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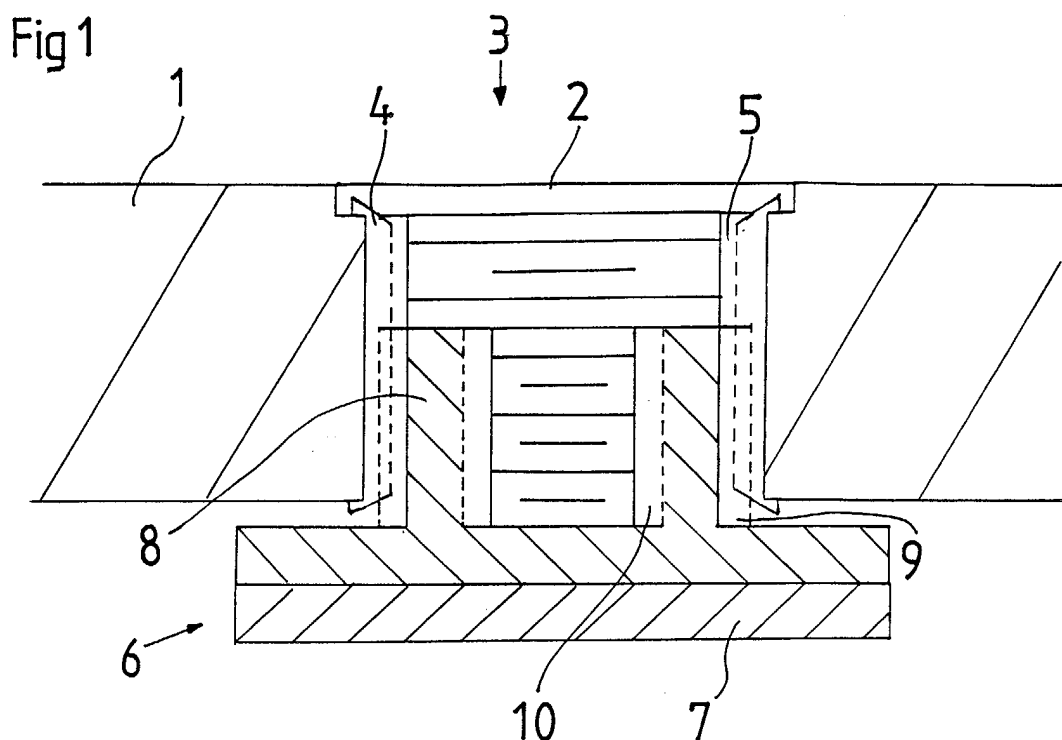
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(54) **Spacer in a construction element**

(57) A spacer in a construction element (1) comprises an inner thread (5) provided in the construction element (1), a spacer screw and a support foot (6). The spacer screw has a thread for cooperation with the inner thread (5). The support foot (6) is intended for abutment against a support surface. The distance between the support foot (6) and the construction element (1) is ad-

justable by rotation of the spacer screw. The support foot (6) has a first engagement means (9) by means of which it is fixable in the construction element (1). The spacer screw and the support foot (6) have mutually corresponding engagement means by means of which the spacer screw is fixable in or on the support foot (6) and the first engagement means of the support foot (6) is releasable from the construction element (1).



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Description

TECHNICAL FIELD

[0001] The present invention relates to a spacer in a construction element, comprising a thread interiorly provided in the construction element, a spacer screw with a thread for cooperation with the inner thread, as well as a support foot intended for abutment against a support surface, the distance between the support foot and the construction element being adjustable by rotation of the spacer screw.

BACKGROUND ART

[0002] Spacers for construction elements such as, for example, studs or boards are previously known in the art. A few common fields of practical use are the alignment of walls and floors. Typically, the spacers are inserted through holes in the construction elements or are alternatively disposed under them. It is to be particularly preferred if the spacers are accessible once the construction element has been finally positioned so that the alignment of the construction element may be adjusted. For example, the slope of a floor may be kept constant even if the substrate is uneven. In certain cases, it is desirable to provide space beneath or behind the construction element, respectively, since it is then possible to provide ventilation therethrough. Such ventilation constitutes one of many conceivable measures for alleviating a poor indoor environment, for example because of fungus or radon.

[0003] One aspect that is interesting in certain practical applications is sound damping and in particular the damping of footfall noise in floors. To these ends, the spacers are occasionally provided with elastic dampers on their end facing towards the substrate. These dampers are of two main types.

[0004] The first type is dampers which are so small that they are insertable through a hole in the construction element, i.e. their transverse dimension does not exceed the transverse dimension of the hole in the construction element. Unfortunately, many problems are associated with these dampers. If the elastic damping material is excessively hard, vibrations will be propagated through it, in other words the damping effect will be insufficient. If, on the other hand, a softer material is employed, this suffers from the drawback that it is far too easily deformed, perhaps permanently, and breaks because the pressure on the damper is too great.

