May 9, 1933. L. KATONA 1,907,979

RAIL JOINT AND PROCESS OF PRODUCING SAME

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Fig. 1

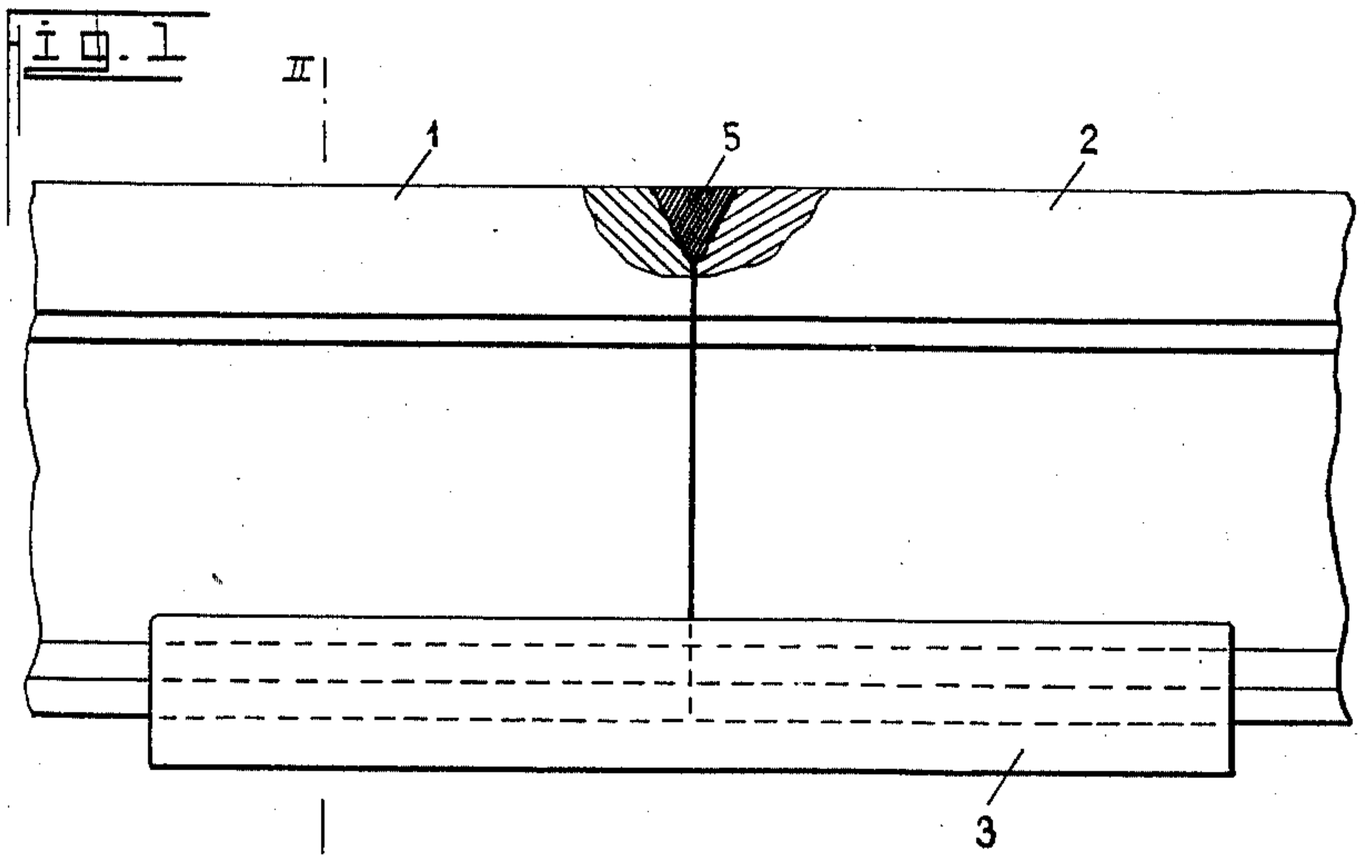

Fig. 2

