J. CHRISTENSEN.

INSULATOR FOR ELECTRIC RAILWAY CARS.

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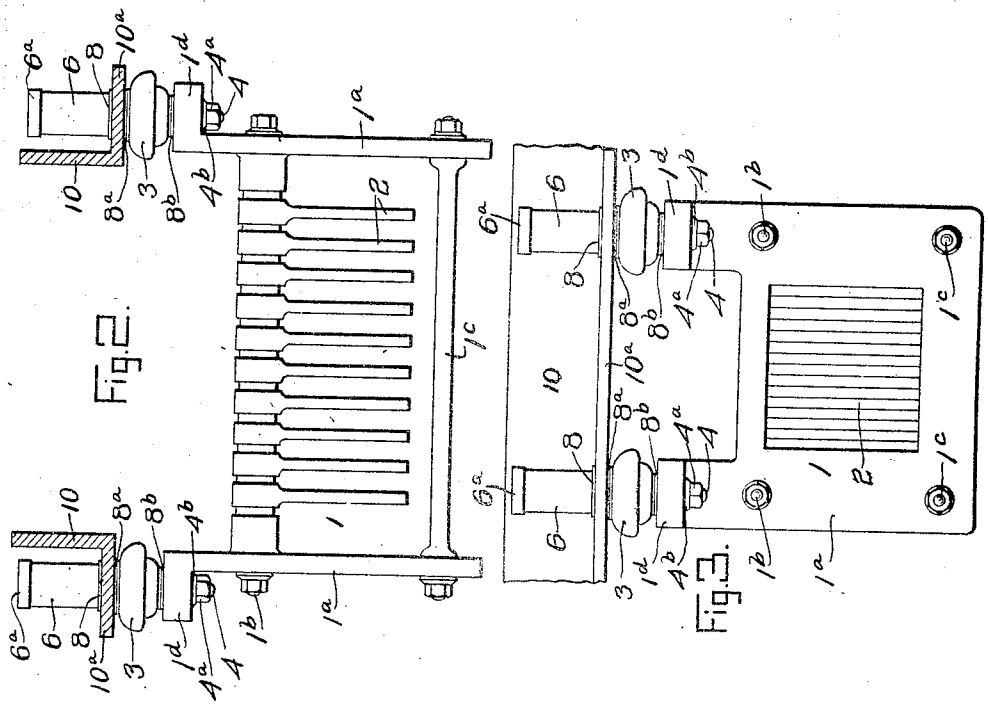

Fig. 2.

Fig. 3.

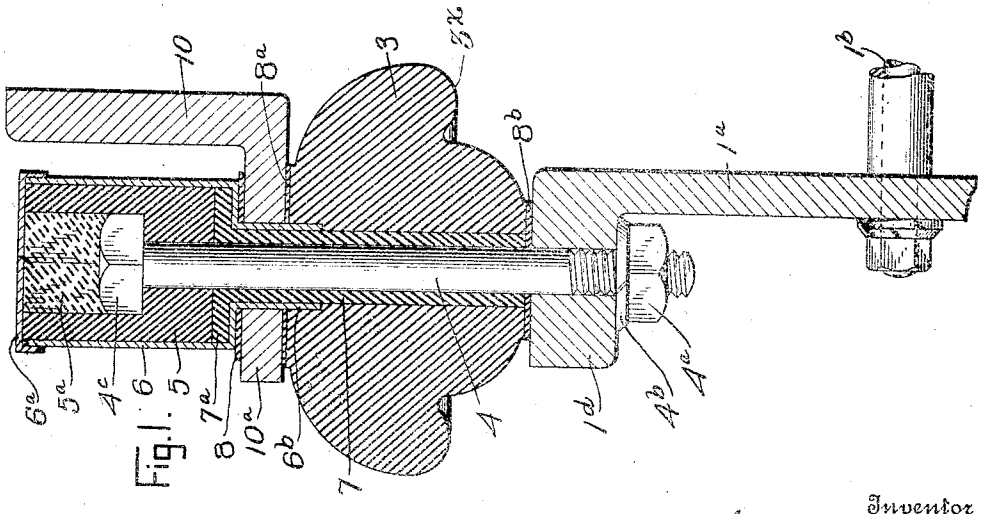

Fig. 1.

Witnesses

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INSULATOR FOR ELECTRIC-RAILWAY CARS.

