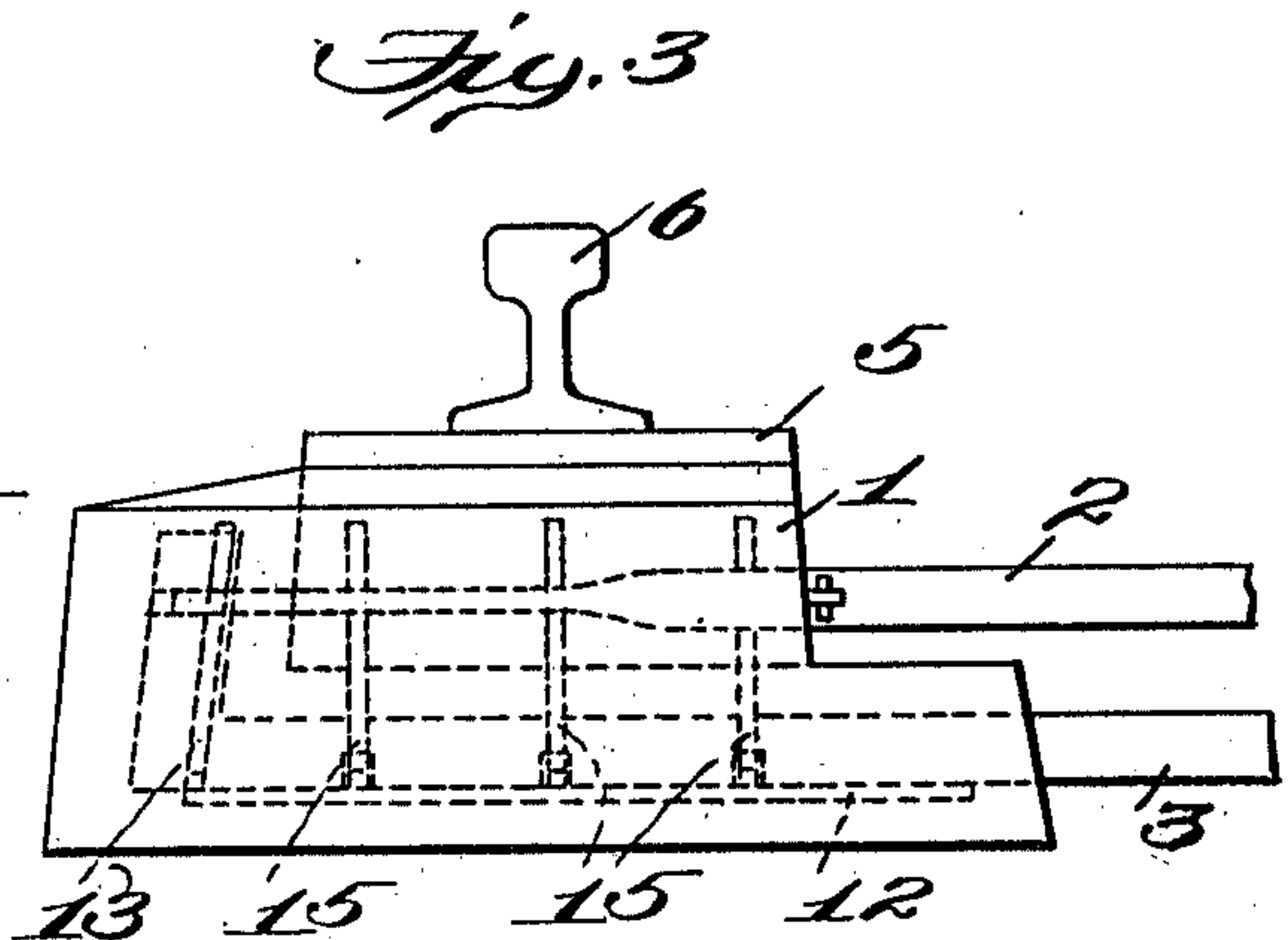
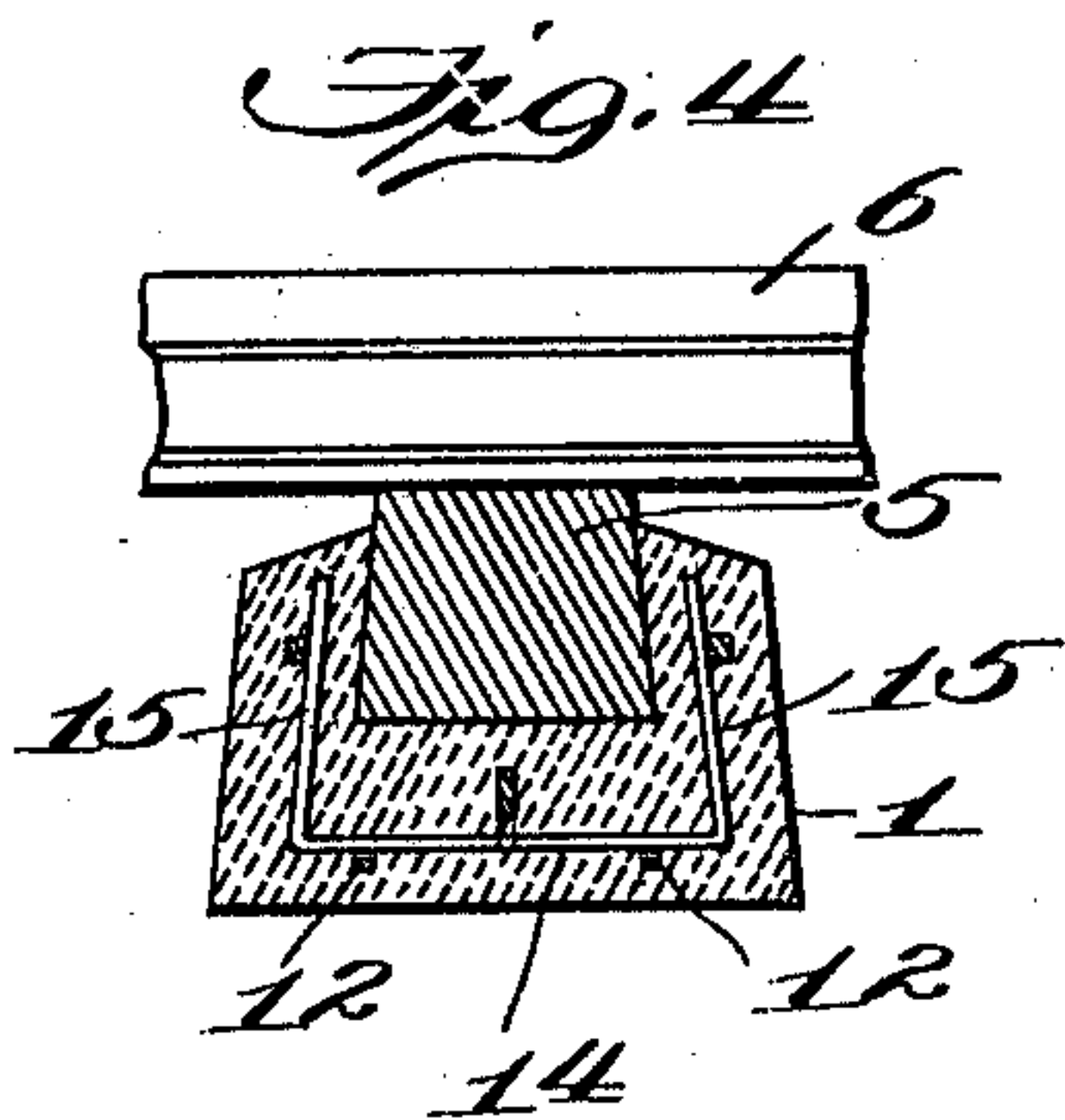
