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(54) **AN INNOVATIVE ELASTIC BEARING FOR SWITCH POINTS, PREFERABLY OF THE SELF-LUBRICATING TYPE**

(57) The present invention concerns a bearing (100, 190, 200) for switch points, comprising:

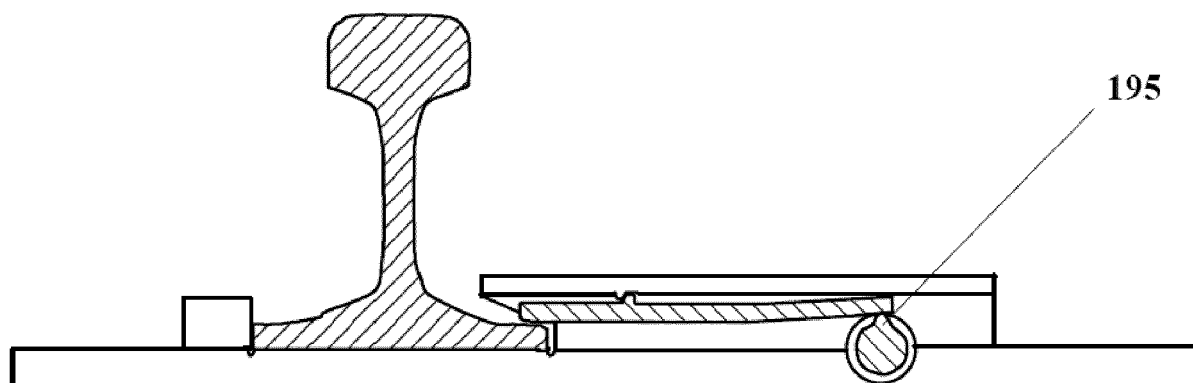
- A support component (100) forming a housing (170, 180);
- A locking assembly (190, 200, 210, 220, 230) for fastening a stock rail (20) to a predetermined area (130), said locking assembly comprising a preferably laminar-shaped (200), flexible element (200), arranged inside said housing (170, 180) in such a manner that an end thereof (201) facing said area (130) of positioning of the stock rail;

- A fulcrum (210, 220);

Characterized in that said locking assembly further comprises:

- An eccentric pivot (109, 195) passing at least in part through said housing (170, 180) and arranged in rotatable manner with respect to the laminar element (200) and the fulcrum, in such a manner that said laminar element (200), the eccentric pivot (190, 195) and the fulcrum (210, 220) form as a whole a lever system that can be activated by the rotation of the eccentric pivot.

FIG. 12
Sec. A-A



Description

Technical field

[0001] The present invention refers to the technical field concerning rail technology, in particular the technical elements for realizing a switch point.

[0002] More specifically, the invention refers to a particularly simple and functional innovative bearing for supporting the sliding of the stock rail.

Prior art

[0003] Switch points, also known as turnouts points, have been known for a long time. Their aim is to allow the train to modify its trajectory from a rail going along a direction towards another rail shunting that direction.

[0004] Generally, structural elements comprise a blade, a stock rail and a supporting metallic tie plate for such blade and stock rail. The stock rail is fixed to that metallic support forming a supporting and sliding surface on which the blade moves and can be moved from/to the fixed stock rail. The movement of the blade from/to the stock rail modifies the route of the train, by directing it to specific directions, according to its position. The movement of the blade is made by means of actuators.

[0005] Such a metallic tie plate may be structured in various ways and comprise lubricating systems for facilitating the sliding of the blade, as well as rolling systems.

[0006] Generally, the term bearing means the whole device formed by the supporting metallic tie plate for attaching the stock rail and operating as sliding surface for the blade; locking devices of the stock rail with respect to said metallic tie plate; possible devices for facilitating the sliding of the stock rail onto the supporting metallic tie plate.

[0007] Figures from 1 to 3, only for clarity purposes, depict a constructive example of bearing with brand name 60C28U Schwiag, available on the market in form of a full kit with the elastic locking system of the stock rail and the system which eliminates the lubrication for the blade.

[0008] Figures 4 and 5 depict an assembly sequence of such a bearing assembly.

[0009] In particular, figure 1 depicts such a metallic tie plate 1 forming a sliding flat surface 2 on which the blade 10 moves with respect to the stock rail 20. The stock rail is fixed to the tie plate 1 and, for that purpose, the tie plate 1 forms a receiving housing 3 for holding the stock rail 20. In this particular embodiment, the tie plate comprises rolls 30 (only one is depicted in figure 2) which facilitate the sliding from/to the stock rail, thus reducing considerably friction and then eliminating the need of lubrication.

[0010] Obviously, there are similar embodiments in which such rolling elements are replaced by a simple lubrication.

[0011] As depicted in the assembly of figure 3 of prior

art, it is to be highlighted that the stock rail has to be fixed to such a bearing. For this purpose, prior art provides attachments with elastic elements. As depicted in the assembly of figure 3 of prior art, it is highlighted that the stock rail has to be fixed to said bearing. For this purpose, prior art provides the fixing with elastic elements. As depicted in figure 3, on one side an elastic hook 50 is used for constraining the flange of the stock rail, while on the other side a ribbon-shaped spring 60 is used (in technical jargon AT 200 spring) by inserting it in a suitable housing obtained in the bearing. This spring, as it is inferable from the cross section of figure 4 - phase A, is hairpin-shaped (generally u-shaped or ribbon-shaped) and is inserted in a housing of the bearing, in such a manner that an end thereof lies on the flange of the stock rail (see phase A and figure 5 phase 1). It is provided a fulcrum interposed between the end of the spring lying on the base of the stock rail and the opposite end of the spring, which, as described further, is raised with a suitable device, in order to be operating (i.e. in load condition in which it exerts locking pressure on the stock rail). A fulcrum is obtained as a tooth inside the housing.

[0012] The two ends (U legs) are then raised by means of a suitable lever, in order to place them on a suitable step in such a manner that the spring bends around the fulcrum, thus exerting a locking pressure on the flange of the stock rail (see phase B or equivalent phases 3 and 4 of figure 5). In this condition, the spring is operating.

[0013] For clarity purposes, figure 5 depicts phases from 1 to 4, generally carried out for the insertion and assembly of such a spring 60 and then to lock the stock rail.

[0014] Provided that, it is now apparent that the embodiment as per prior art owns technical inconveniences.

[0015] In particular, making the spring operating is complex, as the operator has to bend in elastic manner the ends by means of a suitable lever, in order to place them on the steps.

[0016] Another technical inconvenience due to the complex realization of the housing in which such a lever is inserted. Such a housing must comprise a precise working for shaping in precise manner the steps on which the ends of the spring have to lie, as it is bent. If such a working is not precise, either the correct positioning of the spring will be impossible or its locking effectiveness will be reduced. It is clear that an unsafe locking would seriously threaten the safety of rail traffic.

[0017] Also the unlocking operation or release is difficult and complex, as the operator has to operate with the same external lever by which he activated the spring for removing the ends of the ribbon-shaped spring from the steps.

Disclosure of invention

[0018] The aim of the present invention is yet to provide a bearing for switch points which solves the above-mentioned technical inconveniences.

[0019] In particular, the aim of the present invention is to provide a preferably self-lubricating bearing for switch points which proves to be efficient, easily installable without requiring specific complex working on the bearing.

[0020] The aim of the present invention is also to provide a bearing in which the operation of the spring (i.e. whose bent condition in which it operates a locking load) results as simple and fast as the released condition thereof.

