March 30, 1926. 1,578,901

C. G. McCAULLEY

RAIL BOND

Filed Sept. 18, 1922 2 Sheets-Sheet 1

Fig. 1.

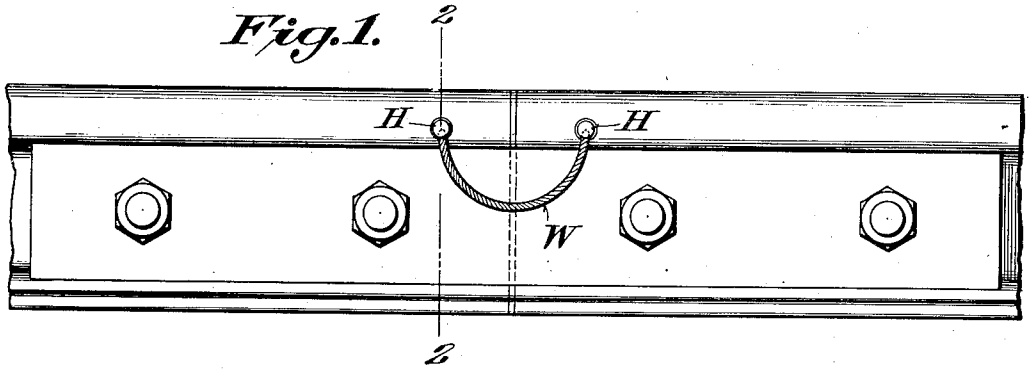
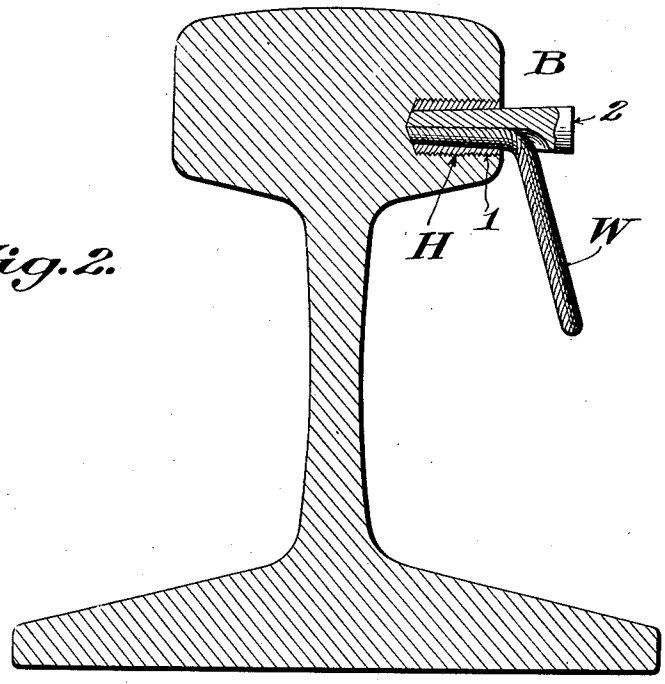


Fig. 2.



Inventor

C. G. McCaulley,

WITNESSES:-

Chas. L. Griesbauer

Emory L. Stoff

By S. P. Wolhaupter

Attorney

March 30, 1926. 1,578,901

C. G. McCAULLEY

RAIL BOND

Filed Sept. 18, 1922 2 Sheets-Sheet 2

Fig. 3.

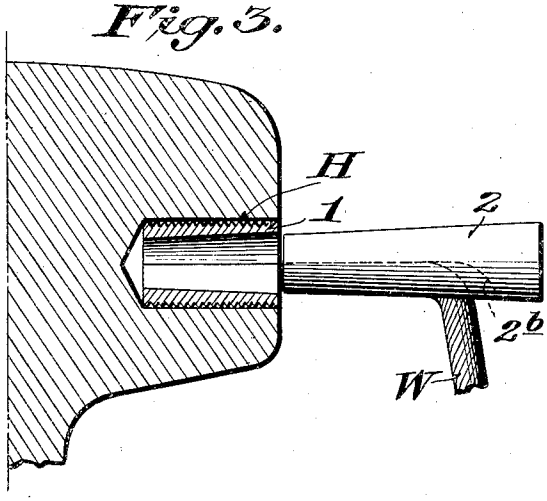


Fig. 8.