[0005] The second type of damper is considerably larger, in order to reduce the pressure on the damper. However, the problem in this case is that such a damper cannot be passed through the hole in the construction element. This entails that the spacer and the damper must be mounted on the underside of the construction element, which may cause difficulties in transport, assembly and adjustment. The situation becomes partic-

ularly complex if the spacers are long. Transport of construction elements with pre-assembled spacers can, in such instance, be extremely bulky and as a result costly.

PROBLEM STRUCTURE

[0006] Hence, the object is to realise a spacer which affords adequate damping and functions satisfactorily in all other respects. At the same time, it must be easy to transport and assemble the construction elements and later adjust the spacer to a suitable level.

SOLUTION

[0007] The object forming the basis of the present invention will be attained if the spacer intimated by way of introduction is characterised in that the support foot has a first engagement means by means of which it is fixable in the construction element, that the spacer screw and the support foot have mutually corresponding engagement means by means of which the spacer screw is fixable in or on the support foot and the first engagement means of the support foot is releasable from the construction element.

[0008] Further advantages will be attained if the spacer according to the present invention is moreover given one or more of the characterising features as set forth in appended Claims 2 to 13.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

[0009] The present invention will now be described in greater detail hereinbelow, with reference to the accompanying Drawings. In the accompanying Drawings:

Fig. 1 is a section through a construction element with a damping support foot included in the spacer according to the present invention disposed therein;

Fig. 2 is a straight side elevation of the construction element, the damping support foot and a spacer screw included in the present invention;

Fig. 3 is a section corresponding to that of Fig. 1 where the spacer screw according to Fig. 2 has been inserted a distance in the construction element and the damping support foot;

Fig. 4 is a section through the support foot, an anchorage in the substrate being shown;

Fig. 5 is a section through an alternative embodiment showing parts in the anchorage; and

Fig. 6 is a perspective view of the alternative embodiment of the engagement means of the spacer

screw.

DESCRIPTION OF PREFERRED EMBODIMENT

[0010] Fig. 1 shows a construction element 1 in the form of a board, for example for a bearing layer for a flooring. The construction element 1 is provided with a number of holes 2 in which may be disposed spacers 3. In the preferred embodiment, a bushing 4 is disposed in the hole 2 and is interiorly threaded. However, it is conceivable that a corresponding thread 5 be provided on the inside of the hole 2, in some other way.

[0011] In the hole 2, there is disposed a damping support foot 6. The support foot 6 is preferably pre-mounted in the hole 2.

[0012] In all cases, the construction element 1, which may be a board or a stud, has a spatial extent, i.e. the construction element 1 has its major extent in one plane, as is the case in a board, or substantially along a line, as is the case in stud. The extent of the construction element 1 depends upon the type of construction element 1, as well as the stresses and loading which it is expected to withstand. In many cases, the construction element 1 proper is thin in relation to the space behind or beneath the assembled construction element 1. In the case where the intention is to install equipment, such as conduits, beneath a floor, the space beneath the floor is quite large in the vertical direction, and this entails that the spacer 3 must be of an extent in the longitudinal direction which substantially exceeds the thickness of the construction element 1.

[0013] As was intimated above, the thread 5 provided interiorly in the construction element 1 is either disposed directly in the board or element 1 or in a loose bushing 4 which has been provided in the hole 2. In the preferred embodiment, the bushing 4 is manufactured from plastic, but other materials are also conceivable. The bushing 4 is disposed in position in the hole 2 preferably by a press- or snap-action.

[0014] The damping support foot 6 has a damping coating 7 and is of a transverse dimension that is greater than the hole 2. The damping coating 7 is intended to abut against the substrate on a sufficiently large surface area for a soft material to be able to be used without the pressure being so great that the damping coating 7 is excessively deformed. The support foot 6 may be manufactured from numerous different materials, for example metal, plastic such as polyamide, or hard rubber, while the damping coating is preferably manufactured from some rubber-like elastic material or a material with inner damping.

[0015] The damping support foot 6 is pre-mounted in the hole 2 in the construction element 1. This entails that it projects out from the construction element 1 only to a limited extent, which affords good possibilities for storing and transporting the construction element 1 with pre-mounted damping support feet 6 in an economically efficient manner. The support foot 6 has an upwardly di-

rected sleeve 8 which, in addition to being upwardly directed, is provided with an outer thread 9. The length of the sleeve 8 is less than the thickness of the construction element 1 so that the sleeve 8 and its thread 9 may be wholly accommodated in the inner thread 5 of the construction element 1 for realising a damping support foot 6 which projects minimally. The thread 9 of the sleeve 8 need not be particularly long, since its function is merely to keep the support foot 6 in place during transport.

[0016] The sleeve 8 is further provided with an inner engagement means 10 which, in the preferred embodiment, is an inner thread.

