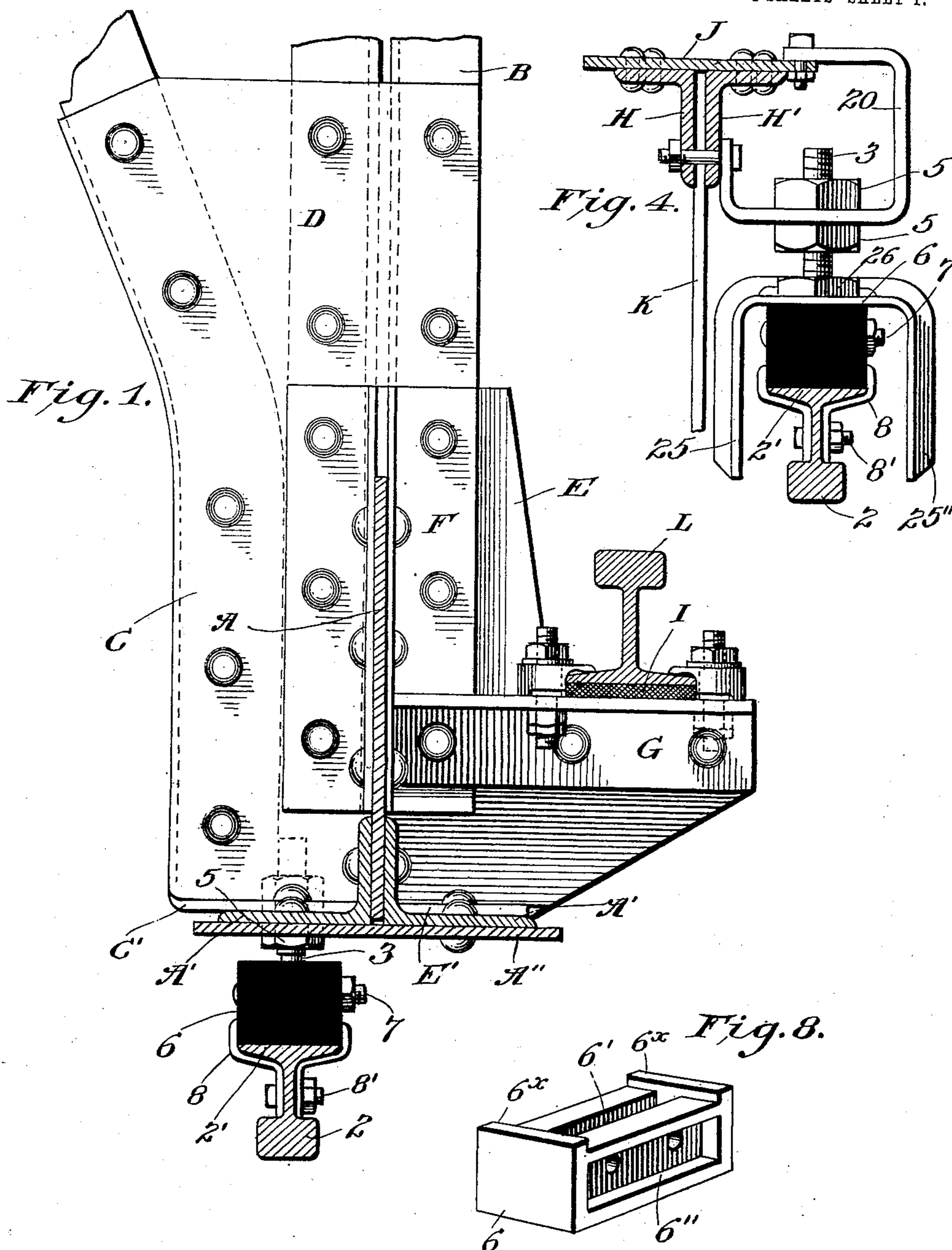


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INSULATING THIRD RAIL SUPPORT.  
APPLICATION FILED JUNE 29, 1908.

915,375.

Patented Mar. 16, 1909.

3 SHEETS—SHEET 1.



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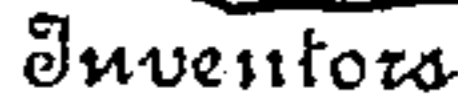
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3 SHEETS—SHEET 3.

Fig. 5.

