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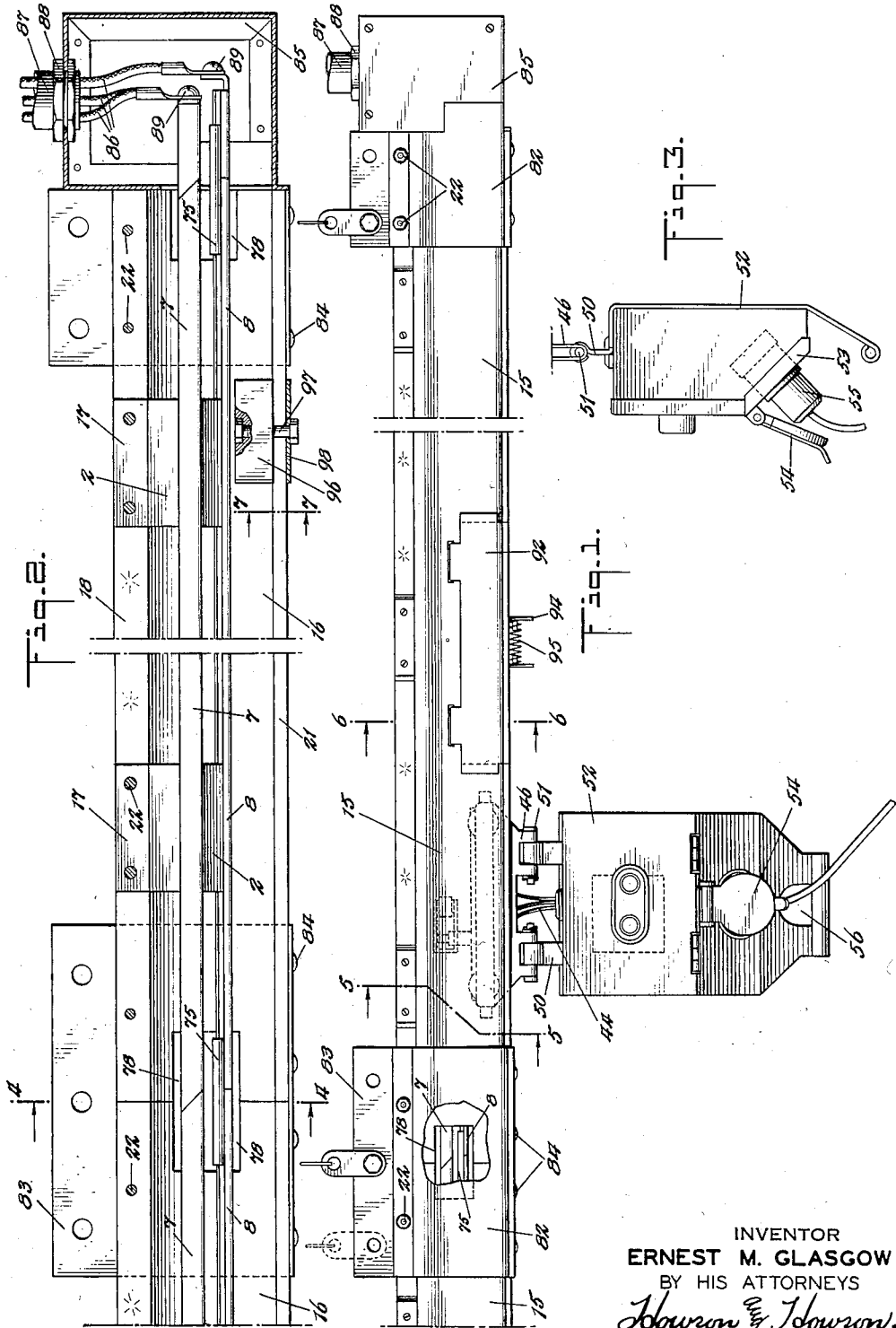
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2,026,884

