

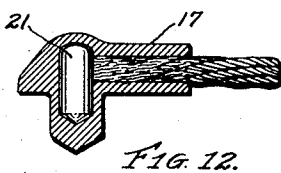
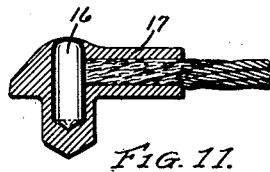
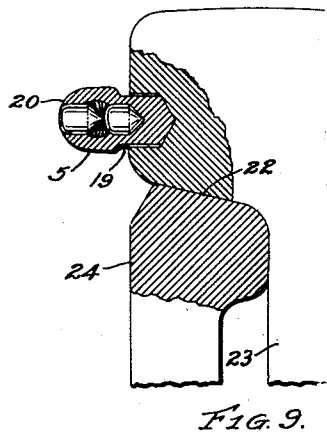
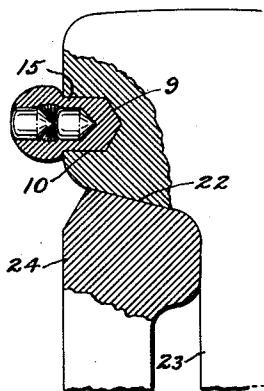
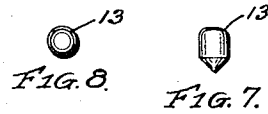
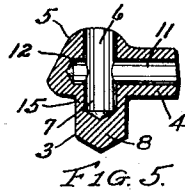
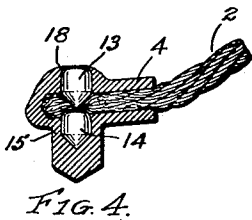
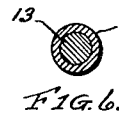
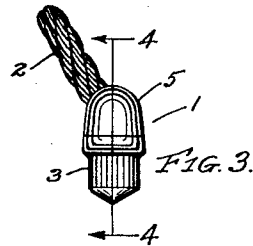
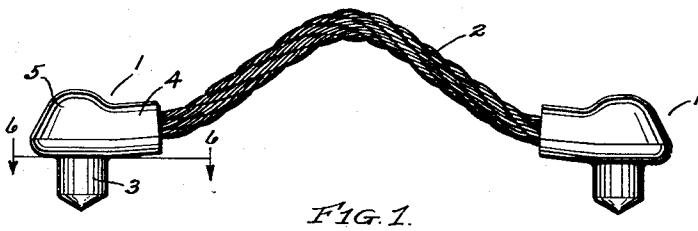
Oct. 17, 1939.

H. P. CHANDLER

2,176,245

RAIL BOND

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2,176,245

RAIL BOND

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5 Claims. (Cl. 173—280)

My invention relates to rail bonds and method of installation for electrically connecting the adjacent ends of track rails and 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 purpose or relatively light currents as used in signal systems.

My invention provides a bond with an improved form of 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 permanent and efficient engagement with the walls of the cavity.

The new and novel construction of my improved rail bond provides a new and novel method of attaching a conductor or a bond terminal to a rail as more specifically set forth as the description of my invention proceeds.

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 the specification.

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, 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 are side and end views respectively of a pin which I use.

Fig. 9 is a view in partial section of a terminal with its stud inserted in a rail cavity and before complete installation.

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

Fig. 11 is a view in partial section of a modified form of terminal.

Fig. 12 is a view in partial section of a second modified form of my invention.

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 bond art are familiar.

The drive portion 5 and the stud portion 3 have aligned channels 6 and 7 respectively and are 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 and the drive portion 5 has a channel 12 aligned with the channel 11. The channels 11 and 12 are for the reception of an end of the conductor, preferably stranded.

Mounted in the channels 6 and 7 respectively are axially aligned pins 13 and 14. These pins are preferably in substantial engagement before installation of the terminal in a rail cavity, but due to variation in manufacture these pins may be either in contact or slightly spaced from each other, but in the latter case will be brought into direct contact upon the first hammer blow applied to the drive portion 5.

The pins 13 and 14 may be of the same or unequal length and are preferably non-deformable, that is they are made of a metal which has been heat treated or later heat treated to harden the same and prevent the deformation of the pins at the time of installation of the terminal; the pins may be said to be made of non-deformable metal, preferably steel.

The terminal member is preferably 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 service; with the above pin construction it is possible to extend the cable end into the terminal beyond the channel 6—7 thus permitting a better grip of the walls of the channels 11 and 12 upon the end of the cable and the use of a relatively short socket 4 thus giving a greater cable length between the socket ends for a given spacing of the studs; a more symmetrical construction is possible with the axes of the channels in a common plane.

A further advantage of the pin construction described is that the pin 13 is pointed at one end which extends through the cable end into engagement with the pin 14. This piercing of the cable by the pin 13 is attained without cutting or injuring the cable strands, as would be the case

if the ends of both pins were flat; in the present construction the pins hold their relative position while the terminal is being installed and the cable strands are not mashed as a result of hammer blows on the portion 5.

One end of the pin 14 is tapered which distributes the force of the hammer blows more uniformly within the stud, thus a better distribution is secured both outwardly and downwardly of the metal in the stud 3 than if the end of the pin 14 were flat; the end may be rounded if desired.

