No. 750,510. PATENTED JAN. 26, 1904.

W. H. WHERRY.

PROCESS OF FORMING ELECTRICAL RAIL BONDS DIRECTLY IN PLACE ON THE RAILS.

APPLICATION FILED JAN. 22, 1903. RENEWED OCT. 1, 1903.

NO MODEL.

Fig. I.

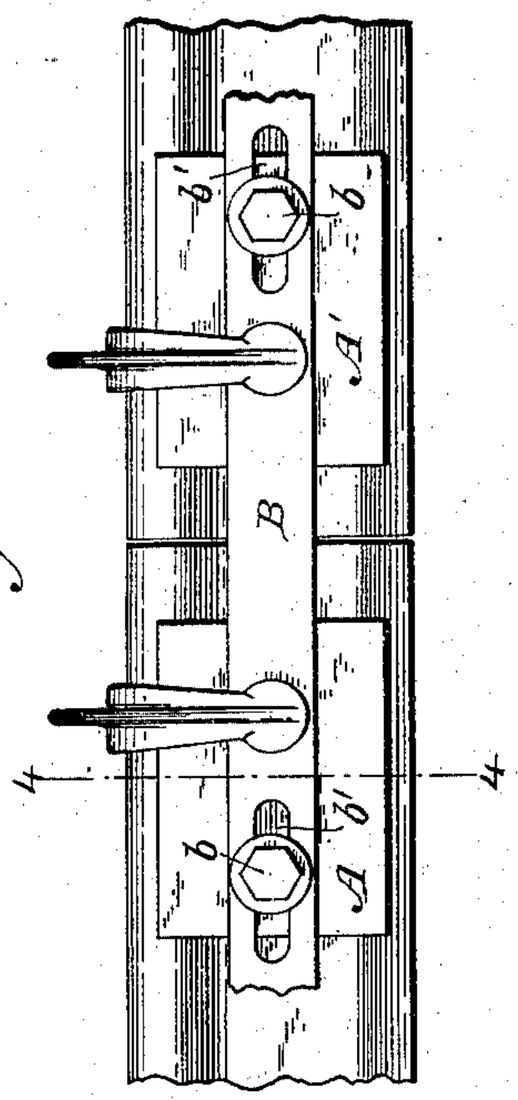

Fig. II.

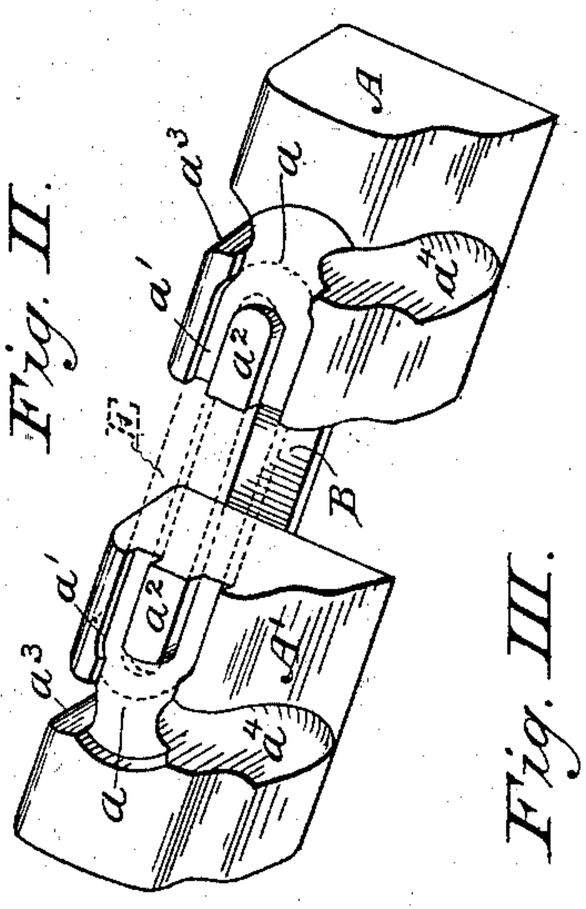

Fig. III.

