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DESCRIPTION

RAIL TO BE MOUNTED ELASTICALLY

Field of application and prior art

The invention relates to a rail to be mounted elastically, said rail having a rail head with a running surface for vehicle wheels, a rail foot, and a rail web connecting the rail head and foot, in particular a grooved rail, which is intended to be enclosed at least on one side by an optionally multi-layered surround/base, which forms an embedment of the rail and the surface of which is in the height region of the running surface, there being a joint, which is to be filled with a joint-filling element, between the embedment and the side face of the rail head. The invention also relates to a method for the elastic laying of a rail in a track bed.

Tracks running through residential areas, such as tram tracks, have rails which are often integrated in the road body, which is also referred to below as surround. The rail running surfaces for the vehicle wheels are almost flush with the road body surface. In the region of this surface, there is a joint between the rigid road body and the rail, said joint being filled with a liquid, curable casting compound (concrete and/or asphalt) after installation of the rail and finishing of the road body. To reduce vibrations and for sound insulation both for the vehicle and for the environment, the rails are mounted elastically. In addition to thermal movements, the rail head is therefore also deflected considerably in both the vertical and the horizontal direction when the vehicle passes over it. This results in the formation of a gap in the region of the joint, since the joint material does not have good adhesion to the rail and to the road body. When the properties of the joint material are set, a decision must always be made between the curing with technical elasticity and the adhesiveness, which does not create ideal conditions for freedom from gaps.

Preparation of the joint and application of the joint material are time-consuming on the construction site and still cannot be solved ideally.

EP 2 960 370 A1 discloses a “boot” for a vignole rail in the form of a sheath which consists of plastic, has air chambers and covers the rail except for the running surfaces. An elastic insert is also laid in the sheath under the rail foot. Attachment to a road body or the like is not provided. The sheath entirely surrounding the rail is also provided for the important electrical insulation of the rail from the subsurface.

EP 2 019 168 B1 describes a similar sheath for a grooved rail. The sheath ends before the upper part of the rail head sides. The adjoining region of the sheath bearing against the lower part of the rail head of the grooved rail is connected to the rail by means of an adhesive strip. Installation in a road body and in particular design of the joint at the rail head are not discussed in the document.

WO 2004/048696 likewise discloses a full sheath for a grooved rail, which partially extends upwards on the rail head sides as far as the height of the running surface. Said document also mentions adhesion-increasing particles, which lie on the upper end of the sheath.

EP 1 206 599 B1 describes profiles to be attached laterally to a grooved rail, which extend upwards on the rail head sides as far as the vicinity of the running surface. The rail is intended to be shielded thereby from the road structure, which extends close to the rail.

DE 10 2016 114 172 A1 also discloses profiles to be applied laterally to a grooved rail, which largely leave the rail head sides exposed. An insulation layer sprayed onto the

rail extends as far as the running surface. The joint at the body is filled with a joint compound as described above.

EP 1 331 310 A2 discloses a grooved rail, during the installation of which elastic plates are initially adhesively bonded to the lower side of the rail feet. Left and right bearing parts are adhesively bonded to the rail web, an elastic layer protruding beyond the supporting parts at the top and bottom. The construction trench is then filled with concrete 11 up to the predefined height, said concrete being laterally adjacent to the elastic layers and penetrating into the part of an installation grating projecting above the side walls of the elastic layers, so that the bearing parts and thus the rail are anchored in the concrete when the concrete hardens. An asphalt layer forming the road covering is applied to this concrete layer, and a joint remains at the rail head and at the elastic insert bearing against same. This joint is then filled with a bituminous casting compound. Rails with joint-filling elements are also disclosed in EP 1 956 143 A1, EP 1 219 749 A2, WO 2018/010740 A1, FR 2911154 A and DE 10 2014 114 172 A1.

Problem and solution

It is an object of the invention to create a durable joint suitable for the elastic rail-mounting between the rail head and the adjacent surround with low laying effort at the construction site.

This object is achieved by the rail to be mounted elastically of Claim 1 and by the method for the elastic laying of a rail of Claim 11. In particular, a prefabricated joint-filling element is provided, which consists of an elastic material and is formed with an inner side facing the rail head, an outer side facing away from the rail head, an upper side and a lower side, the inner side being permanently

adhesively attached to the side face of the rail head before the rail is laid, an outer side opposite the inner side being designed to promote adhesion to the surround, and a lower side facing the rail foot being designed to inhibit adhesion.

The rail can therefore be provided with one joint-filling element on each side of the rail head beforehand, e.g. in a workshop and before being transported to the laying site, said joint-filling element being permanently attached and being prepared on the outwardly facing sides to be brought into engagement with a surround material, that is, concrete or asphalt, in an adhesion-promoting manner after the rail has been elastically fastened to the subsurface. Like on the inner side, this can take place by applying an adhesive. On the inner side there is also the advantage that the rail head sides can be prepared for particularly good adhesion by cleaning, priming or the like, in contrast to on the construction site. It is also possible to use the material of the joint-filling element itself, preferably a silane-terminated polymer, as an adhesive on the rail head side. The silane-terminated polymers have a very high elasticity and resilience but need longer to cure, because they are moisture-curing, which would be disruptive on the construction site. On the outer side of the joint-filling elements, numerous measures can be taken, where necessary supplementary to or instead of the adhesive bonding, which effect adhesion by engagement or embedding of the surround material. For securing in the vertical direction, for example, an interlocking connection between the joint-filling element and the surround, for example an undercut, can be provided.

The invention, however, provides the introduction of adhesion-promoting elements which have a nonwoven into the material of the joint-filling element. This can be, for example, a nonwoven whose fibres protrude beyond the outer side and, according to the invention, also the inner side of

the joint-filling element and is introduced during production of the joint-filling element such that it is embedded in the material of the joint-filling element and absorbs the adhesive on the inner side and/or the concrete slurry or the asphalt on the outer side, so that an interlockingly integrated connection is produced therefrom, which provides tension-resistant elements as anchoring. In the present case, adhesion-promoting means elements or arrangements which fix a positioning of adjacent elements or their surfaces relative to each other directly and/or indirectly, in particular by form fit, force fit or integral bonding.

Other anchoring measures are also practical, for example, embedding fibres or a woven fabric, for example one or more woven fabric strips, which protrude over the outer side of the joint-filling element. All this creates a connection which is both compression-resistant and tension-resistant and takes account of the fact that the rail is arranged both vertically and horizontally during use, wherein the joint-filling element is intended to absorb these movements as compression and extension without becoming loose from the rail head sides and/or the surround (concrete or asphalt) and forming gaps into which water and dirt could penetrate, which can lead to complete detachment of the joint.

