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(54) A DEVICE FOR LEVELLING TILES

(57) A device (10', 10") for levelling tiles (11) comprises support-plate means (12) for the lower face (111) of corresponding tiles (11), knob means (14) for engaging the upper face (112) of the respective tile (11), connecting means (16) between said plate means (12) and said knob means (14), in particular extending from, and in one piece with, said plate means (12) and having means (160) for sliding and retaining said knob means (14) for engaging said upper face (112) of the respective tile (11), and breaking means (18) for separating said connecting means (16) from said plate means (12) in the form of a weakening cavity (180) provided in said plate means (12). Said weakening cavity (180) has an upper defining face (181) which extends longitudinally and has a corresponding central longitudinal, in particular flat, zone (182), and opposite longitudinal outermost zones (183, 183) raised with respect to said central zone (182), i.e., extending in height with respect to said central longitudinal zone (182) towards the corresponding upper surface (121 or 120c) of said support-plate means (12) for the lower face of corresponding tiles (11), and extending until reaching, in height, at, or near, the same upper surface (121) of said support-plate means (12).

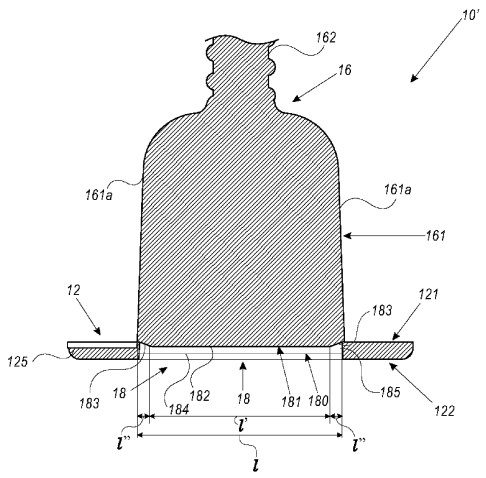

FIG. 1G

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Description

[0001] The present invention relates to a device for levelling tiles.

[0002] Devices for levelling tiles, in particular ceramic tiles, especially in the form of tiles of a flooring or coating of a respective room or living space or other setting, are known, which comprise support-plate means for the lower face of corresponding tiles, in particular having an upper face for supporting said lower face of corresponding tiles, knob means for engaging the upper face of the respective tile, i.e., having a lower face adapted to engage said upper face of the respective tile, to make the levelling in height of the connected tiles.

[0003] Said already-known devices for levelling tiles further comprise corresponding connecting means between said plate means and said knob means, in particular extending from, and in one piece with, said plate means and having means for sliding and retaining said knob means for engaging said upper face of the respective tile, and further comprise corresponding breaking means to promote the separation of said connecting means from said plate means, and which are in the form of a weakening cavity provided in said plate means at said connecting means and extending within said plate means starting from the bottom, or lower, face thereof. With said levelling devices that are know so far, a breakage satisfactorily occurs by a flexural stress to that part of the device, which projects from the tiles.

[0004] However, in the field, it would be desirable to have a levelling device available, in which the breakage, between the base plate means and the connecting means of the knob means, occurs in a reliable and easy manner, while avoiding, to the greatest extent possible, premature and unwanted breakages from occurring during the levelling step, resulting in the need to proceed with a cumbersome and undesired repositioning, which, furthermore, involves an excessive expenditure of time.

[0005] Therefore, by the present invention, it is intended to propose a new and alternative solution to the hitherto known solutions, and in particular, the goal is to obviate one or more of the above-mentioned drawbacks or problems, and/or to meet one or more of the needs cited above, and/or which in any case are felt in the art, and in particular evident from what has been set forth above.

[0006] Thus, a device for levelling tiles is provided, in particular ceramic tiles, especially consisting of the tiles of a flooring or coating of a room or other, comprising support-plate means for the lower face of corresponding tiles, in particular having an upper face for supporting said lower face of corresponding tiles, knob means for engaging the upper face of the respective tile, i.e., having a lower face adapted to engage said upper face of the respective tile, connecting means between said plate means and said knob means, in particular extending from, and in one piece with, said plate means and having means for sliding and retaining said knob means for engaging said upper face of the respective tile, and breaking means for separating said connecting means from said plate means, which are in the form of a weakening cavity provided in said plate means at said connecting means and extending within said plate means starting from the bottom, or lower, face, thereof; characterized in that said weakening cavity has an upper defining face which extends longitudinally and has a corresponding central longitudinal, in particular flat, zone, and opposite longitudinal outermost zones raised with respect to said central zone, i.e., extending in height with respect to said central longitudinal zone towards the corresponding upper surface of said support-plate means for the lower face of corresponding tiles, and extending until reaching, in height, at, or near, the same upper surface of said support-plate means.

[0007] In this manner, it is possible to reduce the flexural resistance at these outermost zones and to promote the breakage and detachment of said connecting means, all of this without unduly weakening the connection of these to the same plate means, hence it is possible to ensure a successful separation breakage while preventing undesired breakages from occurring during the levelling step.

[0008] However, this and other innovative aspects, or respective advantageous implementations, are set out in the attached claims, the specific technical characteristics of which are found, together with corresponding advantages achieved, in the following description, detailing purely exemplary, non-limiting embodiments of the invention, and which is made with reference to the attached drawings, in which:

- Fig. 1A illustrates a schematic, perspective view of a part of a first preferred implementation of a device according to the present invention;
- Fig. 1B illustrates a schematic, top elevational view of a part of the first preferred implementation of a device according to the present invention;
- Fig. 1C illustrates a schematic, front elevational view of a part of the first preferred implementation of a device according to the present invention;
- Fig. 1D illustrates a schematic, top plan view of a part of the first preferred implementation of a device according to the present invention;
- Fig. 1E illustrates a schematic, bottom plan view of a part of the first preferred implementation of a device according to the present invention;
- Fig. 1F illustrates a schematic, vertical sectional view, taken according to the line IF-IF of Fig. 1C, of a part of the first preferred implementation of a device according to the present invention;
- Fig. 1G illustrates a schematic view of an enlarged detail of Fig. 1F;
- Fig. 2A illustrates a schematic, perspective view of a part of a second preferred implementation of a device according to the present invention;
- Fig. 2B illustrates a schematic, side elevational view of a part of the second preferred implementation of

a device according to the present invention;

- Fig. 2C illustrates a schematic, front elevational view of a part of the second preferred implementation of a device according to the present invention;
- Fig. 2D illustrates a schematic, top plan view of a part of the second preferred implementation of a device according to the present invention;
- Fig. 2E illustrates a schematic, bottom plan view of a part of the second preferred implementation of a device according to the present invention;
- Fig. 2F illustrates a schematic, vertical sectional view, taken according to the line IIF-IIF of Fig. 2C, of a part of the second preferred implementation of a device according to the present invention;
- Fig. 2G illustrates an enlarged detail of Fig. 2F;
- Fig. 3 illustrates a schematic, perspective view of a part of a third preferred implementation of a device according to the present invention;
- Fig. 4A illustrates a schematic, side elevational view of the preferred implementation of a knob used in the device according to the present invention;
- Fig. 4B illustrates a schematic, top plan view of the preferred implementation of a knob used in the device according to the present invention;
- Fig. 4C illustrates a schematic, vertical sectional view of the preferred implementation of a knob used in the device according to the present invention, taken according to the line IVC-IVC of Fig. 4B.

[0009] In the attached figures 1A to 1G, a first preferred implementation of a device 10', 10" for levelling tiles 11, in particular ceramic tiles, especially consisting of the tiles of a flooring or coating of a room or other, is illustrated.

