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(54) **RAILWAY TRACK CONSTRUCTION WITH ROAD BED AND TRACK SLABS**

BAHNSCHIENENKONSTRUKTION MIT STRASSEN BETT UND FAHRWEGPLATTEN

STRUCTURE DE VOIE FERREE COMPRENANT UNE PLATE-FORME ET DES DALLES

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## Description

**[0001]** The invention relates to a railway track construction, comprising a concrete road bed that is underpinned with respect to a substrate, a series of track slabs seated on the road bed and positioned one after the other, rails supported by the track slabs, as well as a separation layer situated between the road bed and the track slabs, which road bed and track slabs are stabilised at least with respect to one another by first and second interlocking shapes that prevent relative movements of the road bed and the track slab along the separation layer transversely with respect to the railway track.

**[0002]** Such a railway track construction is disclosed in US-A 3 907 200. The track slabs of this known railway track construction are confined on both sides in a concrete trough. The separation layer in this case runs from underneath the track slabs upwards along the longitudinal sides thereof and thus forms part of the transverse confinement of the track slabs. A stud projects upwards from the bed centrally into the track slabs, by means of which stud the track slabs are stabilised both in the transverse direction and in the longitudinal direction.

**[0003]** Such a railway construction has the disadvantage that the track slabs cannot be kept sufficiently accurately oriented in, for example, routes where trains run at high speed. As a result of the confinement in the transverse direction where the separation layer plays a role, it is possible that rotation, however, minor, occurs around the stud. However, some play in the transverse confinement cannot be avoided, since otherwise the track slabs would not have sufficient room for expansion in the case of temperature changes.

**[0004]** The aim of the invention is therefore to provide a railway track construction that does not have these disadvantages. Said aim is achieved by the characterising features of claim 1.

**[0005]** The separation layer, for example a geotextile layer, affords robust, dimensionally stable support for the track slabs and the rails, while, on the other hand, a certain degree of settlement remains possible in the longitudinal direction of the railway track. No trough-shaped construction is necessary to be able to position the track slabs accurately in the transverse direction, whilst nevertheless there is the possibility for expansion in the longitudinal direction.

**[0006]** In this respect the road bed is provided with upright studs, whilst the track slab is provided with recesses that open out on the underside of the track slab, in which recesses one stud is accommodated in each case. The width of the studs is approximately the same as the width of the recesses. Furthermore, the dimension of the recesses viewed in the longitudinal direction of the railway track can be larger than the corresponding dimension of the stud. In the nominal state the recess surrounds the associated stud with some clearance both at the front and at the back.

**[0007]** With the aim of preventing the open spaces be-

tween the studs and the recesses filling up when concrete is poured, said spaces can be filled with an elastic medium, such as polyurethane foam. Furthermore, each stud can comprise a metal pin that is made with two parallel transverse faces and can be surrounded by a disc that rests on the road bed.

**[0008]** Preferably each recess is defined by a cap that is incorporated in the track slab. This cap can comprise a metal sleeve as well as a flexible cover that is located at the end of the sleeve that is embedded in the track slab. A flexible ring can be situated between the cover and the end of the sleeve. This ring is intended to prevent the metal sleeve from being pushed through the layer of concrete above and, as it were, perforating this under the effect of the loading forces that are exerted on the track slab by the railway traffic.

**[0009]** In addition, each track slab and the road bed are stabilised with respect to one another by second interlocking auxiliary shapes that interlock with no clearance both in the longitudinal direction and in the transverse direction. These auxiliary shapes are preferably located in the central region of the track slab. The interlocking shapes with clearance are located more towards the longitudinal of the track slab.

**[0010]** The invention will be explained in more detail below with reference to an illustrative embodiment shown in the figures.

Figure 1 shows a plan view of a railway track construction according to the invention.

Figure 2 shows a cross-section according to II-II in Figure 1.

Figure 3 shows a detail of a stud with cap such as used in the railway track construction according to the invention.

Figure 4 shows the a section according to IV-IV according to Figure 3.