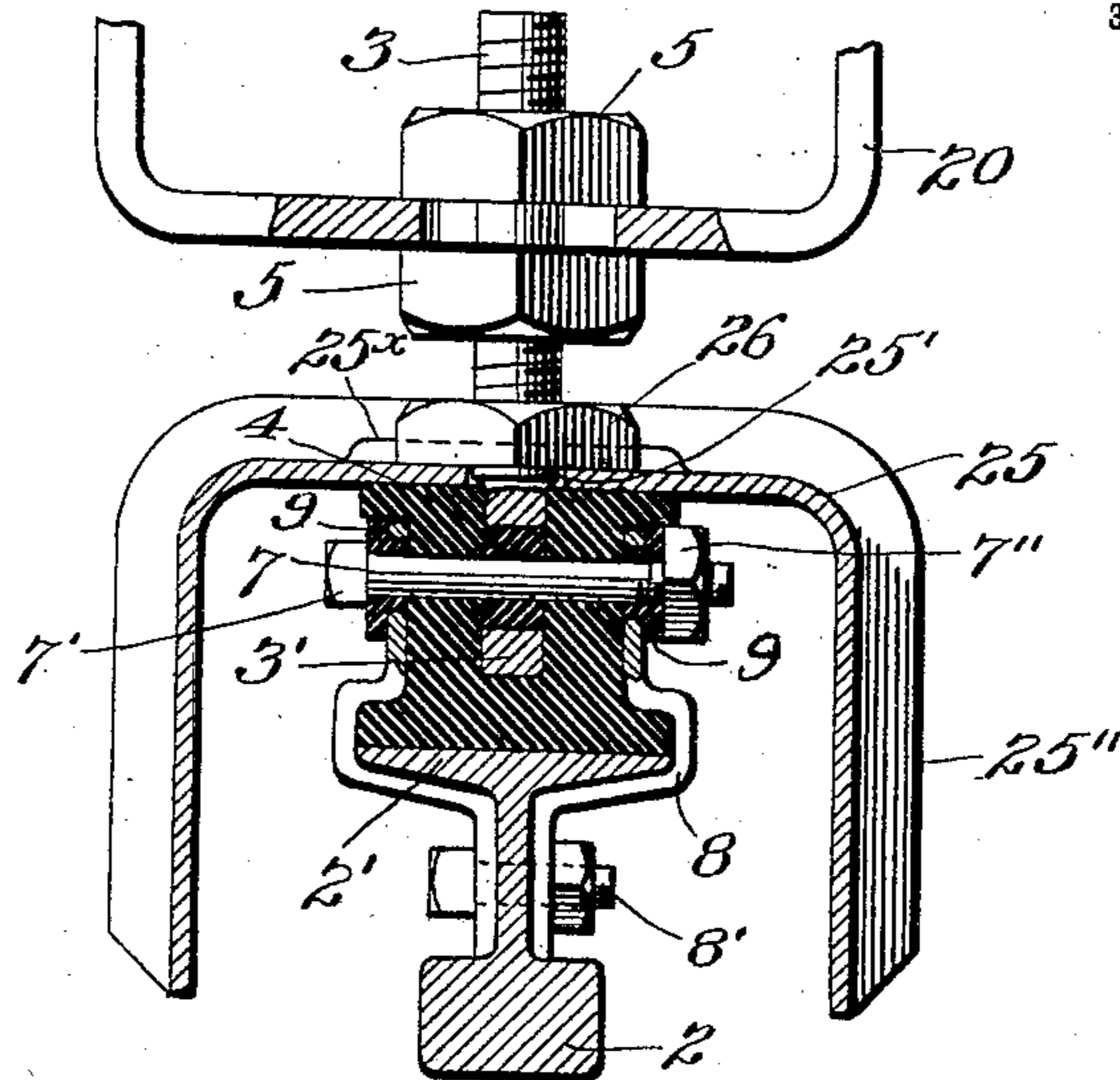


Fig. 6.