[0021] These and other aims are obtained through the present bearing for switch points, according to claim 1.

[0022] Such a bearing (100, 190, 200) comprises:

- A support component (100) forming a housing (170, 180) ;
- A locking assembly (190, 200, 210, 220, 230) for fastening a stock rail (20) to a predetermined area (130), said locking assembly comprising a flexible element (200), preferably the flexible element being laminar-shaped (200), arranged inside said housing (170, 180) in such a manner that an end thereof (201) faces said area (130) of positioning of the stock rail to operate the lock;

[0023] According to the invention, said locking assembly further comprises a pivot (109, 195) passing at least in part through said housing (170, 180) and arranged in rotatable manner, the pivot having such an eccentricity (195) that, through a predetermined rotation thereof, said eccentricity (195) operates on the flexible element, by setting it in a load condition.

[0024] Such a solution easily solves all technical inconveniences.

[0025] In particular, the eccentric pivot, i.e. a cam, allows to set the laminar element in load condition (bending condition) in easy and rapid manner, thus allowing it to generate the locking load on the flange of the stock rail. In the same way, a simple counter-rotation lets such a flexible element pass to a released condition.

[0026] Therefore, it is not necessary to operate with an external lever as per prior art. Moreover, the rotation of the pivot, is simpler with respect to a lever used to raise the ends of a ribbon-shaped spring.

[0027] In addition, the use of an eccentric through pivot allows to avoid complex machining on the support component, in which the flexible element is inserted (the ribbon-shaped spring in prior art). In particular, the steps which were necessary in prior art to put the ribbon-shaped spring in load conditions (in bending position) are now no more necessary.

[0028] Advantageously, a fulcrum is provided.

[0029] Advantageously, such a fulcrum (210, 220) is interposed between said end (201) of the element (200) and the eccentric pivot (190, 195) in such a manner as to have a lever system as a whole, allowing to put such a flexible element in load condition.

[0030] Moreover, in this manner, the type of obtained lever is very simple, i.e. a class 1 lever.

[0031] Advantageously, such a fulcrum is directly obtained by a tooth obtained on the backside of the element.

[0032] Such a solution is advantageous, as it is easily achievable, by making the flexible element more resistant in a high mechanical stress area.

[0033] Consequently, it is here further described a method for locking a stock rail (20) to a bearing for switch points, the bearing forming a housing (170, 180), the method providing the following operating phases:

- Arrangement of an eccentric pivot (190, 195) inserted inside the housing, crossing it at least in part, through an access hole (181);
- Arrangement of a flexible element, preferably laminar-shaped (200), which is inserted inside said housing (170, 180) through the opening (180), in such a manner that an end (201) thereof faces the stock rail and in such a manner that said end (201) of the flexible element lies on the flange of the stock rail to be locked, the element (200) being arranged above the eccentric pivot (190, 195);
- And wherein the locking is made by rotating the eccentric pivot in predetermined manner, such a pivot, through the eccentricity thereof, operates on the flexible element (200), by setting it in a load condition.

[0034] It is described here also the only locking assembly (190, 200, 210, 220, 230) which can be applied to a support component (100) for realizing a switch point, said locking assembly comprising:

- A flexible element (200), preferably laminar-shaped (200), configured for being insertable in a suitable housing (170, 180) of the supporting component, to which it is assigned in operation;
- An eccentric pivot (190, 195), configured for resulting insertable at least in part inside said housing of the support element to which is assigned in operation and mounted in rotatable manner with respect to said housing, in such a manner that a rotation of the eccentric pivot towards a direction places said element in a load condition.

[0035] It is also described here the only support component (100) for a switch point to which a locking assembly can be applied, as described above.

[0036] Such a support component (100) comprises a housing (170, 180) in which the element (200) can be inserted and having a transversal hole (181) intercepting at least in part said housing (170, 180) through which the eccentric pivot (190, 195) can be held.

[0037] Advantageously, in this manner, a lever system occurs inside the housing of said support element (100), such that the rotation of the eccentric pivot towards a direction causes the rotation of the element (200) around the rotation fulcrum (210, 220).

[0038] Lastly, it is also described here a method for modifying a bearing for operating the locking of a stock

rail (20) to the bearing, the bearing forming a housing (170, 180) for holding inside it a preferably laminar-shaped deformable elastic element (200), and the housing thereof equipped with a rotating fulcrum, the method providing the operation of realization of a transversal conduit (181) upstream the rotating fulcrum on the tail of the deformable elastic element, the through conduit intercepting said housing (170, 180), and wherein it is provided the operation of arrangement of an eccentric pivot (190, 195) which is inserted through said through conduit (181) inside the housing (170, 180) crossing it at least in part, in such a manner as to be below the deformable elastic element on its tail and such that the elastic deformation for operating the locking is made by rotating the eccentric pivot in predetermined manner, such a pivot, by means of the eccentricity thereof, operates on the tail and leads the elastic element (200) to rotate around the rotating fulcrum (210, 220).

[0039] Further advantages can be deduced from the remaining dependent claims.

Brief description of drawings

[0040] Further features and advantages of the present device, according to the invention, will become apparent from the following description of preferred embodiment thereof, given only by way of non-limiting, indicative example, with reference to the accompanying drawings, wherein:

- Figures from 1 to 5 depict an introduction of prior art;
- Figure 6 depicts in axonometric view the new bearing configured to allow the application of the innovative locking assembly formed by a rotatable eccentric pivot used to activate the leaf spring 200.
- Figure 7 depicts just the eccentric pivot inserting inside a specific receiving hole of the bearing;
- Figure 8 depicts just the leaf spring 200 which can be placed in load (i.e. operating condition) or released condition by means of a specific rotation of the eccentric pivot of figure 7;
- Figure 9, as well as the detail of figure 14, depicts the bearing mounted on the "released" condition, i.e. when the eccentric element has such a position not to bend the spring, thus maintaining it released;
- Figure 10, the enlarged detail of figure 11 and the section of figure 12 depict a load condition, where the eccentric element is rotated in such a manner as to cause a bending of the spring 200 and then a lever effect generating a locking pressure on the flange of the stock rail;
- Figure 13 is an overall view from above of the bearing from which the section A-A of figure 12 is obtained.

Description of some preferred embodiments

[0041] According to figure 6, it is depicted only the first metallic tie plate 100 being part of the bearing described

in the invention and configured for receiving the locking assembly (190, 200, 210, 220, 230) which locks the stock rail, according to the invention.

[0042] Therefore, with reference to figure 6, the metallic tie plate 100 comprises a housing 300, according to prior art, where the stock rail is arranged (not depicted only for clarity purposes), for being locked elastically.

[0043] Then such a tie plate 100 comprises at the ends thereof the holes for locking bolts to the ground, as per prior art.

[0044] As always depicted in figure 6, according to prior art, it is obtained a raised part which generates the sliding surface 150 for the blade.

[0045] The surface 150 is obviously a flat surface, perfectly coplanar with the base of the tie plate 100. It is worked in such a manner as to have a good level of surface finish.

[0046] Then a housing 170 is obtained in such a raised part, for the insertion of a component being part of the locking assembly. Figure 6 depicts with number 180 the opening of such an inner housing 170, apparent in section of figure 9, for example.

[0047] If longitudinal direction is considered to be the direction moving from the pair of fixing holes on the left to the right ones or vice versa, then according to figure 6, the housing 170, as shown in figure 9, moves to the longitudinal direction.

[0048] A transversal hole 181 (apparent from figure 6), intercepting at least in part the housing 170, is then obtained in the raised block forming the sliding surface 150.

