

Description

Support for a rail

5

The invention relates to a support for a rail comprising at least one baseplate, such as a ribbed plate, receiving the rail and an elastic intermediate layer underneath it.

10

Corresponding supports or mountings for track sections are indicated for example in EP 1 041 200 B1 or DE 44 32 257 C1.

15

The supports or mountings have the common feature that the baseplate, such as a ribbed plate, is itself passed through by fastening means, such as bolts, to connect the support or mounting to a base, such as a sleeper.

US 5 249 743 A relates to a rail fastener with an elastic base that consists of sections length-adjustable relative to one another.

20

The subject matter of US 2013/0015256 A1 is a rail support using angle guide plates.

The subject matter of DE 20 2010 009 778 U1 is a rail fastening system with a plurality of plates of differing stiffness arranged one above the other.

25

A support for a rail is indicated in EP 1 662 046 A1, where an intermediate layer has areas of differing stiffnesses. A guide plate for fastening a rail is known from EP 1 688 540 A1. The guide plate consists here of a lower part and an upper part that is movable relative to said lower part and transversely to the longitudinal direction of the rail.

30

WO 2015/093789 A1 describes a rail support with a bottom plate, an elastic intermediate plate and a base plate. For fastening, guide pieces are provided that positively engage in the appropriate plates such that movement transverse to the rail longitudinal direction is not possible.

The object underlying the present invention is to simplify the design of a corresponding support in comparison with the prior art, in particular with the intent to simplify replacement and fitting. It should also be possible to adjust transversely to the rail longitudinal direction without problems.

To achieve this object, the invention substantially proposes a support for a rail comprising at least one baseplate receiving the rail, an elastic intermediate plate underneath the baseplate and supporting it, and holders receiving the baseplate and the intermediate plate at their end regions and which can be passed through by fastening means outside the baseplate to fasten the support.

An independent solution proposal provides a support for a rail, comprising at least one baseplate receiving and guiding the rail, an elastic intermediate plate underneath the baseplate and supporting it, and holders receiving the baseplate and the intermediate plate at their end regions and which can be passed through by fastening means outside the baseplate to fasten the support, where an elastic element resting on the surface of the baseplate extends from each holder.

An independent solution proposal provides a support for a rail, comprising at least one baseplate receiving the rail, a guide plate underneath the baseplate and supporting it, and holders receiving the baseplate at its end regions and which positively engage in the guide plate and can be passed through by fastening means to fasten the support.

Unlike in already known supports or mountings, the baseplate receiving a rail is no longer passed through itself by a fastening means, but instead the fastening means pass through the holders. This results in the advantage that complete removal of the fastening means is basically not required for removing or inserting the baseplate.

Since the baseplate positively engages in the guide plate, clear-cut positioning is achieved, thereby in turn simplifying fitting.

Furthermore, the invention is characterized in that the elastic intermediate plate, which is likewise received by the holders at its end regions, extends between the baseplate, such as a ribbed plate, consisting of steel and the guide plate, consisting of steel.

- 5 The stiffness of the support forming a rail fastening system can be set with the elastic intermediate layer, where unlike in the prior art the force is introduced not at certain points via the fastening means, but over the entire end edge regions of the baseplate.

- 10 Furthermore, it can be provided that a sole plate, preferably consisting of glass-fibre-reinforced polyamide, extends between the guide plate and a base, such as a sleeper, supporting the support.

The elastic intermediate plate consists in particular of polyurethane, such as polyether urethane, in particular closed-cell polyurethane.

15

The elastic intermediate plate can also consist of a metal plate as the baseplate to which are fastened, such as vulcanized, the elastic shaped pieces which extend in the direction of the base, such as a sleeper. These shaped pieces consist of rubber.

- 20 To set a preload to the required extent, one proposal provides that each holder has a receptacle for one of the end regions of the baseplate and of the intermediate plate, the clear inner height of the receptacle being less than the sum of the thicknesses of the baseplate and of the intermediate plate at their respective end regions and in the unloaded state.

25

To achieve a required preload, there is alternatively the possibility that the preload is set by the elastic element, in particular in the form of an elastomer spring, extending from the holder and resting on the surface of the baseplate, such as the ribbed plate. The elastic element made of elastomer can here be in strip or block form, which extends
30 along the rail in the holder and is positively received by the latter and hence fixed.