Figure 5 shows a fixed stud.

**[0011]** The railway track construction shown in Figure 1 comprises a concrete road bed 1, on which the track slabs indicated in their entirety by 2 are arranged one after the other. These track slabs 2 do not lie directly against one another but enclose gaps 3. The rails 4 are fitted above the track slabs. These rails 4 are seated with bearers in the concrete that forms the track slabs 2 in the known manner.

**[0012]** The track slabs 2 are stabilised with respect to the road bed 1 by means of stabilising means indicated in their entirety by 5 that permit relative movements between the track slab and the road bed 1 in the longitudinal direction, but resist these in the transverse direction. Furthermore, there are stabilisation means 6 that resist relative movements of the track slabs 2 and the road bed 1 in all directions. The separation layer 7, which, for example, can consist of a geotextile, is situated between the track slabs 2 and the road bed 1.

**[0013]** A stabilisation means 5 is shown in vertical sec-

tion in Figure 3. This stabilisation means comprises the stud indicated in its entirety by 8, the lower cylindrical end 9 of which is rigidly incorporated in the concrete of the road bed 1. The upper end 10 adjoining this has, as is shown in the section in Figure 4, two opposing flat side faces 11 that are in contact with the corresponding walls of the cap indicated by 12. This cap is incorporated in the concrete of the track slab 2 concerned.

**[0014]** The cap 12 is elongated in section such that the curved surfaces 13 of the upper part 10 of the stud 8 are at a distance from the related walls of the cap 12. The space arising as a consequence of this is filled with an elastic medium, for example polyurethane foam 14. The advantage of this is that these spaces are preserved, even when concrete is poured for the track slab 2. In other words, these spaces cannot fill up with concrete, which would result in the stud 8 still becoming fixed with respect to the cap 12. On the other hand, the elastic filler, such as polyurethane foam, allows relative movement of the track slab with respect to the road bed in the longitudinal direction. The cap 12 comprises a metal sleeve 15, which is capped at the top by a plastic cover.

**[0015]** A stabilisation means 6 that consists of a completely cylindrical, prismatic stud 17 is shown in Figure 5. This stud 17 is rigidly incorporated in the concrete of the road bed 1 and is also rigidly incorporated in the concrete of the track slab 2. A rubber cap 18 with an elastic ring 19 underneath it is placed on the top of the stud 17. This cap 18 and ring 19 are intended to counteract perforation of the concrete of the track slab 2 located above the stud 17. When the concrete hardens it in fact shrinks somewhat, with the result that were concrete to be located directly on the top of the stud 17 it would be severely loaded and could possibly be punched out. However, the rubber cap 18 and the elastic ring 19 absorb possible movements of the concrete with respect to the stud 17, because they become compressed.

## Claims

1. Railway track construction, comprising a concrete road bed (1) that is underpinned with respect to a substrate, a series of track slabs (2) seated on the road bed (1) and positioned one after the other, rails (4) supported by the track slabs (2), as well as a separation layer (7) situated between the road bed (1) and the track slabs (2), which road bed (1) and track slabs (2) are stabilised with respect to one another by first interlocking shapes (5) and second auxiliary interlocking shapes (6) that prevent relative movements of the road bed (1) and the track slab (2) along the separation layer transversely with respect to the railway track, wherein the first interlocking shapes (5) permit relative movements of the road bed (1) and the track slab (2) along the separation layer (7) in the longitudinal direction of the railway track **characterised in that** said first interlocking shapes (5) being provided with upright studs (8) on the road bed (1) with recesses (12) that open out on the underside of the track slab (2), in which recesses (12) one stud (8) is accommodated in each case and **in that** said second interlocking auxiliary shapes (6) interlock with no clearance both in the longitudinal direction and in the transverse direction.
2. Construction according to Claim 2, wherein the width of the studs (8) is approximately the same as the width of the recesses (12).
3. Construction according to Claim 2 or 3, wherein the dimension of the recesses (12) viewed in the longitudinal direction of the railway track is larger than the corresponding dimension of the studs (8).
4. Construction according to Claim 4, wherein in the nominal state the recess (12) surrounds the associated stud (8) with some clearance both at the front and at the back.
5. Construction according to Claim 5, wherein the clearance is filled with an elastic medium (14), such as polyurethane foam.
6. Construction according to one of Claims 1-5, wherein at least one stud (8) comprises a metal pin (9, 10) that is made with two parallel transverse faces (11).
7. Construction according to one of Claims 1-6, wherein at least one stud (8) is surrounded by a disc that rests on the road bed (1).
8. Construction according to one of Claims 1-7, wherein at least one recess is defined by a cap (12) that is incorporated in the track slab (2).
9. Construction according to Claim 8, wherein the cap (12) comprises a metal sleeve (20) as well as a flexible cover (16) that located at the end of the sleeve (20) that is embedded in the track slab.
10. Construction according to Claim 9, wherein the surfaces of the stud (8) and the sleeve (20) that touch one another are coated with molybdenum sulphide.
11. Construction according to one of the preceding claims, wherein the separation layer (7) comprises a geotextile.
12. Construction according to any of the preceding claims, wherein the auxiliary shapes comprise a stud (6) that is capped by a cover (18).
13. Construction according to Claim 12, wherein a flexible ring (19) is located between the cover (18) and the end of the stud (6).

