(No Model.)

# F. H. DANIELS.

## RAIL BOND FOR ELECTRIC RAILWAYS.

No. 556,046. Patented Mar. 10, 1896.

Fig. 1.

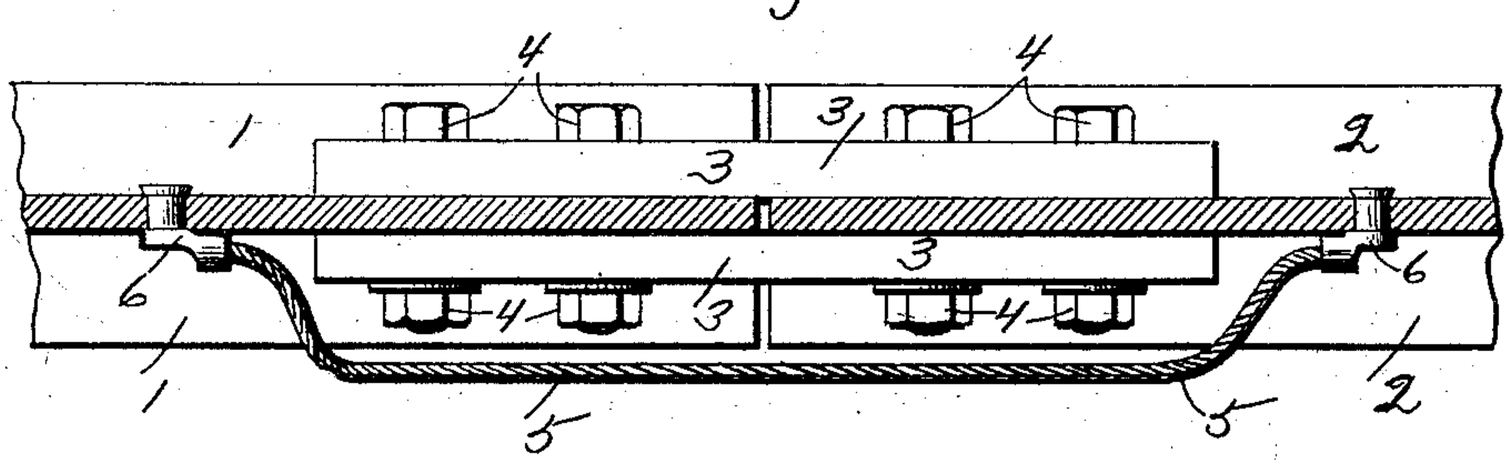



Fig. 2.

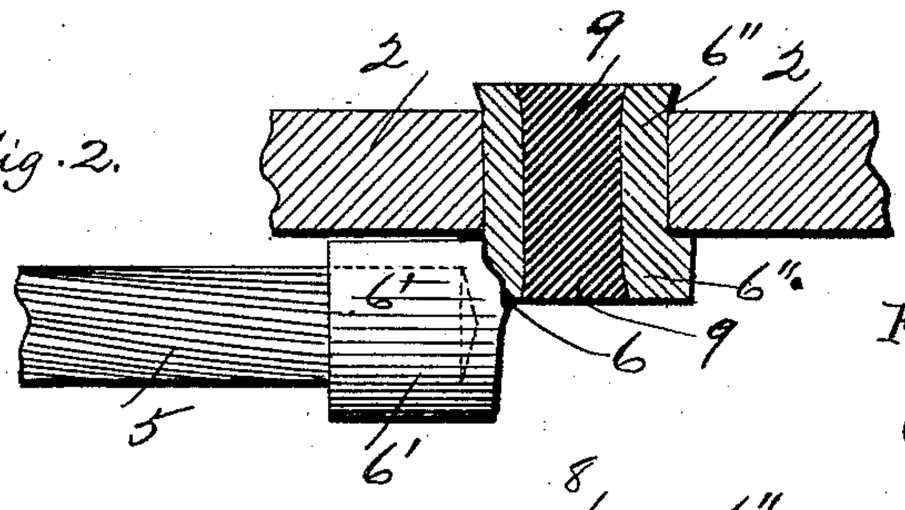



Fig. 3.

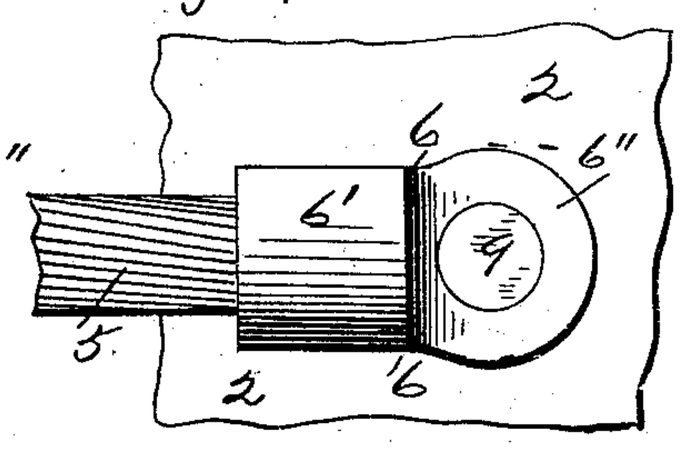
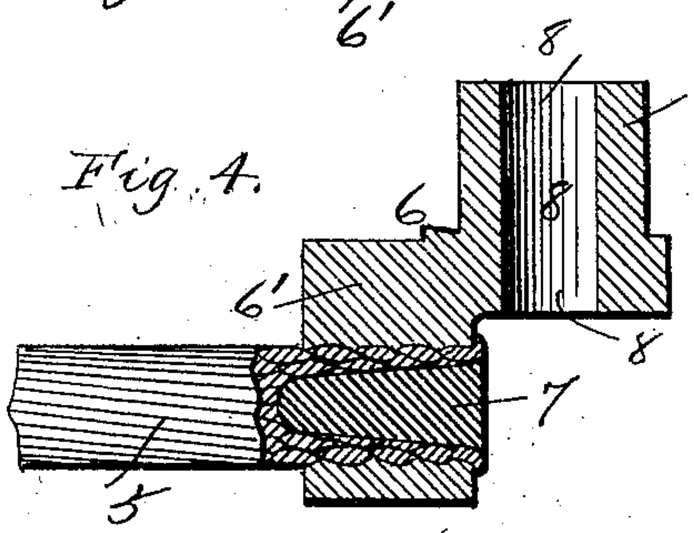



