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(54) **Column for supporting equipment at a predetermined distance from the ground surface, particularly solar panels, dish antennas and the like**

(57) A column (1) extending along a longitudinal straight axis X-X, and having a bottom end (2) whereby a predetermined section (T1) of the post is driven into the ground (9) whereas a second section (T2) remains above the ground (9) with the free end (3) thereof at a predetermined height from the ground surface (10).

The bottom end (2) of the column is open. It communicates with an axial cavity (5) within the column, said cavity (5) having a partition (6) fixed therein transverse to the longitudinal axis X-X and located at a predetermined distance (D1) from said open bottom end (2).

The column (1) is driven into the ground using percussion means and provides high stability, allowing it to be used in the installation of solar arrays and/or dish antennas.

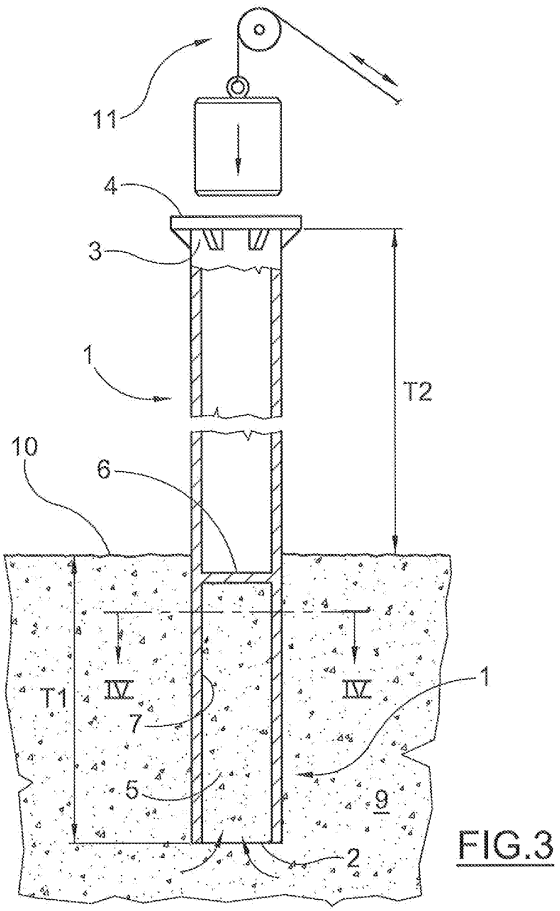

FIG.3

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Description

[0001] The present invention relates to a column extending along a longitudinal straight axis X-X, and having a bottom end whereby a predetermined section of the post is driven into the ground, and a second end designed to remain out of the ground at a predetermined height relative to the surface, as defined in the preamble of claim 1.

[0002] Particularly, the column is used for supporting at a predetermined height from the ground surface a solar array, a dish antenna, or any equipment required to maintain a predetermined distance from the ground as well as the orientation assigned thereto during installation.

[0003] Such need is particularly felt when the column is designed to support large surface equipment, exposed to weather agents, and particularly wind, at its top above the ground.

[0004] By exerting its impact force on the exposed surface of the equipment, the wind causes oscillations of the column, which transfer to the base secured to the ground and may cause the anchors to loosen, with a consequent loss of position and orientation accuracy of the column.

[0005] This is particularly undesired if the equipment is a solar array with a large exposed surface of a dish antenna.

[0006] For maximized position stability, in prior art, a hole is digged in the ground, a concrete footing is formed for anchorage of the end of the column designed to be underground, and finally the footing is buried and the hole is filled.

[0007] Such piling technique requires a number of steps at a non negligible cost, especially considering that most of the times the column is installed in hardly accessible places.

[0008] Also, if the footing is required to be dismantled, time-consuming demolition works have to be carried out, involving time and cost increases.

[0009] The object of the present invention is to provide a column whose features allow it to be mounted in the ground without using concrete footings, while being sure of obtaining and maintaining the original position even when the equipment mounted at the top has large surfaces exposed to the wind.

