

No. 672,769.

Patented Apr. 23, 1901.

J. S. HOLME.

METHOD OF FORMING ENDS OF RAILWAY RAILS FOR SPLICING.

(Application filed Feb. 23, 1901.)

(No Model.)

3 Sheets—Sheet 1.

FIG. 1.

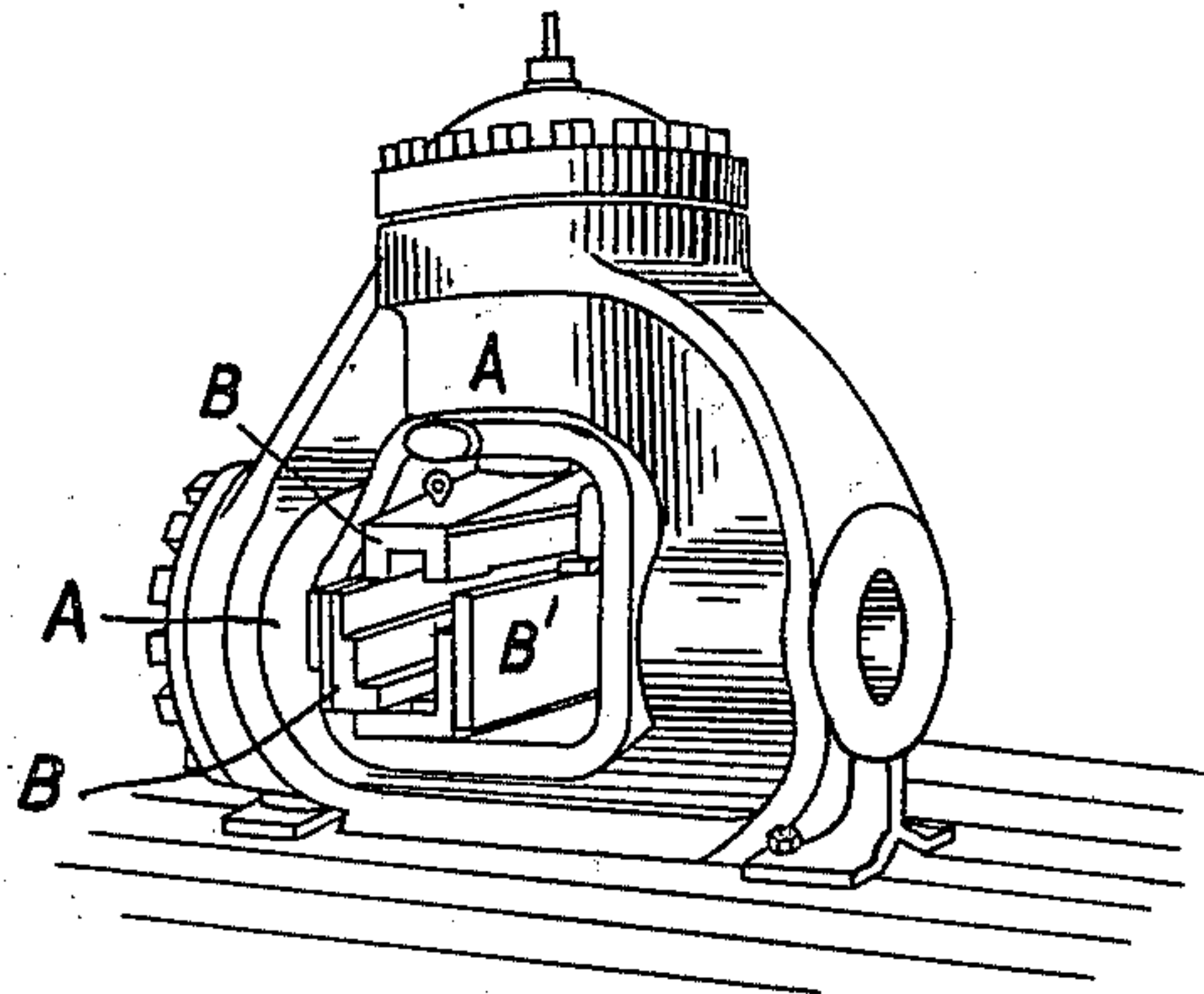


FIG. 3.

