Aug. 30, 1938. H. M. HADLEY 2,128,530

RAIL FASTENING CONSTRUCTION

Filed Oct. 26, 1936

Fig. 1

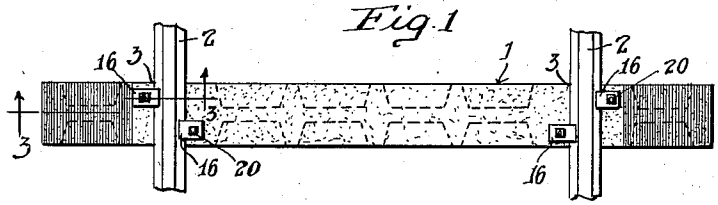


Fig. 2

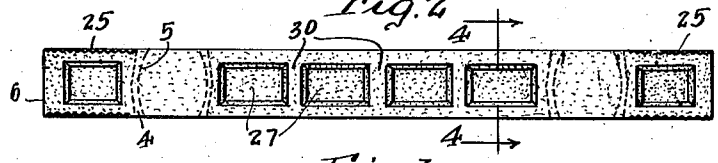
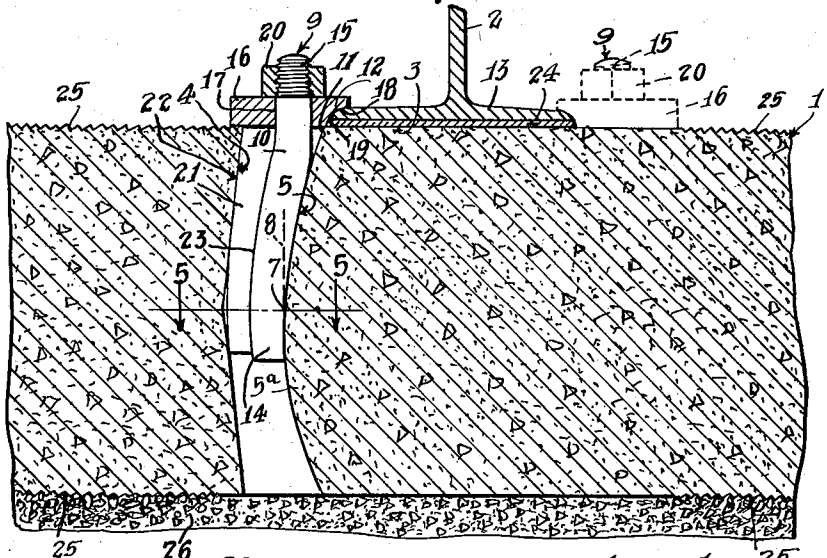


Fig. 3



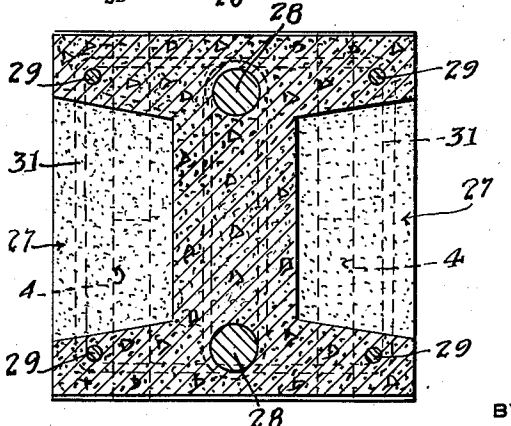


Fig. 4

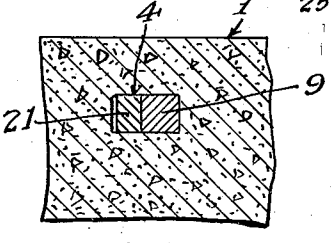


Fig. 5

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RAIL FASTENING CONSTRUCTION

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14 Claims. (Cl. 238—377)

This invention relates to railway tie construction, and the general object of the invention is to provide a railway tie, which is adapted to be molded of a suitable composition such as concrete, and having features of construction, which will enable it to readily cooperate with holding-down means for securing the rails on the tie.

