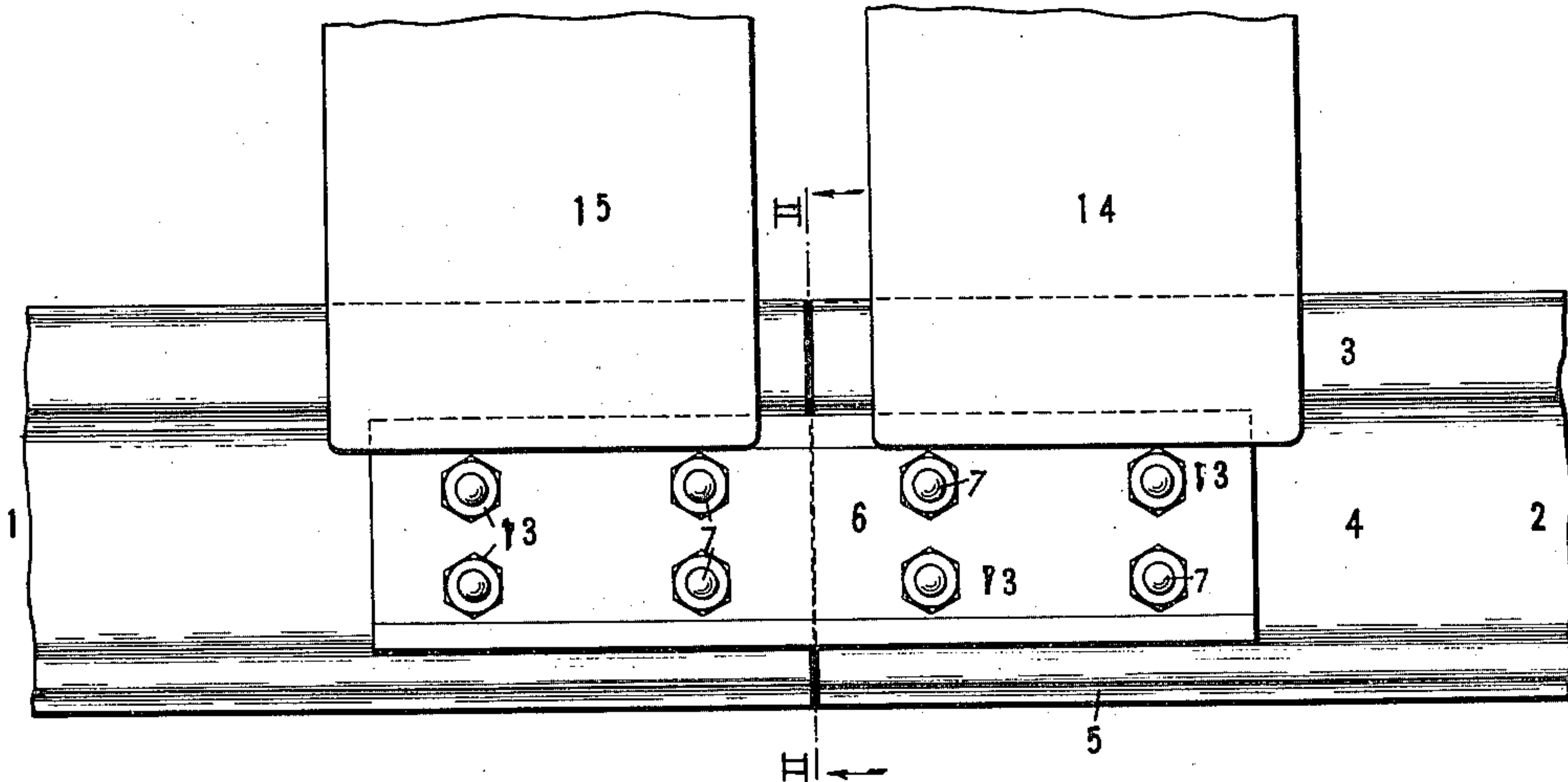


RAIL JOINT.