[0049] An eccentric pivot (190, 195) (or, in other words, eccentric cam) is inserted through said transversal hole 181, as depicted in axonometric view in figure 7.

[0050] The eccentric pivot is generally cylindrically shaped and the central area thereof, as shown in figure 7, is provided with a suitable shaping, in order to obtain a reduction of diameter and form a tooth 195, going along the length of such a central area. Such a tooth determines the eccentric form and so the shaping of eccentric cam in the "operative" area of the pivot.

[0051] Preferably, as detailed below, the head or crest of the tooth has a flattening working.

[0052] One end of the pivot provides a circular crown 196 operating as end stroke shoulder as the pivot is inserted in the hole 181, thus preventing it from penetrating over a preset amount.

[0053] Upstream the circular crown 196, i.e. on the opposite side to the development of the pivot, an end part with hexagonal nut-shaped head is provided in such a manner as to be grasped by means of a suitable tool, for example pliers, wrench or similar ones, in order to rotate the pivot when the elastic block is in load condition.

[0054] Obviously, such a nut-shaped head can be of any type, i.e. hexagonal, octagonal nut etc., according to the new regulations concerning nuts and bolts in general.

[0055] Such an eccentric pivot cooperates with a locking element 200 in form of an elastically flexible laminar

element, for example a tie plate (or a foil, in other words), as depicted in figure 8.

[0056] Therefore, such a locking element 200 is a deformable elastic element, and effectively a "leaf spring".

[0057] Therefore, the locking element 200 can be made of any metal suitable for the aims, steel for example.

[0058] The element 200, generally rectangular-shaped and of predetermined thickness has an upper surface 203 and a lower surface 204.

[0059] Being in the form of a plate, then leaf spring-shaped, generally the thickness thereof is lower than the width and length, thus being a thin element.

[0060] A tooth 210 is provided along the whole length of the upper surface 203, in form of a sort of bump.

[0061] In the preferred embodiment of the invention and as explained further, the function thereof is a swivel for such a leaf spring and then it is the fulcrum around which the bending deformation occurs.

[0062] The housing 170, as shown in figure 9, is then shaped in such a manner as to allow the insertion of the above-mentioned tie plate 200 inside it.

[0063] In particular, as shown in figure 6, the metallic tie plate 100 comprises said opening 180, through which the leaf spring 200 can be easily inserted inside the housing, being the opening clear from any obstacle.

[0064] Before such an operation, it is advisable that the pivot 181 is inserted inside the hole and rotated in such a manner that the pivot 195 forming the eccentric element is turned downwards.

[0065] In this manner, the element 200 (or leaf spring in other words) can be inserted by sliding on the pivot 190 and lying on it.

[0066] The length of the tooth 195 is at least equal or greater than the length of the element 200. In this manner, the element 200, as it is inserted in the housing 170, slides along the pivot 190 lying on it.

[0067] The length of the pivot 195 is at least equal or greater than the length of the element 200. In this manner, the element 200, as it is inserted in the housing 170, slides along the pivot in the above-mentioned central "operative" area where it is placed the tooth 195 forming the eccentric element, initially turned downwards.

[0068] The housing 170 can form in its interior, on the top thereof, a shoulder 220 going along the width of the housing itself and placed in such a manner as to intercept the tooth 210 of the tie plate as it is inserted in the above-mentioned housing in operation.

[0069] In this manner, the shoulder 220 is the end stroke for the insertion of the spring, as, while inserting it in the housing 170, such an insertion occurs until the tooth 210 obtained on the back of the spring 200 intercepts the shoulder 220 obtained on the top of the housing, exactly as depicted in the enlarged view of figure 11. In this manner, the correct positioning of the element 200 is certain and therefore the end thereof faces the area 300 where the stock rail is applied (see for example figure 10 or 11).

[0070] In any case, preferably, only the teeth obtained in the spring has the function of fulcrum, by realizing it of adequate height, therefore greater than the potential shoulder 220 of the housing 170.

[0071] In this manner, there are many advantages. The realization thereof is simpler, as it is easier to realize a tooth on an external surface like the surface 203 of the element 200, rather than a tooth obtained on the top of an external housing.

[0072] Moreover, the wear of such a tooth functioning as a fulcrum can be easily recovered on an element 200, while can be hardly recovered on an internal housing and in this case, it would require the replacement of the whole metallic tie plate 100.

[0073] In case of necessary replacement due to the wear of the fulcrum 210, anyway, the replacement of a foil 200 is less expensive than the replacement of the whole tie plate 100.

[0074] Finally, as a further advantage, the excess of material for the realization of tooth 210 (fulcrum 210) would reinforce the leaf spring in one of the most mechanically stressed points during the activation thereof.

[0075] The shoulder 220 functioning as a shoulder obtained on the top of the housing, could also be removed, otherwise, as an alternative, it could be replaced by a hollow in which the crest of the tooth 210 inserts itself. In this case, the end stroke would be not only easily achievable but also the hollow would easily maintain the fulcrum in correct position, thus avoiding unwanted movements due to the vibrations of the train.

[0076] Nevertheless, such a fulcrum could be obtained also by the only shoulder 220, of adequate height, integral with the housing, i.e. obtained on the top of the housing 170. This solution of fulcrum is generally applied in prior art and it is not considered optimal here with respect to the previously described one. In this case, the height of the potential tooth 210 on the small elastic plate 200 would be lower than that one of the shoulder 220, in such a manner that the only shoulder or tooth 220 functions as fulcrum and with the shoulder 210 or tooth 210 with the only aim of end stroke.

[0077] In any case, as per figure 11, the height of the housing 170 and the related shoulders 220 and tooth 210 allow the tie plate 200, when inserted, to rotate (some millimeters, for example) inside the housing and then having the possibility to bend.

[0078] Substantially, the created system realizes a simple class 1 lever, as per prior art.

[0079] According to the invention, the activation of the leaf spring occurs through a rotating cam, leading the leaf spring to bend in load or operating condition.

[0080] With reference to figure 11, the tie plate 200 lies by means of its tail (i.e. rear part) on the eccentric pivot, while the opposite part 201 (i.e. the head or front end) lies on the base of the element to be locked (i.e. the base of the stock rail) with the fulcrum (210, 220) interposed between the tail and the head.

[0081] The metallic materials are preferred and then

the rotation of the elastic element 200, as described further, is reduced to a bending of the tie plate within few millimeters, 3mm or 4mm approximately, which are enough to generate loads on the end 201, in the range of tons.

[0082] Therefore, as per figure 9, the leaf spring (or elastic element, in other words) inserts itself in the housing 170 with the eccentric pivot inserted in the housing and with the eccentric tooth 195 rotated downwards (see also figure 14).

[0083] In this position, the end 201 lies on the flange of the stock rail without exerting any locking pressure.

[0084] In order to operate the locking, it is enough to rotate the pivot with a suitable tool, in such a manner that the tooth 195 enters into contact with the tie plate 200, as per figure 12. Therefore, the operator can easily operate by means of a suitable tool to rotate the pivot 90 degrees (see sequence figures 9-10). In this manner, as per figure 12, a simple class 1 lever is generated (fulcrum, power and resistance), such that the leaf spring 200 would rotate around the fulcrum formed by the tooth 210, as the cam 195 enters into contact under the tail thereof, thus pushing such a tail upwards.

[0085] In this condition, the spring 200, which tends to rotate, bends for the elastic deformation, as the head pushes on the base of the stock rail and, pushed upwards by the cam, determines a relevant pressure power on the end 201.