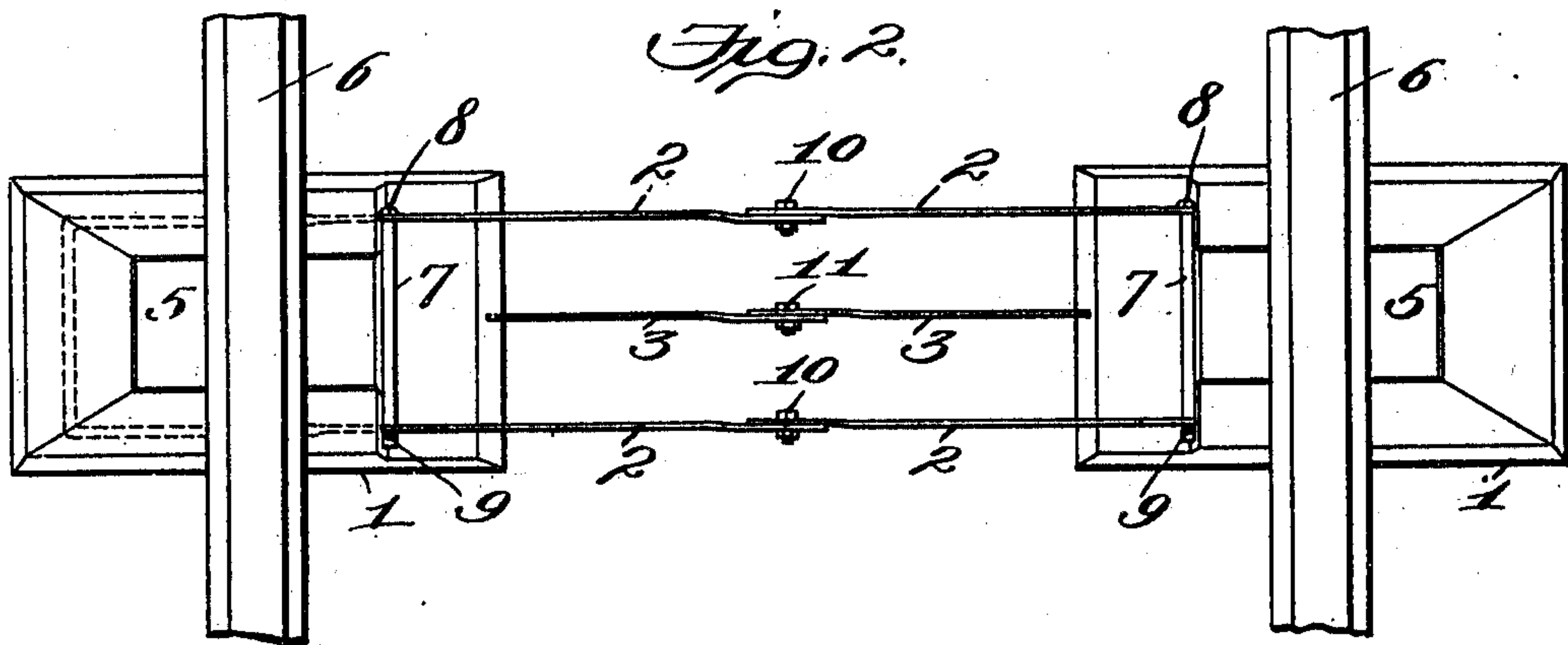


