No. 608,258. Patented Aug. 2, 1898.

S. H. HARRINGTON.

ELECTRIC BOND FOR RAILWAY RAILS.

(Application filed Dec. 10, 1896.)

(No Model.)

Fig. 1.

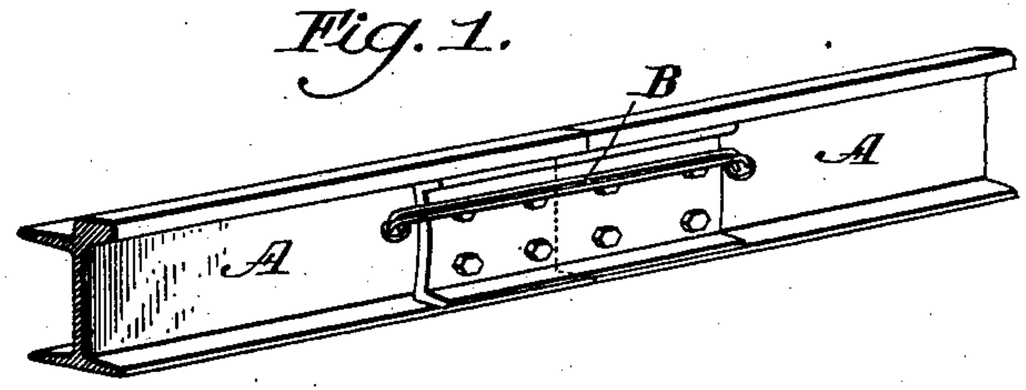


Fig. 2.

