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

(11) **EP 3 636 557 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
15.04.2020 Bulletin 2020/16

(51) Int Cl.:
B65D 6/18 *(2006.01)*

(21) Application number: **19201602.0**

(22) Date of filing: **07.10.2019**

(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
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **09.10.2018 IT 201800009278**

(71) Applicant: **S.C.S. Socita' Costruzione Stampi S.r.l.**
60030 Monsano (AN) (IT)

(72) Inventors:
- **CARBONARI, Alberto**
  60030 Santa Maria Nuova (AN) (IT)
- **CARBONARI, Doriano**
  60030 Santa Maria Nuova (AN) (IT)
- **RICCI, Emanuele**
  62019 RECANATI (MC) (IT)

(74) Representative: **Baldi, Claudio**
Ing. Claudio Baldi S.r.l.
Viale Cavallotti, 13
60035 Jesi (Ancona) (IT)

(54) **IMPROVED STACKABLE INTERLOCKING COLLAPSIBLE CRATE**

(57) A collapsible crate (C) is disclosed, comprising a bottom wall (10), a pair of collapsible longitudinal sides (11, 12) and one pair of collapsible transverse sides (13, 14); the crate also comprises female centering means (2) and male centering means (3); said female centering means (2) are obtained on the collapsible sides (11, 12; 13, 14) of a pair of collapsible sides (11, 12; 13, 14); said male centering means (3a, 3b, 3c, 3d) are disposed on the bottom wall (10); the peculiarity of the collapsible crate (C) is that said female centering means (2) are configured in such a way that a male centering means (3a, 3b, 3c, 3d) of an upper crate can be inserted in a female centering means (2) of an identical lower collapsible crate (C) when the two identical crates are rotated by 90°.

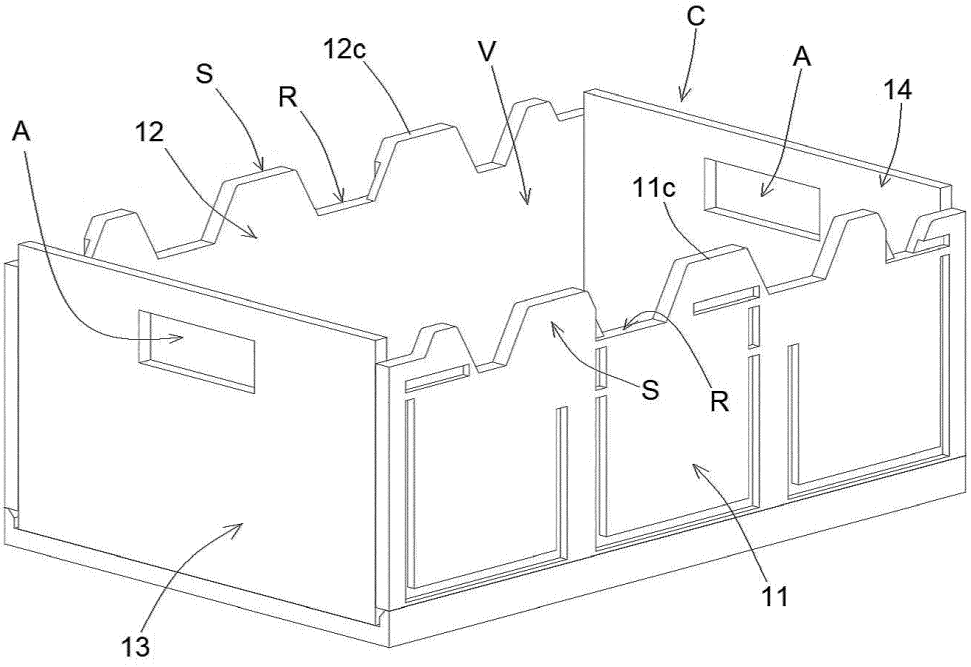

FIG. 1A

EP 3 636 557 A1

Description

[0001] The present patent application for industrial invention relates to an improved stackable interlocking collapsible crate.

[0002] The collapsible crate according to the invention has been devised after a critical examination of the drawbacks related with the storage and the transportation of the collapsible crates with collapsible sides of the prior art.

[0003] A collapsible crate according to the prior art is provided with a bottom wall with a quadrangular shape, preferably a rectangular shape, which comprises an upper side and a lower side.

