

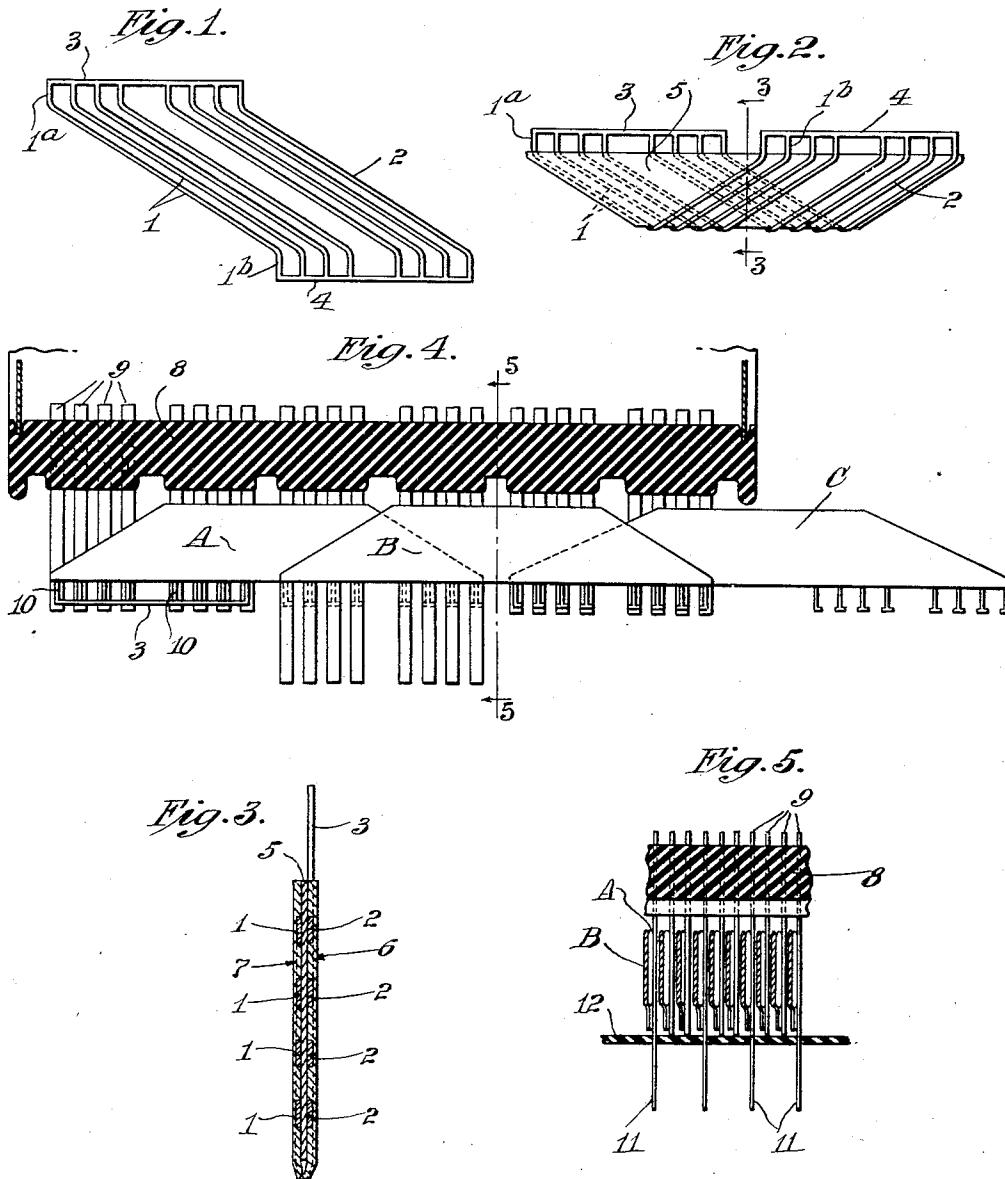
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RIBBON CABLE FOR TERMINAL BANKS

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RIBBON CABLE FOR TERMINAL BANKS

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5 Claims. (Cl. 174-72)

This invention relates to new and useful improvements in cables and more particularly in ribbon cables adapted for the wiring of terminal banks and the like, and for a method of wiring such banks.