[0010] Such object is fulfilled by a column as defined in claim 1 below.

[0011] The invention will be described in greater detail with reference to the annexed drawings, which show a practical embodiment given by way of illustration and without limitation, in which:

- Figure 1 is a schematic sectional view of a column of the invention;
- Figure 2 is a sectional view as taken along line II-II of Figure 1;
- Figure 3 is a schematic sectional view of a column of the invention as it is driven into the ground;
- Figure 4 is a cross sectional view as taken along line IV-IV of Figure 3;
- Figure 5 is an enlarged vertical section of the underground column section at the partition of its axial cavity, which partition is provided in a different embodiment;
- Figure 6 is a cross sectional view as taken along line VI-VI of Figure 5;
- Figure 7 is a perspective view of an embodiment of the column of the invention;
- Figure 8 shows a practical use of the column of the invention to support, for example, a solar array.

[0012] Referring to the above figures, the column, generally designated by numeral 1 has an open bottom end 2 whereby a predetermined section T1 of the post may be driven into the ground and a second end 3, designed to remain above the ground, at a predetermined height T2 relative to the ground surface.

[0013] The end 3 may be fitted with a plate, generally designated by numeral 4, which is designed to support and secure equipment, as better described hereafter.

[0014] The column 1 preferably consists of a tubular metal element extending along a longitudinal axis X-X and having a circular cross section.

[0015] According to the invention, the bottom end 2 communicates with an axial cavity 5 within the column.

[0016] Such cavity 5 is axially delimited by a partition 6 transverse to the longitudinal axis X-X of the column 1 and up to a predetermined distance D1 from the bottom end 2.

[0017] In the embodiment as shown in Figure 1, the partition 6 consists of a plate which is secured by conventional means to the inner wall 7 of the column 1.

[0018] Such means include, for instance, welding through holes 8 formed on the column 1 and preferably situated on the side of the partition 6 away from the bottom end 2.

[0019] Preferably, such partition 6 is placed in the axial cavity 5 at a level from about 3/9 to 5/9 of the overall length of the column, as measured from the open bottom end 2 thereof.

[0020] Referring to Figure 3, it will be appreciated that the column 1 of the invention is driven into the ground 9 through the surface 10 thereof using conventional percussion and/or vibration means as schematically shown by the power hammer 11.

[0021] The column 1 is driven into the ground until a predetermined section T1 thereof is buried therein and, a predetermined section T2 of the column is above the ground, with the end 3 at the predetermined height relative to the surface 10 of the ground 9.

[0022] Since the bottom end 2 of the column 1 is open, as the latter is driven into the ground, the axial cavity 5 fills with the material of the ground 9 up to the partition 6.

[0023] As the column 1 is driven further into the ground until the partition 6 is below the surface 10, as shown in Figure 3, the material in the axial cavity 5 will be com-

pressed and will be much more compacted than the material around the column outside the cavity 5.

[0024] The level of the partition 6 below the ground surface 10 and the degree of compaction of the material in the axial cavity 5 depends on the nature of the ground. The latter shall be accounted for in the design of the overall length of the column 1 for determining the section T1 designed to remain underground as a function of the intended height of the free end of the section T2 from the surface 10.

[0025] Once the column 1 has been fitted into the ground, it will have a stable vertical position, and will not be subjected to any further appreciable vertical sinking, due to the compaction of the ground within the axial cavity 5.

[0026] The column also withstands any thrust applied to its free end 3 lateral to the axis X-X, even when it involves impact forces causing oscillations of the column, and are not capable of causing any further significant sinking and inclination of the column.

[0027] Referring to Figure 5, it shall be noted that, in a modified embodiment, the partition 6 is associated with a second plate 12 having a plurality of through holes 13, which is located within the axial cavity 5 on the side of the bottom opening 2, relative to the partition 6.

