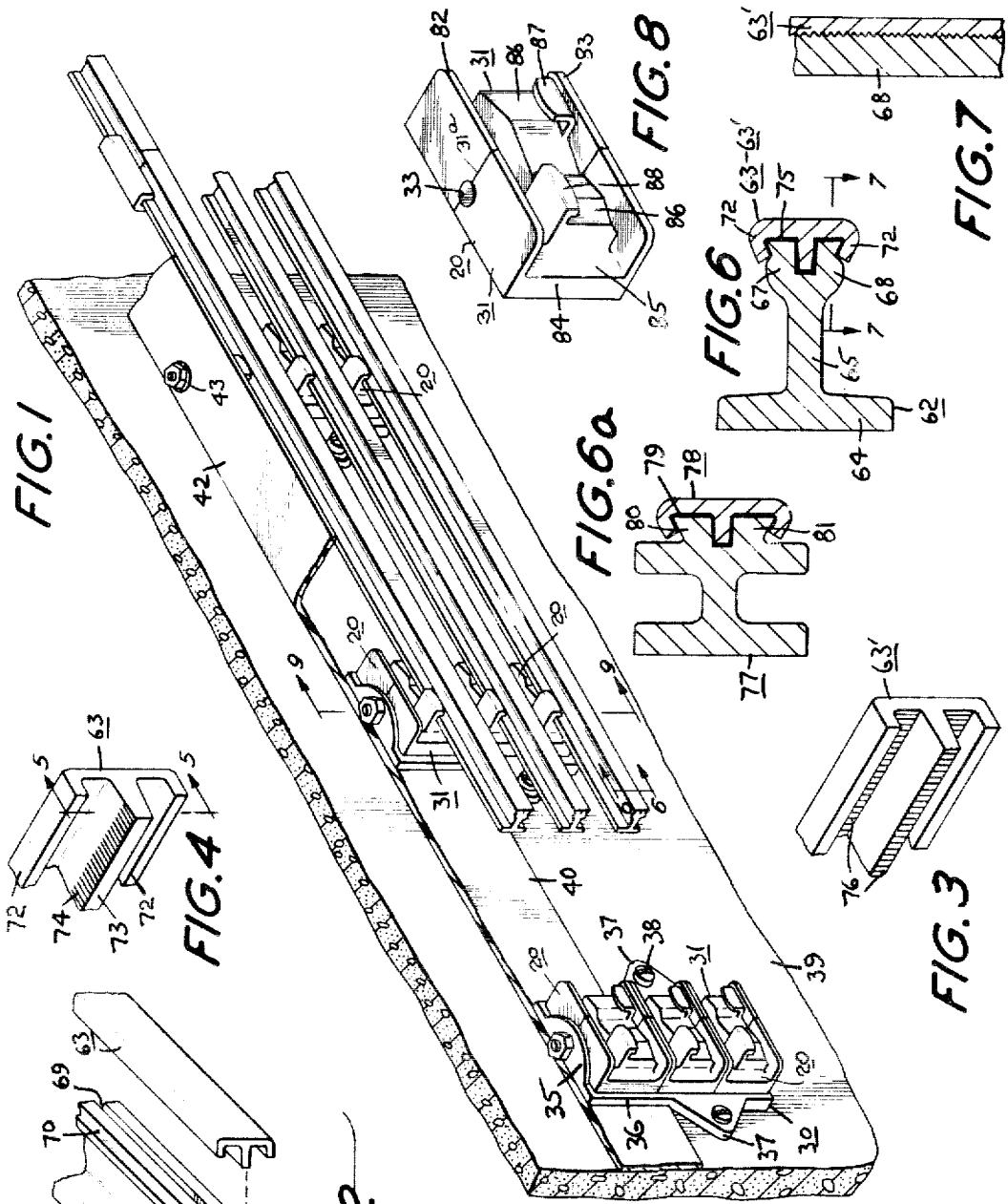
Sept. 12, 1967 G. E. MARTIN ET AL 3,341,669

CURRENT CONDUCTOR RAIL SYSTEM

Filed March 11, 1964 4 Sheets-Sheet 1



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CURRENT CONDUCTOR RAIL SYSTEM

