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(54) **SUPPORT OF A REST BASEPLATE FOR AT LEAST ONE RAIL**

(57) A support of a rest baseplate of at least one rail of a railway track, in operating configuration, said support (1) comprising:

- two bases (2, 3) between which it extends in height;
- a lateral flank (23) interposed between the two bases;
- compressible means (4) identifying a compartment (5)

destined to receive a consolidation material; said compressible means (4) enabling a compressibility in height of said support (1);

- an inlet (6) of the consolidation material destined for the compartment (5), said inlet (5) being accessible from outside.

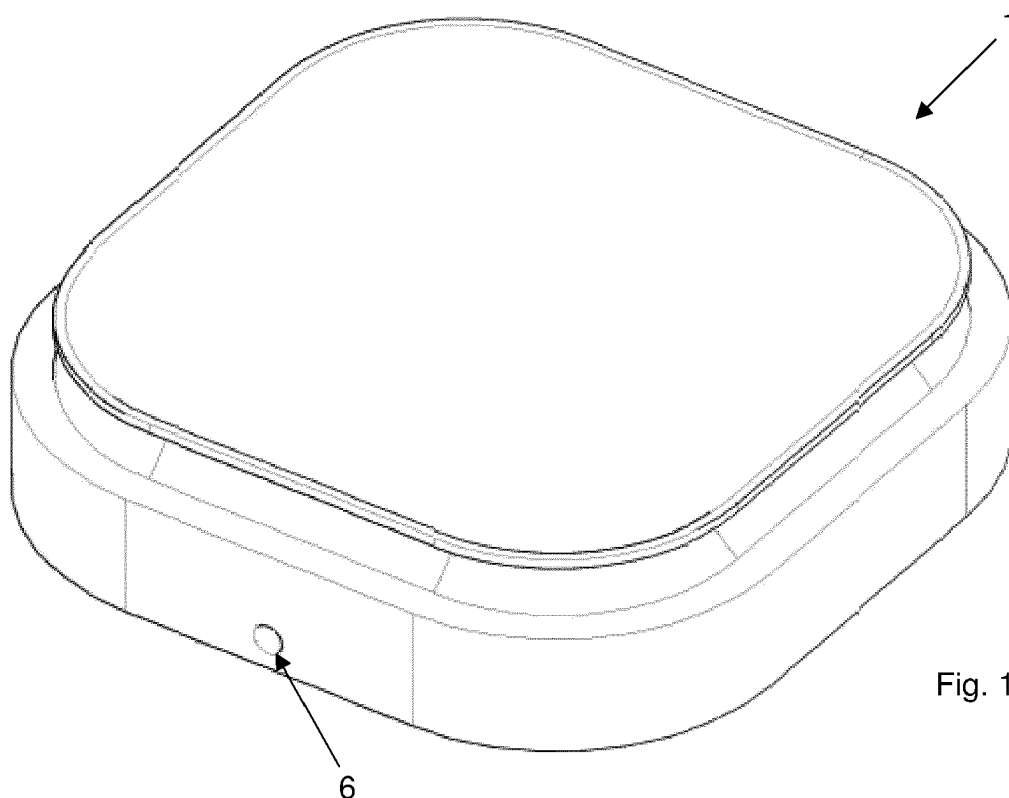


Fig. 1

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Description

[0001] The present invention relates to a support of a rest baseplate for at least one rail, a railway track comprising said baseplate and a method for temporarily supporting a rest baseplate of at least one rail in operating configuration.

[0002] It finds application in particular in a non-ballasted Slab Track System (known in the sector also as STS).

[0003] A system applied in the construction of the first non-ballasted railway tracks is known. It consists of a prefabricated platform in prestressed and vibrated reinforced concrete which is bedded on a reinforced concrete foundation. This foundation is cast on site, develops like a ribbon in the direction of the railway path and has cylindrical compartments at regular intervals. Stoppers integral with the prefabricated platform described above are fitted into said compartments.

[0004] A hollow space, with an average thickness equal to 5 cm, between the platform and the foundation, was filled, through an in situ injection process, with a mixture of cement-asphalt mortar charged with sand and fibres.

[0005] Although said system has proved to be a valid solution, cases of deterioration of the cement-asphalt mortar have still been detected, with probable origin due to phenomena of alkali-silica reactions. Consequently, the appearance and expansion of cracks were detected.

[0006] The cracks thus created allow rainwater and infiltration waters, present in the vicinity of the bedding layer, to flow inside them, generating overpressure when trains pass. This often resulted in the expulsion of portions of the bedding layer from the hollow space. In some cases the phenomenon has reached alarming levels with consequent modification of the rest conditions of the platform.

[0007] Therefore, the object of the present invention is to propose a support of a rest baseplate of at least one rail, a railway track comprising said baseplate and a method for temporary supporting a rest baseplate of at least one rail (in operating configuration) which allows facilitating maintenance interventions on the STS sections as well as the realisation of new STS tracks.

[0008] The specified technical task and the specified purposes are substantially achieved by a support of a rest baseplate of at least one rail, a railway track comprising said baseplate and a method for temporary supporting a rest baseplate of at least one rail (in operating configuration) comprising the technical characteristics set out in one or more of the attached claims.

[0009] Further characteristics and advantages of the present invention will become more apparent from the following indicative and therefore nonlimiting description of what is illustrated in the appended drawings, in which:

- figures 1, 2, 3 show respectively in perspective, plan and side views a support according to the present invention;

- figure 4 shows a railway track according to the present invention;
- figures 5, 6, 7, 8 show steps of a method according to the present invention;
- figure 9 shows the support of figures 1, 2, 3 in two distinct configurations.