A further object of the invention is to provide a railway tie of this type with a socket of characteristic form, and capable of cooperating with a bolt of correlated form in such a way that the bolt can be readily put in place, but when secured will cooperate with the socket in the tie to hold the rail flange down on the tie.

A further object of the invention is to construct the tie in such a way that it is invertible, that is to say, to construct the tie in such a way that it can cooperate with the bolt and lug employed with it, with either face of the tie uppermost, that is, either horizontal face.

A further object of the invention is to construct a tie of this type so that the tie can be readily formed of reinforced concrete.

Objection has sometimes been made to concrete ties, to the effect that the smooth under face of the tie does not offer resistance to the shifting of the tie longitudinally in the track bed; and one of the objects of this invention is to provide a construction for the tie, which will tend to overcome this objection.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combination of parts to be described hereinafter, all of which contribute to produce an efficient rail fastening construction.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawing:

Fig. 1 is a plan of a tie embodying my invention, and representing short sections of rails lying on the tie, and secured thereto.

Fig. 2 is a side elevation of the tie illustrated in Fig. 1, with the rails omitted, but showing the bolt sockets indicated in dotted lines.

Fig. 3 is a section upon an enlarged scale, taken about on the line 3—3 of Fig. 1, and further illustrating details of the invention. In this view one of the holding-down lugs and the upper portion of its corresponding bolt, is indicated in dotted lines. In this view also, a portion of the ballast under the tie is indicated.

Fig. 4 is a vertical cross-section through the tie, taken about on the line 4—4 of Fig. 2, but upon an enlarged scale. This view particularly illustrates reinforcing that may be used in the tie, and further illustrates the means employed at the under face of the tie to prevent its shifting on the ballast.

Fig. 5 is a horizontal section taken about on the line 5—5 of Fig. 3, and further illustrating details of the invention.

Before proceeding to a detailed description of the invention, it should be stated that in accordance with my invention, I provide a holding-down member preferably in the form of a bolt that is received in a socket extending into the tie from its upper face. I am aware that such holding-down bolts have been employed heretofore, but usually they have cooperated with some kind of anchorage means that is embedded in the molded tie. In accordance with my invention, I give the socket a characteristic form, and I give the bolt a correlated bow-form with a bow-form face enabling it to cooperate with the face of the socket, so that the bolt can be readily slipped into position, and seated simply by a downward movement. After the bolt is seated the bolt and the face of the socket cooperate to prevent the bolt from being withdrawn in a vertical direction. This, of course, enables the bolt to resist any upward thrust exerted by the flange of the rail. The bolt also resists lateral or horizontal thrust of the rail against the head of the bolt or a lug held down by the bolt.

Referring more particularly to the parts, 1 indicates a railway tie embodying my invention, and supporting two rails 2 resting on rail seats 3 on the upper face of the tie. In applying my invention to such a tie, I mold the tie of suitable material, preferably concrete, and on each side of the rail seat 3 I form a socket 4. The socket 4 has a convexly curved face 5 on the side of the socket remote from the end 6 of the tie, that is to say, this face is a convex face extending down through the tie from a point adjacent its upper face, and this face is located toward the rail. At a suitable point such as the point 7, which is preferably located in the medial horizontal plane of the tie, the lower portion 5a of the convex face 5 recedes from the end of the tie. In other words, below this point the face of the socket recedes from a vertical tangent line 8 tangent to the convex face at the point 7.

I provide a bolt 9 to cooperate with the socket, said bolt having a body 10, which is of bow-form, that is, curved to correspond with the curvature of the convex face 5. In practice, the convex face