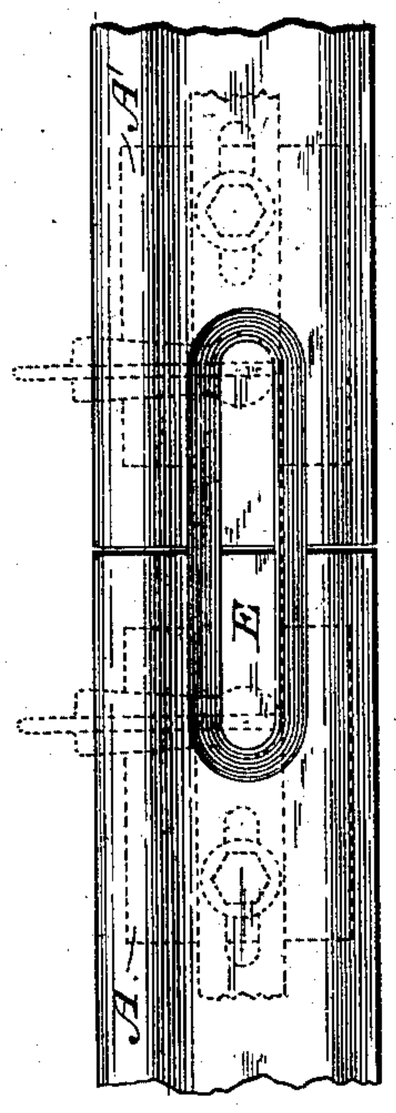

Fig. IV.

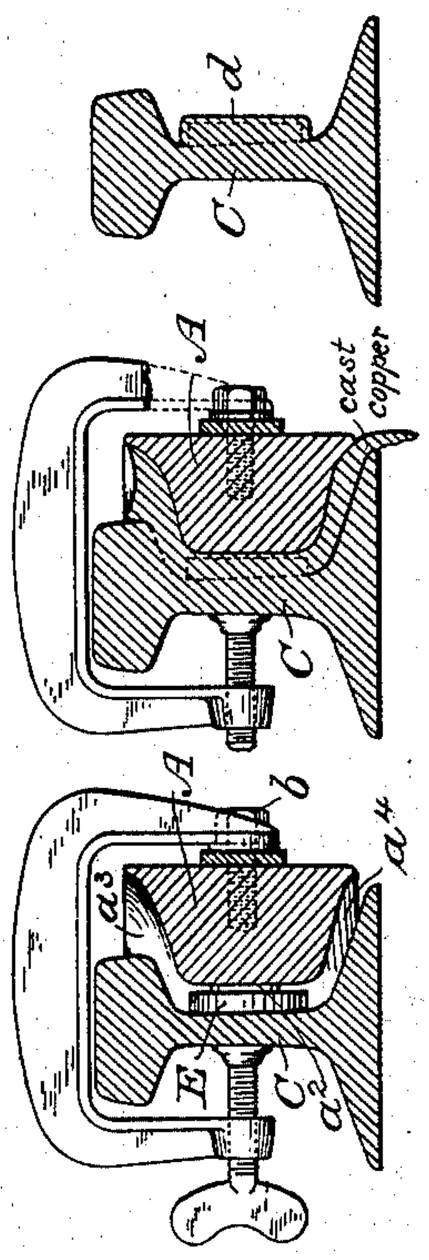

Fig. V.

Fig. VI.

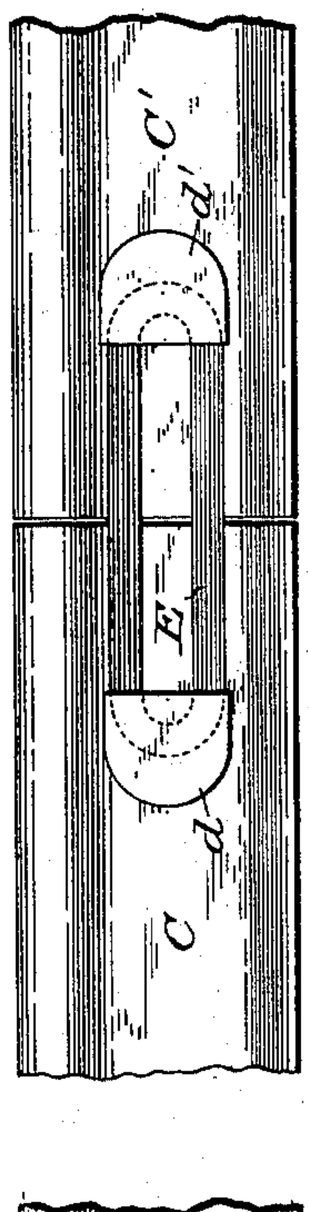

Fig. VII.

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UNITED STATES PATENT OFFICE.

WILLIAM H. WHERRY, OF CLEVELAND, OHIO.

PROCESS OF FORMING ELECTRICAL RAIL-BONDS DIRECTLY IN PLACE ON THE RAILS.

SPECIFICATION forming part of Letters Patent No. 750,510, dated January 26, 1904.