To be able to absorb the lateral movements, the joint-filling element should not enter into any adhesive connection on its lower side, usually to a rail chamber-filling element or the surround or base. To this end, a separating agent can be used, either in the form of an applied or split separating agent layer or by scattering a dry sand.

According to a further, particularly advantageous feature of the invention, the joint-filling element can be provided with a preloading device, which can be triggered after the attachment of the surround and applies a compressive loading

between the surround and the rail head side. This would prevent significant tensile loads acting on the connection points of the joint-filling element during lateral movements, if the preloading is such that the compressive preloading predominates even at maximum deflection.

To this end, devices can be introduced into the joint-filling element even during the production of same, for example bending elements, which are deflected transversely to the preloading direction, that is, in the vertical direction, that is, in the extension direction between the outer side and the inner side of the joint-filling element, and assume a stretched and thus extended form preloading the joint-filling element by action on the joint-filling element, for example by an impact or pressure on the upper side thereof, in the manner of a snap element.

Also possible is a preloaded U-shaped leaf spring, which is provided in a chamber, for example in a channel of the joint-filling element, and is held in its preloaded position by a trigger, which in turn releases the sides of the leaf spring as a result of action on the upper side of the elastic joint-filling element.

Irreversibly expanding materials can also be introduced into a chamber of the joint-filling element, the expansion of which materials is triggered, for example, when heat (where appropriate microwaves) is applied, or multi-component plastics or chemicals can be used, which are introduced into a chamber separately but are brought to mix or react by action on the joint-filling element. It is also possible to introduce into such a chamber a material which increases in volume as a result of the diffusion of moisture through the joint-filling element. Different mineral and organic materials can be used for this. It is advantageous in this case that there is enough time for the full compressive

preloading to be achieved within the usual construction times of tracks.

A further practical possibility consists in creating a chamber in the joint-filling element, which chamber is subjected to a negative pressure itself or, for example, through an inlaid tube, wherein, after installation of the rail, a tiny connection to the atmosphere is sufficient to cause the tube and thus the chamber to expand and thus preload the joint-filling element.

It is also possible, after production of the joint-filling element, to place it under compressive loading between its inner and outer sides and to block said compressive loading by means of an external loading element, for example an adhesive strip, which is removed after the rail is laid. This can also be done by means of an internal loading element, for example a type of sewn seam, wherein the sewn threads can be destroyed by the action of heat. Finally, it is also possible to produce all or some of the joint-filling element from an expandable plastic which expands on absorption of water.

The invention creates a method for the elastic laying of a rail, in particular a rail according to the invention, in a track bed, said rail having a rail head with a running surface for the vehicle wheels, a rail foot, and a rail web connecting the rail head and foot, in which method, in a first step before laying, for example in a workshop or production operation, a prefabricated joint-filling element is adhesively attached permanently to the rail head sides. The rail prepared in this way is mounted elastically on a base, and a surround, that is, concrete or asphalt, is cast around the rail and in particular the joint-filling element in a tension-resistant, adhesive manner. The material of the surround can preferably enclose elements protruding beyond

the outer side of the joint-filling element and embed them adhesively in the manner of tension rods.

The invention thus creates a possibility of carrying out rail laying within a short time and with low construction site effort, wherein the rail is and remains connected to the surround, in particular a surround at substantially the same level as the rail, such as an installation in a road, in a leakproof manner and without any risk of gap formation with penetration of moisture and dirt, even when the rail moves during use. It is also ensured that the rail remains electrically insulated from the surround in this region, which is also. The rail can also be electrically insulated as disclosed in the applicant's document DE 10 2016 114 172 A1. In addition to the lateral, that is, horizontal movements of the rail during use, the vertical rail movements are also absorbed by the joint-filling element. The joint-filling element and its adhesion are also ideally suited to absorbing shear movements and shear forces elastically.

The invention therefore creates a rail and an elastic rail installation with which a prefabricated flexible joint-filling element is provided, already during preparation of the rail, to close the joint arising on both sides of the rail in a gap-free, leakproof manner. Adhesion-promoting elements and measures are provided to create a compression- and tension-resistant connection between the rail and the surround, for example of concrete or asphalt, which is attached only after the rail has been mounted.

To improve the crack-free absorption of in particular lateral movements of the rail further, a triggerable strain accumulator can be provided in the joint-filling element, said strain accumulator creating and maintaining a compressive preloading in the joint-filling element between the surround and the rail after installation of the rail.

The features above and further features can be found in the claims, the description and the drawings; the individual features can be implemented by themselves or combined into sub-combinations in an embodiment of the invention and in other fields and can form advantageous designs which fall within the scope of protection per se. The division of the application into individual sections and subheadings does not limit the general validity of the statements made thereunder. Features and designs described above as possible (can) should always be understood as preferred embodiments of the invention.

Brief description of the drawings

Exemplary embodiments of the invention are shown schematically in the drawings and are described in more detail below. In the figures:

Fig. 1	shows a cross-section through an elastically mounted grooved rail with joint-filling elements and a concrete surround,
Fig. 2 and 3	show partial cross-sections through a rail head and joint-filling elements,
Fig. 4	shows a cross-section corresponding to Figure 1 with joint-filling elements and an anchoring in an asphalt surround,
Fig. 5 and 6	show partial cross-sections corresponding to Fig. 2 and 3 with different joint-filling elements,
Fig. 7 to 16	show enlarged sectional drawings of joint-filling elements arranged on one side of a rail head, with different embodiments of triggerable preloading devices in each case before and after triggering.

Detailed description of preferred exemplary embodiments

The section shown in Fig. 1 shows a grooved rail 12 mounted elastically in a track bed 11 and provided for a rail vehicle (not shown), for example a tram. Said rail has a rail head 13 with a running surface 14 for the vehicle wheels, a flange channel 15 for the flange of the vehicle wheels, and a flange channel side 16. The rail head 13 is connected to the rail foot 18 by a rail web 17. Said rail foot is mounted on an elastic foot profile 19. This in turn lies on a baseplate 25, which evens out bumps in the track bed foundation 26.

Into the rail chambers 20 formed on both sides between the rail head 13 and the rail foot 18 is inserted a correspondingly shaped chamber-filling element 21, which is supported on the rail foot on one side and on the lower sides 22 of the rail head 13 on the other side. The chamber-filling elements end somewhat below the rail head sides 23 in a substantially horizontal face 24. On both sides of the rail, a joint 50 is formed between the rail head sides 23 and a surround 31 formed by in-situ concrete and/or application of an asphalt layer after mounting of the rail 11.

