J. H. ALLEN.

RAIL JOINT.

APPLICATION FILED AUG. 26, 1908.

Patented Sept. 21, 1909

934,648.

FIG. 1.

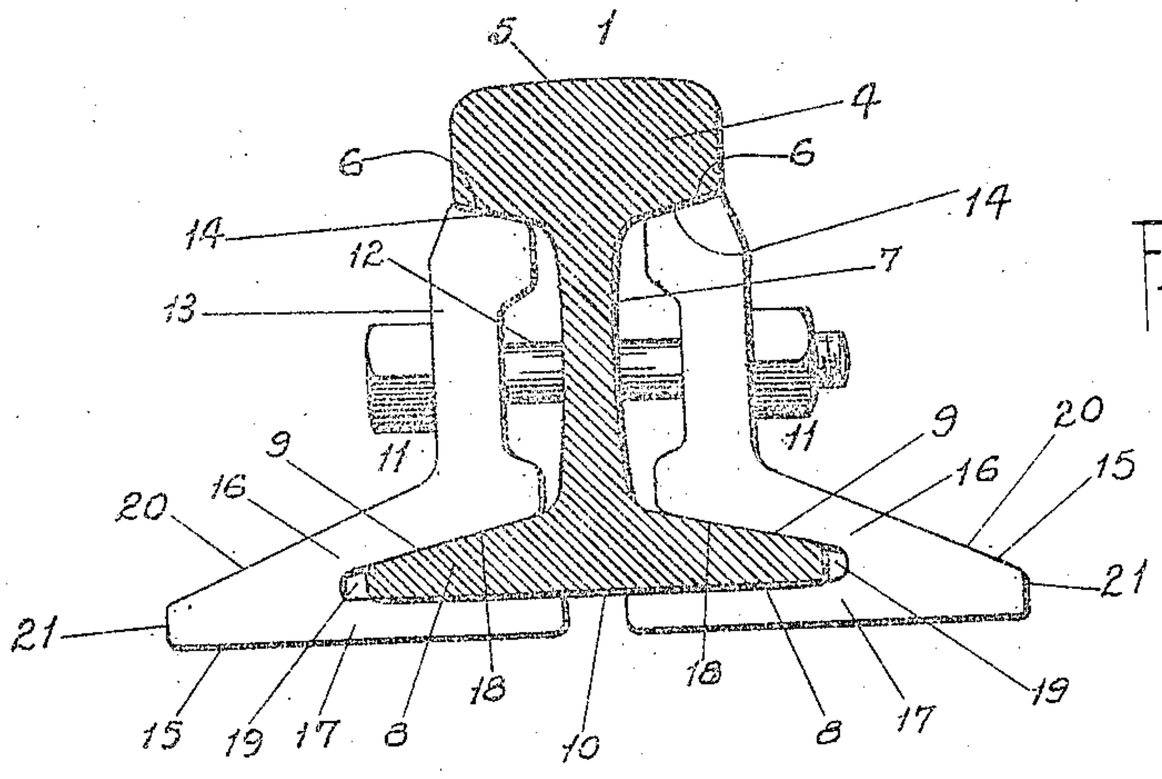


FIG. 2.