997,697.

2 SHEETS—SHEET 1.



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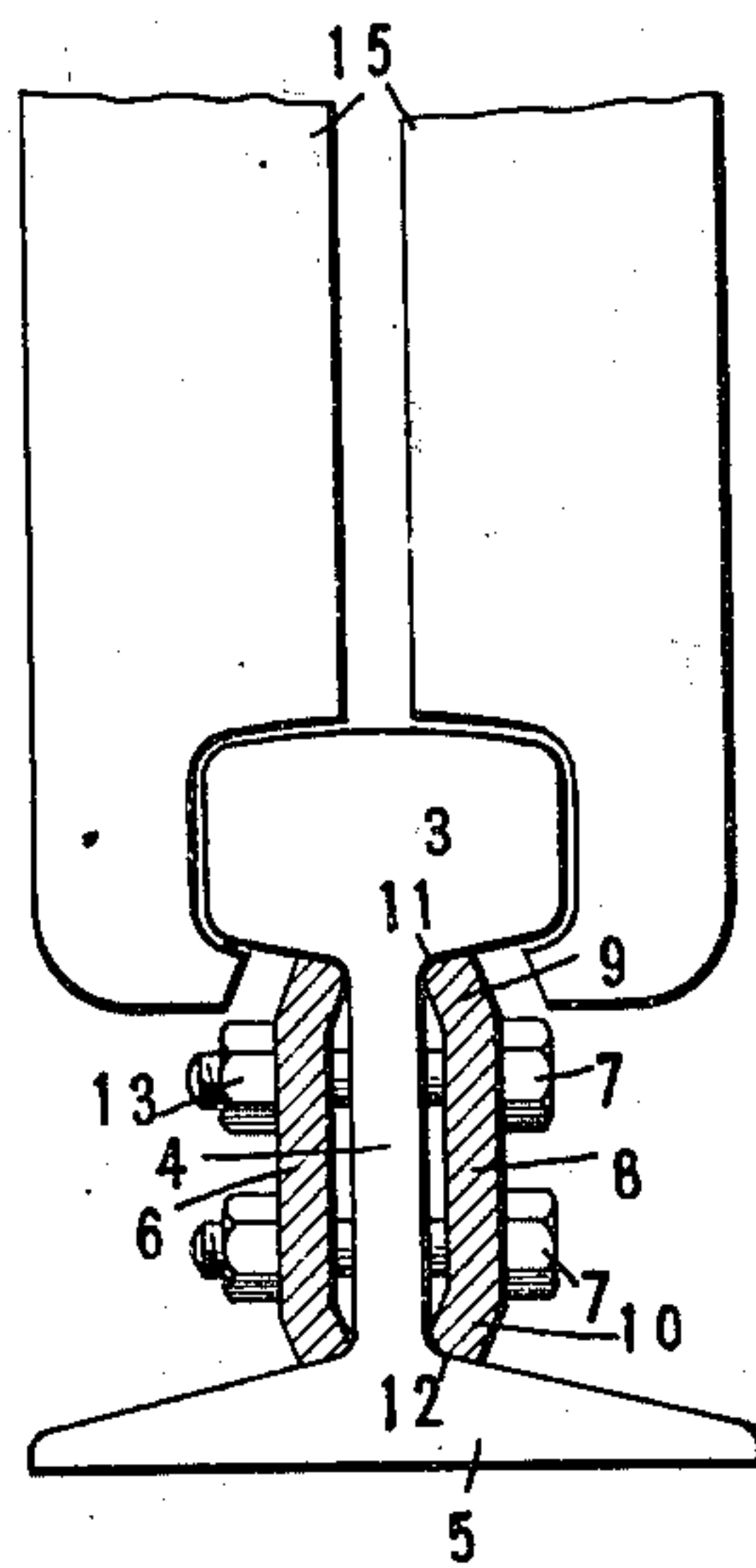


Fig. 2.