[0028] Such plate 12 is secured to the inner wall 7 of the cavity 5 by conventional fixation means, such as welding, like that for the partition 6, at a relatively small predetermined axial distance D2 therefrom, such as a few centimeters, thereby creating an air gap 14.

[0029] Such gap 14 communicates with the atmosphere outside the column 1 through a plurality of radial holes 15.

[0030] The structure that delimits the axial cavity 5 in the modified embodiment as described above allows any small particles of the ground 9 not contributing to column stability during ground compaction within the axial chamber 5, may be expelled out of the chamber 5.

[0031] The above disclosure clearly shows that columns may be installed with the utmost stability without any expensive and complex creation of concrete footings, thereby allowing the free ends thereof to be fitted with equipment having large surfaces exposed to wind such as solar panels designated by numeral 16 in figure 5 or dish antennas, not shown, and without risking any change of their vertical distance from the ground surface 10 or any inclination thereof.

[0032] Any connection to such equipment by conventional underground cables may reach the top 3 of the column 1 through one or more apertures 17 opening into the tubular part 18 of the column 1 on the side of the end 3.

[0033] Particularly, in this configuration, the partition 6 is at a depth of more than at least 40 cm relative to ground level.

[0034] By burying electric cables at a depth above at least 40 cm, power is more effectively carried, which provides solar panels 16 of greater efficiency, with lower leakage as compared with electric cables laid in air or close to the ground.

[0035] Referring to Figure 7, the column 1 appears to have at least one, preferably a plurality of fins 18 disposed proximate the bottom end 2.

[0036] The fins 18 extend radial to the longitudinal axis X-X of such column 2.

[0037] Preferably, the fins 18 are disposed on the outer surface of the column 2 and extend therefrom.

[0038] Advantageously, the fins 18 oppose any torque that may be exerted on the column 1 after installation of the equipment, e.g. the panels 16. As wind impinges against the surface of the panels 16, which may be as large as a few tens of square meters, it may exert torques thereupon and tend to rotate the column 2 about its own longitudinal axis X-X.

[0039] It shall be understood that any material and size may be used, according to special needs, and that embodiments other than those described and illustrated herein may be also implemented by those skilled in the art, without departure from the scope of the present invention, as claimed below.

Claims

1. A column (1) extending along a longitudinal straight axis (X-X), and having a bottom end (2) whereby a predetermined section (T1) of the post is designed to be driven into the ground (9) whereas a second section (T2) remains above the ground (9) with the free end (3) thereof being designed to be located at a predetermined height from the ground surface (10), **characterized in that** said bottom end (2) is open and communicates with an axial cavity (5) within the column (1), said cavity (5) having a partition (6) fixed therein transverse to the longitudinal axis (X-X) and located at a predetermined distance (D1) from said open bottom end (2).

2. A column as claimed in claim 1, **characterized in that** said axial cavity (5) extends along the entire longitudinal length of the column (1).

3. A column as claimed in claim 2, **characterized in that** said axial cavity (5) has a cylindrical shape.

4. A column as claimed in claim 3, **characterized in that** said axial cavity (5) has a circular cross section.

5. A column as claimed in claim 1, **characterized in that** said partition (6) is associated with a plate (12) located at a distance (D2) from said partition (6) to form an intermediate air gap (14), said plate (12) being located in the chamber (5) in the area facing the open end bottom (2).

6. A column as claimed in claim 6, **characterized in that** said plate (12) has a plurality of radial apertures

(15) opening into said air gap (14).

7. A column as claimed in claim 1, **characterized in that** it comprises at least one radial hole (17) opening into a part (18) of said axial cavity (5) which, relative to said partition (6), faces toward the free end (3).

8. A column as claimed in any one of the preceding claims 1 to 7, **characterized in that** said partition (6) is located at a level from about 3/9 to 5/9 of the overall length of the column (1), as measured from the open bottom end (2) thereof.