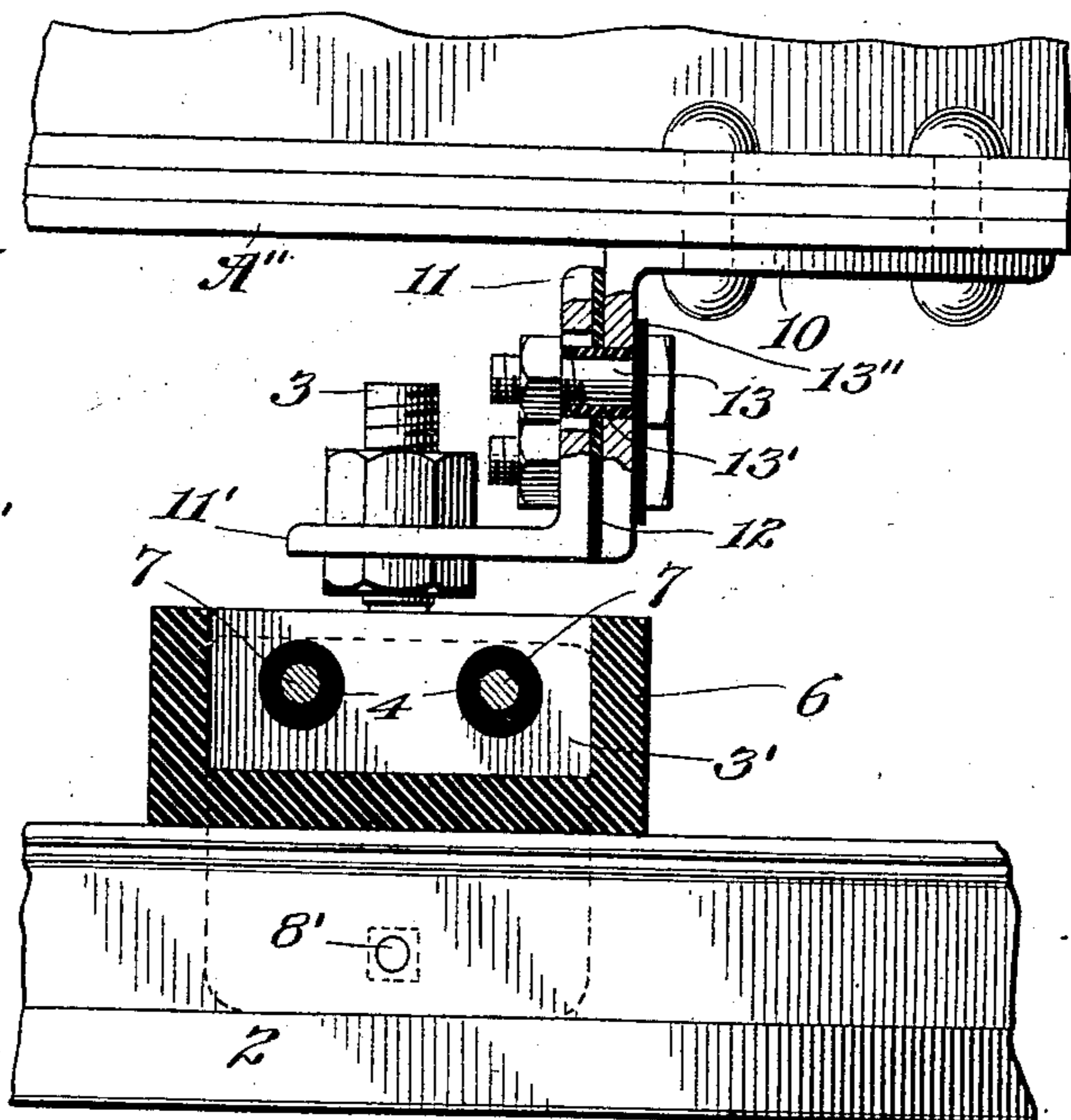
