

SPECIFICATION

Improvements in electrical supply tracks

- 5 This invention relates to electrical supply tracks and, more particularly, to improvements in electrical supply tracks which are adapted to be mounted to ceiling surfaces or the like for supplying electric power to such
10 electric equipment as lighting fixtures and the like.

- Conventionally, such a track constructed as shown in Fig. 1 has been generally used as the electrical supply track of the kind referred to. In the drawing, a case 1 made of, for example, extruded aluminium of an elongated channel shape has a pair of longitudinally opposing side walls 2, which hold respectively an insulative supporting member 5 generally of a synthetic resin which is held at its base by projections 3 so that its elongated conducting member 4 provided at its projected edge is disposed longitudinally in parallel and opposite to the member 4 of the other supporting member 5. As represented by this example, the conventional supply tracks generally employ as the outer case an extrusion moulding of aluminium which allows high dimensional precision to be easily achieved and renders any anti-corrosion treatment unnecessary. In order to support the conductive members for the electrical supply in the outer case, the conductive members are held by the respective supporting members made of an insulative material which are, in turn, secured in the outer case. In such conventional tracks, manufacturing costs have been high since the outer case comprises the extrusion moulding of aluminium which is expensive and the structure and assembling for fixing the conductive members inside the case is expensive and complicated. Moreover, the required dimensional precision for proper contacts of the respective conductive members in the track with plug contactors on the side of electric equipment is hard to achieve whereby the electric contact between the track and the equipment is apt to be made not reliable.

- In the above structure, further, surface treatment is necessary to protect the surface of the metallic case 1 from corrosion unless the case is made of a metal which does not corrode. It is also necessary to mount the supporting members 5 with the conductive members 4 to the side walls 2 of the case 1. In this case, the mounting by means of caulking of the projecting members 3 or of an adhesive is troublesome and difficult, since the case 1 and the supporting members 5 are separately fabricated and assembled together so that mutual dimensional precision of the conductive members 4 in their opposing positions cannot be easily achieved.

- While the supply track of the kind referred to is generally used at the time of installation

- by cutting, by means of a saw or the like, a length of track to the desired length, the structure of the conventional track disclosed above often causes mutual positional fluctuations between the outer case and the respective conductive members at the time of cutting, since these separately prepared elements are assembled together by means of caulking or adhesion. Owing to this and specifically when the supply track is to be extended through a connector by butting mutually the cut end surfaces of the tracks, the surfaces to be joined may not match each other and the electric equipment to be coupled to the track may not be moved smoothly along the track.

- Since the appearance of the case simply made of metal is not attractive and its colouring is restricted, the conventional tracks of the above structure cannot be widely used in harmony with room decorations.

The present invention has been suggested to remove such defects as described above.

- The principal aim of the present invention is to provide an electrical supply track which has dimensional precision and yet is inexpensive and has high mechanical strength.

- According to the present invention, there is provided an electrical supply track comprising a case core of a steel plate bent into a channel shape having a longitudinal aperture; a coating layer of a synthetic resin formed intimately on the inner and outer surfaces of said case core, said layer comprising an inner layer formed on the inner surface and an outer layer on the outer surface of the case core; a pair of supporting members moulded integrally with the inner layer so as to project inwardly to oppose each other and extend in the longitudinal direction of the track in parallel relation to each other; and a pair of electrically conductive members embedded in respective opposing ends of said supporting members, exposed at opposing surfaces of the supporting members and extending parallel to each other in the longitudinal direction of the track.

- Preferably, the inner layer is made of a rigid synthetic resin and the outer layer is made of a flexible synthetic resin. The conductive members are desirably embedded in the supporting members simultaneously with the forming of the synthetic resin layer.

- The present invention avoids the defects of the conventional devices by reducing manufacturing cost with the use of inexpensive steel plate as the case core while increasing its mechanical strength, and compensating for any poor dimensional precision of the bent steel plate and necessity of surface treatment with the formation of the covering synthetic resin layer.

- The invention will now be further described, by way of example, with reference to the drawings, in which:—

- 130 Figure 1 is a fragmentary perspective view

of a typical conventional electrical supply track;

Figure 2A is a fragmentary perspective view of one embodiment of an electrical supply track according to the present invention showing its structure in section;

Figure 2B is a perspective view of an electrical equipment which can be employed in combination with the electrical supply track of the present invention;

Figure 3 is a view illustrating the manner in which the electrical supply track of the present invention is used; and

Figures 4 and 5 show other embodiments of electrical supply tracks according to the present invention.

In Fig. 2A, an electrical supply track according to the present invention is shown, wherein an opening is provided in the lower portion of a channel-shaped case core 11, which comprises an upper section 12, side sections 13 bent vertically from both longitudinal side edges of the upper section 12 and projections 14 respectively extending inwardly from the respective ends of the side sections 13 and parallel to the upper section 12. The projections 14 are employed as supporting edges for hanging type electrical equipment.