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CROSS TIE OR SLEEPER OF REINFORCED CONCRETE OR OTHER PLASTIC MATERIAL.
APPLICATION FILED MAY 26, 1909.

978,343.

Patented Dec. 13, 1910.

2 SHEETS—SHEET 1.



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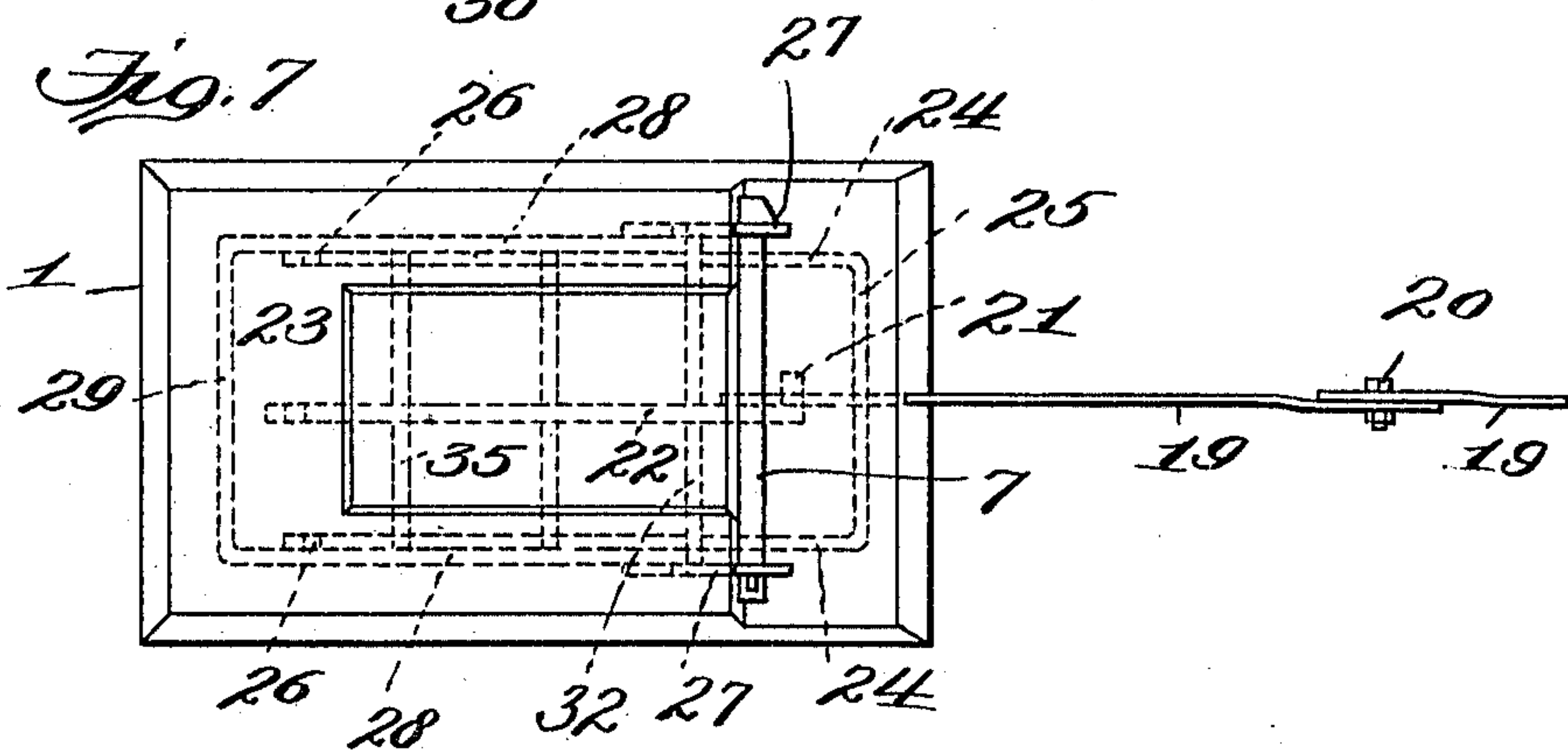
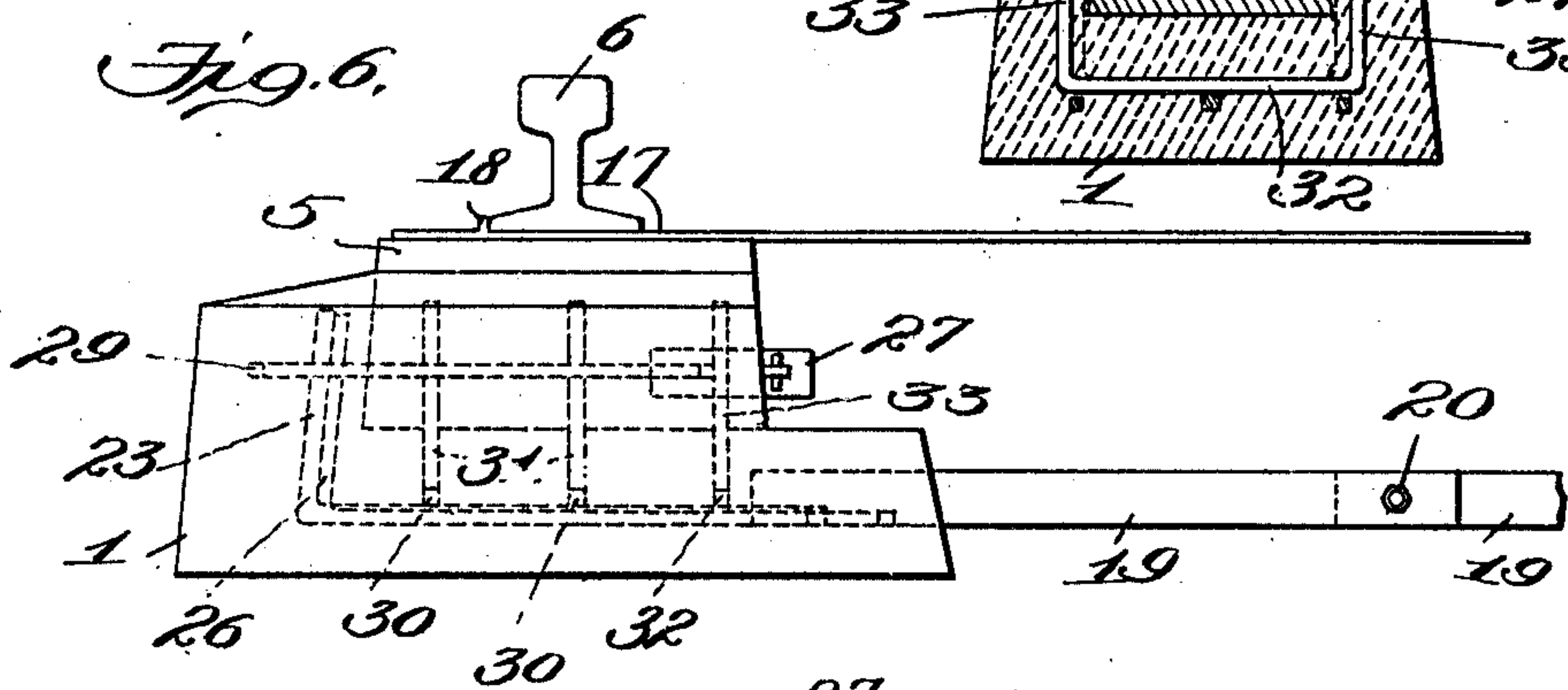