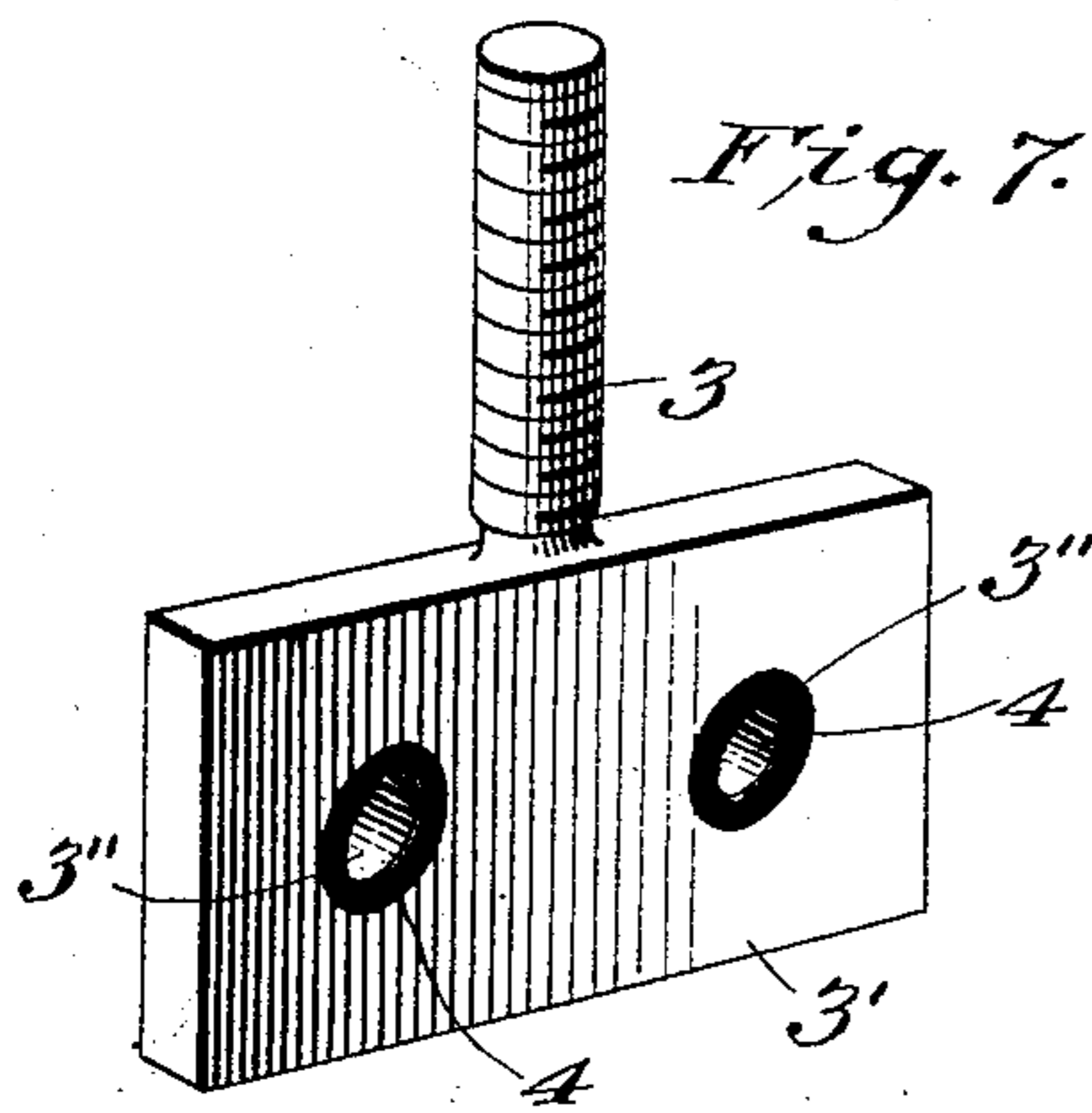