5 is preferably struck on a relatively large radius, and the axis of the body of the bolt would be struck on a slightly larger radius increased by half the diameter or thickness of the bolt in cross section, measured in the direction of the length of the tie. The radius on which the curved face 5 is struck, should be such that the upper and inner edge 11 of the socket preferably lies adjacent to the edge 12 of the rail flange 13. The bolt can be inserted in the socket by resting the concave, or bowed, face of the bolt against the convex face 5, and then sliding the bolt downwardly into the socket. The lower end 14 of the bolt extends below the point 7 and in contact with the face 5a that recedes from the vertical tangent line 8, and hence after the bolt has been put into position it cannot be withdrawn by a vertical movement, but only by a sliding movement along the curved face 5. The upper end of the bolt has a substantially vertical threaded shank 15, which receives a lug 16, said lug of course, having the usual opening 17 to fit over the shank of the bolt just below the threads. This lug may be in the form of a rectangular block having an undercut or rabbet groove 18, so that a shoulder 19 is formed on the lug to engage the edge 12 of the flange, the nose portion of the lug, of course, projecting over the rail flange so as to hold the rail down. On the threaded shank 15 I provide a nut 20, which is screwed home on the upper face of the lug to hold it down against the upper face of the tie, and to clamp the rail flange in position.

If desired, the socket may have a horizontal width measured in the direction of the length of the tie just sufficient to receive the bolt; but in practice, I prefer to make the width of the socket greater than the diameter or thickness of the bolt, so that when the bolt is in the socket a gap will be presented at the back of the bolt, and in this gap I provide means for preventing the bolt from shifting outwardly toward the end of the tie under a horizontal thrust, which might be exerted by the rail flange against the shank of the bolt. For this purpose I prefer to employ a filler 21, which may be of wood or any suitable composition. For this purpose I prefer to use a specially prepared hard rubber composition, which is capable of resisting great forces, but which gives a slight resiliency. The outer side wall of the socket is preferably in the form of an inclined face 22, which converges toward the curved face 5 in a downward direction. As indicated in Fig. 3, the lower end of this face 22 also inclines slightly away from the rail position in a downward direction. In other words, the upper end of this face inclines inwardly toward the rail. The filler or wedge block 21 has a form to fit against this face 22, and has a concave curved forward face 23 to fit against the convex back of the bolt. The lower end of the inclined face 22 is preferably located at about the same level as the point 7 where the lower portion 5a of the convex face commences to recede from the vertical tangent line 8.

In practice, the filler 21 and the bolt 9 are preferably inserted simultaneously in the relation indicated in Fig. 3, and after they are slipped into a position to such an extent that the axis of the shank 15 of the bolt is substantially vertical, the lug 16 is dropped into position over the shank, and the nut 20 is then screwed up. The rear or outer portion of the lug 16, of course, projects over the upper end of the filler 21. An examination of Fig. 3 will make it evident that any upward thrust of the flange against the nose of the lug that projects over the flange will be very effectively resisted by the bolt and lug, because the bolt cannot move vertically on account of its lower portion 14, which projects to the right of the vertical tangent line 8 as indicated. Furthermore, it is evident that the shank of the bolt will resist any force tending to move the bolt laterally, that is to say, toward the end of the tie.

It will be evident that when the nut 20 is tightened up, the tip 14 of the bolt will be drawn upwardly so as to wedge itself between the filler 21 and that portion of the convex face 5 that is located below the point of intersection 7 of this convex face with the vertical tangent plane. Also, there is ample bearing surface between the "flat" bowed face of the bolt and the "flat" curved face of the socket.

If desired, the socket 4 such as illustrated, can extend into the tie merely to a considerable depth, but I prefer to form these sockets so that they extend completely through the tie from the upper face to the lower face as illustrated. This may occasion, of course, the locating of the point 7 in the medial horizontal plane of the tie, and enables the tie to be invertible, that is to say, either of the horizontal faces of the tie can be placed uppermost.

The bolt 9 preferably has a substantially square cross section, with fillets at the corners as illustrated in Fig. 5, and the filler has a corresponding form, but at the point where the section 5—5 is taken, the cross section of this filler, or wedge 21, will be rectangular. If desired, a thin cushion 24 of any suitable material, may be placed between the rail flange and the upper face of the tie.

In order to prevent any tendency of this tie to shift longitudinally, I prefer to form the upper and lower faces with transverse ridges, or ribs 25. These ribs are close together, so that grooves are formed between them, into which parts of the ballast 26 would project, and this would tend to keep the tie from shifting. These ridges, however, are not employed at the rail seats.

