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(54) Gate and associated hinge cap

(57) The gate has a hollow bar (3) with therein provided a hinge cap (15) at its top and bottom end. The hinge cap (15) is provided with laterally projecting ribs (7), made of a plastics material, with which they are clamped into the bar (3) of the gate. To prevent excessive deformation of the hinge caps (15), the hinge caps contain, in addition to said plastics ribs (7), a support skeleton (17) in which the opening (9) for the hinge arm (11) is formed. The support skeleton (17) exhibits lateral projections (19) extending, in the unloaded state of the hinge, up to a short distance from the inside of the hollow bar (3), but which are provided, when the hinge is loaded, to provide an additional support of the hinge cap (15). To this end, the support skeleton (17) is made from a material which has a higher hardness than the plastics material from which said ribs (7) are made.

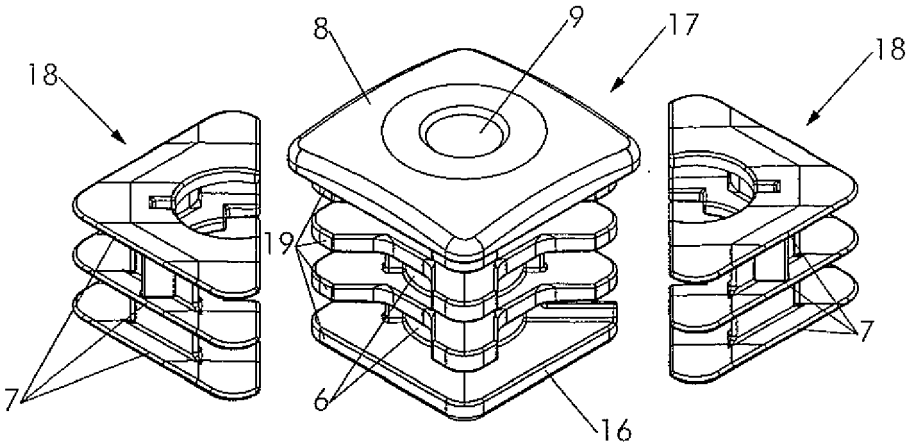

Fig. 5

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Description

[0001] The present invention relates to a gate with a hollow bar, which has an open end at its top and bottom, and with two hinges attached to said bar. The hinges each comprise a hinge arm and a hinge cap, at least partially made of a plastics material. The hinge cap is provided with laterally projecting ribs, made from said plastics material, with which the hinge caps are clamped in the upper and in the lower open end of the bar of the gate, respectively, such that the plastics ribs are deformed against the inside of the hollow bar. The hinge caps each exhibit an opening in which one end of the hinge arms is rotationally received. The invention also relates to a hinge cap for such a gate.

[0002] Hinges with such a hinge cap and a corresponding hinge arm are commercially available. An example thereof is shown in Figure 1. The hinge cap of this known hinge is entirely manufactured of plastics, in particular by injection moulding. The hinge cap consists of a central tube structure which forms the opening for the hinge arm. On said central tube structure, laterally projecting plastics ribs are provided by means of which the hinge cap can be clamped in the hollow bar of the gate. The upper part of the hinge cap is formed by a thicker cover plate with which the upper and the lower open end of the hollow bar is covered, respectively.

[0003] An important advantage of such hinge caps is that they are simple and inexpensive to manufacture. Moreover, they can easily be applied to the gate. In this respect, the flexible plastics ribs are of essential importance, since the hollow bars, notwithstanding they have standard dimensions (in particular external dimensions of 30, 40 or 50 mm), may have slightly varying inner dimensions. The wall thickness of the bars may be, for example 1.5 or 2.0 mm. Furthermore, the hollow bars are produced by cold forming of metal sheets which are subsequently welded together in the longitudinal direction. The thickness of the weld seam thus formed on the inside of said hollow bars may also be compensated by the deformation of the plastics ribs.

[0004] The known plastics hinge caps also exhibit significant disadvantages. In the first place, it is not possible to find a plastics material which has, under all climatic conditions, on the one hand the required hardness to provide the necessary support for the hinge arm, and on the other hand is soft enough to be applied using clamping without breaking in the hollow bar of the gate. In practice, for applications in cold countries, for instance a softer plastics material is selected, such as polyethylene, while in hot countries, a harder plastics material is selected, such as polyamide. However, the well-known plastics hinge caps keep showing the problem that the plastics ribs, particularly in wintertime, may be too brittle and may break off during the insertion of the hinge cap in the hollow bar such that the hinge cap becomes unusable. On the other hand, under warmer conditions, it happens that the ribs are insufficiently hard such that, when the hinge cap experiences an exceptional load, such as when a person is standing on the end of the gate, it will be deformed in such a way that the hinge arm, optionally with the hinge cap itself, may be lifted out of the hollow bar of the gate. After a prolonged use, in particular under warmer conditions, the opening in the hinge cap may also become undesirably large, due to creep of the plastics material. Furthermore, the plastics material, due to frequent opening and closing of the gate, may also simply wear off, particularly if it concerns a softer type of plastics material. A final disadvantage is that the gate fully rests at the bottom on the lower hinge cap, whereas this hinge cap, in particular the upper part thereof, which covers the open end of the hollow bar, and on which the hollow bar rests, may become deformed and may even break under prolonged or excessive stress.

[0005] The object of the invention is to provide a new gate, and in particular a new hinge cap for said gate, by means of which said disadvantages may be remedied.

[0006] To this end, the gate and the hinge caps according to the invention are **characterized in that** the hinge caps, in addition to the plastics ribs, comprise a support skeleton in which the opening for the hinge arm is formed, which support skeleton exhibits lateral projections extending, in the unloaded state of the hinge, up to a short distance from the inside of the hollow bar, and which are provided, when the plastics ribs are deformed as a result of a load on the hinge, to provide an additional support of the hinge cap against the inside of said bar, wherein the support skeleton is made of a material which has a higher hardness than the plastics material said ribs are made of.

