H. GRÖGER.

REINFORCED CONCRETE SLEEPER.

APPLICATION FILED FEB. 3, 1910.

957,328.

Patented May 10, 1910.

2 SHEETS—SHEET 1.

Fig.1.

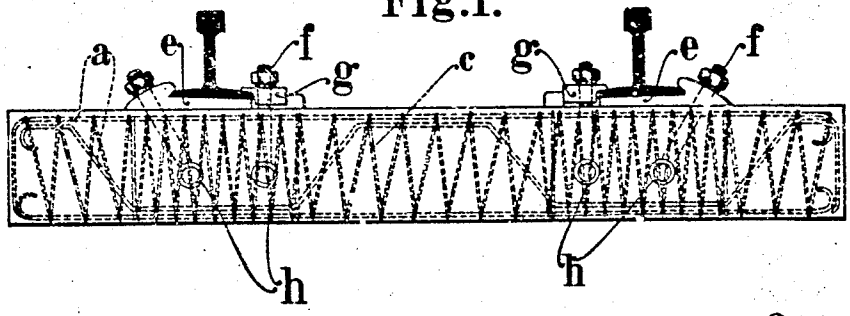


Fig.2.

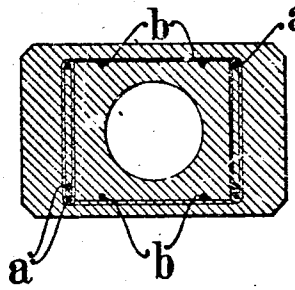


Fig.2a.

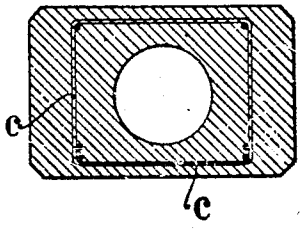


Fig.2b.

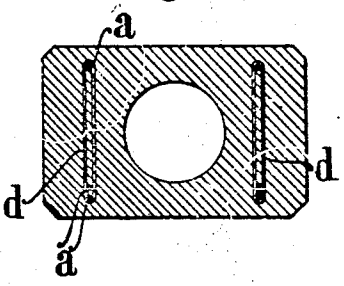


Fig.3.

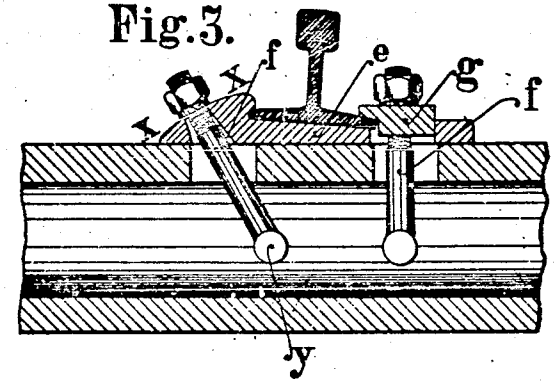
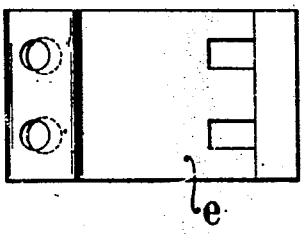


Fig.3a.



Witnesses.

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2 SHEETS—SHEET 2.

Fig.4.

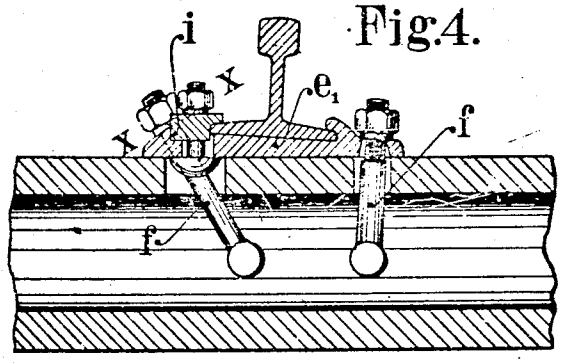


Fig.6.

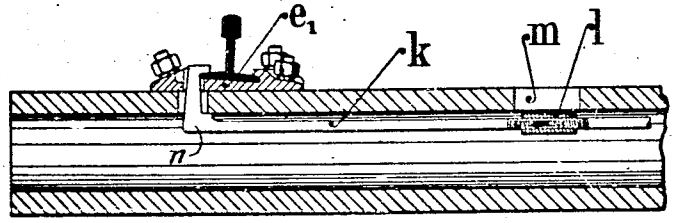


Fig.5.

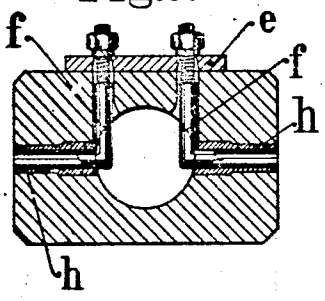
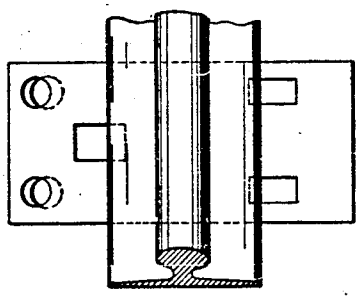


Fig.7.



