(No Model.) 2 Sheets—Sheet 1.

J. McLAUGHLIN.

BOND FOR ELECTRIC RAILWAYS.

No. 583,309. Patented May 25, 1897.

Fig. 2.

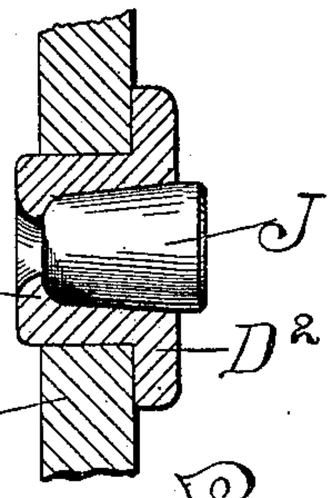


Fig. 1.

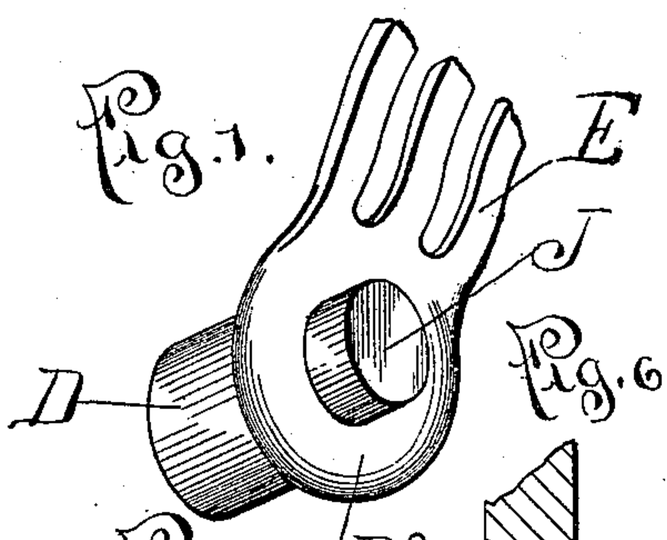


Fig. 3.

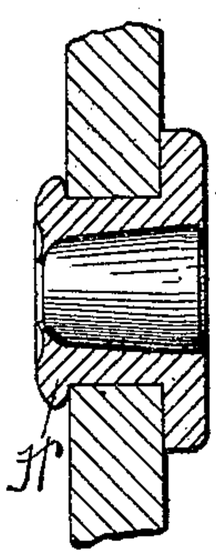


Fig. 4.

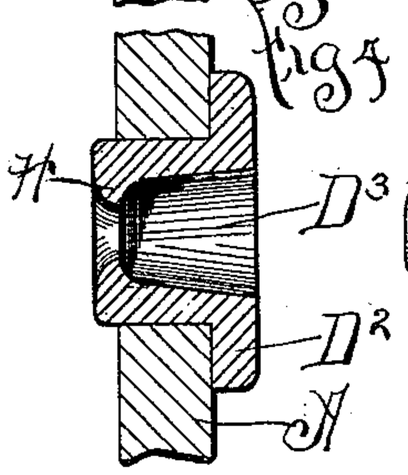


Fig. 5.

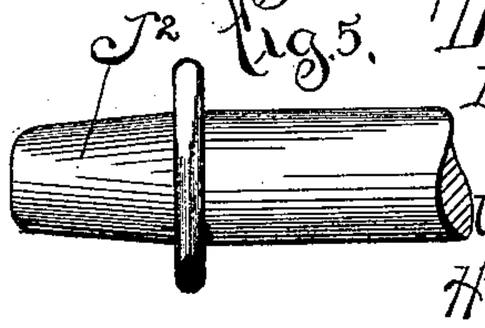


Fig. 6.

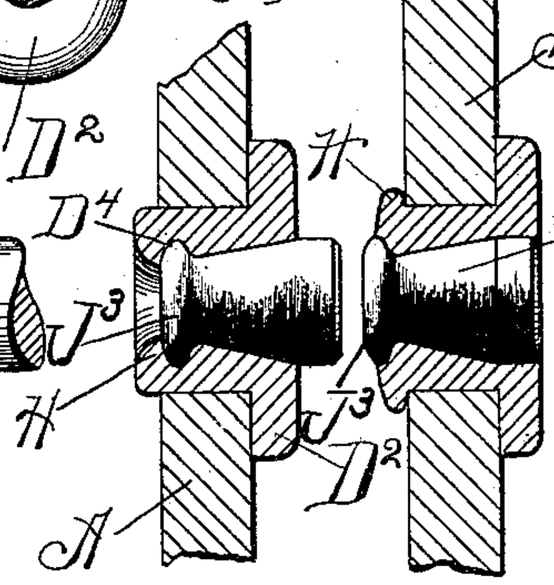


Fig. 7.

