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(54) **A BRAKE ASSEMBLY FOR A BUFFER STOP, A BUFFER STOP COMPRISING THE BRAKE ASSEMBLY AND A METHOD**

(57) A brake assembly for a sliding buffer stop, the brake assembly comprising:

- a brake pad arrangement comprising:
 - a) a first block comprising a first face; and
 - b) a second block comprising a second face and a third face;

- two plates having clamping sections; and
- means for fastening the two plates to clamp said brake pad arrangement to a head of a rail track, such that:

i) the clamping sections can engage the bottom sections of the head; and

ii) the third face of the second block can engage a top section of the head and the first block can be supported by its first face on the second face of the second block;

wherein the second face is inclined with respect to the third face for guiding the first block upwardly relative to the head when said first block slides along the second face.

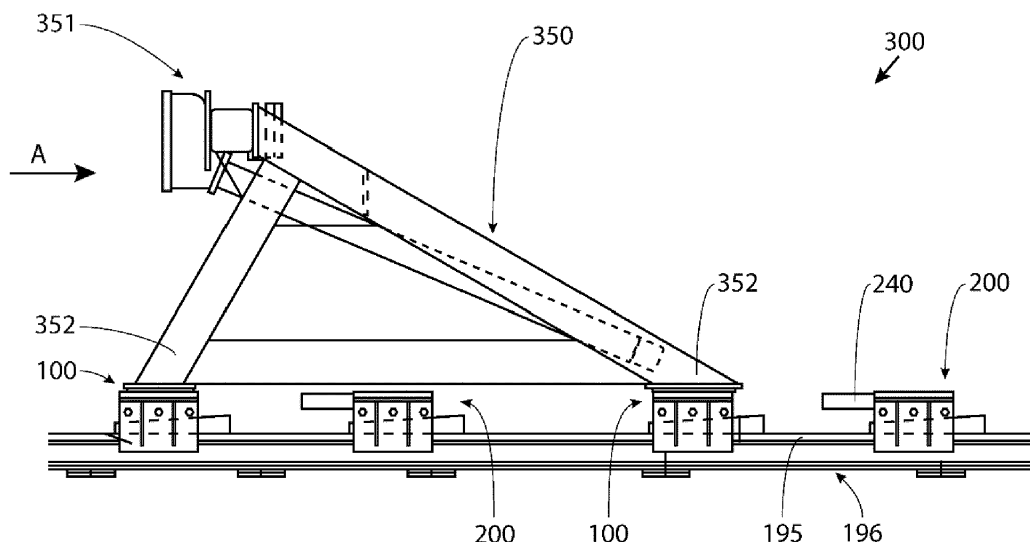


Fig. 3

Description**FIELD OF THE INVENTION**

[0001] The invention is in the field of sliding buffer stops and brake assemblies for a sliding buffer stop. 5

BACKGROUND OF THE INVENTION

[0002] Sliding buffer stops are known in the art. A sliding buffer stop comprises a buffer-structure for receiving an impact, and at least a brake assembly. The term buffer-structure will be referred merely as buffer. The buffer is clamped to a head of a rail track by the brake assembly. The brake assembly is arranged to dissipate energy of an impact against the buffer when the sliding buffer stop slides along the rail track. 10

[0003] US20020185345 discloses a brake assembly for a sliding buffer stop. The energy is dissipated by a stationary friction and a sliding friction provided by a brake pad of the brake assembly. The brake pad comprises a flat face for engaging a top section of a head of a rail track and two plates capable of being fastened to the brake pad by fastening means to clamp the brake pad to the head. When the brake pad is clamped, said brake pad can provide friction. 15

[0004] During a first phase after the impact, the sliding buffer stop acts as a barrier until the stationary friction provided by the brake pad is overcome. Then, the sliding buffer stop starts sliding along the head and the brake pad provides sliding friction. A problem of the above mentioned brake assembly is that both the stationary and sliding friction depends on the strength by which the plates are fastened to the brake pad. If the plates are fastened to tightly, the vehicle may suffer a big shock after impact. If the plates are not fastened enough, the sliding friction may be not good enough. 20

[0005] It is an object of the present application to alleviate the above mentioned problem. 25

SUMMARY OF THE INVENTION

[0006] A first aspect of the invention relates to a brake assembly for a sliding buffer stop, the brake assembly comprising: 30

- a brake pad arrangement comprising:
 - a) a first block comprising a first face; and
 - b) a second block comprising a second face and a third face; 50
- two plates, each of the plates comprising a clamping section; and
- means arranged for fastening the two plates to opposite sides of the brake pad arrangement to clamp said brake pad arrangement to a head of a rail track such that 55

- i) the clamping sections can engage bottom sections of the head; and
- ii) the third face of the second block can engage a top section of the head and the first block can be supported by its first face on the second face of the second block;

wherein for the second block, the second face is inclined with respect to the third face for guiding the first block upwardly relative to the head when said first block slides along the second face of the second block due to a movement of one of the first block, the second block or the two plates along a longitudinal direction of said head.