In order to make the tie light, and yet sufficiently strong, I prefer to give the tie the cross section illustrated in Fig. 4. In other words, the tie is of substantially rectangular cross section, with a plurality of oppositely disposed recesses 27 spaced along its length, and formed at the ends of the tie beyond the rails 2. The tie may also have longitudinal reinforcing bars 28 located in the central plane of the tie, and lighter reinforcing bars 29 near the corners of the tie. At the points where the webs 30 are formed between the recesses 27, binding wires 31 are used that pass around the longitudinal bars 29.

Referring again to Fig. 1, and to the reinforcing bars 28, it will be noted that the sockets 4 are located on each side of the central plane of the tie, so that they do not prevent the use of the central reinforcing rods 28.

It is understood that the embodiment of the invention described herein is only one of the many embodiments this invention may take, and I do not wish to be limited in the practice of the invention, nor in the claims, to the particular embodiment set forth.

What I claim is:

1. In a railway tie construction, the combination of a rail, a tie having bolt-sockets formed in the upper side of the same at each side of the rail, said sockets having curved faces adjacent the rail extending down in a nearly vertical plane from a point adjacent the upper face of the tie, the said faces, on the side toward the rail being convex and curved so that a portion of each curved face toward the under face of the tie

inclines toward the vertical plane passing through the axis of the rail, a holding-down bolt for each socket, each holding-down bolt having a bow-form body and capable of being seated in its socket solely by downward movement in the socket, and having a curved body curved to correspond with the curvature of the said face and fitting against the same with the lower end of the body of the bolt extending downwardly along the curved face so as to lie against the said lower portion thereof, means in each socket back of each bolt for holding the curved face of the bolt pressed against the convex face of the socket, said parts cooperating to prevent the bolt from being pulled vertically out of the socket, each bolt having a threaded shank extending upwardly from the body and projecting above the upper face of the tie, a lug receiving the said threaded shank and having a shoulder engaging the edge of the rail flange to secure the same, and a nut received on the threads and securing the lug in position.

2. In a railway tie construction, the combination of a rail, a tie having bolt-sockets formed in the upper side of the same at each side of the rail seat, said sockets having convex curved faces adjacent the rail seat, convex on the side toward the rail and curved so that a portion of each curved face toward the under face of the tie inclines away from a vertical plane tangent to its corresponding convex face, and toward the vertical plane passing through the axis of the rail, a holding-down bolt for each socket, each holding-down bolt having a bow-form body curved to correspond with the curvature of the said face capable of seating against the convex curved face solely by downward movement in the socket and fitting against the convex face with the lower end of the body of the bolt extending downwardly along the curved face so as to lie against the said lower portion thereof below the line of tangency with the said tangent plane, the curved face of the socket below its corresponding line of tangency with the tangent plane cooperating with each bolt to prevent the same from being pulled vertically out of the socket, each bolt having a threaded shank extending upwardly from the body and projecting above the upper face of the tie, a lug receiving the said threaded shank and having a shoulder engaging the edge of the rail flange to secure the same, a nut received on the threads and securing the lug in position, each socket having a greater width than the body of the bolt measured in the direction of the length of the tie so as to form a gap in the socket at the back of the body of the bolt, and a filler in said gap for holding the bolt against the said curved face with the upper end of the filler located under the lower face of the lug.

3. In a railway tie construction, the combination of a rail, a tie having bolt-sockets formed in the upper side of the same at each side of the rail, said sockets having curved faces adjacent the rail, convex on the side toward the rail and curved so that a portion of each curved face toward the under face of the tie inclines towards the vertical plane passing through the axis of the rail, a holding-down bolt for each socket, each holding-down bolt having a curved body curved to correspond with the curvature of the said face and fitting against the same with the lower end of the body of the bolt extending downwardly along the curved face so as to lie against the said lower portion thereof, said curved face cooperating with each bolt to prevent the same from being pulled vertically out of the socket, each bolt having a threaded shank extending upwardly from the body and projecting above the upper face of the tie, a lug receiving the said threaded shank and having a shoulder engaging the edge of the rail flange to secure the same, a nut received on the threads and securing the lug in position, each socket having a greater width than the body of the bolt measured in the direction of the length of the tie so as to form a gap in the socket at the back of the body of the bolt, a filler in said gap for holding the bolt against the said curved face with the upper end of the filler located under the lower face of the lug, each socket having an inclined outer face extending downwardly from the upper face of the tie, in a direction away from the rail and converging toward the said curved face in a downward direction, said filler having an inclined face on its outer side fitting against the first-named inclined face and having an arcuate face on its inner side fitting against the convex side of the body of the bolt.