Fig. 7.



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# UNITED STATES PATENT OFFICE.

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## INSULATING THIRD-RAIL SUPPORT.

No. 915,375.

Specification of Letters Patent.

Patented March 16, 1909.

Application filed June 29, 1908. Serial No. 440,808.

*To all whom it may concern:*

Be it known that we, DANIEL M. PFAUTZ and JOHN LEWIS LUCKENBACH, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Insulating Third-Rail Supports, of which the following is a specification.

Our invention relates to elevated railroad structures, and more particularly to means for supporting and insulating the third rails thereof.

One object of the invention is to support a third-rail from an elevated structure in such manner that it shall have a plurality of supporting means, each, to a degree independent of the other, so arranged that if one by any chance breaks or becomes otherwise damaged, the rail shall still be supported without danger of falling.

Another object is to provide means for thoroughly insulating the third-rail from contact or electrical connection with any portion of the structure. A further object being to provide a hood for the rail and means for supporting the same.

We accomplish these ends by the several constructions shown in the accompanying drawings, and more particularly set forth in the appended claims.

We have illustrated several embodiments of our invention in the accompanying drawings, wherein:

Figure 1, is a transverse section of the lower chord of an elevated structure, the car supporting rail, and the contact or third-rail. Fig. 2, is a side elevation of a portion thereof, reduced in scale. Fig. 3, is a side elevation, partly in section, of a modified form of third-rail support as applied to the upper chord of an elevated structure. Fig. 4, is a transverse section thereof. Fig. 5, is an enlarged transverse section of the supporting and insulating construction shown in Fig. 4. Fig. 6, is a side elevation partly sectional of a modified third-rail support. Fig. 7, is a perspective view enlarged of the supporting "eye-bolt". Fig. 8, is a perspective view of the insulating block shown in Figs. 4 and 5.

In all the figures like reference characters designate like parts.

Referring now to Figs. 1 and 2, which show the lower chord of an elevated structure. A, designates the longitudinal mem-

ber of the lower chord of a bridge-like structure, which forms one side of an elevated railway; and B, designates a vertical member which extends therefrom to the upper chord. C, designates a laterally extending and upwardly projecting bracing truss; and D, a stiffening plate riveted to the vertical member and to the bracing truss C, this plate being flanged at its lower end as at C'. E, designates a bracket-plate, of a general L-shape, which is bolted to and carried upon the lower end of the vertical members B. The lower margin of the beam A, has riveted to it the opposed angle irons A', whose lower flanges are connected by a horizontal plate A''. The bracket-plate E, at its rear abuts against the inner face of the girder A. It extends outward beneath the rail L, of the track and supports the same, and then downward to the angle irons A', where it is bent to form the flange E', and riveted to the said angle irons. Riveted on both sides of bracket-plate E, at its rear and also riveted to the web of the girder A, are angle irons F. At right angles with the angle irons F, and projecting out therefrom to the end of the bracket-plate E, are the opposed angle irons G, which are riveted to the web of the bracket-plate E. Filling plates are of course inserted between the downwardly projecting flanges of the angle irons and said plate. Supported upon the bracket-plate E, and the upper flanges of angle irons G, is the rail L, resting upon an intermediate deadening plate or pad I.

As the features of our elevated structure form no part of the present specification, we shall not describe them more in detail, it being sufficient to indicate the principal elements and their relation to each other. The third-rail is designed to be suspended from either the upper or the lower chord of this or analogous structures, and the means whereby this is accomplished, and the third-rail entirely insulated, form the subject of this application.

Referring now to Figs. 1 and 2, which show a method of suspending the third-rail from the lower chord of a structure, and to Figs. 5, 6 and 7, which show certain details of the third-rail hanger and insulation, 2 designates the third-rail suspended with the tread of the rail downward, this rail being entirely insulated from the elevated structure by an intermediate insulating block 6.

Broadly,—the third-rail is supported by hangers which engage with one portion of the block, while the block is sustained by a support which engages with another portion.

5 We suspend the rail primarily by means of a peculiar shaped eye-bolt, which is shown in detail in Fig. 7. This consists of a bolt shank 3, having at its lower end an extended flattened head 3', pierced with a plurality of

10 bolt holes 3'', each of which is lined with a sleeve 4, of insulating material. The bolt shank 3, in the form shown in Figs. 1 and 2, passes upward through the plate A'', and angle iron A', of the lower chord of the struc-

15 ture. Reversed nuts, 5, 5, are mounted in the shank 3, and are screwed up against the lower and upper faces of the angle iron A', and plate A''. 6, designates a block of insulating material which is connected to the

20 head 3', of the eye-bolt in the manner shown in Fig. 5. The block is longitudinally slotted on its upper face along its middle as at 6', (Fig. 8), the slot extending downwardly into the block sufficiently to accommodate

25 the head 3', of the eye-bolt. The block is pierced transversely for the passage of a plurality of bolts 7. These transverse passages of course aline with the transverse open-

30 ings 3'', of the head 3', the bolt passing entirely through the head and the insulating block from one side to the other as shown in Fig. 5. The sides of the block are recessed as at 6'', Fig. 8, the side recesses being de-

35 signed to engage with hanger irons 8. These recesses form the faces of the block which engages with the rail supporting means. The lower face of the block is unbroken and fits against the inside face of the base 2', of the rail 2, the rail being drawn up snugly

40 against said block, as will be now described. The rail is held to the block 6, and supported from the eye-bolt 3, by the hanger-plates 8. Each plate fits against the web of the third-

