(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 604 707 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
03.06.2020 Bulletin 2020/23

(51) Int Cl.:
E04F 21/00 *(2006.01)* ***E04F 15/02*** *(2006.01)*

(21) Application number: **19187400.7**

(22) Date of filing: **19.07.2019**

(54) A DEVICE FOR LEVELLING AND SPACING ELEMENTS OF A FLOORING

VORRICHTUNG ZUM NIVELLIEREN UND ABSTANDSELEMENTE EINES BODENBELAGS

DISPOSITIF DE MISE À NIVEAU ET D'ÉSPACEMENT DES ÉLÉMENTS D'UN REVÊTEMENT DE SOL

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **02.08.2018 IT 201800007770**

(43) Date of publication of application:
05.02.2020 Bulletin 2020/06

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(56) References cited:
EP-A1- 2 966 239
CN-U- 203 394 001
US-A1- 2013 067 854
US-B1- 8 429 879

EP 3 604 707 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention has as its subject-matter a device for spacing and levelling flooring elements, for laying said flooring elements, which allows simplifying the carrying out of the manufacturing steps aimed to obtain a perfect planarity of the flooring surface and a perfect spacing between the same elements.

[0002] As it is known, floors obtained by a plurality of flooring elements, such as tiles, briquettes, plates or the like are widespread. One of the needs in such floors it to obtain a perfect planarity and spacing between such elements.

[0003] To this aim, a plurality of flooring elements is located on an adhesive so as to take, during the setting of such adhesive, an operative position which will therefore coincide with the final one. Therefore, such operative position has to be a position such that the flooring elements are as much levelled as possible, and as properly spaced apart one from the other as possible to achieve the objects set forth above in terms of planarity and spacing between the same flooring elements.

[0004] Furthermore, during this setting, such operative position has to be maintained with same stability in order to avoid that the flooring elements move one with respect to the other, jeopardizing the obtainment of the above-mentioned objects. There are devices that allow blocking such plurality of flooring elements in their operative position during the setting of the adhesive. Such devices can be referred to as devices for levelling and spacing flooring elements.

[0005] The levelling and spacing device comprises a base that defines a resting surface adapted to receive in support a plurality of respective portions belonging to the above-mentioned flooring elements, respectively.

[0006] The device comprises a spacing structure which is adapted to keep the flooring elements spaced apart, once the latter are rested with the above-mentioned respective portions on the above-mentioned resting surface.

[0007] The device comprises a stem standing up from the base and is configured to allow an operator to obtain an operative condition of a handle. When the handle takes such operative condition, while the flooring elements take the above-mentioned operative position, the same handle presses on the flooring elements in contrast to the above-mentioned resting surface, so as to keep the flooring elements of blocked in the above-mentioned operative position.

[0008] The device allows an operator to remove the stem after the adhesive has sufficiently set. To this aim, the stem comprises an impact body that may receive a hit to cause the separation, by breaking the stem from the base.

[0009] A problem of the currently known types of such device is the difficulty in making so that such breaking is sufficiently precise to avoid that material residues remain projecting from the base.

[0010] EP2966239 discloses a spacer element for a positioning system for covering elements comprises a base intended to be made to bear on a fixing adhesive for the covering elements and to receive and support a portion of a rear surface of two adjacent covering elements, a plate extending transversely and an intended breaking line being formed between the plate and the base; the base having recesses that makes it possible to facilitate and improve the breakage of the spacer element at the intended breaking area.

[0011] US2013067854 discloses a leveling spacer for laying wall tiles, paving tiles and the like with the interposition of gaps, which comprises a base with spacing protrusions for the abutment of the edges of corresponding tiles so as to define the width of the gaps, a threaded stem, which is fixed at right angles to the base in at least one easily breakable point, a knob for clamping and removing the threaded stem, which comprises a female threaded portion adapted to be screwed to the threaded stem.

[0012] The present finding aims to propose a solution that is new and alternative to the heretofore known solutions, and in particular it is proposed to obviate one or more of the drawbacks or problems set forth above and/or to meet one or more needs set forth above, and/or anyhow felt in the art, and in particular inferred from what has been set forth above.

[0013] A levelling, spacing device of flooring elements having the characteristics of the attached claim 1 allows carrying out the laying process of such flooring elements without the risk of a presence, at the end of such process, of undesired material residues projecting between the above-mentioned flooring elements.

[0014] The present finding also relates to a levelling, spacing system of flooring elements comprising a device for levelling and spacing flooring elements in accordance with the pre-finding, and a handle.

[0015] This and other inventive aspects are anyhow set forth in the attached claims, the technical characteristics of which can be found, together with corresponding advantages achieved, in the following detailed description, illustrating merely exemplary, non-limiting embodiments of the finding, and which is given with reference to the attached drawings, in which:

- Figs. 1a, 1b, and 1c are a perspective, top and longitudinal sectional views, respectively, of a first possible implementation of a levelling, spacing device in accordance with the present description;
- Figs. 2a, 2b, and 2c are a perspective, top and longitudinal sectional views, respectively, of a second possible implementation of a levelling, spacing device in accordance with the present description;
- Figs. 3a, 3b, and 3c are a perspective, top and longitudinal sectional views, respectively, of a third possible implementation of a levelling, spacing device in accordance with the present description;
- Figs. 4a, 4b and 4c are views referring to a first mo-

ment of a laying process of a plurality of flooring elements by such second implementation, in which such second implementation is visible in a perspective, top and side views, respectively;

- Fig. 5 is a perspective view referring to a second moment of such process;
- Fig. 6 is a perspective view referring to a third moment of such process;
- Fig. 7 is a perspective view only of a part of such second implementation, in such third moment;
- Fig. 8 is a longitudinal sectional view of the part of Fig. 7 in such third moment;
- Figs. 9, 10 and 11 are in longitudinal sectional views of a fourth implementation of the levelling device, of a fifth implementation of the levelling device, and of a sixth implementation of the levelling device, respectively;
- Figs. 12A and 12B are enlarged details of Figs. 1c and 3c.

[0016] In Figs. 1a-1c, a first possible implementation of a device in accordance with the present description is shown. Such first implementation is indicated by 1. In Figs. 2a-2c, a second possible implementation of a device in accordance with the present description is shown. Such second implementation is indicated by 1'. In Figs. 3a-3c, a third possible implementation of a device in accordance with the present description is shown. Such third implementation is indicated by 1".

[0017] The device is configured to level and concomitantly space elements of a flooring during the laying of such flooring elements. Such flooring elements can be briquettes or tiles or plates or the like.

[0018] The device comprises a base. The base of the first implementation, the base of the second implementation and the base of the third implementation are indicated by 2, 2' and 2", respectively.

[0019] The base defines a resting surface S. The resting surface of the first implementation, the resting surface of the second implementation, and the resting surface of the third implementation are indicated by S, S' and S", respectively.

[0020] The resting surface S comprises a plurality of surface portions.

[0021] In Fig. 1b such plurality of surface portions is intended as comprising, by way of example and due to reasons which will be more clearly understood herein below, two surface portions, indicated respectively by S1 and S2. In Fig. 2b such plurality of surface portions is intended as comprising, by way of example and due to reasons which will be more clearly understood herein below, four surface portions, indicated respectively by S1', S2', S3' and S4'. In Fig. 3b such plurality of surface portions is intended as comprising, by way of example and due to reasons which will be more clearly understood herein below, three surface portions, indicated respectively by S1", S2", and S3". Such surface portions are suitable to receive in support respective portions of said elements, so that said elements can take an operative position. Such operative position of the plurality of flooring elements corresponds to the support of the respective portion of each of said elements on a respective surface portion of said surface portions.

[0022] Figs. 4a, 4b, 4c, 5-8, refer to an example of a laying process of such elements by the second implementation 1' of the device in accordance with the present description. In such example of process, the plurality of flooring elements comprises a first flooring element E1, a second flooring element E2, a third flooring element E3, and a fourth flooring element E4.

[0023] In Figs. 4a, 4b, 4c, 5, and 6, the flooring elements E1-E4 take the above-mentioned operative position. In such operative position, a portion e1 of the first element E1 rests on the first surface portion S1', a portion e2 of the second element E2 rests on the second surface portion S2', a portion e3 of the third element E3 rests on the third surface portion S3', and a portion e4 of the fourth element E4 rests on the fourth surface portion S4'. In Fig. 4b, although a peripheral outermost part of the resting surface S' is visible, the same peripheral portion is not indicated for the sake of clarity of Fig. 4b.

[0024] The base 2 comprises a bottom portion 22. The bottom portion of the first implementation, the bottom portion of the second implementation and the bottom portion of the third implementation are indicated by 22, 22' and 22", respectively. The bottom portion has an upper outer surface. Such upper outer surface corresponds to said resting surface.

[0025] The upper outer surface of the bottom portion, as regards the first implementation, the second implementation and the third implementation, are indicated by 221, 221' and 221", respectively.

[0026] The bottom portion of the base has a lower outer surface. Such lower outer surface is located and facing opposite said base with respect to said upper surface.

[0027] The lower outer surface of the base, as regards the first implementation, the second implementation and the third implementation, is indicated by 222, 222' and 222" respectively.

[0028] The device comprises a stem 3. The stem 3 takes a securing or connecting condition to the base 2. The stem 3 is configured to define an operative condition of a handle. An example of such handle is indicated by 4 in Fig. 5. The device is configured so that, while the plurality of elements takes said operative position and the handle 4 takes such operative condition, the handle 4 presses on the respective portions of the elements, in contrast to the respective surface portions of said resting surface S, so as to block the elements in the operative position. The base 2 comprises a weakened portion. The weakened portion of the first implementation, the weakened portion of the second implementation and the weakened portion of the third implementation are indicated by 21, 21' and 21" respectively. As regards the second implementation 1', the weakened portion 21' is visible as enlarged in Fig. 8.

[0029] Such weakened portion can be considered as a weakening or a weight reduction.

[0030] In Fig. 5, the handle 4 takes the operative condition and presses the portion e1 of the first element E1 on the first surface portion S1' of the resting surface S', the portion e2 of the second element E2 on the second surface portion S2' of the resting surface S', the portion e3 of the third element E3 on the third surface portion S3' of the resting surface S', and the portion e4 of the fourth flooring element E4 on the fourth surface portion S4' of the resting surface S'. In Fig. 5, the portions of the resting surface are not visible.

[0031] The stem 3 comprises a connecting portion or body 31. The connecting portion is adapted to cooperate with said handle 4 to define a connecting condition of such handle 4 to the stem 3. Such operative condition of the handle 4 corresponds to such connecting condition of the handle 4 to the stem 3, this meaning that such operative condition 4 coincides with and/or occurs by said connecting condition of the handle 4 to the stem 3.

[0032] The device 1 extends along a connecting axis X arranged transversally to said resting surface S. In the implementations shown, the connecting axis X is orthogonal to the resting surface S.

[0033] The connecting portion 31, in the implementations shown, extends along an extension axis thereof coincident with such connecting axis X. Such connecting condition is able to be obtained by at least one movement of said handle 4 on and with respect to said connecting portion 31. Such movement comprises at least one translational component along said connecting axis X.

