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METHOD FOR REMOVING SIGNAL BOND TERMINALS FROM RAILS

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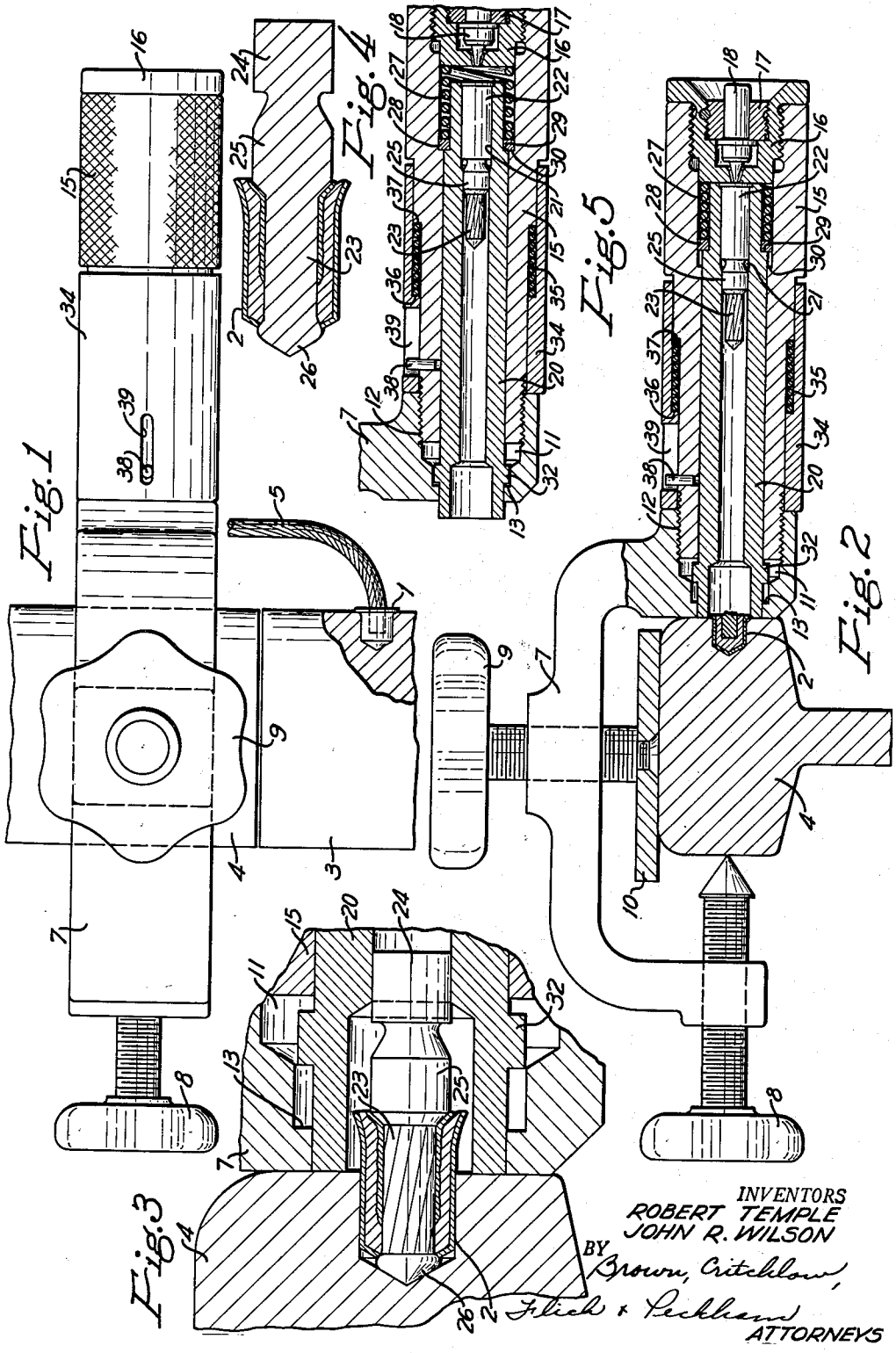


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

INVENTORS
ROBERT TEMPLE
JOHN R. WILSON

BY Brown, Critchlow, Flick & Peckham
ATTORNEYS

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METHOD FOR REMOVING SIGNAL BOND TERMINALS FROM RAILS

Robert Temple, Swissvale, and John R. Wilson, Penn Hills Township, Pa.; said Temple assignor to Mine Safety Appliances Company, Pittsburgh, Pa., a corporation of Pennsylvania

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This invention relates to the removal of signal bond terminals from railroad rails, and more particularly to loosening such terminals by the use of explosive-actuated means.