[0007] A second aspect of the invention relates to a sliding buffer stop comprising a buffer and a brake assembly arranged at the buffer for clamping said buffer to a head of a rail track, wherein the brake assembly corresponds to anyone of claims 1 to 7. 15

[0008] Finally, a third aspect of the invention relates to a method for providing a sliding buffer stop assembly, the method using a brake assembly comprising: 20

- a brake pad arrangement comprising:
 - a) a first block comprising a first face; and
 - b) a second block comprising a second face and a third face defined by a brake lining portion; 25

wherein the second face is inclined with respect to the third face 30

- two plates, each of the plates comprising a clamping section; and
- means arranged for fastening the two plates to opposite sides of the brake pad arrangement for clamping said brake pad arrangement to a head of a rail track; 35

wherein the method comprises the steps of: 40

- clamping the brake pad arrangement to a head of a rail track by fastening the two plates to the brake pad arrangement such that 45

- i) the clamping sections engages the bottom sections of the head arrangement; and
- ii) the third face of the second block can engage a top section of the head and the first block is supported by its first face on the second face of the second block; and 50

- arranging a buffer relative to the brake assembly for moving the first block relative to the second block when the buffer moves along a longitudinal direction of the head, such that said first block moves upwardly relative to the head. 55

DETAILED DESCRIPTION OF THE INVENTION

[0009] The first aspect of the invention concerns a brake assembly according to claim 1. Thus, the brake assembly is capable of providing a braking effect according to the force of the impact against a sliding buffer stop arranged for cooperating with said brake assembly.

[0010] The brake assembly according to the invention comprises a brake pad arrangement, two plates and fastening means. These components have been designed to cooperate together for allowing the brake assembly to be clamped to a head of a rail track when said brake assembly is in use. When the brake assembly is clamped, the two plates are fastened at opposite sides of the brake pad arrangement thanks to the means for fastening.

[0011] The brake pad arrangement comprises a first block and a second block. The first block comprises a first face and the second block comprises a second face and a third face.

[0012] The brake assembly has been designed such that when clamped to the head of the rail track, the first block is supported by its first face on the second face of the second block and such that the third face of the second block engages a top section of the head. In general the second block is supported on said head. Also, each of the two plates comprises a clamping section that engages a bottom section of a head of a rail track.

[0013] According to the invention, the second block is designed such that the second face is inclined relative to the third face. It is preferred that second block is wedge-shaped. Thus, the second face is capable of guiding the first block upwardly relative to the head when said first block slides relative to the second block along the second face. The sliding movement of the first block relative to the second block can be achieved due to a movement of at least one of the first block, the second block or the two plates along a longitudinal direction of the head. This is possible when any of these elements of the brake assembly is arranged for cooperating with the buffer of the sliding buffer stop such that when said sliding buffer stop slides after an impact, said force is also transmitted to said element. For example, any of said elements of the brake assembly may be arranged for being connected to a buffer, e.g. by using further fastening means, to provide a sliding buffer stop. In a different example, the brake assembly may be clamped detached from a sliding buffer stop in such a way that after an impact the brake assembly can receive said sliding buffer stop to provide additional braking effect, said braking element comprising a protruding element connected to said element for receiving the force transmitted by said sliding buffer stop.

[0014] As mentioned before, the two plates are fastened at opposite sides of the brake pad assembly. Therefore, as the first block moves upwardly, so do the two plates. Consequently the friction provided by the brake assembly increases, and said friction depends on the force of the impact against the sliding buffer stop. This is possible since the pressure that the clamping sec-

tions of the two plates applies to the bottom sections of the head increases. Further, since the brake pad arrangement is clamped against the head by the two plates, the third face engaging the top section of the head, once the first block starts moving upwards, the first block applies more force downwardly to the second block. Therefore, the pressure that said third face applies to the top section of the head also increases.