The height of the baseplate, of the intermediate plate and of the region of the elastic element extending between the baseplate and the underside of the receptacle is, in the unloaded state, greater than the distance between the top wall side of the holder and the support of the holder when the latter is firmly connected to the base, such as a concrete sleeper.

The receptacle itself is limited by side walls, a rear wall and the top wall and is left open at the bottom.

10 If an elastic element is used, such as an elastomer spring element, the inside of the top wall of the receptacle has one or more recesses, in which one or more geometrically matching projections of the strip-like or block-like elastic element positively engage in order to fasten the elastic element.

15 In particular, it is provided that the side walls are sections of side members of the holder which extend at least in some areas along a bottom wall of the holder facing away from the receptacle, which bottom wall can be passed through by the fastening means having a shank with a head.

20 For positive engagement of the holder in the guide plate, it is provided that at least one projection extends from the bottom wall on the underside and positively engages in the guide plate.

25 Preferably, two projections can extend from the bottom wall of the holder on the underside and positively engage in the guide plate, the projections extending on opposite sides of an opening, such as a slot, that can be passed through by the fastening means.

30 To permit movement of the holder and hence of the support relative to a base, such as a sleeper, it is provided that the opening in the bottom wall of the holder is surrounded by an area of raised portions and recesses forming a gearing, and that a plate-like or disk-like element with raised portions and recesses of matching structure extending on the

area side is arrangeable between the head of the fastening means and the area forming the gearing. The raised portions and recesses should be parallel to the rear wall of the holder, i.e. in the longitudinal direction of the rail to be fastened.

- 5 Furthermore, the plate-like or disk-like element should have at least two edges parallel to one another and between which is an off-center circular passage opening passed through by the shank of the fastening element. This permits a fine adjustment, since the off-center distance of the center point of the circular passage opening relative to the center line between the edges is less than the distance between consecutive ribs or
10 recesses of the area of the bottom wall forming the gearing. The area forming the gearing can itself be a plate element that is connected, such as welded, to the bottom wall.

- Furthermore, the invention is characterized in that the sole plate consists of two sections
15 that can be kept at a distance to one another in the longitudinal axis direction. It is in particular provided that the sections positively interlock by at least one projection in the longitudinal direction of the sole plate extending from one of the sections and engaging in a recess provided in the other section, for exclusive axial distance alteration of these sections.

20

The rail fastening system having the support or mounting in accordance with the invention for a rail section is thus characterized in particular by one or more of the following features.

- 25 The holders, also referred to as guide pieces, are positively connected to a guide plate, the holders being passed through by fastening means, such as bolts, in order to connect the support to a base, such as a sleeper.

- An elastic intermediate plate is arranged on the guide plate and has, depending on the
30 load to be absorbed from trains travelling along the track, a required stiffness which can for example be between 40 kN/mm and 60 kN/mm.

The intermediate plate can be of the type indicated in DE 298 07 791 A1.

5 The baseplate is placed as a kind of load-absorbing and distributing plate above the elastic intermediate plate. Using the baseplate, the rail can be fastened optionally with a tension clamp, clip bolt, nut and washer, or by means of inserted clamping elements, such as an e-Clip or Fast-Clip.

10 The baseplate has projections extending on both sides of the rail foot for guidance of the rail, so that additional components like angle guide plates are not required.

The holders do not have to form direct guides for the rail.

15 The baseplate and the elastic intermediate plate are positively fixed by the holders longitudinally and laterally relative to the guide plate.

The vertical relative movement of the baseplate of for example 3 – 5 mm is predetermined depending on the spring stiffness of the elastic intermediate plate.

20 The non-positive fastening of the support relative to the base, such as concrete sleeper, is achieved by means of bolts, with a movement in the longitudinal axis direction of the support being achieved by the gearing in the holders and by the associated plate-like or disk-like elements, with whose outer sides the head of the respective bolt is in indirect or direct contact. Fine adjustment is possible due to the off-center position in the element of the opening passed through by the bolt.

25 The gearing can permit a horizontal movement of the support, also referred to as the rail fastening system, for example in the range of ± 15 mm, where the distance between recesses can be 3 mm.

30 In the base, such as a concrete sleeper, an anchoring can be provided by a push-through screw connection, as indicated in the prior art.

The support can be vertically adjusted by the thickness of the sole plate arranged between the guide plate and the base, such as a sleeper. Sole plates of differing thicknesses can offer a vertical adjustment of up to 30 mm.