[0007] Since the support skeleton fits in the hollow bar with some clearance, and because, during insertion of the hinge cap in the hollow bar, only the plastics ribs need to be deformed, the hinge cap may be inserted in the hollow bar in the same simple manner as the existing plastics hinge caps. However, the advantage of the hinge caps according to the invention is that the plastics ribs may be made from a softer plastics material, such that they are less likely to break off rapidly. When the hinge is loaded, the plastics ribs may indeed deform rapidly as the lateral projections of the support skeleton, which are harder than the plastics ribs, provide for an additional support of the hinge cap against the inside of the hollow bar.

[0008] In a preferred embodiment, the support skeleton is made of metal, wherein the support skeleton is preferably injection moulded.

[0009] In this way, the support skeleton of the hinge cap may be manufactured in a simple and relatively inexpensive manner. The metal has a higher hardness than the plastics material, as well as a higher wear resistance, such that it is able to provide the required rigid support for the hinge arm, whereas the plastics material is sufficiently soft for the hinge cap to be clamped in the hollow bar.

[0010] In a further preferred embodiment, the support

skeleton comprises a central tube structure, which forms said opening, wherein said ribs are formed by plastics elements, in particular by two plastics elements, which are laterally clamped over said tube structure.

[0011] In this embodiment, the support skeleton and the plastics part of the hinge cap may be manufactured separately, wherein the plastics elements, for example, may be manufactured in a simple and relatively inexpensive manner by injection moulding, after which, using the snap-fit system, the various parts of the hinge caps may be assembled very easily and quickly.

[0012] In yet a further embodiment, said hollow bar has a cross-section which has a substantially rectangular shape, in particular a substantially square shape, wherein said support skeleton has at least four of said lateral projections, each of which is directed to one of the four corners of the hollow bar.

[0013] This embodiment offers the advantage that the support skeleton is supported on the strongest areas of the hollow bar, namely at the corners thereof. A further advantage is that the weld seam of the hollow bar is situated in the middle of a side thereof, such that the thickness thereof, which may slightly vary from bar to bar, has no effect on the distance between the ends of the lateral projections of the support skeleton and the inside of the hollow bar.

[0014] Further advantages and particularities of the invention will become apparent from the following description of a preferred embodiment of a gate and of a hinge cap according to the invention. However, this description is only given as an example and is not intended to limit the scope, as defined by the claims. The reference numerals indicated in the description, relate to the annexed drawings wherein :

Figure 1, in perspective, shows an exploded view of a part of a gate attached to a pole using a commercially known hinge ;

Figure 2 is the same view as Figure 1, but in which a hinge cap according to the invention is applied;

Figures 3 and 4 show a perspective view on a larger scale of said hinge cap according to the invention, viewed from the top and from the bottom, respectively;

Figure 5 shows, in perspective, an exploded view of the hinge cap according to Figures 2 to 4;

Figures 6 and 7 show a bottom view and a side view of the hinge cap, respectively ;

Figure 8 is a longitudinal sectional view through the hinge cap according to the previous figures, and the hollow bar in which said hinge cap may be tightly clamped;

Figure 9 is a longitudinal sectional view of the hollow bar and the hinge cap according to Figure 8, wherein the hinge cap is inserted in a clamped manner in the hollow bar; and

Figures 10 through 14 illustrate another embodiment of the hinge arm with which the hinge cap may cooperate, wherein said hinge arm is adjustable to be able to adjust the distance between the gate and the pole on to which the gate is mounted.

[0015] The invention generally relates to a gate with a hollow bar, which has an open end at the top and at the bottom, and to hinge caps which are provided to be fitted in said open ends.

[0016] Figure 1 shows an exploded view of such a gate, provided with commercially available hinge caps. This gate 1 consists of a rectangular frame 2, provided with a wire mesh 3. The rectangular frame 2 comprises the hollow bar 3, which has an open end 4 at the top and at the bottom. The hollow bar 3 is formed by a substantially rectangular metal tube which mostly has a square shape. In practice, this tube has a standard outside dimension of 30, 40 or 50 mm. The thickness of the tube is usually about 1.5 or 2.0 mm. Such tubes are produced by cold bending a metal sheet and longitudinally welded their free ends together. The formed weld seam is not shown in the figures but is located approximately in the middle of one of the sides of the tube. On the outside, the weld plane is flattened but on the inside of the tube, the weld seam remains.

[0017] The hinge cap 5, which is already known and which is inserted in a clamped manner in the upper and lower open end 4 of the hollow bar 3, is entirely manufactured of a plastics material, in particular by injection moulding. It consists of a central tube structure 6 with laterally projecting plastics ribs 7 and having at the top a cover plate 8 which rests on the wall of the hollow bar 3. The central tubular structure 6 forms an opening 9 in which one end 10 of a hinge arm 11 is rotationally received. This end 10 of the hinge arm 11 thus forms the axis of the hinge. The other end 12 is located substantially perpendicular to this rotation axis and is provided with screw-thread, to be fixed by means of the nuts 13 to a support, more particularly a rigid pole 14.

[0018] In Figure 2 is displayed the same gate, provided with the same hinge system. In this figure, the same elements as in the known gate are referred to with the same reference numerals. The only difference is that in the hinges of this gate, a hinge cap 15 according to the invention is used.

[0019] As can be seen more clearly in Figure 8, said hinge cap 15 also comprises a central tube structure 6 and laterally projecting plastics ribs 7. The central tubular structure 6 is provided at the top with a cover plate 8 which rests on the wall of the hollow bar 3 (or on which the wall of the hollow bar 3 rests for the bottom hinge). At the bottom, the central tube structure 6 is provided with a collar 16 which fits with some clearance into the hollow bar 3. The central tube structure 6 further forms a central opening 9 in which the end 10 (rotation axis) of the hinge arm 11 is rotationally received, and which extends in the longitudinal direction of the bar 3.

