

### [54] RAILWAY SUPPORTING PLATES

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[51] Int. Cl. ....E01b 9/40

[58] Field of Search.....238/283, 264, 287, 265, 290, 238/291, 298, 304, 306, 349, DIG. 1, 270, 271, 29

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### [57] ABSTRACT

A supporting plate for a railway rail is provided with downwardly extending pins integrally formed with said plate or welded thereto. These pins are inserted into holes formed in the sleeper and the interstices between the pins and the walls of the holes are filled with synthetic resin. The rail is secured to the supporting plate by clamps, so-called pandrols, engaging tunnel-shaped vaults formed in the supporting plate.

**3 Claims, 6 Drawing Figures**

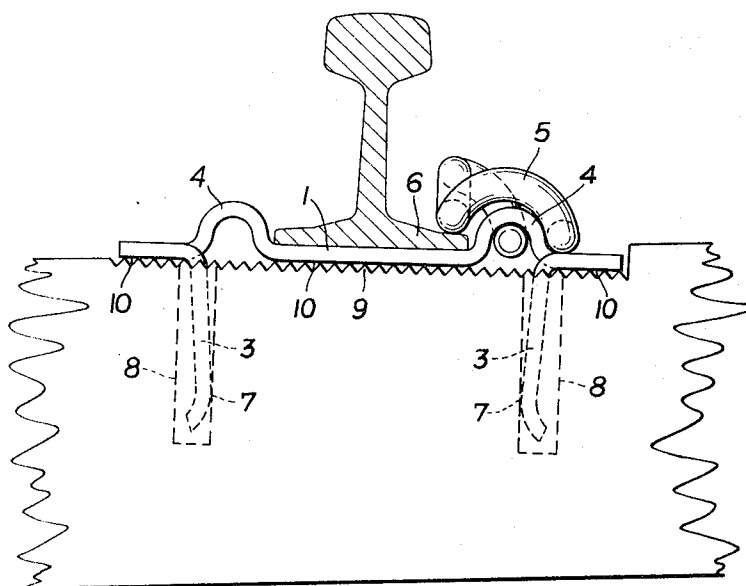


FIG. 1

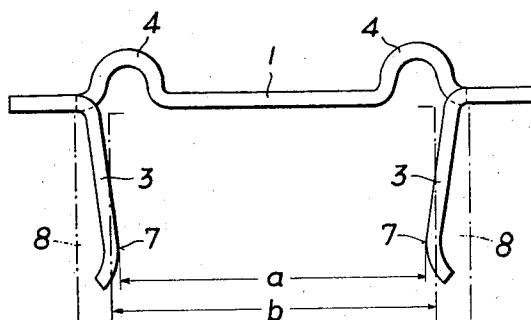


FIG. 2

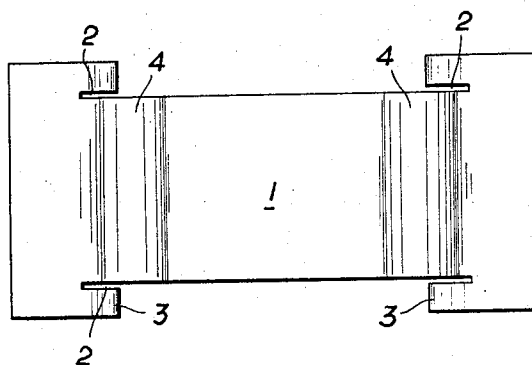


FIG. 3

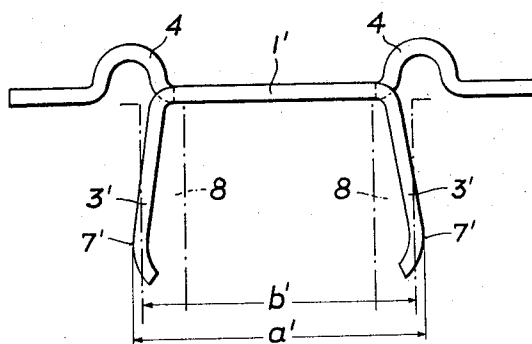
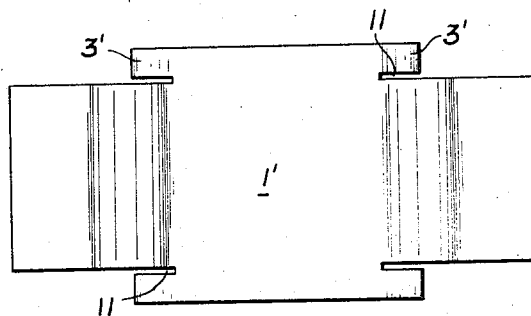