[0015] It is preferred that the third face of the second block further is defined by a brake lining portion in order to increase the friction that said second block can generate when in use. The brake lining portion may comprise any material suitable to provide friction suitable for the purpose of the brake assembly.

[0016] In an embodiment, each of the two plates comprises a brake lining portion arranged at the clamping section such that said brake lining portion can engage the bottom sections of the head when the plate is fastened. In this way, the friction provided by the brake assembly is increased. Further, the brake assembly is more effective when the pressure applied by the clamping sections of the two plates against the bottom sections of the head is increased.

[0017] In an embodiment, the brake pad arrangement is designed such that the whole first face is supported on the second face when said first block slides relative to the second block. In this way, the force that the first block applies to the second block is distributed better and the friction provided by the third face is more effective. The second block may comprise a stopper arranged for preventing the first block from slide out of the brake assembly when sliding along the second face of the second block. For example the second block may comprise tabs protruding from the second face.

[0018] In an embodiment, the first face and the second face are toothed faces. In this way, the first face of the first block and the second face of the second block cooperate to allow a progressive movement of the first block relative to the second block, and the risk of providing an explosive braking effect is reduced.

[0019] In an embodiment, the means are arranged for fastening the plates at opposite sides of the first block. In this way, the brake assembly can be clamped easily to the head of the rail track. This embodiment is especially important when said brake assembly is arranged to support a buffer stop (e.g. at foot portions of said buffer stop) to provide a sliding buffer stop.

[0020] In an embodiment, each of the plates has a further clamping section and wherein the first element has a roof-shaped section arranged for receiving the further clamping sections when the plates are fastened. In this way, the roof-shaped section directs the further clamping sections such that it is ensured that the clamping sections engage the bottom sections of the head correctly. Further, the pressure over the fastening means caused by the upwardly movement of the first block is in part transmitted to said roof-shaped section of the first block and, consequently, the risk of braking said means is reduce.

[0021] In an embodiment, the first block comprises a protruding section arranged for moving said first block relative to the second block when said protruding section is pushed. In this way, the brake assembly can be clamped detached of a sliding buffer stop to provide additional braking when said sliding buffer stop slides after an impact. In general, the protruding section protrudes from the first block along a longitudinal direction of the head of the rail track to which said brake assembly is clamped to receive a sliding buffer stop that slides along the rail track after having received an impact.

[0022] The second aspect of the invention concerns a sliding buffer stop according to claim 9. In this way, a sliding buffer stop having a braking effect according to the force of the impact against said buffer stop is provided. For example, a brake assembly according to the invention may be arranged at the foot portion by welding or fixing said foot portion to the first block. In a different example, one of the plates may be connected to the buffer and even to a plate of a further brake assembly of the sliding buffer stop to coordinate the braking effects of both brake assemblies.

[0023] The third aspect of the invention concerns a method for providing a sliding buffer stop assembly with a sliding braking effect according to claim 10. In this way, it is possible to improve a sliding buffer stop already known in the art.

[0024] This is possible when any of the first block, the second block or the two plates is arranged for being pushed by the buffer when said buffer moves along the rail tracks after an impact. The movement allows the first block to move upwardly relative to the second block and the head of the rail track to provide the braking effect according to the invention. For example, a buffer can be clamped to the heads of rail tracks by means of brake assembly according to the invention.

[0025] In a different example, the braking effect of a sliding buffer stop already known in the art can be improved by using at least a brake assembly according to the invention to provide a further braking effect to said sliding buffer stop. In this example, a sliding brake assembly according to the invention is clamped detached from said sliding buffer stop known in the art. The brake assembly is clamped such that it can receive said sliding buffer stop when the sliding buffer stop starts sliding after an impact. For example the brake assembly can be clamped behind a foot portion of the buffer of the sliding buffer stop at which said sliding buffer stop is clamped, and said brake assembly receives said foot portion after an impact, i.e. via a protruding section.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] For the purpose of illustrating the invention, the drawings show aspects of one or more embodiments of said invention. However, it should be understood that the present invention is not limited to the precise arrangements and instrumentalities shown in the drawings,

wherein:

Fig. 1 A and 1 B depict respectively a lateral view and a cross-sectional view of a first embodiment of a brake assembly according to the invention.

Fig. 2 depict respectively a lateral side view of a second embodiment of the brake assembly.

