

E. D. McDONALD.  
RAILWAY CONSTRUCTION.

APPLICATION FILED DEC. 12, 1906. RENEWED AUG. 6, 1907.

943,198.

Patented Dec. 14, 1909.

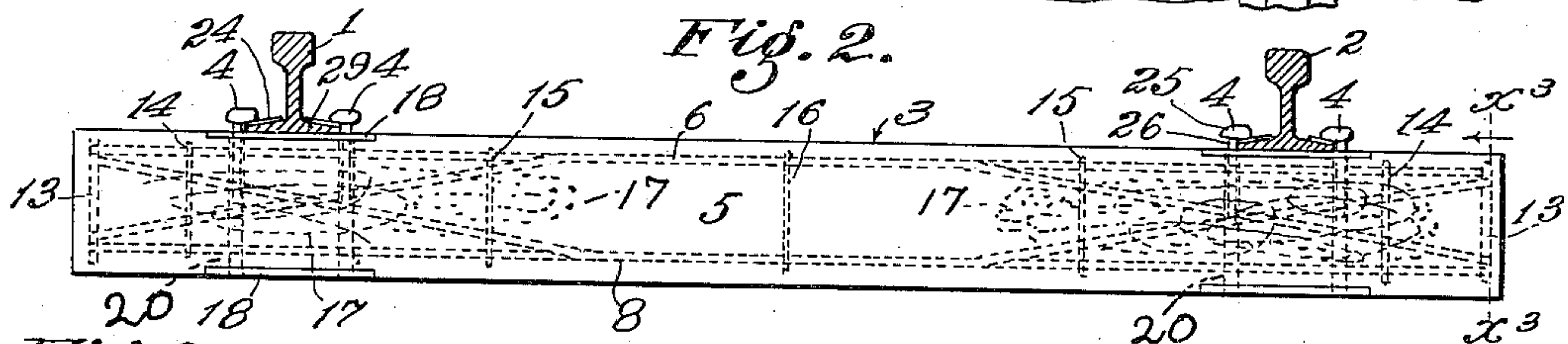
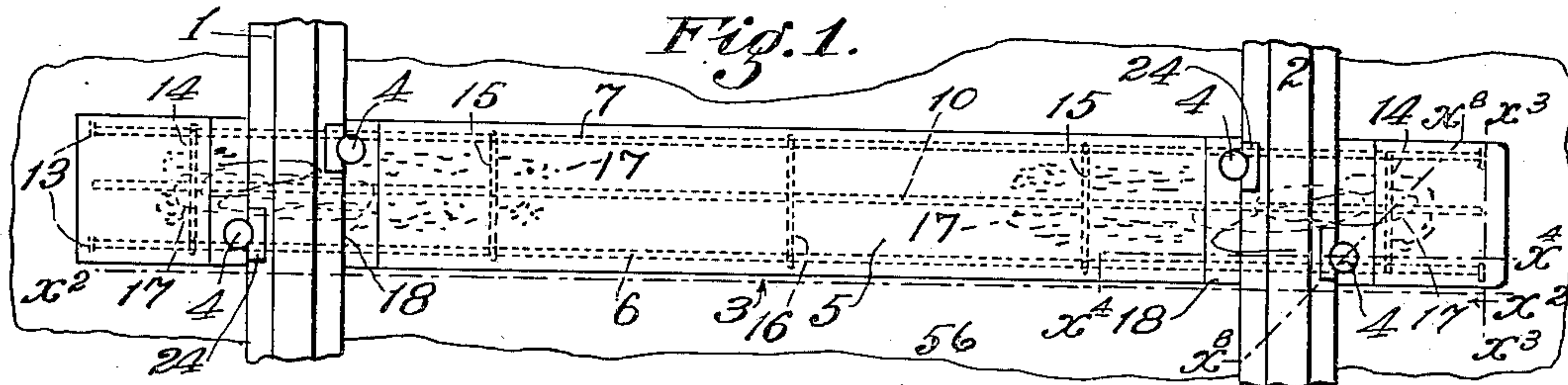


Fig. 3.