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REINFORCED-CONCRETE SLEEPER.

957,328. Specification of Letters Patent. Patented May 10, 1910.

Application filed February 3, 1910. Serial No. 541,309.

To all whom it may concern:

Be it known that I, HUGO GRÖGER, a subject of the Emperor of Austria-Hungary, and residing at IX. Lichtensteinstrasse 43, Vienna, Austria-Hungary, have invented certain new and useful Improvements in Reinforced-Concrete Sleepers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to a concrete sleeper reinforced with iron, which is constructed in such a manner, that it exactly corresponds in all its dimensions to those of the usual wooden sleepers, and at the same time exerts sufficient resistance in use to satisfy the dynamic demands made thereupon.

The manner of fastening the rails according to the present invention suitably adapts the usual method of fastening rails upon wooden sleepers, to concrete sleepers reinforced with iron and having a hollow space in the interior. A wear plate which is laid loosely on the body of the sleeper, serves for this purpose, together with corresponding bolts by means of which the wear plate is secured to the concrete body. The wear plate is of such shape in cross section that the securing bolts lie at an angle and permit of the adjusting of the bolts to a normal gage and to an extension of the said gage. Besides this method of fastening the invention also comprises a new way of maintaining the gage. Hitherto the maintenance of the gage has been attained by fastening the rail to the sleeper and now and then a special distance piece is used for the purpose. This method has serious disadvantages, for if the distance piece is placed so as to be visible, then it is exposed to the action of the sun, etc., and in consequence of variations in temperature does not maintain the gage, if on the other hand the distance piece be embedded and thus protected from changes due to the immediate alterations of temperature, there are the disadvantages that the distance piece is exposed to the action of rust and is also inaccessible. In the present invention the distance piece for maintaining the gage, is placed within the sleeper, in the hollow space thereof, and offers a guarantee for the maintenance of the gage hitherto unknown.

The accompanying drawings illustrate several methods of carrying the invention into effect, in which—

Figure 1 shows a side view of a concrete sleeper constructed according to the invention, and also showing by way of example one method of reinforcing with iron, and the rails arranged on the sleeper. Figs. 2, 2^a, and 2^b each show a cross section through the body of the sleeper. Fig. 3 illustrates a longitudinal section of an arrangement of hook bolts for fastening the rails to the sleeper. Fig. 3^a shows a plan view of the wear plate while Fig. 4 shows a modified form of wear plate. Fig. 5 shows a cross section of the body of the sleeper, showing the journaling of the hook bolts. Fig. 6 is a longitudinal section through the body of the sleeper showing the device for maintaining the gage. Fig. 7 shows in a plan view the placing of a rail on a wear plate, according to Fig. 6.

The cross section profile of the present reinforced sleeper is by preference made rectangular or in the shape of a trapezium, while the cross sectional profile of the interior hollow space is circular, oval, semicircular, rectangular or any other desired shape. The reinforcement consists of iron insertions, the cross section of these insertions being determined by calculation. Figs. 1, 2, 2^a, 2^b, show examples of the reinforcement. The round iron bars *a* extend over the total length of the sleeper, some of these being straight while others are bent, and short iron bars *b* serve to strengthen the sleeper. These iron insertions are of course so calculated, to counteract the bending, pulling and compression tensions. They are connected by means of loops *c* and *d*, of which the loops *c* spirally inclose all the iron insertions and corresponding to the action of the transverse stresses are arranged with a closer pitch beneath the place where the rails are situated and with a larger pitch at the ends of the sleeper and in the center of the track, while the loops *d* always inclose two straight and one bent iron rod, and are rigidly connected with the same, in order that the rods may retain their shape during the filling in of the concrete. The loops *d* may serve as a substitute for the spiral loops

c, distributed over the whole length of the sleeper, in the form of round or flat iron, or the reinforcement can be carried out in any desired manner which will fulfil the same purpose.

The fastening of the rails to the reinforced concrete sleeper is effected (Figs. 3, 3ª, 5) by preference by the help of a wear plate *e*. The essential alteration in the shape of this plate, from that usually employed, lies in the construction of the hook and the projection for the nut of the outer bolt *f*. The wear plate is fixed to the sleeper as shown in the example illustrated by means of four hook bolts *f* which all have the same shape and are of the same size. Two of these hook bolts which are in the outside are inclined to the vertical axis of the rail and serve to maintain the gage, while the two inner bolts are substantially vertical and exert a resistance against the pulling stresses which result at the foot of the rail in consequence of the tipping action, and serve to wedge the rail under the hook portion of the wear plate *e* by means of the correspondingly formed clamp plates, *g*.

The hooks of the bolts *f* engage in sleeves *h* inserted in the concrete, and can be rotated about the horizontal axis of these sleeves. The nuts of the bolts *f* are fastened by means of elastic washer rings, which are well known. The wear plate distributes the pressure of the rail over the total width of the sleeper, in a thoroughly reliable manner. The holes on the upper surface of the sleeper for the bolts can be made previously or can be chipped out in the finished sleeper when *in situ*.