[0010] In the accompanying figures, the reference number 1 indicates a support of a rest baseplate of at least one rail of a railway track. Said support can be suitably used with the railway track in operating configuration, i.e. when the railway track is open to the passage of train sets. This support 1 is suitably pre-fabricated. In the preferred solution the support 1 comprises two bases 2, 3. Said two bases 2, 3 suitably define a lower zone (preferably superficial) and an upper zone (preferably superficial) of the support 2. For example, as shown in figure 3, the base 3 can define a platform 410 better defined hereinafter. They are therefore integrated in the support 1. The support 1 suitably extends in height between the two bases 2, 3. The support 1 also comprises a lateral flank 23. The lateral surface 23 extends between and connects the two bases 2, 3.

[0011] The support 1 comprises compressible means 4. They identify a compartment 5 destined to receive a consolidation material 13.

[0012] The compressible means 4 can be defined as flexible means. They allow a compressibility in height of the support 1. They therefore allow an approach between the two bases 2, 3. This allows a correct height adjustment of the overlying rail (or track) during the step of realisation of a new railway track or during restoration and maintenance interventions of an existing railway track.

[0013] The support 1 comprises/defines an inlet 6. Said inlet 6 comprises or coincides with a hole 6. The inlet 6 is accessible from outside of the support 1. Preferably the inlet 6 is afforded on the lateral flank 23. Suitably, the inlet 6 allows the insertion of the consolidation material 13 into the compartment 5. The inlet 6 could be occludable for example by means of a plug or have a one-way valve that regulates the passage.

[0014] The support 1 comprises a body 7 to which said compressible means 4 are connected. One of said two bases 2, 3 is afforded/integrated in the body 7 (in particular it is the lower base). Another of said two bases 2, 3 is afforded/integrated in the compressible means 4 (in particular it is the upper base). The body 7 is suitably a single monolithic body, but it could possibly be an assembly. For example, it could be a quadrilateral-based prism with sides joined together.

[0015] The body 7 is suitably a pedestal. The compressible means 4 are connected thereto. Suitably, the pedestal is made of rigid material (in any case more rigid than the compressible means 4). In particular, the body 7 comprises a (or is made of) resin, advantageously epoxy.

[0016] In the preferred solution, the compressible

means 4 comprise a bellows 40. It comprises a plurality of folding lines. In this way the bellows 40 allows the compressibility in height of the support 1. The support 1 suitably comprises an upper roof 41. Suitably, the compressible means 4 are for example integrated in the roof 41. The compressible means 4 can for example define an upper roof 41 of the support 1. In particular, the bellows 40 can affect a flank of the roof 41. The upper roof 41 also comprises an upper platform 410 advantageously supported by the bellows 40. The platform 410 is an upper surface of the compressible means 4. In particular, the platform 410 defines one of the two bases 2, 3 described above. Said platform 410 is suitably also made of flexible material. The platform 410 is suitably flat and horizontal. Therefore, the roof 41 suitably comprises the bellows 40 and the platform 410.

[0017] A perimeter edge of the bellows 40 fits in the body 7. An interface zone 70 between the body 7 and the compressible means 4 is sealed. This prevents the consolidation material 13 from outflowing (through the interface zone 70) from the compartment 5 introduced therein through the inlet 6.

[0018] The platform 410 is destined to come into contact with the rest baseplate of the rail(s) of the railway track. Suitably, the compressible means 4 define a single (monolithic) piece. It is therefore not divisible except by breaking it. For example, the compressible means 4 are made of elastomeric material (typically rubber).

[0019] The support 1 comprises a conduit 8 which connects the inlet 6 and the compartment 5. The conduit 8 is at least partially afforded in said body 7.

[0020] The conduit 8 comprises a curved section. In particular, it comprises at least one elbow section. In particular, the conduit 8 comprises an initial section (which is preferably substantially horizontal), a final section (which is preferably substantially vertical or oriented from the top to the bottom) and said elbow section which connects the initial section and the final section. The conduit 8 extends as a hollow conduit delimited by the body 7. In particular, a surface that delimits the conduit 8 is part of the same single monolithic body comprising a surface of the body 8 in which the inlet 6 is afforded.

[0021] Suitably, the compartment 5 is a closed compartment. In particular, the compartment 5 comprises a single opening (which is suitably located at the end of the conduit 8). It allows the introduction of elastomeric material into the compartment 5. However, there is no further opening for the exit of said elastomeric material from the compartment 5. The compartment 5 is delimited at the top by said roof 41, in particular by the platform 410. The compartment 5 can be delimited laterally by said bellows 40. The compartment 5 can be delimited at the bottom by the body 7. In particular, the compartment 5 is delimited at the bottom by a flooring in which an outlet of the conduit 8 is afforded.

[0022] An object of the present invention is also a railway track 10. Said railway track 10 suitably comprises a rest baseplate 11 of one or more rails (as already men-

tioned previously in the description of the support 1). A segment of track defined by two rails is suitably installed on said baseplate 11.

[0023] The railway track 10 also comprises a foundation 12 underlying the baseplate 11. The distance between the baseplate 11 and the foundation 12 is generally variable along the railway path.

[0024] The railway track 10 further comprises at least one support 1 having one or more of the characteristics described above with reference to the support 1. The support 1 is in fact located between the baseplate 11 and the foundation 12 to distance the baseplate 11 and the foundation 12. Suitably, the baseplate 11 is a plate. Suitably, the baseplate 11 is made of concrete, preferably reinforced concrete, even more preferably prestressed reinforced concrete. Suitably, the foundation 12 is made of concrete, preferably of reinforced concrete.

[0025] The railway track 10 also comprises a consolidation material 13 located in the compartment 5. The consolidation material 13 is suitable for hardening over time. For example, the consolidation material 13 could be or comprise a resin (for example epoxy). Therefore the support 1 is able to transfer a stress due to the weight of the baseplate and to external loads (for example a train set in transit along the track) to the foundation.