[0020] It is essential for the hinge caps 15 according to the invention that they contain, in addition to the plas-

tics ribs 7, a support skeleton 17. This support skeleton 17 is displayed in the centre image of Figure 5, and forms the central tube structure 6, in which the opening 9 for the hinge pin 11 is formed. In the preferred embodiment shown in the figures, as can be clearly seen in Figure 5, the plastics ribs 7 are formed by plastics elements 18 which may be clipped laterally on the tube structure 6. According to the invention, the support skeleton 17 shows lateral projections 19 which extend in unloaded condition of the hinge 11, 15, up to a short distance from the inside of the hollow bar 3 (see Figure 9). When the hinge is loaded, the plastics ribs 7 experience a deformation in which the lateral projections 19 (more specifically, at least some of them) starting from a certain load, provide an additional support of the hinge cap 15 against the inside of the hollow bar 3. In order to be able to absorb higher loads, the support skeleton 17 is made of a material which has a higher hardness than the plastics material of which the ribs 7 are made. The distance over which the lateral projections 19 extend, in the unloaded condition of the hinge, from the inside of the hollow bar 3, is preferably less than 2.0 mm, more preferably less than 1.5 mm and most preferably less than or equal to 1.0 mm.

[0021] The plastics ribs 7 ensure that the hinge cap 15 is clamped in the hollow bar 3. As can be seen in Figure 9, these plastics ribs 7 are hereby slightly deformed against the inside of the hollow bar 3. However, the harder lateral projections 19 of the support skeleton 17 remain, when the hinge is not loaded, at a short distance from the inside of the hollow bar 3, such that these may provide for an additional support, but do not hamper the smooth insertion of the hinge cap 15 in the hollow bar 3.

[0022] In the preferred embodiment, shown in the figures, the lateral projections 19 of the support skeleton 17 are provided to extend, when the plastics ribs 7 are deformed as a result of a load on the hinge 11, 15, up to the inside of the hollow bar 3. In a variant embodiment, the plastics material of which the ribs 7 are made, could form a relatively thin buffer between the ends of the lateral projections 19 in the inside of the hollow bar 3, such that these projections 19 do not directly come into contact with the inside of the hollow bar 3, but are still able to offer additional support. Preferably, said plastics buffer has a limited thickness which, in particular, is less than 5 mm, and most preferably less than 3 mm.

[0023] The plastics material the ribs 7 are made of, preferably contains polyethylene (PE) or polyoxymethylene (POM). To reduce the hardness of such plastics, it is known to add plasticisers thereto. The plastics material of the ribs 7 preferably has a Shore D hardness, measured according to ASTM D2240, which is less than 80, preferably less than 70, and more preferably less than 60. However, this Shore D hardness is preferably higher than 10, more preferably higher than 20, and most preferably higher than 30.

[0024] The support skeleton 17 may also be made of a plastics material, in particular of a plastics material which is harder than the plastics material of the ribs 7. The support skeleton 17 may be made, for example, of glass-fibre reinforced polyamide (PA) or, alternatively, also of acrylonitrile-butadiene-styrene (ABS). However, the support skeleton 17 is preferably made of a metal material, for example of aluminium or of an alloy containing at least zinc and aluminium, such as Zamac, with preference being given to aluminium. Indeed, aluminium can be moulded easily and provides the necessary hardness, wherein moulding of the support skeleton is preferred since that is the simplest/cheapest way of manufacturing.

[0025] Both the part of the hinge cap 15 with the plastics ribs 7, as well as the support skeleton 17 are preferably separately produced, preferably by moulding or injection moulding. So-called "over-moulding" techniques, in which the support skeleton 17 is provided in advance as an insert in the mould in which the plastics part is to be manufactured, are also possible but are more complex and more expensive. As described above and is clearly shown in Figure 5, it is preferred for the plastics ribs 7 to be manufactured as part of the plastics elements 18, in which these plastics elements 18 are preferably formed such that they can easily be clipped on the support skeleton 17.

[0026] The lateral projections 19 of the support skeleton 17 extend preferably in at least three, more preferably in at least four layers. In the hinge cap 15 shown in the figures, there are four layers of projections 19, wherein the upper layer of projections 19 is fixed to the bottom of the cover plate 8 and wherein the bottom layer of projections 19 is formed by the collar 16. Between these layers of projections 19, the plastics ribs 7 are positioned.

[0027] The lateral projections 19 of the support skeleton 17 are preferably directed to the corners of the hollow bar 3. At these locations, the hollow bar 3 offers the highest resistance to deformation. Moreover, there are no weld seams in the corners which would hamper insertion of the hinge cap 15 by contact with the hard lateral projections 19 of the support skeleton 17.

[0028] From the above description of the gate and the hinge cap according to the invention, it will be understood that the invention is by no means limited to the embodiments described herein, but that all kinds of modifications may be made thereof without departing from the scope of the invention as defined by the appended claims.

[0029] For example, the hinge arm can have a more complex shape and may possibly also be adjustable, such as the hinge arm 500 shown in Figures 10 to 14. The hinge arm 500 shown in these figures, includes a housing 510 in which the hinged end 520 of the hinge arm is mounted. The housing 510 itself is fixed by means of a bolt 530 and a nut 535 against the pole 14.

[0030] Within the housing 510 there is a toothed rack 540 on which the hinged end 520 is arranged. As shown, the position of the hinged end 520 on the toothed rack 540 can be adjusted according to arrow 550. Once in the correct position, the hinged end 520 can be fixed by

means of a bolt 525. The bolt 525 is screwed into the end 520 and clamps a plate 560 against the toothed rack 540. Such adjustable hinge arm enables thus to control the position of the gate.