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RAIL JOINT.
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997,697.

Patented July 11, 1911.
2 SHEETS—SHEET 2.

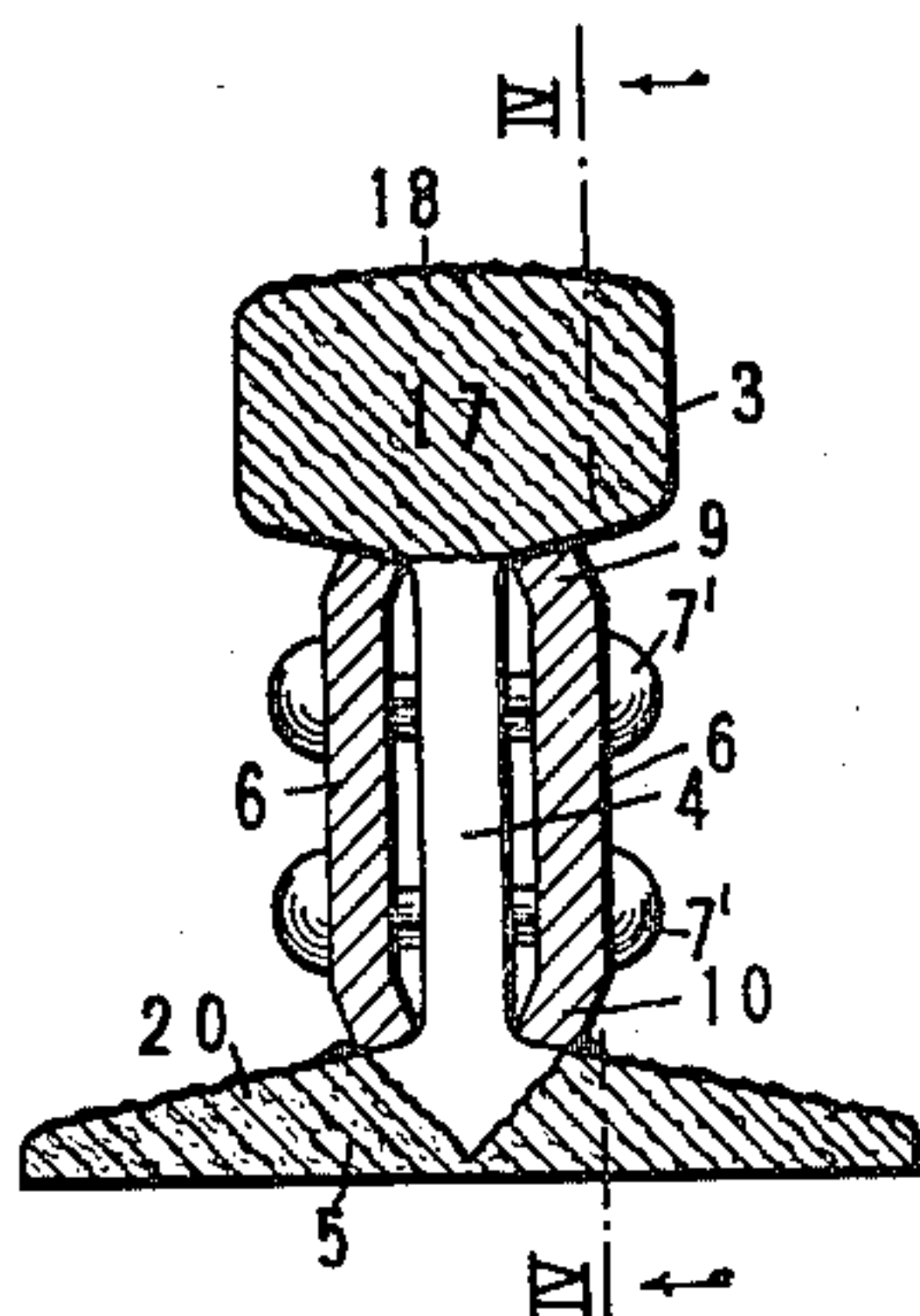


Fig. 3.