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To all whom it may concern:

Be it known that I, JOHN CHRISTENSEN, of Evans City, in the county of Butler and State of Pennsylvania, have invented certain new and useful Improvements in Insulators for Electric-Railway Cars; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improvement in devices for insulating and suspending electrical appliances, and is particularly designed for use on electric railway cars to suspend rheostats, and other electrical apparatus, from the car body or truck.

The chief objections to the present known insulators used for such purposes are their tendency to absorb moisture, their liability to breakage, their comparatively high conductivity when broken, or when possessing cracks or flaws in the non-conducting material, and the leakage of current, which they permit between the suspended apparatus and the supporting structure.

The primary object of the present invention is to obviate the troubles which have been heretofore experienced in insulating rheostats, or resistance boxes, and other electrical apparatus, used in connection with the equipment of electric railway cars, and which are usually located under the body of the car, and exposed to the weather, and to water splashed or thrown upward by the wheels, or running down from the car frame; and which is apt to leak into the interstices between the suspended apparatus and the supporting structure, and short circuit the electric current.

The invention in brief consists in an insulating suspending device, comprising a body of insulating material surrounding the bolt used to connect the suspended apparatus to the supporting structure. The upper part of such insulating material is inclosed in a metallic protecting jacket, which projects through the supporting structure into a spacer or insulating body of porcelain, glass or earthenware, which is interposed between the supporting structure and the suspended apparatus, and by which moisture and foreign substances are excluded entirely from the bolt, so that no current can leak from the connecting bolt to the supporting structure. Such an insulated hanger gives the highest possible resistance to leakage of current, is both light and durable, contains the maximum of insulating effect with a minimum of material, is structurally strong, and entirely prevents any possible diversion of current from the electrified body attached to it.

I will now describe the invention with reference to the accompanying drawings, in which I have illustrated the invention as embodied in devices used for suspending a rheostat from a car body or truck.

Figure 1 represents an enlarged section of one of the insulating hangers. Fig. 2 represents a side elevation of a rheostat or resistance box suspended by my novel devices. Fig. 3 represents an end elevation of Fig. 2.

The rheostat or resistance box 1 may be of any desired construction, an ordinary type being shown in the drawings, said box is provided with plates or end walls 1^a, which are connected by tie rods 1^b and 1^c. Grids 2, which constitute the resistance for the circuit, are supported by the rods 1^b from which they are insulated in the usual manner. The end walls 1^a are provided with outwardly projecting lugs or members 1^d by which the box or rheostat may be hung from the car body or supporting structure, conventionally indicated at 10. The rheostat is ordinarily suspended from the supporting structure at four points, and I use four insulated suspending devices or hangers to suspend the rheostat from the support or car body. Each insulated hanger is preferably constructed as follows, see Fig. 1.

I interpose, between the supporting structure 10 and the suspended rheostat or apparatus 1, an insulating spacer body 3 which is made out of non-conducting, non-absorbent insulating material, such as glass, earthenware or porcelain and which has a dripping lip 3^x. The shape of this insulator or spacer 3 is such as to give it the most possible creepage surface without decreasing the mechanical strength of same. This insulator 3 surrounds a bolt 4 the lower end of which passes through an opening in the flange 1^d of the rheostat end wall, and is secured thereto by a nut 4^a and interposed washer 4^b. The upper end or head 4^c of bolt 4 is seated in a cavity in an insulator block or body 5 of tough fibrous insulating non-absorbing material, the cavity being of such shape as to prevent the bolt turning when its head is inserted therein. The

block 5 is fitted within a metallic casing 6 which is closed by a cap 6^a which is preferably soldered thereto; and this casing 6 rests upon a flange 10^a on the supporting structure 10 attached to the car frame or body from which the rheostat is to be suspended.

The bolt 4 is effectually insulated from the part 10^a by means of a bushing 7 made out of non-conductive non-absorbent insulating material which has a flange 7^a on its upper end fitted within the casing 6 underneath the block 5; and said bushing 7 extends down around the bolt 4 through insulator 3 and effectually insulates the bolt from the casing 6 and the part 10^a. The casing 6 preferably has a cylindric extension 6^b on its lower end which surrounds the upper part of the bushing 7 below flange 7^a and extends through the opening in the part 10^a and slightly into the bore of the insulator 3, see Fig. 1. The object of the extension 6^b of the protecting casing 6 is to prevent cutting of the bushing 7 by the vibration of the rheostat, or chafing against part 10^a.