A modification of this method of fastening is shown in Fig. 4. In this case the hook on the wear plate *e* is on the inside, while the outer side of the foot of the rail is fastened to the wear plate by means of a small bolt provided with a clamp plate *i*. For fastening the whole arrangement to the sleeper in this case also the hook bolts *f* serve, the arrangement of the holes in the sleeper remaining unaltered. The means described permit also an increase of gage at curves, no further means being necessary to attain this. The wear plate *e* being constructed to correspond to the increase of gage required, the outer hook bolts *f* in the case of a maximum increase of gage of 28 mm. can oscillate about a base of 7 mm. to the right or left. This is made possible by the bolts being capable of being rotated within the sleeves *h*. The cross-section of the wear plate corresponding to that of the axis of the bolts is made that of a circular arc *x x* the center of the arc being *y*, the holes provided for the bolts in the plates being conical, the broad base of which is in the interior.

The increase of gage is effected by the means described and in the manner indicated, not only in the mode of fastening according to Fig. 3, but also in the modification according to Fig. 4.

In the mode of construction illustrated a rod *k* is provided in the hollow space of the sleeper for the purpose of maintaining the gage (Fig. 6). This rod engages by means of two hooks *n* the outer side of the foot of the rail, and also has a screw tightening device consisting of a turnbuckle 1. The latter permits of a very accurate adjustment, and also an adjustment when the superstructure is already finished. In order to be able to adjust the device easily a hole M is provided in the surface of the sleeper. So as not to weaken the center portion of the sleeper unnecessarily, it is advisable, not to place this opening and likewise the screw tightening device, in the center of the track, but more to the side, say at a distance of 30 cm. from one of the rails. In consequence of the protection given by the top layer, the distance piece for maintaining the gage is only subjected to minimum variations of temperature and for this reason the gage is accurately maintained. Finally it should also be noted that the reinforced concrete sleeper according to the present invention can be used instead of the wooden sleeper with the usual superstructure of chairs for the rails. The usual chair is connected to the sleeper by means of the hook bolts *f*. In a like manner the present sleeper can be used without any alteration when used parallel with the rails, the rails being fastened in an analogous manner by means of hook bolts. Ordinary sleepers and longitudinal sleepers with several hollow spaces adjacent to each other, can be applied to jointing places, crossings, switches and the like, in order to give the constructional parts and the parts of the rail a safe bedding, or foundation.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In combination with a hollow reinforced concrete sleeper, track rails, a wear plate beneath each rail, the outer side of each wear plate having a spherical surface and a hooked projection for engaging the foot of the rail, vertical and inclined holding down bolts passing through holes in the wear plate and sleeper and extending into the hollow space of the latter, the bolts having hooked ends, sleeves mounted in the sleeper, and engaging the hooked ends of the bolts, nuts on the outer ends of the bolts, those on the inclined bolts fitting upon the spherical surface of the wear plate.

2. In combination with a hollow reinforced concrete sleeper, track rails, a wear plate beneath each rail, the outer side of each wear plate having a spherical surface

and a hooked projection, approximately vertical bolts for holding down the inner side of the wear plate for directly taking up the tension, inclined bolts to hold down the outer side of the wear plate, both sets of bolts passing through relatively large holes in the wear plate and sleeper and extending into the hollow space of the latter, and means permitting the anchoring of the bolts.

3. In combination with a hollow reinforced sleeper, track rails, means for maintaining them apart at a definite gage, vertical and inclined holding down bolts passing through holes, and extending into the hollow space in the sleeper, the bolts having hooked ends, sleeves mounted in the sleeper and engaging the hooked ends of the bolts for the purpose described.

4. In combination with a hollow reinforced sleeper, track rails, adjustable means for maintaining them apart at a definite gage, vertical and inclined holding down bolts passing through holes, and extending into the hollow space in the sleeper, the bolts having hooked ends, sleeves mounted in the sleeper and engaging the hooked ends of the bolts for the purpose described.

5. In combination with a hollow reinforced sleeper, track rails, vertical and inclined holding down bolts passing through holes and extending into the hollow space in the sleeper, the bolts having hooked ends, sleeves mounted in the sleeper and engaging the hooked ends of the bolts, and a hooked adjustable gage maintaining rod engaging the foot of a rail and disposed within the hollow space of the sleeper.

6. In combination with a hollow reinforced concrete sleeper, track rails, a wear plate beneath each rail, a spherical surface and a hooked projection on the wear-plate, vertical and inclined holding down bolts passing through holes in the wear plate and sleeper and extending into the hollow space of the latter, means permitting the anchoring of the bolts at one end and the radial adjustment of the inclined bolts, a hook shaped gage maintaining rod for the rails engaging the foot of a rail and disposed within the hollow space of the sleeper and means whereby one end of the gage rod is accessible from the exterior of the sleeper.

In testimony whereof I affix my signature in presence of two witnesses.

HUGO GRÖGER.

Witnesses:
LUDOLF TAEUMER,
THEODOR SCHWAMBERGER.