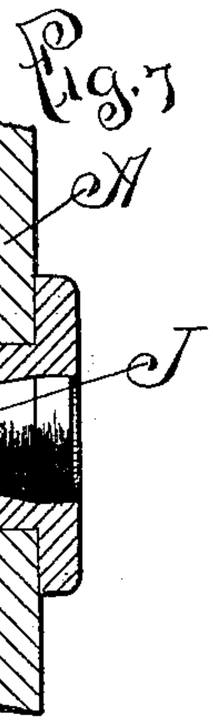


Fig. 8.

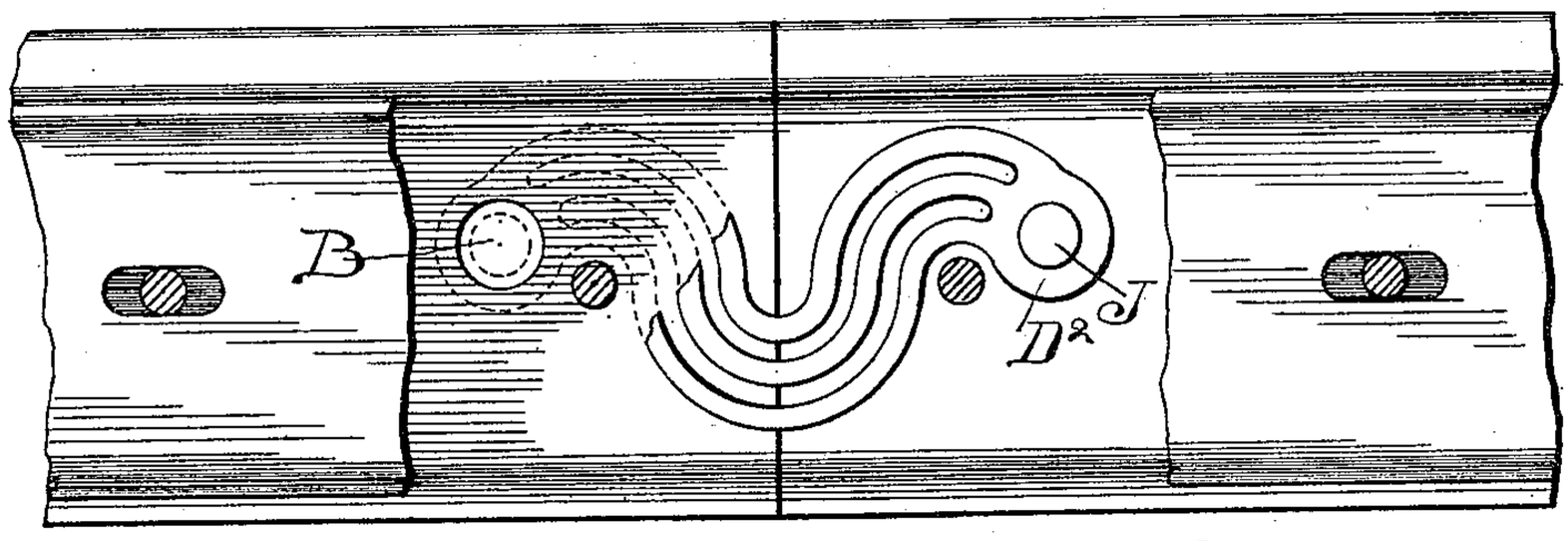


Fig. 9.