[0034] In the implementations shown, the connecting portion 31 is threaded so that such movement is a screwing movement of such handle 4 on such connecting portion 31. Therefore, in the implementations shown, such movement also comprises, concomitantly with such translational component, a rotational component about such connecting axis X.

[0035] In Fig. 5 the handle 4 takes such connecting condition to the stem 3.

[0036] The stem 3 comprises an impact body 32. The impact body 32 is adapted to be hit by a user to cause, by breaking, the passage of said stem 3 from said securing or connecting condition to the base 2, to a separation condition with respect to said base 2. Such securing condition of the stem 3 to the base 2 corresponds to a securing condition of the impact body 32 to the weakening. However, such hit could be applied also to the connecting portion 31.

[0037] In Fig. 6 the stem is not shown since, in the situation of Fig. 6, the stem 3 has been separated from the base 2' by the above-mentioned breaking. In Fig. 6, as regards the device, only the base 2', which is not very visible, is indicated. In Figs. 7 and 8 only the base 2', in the situation where the base 2 is in Fig. 6 is shown, and therefore after the stem has been separated from the base 2.

[0038] The device 1 or 1' or 1" is configured to keep such flooring elements spaced apart from one another, while they take such operative position.

[0039] The device comprises a spacing structure secured on the resting surface so as to define the above-mentioned plurality of surface portions of the resting surface. By such spacing structure the flooring elements are kept spaced apart, while they take said operative position, by the interposition of said spacing structure. The spacing structure of the first implementation is indicated by 5 in Fig. 1a and in Fig. 1c. The spacing structure of the second implementation 1' is indicated by 5' in Fig. 2a and in Fig. 2c. The spacing structure of the third implementation 1" is indicated by 5" in Fig. 3a and in Fig. 3c.

[0040] The spacing structure 5 is virtually secured on such resting surface, so as to project and/or stand up with respect to the same resting surface, along a direction parallel to the connecting axis X, so as to divide the same resting surface into the above-mentioned surface portions.

[0041] The spacing structure 5 of the first implementation 1 defines the two surface portions s1 and s2 indicated in Fig. 1 b, so that the above-mentioned plurality of surface portions can comprise such two surface portions s1 and s2.

[0042] The spacing structure 5' of the second implementation 1' defines the four surface portions s1', s2', s3', and s4' so that the above-mentioned plurality of surface portions can comprise such four surface portions s1', s2', s3' and s4'.

[0043] The spacing structure 5" of the third implementation 1" defines the three surface portions s1", s2", and s3", of Fig. 3b, so that the above-mentioned plurality of surface portions can comprise such three surface portions s1", s2", and s3".

[0044] As regards the second implementation 1' and the third implementation 1", the spacing structure 5' or 5" is part of the base 2' or 2", which therefore comprises such spacing structure 5' or 5". As regards the second implementation 1' and the third implementation 1", the securing condition of the stem 3 to the base 2' or 2" corresponds to a securing condition of the stem 3 to the spacing structure 5' or 5". In this manner, the stem 3 extends along the connecting axis X starting from the spacing structure 5' or 5".

[0045] As regards the first implementation, the impact body 32 defines and/or comprises the same spacing structure 5. As regards the first implementation 1, the securing condition of the stem 3 to the base 2 30 corresponds to a securing condition of the stem 3 to the bottom portion 22 of the base 2. In this manner, the stem 3 extends along the connecting axis X starting from said bottom portion 22 of the base 2.

[0046] The securing condition of the stem to the base corresponds to a securing condition of the stem to the above-mentioned weakened portion of the base, so that such weakened portion guides such breaking and therefore the passage of the stem 3 from the securing condition to the base 2 to the separation condition from the base.

Preferably, the stem 3 is in a single piece with the base 2, before such breaking occurs, so that such securing condition is to be meant so that the stem 3 and the base 2 are in a single piece.

[0047] The weakened portion defines a narrowing of the resistant sectional area of the base, as it can be seen in Figs. 1c, 2c, 3c, and 8. Such narrowing is a reduction of the dimension along the connecting axis X of the above-mentioned resistant sectional area.

[0048] In this manner the weakened portion is configured to guide the above-mentioned breaking, when such breaking occurs by a flexure corresponding to a curvature of the connecting axis X. IN fact, the above-mentioned breaking occurs by a hit on the impact body, which hit causes a flexural deformation of such connecting axis X, sufficient to determine and/or cause the above-mentioned breaking.

[0049] In particular the weakened portion is configured so that such breaking occurs by yielding of the material of the transition zone between the stem 3 and the base 2, so that, upon such breaking, and therefore upon the passage of the stem 3 from the securing condition to the separation condition with respect to the base 2, undesired residues or projections of material do not remain between the flooring elements, which would need to be later removed. By virtue of a breaking mode, a yielding of the material of such transition zone, the guide effect of the same breaking by the same weakened portion is much more precise, and such as to obtain a perfect planarity of the upper surface of the base 2, in the breaking zone, as it can be seen in Fig. 7.

[0050] The weakened portion 21 comprises a cavity 211. The cavity of the first implementation, the cavity of the second implementation and the cavity of the third implementation are indicated by 211, 211' and 211" respectively.

[0051] It can be considered as an extension of the device along the connecting axis X.

[0052] It can be considered as an extension of the bottom portion of the base along the connecting axis X. Such extension of the bottom portion of the base along such connecting axis X is to be intended as a sector, defined by the bottom portion, of the extension of the device along the connecting axis X. Such sector defined by the bottom portion can be intended as a first sector of the extension of the device along such connecting axis X. Such first sector is indicated by g1 only in Fig. 8. The cavity 211 or 211' or 211" passes through at least one part of such first sector, and therefore at least one part of the above-mentioned extension of the bottom portion 22 or 22' or 22" along the connecting axis X.

[0053] In the second implementation 1' and in the third implementation 1" of the device, the cavity 211' or 211" passes through the entire above-mentioned first sector, and therefore the entire above-mentioned extension of the bottom portion 22' or 22" the connecting axis X. This can be seen in particular in Figs. 2c and 8, as regards the second implementation 1', and in Fig. 3c, as regards the third implementation 1".

[0054] It can be considered as an extension of the spacing structure along such connecting axis X. Such extension of the spacing structure along such connecting axis is to be intended as the sector, defined by the spacing structure, of the extension of the device along the connecting axis X. Such sector defined by the spacing structure can be intended as a second sector of the extension of the device along such connecting axis X. Such second sector is indicated by g2 only in Fig. 8. In the second implementation 1' and in the third implementation 1" of the device, the cavity 211' or 211" passes through also a part of such second sector, and therefore also a part of the extension of said spacing structure 5' or 5" along said connecting axis X.

[0055] In this manner such said narrowing is also a narrowing of the resistant sectional area of said spacing structure 5' or 5". Such narrowing is a reduction of the dimension along the connecting axis X of the above-mentioned resistant sectional area of the spacing structure 5' or 5".

[0056] The cavity is obtained starting from the lower outer surface 222 222', or 222" of the bottom portion of the base. This simplifies the obtainment of the weakened portion 21 or 21' or 21".

[0057] As regards the second implementation and the third implementation, the spacing structure 5' or 5" comprises at least a first arm 51 and at least a second arm 52. Such first arm 51 and second arm 52 are oriented on said resting surface S' or S" transversally one to the other. The weakened portion 21' or 21" is located in an intersection zone between such first arm 51 and second arm 52.

[0058] The weakened portion 21' or 21" is located in an intersection zone at least between such first arm 51 and second arm 52.

[0059] In the third implementation 1", the spacing structure 5" comprises also a third arm 53. The third arm 53 is arranged with respect to the first arm 51 and to the second arm 52 so that such first arm 51, second arm 52 and third arm 53 define a T-shaped spacing structure 5', so as to divide the resting surface S" in the first surface portion S1", second surface portion S2", and third surface portion S3".

[0060] The weakened portion 21", in the third implementation 1", is located in an intersection zone between such first arm 51, second arm 52 and third arm 53.

[0061] In the second implementation 1', the spacing structure 5' comprises the above-mentioned third arm 54 and also a fourth arm 54. The fourth arm 54 is arranged with respect to the first arm 51, the second arm 52 and the third arm 53 so that such first arm 51, second arm 52, third arm 53 and fourth arm 54 define a cross-shaped spacing structure 5', so as to divide the resting surface 8" in the first surface portion S1', second surface portion S2', third surface portion S3' and fourth surface portion 84'.

[0062] The weakened portion 21', in the second imple-

mentation 1', is located in an intersection zone between such first arm 51, second arm 52, third arm 53, and fourth arm 54.

[0063] A process for laying a plurality of flooring elements E1-E4 comprises a first step in which the adhesive is laid. Such process comprises a step of setting up the device, and a step of reaching the operative position of the flooring elements E1-E4, so as to reach to the situation set forth in Figs. 4a, 4b and 4c.

[0064] Such process comprises a step of reaching the operative condition of the handle 4, so as to reach to the situation set forth in Fig. 5. Such process comprises a waiting step, during which one waits for the adhesive to set. Such process comprises a step of removing the handle 4, by which one returns to the situation virtually similar to the one in Figs. 4a, 4b, and 4c, unless the adhesive has set.

[0065] Lastly, the process comprises the application of a hit to the stem 3, and preferably to the impact body 32, so that such stem 3 separates from the base, so as to reach the situation set forth in Fig. 6.

[0066] In Figs. 7 and 8 only the base 2' of the second implementation 1' is shown, once the stem 3 has been separated from the base 2'.

[0067] In Fig. 7 all the four arms 51-54 of the spacing structure 5' are visible.

[0068] In the second implementation and in the third implementation 1", the base 2' or 2" can be intended as comprising the spacing structure 5' or 5".

[0069] In Fig. 8, the weakened portion 21' of the base 2 is visible, which weakened portion 21' comprises the cavity 211' and defines a narrowing, along the above-mentioned connecting axis, which is not indicated in Fig. 8, of the resistant sectional area of the base 2' and/or of the resistant sectional area of the spacing structure 5'.

[0070] Fig. 9 shows, in a longitudinal section, a fourth implementation of the levelling device. Such fourth implementation is indicated by 1A. Such fourth implementation differs from the first implementation shown in Figs. 1a, 1b, 1c, substantially only in a different shape of the impact body 32.

[0071] Fig. 10 shows, in a longitudinal section, a fifth implementation of the levelling device. Such fifth implementation is indicated by 1A'. Such fifth implementation differs from the second implementation shown in Figs. 2a, 2b, 2c, substantially only in a different shape of the impact body 32.

[0072] Fig. 11 shows, in a longitudinal section, a sixth implementation of the levelling device. Such sixth implementation is indicated by 1A". Such sixth implementation differs from the third implementation shown in Figs. 3a, 3b, 3c, substantially only in a different shape of the impact body 32.

[0073] In practice, as clearly understood from Fig. 12A, which is an enlarged detail of the implementation of Fig. 1c, and anyhow similarly also for the implementation illustrated in Fig. 9, and from Fig. 12B, which is an enlarged detail of the implementation of Fig. 2c, and anyhow similarly also for the implementations of Figs. 3c, 8, 10 and 11, a device 1, 1' for levelling and concomitantly spacing elements E1, E2, E3, E4 of a flooring such as tiles, briquettes, plates or the like, has therefore been arranged, in which said base 2; 2'; which comprises a weakened portion 21; 21', which weakened portion 21; 21' extends according to a respective longitudinal axis or direction L, in particular parallel to the impact body 32 of the device, and which is such as to have a maximum perpendicular thickness W at the central zone M and a minimum thickness at the opposite longitudinal ends E, E of the same weakened portion 21; 21'.