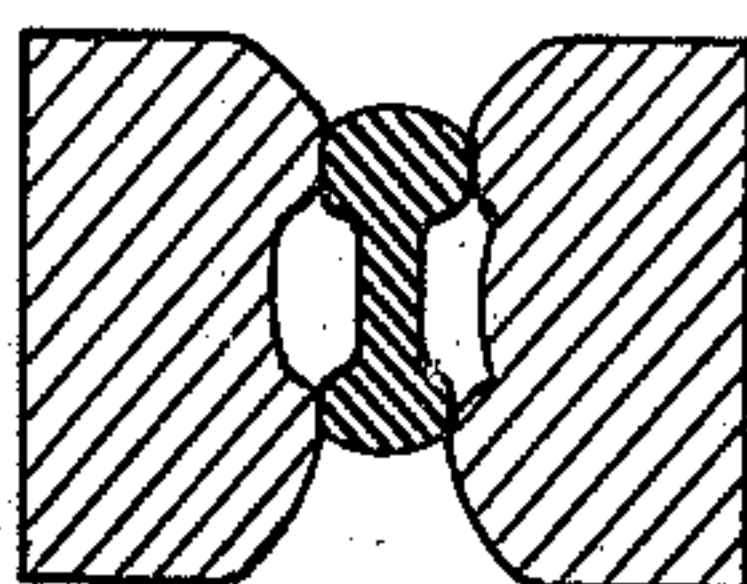


FIG. 4.