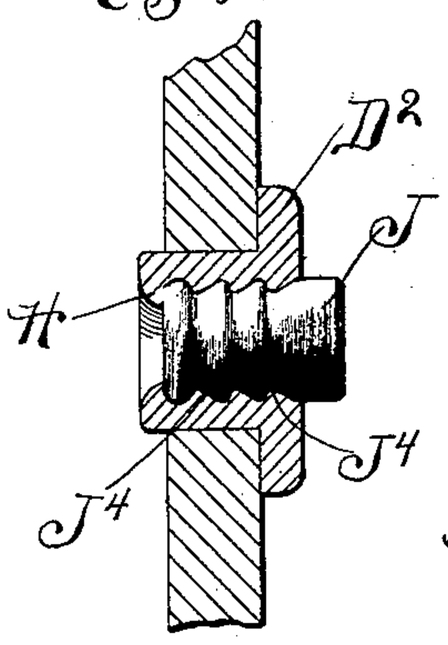


Fig. 10.

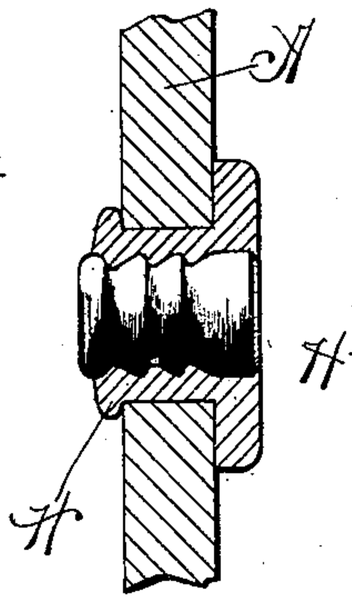


Fig. 11.

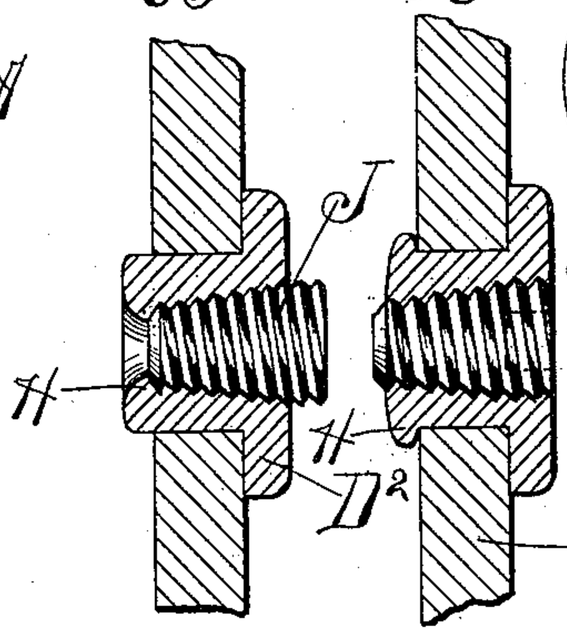


Fig. 12.

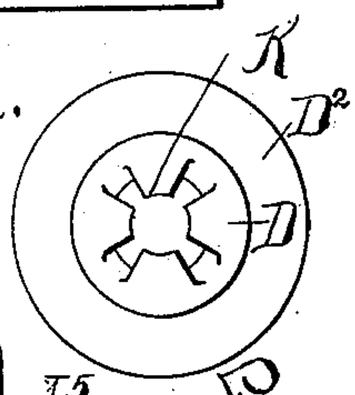
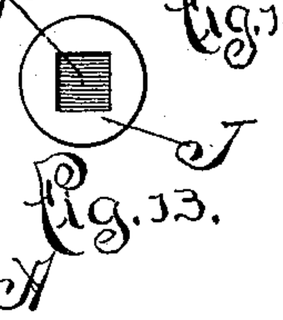


Fig. 14.

Fig. 13.



Witnesses:
J. B. Weir
M. V. Barlow.

Inventor.
James McLaughlin
By Chas. C. Bulkley.
Atty

(No Model.) 2 Sheets—Sheet 2.

J. McLAUGHLIN.

BOND FOR ELECTRIC RAILWAYS.

No. 583,309. Patented May 25, 1897.

Fig. 15.

