May 21, 1963 R. F. DEHN 3,090,840

CONDUCTOR BAR SUPPORT

Filed June 4, 1958 4 Sheets-Sheet 1

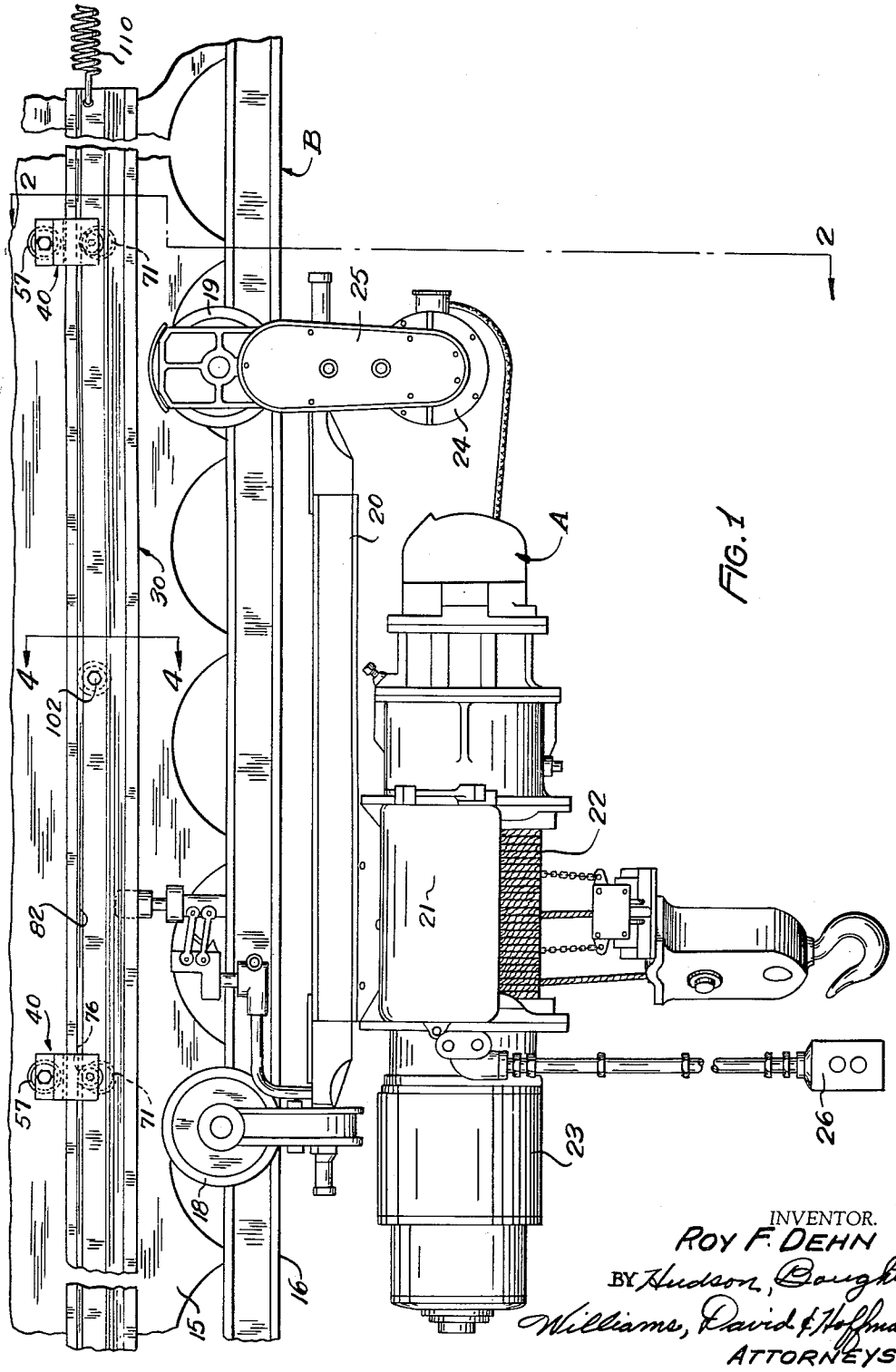