FIG. 4



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FIG. 5

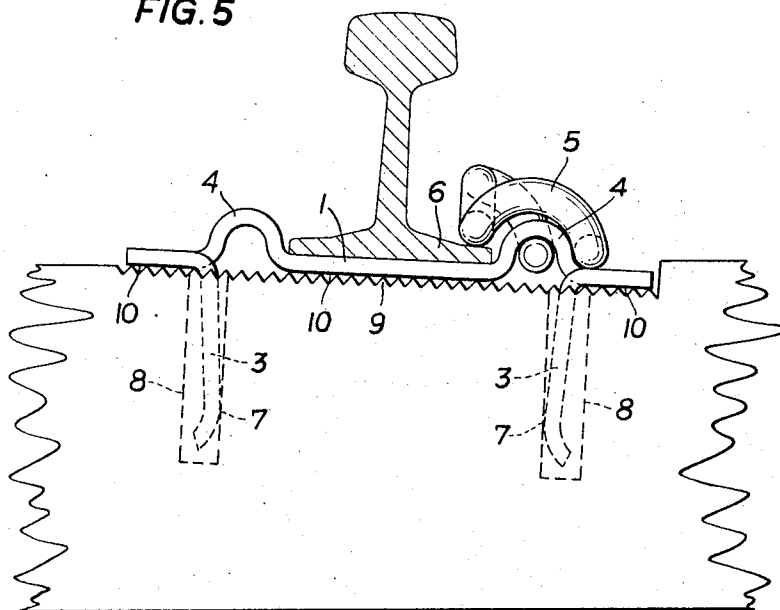
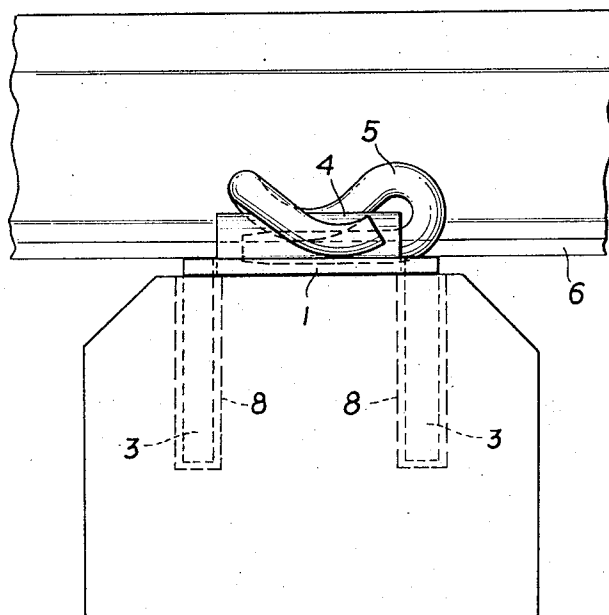


FIG. 6



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## RAILWAY SUPPORTING PLATES

The invention refers to a device for fastening rails on sleepers with interposition of supporting plates for supporting the rail base, the rail base being fastened on the supporting plate by fastening means of different type, for instance screws or spring clamps. In known fastening devices having supporting plates the supporting plates are secured to the sleepers by screws or nails, however, such fastening means are often loosened under the influence of the rolling wheels so that continuous maintenance work has to be effected. Moreover, the loosened supporting plate is, with time elapsing, pressed into the sleeper such that the proper rail distance may be lost. When using spring clamps it is known to have the ends of the spring clamps inserted through holes provided in the supporting plates, and into holes provided in the sleeper, which holes are resiliently engaged by the ends of the spring clamp, but this arrangement also provides a rail fastening which is subjected to loosening. Furthermore, known rail fastening devices are, particularly in connection with wooden sleepers, subjected to corrosion which finally destroys the sleeper in the area of the fastening means.

