No. 683,250. Patented Sept. 24, 1901.

S. P. COWARDIN.

ELECTRIC RAIL BOND.

(Application filed Feb. 19, 1901.)

(No Model.)

Fig. 1.

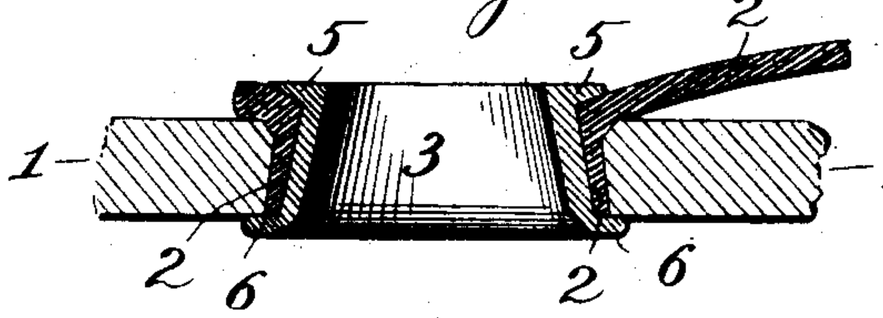


Fig. 2.

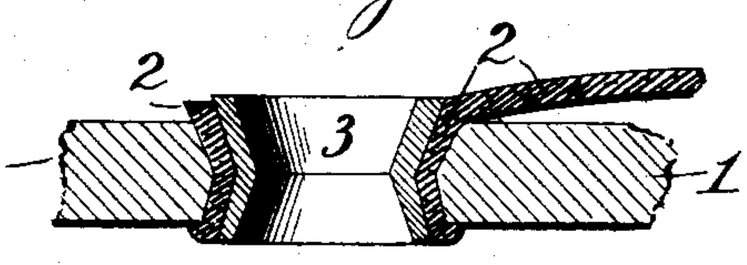


Fig. 3.

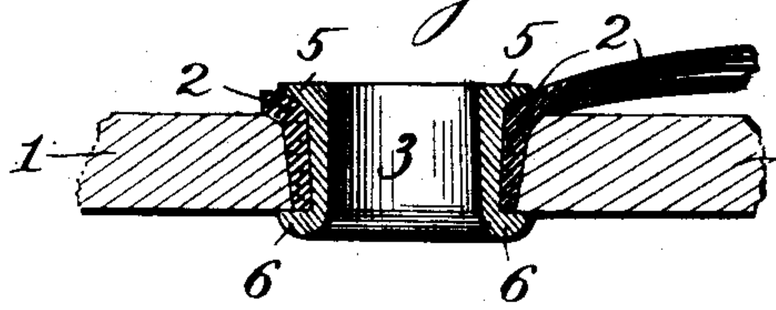


Fig. 4.

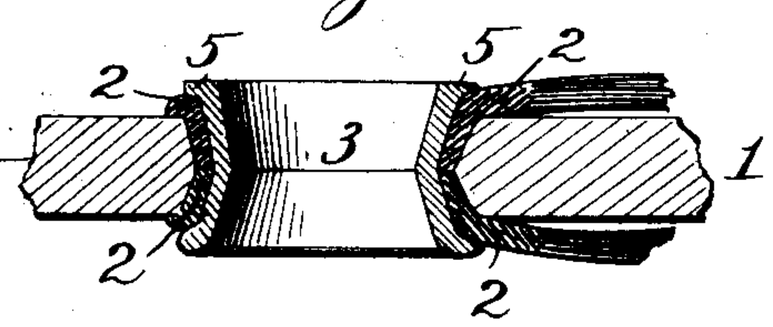


Fig. 5.

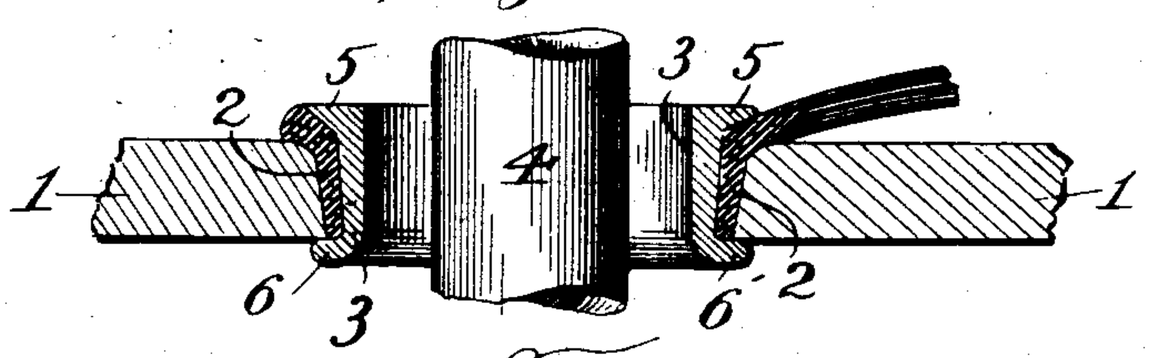


Fig. 6.