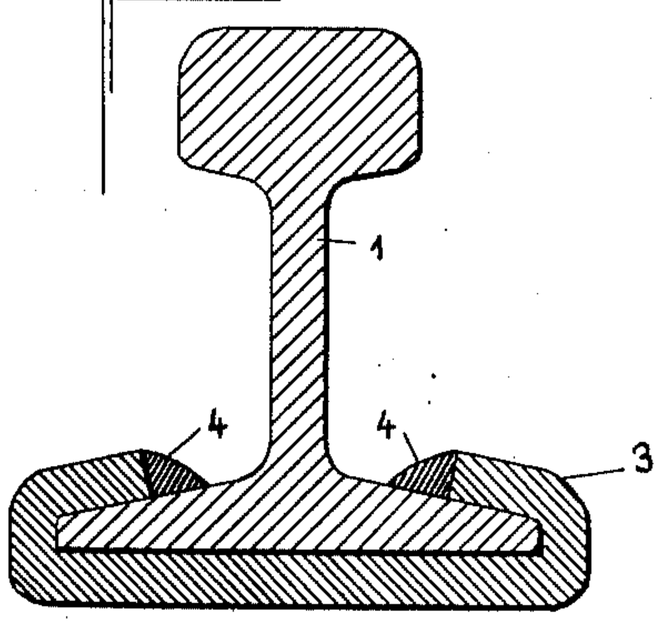

Fig. 3

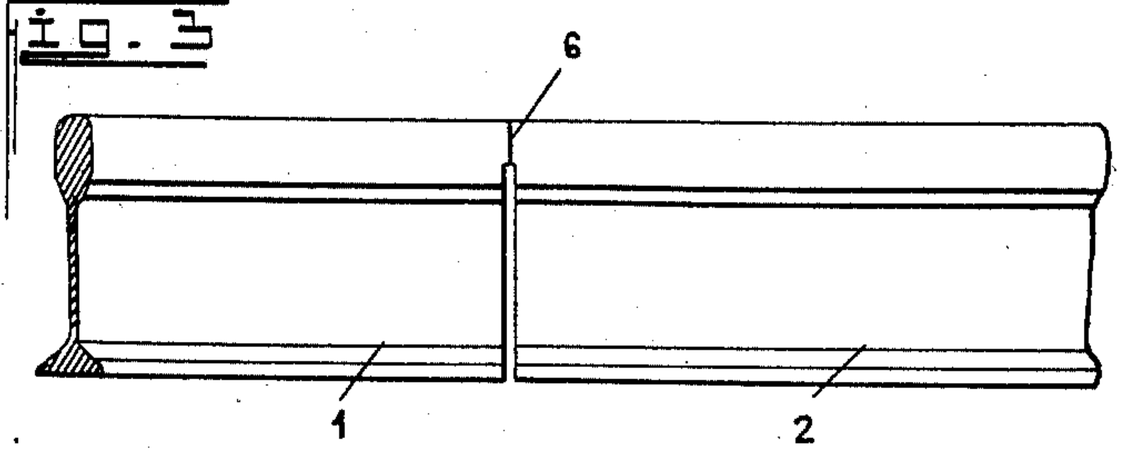

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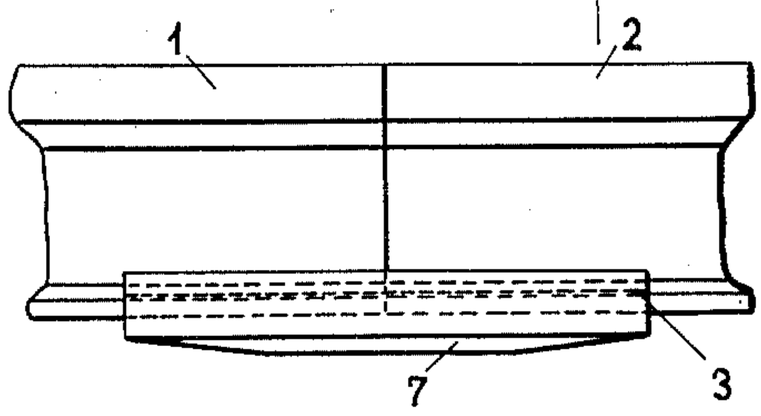
FIG. 4.