[0074] In other terms, as it can be understood from said Figs. 12A and 12B, advantageously, the present weakened portion is defined by a corresponding cavity 211; 211', which extends according to a respective longitudinal axis or direction L, and which, starting from the bottom face 222, 222' of the base 2, 2', has a minimum height, or depth, at the central zone M and a maximum height, or depth, at the opposite outermost longitudinal zones E, E.

[0075] In this manner, by virtue of this configuration of the weakened portion, when, due to the clamping action imparted by said handle 4, to obtain the levelling of the corresponding tiles, and thus on said base 2, 2', by the same stem 3, a corresponding traction in a direction perpendicular to the same base 2, 2' is exerted, the weakened portion is capable of exerting such a resistance as to ensure a safe carrying out of said clamping operation.

[0076] Furthermore, this configuration of the weakened portion, is also such hat, when the stem 3, or the impact body 32, is subjected to a stress that bends the same stem 5, or the impact body 32, the onset of the breaking at a respective outermost zone E, E there of is facilitated, i.e., where such flexural action generates a greater stress level, and where the same weakened section is not so thick, thus weaker. In practice, a thus-shaped weakened portion allows maximizing the perpendicular tensile strength caused by the handle 4 clamping the tiles against the base 2, while it allows minimizing the strength of the base 2, 2' against the flexural action that is imparted by a hit applied, for example, through a kick provided on the stem 3, or the impact body, 32, and directed parallel to said base 2.

[0077] In particular, as it can be understood from Fig. 12A, said cavity 211 advantageously has, starting from the bottom 222 of the base 2, corresponding longitudinal faces F, F, which extend, in particular with a slightly downwardly convex profile, starting from the central zone M of the same cavity, towards the opposite longitudinal ends E, E of the same, and the height or depth of which gradually increases starting from a minimum height or depth, at said intermediate or central zone M, up to a maximum height at the respective longitudinal end zone E, E.

[0078] As it can be understood from said Fig. 12A, said weakening cavity 211 is completed by perpendicular end faces FE, FE, which extend from the respective outer-

most longitudinal ends E, E of the corresponding longitudinal faces F, F. On the contrary, as it is understood from the enlarged detail of Fig. 12B, the corresponding preferred implementation 1' of device has a respective cavity 211', which has a central zone M having a minimum height, or depth that is defined by a perpendicularly extending tooth, or projection D and which has a perpendicularly outermost face F0, in particular parallel to the bottom 222' of the base 2, and from the ends of which in the longitudinal direction corresponding perpendicular faces F1, F1 extend, from which in opposite longitudinal directions, starting from the respective end that is perpendicularly innermost or opposite the one at said outermost perpendicular face S0 of the same perpendicular face F1, F1, corresponding longitudinally extending faces F2, F2 extend, which face the bottom 222' of the base 2', i.e., downwardly, and the height, or depth of which gradually increases, , in particular linearly, starting from the zone at said perpendicular tooth D up to a maximum height, or depth, at the respective outermost longitudinal zone E, E.

[0079] As can be understood from said Fig. 12B, the weakening cavity 211' is completed by perpendicular end faces SE, SE, which extend from the end of the respective longitudinal face S2, S2, which is opposite the end thereof that is locate at said perpendicularly extending tooth D.

[0080] A levelling, spacing system in accordance with the present description comprises the device in accordance with the present description and the handle.

[0081] A device and/or a system in accordance with the present description allows carrying out all the steps of laying flooring elements, thus obtaining a perfect planarity between the flooring elements and a perfect spacing between the same, avoiding that, once the stem that allowed to obtain the handle to block the elements in the operative position has been removed, material residues projecting from the base remain, and in particular between the same flooring elements, which should be subsequently removed. Such flooring elements can be for example briquettes or tiles or plates or the like.

Claims

1. A device (1, 1', 1") for levelling and concomitantly spacing elements (E1, E2, E3, E4) of a flooring such as tiles, briquettes, plates or the like, comprising:

   - a base (2; 2'; 2") defining a resting surface (S, S', 5") that comprises a plurality of surface portions of said resting surface (S), said surface portions being adapted to receive in support respective portions (e1, e2, e3, e4) of said elements (E1, E2, E3, E4), so that said elements (E1, E2, E3, E4) can take an operative position corresponding to the support of the respective portion (e1; e2; e3; e4) of each of said elements (E1, E2, E3, E4) on a respective surface portion of said surface portions;
   - a stem (3), which takes a securing condition to said base (2; 2'; 2") and is configured to define an operative condition of a handle (4), in which said handle (4) presses on said portions (e1, e2, e3, e4) of said elements (E1, E2, E3, E4) in contrast to the respective surface portions of said resting surface (S; S': S"), while said elements (E1, E2, E3, E4) take said operative position, so as to block said elements (E1, E2, E3, E4) in said operative position; wherein said stem (3) comprises a connecting portion (31) adapted to cooperate with said handle (4) to define a connecting condition of said handle (4) to said stem (3), and an impact body (32) adapted to be hit by a user to cause, by breaking, the passage of said stem (3) from said securing condition to a separation condition with respect to said base (2), said operative condition of the handle (4) corresponding to said connecting condition of the handle (4) to the stem (3); wherein said device (1) is configured to keep said elements (E1, E2, E3, E4) spaced apart, while they take said operative position; said base (2; 2'; 2") comprising a weakened portion (21; 21'; 21"), which defines a narrowing of the resistant sectional area of said base (2), said securing condition of the stem (3) to the base (2; 2'; 2") corresponding to a securing condition of said stem (3) to said weakened portion (21; 21'; 21"), so that said weakened portion (21; 21'; 21") guides said breaking; said weakened portion being defined by a corresponding cavity (211; 211') which starts from the bottom face (222, 222') of the base (2, 2'); and **characterized in that** said weakened portion (21; 21'; 21") extends according to a respective axis or longitudinal direction (L) and is such as to have a maximum perpendicular thickness (W) at the central zone (M) and a minimum perpendicular thickness at the opposite longitudinal ends (E, E) of said weakened portion.

2. The device (1, 1', 1") according to claim 1, wherein:

   - said device (1) extends along a connecting axis (X) arranged transversally to said resting surface (S), said connecting condition being able to be obtained by at least one movement of said handle (4) on said connecting portion (31), said movement comprising at least one translational component along said connecting axis (X);
   - said base (2; 2'; 2") comprises a bottom portion (22; 22'; 22") having an upper outer surface (221; 221'; 221") corresponding to said resting surface (S; S'; 8");
   - said cavity (211; 211'; 211") passes through at least a part of the extension of said bottom por-

tion (22; 22'; 22") along said connecting axis (X);
- the device (1, 1', 1") comprises a spacing structure (5; 5'; 5") secured on said resting surface (S; S'; S") so as to define said plurality of surface portions of said resting surface (S; S'; S"), so that said elements (E1, E2, E3, E4) are kept spaced apart, while they take said operative position, by the interposition of said spacing structure (5; 5'; 5").

3. The device (1) according to claim 2, **characterized in that** said cavity (211) advantageously has, starting from the bottom (222) of the base (2), corresponding longitudinal faces (F, F), which extend, in particular with a slightly downwardly convex profile, starting from the central zone (M) of the same cavity, towards the opposite longitudinal ends (E, E) thereof, and the height or depth of which gradually increases starting from a minimum height or depth, at said intermediate or central zone (M), up to a maximum height at the respective longitudinal end zone (E, E).

4. The device (1) according to claim 3, **characterized in that** said weakening cavity (211) is completed by perpendicular end faces (FE, FE), which extend from the respective longitudinal outermost ends (E, E) of the corresponding faces (F, F).

5. The device (1, 1', 1") according to claim 2, **characterized in that** the respective cavity (211'), which has a central zone (M) having the minimum height, or depth that is defined by a perpendicularly extending tooth, or projection (D) and which has a perpendicularly outermost face (FO), in particular parallel to the bottom (222') of the base (2), and from the ends of which, in the longitudinal direction, corresponding perpendicular faces (F1, F1) extend, from which, starting from the respective ends that are perpendicularly innermost or opposite the one at said outermost perpendicular face (S0) of the same perpendicular face (F1, F1), corresponding longitudinally extending faces (F2, F2) extend in opposite longitudinal directions, facing the bottom (222') of the base (2'), i.e., downwardly, and the height, or depth, of which gradually increases, in particular linearly, starting from the zone at said perpendicular tooth (D) up to a maximum height, or depth, at the respective outermost longitudinal zones (E, E).

6. The device (1') according to claim 5, **characterized in that** said weakening cavity is completed by perpendicular end faces (SE, SE), which extend from the end of said longitudinal faces (S2, S2) that is opposite the respective end at said perpendicularly extending tooth (D).

7. The device (1, 1', 1") according to any of the preceding claims, **characterized in that**
- said spacing structure (5'; 5") is part of said base (2'; 2") and said securing condition of said stem (3) to said base (2'; 2") corresponds to a securing condition of said stem (3) to said spacing structure (5'; 5"), so that said stem (3) extends along said connecting axis (X) starting from said spacing structure (5'; 5");
- said cavity (211'; 211") passes through the entire extension of said bottom portion (22'; 22") along said axis (X) and a part of the extension of said spacing structure (5'; 5") along said axis (X), so that said narrowing is a narrowing of the resistant sectional area of said spacing structure (5'; 5").

8. The device (1', 1") according to claim 7, **characterized in that** said spacing structure (5'; 5") comprises at least two arms (51, 52) oriented on said resting surface (5; 5'; 5") transversally one to the other, said weakened portion (21; 21'; 21") being located in an intersection zone between said arms (51, 52).

9. The device (1, 1', 1") according to any of the preceding claims 2 to 8, **characterized in that** said impact body (32) defines said spacing structure (5) and said securing condition of said stem (3) to said base (2) corresponds to a securing condition of said stem (3) to said bottom portion (22) of the base (2), so that said stem extends along said axis (X) starting from said bottom portion (22) of the base (2).

10. The device (1, 1', 1") according to any of the preceding claims, **characterized in that** said cavity (211; 211; 211") is obtained starting from a lower outer surface (222; 222; 222") of said bottom portion (22; 22'; 22") of the base (2), said lower outer surface (222; 222'; 222") being located and facing opposite said base (2; 2'; 2") with respect to said upper surface (221; 221; 221").

11. The device (1, 1', 1") according to any of the preceding claims, **characterized in that** said narrowing is a reduction in the dimension along said connecting axis (X) of said resistant sectional area.

12. The device (1, 1', 1") according to any of the preceding claims 2 to 11, **characterized in that** said cavity (211, 211', 211"), spacing structure (5, 5', 5"), impact body (32), and connecting portion (31) are arranged one after the other along said connecting axis (X).

13. The device (1, 1', 1") according to any of the preceding claims, **characterized in that** said spacing structure (5, 5', 5") impact body (32) and connecting portion (31) are in a single body.