Claims

1. A gate (1) with a hollow bar (3), which has an open end (4) at its top and bottom, and with two hinges attached to said bar (3), which hinges each comprise a hinge arm (11, 500) and a hinge cap (15), wherein the hinge caps (15) are at least partially made of a plastics material and are provided with laterally projecting ribs (7), made from said plastics material, with which they are clamped in the upper and in the lower open end (4) of the bar (3) of the gate, such that the plastics ribs (7) are deformed against the inside of the hollow bar (3), and wherein the hinge caps (15) exhibit an opening (9) in which one end (10, 520) of the hinge arms (11, 500) is rotationally received, **characterized in that**
the hinge caps (15), in addition to said plastics ribs (7), comprise a support skeleton (17) in which said opening (9) is formed, which support skeleton (17) exhibits lateral projections (19) extending, in the unloaded state of the hinge, up to a short distance from the inside of the hollow bar (3), and which are provided, when the plastics ribs (7) are deformed as a result of a load on the hinge, to provide an additional support of the hinge cap (15) against the inside of said bar (3), wherein the support skeleton (17) is made of a material which has a higher hardness than the plastics material from which said ribs (7) are made.

2. A gate according to claim 1, **characterized in that** the support skeleton (17) is made of metal.

3. A gate according to claim 2, **characterized in that** the support skeleton (17) is made of aluminium or of an alloy containing at least aluminium and zinc, wherein the support skeleton is preferably made of aluminium.

4. A gate according to claim 1, **characterized in that** the support skeleton (17) is made of a plastics material, preferably of polyamide that is in particular glass-fibre-reinforced.

5. A gate according to any one of the claims 1 to 4, **characterized in that** the support skeleton (17) is moulded.

6. A gate according to any one of claims 1 to 5, **characterized in that** said lateral projections (19) are provided to extend, when the plastics ribs (7) are loaded as a result of a load on the hinge, up to the inside of the hollow bar (3).

7. A gate according to any one of claims 1 to 6, **characterized in that** said plastics material contains polyethylene or polyoxymethylene.

8. A gate according to any one of the claims 1 to 7, **characterized in that** said plastics material has a Shore D hardness, measured according to ASTM D2240, which is less than 80, preferably less than 70, and more preferably less than 60.

9. A gate according to any one of the claims 1 to 8, **characterized in that** said plastics material has a Shore D hardness, measured according to ASTM D2240, which is higher than 10, preferably higher than 20, and more preferably higher than 30.

10. A gate according to any one of the claims 1 to 9, **characterized in that** said hollow bar (3) has a cross-section which has a substantially rectangular shape, in particular a substantially square shape, wherein said support skeleton (17) has at least four of said lateral projections (19), each of which is directed to one of the four corners of the hollow bar (3).

11. A gate according to any one of the claims 1 to 10, **characterized in that** the support skeleton (17) has a central tube structure (6), which forms said opening (9), wherein said plastics ribs (7) are formed by plastics elements (18), in particular by two plastics elements (18), which are laterally clamped over said tube structure (6).

12. A gate according to any one of claims 1 to 11, **characterized in that** said lateral projections (19) extend in at least three, preferably in at least four layers, wherein between each two successive layers of projections (19) each time at least one of said plastics ribs (7) is provided.

13. A gate according to any one of the claims 1 to 12, **characterized in that** the hinge cap (15) has a cover plate (8), which extends beyond the inside of the hollow bar (3), and which covers the hollow bar (3).

14. A gate according to any one of the claims 1 to 13, **characterized in that** said short distance is less than 2.0 mm, preferably less than 1.5 mm, and more preferably less than or equal to 1.0 mm.

15. A hinge cap for a gate (1) according to any one of the claims 1 to 13, which hinge cap (15) is at least partially made of a plastics material and is provided with laterally projecting ribs (7), made of said plastics material, intended to clamp the hinge cap (15) in an upper or lower open end (4) of a hollow bar (3) of the gate (1) by deformation of said plastics ribs (7),

wherein the hinge cap (15) further comprises an opening (9) which extends in the longitudinal direction of the hinge cap (15) and which is intended to rotationally receive one end (10, 520) of a hinge arm (11, 500) which is provided to form a hinge together with the hinge cap (15), **characterized in that** the hinge cap (15) adjacent to said plastics ribs (7) contains a support skeleton (17) in which said opening (9) is formed, which support skeleton (17) exhibits lateral projections (19) extending, when the hinge cap (15) is clamped by the plastics ribs (7) in said hollow bar (3), up to a short distance from the inside of said hollow bar (15), and which are provided, when the plastics ribs (7) are deformed as a result of a load on the hinge, to provide an additional support of the hinge cap (5) against the inside of said bar (3), wherein the support skeleton (17) is made of a material which has a higher hardness than the plastics material from which said ribs (7) are made.