[0017] Fig. 2 is a side elevation of the construction element 1 and the damping support foot 6 is screwed in position. Above the construction element 1, there is disposed a spacer screw 11 which is about to be inserted in the hole 2 in the construction element 1. The spacer screw 11 has an upper region 12 which is threaded and whose length is optional and advantageously variable, for example by cutting. The cutting operation is advantageously carried out once the spacer screw 11 has been adjusted to its final position. The upper region 12 is thus provided with a first outer thread 13 which meshes with the inner thread 5 provided in the construction element. A lower region in the form of a projection or a pin 14 is provided with an engagement means 15 which, in the preferred embodiment, is a second, outer thread which meshes in the inner thread 10 of the sleeve 8. The pin 14 is so long that it can be screwed to bottom in the sleeve 8 of the support foot 6 so that an additional rotation of the spacer screw 11 entails a simultaneous rotation of the damping support foot 6. In such instance, this allows the support foot 6 to be released from the inner thread 5 in the construction element 1 before the outer thread 13 of the upper region 12 meshes with the inner thread in the construction element 1. The sum total of the length of the inner thread 10 of the support foot 6 and the length of the inner thread 5 in the construction element 1 is thus less than the length of the pin 14.

[0018] In order for it to be possible to turn and adjust the spacer screw 11, it is suitably provided at its upper end with an engagement means which may cooperate with a tool.

[0019] Fig. 3 shows a sectional view of the spacer 3 which includes the spacer screw 11, the support foot 6 and the inner thread 5 in the construction element 1. In the Figure, the spacer screw 11 and the support foot 6 are interconnected to one another via the second outer thread 15 of the spacer screw 11 and the inner thread 10 of the sleeve 8. The spacer screw 11 has meshed with the inner thread 5 of the bushing 4 with its upper region 12. Prior to this, the outer thread 9 of the support foot 6 has been released from the inner thread 5 of the construction element 1. This release operation does not take place until the pin 14 of the spacer screw 11 has bottomed out in the sleeve 8.

[0020] The total length of the spacer screw 11 is optional, which gives a very high degree of flexibility for

the fields of use of the construction element 1. The distance between the construction element 1 and the substrate depends upon the length of the spacer screw 11 and its insertion in the inner thread 5. The distance is variable from a distance that merely entails that the damping foot will have room beneath the construction element 1, to a considerable length of the spacer which, however, must still afford stability to the construction as a whole.

[0021] Fig. 4 shows a schematic sectional view through the support foot 6 and the pin 14 of the spacer screw 11. The spacer screw is advantageously hollow so that a screw, bolt or other anchorage device 16 may be fixed in the substrate 17. The support foot 6 has a central hole 18 and the spacer screw 11 a corresponding hole 19 for simple passage of the anchorage device 16, but it is also conceivable to design the anchorage device 16 so that it is capable of drilling through the bottom of the spacer screw 11 and the support foot 6 only on anchorage in the substrate 17. In such instance, the material in the spacer screw 11 and the support foot 6, respectively, should be selected so that through drilling is possible.

DESCRIPTION OF ALTERNATIVE EMBODIMENTS

[0022] Fig. 5 shows an alternative embodiment in greater detail and in section after fixing of the spacer screw 11 and its foot 6 in the substrate 17. In addition to the screw 16, which may be a concrete screw or bolt, there is also advantageously provided a spacer sleeve 20 which is exteriorly provided with a damping bushing 21. The spacer sleeve 20 is disposed with friction fit in the hole 18 in the support foot 6. The length of the spacer sleeve 20 is adapted to the length of the screw 16 so that the screw 16 is screwed in a sufficient distance when it urges the spacer sleeve 20 against the substrate 17. With the aid of the spacer sleeve 20, uniform tightening of the screws 16 in the substrate 17 will be achieved.

[0023] The damping bushing 21 is disposed outside the spacer sleeve 20 in order to prevent a direct, vibration-transmitting contact between the substrate 17 and the spacer screw 11. By such means, for example foot-fall noise is prevented from being transmitted from the construction element 1 to the substrate 17, which in turn may propagate noise to other parts of the building.

[0024] The damping bushings 21 has a collar 22 which is disposed between the head of the screw 16 and the inside of the spacer screw 11. The soft material in the collar 22 and the rest of the bushing 21 together damp noise and other vibrations in a corresponding manner to the material in the support foot 6. The bushing 21 with the spacer sleeve 20 pre-mounted therein is located as a continuous unit interiorly in the lower, pin-shaped projection 14 of the spacer screw 11, for example by friction.

[0025] The engagement means 10 in the foot 6 has

been described above as being in the form of a thread. However, it is entirely possible to modify the device according to the present invention so that cooperation between the engagement means 10 and the pin 14 of the spacer screw 11 takes place by some other form of engagement. For example, such a type of engagement could be a bayonet catch. The essential feature is that the spacer screw 11 is capable of acting on the support foot 6 so that this is screwed out of the thread 5.

[0026] Another type of engagement is shown in Fig. 6. At its lower end 14, the spacer screw 11 is provided with an engagement means which comprises a series, in this case four in number, of ribs 23, 24 at uniform spacing from one another about the circumference of the spacer screw 11. Two of the ribs 23 are resilient, since slots 25 are disposed on either side of these ribs 23 and extend a distance, approximately halfway, along the sides of the ribs 23. At the lower ends of the ribs 23, there are provided two depressions 26 and one projection 27 which are disposed to cooperate with complementarily formed projections and depressions in the sleeve 8 of the support foot 6. In the sleeve 8 of the support foot 6, there are also provided grooves which are complementary to the ribs 23, 24. The two ribs 24 which are not resilient are slightly shorter than the other ribs 23, so that they do not cooperate with the projections and depressions in the sleeve 8 of the support foot 6. The resulting connection can absorb both torsional forces and tractive forces.

