

July 20, 1948.

C. P. WEST

2,445,463

UNIVERSAL BUS-BAR SUPPORT

Filed May 30, 1944

2 Sheets-Sheet 1

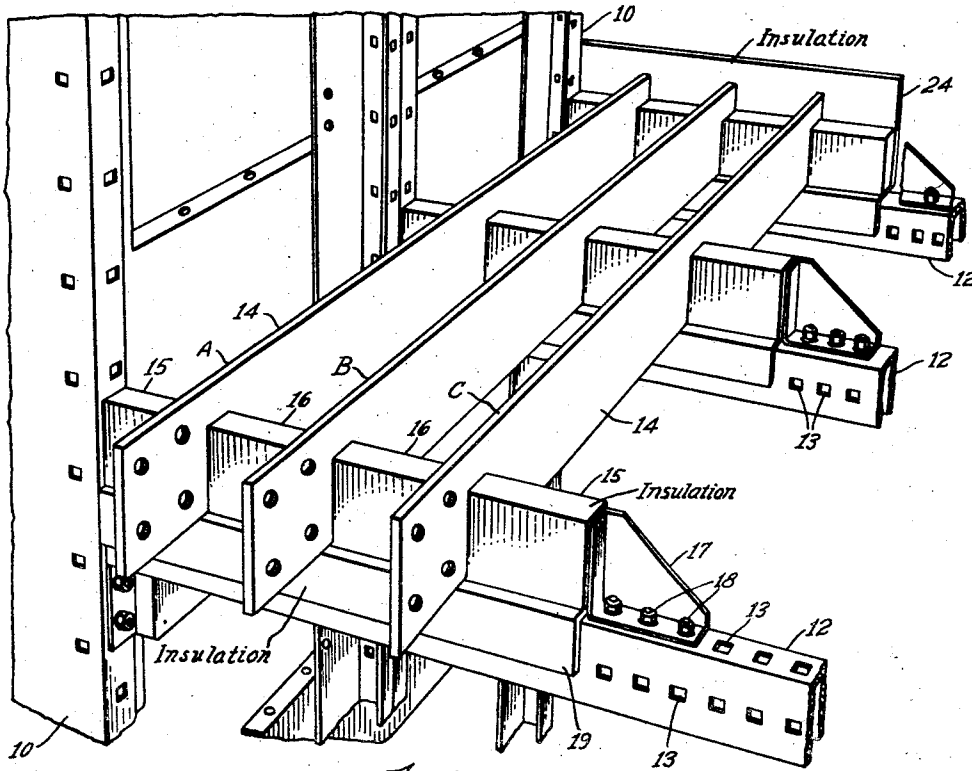


Fig. 1.

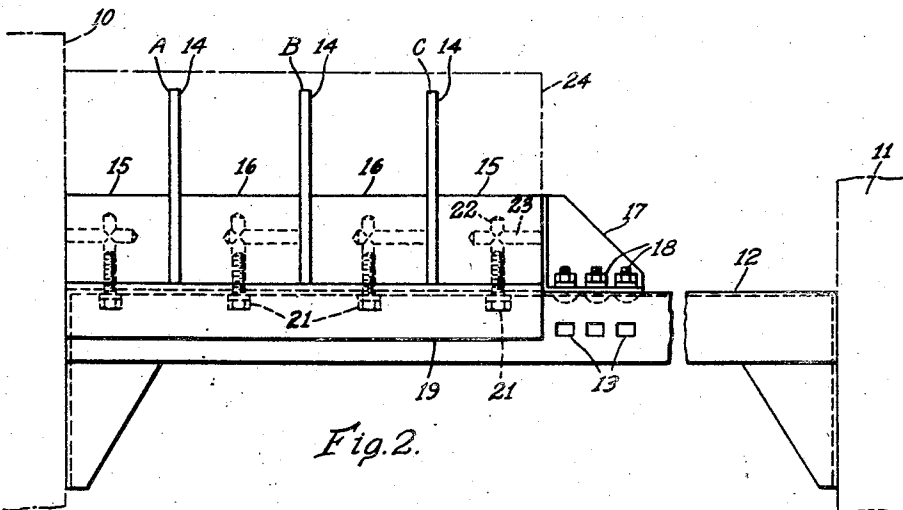


Fig. 2.