14. A system for levelling and concomitantly spacing elements (E1, E2, E3, E4) of a flooring such as tiles,

briquettes, plates or the like, comprising a device in accordance with one or more of the preceding claims and said handle (4).

Patentansprüche

1. Vorrichtung (1, 1', 1") für die Nivellierung und gleichzeitige Distanzierung von Elementen (E1, E2, E3, E4) einen Fußbodens, wie Fliesen, Ziegel, Platten oder dergleichen, umfassend:

   - einen Grund (2; 2'; 2"), der eine Auflagefläche (S, S', 5") definiert, die mehrere oberflächige Teile der Auflagefläche (S) umfasst, an die die oberflächige Teile angepasst sind, um in relativen Stützteilen (e1, e2, e3, e4) der Elemente (E1, E2, E3, E4) aufgenommen zu werden, wobei die Elemente (E1, E2, E3, E4) eine Betriebsposition einnehmen können, die der Stütze des jeweiligen Teiles (e1; e2; e3; e4) jedes der Elemente (E1, E2, E3, E4) auf einem jeweiligen oberflächigen Teil der oberflächigen Teile, entspricht;
   - einen Schaft (3), der mit dem Grund (2; 2'; 2") einen Befestigungszustand ausführt und derart konfiguriert ist, dass er einen Betriebszustand eines Griffs (4) definiert, wobei der Griff (4) drückt die Teile (e1, e2, e3, e4) der Elemente (E1, E2, E3, E4) im Gegensatz zu den jeweiligen oberflächigen Teilen der Auflagefläche (S; S'; S"), während die Elemente (E1; E2, E3, E4) die Betriebsposition einnehmen, um die Elemente (E1, E2, E3, E4) in der Betriebsposition zu blockieren; wobei der Schaft (3) einen Verbindungsteil (31) umfasst, der derart ausgelegt ist, dass er mit dem Griff (4) zusammenarbeitet, um einen Verbindungszustand des Griffs (4) mit dem Schaft (3) zu definieren, und mit einen Stoßkörper (32), der derart angepasst, dass er von einem Benutzer getroffen wird, der die Verlagerung des Schafts (3) aus dem Befestigungszustand in einen Trennzustand von dem Grund (2) durch Brechen bewirkt, wobei der Betriebszustand des Griffs (4) dem verbindungszustand des Griffs (4) auf dem Schaft (3) entspricht; wobei die Vorrichtung (1) derart konfiguriert ist, dass die Elemente (E1, E2, E3, E4) voneinander im Abstand gehalten werden, während diese die Betriebsposition einnehmen; wobei der Grund (2; 2'; 2") einen weniger widerstandsfähigen Teil (21; 21'; 21") umfasst, der eine Verengung des Bereichs des widerstandsfähigen Abschnitts des Grundes (2) definiert, wobei der Befestigungszustand des Schaftes (3) am Grund (2; 2'; 2") einem Befestigungszustand des Schaftes (3) an dem weniger widerstandsfähigen Teil (21; 21'; 21") entspricht, wobei dieser wenigster widerstandsfähige Teil (21; 21'; 21") das Brechen führt; wobei der weniger widerstandsfähige Teil ist definiert durch einen entsprechenden Hohlraum (211; 211'), der von der Bodenfläche (222, 222') des Grundes (2, 2') ausgeht und **dadurch gekennzeichnet ist, dass** der weniger widerstandsfähige Teil (21; 21'; 21") sich entlang einer jeweiligen Achse oder Längsrichtung (L) erstreckt und eine maximale Dicke (W) senkrecht zum zentralen Bereich (M) und eine minimale Dicke senkrecht zu den gegenüberliegenden Längsenden (E, E) des weniger widerstandsfähigen Teils, aufweist.

2. Vorrichtung (1, 1', 1") nach Anspruch 1, wobei:

   - die Vorrichtung (1) sich entlang einer Verbindungsachse (X) erstreckt, die quer zur Auflagefläche (S) angeordnet ist, wobei der Verbindungszustand durch mindestens eine einzige Bewegung des Griffs (4) am Verbindungsteil (31) erhalten werden kann, wobei die Bewegung mindestens eine Translationskomponente entlang der Verbindungsachse (X) umfasst;
   - der Grund (2; 2'; 2") umfasst einen unteren Teil (22; 22'; 22") mit einer oberen Außenfläche (221; 221'; 221"), die der Auflagefläche (S; S' 8"), entspricht;
   - der Hohlraum (211; 211'; 211") durchläuft mindestens einen Teil der Entwicklung des unteren Teils (22; 22'; 22") entlang der Verbindungsachse (X);
   - die Vorrichtung (1, 1'; 1") umfasst eine Abstandsstruktur (5; 5'; 5"), die an der Auflagefläche (S; S'; S") derart befestigt ist, dass die Vielzahl von Teilen der Oberfläche der Auflagefläche (S; S'; S") definiert werden, so dass die Elemente (E1, E2, E3, E4) beim Einnehmen der Betriebsposition durch Zwischenschalten der Abstandshalterstruktur (5; 5'; 5) im Abstand gehalten werden.

3. Vorrichtung (1) nach Anspruch 2, **dadurch gekennzeichnet, dass** der Hohlraum (211) vorteilhafterweise ausgehend vom Boden (222) des Grundes (2) entsprechende Längsflächen (F, F) aufweist, die sich insbesondere mit einem leicht konvexen Profil nach unten erstrecken, beginnend vom zentralen Bereich (M) desselben Hohlraums in Richtung der gegenüberliegenden Längsenden (E, E) davon, dessen Höhe oder Tiefe stufenweise ab einer minimalen Höhe oder Tiefe in der Zwischen- oder Mittelzone (M) bis zu einer maximalen Höhe im jeweiligen Längsende (E, E), zunimmt.

4. Vorrichtung (1) nach Anspruch 3, **dadurch gekennzeichnet, dass** der weniger widerstandsfähige Hohlraum (211) durch senkrechte Endflächen (FE,

FE) vervollständigt wird, die sich ausgehend von den jeweiligen äußersten Längsenden (E, E) der entsprechenden Flächen (F, F), erstrecken.

5. Vorrichtung (1, 1', 1") nach Anspruch 2, **dadurch gekennzeichnet, dass** der jeweilige Hohlraum (211), der einen zentralen Bereich (M) mit einer minimalen Höhe oder Tiefe aufweist, der von einem Zahn definiert wird, der sich senkrecht erstreckt, oder ein Vorsprung (D), der eine äußerste senkrechte Fläche (F0) aufweist, die insbesondere parallel zum Boden (222') des Grundes (2) ist, und von deren Enden sie sich in Längsrichtung erstreckt, sich entsprechende senkrechte Flächen (F1, F1) erstrecken, von denen ausgehend von den jeweiligen Enden, die sich soweit wie möglich senkrecht oder im Inneren gegenüber der äußersten senkrechten Fläche (S0) derselben senkrechten Fläche (F1, F1) sind, wobei entsprechende Flächen (F2, F2), die sich in Längsrichtung erstrecken, sich in entgegengesetzten Längsrichtungen erstrecken, und dem Boden (222') des Grundes (2'), d. h. nach unten, zugewandt sind, und deren Höhe oder Tiefe sich insbesondere allmählich, insbesondere linear zunimmt, beginnend vom senkrechten Zahnbereich (D) bis zu einer maximalen Höhe oder Tiefe, auf den jeweils äußersten Längsbereichen (E, E), erstrecken.

6. Vorrichtung (1') nach Anspruch 5, **dadurch gekennzeichnet, dass** der weniger widerstandsfähige Hohlraum durch senkrechte Endflächen (SE, SE) vervollständigt wird, die sich aus dem Ende der Längsflächen (S2, S2) gegenüber dem jeweiligen Ende der Zahn (D) senkrecht entwickeln.

7. Vorrichtung (1, 1', 1") nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet , dass**

- die Abstandshalterstruktur (5'; 5") ist Teil der Grundes (2'; 2") und der Befestigungszustand des Schaftes (3) auf dem Grund (2'; 2") einem Zustand der Befestigung des Schaftes (3) zur Abstandshalterstruktur (5'; 5") entspricht, wobei sich der Schaft (3) entlang der Verbindungsachse (X) ausgehend von der Abstandshalterstruktur (5'; 5") entwickelt;
- der Hohlraum (211'; 211") sich entlang der Achse (X) durch die gesamte Erstreckung des unteren Teils (22'; 22") und entlang der Erstreckung der Abstandshalterstruktur (5'; 5") entlang der Achse (X) erstreckt, wobei die Verengung eine Verengung der widerstandfähigen Querschnittfläche der Abstandshalterstruktur (5'; 5") ist.

8. Vorrichtung (1'; 1") gemäß Anspruch 7, **dadurch gekennzeichnet, dass** die Abstandshalterstruktur (5'; 5") mindestens zwei Arme (51, 52) aufweist, die auf der Auflagefläche (5; 5'; 5") quer zueinander ausgerichtet sind, wobei der weniger widerstandsfähige Teil (21; 21'; 21") in einem Schnittbereich zwischen den Armen (51, 52) angeordnet ist.

9. Vorrichtung (1; 1'; 1") gemäß einem der vorhergehenden Ansprüche 2 bis 8, **gekennzeichnet dadurch, dass** der Stoßkörper (32) die Abstandshalterstruktur (5) definiert und der Befestigungszustand des Schaftes (3) am Grund (2) einem Befestigungszustand des Schaftes (3) am unteren Teil (22) des Grundes (2) entspricht, wobei sich der Schaft entlang der Achse (X) ausgehend vom unteren Teil (22) des Grundes (2), erstreckt.

10. Vorrichtung (1; 1'; 1") gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Hohlraum (211; 211; 211") ausgehend von einer unteren Außenfläche (222; 222'; 222") des Bodenteils (22; 22'; 22") des Grundes (2) erhalten wird, wobei sich die untere Außenfläche (222; 222'; 222") dem Grund (2; 2'; 2") im Bezug auf die obere Fläche (221; 221; 221") gegenüber liegt.

11. Vorrichtung (1; 1'; 1") gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Verengung eine Reduktion der Größe entlang der Verbindungsachse (X) der Fläche des Widerstandsabschnitts ist.

12. Vorrichtung (1; 1'; 1") nach einem der vorhergehenden Ansprüche 2 bis 11, **dadurch gekennzeichnet, dass** der Hohlraum (211; 211'; 211"), die Abstandsstruktur (5, 5', 5"), der Stoßkörper (32) und der Verbindungsteil (31) nacheinander entlang der Verbindungsachse (X) angeordnet sind.

13. Vorrichtung (1; 1'; 1") nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Abstandshalterstruktur (5, 5', 5"), der Stoßkörper (32) und das Verbindungsteil (31) in einem einzigen Körper enthalten sind.

14. System für die Nivellierung und gleichzeitige Distanzierung von Elementen (E1, E2, E3, E4) eines Bodens wie Fliesen, Ziegel, Platten oder dergleichen, umfassend eine Vorrichtung gemäß einem oder mehreren der vorhergehenden Ansprüche und den Griff (4).