[0026] Preferably, the railway track 10 comprises a bedding layer 14 in which the support 1 is buried. The bedding layer 14, at least at the support 1, occupies a hollow space 15 between the baseplate 11 and the foundation 12. Preferably, the railway track 10 comprises a plurality of supports having one or more of the characteristics described for the support 1.

[0027] Said supports 1 extend in succession interposed between the baseplate 11 and the foundation 12. Suitably, more than one of said supports 1 are buried in the same layer 14 of the consolidation material 13.

[0028] Advantageously, the supports 1 are arranged along one or more rectilinear rows which follow a direction of extension of the rail/track.

[0029] Typically the supports 1 are arranged along two parallel rows between the baseplate 11 and the foundation 12.

[0030] However, it should be recalled that the main function of the support 1 is linked to the possibility of transferring the stress from the baseplate 11 to the foundation 12 before the support 1 is incorporated into the bedding layer 14 (typically this can happen during an intermediate step of the realisation/maintenance process of the railway track 10).

[0031] Suitably, a plurality of height adjustment bars can be used before positioning the support 1 or supports between the baseplate 11 and the foundation 12. The height adjustment bars suitably cross the support from side to side and rest on the foundation 12. The height adjustment bars are preferably threaded and interact with a corresponding nut screw inside the baseplate 11 (the height adjustment bars are therefore for example height adjustment screws 110). They therefore allow the dis-

tance between the baseplate 11 and the foundation 12 to be adjusted.

[0032] An object of the present invention is also a method for supporting a rest baseplate of at least one rail (suitably the baseplate acts as a rest for a track), also in operating configuration (i.e. the passage of a train set along said at least one rail).

[0033] The method comprises the step of positioning at least one support 1 having one or more of the characteristics described above between said baseplate 11 and an underlying foundation 12 (see for example figure 5).

[0034] This can happen:

- interposing the support 1 between the baseplate 11 and the foundation 12 already laid (typically in the case of maintenance of an existing railway track 10 and which does not include the replacement of the baseplate 11 and the foundation 12; in this case it may be necessary to remove the cracked bedding layer located between the baseplate 11 and the foundation 12); or
- resting the support 1 on the foundation 12 and then positioning the baseplate 11 thereon (typically in the case of realisation of a new section of a railway track 10 or in the case of maintenance interventions requiring the removal of the baseplate 11).

[0035] The compressibility in height of the support 1 is exploited to position the support 1 between the baseplate 11 and the foundation 12. If the support 1 is inserted between the baseplate 11 and the foundation 12, it will then be compressed in height to allow it to be inserted in a space between the two. The distance between the baseplate 11 and the foundation 12, which is variable along the path, is imposed by the height adjustment of the rail which takes place by means of one or more height screws 110.

[0036] If the support 1 is placed on the foundation 12 and then the baseplate 11 is placed on the same foundation 12, by means of the screws 110, the adjustment always follows the height path of the rail sliding plane. Depending on the distance created between the foundation 12 and the baseplate 11 there is a greater or lesser compression of the compressible means 4.

[0037] The method further comprises the step of introducing a consolidation material 13 inside said compartment 5, making it transit through the inlet 6 (and suitably the conduit 8). In this regard, see for example figure 6.

[0038] As for example previously mentioned, the step of introducing the consolidation material 13 inside the compartment 5 takes place after adjusting the vertical distance between the foundation 12 and the baseplate 11 (and with the support 1 interposed between the baseplate 11 and the foundation 12). The step of introducing the consolidation material 13 into the compartment 5 takes place with the two bases 2 and 3 of the support which contemporaneously contact one the baseplate 11 and the other one the foundation 12. The step of intro-

ducing the consolidation material 13 preferably takes place after creating a depression from a containment tank. An injection tube 60 is suitably placed between the tank and the inlet 6. The consolidation material 13 hardens in the compartment 5. In particular, the material 13 is introduced in a non-solid form (for example in a fluid form even though this material has a certain viscosity) and then hardens in the compartment 5 (acquiring a solid form). The injection tube 60 is removed after introducing the consolidation material 13 inside the compartment 5 (suitably this material remains and also solidifies inside the conduit 8). In this regard, see for example figure 7.

[0039] The method comprises a step of height adjustment of the rail, positioning it at a distance between the baseplate 11 and the foundation 12. Typically this distance is not predetermined. This adjustment causes the rail (or rather the track) to follow the correct path (and not to be higher or lower). Suitably, the adjustment step takes place before introducing the consolidation material 13 inside the compartment 5. This can take place for example by means of a height screw 110. For example, said screw 110 crosses the baseplate 11 and has one end resting on the foundation 12.

[0040] The method also comprises the step of making the consolidation material 13 placed in the compartment 5 harden (suitably the hardening of the consolidation material 13 provides for waiting the necessary time without carrying out particular operations). In this way the support 1 will be able to carry out a rest action of the baseplate 11. After the consolidation material 13 placed in the compartment 5 has hardened, the height adjustment screw 110 can be removed or in any case moved away from the foundation 12 (see figure 8).

[0041] The method further comprises the step of applying a bedding layer 14 between the baseplate 11 and the underlying foundation 12. The step of applying a bedding layer 14 takes place after the step of introducing the consolidation material into the compartment 5. In particular, the step of applying a bedding layer 14 takes place after the hardening of the consolidation material 13 previously introduced into the compartment 5.

[0042] Furthermore, the method comprises a step of filling, at least in a zone surrounding said support 1, a hollow space 15 between the baseplate 11 and the foundation 12. In this way the support 1 is buried in the bedding layer 14. Suitably, but not necessarily, the bedding layer 14 is made of the same material (consolidation material 13) introduced inside the compartment 5. Suitably, the consolidation material 13 introduced inside the compartment 5 is the same material used for the realisation of the body 7. It is preferably an epoxy resin.

[0043] The present invention achieves important advantages.