ELECTRIC TROLLEY CONSTRUCTION

Filed March 22, 1935

4 Sheets-Sheet 1



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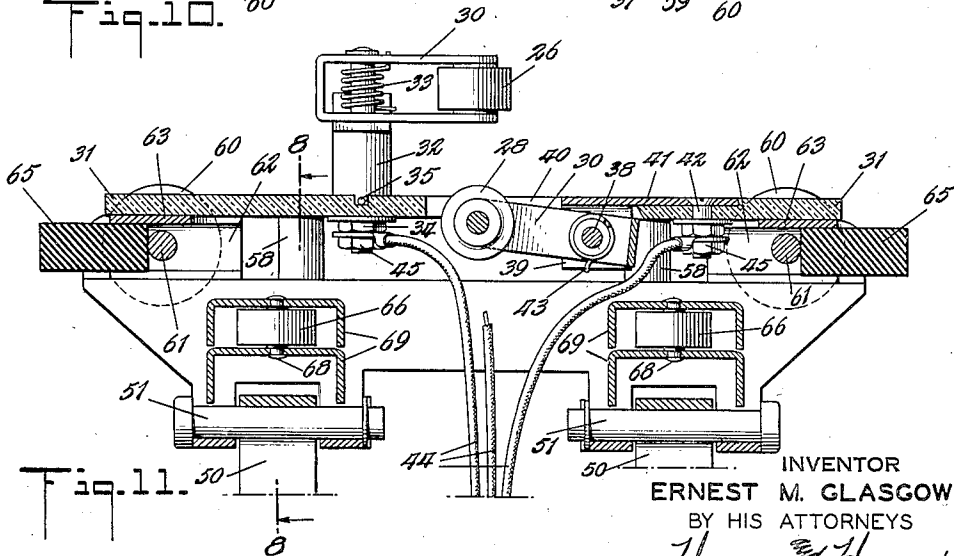
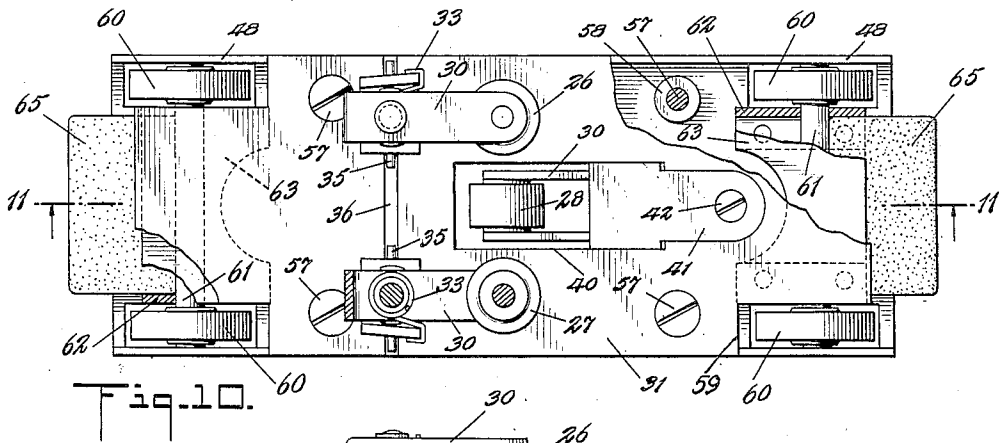
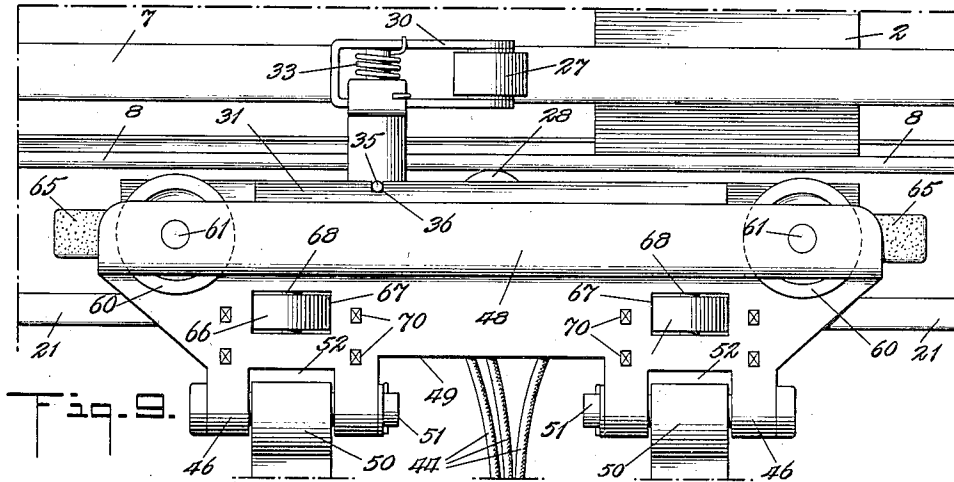
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ELECTRIC TROLLEY CONSTRUCTION