- 5 Furthermore, the fastening elements can be surrounded by insulating bushes to permit electrical insulation of the unit of baseplate with holders and guide plate against the base, such as a concrete sleeper.

- 10 In particular and independently inventively, the invention is characterized by a support for a rail comprising at least one baseplate that receives the rail and using which the rail is fastened, an elastic intermediate plate underneath the baseplate and supporting it, and holders receiving the baseplate and the intermediate plate at their end regions and which are passed through by fastening means outside the baseplate to fasten the support.

- 15 The invention is also characterized by a support for a rail, comprising at least one baseplate receiving the rail, a guide plate underneath the baseplate and supporting it, and receptacles of holders receiving the baseplate at its end regions and which positively engage in the guide plate and outside the baseplate and can be passed through by fastening means for fastening the support, each receptacle being limited by side
20 walls, a rear wall and the top wall and left open at the bottom, and the side walls are sections of side members of the holder which extend at least in some areas along a bottom wall of the holder facing away from the receptacle which is passed through by a fastening means for fastening the support.

- 25 Further details, advantages and features of the invention can be gathered not only from the claims and in the features to be found therein – singly and/or in combination – but also from the following description of a preferred embodiment to be found in the drawing.

30

The drawing shows in:

- Fig. 1 an exploded view of a first embodiment of a support forming a rail fastening system for a track,
- 5 Fig. 2 a plan view onto the support according to Fig. 1,
- Fig. 3 a section along the line A-A in Fig. 2,
- Fig. 4 a perspective view of the support,
- 10 Fig. 5 a perspective view of a holder,
- Fig. 6 a view of the holder according to Fig. 5 from obliquely below,
- 15 Fig. 7 a bottom view of the holder according to Fig. 5,
- Fig. 8 a front view of the holder according to Fig. 5,
- Fig. 9 a plan view onto the holder according to Fig. 5,
- 20 Fig. 10 a section along the line B-B in Fig. 8,
- Fig. 11 a section along the line C-C in Fig. 8,
- 25 Fig. 12 a detail X from Fig. 10,
- Fig. 13 a view of a toothed plate,
- Fig. 14 a section along the line D-D in Fig. 13,
- 30 Fig. 15 an exploded view of a second embodiment of a support forming a rail fastening system for a track,

- Fig. 16 a plan view onto the support according to Fig. 15,
- Fig. 17 a section along the line A-A in Fig. 16,
- 5 Fig. 18 a longitudinal section of the main components of the support,
- Fig. 19 a perspective view of the support,
- 10 Fig. 20 a bottom view of a holder in a perspective illustration,
- Fig. 21 the bottom view of the holder,
- Fig. 22 a rear view of the holder,
- 15 Fig. 23 a section along the line C-C in Fig. 22,
- Fig. 24 a section along the line D-D in Fig. 22,
- 20 Fig. 25 a plan view onto an elastomer spring,
- Fig. 26 a section along the line E-E in Fig. 25,
- Fig. 27 a perspective view of the elastomer spring and
- 25 Fig. 28 a section along the line B-B in Fig. 16.

Figures 1 - 14, in which as a general principal identical elements are identified with the same reference numbers, show a first embodiment of a support 10 for elastically

30 supporting a rail in a track. The support 10 can also be referred to as a holder or track support point or rail fastening system.

The main component of the support 10 is a baseplate 12 shown as a ribbed plate and consisting of steel, along whose underside is an elastic intermediate plate 14 which can have a design corresponding for example to DE 298 07 791 A1, to the disclosure of which express reference is made. The elastic intermediate plate 14 can consist of metal,
 5 onto which shaped pieces consisting of rubber are vulcanized.

There is also the possibility of using an intermediate plate 14 that consists of polyurethane, such as polyether urethane, in particular closed-cell polyurethane.

10 Furthermore, a guide plate 16 consisting of steel is provided that is preferably arranged above a possibly split sole plate 18 on a base, such as a concrete sleeper 20, to which the support 10 is connected. The concrete sleeper 20 can here be part of a fixed track.

The sole plate 18 can consist of polyamide with glass-fibre content.

15

Essential components of the support 10 are furthermore holders 22, 24, also referred to as guide pieces, designed for positively receiving end regions of the baseplate 12 and of the elastic intermediate plate 14.