[0027] Alternatively, the spacer screw 11 may be provided at its lower end 14 with a so-called spline connection which comprises a series of projecting ribs at uniform spacing from one another about the circumference of the spacer screw 11. Each rib has a depression for cooperation with a complementarily formed projection in the sleeve 8 of the support foot 6. The projections are disposed in the bottom of grooves interiorly in the sleeve 8 of the support foot 6 and the grooves complement the ribs. The resulting spline connection can absorb forces both in the longitudinal direction as well as torsional forces.

[0028] In the foregoing description, the inner thread 5 disposed in the construction element 1 has been presented as disposed in a loose bushing 4 which is inserted in the hole 2 in the construction element 1. Naturally, it is possible to provide the inner thread 5 in the construction element 1 in a different manner, for example directly in the material of the element.

[0029] In the preferred embodiment, it was described how the support foot 6 in the pre-mounted position was threaded in the inner thread 5 in the construction element. Alternatively, it is entirely possible to hold the support foot 6 in the pre-mounted position with the aid of some other type of engagement means. A few examples are a friction engagement which is realised by a specifically provided friction layer, an elastic ring around the sleeve 8 or slots in the sleeve 8 which permit pressing in the hole 2. It is entirely possible to vary the engage-

ment means for the pre-mounted position further. In such instance, it is conceivable that the support foot be provided with engagement means which cooperate with the underside of the construction element 1 rather than with the hole 2 or its thread 5. One example is upwardly directed projections on the upper side of the support foot 6. The projections are disposed so that they can be pressed into the construction element 1 around the hole 2. However, a feature common to the different methods is that it must be quite simple to release the support foot 6 from the pre-mounted state on mounting and subsequent adjustment of the construction element 1.

[0030] In the above-described embodiments, the support foot 6 and the spacer screw 11 are non-rotationally interconnectable to one another, since the support foot 6 must be screwed out of the thread 5 provided in the construction element 1. This implies that the support foot 6 will rotate with spacer screws 11 throughout the entire adjustment procedure. Possibly, this may occasion problems since the friction between the underside 7 of the support foot and a subjacent concrete floor may be expected to be high.

[0031] The above-mentioned problem is obviated in one embodiment where the lower end region 14 of the spacer screw 11 is rotatably fixable, for example via a snap connection, in the upwardly directed sleeve 8 of the support foot. This sleeve 8 is then fixable in the construction element 1 or in its bushing 4 in such a manner that it does not need to be rotated in order to be released. An axial movement for release is appropriate and the fixing of the sleeve 8 may be realised by friction, by snap action, by a frangible glue connection etc. Regardless of how this fixing is realised, it is important that the fixing of the spacer screw 11 in the sleeve 8 requires considerably less axial compression force than does the release of the sleeve 8 from the construction element 1.

[0032] The present invention may be modified further without departing from the scope of the appended Claims.

Claims

1. A spacer in a construction element (1), comprising a thread (5) interiorly provided in the construction element (1), a spacer screw (11) with a thread (13) for cooperation with the inner thread (5), as well as a support foot (6) intended for abutment against a support surface, the distance between the support foot and the construction element being adjustable by rotation of the spacer screw, **characterised in that** the support foot (6) has a first engagement means (9) by means of which it is fixable in the construction element (1); that the spacer screw (11) and the support foot (6) have mutually corresponding engagement means (10, 15) by means of which the spacer screw (11) is fixable in or on the support foot (6) and the first engagement means (9) of the support foot is releasable from the construction element (1).
2. The spacer as claimed in Claim 1, **characterised in that** the spacer screw (11) has a longitudinal channel (18) in which a fixing means (16) is disposed so that it extends down in a substrate (17) beneath the support foot (6) for anchoring, in the axial direction, the spacer in the substrate.
3. The spacer as claimed in Claim 2, **characterised in that** there is disposed, about the fixing means (16), a spacer sleeve (20) which, on fixing of the fixing means, is disposed to abut against both the head of the fixing means and against the surface of the substrate.
4. The spacer as claimed in Claim 2 or 3, **characterised in that** the channel (18) has a radial abutment; that there is disposed, about the fixing means (16), a noise-damping bushing (21) which has a radially projecting flange which, when the fixing means is fixed in place, is located between the abutment of the channel and the head of the fixing means (16).
5. The spacer as claimed in Claim 4, **characterised in that** the spacer sleeve (20) is disposed interiorly in the noise-damping bushing (21).
6. The spacer as claimed in any of Claims 1 to 5, **characterised in that** the support foot (6) and the spacer screw (11) are manufactured in two separate parts (6, 11).
7. The spacer as claimed in any of Claims 1 to 6, **characterised in that** the first engagement means of the support foot (6) is releasably fixable in the inner thread (5).
8. The spacer as claimed in Claim 7, **characterised in that** the first engagement means (9) of the support foot (6) is a thread.
9. The spacer as claimed in any of Claims 1 to 8, **characterised in that** the mutually corresponding engagement means (10, 15) of the support foot (6) and the spacer screw (11) are threads.
10. The spacer as claimed in any of Claims 1 to 9, **characterised in that** the mutually corresponding engagement means (10, 15) of the support foot (6) and the spacer screw (11) are splines.
11. The spacer as claimed in any of Claims 1 to 10, **characterised in that** the support foot (6) is pre-mounted in the inner thread (5) of the construction element (1).