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FIG. 9

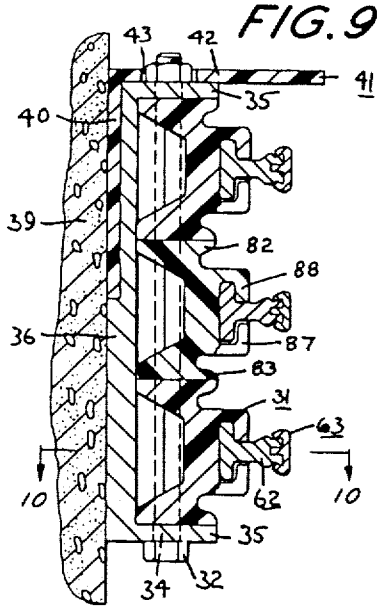


FIG. 10

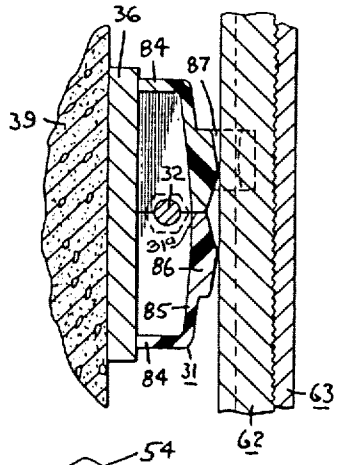


FIG. 13

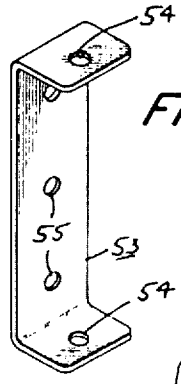


FIG. 11

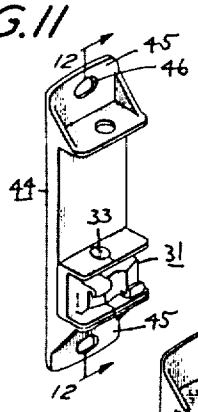


FIG. 12

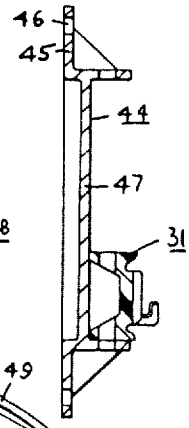


FIG. 14

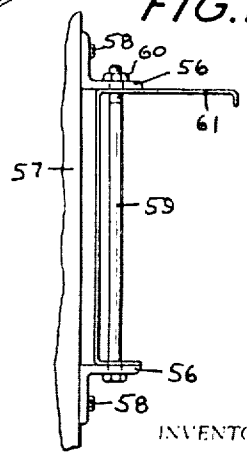
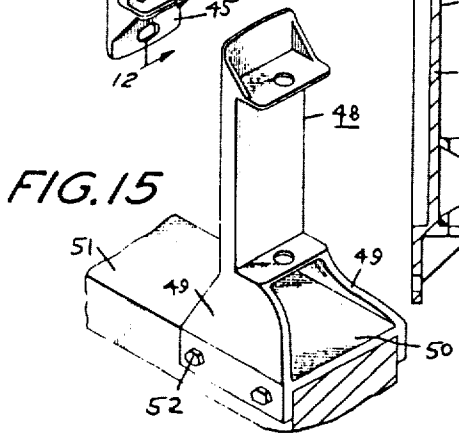


FIG. 15



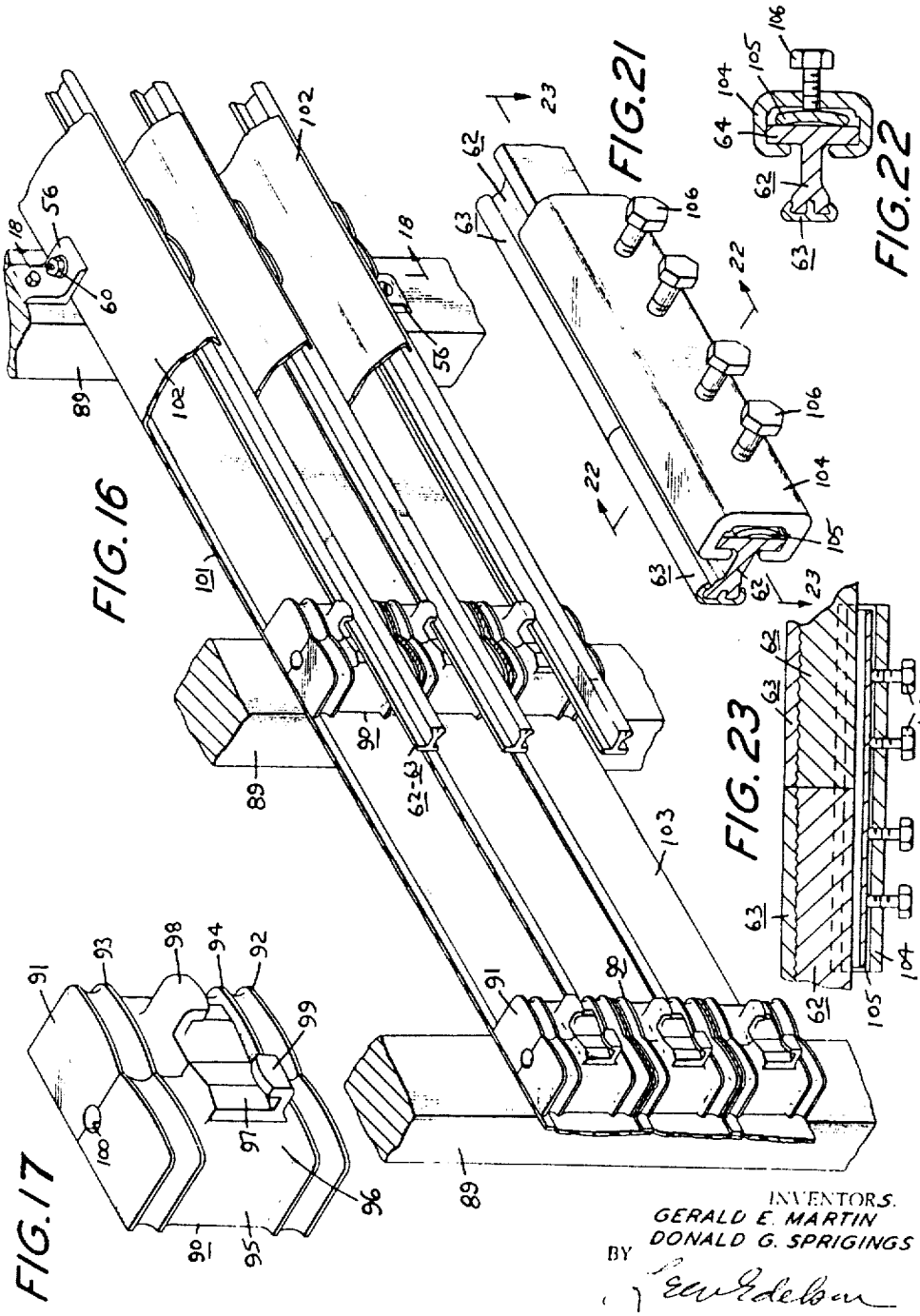
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CURRENT CONDUCTOR RAIL SYSTEM