[0004] Furthermore, said crate is provided with a pair of longitudinal sides and a pair of transverse sides; each side comprising an internal side and an external side.

[0005] Each collapsible side comprises a lower border that is hinged to said bottom wall in such a way that each side can be in an operating position, wherein said side is orthogonal to said bottom wall, and an idle position, wherein said side collapses on top of said bottom wall, in adjacent parallel position relative to said bottom wall.

[0006] When the sides are in operating position, together with the bottom wall, they define a compartment that is suitable for containing fruit and vegetable products, food products and the like.

[0007] The collapsible crates according to the prior art are provided with male centering means disposed on the lower side of the bottom wall, and with female centering means disposed on the external side of at least one pair of sides, which are suitably configured in such a way to be coupled with said male centering means.

[0008] More precisely, the male centering means and the female centering means are configured in such a way that two identical crates with collapsed sides can be disposed one on top of the other, in the same direction, without sliding off.

[0009] Nevertheless, it appears evident that, when the number of stacked crates increases, the stack of crates tends to become unstable, just like when a person tries to transport a high stack of dishes. In view of the above, evidently, the higher the number of crates in the stack, the less stable the stack will be.

[0010] For the storage and the transportation of said crates, the crates must be disposed in a set of adjacent stacks that are positioned on a transporting surface, such as for example a pallet, are stabilized and are fixed to the pallet.

[0011] In order to stabilize the stacks of crates and prevent them from accidentally falling, the crates are tied together by means of strings, elastic straps and the like.

[0012] EP0759400 and EP0928745 disclose collapsible containers comprising one base and four collapsible side walls, which can be moved between an operating position, wherein each collapsible side wall is perpendicular to the base, and an idle position, wherein each collapsible side wall is parallel to the base.

[0013] The purpose of the present invention is to remedy the drawbacks of the prior art by devising a collapsible crate that is suitably configured in order to be steadily disposed on top of an identical collapsible crate during storage or transportation in order to obtain a stack of crates with a much higher stability compared to a stack of crates obtained with collapsible crates of the prior art.

[0014] These purposes are achieved according to the invention with the characteristics that are listed in the appended independent claim 1.

[0015] Advantageous embodiments will appear from the dependent claims.

[0016] The collapsible crate of the invention is defined by claim 1.

[0017] For the sake of clarity, the description of the improved stackable interlocking collapsible crate continues with reference to the appended drawings, which have a merely illustrative, not limiting value, wherein:

- Fig. 1 is an axonometric view of the collapsible crate according to a first embodiment of the invention, wherein the sides are in operating position.
- Fig. 1A is an axonometric view of the collapsible crate according to a second embodiment of the invention, wherein the sides are in operating position.
- Fig. 2 is an axonometric view of the collapsible crate according to the first embodiment of the invention, wherein the sides are in idle condition.
- Fig. 2A is an axonometric view of the collapsible crate according to the second embodiment of the invention, wherein the sides are in idle condition.
- Fig. 3 is a top view of the collapsible crate of Fig. 2;
- Fig. 3A is a top view of the collapsible crate of Fig. 2A;
- Figs. 4 and 5 are a bottom view and an axonometric bottom view of the collapsible crate according to the invention, respectively;
- Fig. 6 is a top view of a layer of a stack of collapsible crates according to the first embodiment of the invention;
- Fig. 7 is a bottom view of a layer of the stack of collapsible crates, which is intended to be disposed on top of the layer shown in Fig. 6;
- Fig. 8 is a sectional view of a stack of crates obtained with the collapsible crates according to the first embodiment of the invention; said stack of crates being sectioned with a horizontal plane passing through the male centering means of a layer of crates;
- Fig. 9 is an enlarged view of the detail contained in the circle P1 of Fig. 3;
- Fig. 10 is an enlarged view of the detail contained in the circle P2 of Fig. 3A;
- Fig. 11 is an enlarged view of the detail contained in the circle P3 of Fig. 4, wherein said detail is rotated by 90° in clockwise direction relative to its direction in Fig. 4;
- Fig. 12 is a sectional view of a stack of crates obtained with the collapsible crates according to the second embodiment of the invention; said stack of

crates being sectioned with a horizontal plane passing through the male centering means of a layer of crates;

- Fig. 13 is a top view of a layer of the stack of collapsible crates according to a second embodiment of the invention;
- Fig. 14 is a bottom view of a layer of the stack of collapsible crates according to the second embodiment of the invention, which is intended to be disposed on top of the layer shown in Fig. 13.