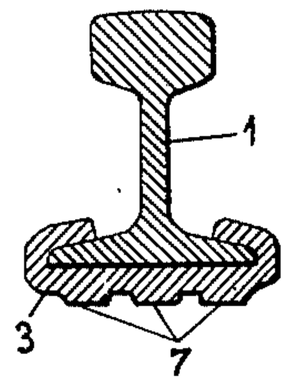


FIG. 5.

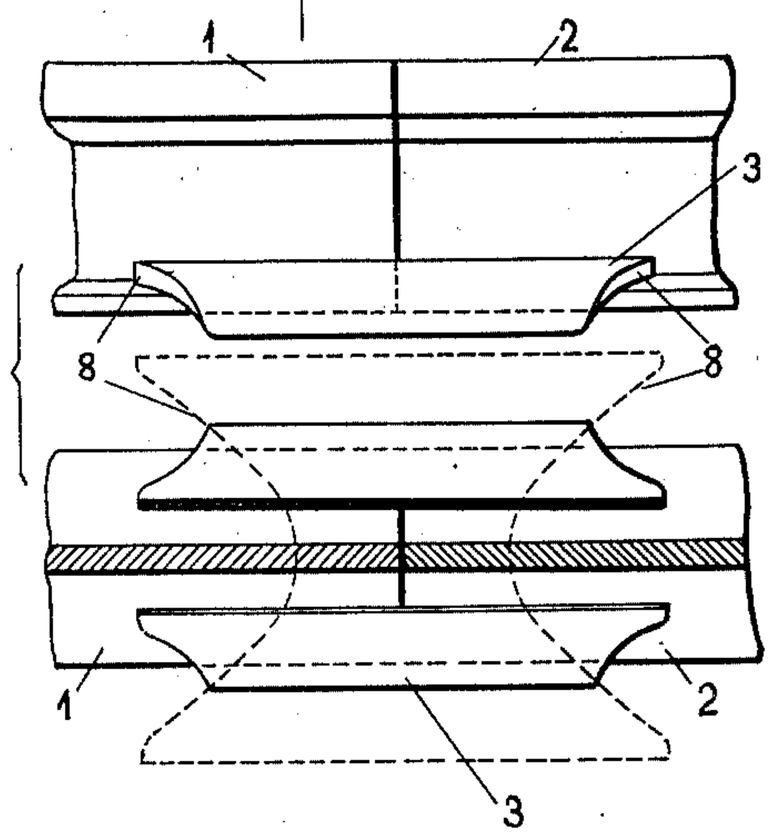


FIG. 6.

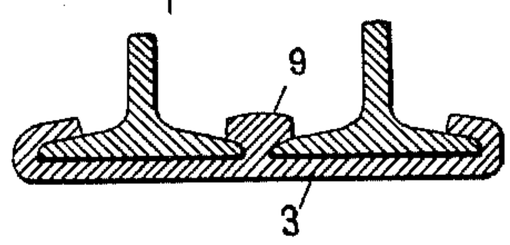


FIG. 7.

