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(54) **POSITIONING SYSTEM FOR COVERING ELEMENTS**

(57) Positioning system (100) for covering elements (3, 4), comprises a spacer element (1) intended to be inserted between at least two adjacent covering elements (3, 4) and comprising a base (5) intended to be made to bear on a fixing adhesive for the covering elements and to receive in support a portion of a rear surface (3b, 4b) of the two adjacent covering elements (3, 4), a threaded shaft (8) extending transversely to the base (5), and a plate (7) interposed between the threaded shaft (8) and the base (5) and intended to be interposed, in use, between facing edges (3c, 4c) of the two covering elements (3, 4), a fixing device (2; 2') comprising a body (12) provided internally with a thread (50) shaped to define a seat (51; 51') for the threaded shaft (8) so as to couple the fixing device (2; 2') and the spacer element (1), and a base (16a, 16; 16'a, 16') intended to be made to bear, in use, on a visible surface (3a, 4a) of the two covering elements (3, 4) to be laid, wherein the thread (50) is defined by at least two separate threaded portions (32, 42; 32', 42') at least one of the threaded portions (32, 42; 32', 42') being movable along a movement axis (Y, Y1) relative to the other in order to vary the extent of the seat (51; 51'), there being provided on the body (11) actuation means (34, 35, 44, 45) for moving the at least one threaded portion (32, 42; 32', 42',) to open/close the seat (51; 51'), in order to couple/uncouple the fixing device (2; 2') and the spacer element (1).

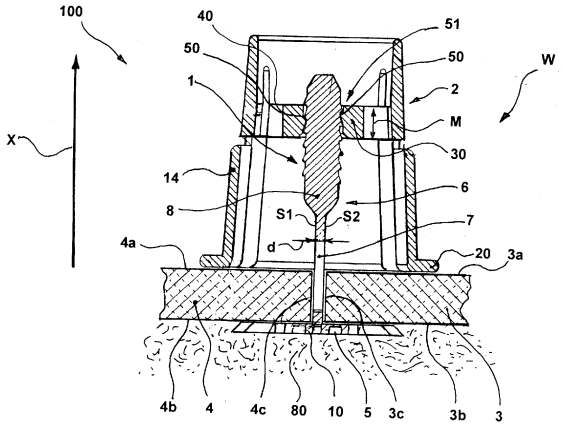

FIG.1

EP 3 421 686 A1

Description

[0001] The invention relates to a positioning system for covering elements, such as tiles or the like, for floors or walls.

[0002] The invention particularly relates to a positioning system for positioning covering elements which allows the mutual alignment of at least two adjacent covering elements, so as to obtain a flooring, or wall, with a regular visible surface, that is to say, without any steps, and with joints having a predetermined dimension.

[0003] Usually, in order to lay a flooring, there is first formed a layer of mortar, adhesive or cement-based adhesive, on the block on which the operator subsequently positions the various covering elements.

[0004] The operator, while positioning a covering element, must check that the covering element is coplanar with respect to the adjacent one(s), in order to avoid producing a flooring with an irregular extent or with steps between two adjacent covering elements.

[0005] The operator must further pay attention to the dimension of the joints, that is to say, the distance between two adjacent covering elements, so as to produce a flooring or wall with joints having dimensions which are almost constant.

[0006] For the purpose of assisting the operator and allowing greater precision and speed during the laying of a flooring, there have been developed some alignment devices, such as, for example, the one described in EP2549030. The device described in EP2549030 comprises a spacer element which is provided with a base which is intended to support the bases of two adjacent tiles and a shaft which extends from the base in a direction perpendicular thereto and which is intended to be positioned between two adjacent tiles. There is provided on the shaft a threaded pin and a plate which is interposed between the base and the threaded pin is intended to be inserted during use between the facing edges of two adjacent tiles.

[0007] There is defined, at the base of the plate, at the side opposite the threaded pin, a weakened zone which is intended to act as a breaking line for the spacer element.

[0008] The alignment device further comprises a handle having a hollow body which is internally provided with a threaded hole which is intended to be screwed to the threaded pin and a flange which is intended to abut, during use, the visible surface of two adjacent tiles in order to level them.

[0009] There are provided on the outer portion of the handle fins which are intended to promote the grip of the handle with respect to a user.

[0010] In order to position a flooring using the alignment device of EP2549030, the operator prepares and spreads the cement-based adhesive on the block, positions a tile on the adhesive, arranges the base of a spacer element on the adhesive under the tile, in such a manner that the plate is in abutment with a free edge of the tile. Subsequently, the operator positions a second tile on the adhesive in such a manner that a free edge thereof is in abutment with the free wall of the plate, so that the plate is interposed between the two adjacent tiles.

[0011] Subsequently, the operator screws the handle on the threaded pin, moving the flange into abutment against the visible surface of the two adjacent tiles and, by continuing to screw, subsequently generates traction on the spacer element, so as to progressively clamp the two adjacent tiles between the flange of the handle and the base of the spacer and to produce progressive alignment between the two tiles.

[0012] Once the clamping is finished, the device is fixed in position for sufficient time to bring about the setting of the adhesive, after which the operator unscrews the handle from the threaded pin, thereby separating it from the spacer element and, by pivoting the shaft of the spacer element with respect to the base thereof, brings about the breakage of the spacer element in the region of the intended breaking line, and therefore withdraws the shaft from the joint.

[0013] A drawback of that device is that it requires from the operator a considerable time for positioning the flooring, as a result particularly of the time necessary for screwing/unscrewing the handle on the threaded pin. EP2573296 describes another levelling device which has the same disadvantages set out with reference to the device of EP2549030.

[0014] An object of the invention is to provide a positioning system which allows the operations of positioning a flooring or wall to be made more rapid, yet ensuring at the same time that there is produced a flooring with a regular visible surface which has substantially no steps and with joints between the various adjacent covering elements having a predetermined extent.

[0015] This object is achieved by a positioning system produced in accordance with the appended claims.

[0016] The features and advantages of the invention will be better appreciated from the following detailed description of some preferred embodiments thereof which are illustrated by way of non-limiting example with reference to the appended drawings, in which:

- Figure 1 is a cross-section of a positioning system according to the invention in a configuration for use;
- Figure 2 is a perspective view of a spacer element of the positioning system of Figure 1;
- Figure 2a is a perspective view of another version of a spacer element which can be used in the positioning system of Figure 1;
- Figure 3 is a front view of an embodiment of a fixing device of the positioning system of Figure 1;
- Figure 4 is a top view of the fixing device of Figure 3;
- Figure 5 is a perspective top view of the fixing device of Figure 3;
- Figure 6 is a perspective bottom view of the fixing device of Figure 3;
- Figure 7 is a perspective view of another embodi-

ment of a fixing device of the positioning system of Figure 1;
- Figure 8 is a top view of the fixing device of Figure 7;
- Figure 9 is a perspective top view of another embodiment of a fixing device according to the invention;
- Figure 10 is a top view of the fixing device of Figure 9;
- Figure 11 is a perspective bottom view of the fixing device of Figure 9;
- Figure 12 is a perspective top view of another embodiment of a fixing device according to the invention;
- Figure 13 is a perspective bottom view of the fixing device of Figure 12;
- Figure 14 is a top view of the fixing device of Figure 12.

[0017] Figure 1 shows a positioning system 100 according to the invention in a configuration for use in which it is used to position a first covering element 3 and a second covering element 4 which are mutually adjacent in order to produce a flooring or wall with a coplanar visible surface.

[0018] The positioning system 100 of the invention allows the positioning of two or more adjacent covering elements in such a manner that the respective visible surfaces are substantially coplanar and that there is produced a flooring or wall with a regular visible surface having joints of a predetermined width, as will be better described below.

[0019] The positioning system 100 of the invention is suitable for positioning ceramic tiles or also covering elements of natural stone or wood or the like, which are intended to form covering floorings or walls.

[0020] Each covering element 3, 4 comprises a respective first surface 3a, 4a which is intended to constitute the visible surface of the covering to be formed and an opposite rear surface 3b, 4b which is supported on a cement-based adhesive 80 or mortar or securing adhesive, in order to secure the covering element 3, 4 to the block and at least one lateral edge 3c, 4c.