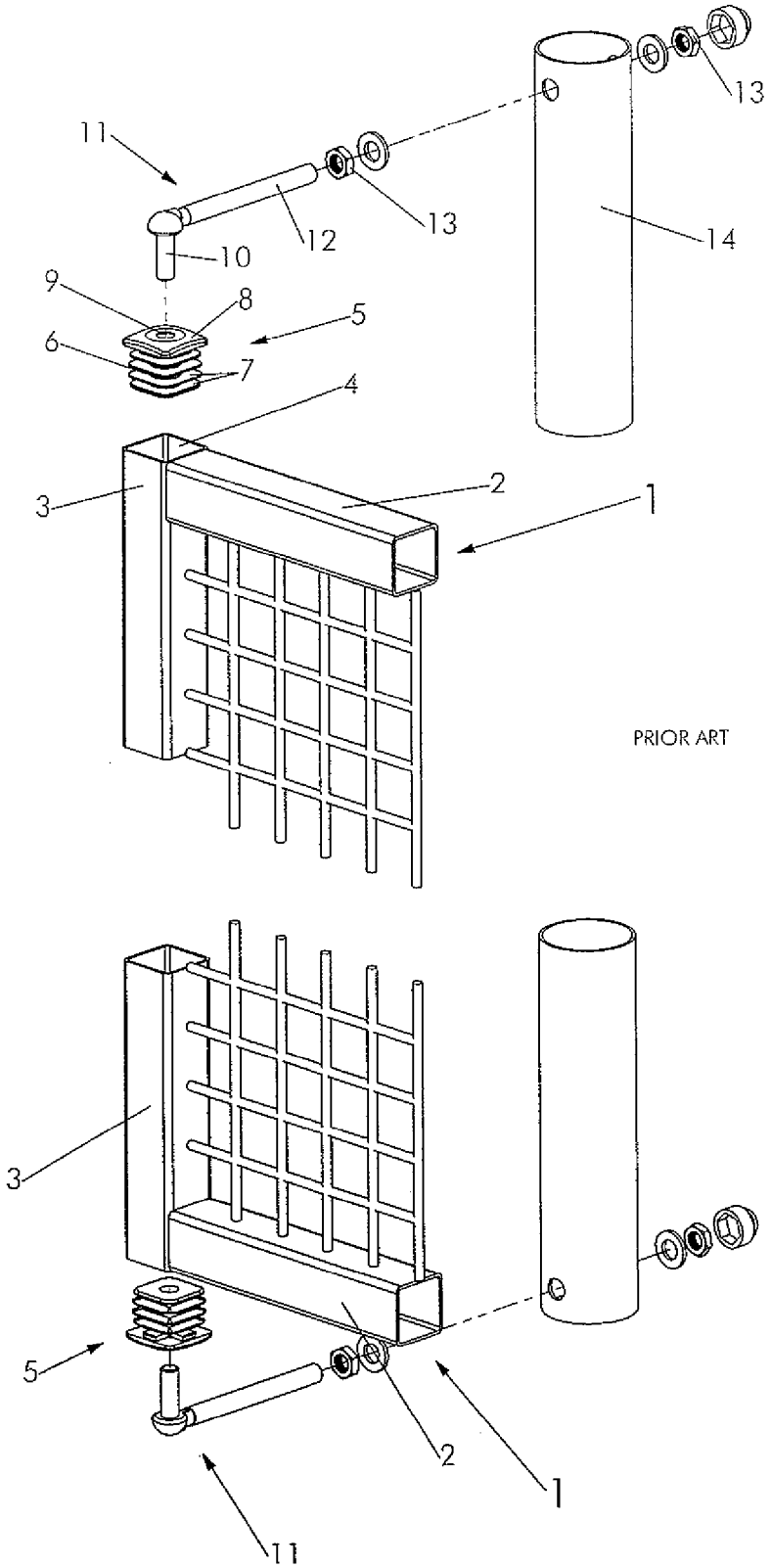

Fig.1

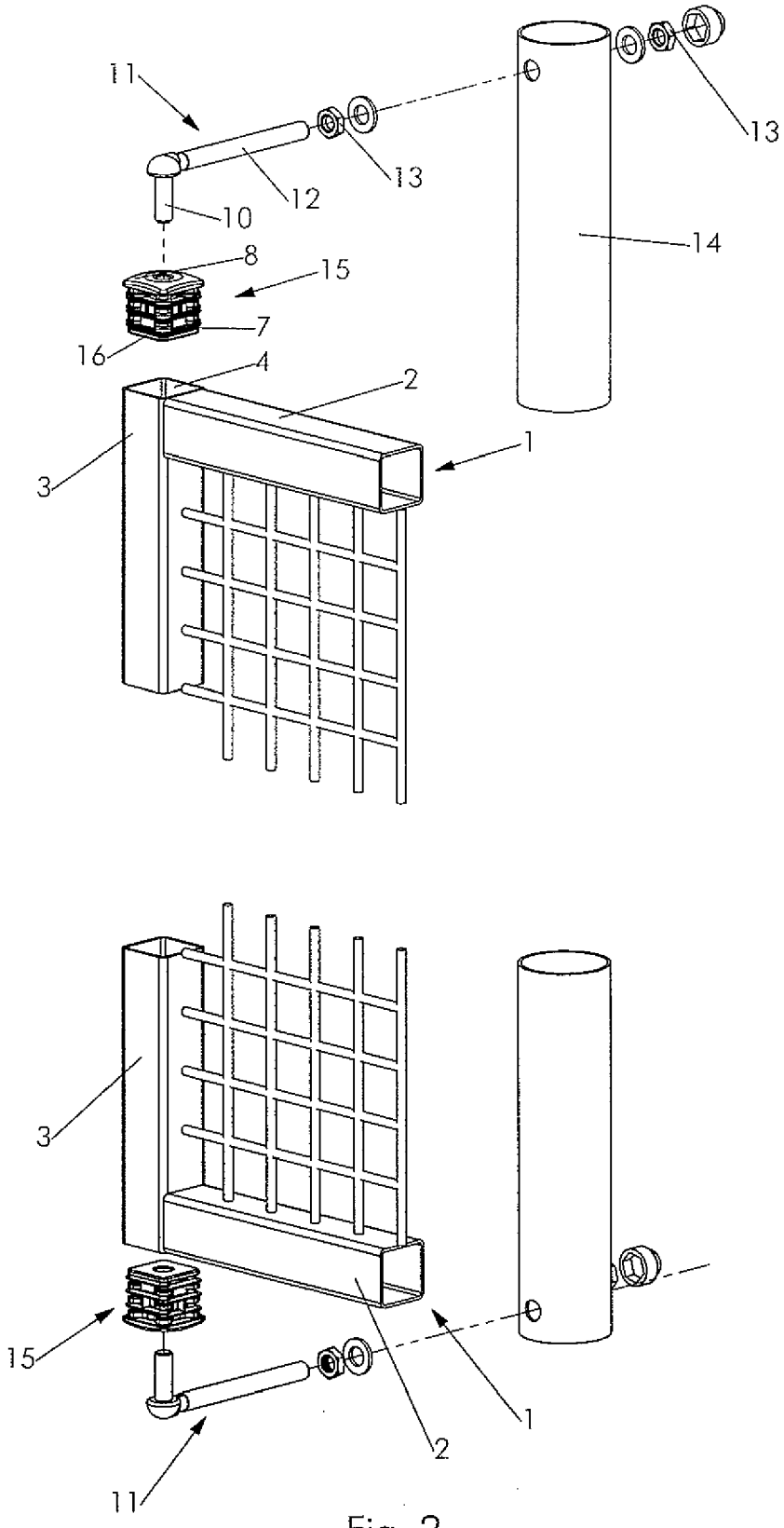

Fig. 2

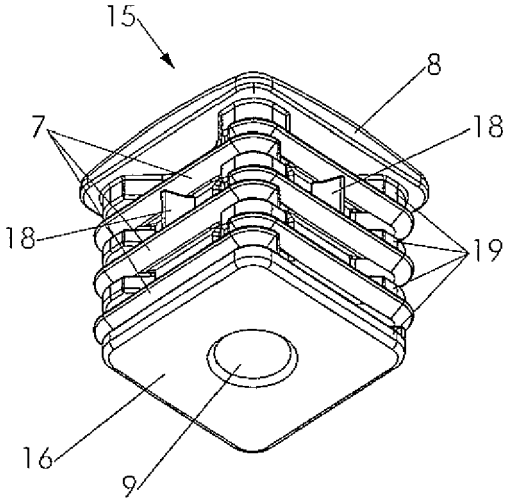

Fig. 3

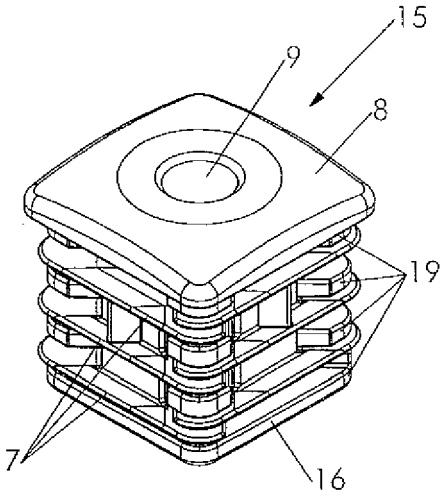

Fig. 4

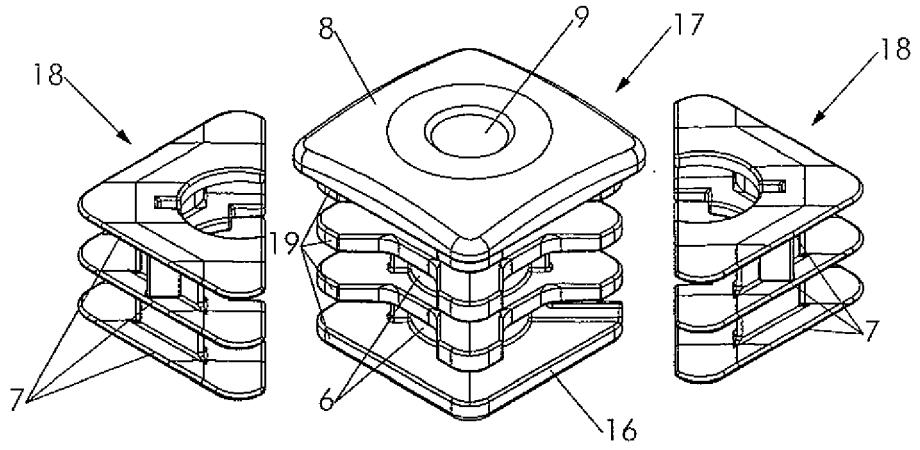

Fig. 5

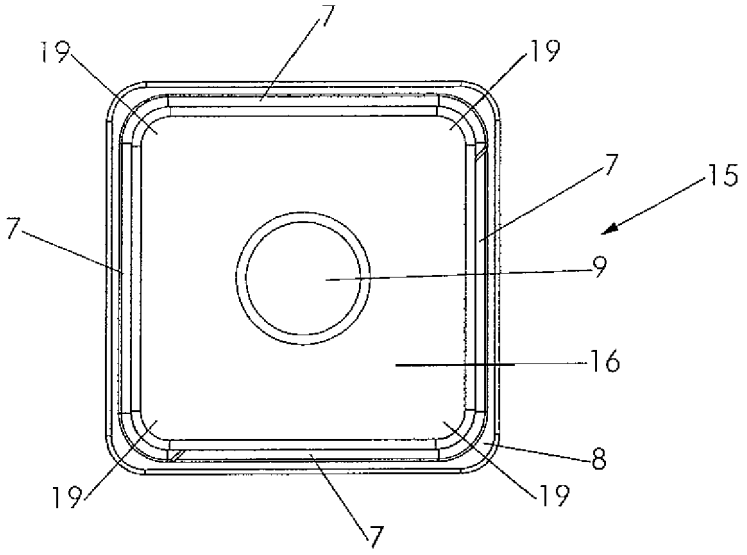

Fig. 6