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4 Sheets-Sheet 3



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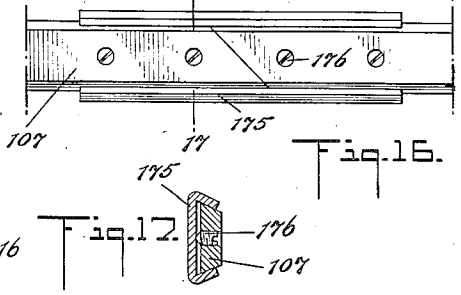
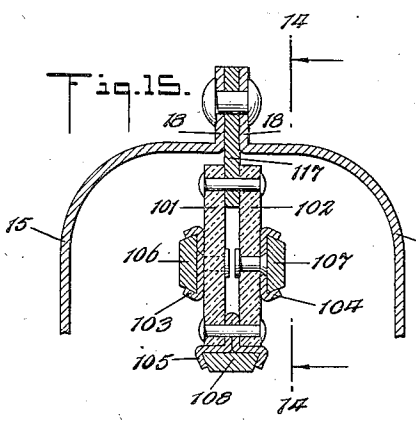
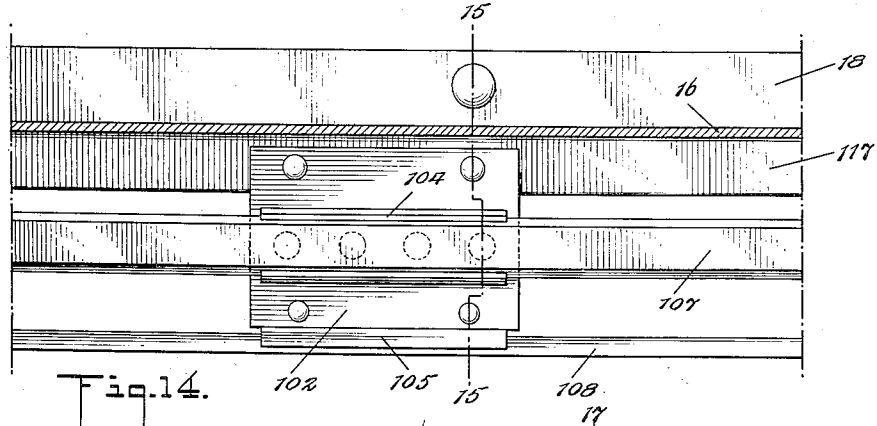
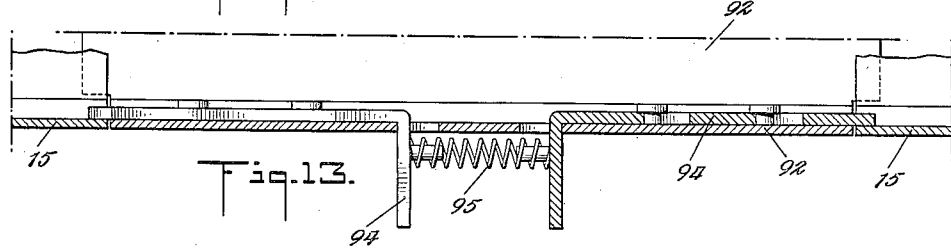
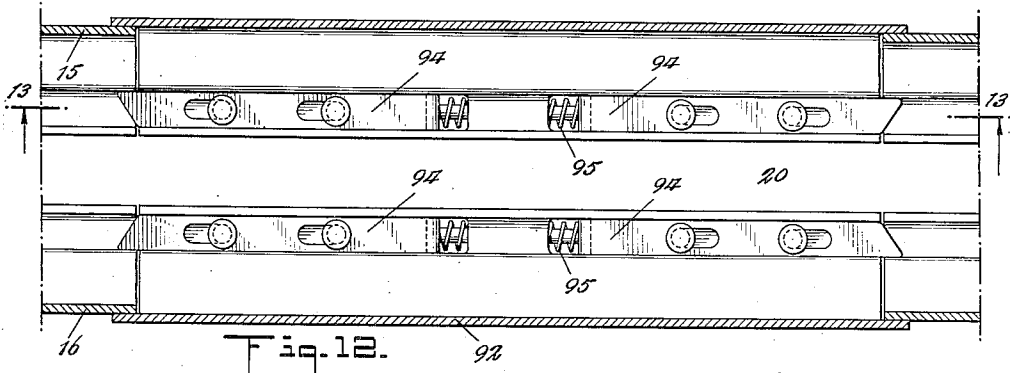
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ELECTRIC TROLLEY CONSTRUCTION

