

July 20, 1943.

LE ROY M. KUBAUGH

2,324,993

RAIL INSULATOR

Filed May 29, 1941

3 Sheets-Sheet 1

FIG. I

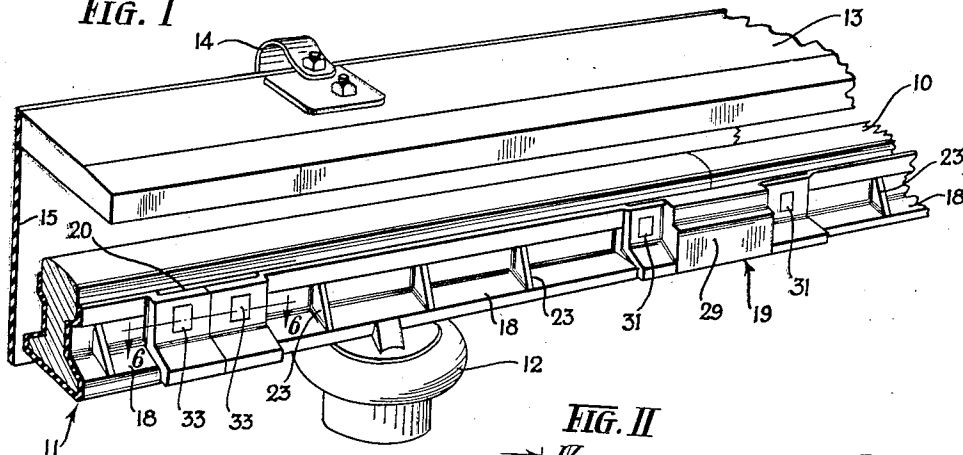


FIG. II

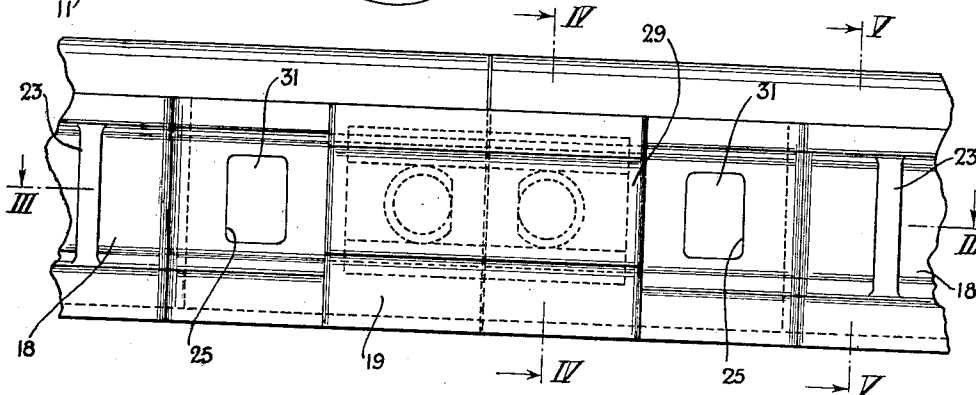
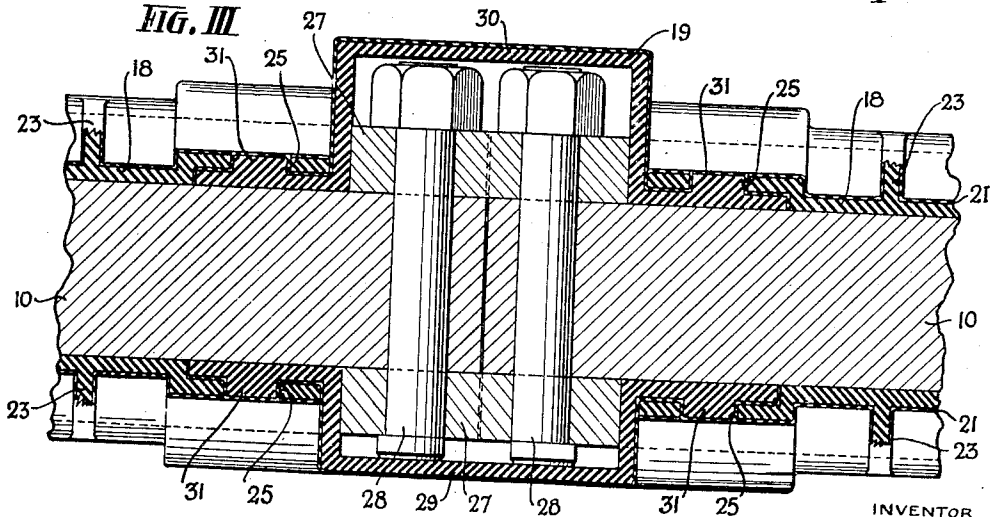