14. Construction according to any of the preceding claims wherein the second interlocking auxiliary shapes (6) are located in the central region of each track slab (2).

15. Construction according to one of the preceding claims, wherein the first interlocking shapes (5) are located close to the longitudinal ends of the track slab (2).

### Patentansprüche

1. Gleisanlagenkonstruktion mit einem Betongleisbett (1), das mit einem Untergrund verankert ist, mit einer Reihe von nacheinander angeordneter, auf das Gleisbett gesetzter Fahrbahnplatten (2), mit von den Fahrbahnplatten (2) gestützten Schienen (4), sowie mit einer zwischen dem Gleisbett (1) und den Fahrbahnplatten (2) eingelegten Trennschicht (7), wobei das Gleisbett (1) und die Fahrbahnplatten (2) relativ zueinander durch erste ineinandergreifende Formteile (5) und zweite ineinandergreifende Hilfsformteile (6) stabilisiert sind, die Relativbewegungen des Gleisbetts (1) und der Fahrbahnplatten (2) entlang der Trennschicht senkrecht zur Gleisanlage verhindern, wobei die ersten ineinandergreifenden Formteile (5) Relativbewegungen des Gleisbetts (1) und der Fahrbahnplatten (2) entlang der Trennschicht (7) in der Längsrichtung der Gleisanlage erlauben, **dadurch gekennzeichnet, dass** die ersten ineinandergreifenden Formteile (5) mit aufrecht stehenden Bolzen (8) im Gleisbett (1) und mit Ausnehmungen (12) ausgestattet sind, die sich an der Unterseite der Fahrbahnplatten (2) erstrecken, wobei jeweils eine Ausnehmungen (12) einen Bolzen (8) aufnimmt, und dass die zweiten ineinandergreifenden Hilfsformteile (6) ohne Spiel, sowohl in Längsrichtung als auch in Querrichtung, ineinandergreifen.
2. Konstruktion nach Anspruch 1, wobei die Breite der Bolzen (8) in etwa der Breite der Ausnehmungen (12) entspricht.
3. Konstruktion nach Anspruch 1 oder 2, wobei die Abmessung der Ausnehmungen (12), betrachtet in Längsrichtung der Gleisanlage, größer ist als die entsprechende Abmessung der Bolzen (8).
4. Konstruktion nach Anspruch 3, wobei die Ausnehmung (12) den zugehörigen Bolzen (8) im Nominalzustand mit etwas Abstand, sowohl an der Vorderseite als auch an der Rückseite, umgibt.
5. Konstruktion nach Anspruch 4, wobei der Abstand mit einem elastischen Medium (14), beispielsweise Polyurethanschäum gefüllt ist.