[0044] First of all, it allows obtaining an optimal support of the rest baseplate in operating configuration (i.e. also in a configuration in which the railway track is open to train set traffic) or during the installation of the railway track 10 or during maintenance interventions that provide

for the replacement of the bedding layer.

[0045] In particular, the use of supports according to the present invention constitutes a reliable solution which at the same time allows optimizing costs. Installation is also very easy as it does not require measuring the distances between the foundation 12 and the baseplate 11. The support 1 can also be made in series.

[0046] The invention as it is conceived is susceptible to numerous modifications and variants, all falling within the scope of the inventive concept characterised thereby. Furthermore, all the details can be replaced with other technically equivalent elements. In practice, all the materials used, as well as the dimensions, can be any whatsoever, according to need.

Claims

1. A support of a rest baseplate of at least one rail of a railway track, said support (1) comprising:

- two bases (2, 3) between which it extends in height;
- a lateral flank (23);
- compressible means (4) identifying a compartment (5) destined to receive a consolidation material; said compressible means (4) enabling a compressibility in height of said support (1);
- an inlet (6) of the consolidation material destined for the compartment (5), said inlet (6) being accessible from outside.

2. The support according to claim 1, **characterised in that** it comprises a body (7) to which said compressible means (4) are connected; one of said two bases (2, 3) being integrated in the body (7) and one being integrated in said compressible means (4).

3. The support according to claim 2, **characterised in that** it comprises a conduit (8) which connects said inlet (6) and said compartment (5); said conduit (8) being at least in part afforded in said body (7).

4. The support according to any one of the preceding claims, **characterised in that** said inlet (6) is afforded on the lateral flank (23).

5. A railway track comprising:

- a rest baseplate (11) of at least one rail;
- a foundation (12) underlying the baseplate (11);
- at least one support (1) according to any one of claims from 1 to 4 positioned between the baseplate (11) and the foundation (12) to distance the baseplate (11) and the foundation (12);
- a consolidation material (13) located in said

compartment (5), said consolidation material (13) being suitable to harden over time.

6. The track of claim 5, **characterised in that** it comprises a bedding layer (14) in which the support (1) is buried; said bedding layer (14), at least at said support (1), occupying a hollow space (15) between the baseplate (11) and the foundation (12).

7. A method for supporting a rest baseplate of at least one rail, comprising the steps of:

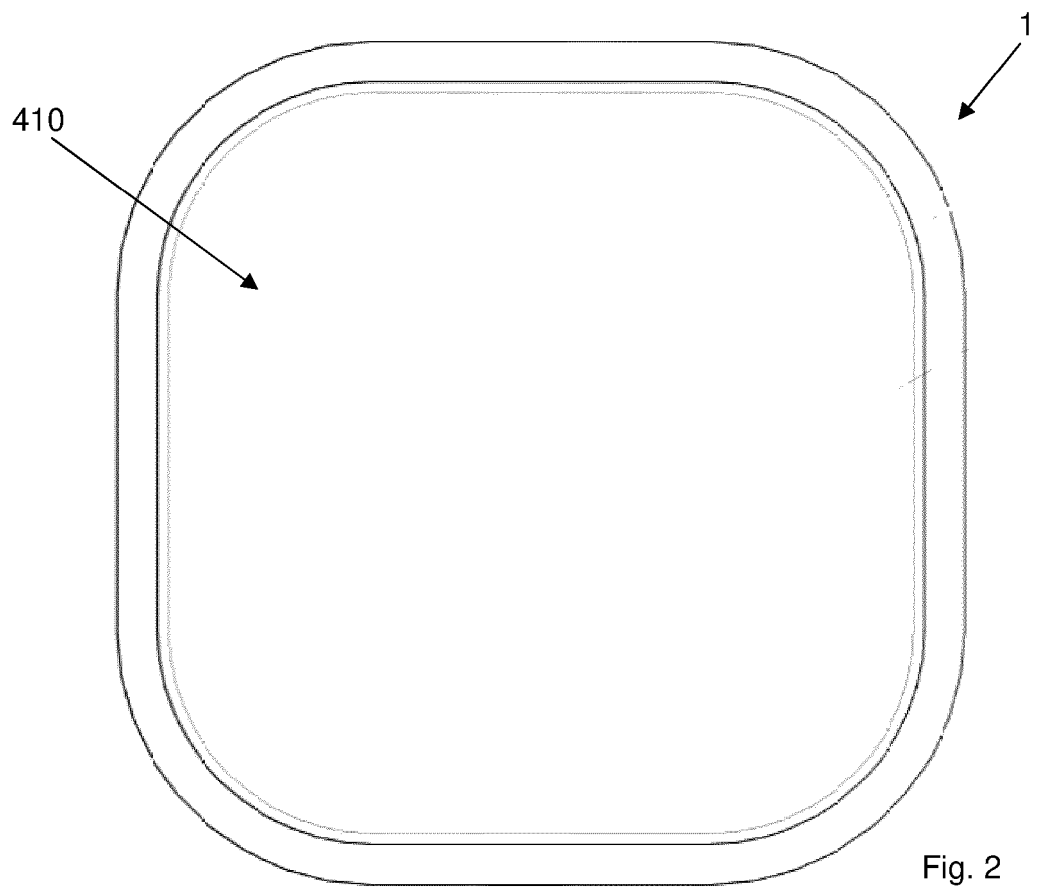
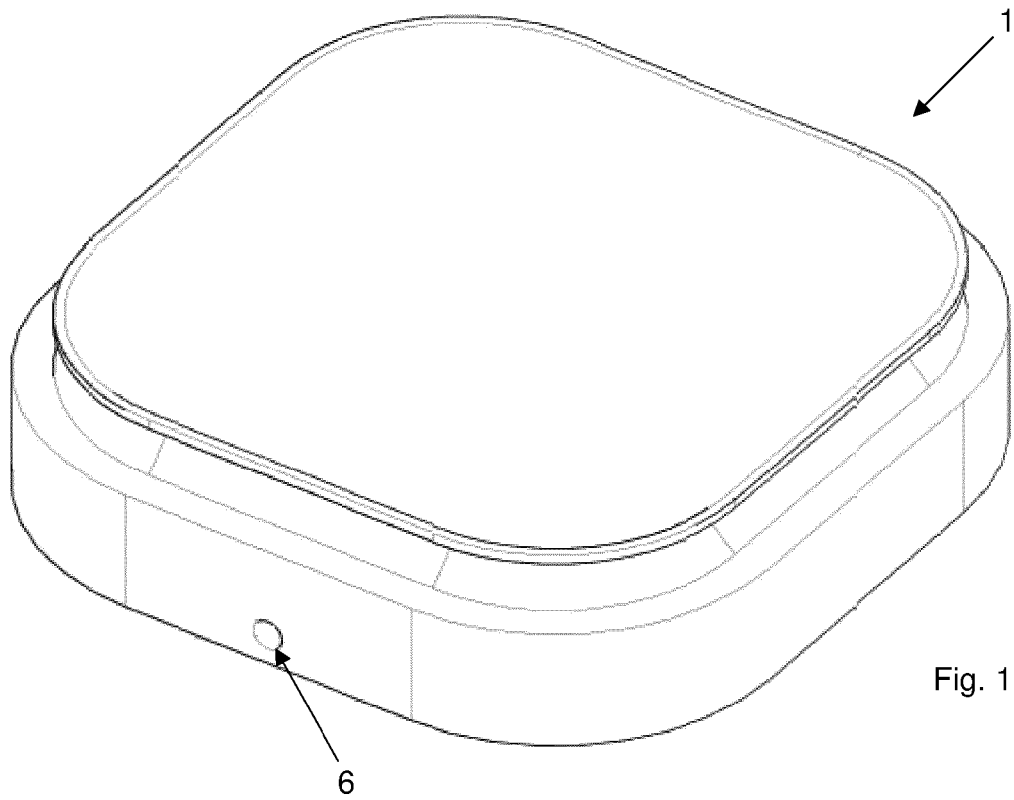
- positioning at least one support (1) according to any one of claims from 1 to 4 between said baseplate (11) and an underlying foundation (12);
- introducing a consolidation material (13) inside said compartment (5) by causing it to transit through the inlet (6), said consolidation material (13) hardening in said compartment (5).