FIG. 1

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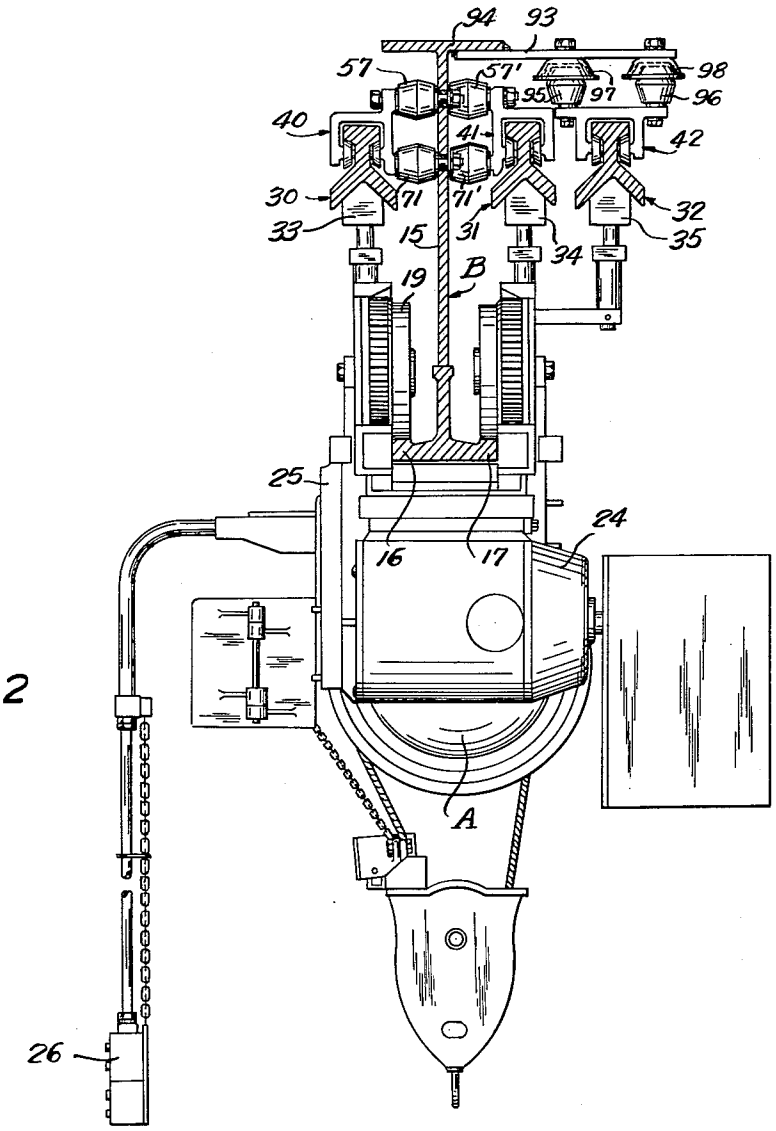