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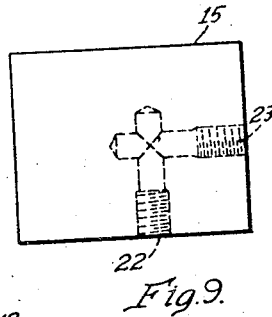
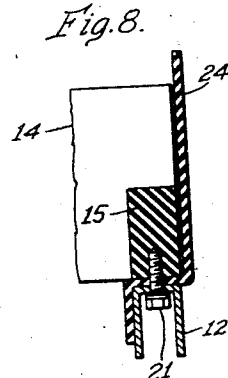
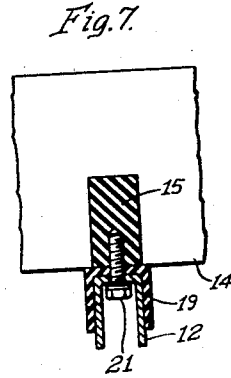
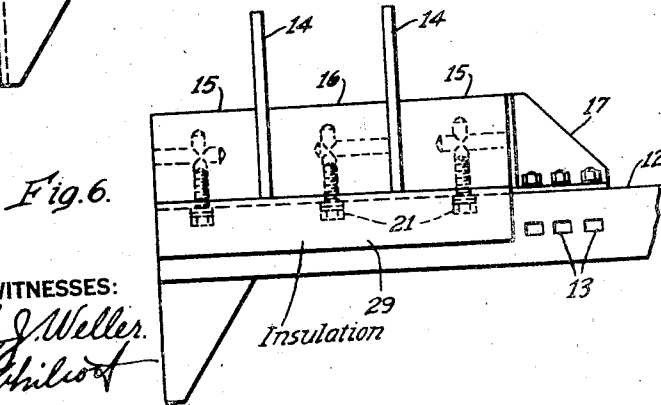
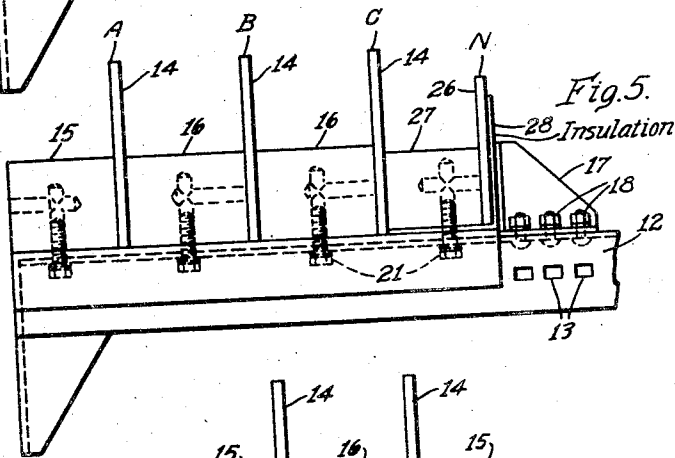
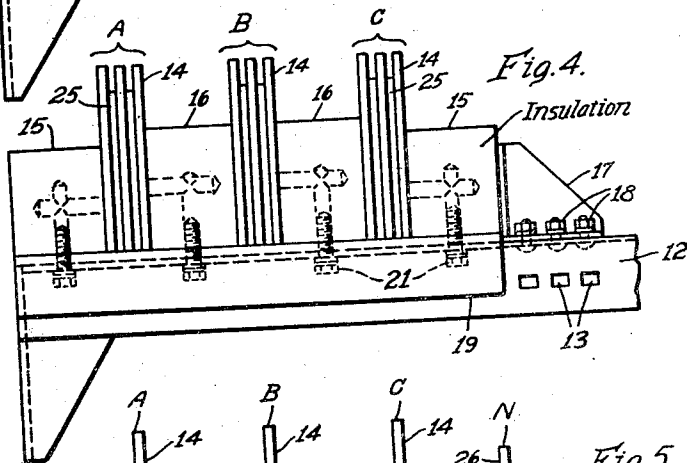
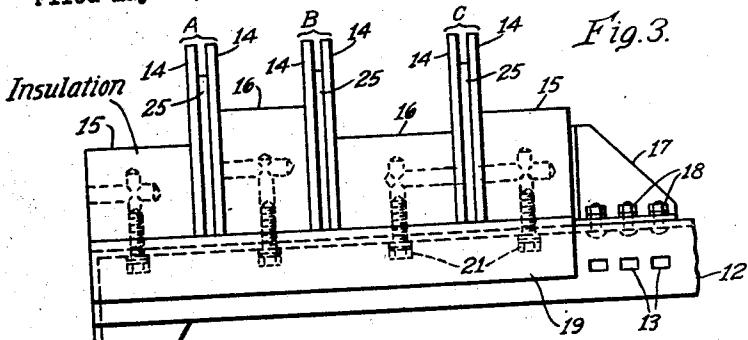
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2,445,463

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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE

2,445,463

## UNIVERSAL BUS-BAR SUPPORT

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Application May 30, 1944, Serial No. 538,077

5 Claims. (Cl. 174-70)

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My invention relates, generally, to bus-bar supports and, more particularly, to supports suitable for use in metal-enclosed switchgear.