FIG. III



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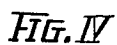
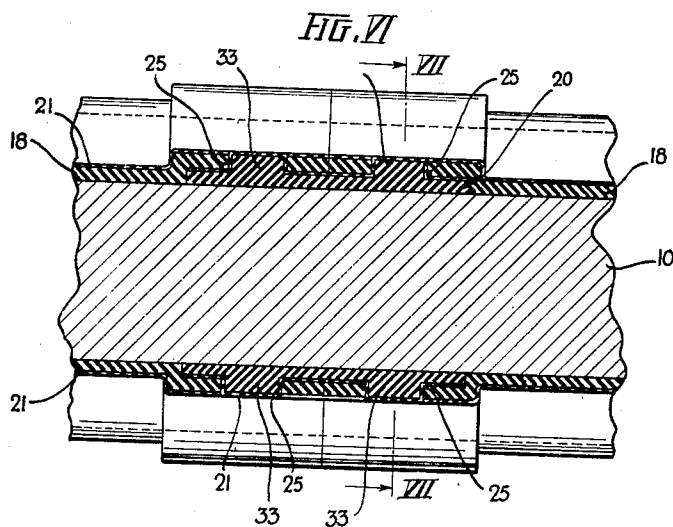
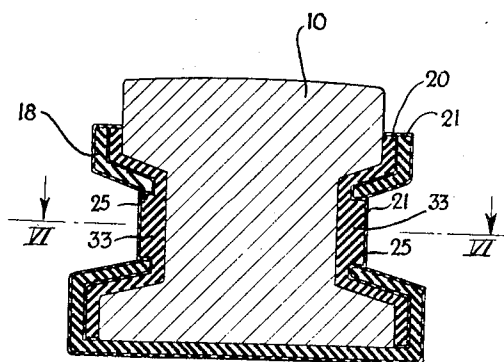