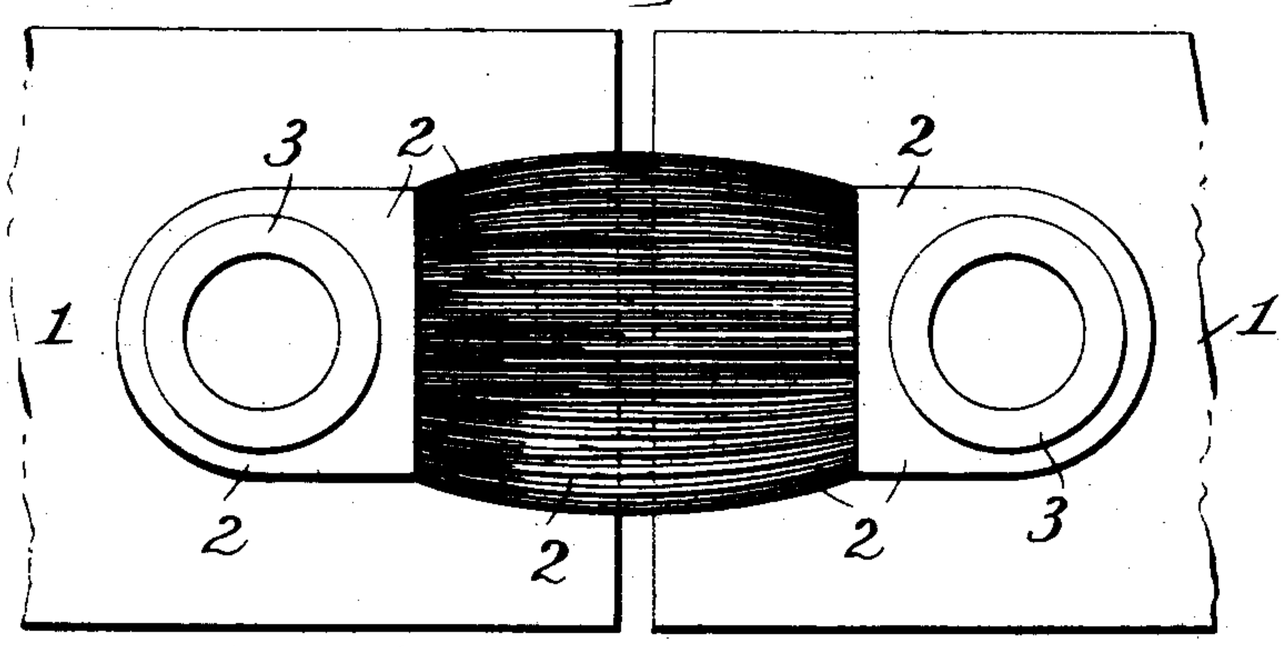
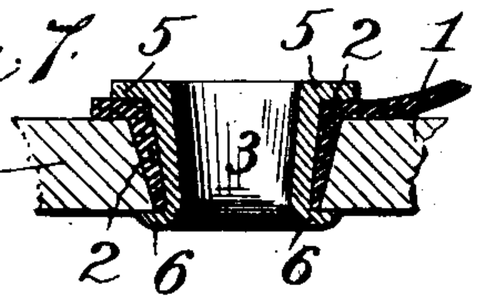


Fig. 7.



Witnesses
Jas. E. Hutchinson.
M. F. Ackley

Inventor
Samuel P. Cowardin
by [illegible]
Attorney.

UNITED STATES PATENT OFFICE.

SAMUEL P. COWARDIN, OF RICHMOND, VIRGINIA.

ELECTRIC RAIL-BOND.

SPECIFICATION forming part of Letters Patent No. 683,250, dated September 24, 1901.

