

J. WATTMANN.
METHOD OF MAKING WELDED RAIL JOINTS.
APPLICATION FILED AUG. 23, 1913.

1,132,052.

Patented Mar. 16, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

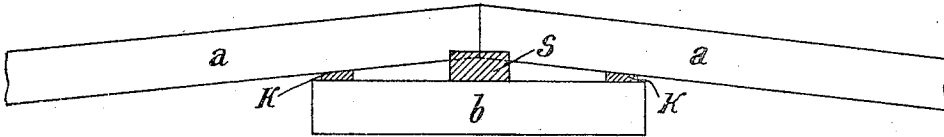


Fig. 2.

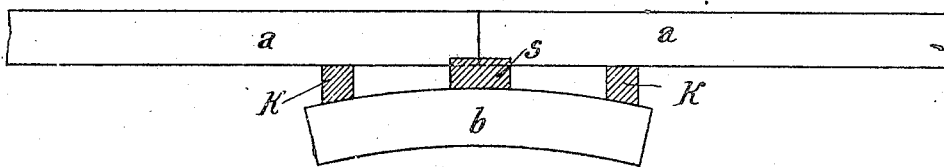


Fig. 3.

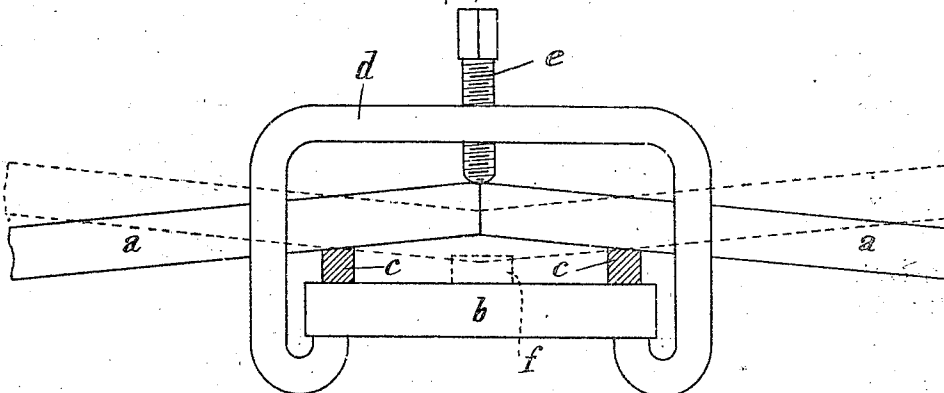
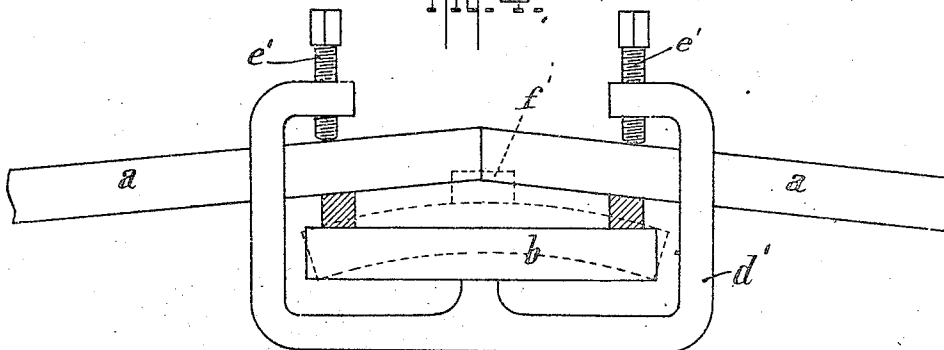


Fig. 4.



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2 SHEETS—SHEET 2.

FIG. 5.

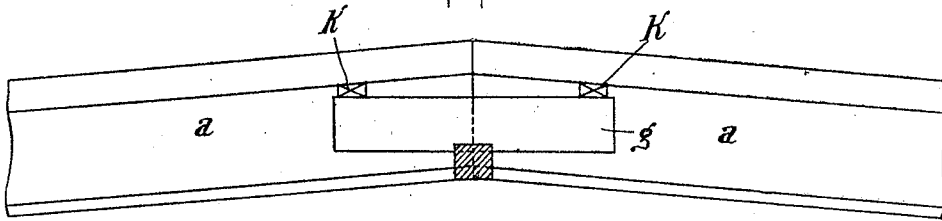


FIG. 6.

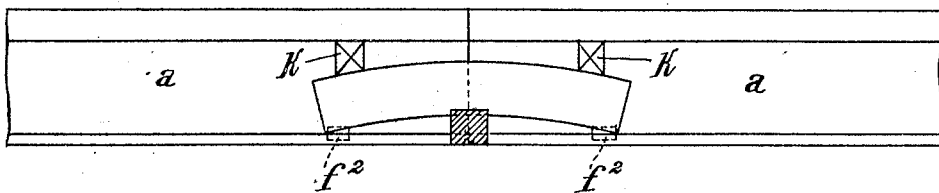


FIG. 7.