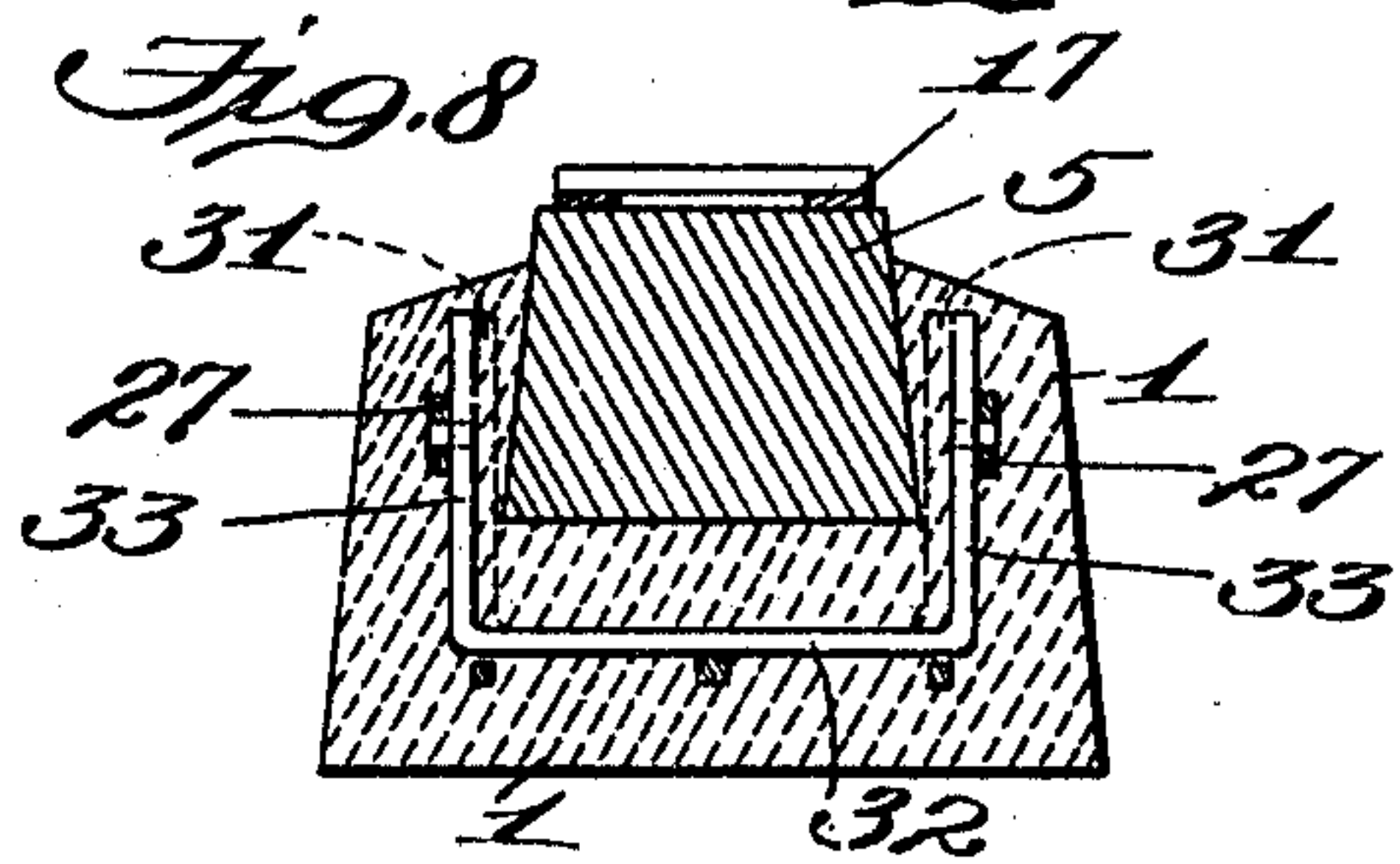
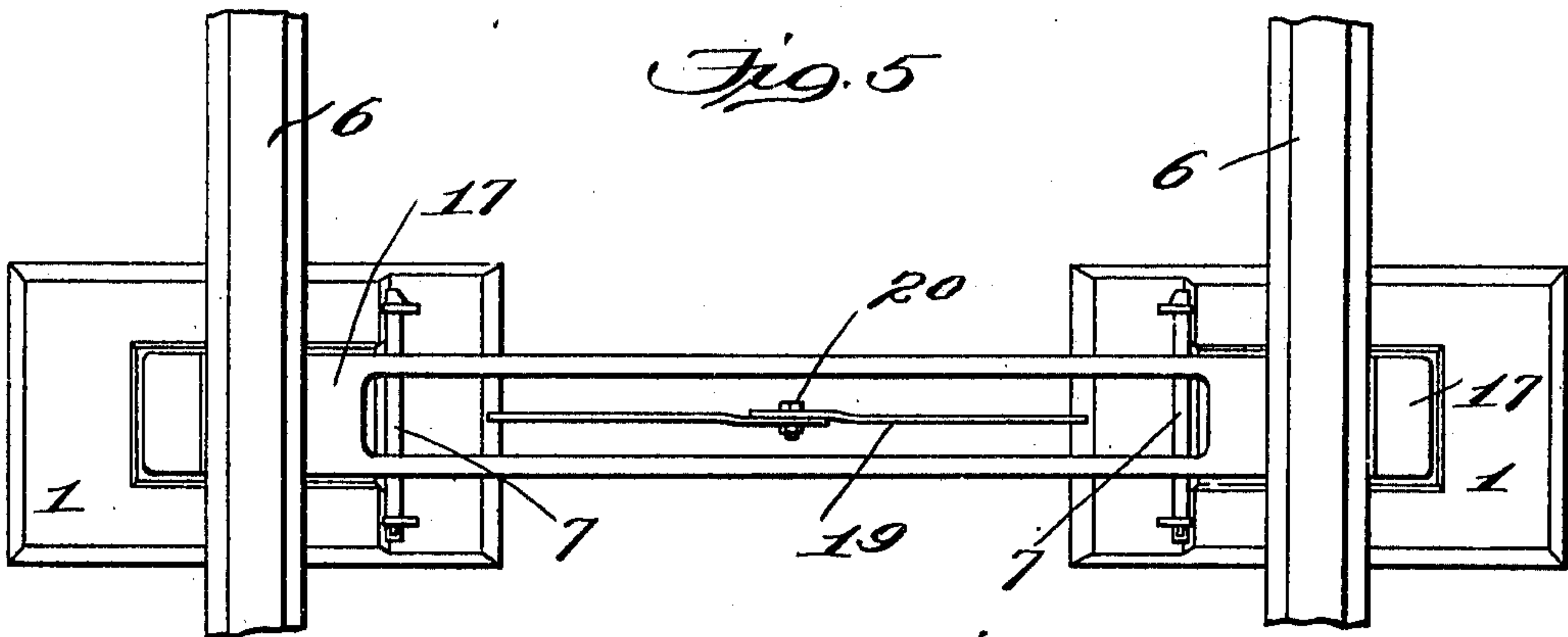
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UNITED STATES PATENT OFFICE.