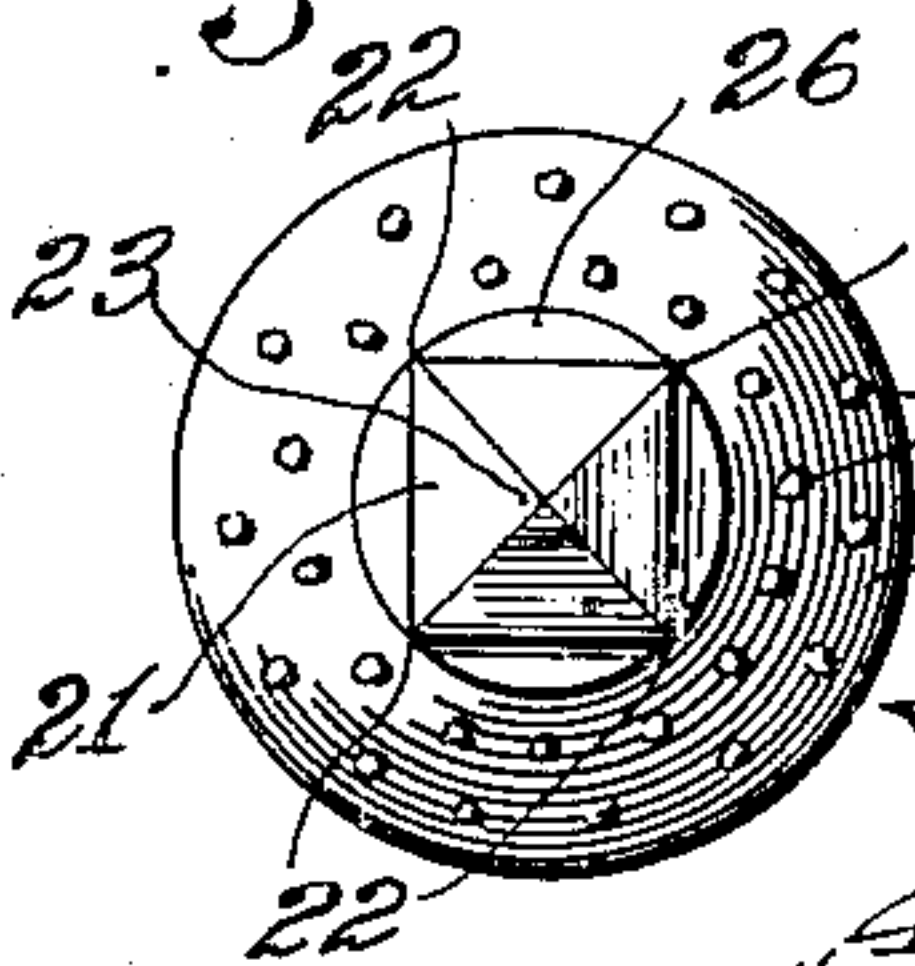


Fig. 4.