[0018] With reference to Figs. 1 to 5, a collapsible crate according to the invention is disclosed, which is generally indicated with reference letter (C).

[0019] The collapsible crate (C) according to the invention comprises a bottom wall (10), which is shown in Fig. 4 and 5; said bottom wall (10) comprises an upper side, a lower side (10b) and four corners (18a, 18b, 18c, 18d).

[0020] The collapsible crate (C) according to the invention comprises male centering means (3a, 3b, 3c, 3d) disposed on said lower side (10b) of the bottom wall (10).

[0021] The male centering means (3a, 3b, 3c, 3d) consist in four feet (3a, 3b, 3c, 3d), each of them being disposed in a corner (18a, 18b, 18c, 18d) of the bottom wall (10).

[0022] With reference to Figs. 4 and 5, each foot has an L-shape and is provided with a longitudinal side (31, 32) and a transverse side (33).

[0023] The longitudinal side (31, 32) and the transverse side (33) are separated. The longitudinal side (31, 32) comprises two separate aligned sections, of which a first section (31) disposed in proximal position relative to the transverse side (33) and a second section (32) disposed in distal position relative to said transverse side (33). Advantageously, the second section (32) of the longitudinal side (31, 32) is longer than the first section (31) of the longitudinal side (31, 32).

[0024] With reference to Figs. 1 to 1A, the crate comprises a longitudinal axis (Y-Y) and a transverse axis (X-X) that is perpendicular to said longitudinal axis (Y-Y).

[0025] The transverse axis (X-X) is perpendicular to the longitudinal axis (Y-Y).

[0026] With reference to Figs. 1 to 3A, the collapsible crate (C) comprises one pair of collapsible longitudinal sides (11, 12) and one pair of collapsible transverse sides (13, 14).

[0027] Each pair of collapsible sides comprises two identical collapsible sides in opposite position. Each collapsible crate (11, 12, 13, 14) comprises a lower border hinged to the bottom wall (10) and a free border (11c, 12c, 13c, 14c).

[0028] As shown in Fig. 1 and 1A, each collapsible side (11, 12, 13, 14) can be in an operating position, wherein said collapsible side (11, 12, 13, 14) is perpendicular to the bottom wall (10), and in an idle position, wherein the collapsible side (11 ,12, 13, 14) is collapsed and parallel to the bottom wall (10), as shown in Fig. 2 and 2A.

[0029] The collapsible sides (11, 12, 13, 14) are hinged to the bottom wall (10) in such a way that when the collapsible sides (11, 12, 13, 14) are in idle position, the pair of transverse sides (13, 14) is disposed between the pair of longitudinal sides (11, 12) and the bottom wall (10).

[0030] With reference to Figs. 2 and 2A, each collapsible side (11 ,12, 13, 14) comprises a first side, which faces said bottom wall (10) when said collapsible side (11, 12, 13, 14) is in idle position, and a second side (41, 42, 43, 44) in opposite direction relative to said first side.

[0031] With reference to Fig. 1 and 1A, the collapsible crate (C) comprises a compartment (V) defined by said collapsible sides (11, 12, 13, 14) and the bottom wall (10) when the collapsible sides (11, 12, 13, 14) are in operating position.

[0032] Moreover, the collapsible crate (C) is provided with an opening (A) obtained on each collapsible side of the pair of collapsible transverse sides (13, 14), which is suitable for acting as handle to lift the collapsible crate (C).

[0033] The collapsible crate (C) also comprises female centering means (2) that are suitable for cooperating with the male centering means (3) disposed on the bottom wall (10).

[0034] As shown in Figs. 2 to 3A, said female centering means (2) are disposed on the second side (11b, 12b) of the collapsible sides of the pair of collapsible longitudinal sides (11, 12).

[0035] The female centering means (2) are configured in such a way that a male centering means (3a, 3b, 3c, 3d) of an upper collapsible crate (C) can be inserted in different positions in a female centering means (2) of an identical lower collapsible crate (C) when the two identical collapsible crates are rotated by 90°.