HAROLD A. WILLS, OF PLAINFIELD, NEW JERSEY.

CROSS-TIE OR SLEEPER OF REINFORCED CONCRETE OR OTHER PLASTIC MATERIAL.

978,343.

Specification of Letters Patent.

Patented Dec. 13, 1910.

Application filed May 26, 1909. Serial No. 498,452.

To all whom it may concern:

Be it known that I, HAROLD A. WILLS, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented new and useful Improvements in Cross-Ties or Sleepers of Reinforced Concrete or other Plastic Material, of which the following is a specification.

My invention relates to cross-ties or sleepers of reinforced concrete or other plastic material and is designed to take the place of the ordinary wooden cross-tie or sleeper now in general use on most railways. It embodies the good points of wooden cross-ties by employing a wooden block of sufficient size to safely hold standard railway spikes or other fastenings which affords ready means for connecting the rail with the tie, preferably treated with creosote or other preservative and set into a cavity formed in a concrete base, the wooden block forming a shock-absorbing means to relieve the concrete from strain and shocks tending to disintegrate or damage the concrete base, the wooden block being of such construction and so held in place that it can be easily and rapidly removed whenever necessary without any special tools or contrivances other than are now in use for wood ties, and without in any way interfering with or disturbing the other parts of the track or roadbed.

It also has for its object to provide improved means for securing the wooden block in place in its concrete base without the employment of bolts and nuts which are liable to work loose and permit the displacement of the wooden block, the improved securing means also serving to take strain from portions of the concrete base and admitting of ready attachment when from any cause it is desired to remove the wooden block from its seat.

It has furthermore for its object to provide that substantially the entire bearing surface shall be under the load or symmetrically disposed about it and present a large and uniform resisting surface to the ballast by making the tie in sections and to connect the section of the tie under one rail with the section of the tie under the other rail by means flexible between the sections so as to prevent binding or cramping of the connecting means and cracking or breaking of the concrete base and so as to make the half-ties

capable of being more easily handled and transported.

It has furthermore for its object to provide that the shock-absorbing block shall be removable in a direction in which there is no action under the load.

It has furthermore for its object to provide improved means for reinforcing the concrete base of the ties so as to take up the longitudinal and transverse tensile strains and shearing strains to which the concrete would otherwise be subjected.

To the accomplishment of the foregoing and such other objects as may be made hereinafter to appear, the invention consists in the features hereinafter particularly described and then sought to be clearly defined by the claims, reference being had to the accompanying drawings in which—

Figure 1 is a side elevation of the improved tie, with a portion of one section thereof in section; Fig. 2 is a plan view of the tie; Fig. 3 is a side elevation of one of the sections of the tie, showing in dotted lines reinforcing members; Fig. 4 is a vertical cross-section through one of the sections of the tie, with the rail in full lines; Fig. 5 is a plan view of a modified form of the tie; Fig. 6 is a side elevation of one section of the modified tie; Fig. 7 is a plan view of the same; and Fig. 8 is a vertical cross-section through one section of the modified tie.

As illustrated in Fig. 1 of the drawing, the tie consists of two concrete base members 1 connected one to the other by metallic bars 2 and an intermediate bar 3. Each concrete member is molded with a cavity 4 having beveled inner walls and one open side, the open side of the cavity in the members being on the inner side of the members so that a wooden block 5 having beveled sides may be slipped or driven into the cavity from the side or space between the two concrete members. The wooden blocks are formed so that the grain in the wood will be at right angles to the rails 6 and will stand above the top of the concrete base members and preferably will have their greatest length transverse to the length of the rail, and in practice will preferably be approximately the dimension of the ordinary wooden ties in vertical cross-section, thus affording substantially the elasticity or cushioning effect of wooden ties and serving to absorb the shocks to which ties are ordinarily subjected

in actual use, and in practice the blocks will fit comparatively snugly in the cavities but not with such tightness as to exert injurious strain or pressure against the walls of the concrete base, and thus the blocks are caused to afford the best cushioning effect. The intermediate connecting metallic bars 3 pass through the lower portion of the concrete base members and at their ends are turned upwardly as indicated clearly in Figs. 1 and 3 of the drawings, and the upper connecting bars 2 pass through the portions of the concrete base constituting the side walls of the cavities in which the wooden blocks are seated and thence extend transversely across the rear wall of the cavity as illustrated. At the front or open side of the cavities in the base members, the bars 2 are connected together by transverse locking bars 7 which are adjusted so as constantly to bear against the inner faces of the wooden blocks, these cross-bars being formed at one end with a head 8 and at the opposite end having a pin 9 passed through them so as to hold them in place. By extending the bars 2 as described and connecting them by the cross-bars 7 side strains are taken from the walls of the cavities in which the wooden blocks are seated and the portions of the concrete bases outside of the rails are strengthened so as better to resist the strain produced by the tendency of the rails to spread which throws the entire weight of the load on the outside face of the wooden block, and thus the greatest strength is provided at the point where comes the greatest strain. The cross or locking rods 7 are also designed so as to hold the wooden blocks in place by constantly bearing against their inner faces. By locating the connecting bars 2 and the locking bars 7 as described outward tipping or toppling of the blocks caused by outward rail leverage is prevented, and thus a perfect alinement and proper gage is always maintained.