20 The holders 22, 24 consist of steel.

As can be seen in Figs. 1 – 4, a rail section 26 is fixed, for example by means of tension clamps 28, 30 on the baseplate 12 designed as a ribbed plate. For that purpose, the baseplate 12 has appropriate ribs, not however indicated in detail, and bolts that are
 25 fixed by means of the ribs. In this regard, reference is made to sufficiently well-known designs for the superstructure. Other fastening types, such as hooks or bolts, nut and washer, or inserted clamping elements, such as an e-Clip or Fast-Clip, are also possible.

It is also clear from the drawing that an intermediate layer 32 extends between the foot
 30 of the rail and the baseplate 12. It can consist of or contain EVA (ethylene vinyl acetate).

Based on Figs. 5 – 14, the design of the holders 22, 24 is described for holder 24. The holder 22 has a corresponding design.

5 The holder 24 has a bottom wall 34 and side members 36, 38 vertical thereto and parallel to one another, and having in the side view a V-angled or acute-angled trapezoidal shape. The bottom wall 34 has a slot 40, which as shown in Fig. 1 is passed through by a fastening element, such as a hexagon bolt 42, whereby the support 10 is connected to the sleeper 20. A push-through screw connection can be used for that purpose, in accordance with for example DE 44 43 401 A1, to the disclosure of which
10 express reference is made.

The holder 24 has on the back a chamber 44 which is limited by side walls 46, 48, a top wall 50 and a rear wall 49. The chamber 44, that may be referred to as receptacle, is open to the bottom. The end regions 52, 54 and 56, 58 of the baseplate 12 and the
15 intermediate plate 14 respectively, in the longitudinal direction of the rail 26 are inserted into the appropriate chamber 44 of the holder 24 and correspondingly into that of the holder 22, thereby fixing the baseplate 12 relative to the intermediate plate 14. The chambers 44 can have rib-like thicker material portions to ensure the required stability.

20 The receptacles for the end regions 52, 54 and 56, 58 in the holders 22, 24 respectively are shown by the partially cutaway plan view according to Fig. 2 and by the sectional view according to Fig. 3.

The clear height of the chamber 44, i.e. the distance between the inside 60 of the top wall 50 and the underside 62 of the bottom wall 34 of the holder 24, is less than the
25 thickness of the baseplate 12 and of the intermediate plate 14 in the unloaded state. As a result, a required preload for the support 10 is achieved when the undersides 62 of the bottom walls 34 of the holders 22, 24 rest on the upper side of the guide plate 16 and the support 10 is connected to the sleeper 20. The required preload can thus be selectively
30 set, where intermediate plates 14 of differing spring characteristic curves can be used depending on the required stiffness.

To achieve a proper alignment of the holders 22, 24 relative to the guide plate 16, the holders 22, 24 positively engage in the guide plate 16. For that purpose, journal-like or cylindrical projections 64, 66 extend from the underside 62 of the holders 22, 24 and hence the bottom wall 34, which engage in correspondingly geometrically matching
 5 recesses 68, 70 and 72, 74 respectively in the guide plate 16. The height of the projections 64, 66 is here equal to or less than the thickness of the guide plate 16.

The support 10 is fixed to the concrete sleeper 20 by means of the fastening elements, such as the hexagon bolt 42 passing through the holder 24 and the bolt 142 passing
 10 through the slot 140 provided in the holder 22. To permit a movement of the baseplate 12 in the longitudinal direction of the sleeper 20, the slots 40, 140 in the holders 22, 24 and corresponding slots 240, 340 in the guide plate 16 are provided, permitting a movement in the longitudinal direction which is the length of the slot 40, 140 less the diameter of the hexagon bolt 42, 142. For that purpose, the slots 40, 140 are surrounded
 15 by a gearing formed by ribs 80, 82 and recesses 84, 86 between them, with the ribs 80, 82 and recesses 84, 86 being parallel to the rear wall 49 of the holders 22, 24 with which the end edges of the baseplate 12 and of the intermediate plate 14 are in contact. A so-called toothed plate 90, indicated in an enlarged view in Figs. 13, 14, is associated with this gearing formed by the raised portions 80, 82 and recesses 84, 86. The toothed plate
 20 90 has in the corresponding area 92 surrounding the slot 40, 140, forming the gearing and formed by the raised portions 80, 82 and recesses 84, 86, and shown darkened in Fig. 9, geometrically matching projections and recesses, some of which are identified as examples with the reference numbers 94, 96 and 98, 100.

25 The toothed plate 90 rests with its gearing on the gearing of the holder 22 or 24 and can thus be moved while engaged in this gearing.