Application filed February 19, 1901. Serial No. 47,997. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL P. COWARDIN, a citizen of the United States, residing in Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Electric Rail-Bonds; and I do 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, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to electric rail-bonds; and it has for its objects to form a bond in which each terminal will consist of a ferrule made from copper or other electric conducting material fitted in an opening in the rail and a second ferrule, of soft iron or steel, fitted in the outer ferrule and expanded against the inside wall of the outer ferrule, so as to force the outer ferrule into close contact with the wall of the opening in the rail, the inner ferrule thus holding the outer ferrule in close contact with the rail and at the same time forming an opening through which the splice-plate bolt may pass. It has also for its object to connect the two terminals or copper ferrules by means of a number of soft-wire conducting-strands—for instance, of copper—with the terminals or copper ferrules so spaced apart that the soft conducting-strands which connect the two terminals will be crumpled or bent from a straight line, thus providing for contraction and expansion without damaging the connecting conductor-wires between the terminals or damaging the terminals themselves.

To the accomplishment of the foregoing and such other objects as may hereinafter appear the invention consists in the construction and also in the arrangement of parts hereinafter particularly described and then sought to be clearly defined by the claims, reference being had to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a sectional plan view of one form of my invention. Fig. 2 is a similar view showing a different form of the two ferrules. Fig. 3 is a similar view showing another form of ferrules, the outer ferrule being made from a number of copper wires welded together to form the outer ferrule and having a number of terminal connecting-strands extending therefrom. Fig. 4 is a similar view showing a double bond, the outer ferrules being formed in a similar manner to the outer ferrule of Fig. 3. Fig. 5 is a similar view to Fig. 3, showing a splice-plate bolt extending through the inner ferrule. Fig. 6 is an elevation showing the adjacent ends of two rails having my bond applied thereto and showing the connecting conductor-strands crumpled or bent between the two terminals, and Fig. 7 is a sectional plan view showing the inner ferrule of a conical or funnel shape.

In the drawings the numeral 1 in the several figures designates a rail which has an opening drilled through it, and within the opening is placed a ferrule 2, made of suitable electric conducting material, the material preferably being copper. Within this ferrule is placed a second ferrule 3, which is made of soft steel or iron. The inner ferrule is now expanded against the inside wall of the outer ferrule by means of a suitable tool inserted in the inner ferrule, so as to force the outer ferrule into close contact with the wall of the opening in the rail, after which the tool is removed and the inner ferrule left free for the passage of a splice-plate bolt 4 when the same is to be used. The outer ferrule being of copper, and hence of a softer material than the inner ferrule, it is pressed into such close contact with the wall of the opening in the rail that a close union is effected between the copper of the furrule and the metal of the rail, so as to afford an easy path for an electric current, and the inner ferrule, being of steel or iron, and hence of a harder material than the copper ferrule, the inner ferrule will retain the shape and expansion imparted to it by the tool, and thus will insure constant close contact between the copper ferrule and the rail and guard against the contact being broken or lessened by reason of jars or vibrations occurring or arising from constant use of the rails. By using an inner expanded ferrule as a means for holding the outer ferrule in contact with the rail the pressure of the inner ferrule against the inside wall of the outer ferrule may be made uniform throughout and, if so desired, can

be made greater at one point than another, according to the shape of the tool employed or the pressure that may be applied to the inner ferrule in expanding the same, and thus uniform or close contact can be obtained between the copper ferrule and the rail at all points, so as to afford a most easy path for the electric current. Another advantage obtained is that after the bond is made the inner ferrule constitutes an opening through which the splice-plate bolt may be passed. One end of the inner ferrule may be formed with the lip or flange 5, and after the ferrule has been inserted in the outer ferrule its opposite end may be turned outwardly to form a bead 6, which may overlie the side of the rail and prevent the ferrule from working out of the outer ferrule if the ferrule is not otherwise formed to accomplish the same result, the bead 6 being formed by means of the expanding-tool, which will be suitably formed for that purpose, although the bead may be formed in any suitable way. If the ferrule be given the form illustrated in Fig. 2 of the drawings, wherein it is shown in the form of a hollow double truncated cone, the flange at one end and bead at the opposite end may be omitted, as the double inclined wall of the ferrule will prevent the ferrule from working out of place. This shape of the ferrule will be given to it by a suitably-shaped tool, which is used for expanding the ferrule, and the shape will be imparted to the copper ferrule, which will thus be made to fit in close contact with the wall of the opening in the rail, said wall in this instance being illustrated as inclined toward the middle from both sides of the rail. In Fig. 3 of the drawings the ferrule is illustrated as conical on its outside or circumference, and in this form it is provided with the flange 5 at one end and with the bead 6 at the other end, said flange and bead being formed in like manner as those heretofore described. In Fig. 4 of the drawings the inner ferrule is illustrated with the flange at one end and the bead at the other, the same as in Fig. 3 of the drawings, and illustrating, in addition, a splice-plate bolt passed through the inner ferrule. In Fig. 4 of the drawings I have illustrated what for convenience I designate a "double bond," and in which two soft-metal or copper ferrules are illustrated, the two entering the opening in the rail from opposite sides of the rail and each ferrule extending part way through the opening. By this construction I secure a very large capacity in a very small space. The inner ferrule is illustrated as of the double-flaring or double-truncated-cone type, the shape being imparted by the expanding-tool, and the wall of the opening in the rail is of the double-inclined type similar to that illustrated in Fig. 2 of the drawings. In this form the ends of the inner ferrule may be formed with a flange and a bead, as illustrated in some of the other forms, or may be made without the same. In Fig. 7 the inner ferrule is illustrated as conical or funnel shaped, and the opening in the rail is of a corresponding shape. Under this form as the inner ferrule is pressed or forced inside of the outer ferrule the latter is pressed into contact with the wall of the opening in the rail, and after the inner ferrule is in position its lower portion is expanded and formed with the bead 6 by means of the expanding-tool. The inner ferrule, being of iron or steel, and hence considerably harder than the outer ferrule, will not only press the outer ferrule closely against the wall of the opening in the rail while pressing or forcing the inner ferrule in place, but will also hold the outer ferrule in close contact with the metal of the rail, and the inner ferrule will be prevented from working out of place by means of the bead formed after the ferrule has been put into position.