[0010] As can be understood, the device comprises support-plate means 12 for the lower face 111 of corresponding tiles 11, in particular having an upper face 121 for supporting said lower face 111 of corresponding tiles 11, and knob means 14 or 10" for engaging the upper face 112 of the respective tile 11, i.e., having a lower face 141 adapted to engage said upper face 112 of the respective tile 11.

[0011] As illustrated, the device further comprises connecting means 16 between said plate means 12 and said knob means 14, in particular extending from, and in one piece 10' with, said plate means 12, and having means 160 for sliding and retaining said knob means 14 for engaging said upper face 112 of the respective tile 11.

[0012] As illustrated, the device also comprises breaking means 18 adapted to allow, or facilitate, i.e., to trigger, the separation of said connecting means 16 from said plate means 12, which are in the form of a weakening cavity 180 provided in said plate means 12 at said connecting means 16, which extends within said plate means 12, starting from the bottom, or lower, face, 122 of the same plate means 12.

[0013] With advantage, as illustrated, said weakening cavity 180 has an upper defining face 181 which extends longitudinally, which has a corresponding central longitudinal, in particular flat, zone 182, and opposite longitudinal outermost zones 183, 183 raised with respect to said central zone 182, i.e., extending in height with respect to said central longitudinal zone 182 towards the corresponding upper surface 121, of said support-plate means 12 for the lower face of corresponding tiles 11, and extending until reaching, in height, at, or near, the same upper surface 121.

[0014] In accordance with a second and third preferred implementations, which are illustrated in the subsequent figures 2A to 3, it is similarly provided for that the corresponding weakening cavity 180 has an upper defining face 181 which extends longitudinally and which has a corresponding central longitudinal, in particular flat, zone 182, and opposite longitudinal outermost zones 183, 183 raised with respect to said central zone 182, i.e., extending in height with respect to said central longitudinal zone 182 towards a corresponding upper surface 120c of said support-plate means 12 for the lower face of corresponding tiles 11, and extending until reaching, in height, at, or near, the same upper surface 120c, as in any case will be best understood from the following of the present description.

[0015] In this manner, it is possible to reduce the flexural resistance at these outermost zones and to promote the breakage and detachment of said connecting means 16, all of this without unduly weakening the connection of these connecting means 16 with the plate means 12, and thus it is possible to ensure a successful separation breakage, while avoiding that undesired breakages occur during the levelling step of the tiles.

[0016] Advantageously, as can be understood from said figures, and in particular from Fig. 1G, said central longitudinal zone 182 extends planarly, in particular horizontal, in use, and/or parallel to said bottom, or lower, face, 122 of said plate means 12 and/or parallel to said upper face 121 of said plate means 12, i.e., parallel to the upper surface 121 or 120c of the same plate means 12, in particular that it is in substantially perpendicular correspondence to said central longitudinal zone 182 of said longitudinal cavity.

[0017] In an advantageous manner, as can be understood from said figures and in particular from Fig. 1G, said longitudinal outermost zones 183, 183 have a respective arched profile, convex towards said weakening cavity 180.

[0018] In an advantageous manner, as can be understood from said figures and in particular from Fig. 1G, in said upper defining face 181 of said weakening cavity 180, the central, in particular flat, zone 182 has a longitudinal length (l') corresponding to more than 80%, preferably corresponding to more than 90%, of the entire longitudinal length (l) of the same upper defining face 181 of said weakening cavity 180.

[0019] Advantageously, as can be understood from said figures and in particular from Fig. 1G, in said upper defining face 181 of said weakening cavity 180, said longitudinal outermost zones 183, 183 have the same lon-

gitudinal length, or extension.

[0020] In a particularly advantageous manner, as can be understood from said figures and in particular from Fig. 1G, in said upper defining face 181 of said weakening cavity 180, the respective one of said longitudinal outermost zones 183, 183 has a longitudinal length (l") corresponding to less than 10%, preferably corresponding to less than 5%, of the entire longitudinal length (l) of the same upper defining face 181 of the same weakening cavity 180.

[0021] In a particularly advantageous manner, as can be understood from said figures and in particular from the figures 1G and 2G, in said preferred implementations, at the central, in particular flat, zone 182 of the upper defining face 181, the height , or thickness, of said plate means 12, which is inferiorly defined by this zone 182 of the upper defining face 181, ranges between 0.1 mm and 0.8 mm, and preferably ranges between 0.3 mm and 0.6 mm, optimally around 0.4 mm.

[0022] Advantageously, as can be understood from said figures and in particular from Fig. 1G, said weakening cavity 180 provided for in said plate means 12 extends from said bottom, or lower, face, 122 of said plate means 12 and is defined by respectively opposite longitudinal faces 184, 184 and transversal faces 185, 185.

[0023] As can be understood from said figures, in an appreciably advantageous manner, said support-plate means 12 for the lower face of corresponding tiles comprise a thin small plate 125, in particular defining said upper face 121 for supporting said lower face 111 of corresponding tiles 11 and said bottom, or lower, face, 122, which are in particular parallel to each other.

[0024] Said bottom face 122 of said plate means is in particular adapted to be rested on the adhesive retaining material for said tiles 11, in particular for the lower faces 111 of the same tiles 11.

[0025] In an appreciably advantageous manner, as can be understood from the subsequent figures 2A to 2G, relating to a second preferred implementation of a device, and 3, relating to a third preferred implementation of a device, the support-plate means 12 for the lower face 111 of corresponding tiles 11 comprise spacing thickness means 120 between opposite tiles, 11, 11, i.e., between opposite side faces 113, 113 of said tiles 11, in particular said thickness means 120 comprising a plurality of members 120a configured, in plan, in the shape of a T, in the figures 2A to 2G, or cross, illustrated in Fig. 3, which thickness means 120 extend from said upper face 121 of said thin small plate 125.

[0026] As can be understood from the subsequent figures 2A to 2G, relating to a second preferred implementation of a device, and 3, relating to a third preferred implementation of a device, advantageously, the respective member 120a of said thickness means 120 has opposite side faces 120b, 120b, in particular parallel to each other, of engagement for the corresponding side face 113 of the respective tile 11.

[0027] As can be understood from said figures 1A to 3, said connecting means 16 between said plate means 12 and said knob means 14 comprise a small sheet 161 for the connection to said plate means 12 and the interposition, in use, between corresponding and facing tiles 11, 11 and a rod 162 for sliding and retaining said knob means 14 extending superiorly from said small sheet 161 and in one piece therewith.

[0028] With appreciable advantage, as can be understood from said figures 1A to 1G, in accordance with the first preferred implementation of a device, said small sheet 161, for the connection to said plate means 12 and the interposition between corresponding and facing tiles 11, 11, extends from the upper face 121 of said thin small plate 125.

[0029] With advantage, advantageously, in accordance with the second and third preferred implementations of a device illustrated in the figures 2A to 3, said small sheet 161, for the connection to said plate means 12 and the interposition between corresponding and facing tiles 11, 11, extends from the upper face 120c of said spacing thickness means 120 between opposed tiles, i.e., of corresponding spacing members 120a thereof.

[0030] As can be understood from said figures, said small sheet 161, for the connection to said plate means 12 and the interposition between corresponding and facing tiles, has opposite transverse, longitudinally outermost, faces 161a, 161a, in particular in a perpendicular, or vertically, proximity, i.e., slightly outside, in particular by a measure less than 0.5 mm, said transverse faces 185, 185, which longitudinally define said weakening cavity 180.

