W. W. COLEMAN.

BOND WIRE CONNECTOR.

APPLICATION FILED DEC. 9, 1916.

1,241,497.

Patented Oct. 2, 1917.

2 SHEETS—SHEET 1.

Fig: 2.

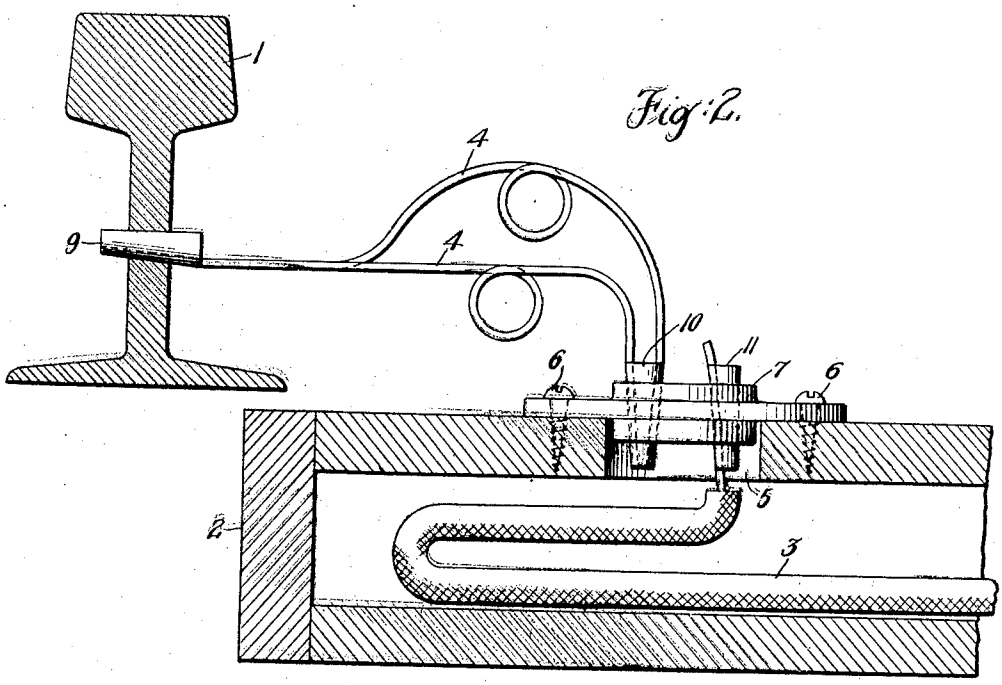
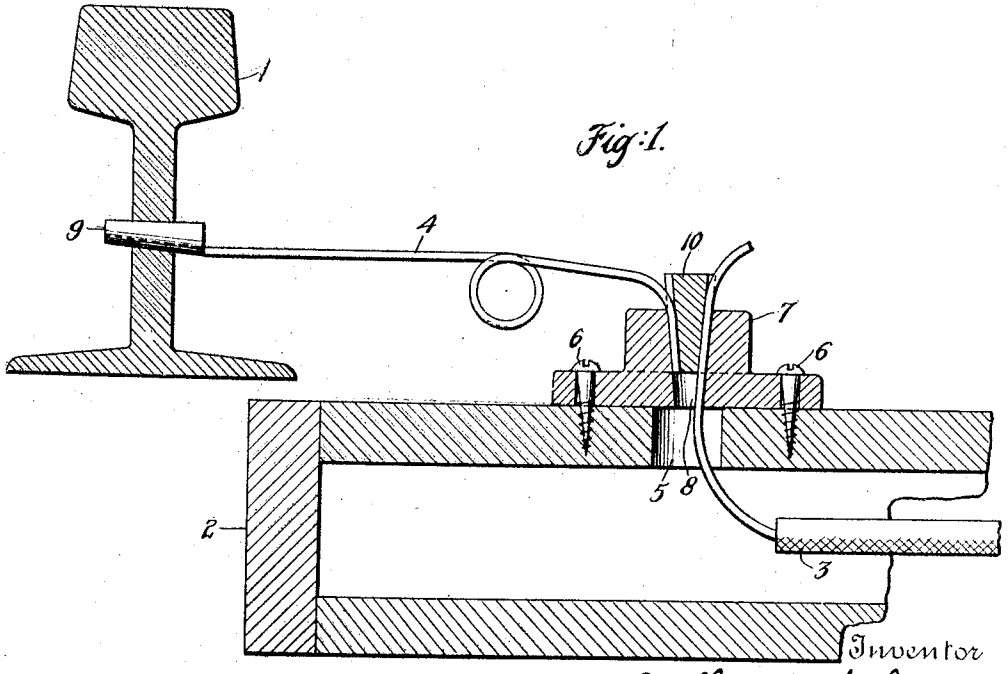



Fig: 1.




