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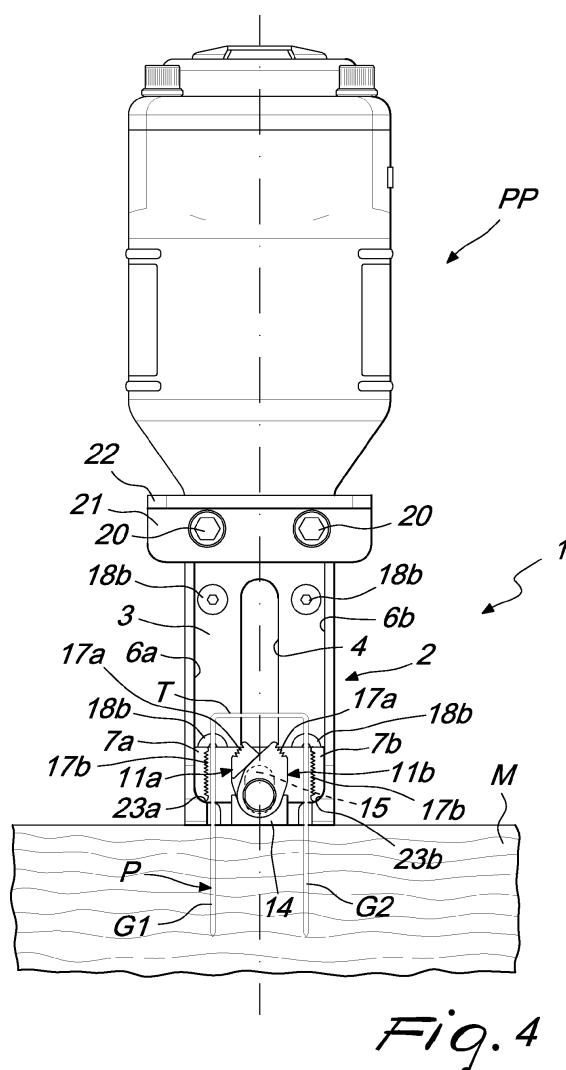
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(54) **Assembly for extracting staples driven partially into a part**

(57) An assembly (1) for extracting staples driven partially into a part made of a material such as wood for a pneumatic gun (PP), the assembly being of the type that comprises a guide (2) which is parallel to the movable piston (PM) of the gun and which ends with an abutment for resting against the surface of the part, comprising a pair of complementary jaws (7a, 7b) which are mounted in a slider (13) associated with a jaw supporting pivot (5) which is actuated so that it can slide along the guide from a lowered configuration for insertion of a pair of jaws (11a, 11 b) which are associated with the pivot (5) under the portion of the staple that protrudes from the part, to a raised configuration for extracting the staple from the part.



Description

[0001] The present invention relates to an assembly for extracting staples driven partially into a part made of a material such as wood.

[0002] In order to grip parts made of a material such as wood, such as for example doors, windows or the like, which must be supported in passing through lines or booths for painting or finishing the surfaces, the use of large staples, also known as U-shaped nails, has become widespread, such staples being provided with two parallel and rather elongated legs which are driven partially along the thickness of the article in positions designed not to be visible after assembly: the portions of the legs of the staple that are not driven in, together with the transverse portion of the staple, form a loop which can be gripped and supported by hanging from a hook.

[0003] Pneumatic guns adapted to perform the partial driving of the staple into the part have long been available commercially, but elimination of the staples at the end of the process is currently solved empirically; most of the times, one proceeds by cutting with nippers the legs of the staple flush with the wood and by hammering with a hammer the staple residues that remain protruding from the wood.

[0004] It should be noted that, if one does not intervene appropriately during extraction, only one of the two legs of the staple might be extracted, leaving the remainder of the badly deformed staple dangling from the leg that has not been extracted: staple extraction further becomes even more difficult in the presence of multiple staples, i.e., in cases in which two or three staples are driven in the same position in order to support very heavy part or parts made of very compact and hard material.

[0005] The aim of the present invention is to obviate the cited drawbacks of the background art, by providing an assembly for extracting staples driven partially into a part that works effectively on individual or multiple staples driven into material of any consistency.

[0006] Within this aim, an object of the present invention is to provide an extraction assembly that is simple, relatively easy to provide in practice, safe in use, effective in operation and of relatively low cost.

[0007] This aim and this object, as well as others that will become better apparent hereinafter, are achieved by the present assembly for extracting staples driven partially into a part made of a material such as wood, for a pneumatic gun, the assembly being of the type that comprises a guide which is parallel to the movable piston of the gun and which ends with an abutment for resting against the surface of the part, characterized in that it comprises a pair of complementary jaws which are mounted in a slider associated with a jaw supporting pivot which is actuated so as to slide along said guide from a lowered configuration for insertion of a pair of jaws which are associated with the pivot under the portion of the staple that protrudes from the part, to a raised configuration for extracting the staple from the part.

