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(54) **Screw pile**

(57) The invention relates to a screw pile comprising:
- a shaft;
- a helical flange arranged around the shaft and extending from one end of the shaft over at least a part of the length of the shaft;
- a mounting head arranged on the other end of the shaft;
- a sleeve free rotatable arranged around the shaft;
- blocking means for blocking axial movement of the sleeve past the mounting head; and
- at least one wing arranged in axial direction along the sleeve and extending in radial direction.

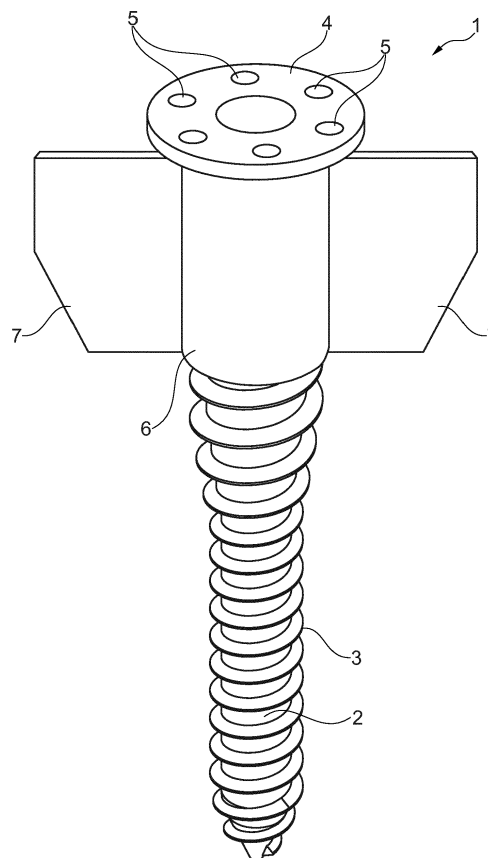


Fig. 1

Description

[0001] The invention relates to a screw pile comprising:

- a shaft;
- a helical flange arranged around the shaft and extending from one end of the shaft over at least a part of the length of the shaft;
- a mounting head arranged on the other end of the shaft.

[0002] Piles in general are used to support structures on non-solid ground. Typically, concrete piles or steel piles are driven into the ground, to a solid ground layer, such as a sand layer or a rock layer. This driving of piles is accompanied by a lot of noise and vibrations.

[0003] To avoid these disadvantages, also screw piles are known. A screw pile is inserted into the ground by rotation similar to a screw in a piece of wood. Because such screw piles are inserted by rotation, the diameter of these screw piles are generally smaller, than conventional piles. As a result, screw piles typically have a lower weight, contributing to a better handling of the piles. When inserting a screw pile, the surrounding ground is compacted, such that the screw piles typically have a good axial strength for supporting structures.

[0004] However, because the screw piles have a relatively smaller diameter, the screw piles have a lower transverse stability than corresponding conventional piles, which are wider and can withstand transverse forces better. Especially for structures with a large height and small width, such as wind screens and noise barriers, a high transverse stability is required. For such applications, the known screw piles are less suitable.

[0005] FR 2863633 discloses a ground anchor having a rod with helical flanges at one end. This ground anchor is first placed into the ground by rotation. Afterwards, a stability part with a number of vertical wings is slid over the top of the rod and pushed into the ground. Then a nut having a loop is screwed onto the rod, such that a cable or the like can be attached to the ground anchor.

[0006] The stability part increases the transverse stability of this ground anchor. However, a separate device or manual labor is required to push the stability part into the ground. Also, the rod needs to extend above the stability part for a mounting part to be attached afterwards. This will increase the height, relative to the ground, and make a flush arrangement of the ground anchor with the surrounding ground difficult.

[0007] CA 2155504 discloses a screw pile in which also first the screw pile is inserted into the ground. Then, after the screw part is inserted into the ground, a threaded rod is screwed into a nut arranged at the top of the screw pile. A stability part with vertical wings is slid over the threaded rod and a second nut is arranged on the threaded rod, such that the stability part can be pushed into the ground by tightening the second nut.