4. In a railway tie construction, the combination of a rail, a tie having a bolt-socket extending into the same from the upper face of the tie, said bolt-socket having a convexly curved face on the side toward the rail, said curved face having a point located at a depth within the tie and above the bottom face of the tie from which the said face recedes in an upward direction and in a lower direction, said socket having an outer inclined face extending upwardly from a point substantially at the level of the said first-named point, a bolt having a bow-form curved body curved to correspond with the curvature of the said curved face and lying against the same, said bolt making contact with the curved face of the socket only on the side of said bowed body, said bolt having a substantially vertical threaded shank at the upper end thereof, a filler received at the back of the bolt and between the said inclined face and the bolt body, a lug receiving the threaded shank seating on the upper face of the tie, having a shoulder for engaging the edge of the rail flange and with the outer side of the lug projecting over the upper end of the filler, and a nut on the thread of the bolt for tightening the bolt in the socket.

5. In a railway tie construction, the combination of a tie having a bolt-socket formed in the same at the side of the rail seat, said socket having a convexly curved face adjacent the rail seat, and curved so that a portion of the curved face toward the under side of the tie recedes from a vertical plane tangent to the said convex face in the direction toward the plane of the web of the rail, a holding-down bolt for the socket having a bow-form curved body, curved to correspond with the curvature of the said face and fitting against the same with the lower end of the body of the bolt extending downwardly along the curved face so as to lie against the said lower portion thereof, and so that the lower portion of said curved face lying below the line of tangency with said plane cooperates with the tip of the bowed body of the bolt to prevent the same from being pulled vertically out of the socket, said bolt having a threaded shank extending upwardly from the body and projecting substantially vertically above the upper face of the tie, means for holding the bolt pressed against said convexly curved face, a lug receiving the said threaded shank and having a shoulder engaging the edge of the rail flange to secure the same, and a nut received on the threads and securing the lug in position.

6. In a railway tie construction, the combination of a tie having a bolt socket formed in the

same at the side of the rail seat, said socket having a convexly curved face adjacent the rail seat, and curved so that a portion of the curved face toward the under side of the tie recedes toward the plane of the web of the rail, a holding-down bolt for the socket having a bow-form curved body, curved to correspond with the curvature of the said face and fitting against the same with the lower end of the body of the bolt extending downwardly along the curved face so as to lie against the said lower portion thereof, and so that the lower portion of said curved face cooperates with the tip of the bowed-form body of the bolt to prevent the same from being pulled vertically out of the socket, said bolt having a threaded shank extending upwardly from the body and projecting substantially vertically above the upper face of the tie, a lug receiving the said threaded shank and having a shoulder engaging the edge of the rail flange to secure the same, a nut received on the threads and securing the lug in position, said socket being of greater width measured in the direction of the length of the tie than the body of the bolt so as to form a gap in the socket back of the bolt, and a filler received in said gap for holding the bolt against the curved face of the socket with the upper end of the filler lying under the lower face of the lug.

7. In a railway tie construction, the combination of a tie having a bolt-socket formed in the same at the side of the rail seat, said socket having a convexly curved face adjacent the rail seat, and curved so that a portion of the curved face toward the under side of the tie recedes toward the plane of the web of the rail, a holding-down bolt for the socket having a bow-form curved body, curved to correspond with the curvature of the said face and fitting against the same with the lower end of the body of the bolt extending downwardly along the curved face so as to lie against the said lower portion thereof, and so that the lower portion of said curved face cooperates with the tip of the bowed body of the bolt to prevent the same from being pulled vertically out of the socket, said bolt having a threaded shank extending upwardly from the body and projecting substantially vertically above the upper face of the tie, means for holding the bolt pressed against said convexly curved face, a lug receiving the said threaded shank and having a shoulder engaging the edge of the rail flange to secure the same, and a nut received on the threads and securing the lug in position, the under face of said tie having transverse ribs thereupon for engaging the ballast to prevent longitudinal shifting of the tie in the road bed.