[0021] The first and second covering elements are positioned with the positioning system 100 of the invention in such a manner that the respective lateral edges 3c, 4c are at least partially facing each other.

[0022] The positioning system 100 comprises a spacer element 1, a version of which is shown in greater detail in Figure 2 and which is intended to be interposed during use between the facing lateral edges 3c, 4c of the first covering element 3 and the second covering element 4 and a fixing device 2, a version of which is shown in greater detail in Figures 3 to 8 and which is intended to be connected in a removable manner to the spacer element 1 in order to correctly position the two adjacent covering elements, as shown in Figure 1, and as will be better explained below.

[0023] Another version of the spacer element and other versions of the fixing device of the invention which are suitable for being used with the positioning system of Figure 1 are shown in Figure 2a and in Figures 9 to 14, respectively, as will be better explained below.

[0024] The spacer element 1 comprises a base 5 which is intended to be supported during use on the adhesive 80 and to receive in abutment a portion of the rear surface 3b, 4b of the first and second covering element 3, 4, and a shaft 6 which extends from the base 5 in an almost perpendicular direction relative thereto in accordance with a longitudinal axis X.

[0025] The shaft 6 comprises a plate 7 which is intended to be interposed during use between the facing lateral edges 3c, 4c of the first and second covering element 3, 4, and a threaded pin 8 which extends orthogonally with respect to the base 5, so positioned that the plate 7 is interposed between the base 5 and the threaded pin 8.

[0026] The plate 7 comprises two opposing lateral surfaces S1, S2 which are intended to abut facing lateral edges 3c, 4c of the first covering element 3 and the second covering element 4, respectively, and has a thickness "d" which is generally between 1 and 8 mm, preferably between 1 and 4 mm; the thickness "d" of the plate 7 determines the extent of the joints between the adjacent covering elements 3, 4.

[0027] The threaded pin 8 is provided with an outer thread 9 and is capable of allowing the connection of the fixing device 2 to the spacer element 1, as will be better explained below.

[0028] There is provided between the plate 7 and the base 5 of the spacer element 1 an intended breaking zone 10 in the region of which the spacer element 1 is fractured in order to allow the separation of the plate 7 from the base 5, as will be better explained below.

[0029] In the version of the spacer element 1 shown in Figure 2, there is provided on the plate 7 an opening 11 which is capable of forming a weight-reduction element for the spacer element 1; in other versions not shown, the plate may be solid.

[0030] The opening 11 further allows the use of the spacer element 1 with a positioning wedge which is not shown in the Figures.

[0031] In a second embodiment shown in Figure 2a for which portions corresponding to the version of Figure 2 will be indicated with corresponding reference numerals and will not be described in detail, the spacer element 1' does not have the second cross-member, that is to say, the opening 11' is defined on the plate 7' by the first and second upright member 12', 13', by the first cross-member 14' and by the upper surface S' of the base 5'.

[0032] In this case, the intended breaking line 10' is defined between the base of the upright members 12a', 13a' and the base 5'.

[0033] The opening 11 or 11' is of substantially rectangular shape with a height H1, when considered in the direction of the longitudinal axis X, of between 15 and 20 mm, and a width L2 between 10 and 15 mm.

[0034] In both versions, the base 5, 5' may be provided with weakening elements which are positioned at the intended breaking line 10 and which are capable of pro-

moting the fracture of the spacer element.

[0035] In a version which is not shown, the shaft of the spacer element is provided with two plates which are orthogonal to each other and which are interposed between the base and the threaded pin and formed so as to define on the base of the spacer element four sectors, each of which is intended to receive a corner portion of a different covering element to be positioned.

[0036] That version of the spacer element is suitable for being used for so-called angular positioning, that is to say, in order to position four separate covering elements at the same time.

[0037] In another version which is not shown, the spacer element is provided with two plates which are orthogonal to each other and which are arranged in a T-like manner so as to define on the base of the spacer element three separate sectors, each of which is intended to receive a different covering element to be positioned. That version is suitable for being used for so-called staggered positioning.

[0038] There will be described below some embodiments of the fixing device 2 which is constructed according to the invention.

[0039] In the version shown in greater detail in Figures 3 to 6, the fixing device 2 comprises a body 12 of substantially frustoconical shape, which is internally hollow and enclosed by a lateral surface 14 which is delimited by a first edge 15 and a second edge 16, which are provided at opposite sides with respect to a longitudinal axis X of the body 12 and which delimit a first base opening 15a and a second base opening 16a having a cross-section greater than the first base opening 15a, respectively. The first base opening 15a has a diameter D1 which is usually between 20 and 35 mm, preferably approximately 29 mm, while the second base opening 16a has a diameter D2 which is usually between 25 and 45 mm, preferably approximately 32 mm.

[0040] In the configuration for use, the longitudinal axis of the fixing device 2 and the spacer element 1 are substantially coincident, so that they will be indicated below with the same reference numbers for simplicity.

[0041] In the region of the second base opening 16a, there is provided a flange 20 which extends in the radial direction and which is intended to constitute the support base of the fixing device 2 on the visible surface 3a, 4a of the two adjacent covering elements 3, 4 to be positioned, so as to allow levelling thereof, as will be better explained below.

[0042] The flange 20 usually has a width "L" between approximately 8 and 12 mm, in such a manner that the total diameter "D" of the fixing device 2 in the region of the support base is between 35 and 60 mm, preferably approximately 50 mm.

[0043] Advantageously, the body 12 is further provided at the outer side with a plurality of ribs 17 which project from the lateral surface 14 in a transverse direction relative thereto and which are intended to make the fixing device 2 easier to grip and handle by a user thereof.

[0044] In the version shown, there are provided four ribs 17 which are equidistant over the lateral surface 14 and which extend almost over the entire length of the lateral surface 14 so that the flange 20 constitutes the support portion for the ribs 17.

[0045] In other versions of the fixing element which are not shown, however, there may be provision for a different number of ribs, for example, 3 or 6, which may not be equidistant, and/or extending only over a longitudinal portion of the body 12, which are positioned so as to promote the grip and the handling of the fixing device 2 by the user.

[0046] In other versions which are not shown, in order to make the fixing device easier to grip and handle, there may be provided as an alternative, or in addition to the ribs, knurled portions which are defined on the lateral surface 14 and/or other gripping elements.

[0047] The fixing device 2 further comprises a first and a second fixing element 30, 40 which are intended to cooperate in order to define a seat 51 for the threaded pin 8 in order to mutually connect the spacer element 1 and the fixing device 2, as will be better explained below.

[0048] The first and second fixing element 30, 40 extend over a portion M along the longitudinal axis X of the fixing device 2 usually between 3 and 12 mm, preferably approximately 7 mm.

[0049] At least one of the first and second fixing elements 30, 40 is movable along a movement axis which is positioned transversely to the longitudinal axis X with respect to the other fixing element 30, 40 in order to vary the extent of the seat 51 so as to open/close the seat 51 in order to connect/disconnect the fixing device 2 to/from the spacer element 1, as will be better explained below.

[0050] The movable fixing element 30, 40 is operationally connected to an actuation element so as to be moved in order to open/close the seat 51, as will be better explained below.

[0051] In the version shown, both the first and the second fixing element 30, 40 are movable along a respective movement axis Y, Y1 in order to open/close the seat 51, each fixing element 30, 40 being operationally connected to a corresponding actuation element 35, 45 in order to be moved along the respective movement axis Y, Y1, as will be better explained below.

[0052] In the version shown, the movement axes Y, Y1 of the first and second fixing element 30, 40 are radial axes.

[0053] In the version shown, both the fixing elements 30, 40 are movable in order to open/close the seat 51 and are of a similar structure, so that the same elements thereof will be indicated with corresponding reference numerals. Each fixing element 30, 40 comprises an arm 31, 41 which is fixed to the inner wall 18 of the body 12 by means of a first end thereof, and a threaded portion 32, 42 which is provided at the free end of the arm 31, 41 opposite the first end.