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FIG. 18

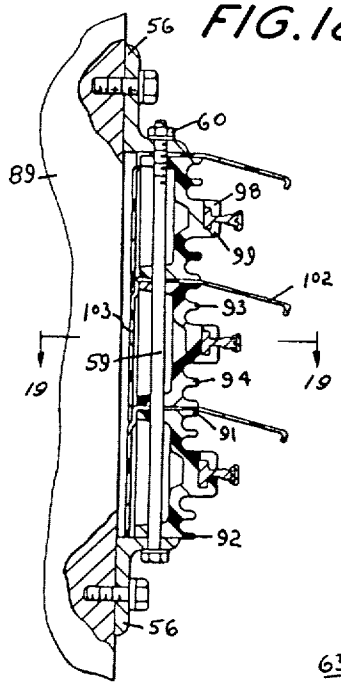
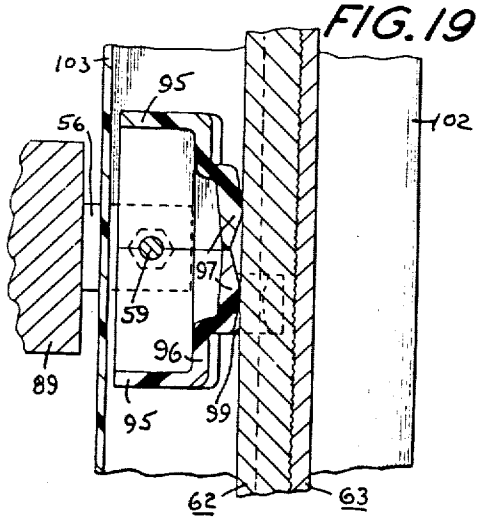


FIG. 19



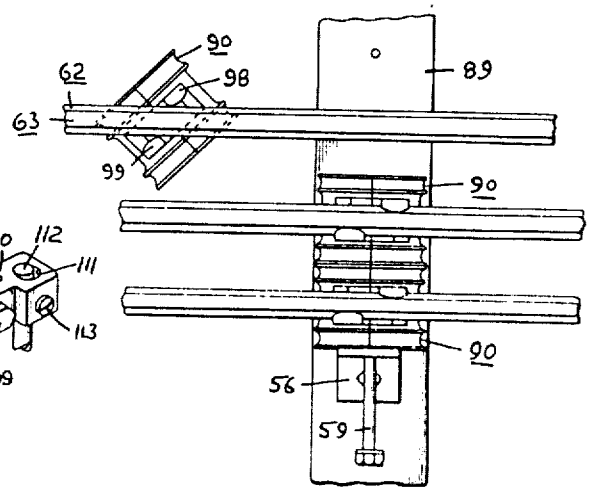


FIG. 24

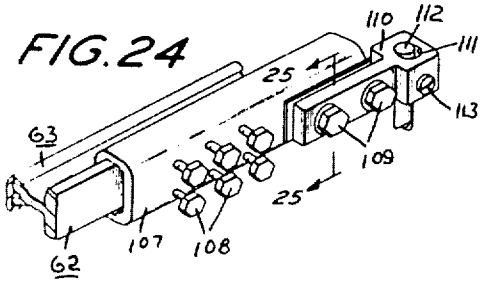


FIG. 25

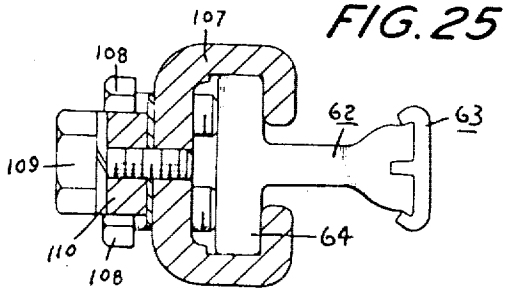


FIG. 20

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United States Patent Office 3,341,669 Patented Sept. 12, 1967

3,341,669

CURRENT CONDUCTOR RAIL SYSTEM

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Filed Mar. 11, 1964, Ser. No. 350,994
5 Claims. (Cl. 191—29)

This invention relates generally to current conductor rail systems, and more particularly relates to current conductor rail systems utilizing a plurality of conductor rails, rail mounting insulators, protective covers and structures for mounting the entire system to physical supports utilizing modular components which may be assembled to form any number of rail supporting sections.

In addition to the overall concept of the novel system, the invention also contemplates and includes as a part thereof a novel composite construction of conductor rail consisting of an assembly of independently formed members, one of which serving as the current-carrying main body portion of the rail is in the form of a structural element typically made of aluminum, and the other of which, typically made of stainless steel alloy having the requisite qualities of surface hardness, high rate of thermal expansion, corrosion resistance and the ability to work-harden on the surface from repeated abrasion and pounding of any current collection device riding thereagainst, serving as a cap member for the rail, is mechanically locked to the main body portion thereof.