[0008] Also this known screw pile requires additional

equipment for arranging the stability part and a lot of mounting steps, before the screw pile is ready for use. Furthermore, the requirement to have to insert a threaded rod into a nut in a typically sandy environment is cumbersome.

[0009] It is an object of the invention to reduce or even remove the above mentioned disadvantages.

[0010] This object is achieved according to the invention with a screw pile according to the preamble, which screw pile is characterized by:

- a sleeve free rotatable arranged around the shaft;
- blocking means for blocking axial movement of the sleeve past the mounting head; and
- at least one wing arranged in axial direction along the sleeve and extending in radial direction.

[0011] The screw pile according to the invention has a sleeve with at least one wing arranged around the shaft. The blocking means ensure that the sleeve, although it can freely rotate around the shaft, cannot slide past the mounting head.

[0012] So, when installing the screw pile according to the invention the shaft including the sleeve with wing is placed on the ground and rotated by engaging a rotary device on the mounting head.

[0013] The screw pile will dig into the ground due to the rotating movement and the helical flange. At a certain depth of the shaft, the sleeve will be clamped between the ground and the blocking means, which prevent the shaft from sliding over the mounting head. By rotating the shaft further, the shaft will go deeper into the ground and take the sleeve with the wings along into the ground.

[0014] So, when the screw pile is at the desired depth into the ground, the sleeve with the at least one wing will also be already installed into the ground. No additional handling to the rotating of the screw pile is required, while still a screw pile with increased transverse stability is achieved.

[0015] In an embodiment of the screw pile according to the invention the blocking means are provided by the mounting head having a circumference extending in radial direction of the sleeve at least partially beyond the circumference of the sleeve.

[0016] By having the mounting head at least somewhat larger than the sleeve, it is ensured, that the sleeve cannot slide over the mounting head.

[0017] Preferably, the blocking means comprise a radially extending circumferential flange arranged to the shaft, wherein the diameter of the circumferential flange is larger than the inner diameter of the sleeve.

[0018] The radially extending circumferential flange provides an end surface against which the sleeve can be supported and the clamping force, generated when inserting the shaft into the ground, can be transferred onto the sleeve and the at least one wing to push the sleeve into the ground.

[0019] In yet another embodiment of the screw pile ac-

cording to the invention the circumferential flange is a mounting flange. The mounting flange provides an easy mounting for structures to be supported by the screw pile of the invention. A mounting flange typically has some holes in the flange, to accommodate bolts and nuts.

[0020] In a preferred embodiment of the screw pile according to the invention the at least one wing at least partially tapers towards the one end of the shaft.

[0021] The tapering end of the wing will ensure, that the wing is easily inserted into the ground. It will also provide some direction to the wing within the ground.

[0022] In a further preferred embodiment of the screw pile according to the invention at least two, preferably four, wings are arranged in axial direction along the sleeve and extending in radial direction, wherein the at least two wings are evenly distributed along the circumference of the sleeve.

[0023] Two wings, evenly distributed along the circumference and therefor in line with each other, provides for a good transverse stability perpendicular to the plane, in which the two wings are provided.

[0024] With four wings the wings are provided into two planes perpendicular to each other and will provide a transverse stability in any direction transverse to the shaft.

[0025] Still a further preferred embodiment of the screw pile according to the invention further comprises a bushing arranged between the sleeve and the shaft.

[0026] Screw piles are typically made of galvanized steel. If the shaft is rotated within the sleeve, the galvanization layer could be damaged, such that the screw pile could start to rust early. By arranging a bushing between the shaft and the sleeve, a bearing is provided, such that the galvanization layer is not damaged.

[0027] The bushing can be made out of a suitable plastic, such as nylon.

[0028] These and other features of the invention will be elucidated in conjunction with the accompanying drawings.

Figure 1 shows a perspective view of a screw pile according to the invention.