[0054] The threaded portions 32, 42 of the fixing elements 30, 40 define together a thread 50 which is formed

so as to be connected with form-fitting to the outer thread 9 of the threaded pin 8.

[0055] There are formed on the threaded portions 32, 42 thread portions so as to allow the threaded pin 8 to be screwed/unscrewed.

[0056] The threaded portions 32, 42 are mutually facing and extend over a circumferential portion which corresponds to an angle preferably between 100 and 150°, preferably approximately 135°, and so as to allow stable clamping of the threaded pin 8 in the seat 51 and to allow mutual movement of the first and second fixing element 30, 40 in order to open/close the seat 51 in order to disconnect/connect the threaded pin 8 and the fixing device 2.

[0057] There is formed on the lateral surface 14 of the body 12 a notch 33 which is configured so as to define a tab 34 which is connected by means of an end 34a thereof to the body 12 and which can be pivoted about the end 34a in the direction of the transverse movement axis Y between a rest configuration W which is shown in the Figures and an operational configuration which is not shown in order to vary the extent of the seat 51. The arm 31 of the first fixing element 30 is rigidly fixed to an inner wall of the tab 34 so that the first fixing element 30 can be moved integrally therewith in order to open/close the seat 51.

[0058] Similarly, there is provided on the body 12 a second notch which defines a second tab 44 which is connected to the body 12 by means of a corresponding second end 44a, to which the second arm 41 is rigidly fixed. The second tab 44 can be pivoted with respect to the second end 44a in order to move the second fixing element 40 in the direction of the second transverse axis Y1 between a rest configuration W which is shown in the Figures and an operational configuration which is not shown.

[0059] The tab 34 and the second tab 44 act as actuation elements 35, 45 for the first and second fixing elements 30, 40, respectively.

[0060] In the version shown, the first tab 34 and the second tab 44 are provided on the body 12 in diametrically opposed positions so as to be moved in substantially parallel directions but in opposite senses in order to open/close the seat 51.

[0061] That positioning allows the user of the fixing device 2 to be able to simultaneously actuate, by using different fingers of the same hand, the first tab 34 and the second tab 44 in order to open/close the seat 51.

[0062] That formation allows the gripping and actuation of the fixing device 2 by a user to be made particularly convenient, as will be better explained below. When the first tab 34 and the second tab 44 are in a rest configuration W, the seat 51 is closed, that is to say, the seat 51 has a minimal extent, and the first tab 34 and/or the second tab 44 are arranged substantially parallel with the lateral surface 14 of the body 12. In the rest configuration W, the thread 50 defined by the first and second fixing elements 30, 40 has such dimensions as to be connected in a form-fitting manner to the outer thread 9 of the threaded pin 8.

[0063] By moving the first tab 34 and/or the second tab 44 from the rest configuration W, the dimensions of the seat 51 are progressively increased. By applying a suitable pressure to the first tab 34 and/or second tab 44, so as to progressively pivot them towards the inner side of the body 12, there is brought about a translation of the first and/or second fixing element 30, 40 along the transverse axis Y and Y1, respectively, so as to cause the progressive movement of the threaded portions 32, 42 away from each other, that is to say, the progressive opening of the seat 51.

[0064] Figures 7 and 8 show another embodiment of the fixing element 2' according to the invention, in which components corresponding to the above-described version of the fixing element 2' will be indicated with the same reference numerals provided with a prime (') and will not be described in detail.

[0065] The fixing element 2' comprises guide elements 60' which are intended to interact with the first and/or second fixing element 30', 40' in order to guide the movement thereof between the rest configuration W and the operational configurations.

[0066] In the version shown, the guide elements comprise a plurality of protrusions 60' which project from the inner wall 18 of the fixing element 2'.

[0067] In the version shown, the guide elements 60' comprise a first plurality of protrusions 60a' which are intended to interact with the arm 31', 41' of the first and/or second fixing element 30', 40' and a second plurality of protrusions 60b' which are intended to interact with the threaded portion 32', 42' of the first fixing element 30' and/or second fixing element 40'. Each protrusion of the first plurality of protrusions 60a' and the second plurality of protrusions 60b' are provided with a guide wall A on which a corresponding wall of the arm 31', 41' or the threaded portion 32', 42' slides during the movement of the first fixing element 30' and/or second fixing element 40' between the rest configuration and the operational configurations, and vice versa.

[0068] Advantageously, the guide wall A of the second plurality of protrusions 60b' is inclined with respect to the transverse movement axis Y, Y1 in order to improve the sliding of the wall of the threaded portion 32', 42' on the sliding wall A itself.

[0069] In the version shown, the first plurality of protrusions 60a' and the second plurality of protrusions 60b' each comprise two separate protrusions which are positioned in a diametrically opposed position on the inner wall of the fixing element 2.

[0070] The protrusions of the first plurality of protrusions 60a' and the second plurality of protrusions 60b' also allow an increase in the stability of the fixing element 2, in particular the first fixing element 30' and the second fixing element 40'.

[0071] In other versions which are not shown, there may be provided guide elements other than the protru-

sions and/or a different number of protrusions.

[0072] In one version, the guide elements act as abutment elements for the first and second fixing elements in the rest configuration W.

[0073] Figures 9 and 11 show another embodiment of the fixing element 2" according to the invention in which components corresponding to the above-described versions will be indicated with corresponding reference numerals and will not be described in detail.

[0074] The guide elements 60" of the fixing element 2" which are intended to interact with the first and/or second fixing elements 30", 40" in order to guide the movement thereof between the rest configuration W and the operational configurations comprise a plurality of protrusions 60" which project from the inner wall 18" of the fixing element 2".

[0075] Each protrusion 60" is provided with a guide wall A" on which a corresponding guide face 36", 46" of the arm 31' or 41' slides, respectively, during the movement of the first fixing element 30" and/or the second fixing element 40" between the rest configuration W and the operational configurations, and vice versa.

[0076] Advantageously, the guide wall A" and the guide face 36", 46" are inclined with respect to the transverse movement axis Y, Y1 in order to improve the sliding of the arm 31' and/or 41'.

[0077] Advantageously, the guide wall A" and the guide face 36", 46" have the same inclination and/or are formed in order to be connected with form-fitting in order to promote the movement of the first fixing element 30" and/or the second fixing element 40".

[0078] The fixing element 2" further comprises a reinforcement element 70 which is provided internally with respect to the hollow body 12" in a longitudinally intermediate position between the first edge 15 and the second edge 16 and which is provided in order to constitute a slidable support base for the first fixing element 30" and/or the second fixing element 40".

[0079] The reinforcement element 70 is provided with a hole 71 which is coaxial with the seat 51 and which has an aperture L greater than the aperture L' defined by the seat 51 in the rest configuration W, that is to say, in the closure configuration.

[0080] In that manner, the reinforcement element 70 does not constitute an obstacle or impediment for the insertion/removal of the threaded pin in/out of the seat 51.

[0081] In that version, the first and second fixing elements 30", 40" are provided in the face directed during use towards the reinforcement element 70 with an undercut 37", 47", respectively, which is intended to slide on the reinforcement element 70 during the movement between the rest configuration W and the operational configuration, and vice versa. In that manner, the movement of the first and second fixing element 30", 40" is guided between the rest configuration W and the operational configuration, and vice versa, making the actuation of the fixing device 2" more precise and simple.

[0082] Furthermore, there are avoided undesirable movements of the first fixing element 30" and/or second fixing element 40" along the longitudinal axis X. This allows the operation of the fixing device 2" to be made particularly precise and undesirable openings of the seat 51" to be prevented, and therefore undesirable disconnections between the fixing element 2" and the spacer element 1.

[0083] That measure further allows an increase in the service-life of the fixing element 2" and allows it to be used repeatedly for a high number of times. Furthermore, the presence of the reinforcement element 70 allows an increase in the dimensional stability of the fixing device 2".