While materials other than aluminum and stainless steel may be employed, their combined use in the construction of current conducting rails affords many advantages. In the first place since aluminum and stainless steel are galvanically compatible, their conjoint use tends to retard interface corrosion between the interlocked parts of the composite rail. The galvanic compatibility of these materials may be further enhanced by the use of a conductive plastic material used as a combined seal and conductive bond therebetween, as, for example, a carbon or silver-filled epoxy resin which effectively also seals out moisture between and so prevents oxidation of the inner surfaces of the interlocked members of the rail. By forming the main body portions of the conductor rail of high electrically conductive but relatively low cost aluminum, while forming the rail cap section of the more expensive stainless steel alloy, a composite rail structure is realizable which embodies the best properties of both materials including those of relatively low cost, high conductivity, and excellent resistance to wear and weathering. Other materials could of course also be used depending upon the particular operating conditions of the system in which the rails are to be used so long as the requisite different properties of the main body portion and cap section are retained.

The insulator blocks which are directly engaged with the conductor rails are molded of a thermosetting plastic material designed for structural and electrical insulation strength and which are characterized by high arc track and wet tracking resistance properties. Typically, these insulators may be made of fiberglass reinforced polyesters, epoxy resins or reinforced diallyl phthalate. The insulators are designed to be stacked one upon the other to support any number of parallel conductor rail sections, and various types of insulator mounts provide for a variety of stacking arrangements.

The insulators are provided with molded support tabs which support the conductor rail sections but provide free sliding of the rails through the insulators, the tabs being of sufficient mechanical strength to support the conductor rails under normal and electrical short circuit conditions. These tabs are so positioned with respect to the body of

the insulator supports that rotation of the individual insulator block to an angle of 45 degrees from its normal in-line position allows the insulator to be removed from engagement with the conductor rail. In most instances, this permits insulator replacement without removing the conductor rails or disturbing the splicing connections thereof.

The system also includes several arrangements of insulating plastic safety covers which run continuously throughout the length of the conductor rails and function to prevent foreign objects from falling across the conductor rails to thereby prevent short circuits. In one form, these safety covers also serve as interphase insulation barriers when used in conjunction with multiphase conductor rail systems.

The conductor rail systems to be hereinafter described find typical application, for example, in high speed transit systems, in material handling systems, and in other movable utility systems requiring electrical current transfer While the drawings illustrate three-rail systems, it will be understood that the structures shown and described may be utilized in systems employing any number of parallel conductor rails which may or may not be of the composite type to be described. Accordingly, it is a primary object of this invention to provide a novel current conductor rail system which includes a novel form of conductor rail and supporting insulator therefor, together with protective covers and mounting supports.

Another object of this invention is to provide a current conductor rail system including a novel construction of composite current conductor rail having a main current carrying structural member to which is prmanently affixed a physically hard, tough and corrosion resistant cap member.

Still another object of this invention is to provide a current conductor rail system including a novel composite current conductor rail formed as aforesaid wherein the main current carrying structural member and the cap member are formed of different metals which are galvanically compatible and which are sealed to one another at their interface by a conductive plastic material effective to seal out moisture and prevent surface oxidation.

A further object of this invention is to provide a current conductor rail system including a novel form of conductor rail supporting insulator block so formed and combined with other such blocks as to enable these insulators to be quickly and easily installed to and removed from the associated conductor rail.

The foregoing and other objects of this invention will become clear from a reading of the following specification in conjunction with an examination of the appended drawings, wherein:

FIGURE 1 illustrates in perspective form a portion of a three conductor rail system including a top protective cover, and in which the entire system is mounted to a wall;

FIGURE 2 is an exploded perspective view of a portion of one form of the novel conductor rail according to the invention;

FIGURE 3 is an enlarged perspective view of the cap member portion of a novel two part conductor rail illustrating one type of under surface serration thereof;

FIGURE 4 is a perspective showing of the cam portion of the novel conductor rail and differs from the showing of FIGURE 3 only with respect to the location of the serrations thereon;

FIGURE 5 is a sectional view through the cap member of FIGURE 4 as would be seen when viewed along the line 5—5 thereof;

FIGURE 6 is an enlarged cross sectional showing of the composite conductor rail structure shown in exploded

form in FIGURE 2, and as would be seen when viewed along the line **6—6** of FIGURE 1;

FIGURE 6*a* is a showing similar to that of FIGURE 6 but illustrating a somewhat different form of the main current carrying portion of the composite conductor rail structure;

FIGURE 7 is a sectional view through the composite conductor rail of FIGURE 6 as would be seen when viewed along the line **7—7** thereof and illustrating the serration structure of a cap member of the type shown in FIGURE 3;

FIGURE 8 is a perspective view of one of the modular conductor rail supporting insulator blocks shown as an assembly in FIGURE 1;

FIGURE 9 is a vertical section through the composite conductor rail system of FIGURE 1 as would be seen when viewed along the line **9—9** of FIGURE 1;

FIGURE 10 is a horizontal sectional view through the lower conductor rail, insulating block and other support structure of FIGURE 1 as would be seen when viewed along the line **10—10** of FIGURE 9;

FIGURE 11 illustrates in perspective view one form of insulator block bracket suitable for holding three stacked insulator blocks in vertical alignment, with one of such insulators being shown in position;

FIGURE 12 is a vertical sectional view through the bracket and insulator block of FIGURE 11 as would be seen when viewed along the line **12—12** thereof;

FIGURE 13 illustrates another, and simpler, form of wall mounting insulator block suporting brackets;

FIGURE 14 illustrates in side elevation another form of insulator block supporting structure suitable for wall or post mounting;

FIGURE 15 illustrates in perspective form an insulator block supporting bracket similar to that shown in FIGURE 11, but which is formed for securement to horizontal tie structures;