Signal bonds are used for electrically connecting the adjoining ends of railroad rails so that the rails can serve as electrical conductors for the train signals along the track. Each bond consists of a short length of cable, the opposite ends of which are embedded in metal that fills metal cups which are forced into holes in the sides of the rails. The cups and their metal fillings and the ends of the cable embedded in them will be referred to herein as the terminals of the bond. For various reasons, including derailments and vandalism, the bond cables often are cut. To replace them with new signal bonds, it first is necessary to remove the old terminals from the rails. This has always been a problem, because the terminals are very tightly wedged in the rails. The most common way of removing them has been to drill them out, which requires a considerable amount of time.

It is an object of this invention to provide a quick and easy method of removing rail bond terminals.

In accordance with this invention, a metal stud is shot inwardly completely through the rail bond terminal that is to be removed and into engagement with the rail at the inner end of the hole containing the terminal. This causes the metal of the terminal to flow outward around the stud, which tends to loosen the terminal in the rail. For best results, the stud is shot with sufficient force to expand its front end so that if the stud has to be pulled out of the rail by a tool, as it usually does have to be, the enlarged front end of the stud will be sure to pull the terminal out with it.

The preferred embodiment of a tool for carrying out our method is illustrated in the accompanying drawings, in which:

FIG. 1 is a plan view of the tool applied to a rail;

FIG. 2 is a vertical longitudinal section through the tool in operative position;

FIG. 3 is an enlarged fragmentary section showing a stud at the moment it strikes the inner end of the rail hole containing the signal bond terminal;

FIG. 4 is a longitudinal section through the stud and terminal after removal from the rail; and

FIG. 5 is a fragmentary longitudinal section of the tool showing the position of the barrel in case the tool is assembled while not on a rail.

Referring to FIGS. 1 and 2 of the drawings, a signal bond has terminals 1 and 2 tightly embedded in two adjoining rails 3 and 4, respectively, provided with drilled holes for that purpose. Ordinarily, these two terminals are connected by a cable 5, but in this case the cable has been cut accidentally. To permit the terminals to be removed from the rails so that a new signal bond can be attached to them, the cable projecting from terminal 2 has been cut off approximately flush with the outer end of the cup as shown in FIG. 2, and the tool forming the subject of this invention has been applied to the rail.

The main body of the tool is a C-clamp formed from a U-shape frame 7 that straddles rail 4 and is considerably longer than the width of the rail. One end of the frame

is adapted to engage the side of the rail that contains the bond terminal 2 when a hand screw 8 in the opposite end of the frame is tightened against the adjacent side of the rail. The distance that the clamp extends down over the rail is controlled by a vertical hand screw 9 in the top of the frame, carrying at its lower end a plate 10 that rests on top of the rail. The rail-engaging end of the frame has an opening 11 through it that is centered around the bond terminal by sighting through the opening and adjusting the two hand screws accordingly. The outer end of the frame opening is enlarged and provided with screw threads 12, while the inner end is provided with an outwardly facing shoulder 13.

After the clamp has been applied in correct position on the rail, the threaded front end of a tubular housing 15 is screwed into clamp opening 11. A hollow breechblock 16, screwed into the rear end of the housing, contains a nut 17, in which a firing pin 18 is slidably mounted. The point of the pin can project from the inner end of the breechblock. The rear end of the pin projects from the nut. Slidably mounted in the housing is a barrel 20 that has a cartridge chamber 21 in its rear end for receiving an explosive cartridge 22. The rear end of the barrel engages the breechblock and its front end is pressed against the rail around the bond terminal. A metal stud 23 forms the projectile and has a head 24 (FIG. 3) mounted in the front end of the cartridge. A short distance in front of the head the stud has an integral piston 25 that helps keep the stud centered in the barrel.

When the outer end of the firing pin is struck by a hammer, the cartridge is discharged and the explosion drives the stud forward through the barrel. It is a feature of this invention that enough force is exerted by the cartridge to drive the stud completely through the bond terminal and against the rail at the inner end of the hole containing the terminal, as shown in FIG. 3. This displaces the metal of the terminal and causes it to flow outward along the stud to such an extent that occasionally, the terminal is loosened in the rail. However, in order to be sure every time that the terminal can be extracted from the rail, a sufficient charge of powder is used in the cartridge to cause the stud to strike the rail hard enough to radially expand the inner or front end of the stud slightly. This enlargement 26 locks the terminal on the stud so that when the stud is pulled out of the rail by any suitable tool, the terminal will have to come out with the stud as shown in FIG. 4. The stud cannot pull out of the terminal. For an even better grip on the surrounding terminal, the stud can be knurled.