Between the bottom of the casing 6 and the supporting structure 10^a is an insulating washer 8 which prevents moisture or any foreign substances from coming in contact with the interior of the insulator.

Between the spacer or insulator 3 and the supporting structure 10 and between the insulator 3 and the suspended apparatus 1 are placed washers 8^a and 8^b; said washers 8, 8^a, 8^b are made of elastic non-conductive, non-absorbent material, to prevent moisture from getting into contact with bolt 4, and to relieve the compression contact pressure on insulator 3.

After the head of connecting bolt 4 is inserted in insulator 5 within protecting casing 6, the whole is thoroughly boiled in a non-conductive, non-absorbent compound, such as paraffin, and the cavity in block 5 is filled with same, as indicated at 5^a to prevent the bolt head 4^a from making contact with metal cap 6^a which is then securely soldered to protecting casing 6.

Insulating suspending devices thus constructed will effectually prevent moisture or any foreign substances coming into contact with the bolt 4, which is surrounded by the non-conductive bodies 7 and 3, and 7 and 5; and moisture is prevented from getting to the head of the bolt by the filling 5^a and the flange 7^a on the upper end of the bushing 7 which extends into the lower end of the protecting casing 6.

The upper section of my insulator is a body of non-conductive, non-absorbent tough fibrous material, surrounding the bolt head, and having the cavity in its upper end receiving the bolt head, filled with a non-conductive, non-absorbent compound; said body of insulating material resting on the flange of a bushing 7 made of non-conductive, non-absorbent material, which bushing surrounds the bolt to its threaded lower end and is in turn protected by the casing 6 and the insulating spacer 3.

The upper section of my insulating hanger is inclosed in a metallic protecting casing which extends down through the supporting structure, and enters the insulating body or spacer 3 interposed between the suspended apparatus and the supporting structure; the extended portion of the casing protecting the bushing from injury by abrasion against the supports, or otherwise. The distance the said extended portion of the casing enters said spacer or insulator, depends on the size of the latter, but should not exceed one-fifth the height of said insulator, in order to maintain sufficient creepage surface, or separation, between said protecting casing and the suspended apparatus.

What I claim is:

1. An insulating suspending device comprising a casing, a bolt having its head confined in said casing and its body projecting therefrom, an insulating bushing surrounding the exterior portion of the bolt and extending into the casing and having a flange on its end within the casing, an insulating body in the casing surrounding the head of the bolt and resting upon the bushing flange, and an insulating spacer on said bushing outside the casing, substantially as described.

2. An insulating suspending device, comprising a casing, a bolt having its head in the casing and its shank projecting therefrom, an insulating bushing surrounding the shank of the bolt below the casing and extending thereinto and having a flange on its upper end within the casing, an insulating block in the casing surrounding the head of the bolt and resting on the flange of the bushing, and having a recess for the reception of the bolt head, a non-conductive moisture proof substance filling said recess, and an insulating spacer body strung on said bushing and bolt below the casing, and between the latter and the suspended device.

3. In combination with a supporting structure and an electrical apparatus adapted to be suspended therefrom; of an insulated suspending device comprising a casing mounted on said supporting structure, and having a cylindric extension depending through the supporting structure, a bolt having its head confined in said casing and its shank depending therefrom and extending through said structure, an insulating bushing surrounding the shank of the bolt and extending through the cylindric extension of the casing, an insulating block in the casing surrounding the head of the bolt above the bushing, and an insulating spacer

body strung on said bushing and bolt below the casing, and interposed between the supporting structure and the suspended apparatus.

4. In combination with a supporting structure and an electrical apparatus adapted to be suspended therefrom; of an insulated suspending device comprising a metallic casing mounted upon said structure and having a cylindric extension depending through an opening in the supporting structure, a bolt having its head confined in said casing and its shank extending therethrough and depending below said structure, an insulating bushing surrounding the shank of the bolt and extending through the opening in the supporting structure into the casing and having a flange on its upper end in the casing, an insulating block in the casing surrounding the head of the bolt and resting upon the bushing flange and recessed above the bolt head,—a non-conductive moisture proof substance filling said recess, and an insulating spacer body strung on said bushing and bolt between the support and the suspending device and surrounding the lower end of the extension of the casing, substantially as described.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

JOHN CHRISTENSEN.

Witnesses:
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