[0031] With advantage, as can be understood from said figures, said small sheet 161, for the connection to said plate means 12 and the interposition between corresponding and facing tiles, has opposite longitudinal planar faces 161b, 161b, in particular parallel to each other and defining therebetween the thickness "s" of said small sheet 161 for the connection to said plate means 12.

[0032] As can be understood from said figures 1E and 1F, advantageously, in accordance with the first preferred implementation of a device, the distance b' between the longitudinal faces 184, 184 of said weakening cavity 180, i.e., the width b' of said weakening cavity 180, is greater than the thickness s of said small sheet 161 for the connection to said plate means 12.

[0033] As can be understood from said figures 2E and 2F, in an advantageous manner, in accordance with the second preferred implementation of a device, the distance b" between the longitudinal faces 184, 184 of said weakening cavity 180, i.e., the width b" of said weakening cavity 180, is less than the thickness s of said small sheet 161 for the connection to said plate means 12.

[0034] In an advantageous manner, while not being particularly illustrated in the attached figures, according to a further embodiment of a device, the distance between the longitudinal faces 184, 184 of said weakening cavity 180, i.e., the width of said weakening cavity 180, is equal, or substantially equal, to the thickness s of said

small sheet 161 for the connection to said plate means 12.

[0035] As can be understood also with reference to the subsequent figures 4A to 4C, advantageously, said rod 162 for sliding and retaining said knob means 14 is in the form of a threaded stem on which said knob means 14 are screwed and unscrewed, which have a corresponding perpendicular cavity, which is suitably threaded, especially at least in its lower part 140.

[0036] As can be understood from the same figures, in a particularly advantageous manner, said threaded stem 162, of said connecting means 16, extends from an intermediate zone of said small sheet 161 for the connection to said plate means 12, i.e., from a point below the upper edge 161c thereof.

[0037] In a particularly advantageous manner, as can be understood from said figures, in practice, said support-plate means 12 for the lower face of corresponding tiles comprise a lower, in particular flat, face 122, an opposite upper face 121 of support for corresponding tiles and which is preferably flat, and a peripheral edge 123, preferably having a general oval shape.

[0038] As can be understood from said figures, advantageously, said small sheet 161 for the connection to said plate means 12 and the interposition between corresponding and facing tiles has substantially the same thickness or width as the corresponding spacing thickness means 120 between opposite tiles.

[0039] As can be understood from said figures, in an appreciably advantageous manner, said spacing thickness means 120 between opposite tiles, i.e., the members 120a thereof on which said small connecting sheet 161 is placed, have an outermost part 120d of the upper face that is slightly inclined downwards, in particular starting from a zone spaced apart from said weakening cavity 180, especially by an angle ranging between 5° and 15°, preferably of about or equal to 10°.

[0040] In this way, any potential obstacle to the bending required to cause the breakage for the separation of the connecting means 16 from the base small plate 12.

[0041] In an appreciably advantageous manner, as can be understood from said figures 4A to 4C, said knob means 14 for engaging the upper face of said tiles have a main body defining a circumferential part, in particular of a general conical shape 149.

[0042] As can be understood from said figures 4A to 4C, advantageously, said body 149 of said knob means 14 defines an inner surface, in particular of a general conical shape 142, for guiding said perpendicular threaded cavity 140 on said rod, or pivot, 162 for sliding and retaining said knob means 14.

[0043] As can be understood from said figures 4A to 4C, with appreciable advantage, said body 149 of said knob means 14 has a plurality of, in particular in a number of six, radial fins 143, to be grasped by the user, projecting from said body 149.

[0044] With appreciable advantage, as can be understood from said figures 4A to 4C, said body 149 of said knob means 14 has a sleeve 144 which extends superiorly beyond the conical part of the same body 149 and beyond the upper edge of said radial fins 143.

[0045] Advantageously, the device, i.e., one or more of the components thereof, in particular said plate means 12 and the corresponding connecting means 16, and said knob means 14, is made, or are made, in plastic material, in particular by moulding in a special mould.

[0046] In practice, as is apparent, the technical characteristics illustrated above allow, individually or in a respective combination, achieving one or more of the following advantageous results:

- it is possible to reduce the flexural resistance at these outermost zones and to promote the breakage and detachment of said connecting means without unduly weakening the connection of these to the same plate means;
- it is possible to ensure a successful separation breakage, while preventing undesired breakages from occurring during the levelling step.

[0047] The present invention is susceptible of clear industrial application. Those skilled in the art are further able to devise a number of modifications and/or variations to be made to the same invention, while remaining within the scope of the inventive concept as broadly disclosed. Furthermore, those skilled in the art will be able to devise further preferred implementations of the invention comprising one or more of the above-illustrated characteristics of the above-mentioned preferred implementation, in particular as set forth in the appended claims. Furthermore, it should also be understood that all the details of the invention can be replaced by technically equivalent elements.

Claims

1. A device (**10', 10"**) for levelling tiles (**11**), in particular ceramic tiles, especially consisting of the tiles of a flooring or coating of a room or other, comprising support-plate means (**12**) for the lower face (**111**) of corresponding tiles (**11**), in particular having an upper face (**121**) for supporting said lower face (**111**) of corresponding tiles (**11**), knob means (**14**) for engaging the upper face (**112**) of the respective tile (**11**), i.e., having a lower face (**141**) adapted to engage said upper face (**112**) of the respective tile (**11**), connecting means (**16**) between said plate means (**12**) and said knob means (**14**), in particular extending from, and in one piece (**10'**) with, said plate means (**12**) and having means (**160**) for sliding and retaining said knob means (**14**) for engaging said upper face (**112**) of the respective tile (**11**), and breaking means (**18**) for separating said connecting means (**16**) from said plate means (**12**), which are in the form of a weakening cavity (**180**) provided in

said plate means (**12**) at said connecting means (**16**) and extending within said plate means (**12**) starting from the bottom, or lower, face (**122**) thereof; **characterized in that** said weakening cavity (**180**) has an upper defining face (**181**) which extends longitudinally and has a corresponding central longitudinal, in particular flat, zone (**182**), and opposite longitudinal outermost zones (**183, 183**) raised with respect to said central zone (**182**), i.e., extending in height with respect to said central longitudinal zone (**182**) towards the corresponding upper surface (**121 or 120c**) of said support-plate means (**12**) for the lower face of corresponding tiles (11**),** and extending until reaching, in height, at, or near, the same upper surface (**121 or 120c**) of said support-plate means (**12**).

2. The device according to claim **1, characterized in that** said central longitudinal zone (**182**) extends planarly, in particular horizontal, in use, and/or parallel to said bottom, or lower, face (**122**) of said plate means (**12**) and/or parallel to said upper face (**121**) of said plate means (**12**), i.e., parallel to the upper surface (**121 or 120c**) of said plate means (**12**), in particular that it is in substantially perpendicular correspondence to said central longitudinal zone (**182**) of the longitudinal cavity.

3. The device according to any of the preceding claims, **characterized in that** said longitudinal outermost zones (**183, 183**) have a respective arched profile, convex towards said weakening cavity (**180**).

4. The device according to any of the preceding claims, **characterized in that,** in said upper defining face (**181**) of said weakening cavity (**180**), the central, in particular flat, zone (**182**) has a longitudinal length (**l'**) corresponding to more than 80%, preferably corresponding to more than 90%, of the entire longitudinal length (**l**) of the same upper defining face (**181**).

5. The device according to any of the preceding claims, **characterized in that,** in said upper defining face (**181**) of said weakening cavity (**180**), said longitudinal outermost zones (**183, 183**) have the same longitudinal length, or extension.