Revendications

1. Dispositif (1, 1', 1") pour le nivellement et l'espacement simultané des éléments d'espacement (E1, E2, E3, E4) d'un plancher, tels que des carrelages, des briquettes, des plaques ou analogues, comprenant:

- une base (2; 2'; 2 ") qui définit une surface de support (S, S', 5") comprenant une pluralité de parties de la surface de support (S), où les parties de surface sont adaptées pour être logés dans des parties de support respectives (e1, e2, e3, e4) des éléments (E1, E2, E3, E4), les éléments (E1, E2, E3, E4) pouvant prendre une position de fonctionnement correspondant au support de la respective partie (e1; e2; e3; e4) de chacun des éléments (E1, E2, E3, E4) sur une partie de surface respective des parties de surface;
- une tige (3) qui réalise une condition de fixation avec la base (2; 2'; 2") et est configurée pour définir une condition de fonctionnement d'une poignée (4), où la poignée (4) appuie contre les parties (e1, e2, e3, e4) des éléments (E1, E2, E3, E4) en opposition avec les parties de surface respectives de la surface de support (S; S'; S"), tandis que les éléments (E1; E2, E3, E4) prennent la position de fonctionnement, de manière à bloquer les éléments (E1, E2, E3, E4) en position de fonctionnement; dans lequel la tige (3) comprend une partie de connexion (31) adaptée pour coopérer avec la poignée (4) de manière à définir une condition de connexion de la poignée (4) avec la tige (3), et un corps d'impact (32) est adapté pour être heurté par un utilisateur provoquant le passage de la tige (3) de l'état de fixation à un état de séparation de la base (2) par rupture, où l'état de fonctionnement de la poignée (4) correspond à l'état de connexion de la poignée (4) à la tige (3); dans lequel le dispositif (1) est configuré pour maintenir les éléments (E1, E2, E3, E4) espacés, tandis que ceux-ci prennent la position de fonctionnement; la base (2; 2'; 2") comprend une partie moins résistante (21; 21'; 21"), qui définit un rétrécissement de la zone de la section résistante de la base (2), où la condition de fixation de la tige (3) à la base (2; 2'; 2") correspond à une condition de fixation de la tige (3) à la partie la moins résistante (21; 21'; 21"), donc la partie la moins résistante (21; 21'; 21") guide la rupture; la partie la moins résistante est définie par une cavité correspondante (211; 211') qui part de la surface inférieure (222, 222') de la base (2, 2'), **caractérisé en ce que** la partie la moins résistante (21; 21'; 21") se développe le long d'un axe respectif ou d'une direction longitudinale (L) et est telle qu'elle présente une épaisseur perpendiculaire maximale (W) sur la zone centrale (M) et une épaisseur perpendiculaire minimale sur les extrémités longitudinales opposées (E, E) de la partie la moins résistante.

2. Dispositif (1, 1', 1") selon la revendication 1, dans lequel:

- le dispositif (1) se développe le long d'un axe de connexion (X) disposé transversalement par rapport à la surface d'appui (S), où la condition de connexion peut être obtenue par au moins un seul mouvement de la poignée (4) sur la partie de connexion (31), dans lequel le mouvement comprend au moins un composant de translation le long de l'axe de connexion (X);
- la base (2; 2'; 2") comprend une partie inférieure (22; 22'; 22") avec une surface externe supérieure (221; 221'; 221") correspondant à la surface de support (S; S'; 8");
- la cavité (211; 211'; 211") traverse au moins une partie du développement de la partie inférieure (22; 22'; 22") le long de l'axe de connexion (X);
- le dispositif (1, 1'; 1") comprend une structure d'espacement (5; 5'; 5") fixée à la surface de support (S; S'; S") de manière à définir la pluralité de parties de la surface d'appui (S; S'; S"), de sorte que les éléments (E1, E2, E3, E4) soient maintenus espacés tout en assumant la position de fonctionnement, en interposant la structure d'espacement (5; 5'; 5").

3. Dispositif (1) selon la revendication 2, **caractérisé en ce que** la cavité (211) présente avantageusement, à partir du fond (222) de la base (2), des surfaces longitudinales correspondantes (F, F), qui se développent notamment avec un profil légèrement convexe vers le bas, à partir de la zone centrale (M) de la même cavité, vers les extrémités longitudinales opposées (E, E) de celle-ci, et dont la hauteur ou la profondeur augmente progressivement à partir d'une hauteur ou une profondeur minimale, dans la zone intermédiaire ou centrale (M), jusqu'à une hauteur maximale sur la zone d'extrémité longitudinale respective (E, E).

4. Dispositif (1) selon la revendication 3, **caractérisé en ce que** la cavité la moins résistante (211) est complétée par des surfaces d'extrémité perpendiculaires (FE, FE) qui se développent à partir des extrémités longitudinales respectives les plus extérieures (E, E) des surfaces correspondantes (F, F).

5. Dispositif (1, 1', 1") selon la revendication 2, **caractérisé en ce que** la cavité respective (211'), qui comporte une zone centrale (M) avec une hauteur minimale ou une profondeur définie par une dent développée perpendiculairement, ou une protubérance (D) et qui présente une surface perpendiculaire la plus externe (F0), notamment parallèle au fond (222') de la base (2), et à partir de l'extrémité de laquelle elles se développent dans le sens longitudinal des surfaces perpendiculaires correspondantes (F1, F1), à partir des extrémités respectives de celles-ci perpendiculaires au maximum à l'intérieur

ou opposées à la surface perpendiculaire la plus externe (S0) de la même surface perpendiculaire (F1, F1), des surfaces correspondantes F2, F2) sont développées dans la direction longitudinale, et s'étendent dans des directions longitudinales opposées, face au fond (222') de la base (2'), c'est-à-dire vers le bas, et dont la hauteur ou la profondeur augmente progressivement, notamment linéairement, à partir de la zone de la dent perpendiculaire (D) jusqu'à une hauteur ou une profondeur maximale, sur les zones longitudinales respectives les plus externes (E, E).

6. Dispositif (1') selon la revendication 5, **caractérisé en ce que** la cavité la moins résistante est complétée par des surfaces d'extrémité perpendiculaires (SE, SE) qui se développent à partir de l'extrémité des surfaces longitudinales (S2, S2) opposée à l'extrémité respective de la dent (D) développée perpendiculairement.

7. Dispositif (1, 1', 1") selon l'une des précédentes revendications, **caractérisé en ce que**

- la structure d'espacement (5'; 5") fait partie de la base (2'; 2") et la deuxième condition de fixation de la tige (3) par rapport à la base (2'; 2") correspond à une condition de fixation de la tige (3) à la structure d'espacement (5'; 5"), de sorte que la tige (3) se développe le long de l'axe de connexion (X) à partir de la structure d'espacement (5'; 5");
- la cavité (211'; 211") traverse tout le développement de la partie inférieure (22'; 22") le long de l'axe (X) et une partie du développement de la structure d'espacement (5'; 5") le long de l'axe (X), le rétrécissement étant un rétrécissement de la zone de la section résistante de la structure d'espacement (5'; 5").

8. Dispositif (1'; 1") selon la de revendication 7, **caractérisé en ce que** la structure d'espacement (5'; 5") comporte au moins deux bras (51, 52) orientés sur la surface de support (5; 5'; 5") transversalement l'un à l'autre, où la partie la moins résistante (21; 21'; 21") est située dans une zone d'intersection entre les bras (51, 52).

9. Dispositif (1; 1'; 1") selon l'une des revendications précédentes 2 à 8, **caractérisé en ce que** le corps d'impact (32) définit la structure d'espacement (5) et la condition de fixation de la tige (3) à la base (2) correspond à une condition de fixation de la tige (3) à la partie inférieure (22) de la base (2), la tige se développant selon l'axe (X) à partir de la partie inférieure (22) de la base (2).

10. Dispositif (1; 1'; 1") selon l'une des revendications précédentes, **caractérisé en ce que** la cavité (211; 211'; 211") est obtenue à partir d'une surface externe inférieure (222; 222'; 222") de la partie inférieure (22; 22'; 22") de la base (2), où la surface externe inférieure (222; 222'; 222") est située et fait face à la base (2; 2'; 2") avec référence à la surface supérieure (221; 221; 221").

11. Dispositif (1; 1'; 1") selon l'une des revendications précédentes, **caractérisé en ce que** le rétrécissement est une réduction de la dimension le long de l'axe de connexion (X) de la zone de la section résistante.

12. Dispositif (1; 1; 1") selon l'une des revendications précédentes 2 à 11, **caractérisé en ce que** la cavité (211; 211'; 211"), la structure d'espacement (5, 5', 5"), le corps d'impact (32) et la partie de connexion (31) sont disposés l'un après l'autre le long de l'axe de connexion (X).

13. Dispositif (1; 1'; 1") selon l'une des revendications précédentes, **caractérisé en ce que** la structure d'espacement (5, 5', 5"), le corps d'impact (32) et la partie de connexion (31) sont un seul corps.

14. Système pour le nivellement et l'espacement simultané des éléments d'espacement (E1, E2, E3, E4) d'un plancher, tels que des carrelages, des briquettes, des plaques ou analogues, comprenant un dispositif selon une ou plusieurs des revendications précédentes et la poignée (4) .