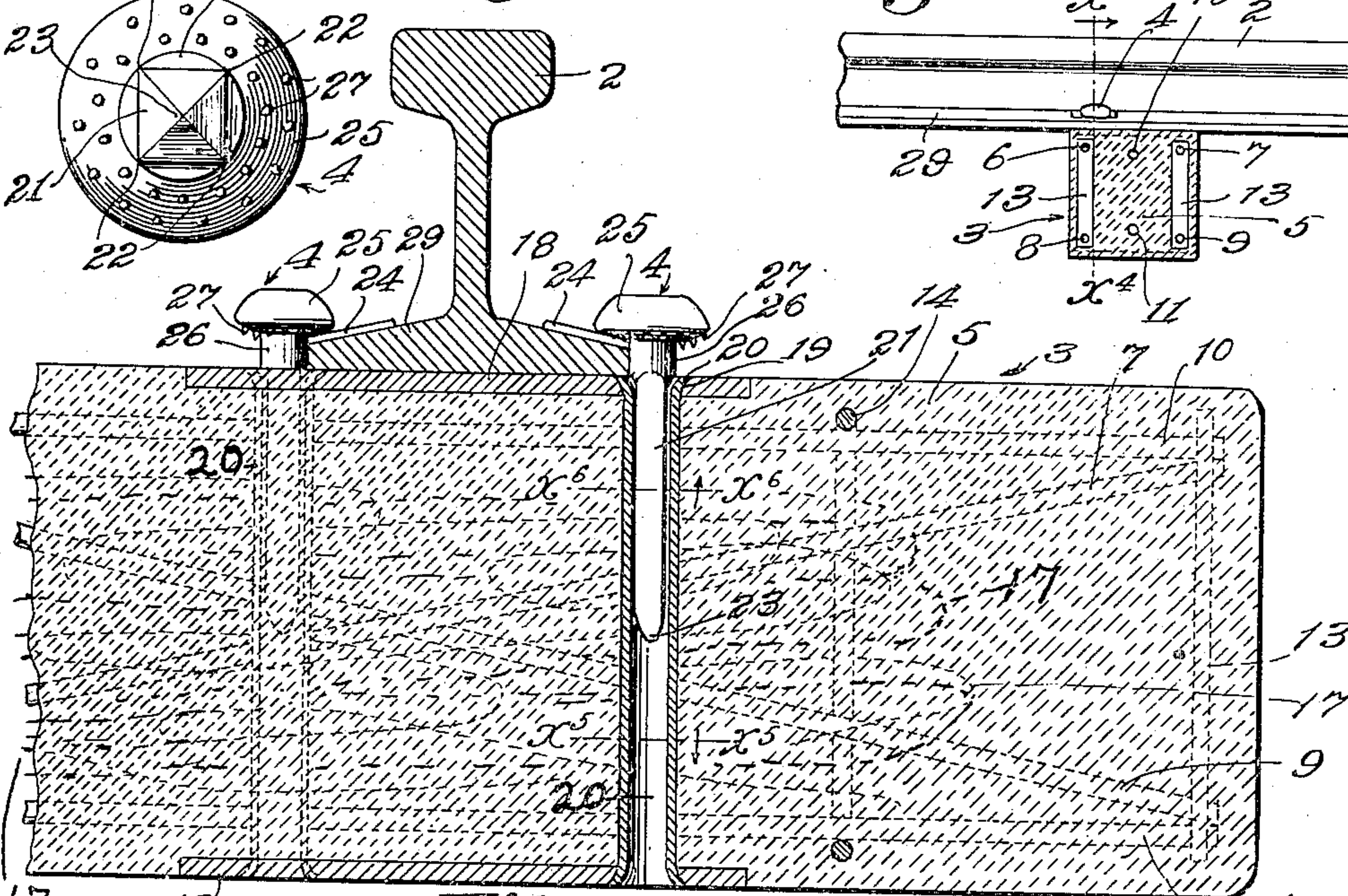


Fig. 5.