6. The device according to any of the preceding claims, **characterized in that,** in said upper defining face (**181**) of said weakening cavity (**180**), the respective one of said longitudinal outermost zones (1**83, 183**) has a longitudinal length (**l'**) corresponding to less than 10%, preferably corresponding to less than 5%, of the entire longitudinal length (**l**) of the same upper defining face (**181**) of the same weakening cavity (**180**).

7. The device according to any of the preceding claims, **characterized in that** at the central, in particular flat, zone (**182**) of the upper defining face (**181**), the height or thickness of said plate means (**12**), which is inferiorly defined by this zone of the upper defining face (**181**), ranges between 0.1 mm and 0.8 mm, and preferably ranges between 0.3 mm and 0.6 mm, optimally about 0.4 mm.

8. The device according to any of the preceding claims, **characterized in that** said weakening cavity (**180**), provided in said plate means (**12**), extends from said bottom, or lower, face (**122**) of said plate means (**12**) and is defined by respectively opposite longitudinal faces (**184, 184**) and transverse faces (**185, 185**).

9. The device according to any of the preceding claims, **characterized in that** said support-plate means (**12**) for the lower face of corresponding tiles comprise a thin small plate (**125**), in particular defining said upper face (**121**) of support for said lower face (**111**) of corresponding tiles (**11**) and said bottom, or lower, face (**122**), which are in particular parallel to each other.

10. The device according to any of the preceding claims, **characterized in that** the support-plate means (**12**) for the lower face of corresponding tiles comprise spacing thickness means (**120**) between opposed tiles, (**11, 11**), i.e., between opposed side faces (**113, 113**) of said tiles (**11**), in particular thickness means (**120**) comprising a plurality of members (**120a**) configured, in plan, in the shape of a T, or cross, which thickness means (**120**) extend from said upper face (**121**) of said thin small plate (**125**).

11. The device according to claim **10, characterized in that** the respective members (**120a**) of said thickness means (**120**) has opposite side faces (**120b, 120b**), in particular parallel to each other, of engagement for the corresponding side face (**113**) of the respective tile (**11**).

12. The device according to any of the preceding claims, **characterized in that** said connecting means (**16**) between said plate means (**12**) and said knob means (**14**) comprise a small sheet (**161**) for the connection to said plate means (**12**) and the interposition, in use, between corresponding and facing tiles (**11, 11**), and a rod (**162**) for sliding and retaining said knob means (**14**) extending superiorly from said small sheet (**161**) and in one piece therewith.

13. The device according to claim **12, characterized in that** said small sheet (**161**), for the connection to said plate means (**12**) and the interposition between corresponding and facing tiles (**11, 11**), extends from the upper face (**121**) of said thin small plate (**125**).

14. The device according to claim **12, characterized in**

that said small sheet (**161**), for the connection to said plate means (**12**) and the interposition between corresponding and facing tiles (**11, 11**), extends from the upper face (**120c**) of said thickness means (**120**) of spacing between said opposed tiles, i.e., of corresponding spacing members (**120a**) thereof.

15. The device according to any of the preceding claims **12 to 14, characterized in that** said small sheet (**161**), for the connection to said plate means (**12**) and the interposition between corresponding and facing tiles, has opposite transverse, longitudinally outermost, faces (**161a, 161a**), in particular in a perpendicular, or vertically, proximity to, i.e., slightly outside said transverse faces (**185, 185**), which longitudinally define, said weakening cavity (**180**).

16. The device according to any of the preceding claims **12 to 15, characterized in that** said small sheet (**161**), for the connection to said plate means (**12**) and the interposition between corresponding and facing tiles, has opposite longitudinal planar faces (**161b, 161b**), in particular parallel to each other and defining the thickness (**s**) of said small sheet (**161**) for the connection to said plate means (**12**).

17. The device according to claim 16, **characterized in that** the distance (**b'**) between the longitudinal faces (**184, 184**) of said weakening cavity (**180**), i.e., the width (**b'**) of said weakening cavity (**180**), is greater than the thickness (**s**) of said small sheet (**161**) for the connection to said plate means (**12**).

18. The device according to claim **16, characterized in that** the distance (**b"**) between the longitudinal faces (**184, 184**) of said weakening cavity (**180**), i.e., the width (**b"**) of said weakening cavity (**180**), is less than the thickness (**s**) of said small sheet (**161**) for the connection to said plate means (**12**).

19. The device according to claim **16, characterized in that** the distance between the longitudinal faces (**184, 184**) of said weakening cavity (180), i.e., the width of said weakening cavity (**180**), is equal, or substantially equal, to the thickness (**s**) of said small sheet (**161**) for the connection to said plate means (**12**).

20. The device according to any of the preceding claims **12 to 19, characterized in that** said rod (**162**) for sliding and retaining said knob means (**14**) is in the form of a threaded stem on which said knob means (**14**) are screwed and unscrewed, which have a corresponding perpendicular cavity, which is threaded, especially at least in its lower part (**140**).

21. The device according to any of the preceding claims **12 to 20, characterized in that** said threaded stem (**162**) of said connecting means (**16**) extends from an intermediate zone of said small sheet (**161**) for the connection to said plate means (**12**), i.e., from a point below the upper edge (**161c**) thereof.

22. The device according to any of the preceding claims, **characterized in that** said support-plate means (**12**) for the lower face of corresponding tiles comprise a lower, in particular flat, face (**122**), an opposite upper face (**121**) of support for corresponding tiles and which is preferably flat, and a peripheral edge (**123**), preferably having a general oval shape.

23. The device according to any of the preceding claims **12 to 22, characterized in that** said small sheet (**161**) for the connection to said plate means (**12**) and the interposition between corresponding and facing tiles has substantially the same thickness or width as the corresponding thickness means (**120**) of spacing between opposed tiles.

24. The device according to any of the preceding claims **10 to 23, characterized in that** said thickness means (**120**) of spacing between opposed tiles, i.e., the members **(120a)** thereof on which said small connecting sheet (**161**) is placed, have an outermost part (**120d**) of the upper face that is slightly inclined downwards, in particular starting from a zone spaced apart from said weakening cavity (**180**), especially by an angle ranging between 5° and 15°, preferably of about or equal to 10°.

25. The device according to any of the preceding claims, **characterized in that** said knob means (**14**) for engaging the upper face of said tiles have a main body defining a circumferential part, in particular of a general conical shape (**149**).

26. The device according to claim **25, characterized in that** said body (**149**) of said knob means (**14**) defines an inner surface, in particular of a general conical shape, (**142**) for guiding said perpendicular threaded cavity (**140**) on said rod, or pivot, (**162**) for sliding and retaining said knob means (**14**).

27. The device according to any of the preceding claims **25 and 26, characterized in that** said body (**149**) of said knob means (**14**) has a plurality of radial fins (**143**), to be grasped by the user, protruding from said body (**149**).

28. The device according to any of the preceding claims **25 to 27, characterized in that** said body (**149**) of said knob means (**14**) has a sleeve (**144**) which extends superiorly beyond the conical part of the same body (**149**) and beyond the upper edge of said radial fins (**143**).

29. The device according to any of the preceding claims, **characterized in that** the device, i.e., one or more of the components thereof, in particular said plate means (**12**) and the corresponding connecting means (**16**), and said knob means (**14**), is made, or are made, in plastic material, in particular by moulding in a special mould.

30. A body (**10'**) defining support-plate means (**12**) for the lower face (**111**) of corresponding tiles (**11**) and means (**16**) for the connection between these plate means (**12**) and corresponding knob means (**14**), **characterized in that** it is as provided for in any of the corresponding preceding claims.