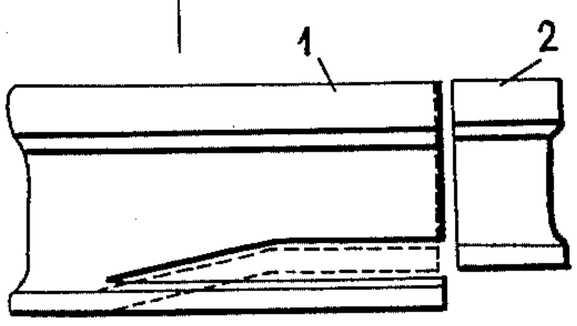
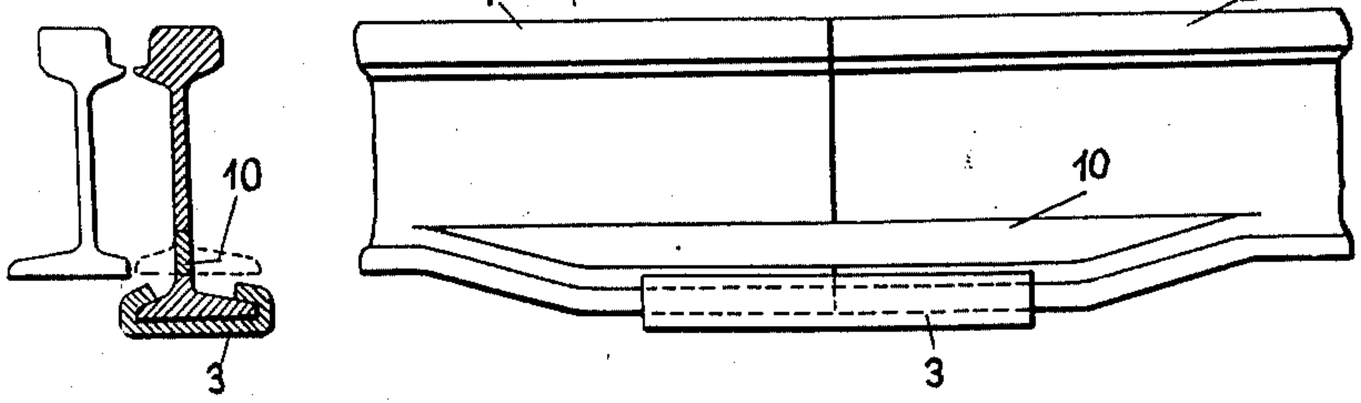


FIG. 8.



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UNITED STATES PATENT OFFICE

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RAIL JOINT AND PROCESS OF PRODUCING SAME

Application filed June 7, 1932, Serial No. 615,842, and in Hungary April 23, 1931.

This invention relates to improvements in or relating to rail joints and a process of producing the same. The alumino-thermical welding process hitherto employed for making rail joints necessitated, as it is well known, a considerable heating up of the area where the welding took place, resulting in important changes in the characteristics of the rail material and more especially in a reduction of its impact strength. Furthermore, the thermite layer if once cast on the rail ends cannot be again separated therefrom and consequently when breaking up a track of this description a suitable length of the welded portions must be cut off resulting in a considerable waste of material. Another disadvantage is that the strength of the joint cannot be arrived at by calculation.

It has already been proposed to construct a rail joint by means of base plates welded on to the bottom of the rails. This, however, even if a slight heating was employed, caused the rail foot to be warped and cracked, the said welding seams being situated at the outer edges of the rail foot, which are the most delicate portions of the rails, and this often caused a partial or total breakage of the rails.

According now to the present invention the rail ends to be connected are joined together by means of straps or braces encircling the foot of the rails and mounted when hot. The ends of the braces bent round the foot of the rails are welded on to the top surface of the rail foot in the vicinity of the web, that is to say at a point wherefrom the welding heat is distributed more uniformly and quicker in the thicker part of the rail material so that no cracking can occur on the edges of the rail foot, which is also protected by the encircling braces in which the rail foot is clipped. The braces produced and mounted as indicated encircle the rail foot like closed rings which, aided by the contraction taking place at the cooling down, clip the rail foot so tightly that there is no possibility of their becoming loose even if the rail is subjected to a maximum stress. For completely bridging the gap of the joint and in order to obtain an increased modulus of resistance, the rail heads are also welded together prior to putting on the braces, in a well known manner. Furthermore, the strength is materially increased if the foot of the rail ends is also welded together.

In the accompanying drawings several forms of the invention are shown by way of example, together with the method of applying the invention to various rail designs.

Fig. 1 is a side elevation of the simplest form of joint.

Fig. 2 is a cross sectional view taken on the line II—II of Fig. 1.

Fig. 3 shows a special design of the rail ends, devised for the purpose of welding together the rail heads electrically.

Figs. 4 to 6 show various forms of construction of the braces.

Figs. 7 and 8 show how the ends of the rails are prepared before jointing in certain special cases.

The abutting rail ends 1 and 2 are jointed by means of the brace or strap 3 which is mounted while hot and welded on to the rail foot, as well as by directly welding together the rail heads. The welding of the rail heads is shown at 4 and that of the foot of the rails at 5.

