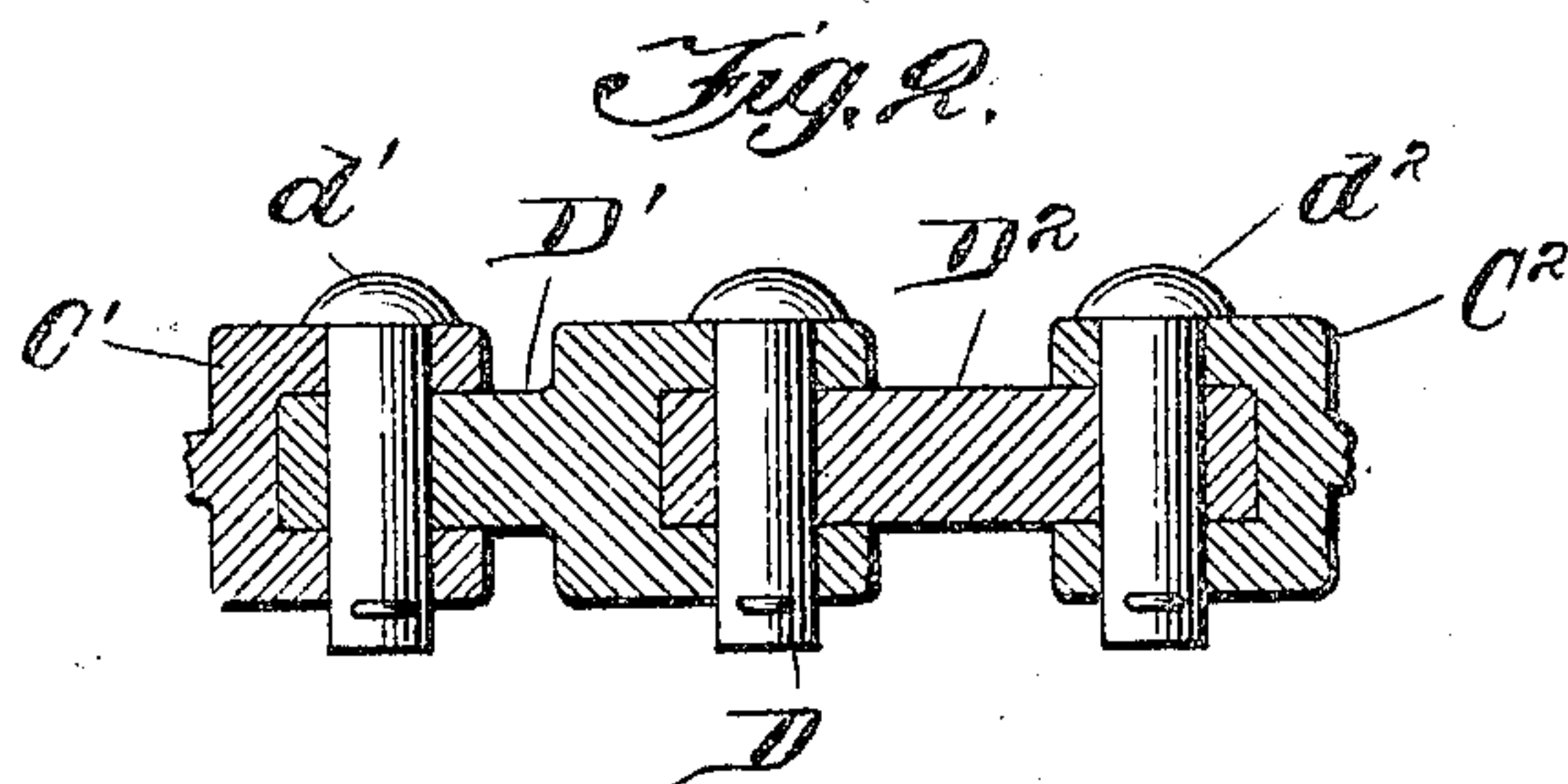