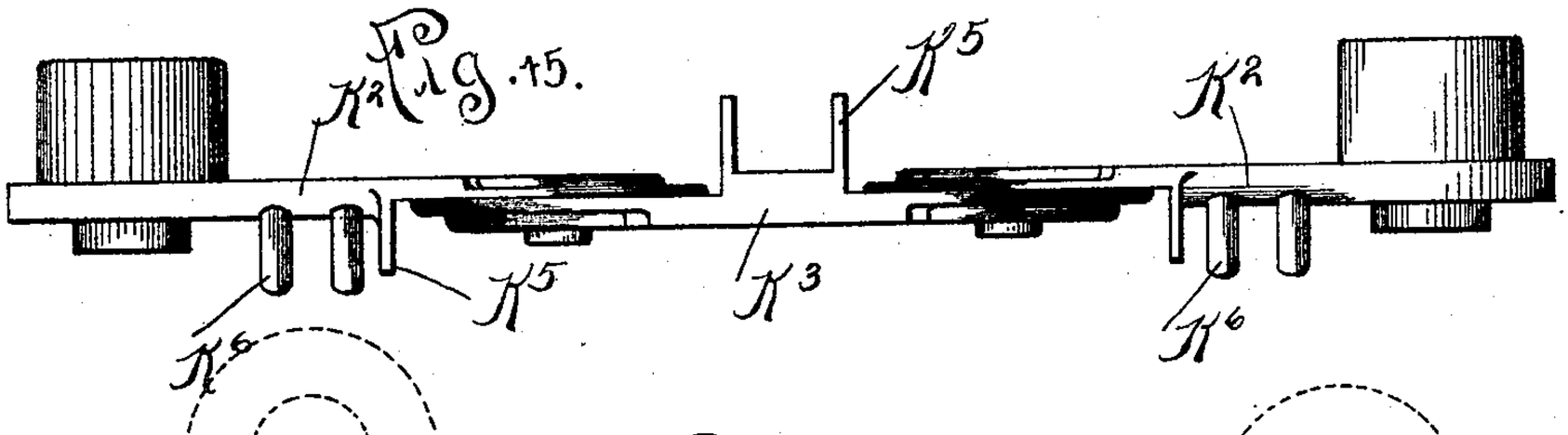


Fig. 16

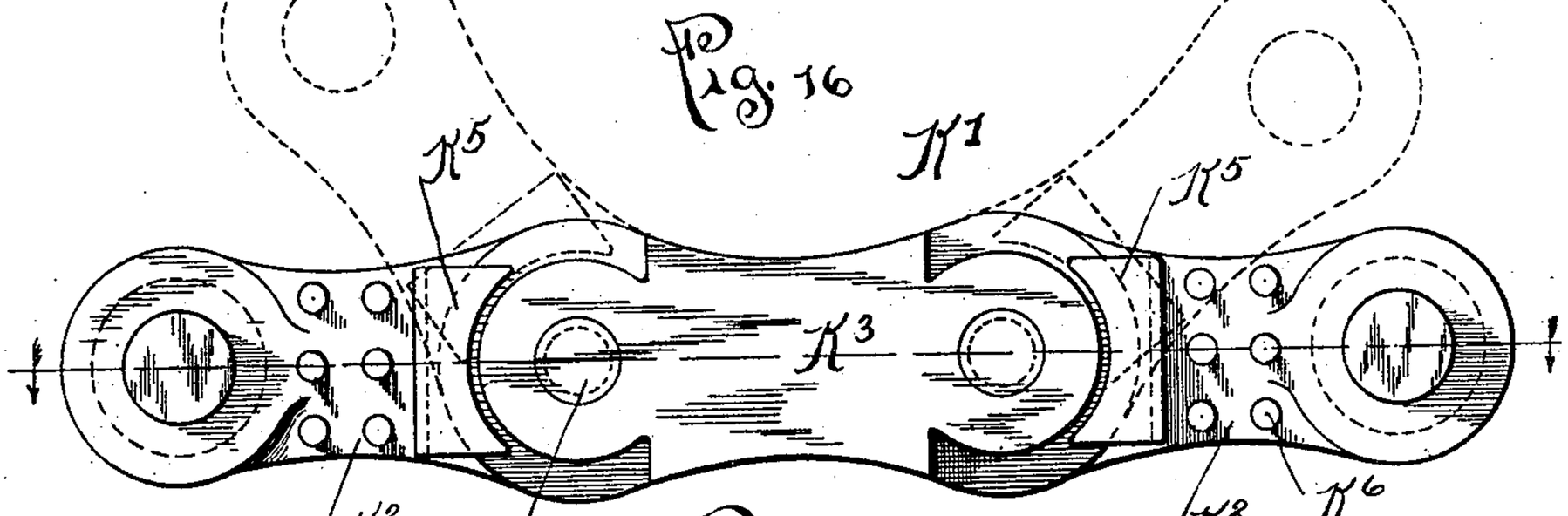


Fig. 17

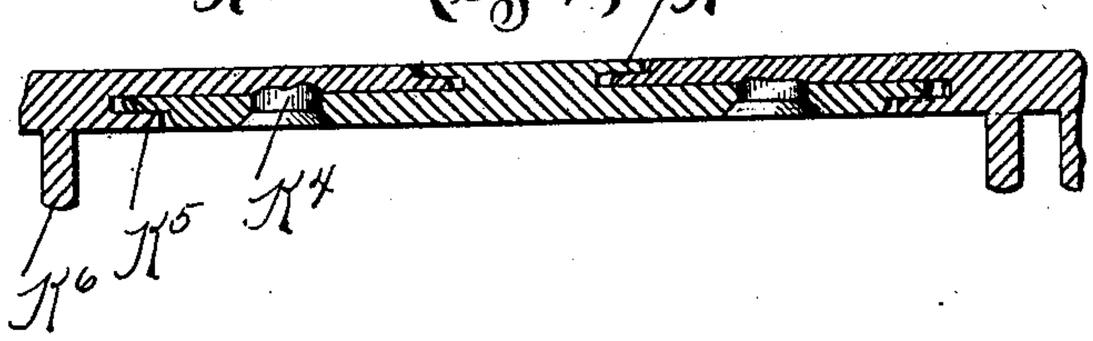