45 rail, and is bolted thereto by bolts 8', the lower edge of the plate abutting against the inside of the rail tread. The plate is bent laterally outward to fit over the face of the base 2', of the rail. It extends upward and then inward into the recess 6'', of the insulat-

50 ing block, and upward to the upper end of the recess 6''. Those portions of the plates 8, which enter the recesses in the blocks are perforated for the passage of bolts 7, such perforations of course alining with the like

55 passages in the block 6, and the bolt head 3'. It is of course understood that there may be as many bolts 7, as desired. The passages through plates 8, are to be lined with insulating bushings 9, (see Fig. 5) of any de-

60 sired insulating material, the bushing having a head or flange which insulates the head 7', and nut 7'', of the bolt from contact with the hanger-plates 8.

It will be seen that the support for the rail and the block support contact with different

portions of the insulating block, and therefore have no electrical connections. It will be obvious that the third-rail supported as described is absolutely and entirely insulated from the superstructure and from the bolts, 70 whereby it is attached, thus preventing not only leakage of current but any electrolytic action. It is also to be noted that the recess 6'', in the block 6, provides laterally projecting flanges on the lower portion of the block, and that the inwardly bent upper ends of the plates engage with these lateral projecting flanges. Thus, should any one of the bolts 7, 8', break, the contact rail will remain suspended by the engagement of the inwardly turned portions of the plates, with the outwardly projecting flanges of the block and with the outwardly projecting flanges forming the base 2', of the rail, the remaining bolts holding the hanger-plates in place. 85

In Figs. 1 and 2, we show the third-rail as supported directly from the lower flanges of the lower chord of an elevated structure. In Fig. 6, we show another manner of supporting the third-rail hanger from a lower chord. In this form an angle plate 10, is bolted to the lower face of the plate A''. To the downwardly projecting flange of this plate is bolted the angle iron 11, the inside faces of the two irons being separated by a sheet of insulating material 12. Bolts 13, pass through the two adjacent flanges, the bolts being insulated by a sleeve 13', and by an insulating washer 13'', beneath the bolt heads. The eye-bolt shank 3, passes through the projecting flange 11', of angle iron 11, reversely acting nuts being secured upon both sides of the flange 11'. 100

The remainder of the construction is of the same character as heretofore described and comprises the eye-bolt 3, with its elongated head 3', the recessed insulating block 6, the transverse bolt 7, the hanger-plates 8, a bolt 8', and contact rail 2. 105

The suspension constructions heretofore described are adapted to support the third-rail from the lower chord of a superstructure, but in Figs. 3, 4 and 5, we show a modified form of means which is to be used in supporting the third-rail from the upper chord of such a structure. 110 115

Referring more particularly to Figs. 3 and 4, H, H', designate opposed angle irons forming the longitudinal element of such an upper chord. J, designates the horizontal plate which is riveted to the upper flanges of the angle iron, and K, the diagonal trusses bolted to the downwardly projecting flanges of the angle irons H, H'. To hold the third-rail and its supporting means away from the trusses K, we provide the yoke 20, formed of a steel plate bent into an incomplete or open rectangle as seen in Fig. 4. One end of this yoke is bolted to the projecting edge of plate J, the other being bolted to the downwardly 120 125 130

projecting flanges of the angle irons H, H'. It is from this yoke that the insulating block 6, and its connections with the third-rail are supported. In order to provide for the longitudinal adjustment of the yoke and its suspended third-rail, the ends of the yoke are slotted; the upper end of the yoke being slotted as at 20', (see Fig. 3) and the lower end, which is to hold against the angle iron H', as at 20''.

In Fig. 5, is shown the detailed construction of the rail supporting hangers and the insulating block. This construction is practically similar to that heretofore described and including the hanger-plates 8, the bolt 8', and the third-rail 2. There is one difference between the block 6, as shown in Figs. 3, 4 and 5, and the block as shown in the remaining figures. In the first named figures, the recesses in the sides of the block do not extend to the upper side of the block, but stop short thereof as shown clearly at the right hand end of Fig. 3; and in Figs. 5 and 8. This difference in construction is due to the necessity of insulating the upper end of the hanger-plates 8, from a hood 25, which covers the insulating third-rail support and the third-rail.