The parts above described are loosely assembled by placing the pin 14 in position in the channel 7, then the cable end is positioned in the channels 11 and 12; the pin 13 is then placed in the channel 6 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 their final position and at the same time brings the stud to a predetermined size.

This operation forces the socket and drive portions into close engagement with the cable end; it also forces the pins into position and forces the edge 18 into over-lapping relation to the end of the pin 13 to lock the pin in place and the pin 13 into interlocked relation with the cable 2.

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 which acts as an anvil against which the end of the stud is forced. The portion 5 is spaced from the rail face by approximately $\frac{1}{8}$ -inch with the portion 19 of the stud projecting from the rail face.

An operator now applies force as by means of hammer blows to the end 20 of the portion 5, forcing the portion 19 into the rail cavity, at the same time pins 13 and 14 are forced forward, the pin 13 forcing the pin 14. Also the metal of the stud 3 within the cavity is forced forwardly and outwardly thus forming an intimate and permanent engagement between the stud and the walls of the cavity. As already stated the bevelled end face of the pin 14 as it moves ahead assists materially in bettering the forward and side movement of the metal 8 within the stud. The pin 14 in the installed terminal projects into both the stud and the drive portion.

The hardened or non-expandible steel pins 13 and 14 transmit the forces of the hammer blows to the forward portion 8 of the stud simultaneously with the force being applied to the drive portion 5 and this is found to be more effective than attempting to install in the rail cavity a terminal having a solid stud by merely applying force to the outer or drive portion. In Fig. 11 is shown a terminal with the pins 13 and 14 combined into a single pin 16 with a cable abutting the side face of the pin and in this construction of the socket 17 is made considerably longer than socket 4 shown in Fig. 4.

In Fig. 12 the hardened pin 21 is entirely enclosed in the terminal body which protects it from the weather.

The method of installing the bond terminal shown in Figs. 11 and 12 is the same as described for the terminal shown in Fig. 4: the force applied to the exposed end of the drive portion of the terminal is simultaneously applied to the outer end of the pin 16 or 21 and transmitted

through the pin 16 or 21 to the end of the stud seated adjacent the end face of the rail socket and the metal at the free or inner end of the stud is forced forwardly and outwardly. The force applied to the drive portion will crowd metal of the stud located without the cavity into the cavity and along side of the pin until it meets the outwardly flowing metal of the stud ends.

The union between the stud and the drive portion is supported by the pins 14, 16 and 21 respectively.

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

I claim:

1. A rail bond comprising in combination a terminal having a cable secured thereto, the terminal provided with a stud portion, a drive portion and a sleeve portion, the terminal having a channel extending through the sleeve portion and into the drive portion and a second channel extending through the drive portion and into the stud portion, the two channels intersecting intermediate their ends, the cable being positioned in the first channel and held therein by compression, a pin positioned in that portion of the second channel located in the stud and having one end engaging the cable at the place of said channel intersection, a second pin positioned in that portion of the second channel located in the drive portion and having a pointed end penetrating the cable, the other end of the second pin being exposed at the face of the drive portion.

2. A rail bond comprising in combination a terminal having a cable secured thereto, the terminal having a stud adapted to be secured in a rail cavity having an end wall to be engaged by the end face of the stud, intersecting angularly disposed channels, each having one open end and one closed end, the closed end of one channel positioned in the stud intermediate its ends, a pin positioned in that portion of the channel located in the stud, the cable positioned in the other channel adjacent an end of said pin, a second pin positioned in the other portion of the first channel and having a pointed end extending into the cable and interlocked therewith, the stud arranged to be expanded into close engagement with the walls of the cavity when force is applied to the terminal axially of the pins in the direction of the stud.

3. A rail bond comprising in combination a terminal and a cable secured thereto, the terminal having a stud to be secured in a rail cavity having an end wall, a channel located in said terminal the axis of which is transversely disposed to the axis of the stud, the cable secured in the channel, a pair of aligned pins positioned in the terminal on opposite sides of the cable with one pin interlocked with the cable and substantially contacting with the end of the adjacent pin, whereby force applied to the terminal axially and in the direction of the stud is transmitted to the interior of the stud to effect an expansion of the stud.

4. A rail bond comprising in combination a cable and a terminal secured thereto, the terminal having a stud to be secured in a rail cavity, a pair of axially aligned pins positioned in said terminal in axial alignment with the stud, one pin having a tapered portion abutting the end of the other pin, a channel, the axis of which channel intersects the axis of the pins at the tapered end of the said pin, the end of the cable

being secured in the channel and being interlocked with the aforesaid tapered end of one of the pins.

5 5. A rail bond comprising in combination a metal terminal and a conductor secured thereto, the terminal provided with a stud to be secured in a bottomed cavity in a rail head and a drive portion, a pair of axially aligned pins in axial alignment with the stud and at least one pin in-
10 terlocked with the conductor to assist in secur-

ing the conductor to the terminal, the pins positioned end to end with the end of the conductor between the pins and with an end of one pin exposed at the surface of the drive portion, the pins arranged to transmit a force to the metal 5 at the free end of the stud when the force is applied to the drive portion to aid in forcing the said metal into contact with the walls of the rail cavity during installation of the bond.

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