No. 834,689. PATENTED OCT. 30, 1906.

C. R. STURDEVANT.

RAIL BOND.

APPLICATION FILED JULY 7, 1905.

Fig. 1.

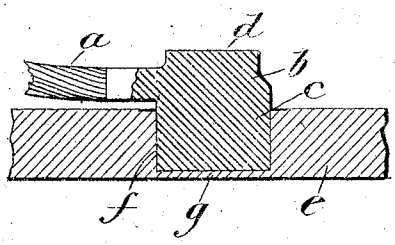


Fig. 2.

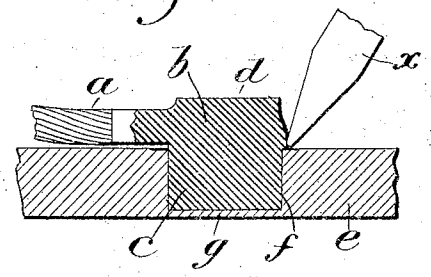


Fig. 3.

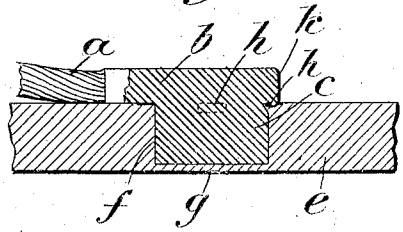
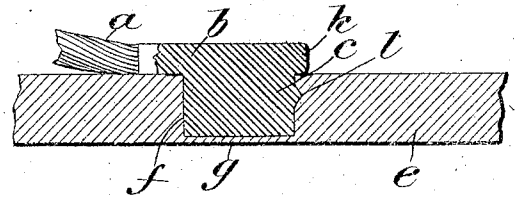


Fig. 4



Witnesses.

W. Edelin.

R. Court.

Inventor:

Charles R. Sturdevant,

by Lemmé & Goldsborough

attys.

UNITED STATES PATENT OFFICE.

CHARLES R. STURDEVANT, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO AMERICAN STEEL & WIRE COMPANY, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF NEW JERSEY.

RAIL-BOND.

No. 834,689. Specification of Letters Patent. Patented Oct. 30, 1906.

Application filed July 7, 1905. Serial No. 268,716.

To all whom it may concern:

Be it known that I, CHARLES R. STURDEVANT, a citizen of the United States, residing at Worcester, county of Worcester, State of Massachusetts, have invented certain new and useful Improvements in Rail-Bonds; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain new and useful improvements in rail-bonds for electrical railways or connections for electrical conductors, and has for its objects to provide a bond with an improved form of terminal which can be effectively driven into a bottomed cavity or cup-shaped hole in the rail; to provide a rail-bond having terminals which may be so applied to the conductor-rail as to insure permanent and efficient contact and which will obviate the disadvantages inherent in most of the devices heretofore employed and the modes of applying the same; to provide a joint between the terminal and the rail having a greater contact area than has been possible to obtain heretofore, and a consequent decrease in contact resistance; to lower the cost of installation and facilitate the application of the bond by obviating the necessity of using compressors, and to greatly reduce the liability of corrosion of the contact-surfaces between the bond-terminals and the rail. Other objects of the invention will appear more fully hereinafter.

In the accompanying drawings, Figure 1 is a transverse section through one terminal of the bond and the coöperating conductor-rail, showing the terminal in the initial stage of its application. Fig. 2 is a corresponding view showing the terminal in the succeeding stage of application. Fig. 3 is a similar section showing the completed joint. Fig. 4 is a view similar to Fig. 3, illustrating a slightly-modified construction of terminal and cup-shaped cavity in the conductor-rail.

In carrying out my invention I provide a connector for the adjacent ends of the conductor-rails comprising the usual flexible conductor, which may take the form of a bundle of twisted wire strands, intimately connected with the terminals which engage the rail-sections. Each of said terminals consists of the body portion *b*, to which the connector *a* is attached, and a stud portion *c*, projecting from the inner face thereof, which stud has a diameter preferably greater than its length, and a boss or projection *d* on the outer face of the terminal, which boss or projection lies within or is included within the lateral walls of the terminal and is preferably of less cross-sectional area than the stud portion *c*. The conductor-rail *e* is provided with a bottomed cavity or cup-shaped opening to receive the stud portion *c* of the terminal, said cup-shaped opening consisting of a drill-hole *f*, which passes only part way through the section of the rail, leaving a fin or web *g*, which forms the bottom of the cavity.