The toothed plate 90 furthermore has a circular opening 102 which is passed through by the shank 43, 143 of the fastening element 42, 142 which has at its end a head 45, 145
 30 whose diameter is greater than that of the opening 102.

Furthermore, it is shown in Fig. 13 that the center point 105 of the opening 102 is off-center between the lateral edges 104, 106 (center line 103) of the toothed plate 90, which in turn are parallel to the ribs 80, 82 and 94, 96 and to the recesses 84, 86 and 98, 100 of the gearing of the holders 22, 24 and the toothed plate 90 respectively. The distance between ribs 80, 82 and 94, 96 respectively is greater than the offset between the center point 105 and the center line 103. The offset can be preferably $\frac{1}{4}$ to $\frac{1}{2}$ of the distance.

The distance between the ribs 80, 82 is preferably for example 3 mm, and the offset for example 0.75 mm.

The area 92 forming the gearing and surrounding the slots 40, 140 can also be a plate element which is fastened on the upper side of the bottom wall 34 of the holders 22, 24, such as welded to it.

It can furthermore be discerned from the illustration in Fig. 9 that marking ribs 110, 112 are arranged vertical to the raised portions 80, 82 and recesses 84, 86 of the area 92 and forming the gearing, in order to facilitate adjustment.

For fastening the support 10, first the sole plate 18 and then the guide plate 16 are laid onto the surface 120 of the concrete sleeper 20, an alignment with the recesses 122, 124 in the concrete sleeper 20 taking place such that the recesses 123, 125 in the sole plate 18 and correspondingly also the slots 240, 340 in the guide plate 16 are aligned with the recesses 122, 124 in the concrete sleeper 20. Then the elastic intermediate plate 14 together with the baseplate 12 is positioned on the guide plate 16 such that the projections 64, 66 on the bottom of the holders 22, 24 can positively engage in the openings 72, 74 and 68, 70 respectively of the guide plate 16. A cup spring 126, a shim 128, an insulating bush 130 and the toothed plate 90 are then pushed onto each shank 43, 143 of the bolts 42, 142 and corresponding elements onto the shank 143. The respective shanks 43, 143 then pass through the slots 40, 140 of the holders 22, 24, the slots 240, 340 of the guide plate 16 and the recesses 123, 125 provided in the sole plate 18, in order to engage in the recesses 122, 124 in the concrete sleeper 20 and, in line

with the drawing illustration according to Fig. 3, be fastened by means of a push-in connection, the intermediate plate 14 being preloaded by tightening the bolts 42, 142, to the extent that the underside 62 of the holders 22, 24 rests on the upper side of the guide plate 16.

5

The insulating bush 130 and the sole plate 18 provide electrical insulation of the support 10 with the rail 26 against the concrete sleeper 20.

10

By lifting up the holders 22, 24 and moving it relative to the gearing (area 92) extending from the holders 22, 24, the baseplate 12 with the elastic intermediate layer 14 can be moved in the longitudinal direction of the concrete sleeper 20 to permit setting of a required track gauge. By rotating the toothed plate 90 180°, it is additionally possible to achieve a fine adjustment of, for example, 1 mm - 2 mm, preferably 1.5 mm.

15

As shown in particular in Fig. 1, the sole plate 18 is split and consists in the example of the sections 17 and 19.

20

To ensure that they are properly aligned with one another, a tab-like projection 21 extends from the section 19 and engages in a geometrically matching recess 23 of the section 17. The projection 21 and the recess 23 run in the longitudinal axis direction of the sole plate 18. This design provides the possibility of using sole plates of one dimension for guide plates whose slots have different distances from one another.

25

Figs. 15 - 27 show a second embodiment of a support 200 which, corresponding to the support 10, has holders 222, 224, referred to as guide pieces, for elastically supporting a rail in a track. The main components of the support 200 too are a baseplate 212 shown as a ribbed plate and consisting of steel, from which rib-like projections 213, 215 extend along the longitudinal sides of the rail foot 211 and are used in turn used for fixing of, for example, tension clamps 228, 230 by means of which the rail is fixed. Other fastening means and methods are also possible.

30

In the example, the rail is fixed using the tension clamps 228, 230 which are clamped by means of clip bolts 217, 219 extending from the ribs 213, 215. Other fastening options are also possible.