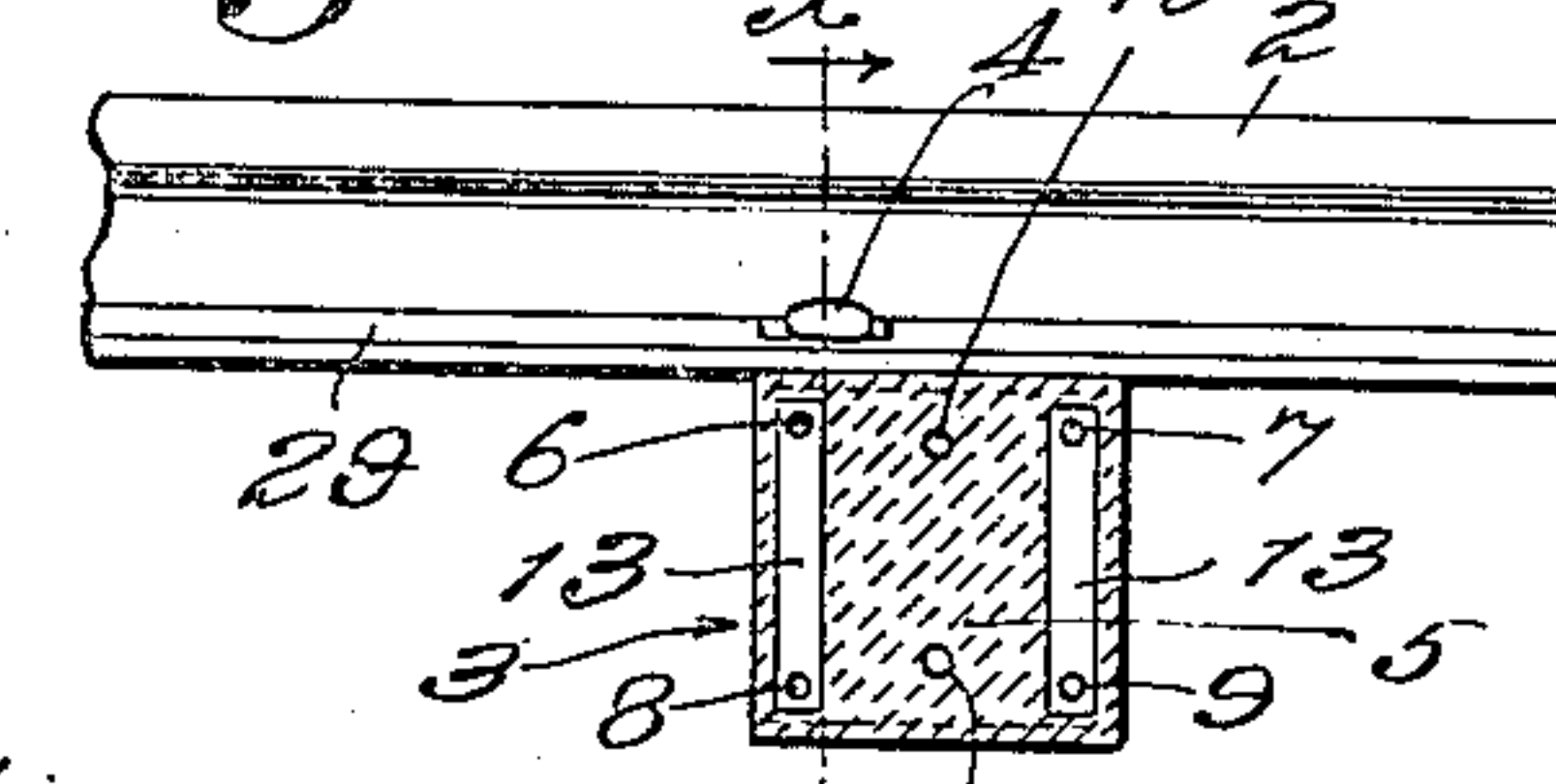


Fig. 6.



Fig. 7.