[0086] The bending degree determines the pressure action, depending on the material.

[0087] As described, the eccentric pivot or cam in other words, has a flattening on the crest of the tooth 195, thus ensuring the stability in operating condition. The flattening enters into contact with the flat surface of the spring element 200, thus ensuring a stable equilibrium. In addition, common and simple system may be provided for ensuring an operating condition, such as an anti-rotating pin which locks the cam pivot in operating condition.

[0088] It has been experimentally verified that a 3,5 mm bending is enough to determine pressures in the range of approximately 1.6 tons with a material of the small iron plate.

[0089] This system is effective, as it can be placed in operating condition (i.e. locking condition) in easy manner, by rotating a pivot and the housing does not need to have particular working.

[0090] Obviously, it is possible to vary the pressure forces for the tightening by adjusting the project of sizes and materials of the eccentric element and the lever system as a whole, in particular the leaf spring.

[0091] Obviously, also the dismantling of the stock rail, including the counter-rotation of the eccentric pivot, is simpler than the solution of prior art.

[0092] As described in the present invention, it is necessary to have a specific metallic plate 100 on which the locking assembly can be inserted, consisting of the tie plate 200, the rotating pivot and a fulcrum which can be obtained inside the housing or as a tooth directly obtained

on the back of the plate 200. The plate element 100 must comprise the transversal conduit for inserting the pivot, thus allowing to place it in correct position under the tie plate 200, in such a manner as to cooperate with it.

[0093] The leaf spring described in the present invention and equipped with tooth 210 might be produced and sold individually as spare part.

[0094] The plate element 100 and locking assembly may also be produced and sold individually. For example, the locking assembly (eccentric pivot and leaf spring) may be sold as spare parts for the related plate and vice versa.

[0095] Provided that, it might also be possible to modify the existing bearings of prior art, by arranging a through hole in the plate element for the insertion of the eccentric pivot, thus realizing a small plate 200 for being inserted in the pre-existing housing.

[0096] In that sense, only the locking assembly might be sold for a traditional plate to be modified.

[0097] In addition, the above-described spring of prior art might be used, thus only operating a through hole in the traditional bearing, in order to insert an eccentric pivot and make the spring operating as described in the patent application, rather than operating by means of the lever to raise and position the end of the spring on the steps.

Claims

1. A bearing (100, 190, 200) for switch points, comprising:

- A support component (100) forming a housing (170, 180);
- A locking assembly (190, 200, 210, 220, 230) for fastening a stock rail (20) to a predetermined area (130), said locking assembly comprising a flexible element (200), preferably the flexible element being laminar-shaped (200), arranged inside said housing (170, 180) in such a manner that an end thereof (201) faces said area (130) of positioning of the stock rail to operate the lock; **Characterized in that** said locking assembly further comprises a pivot (109, 195) passing at least in part through said housing (170, 180) and arranged in rotatable manner, the pivot having such an eccentricity (195) that, through a predetermined rotation thereof, said eccentricity (195) operates on the flexible element, by setting it in a load condition.

2. A bearing (100, 190, 200), according to claim 1, wherein a fulcrum is comprised, around which a bending of the flexible element occurs, preferably the fulcrum (210, 220) being interposed between said end (201) of the element (200) and the eccentric pivot (190, 195) in such a manner as to result a lever system as a whole.

3. A bearing (100, 190, 200), according to claim 2, wherein the rotation of the eccentric pivot towards a direction of rotation causes an elastic deformation of the flexible element (200) around said fulcrum (210, 220) which, in operation, leads the end (201) of said element (200) to operate a clamping action on the stock rail and an opposite rotation releases said elastic deformation by placing the element (200) in a released condition. 5
4. A bearing, according to one or more of the preceding claims, wherein said support component (100) comprises a sliding surface (200) for allowing a blade (30) to slide in its approach/displacement motion to/from the stock rail (20), and wherein said housing (170, 180) is preferably positioned below the sliding surface (200) . 15
5. A bearing, according to one or more of the preceding claims, wherein said support component (100) further comprises said area (130) where the stock rail (20) is applied in operation. 20
6. A bearing, according to one or more of the preceding claims, wherein said fulcrum is obtained by a tooth (210) directly obtained on the backside of the element (200). 25
7. A bearing, according to one or more of the preceding claims, wherein the eccentricity of said pivot is obtained by means of a tooth (195) which branches off radially from the circumference of the pivot. 30
8. A bearing, according to one or more of the preceding claims, wherein said eccentric pivot provides an end thereof (196, 197) coming out from said housing. 35
9. A bearing, according to claim 8, wherein said end (197) is shaped in such a manner as to rotate it by means of specific tools, such as wrenches or similar ones. 40
10. A bearing, according to one or more of the preceding claims, wherein the flexible element (200) is metallic. 45
11. A bearing, according to one or more of the preceding claims, wherein the support component is a metallic tie plate for switch points.
12. A locking assembly (190, 200, 210, 220, 230) which can be applied to a support component (100) for realizing a switch point, said locking assembly comprising: 50
 - A flexible element (200), preferably laminar-shaped (200), arranged inside said housing (170, 180) of the support component, to which is assigned in operation; 55
- An eccentric pivot (190, 195), equipped with eccentricity (195) and configured for resulting insertable inside said housing (170, 180) of the support element to which is assigned in operation and mounted in rotatable manner with respect to said housing, in such a manner that a rotation of the eccentric pivot towards a direction places said element in a load condition.
13. A support component (100) for a switch point to which a locking assembly can be applied, as per claim 12, said support component (100) comprising a housing (170, 180) in which the element (200) can be inserted and having a transversal hole (181) intercepting at least in part said housing (170, 180) through which the eccentric pivot (190, 195) can be held.
14. A method for locking a stock rail (20) to a bearing for switch points, the bearing forming a housing (170, 180), the method providing the following operating phases:
 - Arrangement of an eccentric pivot (190, 195) inserted inside the housing, crossing it at least in part, through an access hole (181);
 - Arrangement of a flexible element, preferably laminar-shaped (200), which is inserted inside said housing (170, 180) through the opening (180), in such a manner that an end (201) thereof faces the stock rail and in such a manner that said end (201) of the flexible element is laying on the flange of the stock rail to be locked, the element (200) being arranged above the eccentric pivot (190, 195);
 - And wherein the locking is made by rotating the eccentric pivot in predetermined manner, such a pivot, through the eccentricity thereof, operating on the flexible element (200), by setting it in a load condition in which the end (201) operates a locking on the base of the stock rail.
15. A method for modifying a bearing for operating the locking of a stock rail (20) to the bearing, the bearing forming a housing (170, 180) for holding inside it a deformable elastic element (200), preferably laminar-shaped, and the housing thereof equipped with a rotating fulcrum, the method providing the operation of realization of a through conduit (181) upstream the rotating fulcrum on the tail of the deformable elastic element, the through conduit intercepting said housing (170, 180), and wherein it is provided the operation of arrangement of an eccentric pivot (190, 195) which is inserted through said transversal conduit (181) inside the housing (170, 180) crossing it at least in part, in such a manner as to be under the deformable elastic element at the tail thereof and such that the elastic deformation for operating the

locking is made by rotating the eccentric pivot in pre-determined manner, such a pivot, by means of the eccentricity thereof, operates on the tail and leads the elastic element (200) to rotate around the rotating fulcrum (210, 220) .