8. The method according to claim 7, **characterised in that** it comprises a step of height adjustment of the rail, positioning it at a distance between the baseplate (11) and the foundation (12) before introducing the consolidation material (13) inside the compartment (5) of the support (1).

9. The method according to claim 7 or 8, **characterised in that** the step of introducing the consolidation material (13) inside the compartment (5) takes place with one of the two bases (2, 3) of the support (1) which contacts the baseplate (11) and the other of said two bases (2, 3) which contemporaneously contacts the foundation (12).

10. The method according to any one of claims 7 to 9, **characterised in that** a bedding layer (14) is applied between the baseplate (11) and the underlying foundation (12); the step of applying a bedding layer (14):

- taking place following the hardening of the consolidation material (13) inside the compartment (5); and
- filling, at least in a zone surrounding said support (1), a hollow space (15) between the baseplate (11) and the foundation (12), burying the support (1) in the bedding layer (14).



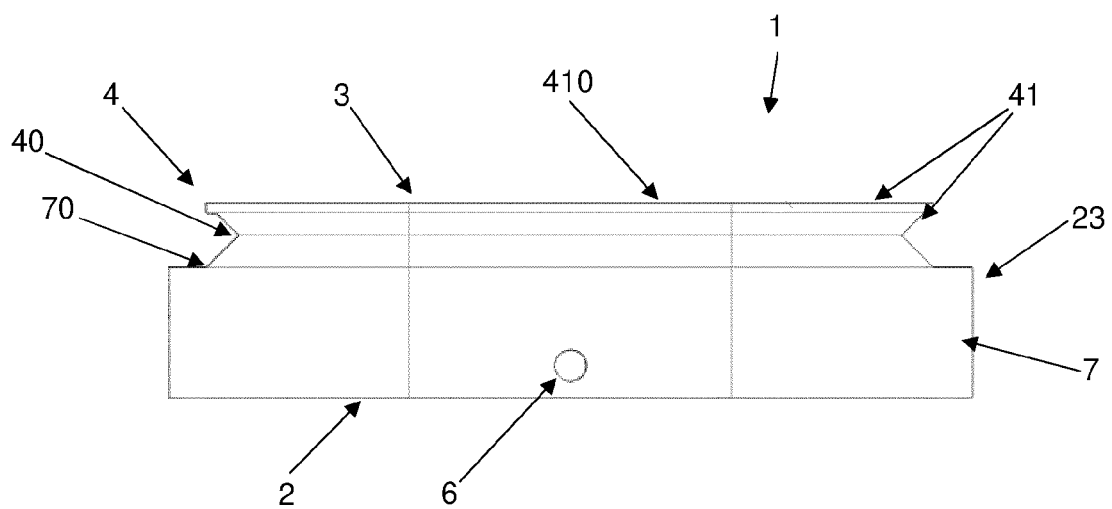


Fig. 3

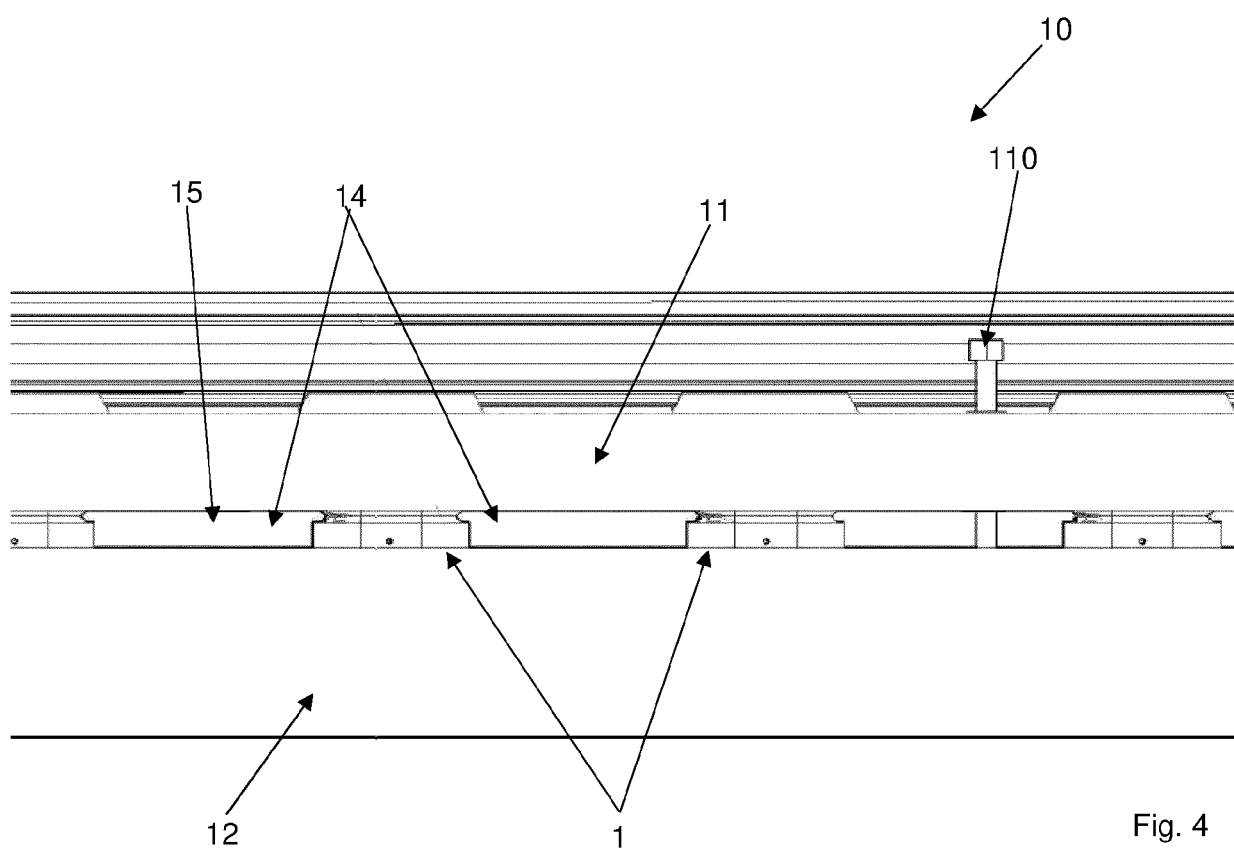
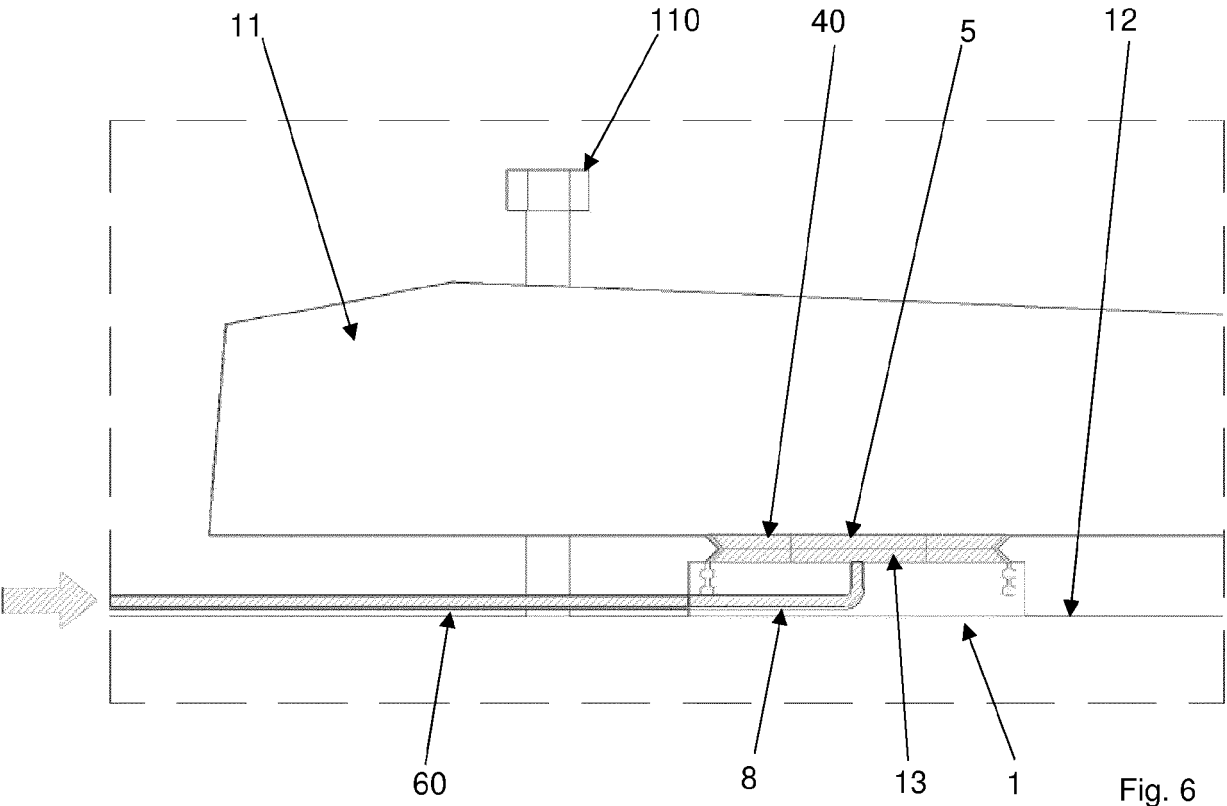
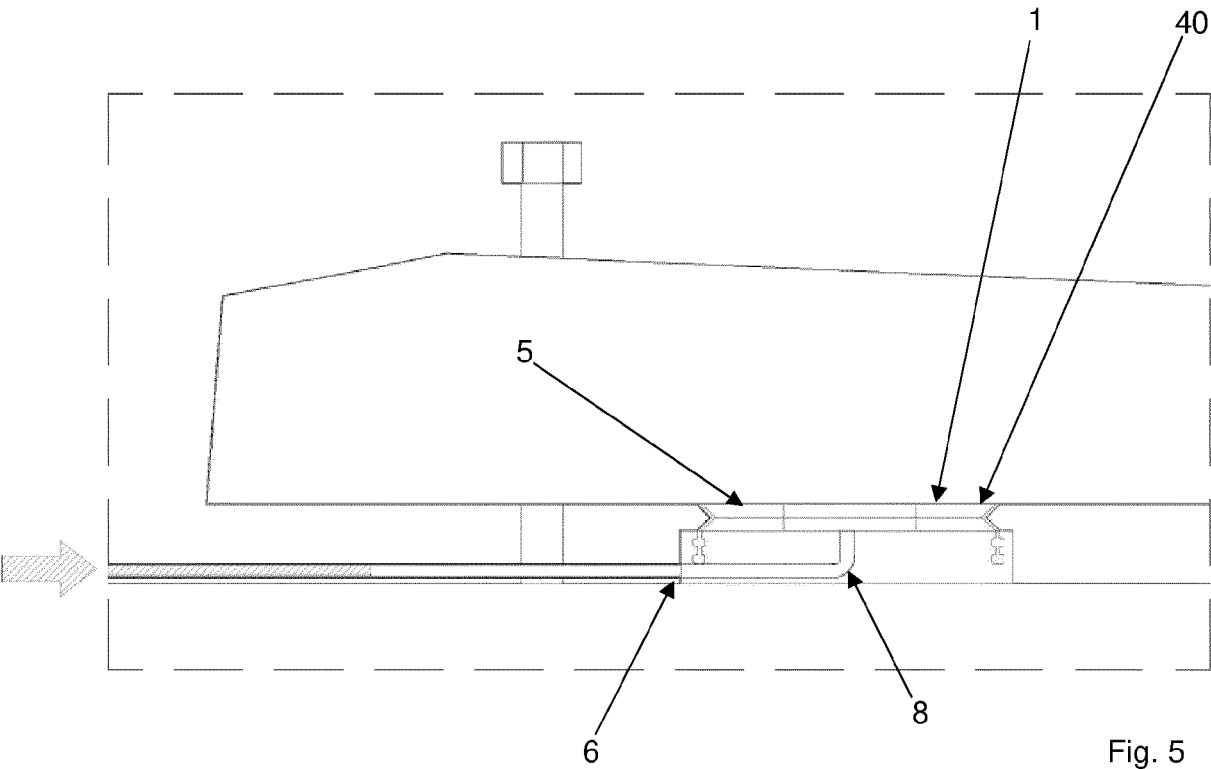
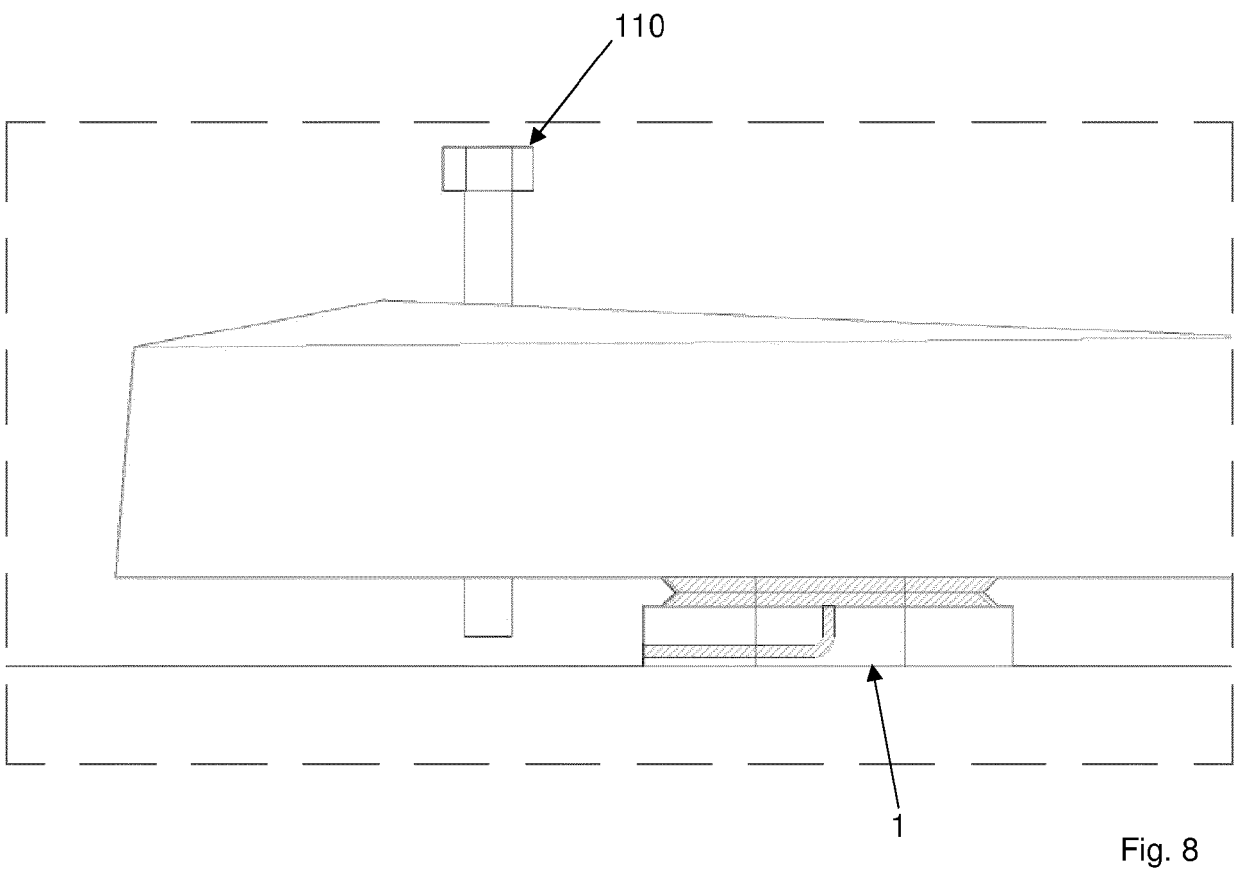
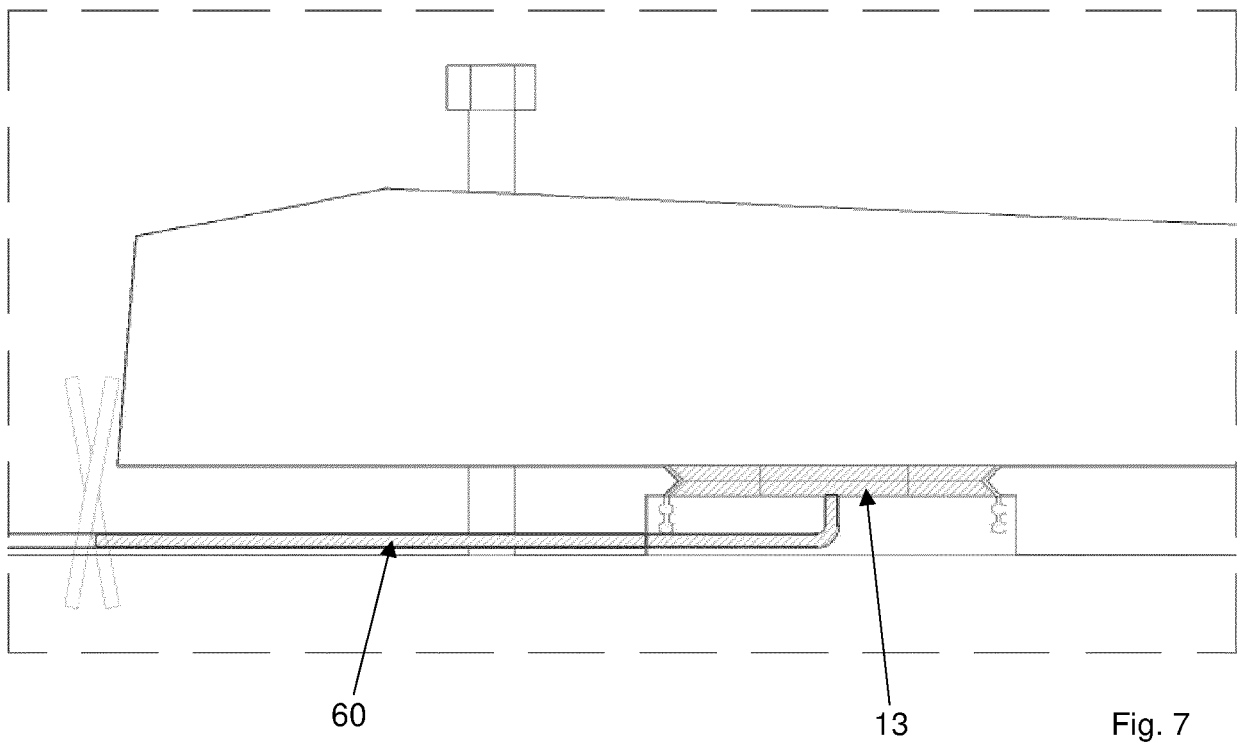