Figure 2 shows schematically the insertion of a screw pile according to figure 1 in different stages.

Figure 3 shows a cross sectional view of the top of the screw pile according to figure 1.

Figure 4 shows a perspective view of a noise barrier supported by a number of screw piles according to figure 1.

Figure 5 shows a perspective view of a variant of a screw pile according to figure 1.

[0029] Figure 1 shows a perspective view of a screw pile 1 according to the invention. The screw pile 1 has a shaft 2 with a helical flange 3 extending from the bottom of the shaft 2 over at least a part of the length of the shaft 2.

[0030] A mounting flange 4 is arranged at the top of the shaft 2. The mounting flange 4 is provided with a

number of holes 5 for accommodation of bolts and nuts and for engagement of a rotary driving means to rotate the shaft 2 into the ground.

[0031] Below the mounting flange 4, a sleeve 6 is provided with two wings 7, which are arranged in axial direction along the sleeve 6 and extending in radial direction. The two wings are evenly distributed along the circumference of the sleeve 6.

[0032] Figure 2 shows schematically the insertion of a screw pile 1 according to figure 1 in different stages. There are four stages shown from left to right in the figure.

[0033] In the first stage, the screw pile 1 is positioned at the correct position on the ground surface 8. The sleeve 6 with the wings 7 is also placed on the ground surface 8 and the shaft 2 extends through the sleeve 6.

[0034] In the second stage, the screw pile 1 is rotated such that it is screwed into the ground 8. The sleeve 6 with the wings 7 stay on the ground surface 8.

[0035] In the third stage, the screw pile 1 is inserted to such a depth into the ground 8, that the sleeve 6 with the wings 7 is clamped between the mounting flange 4 and the ground 8 causing the wings 7 and sleeve 6 to be pushed into the ground due to the rotating action of the screw shaft 1.

[0036] In the fourth stage, the screw pile 1 is inserted fully into the ground and the sleeve 6 with the wings 7 is also fully inserted into the ground 8, such that the mounting flange 4 is flush with the surrounding ground surface 8.

[0037] Figure 3 shows a cross sectional view of the top of the screw pile 1 according to figure 1. It is clear that the diameter of the sleeve 6 is smaller than the diameter of the mounting flange 4, such that the mounting flange 4 effectively blocks the sleeve 6 from for axial movement of the sleeve 6 past the mounting head or mounting flange 4.

[0038] Between the sleeve 6 and the shaft 2, two bushings 9 are arranged providing a bearing for the freely rotatable sleeve 6 relative to the shaft 2.

[0039] Figure 4 shows a perspective view of a noise barrier 10 supported by a number of screw piles 1 according to figure 1. Each screw pile 1 supports a pole 11 of the noise barrier 10. Between the poles 11, shields 12 are provided which provide the noise barrier.

[0040] The wings 7 of each screw pile 1 are arranged in the same plane as the shields 11, such that the screw piles 1 provide an optimal transverse stability in the direction T. This contributes for example in the ability of the noise barrier 10 to withstand strong winds.

[0041] Figure 5 shows a perspective view of a variant of a screw pile according to figure 1. In this variant four wings 7 are arranged evenly distributed along the circumference of the sleeve 6.