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FIG. 1

(Prior art)

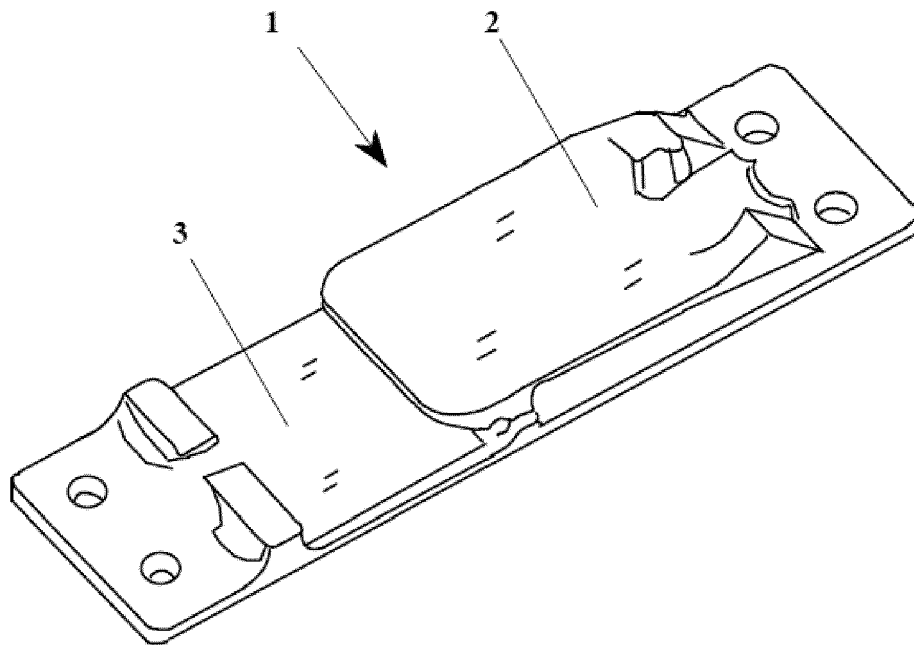


FIG. 2

(Prior art)

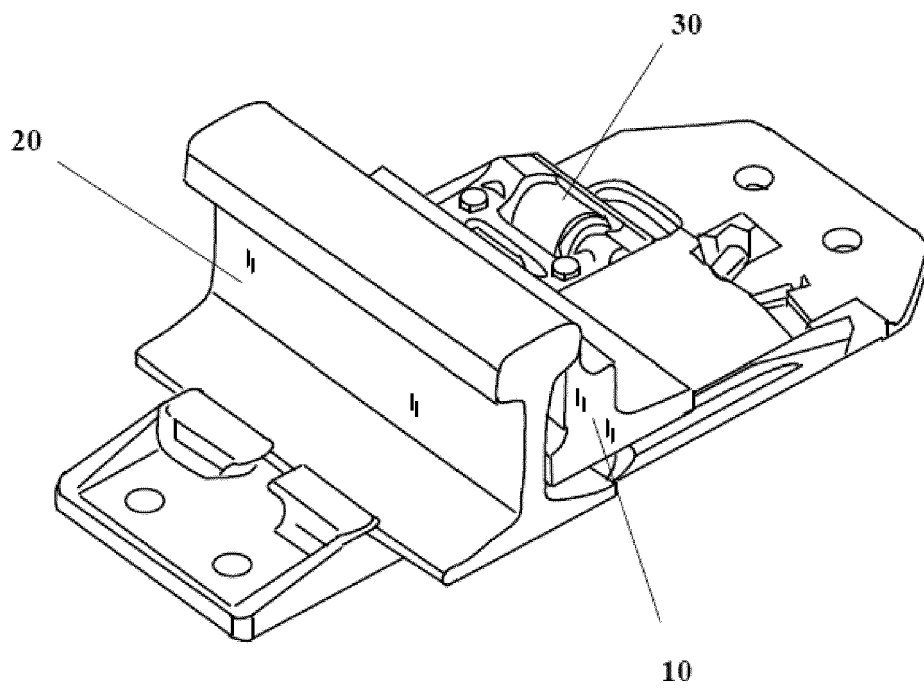


FIG. 3

(Prior art)

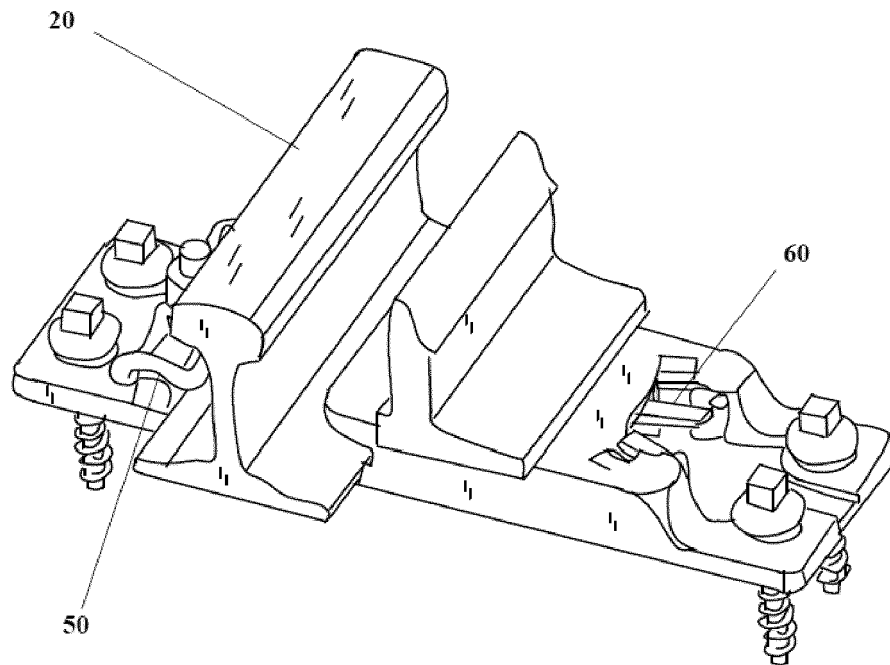


FIG. 4

(Prior art)

PHASE A

PHASE B

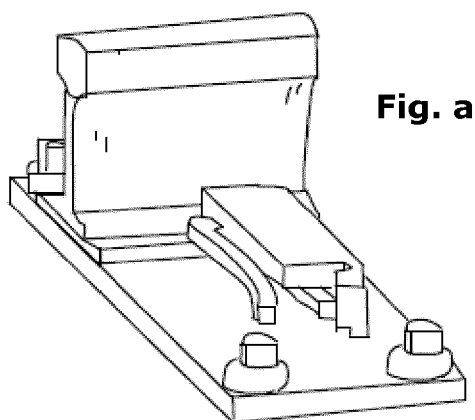


Fig. a

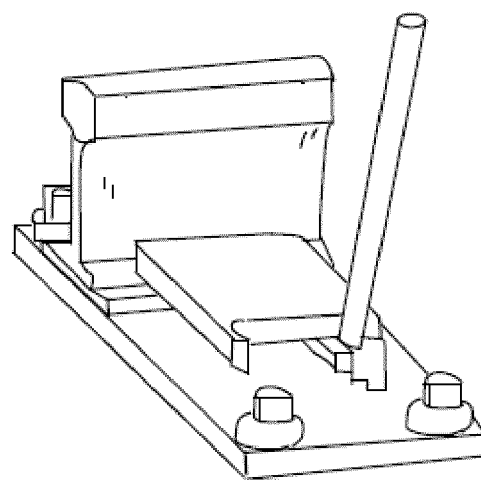


Fig. e

FIG. 5

(Prior art)