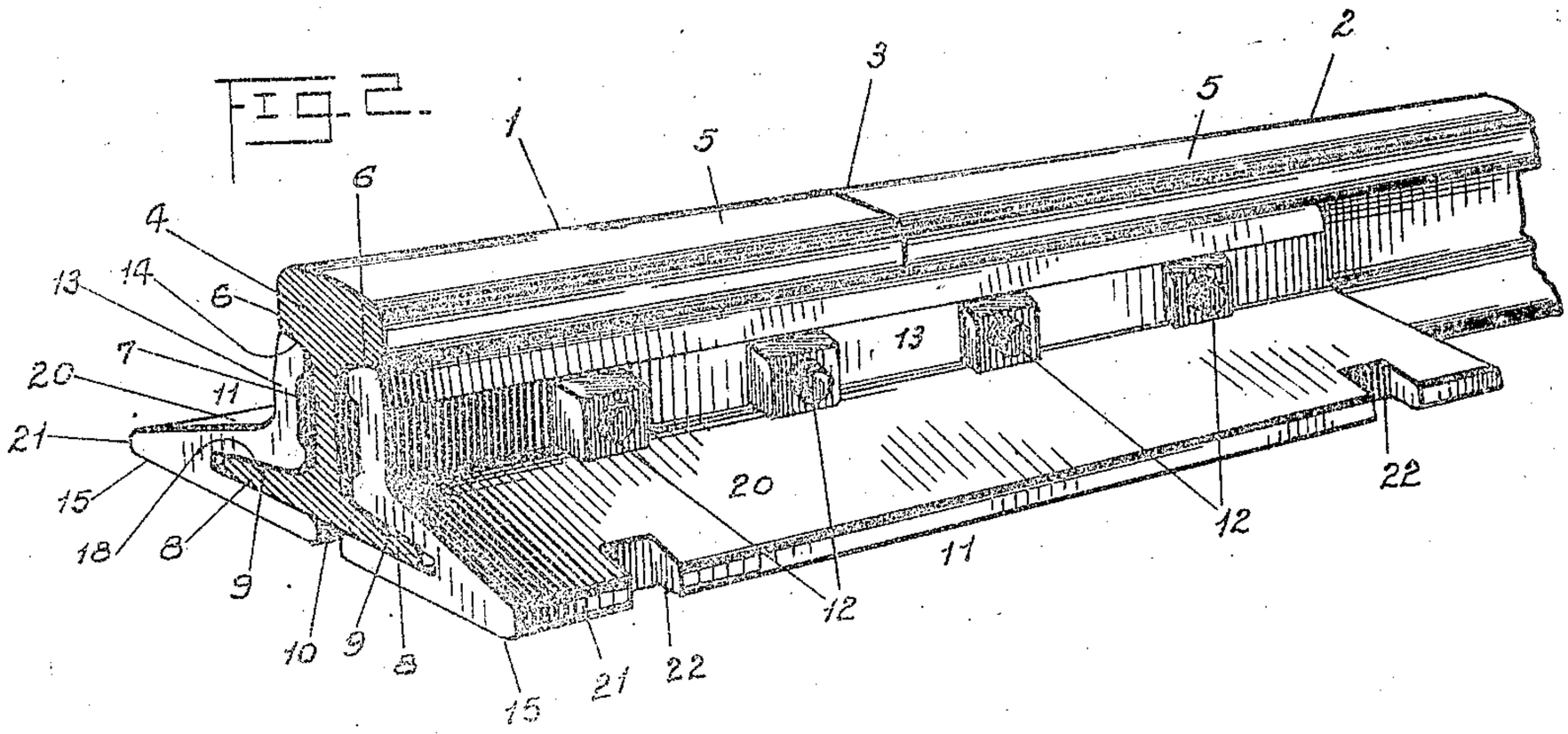
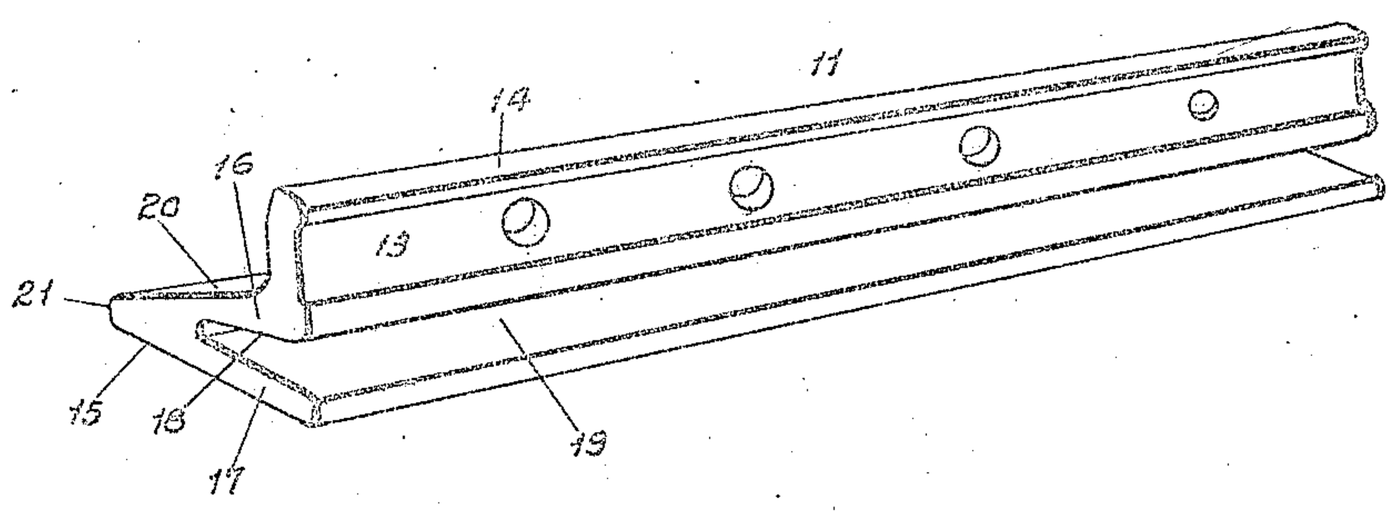


FIG. 3.