Fig. 18

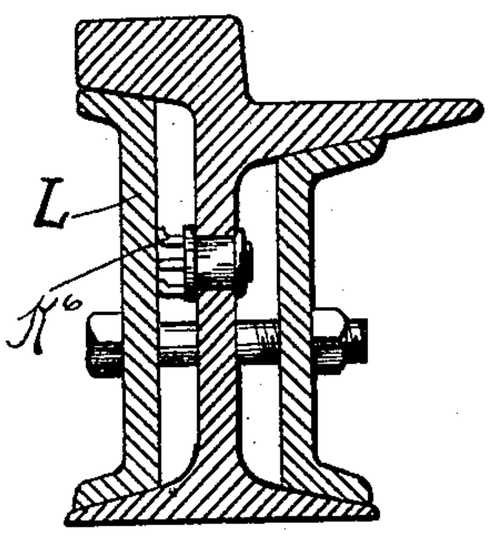
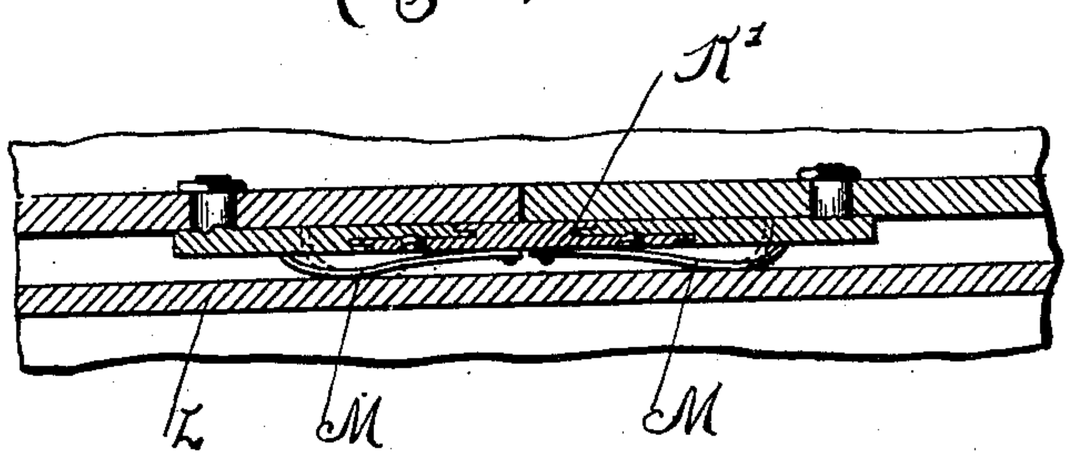


Fig. 19



Witnesses:
J. B. Weir
W. V. Barlow.