FIG. VII

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FIG. VIII

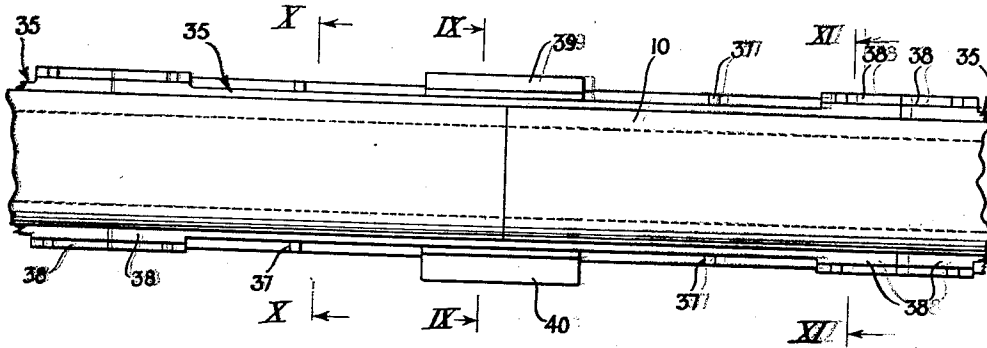


FIG. IX

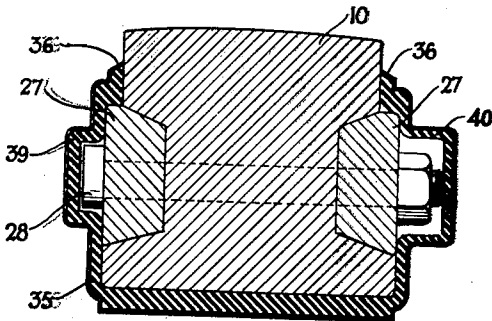


FIG. X

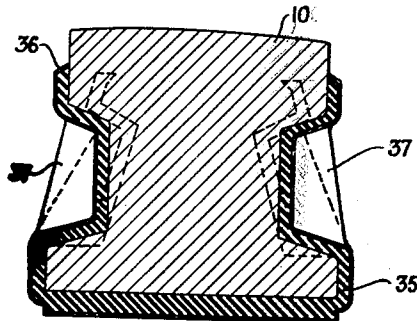
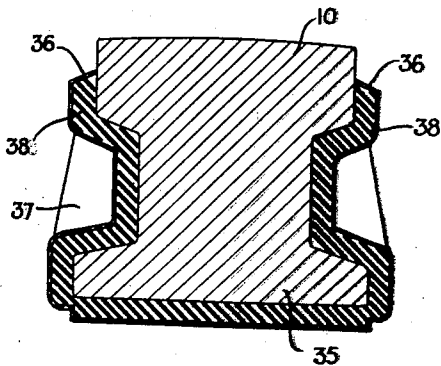


FIG. XI



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## UNITED STATES PATENT OFFICE

2,324,993

## RAIL INSULATOR

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Ohio, a corporation of Ohio

Application May 29, 1941, Serial No. 395,779

7 Claims. (Cl. 191—30)

This invention relates to rail insulators, and more especially it relates to insulators for "third rails" such as are used by some railways for supplying electric energy to the motors of electrical-  
5 driven rail vehicles.

Since third rails carry relatively high voltage, they constitute a definite hazard to maintenance men whose duties require them to work on the railway right of way, and also to others who may recklessly, carelessly, or accidentally come upon  
10 said right of way. Accordingly it has been common practice to apply a protective facing of dielectric material to portions of third rails in those regions of the right of way where the hazard is greatest, and at places where elements  
15 of the switching or signalling system are positioned close to the rail. Such rail insulation as previously provided has been expensive to manufacture and difficult to apply, and it is to the relief of these conditions that this invention primarily is directed.

The chief objects of the invention are to provide improved rail insulation of the character mentioned; to provide rail insulation that readily and easily may be applied to third rails; to provide rail insulation that will not support combustion; to obviate the collection of metallic dust on the margins of the insulator; and to provide  
20 a rail insulator that will hug the rail closely without requiring the use of cement or other bonding agencies. Other objects will be manifest as the description proceeds.

Of the accompanying drawings:

Fig. I is a sectional perspective view of a third rail, and an insulator constituting one embodiment of the invention mounted thereon;

Fig. II is a side elevation on a larger scale, of the insulated third rail shown in Figure I;

Figure III is a section on the line III—III of Fig. II;

Fig. IV is a section on the line IV—IV of Fig. II;

Fig. V is a section on the line V—V of Fig. II;

Fig. VI is a section on the line VI—VI of Fig. I;

Fig. VII is a section on the line VII—VII of Fig. VI;

Fig. VIII is a plan view of another embodiment of the invention, and a third rail on which the same is mounted;

Fig. IX is a section on the line IX—IX of Fig. VIII;

Fig. X is a section on the line X—X of Fig. VIII; and

Fig. XI is a section on the line XI—XI of Fig. VIII.

Referring first to Fig. I of the drawings, there is shown a third rail 10, and mounted thereon is an improved insulating structure designated as a whole by the numeral 11. The rail 10 is of the same general construction as an ordinary T-rail for traction purposes, and comprises the usual head, web, and flange or base, the web, however, being lower and thicker than in a track rail. The rail 10 with insulator 11 thereon is mounted upon spaced apart supports, such as the support 12, that are composed of porcelain or other suitable insulating material. The rail 10 carries the electric current that drives the motor vehicles upon the trackway with which the rail is associated, the electric current being conducted to the vehicles through the agency of shoes (not shown) that are carried by the respective vehicles and which slide upon the top or head of the rail. As a further protection to the rail 10 a wooden guard 13 may be positioned above the same and in spaced relation thereto, said guard being supported by brackets, such as the bracket 14. Usually an apron 15 of dielectric material is secured to one margin of the guard 13 and constitutes a lateral shield for one side of the third rail.