31. The device (**10', 10'**) and body (**10'**), each respectively **characterized in that** it is made according to any of the preceding claims and/or as described and illustrated with reference to the attached drawings.

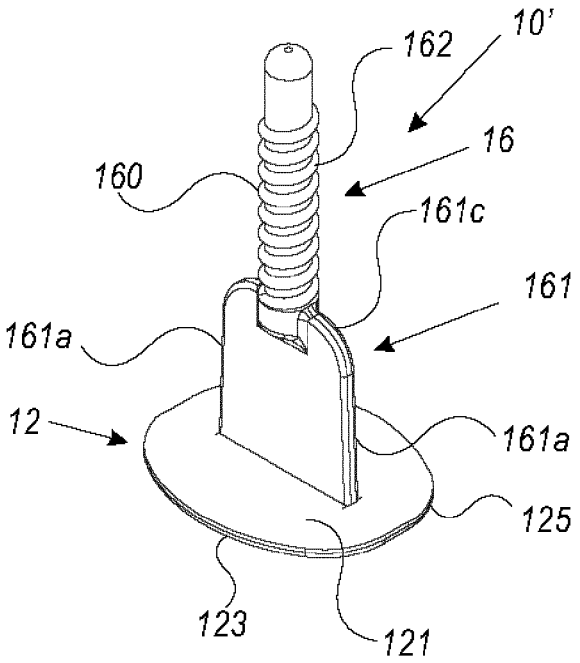


FIG. 1A

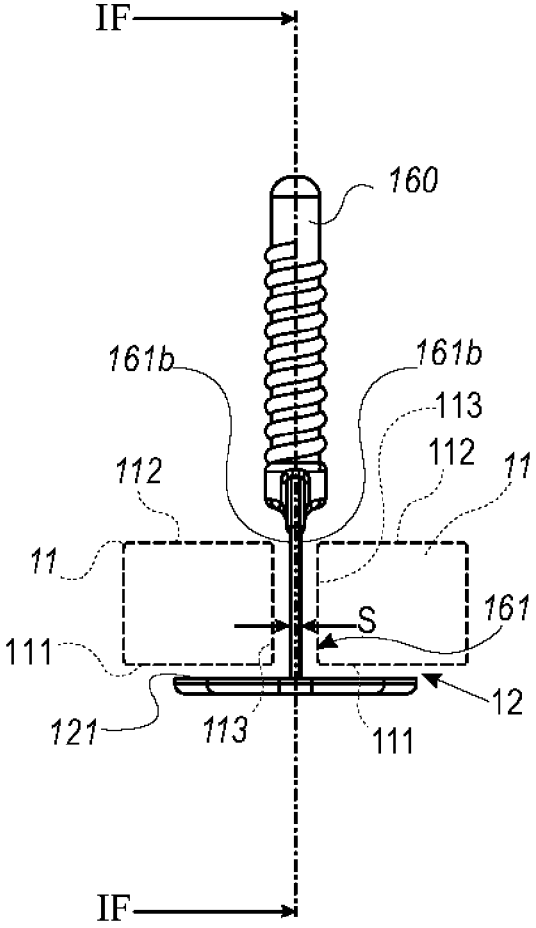


FIG. 1C

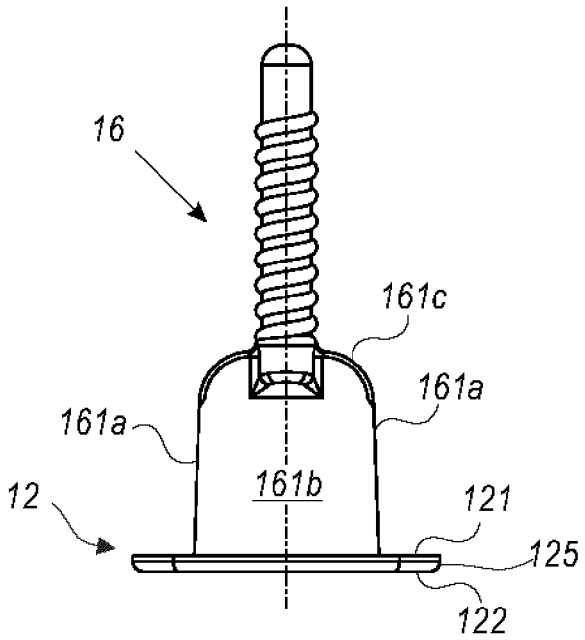
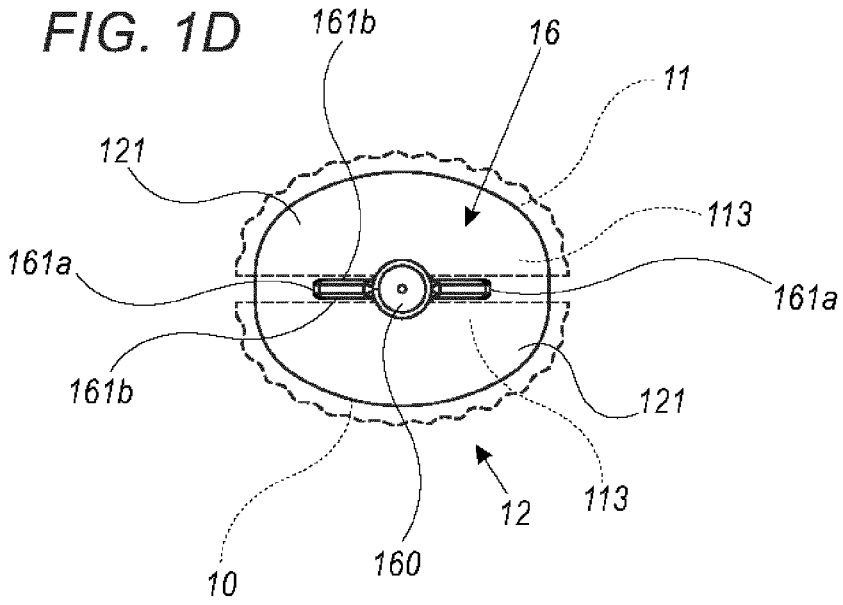