[0084] Figures 12 to 14 further show another embodiment of the fixing element 2" according to the invention in which components corresponding to the above-described versions will be indicated with corresponding reference numerals and will not be described in detail. Each fixing element 30"', 40"' comprises an arm 31"', 41"' which is fixed to the inner wall 18'" by means of a first end thereof, and a threaded portion 32"', 42"' which is provided at the free end of the arm 31"', 41"' opposite the first end.

[0085] The arm 31"', 41"' is preferably engaged in a central portion of the respective threaded portion 32"', 42"', so as to increase the stability of the fixing elements 30"', 40"'. The first end of each arm 31"', 41"' is fixed to the pivotable tab 34"', 44"' so that the fixing elements 30"', 40"' can be moved.

[0086] The arms 31"', 41"' of the two fixing elements 30"', 40"' are preferably arranged in a diametrically opposed position and the movement axes of the first and second fixing element 30"', 40"' are substantially coincident.

[0087] The threaded portions 32"', 42"' of the first and second fixing element 30"', 40"' are mutually facing and extend over a circumferential portion corresponding to an angle which is preferably between 60° and 110°, preferably approximately 90°, and so as to allow the stable clamping of the threaded pin 8 in the seat 51"'.

[0088] The threaded portions 32"', 42"' together define a thread 50"' which is formed so as to be connected in a form-fitting manner to the outer thread 9 of the threaded pin 8.

[0089] Each threaded portion 32"', 42"' is provided with two thrust end members 38, 48 which are provided at the opposite edges of each threaded portion 32"', 42"' and which are intended to interact with actuation means of the two fixing elements 30"', 40"', as will be better explained below.

[0090] The actuation means of the fixing device 2"' comprise two actuators 90, 91 which project from the inner wall 18"' in a diametrically opposite position and which are intended to interact with the first and second fixing elements 30"', 40"' in order to move them between the rest configuration W and the operational configuration.

[0091] Each actuator 90, 91 comprises a body which is fixed at a particular first end thereof and an actuation

tab 90a, 91a so as to be movable along a radial actuation axis which is transverse relative to the movement axis in order to open/close the seat 51"', as will be better explained below, and projecting therefrom towards the inner side of the body 12"' so that the free end thereof is inside the body 12"'.

[0092] The body of each actuator 90, 91 has a practically trapezoidal form in such a manner that the spatial requirement thereof increases towards the first end, that is to say, towards the lateral wall 18.

[0093] Each actuator 90, 91 is further provided, at the particular free end thereof opposite the first end, with two opposite thrust portions 90', 91' which are intended to interact with the thrust end members 38, 48 of the threaded portions 32"', 42"' in order to move the first and the second fixing element 30"', 40"'.

[0094] The thrust portions 90', 91' and the thrust end members 38, 48 are arranged along a radial axis and are formed so that the spatial requirement of the thrust surfaces are formed so that the spatial requirement of the actuators 90, 91 and of the threaded portions 32"', 42"' decreases in the direction away from the inner wall 18, respectively.

[0095] Advantageously, the thrust portions 90', 91' and the thrust end members 38, 48 are arranged along inclined axes with respect to the movement axis Y in such a manner as to facilitate the mutual sliding thereof during the movement for the first and second fixing element 30"', 40"', as will be better explained below.

[0096] The actuation tabs 90a, 91a act as actuation elements for the first and second fixing elements 30"', 40"'; in fact by acting thereon, there is brought about a movement of the actuators in the radial direction so as to vary the radial spatial requirement and to cause a movement of the first and second fixing elements 30"', 40"', as will be better explained below.

[0097] In a version which is not shown, there may be provided a different number of fixing elements and/or actuators.

[0098] There may further be provided a single actuator which can be moved to move the fixing elements.

[0099] The reinforcement element 70"' is intended to constitute a slidable support base for the fixing elements 30"', 40"' and for the actuators 90, 91 so as to make the fixing device 2"' more stable.

[0100] The fixing elements 30"', 40"' and the actuators 90, 91 are provided at the face directed during use towards the reinforcement element 70"' with an undercut 37"', 47"', 90b, 91b, which is intended to slide on the reinforcement element 70 during movement between the rest configuration W and the operational configuration, and vice versa.

[0101] In that manner, it is possible to guide the movement of the first fixing element 30"' and the second fixing element 40"' between the rest configuration W and the operational configuration, and vice versa, making the actuation of the fixing device 2"' more precise and simple. Furthermore, there are prevented undesirable movements of the first fixing element 30"' and/or second fixing element 40"' along the longitudinal axis X and undesirable openings of the seat 51" and therefore undesirable disconnections between the fixing element 2" and the spacer element 1. Furthermore, the service-life of the fixing element 2" and the dimensional stability thereof are increased.

[0102] In the versions shown, the threaded portions and the portions of the first and second fixing elements have substantially the same angular extent but, in other versions, the angular extent of the threaded portions may be different.

[0103] There may further be provided a number of fixing elements other than two, for example, 3 or 4, which can be mutually moved in order to open/close the seat in order to connect/disconnect the fixing element and the spacer element 1 and, in the version of Figures 12 to 14, also a corresponding number of actuators. Where applicable, only one or some of the fixing elements can be moved in order to open/close the seat in order to connect/disconnect the fixing device to/from the spacer element 1.

[0104] In a version not shown, the fixing device comprises a fixed fixing element and a movable fixing element which can be moved with respect to the fixed fixing element in order to open/close the seat.

[0105] In other versions not shown, there can further be provided actuation elements different from the tabs, for example, buttons, or the like, which are capable of moving the at least one movable fixing element which is provided to open/close the seat 51, 51'.

[0106] During operation, an operator prepares and spreads the adhesive 80 on the block, positions the first covering element 3 on the adhesive 80 and subsequently arranges the base 5 of a spacer element 1 so that it is interposed between the adhesive 80 and the rear surface 3b of the first covering element 3, that is to say that the rear surface 3b of the first covering element 3 is supported at least partially on the base 5 and that the free edge 3c of the first covering element 3 abuts a surface S1 of the plate 7.

[0107] Subsequently, the operator positions the second covering element 4 in such a manner that a portion of the rear surface 4b thereof is in abutment with the base 5 and that a free edge 4c thereof facing the free edge 3c of the first covering element 3 is in abutment with the surface S2 of the plate 7 opposite the surface S1 at which the free edge 3c of the first covering element 3 is in abutment.

[0108] In that manner, the plate 7 is interposed between the two adjacent covering elements 3, 4 and there is defined between them a spacing or joint which substantially corresponds to the thickness "d" of the plate 7.

[0109] Subsequently, the operator grips the fixing device 2 and acts on the actuation means 35, 45 in order to open the seat 51 or 51', that is to say, increasing the dimension thereof, in order to readily insert the threaded pin 8 in the seat 51.

[0110] In the version shown, the operator applies pressure to the tabs 34, 44 so as to move them from the rest configuration W into the operational configuration in order to open the seat 51.

[0111] By pressure being applied to the tabs 34, 44, the user brings about a movement of the fixing elements 30, 40 so as to move the first and second threaded portions 32, 42 away from each other with the seat 51 consequently being opened.

[0112] With the tabs 34, 44 being maintained in an operational configuration, that is to say, by the seat 51 being kept open, the operator introduces the fixing device 2 into the spacer element 1 by inserting the threaded pin 8 into the seat 51. With the tabs 34, 44 in an operational configuration, the seat 51 defined between the first and second threaded portion 32, 42 has dimensions greater than the threaded pin 8, which is received with play inside the seat 51.

[0113] Therefore, it is easier to insert the fixing device 2 into the spacer element 1. The operator inserts the fixing device 2 by moving the flange 20 into abutment against the visible surface 3a, 4a of the first and second covering element 3, 4, keeping the seat 51 open. Subsequently, the operator releases the actuation means 35, 45 in such a manner that they return to the rest configuration W, closing the seat 51.

[0114] In that position, the outer thread 9 of the threaded pin 8 is connected with form-fitting to the thread 50 of the seat 51 and the fixing device 2 and the spacer element 1 are connected in a stable manner.

[0115] At this point, the operator screws the fixing device 2 onto the threaded pin 8 so as to move the flange 20 towards the base 5 of the spacer element 1, thereby generating traction on the spacer element 1 which is progressively drawn inside the fixing element 2.

