

Feb. 25, 1941.

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2,232,999

RAIL BOND AND METHOD OF INSTALLATION

Original Filed Dec. 18, 1936

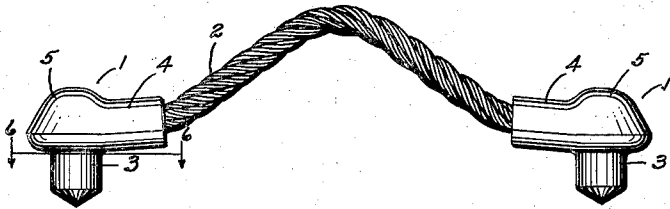


FIG. 1.

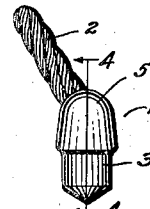


FIG. 3.



FIG. 2.

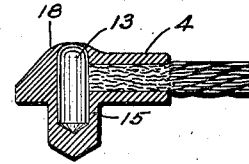


FIG. 4.

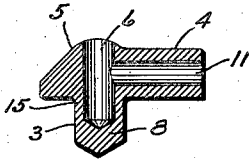


FIG. 5.



FIG. 6.



FIG. 7.



FIG. 8.

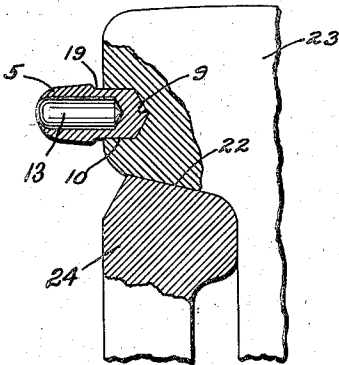


FIG. 9.

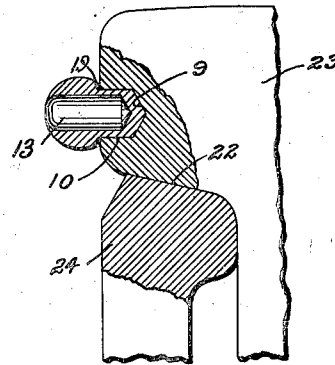


FIG. 10.

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2,232,999

RAIL BOND AND METHOD OF INSTALLATION

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Original application December 18, 1936, Serial No.
116,449. Divided and this application May 5,
1939, Serial No. 271,880

2 Claims. (Cl. 173—280)

My invention relates to rail bonds and the method of installation for electrically connecting the adjacent ends of track rails and it may be so constructed within the scope of my invention as to be applicable for use as a bond for conducting heavy currents for traction purposes or relative light currents as used in signal systems.

My invention provides a bond with an improved terminal which can be readily installed in a bottomed cavity or hole in the side face of a rail head by means of a hammer and which will insure secure and efficient engagement with the walls of the cavity.

My invention resides further in the method of installing the bond in the track rails and the combination therewith of the bond.

My invention resides in the new and novel construction, combination and relation of the parts herein described and shown in the accompanying drawing and in the steps of installation set forth in this specification which is a division of my copending case, Serial Number 116,449, filed December 18, 1936, Patent No. 2,176,245.

In the drawing—

Fig. 1 is a side view of my invention, and

Fig. 2 is a top view of Fig. 1.

Fig. 3 is an end view of my invention shown in Fig. 1, and

Fig. 4 is a longitudinal view in partial section of a single terminal taken on the line 4—4 of Fig. 3.

Fig. 5 is a view in section of a terminal before assembly, and

Fig. 6 is a section on the line 6—6 of Fig. 1.

Figs. 7 and 8 show side views of two forms of pins which I make use of.

Fig. 9 is a view in partial section of a terminal with its stud inserted in a rail cavity and before the terminal has been expanded into engagement with the walls of the hole to effect a complete installation.

Fig. 10 is a view in partial section of a terminal-stud and rail after complete installation.

In the preferred embodiment of my invention, I provide a pair of terminal members 1—1 connected by a conductor 2 which may be stranded or solid.

Each terminal comprises a body having a stud portion 3 and a socket portion 4 in which is positioned an end of the conductor 2, and a drive portion 5 which receives the blows of a hammer used in the installation of the bond terminal.

The terminal may be installed by the use of a

compressor with which those versed in the rail bonding art are familiar.

The drive portion 5 and the stud portion 3 are provided with a single channel 6 which is axially disposed relative to the stud 3. The channel in the stud portion extends only partially through the stud stopping short of the end face and leaving a portion 8 of the stud at the free end thereof and which is engageable with the end wall 9 of the rail cavity 10.

The socket 4 has a channel 11 for the reception of an end of the conductor 2, preferably stranded.

Mounted in the channel 6 of each terminal is a pin 13, which is preferably non-deformable, that is, the pin is made of a metal which has been heat treated either before or after forming to harden the same and prevent the deformation of the pin at the time of installation of the terminal; the pin may be said to be made of non-deformable metal, preferably steel, which will give the highest degree of non-deformability at an economical price.

The terminal is preferably formed of copper but may be of deformable or annealed steel; the cable may be of copper, bronze (phosphor) or high strength steel.

The advantage of the pin construction above described is that it offers a support to the neck 15 of the stud at its thinnest point both during installation and during service; with the above construction it is possible to extend the cable end into the channel 11 up to a point where it contacts with the pin.

The channel 6 may be produced by drilling in which case the enclosed end of the channel will be tapered as is usual where a standard drill is used. The pin shown in Fig. 7 is provided with a tapered end corresponding to that produced by a drill and when such pin is used the tapered end fits securely in engagement with the tapered end wall of the channel 6 and this will tend to distribute the force of the hammer blows more uniformly within the stud, thus a better distribution is secured both outwardly and downwardly of the metal 8 of the stud than if the end of the pin were flat, as shown in Fig. 8 at 14; the other end of the pin may be rounded if desired as shown in Fig. 7.