It is the object of the invention to avoid said drawbacks by providing, according to the invention, in a device for fastening rails on sleepers with the interposition of supporting plates, the supporting plate with downwardly protruding pins, being integral with, particularly forming one single part with the supporting plate, and the sleeper with holes corresponding to said pins and being arranged for accommodating said pins, the interstice between the pins and the walls of the holes in the sleeper being filled with synthetic resin. In this manner, a supporting plate is provided which forms with its fastening means a rigid constructional unit which, as such, can be connected with the sleeper. The synthetic resin provided in the interstice between the pins and the walls of the holes in the sleeper provides a corrosion resistant connection. Conveniently, a synthetic resin layer is additionally provided between the supporting plate and the sleeper. Thus, not only the pins are embedded in synthetic resin but also the supporting plate rests on a synthetic resin bed. This arrangement does not only provide for an unobjectionable support for the supporting plate on the sleeper, and an unobjectionable connection of the supporting plate with the sleeper, but also provides for a reliable seal against humidity in the area of the holes and of the supporting surface for the supporting plate, and further provides for an electrical insulation of the rail. Such an electrical insulation is of advantage in the case that the rail is to be used as an electrical conductor for electrical signals, for instance signal lights or the current necessary for positioning railway point. By connecting the supporting plate and its pins to a rigid unit, the load acting on the supporting plate is not only transmitted to the surface of the sleeper, but also to the core portions of the sleeper by the pins tightly embedded within the holes of the sleeper. For the purpose aimed at, it is particularly suitable to provide four pins arranged at the corner points of a rectangle.

The pins may be rigidly connected to the supporting plate in any suitable manner. The pins may, for instance, be welded to the supporting plate. When using forged supporting plates, the pins may form integral

parts with the supporting plate and be produced when forging the supporting plate. According to a preferred embodiment, the pins are formed by stripes of the plate cut, said stripes being separated by incisions and bent downwardly.

According to the invention the direction of the pins is deviating from the normal direction to the supporting plate such that the pins are resiliently clamped in the holes of the sleeper. This provides the advantage that the supporting plates are securely engaged on the sleeper even if the synthetic resin has not yet cured to a solid state and the rails are subjected to normal traffic. As a rule, however, the supporting plates are connected to the railway sleeper prior to positioning the railway sleeper.

The process for fastening supporting plates to the railway sleepers consists, according to the invention, in filling the holes of the sleeper with a setting or curing synthetic resin and subsequently pressing the pins of the supporting plate into the holes. A prestress of the pins within the holes provides the advantage that the pressing force need only be exerted until the supporting plate is in its proper position and that subsequently, while the synthetic resin is curing, the supporting plate is maintained in its proper position by the clamping action of the pins. When connecting the supporting plate to the railway sleeper, the synthetic resin can be introduced into the holes in such an amount that the synthetic resin expelled out of the holes by the pins forms a layer between the sleeper surface and the supporting plate. However, it is likewise possible to apply a synthetic resin layer on the sleeper surface.

It is possible to use, according to the invention, as synthetic resin a mixture of an unsaturated polyester, for instance poly-(maleic acid glycolester) (a polyester produced from maleic acid and glycol), and an unsaturated monomer, for instance styrene, which mixture contains usual catalysts, for instance benzoylperoxide, and accelerators, for instance cobalt naphthenate. The synthetic resin may, according to the invention, be incorporated with a filler, for instance quartz flour, whereby the weight ratio between synthetic resin and filler is advantageously selected with 60: 40. By incorporating such a filler, the mechanical strength of the synthetic resin is increased and the anchoring effect is improved.

The inventive rail fastening device is particularly suitable in combination with wooden sleepers, but can also be used with sleepers of other type, for instance sleepers of concrete.

The invention is further illustrated by embodiments shown in the drawing in which a so-called Pandrol-rail-fastening is illustrated, i.e. the rail base is secured to the supporting plate by resilient clamps. FIGS. 1 and 2 illustrate an embodiment of a supporting plate formed from a plate by pressing operation, FIG. 1 showing a view in longitudinal direction of the rail, and FIG. 2 showing a corresponding top-plan view. FIGS. 3 and 4 illustrate a further embodiment of a supporting plate, FIG. 3 again representing a view in longitudinal direction of the rail and FIG. 4 a top-plan view. FIGS. 4 and 6 illustrate a sleeper in combination with a supporting plate and a rail, FIG. 5 being a section along line V—V of FIG. 6 and FIG. 6 being a section along line VI—VI of FIG. 5.

