Jan. 24, 1950 D. M. KING 2,495,526

BUS BAR CONSTRUCTION

Filed Oct. 21, 1947 2 Sheets-Sheet 1

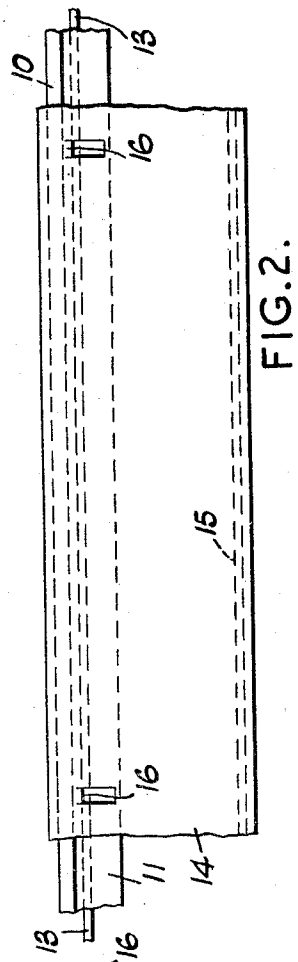


FIG. 2.

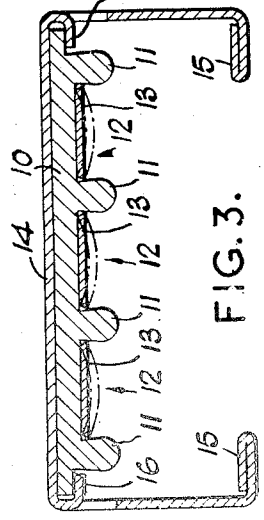


FIG. 3.

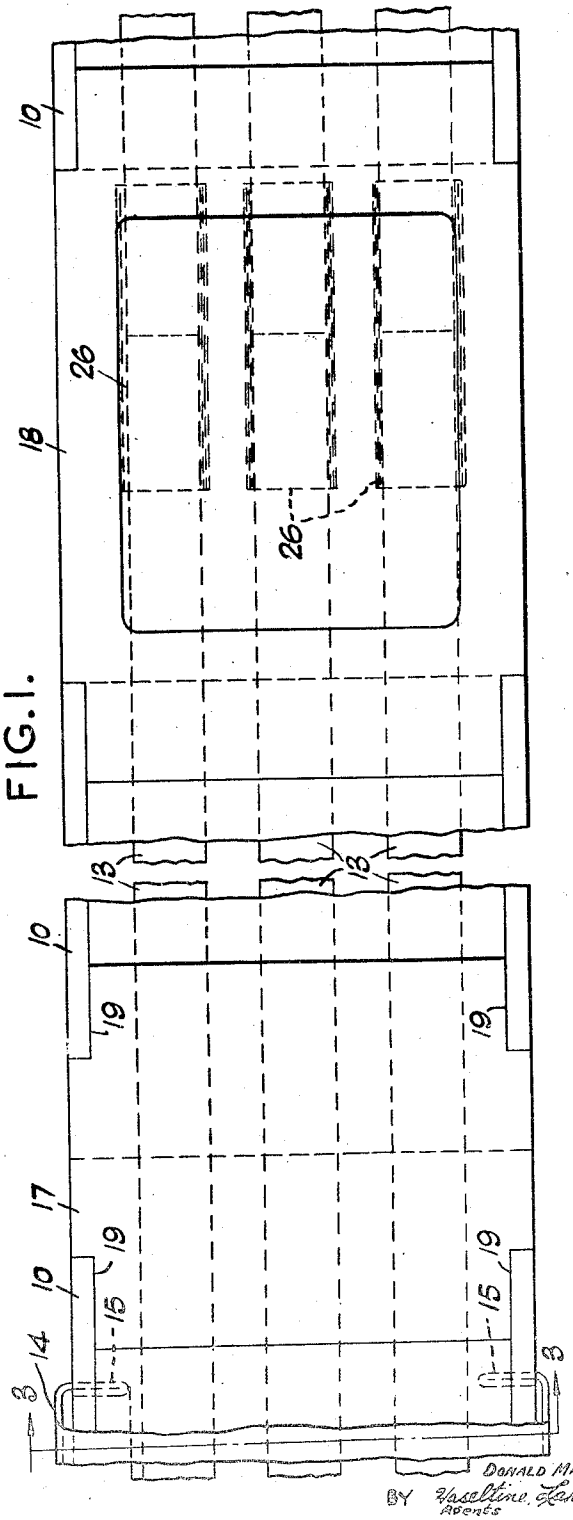


FIG. 1.