As seen in Fig. 5, the hood 25, is U-shaped in cross section, the opening thereof being downward and rests directly upon the upper face of the insulating block 6, the sides of the hood projecting downward on each side of the third-rail, and protecting the same and the insulating block. The material of the hood is perforated as at 25', for the passage of the shank 3, of the eye-bolt, and a nut 26, screws down on the bolt 3', against the upper face of the hood securely holding the hood between the nut 26, of the upper face of the insulating block 6. The yoke 20, has a passage through it for the shank 3, of the eye-bolt and the two opposed nuts 5, 5, on the shank are screwed together tightly and hold the yoke between them. In order to additionally hold the hood from any longitudinal shifting movement and to secure it more rigidly in place, we provide the insulating block 6, at its ends with upwardly projecting ribs 6<sup>x</sup>, these ribs fitting into corrugations 25<sup>x</sup>, formed in the upper side of the hood 25.

As clearly shown in Fig. 3, the hoods 25 are connected by an auxiliary hood 27, which covers the third-rail between the main hoods 25, and is supported thereon. This auxiliary hood is made in two longitudinal sections with a longitudinal flange 27', on each section. These flanges are abutted against each other as shown in Fig. 3, and are there riveted together. The ends of the main hoods 25, are upwardly flanged as at 25'', and the ends of the auxiliary hoods are downwardly flanged as at 27'', and engaged over the ends of the main hoods. This construction provides for a shifting of the aux-

iliary hoods on the main hoods and thus admits of contraction and expansion under the influence of different temperatures. It will be seen that the adjusting slots 20'', provide also for a longitudinal adjustment of the rails 2, as also for the main hoods and the auxiliary hoods. In order to provide for the lateral adjustment of the third-rail, the supports, hoods, etc., and for the proper alinement of the ends of the third-rail, the lower portion of the yoke 20, is preferably slotted transversely and through this slot passes the shank 3, of the eye-bolt. This admits of the eye-bolt being shifted laterally and properly adjusted. After adjustment the eye-bolt is held by means of the nuts 5, 5.

It will be seen from the description heretofore given that we have provided a means of supporting the third-rail of an elevated structure which insulates the third-rail from any contact or electrical connection with the structure itself, and that the arrangement devised also provides a means of supporting the third-rail, which practically eliminates the danger of the third-rail falling or being displaced by reason of the breakage of any of the bolts, our arrangement provides a number of rail supports, practically independent of the other. Our construction also provides for a longitudinal and lateral adjustment of the rails and for protecting the third-rail from accidental contact with anything except the shoe of the car; at the same time the rail is protected from the weather and from any chance of short circuiting due to water collecting upon exposed portions of the third-rail and making an electric contact with the bolts or other rail supports.

A most important advantage due to the thoroughness with which the third-rail is insulated, is the elimination of all chances of an electrolytic action being set up in the superstructure. This not only increases the life of the structure and its component parts, but lessens the chance of the falling or displacement of the third-rail itself with all its dangers.

While we have shown what we believe to be preferable forms of our invention, we do not wish to be limited thereto, as the spirit thereof may be embodied in many other forms.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is:

1. In a third-rail support, a depending third-rail; opposed hanger-plates each having a portion contacting with the web of the rail and bolted thereto, a portion outwardly bent contacting with the base of the rail, and an upwardly projecting portion; an insulating block with which said upwardly projecting portion engages and to which it is bolted; and means for supporting the insulating block from the elevated structure.

2. In a third-rail support, an eye-bolt hav-

ing means for engagement with an elevated structure, an insulating block having a slot into which the eye-bolt is received, hanger plates located on either side of the insulating block conforming to the lateral contour of the third-rail and engaged therewith, and a transverse bolt connecting or passing through the hanger plates, the insulating block and the eye-bolt, but insulated from the hangers and the eye-bolt.

3. In a third-rail support, an eye-bolt having means for engagement with an elevated structure; opposed hanger-plates each engaged with one side of the third-rail and conforming to the lateral contours of said rail; and a transverse bolt connecting the upper ends of said hangers with said eye-bolt.

4. In a third-rail support, an eye-bolt having a flattened head at its lower end; a block having lateral extending flanges at its lower edge and a recess to receive the head of said eye-bolt; opposed hanger-plates engaging on both sides of the third-rail and conforming to the lateral contour of said rail; the upper ends of said hanger-plates engaging over the lateral flanges on said block; and a transverse bolt passing through the upper ends of the hangers through the said block and through the eye-bolt head.