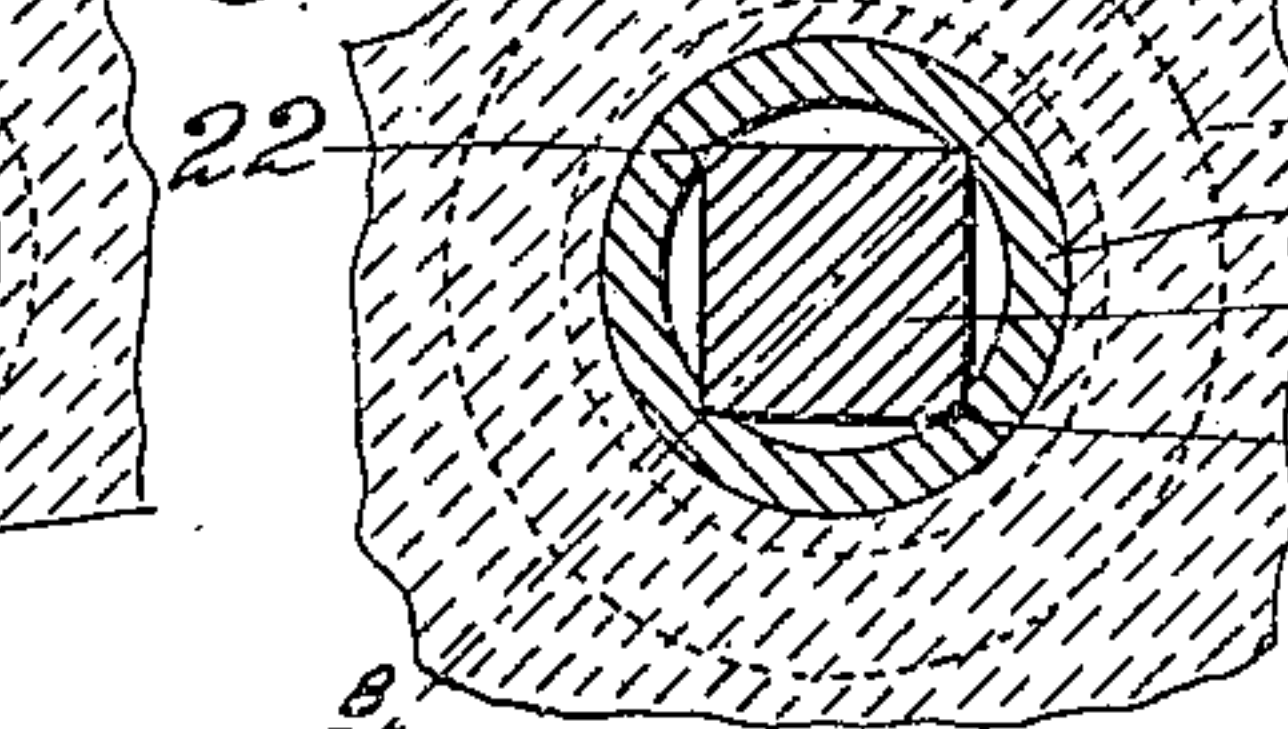
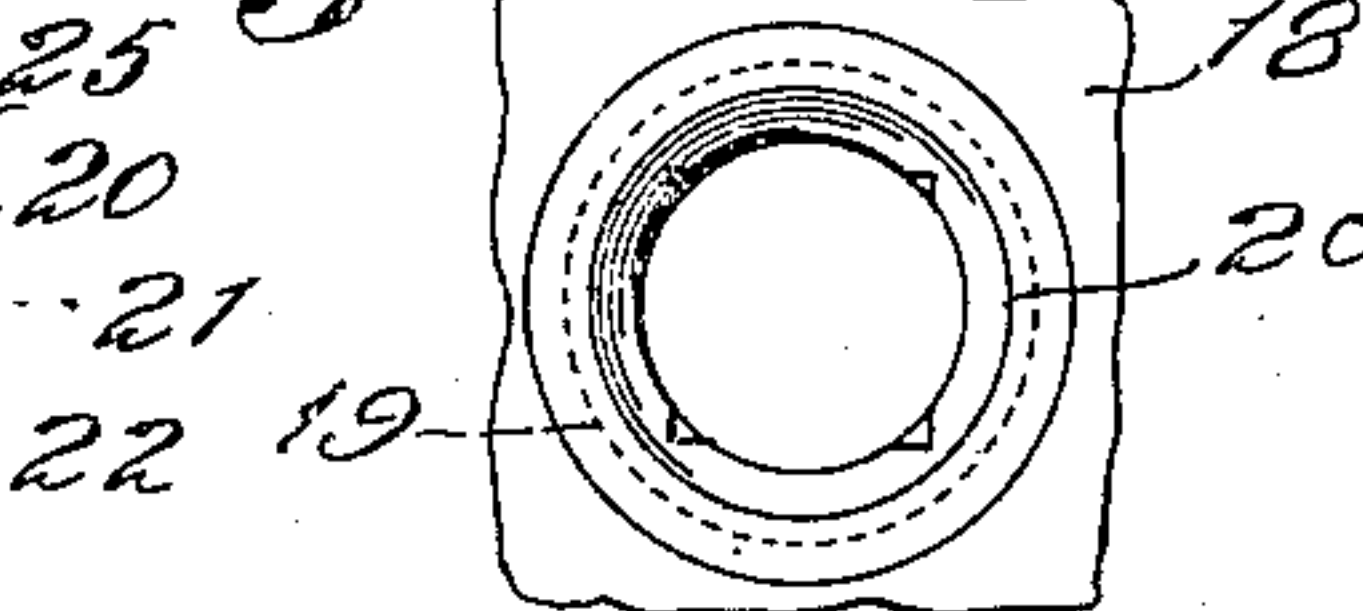


