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DESCRIPTION

The invention relates to a set of points, having a slide chair, a fixed rail, a point blade lying inward of the fixed rail, and, underneath, a sleeper or ballastless track, wherein the slide chair has a baseplate that lies on the sleeper or ballastless track and extends under the fixed rail from outward of the fixed rail to inward of the point blade, the fixed rail is held on the outside by a guide fin that projects from the baseplate, and inward of the fixed rail the slide chair has a slide plate on which the point blade lies such that it can be displaced.

Points are an essential constituent of railway infrastructure, by means of which it is possible for rail vehicles to transfer from one track to another without an interruption in travel. Apart from the frog, at which the two inside rails cross, essential constituents of a set of points are the outside fixed rails and point blades, which lie inward of the two outside fixed rails and can be displaced when the set of points is positioned horizontally, in the direction transverse to the track position, from a moved-away position to a position abutting against the fixed rail. The rail construction of the set of points is conventionally likewise on sleepers (or a corresponding ballastless track, which in the present document should be regarded as having the same significance as the term “sleeper”).

In order to enable the point blades to be moved transversely when the set of points is positioned, a plurality of slide chairs are arranged along the movable point blade on the sleepers or the ballastless track, below the fixed rail and the blade to be moved.

In order to transmit the transverse forces, caused by trains, in sets of points from the rail, through the slide chair and into the sleeper and from there into the superstructure, devices are provided on the slide chair on the outward side of the so-called fixed rail, for the specific purpose of absorbing these forces, and these cause the forces to be transmitted to the slide chair and from there through securing screws to the superstructure. Since the superstructure usually comprises sleepers in the

ballast bed and only rarely ballastless tracks, the forces are first transmitted from the slide chair through screws and into the sleeper and from there into the ballast bed. When steel sleepers are used, slide chairs are also welded to the sleepers.

In the prior art, slide chairs are cast in one piece or welded together from a plurality of parts. Riveted slide chairs are hardly ever used in new installations now, and in many railways are not even permitted any more. Assembling and disassembling slide chairs for sets of points having a high point blade is relatively simple, in that once the sleeper screws have been undone the slide chair can be withdrawn to the outer side of the rail, wherein the fixed rail and the point blade only have to be raised by a very small amount in order to prevent unnecessary friction. By contrast, assembling and disassembling slide chairs with a low point blade is substantially more onerous. The sleeper screws have to be undone, the fixed rail and the point blade have to be raised, and the slide chair is displaced laterally – that is to say in the longitudinal direction of the track – into the sleeper bay, tilted and finally withdrawn. This procedure is necessary because the fixed rail is permanently secured to the track outside by integral, non-removable fins, and on the track inside is covered by the slide plate, which projects over the rail foot. Here, it should be noted that the width of the slide chairs is limited by the fact that the sleeper bays are approximately 600 mm wide, so slide chairs wider than 300 mm collide with the adjacent slide chair when they are displaced laterally. In the case of conventional slide chairs, a greater width is not necessary since they only serve to carry the point blade or the fixed rail on the sleeper. Usually, the width is approximately 160 mm.

These conventional slide chairs for low point blades can, admittedly, be displaced in the direction of the track longitudinal axis, into the sleeper bay – that is to say the free space between two mutually adjacent sleepers – tilted in the track longitudinal axis about an axis and finally withdrawn inward and upward. However, this very onerous procedure not only needs the fixed rail and the point blade to be raised but also requires sufficient free space in the sleeper bay. If necessary, some of the ballast in the sleeper bay has to be removed. In the case of a ballastless track, frequently not enough working space is provided below the fixed rail. It is

correspondingly laborious or even impossible to replace, for example, a damaged slide chair in the case of the known configurations.

DE 101 16 041 B4 discloses a conventional slide chair plate, which corresponds exactly to the precharacterising clause of Claim 1. Fixedly and integrally formed on this slide chair plate is a guide fin that projects from the baseplate, for the purpose of laterally holding the fixed rail. In addition, it has a roller arrangement that is secured, separately from the slide chair plate, to a separate baseplate that is held on the fixed rail and is dimensioned such that it takes up substantially only the space that is available above the sleeper and next to the slide chair plate.

When sets of points are heated at low temperature – to approximately 12°C or such that no radiant heat is used to melt snow or ice – the slide chair has to be heated directly, as described in EP 1 529 880 B1, belonging to the Applicant. That document discusses providing the greatest possible width, in order to heat the entire surface under the region over which the point blade travels, and in which snow and ice could hamper the positioning procedure.

Accordingly, in DE 10 2012 108 586 B3 a heat exchanger is provided as a separate constituent part in the sleeper bay, for the purpose of heating the fixed rail and the point blade between two slide chairs. It is disadvantageous that this separate constituent part requires a separate energy supply for the purpose of heating, so it is onerous to assemble and high-maintenance.

DE 10 2012 108 585 A1 describes a slide chair for a set of points, which is in one piece, equipped with the main component of a heat exchanger having a condensation chamber for geothermal heating. The disadvantage of this device is that a fixedly arranged guide fin is still provided on the slide chair outward of the fixed rail, so the slide chair can only be disassembled by lateral displacement in the direction of the track longitudinal direction into the adjacent sleeper bay, tilting the slide chair and then withdrawing it as it points obliquely inward and upward. In order to ensure this functionality, the slide chair can only have approximately the width of a

sleeper in order to allow it to be moved out freely in the sleeper bay. Accordingly, when only this slide chair heating is used for a set of points, the fixed rail and the point blade and in particular the intermediate space between them in the region of the sleeper bays are not heated. For this reason, it is necessary to provide separate heat exchangers for the sleeper bay according to DE 10 2012 108 586 B3.

The same applies to a heat exchanger according to DE 10 2012 100 545 B4, whereof the heating effect is likewise limited to the width of the sleeper – that is to say the contact region between the slide chair and the fixed rail and the movable point blade.

WO 2014/032867 A2 describes a heat exchanger arrangement for heating a slide chair of a set of points, in which there is provided underneath a slide chair plate a receiving space for the heat exchanger, which is thermally insulated from the sleeper underneath. Here too, the sleeper bay and in particular the fixed rail are not heated sufficiently between the sleepers.

DE 10 2013 016 232 A1 describes a temperature control unit for sets of points, which provides separate heat exchangers that may be clamped on the inside to the point blade and on the outside to the fixed rail. Although, with this construction, both the fixed rail and the point blade are heated over their longitudinal extent, the intermediate space between the fixed rail and the point blade is not heated by these heat exchangers, with the result that once again separate heating elements have to be provided for this purpose. DE 10 2010 029 854 A1 discloses a similar arrangement.

It is thus an object of the invention to construct a set of points, in particular having a low point blade, such that it is possible to replace the slide chair with little effort. It is furthermore an object to specify a set of points that is provided with a slide chair that is in particular prepared for low-temperature heating and makes it possible to distribute heat as widely as possible in the region of the movable point blade.

This object is achieved by a set of points according to Claim 1.

Because a fin part is provided with the guide fin and detachably secured to the baseplate, wherein the guide fin is provided on the separate fin part, once the fin part has been detached and removed and the sleeper screws or the securing have been undone, the slide chair can be displaced inwards towards the track centre on the ballastless track and removed relatively easily. It is thus no longer necessary to carry out displacement in the direction of the track or to tilt the slide chair in the sleeper bay, as a result of which it becomes at all possible to make the slide chair as wide as possible. It is then correspondingly possible to install a new or refurbished slide chair again from the inside – that is to say from the track centre. After it has been slid in below the slightly raised point blade and the fixed rail, which lies parallel thereto, the newly installed slide chair is then secured to the sleeper (or the ballastless track) using the corresponding securing arrangements, and the fin part is secured to the guide fin for the purpose of fixing the outside of the fixed rail to the baseplate of the slide chair.

