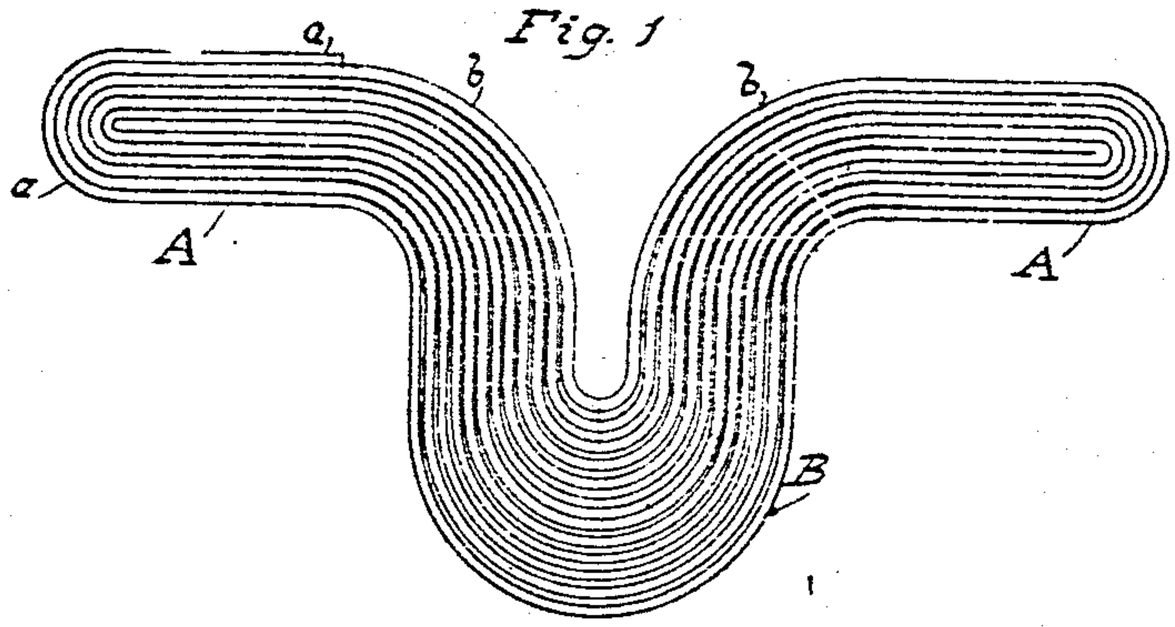
C. L. CADLE.

RAIL BOND.

APPLICATION FILED MAR. 1, 1906.

963,356. Patented July 5, 1910.