FIG. 2

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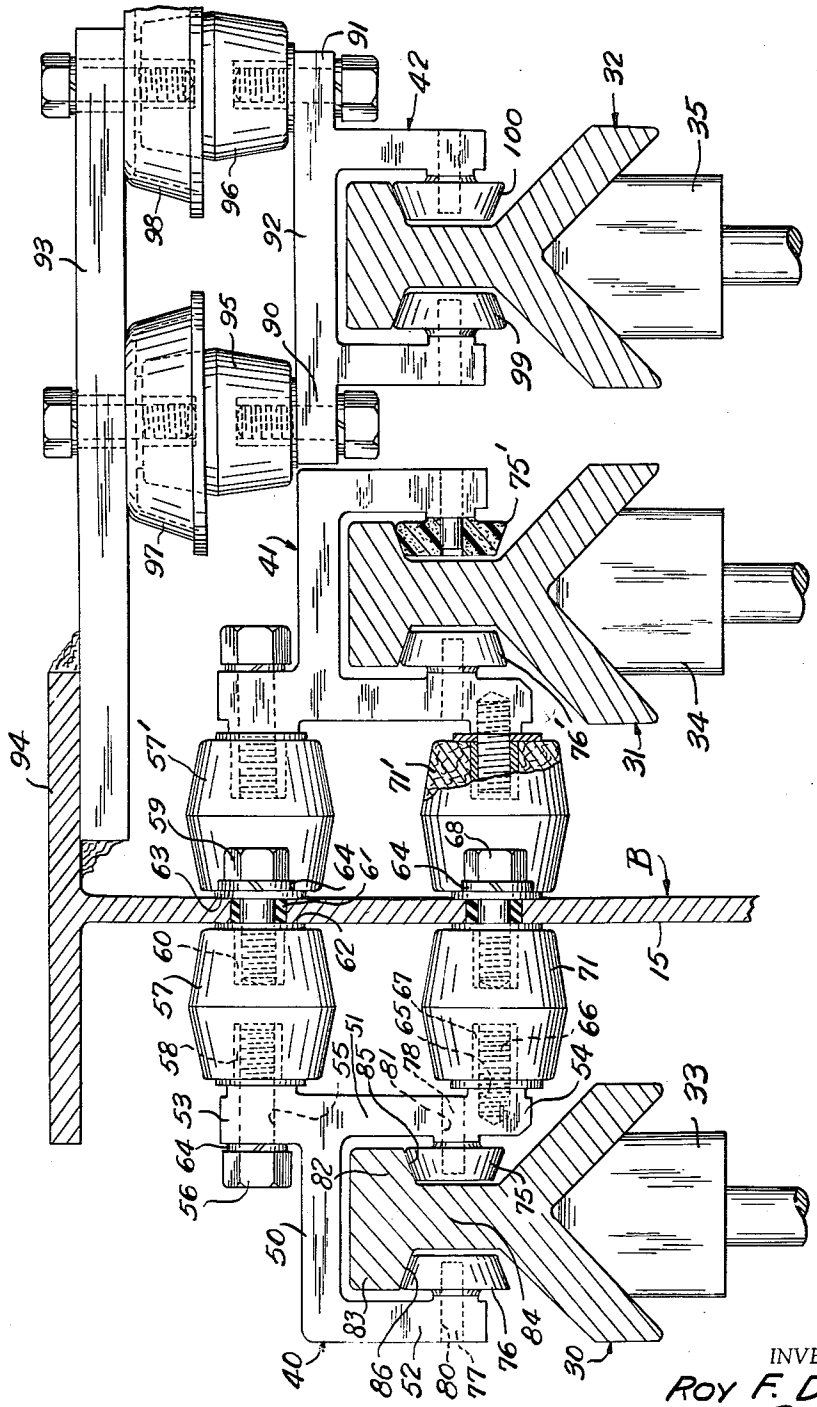