[0036] It must be noted that said female centering means (2) are configured in such a way to insert a male centering means (3) in a female centering means (2) when the two collapsible crates (C) are disposed in the same direction, as well as to insert a male centering means (3) in a female centering means (2)

[0037] With reference to Figs. 2 to 3A, the female centering means (2) comprise three "U"-shaped housings (2a, 2b, 2c), of which two lateral housings (2a, 2b) and one central housing (2c).

[0038] Said "U"-shaped housings (2a, 2b, 2c) have a concavity directed towards the free border (11c, 12c) of the collapsible side (11,12) and comprise two parallel sections (22, 23, 24, 25) and one transverse section (21, 26) disposed in the proximity of the hinged border of the collapsible side (11,12).

[0039] The two lateral sides (2a, 2b, 2c) are symmetrical relative to a vertical plane passing through the transverse axis (X-X) and comprise a long parallel section (22) and a short parallel section (23) in adjacent position to the central housing (2c). The three housings (2a, 2b, 2c) are equally spaced.

[0040] As shown in Fig. 3, the parallel sections (24, 25) of the central housing (2c) comprise a main section (24) that extends from the transverse section (26) towards

the free border (11c, 12c); the length of the main section (24) is equal to the length of the short parallel section (23) of the lateral housings (2a, 2b).

[0041] The parallel sections (24, 25) of the central housing (2c) also comprise a separate section (25).

[0042] The length of the separate section (25) is equal to the length of the first section (31) of the foot (3a, 3b, 3c, 3d) of the male centering means (3).

[0043] The main section (24) and the separate ending section (25) cover a total distance that is equal to the length of the long parallel side (22) of the lateral housings (2a, 2b).

[0044] With reference to Fig. 11, a distance (d) is provided between the transverse side (33) of each foot (3a, 3b, 3c, 3d) and the first section (31) of the longitudinal side (31, 32) of the foot (3a, 3b, 3c, 3d), whereas with reference to Figs. 9 and 10, a distance (D, D1) is provided between one end (E) of the long parallel section (23) of one of the housings (2a, 2b, 2c) of the female centering means (2) and the free border (11c, 12c) of a collapsible side of the pair of longitudinal collapsible sides (11, 12).

[0045] If the distance (D, D1) between the end (E) of the long parallel section (28) and the free border (11c) is higher than the distance (d) between the transverse side (33) and the first section (31) of the longitudinal side (31, 32) of the foot (3a, 3b, 3c, 3d), then said "U"-shaped housings (2a, 2b, 2c) of the female centering means (2) comprise an ending section (28) that is parallel to the transverse section (21, 26) and is disposed in the proximity of the free border (11c, 12c, 13c, 14c) of the collapsible edge (11, 12, 13, 14), as shown in Fig. 10.

[0046] The length of said ending section (28) is equal to or higher than the transverse section (33) of the feet (3a, 3b, 3c, 3d) of the male centering means (3).

[0047] Still with reference to Fig. 10, it can be noted that the long parallel section (23) and the ending section (28) are configured in such a way to house the foot (3a, 3b, 3c, 3d).

[0048] With reference to Figs. 1A, 2A and 3A, according to a preferred embodiment, the collapsible crate (C) comprises a free border (11c, 12c) that is different from the free border (11c, 12c) of the collapsible crate (C) of Figs. 1, 2 and 3.

[0049] Advantageously, the free border (11c, 12c) of the collapsible sides (11, 12) of the pair of collapsible longitudinal sides (11, 12) of the collapsible crate (C) comprises a set of projections (S) and a set of recesses (R), as shown in Figs. 1A and 2A; said projections (S) and recesses (R) are configured in such a way that, when said collapsible sides (11, 12) are in idle position, the projections (S) of the free border (11c, 12c) of a collapsible side (11, 12) are inserted in the recesses (R) of the free border (11c, 12c) of the collapsible side (11, 12) in opposite position.

[0050] Otherwise said, the set of recesses (R) and the set of projections (S) of a free border (11c, 12c) of a collapsible side are configured in such a way to define a complementary profile relative to the profile defined by the projections (S) and by the recesses (R) of the collapsible side in opposite position.

[0051] When the collapsible crates (C) are stacked one on top of the other with the collapsible sides (11, 12, 13, 14) in operating position, the set of projections (S) and the set of recesses (R) generate a set of spaces defined by the bottom wall (10) of an upper collapsible crate (C) and by the recesses (R) of a lower collapsible crate (C), in such a way to see and check the contents of the lower collapsible crate (C).