A special advantage of this arrangement is this that the welding seams 4 get much closer to the neutral axis which is free of stresses than if, for example, the outer edges of rail foot are welded together with a flat base plate. This is also of advantage with respect to the stresses imposed upon the welded portions, as in case of vertical loads the greatest tensile stress occurs at those points which are farthest from the neutral axis, as it is well known. A joint according to the invention can be accurately defined in advance by means of calculation and it will resist, especially when compared to thermite welding, the most severe dropping tests.

For the purpose of welding electrical, gas or any other type of welding process may be selected at will.

For welding together the rail heads preferably the electrical resistance welding is employed. For this purpose, according to Fig. 3, one or both of the rail ends are pro-

vided with a protruding shoulder 6, which may be provided by suitably shaping the rail ends or by inserting a piece of thin plate. When pressing together the rail ends the welding heat will be restricted to the small area of the shoulder, whereupon the welding together is effected under pressure.

If a suitable current is at disposal for putting this process into effect, the same can be utilized for heating the braces as well, inasmuch as these can be inserted into the circuit and when incandescent the ends can be bent round the rail foot, whereupon the braces can be secured in position by the point welding process.

The braces can be designed in a number of different ways, as will be seen from Figs. 4 to 6. Since the greatest tensile stress occurs in the plane of the actual joint, it is desirable to increase the cross sectional area lying in this plane in the centre. As, however, these large dimensions are not necessary at the other points, the brace is preferably constructed with a variable cross section, namely such that is smaller at the ends. This result can be achieved for example by strengthening the braces at the centre or by disposing ribs 7 on the bottom surface of the braces 3.

A special form of the brace is shown in Fig. 5 in side elevation and top view, according to which the two ends of the brace assume a dovetail shape through the prolongations 8. In the top view the position of the prolongations is shown in dotted lines before the bending round. It will be seen that the longitudinal sections of this type of brace will be of varying length. Only the side edges to be welded of the brace possess the full length, while towards the centre the length of the longitudinal section is gradually decreasing. This arrangement results in a gradual transmission of force between the rail and the brace and the tearing of the edges of the rail foot along the bent over edges of the end of the braces is avoided with certainty, as in this case the edges of the cut out portion encircle the edges of the rail foot diagonally so that no cutting strength can develop.

Fig. 6 shows a double brace for providing rail joints in such places where two rails, as in the case of crossings, are disposed so close to each other that the end of the brace lying in between cannot be welded on to the rail foot. This double brace, as will be seen, clips both rails and is provided in the centre with a T-shaped longitudinal rib 9 securing the inner edges of the two rail feet. In this case the foot of the abutting rails is not welded together on the inside with the brace, but nevertheless they are firmly secured by the rib 9. On the other hand the brace is also welded to the neighbouring uninterrupted rail which thereby contributes to increasing the strength of the joint. Furthermore, the strength of the joint is also increased by the more considerable contraction of the wider brace.

If the brace is to be utilized for jointing rails of varying height, first of all the bottom of the rails must be brought to the same level. For this purpose, as will be seen in Fig. 7, a piece corresponding to the difference in height is cut out of the web of the higher rail and the rail foot thus separated is bent upwards into the position shown in dotted lines. This portion is preferably welded on to the web and then the end of the rail is duly adjusted in the vertical direction. It is, however, also possible to proceed in such a manner as to make a cut in the web of the lower rail and to bend downwards the rail foot whereupon the gap thus obtained in the web is filled up by welding in a corresponding filling piece. Hereupon the brace can be mounted on the level rail feet in the manner described above.

A similar procedure can be followed in the case of double tramway rails for the purpose of shifting the rail ends to be jointed into such a position in which the brace will have sufficient room in spite of the presence of the neighboring rail. A joint of this description is shown in Fig. 8. According to this a cut is made in both rail ends, the foot portions are bent downwards, the rail ends levelled and a filling plate 10 is welded into the gap produced. Hereby the cross sectional area of the rail is increased at the joint and a greater strength is achieved.

Similarly, the separated foot portions can be bent in the lateral direction, that is to say horizontally, in which case the filling piece will also occupy a horizontal position.