After the tool has been fired, the hand screw 8 of the clamp may be loosened to permit the tool to be removed from the rail, or barrel housing 15 may be unscrewed from the clamp first. The stud and terminal then are pulled out of the rail if they have not already fallen out. After the barrel housing has been removed from the clamp, barrel 20 can be pulled out of the front end of the housing, reloaded with a new stud and cartridge and then reinserted in the housing. When the barrel is inserted in the housing it will not engage the breechblock because its inward movement is stopped by a coil spring 27 at its inner end. Preferably, the inner end portion of the barrel is reduced to receive the spring and a sliding washer 28 that the spring presses against a radial shoulder 29 at the front end of the reduced portion. The surrounding portion of the barrel may be enlarged in order to form radial shoulder 30 that will limit forward movement of the washer and thereby retain the spring and washer in the housing while the barrel is removed. Since the coil spring spaces the rear end of the barrel from the breechblock, if the unit is dropped on either end there will be

no danger of the firing pin striking the cartridge and accidentally discharging it.

This safety feature is illustrated in FIG. 5 which, however, does not show the best way of using the tool because the loaded barrel is shown attached to the clamp before the clamp has been applied to a rail. Nevertheless, since some people may assemble the tool while it is not on a rail, provision has been made in such a case to prevent the barrel from sliding out of the front end of the barrel housing. Accordingly, the barrel is provided in front of the housing with an integral collar 32 that will engage shoulder 13 in the clamp opening 11 and thereby limit outward movement of the barrel.

While the barrel housing is separated from the clamp it is desirable to protect the housing threads. This can be done by a guard sleeve 34 encircling the housing and urged forward by a coil spring 35 encircling the housing inside of the sleeve. The sleeve is provided with an interior shoulder 36 that engages the front of the spring, and the barrel housing is provided with a shoulder 37 engaging the rear end of the spring. While the barrel housing is screwed into the clamp as shown in the drawings, the front end of the sleeve is pressed against the clamp. When the housing is removed from the clamp, spring 35 pushes the sleeve forward over the housing threads until stopped by a pin 38 projecting from the housing into a longitudinal slot 39 in the sleeve.

According to the provisions of the patent statutes, we have explained the principle of our invention and have illustrated and described what we now consider to represent its best embodiment. However, we desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

We claim:

1. In the method of loosening a metal signal bond solid terminal in a blind hole in one side of a rail, shooting a metal stud of greater length than said hole inwardly completely through the terminal and into engagement with the rail at the inner end of said hole with sufficient force to expand the inner end of the stud to a size greater than the adjoining end of the bore formed by the stud in the terminal and to cause metal of the terminal to flow out of the hole, and removing the loosened rail bond terminal and stud from the blind hole.

2. In the method of loosening a metal signal bond solid terminal in a blind hole in one side of a rail, shooting a metal stud of greater length than said hole inwardly completely through the terminal and into engagement with the rail at the inner end of said hole with enough force to expand the front end of the stud to a size greater than the adjoining end of the bore formed by the stud in the terminal and cause metal of the terminal to flow outward around the stud, and removing the loosened rail bond terminal and stud from the blind hole.

3. In the method of extracting a metal signal bond solid terminal from a blind hole in one side of a rail, shooting a metal stud of greater length than said hole inwardly completely through the terminal and into engagement with the rail at the inner end of said hole with sufficient force to expand the inner end of the stud radially and produce a head having a maximum diameter greater than the adjoining end of the bore formed by the stud in the terminal and to cause metal of the terminal to flow outward around the stud, and withdrawing said stud from the rail to pull out the terminal.

4. In the method of loosening a metal signal bond solid terminal in a blind hole in one side of a rail, shooting a metal stud of greater length than said hole inwardly completely through the terminal and into engagement with the rail at the inner end of said hole with sufficient force to expand the inner end of the stud and produce a head larger than the inner end of the bore formed by the stud in the terminal and to cause metal of the terminal to flow outward around the stud, and withdrawing said stud from the rail to pull out the terminal.

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