An object of my invention, generally stated, is to provide a bus-bar support which shall be simple and efficient in operation and which may be economically manufactured and installed.

A more specific object of my invention is to provide a bus-bar support which may be utilized with either one or a plurality of bus-bars per phase.

Another object of my invention is to provide a universal bus-bar support comprising a plurality of standard parts which may be assembled in different positions to support a different number of bus bars per phase.

A further object of my invention is to provide a bus-bar support which will permit changes in the bus structure to be made readily after the structure is installed.

Other objects of my invention will be explained fully hereinafter or will be apparent to those skilled in the art.

In accordance with one embodiment of my invention, the bus bars of a bus structure are retained in position by spacing blocks which may be assembled in different positions to permit the utilization of 1, 2 or 3 bars per phase in a three-phase bus without changing the overall width of the bus structure.

For a fuller understanding of the nature and objects of my invention, reference may be had to the following detailed description, taken in conjunction with the accompanying drawing, in which:

Figure 1 is a view, in perspective, of a three-phase bus structure embodying my invention;

Fig. 2 is a view, in end elevation, of the structure shown in Fig. 1;

Figs. 3 and 4 are views, similar to Fig. 2, showing the spacing members arranged for 2 and 3 bus bars, respectively, per phase;

Fig. 5 is a view, similar to Fig. 2, with the spacing members arranged for a neutral bar in addition to the phase bus bars;

Fig. 6 is a view, in end elevation, of either a single-phase or a direct-current bus structure embodying my invention;

Fig. 7 is a sectional view showing one manner of insulating the bus bars from the supporting structure;

Fig. 8 is a sectional view showing the manner of insulating the ends of the bus bars from the metal enclosure, and

Fig. 9 is a view, in side elevation of one of

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the spacing members utilized in practicing my invention.

Referring to the drawings and particularly to Figs. 1 and 2, there is shown therein a portion of a switch-gear structure which may be of the type disclosed in my copending application Serial No. 538,076, filed May 30, 1944, now Patent No. 2,424,345, July 22, 1947. The structure shown comprises vertically disposed frame members 10 and 11, and horizontally disposed bus-bar supporting members 12 which extend between the frame members 10 and 11 and are supported thereby. The support members 12 are preferably of a channel shape and are provided with a plurality of openings 13 in the sides and top thereof.

As shown in Figs. 1 and 2, three rectangular bus bars 14 are disposed edgewise on the horizontal bus supports 12 in spaced relation, thereby providing a bus structure suitable for use in a three-phase power system. The bus bar for phase A is spaced from the vertical frame members 10 by rectangular blocks 15 which may be composed of a suitable insulating material. The bus bar for phase B is spaced from the bars for phases A and C by rectangular blocks 16 which, as shown in Fig. 2, are slightly longer than the blocks 15. The bus bar for phase C is spaced from triangular shaped braces 17 by additional blocks 15. The braces 17 may be attached to the support members 12 by bolts 18 which are inserted through the openings 13 in the top of the channel 12.

As shown in Fig. 7, the bus bars 14 are insulated from the support member 12 by a channel-shaped member 19 which may be composed of a suitable insulating material. Each one of the blocks 15 and 16 is retained in position by a bolt 21 which is threaded into the block through one of the openings 13 in the top of the channel member 12. As shown in Fig. 9, each one of the rectangular blocks is provided with tapped openings 22 and 23 in a side and end, respectively, of the block for receiving the bolt 21. It will be seen that the openings 22 and 23 are disposed equal distances from one corner of each block 15 so that the bolt 21 may be inserted through the same hole 13 in the channel 12 when the block is mounted edgewise as when it is mounted sidewise on the channel 12.

In order to insulate the ends of the bus bars 14 from any metal plate which may be disposed at the end of the switchgear structure, an insulating member 24, having a cross section such as

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shown in Fig. 8, may be substituted for the channel-shaped insulating member 19.

In accordance with the usual practice, the current-carrying capacity of the bus structure may be increased by increasing the number of bus bars for each phase. Thus, as shown in Fig. 3, two bus bars 14 may be provided for each phase. The bars for each phase are spaced a slight distance from each other by spacing members 25 which are preferably composed of the same material as the bus bars.

In order that the additional bus bars may be utilized without increasing the overall width of the bus structure, the dimensions of the rectangular spacing blocks 15 and 16 are such that the blocks may be arranged in different ways to provide the space required for the additional bus bars and at the same time firmly retain the bus bars in position. Thus, as shown in Fig. 3, when two bus bars are utilized for each phase, the spacing block 16 between the bus bars for phases A and B is rotated through 90° and placed between the bus bars in an endwise position. Likewise, the spacing block 15 between the bus bars for phase C and the brace 17 is rotated through 90° and mounted endwise instead of sidewise. In this manner sufficient space is made available to install the three additional bus bars 14, and the three spacing members 25 one of which is placed between the bus bars for each phase.