Fig. 3 depicts a lateral side view of a buffer stop assembly comprising the brake assemblies depicted in Fig 1 and 2.

DETAILED DESCRIPTION OF THE DRAWINGS

[0027] It should be noted that items which have the same reference numbers in different figures, have the same structural features and the same functions. Where the function and/or structure of such item has been explained, there is no necessity for repeated explanation thereof in the detailed description.

[0028] It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be able to design many alternative embodiments.

[0029] Figure 1A shows a lateral view of a first embodiment of a brake assembly 100 according to the invention. Figure 1 B shows a cross-sectional view across a plane I-B shown in figure 1A. The brake assembly 100 comprises a brake pad arrangement 110, two plates 120 and means 130 for fastening the brake pad arrangement 110 and the two plates 120 together.

[0030] As depicted in Figure 1A and 1 B, the brake assembly 100 is already clamped to a head 195 of a rail track 196 and ready for use. The clamping of the brake assembly 100 to the head 195 will be explained below.

[0031] The brake pad arrangement 110 comprises a first block 111 supported on a second block 112. In the present example both the first block 111 and the second block 112 comprise structural steel of grade S235J2W.

[0032] The first block 111 comprises two faces 115 and 115' symmetrically tapered along the longitudinal direction of said first block 111 to define a roof-shaped section, (see Figure 1 B) and a first face 116 by which said first block is supported on top of a second face 117 defined by the second block 120 (see Figure 1A). Both the first face 116 and the second face 117 are toothed-shaped faces.

[0033] The second block 112 further comprises a third face 118 defined by the brake lining portion 114 by which said second block 112 is supported on a top section of the head 195. The second block 120 is wedge-shaped and, therefore, the second face 117 is inclined relative to the third face 118 along the longitudinal direction of said second block 112 (see Figure 1A). In the present example the inclination is 50 °.

[0034] The first face 116 of the first block is also tilted relative to the two faces 115 and 115', and the inclination of said first face 116 is selected taking into account the wedge-shape design of the second block 112. In the

present example, when said first block 111 is supported on the second block 112, said second block being supported by the head 195, the two faces 115 and 115' are symmetrically tapered 14° relative to a horizontal plane and arranged transversely with respect to the longitudinal direction of the head 195.

[0035] As shown in Figure 1 B, each of the two plates 120 has a C-shaped cross section to define a clamping section 121 and a further clamping section 122. In the present example, the two plates 120 comprises structural steel of grade S235J2 and the clamping section 121 comprises a brake lining portion 123 comprising a material suitable to provide friction, i.e. bronze. The clamping section 121 and the further clamping section are symmetrically tapered 104° relative to the vertical.

[0036] The two plates 120 are fastened to the first block 111 at opposite sides by the means 130 such that the clamping sections 121 face bottom sections of the head 195 and the further clamping sections 122 face the two faces 115 and 115' of the first block 111.

[0037] In the present example, the means 130 comprise three sets of bolts 131, nuts 132 and spring washers 133. For each set, one bolt 131 is located within through-holes (not shown) arranged in the first block 111 and the two plates 120. The first block 111 and the two plates 120 can thus be fastened together by the cooperation of the bolt 131 with one nut 132 and one spring washer 133 arranged at one side of one of the plates 120 to provide lateral pressure to said plates 120 in order to ensure clamping.

[0038] The brake assembly 100 has been designed such that when the two plates 120 are fastened to the first block 111 by the means 130, the brake lining portions 123 engage the bottom sections of the head 195. Further, when fastened, the two plates 120 the clamping sections 122 also engage the two faces 115 and 115' of the first block 111. Thus, as the two plates 120 are being tightened, the two faces 115 and 115' guide said two plates 120 to ensure that the brake lining portions 123 engage the bottom sections of the head 195. In this way, clamping of the brake assembly 100 to the head 195 is achieved.

[0039] Figure 2 shows a second embodiment of a brake assembly 200. This brake assembly 200 only differs from the brake assembly 100 by a protruding section 240 arranged at the first block 111. The protruding section 240 protrudes parallel to the longitudinal direction of the head 195 between the two plates 120 when the brake assembly is clamped, and its function will be explained below.