[0052] Preferably, the length of the pairs of collapsible longitudinal sides (11, 12) is equal to 3/2 of the length of the collapsible transverse sides (13, 14).

[0053] The 3:2 ratio between the length of the collapsible longitudinal sides and the length of the collapsible transverse sides is calculated in such a way to form a stack of crates that comprises an overlapped set of layers (Q1, Q2) of crates (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50), wherein each layer (Q1, Q2) comprises five crates (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50).

[0054] Preferably, the crates (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50) of each layer (Q1, Q2) have each collapsible side (11, 12, 13, 14) in idle position.

[0055] With reference to Figs. 6 and 7, the five crates (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50) of each layer (Q1, Q2) are disposed in such a way that three crates (C3, C4, C5; C30, C40, C50) are disposed side by side and have the longitudinal axis (Y3-Y3, Y4-Y4, Y5-Y5; Y30-Y30, Y40-Y40, Y50-Y50) in parallel position, and two crates (C1, C2; C10, C20) are disposed in series with longitudinal axis (Y1-Y1, Y2-Y2; Y10-Y10, Y20-Y20) in coincident perpendicular position relative to the longitudinal axes (Y3-Y3, Y4-Y4, Y5-Y5; Y30-Y30, Y40-Y40, Y50-Y50) of the three crates (C3, C4, C5; C30, C40, C50) in side by side position.

[0056] Each layer (Q1; Q2) comprises a first crate (C1; C10) and a second crate (C2; C20) disposed in series, and a third crate (C3; C30), a fourth crate (C4; C40) and a fifth crate (C5; C50) in parallel position.

[0057] In order to understand the cooperation mode of the crates (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50) of the layers (Q1, Q2), the four feet of the male centering means (3) disposed on the bottom walls (10) of each crate (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50) will be defined as first foot (310a, 320a, 330a, 340a, 350a), second foot (310b, 320b, 330b, 340b, 350b), third foot (310c, 320c, 330c, 340c, 350c) and fourth foot (310d, 320d, 330d, 340d, 350d; likewise, the lateral housings of the female centering means (2) will be defined as first lateral housing (210a, 220a, 230a, 240a, 250a) and second lateral housing (210b, 220b, 230b, 240b, 250b).

[0058] Fig. 6 is a top view of the lower layer (Q1), whereas Fig. 7 is a bottom view of the upper layer (Q2).

[0059] The two layers (Q1, Q2) shown in Fig. 6 and 7 are directed in such a way to be disposed one on top of the other, rotated by 180°, as shown in Fig. 8.

[0060] Figs. 6, 7 and 8 describe the arrangement of the crates (C10, C20, C30, C40, C50) of the upper layer

(Q2) on top of the crates (C1, C2, C3, C4, C5) of the lower layer (Q1).

[0061] The first crate (C10) of the upper layer (Q2) is partially disposed on top of the fifth crate (C5) of the lower layer (Q1) and partially on top of the fourth crate (C4) of the lower layer (Q1).

[0062] Specifically, the first foot and the fourth foot (310a, 310d) of the first crate (C10) of the upper layer (Q2) are respectively inserted in the first lateral housing (250a) and in the central housing (250c) obtained on the first longitudinal side (11) of the fifth crate (C5) of the lower layer (Q1).

[0063] The second foot (310b) of the first crate (C10) of the upper layer (Q2) is disposed in such a way that the longitudinal side (31, 32) is inserted in the long parallel section (22) of the first lateral housing (240a) obtained on the first longitudinal side (11) of the fourth crate (C4) of the lower layer (Q1), and the transverse side (33) is disposed in a gap (P) provided between the first free border (11c) of the first longitudinal edge (11) and the free border (12c) of the second longitudinal side (12).

[0064] The third foot (310c) of the first crate (C10) of the upper layer (Q2) is disposed in such a way that the second section (31) and the first section (32) of the longitudinal side (31, 32) are respectively inserted in the main section (24) and in the separate section (25) of the parallel section (24, 25) of the central housing (240c).

[0065] The second crate (C20) of the upper layer (Q2), which is disposed in series relative to the first crate (C10) of the upper layer (Q2), is partially disposed on top of the third crate (C3) of the first layer (Q1) and partially on top of the fourth crate (C4) of the first layer (Q1) with the feet (320a, 320b, 320c, 320d) disposed in the same way as the feet (310a, 310b, 310c, 310d) of the first crate (C10) of the second layer (Q2).