WITNESSES

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RAIL-JOINT.

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To all whom it may concern:

Be it known that I, JOHN H. ALLEN, a citizen of the United States, residing at Verona, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Rail-Joints, of which the following is a specification.

This invention relates to that class of rail joints known as continuous joints, and in which each connecting plate comprises an upright portion wedged between the heads and flanges of the rail ends and a lower V-shaped portion adapted to clasp the said flanges, two such connecting plates being employed one on each of the opposite sides of the rail ends and bolted together through the rails.

The objects of the present improvements are to secure a joint of this type whose base conforms to the general structure of a rail base, or a joint whose base becomes an enlarged rail base; to secure distribution of metal in each connecting plate of such a joint at the points of greatest wear and strain; to reduce and diffuse the stress upon the metal in rolling the connecting plates; to bring the neutral axis of the joint up near the center of the rails; to thus secure equal parts of the joint, doing equal work, above and below the neutral axis of the joint, and to obtain other advantages and results as may be brought out in the following description.

Referring to the accompanying drawings, in which like numerals of reference indicate the same parts in the several figures, Figure 1 is an end view of a rail joint embodying my improvements, the rail being in cross-section; Fig. 2 is a perspective view of the joint, and Fig. 3 is a perspective view of a single connecting plate from its inner side.

In said drawings, 1 and 2 indicate two adjacent rails, the ends of which meet as at 3, said rails having the usual heads 4 with upper tread surface 5 and lower upwardly and outwardly inclined lateral bearing surfaces 6, 6, vertical web 7, and lateral base flanges 8, 8 each having a downwardly and outwardly sloping upper surface 9 and at their under sides or bottoms forming the flat horizontal base 10 of the rail. A pair of my improved connecting plates 11 are employed to form a joint, one being placed at each side of the rails where their ends meet and bolts 12 passed through said rail ends and connecting plates. The two connecting plates are exactly alike, and hence a description of one will suffice.

Each connecting plate 11 has an upright portion or member 13 adapted to lie between the head 4 and base flange 8 of a rail in practically vertical position or parallel to the web 7 of the rail, as shown. The top of this member 13 is beveled outwardly upward, as at 14, to slidably fit against the under surface 6 of the rail head, and it is through these members 13 of the connecting plates that the clamping bolts 12 of the rail joint are passed.

At the lower edge of said upright member 13 of the connecting plate is a laterally and outwardly extending V-shaped portion 15, providing between its upper and lower walls, 16, 17 respectively, an interior annular space 19 to receive the base flange 8 of a rail. The said V-shaped portion 15 thus grips the base-flange 8 as the connecting plate is clamped to the rails, and the lower wall 17 of said V-shaped portion lies parallel to the rail base 10. The upper wall 16 of the V-shaped portion 15 slants downwardly outward from the lower edge of the upright member 13 to its point of union with the lower wall 17, whereby the inner surface 18 of said upper wall is at an angle to the lower wall and gives the opening 19 of the V-shaped portion which receives the flange 8 of the rail base a tapered form so that it wedges upon the said flange. The outer surface 20 of the upper wall 16 slants in a single plane from the upright member 13 to the outer edge 21 of the V-shaped portion, as shown, and it is this particular feature which forms an important part of my invention.

It will be noted that not only does my improved connecting plate present a radically different form to be rolled, in that the top of the V-shaped portion is perfectly plane, but furthermore the disposition of metal is widely different from what has been common heretofore. In my connecting plate, the outer edge 21 of the V-shaped portion 15 is thick and strong to be slotted as at 22 to receive holding spikes (not shown), and the bottom of the upright member 13 is also heavy and solid, while the middle of the upper wall 16 of the V-shaped portion, at the inner end of the space 19 for the rail

flange 8, is thinner. The metal is thus distributed at those points where it is most needed for strength and rigidity,—viz., the bottom of the upright member 13 which resists the brunt of vertical strains, and the outer edge of the V-shaped portion 15 which resists lateral strains. Furthermore, a cross-sectional form of connecting plate is secured which can be rolled with less strain upon the metal than heretofore, and also with simpler dies or rolls. The finished plates are therefore better adapted to resist hard service both by reason of their advantageous distribution of metal, as well as by such metal having not been unduly strained in effecting such distribution. Still further advantages of my improved connecting plate are that by its construction as above set forth, the complete rail joint is given a base which conforms closely to the typical flanged base portion of a standard rail, and which is shaped and constructed to resist maximum strain with minimum metal. The neutral axis of the rail joint is brought up near the center of the rails, and equal portions of the joint are disposed above and below said neutral axis, doing equal work. This secures long life of the joint, and greater effectiveness of it.