FIG. 1B

FIG. 1D



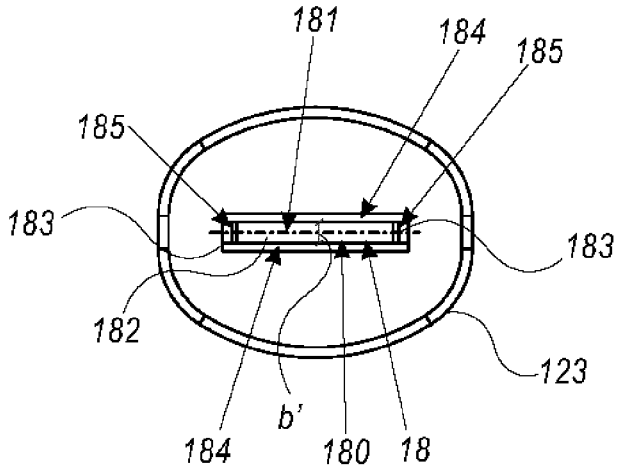


FIG. 1E

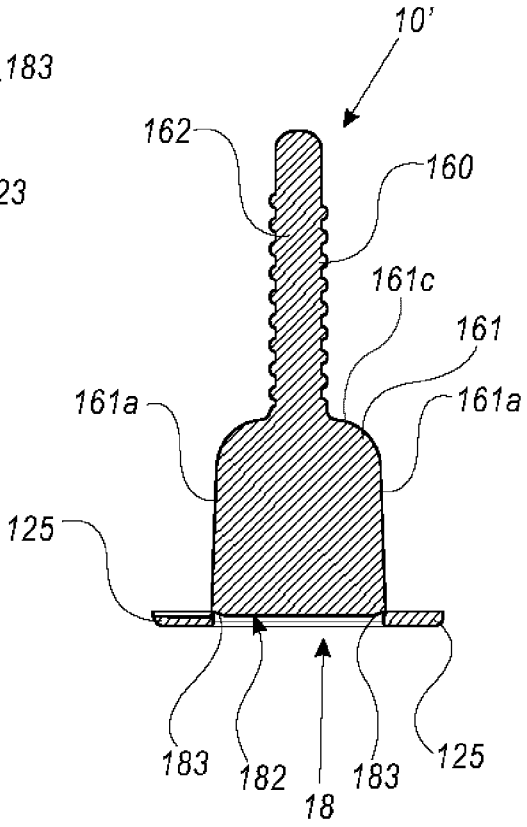


FIG. 1F

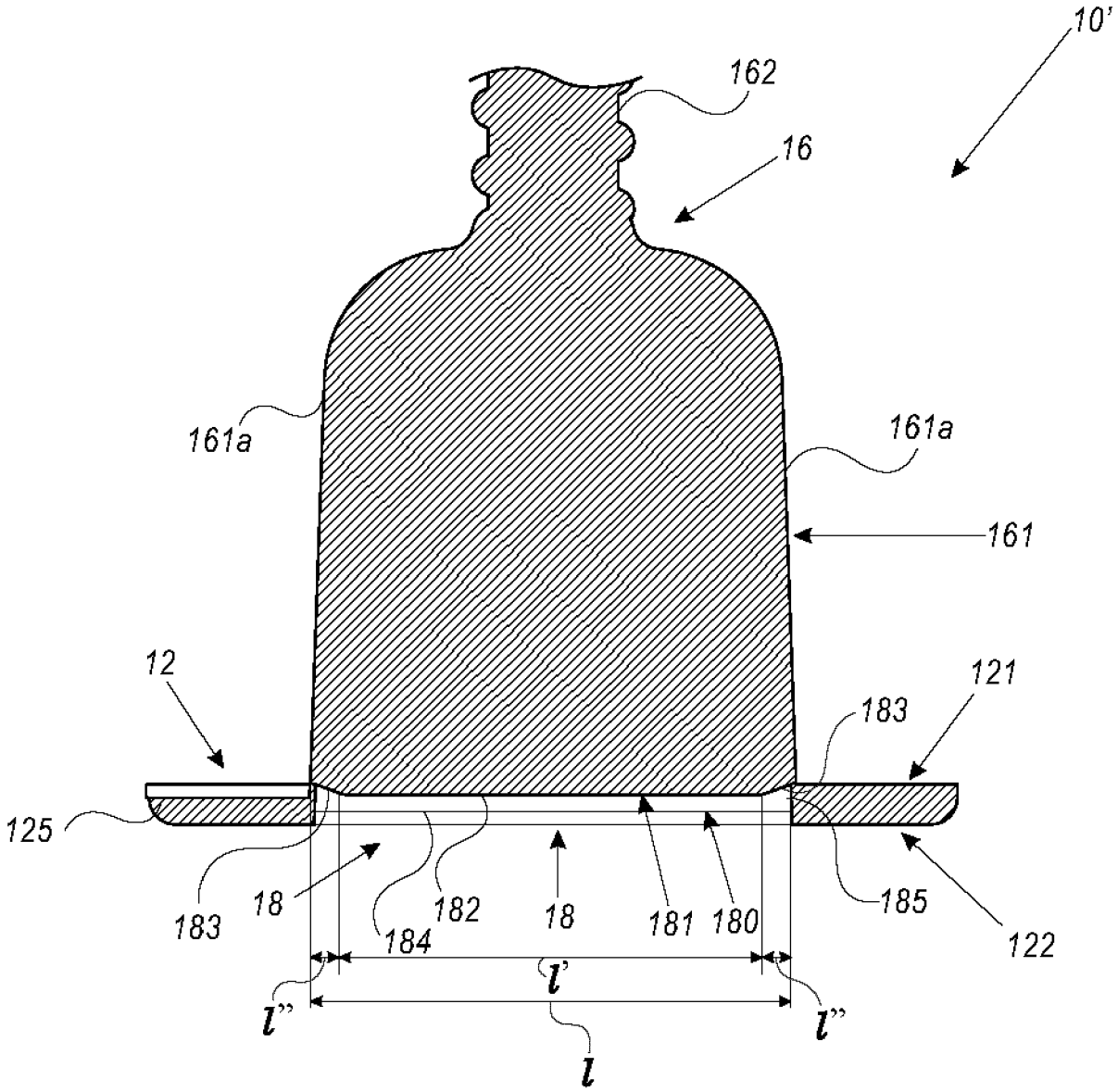

10'
162
16
161a
161a
161
12
121
183
125
18
182
18
181
180
185
122
183
184
l'
l"
l"
l