It is the object of the present invention to produce a ribbon cable which can be manufactured in small units and then as many of such units as are required connected with the terminal bank which it is desired to wire.

The units consist of flat sheets of insulating material from one edge of which projects a row of interconnected conductor ends, one group of the conductor ends being connected within the cable with another group.

In accordance with the present invention, the cable is assembled by first punching a grid out of a thin sheet of suitable metal. The grid consists of parallel ribbons which are held together at their ends by a link which is stamped out of the sheet of conducting material with the conductors.

The grid is then bent double across one edge of a thin sheet of insulating material so that the two ends thereof project beyond the opposite edge of the sheet but displaced with respect to one another. In the preferred embodiment, one end will be in the left-hand and the other end in the right-hand half of the sheet.

In accordance with another feature of the invention, the assembly is facilitated by forming the parallel conductors so that their main portion is at an acute angle to the horizontal but the ends at right angles to the horizontal. When a grid thus formed is bent across the edge of a sheet of insulating material, its two ends will project above the opposite edge at right angles thereto and displaced with respect to one another as above described.

The invention will be more fully explained in connection with a preferred embodiment thereof, illustrated in the drawing, in which:

Fig. 1 is a plan view of a punching of the conductor;

Fig. 2 is a side elevation of the conductor bent across a separator;

Fig. 3 is a cross-section along lines 3-3 of Fig. 2 showing also the insulated covering;

Fig. 4 is a plan view of a terminal bank with ribbon cables attached thereto; and

Fig. 5 is a vertical cross-section along lines 5-5 of Fig. 4.

As a first step in the manufacture of the cable, the grid shown in Fig. 1 is punched diagonally out of a strip of suitable metal 5 to 10 mils thick and adapted for welding. The grid consists of two

groups of four ribbons 1 and 2, each having a main portion forming an acute angle with the horizontal and upper and lower ends 1a, 1b at right angles to the horizontal. The eight ribbon conductors are held together at their vertical ends by horizontal links 3 and 4 to facilitate handling. The spacing between the individual conductors and between the two groups of conductors is, of course, determined by the use to which the cable will be put.

The metal punching is then bent double across the shorter edge of a trapezoidal separator 5 of tough paper, or other suitable material, about 10 mils thick (Fig. 2). The bending line is parallel with the horizontal. The ends 1a, 1b and the links 3 and 4 of the punching project on the two sides of the separator 5 above the wider edge thereof. On account of the diagonal cut of the grid, the upper and lower ends 1a and 1b will be displaced with respect to one another in the left and right-hand portions of separator 5.

When the strips of metal 1 and 2 of the punching are no more under unusual stress or deformation and therefore tend to remain in the position into which they are set, the assembly shown in Fig. 2 is placed in a mold with a thin strip of absorbent paper and suitable plastic material on the two sides thereof and below the lower or narrow edge. The mold encloses the entire separator 5 and the finished product is a flexible unit ribbon cable. The thin strips of paper and plastic material are indicated at 6 and 7 (Fig. 3) and serve to insulate and anchor in place the conductors. The thickness of the insulated unit is between 30 and 40 mils. If the finished cable is to be subjected to great stress, then preferably a thermal setting plastic should be used. If, however, this is not the case, then polystyrene, or other similar plastics may be used.

The bare conductors 1a, 1b projecting from the edge of the unit may be soldered or preferably welded to the contacts which it is desired to interconnect. Fig. 4 illustrates, as an example, the manner in which three units A, B and C are welded to a selector terminal bank. The terminal bank consists of a plurality of terminals 9 held in an insulating base 8 and projecting there-through. The three units A, B and C are placed flat on the projecting ends of the terminals 9 with conductors 1a, 1b parallel with and pointing towards the ends of the terminals. In the case illustrated, the units overlap one another so that conductors of two units are connected with each terminal 9.