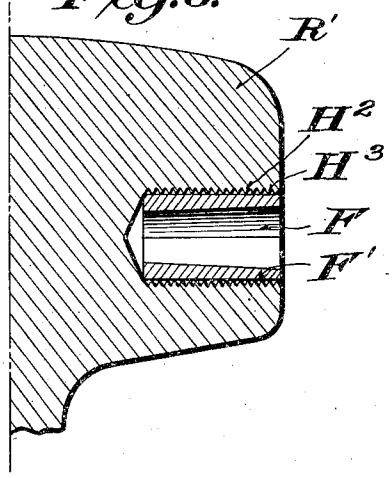


Fig. 4.

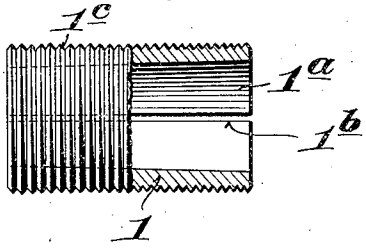


Fig. 5.

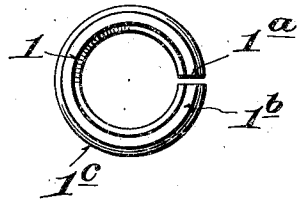


Fig. 6.

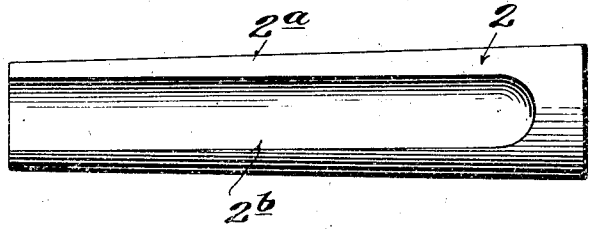
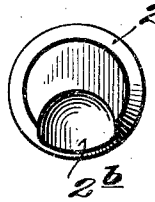


Fig. 7.



Inventor

C. G. McCaulley,

WITNESSES:—

Chas. L. Spiesbauer

Conroy & Gryf

By D. P. Wickander

Attorney

Patented Mar. 30, 1926. 1,578,901

UNITED STATES PATENT OFFICE.

CHARLES G. McCAULLEY, OF JACKSONVILLE, FLORIDA.

RAIL BOND.

Application filed September 18, 1922. Serial No. 588,971.

To all whom it may concern:

Be it known that I, CHARLES G. McCAULLEY, citizen of the United States, residing at Jacksonville, in the county of Duval and State of Florida, have invented certain new and useful Improvements in Rail Bonds, of which the following is a specification.

This invention relates to rail bonds for electrically connecting railway rails.

Many rail bonds now generally in use are open to numerous objections from the standpoint of installation and maintenance due to the original high cost of the wire and its application, and to the subsequent loss of current by leakage, resistance, and damage by trackmen and rolling stock, thereby greatly adding to the annual expense of upkeep to a considerable degree.

Accordingly, the present invention has primarily in view a novel rail bond that may be inexpensively installed, and has the capacity for conducting the current from one rail to another with a minimum resistance by reason of a novel metal-to-metal contact provided between the bond wires and the rails as the result of a simple and practical method and means of application. That is to say, the present invention contemplates a short rail bond which provides practically 100% conductivity, thereby materially reducing the consumption of battery energy and effecting a material annual saving in the cost of battery maintenance, while at the same time making a considerable saving in the labor cost of installation due to the ease and facility by which the ends of the bond wires may be connected to the rails. Also the quantity of wire required is materially lessened in carrying out the present invention. Therefore, the present invention provides a simple, practical and reliable type of rail bond that is both economical to install and maintain, and provides for free conductivity of the track circuit, with a minimum use of wire and entirely obviating the use of pairs of long bond wires as now extensively employed. In brief it is the purpose of the invention to obtain a low-cost bond of maximum efficiency, and maximum economy in installation and maintenance.

A further object of the invention is to provide a rail bond which offers a minimum interference to traffic and the hanging parts of rolling stock, while at the same time providing adequate protection for the bond wire against breakage by track-walkers or maintenance of way men, and also offering practically no interference to the replacement or adjustment of the splice bar. In that connection it is pointed out that due to the novel manner in which the bond wire is connected to the rails the bond wire is protected from breakage by track-men and cannot possibly work upwardly onto the head of the rail, while at the same time the bond itself is protected from corrosion and injury by brine from refrigerator cars.