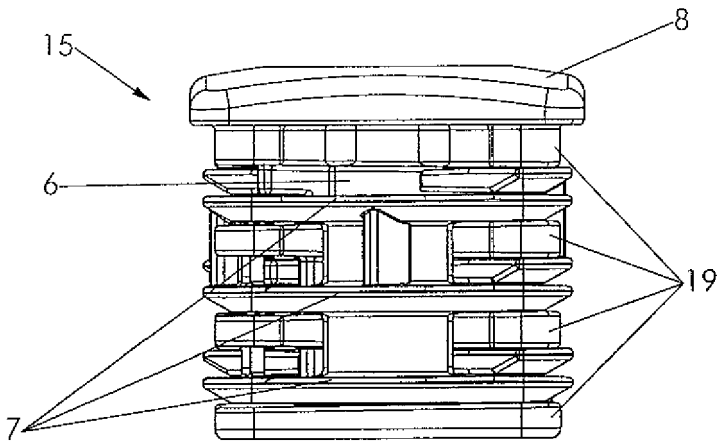

Fig. 7

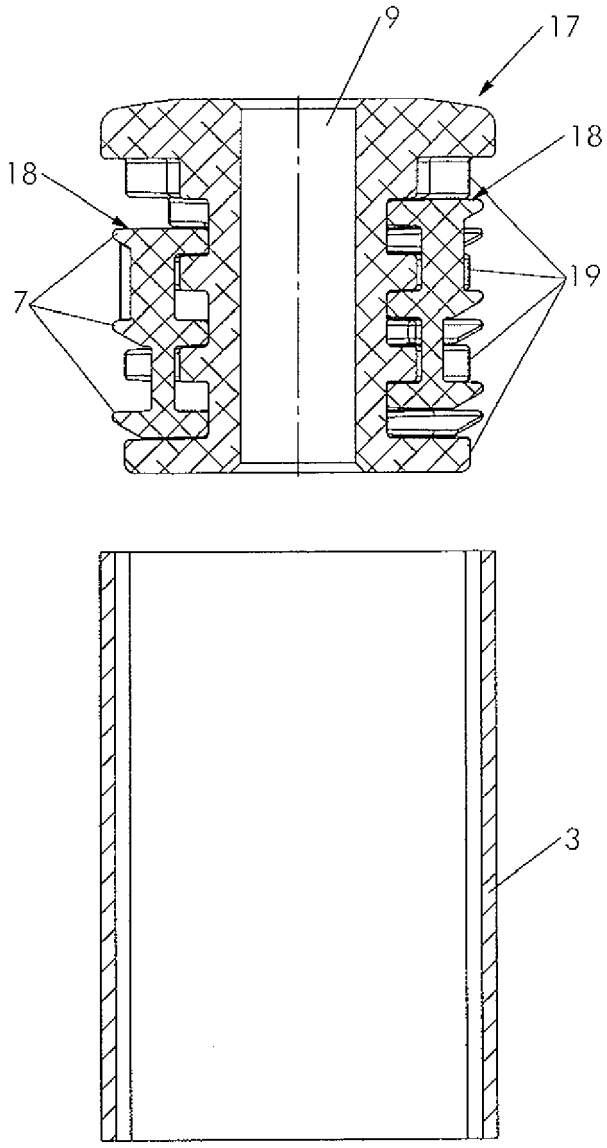

Fig. 8

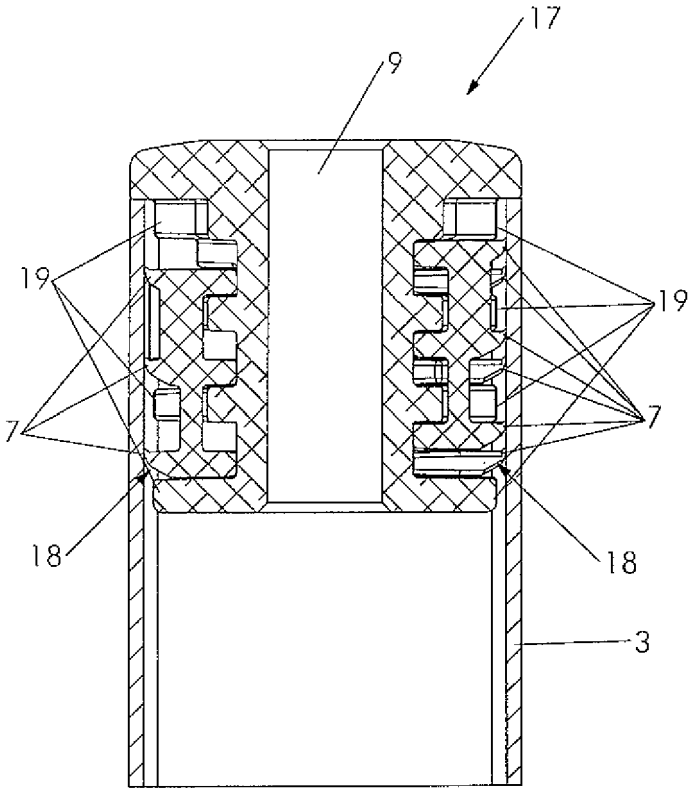

Fig. 9

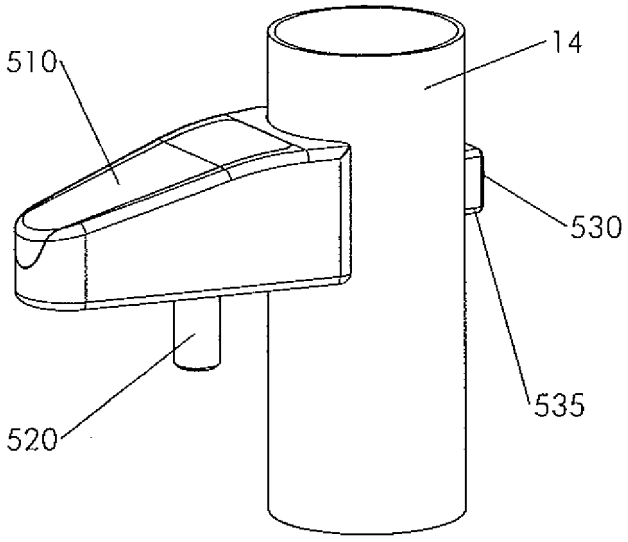

Fig. 10

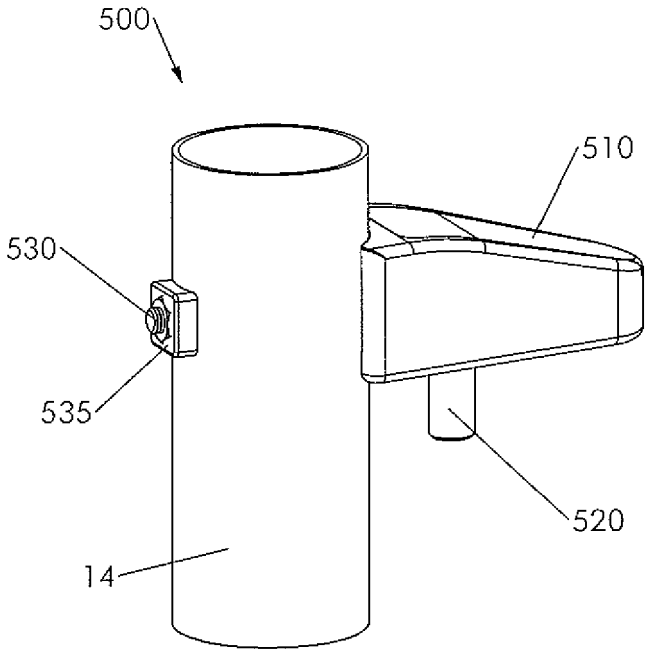

Fig. 11

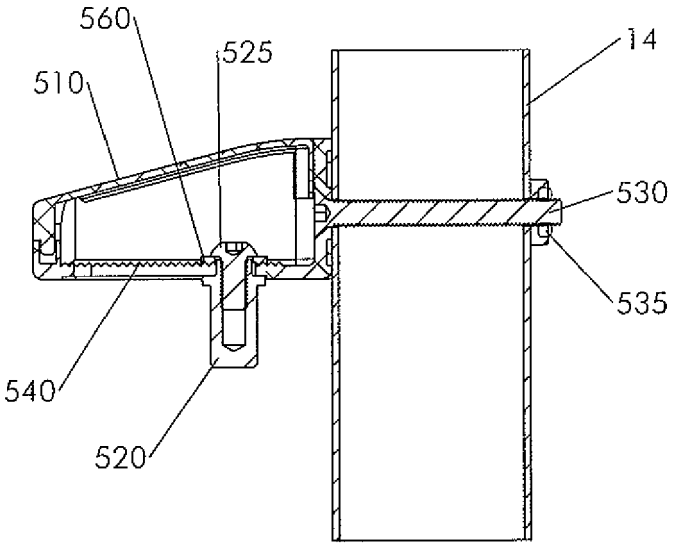

Fig. 12

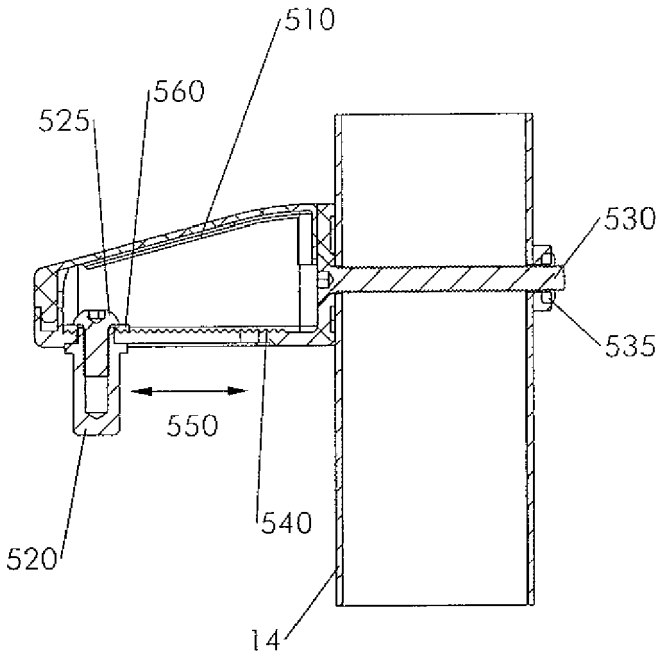