[0066] The fourth crate (C40) of the second layer (Q2), which is disposed between the third crate (C30) and the fifth crate (C50) of the second layer (Q2), is rested on top of the fourth crate (C4), of the second crate (C2) and of the first crate (C1) of the first layer (Q1). Specifically, the first foot and the fourth foot (340a, 340d) of the fourth crate (C40) of the second layer (Q2) are respectively inserted in the second lateral housing (240b) obtained on the second longitudinal side (12) and in the second lateral housing (240b) obtained on the first longitudinal side (11) of the fourth crate (C4) of the first layer (Q1).

[0067] The transverse sides (33) of the first foot and of the fourth foot (340a, 340d) of the fourth crate (C40) of the second layer (Q2) are disposed on the short parallel section (23) of the second lateral housing (240b) obtained on each longitudinal side (11, 12) of the fourth crate (C4) of the first layer (Q1), whereas the longitudinal sides (31, 32) of the first foot and of the second foot (340a, 340d) are disposed on the transverse section (21) of said second lateral housing (240b) obtained on each longitudinal side (11, 12) of the fourth crate (C4) of the lower layer (Q1).

[0068] The third foot (340c) of the fourth crate (C40) of the upper layer (Q2) is inserted in the first lateral housing (210a) obtained on the second longitudinal side (12) of the first crate (C1) of the lower layer (Q1).

[0069] The second foot (340b) of the fourth crate (C40) of the upper layer (Q2) is inserted in the second lateral housing (220b) obtained on the second longitudinal side (12) of the second crate (C2) of the lower layer (Q1).

[0070] The transverse side (33) of the second foot and of the third foot (340b, 340c) of the fourth crate (C40) of the upper layer (Q2) is disposed in correspondence of the transverse section (21) of the lateral housing (2a, 2b) and the longitudinal side (31, 32) is disposed in the short parallel section (23) of the lateral housing (210a, 220b).

[0071] The first foot and the fourth foot (350a, 350d) of the fifth crate (C50) of the second layer (Q2) are inserted in the second lateral housings (250b) of the two longitudinal sides (11, 12) of the fifth crate (C5) of the first layer (Q1), whereas the second foot and the third foot (350b, 350c) are respectively inserted in the central housing (210c) and in the second lateral housing (210b) obtained on the second longitudinal side (12) of the first crate (C1) of the first layer (Q1).

[0072] The first foot and the fourth foot (330a, 330d) of the third crate (C30) of the second layer (Q2) are inserted in the second lateral housings (230b) of the two longitudinal sides (11, 12) of the third crate (C3) of the first layer (Q1).

[0073] The second foot and the third foot (330b, 330c) are respectively inserted in the second lateral housing (220b) and in the central housing (220c) obtained on the second longitudinal side (12) of the first crate (C1) of the first layer (Q1).

[0074] Evidently, the same positions of the crates (C10, C20, C30, C40, C50) of the upper layer (Q2) on top of the crates (C1, C2, C3, C4, C5) of the lower layer (Q1) are obtained also when each crate is rotated by 180°.

[0075] With reference to Fig. 12, wherein the position of two layers (Q1, Q2) of crates according to the second embodiment of the invention is illustrated, the transverse sides (33) of the second foot and of the third foot (310b, 310c) of the first crate (C10) of the second layer (Q2) and the transverse sides (33) of the first foot and of the fourth foot (320a, 320d) of the second crate (C20) of the second layer (Q2) are inserted partially in the ending sections (28) of the first lateral housing (240a) and of the central housing (240c) of the fourth crate (C4) of the first layer (Q1).

[0076] Such a stack is suitable if said crates are to be stored and transported on a pallet with 120 cm x 100 cm dimensions.

[0077] More precisely, if crates with longitudinal sides (11, 12) having a length of 60 cm and transverse sides (13, 14) having a length of 40 cm are used, a layer (Q1; Q2) is obtained having the same dimensions as the pallet (120 cm x 100 cm).

[0078] It must be noted that a different pallet can be used, such as for example a 120 cm x 120 cm pallet.

[0079] With reference to Figs. 13 and 14, with a 120 cm x 120 cm pallet, each layer (H1; H2) of the stack comprises six crates (D1, D2, D3, D4, D5, D6, D10, D20, D30, D40, D50, D60).