To fill this joint 50, joint-filling elements 27 are applied adhesively to the rail head sides 23 on both sides before mounting of the rail 11. Said joint-filling elements are prefabricated from a flexible plastic, in particular silane-terminated polymer in the form of a strip, for example as an extruded profile. Polyurethanes and polysulphites are also suitable. They have an upper side 33 lying substantially in or a little below a plane with the running surface 14 and the surround (road) surface 30 of the surround 31, a lower side 34 which is adjacent to a chamber-filling element 21 in the example shown, an inner side 35 adjacent to the rail head side, and an outer side 36 adjacent to the surround 31.

Fig. 2 and 3 show that the connection to the rail head sides is made by means of an adhesive layer 28, already during preparation of the rail in a workshop set up therefor or in

a suitable facility close to the laying site. This ensures that the adhesive bonding takes place under the best conditions in terms of positioning, cleanliness, temperature control and adhesive surface preparation on the rail 12 and the joint-filling element 27.

The adhesive layer 28 indicated in Fig. 2 and 3 can be an adhesive which adheres well to the rail and to the material of the joint-filling element 20 and advantageously consists of the same material as the joint-filling element itself. These examples also show a structuring of the outer sides 36 of the joint-filling element 27 such that a form fit (undercut) is produced at least in the vertical direction: in Fig. 2, the outer side 36 widens as it runs diagonally downwards, and in Fig. 3, the outer side 36 has an inwardly rounded portion 37. Together with the outer side 23 of the rail head, which is diagonal anyway on the flange channel side, an arrangement which is secured in an interlocking manner in the vertical direction (upwards) results when the surround 31 is produced by casting in concrete or (see Figures 2 to 4) in an asphalt layer 39 applied to the concrete surround underlayer 38, which together form the surround 31.

Fig. 2 and 3 also show an adhesive layer 28 on the outer side 36 of the joint-filling element 27. Since work such as the application of adhesives etc. should be omitted as far as possible on the construction site, an adhesive is only practical, for example, when an adhesive layer 28 previously applied to the joint-filling element can be activated by the application of the surround, for example, when, in a surround 31 with an asphalt layer 39, there is enough heat during the liquid application thereof to activate an adhesive layer 28 consisting of hot-melt adhesive.

Fig. 1 indicates that the joint-filling element has been provided, already during production, on its inner side and outer side with a nonwoven 41, a part, e.g. half, of the

thickness of which is embedded in the material of the joint-filling element 27. It is a high-density nonwoven consisting of plastic and compressed from multiple layers. A nonwoven means in this case any material which is composed of fibres or threads in a regular or irregular, e.g. random, layer and leaves cavities in undercuts exposed. It should have a certain thickness to allow the materials between which it is intended to promote adhesion to penetrate. For instance, the nonwoven 41 is approximately half-filled with the material of the joint-filling element 27 on its side facing the joint-filling element 27. The nonwoven can be brought into a certain shape using a compressing process, and therefore it can also form the formwork for the bevel 43 on the concrete surround 31 shown in Figure 1. The nonwoven 41 improves the adhesion to the rail head sides, in particular as far as the tensile strength of the adhesive connection is concerned. Thanks to the set absorbency of the nonwoven 41, it can absorb both the silane-terminated polymer during the production of the prefabricated joint-filling element 27 and the concrete, i.e., the easily flowable proportion of slurry or mortar contained therein, during casting to produce the surround 31.

During attachment to the rail head sides 23, the above-described adhesive layer 28 penetrates into the fibres, meshes, loops or the like of the nonwoven 41 which protrude out of the inner sides 35 of the joint-filling elements and improves the adhesion even if the surface of the rail head sides is relatively smooth. The rail head sides can also have been treated with an adhesion promoter (primer) as preparation for the adhesive bonding.

After the rail 11 has been laid, the outer sides 36 of the joint-filling elements 27 form the outer limits of the rail complex in the region near the surface. The surround is then made by casting with the material provided therefor, that is, with in-situ concrete (Fig. 1) or an asphalt layer 39 on

a concrete surround underlayer (Fig. 4). In the process, the initially flowable constituents of these materials, that is, concrete slurry and the largely liquid portion of the asphalt, which is usually reinforced with mineral materials, penetrate into the elements which protrude from the outer side 36 and are not embedded in the joint-filling element 27, that is, fibres, meshes, loops or the like of the nonwoven, and thus form an interlocking anchoring of the joint-filling element 27 to the surround 31 and thus a tension-resistant connection between the rail and the surround. To avoid impeding the flexibility of the joint-filling element 27 during movements of the rail, a separating agent 46 is provided between the horizontal face 24 of the chamber-filling element 21 (or other elements provided in this location) and the lower side of the joint-filling element 27. In the simplest case, this can also be scattered quartz sand. Oil paper or a geotextile nonwoven or a sprayed separating agent can also be used.

Fig. 4 shows that, instead of the nonwoven, one or more woven fabrics 45, e.g. in the form of strips running along the rail, are embedded in the joint-filling element on the outer side 36 and are also embedded in the above-described manner in the asphalt layer 39 belonging to the surround 31 when the surround is made. These can also be individual fibres. In this design, a nonwoven 41 is provided as an adhesion promoter on the inner side 35 of the joint-filling element 27, as described.

Fig. 5 shows a combination of the design according to Fig. 2 with an embedded woven fabric strip or fibres and a concrete surround 31. Fig. 6 shows a design in which, in addition to the nonwoven 41, a tensile-strength-reinforcing element, a woven fabric strip or fibres 45 are also embedded in the lower part of the joint-filling element 27 on the outer side of the joint-filling element 27, where the nonwoven 41 ends.

To avoid gap formation in the region of the joint 50 even when the rail moves in the horizontal direction, the joint-filling element 27 can particularly preferably be provided with a preloading device 51 which can be triggered after attachment of the surround, that is to say a strain accumulator which acts mainly in the horizontal direction. Examples are shown schematically in Fig. 7 to 16.

Fig. 7 and 8 show, in a schematically indicated manner, a design of the preloading device 51 in which one or more bending elements 53 are provided in or on the joint-filling element 27, for example as a layer of plastic plates which are roof-shaped. When a pressure is applied to the joint-filling element from above after the surround 31 has cured, the bending elements 53 are pressed flat and maintain this position. The material in the central region of the joint-filling element is thus stretched somewhat and forms a compressive preloading in the edge regions. Fig. 8 shows that the upper side 33 of the joint-filling element 27 can become somewhat concave as a result, which can however be compensated if this surface is produced with a slightly convex upward bulge.