FIG.1c

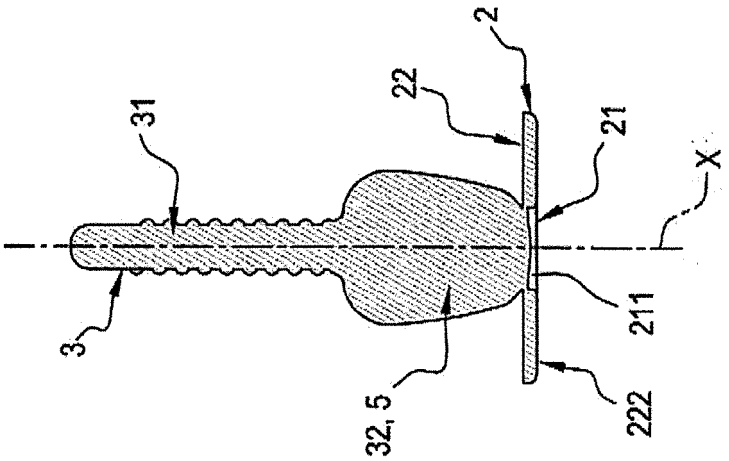


FIG.1b

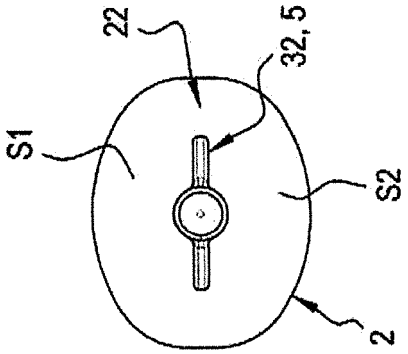


FIG.1a

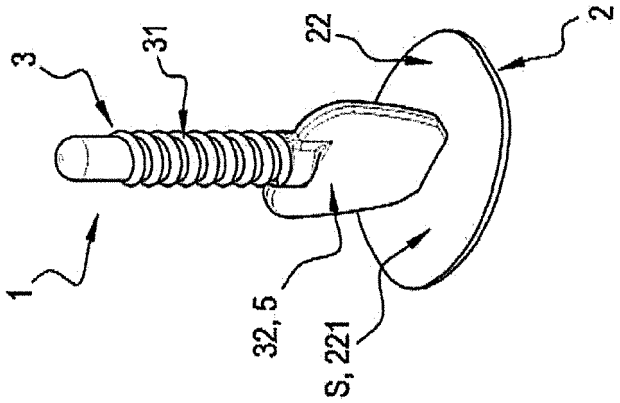


FIG. 2c

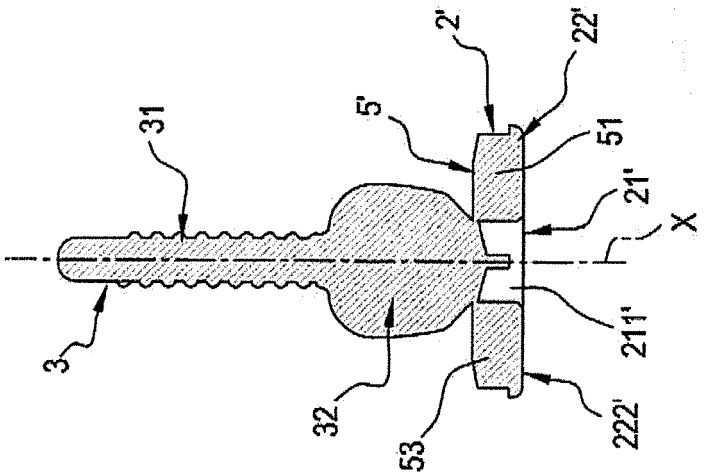


FIG. 2b

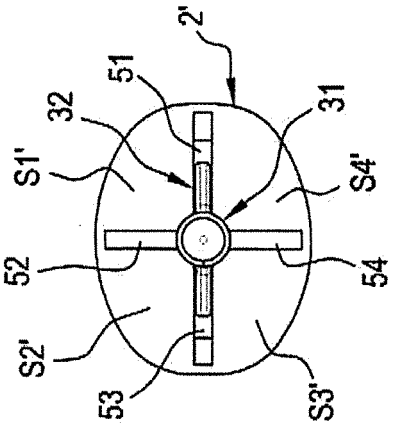


FIG. 2a

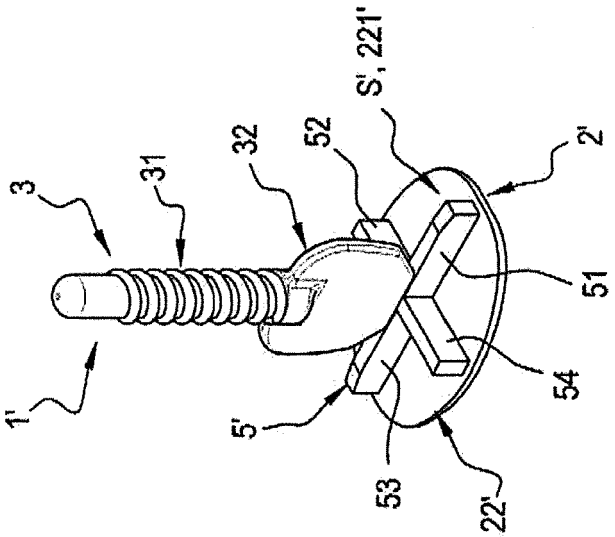


FIG. 3c

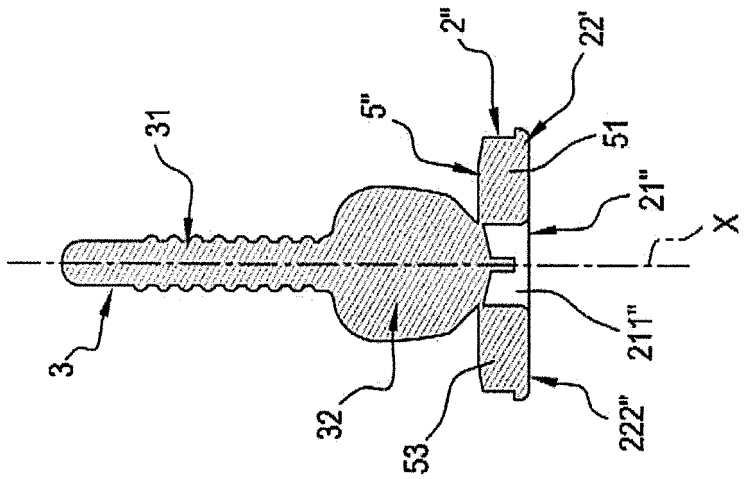


FIG. 3b

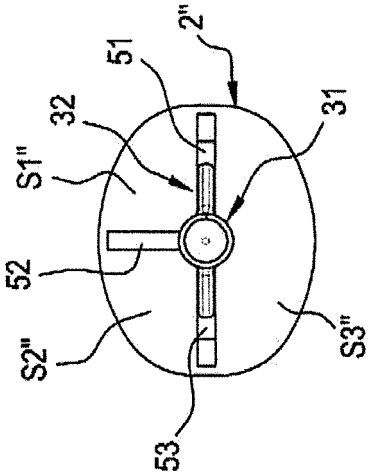
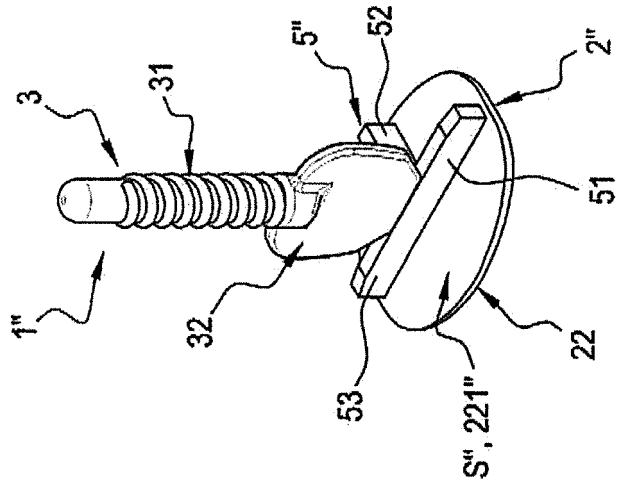


FIG. 3a



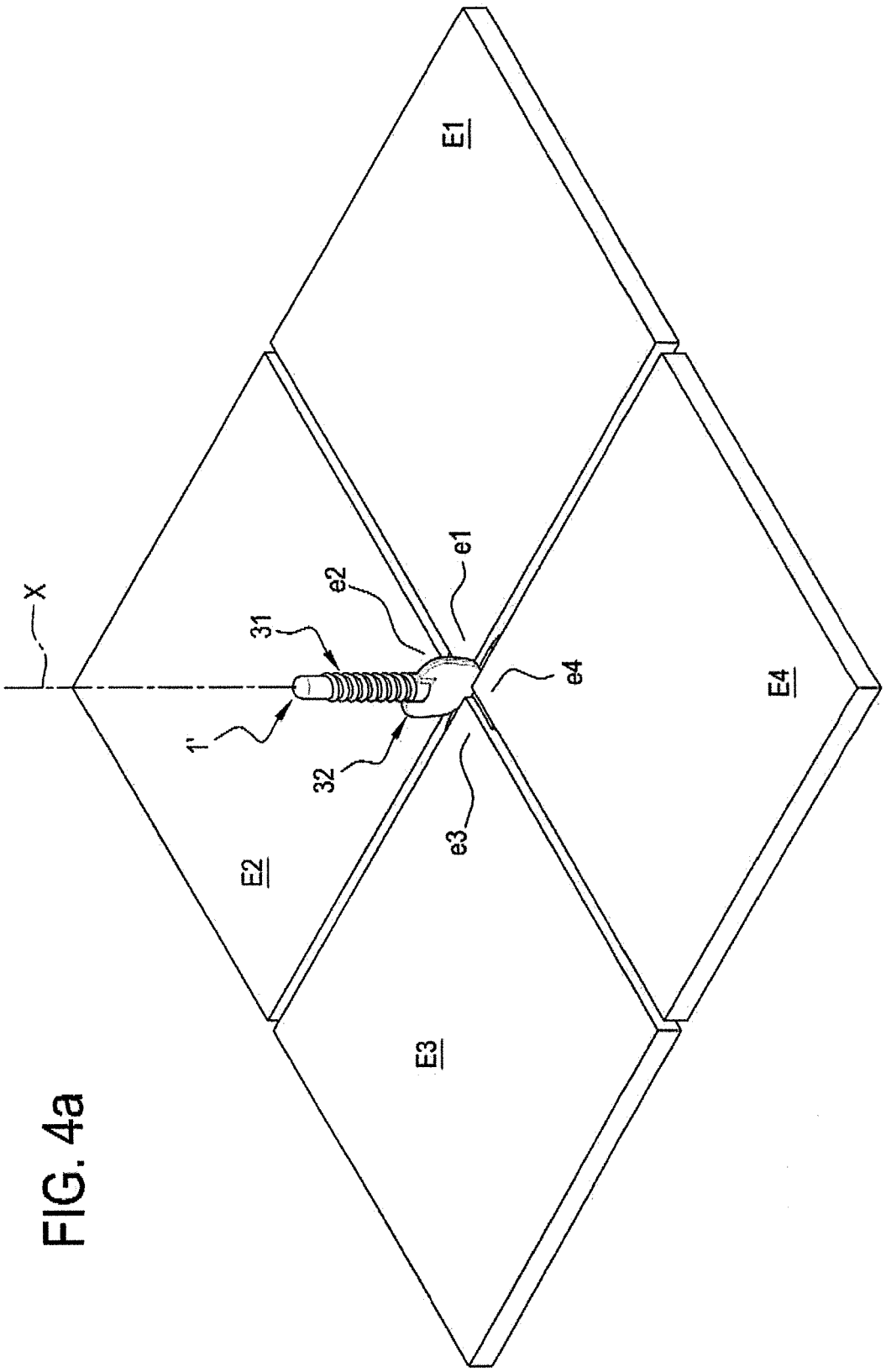


FIG. 4a

FIG. 4c

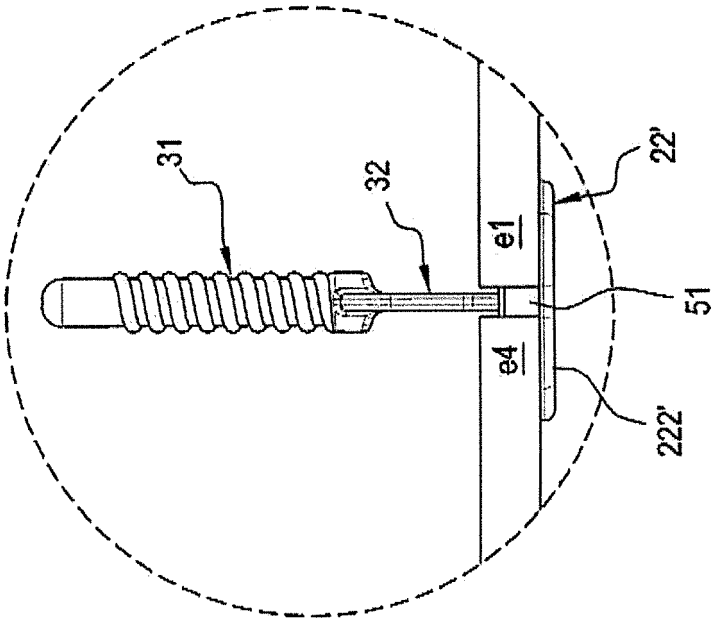
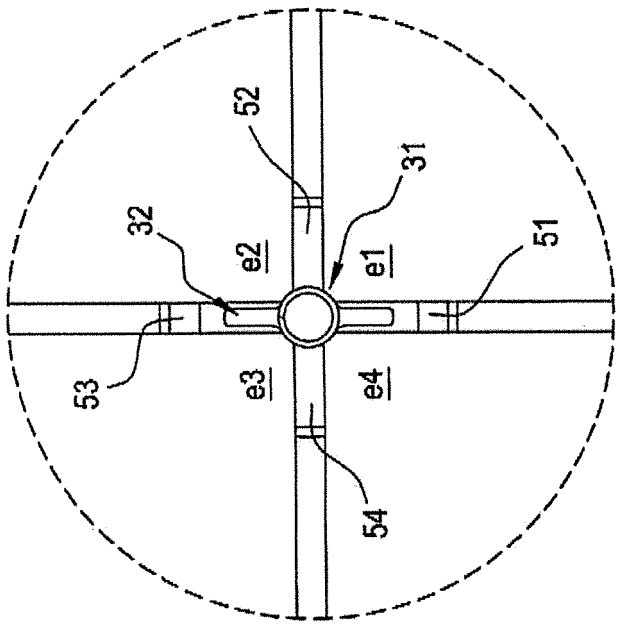