Filed March 22, 1935

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,026,884

ELECTRIC TROLLEY CONSTRUCTION

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Application March 22, 1935, Serial No. 12,530

11 Claims. (Cl. 247-3)

This invention relates to electric trolley constructions of the type comprising bus bars and a carriage having contacts therefor, and more particularly to three phase installations of this character for distributing current to portable electric power tools.

The main objects of the present invention are to economize the manufacture, simplify the construction, and facilitate the installation and operation of constructions of this character, to provide a compact arrangement, and to protect the bus bars from short circuit and the carriage from obstruction.

Other objects and features of novelty will be apparent as the following description proceeds, reference being had to the accompanying drawings, in which

Figure 1 is a side elevation of the trolley construction according to the preferred embodiment of the present invention;

Figure 2 is an enlarged vertical longitudinal section through the conduit shown in Figure 1;

Figure 3 is an end elevation of the control box shown in Figure 1;

Figure 4 is a vertical transverse section through a joint in the conduit taken along the line 4-4 of Figure 2;

Figure 5 is a transverse vertical section taken along the line 5-5 of Figure 1; and showing the trolley carriage in end elevation;

Figure 6 is a vertical transverse section taken along the line 6-6 of Figure 1 through the door portion of the conduit section;

Figure 7 is a vertical transverse section taken along the line 7-7 of Figure 2, showing the bumper block;

Figure 8 is a vertical transverse section through the trolley carriage taken along the line 8-8 of Figure 11;

Figure 9 is an enlarged section similar to Figure 2, but showing the trolley carriage and side elevation;

Figure 10 is a plan of the trolley carriage;

Figure 11 is a vertical longitudinal section through the carriage taken along the line 11-11 of Figure 10;

Figure 12 is a horizontal longitudinal section taken along the line 12-12 of Figure 6, showing the door latching mechanism in plan;

Figure 13 is a vertical longitudinal section taken along the line 13-13 of Figure 12;

Figure 14 is a longitudinal vertical section taken along the line 14-14 of Figure 15;

Figure 15 is a transverse vertical section

through a modified conduit showing modified bus bars and supporting means therefor;

Figure 16 is a detail of the joint for the modified bus bar;

Figure 17 is a section taken along the line 17-17 of Figure 16;

Figure 18 is a detail of the joint for the bus bars according to the preferred embodiment of the present invention; and

Figure 19 is a section taken along the line 19-19 of Figure 18.

The electric trolley construction according to the preferred embodiment of the present invention comprises an insulating member having bus bars secured thereto and complementary conduit members mounted at each side thereof, forming a conduit inclosing the bus bars, but spaced therefrom. The conduit also contains a carriage which moves longitudinally therein, and is provided with contacts engaging the bus bars.

The conduit is manufactured in sections or units, which are adapted to be joined in end to end relation to form a continuous conduit of a length to suit the installation.

Referring more particularly to the drawings, as shown in Figure 5 an insulating member forming a hanger or panel 2 is provided, which may be conveniently molded of bakelite, but may be constructed as desired from any other insulating material. The opposite sides and the edge of the member 2 are provided with undercut grooves 3, 4 and 5. These grooves receive bus bars 6, 7 and 8 respectively, all preferably of the construction shown in Figure 19.

The preferred form of the bus bar comprises a strip of copper or other conducting material having its side edges bent back upon itself as at 10 and 11. The side edges are brought together as at 12 and then both are flared outwardly forming diverging flanges 13 and 14. The metal of these bus bars is resilient and hence the flanges 13 and 14 have a spring action which facilitates their longitudinal insertion in the undercut grooves 3, 4 and 5.