6. Konstruktion nach einem der Ansprüche 1 bis 5, wobei mindestens ein Bolzen (8) aus einem Metallstab (9, 10) besteht, der zwei parallele Querflächen (11) aufweist.

7. Konstruktion nach einem der Ansprüche 1 bis 6, wobei mindestens ein Bolzen (8) von einer Scheibe umgeben ist, die am Gleisbett (1) anliegt.

8. Konstruktion nach einem der Ansprüche 1 bis 7, wobei mindestens eine Ausnehmung durch eine Haube (12) festgelegt ist, die in die Fahrbahnplatte (2) eingelassen ist.

9. Konstruktion nach Anspruch 8, wobei die Haube (12) eine Metallhülse (20) sowie eine flexible Abdeckung (16) umfasst, die an dem Ende der Metallhülse (20) befestigt ist, das in die Fahrbahnplatte eingelassen ist.

10. Konstruktion nach Anspruch 9, wobei die in Kontakt stehenden Oberflächen des Bolzens (8) und der Metallhülse (20) mit Molybdänsulfid beschichtet sind.

11. Konstruktion nach einem der vorangehenden Ansprüche, wobei die Trennschicht (7) aus einem Geotextil besteht.

12. Konstruktion nach einem der vorangehenden Ansprüche, wobei die Hilfsformteile aus einem Bolzen (6) bestehen, der mit einer Abdeckung (18) abgedeckt ist.

13. Konstruktion nach Anspruch 12, wobei sich zwischen der Abdeckung (18) und dem Ende des Bolzens (6) ein flexibler Ring (19) befindet.

14. Konstruktion nach einem der vorangehenden Ansprüche, wobei sich die zweiten ineinandergreifenden Hilfsformteile (6) im Zentrum jeder Fahrbahnplatte (2) befinden.

15. Konstruktion nach einem der vorangehenden Ansprüche, wobei sich die ersten ineinandergreifenden Formteile (5) in den längerstreckten Endbereichen der Fahrbahnplatte befinden.

### Revendications

1. Construction de voie ferrée, comprenant une plateforme de voie en béton (1) qui est reprise en sous-oeuvre par rapport à un substrat, une série de dalles de voie (2) assises sur la plateforme de voie (1) et positionnées les unes après les autres, des rails (4) supportés par les dalles de voie (2), ainsi qu'une couche de séparation (7) située entre la plateforme de voie (1) et les dalles de voie (2), laquelle plate-