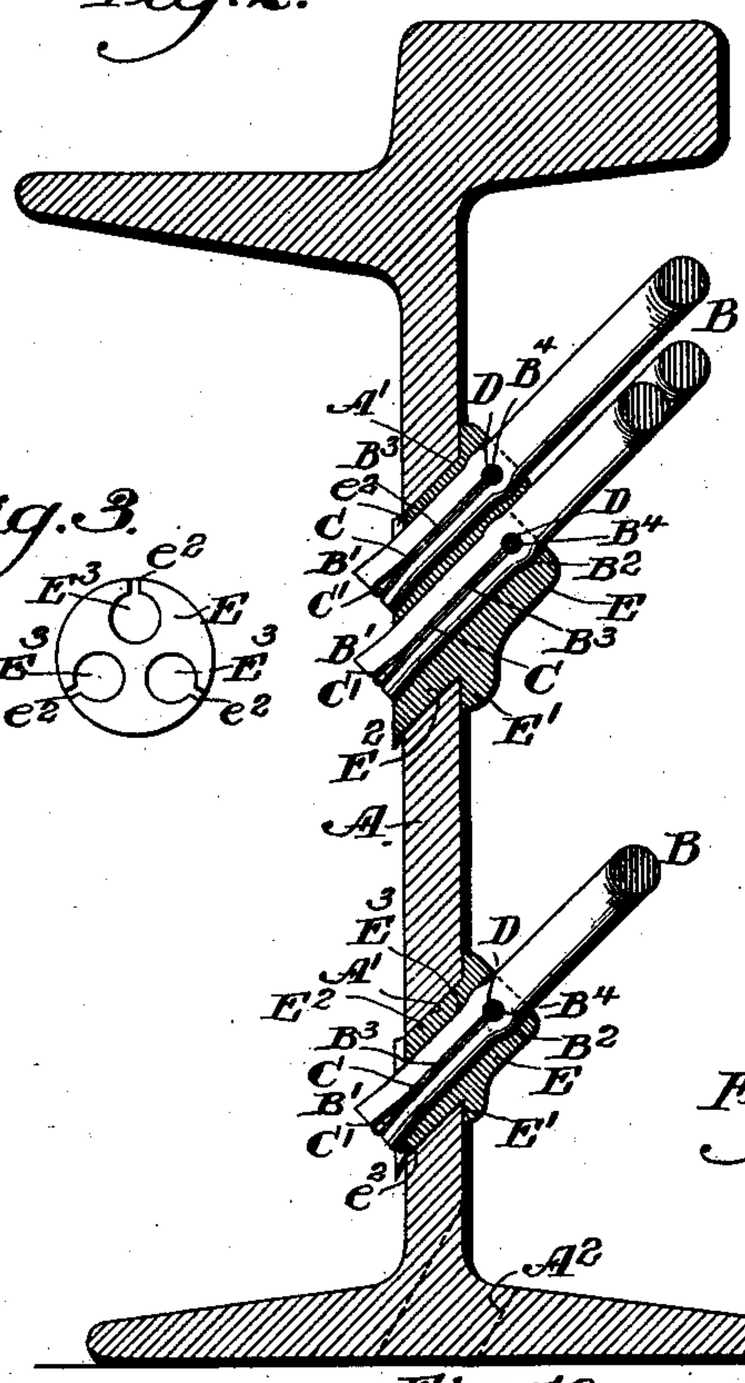


Fig. 3.

Fig. 4.

Fig. 5.

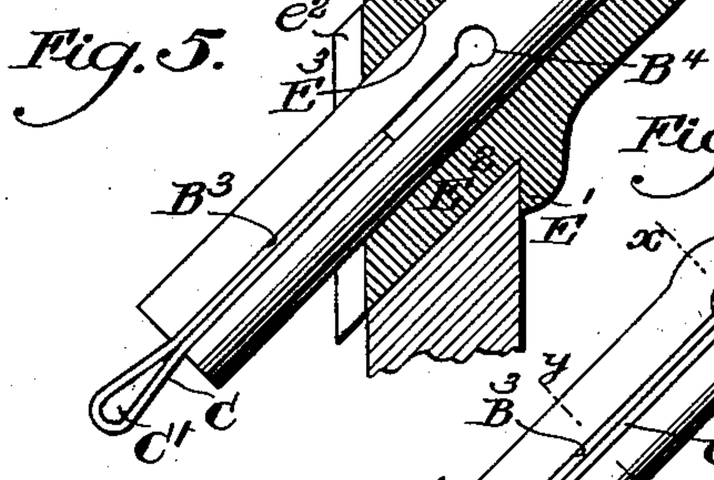
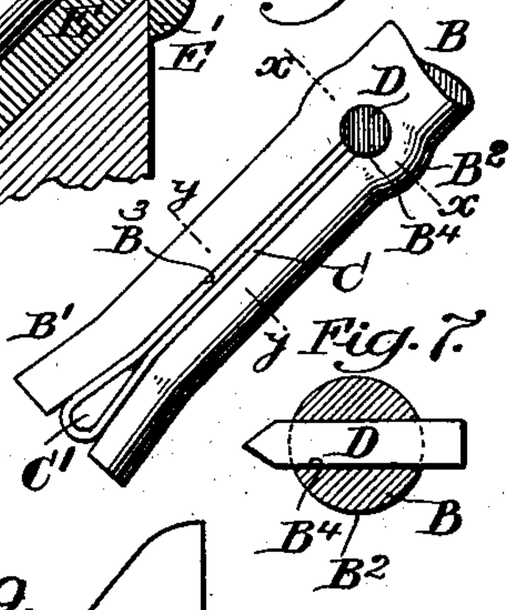


Fig. 6.



y Fig. 7.

Fig. 8.

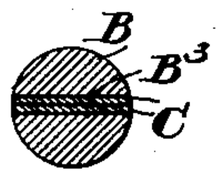


Fig. 9.