The margin of the insulating member 2 is secured between complementary conduit members 15 and 16. In the form shown the insulating member 2 has an upper margin 17 of reduced thickness and the side members 15 and 16 have vertical flanges 18 between which the margin 17 is secured. The conduit members 15 and 16 have side walls parallel to the insulating member 2 and terminating in inwardly directed flanges 19. The inner edges of the flanges 19 are spaced apart thus leaving the trolley slot 20. The flanges 19

adjacent the slot 20 are provided with reinforcing grooves or channels 21.

As shown in Figure 2 the insulating member 2 is not necessarily continuous for the full length of the conduit section, although the bus bars 6, 7 and 8 are preferably continuous from one end of the conduit unit to the other. If the insulating member 2 is not continuous, at least two spaced plates thereof are provided as shown in Figure 2, but a greater number may be provided if desired. Between the spaced plates, the conduit member flanges 18 are brought together and secured for example by spot welding as indicated in Figure 2, while at the portions where insulating member margin 17 extends therebetween, the flanges 18 are bolted to the margin 17 by a bolt 22 shown in Figure 5.

The trolley carriage which operates in the conduit just described is best shown in Figures 9, 10 and 11. This carriage is provided with a pair of trolley contacts 26 and 27 which respectively engage the bus bars 6 and 7, and a trolley contact 28 which engages the bus bar 8.

These contacts are preferably wheels, respectively journaled in U-shaped arms 30, which are pivotally mounted on an insulating plate 31, preferably of bakelite, on the carriage. The arms for the contacts 26 and 27 are respectively pivoted on the upper ends of posts 32 and are urged toward each other by springs 33. The lower ends of these posts pass through the plate 31 and are threaded to receive nuts 34. Pins 35 in a groove 36 in the plate 31 prevent the posts 32 from turning.

The arm for the contact 28 is pivoted on a pin 38 carried by ears 39 depending through a slot 40 in the plate 31, from a clip 41 secured to the top of the plate 31 by a bolt 42. A spring 43 urges the arm 30 upward to project the contact 28 through the slot 40. Insulated wires 44 are respectively connected by nuts 45 to the threaded ends of the posts 32 and bolt 42.

The frame of the carriage is a box like structure, preferably formed from a single piece of sheet metal. Central vertical depending loops 46 join laterally extending floor flanges 47, from which side flanges 48 extend vertically.

As shown in Figure 9, a central portion of the carriage plate between the loops 46 is cut away, forming an aperture 49 through which the wires 44 depend. The loops 46 at each end are slotted to receive eyes 50 which are pivoted on pins 51 carried by the loops. A control box 52 as shown in Figures 1 and 3 is suspended from the eyes 50 and contains a switch, circuit breaker, and/or fuses. In order that different tools may be used interchangeably, a receptacle 53 is mounted in the box 52, under a hinged cover 54, to receive a plug 55. The box 52 is preferably constructed to provide an eye 56, on which the tool may be suspended when not in use.

As shown in Figure 8, the insulating plate 31 is secured to the carriage by screws 57 engaging posts 58 secured to the flanges 47. The corners of the plate 31 are cut away at 59 to clear the carriage supporting wheels 60. These wheels 60 rotate on axles 61 passing through the carriage side plates 48, and through vertical flanges 62 of box like clips 63 which are riveted to the top of floor flanges 47. Rubber blocks 65 in these clips bear against the axles 61, forming bumpers for the carriage.

Guide rollers 66 are mounted in slots 67 cut in the sides of the loops 46 and rotate on vertical pins 68 extending between horizontal channel

clips 69 which connect the sides of the loop. Lugs 70 on these channels pass through the sides 47 and are peened over as shown in Figure 9.

For joining the sections of the conduit, joint structure is provided as shown in Figures 2 and 4. The bakelite bus bar support 2 terminates short of the ends of the conduit side members 15 and 16, but the ends of the bus bars project therefrom substantially to the ends of the side members. The bus bar ends are preferably cut at an acute angle, to meet when adjacent conduit sections are brought together. Channel clips 75 of the bus bar material having converging spring flanges 76 receive the spring flanges 13 and 14 of the bus bar ends, as shown in Figures 18 and 19. To insure that a clip 75 will be provided for each section, one flange 76 is punched as at 77 into the flange 13. For access to the clip 76 notches 78 are provided in each end of the side members 15 and 16.