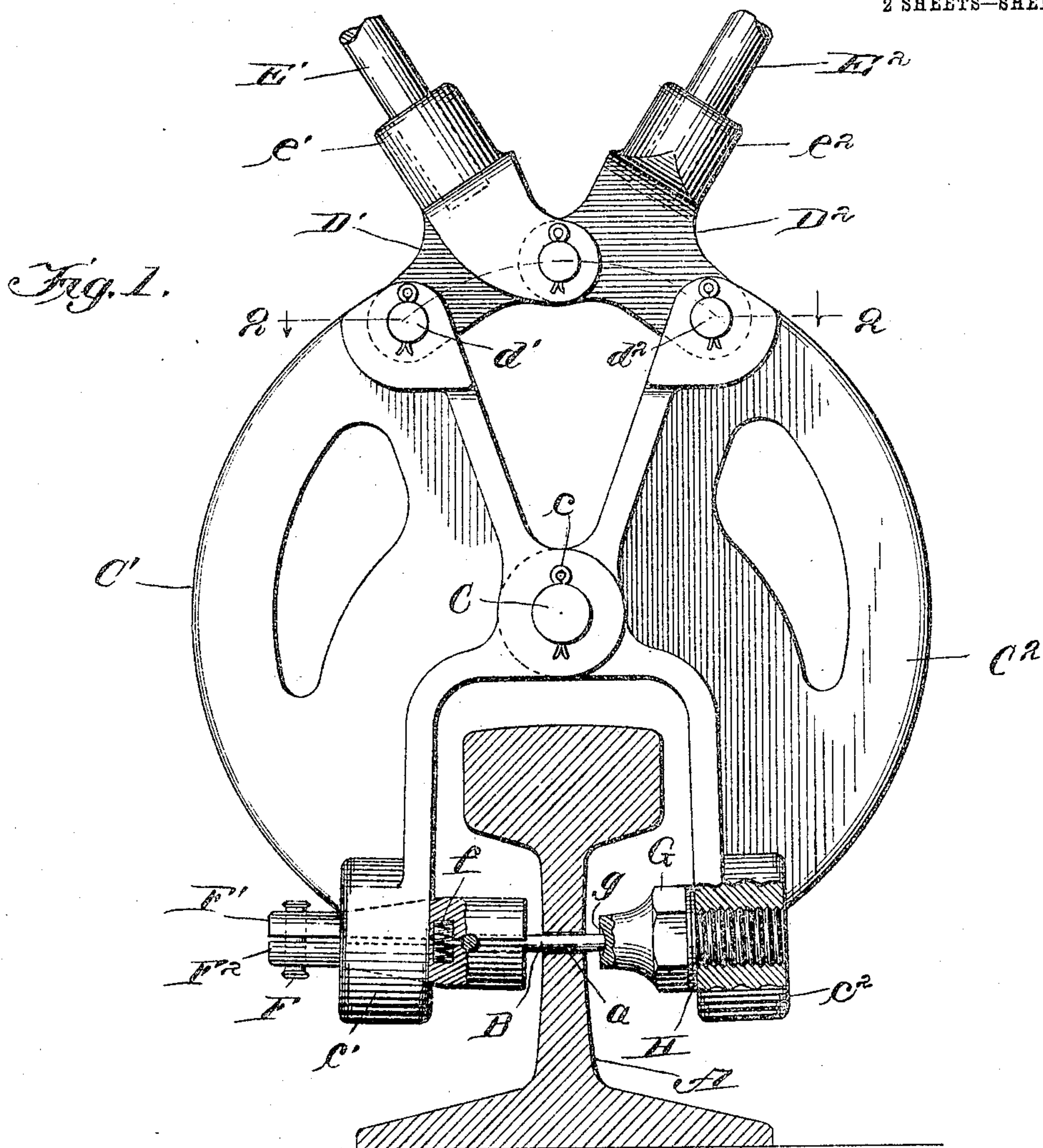