Fig. 9 and 10 show a design of the preloading device 51, in one of which a chamber 54 is provided which runs along the rail 11 in the joint-filling element 27 and in which preloading devices 51 are arranged at a longitudinal distance from one another in U-shaped leaf springs 55, which are held in the loaded state (Fig. 9) by a clamp or trigger 56 engaging behind bends 57 at the ends of the spring sides 58. The inverted T-shaped trigger is pressed downwards after installation by a pressure or impact on the upper side 33 of the joint-filling element 27 and releases the spring sides 58 so that the latter stretch the central region of the joint-filling element 27 and overall build up a compressive

preloading in same, in particular in the upper region in this case.

Fig. 11 and 12 demonstrate a design of the preloading device 51 in which components 47, 48 which are separated by a destructible wall 59 are provided in a chamber 54 provided centrally in the joint-filling element 27. For instance, the chamber which contains one of the components can also contain a capsule or ampule containing a second component which reacts chemically or physically with the other component, resulting in an increase in volume and an expansion for building up a compressive preloading (Fig. 12). The components can form, for example, a flexibly curing plastic foam, which enlarges the chamber permanently but flexibly. However, there are also inorganic materials which can be caused to expand irreversibly by a second component, for example various clay materials or plaster with the addition of water. However, a second component can also be omitted in some circumstances if the triggering reagent is water. In this case, the reaction could also be triggered by diffusing moisture. A "delayed-action" expansion would then be produced. The drawings show that in this case the joint-filling element is produced with a central narrowed portion, that is, concave upper and/or lower sides, in order to obtain flat faces after expansion.

It is still possible to omit a second component if the material introduced into the chamber is reactive at an elevated temperature, for example. This could be generated from the outside either by contact heat (in the manner of an iron) or by thermal or electrical radiation (microwave).

The desired compressive preloading can also be achieved by the use of a material which itself swells on absorbing moisture for the joint-filling element 27. This material is known as a swelling seal. It is a 1-component, solvent-free and water-swellable flexible plastic material based on

polyurethane. It is particularly advantageous that it has outstanding adhesion behaviour on a wide variety of subsurfaces. In this case it would just have to be ensured that the joint-filling element 27 is shielded from water between production and use, but this is not a problem with production and storage in a business. A tearable cover could be provided if necessary.

Fig. 13 and 14 show a design of the preloading device 51, which has a chamber 54 in which a negative pressure is generated, where necessary in a tube 60 lying in the chamber 54, after production of the joint-filling element 27, which negative pressure causes the tube, the chamber and the central part of the joint-filling element to contract. After the attachment of the surround 31, the tube 60 can then be pierced at one end of the elongate joint-filling element and thus enlarge the tube and also the chamber.

Finally, Fig. 15 and 16 show a design of the preloading device 51, in which, after the joint-filling element is produced, it is placed under lateral pressure, which is maintained by an internal loading element 61, e.g. by a sewn seam between the inner and outer sides 35, 36 of the filling element 27. This can be done with a thread 62 which melts easily and can therefore be caused to tear by heating (Fig. 16) and releases the compressive loading stored in the joint-filling element 27.

List of reference signs

Track bed	11
Grooved rail	12
Rail head	13
Running surface	14
Flange channel	15
Flange channel side	16
Rail web	17
Rail foot	18
Foot profile	19
Rail chamber	20
Chamber-filling element	21
Lower side	22
Rail head side	23
Horizontal face	24
Baseplate	25
Track bed foundation	26
Joint-filling elements	27
Adhesive layer	28
Surround surface	30
Surround	31
Upper side	33
Lower side	34
Inner side	35
Outer side	36
Inwardly rounded portion	37
Concrete surround underlayer	38
Asphalt layer	39
Adhesive layer	40
Nonwoven	41
Bevel	43
Woven fabric	45
Separating agent	46
Joint	50
Preloading device	51
Bending element	53

Chamber	54
Leaf spring	55
Trigger	56
Bends	57
Spring side	58
Wall	59
Tube	60
Loading element	61
Thread	62

Patentkrav

1. Skinne (12), der kan lejres elastisk, med fugeudfyldningselement (27), som har
et skinnehoved (13) med en løbeflade til køretøjshjul,
en skinnefod (15) og
en skinnebane (16), der forbinder disse,
især en rilleskinne,
som er beregnet til at blive omgivet, i det mindste på en side, af en eventuelt flerlaget omgivende konstruktion (31), der udgør en indlejring af skinnen, hvis overflade (30) ligger i løbefladens (14) højdeområde, hvor der mellem indlejringen og en sideflade (23) af skinnehovedet (13) er en fuge (50), som skal fyldes ud med fugeudfyldningselementet (27),
hvor
fugeudfyldningselementet (27) er præfabrikeret og består af et elastisk materiale og er udformet med
en inderside (35), der vender mod skinnehovedet (13), og en yderside (36), der vender bort fra skinnehovedet (13),
en overside (33) og
en underside (34),
hvor
indersiden er anbragt permanent vedhæftende på sidefladen (23) af skinnehovedet (13) inden lægningen af skinnen (12),
ydersiden (36) er udformet til at fremme en vedhæftning til den omgivende konstruktion (31), og undersiden (34) er udformet til at forhindre en vedhæftning,
kendetegnet ved, at der er indlejret vedhæftningsfremmende elementer i fugeudfyldningselementets (27) materiale, som har et non-woven-stof (41), som på indersiden (35) er indlejret i et klæbelag (28) mod sidefladen (23) af skinnehovedet (13).

2. Skinne ifølge krav 1, **kendetegnet ved, at** ydersiden (36) af fugeudfyldningselementet (27) har en struktur, som sammen med den omgivende konstruktion (31) danner en i det mindste formsluttende forbindelse.

3. Skinne ifølge et af de foregående krav, **kendetegnet ved, at** ydersidens (36) vedhæftningsfremmende egenskab er tilvejebragt i det mindste supplerende ved hjælp af et klæbelag (28).

4. Skinne ifølge krav 1 eller 2, **kendetegnet ved, at** de vedhæftningsfremmende elementer har
et non-woven-stof (41), hvis fibre rager ud over ydersiden (36) og til vedhæftende optagelse i den omgivende konstruktions (31) materiale,
eller et tekstil (45), der rager ud over ydersiden (36), til vedhæftende optagelse i den omgivende konstruktions (31) materiale,
eller fibre, der rager ud over ydersiden (36), til vedhæftende optagelse i den omgivende konstruktions (31) materiale.

5. Skinne ifølge et af de foregående krav, **kendetegnet ved, at** fugeudfyldningselementet (27) udgør en elastisk tryk- og trækforbindelse mellem sidefladen (23) af skinnehovedet (13) og af den omgivende konstruktion (31).