It may be explained that when the rail joint is strained by a vertical wheel load, the greatest stress will be in the extreme upper and lower fibers of the joint. The intensity of the stress that can be borne by the extreme fibers is the limit of the strength of the joint. The upper fibers are compressed and the lower fibers are stretched, but somewhere along or near the center of the vertical section of the joint, the fibers are neither extended nor compressed; the position of these fibers is called the neutral surface, and the line where this neutral surface intersects a right section of the joint is the neutral axis of the section. The neutral axis passes through the center of gravity of the section. If the moment of inertia of a rail joint is divided by the distance from the neutral axis to the extreme fiber, *i. e.* the fiber that is farthest from the axis, the quotient will be a quantity known as the moment of resistance. When this moment of resistance is multiplied by the amount of stress that may be allowed per square inch upon the extreme fiber, the product represents the efficiency of the joint to resist bending moment. The importance, therefore, is apparent of having equal resistance above and below the neutral axis of the joint or having said neutral axis at as nearly the middle of the joint as possible. This is secured by the construction constituting the invention, and by it the neutral axis of the joint very closely coincides with the neutral axis of the rail itself, which insures great strength and resisting power and minimum liability of breakage under passing trains. The rail joint becomes in effect a rail section of increased cross sectional area.

Having thus described the invention, what I claim as new is:—

1. The herein described connecting plate for rail joints, comprising in one integral piece an upright member adapted to wedge under the head of a rail and a V-shaped portion disposed at its lower wall substantially perpendicular to said upright member and its upper wall joining at the open edge of the V-portion the lower edge of the said upright member, the outer surface of said upper wall of the V-portion being plane from the said upright member to the outer edge of the connecting plate and said outer edge of the connecting plate being of a thickness substantially equal to that of the lower wall of the doubled or V-shaped portion.

2. The herein described connecting plate for rail joints, comprising in one integral piece an upright member adapted to wedge under the head of a rail and a V-shaped portion disposed with its lower wall substantially perpendicular to said upright member and its upper wall joining at the open edge of the V-portion the lower edge of the said upright member, the said V-shaped portion having the outer surface of its top wall extending to the outer edge of the connecting plate at an angle to the outer surface of the bottom wall greater than the angle of the inner surface of said top wall to said bottom wall of the V-shaped portion and the outer surface of said upper wall being plane from the said upright member to its intersection with the plane of the inner surface of the lower wall of the V-shaped portion extended.

3. The herein described connecting plate for rail joints, comprising in one integral piece an upright member adapted to wedge under the head of a rail and a V-shaped portion disposed with its lower wall substantially perpendicular to said upright member and its upper wall joining at the upper edge of the V-portion the lower edge of said upright member, the outer surface of said upper wall of the V-portion being plane from the said upright member to the outer edge of the connecting plate, and the tapering recess of the V-shaped double portion having its narrow closed part located substantially half way between the said upright member and the outer edge of the connecting plate and the inner surface of its upper wall lying in a plane which extended outwardly intersects the plane of the outer surface of the double portion at substantially the edge of the connecting plate and forms an acute angle therewith.

4. A rail joint comprising in combination with the meeting ends of two rails connecting plates at the opposite sides of said rails, each connecting plate having an upright por-

tion between the heads and base flanges of the rails and a lower doubled portion inclosing the base flange, the said doubled portion having the outer and inner surfaces of its top wall converging toward its doubled edge and its top surface plane from the said upright portion to the outer edge of the connecting plate, the neutral axis of the joint substantially coinciding with the neutral axis of the rails.

5. A rail joint comprising in combination with the meeting ends of two rails connecting plates at the opposite sides of said rail ends, each connecting plate having an upright portion wedged between the heads and base flanges of the rails and a lower doubled portion inclosing the base flanges, the outer surface of the upper wall of the V-shaped portion being plane from the said upright member to the outer edge of the connecting plate, said outer edge being of a thickness not greater than the thickness of the lower wall of the doubled portion, the neutral axis of the joint substantially coinciding with the neutral axis of the rails.

JOHN H. ALLEN.

In the presence of—
FREDERICK GERMANN, JR.,
ETHEL B. REED.