If the fin part has a support plate that can be inserted into a recess, adapted to the shape of the support plate, in the baseplate, then the transverse forces (toward the outside of the track) caused by trains travelling over the track and acting on the fixed rail are diverted by the guide fin, which abuts on the outside against the rail foot of the fixed rail, to the fin part and from the fin part, with its support plate, as a result of engaging positively in the recess adapted to the support plate, to the baseplate of the slide chair, and through the securing arrangements thereof to the superstructure – that is to say to the sleeper or the ballastless track.

Because there are provided on the fin part and in the baseplate associated securing bores through which securing screws may be screwed for the purpose of connecting the fin part and the baseplate to the sleeper or ballastless track, there is provided a type of securing that at any time allows the fin part to be detached as required for the purpose of replacing the slide chair without much work, and on the other hand enables a high and also dynamic load caused by train traffic without the securing

working loose. As a result of securing the baseplate to the superstructure underneath – that is to say the sleeper or the ballastless track – the loads, and in particular transverse forces, are transferred to the sleeper or ballastless track over a large surface area and over a broad base, with the result that tilting forces can also be absorbed well.

In order to be sure that, in particular with wooden sleepers, these transverse forces are distributed evenly over all the sleeper screws and overloading of individual screws is avoided, the separate fin part is secured to the baseplate by separate screws.

If the slide chair has heating arrangements, it is possible to heat the set of points such that heat is fed in close to the movable parts of the set of points, and moreover heat is fed in over the entire width, preferably from one sleeper bay centre to the next. If heat is fed in to the slide chair directly, it is ensured that even low-temperature heating (in particular with heating temperatures from 6°C to 20°C, particularly preferably from 8°C to 12°C) acting only by the conduction of heat and not at all or hardly at all through heat radiation gives sufficient protection from wintry conditions to the set of points. Damage to the slide chair equipped with the heating arrangement may be repaired simply by replacing the slide chair, it being possible to repair the defective heating arrangement in the removed slide chair later, in the workshop.

As already described in the introduction in relation to the prior art, it is however advantageous with heating of the set of points at low temperature (at up to 20°C, in particular up to 12°C) to heat the entire surface below the region between the point blade and the fixed rail. Only in this way is it possible to ensure that the point blade always remains freely movable.

Because a widened portion is integrally formed on the slide plate, below the adjustment region between the fixed rail and the point blade, and extends by a quarter to a half into the region between two mutually adjacent sleepers, the sleeper

bay heating that, in the prior art, is otherwise formed separately is also integrated into heating of the slide chair, with the result that the separate constituent part and the separate energy supply can be dispensed with. The overall width of the widened portion here preferably extends almost as far as the sleeper bay centre spacing – that is to say up to half-way into the region between two adjacent sleepers, or half-way into the sleeper bay. It is imperative that it extends slightly less than this distance, since packing ballast under the set of points can displace the sleepers by up to 2-3 cm, and so the possibility that the widened portions of two adjacent slide chairs can collide has to be avoided. Slide chairs equipped with widened portions in this way may be displaced inward on the sleeper, toward the track centre, for the purpose of replacement according to the invention thanks to the removable fin part, and may thus be replaced as a one-piece complete constituent part, since the widened portion of the adjacent slide chair would not permit displacement of the slide chair in the track direction in the conventional manner of replacement. In this case, the slide chairs widened in this way could only be replaced in their entirety on one set of points, or replaced when the set of points is disassembled, which would make repair or retrofitting significantly more difficult and expensive.

If the widened portion has an upper side that falls at an angle of inclination of from 2° to 60°, preferably from 5° to 45°, to the horizontal from the sliding face of the slide plate in the direction of the longitudinal axis of the track, then in one embodiment of the invention the widened portion no longer serves as a direct bearing face for the point blade, with the result that, when a wheel runs over the point blade and so it is subject to corresponding load, it can yield by a small amount, as occurs in particular with low point blades. Otherwise there would be a risk that the edges of the sliding face could buckle when the point blade is subject to load. For this reason, a broader contact surface for the point blade on the slide plate is to be avoided, and the widened portion is to be provided with a slight slope or rounding following yielding of the blade. Further, it is advantageous if the widened portion, which leads to the sleeper bay between two adjacent sleepers, reaches as far down as possible, so that any falling chunks of ice or other small objects can slide down into this cavity and thus

cannot block the intermediate space between the fixed rail and the point blade. Here, chunks of ice are melted when they come into contact with the heated widened portion, and thus easily slide down the inclination on a film of water, to the lowest point. This lowest point should be approximately 8 cm below the lower edge of the sleeper, so that corresponding small parts do not block the set of points, or chunks of ice of relatively large size block the set of points only briefly, until the chunk of ice melts, until it no longer stretches across the intermediate space between the fixed rail and the point blade. Preferably, the inclination of the upper side increases from the sliding face of the slide plate toward the free end of the widened portion, in particular with the upper side being convexly curved.

In an alternative embodiment, when the point blade is in the position abutting against the fixed rail, the attached element additionally abuts against the point blade in thermally conductive manner. In this way, when the slide chair is heated at low temperature, for example using a system heated geothermally by a heat pipe, the point blade is also heated substantially over its entire length. This reduces the risk that parts of the point blade cool too much and snow or ice could settle thereon. In this case, the widened portion then additionally serves, with the attached element below the abutting point blade, as a bearing element for the point blade that is under the load of the weight of the train. Accordingly, a significantly smaller – albeit not entire negligible – yielding of the point blade could result from the axle load of a railway vehicle passing over it.

Further, it is preferable for the point blade to lie on the slide chair in thermally conductive manner even when it is in the moved-away position, as is likewise the case with usual slide chairs. If a roller device is provided, then once the moved-away position has been reached the point blade should lie on the sliding face of the slide chair again, such that in this position too the point blade is heated in thermally conductive manner by the low-temperature heating.

Because there is integrally formed on the widened portion an attached element that spans the space between the inclined widened portion and the fixed rail and abuts

against the fixed rail in thermally conductive manner, the fixed rail is likewise also heated in the region of the sleeper bay. Heating of the slide chairs takes a form such that a heating chamber is connected in thermally conductive manner to an attached element that surrounds the rail foot of the fixed rail from the inside of the track as far as the rail web. This element is a constituent part of the slide chair. Here, it should be noted that the assemblies of the tamping machines – e.g. hooks or rollers for raising the track section – cannot collide with parts of the slide chair. The hooks grip from the rail outside to half-way under the rail foot of the fixed rail, or rollers grip under the rail head from the outside.

Because a heating chamber of the heating arrangement is formed such that it has an access opening in the widened portion, or in the widened portion and the attached element, the heat is introduced directly into the constituent parts concerned, close to the region of the set of points that is to be kept ice-free, wherein the access opening enables maintenance or replacement of the constituent parts contained therein.

This slide chair that undergoes low-temperature heating is either welded from weldable steel or cast steel, or is cast from spheroidal graphite iron that is approved by the respective railway company. The heating is in heating chambers, predominantly arranged next to the load-bearing regions. Preferably, in the installed position of the widened portion, the heating chamber has the access opening in its underside, and the access opening is provided with a removable cover.

An electrical heating element may be used for each heating chamber, or it is utilised as a heat-transferring cavity with an inlet and outlet for a medium with sensible heat, or it takes the form of a condensation chamber for a gas using geothermal heating with direct evaporation. When a working medium having a working pressure of up to 10 bar is used, the condensation chamber should take the form of a flat, open cavity without reinforcing webs. A structured surface – for example with fins shaped in it for the purpose of increasing the heat transfer surface area – is advantageous, however.