- 5 Regardless of this, the baseplate referred to in the following as ribbed plate 212 and an elastic intermediate plate 214, which can consist of for example polyether urethane, in particular of closed-cell polyether urethane, are positively received at their end regions by the holders 222, 224 and preloaded, in accordance with the example of Figs. 1 to 14.
- 10 An intermediate layer 232 of, for example, ethylene vinyl acetate (EVA) can be arranged between the ribbed plate 212 and the rail foot 211.

There is also the possibility that a sole plate 218 likewise made of, for example, ethylene vinyl acetate passes between the intermediate plate 214 and a support, such as
15 a concrete sleeper 220.

Corresponding to the support 10, the support 200 is fastened using the holders 222, 224 by means of bolts, one of which has the reference number 225, which do not pass through the ribbed plate 212, but the bottom walls 234, 235 of the holders 222, 224 at a
20 distance from the rail. In this respect, reference is made to the explanations relating to the support 10.

Unlike the holders 22, 24, the holders 222, 224 have, in their areas receiving the end regions 252, 254, 256, 258 of the ribbed plate 212 and of the intermediate plate 214, in
25 the longitudinal direction of the rail and hence parallel to the rear walls 249, 251, one or more recesses 274, 276 on the inside in their top walls 250, 251, into which recesses sections of an elastic element 258, 260 are inserted for positive fixing of the latter. The elastic element 258, 260 is here fastened in particular by a positive connection. Other fastening options such as vulcanizing are also possible.

30

Figs. 25 to 28 show details of the elastic elements 258, 260, which in cross-section and in longitudinal section each have a rectangular geometry and from whose upper sides

280 cylindrical projections 282, 284 protrude which positively engage in recesses 274, 276, 278 formed in the top walls 250, 252 of the holders 222, 224.

5 As can be discerned in particular from Fig. 28, the longitudinal direction of the elastomer springs 258, 260 extends parallel to the rear walls 249, 251 and hence in the longitudinal direction of the rail to be fixed.

10 The respective longitudinal extent of the elastomer springs 258, 260 is in the example less than the clear distance between the side walls 290, 292 of the holders 222, 224.

To achieve the required preload, the height of the intermediate plate 214, of the ribbed plate 212 and of the elastomer springs 258, 260 outside their projections 282, 284 is, in the unloaded state of the elastic intermediate plate and of the elastomer spring 258, 260, greater than the distance between the underside of the top walls 250, 252 and the support surface of the holders 222, 224, i.e. in the example of the upper side of the sole plate 218.

20 The elastic element 258, 260 acts as an elastomer spring for preloading the unit of ribbed plate 212 and intermediate plate 214, as soon as the holders 222, 224 are fixed on the concrete sleeper 220 or another base using the bolts 242. In other respects, the design of the holders 222, 224 corresponds to that of the holders 22, 24, so that reference is made to the statements relating to the latter.

25 The elastic elements 254, 256 acting as elastomer springs consist in particular of rubber, such as chloroprene rubber.

Essential features and properties of the second embodiment are once again summarized in the following:

30 The support or the rail fastening system comprises the baseplate 212 with the elastic intermediate plate 214 as an internal and movable system and the two holders 222, 224 forming rigidly mounted end pieces, also referred to as guide pieces.

The baseplate 212 and the elastic intermediate plate 214 are positively fixed by the guide pieces 222, 224 longitudinally and laterally relative to the sleeper.

- 5 The non-positive fastening of the guide pieces 222, 224 relative to the base, such as a concrete sleeper 220, can be achieved by a spring ring clamped with a sleeper screw. A cast-in-place plug acts as anchoring for each screw axis in the concrete sleeper.

- 10 Elastomer springs 258, 260 inserted into the guide pieces 222, 224 permit correct clamping of the guide pieces to the sleeper over the entire range of intermediate plate stiffnesses.

The elastic intermediate plate 214 of foamed polyether urethane has a variable nominal static stiffness of 4 to 60 kN/mm.

15

- Above the elastic intermediate plate 214, the baseplate 212, such as a ribbed plate, is placed as a kind of load-absorbing and distributing plate. Fastening of the rail is achieved using the baseplate 212 optionally with a bolted clamping element, such as tension clamp, clip bolt, nut and washer, or by means of an inserted clamping element, such as an e-Clip or Fast-Clip.
- 20

The vertical movement of 1 to 4 mm of the baseplate 212 relative to the guide pieces 222, 224 or to the sleeper 220 is predetermined depending on the spring stiffness of the elastic intermediate plate 214.