Fig. 8.



Witnesses

C. C. Holly  
J. Townsend.

Inventor

Elijah D. McDonald  
by James R. Townsend  
his Atty

Fig. 9.





# UNITED STATES PATENT OFFICE.

ELIJAH D. McDONALD, OF LOS ANGELES, CALIFORNIA.

## RAILWAY CONSTRUCTION.

943,198.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Application filed December 12, 1906, Serial No. 347,558. Renewed August 6, 1907. Serial No. 387,366.

*To all whom it may concern:*

Be it known that I, ELIJAH D. McDONALD, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Railway Construction, of which the following is a specification.

It is one of the objects of this invention to provide improvements in railways, and more particularly to provide novel and improved means for holding the railway rails in place; to provide a reinforced concrete tie or sleeper to which rails may be fastened by withdrawable spikes that can be driven by a sledge, and that will have as great tenacity of hold as spikes driven into oak or other hardwood ties, said concrete ties being of a strength equal to or greater than such hardwood ties; to provide for holding the spikes firmly when redriven from time to time; and to provide a reversible concrete tie or sleeper, a plurality of the sides of which may be successively used uppermost next to the rails.

The invention includes the railway tie or sleeper, and the combinations and parts hereinafter described and claimed.

The invention is capable of embodiment in different forms, and I do not limit myself to the specific construction shown.

The accompanying drawings illustrate the invention in the form I at present deem most desirable.

Figure 1 is a fragmental plan of a railway embodying my invention. Fig. 2 is a cross sectional elevation of the same on line  $x^2$ , Fig. 1, omitting the road bed and ballast. Fig. 3 is a fragmental sectional elevation from line  $x^3$ , of Figs. 1 and 2, omitting road bed and ballast. Fig. 4 is a fragmental sectional detail on line  $x^4$ , Figs. 1 and 3. Fig. 5 is a fragmental section on line indicated by  $x^5$ , Fig. 4, showing one of the hard metal spike-holding sleeves that is embedded in the concrete body of the sleeper and riveted into the bed plates. Fig. 6 is a fragmental section on line indicated by  $x^6$ , Fig. 4, looking upward. Fig. 7 is a fragmental plan of the tie or sleeper showing the flaring mouth of the sleeve from which a spike has been withdrawn. Fig. 8 is a fragmental section on line indicated by  $x^8-x^8$ , Figs. 1

and 6. Fig. 9 is a view of one of the spikes or pins looking at the point thereof.

1, 2 designate T-rails of common construction.

3 is a sleeper with spikes 4 which hold the rails 1, 2, to said sleeper.