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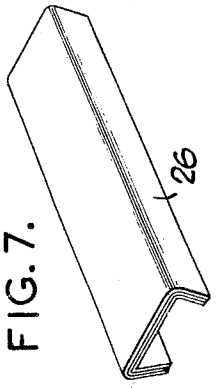


FIG. 7.

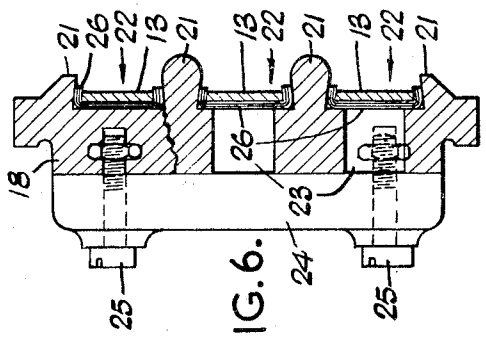


FIG. 6.

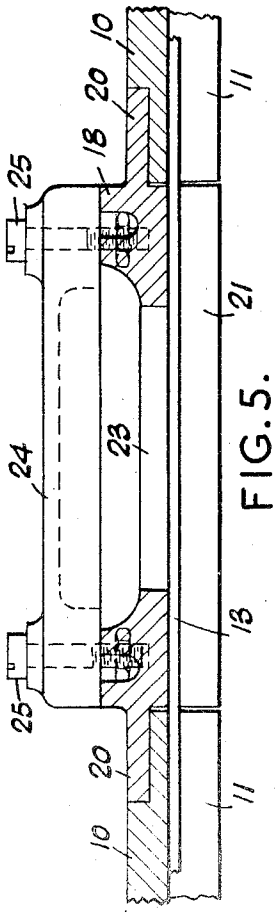


FIG. 5.

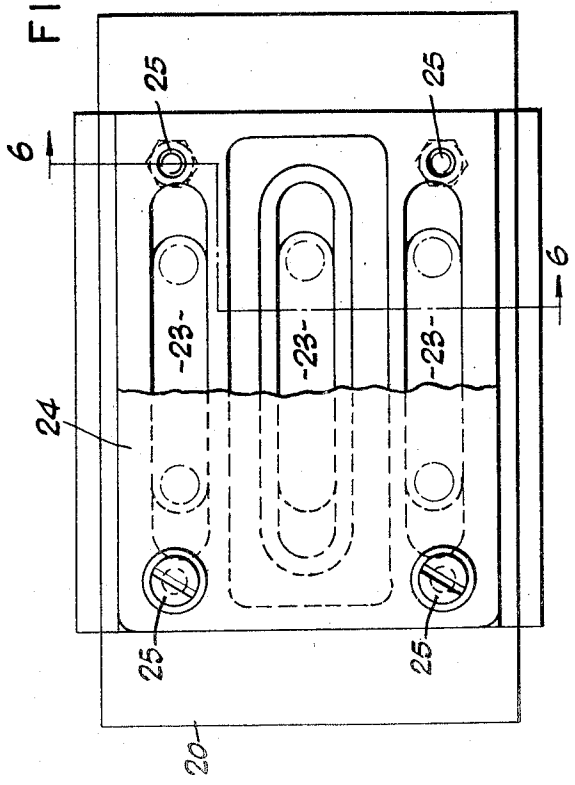


FIG. 4.

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UNITED STATES PATENT OFFICE

2,495,526

BUS BAR CONSTRUCTION

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Application October 21, 1947, Serial No. 781,125
In Great Britain February 22, 1945

Section 1, Public Law 690, August 8, 1946
Patent expires February 22, 1965

1 Claim. (Cl. 191—23)

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This invention relates to busbar assemblies and more particularly to a new or improved method of producing busbar assemblies such as are employed in workshops or factories in association with electrically driven cranes, hoists, tools or other travelling factory equipment.