The case core 11 is formed of a steel plate bent into the formation as described above and a synthetic resin layer 15 is moulded all over the inner and outer surfaces so as to form an inner surface layer 15a and an outer surface layer 15b. More particularly, said layer 15 is moulded on the inner and outer surfaces of the case core 11 with an interposed adhesive layer of vinyl chloride which is coated on the respective surfaces, whereby the resin layer 15 adheres intimately to the case core 11, thus allowing no air layer to exist between the resin layer and the surface of the case core so as to protect the steel case from oxidation and rust while improving thermal conductivity and heat radiation. A pair of supporting members 16 extending longitudinally parallel to each other and projecting inwardly to oppose each other are integrally formed simultaneously with the moulding of the inner layer 15a. At the inner facing edge of each of the respective supporting members 16, a conductive member 17 having an exposed surface and extending longitudinally parallel to the other member is embedded at the same time as the supporting members 16 are formed. The supporting members 16 in which the conductive members are embedded are formed to be sufficiently thick to achieve a desired mechanical strength and are provided with a cavity 18.

The inner layer 15a, specifically in the vicinity of the conductive member 17, is preferably coated thicker than the outer layer 15b for increasing the insulating performance. Further, the inner layer 15a is constituted of a

polymerized vinyl chloride or the like for firmly holding the conductive members 17. The outer layer 15b is of an elastic soft synthetic resin for absorbing any external impact. Furthermore, the synthetic resin used for coating the projections 14 extending from the lower part of the case core 11 is one which does not contain any solvent such as rigid PVC.

At both side edges of the upper section 12, upwardly and longitudinally extending projections 19 are provided so that the track can be secured stably to the ceiling surface or the like.

It is preferable that many thin grooves 20 be provided longitudinally on the entire surface of the outer layer 15b of the track except the upper section 12, making the surface uneven. Generally, the outer layer is preferably thin, but the thickness should be properly determined for not causing any non-uniform moulding of the layer. If the layer is formed unevenly as described above, the grooves which act as a pool of the synthetic resin facilitate the flow of layers forming material, so that the layer can be prevented from being formed improperly. Also, the uneven surface of the outer layer acts as a matted surface, whereby any reflection of light such as a spot light can be prevented and a decorative effect can be brought about.

In Fig. 2B, there is shown an example of hanging type electric equipment 21 which is adapted to be mounted to the supply track of the present invention. The equipment 21 comprises a plug cover body 22, a cord guiding pipe 23 secured at an end to the lower part of the body 22, and a spot light 24 shown as an example and secured to the other end of the pipe 23.

Substantially at the centre of the upper surface of the body 22, a projection 25 is provided which extends upwards and a retractable stopper 26 is provided adjacent an end edge of the upper surface for preventing axial rotation of the plug body 22. In plug body 22 and projection 25, there is provided a through hole 27 which communicates with the bore of the cord guiding pipe 23 and this through hole 27 is longitudinally separated into two spaces by an insulative wall 28 positioned in the centre of the hole. The projection 25 secures a pair of plug blades 29 at the upper end, each of which is positioned adjacent a respective one of the two spaces of the hole 27, and these blades 29 extend in opposite directions and substantially at right angles with respect to the longitudinal axis of the body 22 and are connected to lead wires of the cord (not shown) passed through the hole 27 and pipe 23, which wires are connected with a light bulb 30 mounted in the spot light 24. Between the respective plug blades 29 and the upper end surface of the plug body 22, the projection 25 is provided with a pair of receiving projections 31 formed integrally

with the projection 25 so as to extend in the same directions as the respective plug blades 29.

Fig. 3 shows the manner in which the hanging type electric equipment 21 is mounted on the electric supply track of the present invention. In performing the mounting, the track is first fixed to a ceiling surface or like desired surface by means of screws (not shown). In this case, the projections 19 formed on the outer layer 15b covering the upper section 12 of the track make it possible to fix the track stably to the desired surface. The equipment 21 is brought into abutment with the track in such a manner that the plug blades 29 and receiving projections 31 of the projection 25 are passed through the lower opening of the track with their extended directions aligned with the longitudinal direction of the opening, and then the equipment 21 is rotated through 90° about its longitudinal axis, whereby the tips of the plug blades 29, which blades are provided with a resiliency in their extending directions, are brought into contact with the exposed surfaces of the conductive members 17 embedded in the supporting members 16 and the lower surfaces of the receiving projections 31 are slidably placed on the inner surfaces of the projections 14 of the track. In this case, the retractable stopper 26 which is biased in the direction of the longitudinal axis of the plug body 22 is first caused to be retracted by the lower surface of one of the projections 14 as the blades 29 and projections 31 are passed through the track opening but, after the 90° rotation of the equipment, the stopper 26 is caused by its biasing means (not shown) to extend into the opening and between the opposing conductive members 17 and projections 14 so that further axial rotation of the equipment is thereby prevented.