Claims

1. Screw pile comprising:

- a shaft;
 - a helical flange arranged around the shaft and extending from one end of the shaft over at least a part of the length of the shaft;
 - a mounting head arranged on the other end of the shaft, **characterized by**
 - a sleeve free rotatable arranged around the shaft;
 - blocking means for blocking axial movement of the sleeve past the mounting head; and
 - at least one wing arranged in axial direction along the sleeve and extending in radial direction.
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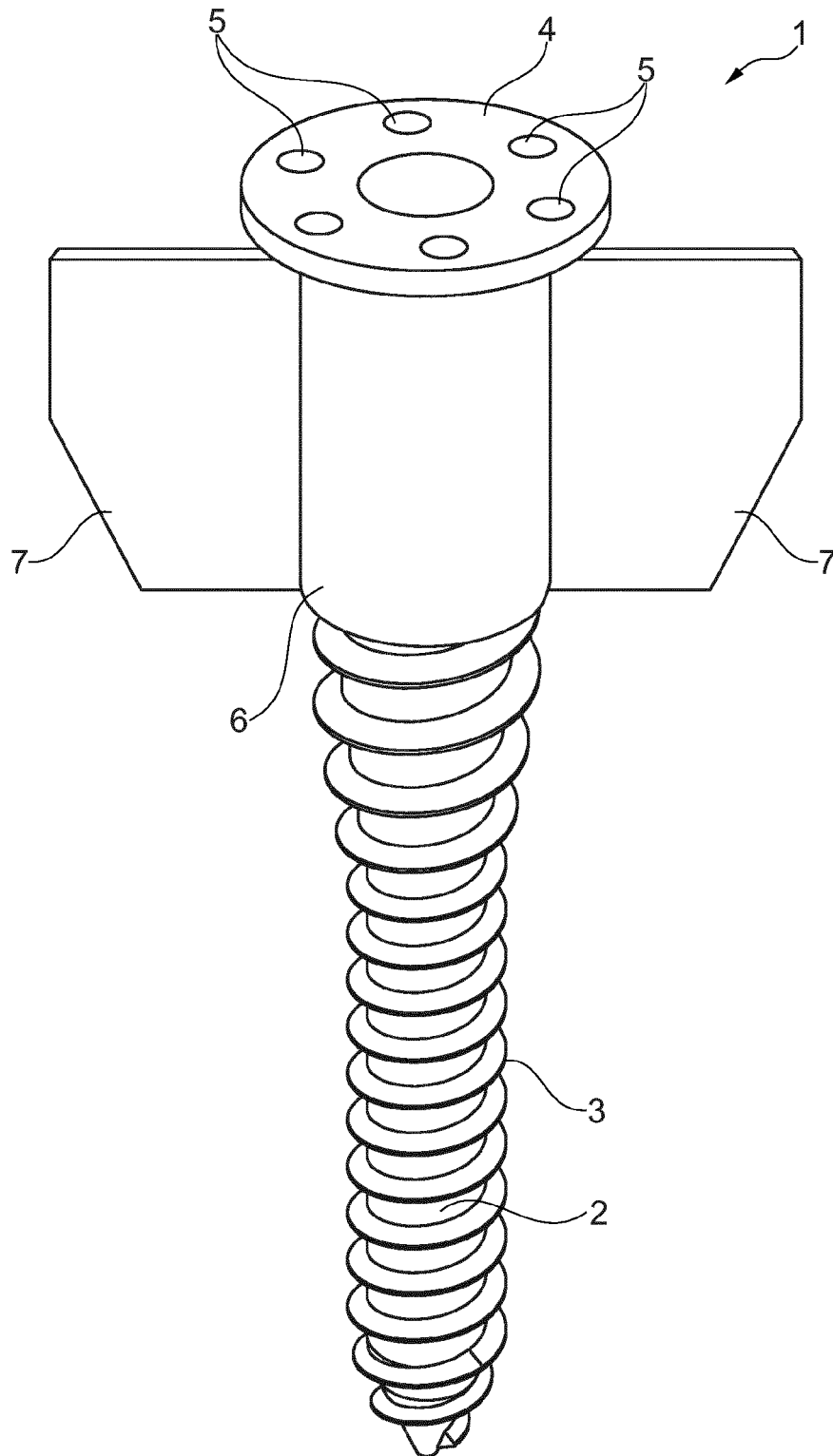