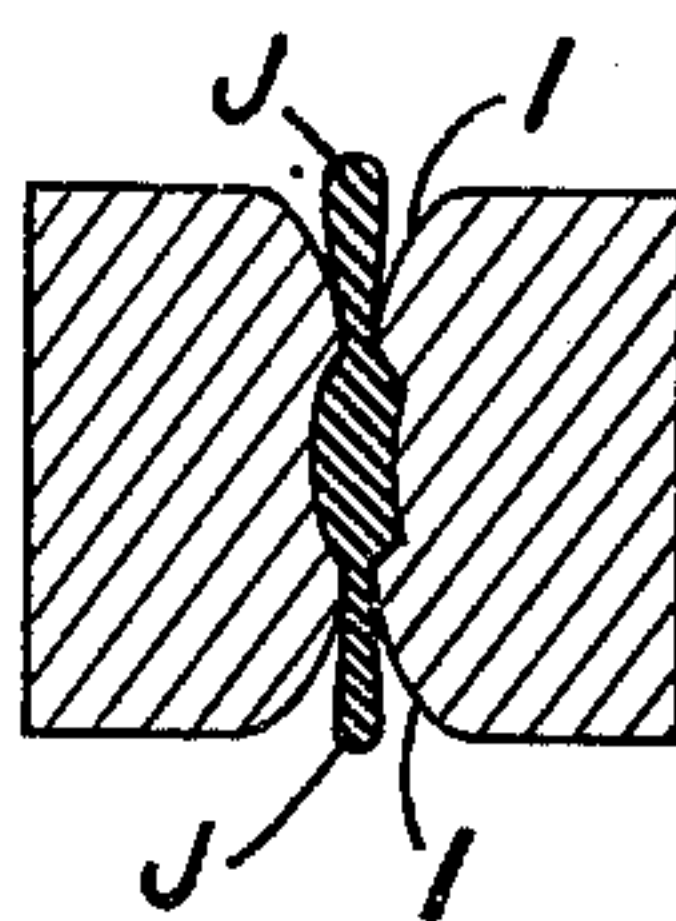
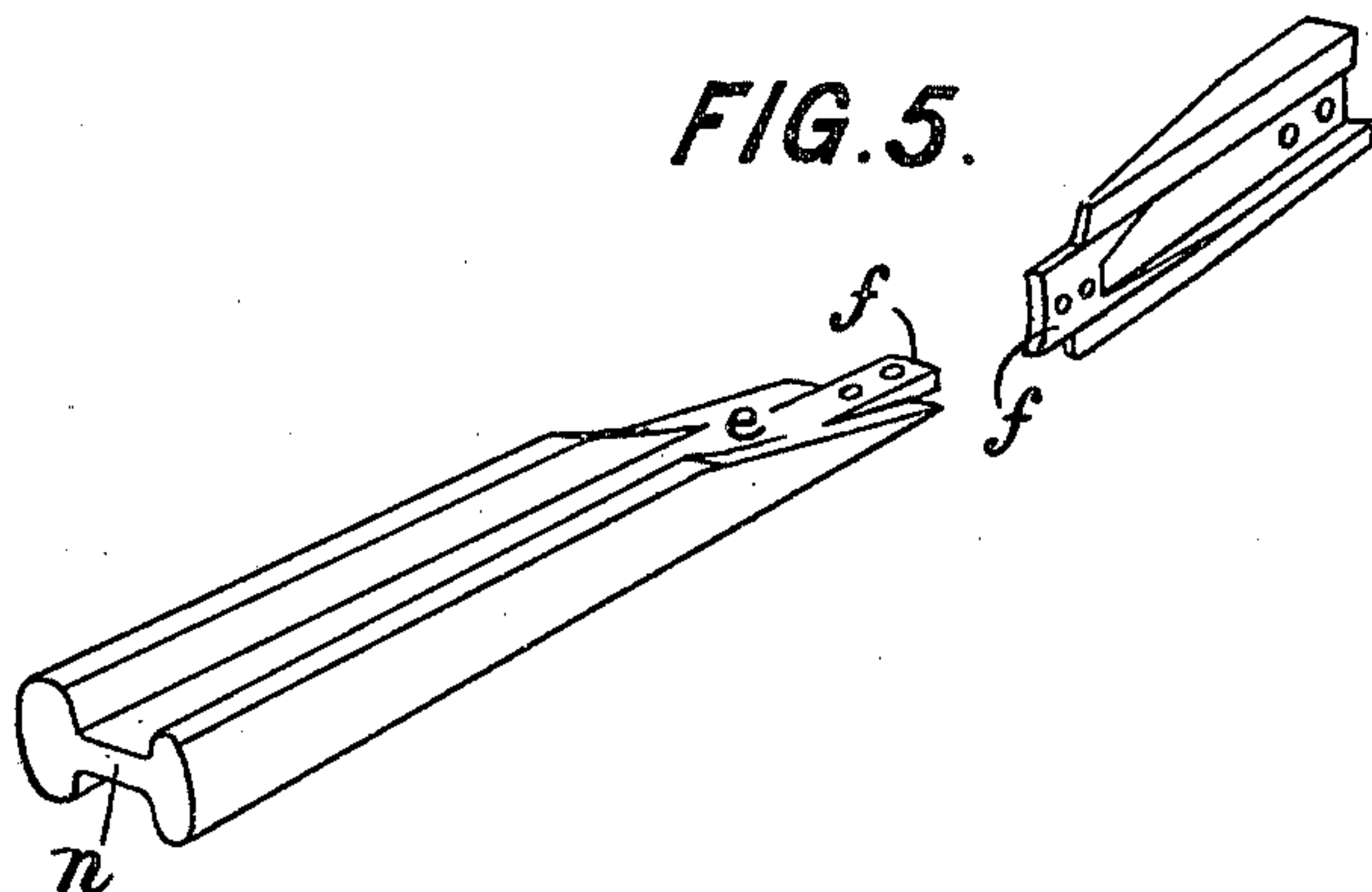