[0116] Since the covering elements 3, 4 are interposed between the base 5 of the spacer element 1 and the flange 20 of the fixing device 2, that traction generates a corresponding traction on the covering elements 3, 4 which are progressively clamped between the flange 20 and the base 5.

[0117] Since the flange 20 abuts the visible surface of both the covering elements 3, 4 to be positioned, the elements are levelled, that is to say, positioned so that the respective visible surfaces 3a, 4a are coplanar.

[0118] The positioning system 100 is maintained in that clamping position for sufficient time to bring about the setting of the adhesive 80, after which the operator can grip the fixing device 2 and, by acting on the actuation means 35, 45, open the seat 51.

[0119] At this point, the operator can, by keeping the seat 51 open, readily withdraw the fixing device 2 from the spacer element 1 so as to disconnect them.

[0120] After separating the fixing device 2 and the spacer element 1, the operator can break the spacer element 1 at the intended breaking line 10 and withdraw the shaft 8.

[0121] The positioning system of the invention allows an increase in the speed of the positioning operations, reducing the time necessary for connecting/disconnecting the fixing device 2 and spacer element 1.

[0122] In order to disconnect the fixing device 2 and the spacer element 1, it is simply necessary to act on the actuation means 35, 45 so as to open the seat 51 by disconnecting the outer thread 9 and the thread 50 and to withdraw the fixing device 2 from the spacer element 1. With the system of the invention, it is no longer necessary to unscrew the fixing device 2 until the threaded pin 8 extends out of the threaded seat 51.

[0123] Furthermore, by acting on the actuation means 35, 45 so as to open the seat 51, the insertion of the threaded pin 8 into the seat 51 is easier and the connection between the fixing device 2 and the spacer element 1 is simplified.

[0124] By the seat 51 being kept open, it is possible to introduce the fixing device 2 until the flange 20 moves into abutment with the visible surface 3a, 4a of the covering elements and, only subsequently, to release the actuation means 35, 45 in order to close the seat 51 so as to connect the outer thread 9 and the thread 50 and to screw the fixing device 1 onto the threaded pin 8 in order to bring about the clamping of the covering elements.

[0125] This involves a substantial acceleration of the positioning procedure of floorings or walls.

[0126] This allows an improvement of the stability of the connection between the spacer element 1 and the fixing device 2 and therefore of the positioning system 100 of the invention.

[0127] Furthermore, since the rest configuration W of the actuation elements corresponds to the closure of the seat 51, it is necessary for the operator to intervene to open the seat, and therefore the security of the system of the invention is increased, preventing accidental disconnection of the fixing device 2 and the spacer element 1.

[0128] The operation and the use of the fixing device 2' is substantially similar to that described above, in addition the guide elements allow guiding of the movement of the first and/or second fixing element 30', 40' during the movement from the rest configuration W to the operational configurations, and vice versa.

[0129] The presence of the guide elements 60' allows the operation of the fixing device 2' of the invention to be made more precise and the operation, that is to say, the opening/closure of the seat 51, to be kept precise over time. The protrusions allow the fixing device 2' to be made dimensionally more stable with respect to the known devices.

[0130] Furthermore, it is possible to provide in the device of the invention threaded portions also having a substantial longitudinal extent without consequently increasing the positioning times of the flooring.

[0131] This allows an improvement in the connection between the fixing device and the spacer and therefore the stability of the system of the invention.

[0132] The operation and the use of the fixing device 2" is substantially similar to that described above, in addition the guide elements allow guiding of the movement of the first and/or second fixing element 30', 40' during the movement from the rest configuration W to the operational configurations, and vice versa, and furthermore the reinforcement element 70 allows the operation of the device to be made more stable and the operation thereof to be improved.

[0133] Furthermore, by the fixing element 2' being fitted on a spacer element, the reinforcement element 70' can act as an additional travel stop element, abutting the upper wall of the plate 7, that is to say, the wall directed towards the threaded shaft.

[0134] During use of the version of the fixing device 2"' shown in Figures 12 to 14, the operator grips the fixing device 2"' and acts on the actuation tabs 90a, 91a so as to move the actuators 90, 91 in a radial direction towards the seat 51"'.

[0135] Following that movement, the thrust portions 90', 91' of the actuators are urged against the thrust end members 38, 48 of the fixing elements 30"', 40"'.

[0136] Since the thrust portions 90', 91' are radial, the spatial requirement of the actuators 90, 91 increases in the direction towards the inner wall 18. By the actuators 90, 91 being moved progressively, there is brought about a variation of the spatial requirement and a corresponding movement of the fixing elements 30"', 40"' in a radial direction.

[0137] By the actuators 90, 91 being moved towards the seat 51"', the thrust portions 90', 91' apply a force against the thrust end members 38, 48 so as to urge the fixing elements 30"', 40"' away from the seat 51"', that is to say, so as to open the seat 51"' itself.

[0138] By the actuation tabs 90a, 91a being maintained in an operational configuration, that is to say, by the seat 51 being kept open, the operator introduces the fixing device 2 onto the spacer element 1 by inserting the threaded pin 8 into the seat 51.

[0139] In that version, the presence of the guide elements and the reinforcement element also allows an improvement of the stability and the operation of the device.

Claims

1. Positioning system (100) for covering elements (3, 4), comprising

   - a spacer element (1) intended to be inserted between at least two adjacent covering elements (3, 4) and comprising a base (5) intended to be made to bear on a fixing adhesive for said covering elements and to receive in support a portion of a rear surface (3b, 4b) of said at least two adjacent covering elements (3, 4), a threaded shaft (8) extending transversely to said base (5), and a plate (7) interposed between said e threaded shaft (8) and said base (5) and intended to be interposed, in use, between facing edges (3c, 4c) of said at least two covering elements (3, 4),
   - a fixing device (2; 2') comprising a body (12; 12') provided internally with a thread (50; 50') shaped to define a seat (51; 51') for said threaded shaft (8) so as to couple said fixing device (2; 2') to said spacer element (1),
   - and a base (16a, 16; 16'a, 16') intended to be made to bear, in use, on a visible surface (3a, 4a) of said at least two covering elements (3, 4) to be laid, **characterized in that** said thread (50) is defined by at least two separate threaded portions (32, 42; 32', 42'), at least one of said threaded portions (32, 42; 32', 42') being movable along a movement axis (Y, Y1) relative to the other in order to vary the extent of said seat (51; 51'), said fixing device (2; 2') comprising actuation means (34, 35, 44, 45) for moving said at least one threaded portion (32, 42; 32', 42') to open/close said seat (51; 51'), in order to couple/uncouple said fixing device (2; 2') and said spacer element (1).

2. System according to claim 1, wherein said actuation means comprise a tab (34, 44) formed on a lateral surface (14) of said body (12) and pivotable about said movement axis (Y, Y1) to open/close said seat (51; 51').

3. System according to claim 1 or 2, wherein said two separate threaded portions (32, 42; 32', 42') are movable along respective movement axes (Y, Y1) placed parallel with one another, in order to open/close said seat (51).

4. System according to any one of the preceding claims, wherein said fixing device (2; 2') comprises a first and a second fixing element (30, 40; 30', 40') which are intended to cooperate to form said seat (51; 51') and are movable to open/close said seat (51; 51'), and comprising an arm (31, 41; 31', 41') fixed at a first end thereof to an inner wall (18) of said fixing device (2; 2'), said threaded portion (32, 42; 32', 42') being provided at the end of said arm opposite said first end.

5. System according to any one of the preceding claims, wherein said fixing device (2') comprises guide elements (60') intended to interact with said first and/or second fixing element (30', 40') to guide the movement thereof for opening/closing said seat (51; 51').

6. System according to the preceding claim, wherein said guide elements (60') comprise a plurality of protrusions (60') extending from said inner wall (18) of

said fixing element (2').

7. System according to the preceding claim, wherein said plurality of protrusions (60') comprises a first plurality of protrusions (60a') intended to interact with said arm (31', 41') of said first (30') and/or said second fixing element (40') and a second plurality of protrusions (60b') intended to interact with said threaded portion (32', 42') of said first (30') and/or said second (40') fixing element.