If an electrical heating element is used, it is recommended to close the lower side of the heating chamber with a cover made of thermally insulating material, in order to prevent unnecessary losses. If the heating chamber is utilised as a condensation chamber, it should be closed such that it is gas-tight and pressure-tight. In the case of weldable material, this may be done by welding, and in the case of spheroidal graphite iron by a cover having a gas-resistant and pressure-resistant seal that is advantageously cured onto the metal for the purpose of sealing.

Because the heating chamber takes a form having an electrical heating element, or takes the form of a heat-transferring cavity for a heat-circulating heat transfer medium, or takes the form of a condensation chamber for a fluid for the purpose of geothermal heating by direct evaporation, wherein the supply lines required for this purpose are connected up in the cover, it is readily possible to change over from an electrical heating element to another heating by replacing the cover and supplementing inflow and outflow of the working medium.

Modern points are equipped to reduce the friction between the point blade and the sliding face, and to reduce the wear, in some cases using roller systems. Accordingly, there is provided on the slide chair a roller device having at least one freely rotatable roller, wherein the roller projects slightly over the sliding face of the slide plate such that during the movement procedure the point blade is raised slightly by the roller in a manner reducing friction, but in the position abutting against the fixed rail and in the position moved away from the fixed rail it lies entirely on the sliding face of the slide plate. As a result of the fact that the fixed rail lies on the sliding face of the slide plate in both the abutting and the moved-away positions, it is ensured in all positions of the set of points that thermal contact from the slide chair to the point blade is guaranteed. Only during the movement procedure is the point blade raised slightly during movement by the roller, with the result that the movement procedure is performed with significantly reduced friction.

Particularly preferably, the roller is arranged on a cranked axle, between two slide chairs arranged next to one another at the spacing of the sleepers, supported against the slide plates thereof. In this case, the cranked axle may be inserted into recesses provided therefor in the region of the slide plate.

The invention will be described in detail below by way of some exemplary embodiments, with reference to the attached drawings.

In the drawings:

Fig. 1 shows a partially sectional view of a slide chair with constituent parts of the set of points, in a first embodiment,

Fig. 2 shows a plan view of a slide chair with parts of the set of points, in a second embodiment,

Fig. 3 shows a section and a view of the slide chair according to Fig. 2,

Fig. 4 shows a view from below of the slide chair according to Fig. 2,

Fig. 5 shows a partially sectional view of a slide chair with constituent parts of the set of points, with the fin part taken away, in a third embodiment,

Fig. 6 shows a plan view of a slide chair, in a fourth embodiment, and

Fig. 7 shows a perspective view of the slide chair according to Fig. 6.

Fig. 1 illustrates a slide chair 1 in side view, in a first embodiment, with constituent parts of a set of points in a partially sectional illustration, in a view in the longitudinal direction of the track. The slide chair 1 is placed on a sleeper 4 of the set of points, wherein a fixed rail 2 and an associated point blade 3 are mounted on the slide chair 1.

The slide chair 1 comprises an elongate baseplate 10 that lies on the upper side of the sleeper 4, over a broad base along the sleeper 4. Further, a slide plate 11 is provided, on the upper side whereof, which takes the form of a sliding face 111, the point blade 3 is displaceably mounted. In Fig, 1, the point blade 3 is illustrated in the position abutting against the fixed rail 2. When the set of points is moved from this point position to the other point position, the point blade 3 is displaced on the sliding face 111 of the slide plate 11, to the left as seen in the plane of the drawing. In that case, a rail vehicle would no longer be guided onto the branched-off point blade 3 but along the fixed rail 2. The baseplate 10 and the slide plate 11 of the slide chair 1 are made in one piece, for example from spheroidal graphite iron. It goes without saying that the slide chair 1 may also be made from steel, by welding technology.

In addition to the functions of guiding and load bearing for the point blade 3, the slide chair 1 moreover keeps the fixed rail 2 anchored on the superstructure (sleeper 4 or ballastless track and ballast bed). For this purpose, a guide fin 50 is arranged outward of the fixed rail 2, on the rail foot 21 thereof. Inward of the fixed rail 2, the slide plate 11 takes a form such that it reaches over the rail foot 21 of the fixed rail 2. Within the slide plate 11, there is provided in known manner a thrust channel 19 for an anchoring spring (not illustrated), which applies a resilient elastic load to the rail foot 21 of the fixed rail 2. Outward of the fixed rail 2, conventional securing reaching over the guide fin 50 is used for securing by means of so-called track fasteners (for example rail clamp and securing screw; see Fig. 5).

According to the invention, the guide fin 50 is not an integral constituent part of the baseplate 10 or the slide chair 1, but rather the guide fin 50 is provided on a separate fin part 5. The fin part 5 may have a support plate 51 with a guide fin 50 integrally formed thereon, as illustrated in a further exemplary embodiment in Fig. 5. The fin part 5 is in this case detachably secured to the baseplate 10. In order that the transverse forces that act on the fixed rail 2 when rail vehicles travel over the set of points are reliably introduced through the baseplate 10 of the slide chair 1 and into the superstructure (sleeper 4, etc), there is made in the baseplate 10, at the position

for securing the fin part 5, a recess 16 having an abutment element 18, and the support plate 51 of the fin part 5 fits into this recess 16 with positive engagement.

Securing bores 14 are provided in the baseplate 10 close to the inward and outward ends of the baseplate 10, in order to be secured by securing screws 41 that are suitable for the underlying superstructure, for example a concrete or wooden sleeper 4. At the outward end of the baseplate 10, the securing bores 14 made there lie below the support plate 51 of the fin part 5, wherein securing bores 52 matching the securing bores 17 are provided in the support plate 51, so that when the securing screws 41 are screwed in the fin part 5 is fixed to the sleeper 4 together with the slide chair 1. In order to reliably transmit into the superstructure the considerable transverse forces that have to be absorbed from the fixed rail 2 by way of the guide fin 50 of the fin part 5, in addition to the securing at one end by means of the sleeper securing screws 41 further securing bores 52 are provided on the support plate 51, corresponding to associated threaded bores 17 on the baseplate 10. The support plate 51 and consequently the fin part 5 are thus connected to the baseplate 10 by separate screws 53. This situation is reproduced in an exploded illustration in Fig. 5.

Fig. 2 illustrates a slide chair 1 in a second embodiment, in plan view. Here, the left-hand part of Fig. 2 illustrates the set of points with the point blade 3' moved away from the fixed rail 2, and the right-hand part of Fig. 2 illustrates the situation with the point blade 3 abutting against the fixed rail 2. Only a portion of the sleeper 4 is illustrated. The track centre is located at the bottom in the plane of the drawing in Fig. 2. The fixed rail 2, which runs in the longitudinal direction X of the track, is likewise illustrated as a detail. Likewise, a portion of the point blade 3 is illustrated, as described above, on the left in the moved-away position 3' and on the right in the abutting position 3.

The slide chair 1 is on the sleeper 4, with its baseplate 10, which is in the shape of an elongate rectangle, anchored in the sleeper 4 through four securing bores 14 by securing screws 41 (not illustrated here, in Fig. 2). On the baseplate 10 and inward of the fixed rail, the slide plate 11 is illustrated projecting over the rail foot 21 of the

fixed rail. The receiving channel (thrust channel 19) for the clamping spring, which passes through from the inside to the fixed rail, is illustrated in a dashed line within the slide plate 11. The conventional form of latching for this clamping spring is illustrated at the inward end of the slide plate 11, for the sake of completeness. The fin part 5 is illustrated with its support plate 51 lying outward of the fixed rail 2, in the recess 16 in the baseplate 10. Here, the guide fin 50 of the fin part 5 abuts against the outside of the rail foot 21 of the fixed rail 2. At the outward edge, illustrated at the top in Fig. 2, of the fin part 5 there are illustrated two relatively large securing bores 52, which correspond to the securing in the baseplate 10 underneath and serve to receive the sleeper securing screws 41 (not illustrated here, however). Also illustrated are the securing lugs made in the support plate 51 of the fin part 5, with corresponding threaded bores 17 into which separate screws 53 may be screwed for a direct screw connection in the threaded bores 17 in the baseplate 10. Further, centrally in relation to the guide fin 50 there is illustrated a conventional rail securing screw with a clamping bracket, so-called track fasteners 22 for securing the rail foot 21 of the fixed rail 2.