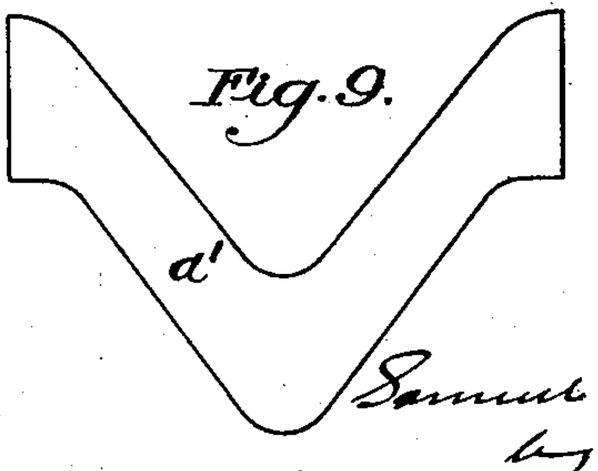
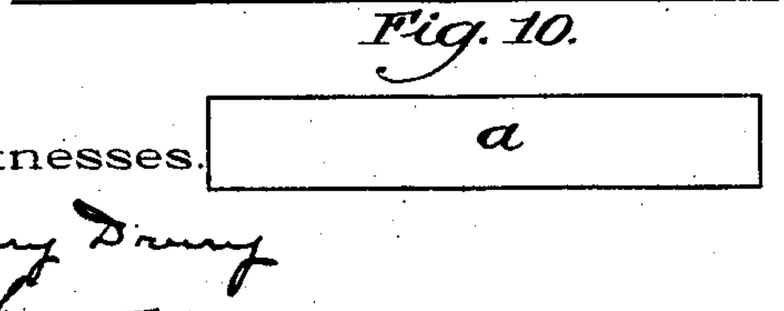


Fig. 10.



a

Witnesses.

Henry Drury

D. Stewart

Inventor.

Samuel H. Harrington

by Francis J. Chambers

his Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

SAMUEL H. HARRINGTON, OF NEW YORK, N. Y.

ELECTRIC BOND FOR RAILWAY-RAILS.

SPECIFICATION forming part of Letters Patent No. 608,258, dated August 2, 1898.

Application filed December 10, 1896. Serial No. 615,085. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL H. HARRINGTON, a citizen of the United States of America, residing in the city, county, and State of New York, have invented a certain new and useful Improvement in Electric Bonds for Railway-Rails, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to the bonding of railway-rails, and has for its object to provide a bond which will secure a large surface contact with the rails, while having a relatively small cross-sectional area, also one which can be secured to rails already in place readily and with the least possible disturbance of the street-surface; and my invention further consists in various details of construction, which will be best understood as described in connection with the drawings, in which my improved bond is illustrated, and in which—

Figure 1 is a perspective view of two abutted rail ends, showing my bond in place. Fig. 2 is a cross-sectional view taken through a rail and through two rail-bonds secured in the web of the rail. Fig. 3 is an end view of the upper rail-bond ferrule shown in Fig. 2. Fig. 4 is an enlarged side view of the bond-ferrule constructed as shown in the lower part of Fig. 2. Fig. 5 is a similar view showing the rail-bond in section and showing the end of the rail-bond inserted in the ferrule. Fig. 6 is a side view of the end of the rail-bond, showing in somewhat exaggerated form the shape of the end when brought to final operative position, also the devices which I prefer to employ for imparting the desired shape to the bond ends. Fig. 7 is a cross-section on the line $x\,x$ of Fig. 6. Fig. 8 is a cross-section on the line $y\,y$ of Fig. 6. Fig. 9 is a diagram illustrating the relative contact area between the bond and the web of the rail which is secured by my construction as contrasted with the contact area attainable when the bond is inserted in a perforation made at right angles to the plane of the rail-web and the relative area of which is indicated in Fig. 10.

A indicates the web of a railway-rail, the form shown being that commonly used for electric street-railways.

A′ indicates a perforation formed through the web of the rail and in a direction such that its axis will lie at an acute angle to the plane of the rail-web. The center line or axis of the perforation A′ is preferably made to lie at such an angle to the plane of the web itself as would result in its clearing the head of the rail lying above it, so as to permit of the insertion of the bond in rails already in place and with a minimum disturbance of the street-surface.

At A^2, Fig. 2, I have indicated a location for the angularly-set perforation at the junction of the web and base of the rail. This position is advantageous as giving a large area to the walls of the perforation.