8. System according to any one of the preceding claims, wherein said body (12; 12') has a frustoconical shape enclosed by a lateral surface (14; 14') delimited by a first edge (15) and a second edge (16), said edges (15, 16) being provided at opposite sides with respect to a longitudinal axis (X) of said body (12; 12') and delimiting, respectively, a first base opening (15a) and a second base opening (16a) having a greater extent than said first base opening (15a).

9. System according to the preceding claim, further comprising a flange (20) projecting from said second base opening (16a) in a radial direction and intended to constitute the bearing portion of said fixing device (2) on said visible surface (3a, 4a) of said covering elements (3, 4).

10. System according to any one of the preceding claims, further comprising a plurality of ribs (17) projecting from a lateral surface (14) of said body (12) in a direction transverse to said body, and intended to facilitate the gripping and handling of said fixing device (2), wherein said actuating elements (34, 35, 44, 45) are each provided on said body (12) between two adjacent ribs.

11. System according to any one of the preceding claims, wherein said actuation means comprise an actuator (90, 91) which can be moved in a radial direction and which is intended to interact with said at least one threaded portion (32, 42; 32', 42') in order to open/close said seat (51"') and an actuation element for actuating said actuator (90, 91).

12. A system according to the preceding claim, wherein the actuation element comprises an actuation tab (90a, 91a) which is formed on a lateral surface (14) of said body (12) and which can be pivoted about an actuation axis transverse to said movement axis (Y, Y1) in order to open/close said seat (51; 51').

13. System according to any one of the preceding claims, and further comprising a reinforcement element (70, 70"') which is provided internally with respect to said body (12", 12"') in a longitudinally intermediate position between said first edge (15"') and said second edge (16"') and which is provided in order to constitute a slidable support base for said at least one threaded portion (32, 42; 32', 42').

14. System according to the preceding claim, wherein said reinforcement element (70, 70"') is provided with a hole (71) which is coaxial with respect to said seat (51) and which has an aperture (L) greater than the aperture (L') defined by said seat (51) in a closure configuration thereof.

15. System according to the preceding claim, wherein said at least one threaded portion (32, 42; 32', 42') is provided in the face directed during use towards said reinforcement element (70) with an undercut (37", 47") which is intended to slide on said reinforcement element (70) during the movement between said rest configuration (W) and said operational configuration, and vice versa.

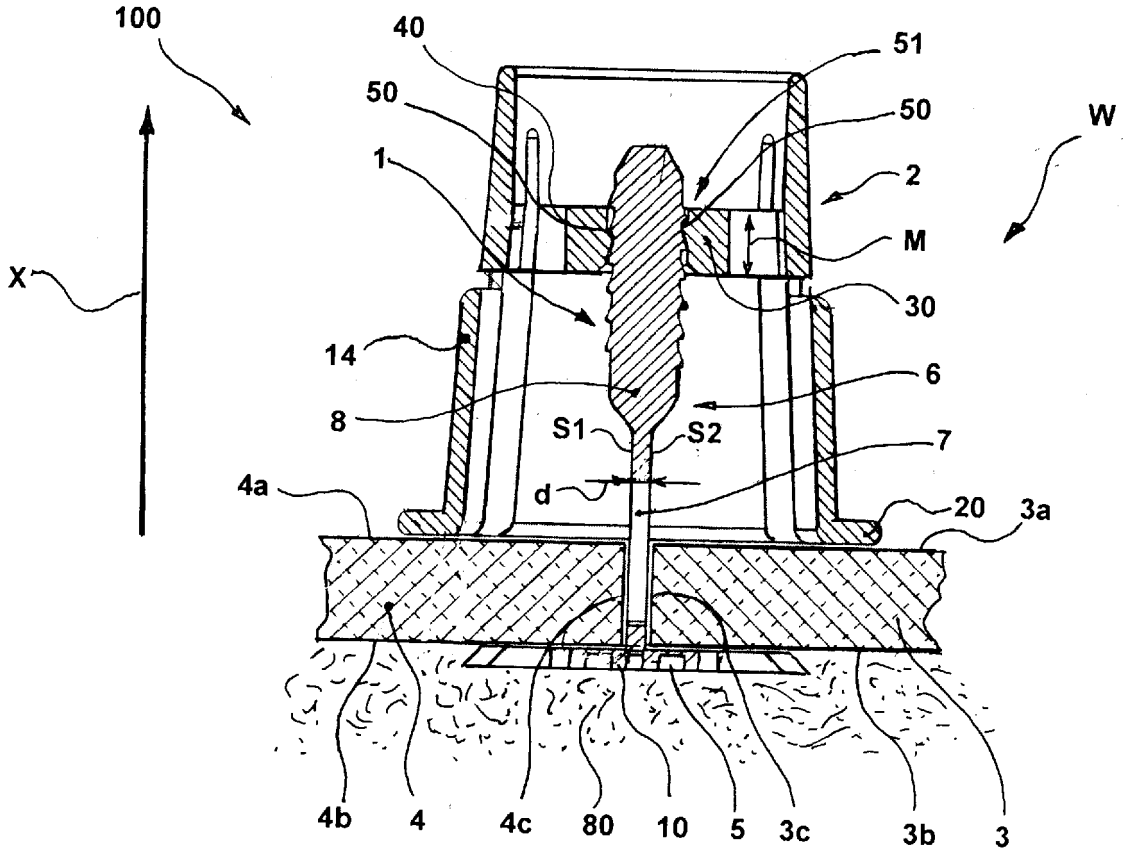
100
X
40
50
1
51
50
W
2
M
30
14
6
8
S1
S2
7
d
4a
20
3a
4b
4
4c
80
10
5
3c
3b
3