The welding is along line 10. The links 3 and

4. which keep the projecting conductor ends in proper alignment during welding are then removed, care being taken to prevent the parts cut out from falling between the terminals.

The unit A is welded to the first sixteen terminals 9, the unit B to terminals 9—24, and the unit C to terminals 17—24. The second half of unit C will be welded to the first eight terminals of the adjacent terminal bank overlapping one-half of the first cable unit (corresponding to A) when the terminal banks and their cooperating switches are installed.

As shown in Fig. 5, every third bank terminal 11 is long, projecting beyond a fiber protection strip 12, which is placed in position after the unit C is welded into position.

After the three units, A to C, have been welded in position and the connecting links 3 and 4 have been removed, each conductor is mechanically checked for strength of connection and electrically tested for continuity, installation resistance and cross-connection.

It will be obvious to those skilled in the art that without departing from the spirit of the invention many of its elements may be modified and their size, shape, composition and number altered.

Although for simplicity in description I have described the bending of the grid as being actually performed against the edge of the same insulating sheet which is destined ultimately to lie between the two folded halves of the grid, this step of folding may be effected in any other way, e. g., across the edge of a steel blade in a bending jig. Thereafter the required sheet of insulation may be inserted between the halves of the folded grid. It should therefore be understood that when reference is made in the claims to an article including an insulating sheet "across one edge of which" certain conductors "are bent double" such language describes only the relation of the parts after the article is complete, and should not be construed as implying that the edge of the sheet was used as a tool to apply the bending force. Conversely, when reference is made to a process including such steps as bending a grid and "at a suitable time disposing a sheet between the overlapping portions of such bent grid," such language should be understood to cover the simultaneous performance of these two steps as well as the successive performance thereof.

What I claim is:

1. In a cable, a sheet of insulation, a plurality of conductor ends projecting from one edge of the sheet and divisible into two groups, two links parallel to said edge, each link interconnecting the projecting conductor ends of a group, and

connections joining the ends of one group with the ends of the other group, said connections contacting with both sides of said sheet of insulation.

2. In a cable, a sheet of insulation, a row of conductor ends projecting from one edge of the sheet but from different sides thereof, the ends projecting from one side belonging to a first and the ends projecting from the other side belonging to a second group, a link interconnecting the ends of the first group, a link interconnecting the ends of the second group, and connections insulated from one another, joining the ends of the first with those of the second group, said connections contacting with both sides of said sheet of insulation.

3. In a ribbon cable, a punching comprising a plurality of parallel ribbon conductors, the main portion of each being at an acute angle and the two ends at right angles to the horizontal, a sheet of insulating material across one edge of which the conductors are bent double with the ends of the conductors projecting beyond the opposite edge, links interconnecting the projecting conductor ends, and insulation covering and anchoring to said sheet the said portions of said conductors, with the conductor ends bare for connections.

4. In a ribbon cable, a punching comprising a plurality of parallel ribbon conductors, the main portion of each being at an acute angle and the two ends at right angles to the horizontal, a horizontal connecting link for each end of the conductors, a sheet of insulating material across one edge of which the conductors are bent double with the ends of the conductors projecting beyond the opposite edge at right angles and the connecting links parallel to the edge and insulation covering and anchoring to said sheet the main portions of said conductors, with the conductor ends bare for connections.

5. In a ribbon cable, a punching of parallel metal ribbons held together at their upper and lower ends by horizontal links, the main portion of each ribbon being at an acute angle and portions near the two ends at right angles to the horizontal, a flat thin sheet of insulating material across one edge of which the ribbons are bent double along a line parallel with the horizontal links, the ends of the ribbons projecting beyond the opposite edge, the upper ends on one and the lower ends on the other side of the sheet, but displaced with respect to each other so that one horizontal link is longitudinally displaced with respect to the other, the links being parallel with the edge of the sheet, and insulation covering the main portion of said ribbons.

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