With the above and other objects in view which will more readily appear as the nature of the invention is better understood the same consists, in the novel construction, combination and arrangement of parts, hereinafter more fully described, illustrated and claimed.

A preferred and practical embodiment of the invention is shown in the accompanying drawings, in which:—

Figure 1 is a side elevation of a pair of rail ends at the point illustrating the application of the bond.

Figure 2 is a vertical cross-sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a detail view illustrating a preliminary step in the installation of the bond.

Figure 4 is an enlarged detail view of the contact ferrule.

Figure 5 is an end view of the ferrule shown in Figure 4.

Figures 6 and 7 are respectively side elevation and end views of the expanding and locking plug, on an enlarged scale.

Figure 8 is a detail view illustrating a modification wherein the outer face of the contact ferrule is smooth and the side of the cavity in the rail head is formed with corrugations.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

As previously indicated, one of the important problems confronting signal engineers has been to provide an economical and efficient bond having sufficient current-carrying capacity to reduce the resistance in the track circuit to a minimum, besides obtaining adequate protection from the factors that are responsible for high cost of installation and maintenance. To that end the present invention provides a novel and secure metal-to-metal contact between the bond and

the rails, thereby insuring free conductivity between the ends of the bond wires and the rails, and so constructed and arranged as to adequately protect the bond from corrosion, rust and careless or accidental breakages.

In installing the bond contemplated by the present invention it is proposed to drill two holes H—H, one in the outside face of each of the adjacent rail ends, about one and one-half inches from the end of the rail, the said holes preferably being positioned below the horizontal axis of the head, and also preferably made at one operation by means of a double drill which may be held by the workmen against the sides of the rail heads in such a manner that both holes may be produced by the one operation. Due to the fact that the holes are of relatively shallow depth, that is do not completely pierce the part in which they are made, the drills will be less likely to break, because it is well known that a large proportion of drills are broken by fouling just as they are cutting through the part in which the hole is made. Thus, this manner and arrangement of providing the holes or cavities in the sides of the rail heads saves the drills, and obviously can be very economically produced quickly and with a minimum of manual labor.

After the holes H—H have been drilled in the sides of the rail the novel bond proposed by the present invention may be applied. This bond is designated generally as B and essentially comprises a novel split ferrule or contact sleeve 1 adapted to be expanded into the hole H by the dowel pin or plug 2 as the latter clinches the end of the bond wire W within the ferrule, thereby to rigidly and securely incorporate the end of the wire W in the bond. The split contact ferrule or sleeve 1 is preferably made from hard high-carbon steel capable of positively and uniformly biting into the wall of the socket or hole H in the rail head when forcibly extended into a locked position by the driven dowel or pin.

As will be observed from Figure 4 the contact ferrule 1 is preferably provided with an interiorly tapered bore 1^a thus providing a tapered socket in the rail head and is longitudinally cut or split as indicated at 1^b thereby to permit of the ferrule to be readily expanded against the wall of the hole or socket H, so that the relatively sharp-toothed or roughened outer surface 1^c of the ferrule will bite into the metal of the rail and provide a tight and positive engagement therewith. The said toothed outer surface of the ferrule is preferably formed by a series of sharp crested corrugations, which of course, are considerably enlarged in Figure 4 to clearly illustrate the fact that the ferrule is provided with a metal embedding outer surface to insure a positive metal-to-metal contact between the bond and the rail head.

The pin 2 which is clearly illustrated in Figures 6 and 7 is uniformly tapered throughout as indicated at 2^a to correspond with the taper of the inner bore 1^a of the ferrule so that when the pin is driven into the ferrule a uniform extension of the latter takes place throughout its length, thereby insuring an adequate and positive grip between the ferrule and the sides of the socket or cavity in the rail head. Also, for the purpose of accommodating the end of the bond wire W the pin 2 is channeled at its underside as indicated at 2^b, and as the dowel pin is driven home in the ferrule with the end of the bond wire in the channel it will be apparent that the latter will be crowded between the bottom of the channel and the inside tapered surface of the ferrule as shown in Figures 2 and 3 thereby to firmly and positively incorporate the end of the wire W into the bond.