5. In a third-rail support, an eye-bolt having a flattened head at its lower end, said eye-bolt being adapted to engage with an elevated structure; a block having laterally extending flanges at its lower edge and a recess in its upper side to receive the head of said eye-bolt; opposed hanger-plates having their lower ends adapted to engage on both sides of a third-rail and bolted thereto, said hangers extending outwardly and upwardly along the outer face of the base of said rail, then upwardly and inwardly over the flanges of said block and then upwardly to the upper portion of said block; and a transverse bolt passing through the upper ends of said hanger-plates, through the block, and through said eye-bolt head, said bolt being entirely insulated from the hanger-plates and from the eye-bolt head.

6. In a third-rail support, a depending third rail, a block formed of insulating material located above said third-rail acting as a partial support for the same, the exterior of said block having laterally projecting flanges, rail hangers engaging with the base of the rail located one on each side thereof and having inwardly projecting portions engaging with the laterally projecting flanges of the block, an eye-bolt having a head received in a recess in said insulating block and adapted to engage at its other end with an elevated structure, bolts connecting said hangers to the rail, and a transverse bolt connecting said hangers to the block, and the block to the eye-bolt.

7. In a third-rail support, an eye-bolt adapted to engage with an elevated structure, said bolt having a flattened head; a block of insulating material having a recess into which said eye-bolt head extends; a third-rail supported beneath the insulating block; and supports from said third-rail attached to said insulating block.

8. In a third-rail support, an eye-bolt having an extended flattened head, passages through said head lined with insulating material; a block of insulating material having a longitudinal recess in its upper face into which the eye-bolt head is adapted to be received; a third-rail, hangers engaging with the third-rail and extending upwardly; and bolts passing through said hangers, through the insulating block and through the insulated passages in the eye-bolt head, said bolts being insulated from contact with the rail hangers.

9. In a third-rail support, an eye-bolt having a screw threaded shank and an extended flattened head; nuts on the shank; an insulating block having a longitudinal recess on its upper face into which the head of the eye-bolt extends; a third-rail; hangers engaging with the third-rail and with the insulating block; and a bolt passing through said hangers, the block, and said eye-bolt head.

10. A third-rail support having an insulating block and means for holding the third-rail thereon, a longitudinally slotted supporting strip attached at both ends to the elevated structure transversely to the line of the rail, a bolt connecting the insulating block to said supporting strip, said bolt being screw threaded and passing through the slot in the strip, and nuts on said bolt above and below the strip whereby said insulating block and its attaching rail may be adjusted laterally and vertically.

11. A third-rail support having a series of insulating blocks; means for supporting said blocks from an elevated structure; means for supporting a third-rail from said blocks, a series of main hoods each supported on the upper side of one of said blocks; and auxiliary hoods between the main hoods supported thereto and having a sliding engagement therewith.

12. A third-rail support having a series of insulating blocks; means for supporting said blocks from an elevated structure; means for supporting a third-rail from said blocks; a series of main hoods each supported on the upper side of one of said blocks, and each being provided at its ends with upturned flanges; and a series of auxiliary hoods located between said main hoods, the ends of said main hoods having upwardly turned flanges, and the ends of said auxiliary hoods having downwardly turned flanges adapted to engage with each other.

13. In a third-rail support, an eye-bolt adapted to engage with an elevated structure; an insulating block having a recess for the head of said eye-bolt, a third-rail below said insulating block, rail hangers bolted to said third-rail and engaging with said insulating block; and insulated bolts passing through said rail hangers, the insulating block and said eye-bolt, and coupling them together.

14. In a third-rail support, an insulating block having recesses on its sides, and a longitudinal recess in its middle; an eye-bolt engaging with said recess in the insulating block; rail supports engaging with the recesses in the sides of the block; and an insulated bolt passing through the rail supports, through the insulating block and through the eye-bolt; in combination with a hood supported upon the upper side of said insulating block and projecting down on either side of the third-rail, said hood having transverse recesses formed therein and the said block

having transverse ribs adapted to engage with said recesses.

15. In a third-rail support, an insulating block; a third-rail supported therefrom; an eye-bolt attached to said insulating block; and a yoke adapted to be attached to an elevated structure, said bracket being formed of a rectangularly bent strip, the ends of which are attached to different parts of the elevated structure, the lower portion of said bracket being provided with a slot through which the eye-bolt passes and the eye-bolt having nuts, one on either side of said supporting bracket.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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