Application filed January 22, 1903. Renewed October 1, 1903. Serial No. 175,325. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. WHERRY, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Processes of Forming Electrical Rail-Bonds Directly in Place on the Rails, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My improved process relates to forming electrical rail-bonds directly in place upon the rail; and it consists of steps hereinafter fully described, and specifically set forth in the claims.

In my process I first locate the wire that is to form the connection between the terminals of the electrical rail-bond in position spanning the two rails that are to be electrically connected, whether said rails are located end to end parallel with each other or otherwise. By means of a mold I then cast a terminal onto the end or extremity of the wire, using sufficient of the fluid metal to heat and soften the rail, so as to form an alloy of the rail and the terminal, whereby they become integral with each other, and thus utilizing the heat of the fluid metal which forms the terminal to accomplish the double function of softening the rail at the point of contact to the point of causing the two metals to alloy, as well as forming the terminal on the wire and causing the wire and terminal to become integral. At the same time I utilize the mold as a chill to prevent the too great heat of the fluid metal burning off and destroying the thin portion of the cast terminal where contact is made with that portion of the wire that is farthest removed from the rail. The mold is also used as a chill to prevent the too great heat of the molten metal from burning and destroying the wire immediately beneath said thin terminal portion above referred to. In case it is desired to secure a definite line of demarcation between the cast copper and the exterior steel or to cast the copper upon a definite area of the steel refractory material may be used to cover those exposed parts of the steel which should be protected from the molten metal.

A mold can be fitted over the steel where it is desired to cast the copper, such mold having proper sprues, which may be at the top and bottom, to allow of the entrance and escape of molten copper, which is preferably allowed to run continuously through the mold until the steel becomes heated, softer, and more porous, and an intimate and permanent union is effected between the copper and the steel when the desired quantity of molten copper is retained upon the steel and allowed to cool. The molten copper that escapes from the bottom of the mold can be reheated and again used. The length of time the molten copper should be let run and the amount of copper allowed to run through the mold depend upon the copper and the steel which it is desired to unite. It may often be found advisable to heat and soften the steel by means other than that of letting the copper run for a sufficient time to accomplish these ends, such as a hot blast or any other well-known method of heating a metal. The devices for first cleansing the surfaces of the steel by emery or other means and also for nicking it with a tool will both be found serviceable in obtaining a more intimate contact of the metals.

The annexed drawings and the following description set forth in detail certain means for carrying out the invention, such disclosed means constituting but one of various forms in which the principle of my invention may be applied.

In said annexed drawings, Figure I represents a side elevation of two abutting rail ends, showing the mold for casting the bond-terminals upon the rails secured thereon. Fig. II represents a perspective view of said mold. Fig. III represents a side elevation of said rail ends, showing a bond-loop in position thereon ready for union with the rails, the mold being shown in dotted lines in proper position for casting. Fig. IV represents a vertical transverse section taken upon the plane represented by line 4 4 in Fig. I. Fig. V represents a similar section showing the mold filled with copper united with the rail. Fig. VI represents a similar section with the mold removed

and showing the bond-terminal trimmed. Fig. VII represents a side elevation of the rail ends and completed and finished bond.

The mold illustrated consists of two duplicate cast-iron parts A and A′, joined by a bar B, secured to such parts by means of screws *b b*, passing through elongated slots *b′ b′*, whereby the distance between the molds may, as will be readily understood, be changed or adjusted to correspond with different lengths of bonds. Each such mold part is formed to snugly fit between the under surface of the rail-tread and the upper surface of the rail-flange, as shown in Figs. IV and V, and against the web. The inner surface thereof is provided with a terminal-recess *a* and loop-recess *a′*, the latter in the particular form illustrated being divided by a projection a^2. Recess *a′* is adapted to receive the end of the bond-loop, which snugly fits therein, so as to prevent metal from flowing therethrough, such recess being of a depth equal to the thickness of the loop. The outer end of projection a^2 is rounded to fit the interior curved surface of such loop. A loop located in the mold is shown in dotted lines in Fig. II, whereby it is seen the loop projects a short distance into recess *a*. Communicating at the top and bottom, respectively, with each recess *a* are two sprues a^3 and a^4, the sprue a^3 being somewhat enlarged at its outer end to facilitate the pouring of the copper therein. The recess *a* is made slightly deeper than recess *a′*. Before applying such described mold to the rails the interior surfaces of the recesses and sprues are covered with a material which will prevent the union or sticking of the copper to the mold. A suitable substance for this purpose is clay mixed in liquid form, commonly called "clay-wash." A loop E is now laid in the mold, as indicated in said Fig. II. That part of the surface of the rail-web upon which the terminals are to be cast—that is, the surface immediately behind the recess *a* when the mold is in place—is now prepared as above described. The mold is now placed in position against the rail ends and securely clamped thereto by any suitable means. Copper is now poured through sprue a^3 into recess *a*, from whence it flows out of sprue a^4. After such flowing of copper has sufficiently heated the rail-web it is stopped by plugging up the lower end of sprue a^4 and permitted to set. After setting the mold is removed. The copper terminal formed by recess *a* will now be found to be intimately united with the rail and copper bond-loop, as shown in Fig. V. The superfluous metal above and below the terminal is now cut off, leaving the bond completed and trimmed, as shown in Figs. VI and VII. The metal mold serves as a chill to prevent too great heat on the thin portion of the cast terminal, where contact is made with that portion of the wire that is farthest removed from the rail, thereby preventing the too great heat of the molten metal from injuring the wire at this point.