According to the embodiment shown in FIGS. 1 and 2 the supporting plate 1 consists of a plate cut. Incisions 2 of the plane plate cut form stripes which are bent downwardly to provide the required pins 3. Simultaneously, two tunnel-shaped vaults are formed, which serve for inserting resilient clamps 5, so-called Pandrols. The resilient clamps 5 serve for pressing the rail base 6 against the supporting plate 1 (see FIGS. 5 and 6). The downwardly bent stripes, forming the pins 3, deviate from a normal direction to the supporting plate 1. These pins 3 are slightly curved. In the normal, relaxed condition, the distance  $a$  between the apices 7 of the curvature is smaller than the distance  $b$  between the walls of the holes 8 in the sleepers, measured at the areas of cooperation of said pins with said walls, the walls of the holes 8 being represented in FIGS. 1 and 3 by dashed lines. In this arrangement, the pins 3 are clamped within the holes 8 when pressing the pins 3 into these holes 8 of the sleeper. Prior to pressing the pins into the holes, the holes are filled with synthetic resin. By clamping action of the pins 3 the supporting plates 1 are maintained in their proper position also after removal of the pressing force, so that a reliable connection between the supporting plate and the sleeper can be established by the curing synthetic resin. When pressing the pins 3 into the holes 8, excessive synthetic resin is expelled from the holes 8 and forms an insulating intermediate layer 10 between the sleeper surface 9 and the supporting plate 1 (see FIG. 5). For improving adhesion of the intermediate layer 10 on the sleeper surface 9, the sleeper surface 9 is toothed or waved so that the surface of the sleeper is enlarged at the area in question and a greater contact area between synthetic resin and the sleeper is provided for. The teeth or waves further provide for some deep reaching action. As a whole, more favorable conditions for transmitting pressure stress from the supporting plate to the sleeper are provided for, noting that by means of the teeth or waves deeper layers of the sleeper are also made accessible for load transmission.

The embodiment shown in FIGS. 3 and 4 differs from the embodiment shown in FIGS. 1 and 2 only insofar as the pins 3' are formed by stripes which have been separated from the plate cut of the supporting plate 1' along lines 11. In this manner, a broader supporting surface for the rail base is provided on the supporting plate 1'.

In this case, the apices 7' of the curvature of the curved pins are directed outwardly, i.e. turned away from one another. To provide for a reliable clamping action of the pins within the holes 8 of the sleeper, the distance  $a'$  between the apices 7' is greater than the distance  $b'$  between those wall-areas of the holes 8, cooperating with the apices 7'.

The railways should have an inclination of 1 to 20 in inward direction. The supporting plates 1 and 1' respectively, consist, within the area for supporting the rail base, of parallel surfaces. For this reason the sup-

porting surface 9 of the sleepers has been given, as is shown in FIG. 5, a corresponding inclination by fraising operation. The resilient clamps (pandrols), which serve for pressing downward the rail base 6, are inserted in longitudinal direction of the rail into the tunnel-shaped vault of the base plate.

There are provided four pins 3 and 3', respectively, which protrude into the four holes 8 provided in the sleepers. The supporting plate is, therefore, supported by four supporting legs formed by the pins 3 or 3' which extend deeply into the sleeper and are anchored within the holes 8 by the synthetic resin, such, that the load is partly transmitted into the inner zones of the sleeper.

What I claim is:

1. A tie plate adapted to be interposed between a track rail and a sleeper provided with a plurality of resin-filled cavities which extend perpendicularly downwardly from the top surface toward the interior of said sleeper, comprising a tie plate mid-portion having a substantially flat bottom surface for engagement with said top surface of the sleeper and covering an area between said cavities, and a plurality of legs integral with said mid-portion and extending downwardly therefrom into said cavities, each of said legs including an upper portion of substantially uniform thickness and of substantially less cross-sectional area than that of the corresponding cavity and being inherently biased in such a transverse direction that the lower ends of a pair of said upper leg portions before being inserted into said cavities are disposed outside of the perimeter of the top openings of the respective cavities in opposite directions, said upper portions of said pair of legs each merging into a lower leg portion the lower end of which prior to said insertion is disposed within the respective perimeter, whereby said pair of legs upon insertion and downwardly movement of said lower ends of the lower leg portions into said cavities by engagement of said lower ends of the upper leg portions with the walls of said cavities are forcibly moved in opposite directions against said bias, thereby retaining the tie plate in position on said sleeper even prior to setting of the resin in said cavities.

2. The tie plate according to claim 1, in which said mid-portion and said legs are made of a single substantially rectangular piece of sheet steel, said legs comprising portions of the longer sides of said rectangular piece which have been partly severed therefrom and bent downwardly to form a pair of said legs at each such longer side of said piece of sheet steel.

3. The tie plate according to claim 2, including two parallel downwardly facing grooves formed in said piece of sheet steel by curving portions thereof upwardly at places spaced apart a distance at least as great as the width of the rail foot, said grooves being adapted for insertion therein of means securing the rail to the sleeper.

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