25

A thin sole plate 218 made of EVA acts as the equalizing level for irregularities on the sleeper upper side and also as an electrical insulator between the electrically conducting components and the concrete sleeper.

The two guide pieces 222, 224 fix the movements of the primary elements of the elastic mounting, such as a ribbed plate mounting, consisting of baseplate 212 and elastic intermediate plate 214, positively in the longitudinal and lateral directions. At the same time, vertical movement of the baseplate 212 is enabled, due to sinkage of the elastic intermediate plate 214 resulting from wheel load. Compared with the previous elastic ribbed plate mounting, the baseplate 212 and the elastic intermediate plate 214 have no through-holes for fixing and clamping relative to the concrete sleeper 220.

By contrast, the guide pieces 222, 224 have pockets (receptacles) provided for positive connection of the baseplate 212 and of the elastic intermediate plate 214. Inside these pockets, movements of the baseplate 212 in the horizontal plane are blocked.

Raised portions inside the pocket, each for example 1 mm high, on the rear wall and on the sides are intended to reduce the contact friction of the baseplate with the guide piece during vertical sinkage.

Furthermore, the guide piece 222, 224 has on its sides reinforced ribs, so that it can absorb without being overstressed the wheel guidance forces transmitted by the baseplate 212 and also the forces and torques arising from the clamping of the elastic intermediate plate 214.

A further feature of the system is the use of an elastomer spring 258, 260 as the upper spring. The cuboid elastomer spring of vulcanized chloroprene rubber has on its upper side two small journals 282, 284 of circular section. Equivalent blind holes 274, 276 in the guide pieces 222, 224 are used for positively receiving the elastomer springs 258, 260.

The elastomer springs 258, 260 arranged in a row to the elastic intermediate plate 214 are intended to reduce the total spring rate resulting from clamping of the guide pieces 222, 224 and to ensure continuous states in the elastic intermediate plates 214 across all stiffnesses.

The elastomer springs 258, 260 have a spring rate of approx. 450 kN/mm. Ideally, the elastomer springs 258, 260 are compressed by 3 mm during clamping of the guide pieces 222, 224. The baseplate 212 is thus preloaded with approx. 1.3 kN per side.

- 5 The unloaded elastomer springs 258, 260 are dimensioned so large that in the loaded state, contact to the baseplate 212 is achieved across all component tolerances of guide pieces 222, 224, baseplate 212 and elastic intermediate plate 214.

The baseplate 212 has the function of absorbing wheel loads acting vertically and
 10 horizontally via the rail and then distributing them over a wide area to the support point elements underneath. The baseplate 212 also serves to anchor rail fastening elements that are optionally bolted or inserted. For that purpose, the baseplate 212 can have, on both sides of the rail, either pairs of ribbed projections for fastening to KS-type rail fastening structure, or shoulders matching the respective type for fastening with inserted
 15 clamping elements.

The elastic intermediate plate 214 consists of only one spring element in full-surface contact. The differing stiffnesses are achieved by different formulas for the closed-cell polyether urethane. The defined plate thickness can be for example 12.5 mm.

20

The guide pieces 222, 224 are fixed to the sleeper 220 with four sleeper screw axes each. The sleeper screws can have a trapezoidal thread. A polymer plug with steel shell is placed in the sleeper 220 as the mating part. In each axis, an inserted spring ring above the guide pieces 222, 224 can generate a preload force of approx. 30 kN. The
 25 resultant non-positive connection between the guide pieces 222, 224 and the cast-in-place plug in the concrete sleeper 220 has the effect that the positively connected baseplate 212 is held in position in the horizontal plane. At the same time, shear stress on the bolts is prevented. This means that the wheel guidance force is dissipated by the bolt preload force and by the frictional force between the loaded plates due to the
 30 proportion of the vertical wheel load.

Claims

5 Support for a rail

1. Support (10, 200) for a rail, comprising at least one baseplate (12, 212) receiving the rail, an elastic intermediate plate (14, 214) underneath the baseplate, and
10 receptacles (44) of holders (22, 24, 222, 224) receiving the baseplate and the intermediate plate at their end regions (52, 56) and which can be passed through by fastening means (42, 142, 225) outside the baseplate (12) to fasten the support.

2. Support according to claim 1,
15 w h e r e i n
a guide plate (16) passes underneath the baseplate (12) and supports it, and the holders (22, 24) receiving the baseplate at its end regions (52, 56) positively engage in the guide plate.