12. The spacer as claimed in any of Claims 1 to 11, **characterised in that** the support foot (6) has a largest transverse dimension which exceeds the transverse dimension of the thread (5) provided in the construction element (1). 5
13. The spacer as claimed in Claim 9 or 10, **characterised in that** the length of the outer engagement means (15) of the spacer screw (11) exceeds the sum total of the length of the inner engagement means (10) of the support foot (6) and the inner thread (5) of the construction element (1). 10
14. The spacer as claimed in any of Claims 1 to 13, **characterised in that** the inner thread (5) of the construction element (1) is realised in a bushing (4) disposed in the construction element (1). 15

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Fig 1

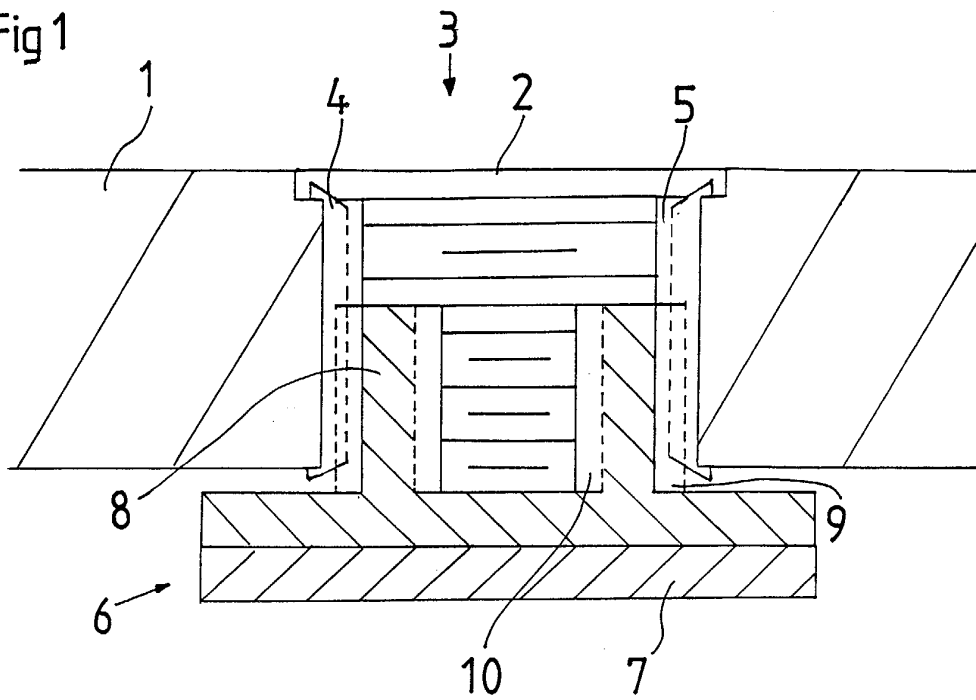


Fig 3

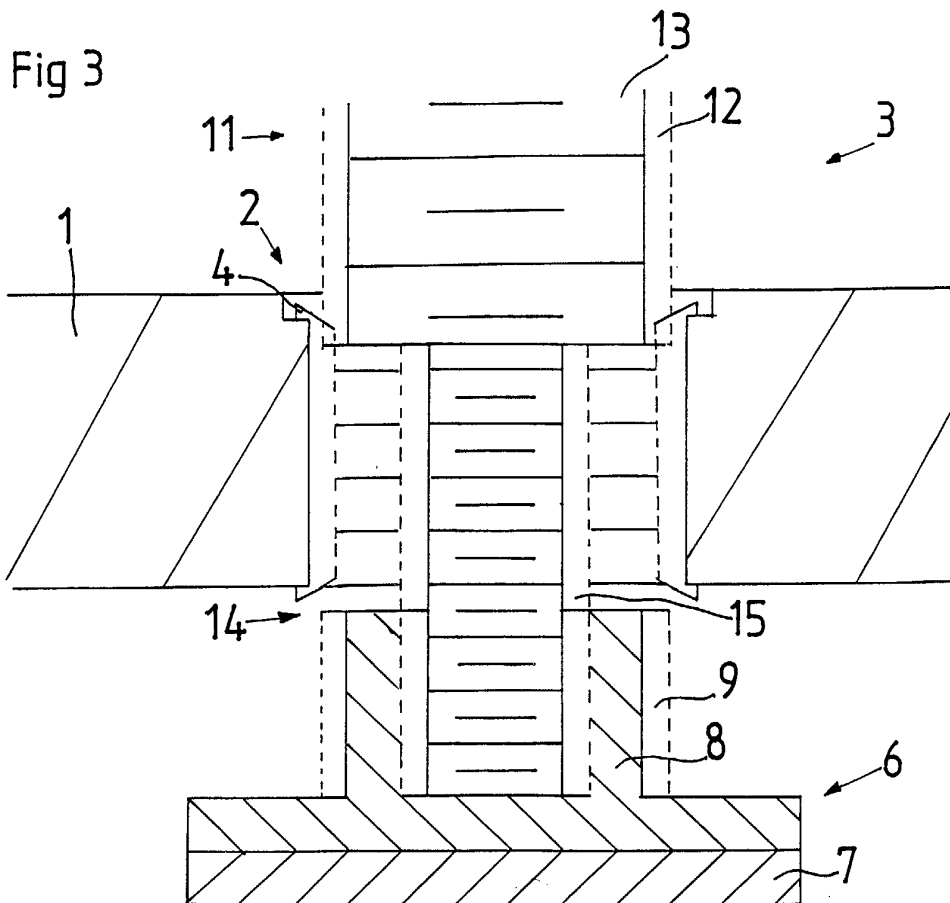


Fig 2

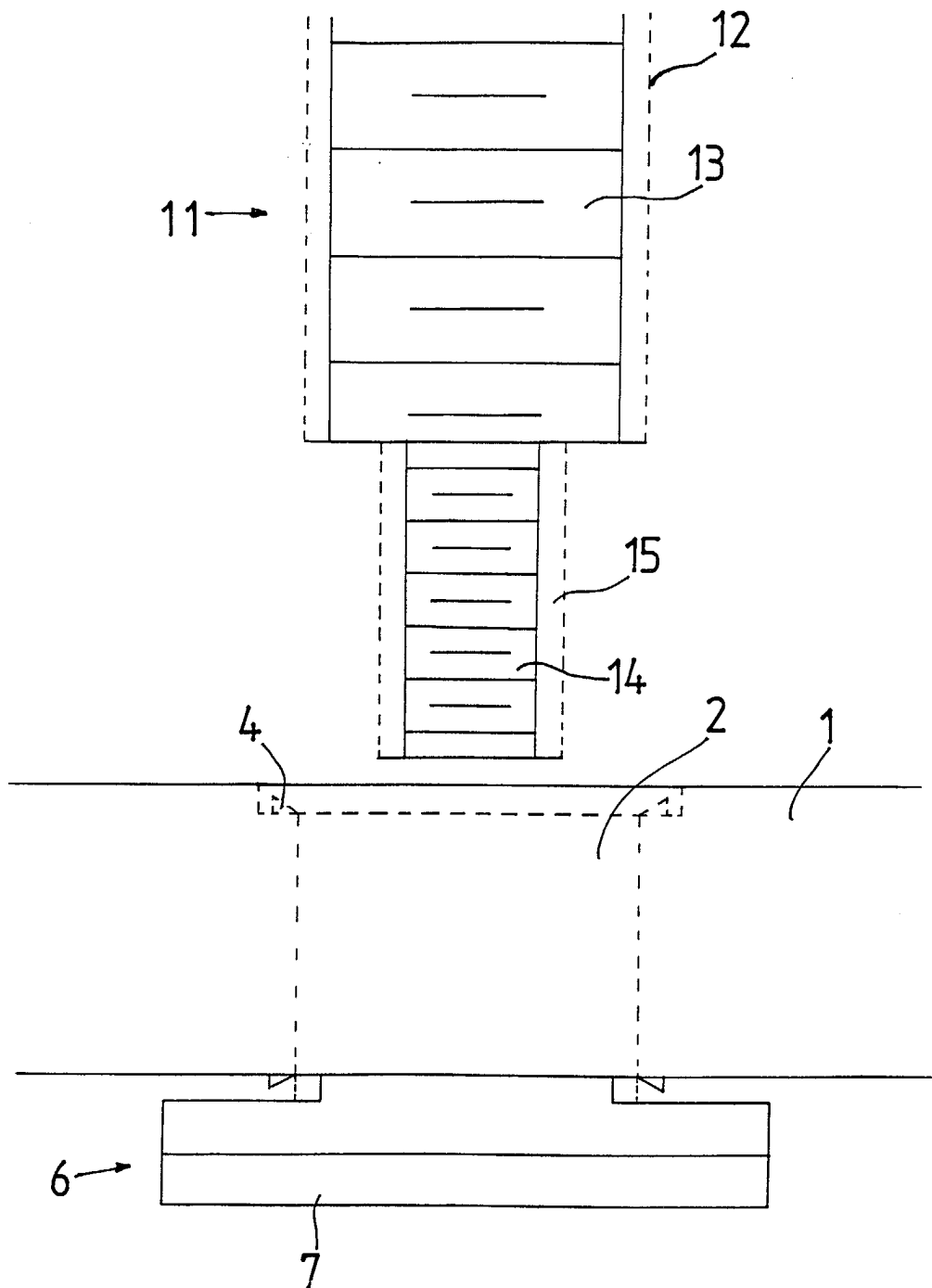


Fig 4

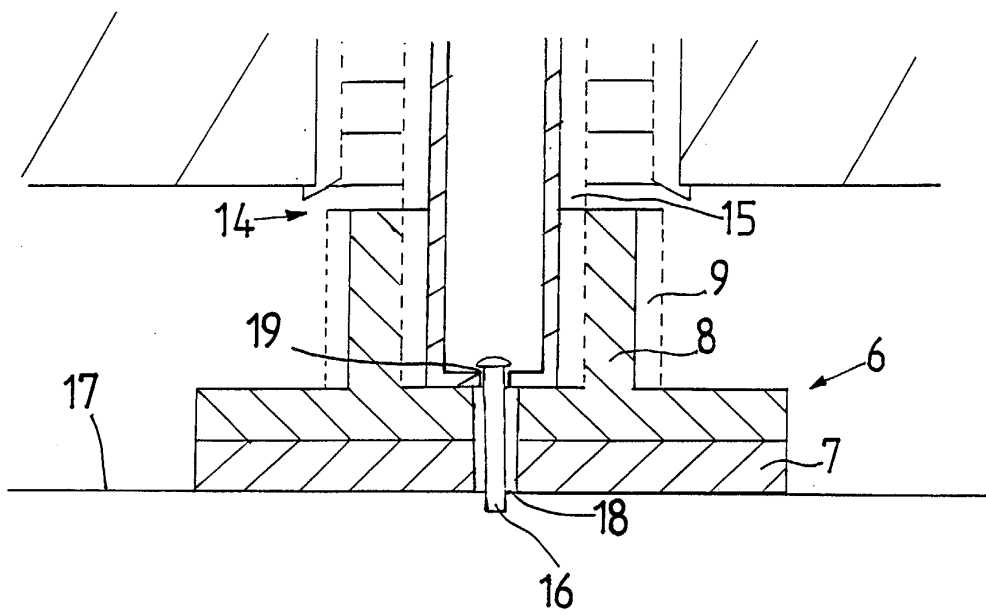
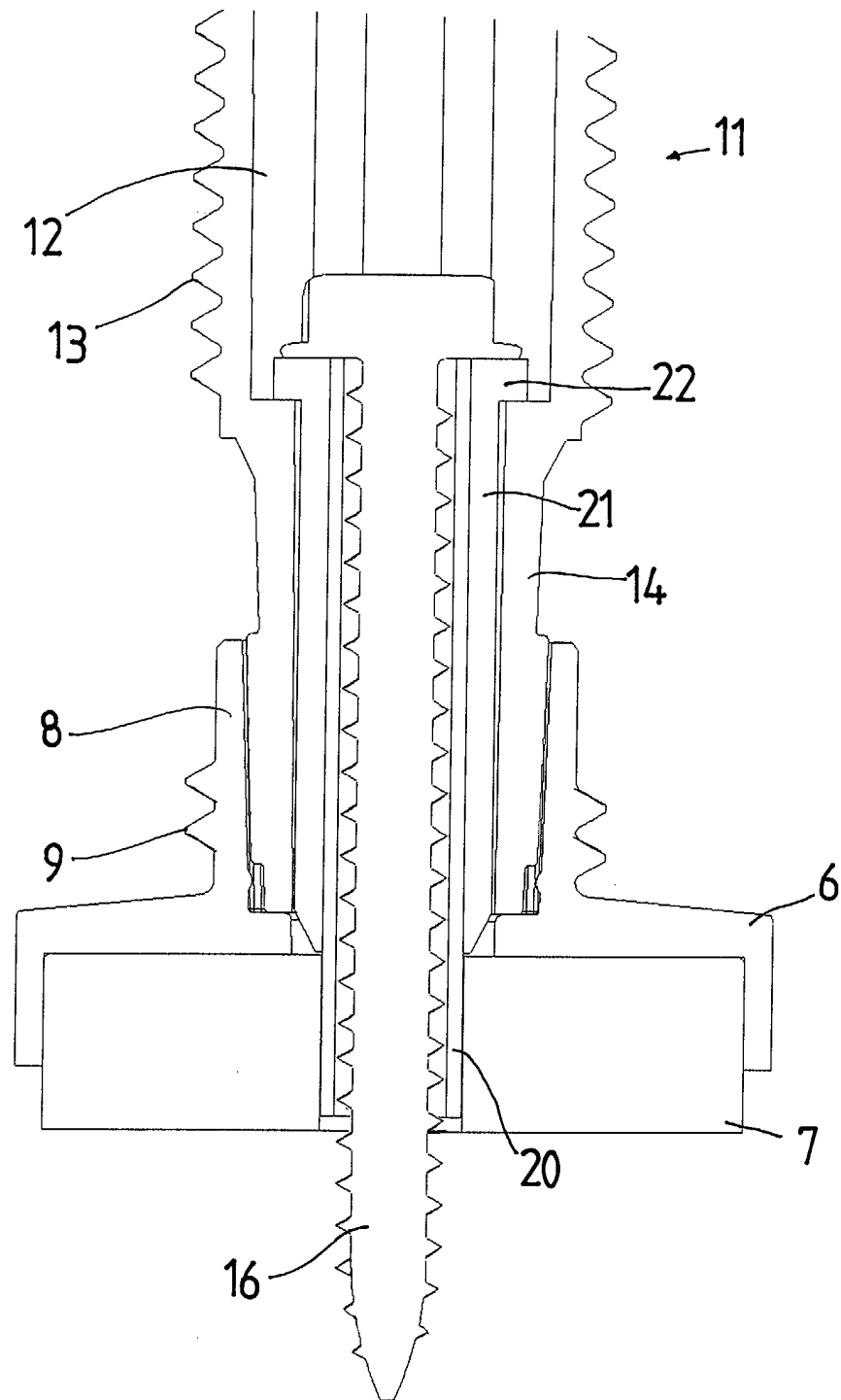