No. 812,803.

PATENTED FEB. 20, 1906.

F. C. AREY.  
TOOL FOR BONDING RAILS.  
APPLICATION FILED AUG. 15, 1903.

2 SHEETS—SHEET 1.



Witnesses:  
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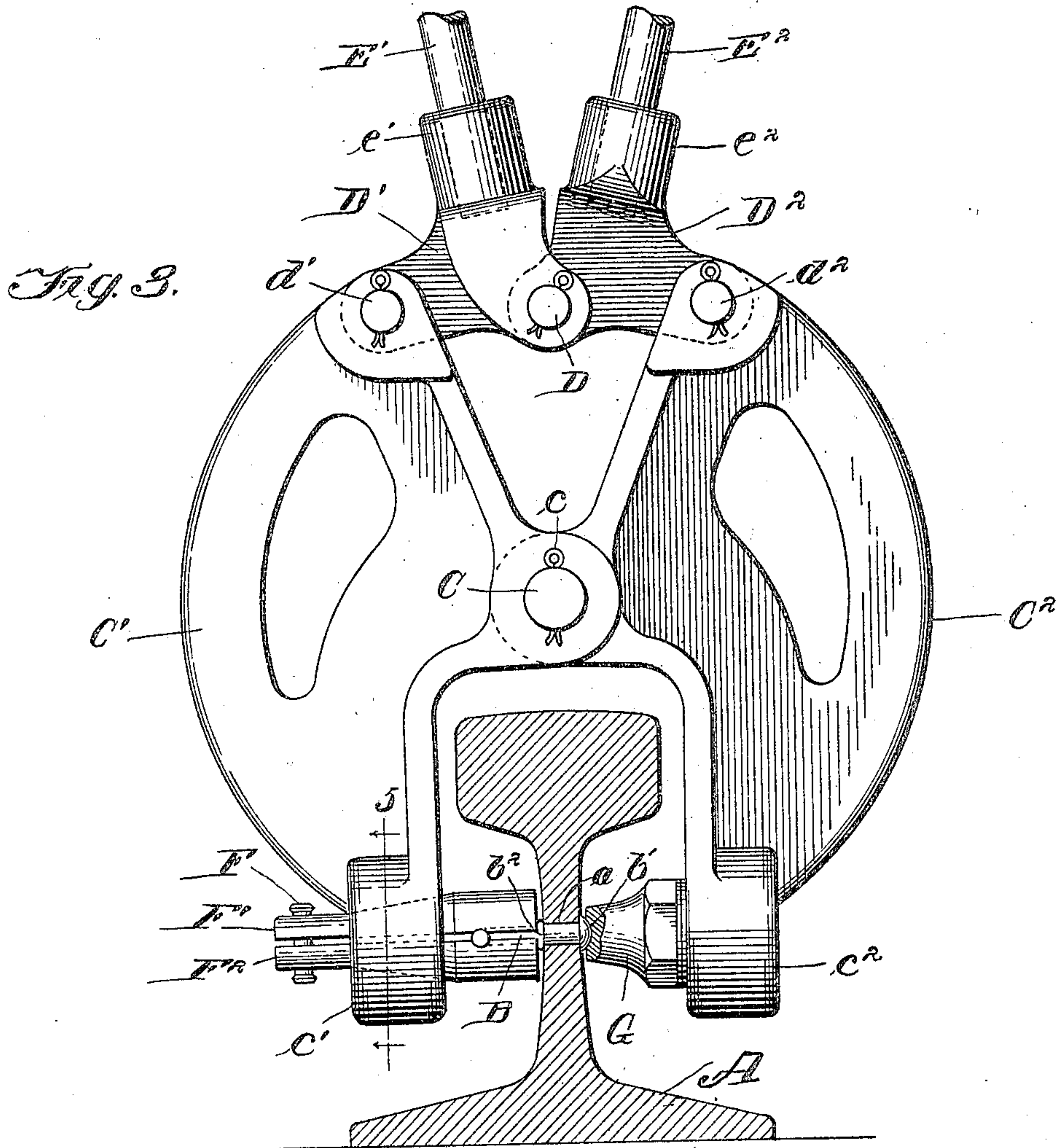