Fig. 4.

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# UNITED STATES PATENT OFFICE.

FRED H. DANIELS, OF WORCESTER, MASSACHUSETTS.

## RAIL-BOND FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 556,046, dated March 10, 1896.

Application filed June 26, 1895. Serial No. 554,092. (No model.)

*To all whom it may concern:*

Be it known that I, FRED H. DANIELS, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Rail-Bonds for Electric Railways, of which the following is a specification.

My invention relates to rail-bonds for electric railways; and the object of my invention is to improve upon the construction of rail-bonds as now ordinarily made, and more particularly to provide a flexible rail-bond wire or rod provided with terminals or ends made separate therefrom and consisting of a head, preferably of cylindrical shape, to receive the end of the bond-wire, and a portion extending at right angles to the head, also of cylindrical shape, and adapted to extend through the hole in the rail, said portion being made hollow or having a hole or opening extending through it, through which the drift-pin is driven, or into which a taper-tool may be driven first from one side and then from the other to expand the metal.

My invention consists in certain novel features of construction of my rail-bond, as will be hereinafter fully described, and the nature thereof indicated by the claims.

Referring to the drawings, Figure 1 is a sectional plan view of the adjacent ends of two rails with my rail-bond applied thereto. Fig. 2 is a sectional detail of the rail and one end of the rail-bond secured to the rail by a drift-pin. Fig. 3 is a view of the parts shown in Fig. 2, looking in the direction of arrow *a*, same figure; and Fig. 4 shows a modified way of securing the end of the flexible rail-bond wire to the terminal by a pin. Figs. 2 to 4, inclusive, are on an enlarged scale.

In the accompanying drawings, 1 and 2 are adjacent ends of two rails fastened together by fish-plates 3, secured thereto by bolts 4, in the ordinary way.

5 is a flexible rail-bond wire or rod, preferably made of separate strands of copper wire twisted or coiled together.

6 are the terminals or ends, preferably made of copper, and consisting of the head or portion 6′, preferably of cylindrical shape, and provided with a hole or opening therein into which the end of the bond-wire 5 extends, as shown in Fig. 2.

The end of the bond-wire 5 is preferably secured in the head 6′ of the terminal or end 6 by brazing, but it may be secured by having the hole or opening extend through the head 6′ and driving a pin 7 into the end of the bond-wire 5, as shown in Fig. 4. The other portion, 6″, of the terminal or end 6 is made of cylindrical shape and extends at right angles to the head 6′, and is adapted to enter the hole or opening in the rail. The portion 6″ is preferably made hollow, or provided with a hole or opening 8 extending through it in the direction of its length (see Fig. 4) to receive the drift-pin 9. After the part 6″ of the terminal 6 is inserted through the opening in the rail the drift-pin 9 is driven into the hole 8 in said part 6″ and acts to force the exterior part of said part 6″ into solid contact with the surface of the hole in the rail and make an absolutely-tight joint and insure perfect conductivity, so that there will be no resistance to the passage of the electric current through the joint from iron or steel to copper and from copper to iron or steel. After the drift-pin 9 is driven through the opening 8 the ends of said pin, and also of the part 6″, are headed or upset, as shown in Fig. 2, to prevent said part 6″ from moving either way in the rail.

The advantages of my rail-bond will be readily appreciated by those skilled in the art. I provide a flexible bond which can be readily bent to make it fit the holes in the rails in case said holes are at different distances apart.

By making the portion of the terminal or end which extends through the hole in the rail of large diameter I provide a large area of copper surface to be brought in contact with the iron or steel rail, and by driving a drift-pin or a taper-tool into the hole or opening extending through said portion I force the copper surface into solid contact with the iron or steel and hold it there, and by heading or upsetting both ends of said portions, and also of the drift-pin, I prevent any motion of the same in either direction.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a rail-bond, the combination with the two terminals or ends 6, consisting of the head 6′ of cylindrical shape, into which the end of the bond-wire extends, and the portion 6″ also of cylindrical shape, and extending at right angles to the head 6′, and provided with a central opening extending through it to receive the drift-pin, of the bond-wire secured at its ends to the terminals, substantially as set forth.

2. In a rail-bond, the combination with the two terminals or ends each having a head of cylindrical shape, and provided with an opening to receive the end of the bond wire or rod, and the cylindrical hollow portion adapted to extend through a hole in the rail, and to receive a drift-pin or taper-tool, of a bond wire or rod made separate from said terminals, substantially as set forth.

3. In a rail-bond, the combination with two terminals or ends, having an opening or perforation through the head or that portion thereof which receives the end of the bond-wire, and an opening or perforation through that portion which is inserted in the hole in the rail, of the flexible bond-wire, having each end inserted in the opening in the head of the terminals or ends, and secured therein by a pin driven into the end of said wire, substantially as set forth.

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