Fig 5



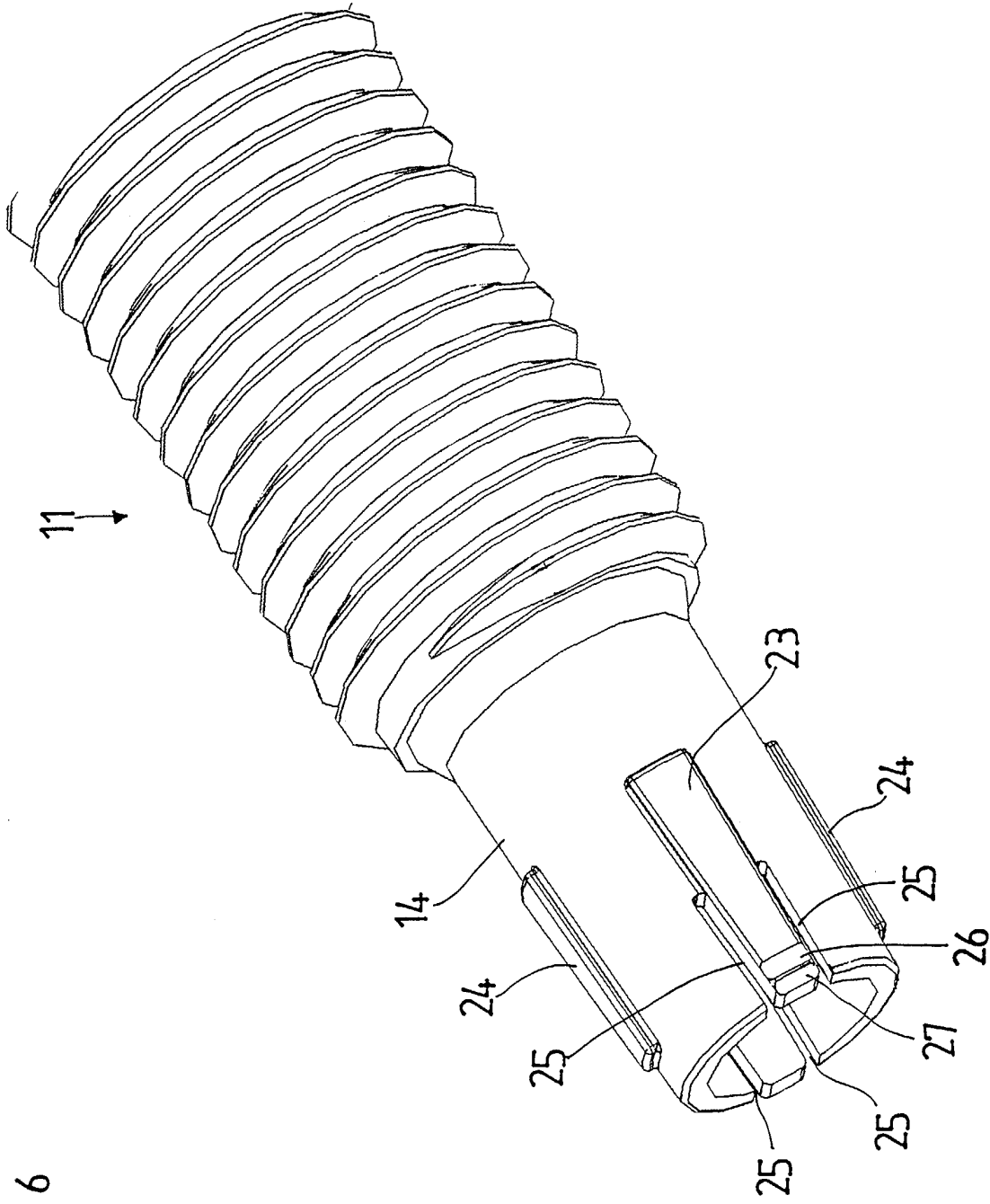


Fig 6



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EUROPEAN SEARCH REPORT

Application Number
EP 04 07 5716

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The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 3 June 2004	Examiner Bouyssy, V
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 07 5716

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