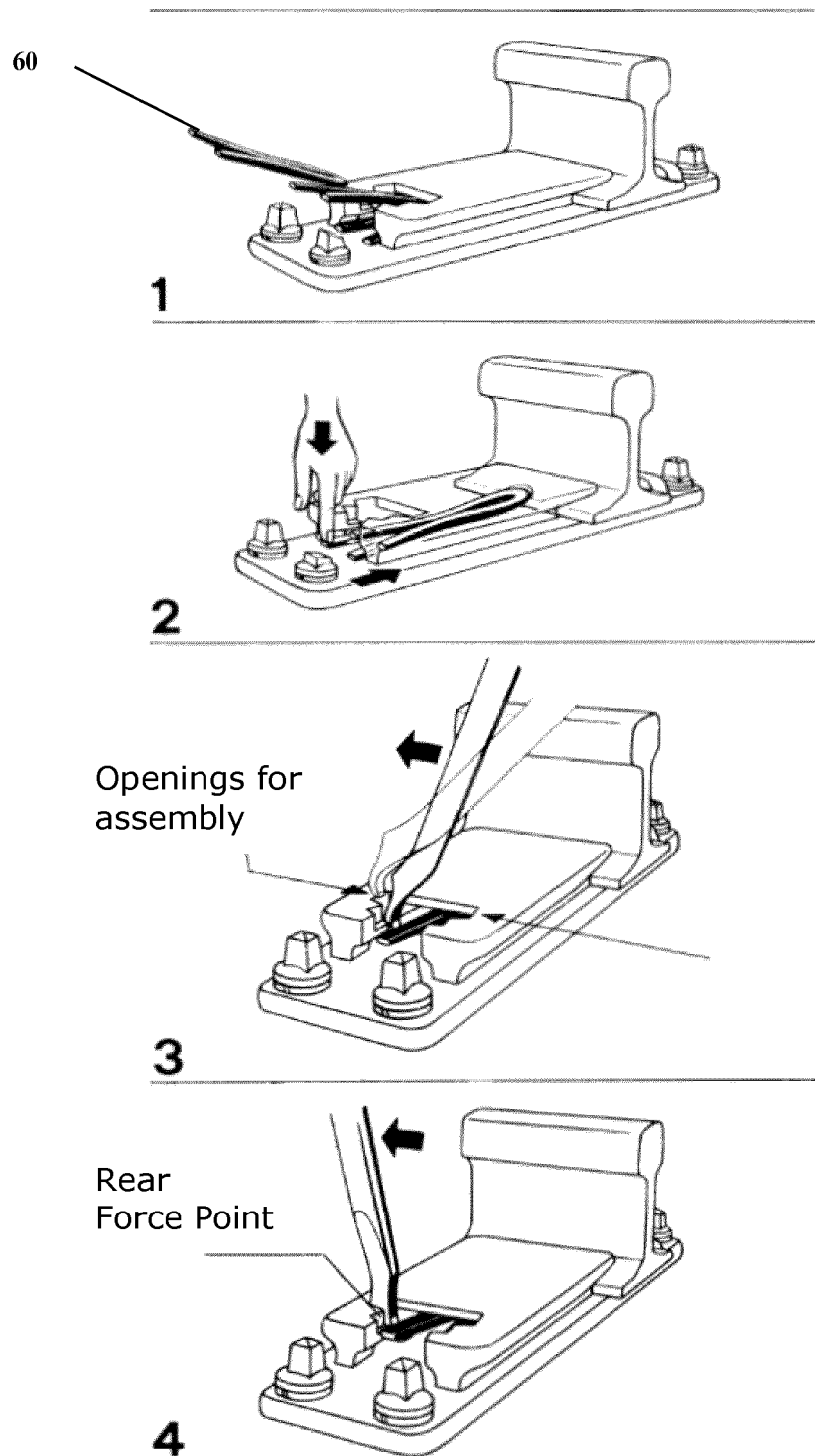


FIG. 6

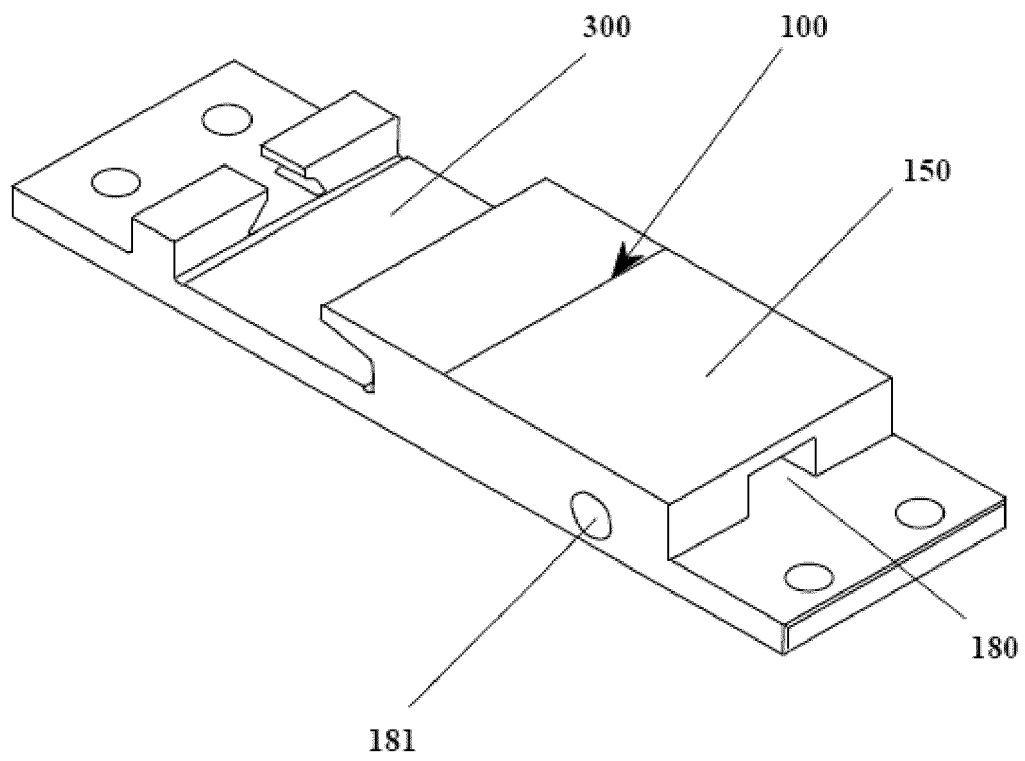


FIG. 7

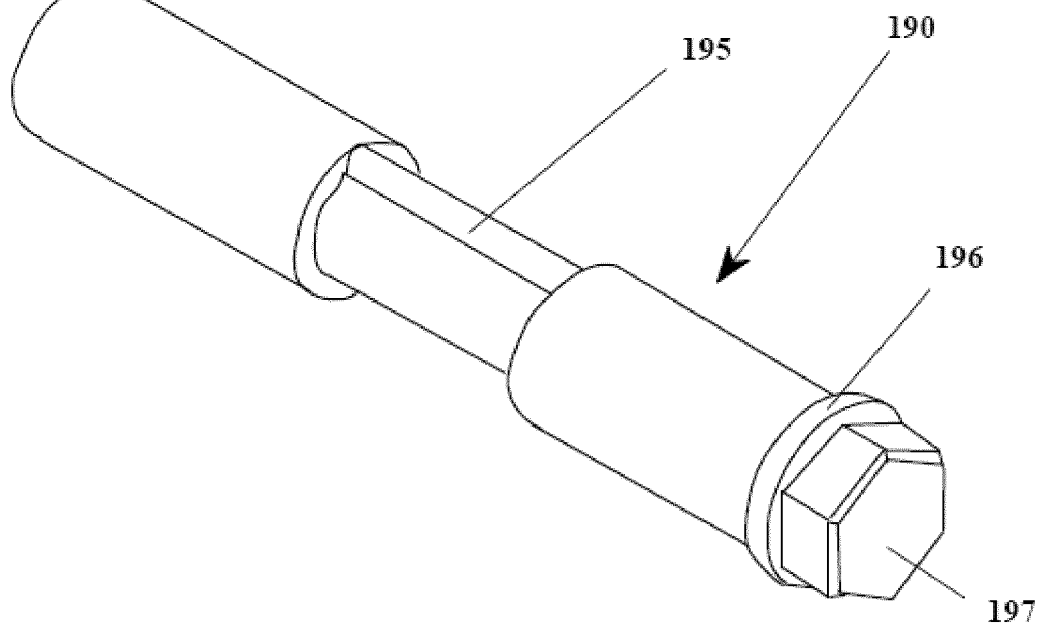


FIG. 8

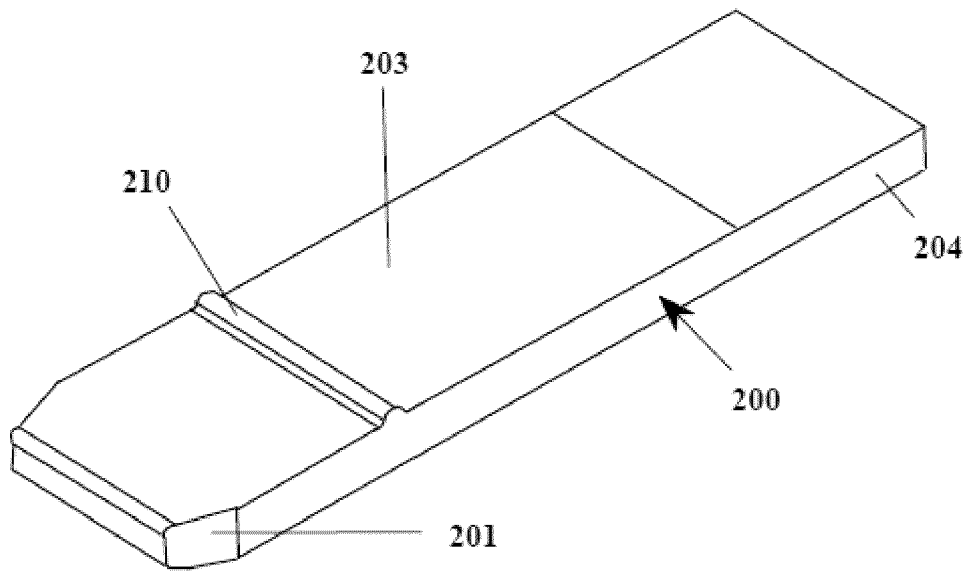


FIG. 9

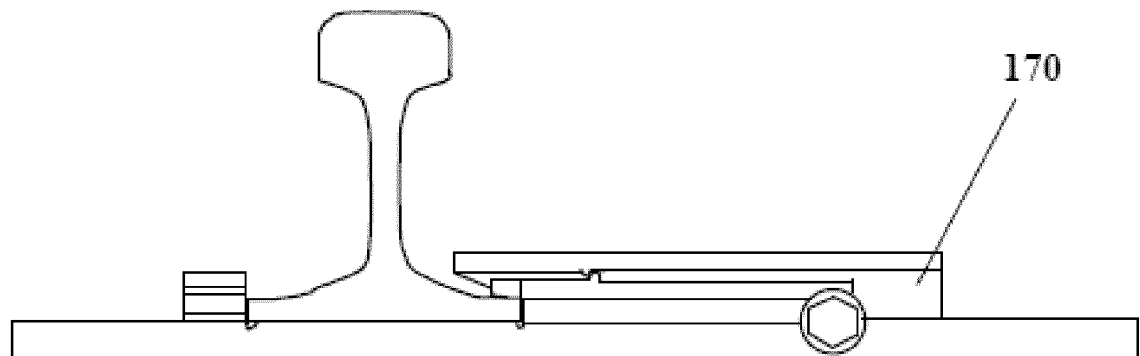


FIG. 10

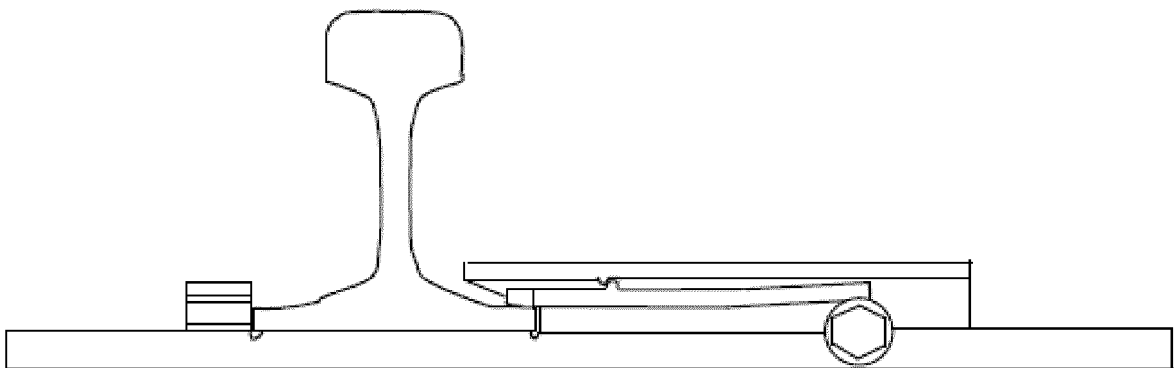


FIG. 11

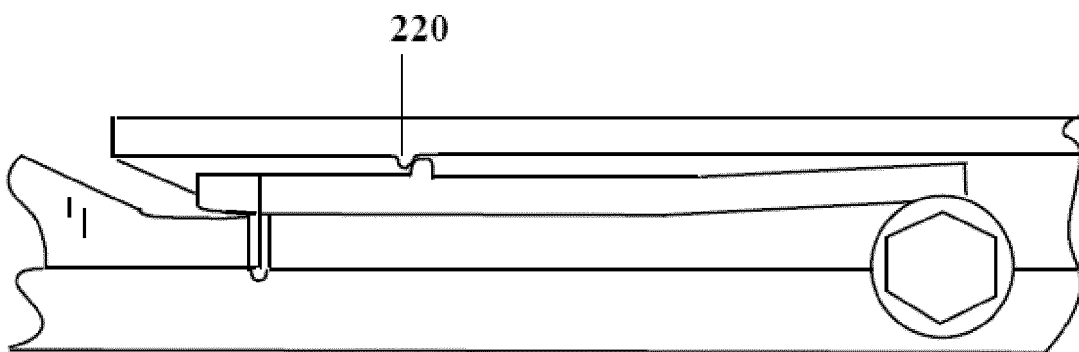


FIG. 12
Sec. A-A

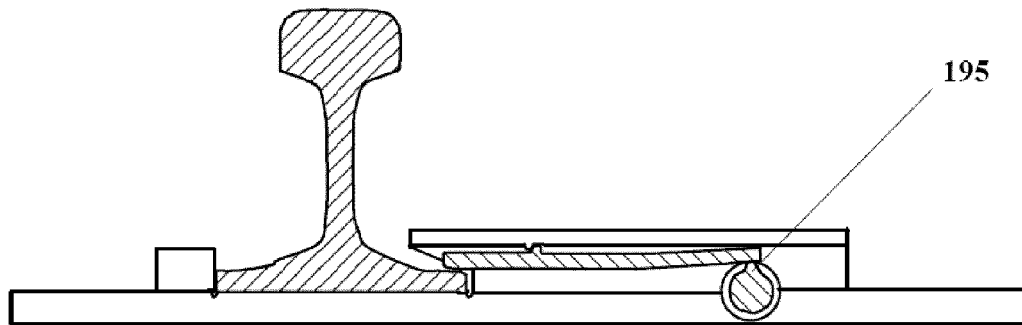


FIG. 13

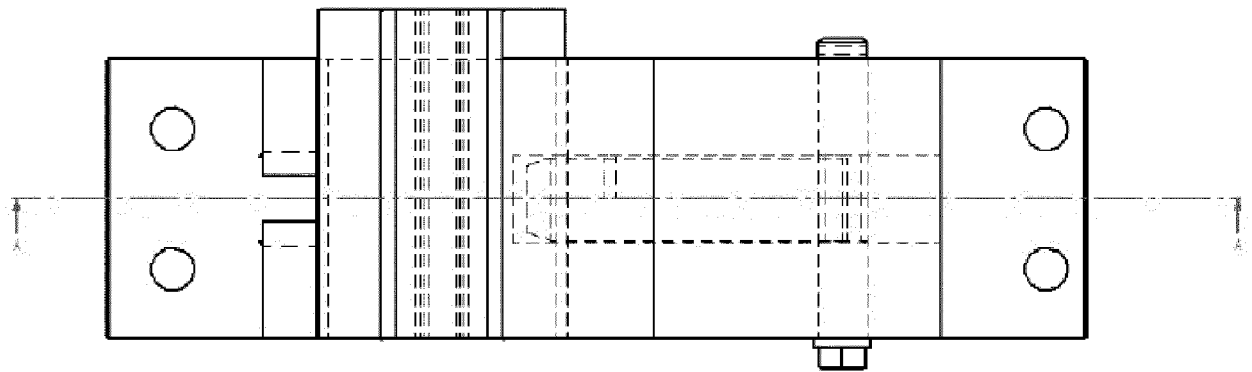
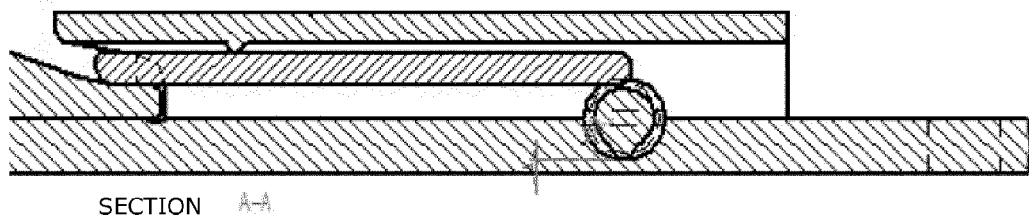


FIG. 14



**PARTIAL EUROPEAN SEARCH REPORT**

Application Number

under Rule 62a and/or 63 of the European Patent Convention.
This report shall be considered, for the purposes of
subsequent proceedings, as the European search report

EP 17 42 5107

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 488 979 A1 (SIEMENS SCHWEIZ AG [CH]) 22 December 2004 (2004-12-22) * paragraph [0008] - paragraph [0009] * * paragraph [0027] - paragraph [0029] * * figure 2 *	1-14	INV. B61L5/02 E01B7/26
A	DE 20 2012 103256 U1 (TRIPLE S GMBH [DE]) 2 December 2013 (2013-12-02) * paragraph [0027] - paragraph [0028] * * page 3 *	1-14	
A	CH 694 532 A5 (SCHWIHAG GMBH [CH]) 15 March 2005 (2005-03-15) * figures 1a,1b,2a,2b * * column 6, line 20 - line 45 *	1-14	
A	GB 2 417 508 A (SCHWIHAG GMBH [CH]) 1 March 2006 (2006-03-01) * abstract * * figures 1-5 *	1-14	
A	US 1 599 047 A (TOM HALL) 7 September 1926 (1926-09-07) * page 1, line 69 - line 100 * * figure 3 *	1-14	TECHNICAL FIELDS SEARCHED (IPC) B61L E01B

INCOMPLETE SEARCH

The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.