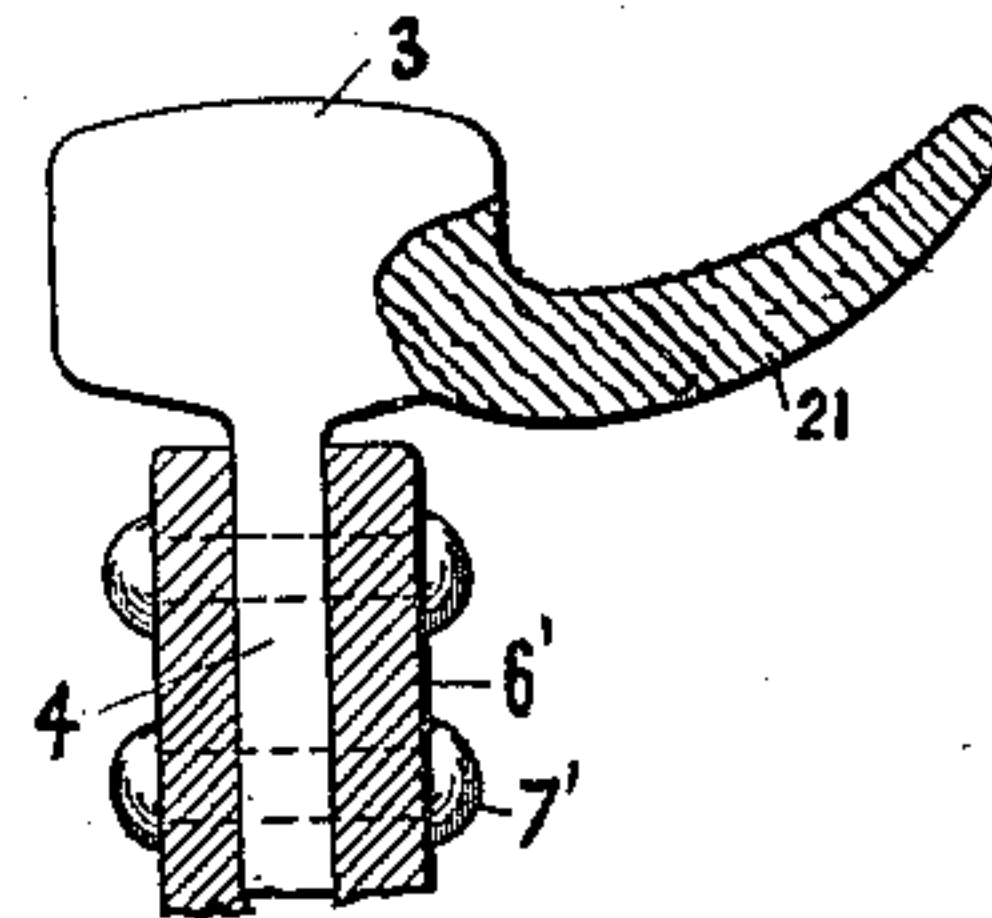


Fig. 5.