9. A column as claimed in claim 1, **characterized in that** it has at least one fin (18) proximate to said bottom end (2), said at least one fin (18) extending radially from said straight longitudinal axis (X-X).

10. A column as claimed in claim 9, **characterized in that** said at least one fin (18) is disposed on the outer surface of the column.

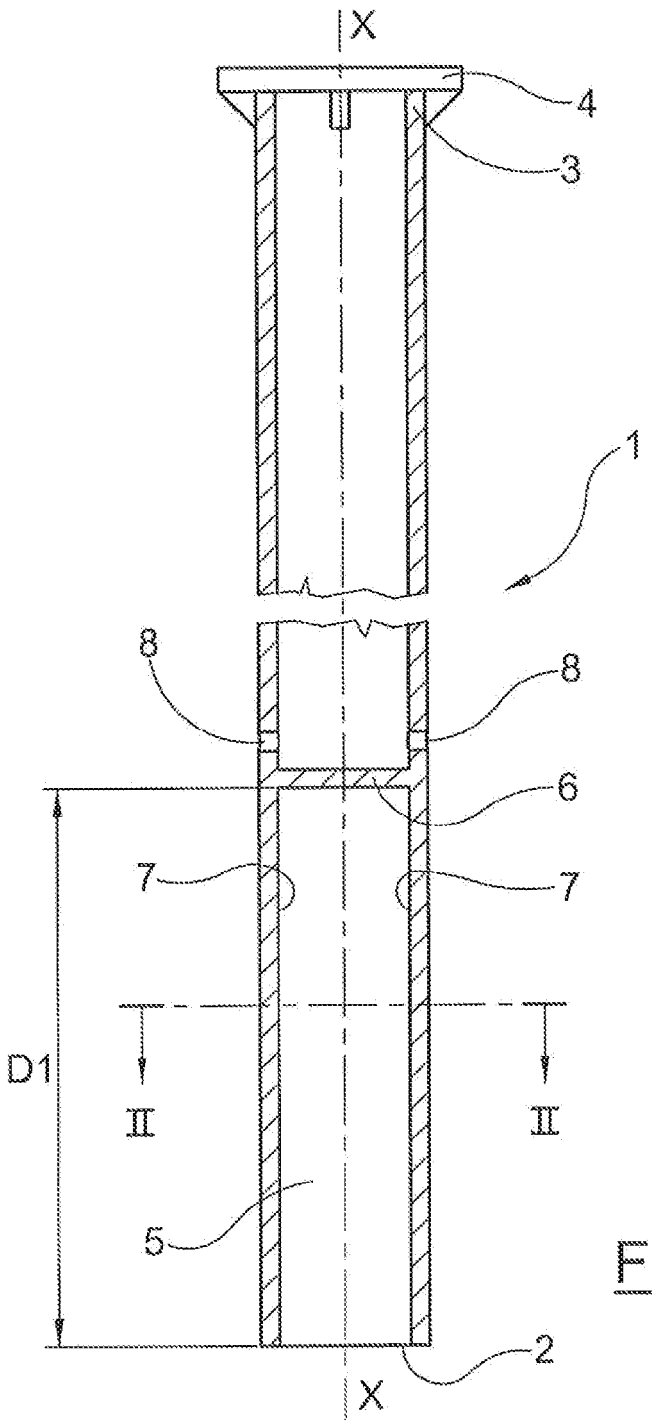

FIG.1

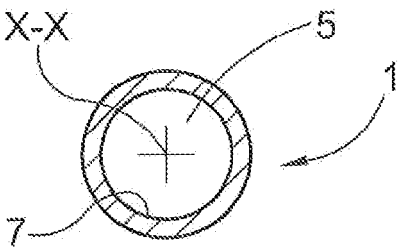

FIG.2

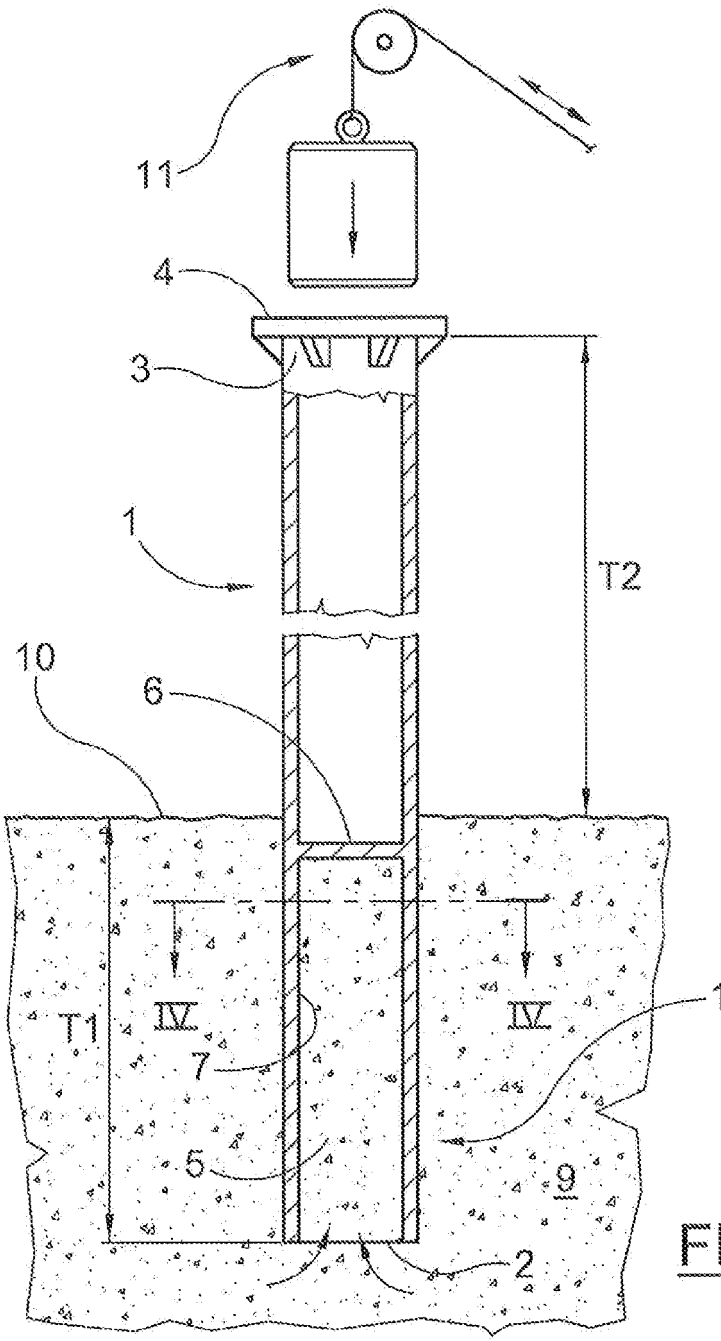

FIG.3

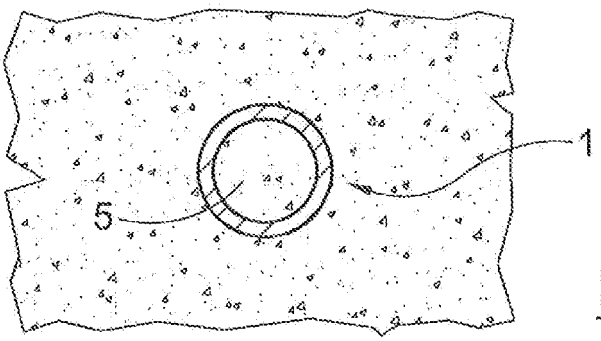

FIG.4

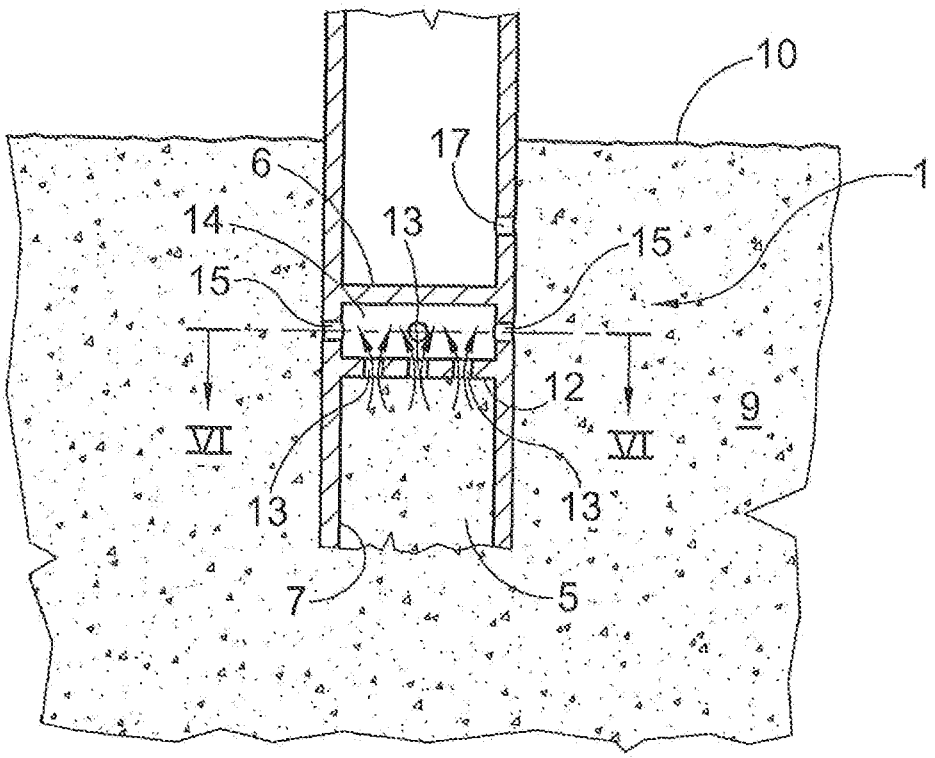

FIG.5