FIGURE 16 is a fragmentary perspective showing of a conductor rail system similar to that of FIGURE 1, but differing therefrom in that the system is post mounted, utilizes inter-rail insulating protective covers and a somewhat different form of insulator block;

FIGURE 17 is an enlarged perspective view of one of the insulator blocks illustrated on a smaller scale in the showing of FIGURE 16;

FIGURE 18 is a vertical sectional view through the conductor rail system illustrated in perspective in the showing of FIGURE 16 and as would be seen when viewed along the line **18—18** thereof;

FIGURE 19 is a horizontal sectional view through the conductor rail system of FIGURE 16 as would be seen when viewed along the line **19—19** of FIGURE 18;

FIGURE 20 is a front elevation of a conductor rail system of the type shown in FIGURE 16 but without the protective covers, illustrating an insulator block in position for detachment from or attachment to the upper one of the conductor rails of the system;

FIGURE 21 illustrates in perspective form a device for splicing together successive sections of the conductor rail structure;

FIGURE 22 is a cross sectional view taken through the splicing structure of FIGURE 21 as would be seen when viewed along the line **22—22** thereof;

FIGURE 23 is a longitudinal sectional view through the splicing structure of FIGURE 21 as would be seen when viewed along the line **23—23** thereof;

FIGURE 24 is a perspective showing of a power take-off device and its securement to a conductor rail according to the invention; and

FIGURE 25 is an enlarged cross sectional view through the power take-off device illustrated in perspective in the showing of FIGURE 24 and as would be seen when viewed along the line **25—25** thereof.

In the several figures of the drawings, like elements are denoted throughout by like reference characters.

Referring now to the drawings, it will be observed that the conductor rail system, as illustrated in FIGURE 1, includes generally a plurality of conductor rail supporting insulating block assemblies **20**, each of which includes a bracket **30** and a plurality of vertically stacked insulator blocks **31** secured to one another and to the bracket **30** by means of a vertically extending nut-secured bolt **32** projected through vertically aligned bores **33** in the insulator blocks and apertures **34—34** in the top and bottom flanges **35** of the supporting bracket, which flanges extend forward from the bracket rear wall **36**. The lower portion of the bracket rear wall **36** is formed with laterally extending apertured side ears **37** through which securement bolts or screws **38** are projected to fixedly secure the bracket to the wall **39**. As best seen in the vertical sectional view of FIGURE 9, the upper half of the bracket rear wall **36** is recessed forward to provide an opening into which may be projected the downwardly extending vertical rear flange **40** of the L-shaped insulating protective shield or cover **41**, the horizontally forwardly extending top flange **42** projecting laterally outward beyond the conductor rails and also being apertured as at **43** to provide through the passage for the upper end of the bolt **32** and the nut securing the same.

FIGURES 11 through 15 illustrate other forms of bracket which might be used in various applications in place of the bracket **30** which has just been described. The bracket **44** shown in FIGURES 11 and 12 is generally similar to the bracket **30**, differing therefrom in that it does not have any equivalent of the apertured side ears **37** but instead is provided with top and bottom vertical extensions **45**, each apertured as at **46**, which function as mounting ears. As best seen in the showing of FIGURE 12, the bracket rear wall **47** is set forward of the rear face of the bracket vertical extensions **45** so that the insulators **31** carried by the bracket are set forward from the supporting member to which the brackets are secured. Such a forward offset of the insulator blocks **31** is also observed in the mounting arrangement of FIGURE 9, this feature being necessary to permit installation and removal of the insulator blocks from the conductor system by rearward and forward shifting of the insulator block relative to the conductor rails, as will appear more clearly hereinafter. Therefore, when the conductor system is backed by a wall, such as **39** shown in FIGURE 1, the ability to shift the insulator blocks rearward relative to the conductor rails is quite important.

The bracket **48** illustrated in FIGURE 15 is similar to the bracket **44** illustrated in FIGURES 11 and 12, differing from the latter in that it is intended for bottom securement to the cross ties of a track structure rather than for flat securement against a wall or post. The lower end of the bracket **48** is therefore formed with the flaring depending side flanges **49** bridged transversely as at **50** by a web which seats flatwise down upon the upper surface of the tie **51**, the side flanges **49** being apertured below the level of the bridging web **50** so that securing bolts or screws **52** may be projected therethrough into the tie **51**.

FIGURE 13 illustrates a bracket **53** of C-shaped configuration apertured through the top and bottom flanges as at **54** to receive an insulator block securing bolt, and apertured on the rear wall as at **55** to provide means for securing the bracket to a supporting structure.

FIGURE 14 illustrates yet another form of bracket which includes top and bottom L-shaped angles **56** secured to the wall **57** as by means of the screws **58** and being provided with vertically registering holes through the horizontal flanges of the angles **56** through which may be projected the insulator blocks securing bolt **59**, securable as by means of the nut **60**. The backwall of the bracket is formed integrally with the horizontally projecting upper portion **61** which latter functions as a protective cover, the composite backwall and protective cover structure being provided with a bottom flange and suitable aper-

tures through which the bolt **59** is projectable in the illustrated manner for securement purposes.

In all instances, the supporting brackets for the rail-supporting insulators are spaced lengthwise of the rails to provide each modular rail section with at least two longitudinally spaced supports therefor, which spacing may be from 8 to 10 feet for modular lengths of rails running from 15 to 30 feet to provide same with adequate beam and column strength.