Fig. 13

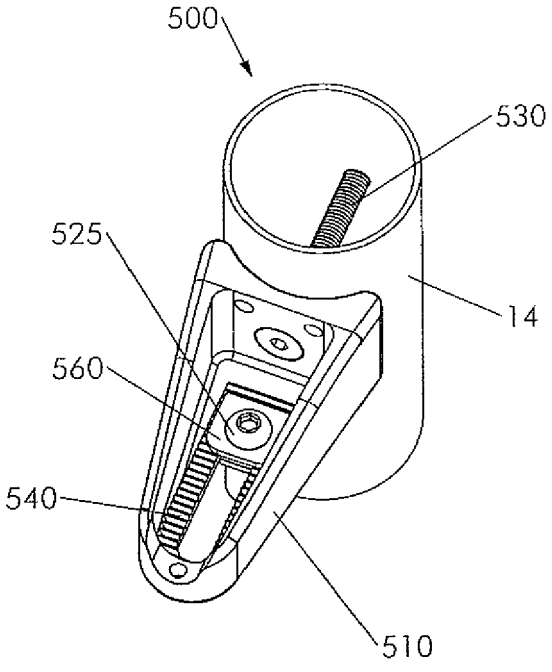

Fig. 14

Europäisches Patentamt
European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 12 19 9098

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 2 430 967 A (LAN RED [TW]) 11 April 2007 (2007-04-11) * page 7, line 23 - page 8, line 2; figures 4,5 * -----	1	INV. E05D5/14 E05D5/16 E05D7/08 E05D5/02
			TECHNICAL FIELDS SEARCHED (IPC) E05D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 March 2013	Van Kessel, Jeroen

CATEGORY OF CITED DOCUMENTS

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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