The length of the terminal stud *c* which enters the cavity or cup-shaped opening *f* in the conductor-rail is preferably made from one-half to three-fourths of the diameter of said stud portion and a little greater than the depth of the hole *f* for best results. The metal which constitutes the boss *d* on the outer face of the terminal, together with that which forms the stud portion *c*, is sufficient to entirely fill the opening in the rail and to overflow the edges of the hole upon the surface of the rail and form a projection or shoulder *k* under the action of heavy hammer-blows, thus increasing the contact-surface between the terminal and the rail and effectively sealing the joint. The terminals may of course be made of any appropriate metal, though it is customary and preferable to use copper for this purpose, owing to its high conductivity and plastic properties.

In applying a bond of the character hereinbefore described a hole *f* is drilled to any desired depth in the rail-section *e*, and preferably, though not necessarily, a bright metallic annular surface is produced on the rail adjacent to the opening. The bottom of the cup-shaped hole or opening may be made quite flat in thin rail-sections, as shown in Figs. 1, 2, 3, and 4, or said bottom portion may be given a conical form without seriously affecting the efficiency of the joint, it being evident that the exact contour of the opening in the rail or the form of the bottom thereof is not essential. The stud portion *c* of the terminal is inserted in the cup-shaped hole *f* and subjected to the application of a few heavy blows by a sledge-ham-

mer (or to compression, if desired) until the terminal is partly compressed and takes the general form as outlined in Fig. 2, in which the hole *f* has been entirely filled and a small amount of metal has been forced out over the surface about the edge of the hole. A blunt-pointed tool, as *x*, is driven into the metal of the rail about the edge of the hole at one or more places, so as to upset the metal around the edge of the hole and force the small portions *h* thereof into the body of the stud *c*, which serves to hold the terminal rigidly in position in the cup-shaped opening in the rail. It has been found that three such indentations or projections render it quite impossible to remove or loosen the terminal; but of course any desired number of such indentations may be made. After these indentations have been made the terminal is further subjected to the riveting action of the hammer until the terminal takes the generally-finished form as shown in Fig. 3. During this operation the metal will be forced into the cavity or cup-shaped opening and will completely fill overy pore and minute depression of the wall about the hole in the rail. This construction of terminal and cup-shaped opening and the mode of applying the terminal to the opening makes an extremely rigid and permanent joint of very high conductivity which absolutely excludes the air and moisture which would tend to corrode the same. The operation of hammering the copper into the hole rapidly hardens it and renders the joint all the more secure and permanent. By making small prick-punch depressions in the lateral walls of the hole *f*, as shown at *l* in Fig. 4, or by drilling, threading, or otherwise slightly indenting or roughening the wall of the cavity, the copper of the terminal will be forced into the depressions thus formed, and as the cross-sectional area of the cavity through these depressions will be increased over that at the entrance of said cavity the connection between the rail and the terminal will be, in effect, a dovetailed joint and the terminal will be rendered correspondingly more rigid, though, of course, it is to be understood that the application of this roughening or indenting of the surface is not essential to the success of the invention. The body portion of the bond connecting the terminals may be of any desired capacity or of any preferred form or construction and arrangement of strands or laminations. It is also obvious that the terminals may be connected to the body portion *b* in any suitable manner that may be desired, and it is to be understood that the invention is not to be limited or restricted in these respects.

Having thus described my invention, what I claim is—

1. A rail-bond, comprising a connecting-body and solid metal terminals, each of said terminals having an integral boss or enlargement on its outer face of less cross-sectional area than the remainder of the terminal.

2. A rail-bond, comprising a connecting-body and solid metal terminals, each of said terminals having an integral boss or enlargement on its outer face, and a stud on its inner face, the diameter of the studs being greater than their length, and the cross-sectional area of the bosses or enlargements being less than that of the studs.

3. A rail-bond, provided with a metal terminal having a stud on one face and a boss or projection on the opposite face thereof, said boss lying within the cross-sectional area of the stud, and a conductor-rail having a bottomed cavity to receive the terminal stud.

4. A rail-bond, provided with a solid metal terminal stud, and a conductor-rail having bottomed cavity to receive said terminal stud, the cross-sectional area of said cavity being increased below the entrance or initial portion of said cavity.

5. A rail-bond, provided with solid metal terminals, each having a stud on one face and a reduced boss on the other face thereof, and conductor-rails having hollow cup-shaped openings to receive the studs of said terminals, the cross-sectional area of each cavity being increased below the entrance or initial portion thereof.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES R. STURDEVANT.

Witnesses:
H. M. LATHAM,
THOS. MACDUFF.