B indicates the rail-bond or, as I shall hereinafter refer to it, the "rail-bond body," which descriptive term I use because in my preferred construction I make up my bond of one or more rods B, the ends of which fit into ferrules, (indicated at E,) said ferrules in turn fitting into and making close contact with the perforations A′ in the rail-web. I prefer to use these ferrules as a part of my bond because, in the first place, they enable me to secure the bonds to the rail more conveniently and more efficiently and because, in the second place, they enable me to secure a larger surface contact with the rail than would be practicable between the rods making up the body of the bond and the rail-web without unduly increasing the sectional area of these rods, or in the alternative forming them of irregular section, which would materially increase their cost. It will be obvious, however, that the ends of the bond-body can be made to fit directly into the perforations A′ of the rail-web without the interposition of the ferrule and that the very materially increased surface contact between the body of the rail due to the insertion of the bond in the obliquely-lying perforation, which is one and an important feature of my invention, would be attained in this way. It will also be understood, of course, that I form my bond-body and bond-ferrules of metal of greater conductivity than the iron or steel of which the rails are made, copper being preferred for the purpose not only on account of its great conductivity, but also by reason of its softness, a quality which peculiarly adapts it for use in the manner to be herein-

after described in connection with my appliances and their mode of use in securing the bond in place in the rail.

I form the ferrule E, as shown, with a shoulder E′ on its inner end lying at the same angle with the center line of the ferrule as that which the perforation A′ forms with the plane of the web A, so that when the contacting body (indicated at E^2) of the ferrule is inserted in the perforation A′ the shoulder E′ will lie against the face of the rail-web. This feature, however, I do not claim or consider essential. Through the center of the ferrule I form one or more longitudinal perforations E^3, one being shown in the lower part of Fig. 2 and Figs. 4 and 5, while three such perforations E^3 are shown at the upper part of Fig. 2 and in Fig. 3. The number of perforations E^3 will depend, of course, upon the number of rods B used to form the body of the bond, and I may state that I prefer to employ two or more such rods, because I thus secure at the same time greater conductivity for a given area of metal used in making the bond and am enabled to use copper rods of less cost than would be single rods of the necessary section.

The body of the ferrule should be made of such a length as will result when it is driven into place in the rail-web in its outer end projecting beyond the outer face of the rail-web, and I prefer to form slots or cuts, as indicated at e^2, in this projecting part of the ferrule for the purpose of facilitating the spreading of the projecting end, so as to prevent the withdrawal of the ferrule from the perforation in the rail-web.

E^4 indicates a transverse perforation through the inner end of the ferrule, the purpose of which will be described hereinafter.

The ends of the rods B making up the body of the bond are of course to be inserted in the holes E^3 in the ferrules, and the fit between the ends of the rods B and the ferrule-holes should be made as close as possible compatible with the freedom which the rods B should have to move longitudinally in the ferrules. Having inserted the rod end in the ferrule, as shown in Fig. 5, and thrust it forward, so that its end will extend some distance beyond the outer end of the ferrule, the extreme outer end of the rod is expanded, so as to give it a tapered and substantially conical form, the purpose of this being twofold—first, to prevent the withdrawal of the rod end from the ferrule, and, second, to provide a means whereby the retraction of the rod end into the ferrule will not only make a very close contact between the ferrule and rod, but will also act to wedge or press upward the free end of the ferrule, so as to make it grip upon the outside of the rail-web, as is indicated in Fig. 2. The desired expansion of the rod end to the substantially conical form, as indicated at B′, may be effected in any convenient way. Preferably, however, I form the end of the rod B with a longitudinal slot, as indicated at B^3, and I insert a wedge in the slot, which will force the parts on each side of the slot outward, as is indicated in somewhat-exaggerated form in Fig. 6. Preferably also I extend the slot considerably farther up the bar than the length of the portion to be expanded, and I insert in this prolonged slot a folded piece of sheet-copper, as indicated at C, inserting in the end of the fold an additional plate or wedge of copper, as indicated at C′. In Fig. 5 the folded copper plate C and wedge C′ are represented as partly inserted, and in Fig. 6 as entirely inserted, in place in the slot of the rod end B′.

It will readily be understood that the above-described plan of inserting the wedge-piece is one which insures the retention of the wedge in the rod end.