By "wire" I mean a single wire, a flexible strand, a plurality of flexible, flat, or round wires, or any other shape or number of connectors that may be used to electrically unite two rails.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the process herein disclosed, provided the means stated by any one of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention—

1. In a process of forming electrical rail-bonds directly in place on the rail: locating the wire in position; casting a terminal on the wire and rail by continuing to pour molten metal upon them until they are sufficiently heated and softened to allow of the intimate and permanent union of the metal and rail, whereby the heat of the fluid metal which forms the terminal is used to heat and soften the rail, and thereby the terminal and rail are made integral with each other.

2. In a process of forming electrical rail-bonds directly in place on the rail: locating the wire in position; fitting a mold over the rail; casting a terminal on the wire and rail by continuing to pour molten metal into the mold and upon the rail and wire until they are sufficiently heated and softened to allow of the intimate and permanent union of the metal and rail, whereby the heat of the fluid metal which forms the terminal is used to heat and soften the rail, and thereby the terminal and rail are made integral with each other.

3. In a process of forming electrical rail-bonds directly in place on the rail: locating the wire in position, fitting a mold over the rail; casting a terminal within the mold on the wire and rail; and utilizing the mold as a chill to prevent too great heat on the thin portion of the cast terminal where contact is made with the portion of the wire that is farthest removed from the rail.

4. In a process of forming electrical rail-bonds directly in place on the rail: locating the wire in position; fitting a mold over the rail with proper sprues to allow of the entrance and escape of molten metal; pouring molten metal into the mold and upon the rail and wire until the latter are made soft and porous; plugging up the mold, whereupon the retained fluid metal is made integral with the softened and porous rail.

5. In a process of forming electrical rail-bonds directly in place on the rails: cleaning the surface of such rail; nicking the surface of such rail; locating the wire in position; fitting a mold over the rail; casting a terminal on the wire and rail by continuing to pour

molten metal into the mold and upon the rail and wire until they are sufficiently softened to allow of the intimate and permanent union of the metal and rail, whereby the heat of the fluid metal which forms the terminal is used to heat and soften the rail, and thereby the terminal and rail are made integral with each other.

6. In a process of forming electrical rail-bonds directly in place on the rails: locating the wire in position; heating such rails until they are made soft and porous; and then casting a terminal on the wire and rail by pouring molten metal upon them, whereupon the terminal thus cast is made integral with the soft and porous rail.

7. In a process of forming electrical rail-bonds directly in place on the rails: locating the wire in position; and then casting a terminal on the wire and rail by continuing to pour molten metal upon them until they are made soft and porous by the heat of the molten metal, whereupon the terminal thus cast is made integral with the soft and porous rail.

8. In a process of forming electrical rail-bonds directly in place on the rail: locating the wire in position; fitting a mold over the rail with proper sprues to allow of the entrance and escape of molten metal; pouring molten metal into the mold and upon the rail and wire until the latter are made soft and porous; plugging up the mold, whereupon the retained fluid metal is made integral with the softened and porous rail; and utilizing the mold as a chill to prevent too great heat on the thin portion of the cast terminal where contact is made with the portion of the wire that is farthest removed from the rail.

9. In a process of forming electrical rail-bonds directly in place on the rail: cleaning the surface of such rail by means of emery; or other mechanical device; nicking the surface of such rail; locating the wire in position; spreading refractory material over those exposed parts of the rail which should be protected from molten metal; fitting a mold over said rail which has proper sprues to allow of the entrance and escape of molten metal; pouring molten metal into the mold and upon the rail and wire until the latter are made soft and porous, plugging up the mold, whereupon the retained fluid metal is made integral with the softened and porous rail; allowing the rail and cast terminal to cool and removing mold.

Signed by me this 20th day of January, 1903.

WILLIAM H. WHERRY.

Attest:
G. W. SAYWELL,
D. T. DAVIES.