[0040] The functioning of the brake assembly 100 and 200 is the same. When the brake assembly 100 or 200 is clamped, the brake pad arrangement 110 is among the two plates 120 and the top section of the head 195. In the present examples, the first block 111 is supported all along the first face 116 and is dimensioned relative to the second block 112 such that it is capable of sliding along the second face 117 when one of said first block 111, the second block 112 or the two plates 120 moves

in a direction A parallel to the longitudinal direction of said head 195. Thus, since the second block 112 is wedge-shaped, the first block 111 will slide relative to the second block by the cooperation of the first face 116 and the second face 117. This sliding movement causes that the first block 110 moves upwardly relative to the head 195.

[0041] When the brake assembly 100 or 200 is clamped, the brake lining portions 123 of the two plates 120 engage the bottom sections of said head 195. Since the first block 111 is fastened to the two plates 120, as the first block 110 moves upwardly, so do the two plates 120. Therefore, two dynamic braking effects are provided by the brake assembly 100 or 200.

[0042] The first dynamic braking effect is provided by the brake lining portions 123 arranged at the clamping sections 121. As the clamping plates 120 are moving upwardly, the pressure that these brake lining portions 123 applies to the bottom sections of the head 195 will increase as the first block 111 moves in the direction A. Thus, the friction that said brake lining portions 123 provide increases.

[0043] The second dynamic braking effect is provided by the second block 112. Since the brake pad arrangement 110 is clamped against the head 195 by the two plates 120 engaging the bottom sections of the head 195, once the first block 111 starts sliding along the second face 117, the first block 111 applies more force downwardly to the second block 112. Therefore, the friction that the brake lining portion applies to the top section of the head by the third face 118 also increases.

[0044] Since both the first face 116 and second face 117 are toothed-shaped faces, once the first block 111 start sliding relative to the second block 112 and the dynamic braking effects are also provided gradually.

[0045] A brake assembly capable of providing the dynamic braking effect can be achieved also within the scope of the claims with different embodiments. For example, if there is no brake linings portions 123 the arranged on the plates, the first dynamic effect is provided by the clamping sections 121. Thus said brake clamping portions 123 simply provide a surface with a higher friction coefficient.

[0046] Also, the means 130 can be arranged such the two plates 120 are fastened to the second block 112. In this embodiment the second block 112 moves relative to the first block 111 in the direction A. In order to provide the same dynamic braking effect, the brake pad assembly is clamped such that the inclination of the second face 117 goes down in that direction A.

[0047] Figure 3 shows a lateral side view of a sliding buffer stop assembly 300. The sliding buffer stop assembly 300 comprises, in the present example, a sliding buffer stop 350, and two brake assemblies 200.

[0048] The sliding buffer stop 350 comprises a buffer 351 for receiving impacts and four brake assemblies 100. In the present example, the buffer 351 comprises four foot portions 352 at which said buffer is welded to a top

section of the first block 111 of each of the brake assemblies 100. Thus, the sliding buffer stop 350 is supported on and clamped to the heads 195 of two rail tracks 196 by means of said brake assemblies 100. Further, opposite brake assemblies 100 clamped to the two rail tracks 196 are also connected to each other by beams (not shown) fastened to opposing plates 120 of said two brake assemblies 100.

[0049] When the buffer 351 receives an impact in the direction A, the first blocks 111 and the clamping plates 120 of the four brake assemblies 100 are moved in said direction, and the dynamic braking effects is provided to the sliding buffer stop 350.

[0050] As shown in Figure 3, a brake assembly 200 is clamped at each of the two rail track 196 in a rear position relative to the movement of the sliding buffer stop 350 in the direction A. In each of the brake assemblies 200, the protruding section 240 is arranged in such that it protrudes along the longitudinal of the head 195 towards the sliding buffer stop 350. Said two brake assemblies 200 are designed such that the protruding sections 240 are arranged at a height suitable for being pushed by the first blocks 111 of the rear brake assemblies 100 of the sliding buffer stop 350. Thus, when after an impact against the buffer 351 the sliding buffer stop 350 slides in the direction A along the rail tracks, the rear first blocks 111 of the two rear brake assemblies 100 will engage and push the first blocks 111 of these two brake assemblies 200 to provide further dynamic braking effect. In this way the braking capacity can be increased.

[0051] Finally, a dynamic braking effect can be provided to a sliding buffer stop known in the art by means of said brake assemblies 200.