It will be observed that in all of the different forms the same principle of construction is common to them all in that in each form the inner ferrule, of soft steel or iron, is expanded by a suitable tool, so as to force and hold the outer soft-metal or copper ferrule in close contact with the wall of the opening made in the rail, and when the tool is removed the inner ferrule is open or free for the passage of the splice-plate bolt when the same is used. It will be observed that in Figs. 1 and 2 the extension of the outer copper ferrule is solid, while in the other figures of the drawings the extension is made up of a number of soft wires or strands. When made in this form, the two terminals of the bond will be connected together by a number of these soft-metal or copper strands, which serve as the conductor for the current from one terminal to the other. When the two terminals are so connected, they may be placed at such distance apart that the soft strands connecting the two will be made to bend or crumple, and thus admit of or compensate for contraction and expansion without detriment to the bond. These strands are normally straight as distinguished from coils, and therefore this form admits of a comparatively larger number of conducting-strands being employed between the two terminals, so that there will be a freer passage afforded for the electric current and greater freedom in contraction and expansion is provided for than would be the case if the connecting-conductors were otherwise formed.

I have illustrated and described different forms of ferrules for the purpose of indicating that my invention is not limited to any particular form and that various forms may be employed and be within the scope of my invention, so long as the essential features of the invention hereinbefore particularly pointed out are employed. While I have illustrated the bond and described it as connecting two rails, it is obvious that I am not confined to any particular point of application of the bond, as the invention is the same

wherever it may be applied to connect parts or members of the rail and wherever it will serve the purposes hereinbefore set forth.

It will be understood that in general practice the flange 5 at one end of the ferrule will be formed at the time that the ferrule is made and that only the bead at the opposite end is formed by the expanding-tool; but if the flange 5 should also be formed by the expanding-tool it would be within the scope of my invention to so form it.

Having described my invention and set forth its merits, what I claim is—

1. An electric rail-bond comprising an outer ferrule, and an inner expanded ferrule for pressing and holding the outer ferrule in contact with a rail member, one ferrule being of a comparatively harder material than the other ferrule, substantially as described.

2. An electric rail-bond comprising an outer ferrule to fit in an opening in a rail member and an inner ferrule of varying dimensions fitting within the outer ferrule and of a comparatively harder material than the outer ferrule, said inner ferrule serving to expand the outer ferrule and hold it in its expanded condition, substantially as described.

3. An electric rail-bond comprising two outer ferrules lying within an opening in a rail member with their adjacent ends contiguous to each other, and an inner ferrule fitting within the outer ferrules and expanded to hold the outer ferrules in contact with the wall of the opening in the rail member, said outer ferrules each having conductors leading therefrom, substantially as described.

4. The combination with a rail member having an opening formed with a wall of varying dimensions, of a rail-bond comprising an outer ferrule to fit in said opening and having its outer face conforming to the shape of the opening in the rail member, and an inner ferrule fitting within the outer ferrule and having its outer face conforming to the inner face of the outer ferrule, said inner ferrule being shaped to prevent end movement in either direction and expanded to hold the outer ferrule in contact with the wall of the opening in the rail member, substantially as described.

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

SAMUEL P. COWARDIN.

Witnesses:

THOS. N. WILLIAMSON,

H. T. BURNLEY.