Fig. 1

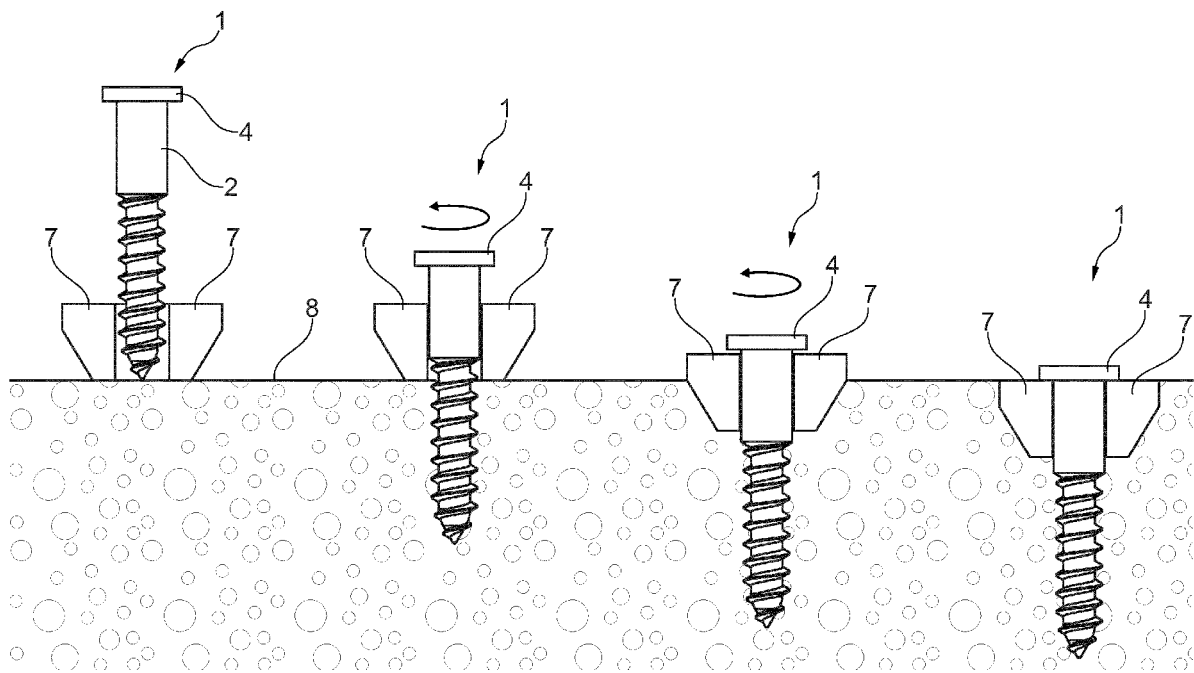


Fig. 2

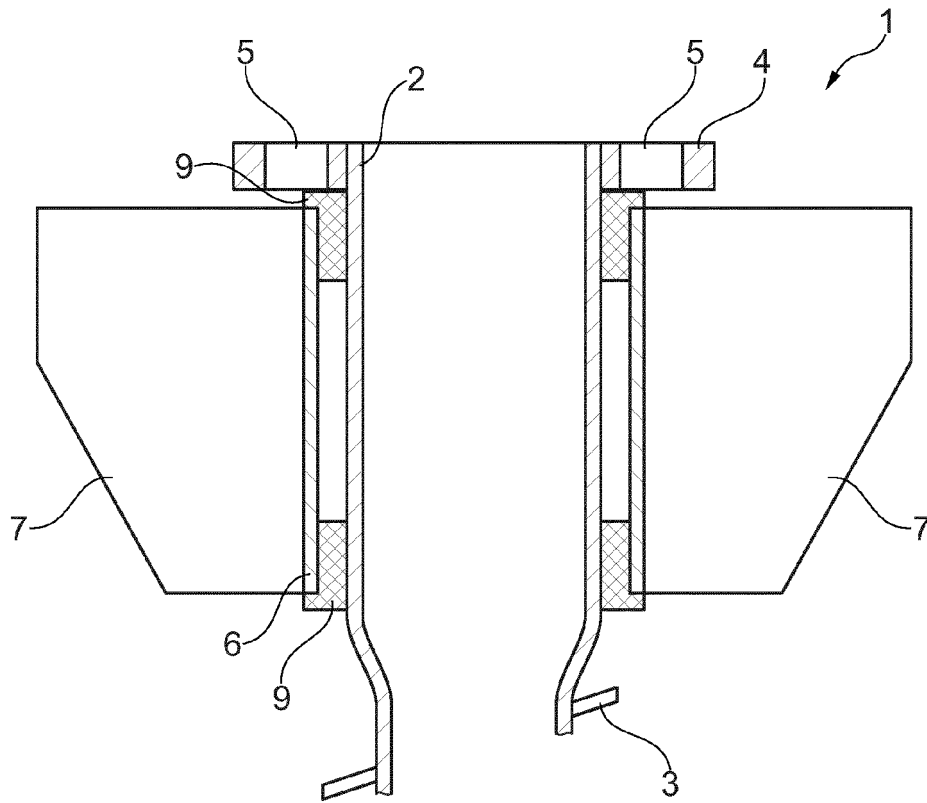


Fig. 3

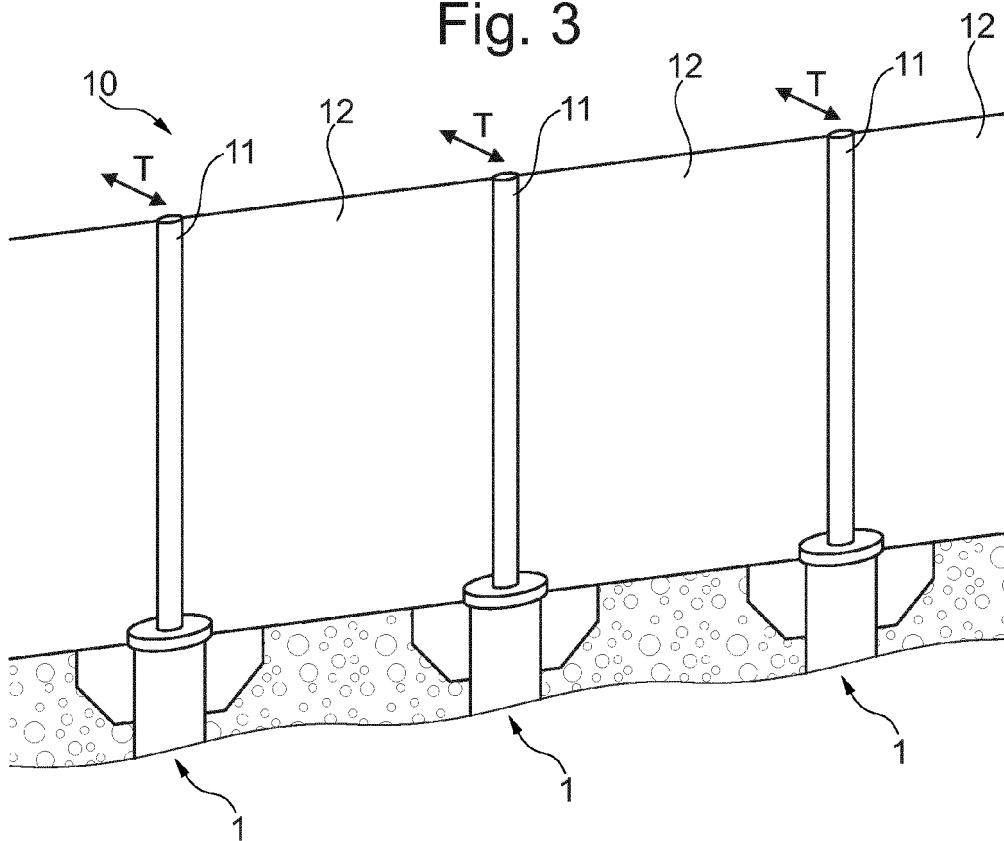


Fig. 4

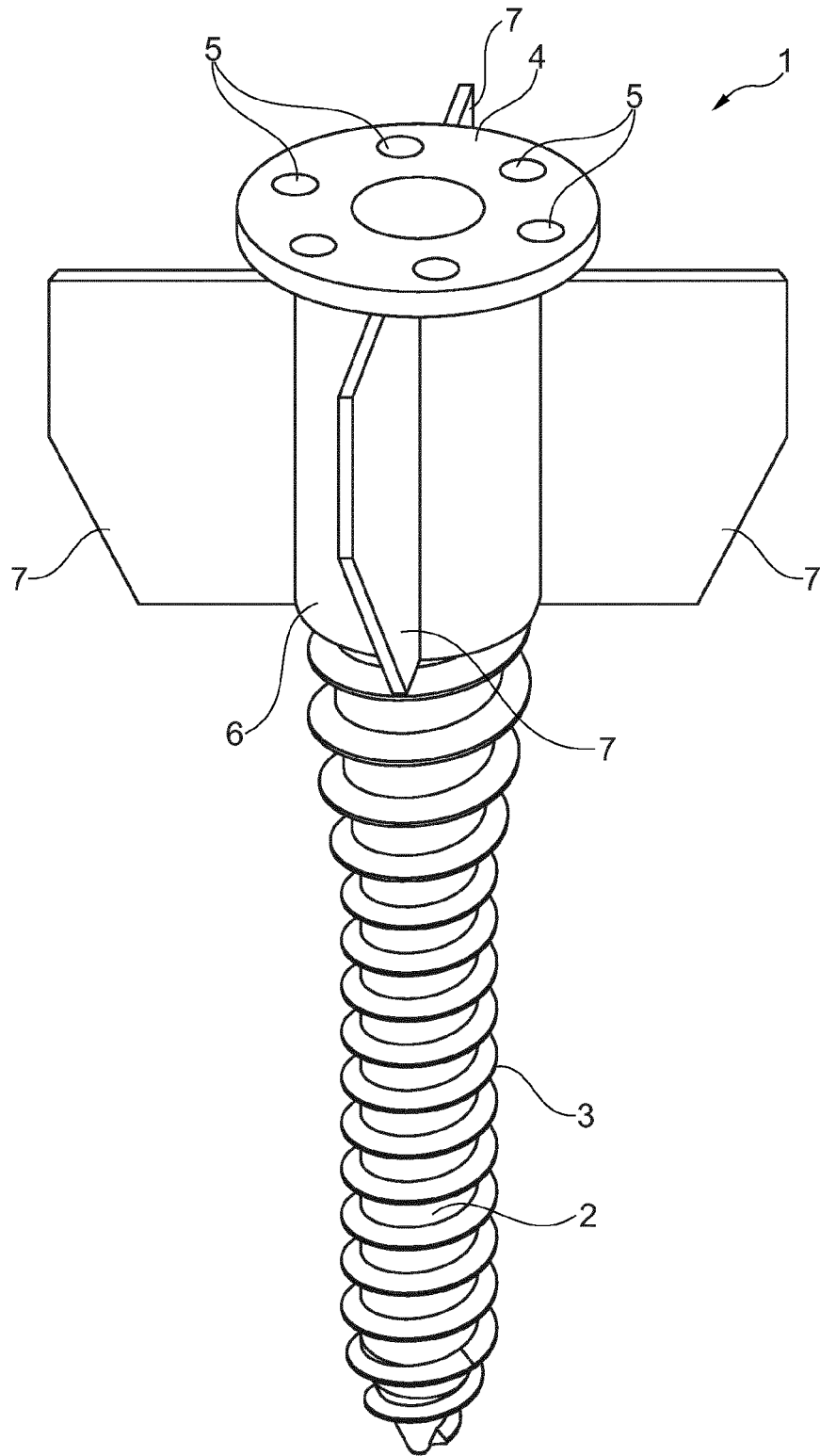


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 14 18 8219

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			TECHNICAL FIELDS SEARCHED (IPC)
			E02D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 May 2015	Examiner Geiger, Harald
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 14 18 8219

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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