Claims

1. A brake assembly (100, 200) for a sliding buffer stop, the brake assembly (100, 200) comprising:

- a brake pad arrangement (110) comprising:

- a) a first block (111) comprising a first face (116); and
- b) a second block (112) comprising a second face (117) and a third face (118);

- two plates (120), each of the plates (120) comprising a clamping section (121); and

- means (130) arranged for fastening the two plates (120) to opposite sides of the brake pad arrangement (110) for clamping said brake pad arrangement (110) to a head (195) of a rail track (196), such that:

- i) the clamping sections (121) can engage the bottom sections of the head (195); and
- ii) the third face (118) of the second block

(112) can engage a top section of the head (195) and the first block (111) can be supported by its first face (116) on the second face (117) of the second block (112);

wherein for the second block (112), the second face (117) is inclined with respect to the third face (118) for guiding the first block (111) upwardly relative to the head (195) when said first block (111) slides along the second face (117) of the second block (112) due to a movement of one of the first block (111), the second block (112) or the two plates (120) along a longitudinal direction of said head (195).

2. The brake assembly (100, 200) according to claim 1, wherein the second block comprises a wedge-shape.
3. The brake assembly (100, 200) according to claim 1 or 2, wherein each of the two plates (120) comprises a brake lining portion (123) arranged at the clamping section (121) such that said brake lining portion (123) can engage the bottom sections of the head (195) when the plate is fastened.
4. The brake assembly (100, 200) according to anyone of the previous claims, wherein the brake pad arrangement (110) is designed such that the whole first face (116) is supported on the second face (117) when said first block (111) slides relative to the second block (112).
5. The brake assembly (100, 200) according to anyone of the previous claims, wherein the first face (116) and the second face (117) are toothed faces.
6. The brake assembly (100, 200) according to anyone of the previous claims, wherein the means (130) are arranged for fastening the plates (120) to opposite sides of the first block (111).
7. The brake assembly (100, 200) according to anyone of the previous claims, wherein each of the plates (120) has a further clamping section (122) and wherein the first block (111) has a roof-shaped section (115, 115') arranged for receiving the further clamping sections (121) when the plates (120) are fastened.
8. The brake assembly (100, 200) according to anyone of the previous claims, wherein the first block (111) comprises a protruding section (240) arranged for moving said first block (111) relative to the second block (112) when said protruding section (240) is pushed.
9. A sliding buffer stop (350) comprising a buffer (351) and a brake assembly (100, 200) arranged at the

buffer (351) for clamping said buffer (351) to a head (195) of a rail track (196), wherein the brake assembly (100, 200) corresponds to anyone of claims 1 to 7.

10. A method for providing a sliding buffer stop assembly (300), the method using a brake assembly (100, 200) comprising:

- a brake pad arrangement (110) comprising:

- a) a first block (111) comprising a first face (116); and
- b) a second block (112) comprising a second face (117) and a third face (118),

wherein the second face (117) is inclined with respect to the third face (118);

- two plates (120), each of the plates (120) comprising a clamping section (121); and

- means (130) arranged for fastening the two plates (120) to opposite sides of the brake pad arrangement (110) for clamping said brake pad arrangement (110) to a head (195) of a rail track (196);

wherein the method comprises the steps of

- clamping the brake pad arrangement (110) to a head (195) of a rail track (196) by fastening the two plates (120) to the brake pad arrangement (110) such that

- i) the clamping sections (121) engages the bottom sections of the head (195); and
- ii) the third face (118) of the second block (112) can engage a top section of the head (195) and the first block (111) is supported by its first face (116) on the second face (117) of the second block (112); and

- arranging a buffer (351) relative to the brake assembly (100, 200) for moving the first block (111) relative to the second block (112) when the buffer (351) moves along a longitudinal direction of the head (195), such that said first block (111) moves upwardly relative to the head (195).