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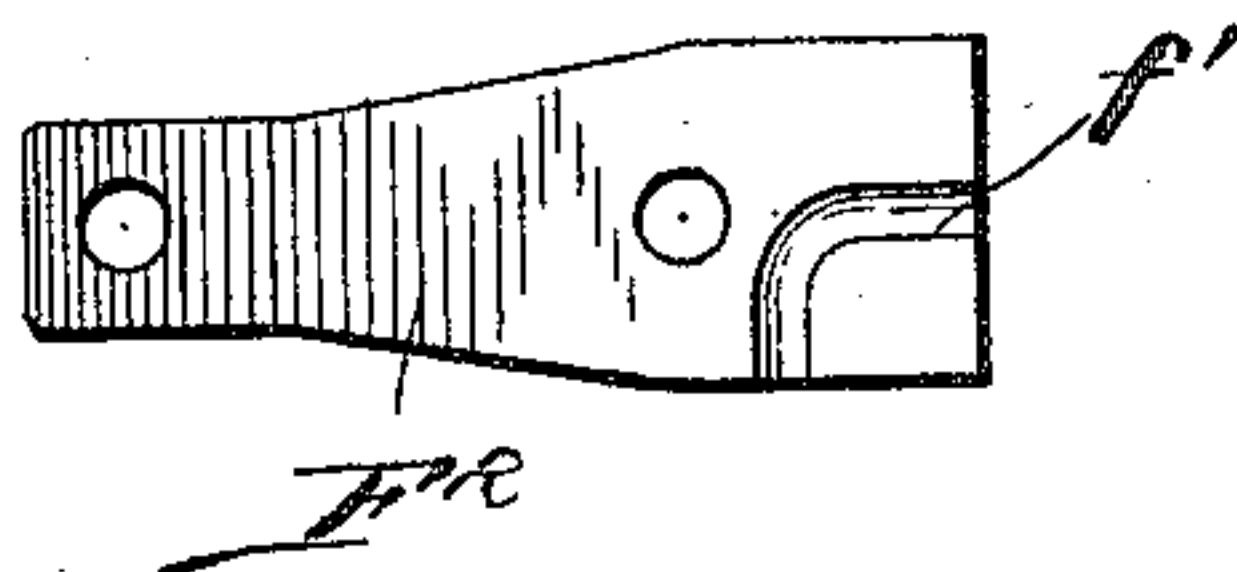
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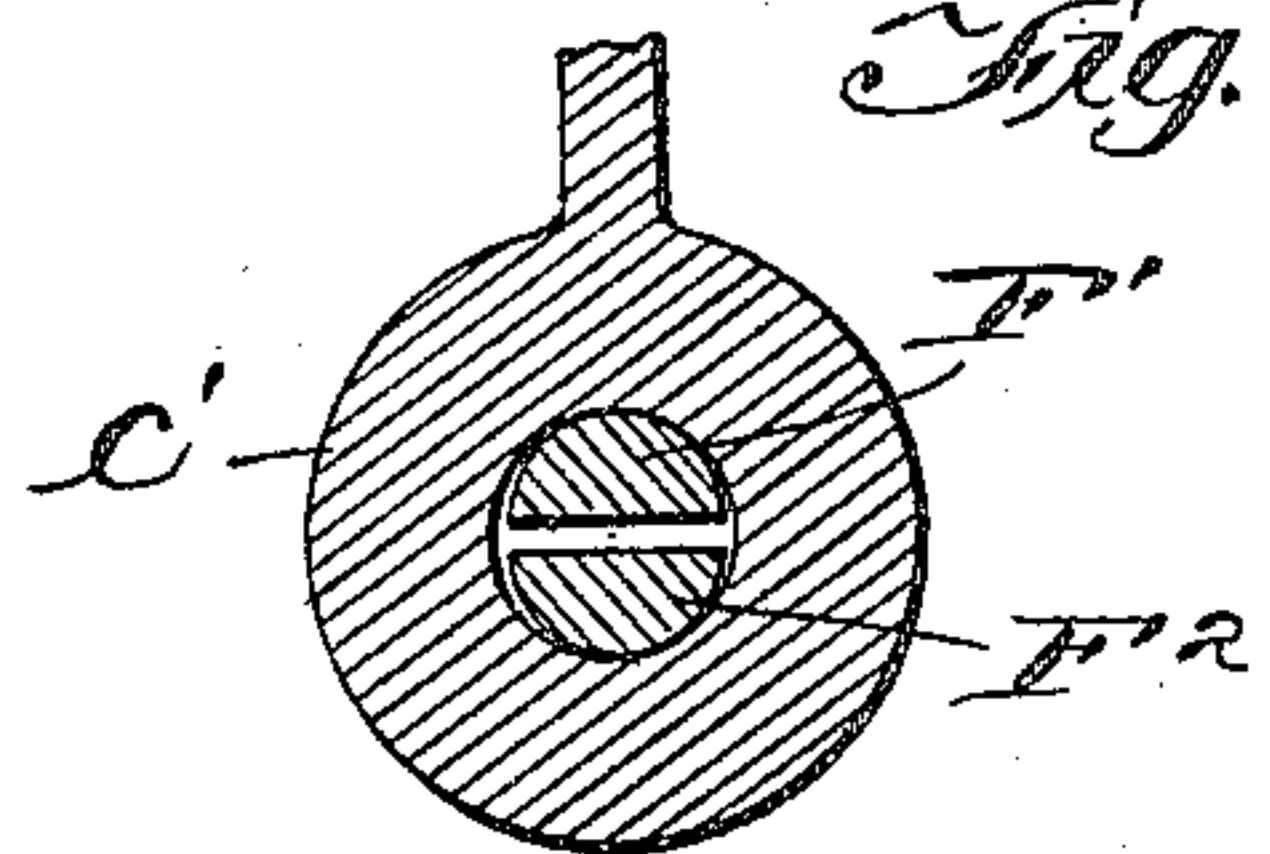
2 SHEETS—SHEET 2.