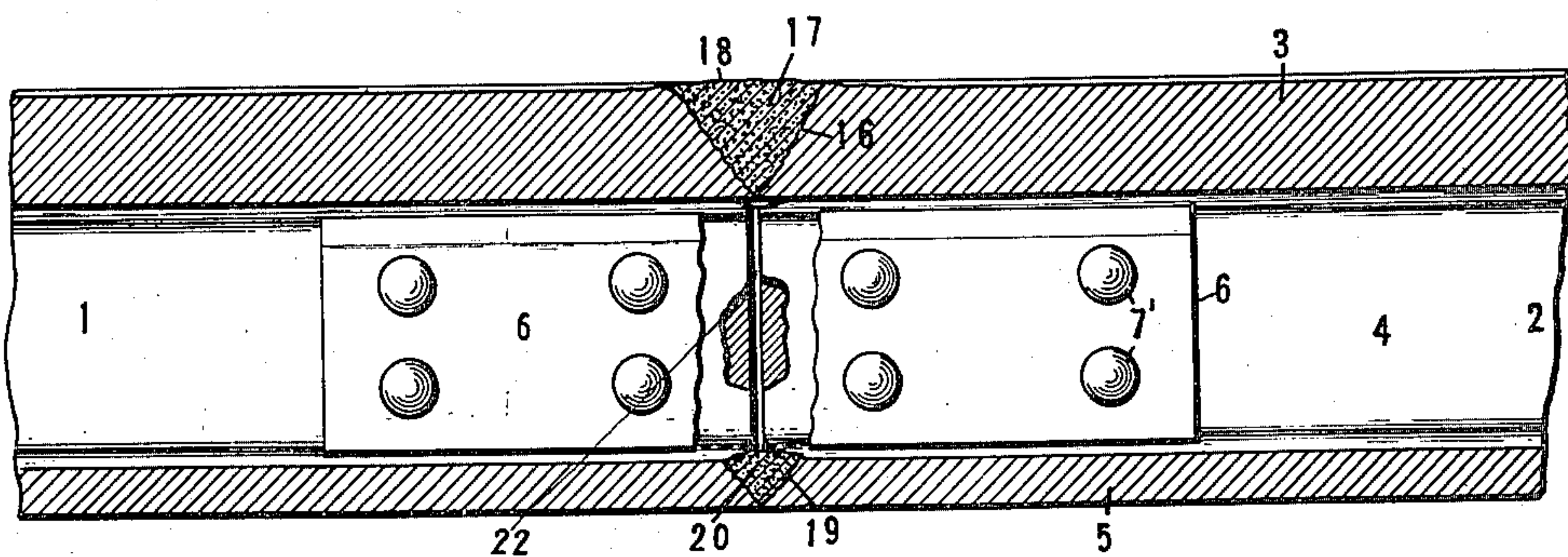


Fig. 4.

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UNITED STATES PATENT OFFICE.

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RAIL-JOINT.

997,697.

Specification of Letters Patent.

Patented July 11, 1911.

Application filed August 31, 1909. Serial No. 515,422.

To all whom it may concern:

Be it known that I, GEORGE E. PELLISSIER, a citizen of the United States, and a resident of the borough of Manhattan, county, city, and State of New York, have invented certain new and useful Improvements in Rail-Joints, as set forth in the following specification.

This invention relates to rail joints, which may be termed combination joints and comprise applied mechanical connecting members and welded portions of the abutting rail ends.

An object of the invention is to effect the joining of rails in a speedy and efficient manner, to withstand all strains incident to traffic, and to provide electrical continuity from rail to rail.

To the above end the invention contemplates the provision of fish plates to take up the greater amount of the strain to which the joint may be subjected and to this end it is preferred that the fish plates be secured to the abutting rail webs in a heated condition so that their shrinkage upon cooling will place the fish plates under normal tension and the welded portions of the rail ends under normal compression. By this expedient a large proportion of the strain which may occur in the rail joint will be sustained by the fish plates which are designed to withstand such strains, both of tension and shear. Furthermore the portions of the rail ends welded are the extreme cross sectional portions, commonly the head or foot or both the head and foot portions of the rail, so that they are properly located to be most effective in withstanding the most likely disrupting strains tending to place either the head or foot of the rail under tension, occasioned by traffic on the railroad.

The above and further objects of the invention will be apparent from the following specification and will be pointed out more particularly in the following claims, which should be read in connection with the accompanying drawings, which form part of this application, in which like characters designate corresponding parts, and in which,—

Figure 1 is a side elevation of two abutting rail ends during the process of completing the joint; Fig. 2 is a cross section through line II—II of Fig. 1; Fig. 3 is a cross section corresponding to Fig. 2 in position but showing the completed joint; Fig.