For joining the ends of adjacent side members 15 and 16, complementary joint members 80 and 82 are provided, which fit over the side members and their flanges 18 and are joined thereabove, forming a double flange 83 by which the conduit may be supported. The bolts 22 secure the members 80 and 82 together at the top, and screws 84 secure the bottom margins to the slot reinforcing grooves 21.

The end of the conduit which receives the power supply terminates in a box 85. Power leads 86 enter this box 85 from a pipe 87 through an insulating bushing 88, and are connected as at 89 to terminal ends of the bus bars.

One of the conduit sections is provided with a door through which the trolley carriage may be inserted or applied. As shown in Figure 6 the lower portion 92 of each side member 15 and 16 is hinged at 93. This movable portion is somewhat longer than the trolley carriage, as shown in Figure 1. Opposed latch members 94 are mounted in the grooves 21, of the hinged portion 92, and are urged apart by springs 95.

To insert the trolley carriage in the conduit, the latch members 94 are caused to compress the springs 95 to release the hinged portions 92 which are swung upward. The carriage is then inserted, with the trolley contact 28 aligned with the lower edge bus bar 8. The posts 32 extend up on each side of the insulating member 2. As this bakelite bus bar support is tapered at its lower portion, the trolley contacts 26 and 27 are spread thereby, against the action of their springs 33. When the hinged portions 92 are relatched, the edges of channels 21 engage the guide rollers 66 with a slight clearance, and the flanges 19 therebeyond pass under the supporting wheels 60 and form a track therefor. This condition may also be obtained by moving the carriage along into the rigid portion of the conduit section before the movable portion is replaced.

As shown in Figures 2 and 7 a bumper block 96 is fitted in the conduit between the side plates 15 and 16, and is clamped to the flanges 19 by a bolt 97 in the slot 20 passing through a strap 98, the ends of which are turned over the channels 21.

In the modification shown in Figures 14, 15, 16 and 17, a pair of insulating plates 101 and 102 have riveted to the outer sides thereof channel members 103 and 104 having inturned flanges. A similar channel member 105 has a central fold riveted between the lower edges of these plates 101 and 102.

The bus bars 106, 107 and 108 are of solid

trapezoidal section fitting the grooves of these channels. A strip 117 has a lower margin riveted between the insulating plates, and an upper margin riveted between the flanges 18 of the conduit side members 15 and 16.

The bus bar ends of adjacent conduit sections are joined by a copper channel section 175, into which the bus bar ends are fitted, and secured in place by binding screws 176 therein.

From the foregoing description it will be readily apparent that the construction according to the present invention is unusually compact, as the bus bars are close together although well insulated. The carriage also is small and compact which permits it to be housed by the conduit. The conduit having only the necessary trolley slot protects the bus bars from short circuit, and prevents obstruction of the track for the carriage supporting wheels.

Claims to the trolley or carriage per se have been divided out of this parent application and presented in my copending application Serial No. 53,075 filed December 5, 1935, which is in part a continuation of this application.

The invention is not limited to the details disclosed, but includes such embodiments as fall within the scope of the following claims.

What I claim is:

1. In an electric trolley construction, an insulating member, bus bars mounted on said insulating member, complementary conduit members having margins secured to the margin of said insulating member and side walls spaced from said bus bars and terminating in inwardly directed flanges spaced apart to form a slot.

2. In an electric trolley construction, an insulating member, bus bars respectively secured along opposite sides and another portion of said insulating member, a conduit comprising a pair of complementary conduit members having margins secured to the margin of said insulating member and side walls spaced from said bus bars and terminating in inwardly directed flanges spaced apart to form a slot, a carriage in said conduit supported on said flanges for longitudinal movement therealong, trolley contacts on said carriage and insulated therefrom, means for urging a pair of said contacts toward each other into engagement with said side bus bars, and means for urging another of said contacts into engagement with said other bus bar, and electrical conductors connected to said contacts and insulated from said carriage passing through said slot for distributing current from said bus bars.

3. In a three phase trolley construction, a conduit having a continuous slot, an insulating panel within said conduit secured to the wall of said conduit at a point substantially opposite said slot and extending therefrom toward said slot, a bus bar secured along one side of said panel, a second bus bar secured along the other side of said panel, and a third bus bar secured along the portion of said panel toward said slot.