*Fig. 4.*



*Fig. 5.*



Witnesses:  
H. S. Gaither  
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# UNITED STATES PATENT OFFICE.

FRED C. AREY, OF CHICAGO HEIGHTS, ILLINOIS.

## TOOL FOR BONDING RAILS.

No. 812,803.

Specification of Letters Patent.

Patented Feb. 20, 1906.

Application filed August 15, 1903. Serial No. 169,562.

*To all whom it may concern:*

Be it known that I, FRED C. AREY, a citizen of the United States, residing at Chicago Heights, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Tools for Bonding Rails; and I declare the following to be a full, clear, and exact description of the invention, such as it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates, in general, to implements for radially expanding a wire or rod by axial compression, and more particularly to tools for uniting the terminals of bonds to railroad-rails.

It is customary in the art of railroad signaling to electrically connect the adjoining ends of rails by wire bonds the ends of which are secured within the holes in the rails. Tapered channel-pins of U-shaped cross-section are usually employed, which are placed partially around the bond-wires and then driven into the holes in the rails. I have discovered, however, that the bonds may be directly united to the rails without the use of channel-pins or other fastening devices by axially compressing portions of the bonds within the holes in the rails, thereby expanding the bond-terminals into close contact with the walls around the holes.

The primary object of my invention is to provide a tool for axially compressing the terminals of a bond, thereby expanding the portions of the bond which pass through holes in the rails and coincidentally forming enlargements on the bond at either side of the web or other part of the rail through which the bond extends.

A further object of my invention is to provide a tool for expanding by axial compression a rod or wire which will be simple in construction, inexpensive in manufacture, and efficient in use.

My invention, generally described, consists in two pivotally-connected jaws united at their upper ends by toggle-links and provided at their lower ends with means for tightly gripping a section of predetermined length of a wire or rod, the toggle-links being provided with handles by means of which the links are straightened out, and the pivoted jaws thereby relatively oscillated, so as to move the lower ends of the jaws toward each other, thereby axially compressing the por-

tion of the wire or rod between the gripping devices.

My invention will be more fully described hereinafter with reference to the accompanying drawings, in which the same is illustrated as embodied in a convenient and practical form, and in which—

Figure 1 is an elevational view of my improved implement in position to axially compress the portion of a bond within a hole through the web of a rail. Fig. 2 is a detail sectional view on line 2 2, Fig. 1; Fig. 3, a view similar to Fig. 1, showing the parts in the positions they assume at the completion of the operation of uniting the bond to the rail; Fig. 4, a detail plan view of one member of the clamp for gripping the wire, and Fig. 5 a sectional view on line 5 5, Fig. 3.

The same reference characters are used to designate the same parts in the several figures of the drawings.

A indicates a railroad-rail of ordinary construction, and *a* a hole through the web thereof.

B indicates the terminal of a bond, which extends through the hole *a* in the web of the rail.