4 is a longitudinal section through line IV—IV of Fig. 3 but with a portion of a fish plate removed and showing a fragmentary longitudinal section through the webs of the rails; and Fig. 5 is a fragmentary cross sectional view showing a modified cross section for a rail which is merely illustrative of any of the well known modifications.

The abutting ends of the rails to be joined are indicated by 1 and 2, each rail, as to its cross-sectional contour, comprising three principal portions,—the head 3, the web 4, and the flange portion or foot 5. The rail indicated is of a cross-sectional contour ordinarily employed in railway work. It is, however, to be understood that any rail having a web connecting the bottom flange portion with an enlarged portion providing a tread is contemplated and includes many types of tramway rails of varying head contour, as for instance that shown in Fig. 5.

In the preferred practice of the invention a pair of steel fish plates 6 are heated to a suitable degree as, for instance, to red heat. They are provided with bolt holes preferably round to coincide with a set of mating holes in the webs 4 of the abutting rail ends 1 and 2, it being understood that the holes are so formed that coincidence occurs when the fish plates are heated or if desired exact coincidence may be insured by first inserting a reamer after which the fish plates are quickly secured to the rails either by means of bolts 7 having a driving fit or by rivets 7' which are riveted in the usual manner after first being heated. It is preferred that the rivets or bolts at the extreme ends of the fish plates be first secured so that the shrinking of the entire length of the fish plates may be more effective. Although the actual amount of shrinkage in the fish plates is slight, it is sufficient to draw the rail ends together under considerable pressure.

In connection with the showing in Figs. 1, 2, 3 and 4 attention is called particularly to the cross sectional contour of each fish plate. The horizontally disposed central portion 8 extends upwardly and downwardly a distance somewhat short of the adjacent respective faces of the head and foot of the rail. Both top and bottom margins 9 and 10 of the fish plates 6 are deflected inwardly at a slight angle toward the web 4 of the rail. Attention is further called to the outward inclination or outward divergence of the adjacent inside faces of the head and

foot of the rail. It is preferred that the fish plates employed be of a width to engage both the lower face of the head and the upper face of the foot portion before it has been forced quite home against the web 4, whereby the wedging action of the said inclined faces may be employed upon the edges 11 and 12 of the fish plates, all in a preferred practice of the invention and when the nuts 13 are tightened or the rivets 7' contract. However, there is illustrated in Fig. 5 a pair of fish plates 6' which are riveted flush against the side faces of the rail webs. The next step in the practice of the invention is to fuse together, by locally applied heat, abutting portions of the rail ends which are exposed (uncovered) by the fish plates. During this fusing or welding process the fish plates serve to hold the rail ends in their proper abutting positions but it is preferred to keep them heated during the welding process for a purpose which will be apparent later.

Heat may be applied locally to the abutting heads and feet of the rail ends by means of an electric welding machine thereby causing a heavy current to flow through the portions to be welded. As these portions are exposed the jaws of a welding machine may be applied with convenience and are indicated by the numerals 14 and 15 in their application to the head of the abutting rail ends and as shown in Figs. 1 and 2. For the preferred practice of the invention, however, the blow pipe process, preferably the oxy-acetylene blow pipe process is employed to effect fusion. According to this mode of procedure, the blow pipe flame is caused to cut away opposite portions from the ends of the abutting rail heads, so that a trough-like channel, more or less irregular in contour and indicated by the numeral 16, is formed across the meeting heads of the rails. When portions of the abutting rail ends are cut away or removed by fusing them out with the blast flame of the oxy-acetylene blow-pipe the walls of the channel 16 so formed are by the same process simultaneously heated ready for the filling-in step. This channel is then completely filled and its sides built together portion by portion by fusing the end of an inserted stick of steel to the channel walls. The weld accomplished in this manner is exaggeratedly illustrated in Fig. 4, the built in metallic weld being indicated by 17, its upper surface 18, being more or less rough, as shown. The end portions of the abutting rail feet are similarly cut away to form trough-like channels indicated by 19. These trough-like channels are likewise filled in with steel 20, which is welded on to the end portions of each of the abutting ends of the rail feet.