Inventor
James McLaughlin,
By Chas. C. Bentley.
Atty.

UNITED STATES PATENT OFFICE.

JAMES McLAUGHLIN, OF CHICAGO, ILLINOIS.

BOND FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 583,309, dated May 25, 1897.

Application filed October 19, 1896. Serial No. 609,324. (No model.)

To all whom it may concern:

Be it known that I, JAMES McLAUGHLIN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improved Bond for Electric Railways, of which the following is a specification.

My invention relates to certain improvements in that character of apparatus employed to electrically connect the meeting ends of railway-rails.

My present invention is designed to provide an electrical bond for railway-rails which is simple in construction, minimized in the number of its parts, readily and quickly adjusted and secured in place, and which when so secured is maintained firmly in position and intimately in contact to provide a bond of maximum conductivity at all times and under all circumstances.

My invention consists in a rail-bond having a connecting head or bushing constituting a terminal of the bond, secured to or formed with the conductor of the bond, an annular shoulder or plurality of abutments formed in the head or bushing at or about the perforation therethrough, and a driving and locking pin or key, the shoulder or abutments being located on that side or end of the perforation opposite the end at which the pin or key is inserted and driven and also inturned to a position in the path of the advancing driven key or pin, whereby the latter encounters the shoulder or abutments and in forcing the same outwardly locks the bushing securely and firmly in place and forming a complete, firm, and intimate electrical union between the bushing or head and the rail in a simple and convenient manner..

My invention consists, further, in providing a bushing or head having a locking key or pin held permanently therein, the bushing being cast or formed about the key in such a manner as to hold the same in the bushing or head, the key or pin, when driven by any ordinary driving implement, after the bushing is inserted in an opening in the rail, then locking the bushing into a secure, complete, and intimate electrical union with the rail, this result being accomplished without the use of special tools and the work of securing the parts accomplished all from one side of the rail.

My invention has certain other objects in view; and it consists in certain other features particularly described, reference being now had to the accompanying drawings, in which—

Figure 1 is a perspective view of the bushing or head and the key or pin permanently held therein, showing the projecting position of said key or pin before driving the same. Fig. 2 is sectional view through the web of a rail and the bushing, the pin or key being shown in full and these parts adjusted in the rail in that position assumed just before driving the key or pin into a locking position. Fig. 3 is a like view showing the key or pin driven into locking position. Fig. 4 is a like view showing the pin or key removed. Fig. 5 is a side view of a particular character of removable driving-pin. Figs. 6 and 7 are views, partly in section, showing another form of bushing and key or pin. Fig. 8 is a side elevation of the end portions of meeting rails, showing my improved bond in position. Figs. 9 and 10 show another form of the type illustrated in Figs. 6 and 7, and Figs. 11 and 12 show still another form. Fig. 13 is an end view showing a key-opening for the form shown in Figs. 11 and 12. Fig. 14 is an end view showing abutments or lugs instead of an annular shoulder. Fig. 15 is an edge view of a complete bond which is hinged or pivoted together. Fig. 16 is a side view of the same, the dotted lines indicating the position which the parts assume. Fig. 17 is a sectional view on the line $x x$ of Fig. 16. Fig. 18 is a cross-section of a rail, showing the fish-plate drawn up and in contact with the bond. Fig. 19 is a section same as Fig. 17, showing spring contact-points.

Various kinds of rail-bonds and means for fastening the same have been devised and used, and various disadvantages in practical application have been found which I have overcome.

In previous forms of bonds the bushing or head is inserted on one side of the rail and implements applied to swage or upset and secure the bushing in position on the opposite side of the rail. The necessity of operating upon each side of the rail to secure the bond in position requires in street-railway work the removal of the pavement on both sides when the track and pavement is laid, and also considerably increases the length of

time occupied. When the bond is to be attached to the base instead of the web of the rail, it is also exceedingly difficult to operate upon both sides of the rail. It is primarily my object to provide such a construction of bond that the bushing or head thereof may be simply inserted into the aperture of the rail and then secured firmly into intimate conductive position at all points by means of any simple driving implement and without any special parts or tools, the operation being confined to one side of the rail only.