[0080] In particular, each layer (H1; H2) comprises three first crates (D1, D2, D3; D10, D20, D30) disposed in parallel position and three second crates (D4, D5, D6; D40, D50, D60) disposed in parallel position.

[0081] Each crate of said first three crates (D1, D2, D3; D10, D20, D30) is disposed in series with a crate of said second three crates (D4, D5, D6, D40, D50, D60).

[0082] In such a case, each layer (H1; H2) is rotated by 90° relative to a lower adjacent layer and/or an upper adjacent layer.

[0083] As already mentioned, the male centering means (3) and the female centering means (2) are configured in such a way to insert a male centering means (3) in a female centering means (2) with the two collapsible crates (C) disposed in the same direction.

[0084] In view of the above, the collapsible crates (C) can be disposed one on top of the other with the same direction, as in the prior art.

[0085] In view of the preceding description, the advantages of the collapsible crate (C) of the invention are manifest. Because of the configuration of the male centering means (3) and of the female centering means (2) of the collapsible crate (C) according to the invention, an extremely stable stack can be formed regardless of the number of layers (Q1, Q2).

[0086] Otherwise said, the crates (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50) are interlocked in such a way to generate a stack of crates with a supporting area that is five times (Figs. 6 and 7) or six times (Figs. 12 and 13) larger than the supporting area of a stack in which the crates are disposed one on top of the other. Because of the large supporting area and of the interlocked connection between the various layers of the stack of crates according to the invention, a stack with high stability can be obtained, thus avoiding the stabilization means that are currently used - such as strings, elastic straps and the like - to tie the stacks of traditional collapsible crates in which each stack is composed of an overlapped set of identical collapsible crates that are exactly disposed one on top of the other.

[0087] In spite of the fact that the crate (C) of the invention is only provided with male centering means and female centering means (2, 3), and not with mechanical fastening means, by using the crate (C) of the invention and rotating the various layers (Q1, Q2; H1, H2) of the stack, the crates (C) can be mechanically interlocked, preventing the crates from oscillating laterally relative to a vertical direction.

[0088] Moreover, the collapsible crate (C) of the invention can be stored and transported in pallets with different dimensions in order to meet any transport requirement.

[0089] Numerous variations and modifications can be made to the present embodiment of the invention, which are within the reach of an expert of the field, falling in any case within the scope of the invention as disclosed by the appended claims.

Claims

1. Collapsible crate (C) comprising:

- a bottom wall (10) comprising an upper side (10a) and a lower side (10b);
- a longitudinal axis (Y-Y) and a transverse axis (X-X); said transverse axis (X-X) being perpendicular to said longitudinal axis (Y-Y);
- a pair of collapsible longitudinal sides (11, 12) and a pair of collapsible transverse sides (13, 14); each pair of collapsible sides (11, 12; 13, 14) comprising two opposite collapsible sides; each collapsible side (11, 12, 13, 14) comprising a border hinged to said bottom wall (10) and a free border (11c, 12c, 13c, 14c); each collapsible side (11, 12, 13, 14) being configured in such a way to be in an operating position, wherein said collapsible side (11, 12, 13, 14) is perpendicular to said bottom wall (10), and in an idle position, wherein said collapsible side (11 ,12, 13, 14) is parallel to said bottom wall (10); each collapsible side (11 ,12, 13, 14) comprising a first side that faces said bottom wall (10) when said collapsible side (11, 12, 13, 14) is in idle position, and a second side (41, 42, 43, 44) that faces the opposite direction relative to said first side (11a, 12a, 13a, 14a);

female centering means (2) and male centering means (3); said female centering means (2) being obtained on the second side (41, 42, 43, 44) of the collapsible sides (11, 12; 13, 14) of a pair of collapsible sides (11, 12; 13, 14); said male centering means (3a, 3b, 3c, 3d) being disposed on said lower side (10b) of the bottom wall (10);

wherein said female centering means (2) are configured in such a way that a male centering means (3a, 3b, 3c, 3d) of an upper crate can be inserted in a female centering means (2) of a lower identical collapsible crate (C) when the two identical crates are rotated by 90°;

characterized in that

said female centering means (2) disposed on said at least one pair of sides (11, 12, 13, 14) comprise three "U"-shaped housings (2a, 2b, 2c), of which two lateral housings (2a, 2b) and one central housing (2c); each housing of said three housings (2a, 2b, 2c) comprising two parallel sections (22, 23, 24, 25) and one transverse section (21, 26).