4. In an electric bus bar construction, an insulating member, bus bars having contact surfaces outside of said insulation and longitudinal folds forming attachment portions with surfaces divergent at acute angles to said contact surfaces, said hanger having for each bus bar a recess with undercut side walls into which said divergent bus bar surfaces may be inserted longitudinally, so as to bear thereagainst by spring action.

5. In a three phase electric trolley construction, an insulating panel forming a hanger for bus bars respectively secured along the sides and

edge thereof, complementary conduit members parallel to said bus bars and marginally secured to the margin of said insulating panel and having sides extending therefrom spaced from said bus bars to form a conduit therefor and terminating in inwardly directed flanges spaced apart to form a slot.

6. In an electric trolley construction, an insulating panel, three bus bars respectively secured to said insulating panel, a conduit therefor having side walls terminating in edges spaced apart to form a slot, a carriage supported by and movable along and within said conduit, a contact carried by said carriage between each side of said insulating panel and the adjacent side wall of said conduit, means for urging said contacts toward each other into engagement with the bus bars therebetween, a third contact carried by said carriage between said panel and said slot, and means for urging said third contact toward said panel into engagement with the third bus bar.

7. In an electric trolley construction, a group of closely spaced longitudinally parallel bus bars all of which do not lie in the same plane, a sheet metal tube forming a conduit substantially inclosing said group but having a longitudinal slot coextensive therewith through which a moving conductor may take off power from said bars, and insulating means for supporting said group substantially centrally of said tube and spaced from the walls and slot thereof, comprising a member of insulating material having a margin or edge secured to the wall of said tube and projecting therefrom into said tube and having said bars secured thereto, said bars having contact surfaces facing outwardly toward the wall of the substantially inclosing tube.

8. In a three phase electric trolley construction, a conduit having opposed edges forming a continuous slot, three bus bars within said conduit parallel to said slot and insulated from said conduit and from each other, a carriage supported in said conduit for movement therealong, three trolley contacts each mounted for swinging movement on said carriage, means for urging a pair of said contacts in opposite directions into respective engagement with a pair of said bus bars, and means for urging said third contact into engagement with said third bus bar, said pair of contacts engaging said pair of bus bars at points substantially in a plane transverse to said conduit, whereby the turning moments of said urging means tending to turn said carriage relative to said bus bars are substantially balanced.

9. In an electric trolley construction, a duct substantially enclosing a group of spaced longitudinally parallel bus bars but having a longitudinal slot coextensive therewith through which a moving conductor may take off power from said bus bars, and insulation having slots therein with recesses therebelow larger than said slots, said bus bars having contact surfaces outside of said slots and extending laterally on both sides thereof, said bus bars also having attachment portions extending through said slots and diverging in said recesses, whereby said bus bars may be mounted by inserting said bus bars longitudinally in said conduit with said attachment portions inserted longitudinally in said slots.

10. In an electric trolley construction, a group of longitudinally parallel bus bars all of which do not lie in the same plane, a duct enclosing said group but having a longitudinal slot, and

insulating means for mounting said bus bars in said duct, said insulating means having a wedge portion, a carriage supported in said duct for movement therealong, three trolley contacts each
5 movably mounted on said carriage, means for urging a pair of said contacts toward each other, means for urging the third contact toward said pair, the mounting and urging means for said pair of contacts being adapted to be spread by
10 the wedge portion of said insulating means to pass over said group of bus bars into engagement with a pair thereof and into engagement of said third contact with another bus bar, for
15 carriage along said duct.

11. In an electric trolley construction, a duct having an elongated slot, bus bars within said

duct and parallel to said slot and insulated from said conduit and from each other, a carriage in said conduit movable along said slot, trolley contacts carried by arms pivoted on said carriage, means for urging a pair of said arms in opposite
5 directions about their pivots to engage their contacts with a pair of said bus bars, and means for urging another arm about its pivot to engage its contact with another of said bus bars, said
10 pair of contacts engaging said pair of bus bars at points substantially in a plane transverse to said conduit, whereby the moments of said arms and urging means tending to turn said carriage
15 relative to said bus bars are substantially balanced.

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