FIG. 4b



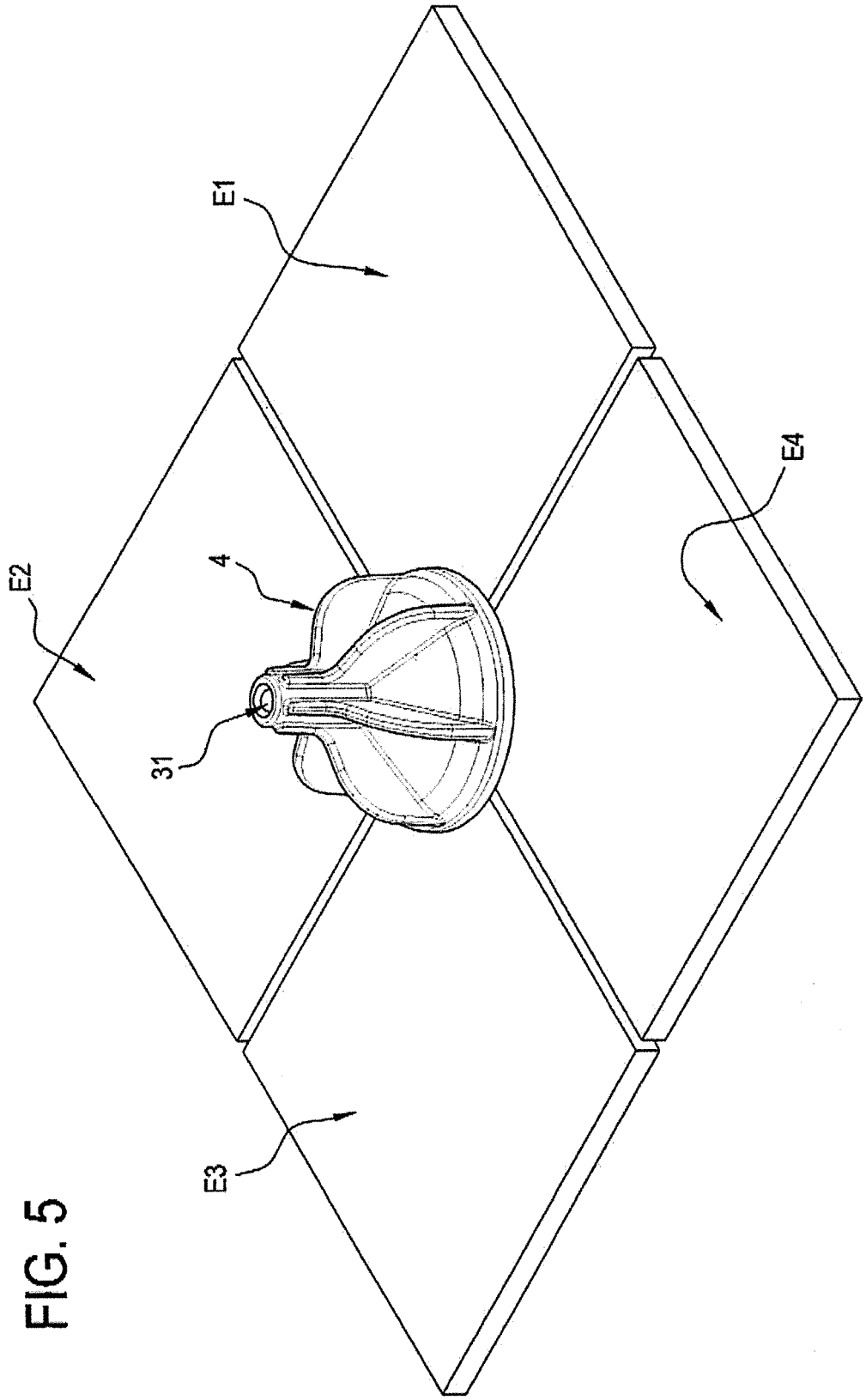


FIG. 5

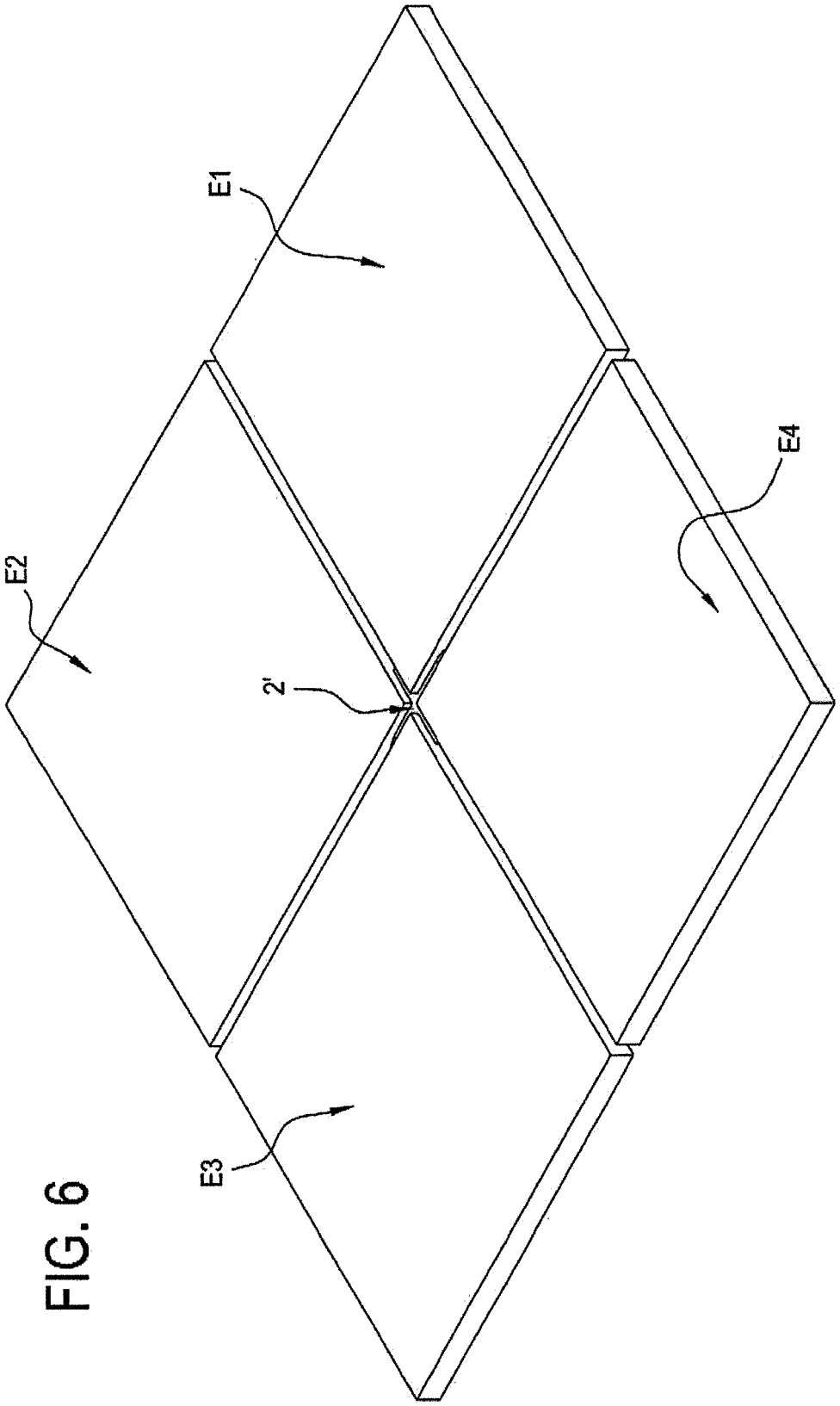


FIG. 6

FIG. 8

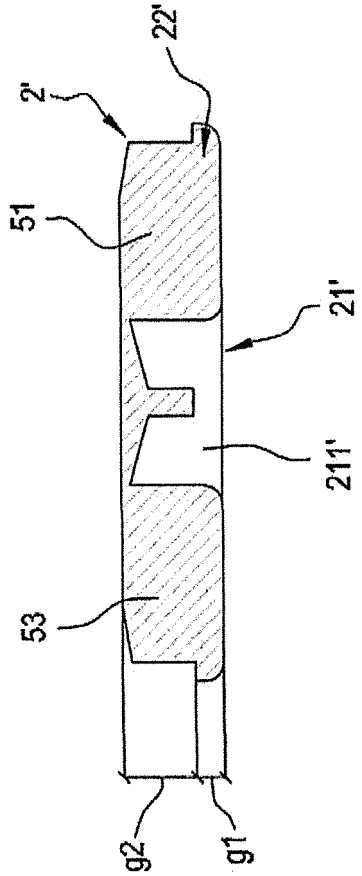


FIG. 7

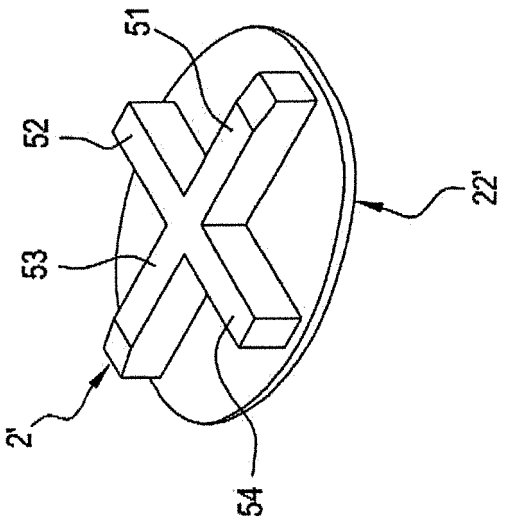


FIG. 11

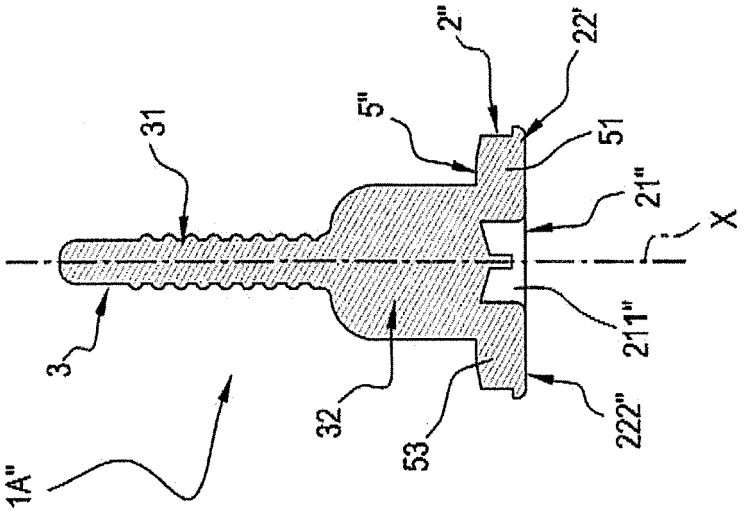


FIG. 10