FIG. 3

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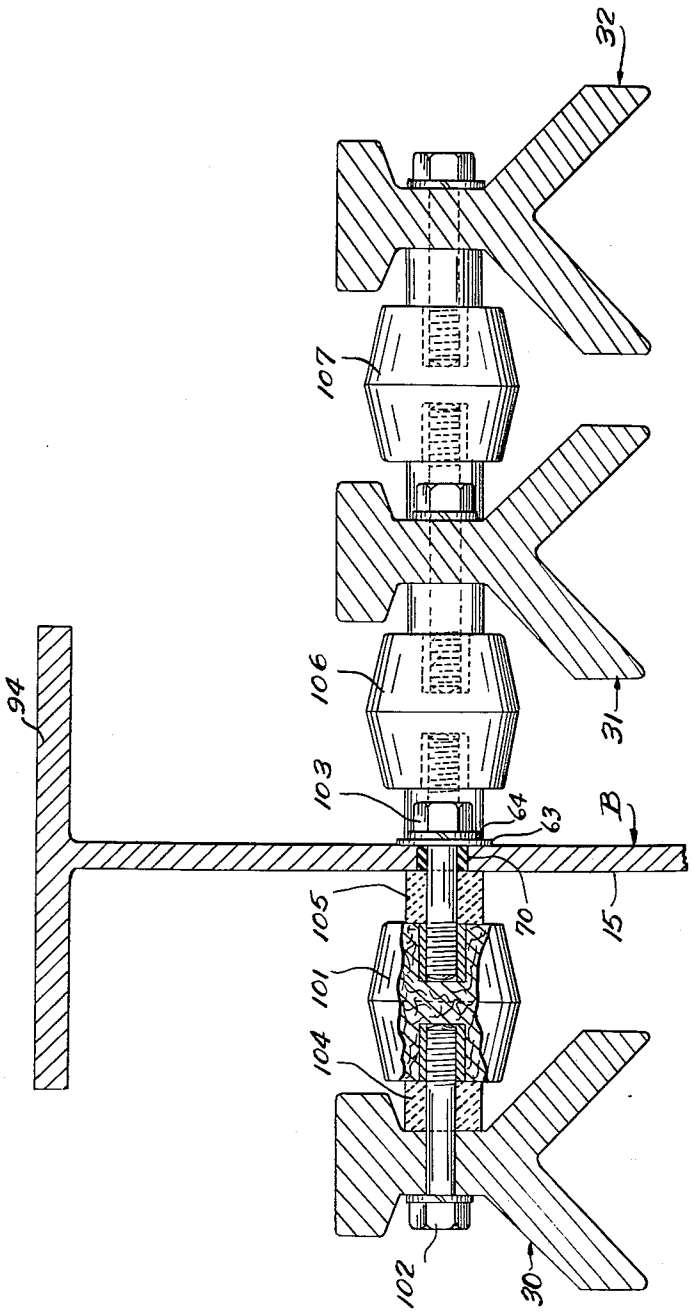



FIG. 4

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3,090,840

# CONDUCTOR BAR SUPPORT

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4 Claims. (Cl. 191—23)

The present invention relates to electric current distribution systems of the type where in current is conducted from or to a movable contact member in engagement with and movable along an elongated conductor bar, and more particularly, to the conductor bar of such a system and to a means for supporting the conductor bar.

Systems of the type referred to are employed, for example, on electrified railroads where they are commonly referred to as the "third rail" system, and electrified material handling apparatus such as, overhead traveling cranes, and monorail carrier systems, etc.

The principal object of the invention is the provision of a new and novel distribution system of the character referred to comprising a rigid rod or bar-like elongated continuous conductor or conductor bar having pressure type, non-expansion splices, in combination with means for supporting the conductor bar so as to allow for expansion and contraction of the conductor without distortion.

The invention resides in certain constructions and combinations and arrangements of parts and further objects and advantages of the invention will be apparent to those skilled in the art to which it relates from the following disclosure and description of apparatus embodying the invention described with reference to the accompanying drawings forming a part of this specification, in which like reference characters designate corresponding parts, and in which:

FIG. 1 is a side elevational view of a section of an electrified, overhead monorail system including a power propelled trolley or carrier embodying the invention;

FIG. 2 is a vertical sectional view, approximately on the line 2—2 of FIG. 1, through the monorail and trolley conductor bars mounted thereon showing the trolley or carrier in end elevation;

FIG. 3 is an enlarged fragmentary view of the track portion of FIG. 2, with parts in section; and

FIG. 4 is an enlarged fragmentary sectional view approximately on the line 4—4 of FIG. 1.

While the present invention is susceptible of being embodied in different structures, and of being used with various types of equipment, it is herein shown and described as embodied in an overhead, monorail, material handling system having a power-propelled trolley, in the present instance a carrier A, incorporating an electric hoist mechanism. The carrier A is movable along a track or runway formed by a monorail B for transporting materials from one location to another.