FIG.1

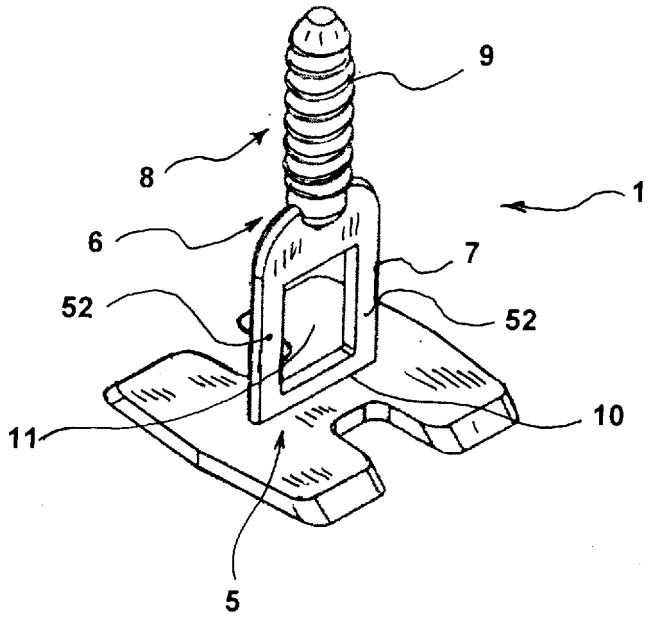
9
8
1
6
7
52
52
10
11
5

FIG.2

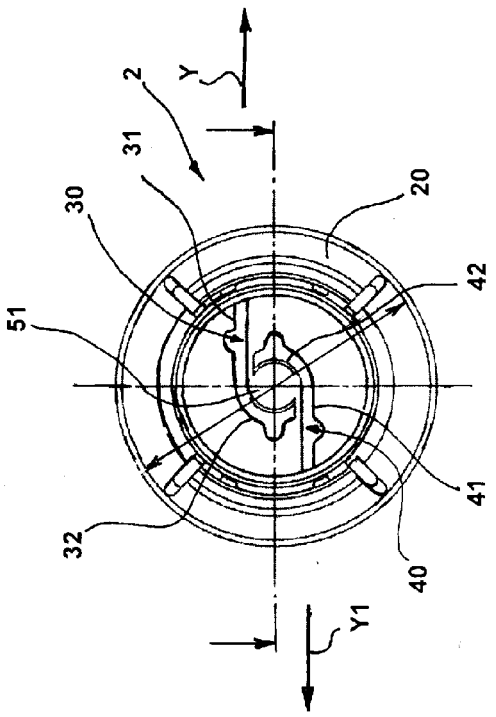

FIG.4

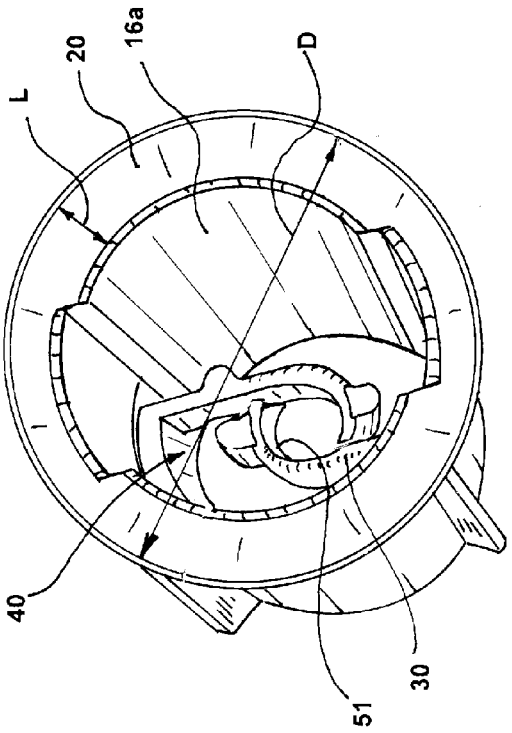

FIG.6

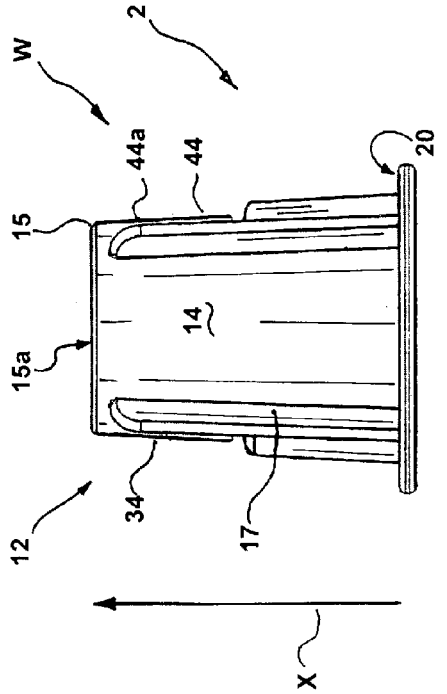

FIG.3

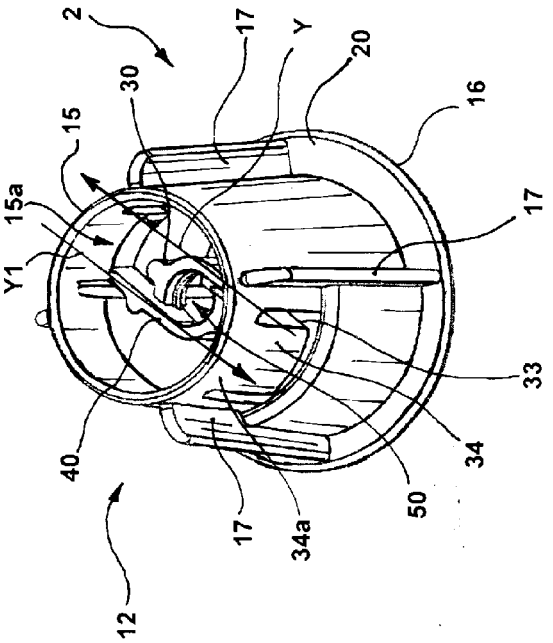

FIG.5

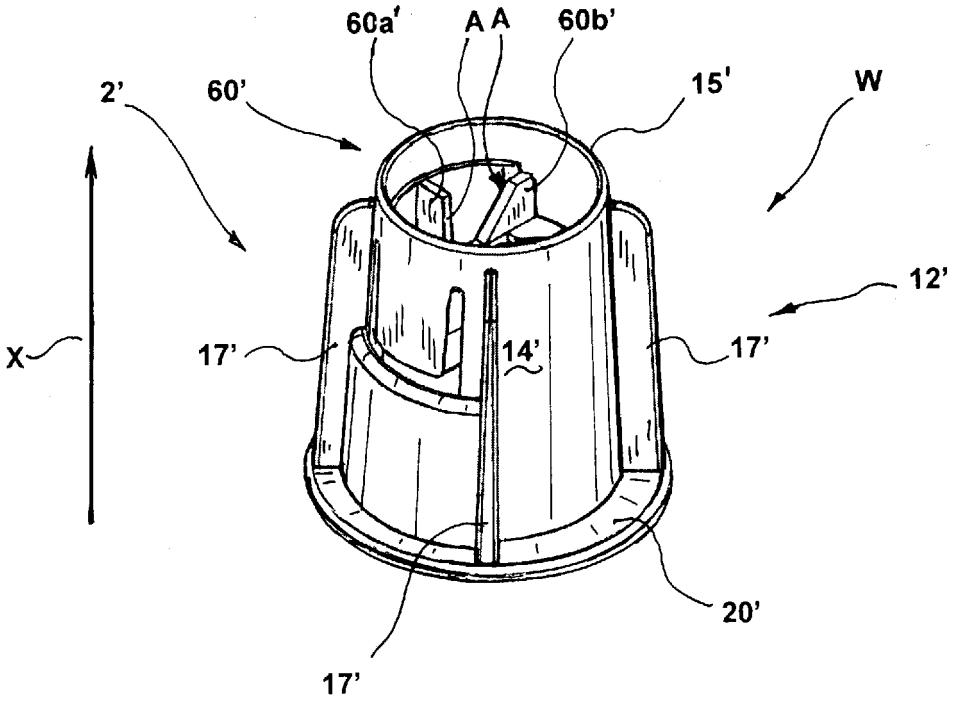
60a'
A A
60b'
2'
60'
15'
W
12'
X
17'
14'
17'
20'
17'

FIG.7

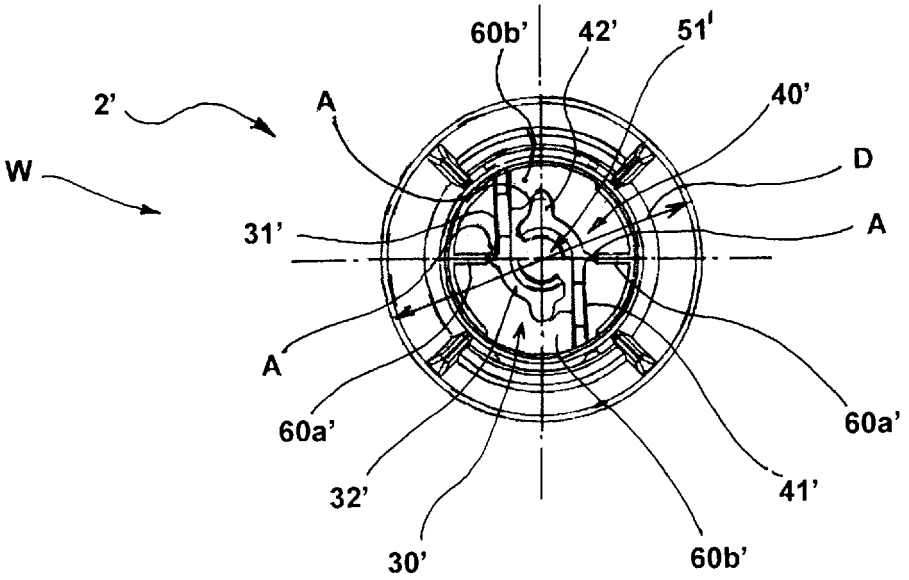
60b'
42'
51'
2'
A
40'
W
D
31'
A
A
60a'
60a'
32'
41'
30'
60b'