It is to be understood that it is far from necessary in all instances to weld the entire

cross section of the rail head or of the rail foot to the corresponding abutting rail head or rail foot. For instance, in Fig. 5, a tramway rail is shown in which merely the offset flange 21 is welded to the abutting flange of the abutting rail, the weld being shown in cross section and extending into a portion of the rail head forming the tread of the rail. It is also to be understood that for many purposes it may be sufficient to weld merely a portion of the head of the rail leaving the remainder of the head and foot unwelded (see Fig. 5.)

It is believed advantageous that the tread portion of the rail be made continuous by either of the welding processes described, although the melting out of a trough across the abutting end portions and the welding together of these end portions by filling up the troughs with fused metal is preferable.

When the blow pipe process of welding is employed the fused portions of the joints may be compacted, as by hammering, which will tend to compact the material in the weld both to strengthen the same and occasion a slight compression in the welded portion of the joint. It is also desirable to finish off the exposed surfaces of the welded portions flush with the continuing portions of the rail by abrading the surplus metal in the weld, as by means of an emery wheel. This is particularly necessary on the head of the rail to form a continuous even tread.

As has heretofore been recited, the fish plates were applied to and secured to the rail in a heated condition. After the welds have been completed the fish plates are allowed to cool off and their consequent shrinkage places them in normal tension and the welded joint in normal compression in excess of that which might be due to compacting the welded portions of the joint. It is even possible that the abutting webs 4 of the rail ends in the completed joint may have a slight space, indicated by 22, between the same. If the welded portions at the head and foot of the rail are compacted locally, as by hammering, the space indicated by 22 will be larger than if these welded portions are not locally compacted in this manner. This is occasioned by the crowding in of surplus material between the abutting rail heads or abutting rail feet to oppose the compression strain exerted in the direction of the length of the rails upon the cooling of the fish plates. Of course, if merely the head or the foot portions of the abutting rails are welded together, consequently the foot or the head portions unwelded, as the case may be, will be separated by a slight space the same as will the abutting ends of the rail webs.

Particular attention is called to the fact that the welded portions of the welded joint are located on the extremities of the vertical

cross section of the rail whereby they have the greatest possible leverage to resist bending at the joint. The normal tension in the fish plates is also effective in relieving the welded portions of the joint from bending moments and the fish plates themselves are designed so as to take up all tension strains in the joint which may be occasioned by temperature changes in the rails. Thus it is apparent that practically all strains to which the joint may be subjected are initially taken care of by the fish plates and that the welded portions themselves are so located as to be best capable of withstanding the comparatively slight strains to which they may themselves be subjected.

Although the fish plates employed may be arranged as previously described to be wedged between the head and foot of the rails by tightening the nuts 13 or to be so wedged automatically upon the shrinking of the heated rivets 7', it is to be understood that fish plates clamped flush against the webs of the rails, as shown in Fig. 5, are also contemplated. Furthermore, although preferred embodiments of the invention have been illustrated and described, it is to be understood that the same are merely illustrative.

What is claimed and what is desired to be secured by United States Letters Patent is:—

1. The process of forming rail joints comprising bolting abutting rail ends closely together by fish plates and bolts; forming a transverse channel by removing metal from abutting portions of the rail ends which are left freely accessible by the fish plates; and filling in said channel with molten metal and welding the same to the opposite walls of said channel.

