A. H. OP TEN NOORT.

RAIL JOINT.

APPLICATION FILED NOV. 18, 1916.

1,220,882.

Patented Mar. 27, 1917.

2 SHEETS—SHEET 1.

Fig: 2.

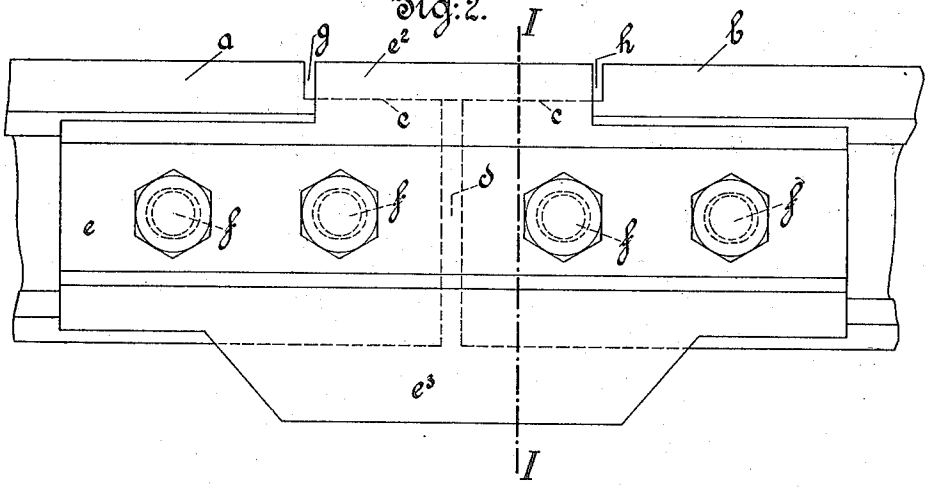


Fig: 1.

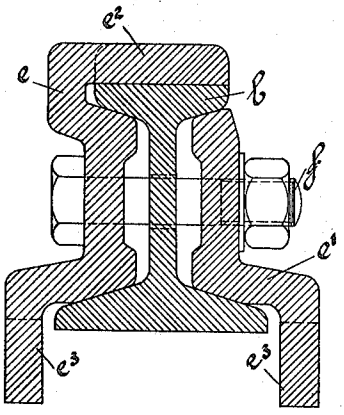
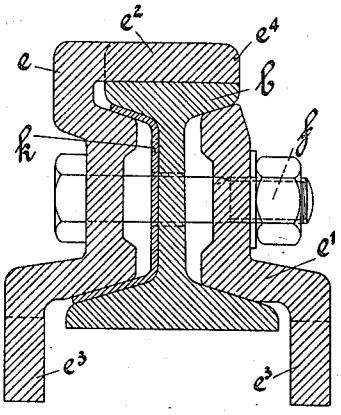


Fig: 3.



Witnesses:

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2 SHEETS—SHEET 2.

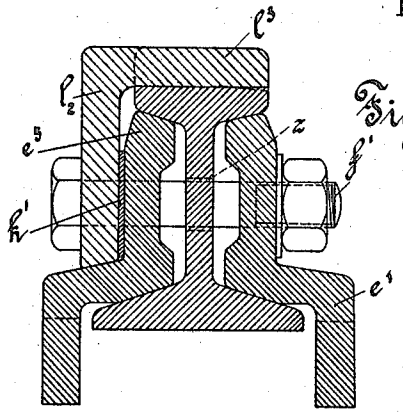


Fig: 4.

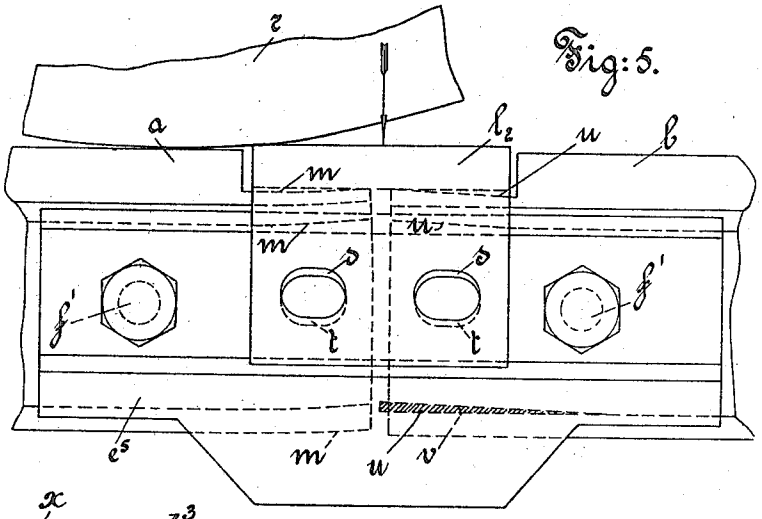


Fig: 5.