The monorail B comprises a vertical web 15 having laterally projecting horizontal flanges 16, 17 along its lower edge and upon which the carrier A is supported by longitudinally spaced sets of flanged rail wheels 18, 19 for movement along the rail. The carrier further comprises a load bar 20 suspended between yoke or frame members to which the sets of wheels 18, 19 are connected and to which the bar 20 and in turn the electric hoist mechanism or hoist 21 is connected.

The hoist 21 includes the usual cable drum 22 driven by an electric motor 23. The carrier A further comprises an electric motor 24 carried by the rear frame member 25 and connected to the rear pair of wheels 19 for propelling the carrier along the rail B. The carrier A is of commercial construction and will not be further described



except to say that the motors 23, 24 are controlled from a push-button station 26 on the carrier.

The power for operating the electric motors on the carrier is supplied from longitudinally extending conductor bars 30, 31, 32 mounted alongside the monorail B. In the system illustrated, the motors on the carrier are of the three-phase alternating current type, therefore three conductor bars are provided. The power is transferred from the conductor bars to the carrier by three collector shoes 33, 34, 35 mounted on the carrier A and supported to slidably engage with the lower downwardly facing bottom surface of the conductor bars 30, 31, 32, respectively. The collector shoes and manner in which they are supported on the carrier are conventional and form no part of the present invention.

The conductor bars 30, 31, 32 are identical, are made of extruded aluminum and have a cross sectional shape similar to that of an inverted boldface roman capital y, i.e. Y. The conductors extend along the runway or track and are supported from the upper or beam part of the rail B by brackets 40, 41, 42, respectively, spaced at suitable distances longitudinally of the track or runway. The brackets 40, 41 are identical and attached to the web 15 of the rail B in the same manner and only the bracket 40 will be described in detail. The duplicate parts of the bracket 41 will be indicated by the same reference characters with prime marks affixed thereto.

The bracket 40 is of inverted U-shape form and has a horizontal base 50 from which two tines 51, 52 project in a downwardly direction. The tine 51 nearest the rail A is, so to speak, extended vertically in both directions to provide upwardly and downwardly projecting lugs 53, 54. The lug 53 projects above the base 50 of the bracket and has a hole 55 therein through which projects the shank of a cap screw 56 used in connecting the bracket to an insulator 57. The screw 56 projects horizontally through the hole 55 in the lug 53 and is threaded into a short bushing 58 in the adjoining end of the insulator. The insulator 57 is connected to the web of the rail by a cap screw 59, the shank of which projects through a hole in the rail and the projecting end of which is threaded into a bushing 60 similar to the bushing 58. The hole in the web of the rail has an insulating grommet 61 therein which together with insulating washers 62, 63 at opposite sides of the web of the rail insulates the screw 59 from the rail. A lock washer 64 is employed underneath the head of each of the cap screws.

The downwardly projecting lug 54 of the bracket 40 is provided with a tapped aperture 65 and is connected to the insulator 71 by a stud 66 threaded into the aperture 65 and the bushing 67 in the adjacent end of the insulator which insulator is similar to the insulator 57. The insulator 71 is connected to the web of the rail by a cap screw 68 in a manner similar to that in which the insulator 57 is connected thereto.

The conductor bar 30 is supported or carried by two rollers or wheels 75, 76 rotatably supported on stud shaft 77, 78 fixedly secured in suitable aligned apertures 80, 81 in the tines 51, 52, respectively, of the brackets. The stud shafts 77, 78 are normal to the web 84 of the conductor bar and the wheels engage underneath horizontal flanges 82, 83 of the conductor bar 30 which project in opposite directions from the central vertical web 84 of the conductor bar adjacent to its upper edge and which flanges correspond to the serifs of the Y. The surfaces 85, 86 on the underside of the flanges 82, 83 and which surfaces are engaged by rolls or wheels 75, 76, respectively, are spaced above the bottom surface engaged by the current collector 33. The rollers 75, 76 are preferably made of non-metallic material having electrical insulating properties, such as, fiber, plastic, etc., for example, nylon, and the like, but

may be made of any suitable non-corrosive material; such as, stainless steel, oil impregnated or so-called self-lubricating bearing material.