In the embodiment of this invention shown in Figs. I to VII of the drawings, the rail insulator 11 is composed of a succession of insulator units that are mechanically interlocked to each other to provide a continuous insulating structure. The insulator units are of three different types, the majority of the units being of standard type, designated 18 in the drawings. Of fewer number are the joint type 19 adapted to cover the splice bars and bolts that connect adjacent ends of the rails 10, and the extension type 20 adapted to connect adjacent ends of the standard type units 18. All of said types of units are composed primarily of resilient dielectric material such as rubber composition as shown, no internal reinforcing of the material being required, although a fabric reinforcing may be provided if desired. Each insulator unit has its outwardly presented surface covered with a relatively thin layer of flexible, fire-resistant material 21 that is bonded thereto. The synthetic rubber-like material known as neoprene has been found to be satisfactory material for the facing 21, since neoprene in the presence of flame gives off chlorine, which will not support combustion, and which will extinguish or suppress a flame by smothering the same. The presence of the fire-resistant facing 21 is desirable for the reason that the shoe that rides the third rail may leave the same at curves

in the trackway, and cause arcs between the shoe and rail that would burn the rubber structure of the insulating units.

The standard type units 18 are made in any length that conveniently may be molded and vulcanized, which length, for example, may be from 25 inches to 40 inches. Each of the units 18 is so shaped as completely to embrace the base flange and both lateral faces of the web of the rail 10, the margins of the unit being located on the respective lateral faces of the rail head in the medial region thereof. The transverse contour of the unit closely approximates the profile of the portions of the rail enclosed thereby. Added rigidity is imparted to the unit by buttresses or ribs 23, 23 integrally formed on the exterior of the unit and spanning the longitudinal recess in the unit at the region thereof that engages the web of the rail. At each of its ends the respective lateral walls of the unit 18 are formed with offset portions 24, 24 that are spaced from the surface of the rail 10 a distance equal to the thickness of the wall of the unit, each of said offset portions being centrally formed with a substantially rectangular aperture 25.

The joint type insulator units 19 are designed to embrace the third rail at the splices where adjacent rail units are connected to each other, which connections are made by means of splice plates 27, 27 positioned on opposite sides of the rail units and spanning the juncture thereof, and bolts 28, 28 that extend through said splice plates and through the webs of the abutting rail units. The respective end portions of each joint unit 19 are of the same thickness and transverse contour as the intermediate regions of the standard units 18. Intermediate said end portions the unit is formed on one side with a bulge or lateral projection 29 adapted to embrace the heads of the bolts 28 and a splice plate 27, and on the other side is formed with a similar but larger bulge or projection 30 adapted to embrace the other splice plate 27 and the nuts on the ends of the bolts 28, as is best shown in Fig. III and Fig. IV. When a joint unit 19 is operatively positioned with relation to two adjacent standard units 18, the end portions of the unit 19 are disposed beneath the offset portions on the confronting ends of the said standard units. Each of the said end portions of the unit 19 are formed with outwardly projecting, substantially rectangular lugs 31, 31, which lugs are receivable in the apertures 25 in the offset portions of the standard units 18. The arrangement provides a mechanical interlock of the units 18, 19 that prevents separation of the units and assures the uninterrupted continuity of the insulator throughout its length.

The extension type insulator units 20 are shown in Figs. VI and VII. Two of the units 20 are used at the juncture of two standard units 18, each unit 20 being shaped to fit flush against a lateral face of the rail 10. The length of each unit 20 is slightly less than the combined length of the offset portion on the adjacent ends of two abutting standard units 18, the arrangement being such that the units 20 are snugly receivable within the offset portions of the two adjacent standard units, between said offset portions and the lateral faces of the rail 10. Each unit 20 is formed, midway between its upper and lower margins, with two outwardly projecting, substantially rectangular lugs 33, 33, which lugs are spaced apart from each other longitudinally of the unit, and are snugly received in respective aper-

tures 25 in the offset portions of the units 18, providing a mechanical interlock that prevents separation of adjacent units 18.

In the embodiment of the invention shown in Figs. VIII to XI the rail insulator is made up solely of a plurality of standard insulator units 35, the joint units and extension units of the previously described embodiment being dispensed with. In many respects the units 35 are similar to the units 18 previously described. Thus they are composed of resilient rubber composition, they are laterally stiffened by buttress ribs 37, and they have a thin facing of neoprene on the outer or exposed surface thereof, the rubber being fabric reinforced if desired. The base portion of the unit, that is, the portion on which the flange or base of the rail 10 rests, is somewhat thicker than the base of unit 18, and is thicker than the lateral walls of the unit 35. The marginal faces of the unit 35 are beveled as at 36, 36 so as to slope downwardly from the edges thereof that abut the rail 10, the arrangement being such as to obviate the accumulation of dust, such as metallic dust resulting from friction between contact shoes and the rail, upon the marginal faces of the unit. The construction is such as to reduce the fire hazard since such dust will burn in the presence of an electric arc.