[0008] Further characteristics and advantages of the invention will become better apparent and evident from the following detailed description of a preferred but not exclusive embodiment of an assembly for extracting staples inserted partially in a part according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a side view of a pneumatic gun equipped with the extraction assembly according to the invention, during approach to a staple driven partially into a part;

Figure 2 is a partially sectional side view, in enlarged scale with respect to Figure 1, of an assembly for extracting staples during approach to the staple driven into the part;

Figure 3 is a partially sectional side view, in enlarged scale, of an assembly for extracting staples with the slider in the lowered configuration;

Figure 4 is a front view of an extraction assembly with the slider in a lowered configuration;

Figure 5 is a front view of an extraction assembly with the slider in an intermediate configuration;

Figure 6 is a front view of an extraction assembly with the slider in the completely raised configuration;

Figure 7 is an exploded perspective view of the components of the extraction assembly according to the invention.

[0009] With reference to the figures, the reference numeral 1 generally designates an assembly for a pneumatic gun, generally designated by the reference sign PP, for extracting staples P which have legs G1, G2 which are driven partially into a part M made of a material such as wood and a crossmember T which forms, together with the part M and the legs G1, G2, an engagement loop.

[0010] The pneumatic gun PP has been shown for the sake of clarity in exposition, but can be of any type that differs from the one shown.

[0011] The assembly 1 comprises a guide 2 which is parallel to the movable piston PM of the gun and ends with an abutment S for resting against the surface of the part.

[0012] The guide 2 is constituted by a vertically elongated rectangular plate 3, which is crossed by an elongated central slot 4 for guiding a jaw supporting pivot 5 and has two lateral side members 6a, 6b for guiding the outer sides of two complementary jaws 7a, 7b.

[0013] The pivot 5 is perpendicular to the plate 3 and has an end 8 that is shaped like a parallelepiped and is crossed by a hole 8a with a vertical axis for fixing a stem 9 which is coupled to the movable piston PM of the pneumatic gun; the pivot 5 has a portion 10a whose diameter is slightly smaller than the width of the slot 4 that passes through the plate 3 and continues for a portion 10b having a reduced diameter, at which the pair of jaws 11a, 11b are articulated: the jaws 11a, 11b are mutually identical and have the region of articulation to the pivot which is

crossed by a respective through hole 12a, 12b and has a thickness that is equal to half the remaining part of the jaws; the jaws, at the articulation end, have a substantially semicylindrical external profile. The pivot 5 ends with an annular slot 10c for the interlocking of an elastic ring 10d for stopping the axial sliding of the jaws.

[0014] The reference numeral 13 generally designates a slider which is associated with the jaw supporting pivot 5 and is actuated so as to slide along the guide from a lowered configuration for inserting the jaws under the part of the staple that protrudes from the part, to a raised configuration for extracting the staple from the part.

[0015] The jaw supporting pivot 5 is central to the plate 3 and the jaws that are articulated thereto are independent.

[0016] The slider 13 is constituted by a base that rests frontally against the plate 3 having the two lateral complementary jaws 7a, 7b jointly connected thereto together with a central jaw release cradle 14, which has a semicylindrical concave contour which is open upward; the base of the slider 13 is crossed by a vertically elongated slot 15 which lies above the cradle 14 and in turn is crossed by the portion 10b of the pivot 5.

[0017] The actuation of the pivot 5 in the direction of the arrow A for moving the slider away from the surface of the part causes the rotation in opposite directions of the jaws 11a, 11b, which is shown by the arrows B in Figure 5, to lock against the complementary jaws the respective legs of the staple, while the actuation of the pivot in the opposite direction is adapted to produce, at the end of the approach stroke, in the opposite direction with respect to the arrow A, the sliding of the external cylindrical profiles of articulation of the jaws in the cradle so as to make the jaws converge toward each other and leave between each jaw and the respective complementary jaw space for the access of the respective leg of the next staple to be extracted (see Figures 1,2,3,4).

[0018] In order to increase the effectiveness of the locking and improve the grip of the staples, the surfaces 16 of the jaws designed to lock toward the respective complementary jaw have some teeth 17a with sharp edges: advantageously, and for the same purpose, the surfaces directed toward the cradle of the complementary jaws 7a, 7b also are affected by respective series of teeth 17b with sharp edges.

[0019] The plate 3 has four holes 18a for fixing with screws 18b with a countersunk head and a hexagonal socket to a rear box-like housing, not shown, for protecting the stem 9 associated with the movable piston PM of the pneumatic gun PP, and two upper holes 19 for fixing with bolts 20 the coupling portion 21 folded at right angles of a shield 22 for protection against the extracted staples, such shield being therefore jointly connected to the pneumatic gun.

[0020] The plate 3 is provided in a lower region with two trapezoidal lugs 23a, 23b, which facilitate the insertion of the base of the assembly under the partially inserted staple.

[0021] The operation of the invention is as follows.