C' and C<sup>2</sup> designate two jaws, in the form of bell-crank levers, which overlap and are pivotally connected by a bolt or rod C. Suitable means are employed for retaining the pivot-rod C in proper position—such, for instance, as a cotter-pin *c*. Interposed between the upper ends of the jaws C' and C<sup>2</sup> is a pair of toggle-links D' and D<sup>2</sup>, pivotally united to each other by means of a rod or bolt D. The free ends of the links are pivotally connected to the upper ends of the jaws C' and C<sup>2</sup> by suitable means—such, for instance, as rods or bolts *d'* and *d*<sup>2</sup>. The toggle-links may be conveniently constructed as shown in Fig. 2, in which the link D<sup>2</sup> is received within ears on the link D', the pivot-bolt D extending through the ears on the link D' and the interposed end of the link D<sup>2</sup>. The outer ends of the links are received within ears formed at the upper ends of the jaws C' and C<sup>2</sup>, the pivot-rods *d'* and *d*<sup>2</sup> extending through the ears on the respective jaws and the interposed portions of the toggle-links. The toggle-links are provided with upwardly-projecting sockets *e'* and *e*<sup>2</sup>, which receive handles E' and E<sup>2</sup>. (Shown broken away in Figs. 1 and 2.)

The lower end of the jaw C' is provided with a boss *c'*, through which extends a con-



ical opening. A clamp composed of two similar members  $F'$  and  $F^2$  extends through the conical opening in the boss  $c'$ , the two members of the clamp being pivotally united at corresponding ends by means of a pin  $F$ , loosely extending through registering holes. The inner faces of the members of the clamp are provided with registering grooves  $f'$ , which extend axially with respect to the clamp a short distance from the inner ends of the members and then lead to corresponding sides of the members, as clearly shown in Figs. 1, 3, and 4. Registering recesses are formed in the members of the clamp, in which is seated a coil-spring  $f$ . The portions of the clamp members which extend through the conical opening in the boss  $c'$  on the jaw  $C'$  are conical to coöperate with the surface of the conical opening through the boss  $c'$ ; but, as clearly shown in Fig. 5, the cross-section through the conical portions of the two members of the clamp is slightly vertically elliptical, so as to engage the conical opening through the boss at the top and bottom, but to at all times be out of contact with the side walls of the conical opening through the boss.

The lower end of the jaw  $C^2$  is provided with a boss  $c^2$ , through which extends a screw-threaded opening. A die  $G$  is provided with a screw-threaded extension which engages with the screw-threaded opening through the boss  $c^2$ . The inner face of the die is provided with a shallow recess  $g$ . One or more washers  $H$  may be interposed between the boss  $c^2$  and the enlarged portion of the die  $G$  in order that the position of the die may be so adjusted as to regulate the extent to which its inner end projects. The die may be engaged with and disengaged from the screw-threaded hole through the boss by a wrench applied to the facets thereon.

The jaws and toggle-links are provided with reinforcing ribs and webs wherever desired to give the requisite structural strength to the implement.

The operation of my invention is as follows: The end of the bond  $B$ , which consists in an ordinary wire electrical conductor, is bent to conform to the grooves  $f'$  in the members of the clamp and then inserted through the hole  $a$  in the web of the rail  $A$ . The handles  $E'$  and  $E^2$  of the tool are moved farther apart than the position shown in Fig. 1, so that the lower ends of the jaws will be swung apart a distance sufficient to permit their passing over the tread of the rail and being located at either side of the web. The members  $F'$  and  $F^2$  of the clamp are then placed above and below the portion of the bond in which the bend was formed, the bent portion of the bond being received within the grooves  $f'$  in the faces of the clamp members. The recess  $g$  in the end of the die is placed against the end of the bond, so that the tool and bond assume the positions shown in Fig. 1. The