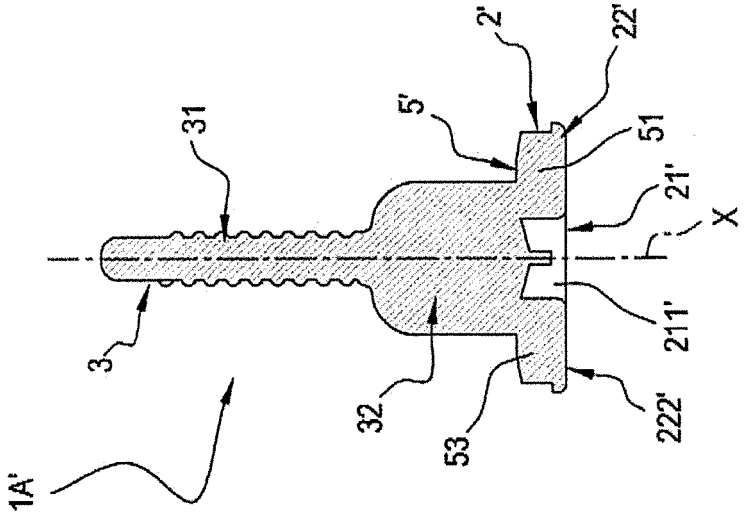
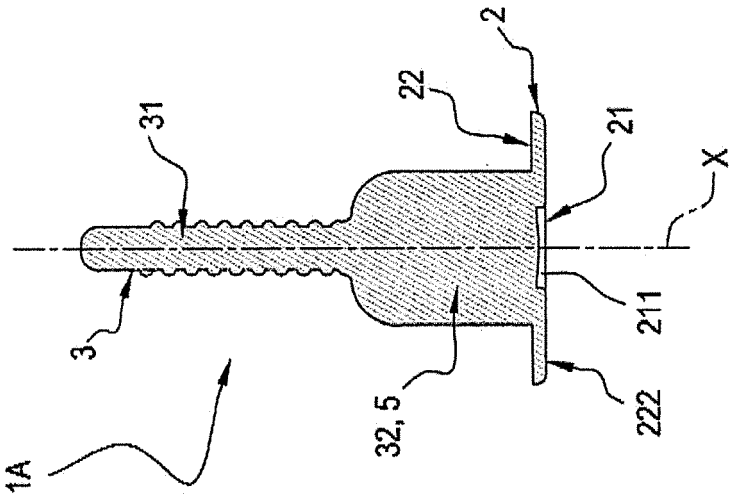


FIG. 9



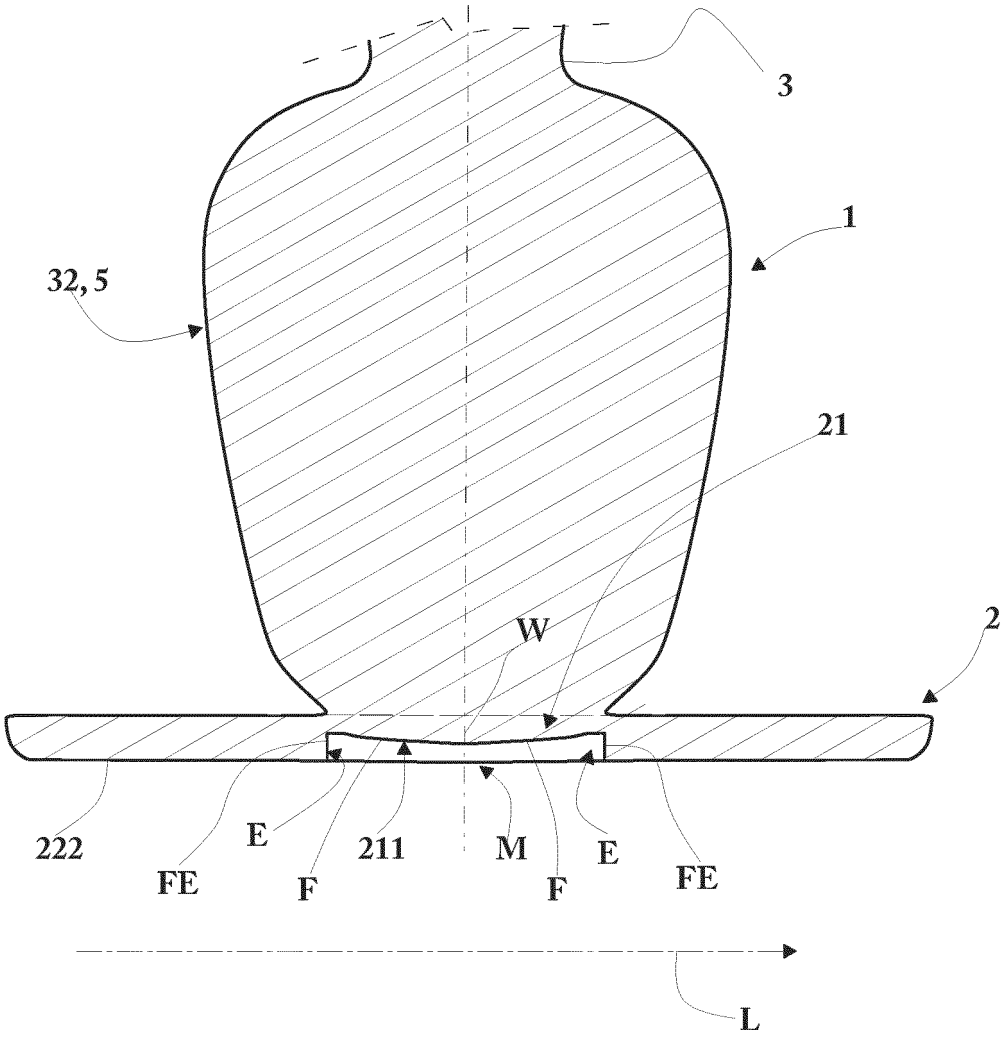


FIG. 12A

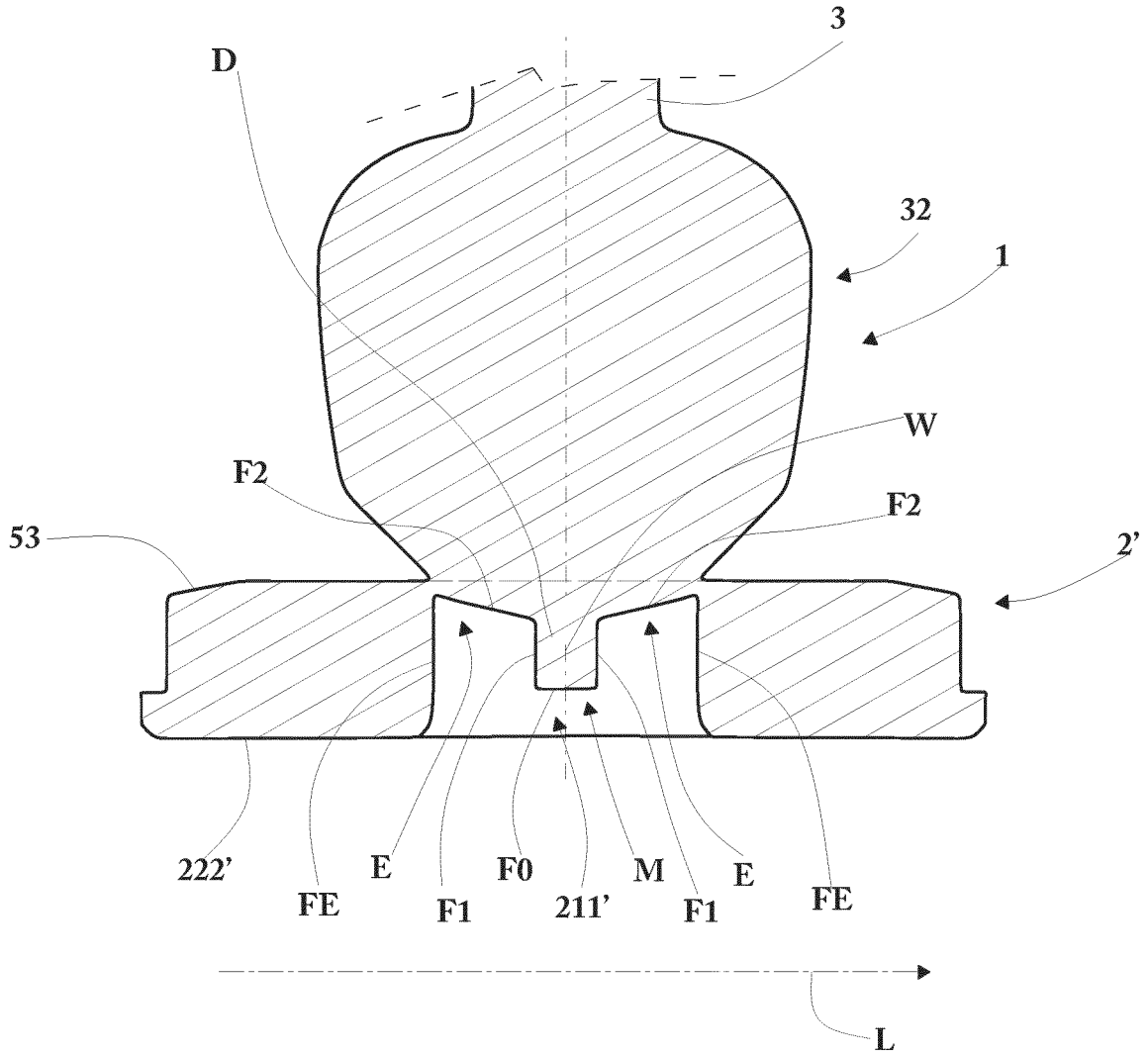


FIG. 12B

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2966239 A **[0010]**
- US 2013067854 A **[0011]**