The brackets 42 which support the conductor bar 32 are similar to the brackets 40 except for the fact that the attachment lugs 90, 91 project horizontally from opposite sides of the base 92 which corresponds to the base 50 of the brackets 40, and are in effect extensions of the base 92. The change in construction is necessitated by the fact that the bracket 42 is connected to a horizontal member as distinguished from a vertical member.

As shown, each of the brackets 42 is connected to the underside of a plate 93 welded to and projecting from the upper flange 94 of the rail B. In this instance, the insulators 95, 96, corresponding with the insulators 57, 71 which support the bracket 40, are provided with inverted cup-shaped members or skirts 97, 98, made of insulating material and which protect the insulators from dirt, etc. Each of the brackets 42 is connected to the plate 93 by cap screws, washers and grommets in a manner similar to that in which the brackets 40 are connected to the web 15 of the rail. The brackets 42 comprise rollers or wheels 99, 100 corresponding with the bracket rollers 75, 76 of the brackets 40. The rollers 99, 100 support the conductor bar 32. The fact that each of the brackets 40, 41 and 42 are connected to their supporting structure by two insulators prevents distortion of the brackets which might cause binding and prevent free movement of the conductor bars therein.

The conductor bars are preferably fixed against lengthwise movement at approximately their mid-points thus allowing each end free to expand and contact as required. In the embodiment shown, the conductor bar 30 is connected to the web of the rail 15 at approximately its mid-point by an insulator 101 similar to the insulator 57 and connected to the web of the conductor bar and to the web of the rail by cap screws 102, 103 in a manner similar to that in which the projecting lug 53 of the bracket 40 is connected to the web of the rail. In this instance, however, tubular-like spacers 104, 105 preferably made of insulating material are employed at opposite ends of the insulator 101 since the distance between the conductor bar and the web of the rail is greater than the distance between the lug 53 and the web of the rail.

The conductor bar 31 is connected to the web of the rail 15 against longitudinal movement at about its midpoint, as shown in FIGURE 4, by an insulator 106 in a manner similar to that in which the conductor bar 30 is connected by the insulator 101 to the web of the rail. The conductor bar 32 is connected against longitudinal movement at approximately its mid-point by being connected to the web of the conductor bar 31 by an insulator 107 similar to the insulator 101 in a manner similar to that in which the conductor bars 30 and 31 are connected to the web of the rail. As will be understood, the insulators 101, 106 and 107 are offset with respect to one another a short distance longitudinally of the rail to accommodate their respective cap screws, etc.

According to the present invention, the conductor bars are supported for relatively free movement lengthwise of the runway or track. This is particularly important in any system which incorporates long runs of tracks and where provision must be made for expansion and contraction of the conductor bars. The rollers which support the conductor bars are made of material which is non-corrosive so that there will be no tendency for the conductor bars to stick or adhere thereto which would interfere with their free movement lengthwise of the track of runway. As previously stated, the conductor bars are preferably made of extruded aluminum and the aluminum of which they are made is preferably relatively pure, so as to obtain the highest possible electric conductivity. Unless conductor bars of the character referred to are so mounted that they can move freely incident to expansion and contraction, they will buckle and deform during use.

If desired, the conductor bars may be maintained under a continuous slight tension by connecting the ends of the conductor bars to some permanent part of the supporting structure or the rail by a tension spring, such as the spring 110 shown in FIGURE 1 of the drawings.

The bracket rollers, in addition to supporting the conductor bars in such a manner that they are free to move lengthwise upon contraction and expansion, etc., if made of metal, may also be used to conduct electric current from the brackets to the conductor bars. Current, however, is preferably conducted to the conductor bars by a current conductor connected directly to the conductor bar.