Two forms of composite conductor bar structure are illustrated in FIGURES 6 and 6*a*, the showing of FIGURE 6 illustrating a basically T-shaped member whereas the showing of FIGURE 6*a* illustrates a basically H-shaped structure. Considering first the conductor rail structure of FIGURE 6, reference should also be made to FIGURES 2 through 5 and 7. The two part conductor rail of FIGURES 2 and 6 includes the main current carrying structural section designated generally as **62** and the utility current collector contacting cap portion section designated generally as **63**. The main section **62** is generally of T-shape in configuration, having a base portion **64** and a web portion **65**, the end of the web **65** terminating in a generally C-shaped enlargement **66** having a pair of arms **67** and **68** respectively separated by a longitudinally extending wedge-shaped slot or groove **69** lying in a plane coincident with that of the web portion **65**. As best seen in FIGURES 2 and 6, the opposite outer surfaces of the arms **67** and **68** of the C-shaped enlargement **66** are respectively rabbetted along the full lengths thereof to provide the enlargement with shouldered end portions having oppositely tapered surfaces **70** and **71** which converge toward a point lying in the longitudinal median plane of the T-shaped main section of the conductor rail. The tapered surfaces **70** and **71** operate in conjunction with the opposite flanges **72** of the generally E-shaped cap section **63** to form a mechanical interlock between the T-shaped main section **62** and the cap section **63**.

The cap section **63** is medially provided along its full length with a wedge-shaped web portion **73** serrated along its side surfaces as at **74**, which wedge-shaped web is complemental in shape to and is forcible downward into the wedge-shaped groove **69** of the C-shaped enlargement **66** formed on the end of the main section stem. The surfaces of the wedge-shaped groove **69** may also be serrated to interlock with the serrations **74** of the cap member **63**, or they may be free of serrations but so relatively spaced apart that the serrations **74** of the cap **63** cut into these surfaces as the cap is forced mechanically onto the main section **62**. These serrations serve effectively not only to provide maximum physical and electrical interengagement between the interlocked elements of the composite rail, but also insure against all possible longitudinal shifting movement of one element relatively to the other.

While the cap section **63** shown in detailed form in FIGURES 4 and 5 is illustrated as being serrated on the side surfaces of its medial web **73**, the serrations may alternatively be formed on the bottom of the web portion **73** and on the inner cap surfaces parallel thereto in the manner illustrated at **76** in the showing of FIGURE 3 illustrating a modified form of cap section **63'**. Of course, if desired, the serrations **74** and **76** may both be utilized.

As best seen in FIGURE 6, in the assembly of the rail section **62** and its cap **63**, the top and bottom flanges **72** of the cap **63** are forced inward toward one another and around the laterally spaced arms **67** and **68** of the C-shaped enlargement until the flanges engage the surfaces **70** and **71**. Preferably, before the main section and cap section of the composite conductor rail are mechanically interfitted and secured together, the mating surfaces are coated with a conductive plastic material **75**, such as a carbon or silver-filled epoxy resin, which functions as a combined sealant and bond between the metal rails sections.

FIGURE 6*a* illustrates another form of composite conductor rail structure organized in exactly the same manner as that illustrated in FIGURE 6 in that it includes a main section **77** and a cap section **78** mechanically intersecured and bonded together by a conductive plastic material **79**. The cap section **78** is observed to be of the same E-shaped configuration as the cap sections **63** and **63'** previously described, whereas the main section **77** differs from the main section **62** in that it is of H-shape rather than of T-shape. The equivalent of the opposite side arms **67** and **68** of the C-shaped enlargement **66** of the structure shown in FIGURES 2 and 6 is present in that structure of FIGURE 6*a* as the laterally spaced arms **80** and **81** formed as extensions of the web portion of the H-shaped main section **77** which arms define therebetween a wedge-shaped groove and are longitudinally rabbetted or shouldered top rovide the raked or angulated outer surfaces about and against which the opposite side flanges of the cap section **78** are turned inward.

Although the conductor rail main sections have been illustrated in the showings of FIGURES 6 and 6*a* as being of T-shape or H-shape, other structural forms may as well be utilized so long as they provide the mechanical strength required for the particular application and sufficient cross-sectional area to prevent any substantial electrical voltage drop along the length of the conductor rail system.

As best seen in FIGURES 8, 9 and 10, each of the insulator blocks **31** is formed with forwardly projecting flat planar top and bottom flanges **82** and **83** respectively, opposite side walls **84** and a generally arcuate front wall **85** formed with a pair of laterally spaced forwardly projecting bosses **86**. Extending forwardly from the bottom edge of the right hand boss of each insulator block, as best seen in FIGURES 8 and 10, is an element **87** terminating in an upturned flange to provide a shelf-like support for the conductor rail section, each of these supports being of sufficient strength to support its share of the rail load under normal and electrical short circuit conditions. Extending forward from the upper edge of the left-hand boss **86** of each insulator block is a second element **88** terminating in a downturned flange which element **88** overlies the rail supported by the element **87** and assists in holding the rail in its normal mounted position. The insulator blocks **31** are so formed that they may be turned top-for-bottom with either of the elements **87** and **88** functioning as the actual load bearing device. The elements **87** and **88** are so spaced relatively to one another and to the rail supported therebetween as to permit free longitudinal shifting of the rail relatively to the insulator blocks for such positional adjustment of the rail as may be necessary.