In this illustrated embodiment, the slide plate 11 has widened portions 12 that are integrally formed on both sides in the direction X of the longitudinal axis of the track, and these may serve for example to receive heating arrangements 6 (not illustrated in more detail here). Of the heating arrangements 6, there is illustrated in each case only a supply line 65, which is preferably brought in from below to the widened portions 12. The two supply lines 65 illustrated in Fig. 2 are in this case guided below the fixed rail 2 and along the sleeper 4 to the outside. In order to avoid damage to these supply lines 65 when ballast is packed, in each case a solid protective sheet-metal piece 42 is provided on the sleeper 4, covering the supply line 65. Moreover, there is integrally formed on the widened portion 12 an attached element 13 that makes thermally conductive contact with the rail foot 21 of the fixed rail 2 on its inner side.

Fig. 3 illustrates, in the left-hand half, a cross section along the dot-and-dash line illustrated in Fig. 2, seen from the inside, and on the right-hand side a view from the outside, corresponding to the arrow marked “III” in Fig. 2.

Visible in Fig. 3 is the sleeper 4, on which the slide chair 1 is secured. The slide chair 1 has the baseplate 10 with the slide plate 11 connected thereto in one piece. The slide plate 11 has a widened portion 12, which has an upper side 121 (see for example Fig. 5) that is inclined from the horizontal sliding face 111 of the slide plate 11 toward its free end 122, at an inclination that increases to approximately 45 degrees.

Fig. 3 moreover illustrates the constituent parts of the heating arrangement 6. A heating chamber 61 takes the form of a cavity in the widened portion 12. This cavity has, on its underside, an access opening 62 that (in the exemplary embodiment illustrated here) is releasably closed, by means of cover securing screws 64, by a cover 63. Provided between the cover 63 and the access opening 62 is a seal (not illustrated in detail) such that the heating chamber 61 may be used as a gas-tight and pressure-tight condensation chamber for a geothermally evaporated fluid that is supplied by way of a corresponding supply line 65 from the geothermal bore.

Further illustrated in Fig. 3 is the attached element 13, which is integrally formed on the widened portion 12. It connects the space between the widened portion 12, which extends obliquely downward into the sleeper bay, and the rail foot 21 of the fixed rail 2, such that the fixed rail 2 can also be heated by thermal conduction in the region of the sleeper bay.

Further illustrated in Fig. 3, on the left-hand side, is a roller device 7, which has a freely rotatably mounted roller 71 that is held by a cranked axle 72. The cranked axle 72 continues in corresponding manner to the left, on the other side of the roller 71, and lies on the next slide chair, which lies on the next sleeper 4. The load created by the point blade 3 during the movement procedure is accordingly diverted on either side to a respective slide chair by the roller device 7. The roller 71 is arranged such

that it projects slightly over the sliding face 111 of the slide chair 1 and thus raises the point blade 3 by for example 0.1 mm during the movement procedure. This significantly reduces friction during the movement procedure of the set of points. Since the point blade lies with its underside flat on the sliding face 111 of the slide plate 11 in both the abutting position 3 and in the moved-away position 3', however, in the case of the heated set of points the point blade 3 is always heated by thermal conduction.

Fig. 4 illustrates, in a view from below, one half of the slide chair 1 with its baseplate 10, since it is entirely symmetrical in form. In the illustration shown in Fig. 4, the cover 63 has been removed from the widened portion 12 and the attached element 13 in order to have a clear view into the heating chamber 61. The widened portion 12, as seen from below, has a plurality of cover securing bores 123 in its outer wall. When the cover 63 (not illustrated here) is placed on, associated cover securing screws 64 are screwed into these cover securing bores 123. It goes without saying that a seal is to be provided between the cover 63 and the access opening 62 (visible here) to the heating chamber 61. This may for example be cured onto the cover 63.

Provided in the heating chamber 61 are a plurality of fins 66, in order to enlarge the heat transfer surface area. Fins 66 of this kind are likewise provided in the part of the heating chamber 61 projecting into the attached element 13. This can be seen in Fig. 4 on the right-hand part of the widened portion 12.

Fig. 5 illustrates, in a further exemplary embodiment, as described above, the removable fin part 5 in the detached condition. Further illustrated in Fig. 5 is a view of the slide plate 11 with the widened portion 12, wherein the attached element 13, which is integrally formed on the widened portion 12, is shown in a cross-sectional illustration. The attached element 13 has a part of the heating chamber 61, in the form of a cavity, in order to directly obtain a heat transfer in this component too, by condensation of the geothermally evaporated fluid. Further, in this partially sectional illustration, a beak-like rail foot receiver 131 that is shaped to surround the rail foot

21 of the fixed rail 2 is visible. The attached element 13 is accordingly connected over its longitudinal extent along the fixed rail 2, such that it is thermally conductive over a large surface, to the rail foot 21 of the fixed rail 2. Fig. 5 illustrates the point blade 3 in both the abutting position and in the moved-away position 3', in order to display the movement travel Y of the point blade 3.

In a further embodiment, Fig. 6 illustrates the left-hand half of a slide chair in plan view, similar to the situation according to Fig. 4. Constituent parts that are functionally equivalent to those in the embodiments described above are designated by the same reference numerals and in some cases are not described separately here.

In order to display the shape of the slide chair 1 and in particular that of the slide plate 11 with the widened portion 12 and the attached element 13, both the fixed rail and the point blade have been omitted from Fig. 6.

On its upper side, the slide plate 11 has a planar sliding face 111 that extends above the baseplate 10 over the movement travel Y of the point blade (not illustrated). Further, however, the sliding face 111 also extends above the attached element 13 – that is to say in the region of the widened portion 12 – but below the point blade only when it is in the position abutting against the fixed rail, as a result of which a somewhat T-shaped sliding face 111 is produced for a slide chair 1 having widened portions on both sides. In the region of the widened portion 12, the upper side 121 reaches into the space of the sleeper bay with a marked downward extent, with the result that the upper side 121 leaves a free space of several centimetres, preferably at least 8 cm, free here on the underside of the point blade. This is displayed in Fig. 6 by “contours” indicated by fine lines.

This overall situation is illustrated again in Fig. 7, in a perspective view with the fixed rail 2 and the point blade 3 both in section. In the perspective view, the three-dimensional shape adopted by the slide chair widened portion 12 with the attached element 13, and the overall T-shaped form of the sliding face 111, are visible.

Further, the rail foot receiver 131 for the rail foot 21 of the fixed rail 2, and on the track outer side the detachable fin part 5 with the guide fin 50 and the associated recess 16 in the baseplate 10 with the abutment element 18, are illustrated.

It is visible in the embodiment according to Figs. 6 and 7 that, for a slide chair that is heated at low temperature, in particular geothermally by condensation heat from a heat pipe, both the fixed rail 2 and the point blade 3 in the area of the path of movement of the set of points are in a thermally conductive connection with the slide chair, the widened portion and in particular the attached element over as great a surface area as possible. This ensures that the low-temperature heat for melting snow and ice can be supplied to a sufficient extent and thus reliable winter operation of a set of points equipped in this manner is possible.

Functioning of the slide chair will be described below with reference to the drawings.