[0022] After entering with the jaws of the assembly in the configuration in which they are gathered upward under the staple, arrow C in Figure 2, the jaw supporting pivot 5 is actuated so as to rise, arrow A in Figure 3; in the first portion of the upward motion, the jaw supporting pivot 5 is spaced from the cradle 14 and the jaws 11 are free to reach a divaricated position, in which the contact surfaces 16 provided with teeth 17 are locked independently of each other against the respective complementary jaw 7, arrows B of Figure 5: in practice, each jaw 11 with the respective complementary jaw 7 performs a clamp-like effect on each one of the two legs G of the staple P; the upward motion of the jaws, Figure 6, produces the extraction of the legs G of the staple from the part; at the end of the upward stroke of the jaws 11, the staple continues by inertia to rise, disengaging from the jaws, and strikes the protective shield 22, becoming harmless.

[0023] It has thus been shown that the invention achieves the proposed aim and objects, and in particular that it acts on each of the two legs of the staple and does so even in the presence of multiple staples.

[0024] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0025] All the details may further be replaced with other technically equivalent ones.

[0026] In the exemplary embodiments shown, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

[0027] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0028] In practice, the materials used, as well as the shapes and dimensions, may be any according to requirements without thereby abandoning the protective scope of the appended claims.

[0029] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. An assembly for extracting staples driven partially into a part made of a material such as wood for a pneumatic gun, the assembly being of the type that comprises a guide which is parallel to the movable piston of the gun and which ends with an abutment for resting against the surface of the part, **characterized in that** it comprises a pair of complementary jaws which are mounted in a slider associated with

a jaw supporting pivot which is actuated so as to slide along said guide from a lowered configuration for insertion of a pair of jaws which are associated with the pivot under the portion of the staple that protrudes from the part, to a raised configuration for extracting the staple from the part. 5

2. The assembly according to claim 1, **characterized in that** said jaw supporting pivot is central and said jaws articulated thereto are independent. 10

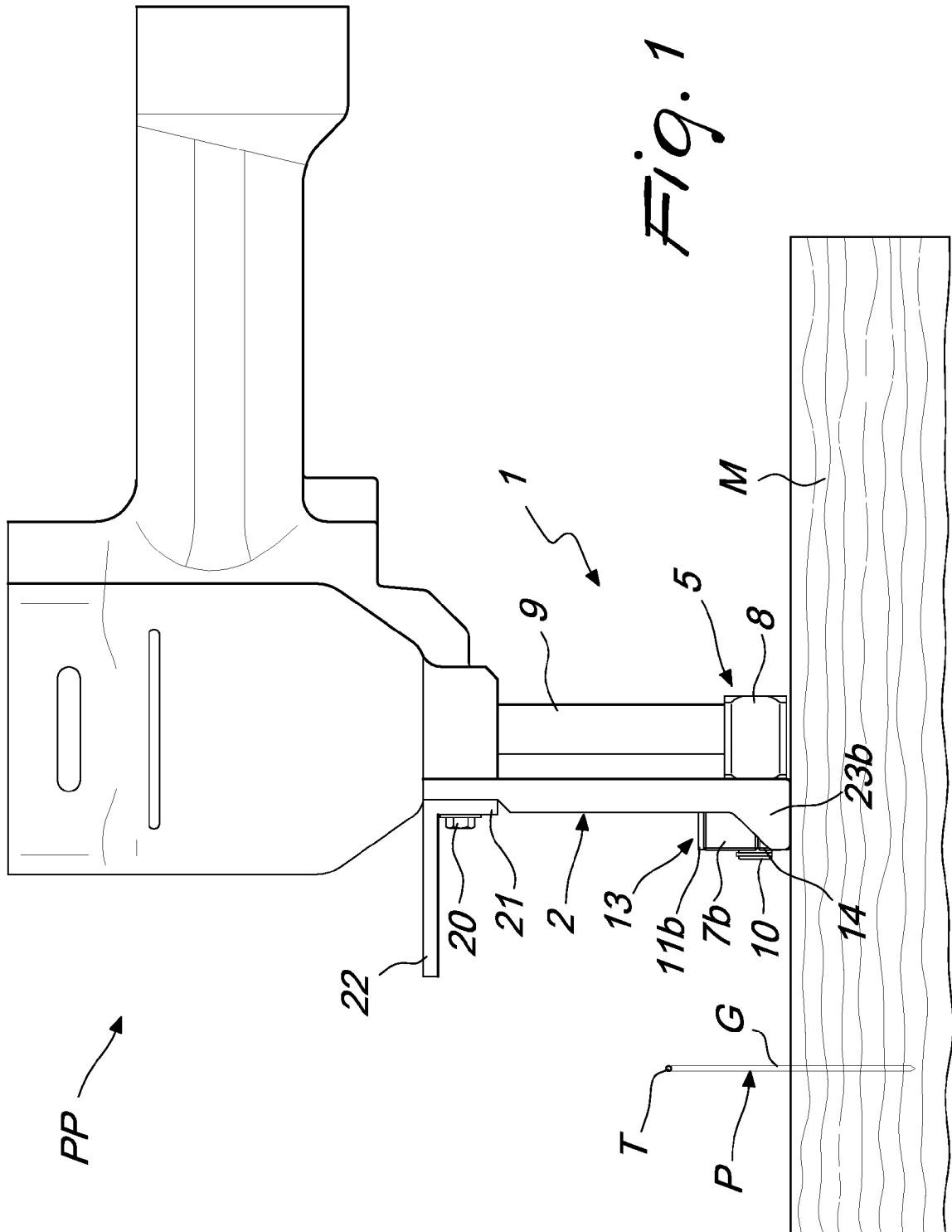
3. The assembly according to one or more of the preceding claims, **characterized in that** said slider has a pair of lateral complementary jaws jointly connected thereto and a central jaw release cradle with a semicylindrical contour, said slider having an elongated slot that is crossed by said pivot, the actuation of said pivot in the direction for moving the slider away from the surface of the part being adapted to cause first the rotation in mutually opposite directions of said jaws in order to lock to the complementary jaws the respective legs of the staple and then the extraction of the staple, while the actuation in the opposite direction of said pivot is adapted to produce, at the end of the approach stroke, the sliding of the cylindrical profiles of articulation of the jaws in the cradle in order to make the jaws converge toward each other and leave between each jaw and the respective complementary jaw the access space of the respective leg of the staple. 15
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4. The assembly according to one or more of the preceding claims, **characterized in that** the surfaces of the jaws designed to lock toward the respective complementary jaw have some teeth with sharp edges adapted to increase the effectiveness of the locking and improve the grip of the staples. 35