Fig. 4





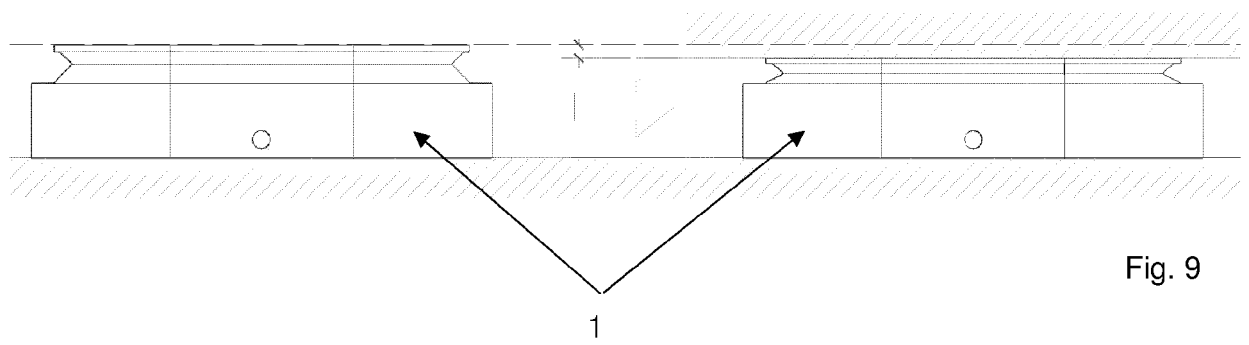


Fig. 9



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