FIG. 5.



Witnesses

*J. H. Wiman*  
*Peter A. Ross*

Inventor

*John Stanley Holme*  
By *Henry C. Cunniff*  
Attorney

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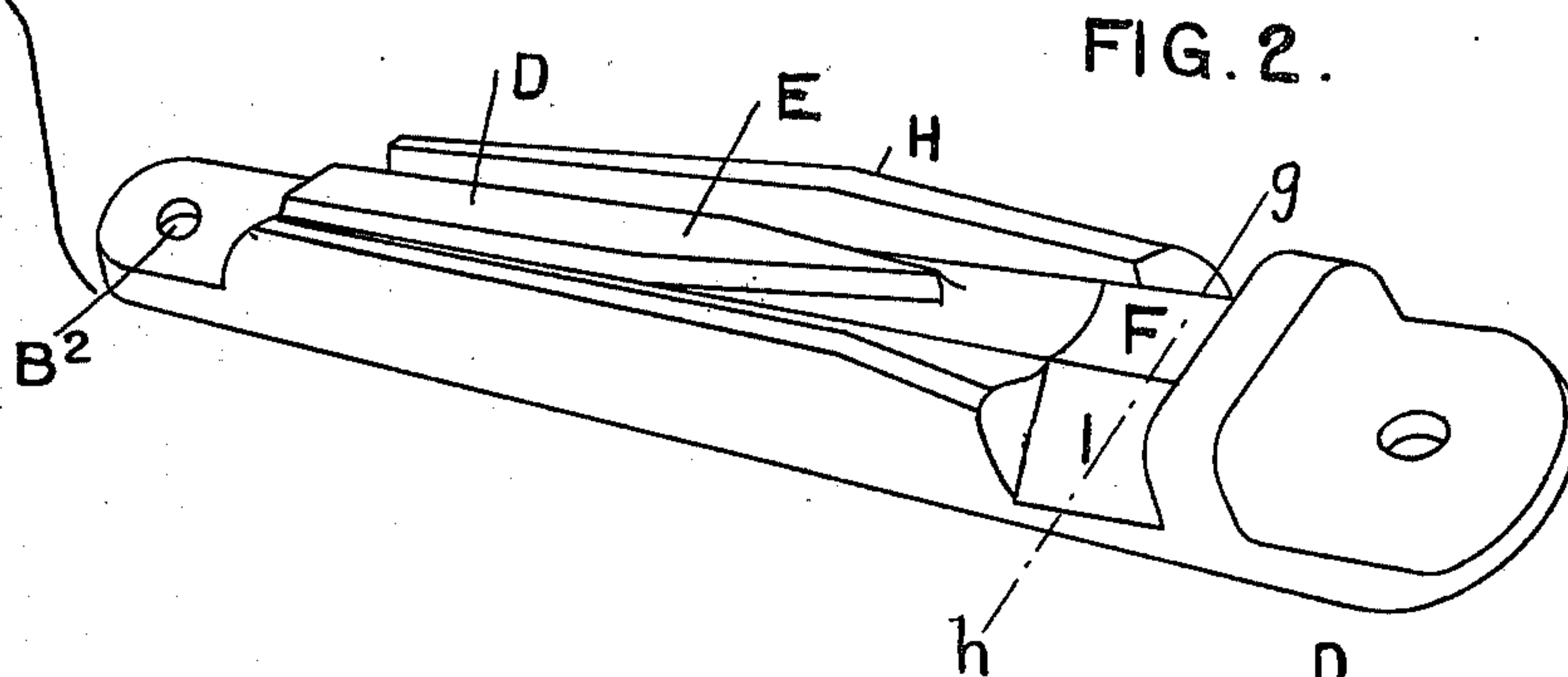
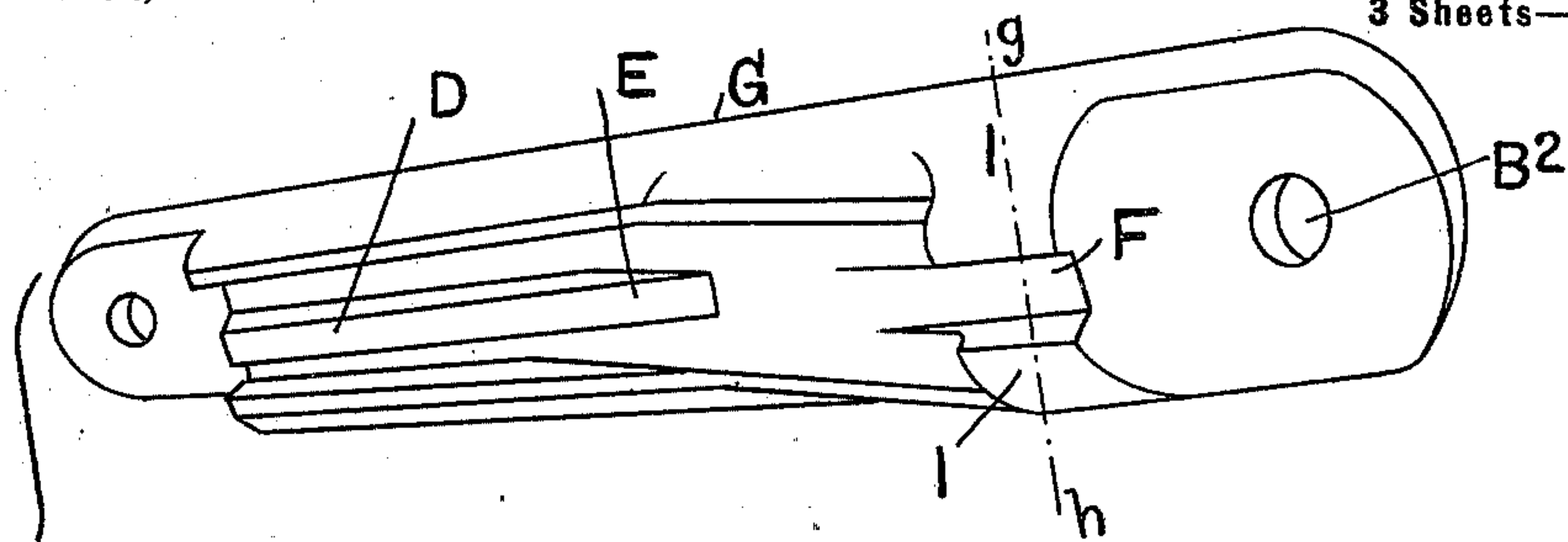
**J. S. HOLME.**

# METHOD OF FORMING ENDS OF RAILWAY RAILS FOR SPLICING.

(Application filed Feb. 23, 1901.)

