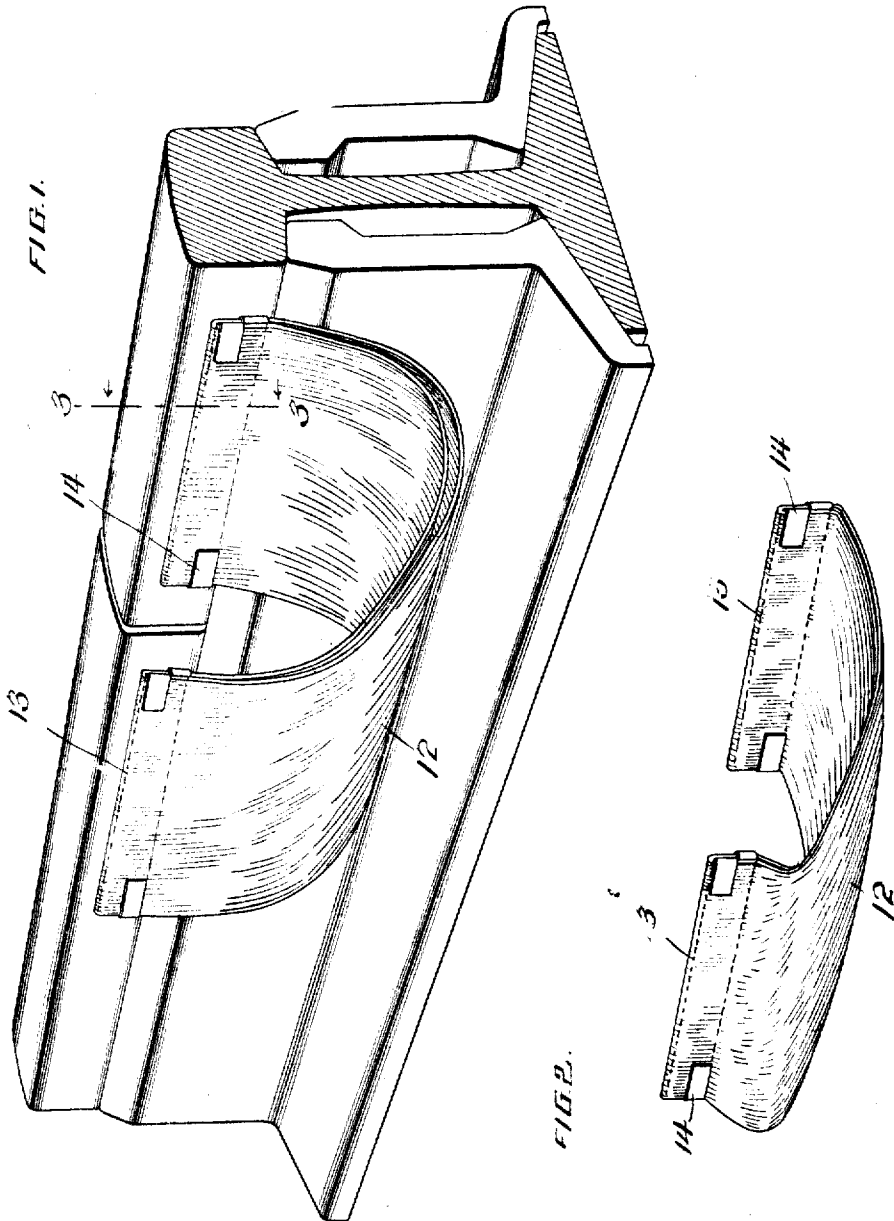


H. MILLIKEN.
RAIL BOND.
APPLICATION FILED FEB. 15, 1910.

Patented Nov. 21, 1911.
2 SHEETS—SHEET 1.

1,009,166.



WITNESSES:
Wm. H. Taylor.
G. M. Sweeney.