I will now proceed to describe the various ways in which this and certain other incidental results may be accomplished.

The rail shown in the various views is designated at A and has at its meeting end a suitable aperture B for the reception of the bushing of the bond. This bushing is designated at D and has a stop-shoulder D^2 formed therewith, with which the conductor E of the bond is connected, as shown in Figs. 1, 2, 3, and 4. At the end of the bore or perforation D^3 opposite to the stop-shoulder D^2 is an annular locking shoulder or ring H, which is inturned toward the center of the bore D^3. As shown, this bore D^3 is preferably formed tapering, but this is not indispensable.

The pin or locking-key is designated at J, and is in most cases formed and held permanently in the bore D^3 of the bushing D by casting the bushing about the pin or key or securing the key in said bore permanently in any suitable way. The pin or key J, before being driven to lock the bushing and parts in position, rests against the locking-shoulder H at its inner end and projects beyond the face of the bushing D at the other end.

In order to secure the bond in position, it is simply necessary to insert the bushing D and pin or key J, held permanently therein, into the aperture B of the rail and then with a hammer or other suitable driving implement drive the pin or key J inward. As the pin or key J moves inwardly it impacts forcibly against the locking-shoulder H and exerting an outward pressure thereon gradually forces and upturns the metal of the said shoulder and of the bushing into a riveting or clenching position, as shown in Fig. 3. Further, it is evident that the bushing D is loosely positioned when first inserted in the aperture of the rail and that upon the first application of force to the driving end of the key or pin the bushing is also driven into a seated position, the stop-shoulder D^2 bearing closely against the side face of the rail. This bearing between the rail and shoulder becomes more close and intimate as the pin or key is driven farther into the bore D^3, and stop-shoulder D^2 is finally held in this close, intimate, and perfect electrical connection by means of the firm and secure expanding, clenching, or riveting of the upturned impact-shoulder H. It is further evident that this intimate and close union is maintained and increased until the bushing is finally locked, as the force is applied to the key to drive it inward at all times. As the key or pin is inserted in a tapered bore D^3 and is also itself tapered, it follows that the act of driving the key or pin also expands the bushing in its aperture in the rail, and thus the farther the pin or key is driven into the bushing the more intimate is the electrical contact between the bushing and the rail in the aperture thereof. Thus the bushing is expanded by the key or pin into close and intimate union with the rail and the shoulder D^2 also brought into such contact, the bushing being held securely and firmly in such position by means of the upturned and expanded locking-shoulder H, the whole of the result being accomplished from that side of the rail at which the bushing and key or pin is inserted. If desired, instead of a permanently-secured key J an ordinary removable driving-pin J^2, Fig. 5, may be employed.

In Figs. 6 and 7 I have shown another form of bushing and key. The key J is permanently held and maintained in the bushing D^2 by casting or forming the latter about the key. In this instance, however, the key has a head J^3 on its advancing end, which is normally within a groove D^4 in the bushing, and as the key is driven into the bore D^3 it expands the bushing and also locks it in positon.

In Figs. 9 and 10 is still another form showing a plurality of annular rings J^4, each of which is within a corresponding groove in the bushing.

In Figs. 11, 12, and 13 is shown a form in which the key and bushing are screw-threaded, the key having a head J^5, adapted to receive a suitable key for rotating the locking pin or key.

In Fig. 14 is shown a series of lugs or abutments K, which are inturned and positioned so as to be upturned by the driven key or pin to lock the bushing. After the pin or key is driven into position the metal of the bushing or head may be riveted over upon the driven end of the key or pin in order to hold the pin or key firmly and securely in position.

In Figs. 15 to 19, inclusive, I have shown a construction relating more particularly to the conductor between the terminals of the bond and means for insuring a more intimate and complete contact.

As the apertures in the rails near the ends thereof are often at relatively unequal distances from the ends, it is necessary that some provision be made for adjusting the terminals of the bond in position, as the other bonds are of equal length. So, also, it is desirable that provision be made to avoid the loosening of the contacts between the terminals and the rails by reason of that springing movement of the ends of the rails occasioned by the vehicles and motors moving along and over said ends of the rails. It is likewise evident that the construction is also operative to relieve stress at the terminal connection occasioned by endwise movement of the rails under expansion

or contraction. In order to accomplish the desired result, I provide a connecting-conductor K′, which is formed in sections, which may be termed the "terminal" sections K^2 and K^2 and the "connecting-section" K^3.