- forme de voie (1) et lesquelles dalles de voie (2) sont stabilisées les unes par rapport aux autres par des premières formes d'enclenchement (5) et des secondes formes d'enclenchement auxiliaires (6), qui empêchent les mouvements relatifs de la plate-forme de voie (1) et la dalle de voie (2) le long de la couche de séparation transversalement, par rapport à la voie ferrée, dans laquelle les premières formes d'enclenchement (5) permettent les mouvements relatifs de la plate-forme de voie (1) et la dalle de voie (2) le long de la couche de séparation (7) dans la direction longitudinale de la voie ferrée, **caractérisée en ce que** lesdites premières formes d'enclenchement (5) sont pourvues de goujons verticaux (8) sur la plate-forme de voie (1) et d'évidements (12) qui donnent sur la sous-face de la dalle de voie (2), dans lesquels évidements (12) un goujon (8) est logé dans chaque cas, et **en ce que** lesdites secondes formes d'enclenchement auxiliaires (6) s'enclenchent sans aucun espace libre dans la direction longitudinale et dans la direction transversale.
2. Construction selon la revendication 1, dans laquelle la largeur des goujons (8) est approximativement la même que la largeur des évidements (12). 25
  3. Construction selon la revendication 1 ou 2, dans laquelle la dimension des évidements (12), vue dans la direction longitudinale de la voie ferrée, est supérieure à la dimension correspondante des goujons (8). 30
  4. Construction selon la revendication 3, dans laquelle, dans l'état nominal, l'évidement (12) entoure le goujon associé (8) avec un certain espace libre à l'avant ainsi qu'à l'arrière. 35
  5. Construction selon la revendication 4, dans laquelle l'espace libre est rempli avec un matériau élastique (14), tel que de la mousse de polyuréthane. 40
  6. Construction selon une des revendications 1 à 5, dans laquelle au moins un goujon (8) comprend une tige métallique (9, 10) qui est faite avec deux faces transversales parallèles (11). 45
  7. Construction selon une des revendications 1 à 6, dans laquelle au moins un goujon (8) est entouré par un disque qui repose sur la plate-forme de voie (1). 50
  8. Construction selon une des revendications 1 à 7, dans laquelle au moins un évidement est défini par une coiffe (12) qui est incorporée dans la dalle de voie (2). 55
  9. Construction selon la revendication 8, dans laquelle la coiffe (12) comprend un manchon métallique (20) ainsi qu'un couvercle flexible (16) qui est positionné à l'extrémité du manchon (20) qui est encastré dans la dalle de voie.
  10. Construction selon la revendication 9, dans laquelle les surfaces du goujon (8) et du manchon (20) qui se touchent sont enduites avec du sulfure de molybdène.
  11. Construction selon une des revendications précédentes, dans laquelle la couche de séparation (7) comprend un géotextile.
  12. Construction selon l'une quelconque des revendications précédentes, dans laquelle les formes auxiliaires comprennent un goujon (6) qui est recouvert par un couvercle (18).
  13. Construction selon la revendication 12, dans laquelle un anneau flexible (19) est positionné entre le couvercle (18) et l'extrémité du goujon (6).
  14. Construction selon l'une quelconque des revendications précédentes, dans laquelle les secondes formes auxiliaires d'enclenchement (6) sont positionnées dans la région centrale de chaque dalle de voie (2).
  15. Construction selon une des revendications précédentes, dans laquelle les premières formes d'enclenchement (5) sont positionnées à proximité des extrémités longitudinales de la dalle de voie (2).