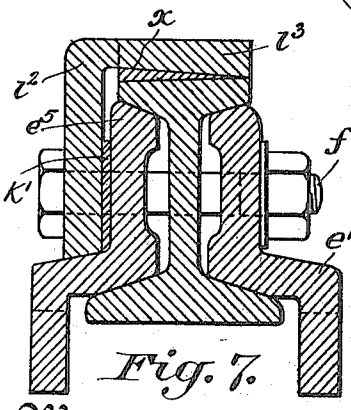
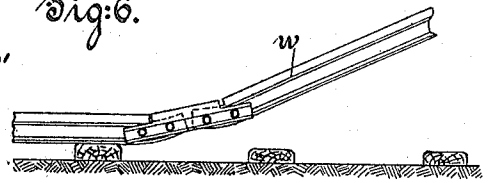


Fig. 7.

Fig: 6.



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UNITED STATES PATENT OFFICE.

ANTON HELMICH OP TEN NOORT, OF UTRECHT, NETHERLANDS.

RAIL-JOINT.

1,220,882. Specification of Letters Patent. Patented Mar. 27, 1917.

Application filed November 18, 1916. Serial No. 132,180.

To all whom it may concern:

Be it known that I, ANTON HELMICH OP TEN NOORT, subject of the Queen of the Netherlands, residing at Utrecht, Kingdom of the Netherlands, have invented new and useful Improvements in Rail-Joints; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to rail joints of the class wherein the fish plate has a head which forms a portion of the rail tread by seating in recesses in the heads of the rails.

The object of the invention is to provide a joint which will more effectively prevent the formation of a step or fall at the joint under the weight of the train and thus bring about smoother running and at the same time reduce the liability of breakages.

Briefly stated the rail joint is formed by recessing and upwardly inclining the ends of the rails at their meeting ends either by bending, or by shaping the same by cutting, sawing, or by any other suitable method, then forcing such ends back under pressure into the normal plane or an approximately straight line with the body of the rails and then, while the rails are under pressure, attaching fish plates which have heads adapted to fill the recesses, or by attaching the fish plates previous to applying such pressure and subsequently applying the pressure. The fish plates remain in a state of upward tension which serves to counteract the weight of the train, and avoids the usual shock or jar to the wheel.

The invention will be best understood by reference to the accompanying drawings in connection with the following description—

In these drawings:—

Figure 1 is a cross section on line 1, 1 of Fig. 2 of one form of completed joint the slight upward spring of the fish plate not being shown.

Fig. 2 is a front elevation of same.

Fig. 3 is a cross section of another form.

Fig. 4 is a cross section of a further form.

Fig. 5 is a front elevation of the form shown in Fig. 4 but with the joint not completed, the left hand rail end having been treated by bending and the right hand rail end having been treated by cutting, and

Fig. 6 is an elevation of a portion of a track showing two bent ends, and one rail (the free one) raised to enable the fish plates to be bolted on after which the tension is obtained by bending back and securing the free rail.

Fig. 7 is a view similar to Fig. 4, showing a modified form of the fish plate shown in Fig. 4.

Referring to Figs. 1 and 2, *a* and *b* are two rails each recessed at the treads at *c*. The gap *d* between the ends of the rails is closed on one side by a fish plate *e* having a head portion e^2 which seats in the recesses *c*. The gap *d* is closed on the opposite side of the rails by a counter-plate e′ both plates having a strengthening web e^3 intermediate their ends. The two plates are secured by the usual bolts and nuts *f*. The aggregate of the gaps *g* and *h* left between the abutting ends of the rail heads, respectively and the fish plate head e^2 will be approximately equivalent to the central gap *d*, though it is evident that the latter gap may be still wider if desired, that is to say, it may be much wider than the single gap existing in the forms of joints at present most generally in use, and if necessary twice as wide. The gaps *g*, *h* may, if desired, be calked with any suitable material the thickness of which may be varied according to the time of year. Fig. 2, which shows the joint completed with the upper surface of the head e^2 of the fish plate *e* flush with the rail heads, does not disclose the upwardly inclined ends obtained by the bending or cutting of the rail ends, but this is illustrated in a figure hereafter described.