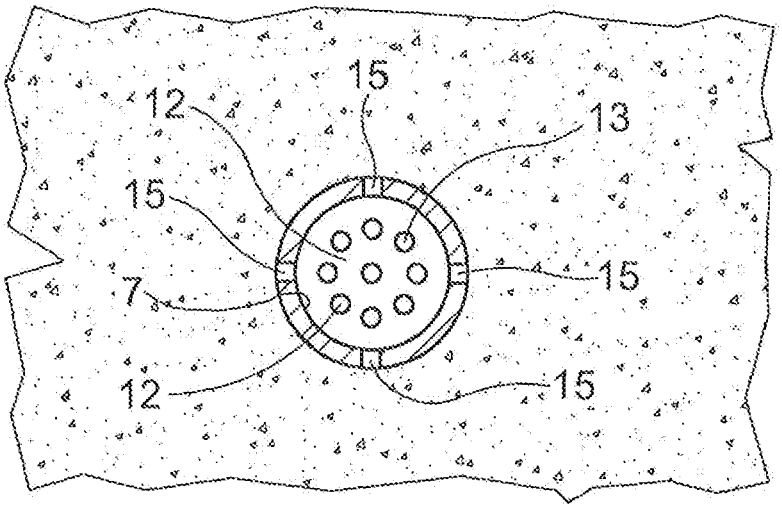

FIG.6

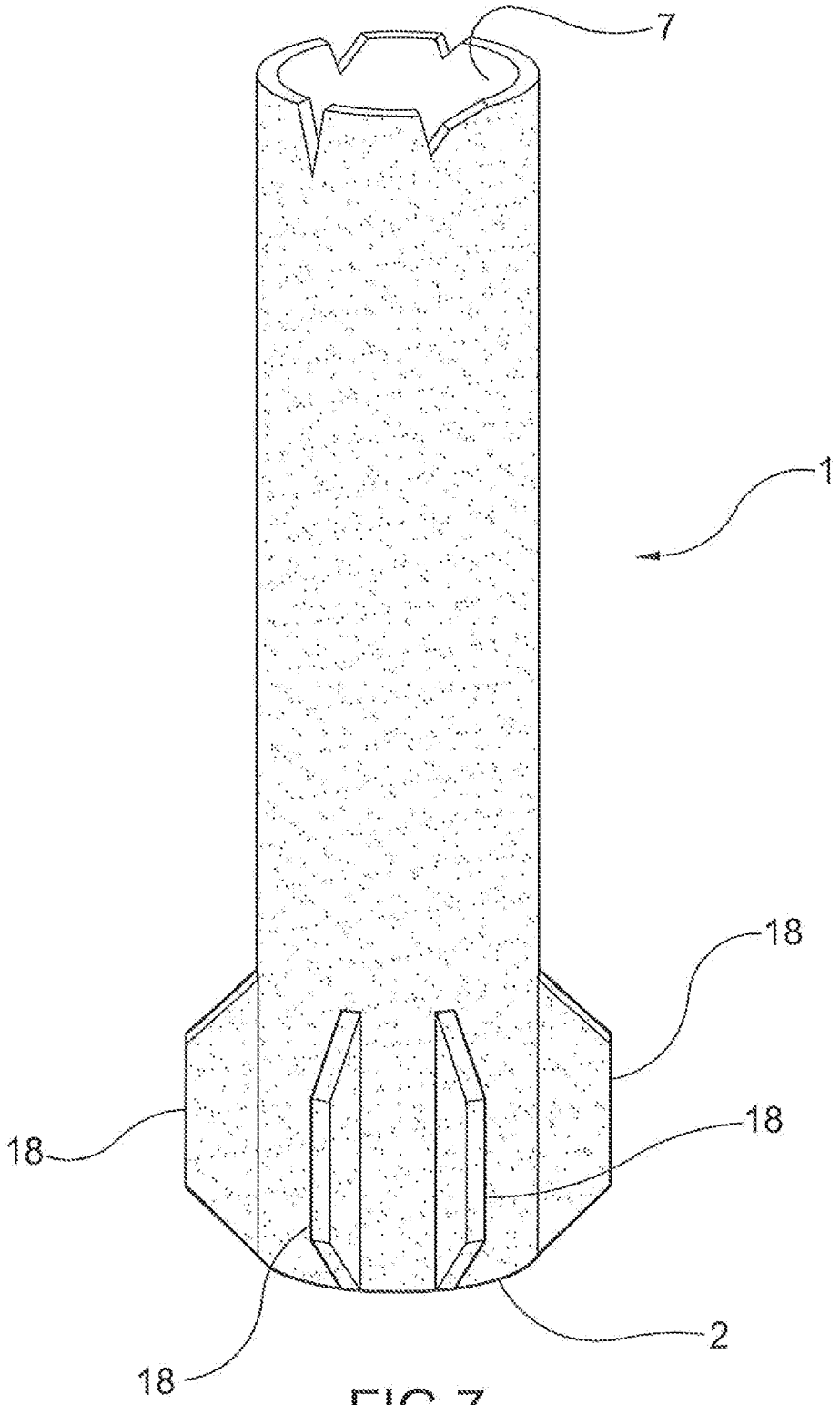

FIG.7

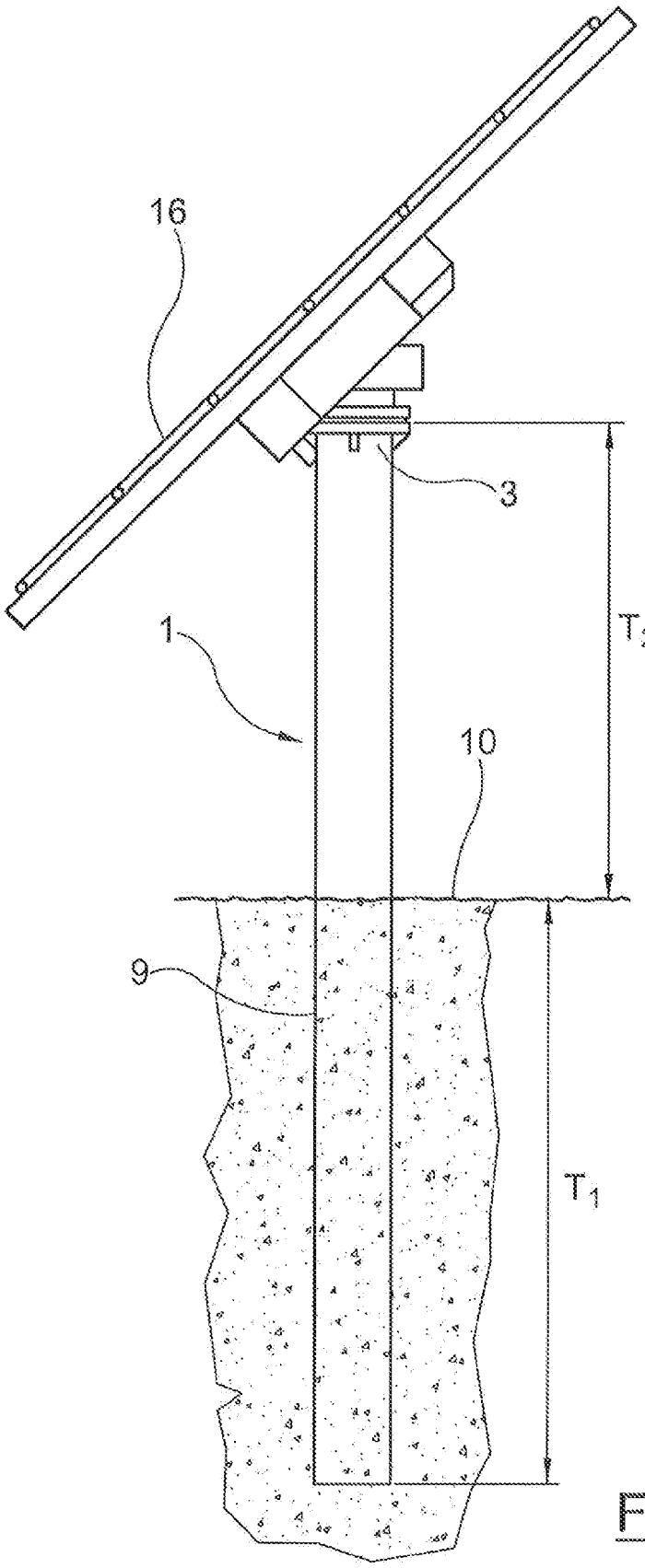

FIG.8

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EUROPEAN SEARCH REPORT

Application Number
EP 09 42 5008

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CH 333 106 A (SARRASIN ALEXANDRE PROF [CH]) 15 October 1958 (1958-10-15) * column 3, last paragraph - column 4, paragraph 2; figures 4-6 *	1-4,7,8	INV. E04H12/22
Y		9,10	
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X	US 5 582 491 A (PARDUE SR JAMES H [US]) 10 December 1996 (1996-12-10) * figures 2,3 *	1-5,7	

TECHNICAL FIELDS SEARCHED (IPC)

E04H
B63B
E02D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 June 2009	Hellberg, Jan

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 42 5008

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24-06-2009

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82