Inventor

William W. Coleman

By his Attorney

Lyman E. Dodge

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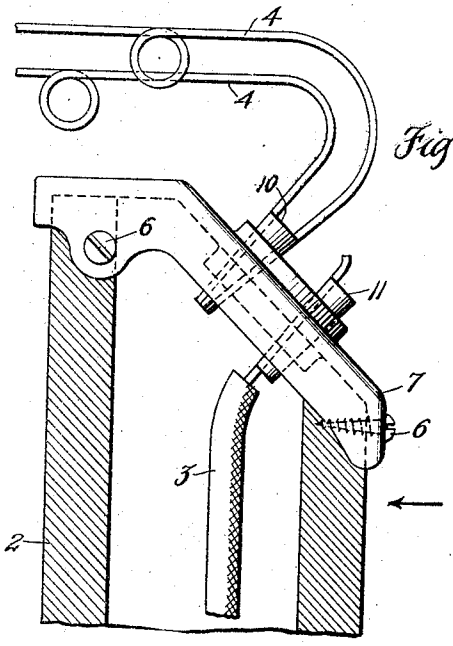
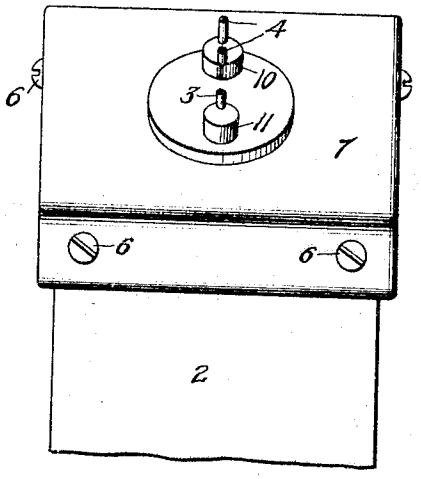



Fig: 3.

Fig: 4.



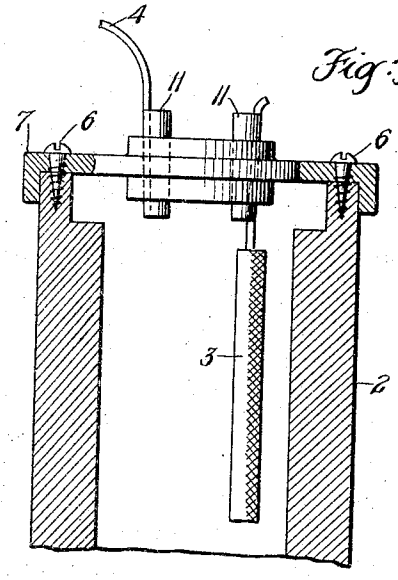
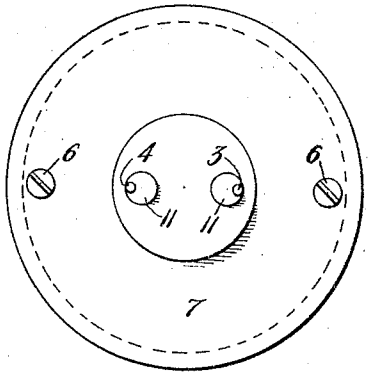




Fig: 5.

Fig: 6.




Inventor

William W. Coleman

By his Attorney

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# UNITED STATES PATENT OFFICE.

WILLIAM W. COLEMAN, OF NEW YORK, N. Y.

## BOND-WIRE CONNECTOR.

1,241,497. Specification of Letters Patent. Patented Oct. 2, 1917.

Application filed December 9, 1916. Serial No. 135,970.

*To all whom it may concern:*

Be it known that I, WILLIAM W. COLEMAN, a citizen of the United States, and a resident of the city of New York, county of New York, and State of New York, have invented a new and useful Bond-Wire Connector, of which the following is a specification.

This invention relates generally to railway electric signaling and particularly to track circuits as used therein, having especial reference to the means by which a source of electro-motive force or a translating device may be connected to track rails.

As is well known by those skilled in the railway electric signal art, a track circuit includes a source of electro-motive force and a translating device, each of which must be connected to the rails of a trackway by means of electric conductors. The source of electro-motive force and the translating device are, in practice, as is well known, located some little distance from the rails, and as the source of electro-motive force is for well understood reasons of very low potential the conductors are composed of copper, which by reason of extremely high conductivity causes the least electrical loss between the source of electro-motive force and the rails, and the rails and the translating device, respectively. The connection of the copper conductor is not made directly to the rail as by welding (of course it cannot be soldered) because it has been found that there are many objections to exposing a copper wire in the position such a wire would necessarily be in.