The bars 2 and 3 are connected at their center by bolts 10 and 11 so as to afford a flexible joint to prevent binding or cramping of the parts and liability of cracking or damaging the concrete bases of which there would be more or less liability if the connecting bars were rigid or not flexible. This flexibility may be provided for equally well by making a joint or joints at other points as, for example, by cutting off the bars 2 and 3 close to the base members 1 and connecting the ends by a rod fastened to them. By positioning the bars 2 above the horizontal plane of the intermediate bar 3, the bars will serve to retain the ties in position in the ballast by presenting a larger resisting surface to the ballast in the direction of the track.

For the purpose of further reinforcing the concrete members of the tie, parallel rods

12 are embedded in the concrete members and their outer ends 13 are bent upwardly as illustrated in Fig. 3 of the drawing, and cross-rods 14 are placed across the rods 12 and their ends 15 are extended upwardly as indicated in Fig. 4 of the drawing. The cross-rods 14 may lie within notches or recesses 16 formed in the lower edge of the intermediate connecting bars 3, and these recesses will also serve to receive portions of the concrete constituting the base members so as the better to tie the reinforcing rods in the concrete. These longitudinally and transversely extending reinforcing rods take up the tensile strains and also provide or take care of the shearing stresses on the ends and the sides of the concrete base members.

The construction described is adapted for all railways and is particularly well adapted for electric railways, or railways having an electric signaling system, because the rails or the rail fastenings do not come in contact with any metal that connects with the opposite rail, and all the reinforcing rods are embedded in a substantial body or thickness of concrete, and consequently the possibility of short circuiting, as well as of electrolytic action, is avoided.

Instead of the construction described I may use the following modification, especially on roads where the rails are not used in connection with block-signaling or in any way electrified, or where a short circuiting would make no practical difference in the operation of trains, the main features of construction however being the same in both forms of the invention. The modified form is illustrated in Figs. 5 to 8 of the drawings, and in which instead of using separate connecting bars 2 there is used a plate or steel bar 17 resting on top of the wooden blocks 5 in the concrete base members of the tie, beneath the track-rails, and connecting the two base members. This bar may be shaped like the ordinary shouldered tie-plates now in use with a flange or bead 18 where it passes beyond the rails and properly perforated for spikes as usual but not so illustrated. The portion of this bar spanning the space between the two base members may be centrally cut away as illustrated to form two parallel bars on opposite sides of the open space. The intermediate connecting bar 19 will have its meeting ends jointed by a bolt 20 so as to form a central flexible joint, and the ends which enter the concrete base members are hooked over the hook end 21 of a central longitudinally extending reinforcing bar 22 whose rear end 23 is bent upwardly at the rear of the wooden block 5 as illustrated in Figs. 6 and 7. In the lower part of the base member there are also embedded parallel bars 24 the forward ends thereof being united by a cross-rod 25 and

the rear ends 26 of which are bent upward as illustrated in Figs. 6 and 7.

In the portions of the base constituting the side-walls to the cavity in which the wooden block is seated there are embedded the plates 27 the forward ends of which extend in front of the side walls and serve to receive the locking bar or rod 7, formed and connected to the bars in the same manner as described for the first construction. From these plates 27 reinforcing rods 28 extend longitudinally through the side walls to a point to the rear of the wooden block cavity and at their rear are joined together by a connecting rod 29. The parts thus serve to reinforce the concrete base member and to receive the strains as in the form first described.

Reinforcing rods 30 extend across the longitudinal rods 22 and 24 and have their ends 31 extended upwardly as indicated in the drawing, and a reinforcing rod 32 likewise extends across the longitudinal rods and has its ends 33 extended upwardly and next to the plates 27 as shown in Figs. 6, 7 and 8 of the drawing. These several rods serve the same reinforcing and strain-relieving and stress-receiving functions described for the corresponding parts in the construction first described.

Where the bars which connect the oppositely disposed concrete base members of each tie are embedded in the concrete, they are deformed in any suitable manner, for instance, by notching or by changing the shape from flat to round or angular in construction, as illustrated in the several figures of the drawing, so as to afford a better gripping contact with the inclosing concrete. It will be understood that the exact location and number of connecting bars is not essential.

If desired, there may be embedded in the side walls of the concrete base members expanded metal or some form of wire mesh, which may extend lengthwise of the side walls, so as to distribute strain and better withstand shock.

For the purpose of preventing creeping of the ties the bottom of the concrete bases or that portion coming next to the ground may be treated or formed of heavy crushed stone partially embedded in the concrete mixture in the operation of molding, so as to form a rough surface that will take a better hold on the ground when set in place. Or the bottom of the base members may be corrugated or otherwise roughened by a corresponding configuration of the mold so as to produce a gripping surface to the base members. The top as well as the side faces of the concrete bases may be inclined as illustrated so as to better shed water from the surfaces and all corners and edges may be rounded or beveled to prevent chipping.

I have not illustrated any form of rail fastenings because the construction is such that the ordinary spikes or any of the other approved styles of fastenings in use may be employed, and the same does not constitute a part of the invention.