(No Model.)

**3 Sheets—Sheet 2.**



Witnesses

J. H. Ziman  
Peter A. Ross

Inventory

John Stanley Holme  
By Henry Conner  
Ass. Attorney

No. 672,769.

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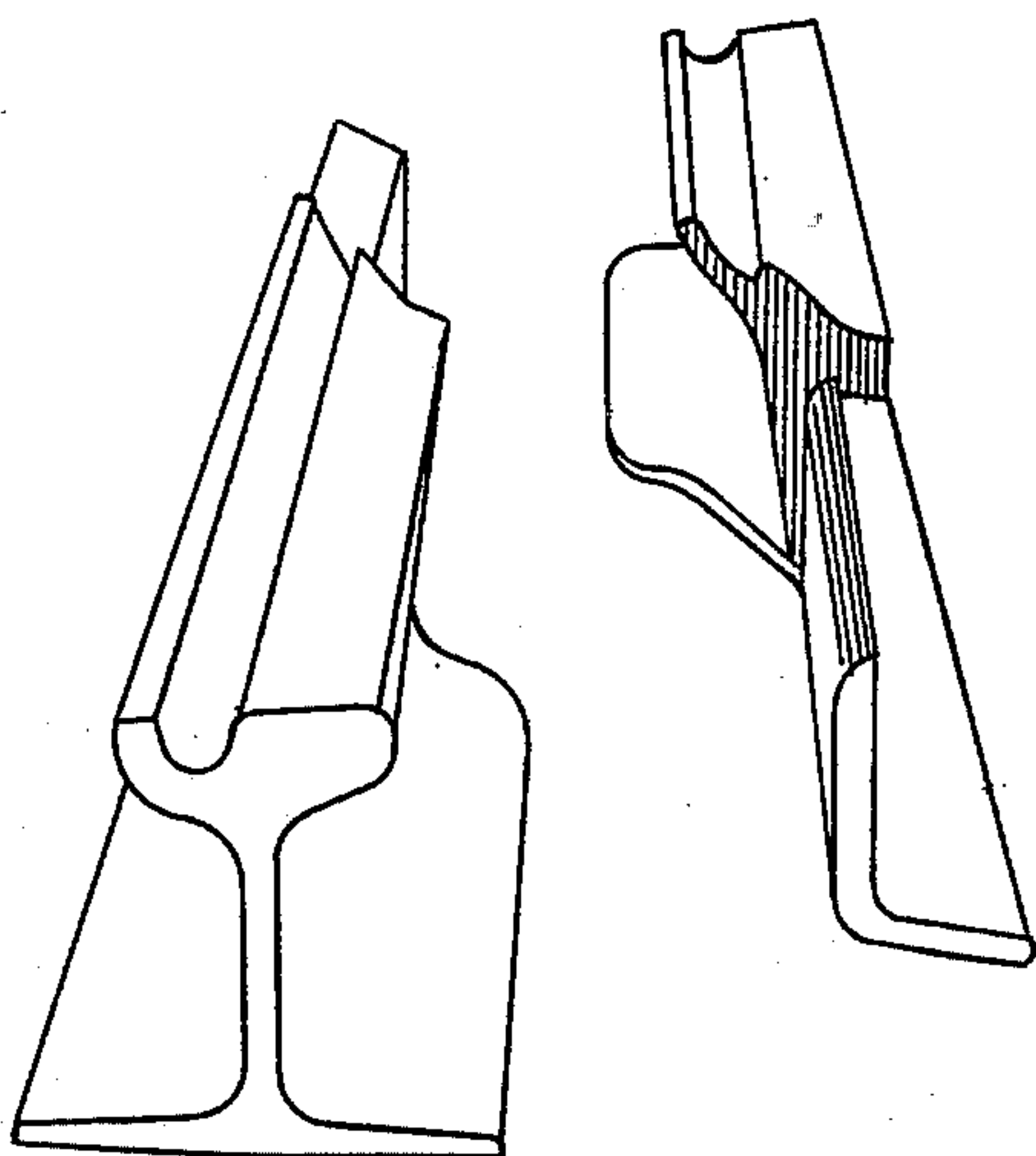
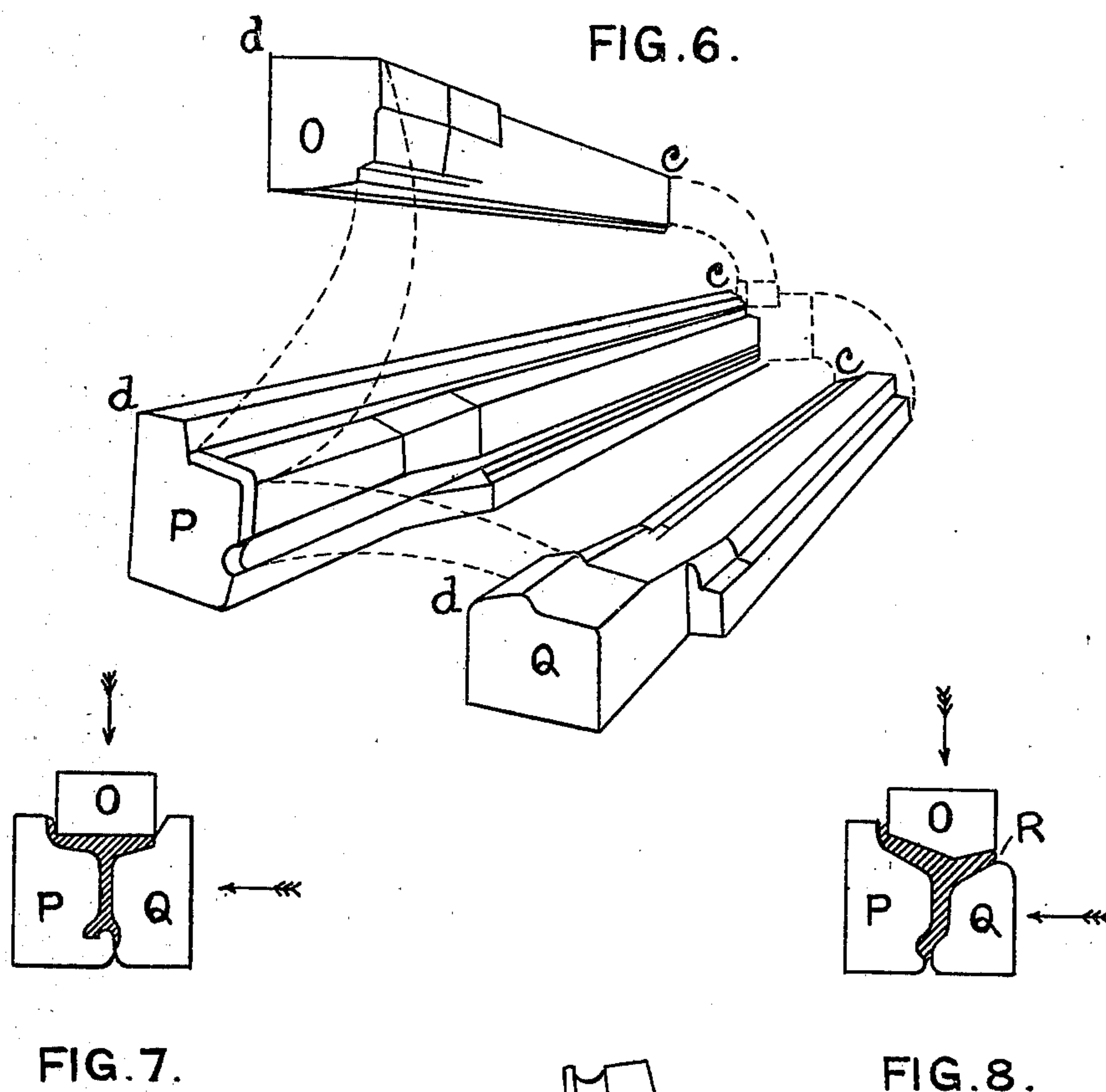
J. S. HOLME.