The cavities 18 formed in the supporting members 16 are effective to absorb a pressure exerted on the supporting members by the plug blades 29 and also to prevent the formation of a gap between the conducting members 17 and the plug blades 29 with the resiliency provided by the cavities, so that an electrically stable contact can be obtained while effectively dissipating any heat produced between contacting surfaces.

As the projections 14 on which the receiving members 31 are placed are coated with the synthetic resin material without containing any solvent, the receiving members 31 can be prevented from being deteriorated even if they are made of material which is weak to solvents such as polycarbonate.

In Fig. 4, another embodiment of the present invention is shown. This embodiment is different from the one shown in Fig. 2A in that there are formed fins 45 of synthetic resin extending upward to the ceiling surface 44 from the lower part of the coating layer 43

of synthetic resin coated on the side sections 42 of the case core 41. As compared with fins made of metal, these fins of synthetic resin are more resilient so that they can neatly about the ceiling surface and provide a favourable finish of the installation and an enhanced appearance.

The structure and operation of this embodiment is otherwise substantially the same as the previously described embodiment to which reference should be made for details.

Fig. 5 shows still another embodiment of the present invention, in which a case core 51 is formed to extend into a ceiling 52 and a pair of fins 54 of synthetic resin are provided which extend outwardly from the lower part of both side sections 53 of the case core over the length of the track, so that the track can be fitted to the ceiling by means of these fins 54. The structure and operation of this embodiment is otherwise substantially the same as that of the embodiment shown in Figs. 2A, 2B and 3.

With the above described arrangements, the present invention shows the following effects:

1. The electrical supply track of the present invention is formed by coating the channel-shaped case core 11 of steel plate with a synthetic resin over the inner and outer surfaces and embedding the electrical conductive members 17 in the inner coated layer 15a preferably simultaneously with the moulding of the inner layer 15a, so that the electrical supply track maintains the mechanical strength for holding the hanging-type electric equipment 21 and requires no anti-corrosion surface treatment. Thus the manufacture of the track and its production cost are made easy and inexpensive and the entire dimensional precision is high. It is also effective in providing remarkably low cost electrical supply track by using steel plate which is an inexpensive material and yet still fulfils the respective requirements of the product and that only such simple sets as the bending of the plate and extrusion moulding of the synthetic resin are required.

2. Since the coating layer 15 formed of synthetic resin intimately adheres to the inner and outer surfaces of the case core 11 through the adhesive agent, no air layer exists between the case core surface and the coating layer 15, whereby the thermal conductivity of the entire track is made high, and any heat generated at the conductive members 1 can be radiated through the layer. The provision of the inner and outer synthetic resin layers 15a and 15b ensure the insulative effect over the entire surfaces of the metallic case core and thus a high safety performance of the track.

3. Since the inner layer 15a is formed of a hard synthetic resin, the conductive members 17 can be firmly held and, since the receiving

members 31 of the hanging-type electric equipment 21 are placed on the projections 14 through the hard resin inner layer 15a coated on the case core 11, the equipment 21 can be freely slid along the track, while the layer 15a is high in resistance to thermal deformation. Further, the outer layer 15b formed of soft synthetic resin provides the supply track with an excellent anti-shock characteristic.

4. Since the coating layer 15 covering the projections 14 which hold the electric equipment 21 is formed with a resin material containing no solvent as plasticizer, the receiving members 31 of the electric equipment 21 are not deteriorated even if the equipment is formed of polycarbonate which is weak to the solvent, so that the mounting of the equipment on the tack can be maintained stable for long periods.

5. Since the thickness of the inner layer 15a in the vicinity of the conductive members 17 is greater than that of the outer layer 15b, the flow of moulding material is favourable, required high dimensional precision of the moulded layer can be easily achieved and sufficient strength for holding the conductive members 17 can be easily obtained.

6. Since the entire surface of the outer layer 15b, except the upper portion of the upper section 12 of the case core, is uneven, such uneven surface is effective to act as a pool of molten moulding material, enhancing the flow of the material, reducing the reflection of any light by having a matt finish and giving no influence on the interior decoration of the housing, while the layer can be made thin.

7. Since the outer layer 15b is coated on the outer surface of the case core 11, cutting the track into a required length by means of a saw or the like can be positively performed without causing any slipping of saw teeth, so that the cut end surface can be made smooth, while any metallic burr owing to the sawing can be absorbed in the coating layer so that a worker is protected from injury from the burr.