handles  $E'$  and  $E^2$  are then drawn together, which, through the interposed toggle-links  $d'$  and  $d^2$ , forces the upper ends of the jaws apart, and consequently moves the lower ends of the jaws toward each other, the result being that the die  $G$  and clamp approach each other, thereby axially compressing the portion of the bond between the clamp and die. The inward movement of the lower end of the jaw  $C'$  through the engagement of the conical hole therethrough with the two members of the clamp forces such members tightly together, thereby securely gripping the bond between the grooves  $f'$ . The axial compression of the bond between the die and clamp causes the portion thereof within the hole through the web of the rail to expand into close contact with the walls surrounding the hole, and subsequently such axial compression forms a head  $b'$  on the end of the bond and a collar  $b^2$  on the bond adjacent to the side of the web opposite to the head  $b'$ . The head  $b'$  and collar  $b^2$  serve to structurally and electrically unite the bond to the rail, and thereby increase the structural and electric connection between the bond and rail resulting from the expansion of the bond. The head  $b'$  and collar  $b^2$  also serve to completely close the ends of the hole through the rail, so as to prevent any water or moisture working in between the bond-terminal and rail, which would corrode and injure the electrical connection. After completing the operation above described the tool may be readily removed by moving the handles apart, which separates the lower ends of the jaws and permits the members of the clamp to be moved with respect to the surrounding boss  $c'$  a sufficient distance to disengage the grooves  $f'$  from the bond.

From the foregoing description it will be observed that I have invented a portable tool for axially compressing a rod or wire which while especially adapted for uniting bonds to railroad-rails may be used equally as well for uniting a small electrical conductor to a relatively large conductor or, in fact, for any purpose involving the expansion of a wire or rod by axially compressing the same.

While I have described more or less precisely the details of construction, I do not wish to be understood as limiting myself thereto, as I contemplate changes in form, the proportion of parts, and the substitution of equivalents, as circumstances may suggest or render expedient, without departing from the spirit of my invention.

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

1. In a portable tool for bonding railroad-rails by axially compressing the bonding-wire, the combination with a pair of relatively movable jaws spaced apart to straddle the head of the rail and extend downwardly op-



posite a given point in the rail-web, toggle-links operatively connected to said jaws, means for operating said toggle-links and thereby relatively moving the free ends of  
5 said jaws toward the rail-web, and means carried by said jaws for rigidly engaging the wire at predetermined points.

2. In a device for bonding railroad-rails, the combination with a pair of pivotally-  
10 united jaws spaced apart to straddle the head of the rail and extend downwardly opposite a given point in the rail-web, of a pair of toggle-links interposed between and operatively connected to said jaws, means for operating  
15 said toggle-links to move the free ends of the jaws toward a common point in the rail-web, and means carried by the free ends of said jaws for rigidly engaging a wire at predetermined points.

20 3. In a device for bonding railroad-rails, the combination with a pair of pivotally-united jaws spaced apart to straddle the head of the rail and extend downwardly opposite a given point in the rail-web, of a pair of toggle-links interposed between and operatively  
25 connected to said jaws, means for operating said toggle-links, a clamp carried by one jaw adapted to rigidly engage a wire, and means carried by the second jaw to rigidly engage  
30 the wire at a predetermined distance from said clamp.

4. In a device of the character described, the combination with a pair of pivotally-united jaws spaced apart to straddle the head  
35 of a rail and extend downwardly on opposite sides of the web thereof, of a pair of toggle-

links interposed between and operatively connected to said jaws, means for operating said toggle-links, a clamp carried by one jaw adapted to rigidly engage a wire at a prede- 40  
termined distance from its end, and a die carried by the second jaw adapted to engage the end of the wire.

5. In a device of the character described, the combination with a pair of pivotally- 45  
united jaws, of a pair of toggle-links interposed between and operatively connected to said jaws, means for operating said toggle-links, a two-part clamp loosely extending through a tapered opening in the lower end 50  
of one jaw adapted to grip the wire at a predetermined distance from its end, and a die carried by the other jaw adapted to engage the end of the wire.

6. In a device of the character described, 55  
the combination with a pair of pivotally-united jaws, of a pair of toggle-links interposed between and operatively connected to said jaws, means for operating said toggle-links, a two-part clamp loosely extending 60  
through a tapered opening in the lower end of one jaw having grooves between which a portion of the wire is gripped, a spring interposed between the two parts of said clamp, and a die carried by the second jaw adapted 65  
to engage the end of the wire.

In testimony whereof I sign this specification in the presence of two witnesses.

FRED C. AREY.

Witnesses:

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C. C. CUNNINGHAM.