The expanded end B′ of the rod B may be relied upon to prevent the retraction of the rod through the ferrule; but it is advisable to provide also against the rod being forced forward in the ferrule after the bond is in place, and while any retaining device may be employed for this purpose I prefer the device illustrated in the drawings and consisting in a transverse hole or perforation B^4, formed through the rod B at a part which comes at or near the inner end of the ferrule. This may lie immediately outside of the ferrule, but preferably I place it so as to come opposite to a transverse perforation E^4, formed in the inner end of the ferrule, and after the rod B has been retracted in the ferrule to the desired extent I drive a pin D (see Fig. 7) through the perforation B^4, which will expand the rod B, as indicated at B^3, and effectually lock it in place at the inner end of the ferrule.

In using my improved bond the necessary perforation is first formed in the rail and the rod or rods B inserted through the perforations in the ferrules, but not retracted therein, so as to bring the wedging portion into operation against the outer end of the ferrule. The ferrules are then inserted in the perforations in the rail-web and, fitting closely therein, are driven home until the shoulder E′ rests in contact with the inner face of the web, as shown, for instance, in Fig. 4. This driving in of the ferrule will have the effect of compressing it around or upon the rod or rods B passing through it. Then the ends of the rod or rods B are retracted or drawn inward through the ferrules—an operation which should be performed by means of a tool or appliance which while drawing the rods B inward will at the same time press against and prevent the retraction of the ferrules E. As the ends of the rod B are retracted the deeper portion B′ will be drawn into the outer end of the ferrules and will expand these outer ends, pressing them tight against the perforations in the rail-web and so expanding the free end of the ferrule as to cause it to lap over and engage with the edges of the perforations. This expansion of the outer end of the ferrule may be facilitated by the slots e^2,

which I form in it. After the rod or rods B are retracted to the desired extent the pins D are driven into the perforations B^4, expanding the metal of the rods and causing it to tightly engage the inner end of the ferrule.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric bond for railway-rails the combination of an iron or steel rail having a perforation formed in it at an acute angle to the plane of the web of the rail with a bond formed of metal having greater conductivity than the metal of the rail, said bond being inserted in and brought into close contact with the sides of the perforation in the rail, all substantially as specified and so as to provide an enlarged contact-surface between the rail and bond.

2. In an electric bond for railway-rails the combination of an iron or steel rail having a perforation formed in its web at an acute angle to the plane of the web with a bond formed of metal having greater conductivity than the metal of the rail, said bond being inserted in and brought into close contact with the sides of the perforation in the rail-web, all substantially as specified and so as to provide an enlarged contact-surface between the rail and bond.

3. In an electric bond for railway-rails the combination of an iron or steel rail having a perforation formed in it at an acute angle to the plane of the web of the rail with a bond-ferrule formed of metal having greater conductivity than the metal of the rail, said bond-ferrule being inserted in and brought into close contact with the sides of the perforation in the rail, and a bond-body also formed of metal of greater conductivity than that of the rail, said bond-body being inserted in the ferrule.

4. In an electric bond for railway-rails the combination of an iron or steel rail having a perforation formed in its web at an acute angle to the plane of the web with a bond-ferrule formed of metal having greater conductivity than the metal of the rail, said bond-ferrule being inserted in and brought into close contact with the sides of the perforation in the rail-web, and a bond-body also formed of metal of greater conductivity than that of the rail, said bond-body being inserted in the ferrule.

5. The combination with a bond-ferrule adapted to enter and fit in a rail-perforation with a bond-body passing through and movable in said ferrule said bond-body having its extreme end spread into substantially conical form so as to make a tight wedging contact with the ferrule when retracted into it said bond-body end having also a transverse perforation as B^4 arranged at the part which lies at or near the inner end of the ferrule and a pin as D adapted to enter said perforation and spread the metal of the bond-body.

6. The combination with a bond-ferrule adapted to enter and fit in a rail-perforation with a bond-body passing through and movable in said ferrule, said bond-body having its extreme end slotted as at B^3 and a wedge, as C C′, arranged to lie in said slot and spread the end of the bond-body.

SAMUEL H. HARRINGTON.

Witnesses:
LAVINIA JACKSON,
CHARLOTTE BECKER.