The pin 13 is made of such length that it will be practically flush with the outer end of the drive portion 5 or the pin may be somewhat shorter than the depth of the channel 6 in which case some of the metal of the drive portion 5

will cover the outer end of the pin 13 either wholly or partially.

The parts above described are loosely assembled by placing the pin 13 in position in the channel 6, then the cable end is positioned in the channel 11 and the parts thus assembled are placed between suitable dies in a powerful press and while cold, pressure is applied which forces the parts in one operation into final relation and at the same time forces the stud to a predetermined size.

This operation forces the socket 11 into close engagement with the cable end; and also forces the pin 13 into position and the metal of the stud into close engagement with all concealed surfaces of the pin 13 and also forces the edge 18 into a slight overlapping relation to the end of the pin 13 whereby the pin is locked in place.

The pin 14 shown in Fig. 8 may be substituted for the pin 13 even though the end face of the channel 6 is tapered. Since the pin is of hardened steel and the terminal 3 of softer metal, the force applied in assembling the parts will force the end wall of the channel 6 to conform to and engage the end face of the pin. There is an advantage in the pin shown in Fig. 8 in that it is only necessary to shear the pin from a rod of metal of the proper diameter which operation is very quick and inexpensive and then temper the same to a non-deformable condition. In case of the pin shown in Fig. 7 it is necessary to produce the same in a lathe from a rod of proper size.

To install the bond, a bottomed hole is drilled, preferably in the side of the rail head adjacent the fishing surfaces 22 of the rail 23 and plate 24, but may be drilled in the rail web if desired. The depth of the hole is less than the length of the stud. The bond stud is positioned in the rail cavity abutting the end face 9 of the cavity which acts as an anvil against which the end of the stud is forced. The drive portion 5 is spaced from the rail face by approximately $\frac{1}{8}$ -inch whereby the portion 19 of the stud projects from the rail face.

An operator now applies force as by means of hammer blows to the end of the drive portion 5, forcing the portion 19 into the rail cavity, at the same time the hammer blows are effective upon the outer end of the pin 13 (or 14) which is forced forward. As the pin 13 advances, the metal 8 of the stud 3 within the cavity is forced forwardly and outwardly thus forming an intimate and secure engagement between the stud 3 and the walls of the cavity 6. The pin 13 in the installed terminal projects into both the stud and the drive portion bridging the union of the stud with the drive portion thus overcoming any tendency for the stud to break at the outer edge of the rail adjacent the drive portion.

When the cavity 10 in the rail has been completely filled with the metal of the stud, it will be found that excess metal in the stud will tend to overlap the outer edge of the rail as at 19.

The hardened or non-expandable steel pin will transmit the force of each hammer blow to the forward portion 8 of the stud simultaneously with the same force being applied to the drive portion 5 which forces that part of the stud between the portions 5 and 8 forward into the cavity 10 and this simultaneous application of the force to two different parts of the stud is found to be more effective than attempting to install in the rail cavity a terminal having a solid stud by merely applying a force to the outer or drive por-

tion thereof or a terminal having a pin through the medium of which the complete installation is made.

Bonds have been made in which that portion of the terminal which is wholly within the cavity of a rail is expanded into contact with the walls of the cavity thus leaving that portion of the terminal between the rail and the stud 3 at the outer edge of the cavity without secure contact, thus permitting moisture to enter the cavity and start the rail rusting. With my improved bond and the method of installing the same, a large portion of the stud within the rail cavity 10 is expanded through the medium of the pin 13 and the balance of the metal of the stud as at 19 is forced forward and into the cavity, completely filling the cavity 10 and securely sealing the same as by the overlap 19, from the entrance of moisture. By fully concealing the pin 13 with metal of the drive portion 5, if of copper, there can be no rusting of the pin 13 although made of steel.

Modifications will suggest themselves to those skilled in the art based upon my disclosures; therefore, I wish to be limited only by my claims.

I claim:

1. The method of connecting a rail bond to a rail comprising the steps of inserting, into a recess in a rail, a stud attached to a conductor, the stud being formed of soft metal having a hard metal core, completely filling said recess with said stud, exerting force on the outer end of the soft metal of said stud tending to force the soft metal of said stud into said recess and simultaneously transmitting pressure through said core to a surface of the soft metal of said stud within said recess while said soft metal is completely confined within said recess by the surfaces of said recess and core and by the force exerted on said soft metal so as to compress said soft metal into intimate contact with the entire inner surface of said recess.

2. The method of connecting, to a rail, a rail bond which has a terminal member provided with a soft metal stud and a hard metal core secured in the stud, the forward end of the core being spaced backwardly from the forward end of the stud and the rear end of the core being substantially flush with the rear surface of said terminal member so that the force of a blow on said terminal member will be received partially by the soft metal of said terminal member at the rear of said stud and be partially transmitted by said core to the soft metal at the forward end of said stud, said method comprising the steps of forming a recess in a rail, inserting said stud with its core therein into said recess, exerting pressure simultaneously on the soft metal at the rear end of said stud and on the rear end of said core, the pressure on said core being transmitted thereby to the soft metal of said stud at the forward end of said core, the pressure thus exerted expanding said stud in said recess to fill said recess completely and placing the soft metal of said stud under pressure applied through said core to said metal at a point within said recess while said recess is completely filled and while said soft metal is held from escape by the walls of said recess and by the force simultaneously applied at the rear end of said stud thus effecting compression of said soft metal within said recess and intimate contact of said metal with the end and side walls of said recess.