaged.

Although only a preferred embodiment of the present invention has been described herein, it will be understood that various modifications and changes may be made in the construction shown without departing from the spirit of the invention as pointed out in the appended claims.

We claim:

1. A connector block for ribbon cable comprising a base, a first and a second pressure pad mounted on said base, a cover overlying said base and said pressure pads, each of said pressure pads having an upper and a lower backing surface disposed at an angle to each other, said backing surfaces being oppositely disposed from each other, and two headed terminal screws extending through said cover and between said pressure pads, and being disposed at an angle to each other, one of said terminal screws cooperating with the upper backing surface of said first pressure pad and the lower backing surface of said second pressure pad to provide an insulation penetrating engagement with the end portions of two lengths of ribbon cable overlying said respective pressure pads, and to provide an electrical connection between the first conductors of each, and said second terminal screw cooperating with the lower backing surface of said first pressure pad and the upper backing surface of said second pressure pad to provide an insulation penetrating engagement with said end portions of said ribbon cable lengths and to provide an electrical connection between the second conductors of each.

2. A connector block as claimed in claim 1 in which said pressure pads are of resilient material.

3. A connector block as claimed in claim 1 which includes tapped bushings mounted in said cover, said terminal screws extending through said bushings.

4. A connector block as claimed in claim 1 in which each of said lower backing surfaces of said pressure pads converges slightly toward the lead end of its associated terminal screw.

References Cited in the file of this patent

UNITED STATES PATENTS

2,199,219	Edwards et al.	Apr. 30, 1940
2,283,177	Brainard	May 19, 1942
2,287,035	Hubbell et al.	June 23, 1942
2,908,884	Wirshing	Oct. 13, 1959
3,014,140	Tupper	Dec. 19, 1961