From the foregoing description of the preferred embodiment of the invention, it will be apparent that the objects herebefore enumerated and others have been accomplished, and that there has been provided a novel and improved electric current distribution system comprising continuous bar or bar-like elongated conductors free of expansion joints in combination with means for supporting the same in such a manner that they will be free to move incident to expansion and contraction, etc. While the preferred embodiment of the invention has been described in considerable detail, as is understood, the invention is not limited to the particular details of construction shown and it is the intention to hereby cover all adaptations, modifications, and uses thereof which come within the practice of those skilled in the art to which the invention relates, and the scope of the appended claims.

Having thus described my invention what I claim is:

1. In a material handling device having a track, an apparatus on said track and movable therealong, electrical equipment on said apparatus and an electric current contact member on said apparatus and electrically connected to said electrical equipment, an electrical conductor system comprising: a rigid, elongated bar-type electric current conductor of predetermined length formed of a material which expands or contracts upon change in its temperature and adapted to be engaged by said contact member, means fixedly anchoring said bar-type conductor at only one point throughout its said predetermined length against bodily movement lengthwise, and means rollably engaging and supporting said bar-type conductor adapted so that the conductor is free to expand and/or contract without deformation relative to said engaging and supporting means but is fixed against lengthwise bodily movement.

2. In a material handling device having a track, an apparatus on said track and movable therealong, electrical equipment on said apparatus, and an electric current contact member on said apparatus and electrically connected to said electrical equipment, an electrical conductor system comprising: a rigid, elongated bar-type electric current conductor of predetermined length formed of a material which expands or contracts upon change in its temperature and adapted to be engaged by said contact member, means fixedly anchoring said bar-type conductor only at approximately the midpoint of its length to prevent bodily movement lengthwise, and means rollably engaging and supporting said bar-type conductor adapted so that the conductor is free to expand and/or contract without deformation relative to said engaging and supporting means but is fixed against lengthwise bodily movement.

3. In a material handling device having a track, an apparatus on said track and movable therealong, electrical equipment on said apparatus and an electric current contact member on said apparatus and electrically connected to said electrical equipment, an electric conductor system comprising: an elongated bar-type electric current conductor formed of material which expands or contracts upon change in its temperature extending along said track and having a longitudinally extending smooth continuous contact surface adjacent to one side adapted to be engaged

and traversed longitudinally by said contact member on said apparatus as said apparatus travels along said track, said bar-type conductor having a surface on each of two of its opposite sides adjacent to said one side, said surfaces on said opposite sides of said bar-type conductor being spaced from said contact surface of said bar-type conductor and facing in the same general direction as said one side, means supporting said bar-type conductor, said last named means comprising roller members directly engaging said surface on said opposite sides of said bar-type conductor, means supporting said roller members along said track for rotation about axes generally normal to the central plane of said bar-type conductor intermediate said surfaces on said opposite sides of said bar-type conductor, and means fixedly anchoring said bar-type conductor extending along said track at only one point throughout its length against bodily movement lengthwise of said track whereby said bar-type conductor extending along said track is fixed against bodily movement lengthwise of said track but is free to expand and/or contract without deformation.

4. In a material handling device having a track, an apparatus on said track and movable therealong, electrical equipment on said apparatus, and an electric current contact member on said apparatus and electrically connected to said electrical equipment, an electric conductor system comprising: an elongated bar-type electric current conductor formed of material which expands or contracts upon change in its temperature extending along said track said bar-type conductor having a transverse cross-sectional shape similar to that of a boldface Roman capital *y* with the surfaces of the tines facing one another serving as a longitudinally extending smooth continuous contact surface to be engaged and traversed longitudinally by said contact member on said apparatus as said apparatus travels along said track, means supporting said bar-type conductor, said last named means comprising roller members directly engaging the sides of the flanges of said bar-type conductor corresponding to the serifs of the *y* which sides face the tines, means supporting said roller members along said track for rotation about axes generally normal to the plane of the web of said bar-type conductor, and means fixedly anchoring said bar-type conductor extending along said track at only one point throughout its length against bodily movement lengthwise of said track whereby said bar-type conductor extending along said track is fixed against bodily movement lengthwise of said track but is free to expand and/or contract without deformation.

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