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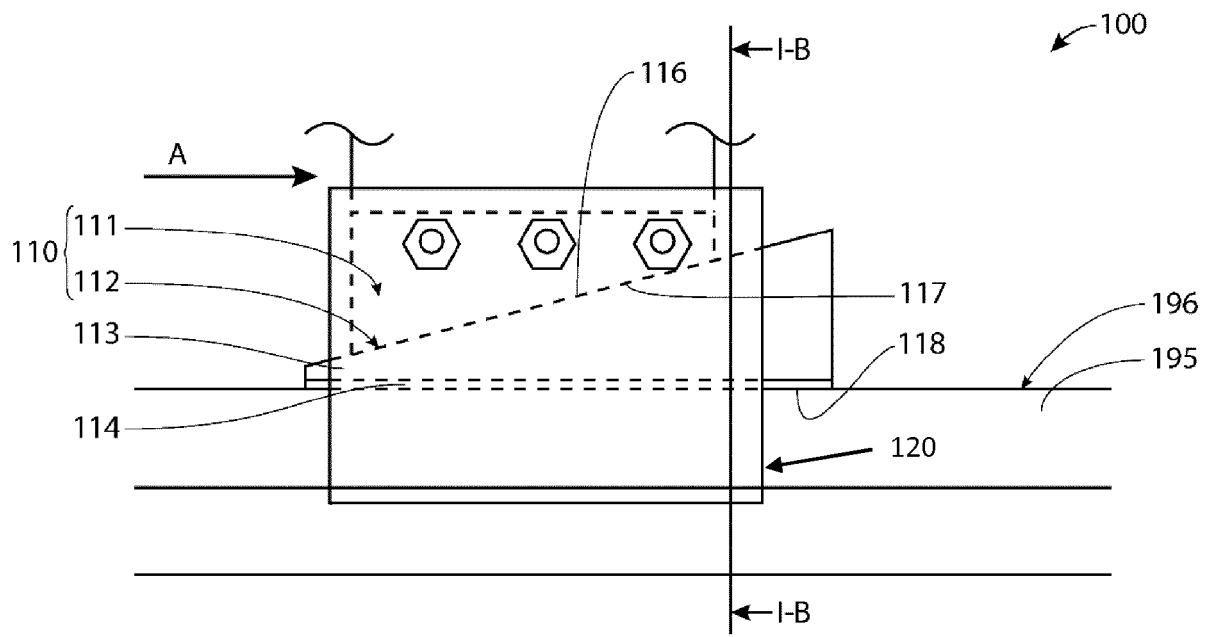