According to the invention the method consists in forming an insulator with one or more channels the side walls of which are outwardly convergent from their bases for at least a portion of their depth, inserting a strip of relatively soft electrically conductive material of bowed or arcuate section into the or each channel and thereafter flattening said strip or strips within said channel or channels by a rolling operation.

In accordance with a further aspect of the invention a busbar assembly comprises an insulator having one or more channels the side walls of which are outwardly convergent from their bases for at least a portion of their depth and a strip of relatively soft electrically conductive material seated in the base of each channel, said strip being so dimensioned with respect to the channel that due to the formation of the latter it will be retained rigidly in position therein without the aid of fixing means such as bolts, rivets or the like. Preferably the insulator and the busbar or bars carried thereby are mounted within a housing which is so formed as to provide tracks along which a collector trolley or other equivalent current collector device is adapted to run.

The invention also includes means for interconnecting successive lengths or sections of the insulator and in addition means for coupling successive lengths of the electrically conductive strips forming the busbars in such a manner as to provide satisfactory electrical and mechanical joints therebetween.

In order that the said invention may be clearly understood and readily carried into effect the same will be hereinafter more fully described with reference to the accompanying drawings in which:

Figure 1 is a plan view of a bus bar assembly constructed in accordance with the invention certain parts being broken away to permit of better illustration;

Figure 2 is a side view of a portion of the assembly shown in Figure 1;

Figure 3 is a section on the line 3—3 of Figure 1;

Figure 4 is a plan view of a jointing element employed in the assembly shown in Figure 1;

Figure 5 is a view partly in side elevation and partly in section of the element shown in Figure 4;

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Figure 6 is a section on the line 6—6 of Figure 4 but with a portion in end elevation;

Figure 7 is a perspective view of a clip for use in connecting the busbars.

Referring now to the drawings which show a busbar assembly adapted for use for example with a collector trolley of the three phase kind, 10 denotes insulator sections which may be moulded or extruded in suitable lengths. The insulator sections 10 are each formed on one face thereof with four longitudinally extending laterally spaced parallel ribs 11 which in turn form three recesses or channels 12 of substantially equal width. The surfaces of the ribs 11 which form the side walls of the channels 12 are inclined inwardly in such a manner that said channels are of greater width at their bases than at their open ends.

Each of the busbars comprises a bar or strip 13 of copper or other relatively soft electrically conductive material of such a width as to fit easily within the channels 12. As is shown in dotted lines in Figure 3 the strips 13 are initially of bowed or arcuate section and they are inserted into the channels 12 with their edge portions seated on the base surfaces of said channels. The strips 13 are then subjected, preferably concurrently, to a longitudinal rolling operation whereby they are flattened and their side edges are forced into firm engagement with the oppositely inclined side faces of the channels 12.

With an arrangement such as that above described the busbars 13 are firmly and permanently secured to the insulator sections 10 being entirely independent of fixing means such as bolts or rivets which in use may become loose and which require the provision of fixing holes in the busbars thereby reducing at frequent intervals the effective contact area of the latter.

As an alternative to the construction of the channelled insulator sections 10 above described and illustrated the sides of each channel adjacent the base thereof may be outwardly convergent for a distance properly to form a seating for the bars 13 said sides thereafter diverging outwardly.

The insulator sections 10 are adapted to be disposed within a housing 14 which is generally of inverted U shape in cross section and may for example be formed of pressed steel sheets. The housing 14 is also formed with inturned flanges or rails 15 on which a collector trolley (not shown) is adapted to run. The mounting of the insulator sections 10 within the housing 14 may also be independent of bolts or like fixing means and may be effected in the manner illus-

trated in the drawings by cutting and pressing the steel sheets from which said housing is made to form inwardly directed tongues or ribs 16 which are adapted to engage over edge portions of the insulator sections 10.

The insulator sections 10 may be made from a material which, after moulding or extrusion, is either flexible or rigid the aforesaid housing 14 providing the required degree of rigidity in the case of a flexible insulator.