In Fig. 3 an auxiliary metal spacing plate *k* is inserted between the fish plate *e* and the contiguous surfaces of the rails, partly covering the under side of the heads and the upper side of the feet of the rails. This plate provides a means of adjustment to prevent the fish plate head e^2 from projecting with its edge e^4 beyond the inner edge of the rail head in case of greater wear of the inner edges of the heads of the rails than that of the edge e^4 or, when the bolts are screwed up too tightly. In such cases the plates *k* may be replaced by one of a greater thickness to bring the parts into line.

As shown in Fig. 7, the headed portion e^2 of the fish plate *e* shown in Figs. 1 to 3 may be omitted and an angle plate forming a supplemental fish plate l^2 having a headed portion or member l^3 which is secured by the bolts and nuts *f′* to one of the fish plates e^5 may be substituted therefor.

As is also shown in Fig. 7 the inside face

of the head l^3 may be inclined inwardly to the web portion as at x which is advantageous when the separate plate l^2 is employed. Figs. 4 and 7 also show an adjusting plate k' between the supplemental plate and the fish plate and which serves the same purpose as the plate k in Fig. 3.

Fig. 5 shows on the left hand the initial shape of a cut end of the rail where the recess has an upwardly inclined bottom surface given to it at the head by bending, the form of fish plate being that of Fig. 4. This upward bending is represented by the lines m m m. The right hand part shows the initial shape where the end is cut, sawed, or otherwise trimmed to provide the upwardly inclined bottom surface of the recess in the tread.

On the left hand side of this figure the lines m m m indicate where the complete bending of the whole rail end has been effected, and on the right hand side of said figure the lines u u indicate where the upper face, the underside of the head and the foot of the rail have been cut or sawed, the foot of the rail in this case being filled up with a plate indicated by v to correspond to u u.

In fitting up the joint the fish plates e^5 e' (in the case last referred to) with the bolts, are placed in position on the rail bodies but the bolts are not tightened up. The loose plate l^2 is then put in place with its head l^3 normally above the tread portions of the rail. An artificial load is then applied to the upper face of the head for example by rolling a heavily loaded wheel r on the head surface l^3 to deflect the cut ends of the rails so that the holes s s of such plate, which normally did not coincide horizontally with the holes t t of the fish plates e^5 e' or the holes z of the rails, will then do so, whereupon all the bolts can be screwed up tightly with the result that the inclined surfaces of the rail ends are brought into a plane substantially parallel to the treads and the upper surface l^3 of the head portion of the plate l^2 is in alinement with said treads.

Fig. 6 shows two rails with an exaggerated amount of bend where the free end rail w is lifted, and caused to abut against the other, after which the fish plates are applied and firmly bolted on, whereupon the free rail end is bent down and is secured to the ties in the usual way.

The joints in question are under a tension produced by a force equal to the wheel pressure of the vehicles running over them when in use, so that the rail ends tend to spring upward but are prevented from so doing by the restraining forces of the fish plates. The resulting stresses set up in the rail ends manifest themselves in the fish plates in the form of an upward elastic bending stress, so that they are under tension at the top and under compression at the bottom. These stresses are counteracted when the wheels of rolling stock pass over the rails because the wheel load acts with a force downward as the spring of the downwardly pressed rail ends acts in the upward direction.

However, since at the same time the rail ends are held down in their working position by the wheel load, all tendency to form a step at the rail joint is prevented, provided care has been taken, by accurately dimensioning the original upward bend or angle of the rail ends, that the wheel pressure does not exceed the springy force with which the rail ends tend to rise again.

Strictly speaking, these considerations apply only to the case where the working load is applied directly over the rail joint. The final effect, namely the prevention of a step, is however also attained when the working load is in the intermediate positions, owing to the fact that the fish plates are not then entirely relieved of stress, and that their residual diminished stresses hold the rail ends down to an extent compensating for the diminished effect of the working load.