FIG. 1G

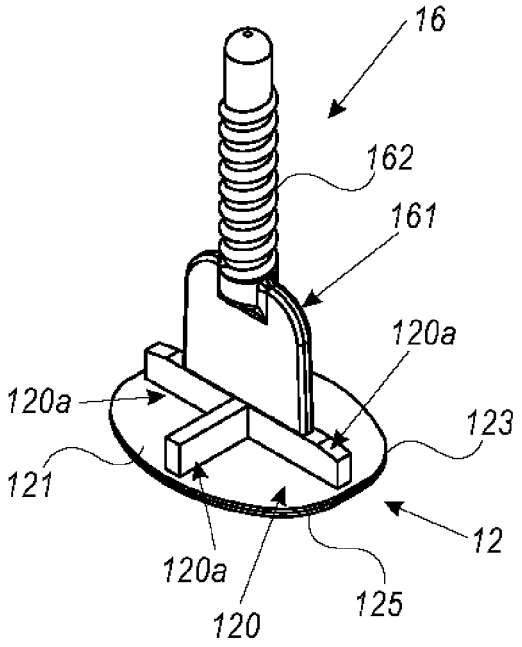


FIG. 2A

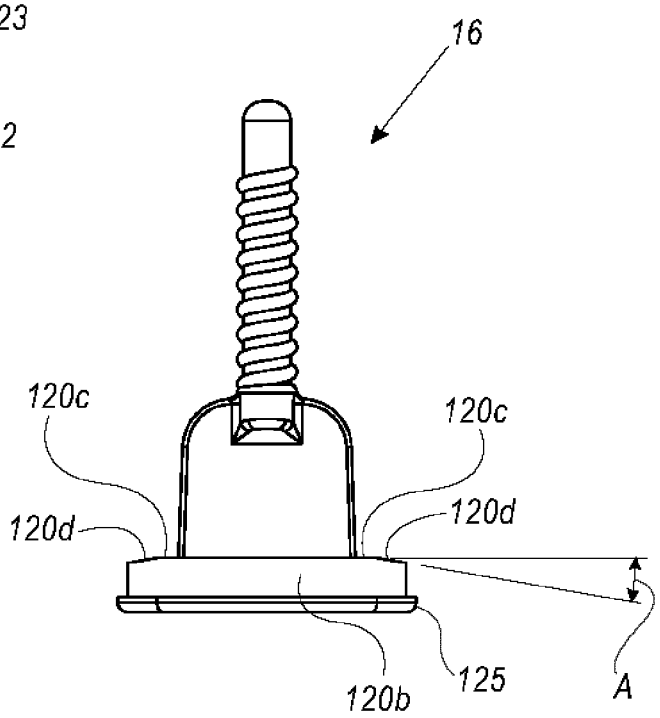


FIG. 2B

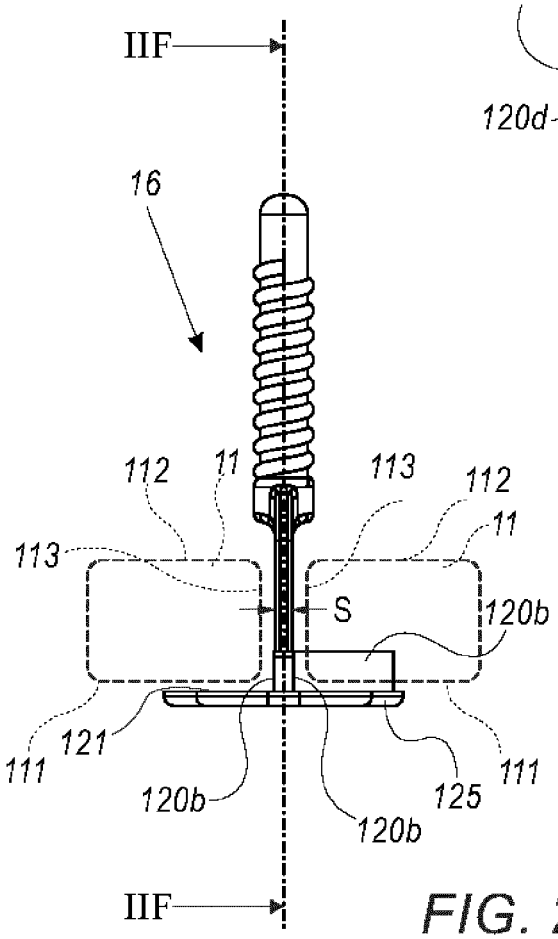


FIG. 2C

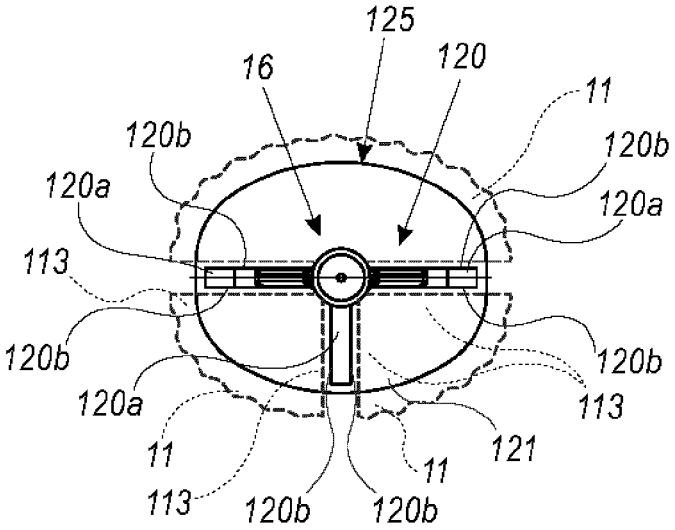


FIG. 2D

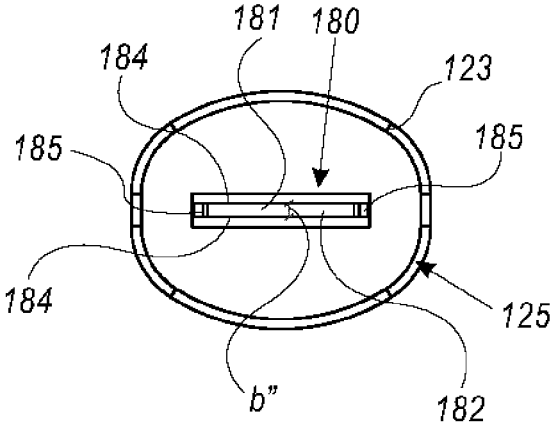


FIG. 2E

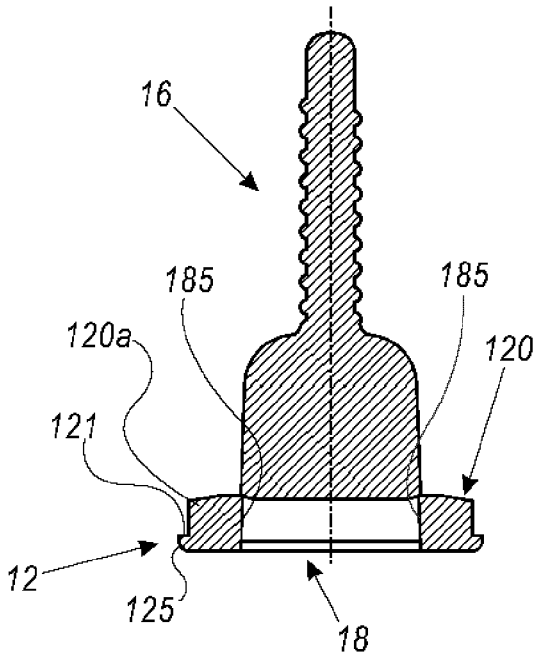


FIG. 2F

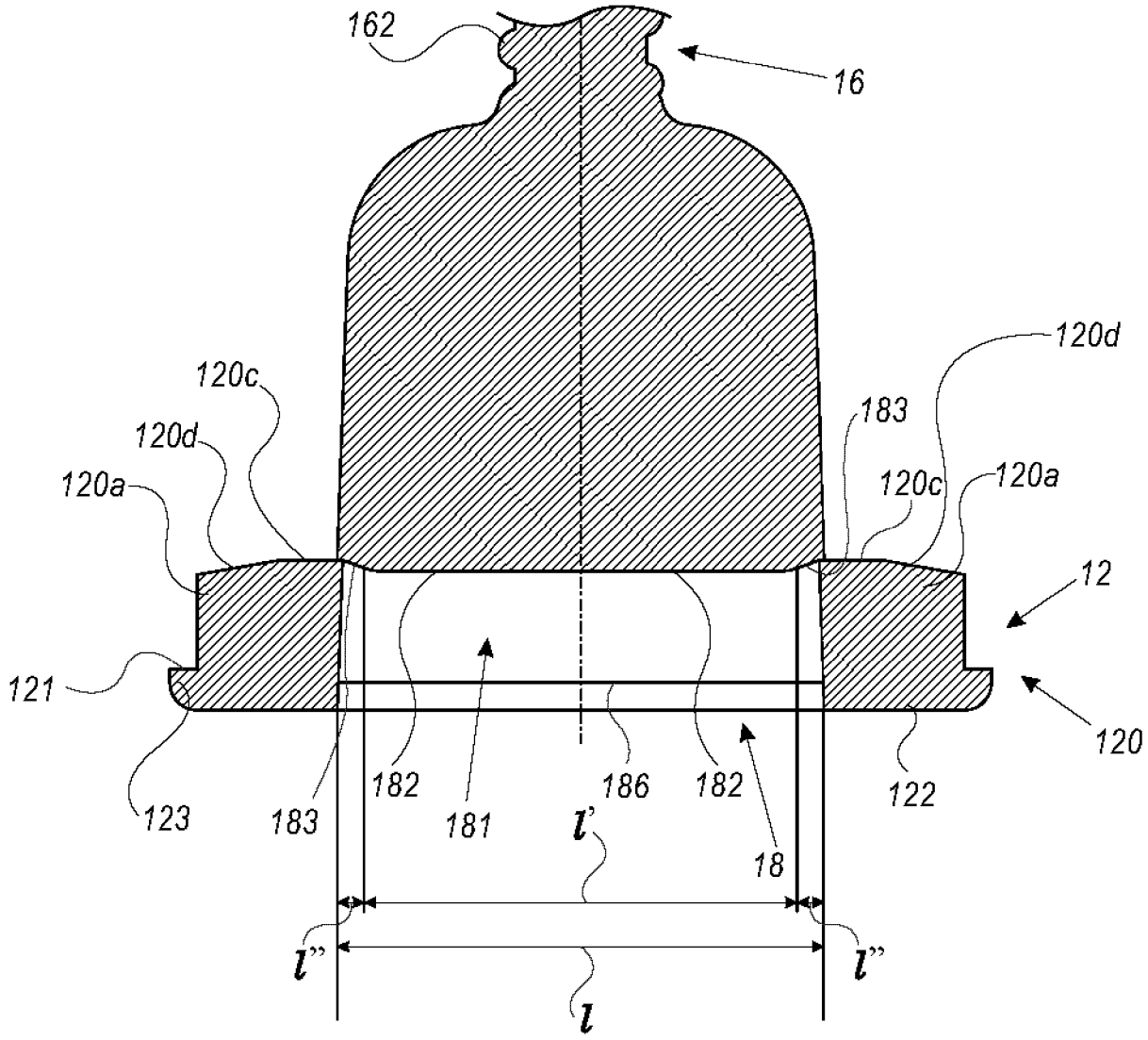

162
16
120d
120c
183
120d
120c
120a
120a
12
121
120
123
183
182
181
186
182
122
18
l'
l"
l"
l

FIG. 2G

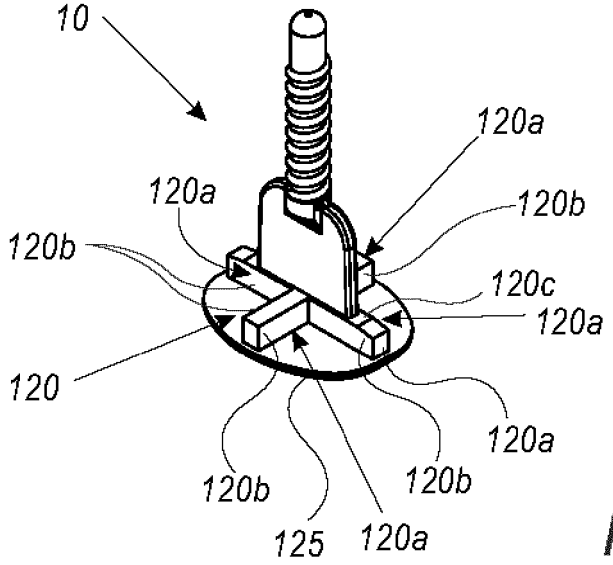
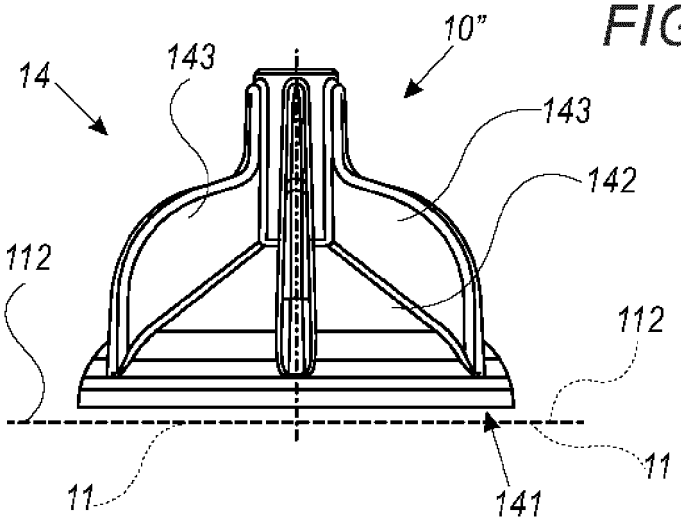

10
120a
120a
120b
120b
120c
120a
120
120a
120b
120b
125
120a

FIG. 3

FIG. 4A



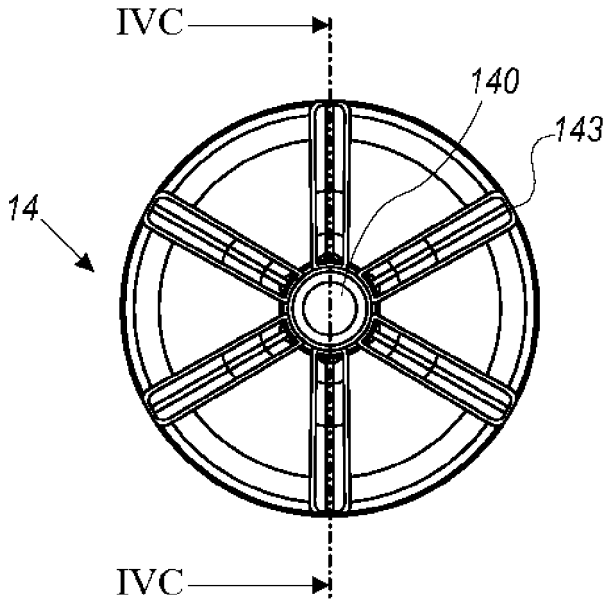


FIG. 4B

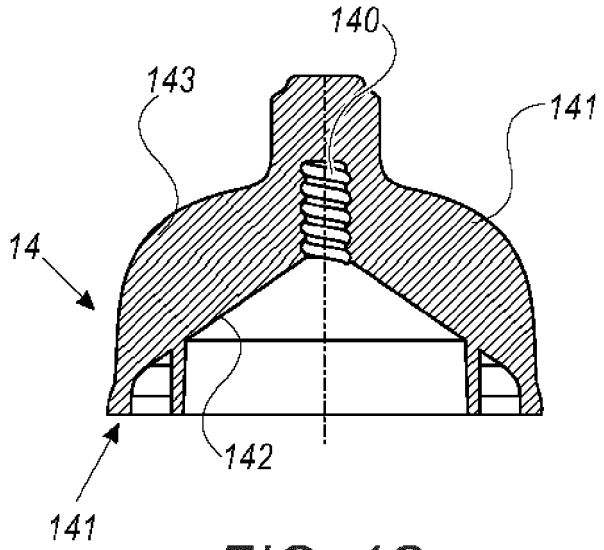


FIG. 4C

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European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 23 18 9363

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	EP 3 524 756 A1 (TTI MACAO COMMERCIAL OFFSHORE LTD [MO]) 14 August 2019 (2019-08-14) * paragraphs [0001], [0028] - [0032], [0041] * * figures 1A,2A,2B,2F,3C,3D,3F *	1-15	INV. E04F15/02 E04F21/00 E04F21/18 E04F21/22
A	EP 2 966 239 A1 (FI R P DI FIORESE M E C S N C [IT]) 13 January 2016 (2016-01-13) * paragraphs [0001], [0037], [0050], [0051], [0056], [0064], [0097], [0098] * * figures 1,2,4,10 *	1-15	
A	CN 204 456 799 U (ZHONGKE SUNBROAD CONSTRUCTION GROUP CO LTD [CN]) 8 July 2015 (2015-07-08) * figures 1-5 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	3 April 2024	Estorgues, Marlène

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

EPO FORM 1503 03.82 (P04C01)

Europäisches Patentamt
European Patent Office
Office européen des brevets

Application Number
EP 23 18 9363

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☒ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 18 9363

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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03-04-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		CN 210127615 U	06-03-2020
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82