METHOD OF FORMING ENDS OF RAILWAY RAILS FOR SPLICING.

(Application filed Feb. 23, 1901.)

(No Model.)

3 Sheets—Sheet 3.



Witnesses

*J. W. Kimball*  
*Peter A. Ross*

Inventor

*John Stanley Holme*  
*By Henry Combs*  
*Attorney*



# UNITED STATES PATENT OFFICE.

JOHN STANLEY HOLME, OF MANCHESTER, ENGLAND.

## METHOD OF FORMING ENDS OF RAILWAY-RAILS FOR SPLICING.

SPECIFICATION forming part of Letters Patent No. 672,769, dated April 23, 1901.

Application filed February 23, 1901. Serial No. 48,407. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN STANLEY HOLME, iron and steel merchant, a subject of the King of Great Britain, residing at Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in Methods of Forming the Ends of Railway-Rails for Splicing and the Like, of which the following is a specification.

15 This invention relates to the manufacture of railway or tramway rail scarf or lap joints of the kind in which the joint is produced by forming the two rails so that the joint between the two lateral faces of the overlapping  
15 rails extend obliquely across the crown of the rail. By employing this class of joint fish-plates can be entirely dispensed with.

The method of making these joints has hitherto been by bending the rails laterally  
20 at the ends and then planing away the requisite amount of metal at the outside to make, when the two ends are overlapped or jointed together, the same width as the ordinary head or base of the rail. The making of this kind  
25 of joint in the manner above described has been found in practice to be seriously detrimental to the steel, inasmuch as by bending the rail ends back and then planing away part of the metal it destroys the continuity  
30 of the fiber, and consequently makes the rail ends or joints weak.

Now the object of the present invention is to manufacture rails with this oblique form of scarf-joint and at the same time avoid the ob-  
35 jections commonly urged against such joints, among which may be mentioned that they are structurally weak, owing to the planing away of the metal, which destroys the continuity of the metallic fiber and are costly to manu-  
40 facture.

The invention is also applicable for making switch-tongues.

In carrying the invention into effect I heat the rail ends and then swage or press the  
45 heated end portions of the rail between dies or swages, so as to form a lap or scarf joint. This is effected in a hydraulic press or by a steam-hammer or the like in such a manner that the web is obliquely deflected laterally  
50 at the ends of the rails, which overlap in forming the joint. Furthermore, a part of the metal which is displaced by the pressing is

pressed into the web and taper of the rail end, thus thickening and strengthening it. This enables what would otherwise be the weak-  
55 est portion of the rail—namely, the taper—to be as strong as the ordinary section of rail, as by my method of swaging or pressing the rail ends they undergo considerable compression, and thus the particles are brought into  
60 closer and more intimate contact, with a corresponding increase in tensile strength, ductility, and compactness of surface, and, besides, the parts so compressed are reinforced by the addition of surplus metal pressed into  
65 them. This enables the rail ends to resist the same amount of heavy wear as the other portion of the rail. By this invention, therefore, the rail is made as strong or stronger at the  
70 splice than at any other part instead of being weaker, and, further, I do away entirely with separate fish-plates, as the securing-bolts pass through slotted holes in the webs of the overlapping rails. This imparts strength to  
75 the rail at the splice, and each rail end is rigidly supported at the joint by the adjacent rail, and thus the rails throughout the entire length of the permanent way mutually support each other and provide a thor-  
80 oughly-smooth railway-track.

In the accompanying drawings the preferred mechanism for carrying out the improved method is fully illustrated.

In the drawings, Figure 1 is a general view of a swaging-press, with dies removed, for  
85 swaging or pressing the heated end portions of the rails; Fig. 2, a general view of the dies for bull-headed railway-rails; Fig. 3, a cross-section through these dies when in use, taken on line *g h* of Fig. 2, before being closed to-  
90 gether; Fig. 4, the same, showing the dies closed together; Fig. 5, a perspective view of two railway-rail ends after having been pressed or swaged at ends to form the joint; Fig. 6, a detail view of the dies for making  
95 tramway-rails of standard section; Fig. 7, a view of these dies at end lettered *c*, Fig. 6, when closed together; Fig. 8, a similar view of the end lettered *d*; Fig. 9, a perspective view of the ends of two tramway-rails after  
100 having been pressed or swaged at ends to form the joint; Fig. 10, a detail view of the dies for making switch-tongues, also a switch-tongue made by the said dies.



Referring to the drawings, Fig. 1 shows a press such as may be used for pressing or swaging the rail ends. The press illustrated in the drawings is a hydraulic press, in which  
 5 A represents the two cylinders, and B B' the cross-heads in which the dies are mounted and secured. The figure shows three cross-heads, one for holding the die acting on bottom of rail and two for supporting the rail and act-  
 10 ing upon its sides. One of these cross-heads, B', is a fixture and the other two, B, are movable by hydraulic rams in the cylinders A. Though three dies are shown, it is obvious I do not confine myself to that number, as one,  
 15 two, or any other number may be used.