6. Skinne ifølge et af de foregående krav, **kendetegnet ved, at** undersiden (34) af fugeudfyldningselementet (27) ved hjælp af et separationsmiddel (46) er udformet til at blive forbundet vedhæftningsforhindrende med et kammerudfyldningselement (21), der skal indsættes i et skinnekammer (20), der er dannet mellem skinnehoved (13), skinnebane (17) og skinnefod (18).

7. Skinne ifølge et af de foregående krav, **kendetegnet ved, at** fugeudfyldningselementet (27) er forsynet med en forspændingsindretning (51), som kan udløses efter anbringelsen af den omgivende konstruktion (31), og som genererer en trykforspænding mellem omgivende konstruktion (31) og skinnehovedside (23).

8. Skinne ifølge krav 7, **kendetegnet ved, at** den udløselige forspændingsindretning (51) har et af de følgende træk:
fugeudfyldningselementet (27) har mindst et knækelement (23), som er forsynet med en afbøjning, der er orienteret på tværs af forspændingsretningen, og som kan bringes til en strakt form ved indvirkning på fugeudfyldningselementet (27), eller

i fugeudfyldningselementet (27) er anbragt en forspændt fjeder (55), især en bøjet bladfjeder, som er holdt fastspændt af en udløser (56), indtil udløseren ved hjælp af en ydre indvirkning på fugeudfyldningselementet (27) aktiveres med henblik på at frigive fjederspændingen, eller
fugeudfyldningselementet (27) indeholder et kammer (54), som er fyldt med et materiale, som udvider sig irreversibelt ved påføring af varme.

9. Skinne ifølge krav 6 eller 7, **kendetegnet ved, at** den udløselige forspændingsindretning (51) har et af de følgende træk:
fugeudfyldningselementet (27) indeholder et kammer (54), som indeholder to komponenter, som i starten er adskilt fra hinanden, og som bringes i kontakt med hinanden ved mekanisk indvirkning under udvidelse, eller
fugeudfyldningselementet (27) indeholder en indeslutning af et materiale, som forstørrer dets volumen ved diffusion af fugtighed i fugeudfyldningselementet, eller
fugeudfyldningselementet (27) indeholder et kammer (54,60), som står under atmosfærisk undertryk og udvider sig efter tilvejebringelsen af en luftadgang.

10. Skinne ifølge et af kravene 6 til 9, **kendetegnet ved, at** den udløselige forspændingsindretning (51) har et af de følgende træk:
fugeudfyldningselementet (27) er sat under trykspænding, som er blokeret af et ydre spændeelement (61), som skal fjernes, eller
fugeudfyldningselementet er sat under trykspænding, som er blokeret af et indre spændeelement (61,62), som kan ødelægges ved varmepåvirkning.

11. Fremgangsmåde til elastisk lægning af en skinne (12) med fugeudfyldningselement (27) i et sporleje (11), som har et skinnehoved (13) med en løbeflade til køretøjshjulene, en skinnefod (18) og en skinnebane (17), især en rilleskinne, der forbinder disse, hvor fugeudfyldningselementet (27) er præfabrikeret og består af et elastisk materiale og er udformet med en inderside (35), der vender mod skinnehovedet (13), og en yderside (36), der vender bort fra skinnehovedet (13), en overside (33) og en underside (34), med de følgende arbejdstrin:

elastisk anbringelse af skinnen (12), der inden lægningen er forsynet med fugeudfyldningselementet (27), der er anbragt vedhæftende på skinnehovedet (13) i det mindste på en side, på en omgivende konstruktion (26),
faststøbning af den omgivende konstruktion (31) til ydersiden (36) af fugeudfyldningselementet (27) under vedhæftende forbindelse mellem disse,
kendetegnet ved, at
der er indlejret vedhæftningsfremmende elementer i fugeudfyldningselementets (27) materiale, som har et non-woven-stof (41), som på indersiden er indlejret i et klæbelag (28) mod sidefladen (23) af skinnehovedet (13).

12. Fremgangsmåde ifølge krav 11, **kendetegnet ved, at** den vedhæftende forbindelse omfatter en inkludering af elementer, der rager ud fra ydersiden af fugeudfyldningselementet (27), i den omgivende konstruktion (31).

13. Fremgangsmåde ifølge krav 11 eller 12, **kendetegnet ved, at der** efter anbringelse af den omgivende konstruktion (31) på skinnen ved indvirkning på fugeudfyldningselementet (27) udløses en forspændingsindretning (51), som er tilvejebragt for fugeudfyldningselementet (27), til at generere en trykforspænding i fugeudfyldningselementet (27) mellem skinnehovedside (23) og omgivende konstruktion (31).

14. Fremgangsmåde ifølge krav 13, **kendetegnet ved, at** indvirkningen på fugeudfyldningselementet (27) omfatter et af de følgende arbejdstrin:
mekanisk indvirkning på oversiden (33) af fugeudfyldningselementet (27) ved tryk eller slag, eller
varmepåvirkning af fugeudfyldningselementet (27) eller
tilvejebringelse af en forbindelse mellem et kammer (54, 60), der befinder sig i fugeudfyldningselementet (27), og atmosfæren, eller
fjernelse af en indretning, der blokerer for en forspænding af fugeudfyldningselementet (27), eller
frigivelse af fugeudfyldningselementet (27) for fugtighed.