Fig. 1



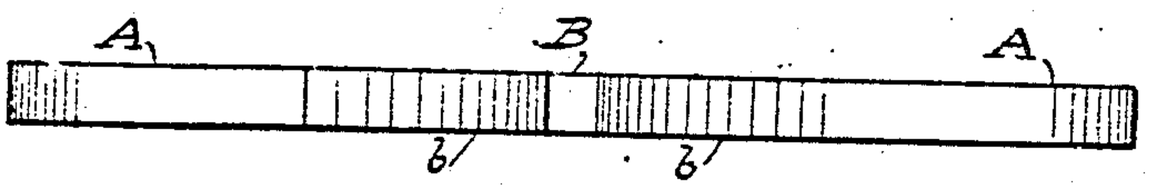


Fig. 2

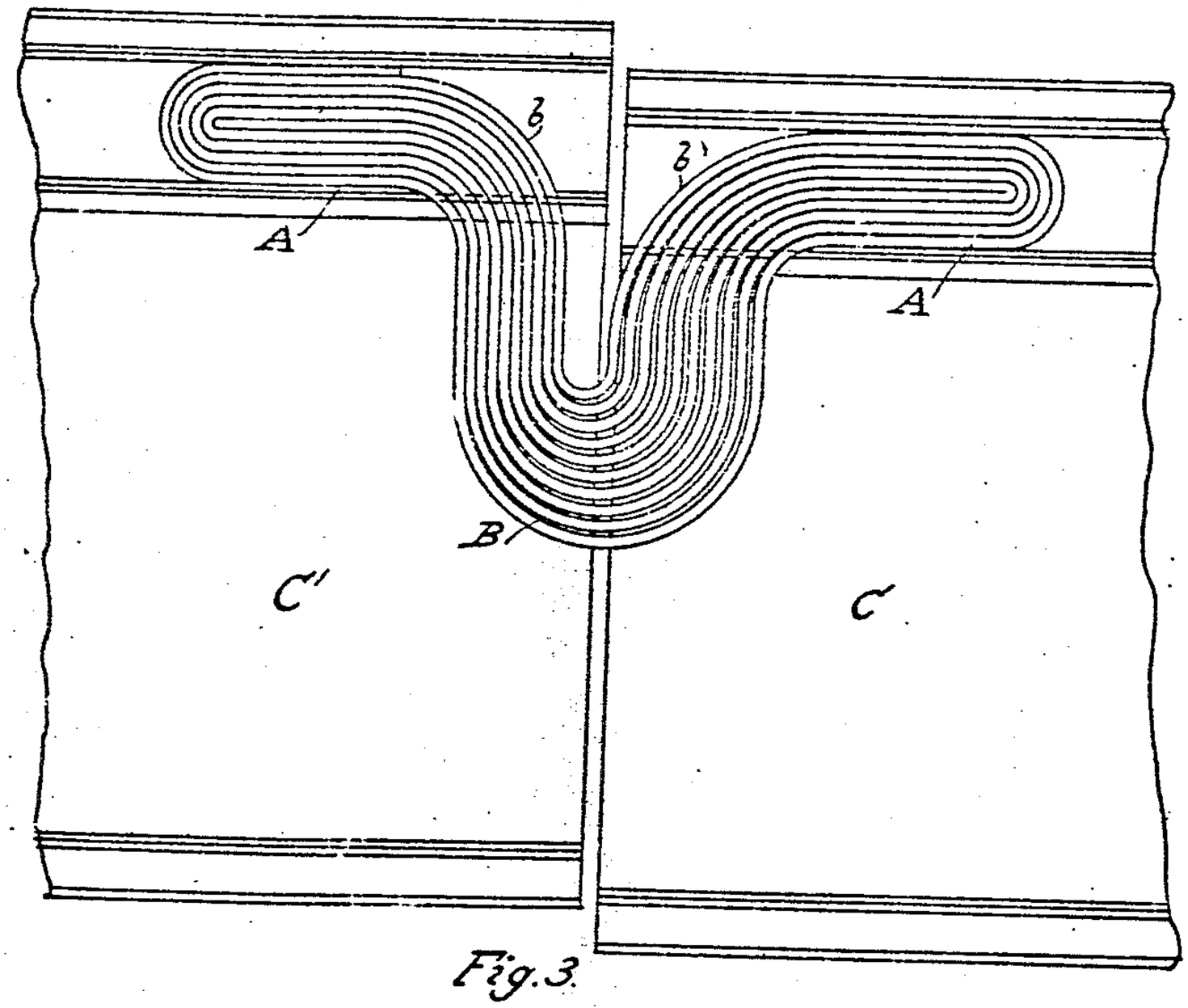


Fig. 3.

WITNESSES:

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CHARLES L. CADLE, OF CLEVELAND, OHIO, ASSIGNOR TO THE ELECTRIC RAILWAY IMPROVEMENT COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

RAIL-BOND.

963,356. Specification of Letters Patent. Patented July 5, 1910.

Application filed March 1, 1906. Serial No. 303,575.

To all whom it may concern:

Be it known that I, CHARLES L. CADLE, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Rail-Bonds, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to rail-bonds for electrically connecting the adjacent ends of contiguous rails.

The object of my invention is to produce a bond that will effect such connection of rails in an efficient and durable manner.

It relates more especially to the construction of the body of bonds of the laminated type and is not limited to any particular method or means for securing the bond in place on the rails.

Said invention consists of means hereinafter fully described and specifically set forth in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing: Figure 1 represents a side elevation of my bond as it appears in its normal condition; Fig. 2 is a top view of the same; while Fig. 3 is another side elevation of such bond showing it as it appears when applied to the ends of two rails and under one of the conditions of service peculiar to that situation.