When a joint is to be made in a bend, the brace is pressed into position by means of suitably curved implements or the like.

What I claim, and want to secure by Letters Patent of the United States is:—

1. In a rail joint a stirrup shaped strap or brace mounted on the abutting rail ends when hot, the bent over ends of the said brace being welded on to the top surface of the rail foot.

2. In a rail joint a stirrup shaped strap or brace mounted on the abutting rail ends when hot, the bent over ends of the said brace being welded on to the top surface of the rail foot and the head portions of the said rail ends being directly welded together.

3. In a rail joint a stirrup shaped strap or brace mounted on the abutting rail ends when hot, the bent over ends of the said brace being welded on to the top surface of the rail foot and the head portions as well as the foot portions of the said rail ends being directly welded together.

4. In a rail joint a stirrup shaped strap or brace mounted on the abutting rail ends

when hot, the bent over ends of the said brace being welded on to the top surface of the rail foot, and the cross sectional area of the said brace decreasing towards the ends thereof.

5. In a rail joint a stirrup shaped strap or brace mounted on the abutting rail ends when hot, the bent over ends of the said brace being welded on to the top surface of the rail foot, the said brace being provided with ribs increasing in height towards the centre.

6. In a rail joint a stirrup shaped strap or brace mounted on the abutting rail ends when hot, the bent over ends of the said brace being welded on to the top surface of the rail foot, the ends of the said brace being cut away in arch form.

7. In a rail joint a stirrup shaped strap or brace, mounted on the abutting rail ends when hot, the bent over edges of the said brace being welded on to the top surface of the outside portion of two neighboring rails, and the said brace being provided between the two neighboring rails with a T-shaped rib, the horizontal edges of which reach over the inside portions of the feet of the neighboring rails.

8. In a rail joint a filling piece inserted into the web of one of the rails for equalizing the heights of the two rail ends, a stirrup shaped strap or brace mounted on the abutting rail ends when hot, the bent over ends of the said brace being welded on to the top surface of the rail foot.

9. In a rail joint the foot of one of the rail ends bent towards the head of the rail across a gap produced in the web and welded to the edge of the web left free by the gap for equalizing the heights of the two rail ends, a stirrup shaped strap or brace mounted on the abutting rail ends when hot, the bent over ends of the said brace being welded on to the top surface of the rail foot.

10. In a rail joint a filling piece inserted between the web and the bent down foot portions of the rail ends, the said filling piece being welded into position, a stirrup shaped strap or brace mounted on the abutting rail ends when hot, the bent over ends of the said brace being welded on to the top surface of the rail foot.

11. In a rail joint a filling piece inserted and welded into position between the web and the laterally bent foot portions of the rail ends, a stirrup shaped strap or brace mounted on the abutting rail ends when hot, the bent over ends of the said brace being welded on to the top surface of the rail foot.

12. In a rail joint a stirrup shaped strap or brace mounted on the abutting rail ends when hot, the bent over ends of the said brace being welded on to the top surface of the rail foot, shoulders provided on the head portions of the rail ends, the said head portions being directly welded together by passing electric current through the rails and pressing together the ends when the said shoulders become incandescent.

13. In a rail joint a stirrup shaped strap or brace mounted on the abutting rail ends when hot, the bent over ends of the said brace being welded on to the top surface of the rail foot, a metal plate inserted between the head portions of the rail ends, the said head portions being welded together by passing electric current through the rails until the metal plate and the ends of the rail heads become incandescent and pressing together the rail ends.

14. In a rail joint welding together the heads of the rail ends by passing electric current therethrough and pressing together the rail ends when the head portions become incandescent, a stirrup shaped strap or brace mounted on the rail ends and heated by the passage of electric current therethrough, the edges of the said brace being bent round the rail foot and welded on to the top surface of the said rail foot by the point welding process.

15. In a rail joint curved rail ends, a stirrup shaped strap or brace mounted on the abutting rail ends when hot, the bent over ends of the said brace being welded on to the top surface of the rail foot, and the said brace being mounted on the curved rail ends by means of suitably shaped implements or the like.

LAJOS KATONA.