The connecting-section K^3 is pivoted or hinged at K^4 to the terminal sections K^2 K^2, and thus a flexible connecting-conductor is provided that is a connecting-conductor capable of flexure. If any variation should exist in the distance between the apertures in the rails when the track is laid, it is evident that the bond is accommodated to this variation, as the end sections may assume even the extreme position shown by the dotted lines in Fig. 17, and it is further evident that as the connecting-conductor between the terminals yields at its pivots or hinges the springing of the rail ends or expansion or contraction of the rails in no wise affects the connection of the terminals as the parts move on the hinges or pivots. I provide the flanges K^5, which are adapted to be bent over from the position shown in Fig. 15 into the position shown in Fig. 17, these flanges serving to maintain the parts in position and also to increase the conductivity of the connecting-conductor as a whole. I also provide projecting contact-pins K^6, which engage against the fish-plate L, as shown in Fig. 18, thus providing an additional path for the current through the fish-plate. In Fig. 18 I have shown a form which employs a flat spring or springs M, which are interposed between the fish-plate L and the connecting-conductor of the bond, these springs serving to keep the sections in position and also to connect the bond electrically with the fish-plate, and thus provide another path for the current through the fish-plate.

By reference to Fig. 8 it will be observed that I have formed the connecting-conductor between the terminals of separate bars, which will yield under the movements of the rail either in springing by reason of the movement of bodies along the rail or by reason of expansion or contraction. When the connecting-conductor is thus formed, the strain upon the terminal is avoided.

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

1. In a bond for electric railways a terminal head or heads and a pin or key held permanently in said terminal head by casting or forming the head about the key or pin and means for expanding and locking the head by driving the pin or key.

2. In a bond for electric railways a connecting-conductor between the heads or terminals which is constructed of sections hinged together whereby to yield in the movements of the rails.

3. In a bond for electric railways, a connecting-conductor between the heads or terminals which is constructed of hinged sections whereby to yield in the movements of the rails and projecting portions adapted to be turned over and hold the parts in position and increase the conductivity of the bond.

4. In a bond for electric railways, a combined connecting-conductor and terminal heads adapted to be interposed between the rail and the fish-plate and contact-points extended from the bond to engage against the fish-plate thereby establishing a conducting path through the fish-plate.

5. In a bond for electric railways, a combined connecting-conductor and terminal heads adapted to be interposed between the rail and the fish-plate and a spring-piece bearing against the fish-plate and connected with the bond whereby a conducting path is established through the fish-plate.

6. In a bond for electric railways, a combined connecting-conductor and terminal heads, said connecting-conductor consisting of sections hinged together, the bond as a whole being adapted for interposition between the rail and the fish-plate and contact-points extended from the bond to engage against the fish-plate thereby establishing a conducting path through the fish-plate.

7. In a bond for electric railways, a combined connecting-conductor and terminal heads, said connecting-conductor consisting of sections hinged together, the bond as a whole being adapted for interposition between the rail and the fish-plate and a spring-piece bearing against the fish-plate and connected with the bond whereby a conducting path is established through the fish-plate and the sectional parts of the connecting-conductor held in position.

8. In a bond for electric railways a terminal head or heads adapted for insertion in the ends of the rails and connected together by a connecting-conductor, an expanding key or pin in the terminal head having screw-threads which mesh with those of the head, an inturned member against which the pin or key engages and means for turning said pin or key to drive the same whereby the inturned member is upset and the head locked in position.

9. In a bond for electric railways, a combined connecting-conductor and terminal heads adapted for interposition between the rail and the fish-plate and contact-points extended from the bond to engage against the fish-plate to establish a conducting path through the fish-plate.

10. In a bond for electric railways, a combined connecting-conductor and terminal heads, adapted for interposition between the rail and the fish-plate and a spring-piece bearing against the fish-plate and connected with the bond whereby a conducting path is established through the fish-plate.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES McLAUGHLIN.

Witnesses:
CHAS. C. BULKLEY,
J. B. WEIR.