INVENTOR:
Humphreys Milliken,
BY *Robert R. R. R.*
Attorneys

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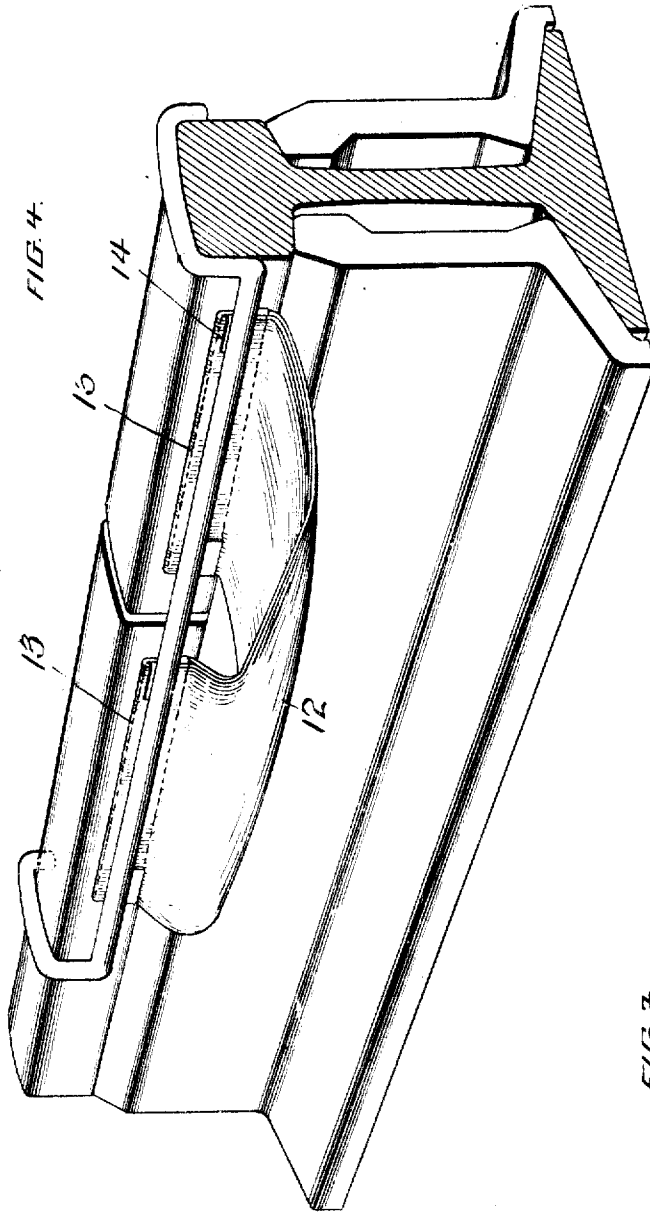
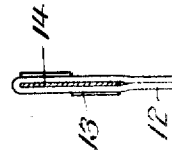


FIG. 3.



WITNESSES:
H. F. Kay, Jr.
L. H. Sweeney.

INVENTOR:
Humphreys Milliken
BY Calvin C. Calkins
Attorneys.

UNITED STATES PATENT OFFICE.

HUMPHREYS MILLIKEN, OF NEW YORK, N. Y.

RAIL-BOND.

1,009,166.

Specification of Letters Patent. Patented Nov. 21, 1911.

Application filed February 15, 1910. Serial No. 544,111.

To all whom it may concern:

Be it known that I, HUMPHREYS MILLIKEN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented or discovered certain new and useful Improvements in Rail-Bonds, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to bonds for electrically connecting the rails of electric railways, and has for its object to provide a bond which may be made at a minimum cost, which may be conveniently soldered to the rails, and which is of such construction as to avoid being injured by worn wheels and which will permit of a free flow of the electric current.

To this end the improved bond is made flat or comparatively thin throughout, and comprises a thin or flat body which is practically of the same width as the terminals of the bond.

The improved bond, in its preferred form, comprises a series of looped strands of copper wire made by winding the wire upon a former or mandrel, and then flattening together the convolutions of wire thus formed; but it may consist of sheet copper bent into proper shape and solid in the terminals of the bond, but closely slitted in the body portion of the bond; or, for greater flexibility, the bond may consist of several thin layers of sheet copper, formed, as just above referred to, and soldered together at the terminals of the bond.

In the accompanying drawings Figure 1 is a perspective view of a preferred form of the improved bond as it will appear when finally secured in place on the rails. Fig. 2 is a perspective view of the same as it will be preferably made, for convenience, for being soldered to the rails. Fig. 3 is a detail section on line 3-3, Fig. 1, through the terminal of the bond. Fig. 4 is a perspective view showing the bond in the form in which it appears in Fig. 2 and showing a convenient form of clamp by which the bond may be held to the rails when being soldered.

Referring to the drawings, 12 denotes the flat body portion of the improved bond, and 13 the terminals or end portions thereof.