As shown in Fig. 4, when it is desired to utilize three bus bars per phase, all of the spacing members 15 and 16 are rotated through 90° and mounted endwise instead of sidewise. In this manner sufficient space is made available for three bus bars for each phase, and the necessary spacing members 25 between the bus bars for each phase. Thus, it will be seen that 1, 2 or 3 bus bars per phase may be utilized without changing the overall width of the bus structure.

In some three-phase power systems, a neutral conductor N is utilized in addition to the phase conductors A, B and C. As shown in Fig. 5, a neutral bus bar 26 may be installed by substituting a spacing block 27 for the block 15 between the bus bar for phase C and the brace 17. The block 27 is slightly shorter than the block 15, thereby providing the space required for the neutral bus bar 26. The neutral bar may be insulated from the brace 17 by an L-shaped insulating member 28 which is secured in position by the bolt 21 which secures the block 27. If it is desired to increase the number of bus bars per phase when a neutral bar is utilized, this may be done by rotating the spacing blocks 15, 16 and 27 through 90° in the manner hereinbefore described.

When it is desired to install a single-phase or a direct-current power system which requires only two conductors, the structure shown in Fig. 6 may be utilized. Since less space is required for a single-phase system, a shorter insulating channel member 29 may be substituted for the channel member 19. Also only one spacing block 16 is required in place of two as in the three-phase structure. Space may be made available for installing additional bus bars by rotating the spacing members 15 and 16 through 90° in the manner hereinbefore described.

From the foregoing description, it is apparent that I have provided a universal bus-bar support which may be utilized with one or a plurality of bus bars for each phase of a polyphase system and which is also suitable for use in single-phase or direct-current systems. The supporting struc-

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ture is composed of a relatively small number of standard parts which may be arranged in different ways to provide space for the desired number of conductors. Thus, changes and additions may be made without requiring new parts. Furthermore, the structure may be readily assembled by the factory personnel of a manufacturing company without requiring engineering drawings for each particular installation.

Since numerous changes may be made in the above described construction, and different embodiments of the invention may be made without departing from the spirit and scope thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. A bus structure comprising, a horizontally disposed support member having a plurality of openings through the top thereof, rectangular bus bars disposed edgewise on the support member in spaced relation, rectangular spacing members disposed between said bars, a brace secured to said support member, an additional rectangular spacing member disposed between one of said bars and the brace, and bolts extending through said openings into said spacing members for retaining them in position, said spacing members being rotatable about a transverse axis of the members through an angle of 90° to provide space for additional bus bars and having openings in the sides and ends thereof for receiving said bolts when so rotated.

2. A bus bar structure comprising, a horizontally disposed support member having a plurality of openings through the top thereof, rectangular bus bars disposed edgewise on the support member in spaced relation, rectangular spacing members disposed between said bars, a brace secured to said support member, an additional rectangular spacing member disposed between one of said bars and the brace, and bolts extending through said openings into said spacing members for retaining them in position, said spacing members being rotatable about a transverse axis of the members through an angle of 90° to provide space for additional bus bars and having openings in the sides and ends thereof for receiving said bolts when so rotated, the openings in said additional spacing member being disposed equal distances from one corner thereof.

3. A bus structure comprising a horizontally disposed support member having a plurality of openings through the top thereof, rectangular bus bars disposed edgewise on the support member in spaced relation, rectangular spacing members disposed between said bars, and bolts extending through said openings into said spacing members for retaining them in position, said spacing members being rotatable about an axis of the members through an angle of 90° to provide space for additional bus bars and having openings in the sides and ends thereof for receiving said bolts when so rotated.

4. A bus structure comprising, a horizontally disposed support member having a plurality of openings through the top thereof, rectangular bus bars disposed edgewise on the support member in spaced relation, insulating spacing members disposed between said bars, and bolts extending through said openings into said spacing members for retaining them in position, said spacing members being rotatable about an axis of the members through an angle of 90° to pro-

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vide space for additional bus bars and having openings therein for receiving said bolts when so rotated.

5. A polyphase bus structure comprising, vertically disposed frame members, a support member horizontally disposed between the frame members and having a plurality of openings through the top thereof, rectangular bus bars disposed edgewise on the support member in spaced relation, insulating spacing members disposed between the bus bars for different phases, and bolts extending through said openings into said spacing members for retaining them in position, said spacing members being rotatable about an axis of the members through an angle of 90° to pro-

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vide space for additional bus bars for each phase and having openings therein for receiving said bolts when so rotated.

CHARLES P. WEST.

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The following references are of record in the file of this patent:

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