The insulator sections 10 may for example be made in lengths of from 8 to 10 feet in order to provide for ease in handling and erecting. In order to effect jointing of successive sections in end to end relationship jointing elements are provided in accordance with the invention such elements being made for example from similar materials to that of said sections. In the arrangement shown in Figure 1 two different jointing elements, designated 17 and 18 respectively, are employed. The element 17, which is employed to join two insulator sections 10 at a point where the busbars 13 are continuous, merely constitutes a flat rectangularly shaped plate which is formed with projecting portions or tongues 19 which latter are adapted to seat in correspondingly shaped recesses formed in the upper faces of two adjacent insulator sections 10 and at the abutting ends thereof. The edge portions of the sections 10 adjacent the aforesaid recesses are cut away to accommodate the element 17 the arrangement being such that when said element is in place any relative longitudinal or lateral movement of said sections will be prevented. The jointing element 18 is also adapted to serve as a connection between any two adjacent insulator sections 10 but it is at the same time so constructed and arranged as to be capable of housing or accommodating power supply leads and the connections of the latter to the busbars 13. The element 18 may also be employed at points whereat it is desired to interconnect adjacent or successive lengths of the busbars 13 in addition to two adjacent insulator sections 10. The jointing element 18 which is more clearly shown in Figures 4 to 6 comprises a substantially rectangularly shaped block or the like formed of the same material as the insulator sections 10 and is provided with a pair of tongues or the like 20 adapted as can be clearly seen from Figures 1 and 5 to seat in recesses in the upper faces of the adjacent ends of two aligned insulator sections 10 which are to be interconnected the arrangement being such that when said element 18 is in place relative longitudinal or lateral movement of said sections will be prevented. The element 18 is also formed with ribs 21 and channels 22 corresponding to and adapted to be aligned with the ribs 11 and channels 12 in the sections 10. Preferably the base of each channel 22 is apertured as at 23 to allow of the introduction of power leads (not shown) and of the connection of such leads to terminals or the like (not shown) carried by the busbars 13. In order that the electrical connections above referred to may be enclosed a cover 24 is provided which is adapted to be held in place by a number of screws 25.

For the purpose of electrically interconnecting successive lengths of the busbars 13 in end to end relationship it is proposed to employ a spring clip 26 which as can be clearly seen from Figure 7 is built up of a series of layers or laminations which latter are formed of electrically conductive material such as Phosphor bronze. As

above indicated the clips 26 are so formed as to possess a degree of resilience and are so dimensioned with respect to the busbars 13 that when two lengths of said bars are brought together in end to end relationship a strong electrical and mechanical joint may readily be made between them by springing a clip 26 over the abutting ends thereof. It will be seen from Figure 6 that the clips 26 are adapted to seat in the channels 22 in the element 18 which channels may be widened with respect to the channels 12 in the sections 10 in order to accommodate said clips or if desired the ends of the busbars 13 may be reduced so that the external dimensions of the clips 26 will be equivalent to the normal dimensions of the busbars in which case the dimensions of the channels 22 may be identical with those of the channels 12. If desired the clips 26 may have terminals or other equivalent connecting devices mounted thereon or associated therewith to allow for the connection of power cables and the like for the supply of power to the busbars.

From the above it will be appreciated that the invention provides a method of making and assembling a busbar which is quick simple and inexpensive. Furthermore due to the provision of the jointing elements it is possible to produce a busbar assembly of any required length and to provide for the connection of said busbars to a source of current supply at any required point or points along the length thereof. Obviously it is not essential that the insulator sections should be so formed as to accommodate three busbars in the manner above described and illustrated since the number of channels in said sections and the number of bars present may be varied to suit the requirements of the particular collector trolleys or equivalent devices to be employed therewith.

What I claim is:

A busbar assembly comprising an insulator made up of a plurality of sections arranged in end to end relationship each section having at least one channel therein the side walls of which are outwardly convergent from its base, a plain strip of relatively soft electrically insulating material seated in the base of said channel and lying flush thereagainst such strip being so dimensioned relatively to the channel that due to the formation of the latter it will be held in place without the aid of mechanical fixing means and means for securing successive insulator sections together comprising a jointing element formed of similar material to that of the insulator sections and similarly channelled to receive the strip said jointing element also including tongues or projecting portions adapted to seat in recesses formed in the adjacent ends of said insulator sections and in that surface of the latter remote from the channel.

DONALD MAYER KING.

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