As has been stated, and as readily appears from an inspection of the figures just described my improved rail-bond is of the laminated type; that is, it is composed of a number of superimposed strands or narrow strips of conducting material. Such superimposed strands or strips may be merely parts of the convolutions of a single continuous strand wound upon itself, or they may be separate strips suitably secured together at their ends. Such laminated bonds are usually attached at each end to the respective rails they are designed to connect, by being brazed or soldered thereto; although in certain instances heads have been cast or otherwise attached to their ends instead, whereby they could be attached by being riveted in suitable apertures in the rails.

As is well understood, a rail-bond to be satisfactory must possess at least two characteristics in addition to being of sufficient conductive capacity to accommodate the current in the rails; in the first place it must be capable of longitudinal contraction and expansion to accommodate the lengthening and shortening of the rails under the influence of varying temperatures, and in the second place it must have sufficient vertical flexibility to accommodate the displacement of the end of a rail that occurs, even on quite solid foundations, when a car passes over a joint. In bonds having a laminated structure longitudinal contraction and expansion are usually provided for by giving the portion of the bond intermediate of the ends, or feet, an arched form; while sufficient vertical flexibility has been assumed to be furnished by the laminated structure itself. In bonds, as heretofore constructed, however, the latter has been found not to be the case. The reason for this appears when it is reflected that in such bonds the superimposed strands or strips are tightly wound or held together, even in the intermediate arched portion. Accordingly when the bond undergoes flexure or bending, such flexure or bending is in mass and the outer strands in particular are subjected to an undue amount of strain. As a result the latter frequently snap asunder while the bond as a whole undergoes quite rapid disintegration.

I have deemed the foregoing explanation essential to a full understanding of the significance of my improvement, which consists simply in leaving in the arched portion of the bond a slight space between successive strands. This appears quite clearly in Fig. 1, where it will be perceived that while the strands *a* in the end or foot portions A of the bond are in close contact one with another, they are, beginning at the lower curve *b* of the arched portion B, wound successively more loosely so as to successively leave a slight space between adjacent convolutions.

In Fig. 3, as has been stated, the bond is shown as applied and in use. The end of one rail C is there represented as depressed below the level of the end of the adjacent rail C' just as would be the case were a car

to approach the joint from the right. Under these conditions of course the corresponding end of the bond is also depressed below the level of the other end. The effect produced thereupon in the disposition of the strands is at once evident; for the strands being free to move independently throughout the arched portion of the bond are all shoved laterally whereby they are tightly compressed together on the left side of the arch and are moved correspondingly farther apart on the right side. Were the individual strands not free to thus shift laterally, such shifting involving only a very slight flexure of any one strand, the bond would have to bend as a whole at points *b b* and more slightly at the summit of the arch. The detrimental effects of such bending incident as it is to each frequently recurring depression of first one rail end, then the other, has already been sufficiently dilated upon.

Bonds involving my improvement give evidence of lasting at least twice as long as those of the ordinary construction.

Inasmuch as the manner of attachment of the bond to the rails has evidently no bearing upon the movement of the strands in the arched portion, it follows that any approved mode either of brazing or riveting may be used indifferently without detracting from the added degree of flexibility which my construction provides.

Having thus described my invention in detail, that, which I particularly point out and distinctly claim, is:

1. As a new article of manufacture, a rail-bond composed of a continuous flat metal strand wound upon itself a plurality of times to form a laminated strip, said strip being bent to provide laterally extending feet and an arched intermediate portion, such parts of the several turns of said strand as enter into the feet being compressed closely together, and there being a space left between such parts as enter into the arched intermediate portion.

2. As a new article of manufacture, a rail-bond composed of a continuous flat metal strand wound upon itself a plurality of times to form a laminated strip, said strip being bent to provide laterally extending feet and a U-shaped intermediate portion, such parts of the several turns of said strand as enter into the feet being compressed closely together, and there being a space left between such parts as enter into the U-shaped intermediate portion, whereby such last named strand-parts are adapted to shift longitudinally of the bond when one foot of the latter is depressed below the other, substantially as described.

Signed by me this 14th day of February, 1906.

CHARLES L. CADLE.

Attested by:
D. T. DAVIES,
JNO. F. OBERLIN.