8. A tie of the kind described, formed of a cementitious molded material, said tie having bolt sockets formed therethrough to facilitate securing rails to the tie, each of said sockets passing completely through the tie from its upper to its lower face, and having a convex face on the side remote from the end of the tie, the point of tangency of said curved face to a vertical plane being located substantially at the medial horizontal plane of the tie, the faces of the sockets adjacent the ends of the tie being inclined toward the middle of the tie from a point at about the medial horizontal plane of the tie and converging toward the said curved faces in the direction of the medial plane of the tie.

9. A cementitious member for supporting a rail having bolt sockets formed therethrough to facilitate securing rails to the cementitious member, each of said sockets passing completely through the cementitious member from its upper to its lower face and having a convex face on the side toward the position of the rail, the point of tangency of said curved face to a vertical plane being located adjacent the medial horizontal plane of the cementitious member, the faces of the sockets remote from the rail position being inclined toward the rail position from a point at about the medial horizontal plane of the cementitious member, and converging with the said curved faces from the upper and lower faces of the cementitious member in the direction of the medial plane of the cementitious member.

10. A cementitious molded member to which a steel rail is to be attached, having a socket formed therein, said socket having a convex face on the side adjacent the axis of the steel rail, the point of tangency of said curved face to a vertical plane being located below the top surface of the member, said socket having faces on the side remote from the axis of the rail inclined toward the location of the rail and away from a vertical plane passing through their intersection at a point substantially opposite that at which the curved inner face of the socket is tangent to a vertical plane.

11. A cementitious molded member to which a steel rail is to be attached, said member having a socket formed therein, said socket having a convex face on the side adjacent to the axis of the steel rail, the point of tangency of said curved face to a vertical plane being located below the surface of the member, said socket having faces on the side remote from the axis of the rail inclined toward the location of the rail and away from a vertical plane passing through their intersection at a point substantially opposite that at which the curved inner face of the socket is tangent to a vertical plane, and means held in said socket for engaging and holding the steel rail.

12. In a rail holding construction including a cementitious body, the combination of a bolt having a substantially bow-form body extending down into the cementitious body from the upper surface thereof in a substantially vertical position, the body of said bolt having a bow-form concave side face disposed toward the rail position, said cementitious body having a socket extending into the same from its upper face to receive the said bolt and fitting against the said concave face of the bolt, the lower portion of said bolt and the face of the socket adjacent thereto inclining in a downward direction toward a vertical plane passing through the rail position, said bolt having means at its upper end for engaging the rail; and a filler fitting into the socket back of the bolt and holding the same against the convex face of the socket, the lower portion of the bowed body of said bolt and the adjacent face of the socket cooperating with the said filler to hold the bolt against upward movement in the socket.

13. In a rail holding construction including a cementitious body, the combination of a bolt having a substantially bow-formed body extending down into the cementitious body from the upper surface thereof in a substantially vertical position, the body of said bolt having a bow-form concave side face disposed toward the rail position, said cementitious body having a socket extending into the same from its upper face to receive the said bolt, and fitting against the said concave face of the bolt, the lower portion of said bolt and the face of the socket adjacent thereto inclining in a downward direction toward a vertical plane passing through the rail position, said bolt having means at its upper end for engaging

the rail; and a filler fitting into the socket back of the bolt and holding the same against the convex face of the socket, the lower portion of the bowed body of said bolt and the adjacent face of the socket cooperating with the said filler to hold the bolt against upward movement in the socket.

14. In a rail holding construction, the combination of a cementitious body having a socket, said socket having a convex lateral face extending down into the same from a point adjacent the upper face of the cementitious body, a bolt having a concave lateral face toward the said convex face, a filler received in the socket at the back of the bolt operating as a wedge to press the body of the bolt laterally and against the lateral face of the socket that is disposed toward the rail position, said lateral face of the socket and the adjacent face of said bolt having engaging faces inclined slightly from a vertical line in a downward direction and toward the rail position, and cooperating with the filler to prevent upward movement of the bolt.

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