Among the advantages effected by the invention may be mentioned the maximum of shock-absorbing surface afforded by the wooden block seated in the concrete base member as described; the ease and rapidity with which the wooden block may be removed and replaced whenever necessary for any purpose; the disposition of substantially the entire bearing surface under the load and the increased resistance offered by the ballast to the ties by reason of their being made in sections and the bars connecting the oppositely disposed concrete sections of the ties, and the ease with which the ties can be laid, handled and transported; the maximum reinforcing effected by the disposition of the reinforcing rods as described, and the strength given to withstand shock, impact and vibration, and capacity to take up tensile and shearing strains; the stability and longevity possessed by the ties formed as specified; the protection of the concrete base members from disintegration due to pounding of equipment under excessive or high speeds, as the wooden blocks serve as cushions and keep the rails from directly contacting with the concrete or with metal in contact with the concrete; the flexible joints in the connecting bars, serving to prevent center binding and cracking; the exposure to view of all the holding parts of the tie so that if any part becomes accidentally separated or loosened it may be promptly detected and corrected; the fitting of the wooden blocks in their seats so that they may give to strain without forcing the concrete and holding them in place by locking bolts across their face instead of being molded in position, thus also making it possible to quickly remove and replace them without disturbing other parts of the tie. The foregoing are some of the advantages sought to be accomplished by the features of construction devised and illustrated.

I remark that the preferred form which embodies the construction of the cavity in the end member in such manner that the shock-absorbing wooden block is inserted and withdrawn transversely to the rails and through an opening in the side of the cavity toward the center of the track is particularly advantageous. It permits the removal of the shock-absorbing block in a direction in which there is no action under the load, thus guarding against the blocks being affected by the creeping of the rails. It is moreover desirable to have the wooden blocks of considerable size in order to secure proper cushioning effect and to have the

grain of the wood run transversely to the rails because otherwise the track soon becomes insecure. The provision for inserting the wooden shock-absorbing block through an opening running transversely to the rails thus permits me to use a large cushioning block at a cost greatly less than would be the case were the block inserted through an opening in the cavity parallel with the rails because of the size and consequent cost of the piece of wood which would be required to obtain such blocks cut transversely to the grain of the wood and the provision for inserting the block through an opening in the cavity toward the center of the track provides for proper support for it from the reinforced concrete at the points where support is most desirable.

Changes may be made in details without departing from the scope of the invention as specified in the appended claims.

Having described my invention and set forth its merits, what I claim is:—

1. A cross-tie comprising concrete end base members spaced apart from each other, a metallic bar connecting the end members and extending longitudinally into the lower portion thereof and having upwardly extending portions toward the outer faces of the members and lying below the top surface of the members, and other metallic bars connecting the end base members together in a higher horizontal plane than the first mentioned bar and embedded in the end members.

2. A cross-tie comprising concrete end base members spaced apart from each other and each formed with a cavity to receive a wooden shock-absorbing block, a wooden block fitting in each of said cavities, a metallic bar connecting the end members together, a reinforcing member embedded in the concrete of each end member around the wooden block in the cavity and a cross bar connecting together opposite limbs of said reinforcing member at the inner side the base member.

3. A cross-tie comprising concrete end members, each formed with a cavity to receive a wooden shock-absorbing block and having an open side, a wooden block fitted in each cavity, and a locking-bar crossing the open side of the cavity across the block therein to hold the block in place.

4. A cross-tie comprising concrete end members, each formed with a cavity to receive a wooden shock-absorbing block and

having an open side, a wooden block fitted in each cavity, a reinforcing member embedded in the concrete around the block in the cavity, and a locking-bar connecting parts of said reinforcing member and extending across the end of the block at the open side of the cavity.

5. A cross-tie comprising concrete end members, each formed with a cavity having an open side toward the opposite concrete member to receive a wooden shock-absorbing block, a wooden block fitted in each cavity and projecting above the top of the concrete end member, metallic bars connecting one concrete end member with the other, and reinforcing members embedded in the concrete of the end members.

6. A cross-tie comprising concrete end members, each formed with a cavity to receive a wooden shock-absorbing block, a wooden block fitted in each cavity, metallic bars connecting one end member with the other, and reinforcing members extending longitudinally and transversely of the concrete members and crossing each other and having upwardly extending portions, some of said upwardly extending portions being positioned so as to lie both inside and outside of a rail when placed on each concrete member, said reinforcing members being embedded in the concrete of the end members.

7. A cross-tie comprising wooden shock-absorbing blocks, concrete end members each formed with a cavity to receive and hold one of said blocks having an open side parallel to the rails through which the block may be inserted and withdrawn, means for locking the blocks in place, and connecting means holding the end members together.

8. A cross-tie comprising wooden shock-absorbing blocks, concrete end members each formed with a cavity to receive and hold one of said blocks having an open side parallel to the rails and toward the center of the track through which the block may be inserted and withdrawn, means for locking the block in the cavity, and connecting means holding the end members together.

Signed at New York city, in the county of New York and State of New York, this 6th day of May, 1909.

HAROLD A. WILLS.

Witnesses:

HERMAN GUSTOW,
KATHRYN M. KILEY.