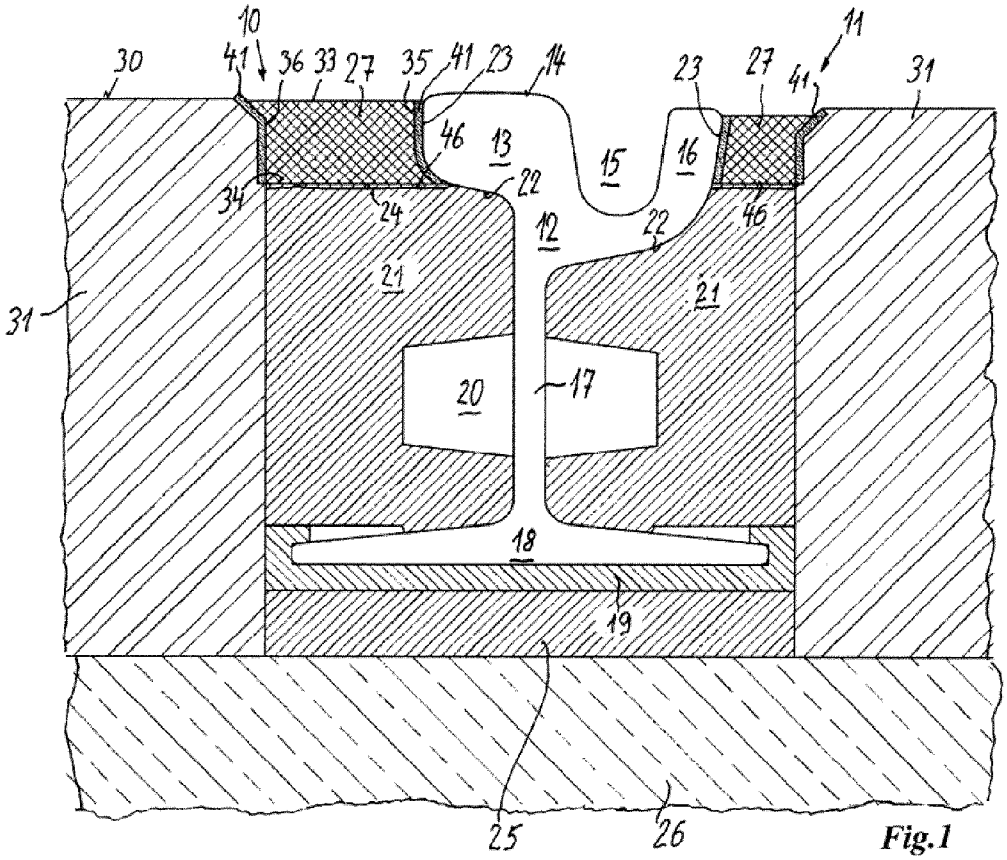
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Fig.1

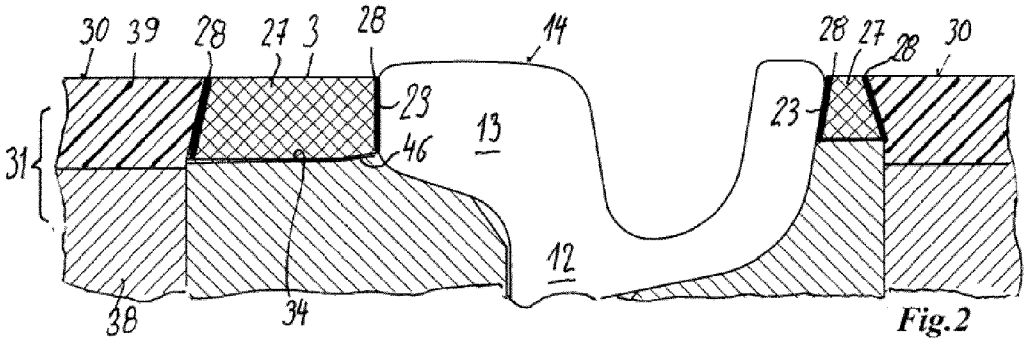
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Fig.2

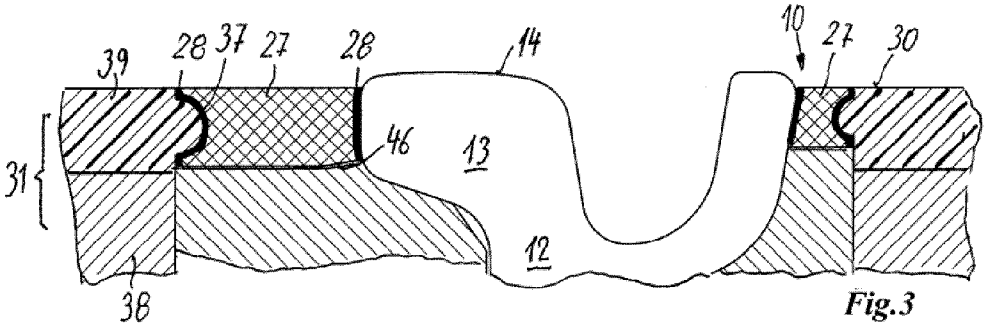
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Fig.3

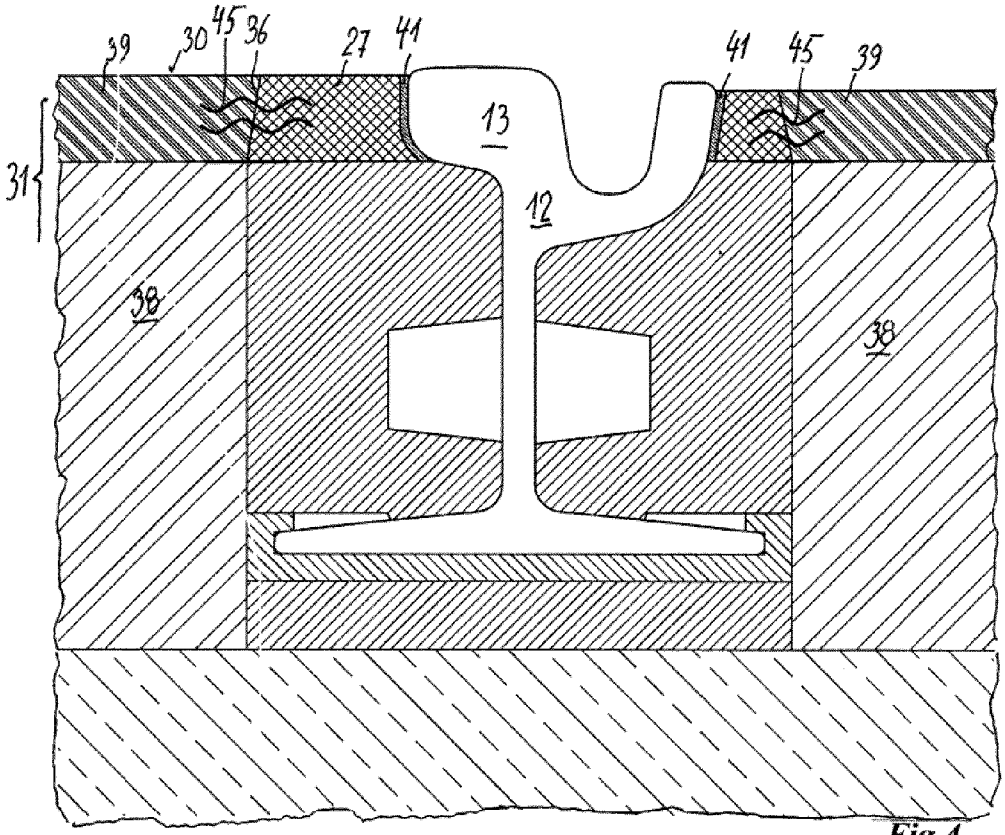
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Fig.4