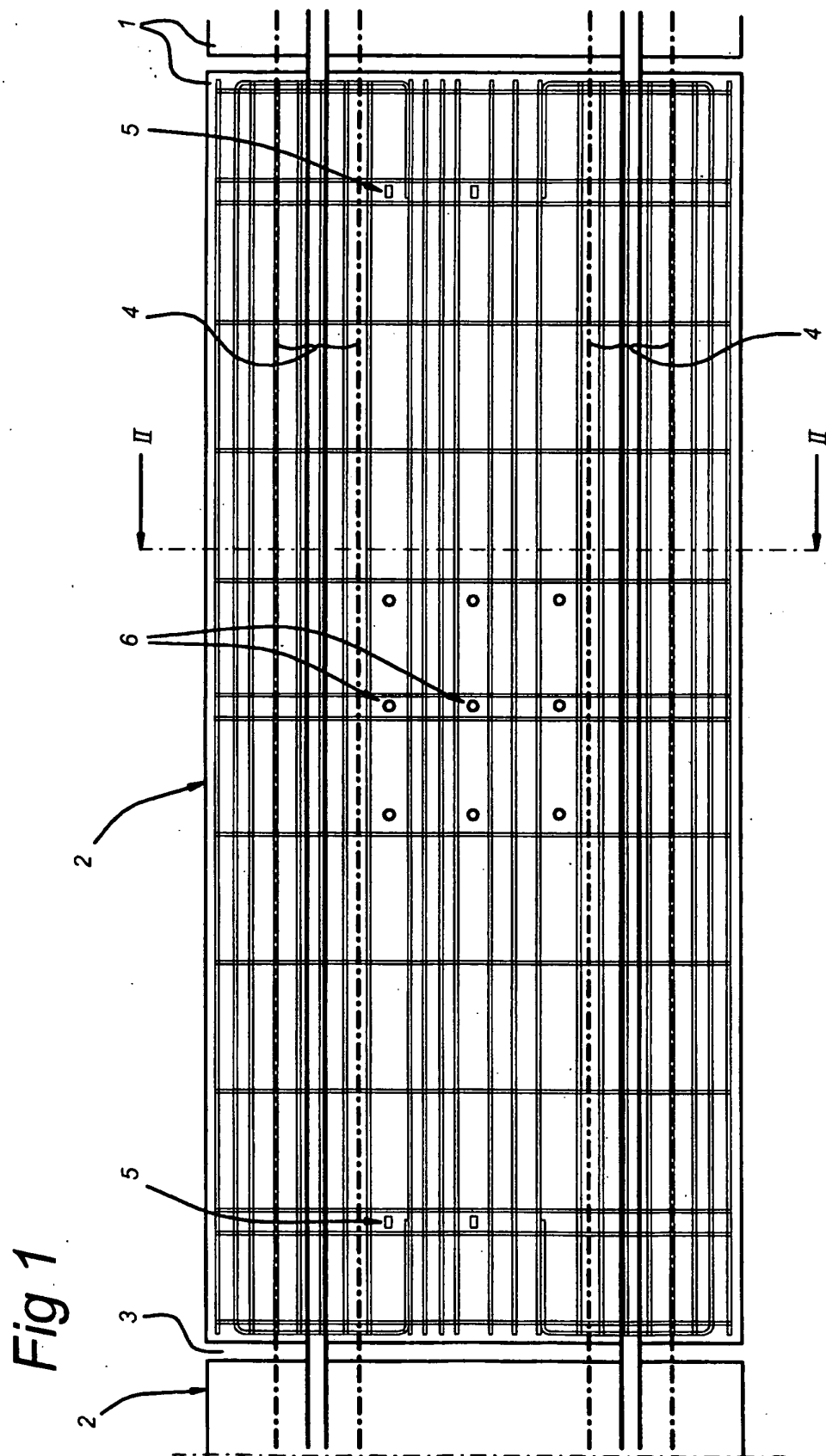


Fig 2

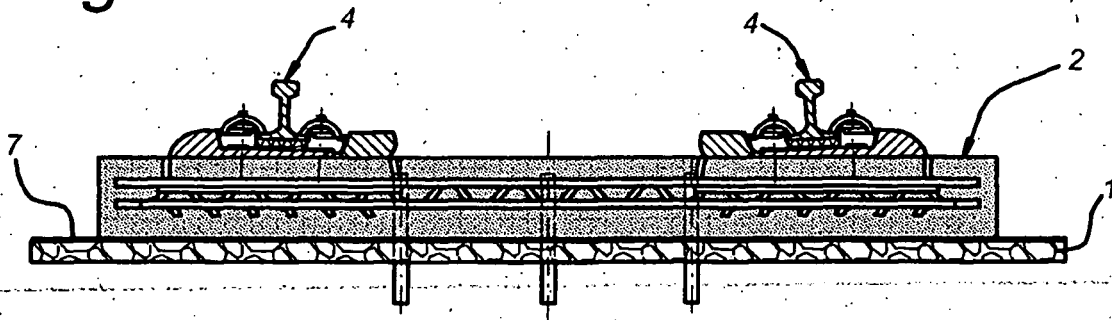


Fig 3

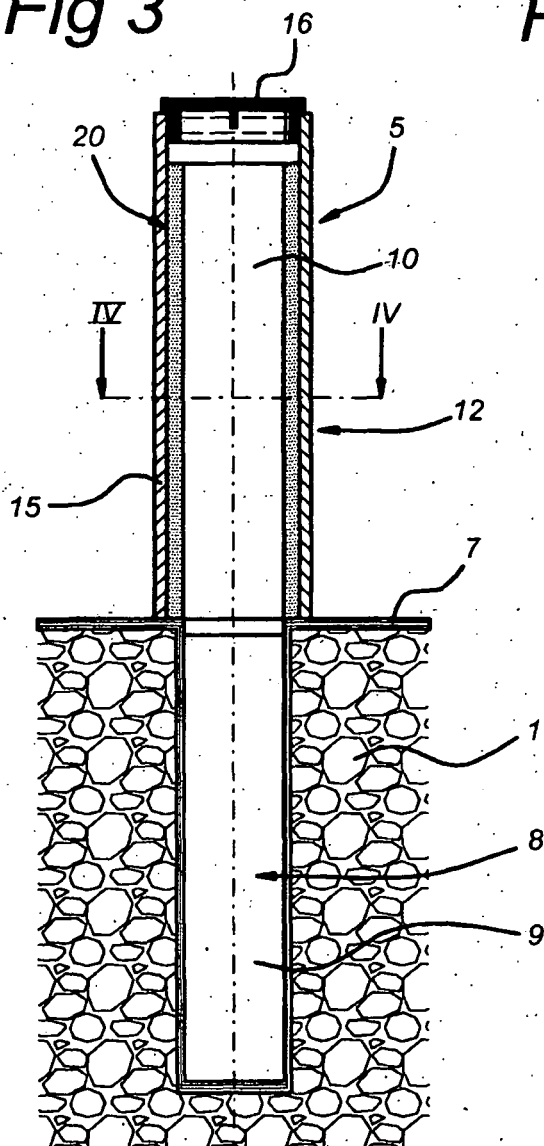
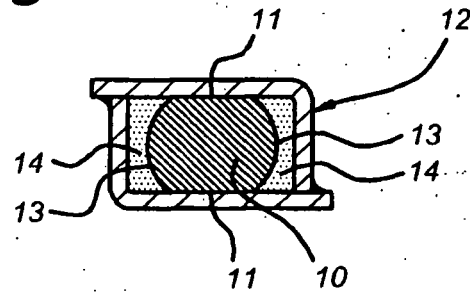