5 is the concrete body of the sleeper with internal reinforcement comprising longitudinally arranged bent metal truss rods 6, 7, 8, 9, parallel reinforcing rods 10, 11, end tie plates 13, and intermediate ties 14, 15, 16, all of which are enveloped in the concrete body 5 at the time the same is molded. 17 designates further reinforcements in the form of bunches of wires likewise enveloped and arranged between the seats 18 for the rails. Said seats may be in the form of metal plates embedded in the concrete body 5 at top and bottom thereof, and each perforated with countersunk holes 19 in which the ends of hard metal sleeves 20 are inserted and expanded, riveted or upset, as clearly shown in Fig. 4.

The hard metal sleeves 20 are preferably sections of wrought iron pipe, the ends of which are inserted into the perforations 19 and are there expanded and upset, thus securing the metal firmly together and also forming tubular openings through the concrete body 5 from face to face thereof, into which may be driven the angular bodies 21 of the spikes 4. The bodies of said spikes are preferably rectangular in cross section, as shown in Fig. 6, throughout a greater portion of their length, thereby providing longitudinal edges 22 to cut into and become embedded in the internal wall of the sleeve 20. The point 23 of the spike 4 may be tapered as indicated in Figs. 4 and 9. 24 designates wood or fiber cushion shims between the heads 25 of the spikes and the base of the rail 2.

In practice the reinforcing means may be formed as a frame and the same together with the plates 18 and tubes 20 may be arranged in the relative positions they are to occupy in the complete sleeper and then the plastic concrete will be molded in form around said frame and tubes and between said plates and will be allowed to become hard as in the usual method of constructing reinforced concrete structures.

Each spike 4 may have a cylindrical neck



portion 26 between the head 25 and the angular portion 21 of the spike body, and the underface of the head may be frusto-conical, so that the spike may be partially rotated or turned around, and may be driven in with the edges 22 thereof in various positions from time to time, thus to take a new hold each time the spike is driven and to allow the under face of the spike head to conform to the top of the rail base in all positions of the driven spike. The under faces of the heads of the spikes may be provided with downwardly-projecting detents or teeth 27 to engage the shims 24, thereby to hold them against displacement when the spikes are driven home.

In practice, the sleepers may be constructed as follows:—The bent truss-rods 6, 8 and 7, 9 may be assembled in pairs with the perforated bars 13 into which the ends of the bent truss-rods may be riveted. Then the bed-plates 18 may be fastened together in pairs by means of the sleeves 20, the ends of which are expanded in the perforations of said bed-plates. The frames formed by said bed-plates and expanded sleeves may be fastened together around the pairs of truss-rods, and said truss-rods may be held apart by bunches of wires 17, located between the bed-plates and may be tied together by the tie wires or bands 14, 15, 16, which may be wrapped around the bent truss-rods to hold them in place. The reinforcing rods 10 and 11 may be inserted inside the tie wires between the bed-plates at top and bottom, midway between the sleeves. The frames thus formed may be placed in a mold box, not shown, with a pair of the truss-rods as 7 and 9, undermost, and the ends of the bed-plate 18 resting on the bottom of the mold-box. Then plastic or fluid concrete may be filled into the mold-box until the mold is full, thus enveloping all of the truss-rods, ties, cushion wires, and reinforcing rods and forming a solid reinforced concrete body in which the bed-plates are embedded.

The bases 29 of the T-rails are of a definite width and the transverse hard metal pipe sections 20 are so arranged that the tubular openings in the tie are spaced apart longitudinally of the tie a distance slightly greater than the width of the base of such T-rail. The cylindrical neck portions 26 of the spikes are of such diameter that when the spikes are driven home on the rail sufficiently to seat or nearly seat said cylindrical portions in the mouths of the sleeves or pipe sections the cylindrical portions of the spikes will engage the opposite edges of the rail base. The engagement between the spike and pipe sections is solely at the corners of the spike and the diagonal cross-sectional dimension between the opposite

corners of the spike is greater than the diameter of the tubular opening so that said corners embed themselves in the wall of the sleeve and take firm hold therein.