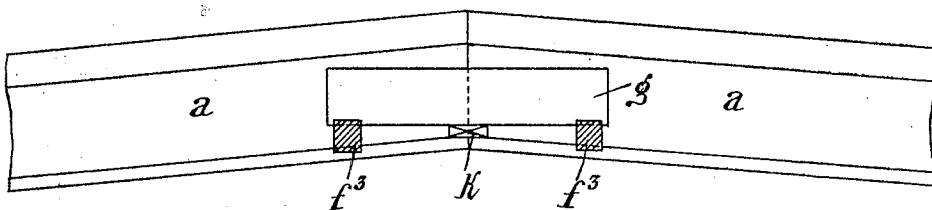
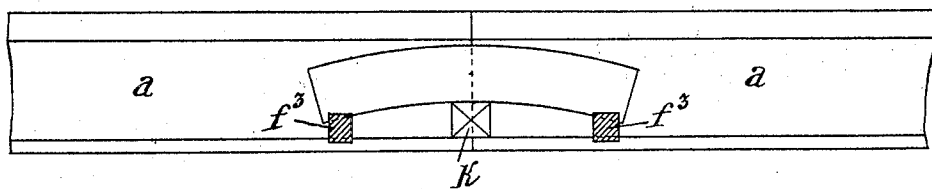


FIG. 8.



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METHOD OF MAKING WELDED RAIL-JOINTS.

1,132,052.

Specification of Letters Patent.

Patented Mar. 16, 1915.

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To all whom it may concern:

Be it known that I, JOHN WATTMANN, a subject of the German Emperor, and resident of Treptow, near Berlin, Germany, have invented certain new and useful Improvements in a Method of Making Welded Rail-Joints, of which the following is a specification.

In welding rail joints it is desirable to leave the rail heads unwelded, for the reason that the heating of the metal will always cause a change in its internal structure, thus giving the upper or tread surface a resistance against wear different from the resistance at other points of said tread surface.

Welding the rail ends at the bases only is unsatisfactory because the rails will oppose an insufficient resistance to forces tending to give the joint a convex upward curvature, so that the joint will open at the rail heads. Such forces come into play when the joint comes between two loaded axles, and the bending force may become quite considerable, particularly when the track is constructed with cross ties. It is true the resistance against such bending stresses may be increased by welding fish-plates or joint-bridging supports to the rail bases, but even then the joint will open (although to a smaller extent) whenever the rail ends are bent upward and whenever the rails contract owing to temperature changes. Of course, as soon as the joint opens, the same defects will occur (to a greater or smaller extent) which are well known in connection with all rail joints employing screws or wedges. These drawbacks may be avoided by producing in the joint, during the welding operation, a permanent artificial strain of such a character that the rail heads are strongly pressed against each other at the joint. In this case, tension strains such as occur in the rail heads when outer forces give the rails an upwardly convex curvature, will not at once cause the joint to open, but will, at first, only reduce the inner compression strains normally existing in said rails. The joint will open only when these outer forces overcome these inner strains, so that a tension strain results at the joint. In the same manner, contractions of the track due to temperature changes will take place without causing the joints to open. Thus, within certain limits of stresses, which are not exceeded in practice, the rail joints may be caused to remain closed permanently. It is

well-known that these artificial compression strains can be produced by thermic means, viz., by cooling the parts which are heated unevenly during the welding operation. This method of welding rail-joints, while correct in principle, is objectionable in practice, first, on account of the difficulty and almost impossibility of obtaining exactly the desired amount of internal strain, since the heating of the joint depends very largely on the size of the weld, the time used for welding, the order in which the successive weldings of a joint are performed, and so on; second, because the choice of shapes for the joint-bridging support is restricted, since the heating of the support, as regards conduction and radiation, is governed by the form of its cross-section and of its surface.

According to my present invention an artificial internal combustion strain is produced at the joint portion of the rail heads by bending (within the elastic limit) either the rail or the joint-bridging support, or both, by mechanical means such as screws, wedges, etc., and welding the parts together while they are thus bent or deformed.

The invention is applicable, broadly, to constructions in which a joint-bridging member is welded to meeting rail ends, whether such member be a support proper extending under the rail bases, or a laterally-applied fish-plate.

The advantage of my invention resides in the fact that the outer forces applied to the joint in order to produce the internal strain, may be exactly predetermined, that is to say, the exact amount of internal strain desired may be obtained with certainty. Further, the joint-bridging member may be given any shape desired, provided, of course, it has the requisite strength.

It is preferable to lay the rail joints and joint bridging members before the bending operation, so that the rail ends will resume their horizontal position at the end of the welding operation.

In the accompanying drawings, I have shown, in side elevation, several different ways of carrying out my invention, Figures 1 to 4 illustrating the use of a support extending under the rail bases, while Figs. 5 to 8 show the use of fish-plates; Fig. 1 is a side elevation of one form of my invention at an intermediate stage, and Fig. 2 shows the same form at its final stage; Figs. 3 and 4 each illustrate another form of my inven-

tion; Figs. 5 and 6 show a fourth form of my invention in an intermediate and the final stage respectively; and Figs. 7 and 8 are similar views of a fifth form of the invention.