8. The fins 45 of synthetic resin formed integrally with the side sections 42 of the case core make it possible to improve the appearance of the track when it has been fixed to a ceiling surface or the like.

CLAIMS

1. An electrical supply track comprising a case core of a steel plate bent into a channel shape having a longitudinal aperture; a coating layer of a synthetic resin formed intimately on the inner and outer surfaces of said case core, said layer comprising an inner layer formed on the inner surface and an outer layer on the outer surface of the case core; a pair of supporting members moulded integrally with the inner layer so as to project inwardly to oppose each other and extend in the longitudinal direction of the track in paral-

lel relation to each other; and a pair of electrically conductive members embedded in respective opposing ends of said supporting members, exposed at opposing surfaces of the supporting members and extending parallel to each other in the longitudinal direction of the track.

2. An electrical supply tack according to claim 1, wherein said inner layer is made of a hard synthetic resin.

3. An electrical supply track according to claim 1 or claim 2, wherein said coating layer is coated on said case core with an adhesive interposed therebetween.

4. An electrical supply track according to any preceding claim, wherein said inner layer is coated thicker than said outer layer.

5. An electrical supply track according to any preceding claim, wherein a pair of inwardly directed flanges extend from the lower edges of the sides of the track, said flanges being coated with synthetic resin containing no solvent as plasticiser.

6. An electrical supply track according to any preceding claim, wherein said outer layer is provided with a plurality of narrow grooves extending in the longitudinal direction along the sides of said supply track.

7. An electrical supply track according to any preceding claim, wherein said outer layer is provided with intergal fins of a synthetic resin.

8. An electrical supply track according to claim 7, wherein the fins extend upwardly and outwardly from the lower ends of the sides of the supply track, the outermost ends of the fins being located substantially at the level of the upper surface of the supply track.

9. An electrical supply track according to claim 7, wherein the fins extend outwardly from the lower ends of the sides of the supply track and are substantially co-planar.

10. An electrical supply track according to any one of claims 1 to 8, wherein the upper surface of the track is provided with upwardly extending ribs at its side edges.

11. An electrical supply track according to any preceding claim, wherein the conductive members are embedded in the supporting members simultaneously with the moulding of said supporting members.

12. An electrical supply track substantially as described herein with reference to Figs. 2A-3, Fig. 4 or Fig. 5 of the drawings.



members 31 of the hanging-type electric equipment 21 are placed on the projections 14 through the hard resin inner layer 15a coated on the case core 11, the equipment 21 can be freely slid along the track, while the layer 15a is high in resistance to thermal deformation. Further, the outer layer 15b formed of soft synthetic resin provides the supply track with an excellent anti-shock characteristic.

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5. Since the thickness of the inner layer 15a in the vicinity of the conductive members 17 is greater than that of the outer layer 15b, the flow of moulding material is favourable, required high dimensional precision of the moulded layer can be easily achieved and sufficient strength for holding the conductive members 17 can be easily obtained.

6. Since the entire surface of the outer layer 15b, except the upper portion of the upper section 12 of the case core, is uneven, such uneven surface is effective to act as a pool of molten moulding material, enhancing the flow of the material, reducing the reflection of any light by having a matt finish and giving no influence on the interior decoration of the housing, while the layer can be made thin.

7. Since the outer layer 15b is coated on the outer surface of the case core 11, cutting the track into a required length by means of a saw or the like can be positively performed without causing any slipping of saw teeth, so that the cut end surface can be made smooth, while any metallic burr owing to the sawing can be absorbed in the coating layer so that a worker is protected from injury from the burr.

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lel relation to each other; and a pair of electrically conductive members embedded in respective opposing ends of said supporting members, exposed at opposing surfaces of the supporting members and extending parallel to each other in the longitudinal direction of the track.

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6. An electrical supply track according to any preceding claim, wherein said outer layer is provided with a plurality of narrow grooves extending in the longitudinal direction along the sides of said supply track.

7. An electrical supply track according to any preceding claim, wherein said outer layer is provided with intergal fins of a synthetic resin.

8. An electrical supply track according to claim 7, wherein the fins extend upwardly and outwardly from the lower ends of the sides of the supply track, the outermost ends of the fins being located substantially at the level of the upper surface of the supply track.

9. An electrical supply track according to claim 7, wherein the fins extend outwardly from the lower ends of the sides of the supply track and are substantially co-planar.

10. An electrical supply track according to any one of claims 1 to 8, wherein the upper surface of the track is provided with upwardly extending ribs at its side edges.

11. An electrical supply track according to any preceding claim, wherein the conductive members are embedded in the supporting members simultaneously with the moulding of said supporting members.

12. An electrical supply track substantially as described herein with reference to Figs. 2A-3, Fig. 4 or Fig. 5 of the drawings.