The chief objection is that it would soon be stolen. Another objection is that it is not of sufficient mechanical strength to successfully withstand the rough usage which a wire, situated as it would be, would necessarily have to endure. It will be remembered that such a wire would practically lie on the ground or ballast and be directly in the path of pedestrians, such as track walkers, passing along the track. A further objection is that even if insulated it is necessarily exposed for some slight distance adjacent to the rail and by reason of the elements it would soon become corroded and destroyed.

Because of the above stated objections, it has been practically the universal custom in railway electric signaling to lay the insulated conductors from the source of electro-motive force to the rails, and from the translating device to the rails in some form of trunking or conduit laid on and in the ground which is usually brought up by the side of the rail to form what is known as a boot-leg. The copper wire extends as far as the boot-leg, where it is firmly soldered to a galvanized iron wire which is carried upward and out of the boot-leg and connected to the rail.

This galvanized iron wire is of good size so that it is husky and strong and well resists the knocking about which it necessarily gets due to its location. Furthermore as it is thoroughly galvanized it is not affected by the elements. It is impracticable to attach this galvanized wire to the rail by welding, brazing or soldering, and there is practically but one form of clamp connection which is at all satisfactory, and this is the one known in the art as the channel pin connection. The channel pin connection comprises a hole in the web or flange of the rail and a tapered pin having a channel or groove along one side in which the wire to be attached is placed, after which the pin is driven firmly in the hole in the rail.

If a connection between the rails and a source of electro-motive force or a translating device is made in the manner pointed out, that is with insulated copper wire laid in conduit or trunking up to the rail and then by galvanized iron wire securely soldered to the copper wire, the joint being located in the trunking, and the galvanized iron wire being joined to the web of the rail by a channel pin, a very serviceable construction results but which nevertheless in spite of the fact that it is practically universal, has serious objectionable features which will be pointed out and which it is the primary object of this invention to obviate.

The only place at which the joint between the galvanized iron wire and the copper wire can be made is right at the place where it is to remain, that is on the trackway. In order to make a proper joint at such place it is then necessary for a skilled workman to go to such place with a full equipment of tools and supplies which includes wire scrapers and cleaners, flux, solder and last but not least a blow-torch or solder pot and furnace. Thus equipped if he is a competent man he can do a good job if it is good weather, but if it is very cold or raining

or snowing it has been found by experience that the joints made are not always up to standard and not unusually soon give trouble. Furthermore after the joint is once made and tucked down into the boot-leg it is very difficult to inspect and may well get into very bad electrical condition without the knowledge of the maintainer, and due to its location under or on the surface of the ground in the trunking water is likely to get on it and corrosion set in. This more readily happens due to the fact that the wire coming out of the boot-leg makes a very loose fit in the hole through which it is led out so that the wire and joint may be readily pulled out for the periodical inspection which such a joint must be given due to its extreme likelihood of failing.

It is the primary object of applicant's invention to obviate not only the objectional features incident to the making of a joint such as has been described but also to provide a joint which after being made will not be at all likely to fail and which furthermore can be inspected by mere viewing without manual manipulation.

A further object of applicant's invention is to obviate the liability of snow and water getting into the boot-leg and trunking and so injuring the electrical insulation of the wire therein or diminishing its insulation resistance, or causing corrosion of the wire itself.

Other objects and advantages of the invention will appear hereinafter as the description of the invention progresses, and the novel features of the invention will be pointed out in the appended claims.

In the accompanying drawings in which is illustrated preferred physical embodiments of the invention, and in which like reference characters refer to like parts in the several views:

Figure 1, is a cross sectional view showing my improved form of connection; Fig. 2, is a cross sectional view showing a modified form of my connection; Fig. 3, is a view partly in cross section showing another form of my connection; Fig. 4, is an elevation of the same construction as Fig. 3 viewed in the direction of the arrow in Fig. 3; Fig. 5, is a cross sectional view of still another modification of my invention, and Fig. 6, is a top plan view of the construction shown by Fig. 5.

In Fig. 1, 1 designates a track rail; 2 a portion of trunking; 3 an insulated copper wire attached at the end not shown to a source of electro-motive force or a translating device; 4 a galvanized iron or copper clad wire which must connect at one end to the rail and at the other to the copper wire 3.