In installing the type of bond proposed by this invention the holes H—H are as stated preferably formed by a double drill at one operation and then the bond wire, contact ferrule and expanding pin are ready for assembly and final application to the rails. The drilling operation which forms the holes may be very readily accomplished at a minimum cost as compared with welding operations heretofore employed in connection with the formation of rail bonds and which require the use of oxy-acetylene equipment for that purpose. Thus, the present invention involves a great saving in labor at the time of installation where the bonds are applied to the rail heads.

After the holes are formed in the rail heads the contact ferrules 1 are placed in position and the end of the bond wire W inserted in the ferrules and the channel 2^b of the expanding pin as shown in Figure 3, is placed over the bond wire W within the tapered bore 1^a of the ferrule. When they have been sufficiently set by hand, the head of the expanding pin is subjected to a series of blows by a hammer or equivalent tool and the pin tightly and solidly driven into the ferrule, thus expanding the ferrule into biting contact with the sides of the hole in the rail head and at the same time firmly securing the bond wire W in place. Due to the force by which the pin 2 is driven into the ferrule the possibility of voids or crevices existing in the completed bond is practically impossible, and by cutting open a bond formed in accordance with this invention it has been found that the pin, ferrule and wire provide a practical bond completely filling the cavity in the rail, excluding water and other foreign matter, and insuring the maximum efficiency of the bond at all times.

As will be observed from Figure 2 the head of the pin 2 projects beyond the outer surface of the rail head when the installation is complete, thereby affording maximum protection for the end of the bond wire as it leaves the underside of the rail head. Also by reason of the fact that the bond wire W is comparatively short it has a minimum projection into the zone of the rail joints thereby offering little interference with the application or adjustment thereof. Furthermore, it is to be observed that the channel in the dowel or pin is preferably disposed at the underside thereof so that the dowel or pin has the desirable function of holding the bond wire down, so that it will be prevented from working upward on top of the rail in danger of coming under the impact of the wheels.

It should be understood that the bond wire, dowel pin and ferrule are preferably tinned, and the bond wire is of relatively heavy gauge, for example #6 copper wire which offers a minimum current resistance.

An alternative form of the invention is illustrated in Figure 8 of the drawings, wherein the cavity or socket H^2 formed in the rail head R′ is provided with a toothed or roughened inner wall H^3 while the split ferrule F is provided with a smooth outer face F′. When the expanding pin is inserted in this type of ferrule the same advantageous metal-to-metal biting contact is obtained by extending the ferrule into the opening, thereby resulting in the formation of a practical bond as proposed in the other figures of the drawings.

Without further description it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will of course be understood that changes in the form, proportion and minor details of construction may be resorted to without departing from the spirit of the invention or scope of the appended claims.

I claim:—

1. A rail head bond including in combination with the rail head having a socket therein, a tapered channel pin, a bond-wire lying in and filling the channel of the pin, and a ferrule fitting the socket and having its inner surface tapered to receive the channel pin and to conform to the taper thereof.

2. A rail head bond including in combination with the rail head having a socket therein, a ferrule registering with said socket and having its inner surface tapered, a tapered channel pin whose taper conforms to the inner taper of the ferrule, and a bond-wire lying in and filling the channel of the pin, the said bar tapering toward the end of the wire.

3. A rail head bond including in combination with the rail head having a socket therein, a ferrule registering in the socket and having a tapered inner surface, a tapered channel pin having its taper conforming to the taper of the inner surface of the ferrule, and a bond-wire lying in and filling the channel of the pin, said pin being of greater length than the depth of the socket so as to provide a driving head permitting the driving of the channel pin into the rail on the bond-wire side of the rail.

4. A rail head bond including the rail head provided with a socket, a ferrule fitted in said socket and having an interior taper, a channel pin entirely filling the tapered interior of the ferrule, and a bond-wire filling the channel of the pin, said pin having a taper corresponding to the interior taper of the ferrule and adapted to wedge the wire in the channel of the pin and against the inner surface of the ferrule.

5. A rail head bond including the rail head provided with a socket, a ferrule seated in said socket, and having an interior taper, and a channel pin having a taper corresponding to the interior taper of the ferrule and adapted to wedge the wire end in and on the ferrule.

In testimony whereof I hereunto affix my signature.

CHARLES G. McCAULLEY.