In the embodiment of the slide chair 1 according to Fig. 1, it can be seen that by undoing the securing screws 41 and 53 on the support plate 51 of the fin part 5, this fin part 5 can be removed, with the guide fin 50, from the baseplate 10. Once the inside securing screws 41 of the slide chair 1 have been undone and the fixed rail 2 and the point blade 3 have been raised slightly, the slide chair 1 can be withdrawn inward, toward the track centre, on the sleeper 4 and thus disassembled. In its stead, a new or refurbished slide chair 1 can likewise be pushed through below the point blade 3 and the fixed rail 2 from the track centre, lying on the sleeper 4, and secured at its securing location using the screws 41 once the fin part 5 has been inserted. Then, the rail foot 21 of the fixed rail 2 is clamped in conventional manner, on the inside using a clamping spring through the thrust channel 19 in the slide plate 11, and on the outside using conventional track fasteners 22, as shown in Figs. 2 and 5.

In an embodiment of the slide chair 1 with widened portions 12 and where appropriate an attached element 13, referring to Fig. 5 it is likewise possible to replace the slide chair with little effort, since once again the detachable fin part 5 can be removed such that once the fixed rail 2 and the point blade 3 have been raised

slightly the entire slide chair can be displaced inward in the direction of the track centre – that is to say to the left in Fig. 5 – on the sleeper 4, and lifted out of the set of points. Here, the widened portions 12, which are inclined downward into the sleeper bay, are no hindrance, since they still lie above the level of the ballast. Where appropriate, a thin layer of ballast in the sleeper bay should be removed.

It can also be seen from Fig. 5 that despite the formation of the rail foot receiver 131 of the attached element 13, which surrounds the rail foot 21 of the fixed rail 2, it is possible to replace the slide chair 1 without problems.

The particular feature of the slide chair is thus the fact that it is produced as far as possible in a single piece, for example as a cast part, and in particular when it is formed with a heating arrangement has optimum thermally conductive properties as a result of being made in one piece. Only on the outer side of the slide chair, as a result of the formation of the removable fin part 5, is a separate, detachable element required so that the slide chair is replaceable. Surprisingly, it is possible to form a one-part slide chair even if the slide chair takes a very wide form, with widened portions reaching approximately almost halfway across the sleeper bay spacing, since the movement needed for replacement of the slide chair 1 is directed purely translationally in the direction of the sleeper, inward toward the track centre.

As a result of forming the one-part slide chair with heating chambers 61 in the widened portion 12 and preferably in the attached element 13, the desired heat source or heating arrangement may be inserted into this heating chamber as required. Here, the heating arrangements 6 should operate in the low-temperature range (6°C to 20°C, preferably 8°C to 12°C), in order to transfer heat to the locations to be heated, by heat conduction in targeted manner. Thermal radiation should be avoided in order to minimise energy losses. This type of heating is possible in particular using a geothermal heating through heat pipes that are installed in a bore in the earth approximately 100 metres deep, wherein the heat pipes are filled with a working medium whereof the phase transition from liquid to gas takes place at the temperature of the geothermal heat source in the bore, for example at approximately

10°C, wherein the working medium rises in gaseous form without externally driven pumps and condenses in the condensation chamber provided in the slide chair, in particular in the widened portion 12 and the attached element 13, accordingly emits heat of condensation and then drips down again through the pipe in liquid form, to be evaporated again. This type of heating a set of points is low-maintenance and reliable.

List of reference numerals

1	Slide chair
10	Baseplate
11	Slide plate
111	Sliding face
12	Widened portion
121	Upper side
122	Free end
123	Cover securing bore
13	Attached element
131	Rail foot receiver
14	Securing bore
16	Recess
17	Threaded bore
18	Abutment element
19	Thrust channel
2	Fixed rail
21	Rail foot
22	Track fasteners
3	Point blade, abutting
3’	Point blade, moved away
4	Sleeper
41	(Sleeper) securing screw
42	Protective sheet-metal piece
5	Fin part
50	Guide fin

51	Support plate
52	Securing bore
53	Separate screw
6	Heating arrangement
61	Heating chamber
62	Access opening
63	Cover
64	Cover securing screw
65	Supply line
66	Fin
7	Roller device
71	Roller
72	Cranked axle
X	Longitudinal axis of track
Y	Movement

Patentkrav

1. Sporskifte med glidestol (1), sideskinne (2), i forhold til sideskinnen (2) indvendigt liggende tunge (3) og derunder i monteret tilstand anbragt svelle (4) eller fast kørebane, hvor glidestolen (1) har en grundplade (10), som i monteret tilstand hviler på svellen (4) eller den faste kørebane og i fraliggende position strækker sig under sideskinnen (2) fra på ydersiden af sideskinnen (2) til på indersiden af tungen (3), sideskinnen (2) på ydersiden holdes af en føringsribbe (50), der rager frem på grundpladen (10), og glidestolen (1) på indersiden af sideskinnen (2) har en glideplade (11), på hvis overflade som glideflade (111) tungen (3) hviler forskydeligt, kendetegnet ved, at føringsribben er indrettet på et ribbestykke (5), der er fastgjort løsbart på grundpladen (10), således at glidestolen (1) med sin grundplade (10) med henblik på behovsmæssig udskiftning efter løsningen af ribbestykket (5) kan forskydes indadtil mod spormidten på den derunder anbragte svelle (4) eller faste kørebane og udtages.

2. Sporskifte ifølge krav 1, kendetegnet ved, at ribbestykket (5) har en støtteplade (51), der kan indføjes i en til støttepladens (51) form tilpasset udtagning (16), i grundpladen (10).

3. Sporskifte ifølge krav 1 eller 2, kendetegnet ved, at der er indrettet på ribbestykket (5) og i grundpladen (10) tilordnede fastgørelsesboringer (14, 52), gennem hvilke fastgørelsesskruer (41) kan iskrues med henblik på forbindelse af ribbestykket (5) og grundpladen (10) med svellen (4) eller den faste kørebane.

4. Sporskifte ifølge krav 1, 2 eller 3, kendetegnet ved, at ribbestykket (5) er forbundet med grundpladen (10) via separate skruer (53).

5. Sporskifte ifølge et af de foregående krav, kendetegnet ved, at glidestolen (1) har opvarmningsmidler (6).

6. Sporskifte ifølge krav 5, kendetegnet ved, at der på glidepladen (11) er tildannet en udvidelse (12), der er anbragt under omstillingsområdet mellem sideskinne (2) og tunge (3) og med en fjerdedel indtil halvdelen rækker ind i området mellem to ved siden af hinanden liggende sveller (4).

7. Sporskifte ifølge krav 6, kendetegnet ved, at udvidelsen (12) har en overside (121), der fra glidepladens (11) glideflade (111) skråner ned i retning mod sporets længdeakse (X) med en hældning på indtil 60° i forhold til den vandrette linje.

8. Sporskifte ifølge krav 7, kendetegnet ved, at oversidens (121) hældning fra glidepladens (11) glideflade (111) til den frie ende (122) af udvidelsen (12) tiltager, og oversiden (121) især er hvælvet konvekst i sporets længdeakse.

9. Sporskifte ifølge krav 7 eller 8, kendetegnet ved, at der på udvidelsen (12) er tildannet et ansatselement (13), der danner bro over rummet mellem den hældende udvidelse (12) og sideskinnen (2) og ligger termisk ledende til på sideskinnen (2).

10. Sporskifte ifølge krav 9, kendetegnet ved, at ansatselementet (13) yderligere ligger termisk ledende til på tungen (3) i dennes mod sideskinnen (2) tilliggende position.

11. Sporskifte ifølge krav 6, 7, 8, 9 eller 10, kendetegnet ved, at der i udvidelsen (12) eller i udvidelsen (12) og ansatselementet (13) er udformet et varmekammer (61) til opvarmningsmidlet (6) med adgangsåbning (62).