2. The process of forming combination rail joints comprising, securing the rail ends in abutting relation by securing heated fish plates to the webs of abutting rails; forming a channel across abutting portions of the rail ends which portions are left freely accessible by the fish plates; filling in said channel with metal and causing a molecular union of the same with the walls of said channel; and allowing the fish plates to cool to place the welded portions under normal compression.

3. The process of forming rail joints comprising bolting abutting rail ends closely together by fish plates and bolts; melting out a transverse channel from abutting portions of the rail ends which are left freely accessible by the fish plates; and filling in said channel with molten metal and welding the same to the opposite walls of said channel.

4. The process of forming combination rail joints comprising, securing the rail ends in abutting relation by securing heated fish

plates to the webs of abutting rails; fusing out a channel across abutting portions of the rail ends which portions are left freely accessible by the fish plates; filling in said channel with metal and causing a molecular union of the same with the walls of said channel; and allowing the fish plates to cool to place the welded portions under normal compression.

5. The process of forming combination rail joints comprising, securing the rail ends in abutting relation by securing heated fish plates to the webs of abutting rails; fusing together by locally applied heat abutting portions of the rail ends which portions are left freely accessible by the fish plates; compacting the welded portions while the fish plates are still hot; and allowing the fish plates to cool to place the welded portions under normal compression.

6. The process of forming rail joints comprising placing two rail ends in close abutting contact; heating a pair of fish plates materially to lengthen the same longitudinally; bolting the end portions of said fish plates to the webs of the abutting rails in symmetrical relation with the plane of the rail ends while maintaining the rail ends comparatively cold and the fish plates heated; and locally welding together abutting portions of the rail ends which are left freely accessible by the fish plates while the fish plates are maintained heated relatively to the rail ends.

7. A rail joint comprising fish plates secured at their ends respectively to opposite sides of the webs of closely abutting rail ends, said fish plates being under normal tension and the abutting rail ends under normal compression; a local weld uniting an extreme vertical portion of the cross section of one rail end to the opposite portion of the other rail end, said local weld comprising a filling of metal fused into molecular union with abutting portions of the rail ends.

8. A rail joint comprising closely abutting rail ends; a pair of fish plates having their end portions bolted together through the webs of the abutting rails on opposite sides of the joint, said fish plates being under normal longitudinal tension and the portions of the rail ends between bolted portions of the fish plates being under normal longitudinal compression; a local weld formed crosswise at the head portion of the abutting rail ends; and a local weld formed crosswise along a portion of the abutting rail feet, whereby electric continuity is supplied by the welded portions of the rail ends, while mechanical strains at the joint are sustained by the fish plates.

9. The method of making a railway track composed of rails having a continuous tread surface, which consists in removing a por-

tion of the head of adjacent rail sections to form a space, heating the head portions of adjacent rail sections, and filling the space with molten metal which is molecularly united to the heads of adjacent rail sections to form a head of a rail between the heads of adjacent rail sections which is molecularly united to said adjacent heads, substantially as described.

10 10. A railway track composed of rail sections having their webs mechanically joined together, and their heads molecularly united by an interposed head portion of metal which bridges the joint between the webs of adjacent rail sections and forms an unbroken tread surface above said joint, substantially as described.

11. As a new article of manufacture, a railway track provided with lengths of plain track composed of rail sections having the heads of adjacent sections molecularly united at their tread surfaces for a substantial portion of the depth of the heads, and

having the webs of adjacent sections below the united heads molecularly disconnected but mechanically united, substantially as described. 25

12. As a new article of manufacture, a railway track provided with lengths of plain track composed of rail sections having the heads of adjacent sections molecularly united at their tread surfaces for a substantial portion of the depth of the heads, having abutting portions of adjacent rail feet molecularly united and having the webs of adjacent sections below the united heads molecularly disconnected but mechanically united, substantially as described. 35

In witness whereof, I have signed my name to this specification, in the presence of two subscribing witnesses. 40

G. E. PELLISSIER.

Witnesses:

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LOUELLA F. LITTLE.