The improved bond, in its preferred form, comprises 66 turns or convolutions, making

132 strands of #18 B. & S. gage copper wire, in multiple, in order to provide the required cross sectional and terminal dimensions, although it will be understood that the number of strands of the improved bond or the size of the wire comprising the same may be varied as may be desired. In flattening the turns or convolutions of the wire together such convolutions are doubled or looped at the terminal portions of the bond, and to prevent the separation of the wires composing the bond, while being soldered at the terminals, the doubled or looped portions thereof are preferably held together by means of strips 14 of sheet copper or sheet tin passed through the loops and folded over against the faces of the looped wires at or adjacent to the terminals; or the looped wires may be held together by wires passed around the bodies of the bonds and stitched or joined at frequent intervals by fine wires passing between the strands of the bonds. The said looped wires are then soldered together at the terminals, to complete the bond.

To provide for conveniently attaching the improved bonds to the rails, by soldering or brazing, the terminals of the bonds are preferably bent at right angles, or approximately so, to the bodies of the bonds, as shown in Fig. 2; so that when a bond is clamped to the sides of the "balls" of contiguous or adjacent rails, as shown in Fig. 4, for soldering, a cooling brush may be readily applied beneath the terminals of the bonds, and may be readily shifted or slid from one terminal to the other. In soldering bonds to rails it is usual to apply a flat brush wet with water beneath the terminals being soldered, to solidify the melted solder poured onto the terminal and prevent the same from running down and being wasted; but in some forms of bonds heretofore generally in use, it has been difficult, owing to the forms of the bonds, to insert the cooling brushes in the desired positions beneath the terminals, and it has been impossible in most or all forms of bonds heretofore in use to conveniently slide or shift the cooling brush from one terminal to the other when the bonds are being soldered in place; and this objection to the convenient attachment of the bonds to the rails is avoided in the present improved construction wherein the bonds, when being soldered to the rails, have

their body portions extended out horizontally, as shown in Figs. 2 and 4, but which body portions are subsequently bent down vertically as shown in Fig. 1.

5 Owing to the comparatively thin and flat terminals afforded by the present improved bond, and which flat terminals thus lie much more closely to the bodies of the rails than the terminals of the bonds heretofore generally in use, the chances that said terminals
10 will be struck or injured by worn wheels are reduced to a minimum. Also the improved bonds, made in the manner above described, and having flat bodies which are practically of the same cross sectional area as the terminals of the bonds, require less copper in their construction for
15 conducting a given amount of current than the bonds heretofore generally in use, by reason of the fact that the material is more economically distributed and the maximum cross sectional area is maintained throughout. These bonds are also adapted to carry
20 more current, with the same rise in temperature, than the bonds heretofore generally in use, owing to their greater radiating surfaces. Also these flat bonds have a greater range of flexibility than the types of bonds
25 heretofore generally in use, and are less likely to become loosened from the rails owing to the shearing stress due to unequal expansion of copper and steel, this flexibility being due, as will be understood, to the fact that the terminals of the bonds, in
30 their preferred form, are composed of small wires, instead of being solid as in the bonds heretofore generally in use. Moreover the form of the present improved flat bond makes the use of a bond shield, consisting
35 of sheet iron secured under the heads of the track bolts more practicable than with

the types of bonds heretofore generally in use.

Having thus described my invention I claim and desire to secure by Letters Patent: 45

1. A rail bond consisting of thin, flat, flexible terminals and a relatively thin and substantially flat body portion of substantially the same width and thickness as the horizontal cross section of said terminals. 50

2. A rail bond consisting of thin, flat, terminals adapted for attachment to the ball of a rail, and a laterally flexible, relatively thin and substantially flat body portion connecting said terminals and normally depending therefrom. 55

3. A rail bond consisting of terminals composed of a series of vertically arranged strands of wire adapted for attachment to the side of the ball of a rail and a body portion comprising depending continuations of said strands, said strands being continuous between said terminals. 60

4. A rail bond consisting of thin flat terminals and a relatively thin and approximately flat body portion of substantially the same width as the terminals, said bond being composed of a series of strands of wire doubled on themselves at the terminals of the bonds, combined with strips of sheet metal passing through the looped portions of said wires and folded against the faces of the bonds, thereby serving to hold the looped wire strands together at said terminals. 70 75

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

HUMPHREYS MILLIKEN.

Witnesses:

LILLIAN J. RIDDLE,
ALBERT E. HOLL.