FIG.8

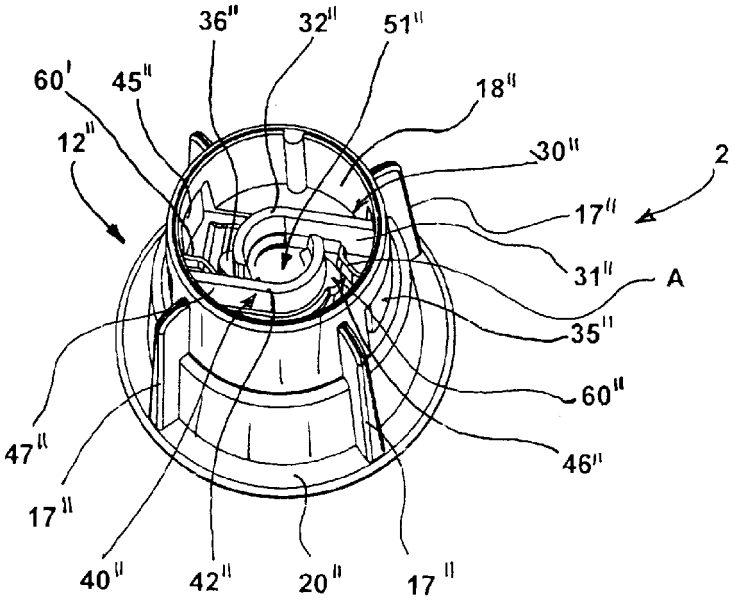

FIG.9

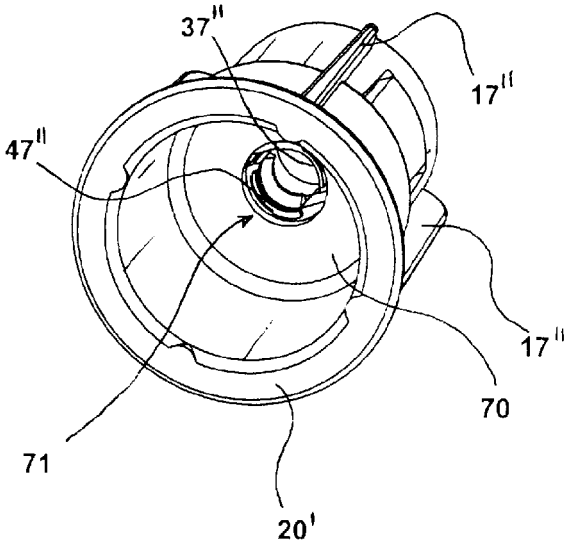

FIG.10

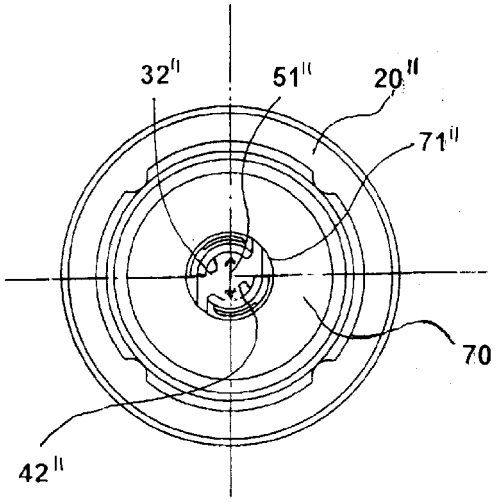

FIG.11

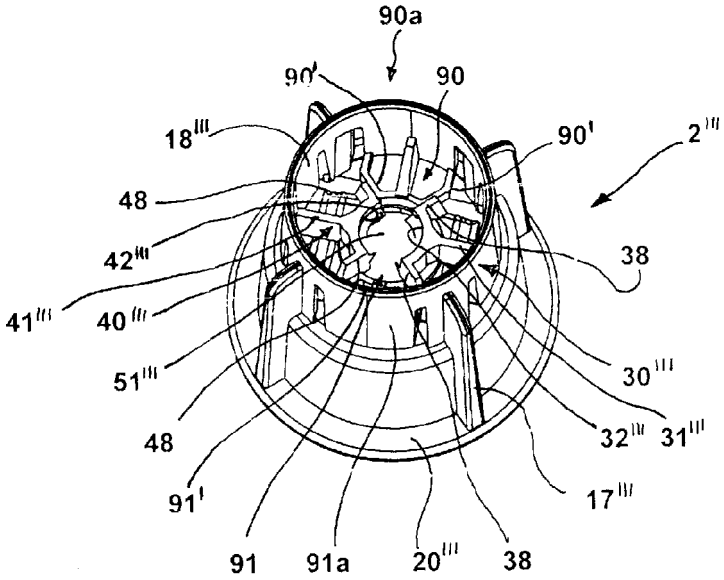

FIG.12

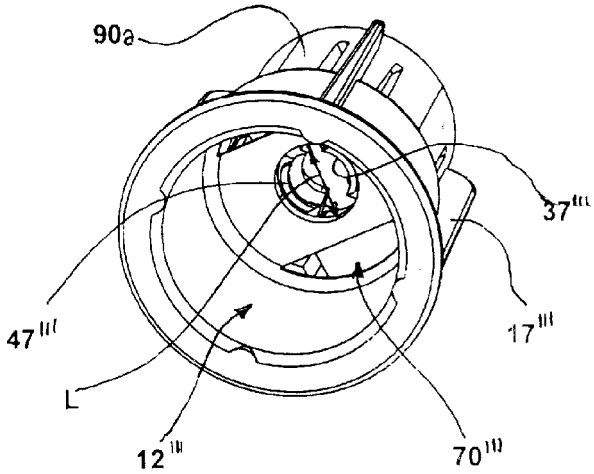

FIG.13

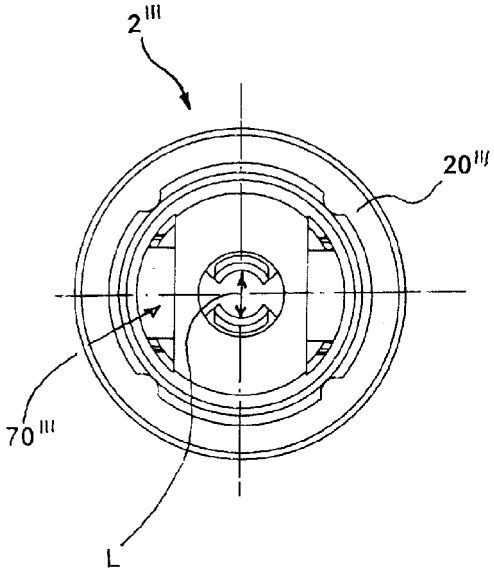

FIG.14

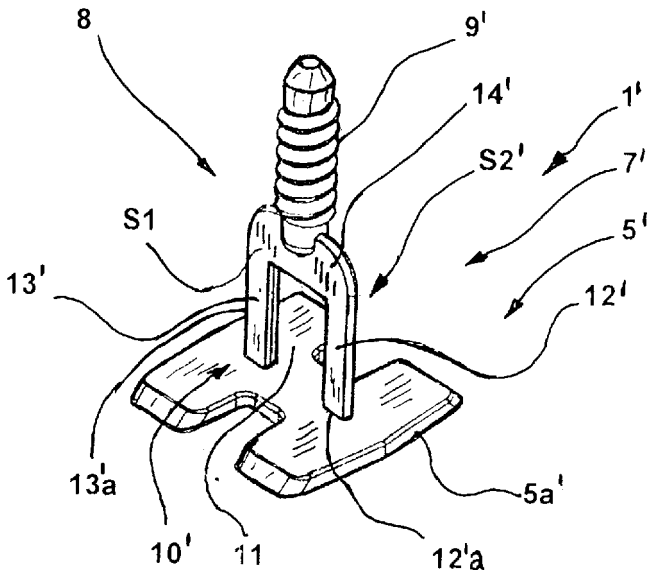

FIG.2A

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EUROPEAN SEARCH REPORT

Application Number
EP 18 17 6127

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	23 October 2018	Arsac England, Sally

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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L : document cited for other reasons

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