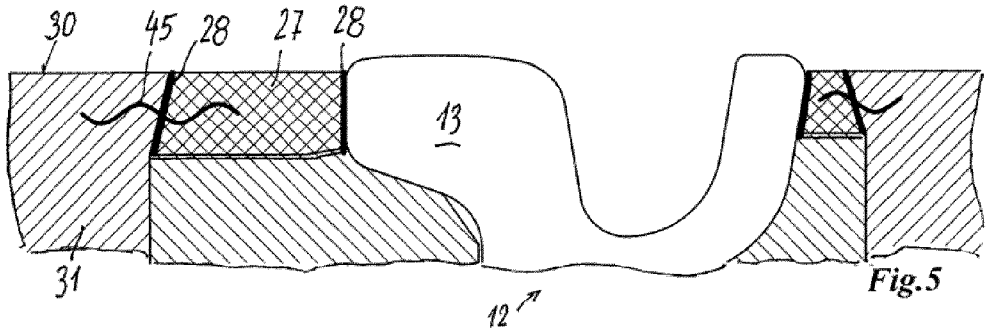
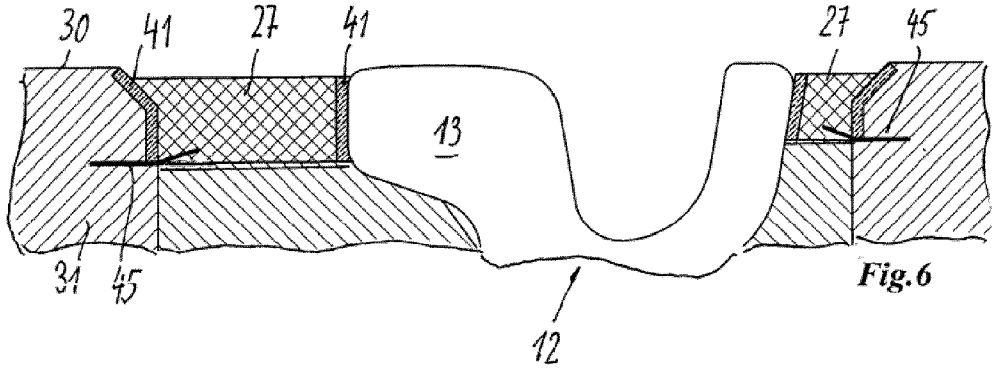


Fig.5



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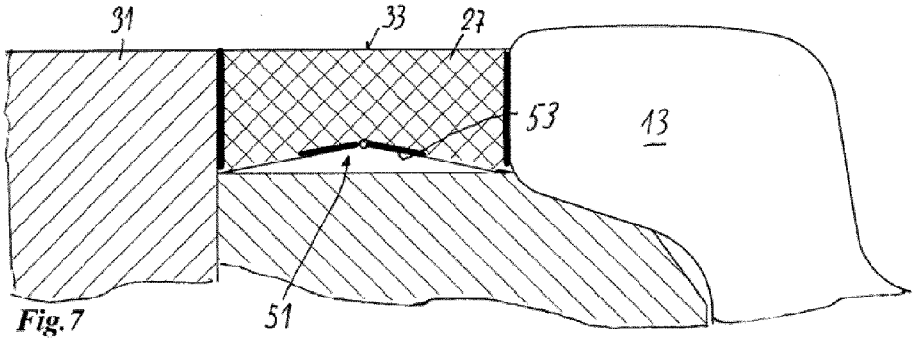

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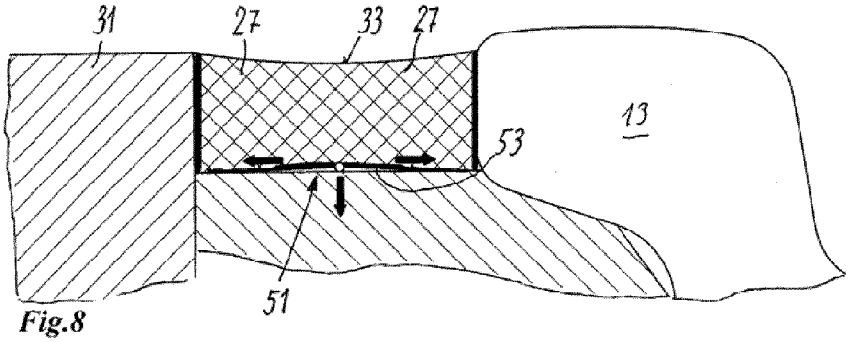

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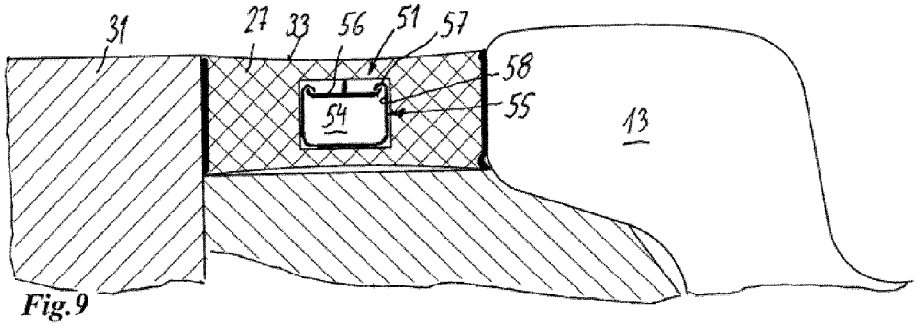