5. The assembly according to one or more of the preceding claims, **characterized in that** the surfaces of the complementary jaws against which the respective jaws lock have some teeth with sharp edges adapted to increase the effectiveness of the locking and improve the grip of the staples. 40
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6. The assembly according to one or more of the preceding claims, **characterized in that** said guide comprises a central elongated slot for guiding said pivot and two lateral side members for guiding the outer sides of said complementary jaws. 50

7. The assembly according to one or more of the preceding claims, **characterized in that** a shield for protection against the extracted staples is mounted at the top of said guide. 55



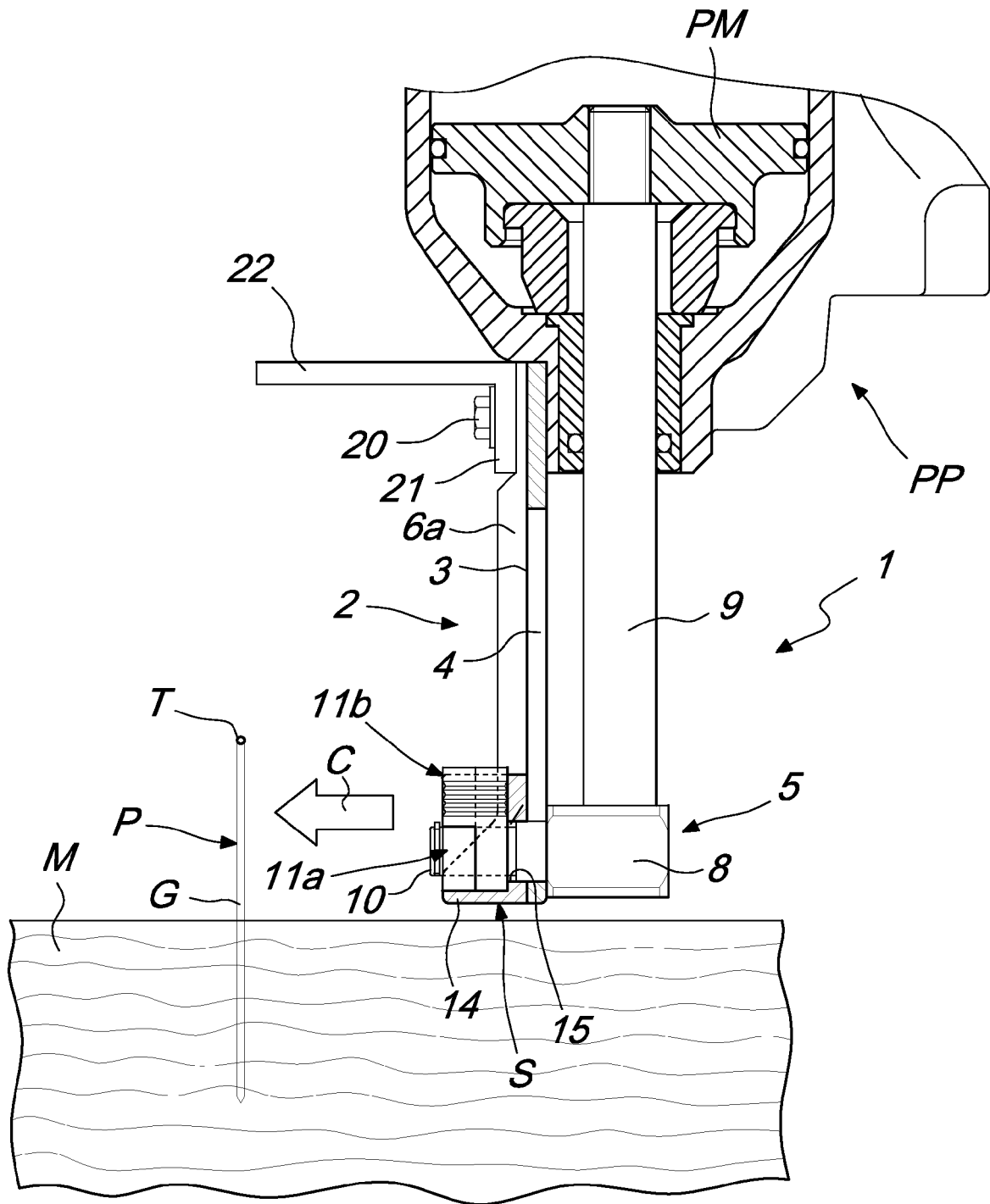


Fig. 2

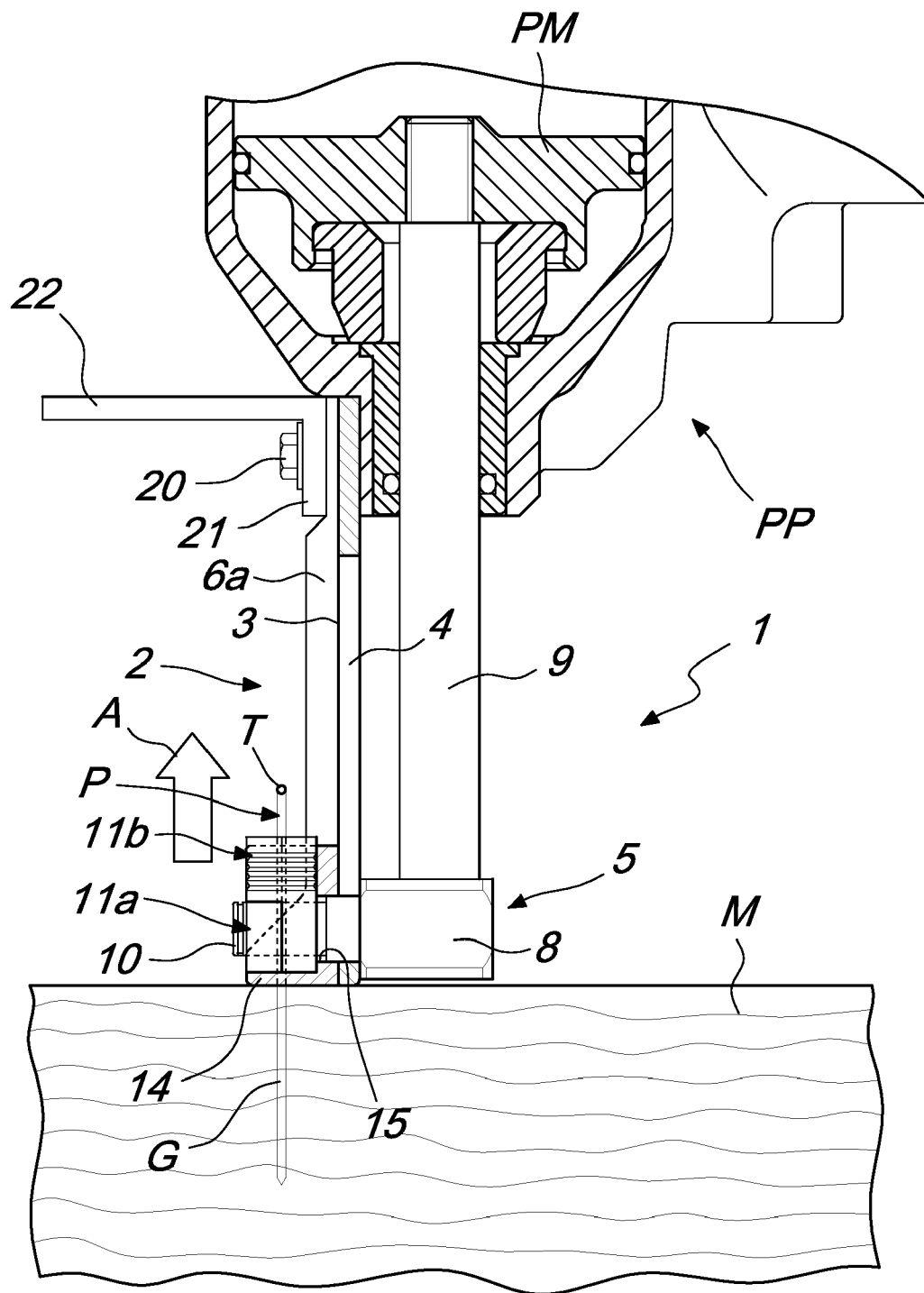


Fig. 3

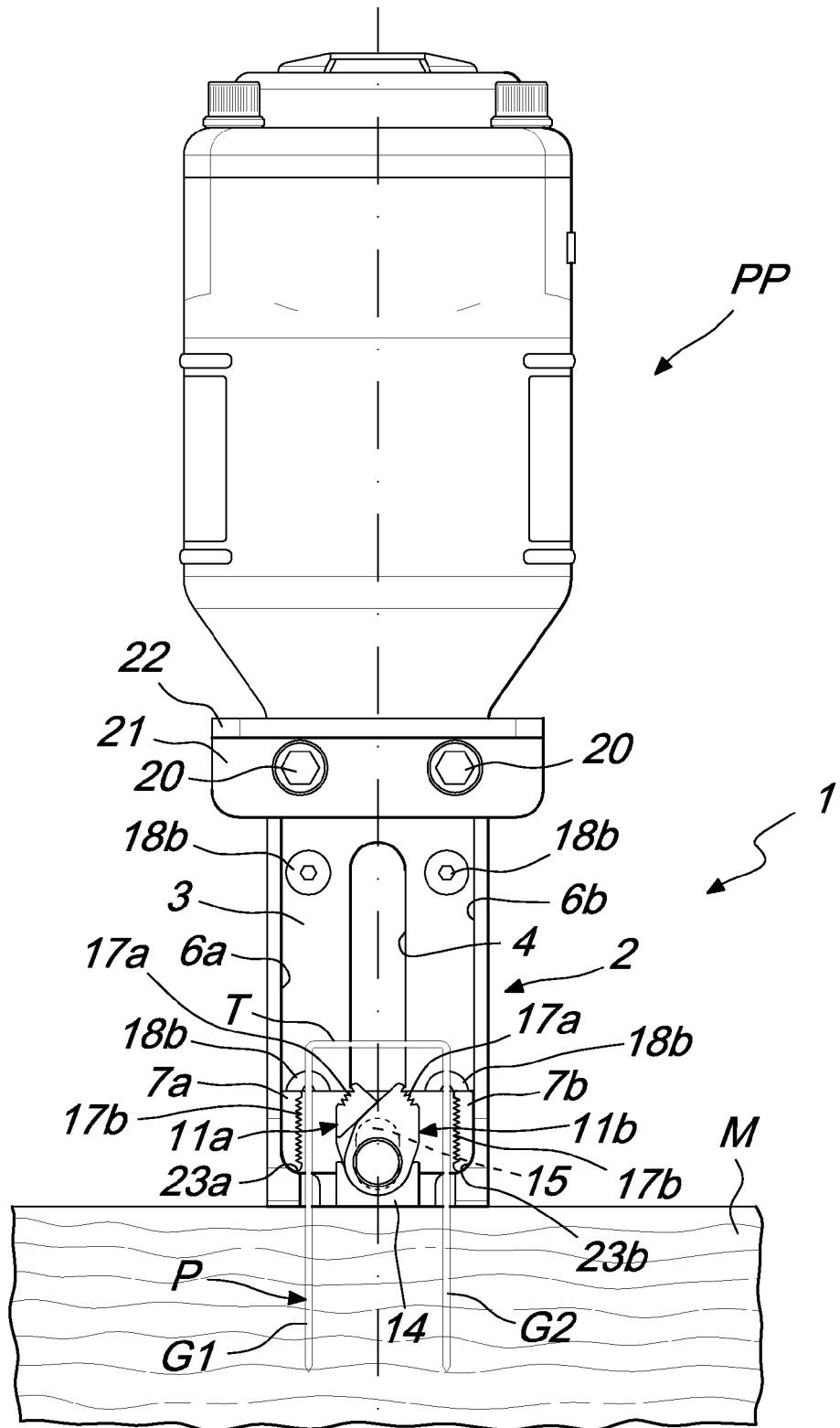
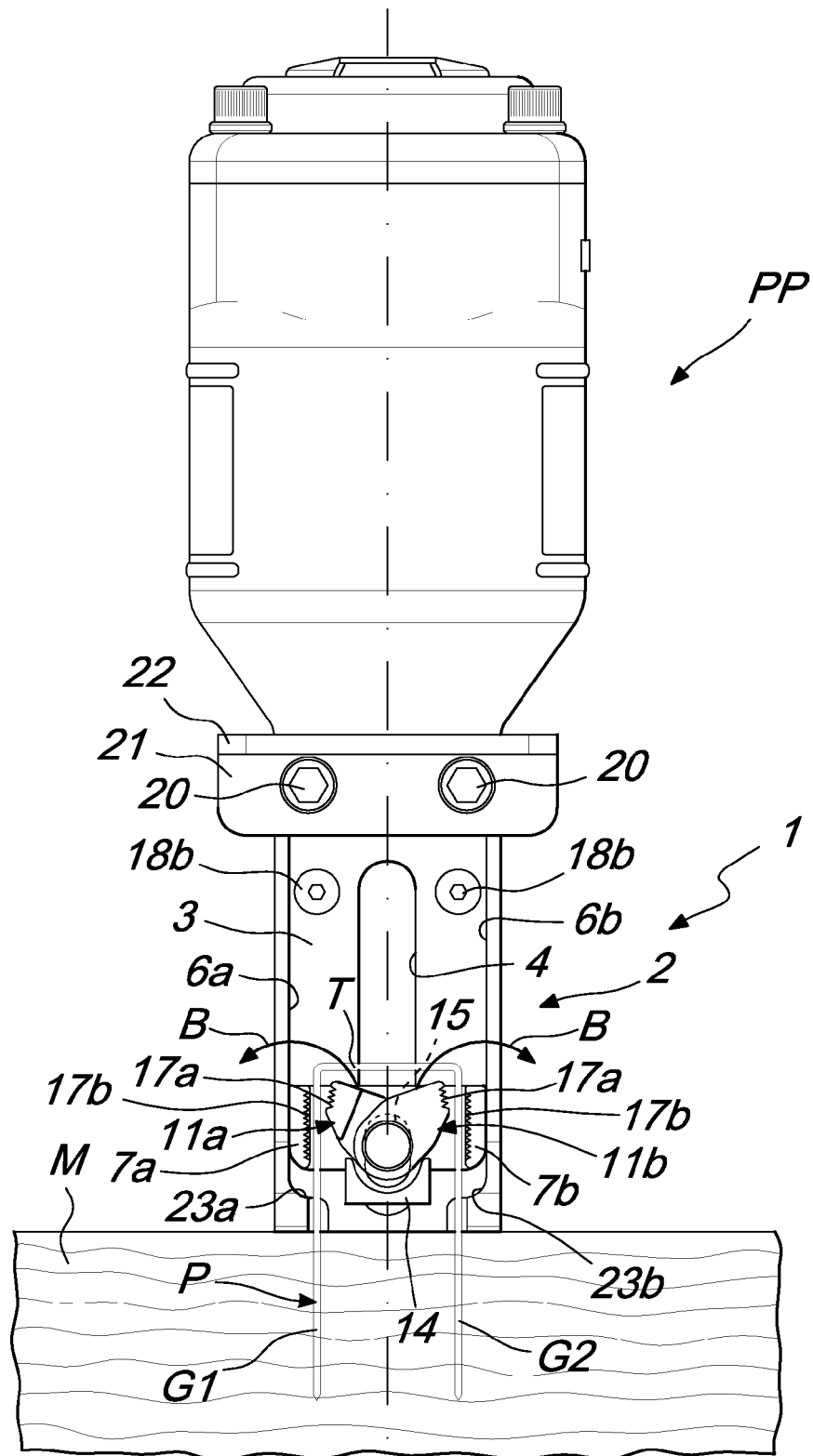
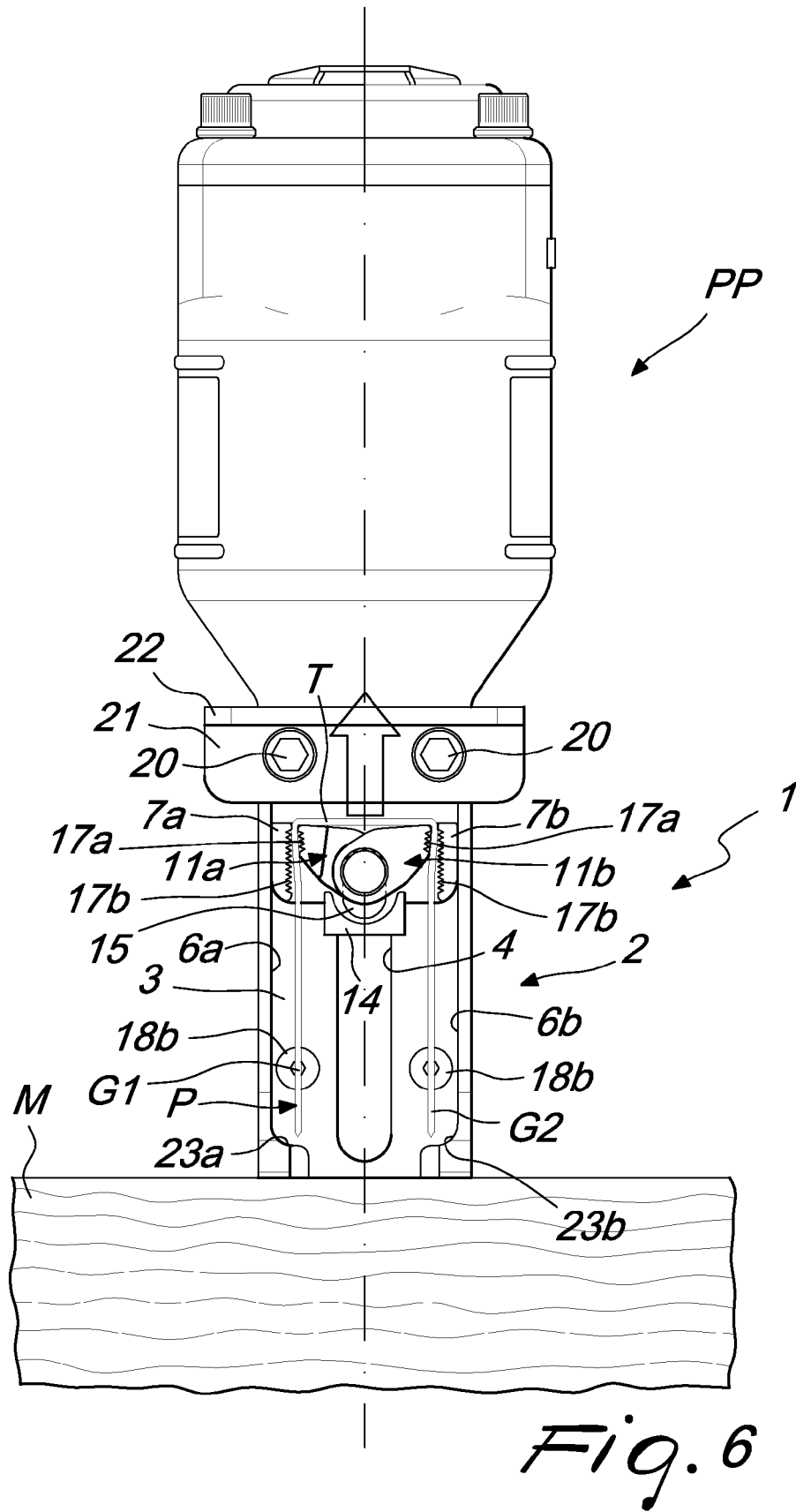
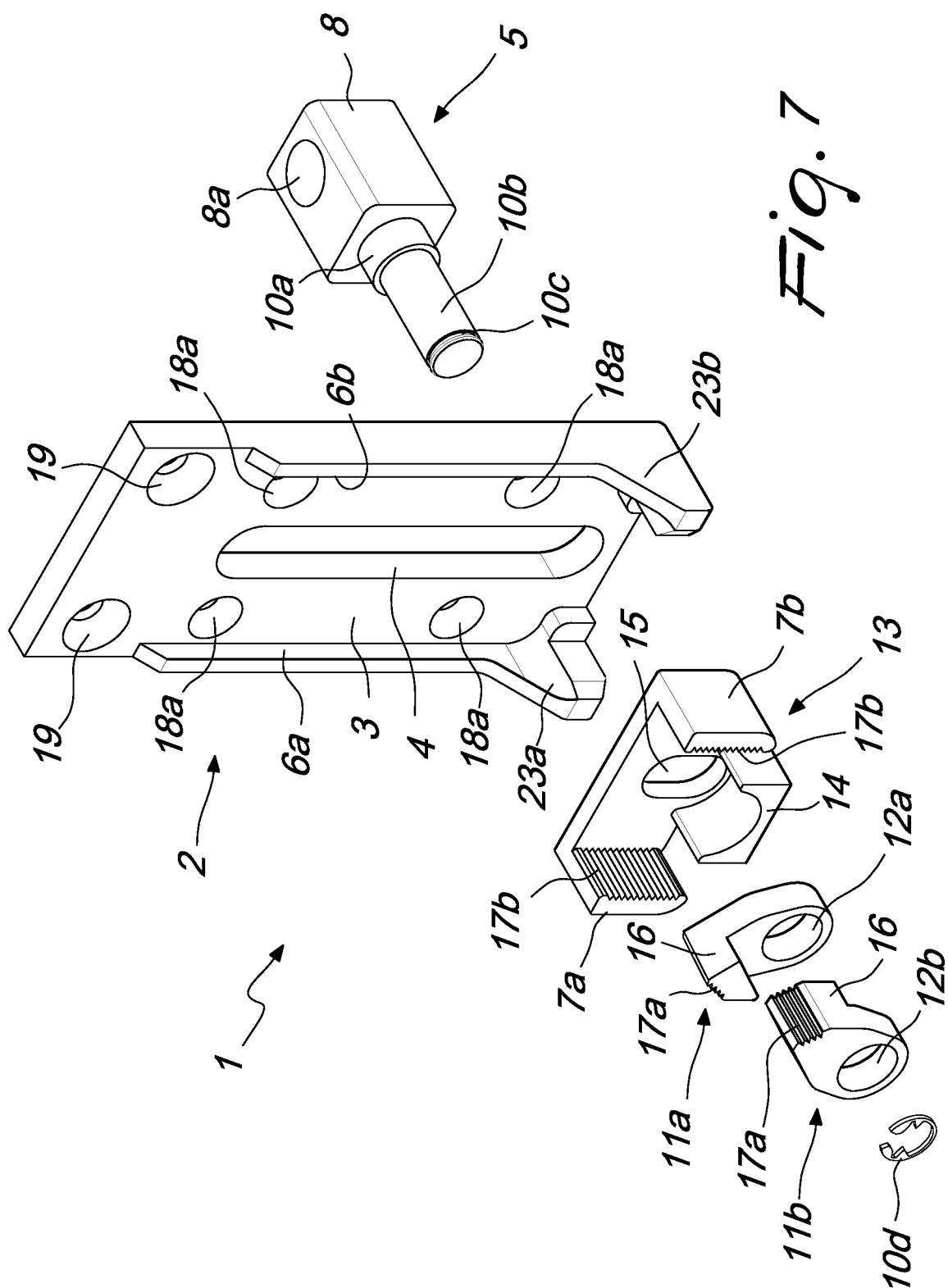


Fig. 4









EUROPEAN SEARCH REPORT

Application Number
EP 09 17 7054

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	US 6 481 691 B1 (IRVING JOHN R [CA]) 19 November 2002 (2002-11-19) * abstract; figures 2,12-15 * * column 6, lines 7-27 * -----	1,2,4,5	INV. B25C11/00
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search		Date of completion of the search	Examiner
The Hague		17 May 2010	Popma, Ronald
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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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 17 7054

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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