Claims searched completely :

Claims searched incompletely :

Claims not searched :

Reason for the limitation of the search:

see sheet C

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EPO FORM 1503 03.82 (P04E07)

Place of search	Date of completion of the search	Examiner
Munich	12 June 2018	Janssen, Axel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document		

**INCOMPLETE SEARCH
SHEET C**

Application Number

EP 17 42 5107

5

Claim(s) completely searchable:
1-14

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Claim(s) not searched:
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Reason for the limitation of the search:

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In reply to the invitation to indicate the claims on which the search is to be based, the applicant provided arguments to support multiple independent claims in the same category of claims.

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In his letter of 17.05.2018 he argued that claims 1, 12, 14 and 15 would comprise interrelated products being allowed under Rule 43 EPC, because they relate to intermediate products and a final product; and because they do not relate to chemical products.

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This argumentation could convince the examining division in regard to claim 12. However, this argumentation cannot be followed for claim 15, which relates to method for modifying a bearing for a railroad switch, which is clearly not an interrelated product. Thus, said claim 15 is not allowed under Rule 43 EPC.

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Thus, the search report has been drawn up on the basis of claims 1-14 (Rule 62a(1) EPC).

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 42 5107

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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12-06-2018

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1488979 A1	22-12-2004	AT 420010 T	15-01-2009
		AU 2004247348 A1	23-12-2004
		CA 2529568 A1	23-12-2004
		EP 1488979 A1	22-12-2004
		EP 1633617 A2	15-03-2006
		US 2007272803 A1	29-11-2007
		WO 2004110844 A2	23-12-2004

DE 202012103256 U1	02-12-2013	DE 202012103256 U1	02-12-2013
		EP 2890849 A1	08-07-2015
		ES 2637717 T3	16-10-2017
		HU E035602 T2	28-05-2018
		PL 2890849 T3	30-03-2018
		WO 2014032864 A1	06-03-2014

CH 694532 A5	15-03-2005	AT 404038 B	27-07-1998
		BE 1009023 A3	01-10-1996
		CA 2123038 A1	08-11-1994
		CH 694532 A5	15-03-2005
		CZ 9401127 A3	16-11-1994
		DE 4315200 A1	10-11-1994
		DK 52494 A	08-11-1994
		ES 2117906 A1	16-08-1998
		FI 942129 A	08-11-1994
		FR 2704875 A1	10-11-1994
		GB 2278383 A	30-11-1994
		HU 211369 B	28-11-1995
		IE 940376 A1	16-11-1994
		IT RM940289 A1	07-11-1994
		JP 3732534 B2	05-01-2006
		JP H07127002 A	16-05-1995
		LU 88479 A1	01-12-1994
		NL 9400728 A	01-12-1994
		NO 941695 A	08-11-1994
		PL 173950 B1	29-05-1998
		PT 101514 A	31-01-1995
		RO 112199 B1	30-06-1997
		RU 94015831 A	20-09-1996
		US 5562267 A	08-10-1996

GB 2417508 A	01-03-2006	NONE	

US 1599047 A	07-09-1926	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82