12. Sporskifte ifølge krav 11, kendetegnet ved, at varmekammerets (61) adgangsåbning (62) i udvidelsens (12) monterede position er indrettet i dets underside, og adgangsåbningen (62) er forsynet med et aftageligt låg (63).

13. Sporskifte ifølge krav 12, kendetegnet ved, at varmekammeret (61) er udformet med et elektrisk varmeelement eller som varmeoverførende hulrum for et cirkulerende varmebærermedium eller som kondensationskammer for en fluid med henblik på geotermisk opvarmning ved hjælp af direkte fordampning, hvor de dertil nødvendige tilledninger (65) er tilsluttet i låget (63).

14. Sporskifte ifølge krav 12 eller 13, kendetegnet ved, at der er indrettet en rulleindretning (7) med i det mindste en frit drejelig rulle (71), hvor rullen (71) rager ganske lidt ud over glidepladens (11) glideflade (111), således at tungen (3) under omstillingsprocessen friktionsreducerende er løftet lidt ved

hjælp af rullen (71), men i mod sideskinnen (2) tilliggende position og i fra sideskinnen (2) fraliggende position alligevel hviler fuldstændigt på glidepladens (11) glideflade (111).

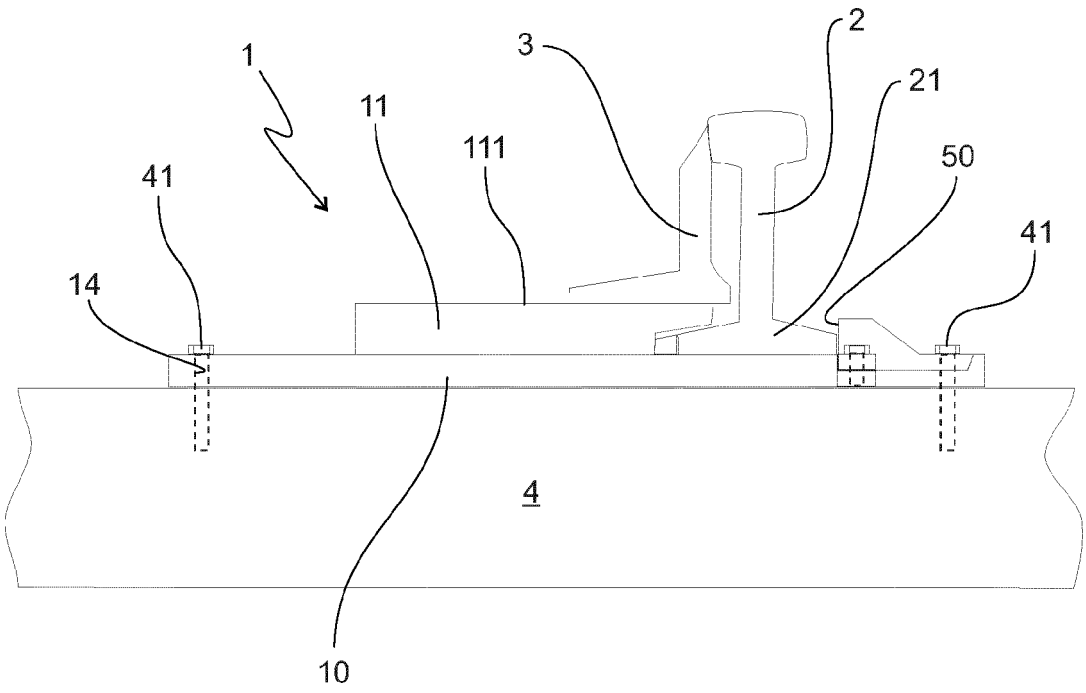

1