As best shown in FIGURES 8, 9 and 10, the insulator block **31** is of symmetrical configuration with reference to both its horizontal and its vertical median planes, in consequence of which it may be readily molded of two identical half-sections which are then suitably bonded together, as indicated by the line **31***a* to form a unitary assembly as shown. Of course, the insulator block **31** may also be molded as a one-piece construction, in which case there would be no central joint such as is shown in the drawings. Whether formed as a one-piece molding or of two sections joined together as shown, the front wall **85** of the insulator block **31** is spaced forward of its rear surface so that the insulator block is basically in the shape of a hollow unit, thus saving on the cost of materials without in any way degrading the electrical insulation properties and capability of the insulator block. The flat planar top and bottom flanges **82** and **83** permit the vertical stacking of a plurality of such insulator blocks in the manner most clearly shown in the illustrations of FIGURES 1 and 9, and the lateral offset of the rail support elements **87** and **88** affords the ability to rotate the individual insulator block through an angle of 45 degrees from its normal in-line position, as shown in

FIGURE 1, to allow the insulator to be installed to or removed from the conductor rail without necessitating the removal of the rail or disturbance of rail splice connections. These insulator blocks are molded of electrical grade thermosetting plastic which might be typically fiberglass reinforced polyester, an epoxy resin or reinforced diallyl phthalate, all of which are designed for structural strength, high arc track and wet tracking resistance and adequate electrical creepage characteristics.

Turning now to the showings of FIGURES 16, 18 and 19, it will be observed that these figures correspond respectively to the showings of FIGURES 1, 9 and 10, but with respect to a different arrangement of protective covers, support brackets and insulation blocks. The support brackets are seen in the showings of FIGURES 16 and 18 to be of the type illustrated in the showing of FIGURE 14 as including a pair of L-shaped upper and lower angles **56** between which vertically extends the insulator block securing bolt **59** secured at its upper end by the nut **60**. The insulator block carrying brackets are secured to laterally spaced vertically extending posts **89** rather than to the previously illustrated walls.

The insulator blocks **90**, as best illustrated in FIGURES 16 through 19, are observed to be very similar to the previously described insulator blocks **31** as shown in detail and described in connection with FIGURES 8, 9 and 10. The insulator blocks **90** differ, however, from the previously described insulator blocks **31** in that instead of merely being provided with top and bottom flanges **91** and **92** similar to those designated **82** and **83** in FIGURE 8, the insulator blocks **90** are additionally provided with a pair of vertically spaced intermediate flanges **93** and **94** respectively disposed above and below the rail supporting section of the insulator block. These intermediate flanges **93** and **94** increase the surface path length across which any electrical discharge must take place, and hence increase the surface insulation resistance of the insulator block. As with the previously described insulator blocks **31**, the insulator blocks **90** also include a pair of opposite side walls **95**, a front wall **96** carrying forwardly projecting bosses **97** disposed in side-by-side relationship from the top of one of which bosses forwardly extends a flanged support element **98** while a similar support element **99** extends forwardly from the bottom of the other boss. Extending vertically through the flange carrying top and bottom walls **91** and **92** are the vertically aligned insulator block bores **100** through which the mounting bolt **59** is projected to secure the insulator blocks in proper position.

The conductor rail system of FIGURE 16 is provided with interphase insulating protective shields or covers of inverted L-shape designated generally as **101** with each including a generally horizontally disposed top wall **102** and a vertically disposed rear wall **103**. As in the case of the insulating blocks for supporting the rails, these shields or cover are formed of any suitable electrically-non-conductive material, such as fiberglass reinforced polyester, epoxy resin or the like. The top wall **102** of the two lowermost protective shields or covers is disposed between the top and bottom flanges of the insulator blocks **90** in the manner best seen in the showing of FIGURE 18. The insulating cover top walls **102** are of course suitably apertured for alignment with the insulator block holes **100** so that the vertically extending bolt **59** may be passed therethrough. Also, as best seen in FIGURE 18, the cover vertical rear walls **103** are of somewhat greater length than the height of the insulator blocks **90** so that the bottom edge of the cover rear wall extends downward below the bottom flange **92** of the insulator block. This bottom extension overlaps the forwardly offset upper edge of the cover rear wall to provide an unbroken rear wall of cover insulation in the region between the posts **89** and thereby prevent access to the electrically energized conductor rails from the rear.

Referring now to FIGURE 20 it is observed that in the event that it is desired to replace an insulator block **90** in a post carried system of the type shown, it is only necessary to release the vertically extending bolt **59** which holds the insulators in proper vertical position, drop the bolt until it clears the bottom of the insulator to be changed, which in the illustrated case is the upper such unit, slide the insulator block **90** laterally to clear the post **89** and rotate it through approximately 45 degrees to disengage the support tabs **98** and **99** from the conductor rail structure, and then rearwardly remove the insulator. The new insulator is attached in exactly the reverse of the manner just described, namely, the insulator is engaged with the conductor rail by holding it in the position shown in FIGURE 20, then rotating the insulator block **90** through 45 degrees and sliding the same laterally into vertical alignment with the other insulator blocks. The bolt **59** is then pushed upward through the insulator block apertures **100** and is secured to the upper end of the bracket. The insulator blocks **31** shown in FIGURES 8, 9 and 10 are of course exchanged in exactly the manner just described for the insulating blocks **90**.

FIGURES 21 through 23 illustrate the manner of splicing adjacent lengths of conductor rail together to form a continuous conductor rail of any desired length. The splicing mechanism consists of a C-shaped sleeve member **104** which slips endwise about the top portion of the T-shaped conductor rail main section **62** or its equivalent in the H-shaped conductor rail **77**, these latter being illustrated in FIGURES 6 and 6*a*, an arcuate bias plate **105** disposed between the top of the conductor rail main section and that portion of the C-shaped sleeve member which bridges between the opposed arms thereof, and a plurality of draw up bolts **106** threadedly engaged through the C-shaped sleeve member bridging wall into abutment with the convex surface of the bias plate **105**. With the conductor rail sections in end abutment, as seen in FIGURES 21 and 23, the bolts **106** are driven against the bias plate **105** to thereby pull the arms of the sleeve member tightly against the underside of the top portion of the conductor main section **62** to thereby effect a tight clamp.