The trunking 2 has a hole 5 formed therein and located directly over this hole and attached to the trunking by any appropriate means as by screws 6, is what I term my combined trunking cap and connection block 7. This block is formed with a straight or tapered hole 8 therein and should be of substantial dimensions, sufficient at least to easily resist destruction by the driving of a tapered pin into the hole 8. The form of the block is quite immaterial if it is of such form that it can when appropriately applied act as a closure for the boot-leg opening 5, and can be readily secured as by screws 6 to the trunking or boot-leg. In practice the joint between the connection block 7 and trunking or boot-leg 2 may be made water-tight by the use of any suitable material between the two, such as a red lead and linseed oil paste or putty.

It is to be understood, however, that although an important advantage of my connection block 7 is to act as a closure for the hole 5, nevertheless this is not a necessary function, and the block need not necessarily be made of such forms or so applied as to this function, just so long as it serves its indispensable function of acting as a connection block.

The galvanized iron wire 4 is attached by the well known single channel pin 9 to the web of the rail 1 and is then formed into a coil to allow for expansion and contraction and the inevitable creeping of the rail 1 which occurs in practice. The other end of the iron wire 4 is then inserted in one groove of the duplex channel pin 10, into the other groove of which is inserted the end of the copper wire 3 and all three are then inserted into the hole 8 in the connection block and the duplex channel pin 10 driven firmly home.

If the surface of the hole 8 in the connection block is a fresh one and the wires 4 and 3 are scraped bright before the above described operation a perfect electrical connection is made between wire 3 and wire 4 and so between wire 3 and the rail 1. Furthermore as is well known to those skilled in the use of channel pins this connection will retain its electrical characteristics without change practically indefinitely.

The making of a joint such as has been described requires practically no tools other than a hammer and a screw driver which every signal maintainer always has with him, and can be made to give a perfect electrical connection by any the most unskilful even in the worst weather, and when made acts as a perfect closure for the trunking, excluding rain and snow, lasts indefinitely and can be inspected by merely walking past it.

Experience with this combined trunking cap and connection block has demonstrated

its superiority in first cost and lasting qualities and effectiveness over all other forms of boot-leg connection heretofore used; and has conclusively shown that it is an important advance in the art of rendering safe the transportation of freight and passengers on railways.

Some signal engineers have been so fearful of a broken connection to the rail in the past that they have duplicated the iron wires, as 4, using two channel pins 9 and two wires, as 4, as shown in Fig. 2. It is true that this connection is one of the most important if not the most important connection in railway electric track circuit signaling and they were well justified in their precaution, so applicant has provided a combined trunking cap and connection block adapted to be used in such situation as shown by Fig. 2. In this modification the connection block has two holes formed therein, in one of which a duplex channel pin 10 binds the two wires 4 and in the other of which a single grooved channel pin as 11 binds the wire 3. It is believed, however, that the superior joint devised by applicant will in the future avoid the necessity of using two galvanized iron wire connections to the rail.

In some cases the trunking is extended vertically as shown by Figs. 3 and 4 in which case a different form of combined trunking cap and connection block should be used. Applicant has provided such a form in which the number of holes and the method of connecting the wires are the same as is shown by Fig. 2.

Some signal engineers use a round form of trunking or conduit 2 as shown in Figs. 5 and 6. This form requires another form of combined trunking cap and connection block and the form shown by applicant is well adapted for such form of conduit and its construction is evident without further description. It may be pointed out, however, that in this form two holes are formed, one of which serves to retain the channel pin and iron wire connected to the rail, the other of which serves to retain the channel pin and copper wire connected to the source of electro-motive force or translating device.

Applicant does not wish it to be understood that his invention resides in any particular form of channel pin as single, duplex or triplex, or in the use of any one or all in any particular combination, but his invention is commensurate with the scope of the appended claims.

What I claim is:

1. In a railway track circuit connection, in combination; a rail; a wire connected to said rail; a wire for connection to said first wire; trunking in which said second wire is located formed with a hole therein; means for forming said connection and closing said hole comprising a metallic block formed with a hole therein, a channel pin for binding said first mentioned wire electrically to said block in said hole and means for binding said second wire to said block; and means for binding said block to said trunking.

2. In a railway track circuit connection, in combination; a rail; a wire connected to said rail; a wire for connection to said first wire; trunking in which said second wire is located formed with a hole therein; means for forming said connection and closing said hole comprising a metallic block formed with two holes therein, a channel pin for binding said first mentioned wire electrically to said block in one of said holes and a channel pin for binding the other of said wires electrically to said block in the other of said holes; and means for binding said block to said trunking.

WILLIAM W. COLEMAN.

**Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."**