Figs. 2, 3, and 4 show dies suitable for making railway-rail joints of the bull-head pattern. These are mounted in the cross-heads of the press and secured by passing bolts  
 20 through holes B<sup>2</sup>. They are so made and operate as to form the rail ends (shown in Fig. 5) and not only deflect the web obliquely at the ends, but also compress the whole taper of the rail, so that its particles are brought  
 25 into closer and more intimate contact, and, further, reinforce the parts so compressed by pressing thereinto surplus metal resulting from the pressing of the rail ends into the scarf or splice. With this end in view the  
 30 dies are made at D, so as to fit the section of the rail required to be dealt with, and thus prevent any escapement of metal at that end during the pressing, while at E the two dies begin to obliquely deflect the web laterally,  
 35 so as to produce the oblique splice *e*. The head and base are gradually tapered off to an S curve, and by means of the projecting parts F F on the two dies the head is completely pressed off at the extreme ends of rails  
 40 and flows out at J as surplus metal. In railway-rails I generally provide two dies G H, as shown in Fig. 2—namely, one, H, for acting on the back of the rail, and the other, G, for acting on the other side. Thus it will be seen by  
 45 reference to Fig. 2 that the part D fits the section of the rail required to be dealt with, while the remainder of the dies deflect the web and compress both the web and the head and base, so as to bring the particles into closer and  
 50 more intimate contact, with corresponding increase of tensile strength, ductility, and compactness of surface. Furthermore, this pressing forces a part of the metal to flow forward and be pressed into the web and taper of the  
 55 rails, so as to reinforce them and, in fact, make the overlapping part *f* thicker than the main web. Any surplus metal, such as J, flows out at the gits or channels I and is nipped off. The parts F and I are so formed as to press  
 60 the head and base of the rail out through the gits, leaving the part *f*, which is straight and not oblique like the tapered part *e*, intact. Of course the displacement gets less and less toward the other end of the dies at D, and  
 65 finally disappearing altogether. At this point the swages envelop the rail. The rails when they are forged by the dies at one end are taken

from the press and the other end heated and then forged at the opposite end. The appearance of the rail ends when completed are set  
 70 forth in Fig. 5, in which *e* is the taper or reinforced web obliquely deflected laterally out of line with the main web *n*, so that the line of the web at this point does not follow the  
 75 longitudinal axis of the rail. The part *f*, which is also reinforced in thickness, is in a different plane to the longitudinal axis of the rail, but parallel thereto.

In making tramway-rails of standard section I have found it desirable to use three  
 80 dies, as shown in Fig. 6—one, O, for acting on bottom of the rail, which I prefer to forge head downward, and two, P Q, for supporting the rails and for acting on its sides. The  
 85 swage P is a fixture and the swages O and Q, which are mounted in cross-heads attached to hydraulic rams, do the displacement of the flange and the nipping off of the side that has to be removed. The dotted lines in Fig. 6  
 90 show the way in which the swages come together in their working positions. They are simply opened out in the manner indicated, so that the working face can be seen. The groove in the rail being out of the center, the tram-rail will require right and left hand  
 95 swages. Right and left hand swages are also generally required in the case of railway-rails. The arrows show the direction of motion of the swages. The dies in this case also compress the metal at the ends, thus bringing  
 100 the metallic fibers into closer and more intimate contact, and at the same time causing the surplus metal to flow toward the end, so as to reinforce or thicken the overlapping parts of the web, any excess of metal being forced out  
 105 by the dies and nipped off as surplus. The rail completely formed by these dies is shown in Fig. 9. The dies may be so arranged as to punch holes in the heated rail ends at the same time as they are being pressed. This  
 110 may be effected by forming projecting studs on one die projecting into holes on the opposite die.

Fig. 10 shows the dies for making switch-tongues for bull-headed rails, in which G is  
 115 the die for acting on one side of the rail and H the die for acting on the other side thereof. T is the tongue formed by the dies. The dies G and H are made at D, so as to fit the section of the rail required to be dealt with, and  
 120 thus prevent any escapement of metal at that end during the pressing, while at E the die G begins to form the oblique or tapering face of the tongue and also to deflect the web laterally, so that on one face the rail will have a  
 125 flat surface.

The term "railway-rail" is herein meant, of course, to include tramway-rails, switch rails or tongues, and all such metals as form  
 130 parts of the track of a railway.

I declare that what I claim is—

1. The herein-described method of forming the obliquely-tapered extremity of a railway-rail and strengthening the same, which con-



sists in first heating the end of the rail and then pressing the heated rail laterally across its entire depth, thereby compressing and strengthening the tapered and thinner portion of the rail end, substantially as set forth.

5 2. The herein-described method of forming the obliquely-tapered extremity of a railway-rail, which consists in first heating the end of the rail and then pressing the same laterally  
10 across its entire depth, deflecting the web of the rail laterally and pressing into the same

wholly or in part the surplus metal from the thicker or wider portion of the heated rail, substantially as set forth.

In witness whereof I have hereunto signed 15  
my name, this 13th day of February, 1901, in the presence of two subscribing witnesses.

JOHN STANLEY HOLME.

Witnesses:

G. C. DYMOND,  
F. P. EVANS.