FIGURES 24 and 25 illustrate a device for transmitting electrical power to or withdrawing power from a conductor rail. This device includes a C-shaped sleeve member **107** having its arms engaged with the head of the T-shaped main section of conductor rail in the same manner as just described for the conductor rail splicing device, and being clamped tightly thereto by means of the bolts **108** threaded through the bridging wall of the C-shaped clamp **107** into bearing engagement with the upper surface of the top portion **64** of the conductor rail main section **62**. Rigidly secured to the C-shaped clamp **107** by bolts **109** projected therethrough and into threaded engagement with the clamp is a T-shaped element **110** having an aperture **111** extending completely therethrough from top to bottom and into which may be projected an electrical conductor **112** securable as by means of the clamping set screw **113**.

Having now described our invention in connection with particularly illustrated embodiments thereof, variations and modifications of our invention may now suggest themselves from time to time to those persons normally skilled in the art without departing from the essential spirit or scope of the invention, and accordingly it is intended to claim the same broadly as well as specifically as indicated by the appended claims.

What is claimed to be new and useful is:

1. A current conductor rail section for use in systems for supplying electrical energy to electrically energizable movable utilities carrying current collector devices engageable with such rail, comprising in combination:

(a) a main current-carrying member of high electrical conductivity formed in the shape of a structural member,

(b) an electrically conductive cap member of smaller cross-sectional area than said main member mechanically interfitted with and locked to said main member in good electrical contact therewith to provide a facing for the latter and which is to be engaged by the current collector devices of the aforesaid movable utilities, said cap member being formed from a material characterized by the ability to work harden on the surface, and

(c) a thermosetting conductive plastic material disposed between all of the non-contacting surfaces of the mechanically interfitted parts of said main member and cap members to fill any void spaces therebetween and function as a seal and conductive bond.

2. A current conductor rail section for use in systems for supplying electrical anergy to electrically energizable movable utilities carrying current collector devices engageable with such rails, comprising in combination:

(a) a main current-carrying member made of material having high electrical conductivity and including

(1) a substantially vertically extending base part adapted for engagement by rail supporting devices, and

(2) a web extending laterally from said base part and having a bifurcated terminal end formed by a pair of longitudinally parallel extending upper and lower arms which define a wedge shaped opening therebetween,

(b) an electrically conductive and generally E-shaped cross-section cap member of smaller cross-sectional area and formed of material harder than said main member, the center arm of said E-shaped cap member tapering to lesser thickness toward its free end and being force fitted into the wedge-shaped opening between and thereby engaging the arms of the bifurcated terminal end of said web, and the top and bottom arms of said E-shaped cap member being pressed inward toward one another around and into surface engagement respectively with the upper and lower arms of the said bifurcated terminal end of said web,

(c) a thermosetting conductive plastic material disposed between all of the non-contacting facing surfaces of the cap member and bifurcated terminal end arms of the main member filling all void spaces therebetween and functioning as a seal and conductive bond.

3. A current conductor rail of the character described comprising, in combination, an elongated main body member of electrically conductive material having a longitudinally extending substantially flat base portion, a longitudinally extending kerfed head portion and an intermediate web portion integrally uniting said base and head portions, and an electrically conductive cap member embracing said head portion of the main body member, said cap member having a longitudinally extending central rib portion wedge into the kerf of said head portion and a pair of longitudinally extending laterally spaced side portions respectively engaging the opposite sides of said kerfed head portion whereby said main body member and cap member are mechanically interlocked together to form a unitary composite conductor rail, the interface surfaces of said interlocked main body member and cap member being bonded together by a thermosetting electrically conductive plastic composition to provide a moisture-excluding seal between said members.

4. A current conductor rail section for use in systems for supplying eelctrical energy to electrically energizable movable utilities carrying current collector devices engageable with such rail, comprising in combination:

(a) an elongated main current-carrying member made of material having high electrical conductivity and including,

(1) a longitudinally extending base part adapted for engagement by rail supporting devices,

(2) a web extending longitudinally coextensively with and laterally from said base part and having a longitudinally extending terminal edge adapted to have secured thereto an electrically conductive cap member, and

(3) lateral projections extending longitudinally of said web on both sides thereof at a position spaced away from said web terminal edge but closer thereto than to said base part,

(b) an electrically conductive cap member of smaller cross-sectional area than said main member mechanically interfitted with and locked to the web terminal edge of said main member in good electrical contact therewith to provide a facing for the latter and which is to be engaged by the current collector devices of the aforesaid movable utilities, said cap member being formed from a material characterized by the ability to work harden on the surface and including locking elements which secure the cap member to the terminal edge of the main member web so that said web lateral projections are disposed proximate to said cap member and between said cap member and main member base part, whereby said lateral projections provide for the composite rails an increased thermal sink capability and increased radiating surface for thermal dissipation.

5. A current conductor rail section as defined in claim 4 wherein said main member web is disposed orthogonally to said main member base part, and wherein said lateral projections extend orthogonally from said web for substantially the same distance as the said main member base part, whereby said base part and web and lateral projections form a substantially H-shaped major part of said main member.

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