The various known methods operating by initial stresses, generate and apply these stresses in another way. Thus, in the arrangement according to United States Patent 378543, the rail ends, which are not originally sloped upward, are permanently sprung in an upward direction by the pull exerted by upwardly curved fish plates, so that, from the outset, the fish plates are subjected to a downward bending stress by the elastic reaction of the rail ends, and this stressing is still further intensified by the working load, so that no relief occurs. In other arrangements, operating by initial stresses, the object is to prevent the rail joint from gaping in the upward direction, which is quite a different problem from that which the present invention seeks to solve.

Since in the rail joint of the present invention, a powerful pressure continuously exists between the rail ends and the fish-plate head which bridges over them, it is important that the surfaces which take up the pressure should be formed in such a way as to prevent the one part from eating into the other, which might happen if—for example in the form disclosed in German Patent 165313—nearly the full depth of the rail head were cut away leaving the narrow web of the rail to bear against the fish-plate head. Consequently, according to this invention, the rail head is cut away in such a manner that the fish-plate head bears with its full head width against the rail ends.

What I claim is:—

1. In a rail joint, in combination with a plurality of rails having recesses in their

tread portions at their meeting ends, the bottoms of said recesses having surfaces upwardly inclined toward the ends of the rail, a fish plate having a head portion adapted to fill the adjacent recesses of the rail treads of the abutting ends of each pair of rails, and bolts for securing the fish plates to the rails, said bolts when fastened holding the previously inclined surfaces of the rail ends in a plane substantially parallel to the treads and the upper surface of the head portion of the fish plate in alinement with said treads.

2. In a rail joint, in combination with a plurality of rails having recesses in their tread portions at their meeting ends, said recessed portions being upwardly unresiliently bent toward the ends of the rails, a fish plate having a head portion adapted to fill the adjacent recesses of the rail treads of the abutting ends of each pair of rails, and bolts for securing the fish plates to the rails, said bolts when fastened holding the upper previously bent surfaces of the recessed ends in a plane substantially parallel to the treads, and the upper surface of the head portion of the fish plate in alinement with said treads.

3. In a rail joint, in combination with a plurality of rails having recesses in their tread portions at their meeting ends, the bottoms of said recesses having surfaces upwardly inclined toward the ends of the rails, fish-plates, a supplemental angled fish plate adapted to be attached to one of such fish plates and having a head portion adapted to fill the adjacent recesses of the rail treads of each pair of rails, and bolts for attaching the fish plates and supplemental plate to the rails, said bolts when fastened holding the previously inclined surfaces of the rail ends in a plane substantially parallel to the treads and the upper surface of the head portion of the supplemental plate in alinement with said treads.

4. In a rail joint, in combination with a plurality of rails having recesses in their tread portions at their meeting ends, and the bottoms of said recesses having surfaces upwardly inclined toward the ends, a fish plate having a head portion adapted to fill the adjacent recesses of the rail treads of each pair of rails, bolts for securing the fish plates to the rails, said bolts when fastened holding the previously inclined surfaces of the rail ends in a plane substantially parallel to the treads and the upper surface of the head portion of the fish plate in alinement with said treads, and a spacing plate located between the fish plate and the rail, the thickness of which provides an adjustment enabling the inner edge of the fish plate head to be brought into alinement with the inner edge of the rail heads.

5. In a rail joint of the character described, means for obtaining alinement of the tread surface of the head of a fish plate with the tread surfaces of the meeting rails comprising a pair of rails having bolt holes in their webs adjacent their ends, a fish plate having bolt holes complemental to the bolt holes in the webs of the rails and normally vertically out of line with the latter, bolts adapted to pass through the holes in the rails and fish plate, and securing means for said bolts adapted to be applied to said bolts after the holes in the rails and fish plate have been brought into alinement.

6. For a rail joint, a rail having its tread portion recessed at an end, the bottom surface of such recess being upwardly inclined toward such end as and for the purpose described.

7. A rail joint comprising a pair of rails having recesses in their treads at their meeting ends, an angled plate one member of which is adapted to fill the recesses in the tread portions and to lie normally above such tread portions and means for holding the recessed ends of the rails deflected and with the upper surface of the member of the plate in the same plane as the surfaces of the treads when the joint is completed.

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

ANTON HELMICH OP TEN NOORT.

Witnesses:
THOMAS D. VERHAVE,
I. I. HELSDON RIX.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."