- 20 3. Support (10) according to claim 1,
w h e r e i n
an elastic element (258, 260) resting on the surface of the baseplate (21) extends from each holder (222, 224).

- 25 4. Support according to at least claim 2,
w h e r e i n
a sole plate (18), preferably consisting of or containing polyamide, extends between the guide plate (16) and a base (20), such as a sleeper, supporting the support (10).

- 30 5. Support according to at least claim 1,
w h e r e i n

each holder (22, 24) has a receptacle (44) for one of the end regions (52, 56; 54, 58) of the baseplate (12) and of the intermediate plate (14), either the clear inner height of the receptacle being less than the sum of the thicknesses of the baseplate and of the intermediate plate at their respective end regions and in the unloaded state, or less than the sum of the thicknesses of the baseplate and of the intermediate plate and of the region of the elastic element extending between the baseplate and the underside of the receptacle, in each case considered in the unloaded state.

6. Support according to at least claim 1 and/or 2,
w h e r e i n
the receptacle (44) is limited by side walls (46, 48, 290, 292), a rear wall (49, 249, 251) and a top wall (50, 250, 252) and left open at the bottom.

7. Support according to at least claim 1 and/or 2,
w h e r e i n
the side walls (36, 38) are sections of side members of the holders (22, 24) which extend at least in some areas along a bottom wall (34) of the holder facing away from the receptacle, which bottom wall can be passed through by the fastening means (42, 142) having a shank (43, 143) with a head (45, 145).

8. Support according to at least one of the preceding claims,
w h e r e i n
at least one projection (64, 66) extends from the holders (22, 24) or their bottom wall (34) on the underside and positively engages in the guide plate (16).

9. Support according to at least one of the preceding claims,
w h e r e i n
two projections (64, 66) extend from the bottom wall (34) on the underside and positively engage in the guide plate (16), the projections extending on opposite sides of an opening (40), such as a slot, that can be passed through by the fastening means (42, 142).

10. Support according to at least one of the preceding claims,

w h e r e i n

the side walls (46, 48) limiting the receptacle (44) are designed with thicker material on the inside, for example by ribs.

11. Support according to at least one of the preceding claims,

w h e r e i n

the opening (40) that can be passed through by the fastening means (42, 142) in the bottom wall (34) of the holders (22, 24) is surrounded by an area (92) forming a gearing of raised portions (80, 82) and recesses (84, 86) preferably parallel to the rear wall (49), and a plate-like or disk-like element (90) with raised portions (94, 96) and recesses (98, 100) of matching structure extending on the area side is arrangeable between the head (45, 145) of the fastening means (42, 142) and the area (92) forming the gearing.

12. Support according to at least claim 11,

w h e r e i n

the element (90) has at least two edges (104, 106) parallel to one another, between which is an off-center circular passage opening (102) passed through by the shank (43, 143) of the fastening element (42, 142).

13. Support according to at least claim 12,

w h e r e i n

the center point (105) of the passage opening (102) is offset at a distance from the center line (103) between the edges (104, 106) which is smaller than the distance between two recesses (84, 86) or raised portions (80, 82) of the area (92) of the holders (22, 24) forming the gearing, the distance between the center point (105) and the center line (103) preferably being smaller than the distance between the recesses (84, 86) or raised portions (80, 82), and preferably approximately $\frac{1}{4}$ to $\frac{1}{2}$ of said distance.

14. Support according to at least one of the preceding claims,
w h e r e i n
the sole plate (18) consists of two sections (17, 19) that can be kept at a distance
to one another in the longitudinal axis direction.

5

15. Support according to at least claim 14,
w h e r e i n
the sections (17, 19) positively interlock by at least one projection (21) in the
longitudinal direction of the sole plate (18) extending from one of the sections and
engaging in a recess (23) provided in the other section, for exclusively axial
distance alteration of these sections.

10

16. Support according to at least claim 3,
w h e r e i n
the elastic element (258, 260) consists of elastomer, preferably a strip-like or
block-like element extending in the longitudinal direction of the rail and
consisting in particular of rubber, such as chloroprene rubber.

15

17. Support according to at least claim 16,
w h e r e i n
the elastic element (258, 260) is positively connected to the holders (222, 224), in
particular by at least one preferably cylindrical projection with which a recess
(274, 276) on the inside (293) of the top wall (250, 252) of the holder is
associated.

20