To construct the railway the sleepers may be laid in the road-bed 56 and the rails 1, 2, put in place. Then the spikes 4 may be inserted in the flaring mouths of the sleeves and driven home. The angular edges 22 thereof cut into and form strong frictional bonds or contacts with the interior walls of the sleeves. The spikes and sleeves are preferably both made of iron so as to secure great frictional resistance against withdrawal of the spikes from the sleepers.

In case of reconstruction, before redriving, the spikes may be partially rotated to cause the corners to engage uncut portions of the sleeves, and when the sleeves or the sleeper are too much worn on one side of the sleeper, the sleeper can be turned upside down, thus providing a new surface at the top and an unused portion of the sleeves into which spikes may be driven as above described.

The cushion shims 24 serve the double purpose of avoiding any rebounding of the spike that might occur if the head of the spike were driven directly home onto the base of the rail, and also to avoid liability of withdrawal of the spikes through vibrations transmitted from moving trains.

What I claim is:—

1. A sleeper comprising a concrete body and pipes forming tubular openings there-through from side to side thereof to receive spikes.

2. A sleeper provided with a hard-metal pipe and an angular spike in said pipe, the corners of which spike are embedded in the inner wall of the pipe.

3. A sleeper comprising a concrete body, bed plates on opposite faces of the body, and hard-metal sleeves extending through said body and fastened to said bed-plates.

4. A sleeper comprising a concrete body, bed plates on opposite sides of said body, hard-metal sleeves extending through said body and fastened to said bed plates, and angular spikes in said sleeves, the corners of said spikes being embedded in the sleeves.

5. A sleeper comprising a reinforced concrete body, hard-metal sleeves fastened in said body, a rail on the sleeper, and spikes having angular bodies in the sleeves, the corners of said bodies being embedded in the walls of the sleeves, said spikes having heads for fastening the rails on the sleeper.

6. A sleeper comprising a reinforced concrete body, hard-metal sleeves fastened in said body, a rail on the sleeper, spikes having angular bodies in the sleeves, the corners of said bodies being embedded in the walls of the sleeves, said spikes having heads



for fastening the rails on the sleeper, and cushion shims between the rail and heads of the spikes.

5 7. A sleeper comprising a reinforced concrete body, hard metal sleeves fastened in said body, a rail on the sleeper, spikes having angular bodies in the sleeves, the corners of said bodies being embedded in the walls of the sleeves, said spikes having heads  
10 for fastening the rails on the sleeper, and cushion shims between the rail and heads of the spikes, the under sides of said heads being provided with detents, said detents to engage said shims.

15 8. A reinforced concrete sleeper provided with hard metal sleeves, a rail on said sleeper, and spikes each provided with an angular body having its corners embedded in a sleeve, and a cylindrical neck and a  
20 head for holding the base of the rail.

9. A concrete sleeper provided with bed plates at top and bottom, sleeves connected to said bed plates and extending through

the sleeper, and a bunch of wire between the bed plates and the sleeves.

25 10. A concrete sleeper provided with bent truss rods arranged in pairs, bars fastening the ends of the rods of said pairs together, ties for said truss rods, bed plates on opposite sides of the sleeper, and sleeves  
30 connecting said bed plates.

11. A concrete sleeper provided with bent truss rods arranged in pairs, bars fastening the ends of the rods of said pairs together, ties for said truss rods, bed plates on opposite sides of the sleeper, sleeves connecting  
35 said bed plates, and bunches of wires between the bed plates and the sleeves.

In testimony whereof, I have hereunto set my hand at Los Angeles, California this  
40 6th day of December 1906.

ELIJAH D. McDONALD.

In presence of—

JAMES R. TOWNSEND,  
JULIA TOWNSEND.