In all these figures the amount of bend given to the rails and to the bridging members has been exaggerated, for the sake of clearness.

In Fig. 1 it has been assumed that the ends of the rails *a* have been brought together as close as possible and then the rail ends have been connected with each other at their bases and with the joint-bridging support *b* by welding metal *s*. This support *b* may be a piece of rail resting on two cross-ties (not shown). Wedges *k* tapering transversely of the rails are then driven between the rail bases and the ends of the support *b* so as to force the support away from the rail bases at both ends. Fig. 2 shows that this forcing apart of the rails *a* and support *b* bends the bridging support *b* upward and the rails *a* downward so as to produce a compression strain at the joint surfaces of the rail heads. The joint is completed by welding the wedges *k* to the rails *a* and to the support *b*.

According to Fig. 3 the ends of the bridging support *b* are first welded to the rails *a*, as indicated at *c*, the rails being bent or deflected upward at the joint as indicated by full lines. Then, by means of any suitable pressure device, such as the bow *d* and screw *e*, the rails are bent down to the position indicated by dotted lines, which also forces the ends of the rail heads against each other so as to produce a longitudinal compression strain in said heads. Then the central portion or joint proper is welded, as at *f*, to connect the ends of the rail bases with the support *b*. Upon removing the press *d*, *e*, the rails *a* spring back into the alining position shown in Fig. 2, while at the same time the support *b* assumes the upwardly convex shape shown in said Fig. 2, all owing to the elasticity of the rails *a* and the support *b*.

According to Fig. 4, the ends of the support *b* are first welded to the rails *a*, which are deflected upward in the same manner as in Fig. 3. I then apply a press consisting of a bow *d'*, which engages the central portion of the support *b* from below, and screws *e'* engaging the rails *a* from above at points corresponding to the ends of the support. By turning the screws *e'* to force them down in the bow *d'*, the support *b* is bent into the upwardly convex shape indicated by dotted lines, and with the parts in this position, the central weld *f'* is made. The press having been removed, the elasticity of the support *b* will cause it to pull or bend the rails *a* down into alining position, so that the final shape of the completed joint is as in Fig. 2.

In Figs. 5 to 8, the joint-bridging member

is not a support extending under the rail bases, but a laterally arranged fish-plate *g*. According to Fig. 5, the rails *a*, held in contact and deflected upwardly as in Fig. 1, are first welded at the adjacent ends of their bases, to the central portion of the fish-plate *g*. Then wedges *k* are driven between the ends of the fish-plate and the adjacent portions of the rail heads, thereby bending the said fish-plate into an upwardly convex shape, and bringing the rails into the alining position as shown in Fig. 6. Thereupon the joint is finished by welding the ends of the fish-plate to the rail bases, as indicated at *f*².

According to Figs. 7 and 8 the ends of the fish-plate *g* are first welded to the rail bases as at *f*³, and then, by driving a wedge *k* between the central portion of the fish-plate and the meeting ends of the rail bases, the rails and the fish-plate are brought from the original position (Fig. 7) to the final position, Fig. 8, in which the alining rail ends are subjected to an internal compression strain, which is preserved by welding the wedge to the fish-plate and to the abutting rail bases.

In all forms of my invention, the heads of the alining rail ends, welded to the joint-bridging member, are normally under an internal compression strain, the magnitude of which may be determined exactly during the making of the joint. The welding operation is preferably performed electrically.

Various modifications may be made without departing from the nature of my invention as set forth in the appended claims.

I claim:

1. The method of welding rail joints, which comprises placing a joint-bridging member adjacent to the rail ends, then applying mechanical means to produce a relative elastic bending between rails and said member, to produce an internal compression strain in the rail heads, and then welding said member to the rails.

2. The method of welding rail joints, which comprises placing a joint-bridging member adjacent to the rail ends, welding the central portion of the said member to the rail bases and at the same time welding the ends of the rail bases to each other, then driving the ends of the joint-bridging member away from adjacent portions of the rails, by mechanical means, and finally securing the ends of the joint-bridging member to the rails in this strained position.

3. The method of welding rail joints which comprises placing a joint-bridging member adjacent to the rail ends, welding said member to each of said rails, then mechanically bending said member and the rails relatively to one another so as to produce an internal compression strain in the rail heads, and then securing said member

to each of the rails at points separated from the first named welding points.

4. The method of welding rail joints which comprises placing a joint-bridging member adjacent to the rail ends and welding said member to each rail at the rail ends and to at least two other separated points, said member and the rails being elastically bent with reference to one another, so as to have an internal compression strain in the

rail heads, when the last of said welds is made.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN WATTMANN.

Witnesses:

HENRY HASPER,
HARRY L. WILSON.