The major portion of each insulator unit 35 has the transverse structure shown in full lines in Fig. 10. Each end portion of the unit 35 is stiffened, and to this end the lateral walls thereof, in the regions designated 38, 38, are of increased thickness, which thickness is substantially twice the thickness of other regions of said lateral walls. The thickening and stiffening of the ends of the units 35 obviates collapse or sagging of the same after long periods of use. In the medial region of the unit 35, the lateral walls thereof are formed with respective outwardly bulged regions 39 and 40. In use the said bulged portions are positioned at the juncture of two rail units 10, over the splice plates 27 and bolts 28 thereat, the bulge 39 accommodating splice plate and the heads of said bolts and the bulge 40 accommodating a splice plate and the nuts on the ends of said bolts, as is clearly shown in Fig. IX.

In order that the units 35 will firmly embrace the rail 10 when mounted thereon, the units are molded with the lateral walls thereof inclined toward each other, as indicated in broken lines in Fig. X. Said walls readily are spread apart to enable the units to be mounted on the rail 10, the tension set up in the unit by such deformation thereof thereafter urging said walls against the lateral faces of the rail. This feature of the invention also is employed in the manufacture of the standard type units 18.

In mounting the units 35 upon a rail, the splices at the juncture of adjacent rails first receive the units, the bolts and splice plates at said junctures being received within the bulges 39, 40 of the units. Thereafter other units 35 are mounted upon the rail in end-to-end abutment with units already mounted thereon. Of course the bulges 39, 40 of units positioned between rail splices serve no useful purpose, but the presence of said bulges in all the units obviates the necessity for joint units, such as the joint units 19 of the previously described embodiment of the invention. Also the stiffening of the end portions of the units 35 obviates the necessity for extension units, such as the units 20 previously described.

The invention reduces the cost of insulating third rails, it reduces the fire hazard incidental

to the use of insulators, and it achieves the other advantages set out in the foregoing statement of objects.

Other modifications may be resorted to without departing from the spirit of the invention, or the scope thereof as defined by the appended claims.

What is claimed is:

1. A rail insulator for "third rails" and the like, said insulator comprising a structure of dielectric material adapted to embrace a portion of a rail including the lateral faces thereof and leaving a continuous surface of the rail exposed for contact with a current collector sliding therealong, and a facing on the outer surface of said structure, said facing consisting of a material that is adapted to suppress combustion.

2. A rail insulator of the character described comprising a structure composed primarily of resilient rubber composition adapted to embrace a rail including the lateral faces thereof and leaving a continuous surface of the rail exposed for contact with a current collector moving therealong, and a flexible facing on the outer surface of said structure, said facing consisting of a material that is adapted to generate fumes that will suppress combustion.

3. A rail insulator of the character described comprising a flexible structure adapted to embrace a rail including the lateral faces thereof and to leave a surface of the rail exposed for contact by a current collector sliding thereover,

the walls of said structure being laminated, one ply thereof being natural rubber composition and another ply being a synthetic rubber-like material capable of generating flame-smothering fumes in the presence of combustion.

4. A combination as defined in claim 3 in which the synthetic rubber-like ply is disposed on the outwardly presented face of the structure.

5. A combination as defined in claim 3 in which the synthetic rubber-like ply is relatively thin as compared to the remainder of the laminated structure.

6. A rail insulator of the character described comprising a plurality of flexible units of dielectric material mounted end to end in a series upon a rail longitudinally thereof, and joint units of shorter length spanning the juncture of the confronting ends of the first-mentioned units and mechanically interlocked with the latter.

7. A rail insulator of the character described comprising an upwardly opening channel shape structure composed of resilient dielectric material adapted to fit about the base, the web, and a portion of the head of a rail, said structure being of substantially uniform wall-thickness throughout and conforming to the contour of the rail, and buttress-like ribs formed at spaced points on the lateral walls of the structure to reinforce the same.

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