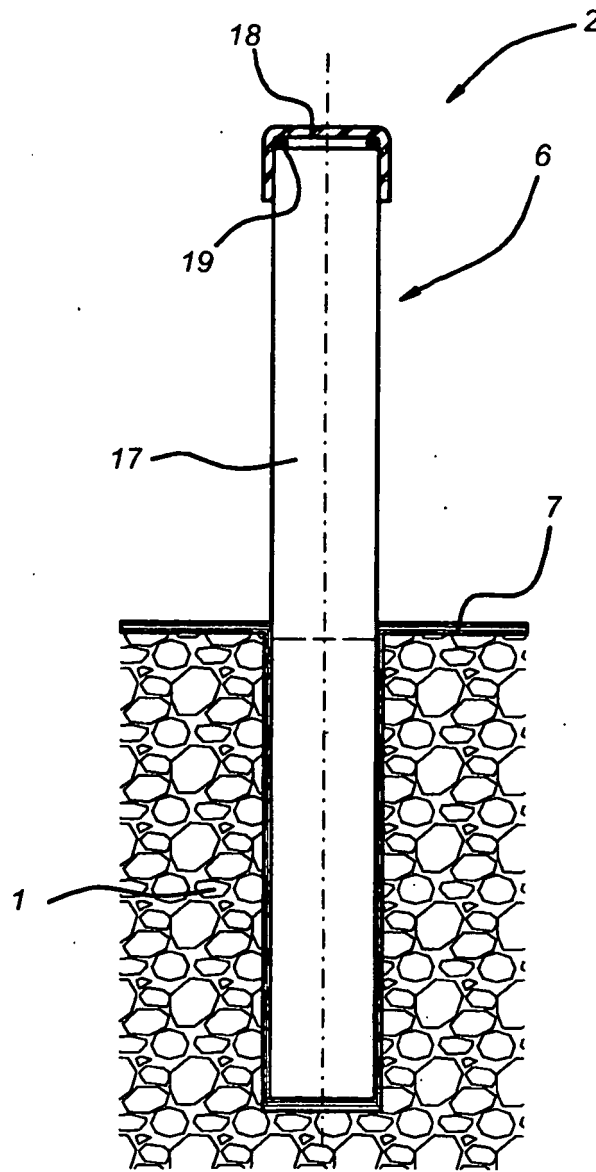


Fig 4



*Fig 5*



**REFERENCES CITED IN THE DESCRIPTION**

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