11
111
3
2
21
50
41
41
14
4
10

Fig. 1

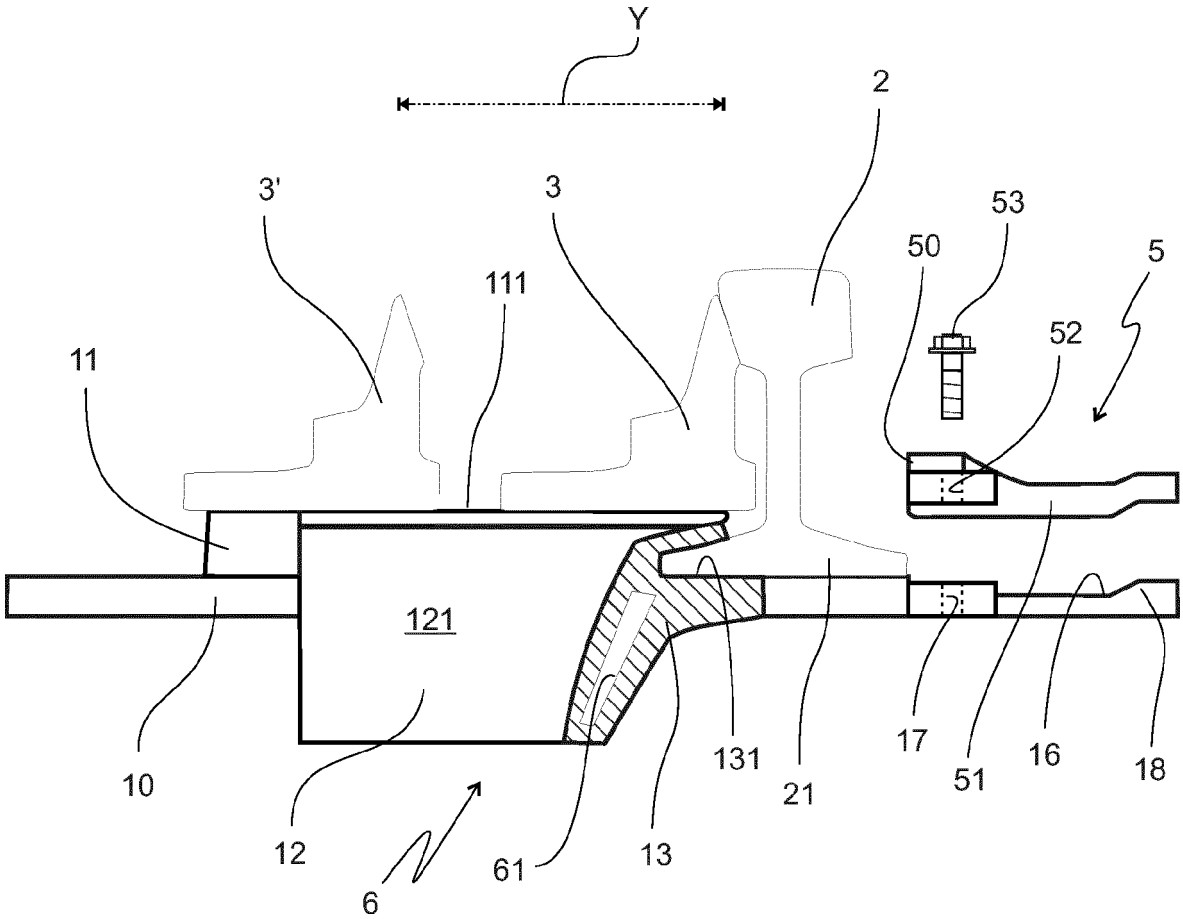

Y
2
3'
3
53
50
5
111
52
11
121
10
12
6
61
13
131
21
17
51
16
18

Fig. 5

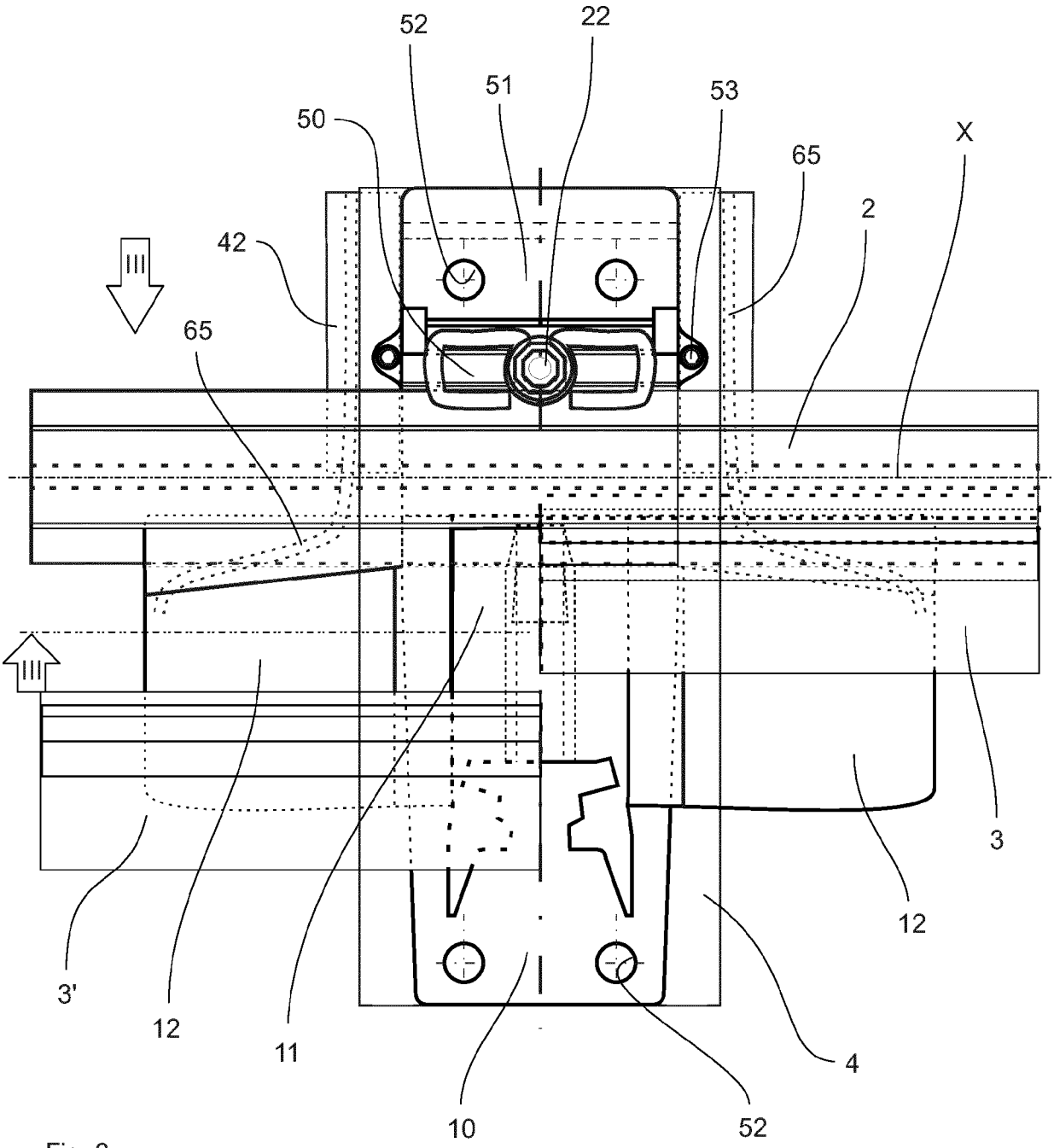


Fig. 2

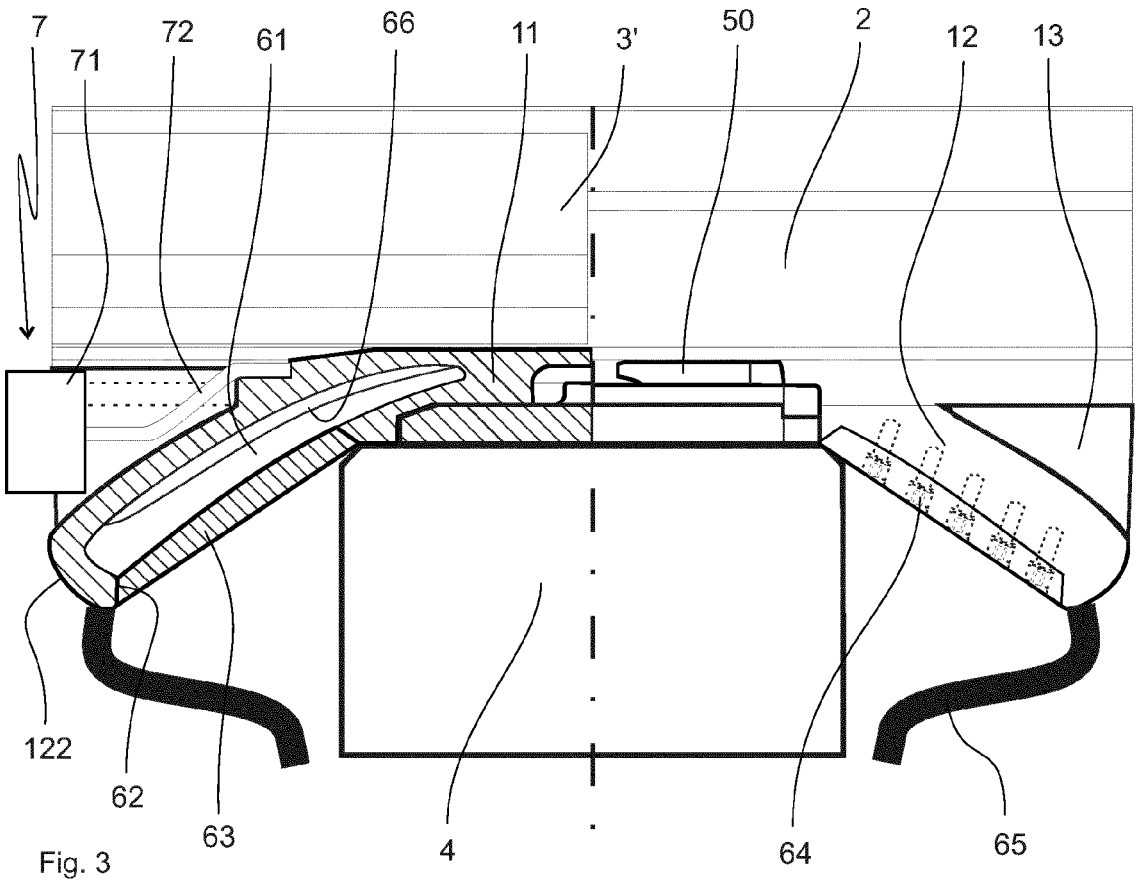

7
71
72
61
66
11
3'
50
2
12
13
122
62
63
4
64
65

Fig. 3

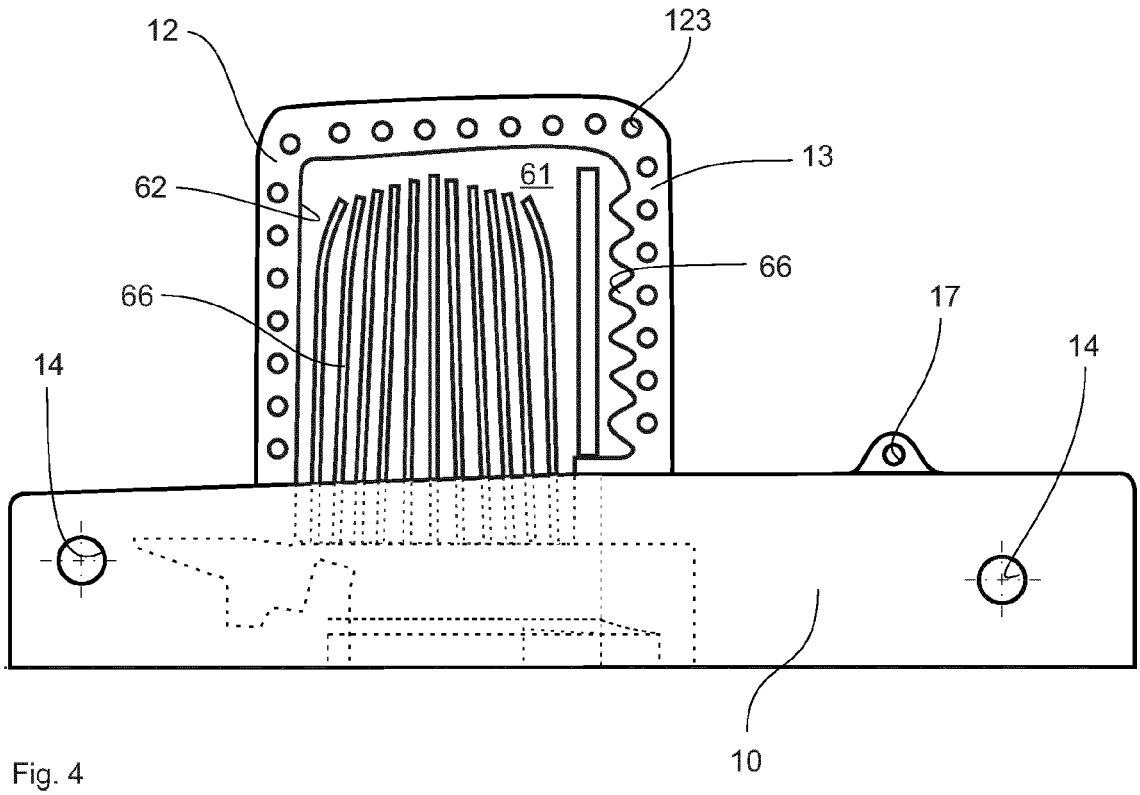
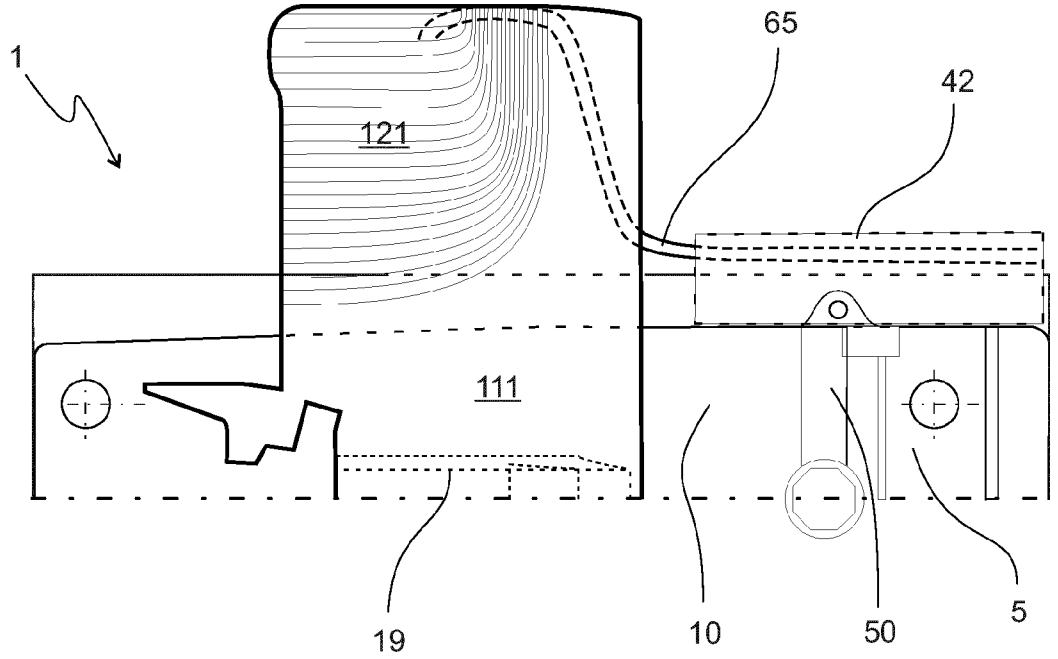

12
123
13
62
61
66
66
17
14
14
10

Fig. 4

Fig. 6


1
121
65
42
111
19
10
50
5

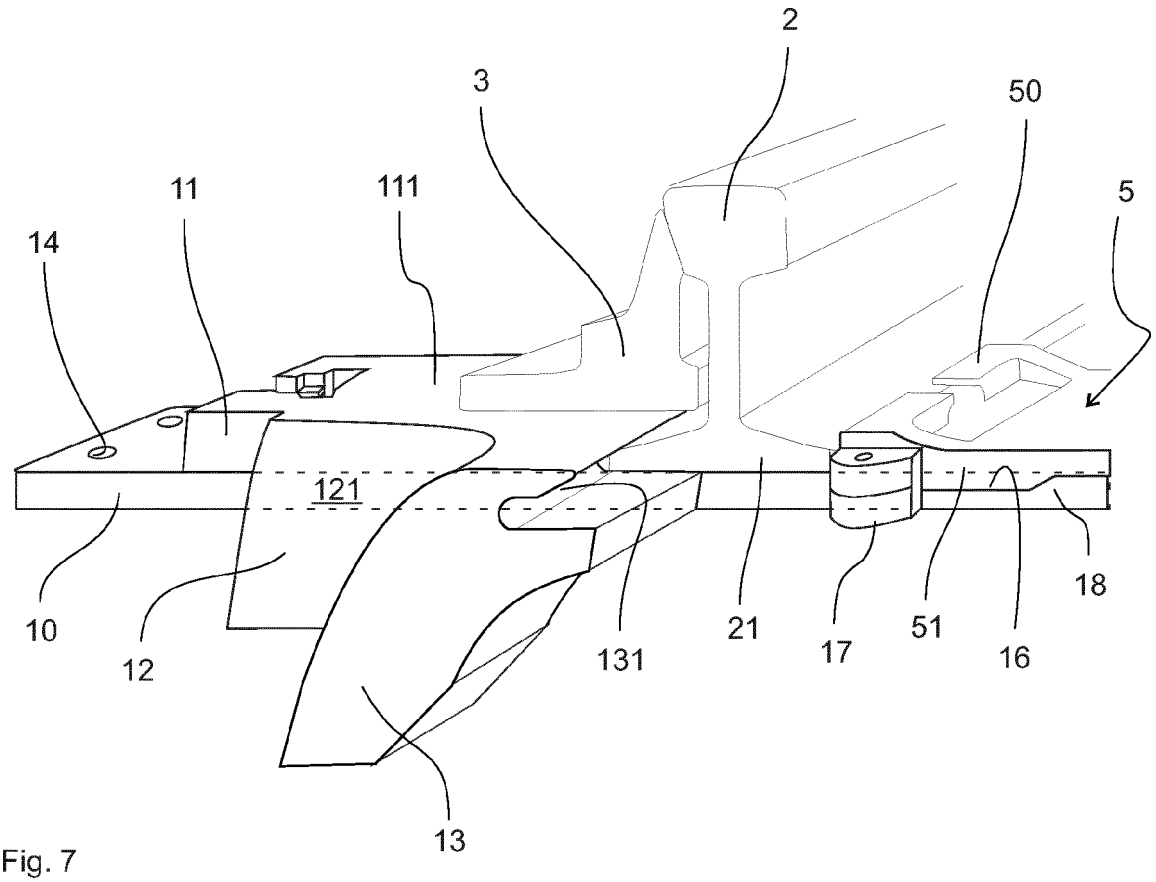

2
3
50
11
111
5
14
121
10
12
131
21
17
51
16
18
13

Fig. 7