Fig.9

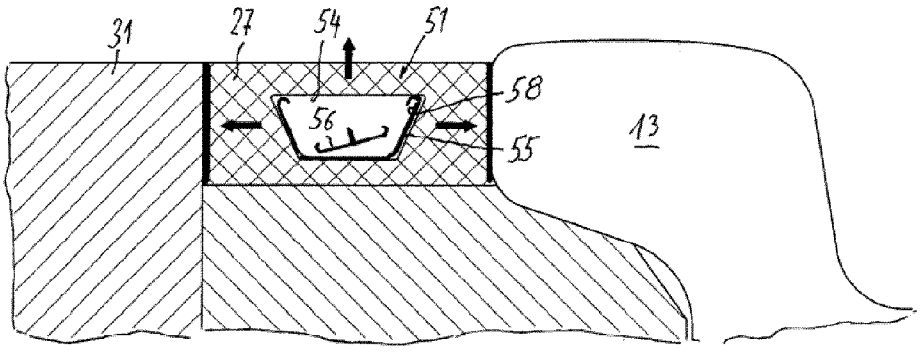


Fig.10

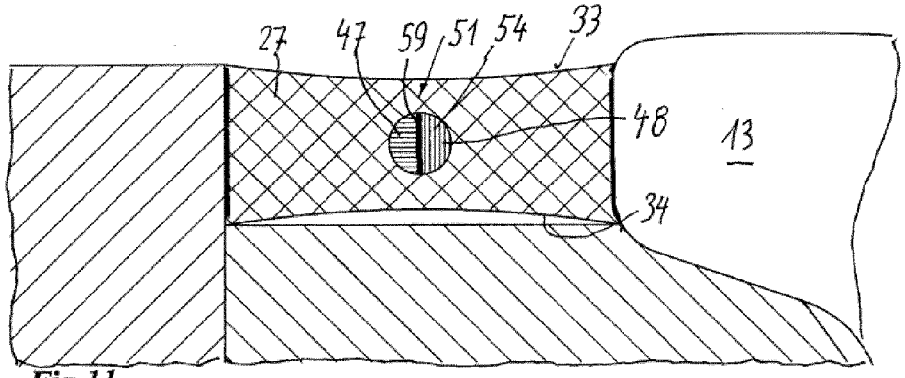


Fig.11

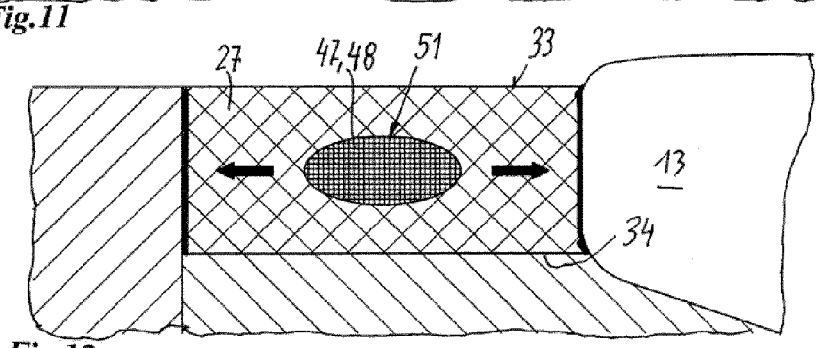
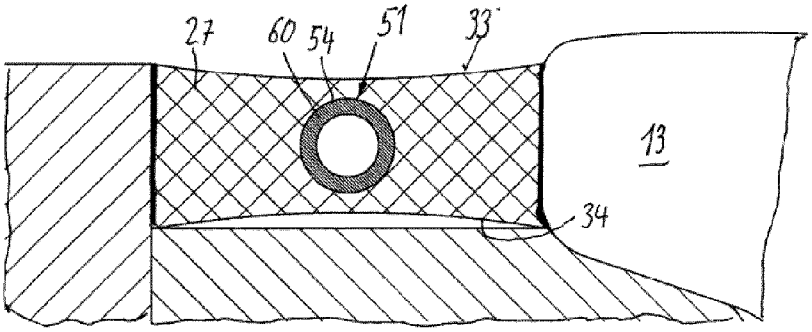


Fig.12



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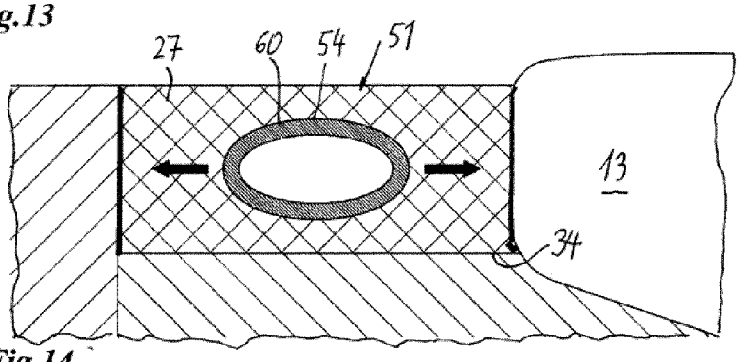

Fig.14

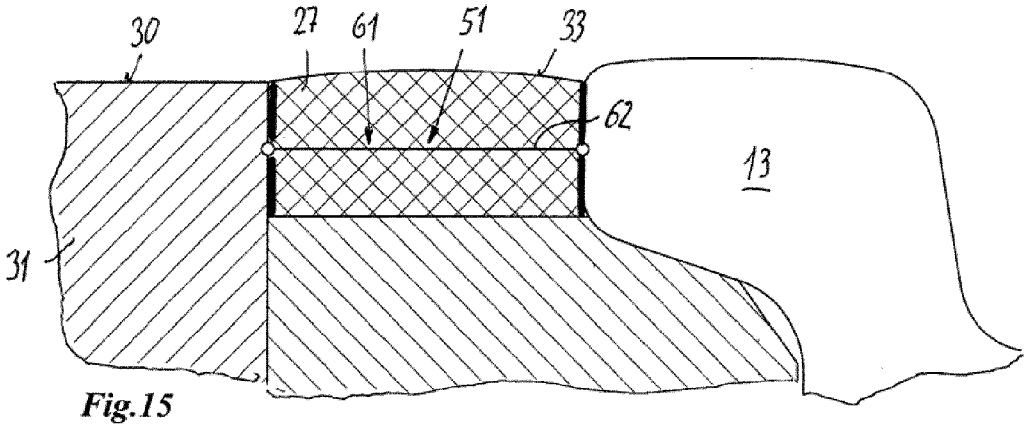

Fig.15

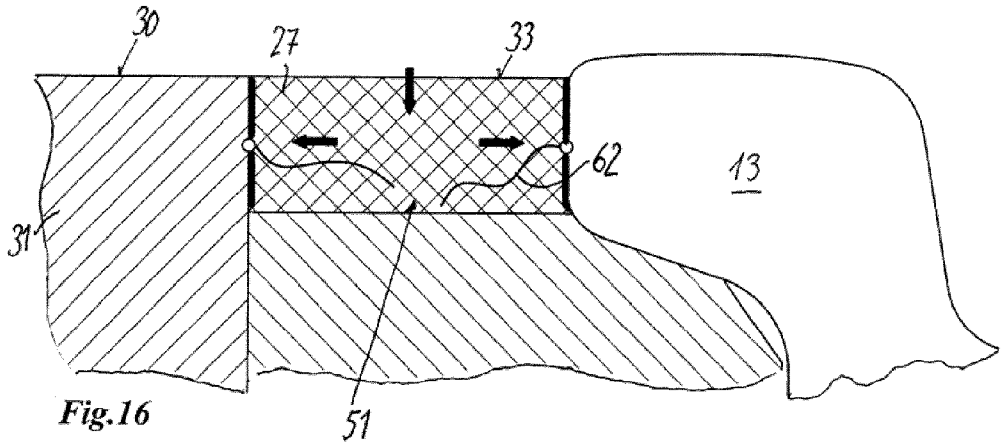

Fig.16