Fig. 1A

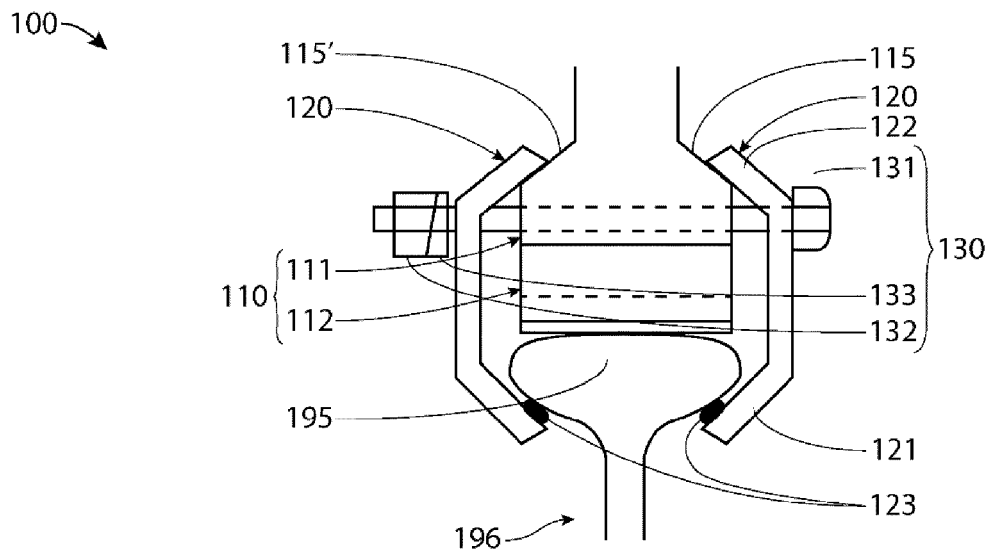


Fig. 1B

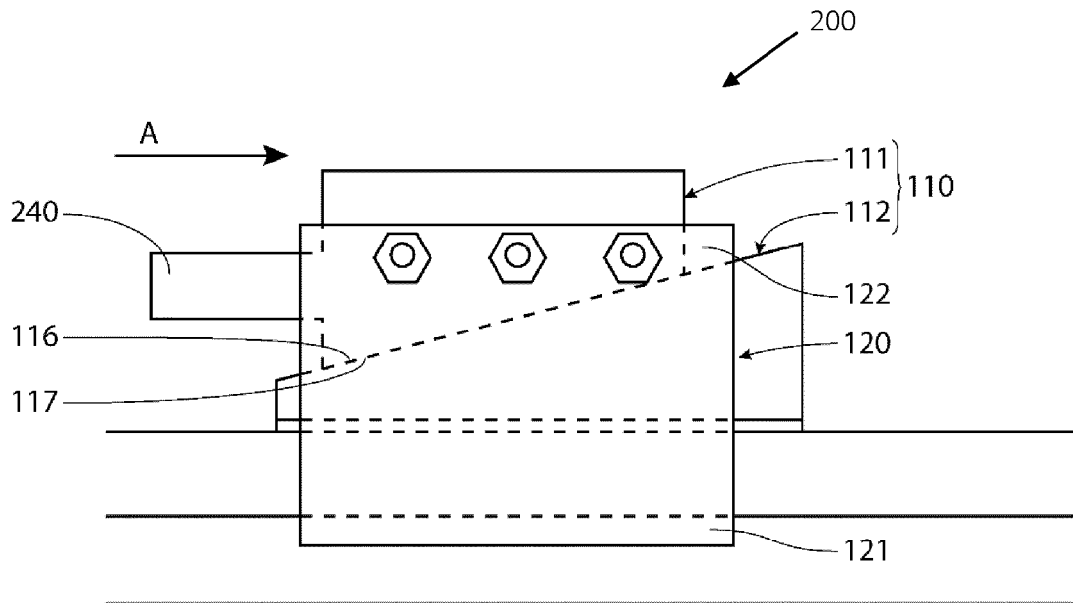


Fig. 2

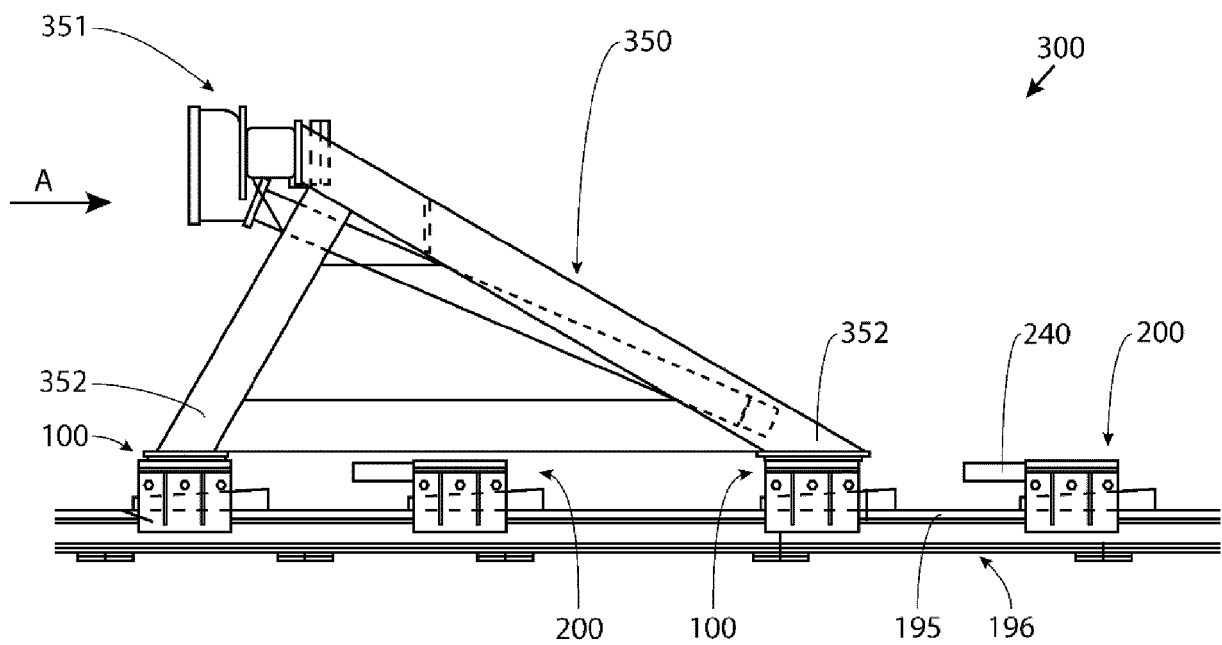


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 16 15 4122

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			TECHNICAL FIELDS SEARCHED (IPC)
			B61K
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 July 2016	Examiner Awad, Philippe
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EPO FORM 1503 03/82 (P04C01)

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

EP 16 15 4122

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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25-07-2016

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