2. The collapsible crate (C) of claim 1, wherein said bottom wall (10) comprises four corners (18a, 18b, 18c, 18d); said male centering means (3) comprise

four feet (3a, 3b, 3c, 3d); each foot (3a, 3b, 3c, 3d) being disposed in a corner (18a, 18b, 18c, 18d) and having an "L" shape with a longitudinal side (31, 32) and a transverse side (33).

3. The collapsible crate (C) of claim 2, wherein said longitudinal side (31, 32) and said transverse side (33) of each foot (3a, 3b, 3c, 3d) are separate; said longitudinal side (31, 32) being divided into two separate sections; said two sections comprising a first section (31) in the proximity of the transverse side (33) and a second section (32); said second section (32) being longer than the first section (31).

4. The collapsible crate (C) of anyone of claims 1 to 3, wherein said three housings (2a, 2b, 2c) are equidistant and wherein the two lateral housings (2a, 2b) are symmetrical relative to a plane passing through the transverse axis (X-X); each lateral housing (2a,2b) comprising a long parallel section (22) and a short parallel section (23), in adjacent position to the central housing (2c).

5. The collapsible crate (C) of claim 4, wherein said parallel sections (24, 25) of the central housing (2c) comprise a main section (24) that extends from the transverse section (26) towards the free border of the side (11,12); said main section (24) having a length equal to the short parallel section (23) of the lateral housings (2a, 2b).

6. The collapsible crate (C) of claim 5, wherein the parallel sections (24, 25) of the central housing (2c) comprise a separate ending section (25); said main section (24) and said separate ending section (25) covering a total distance that is equal to the length of the long parallel section (22) of the lateral housings (2a, 2b); said separate ending section (25) having a length that is equal to the length of the first section (31) of the foot (3a, 3b, 3c, 3d) of the male centering means (3).

7. The collapsible crate (C) of any one of claims 2 to 6, wherein at least one of said "U"-shaped housings (2a, 2b, 2c) of the female centering means (2) comprises an ending section (28) that is parallel to the transverse section (21, 26) and is disposed in the proximity of said free border (11c, 12c, 13c, 14c) of the collapsible side (11, 12, 13, 14); said ending section (28) having a length that is equal to or higher than the transverse side (33) of the feet (3a, 3b, 3c, 3d) of the male centering means (3).

8. The collapsible crate (C) of any one of claims 1 to 7, wherein said free border (11c, 12c, 13c, 14c) of the collapsible sides (11, 12, 13, 14) of at least one pair of collapsible sides (11, 12, 13, 14) comprises a set of projections (S) and a set of recesses (R); said projections (S) and said recesses (R) being configured in such a way that when said collapsible sides (11, 12, 13, 14) are in idle position, the projections (S) of the free border (11c, 12c, 13c, 14c) of a collapsible side (11, 12, 13, 14) are inserted in the recesses (R) of the free border (11c, 12c, 13c, 14c) of the collapsible side (11, 12, 13, 14) in opposite position.

9. The collapsible crate (C) of any one of claims 1 to 8, wherein the collapsible sides of the pair of longitudinal sides (11, 12) have a length that is equal to 3/2 of the length of the collapsible sides of the pair of transverse sides (13, 14).

10. Stack of crates comprising an overlapped set of layers of crates (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50); each layer comprising five crates (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50) according to any one of claims 1 to 9; said five crates (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50) of each layer being disposed in such a way that three crates (C3, C4, C5; C30, C40, C50) are disposed in adjacent position and have the longitudinal axis (Y3-Y3, Y4-Y4, Y5-Y5; Y30-Y30, Y40-Y40, Y50-Y50) in parallel position, and two crates (C1, C2; C10, C20) have the longitudinal axis (Y1-Y1, Y2-Y2; Y10-Y10, Y20-Y20) in coincident perpendicular position to the longitudinal axes (Y3-Y3, Y4-Y4, Y5-Y5; Y30-Y30, Y40-Y40, Y50-Y50) of the three crates (C3, C4, C5; C30, C40, C50) in adjacent position.

11. The stack of crates of claim 10, wherein each layer (Q1, Q2) is rotated by 180° relative to the upper adjacent layer (Q2) and/or the lower adjacent layer (Q1).

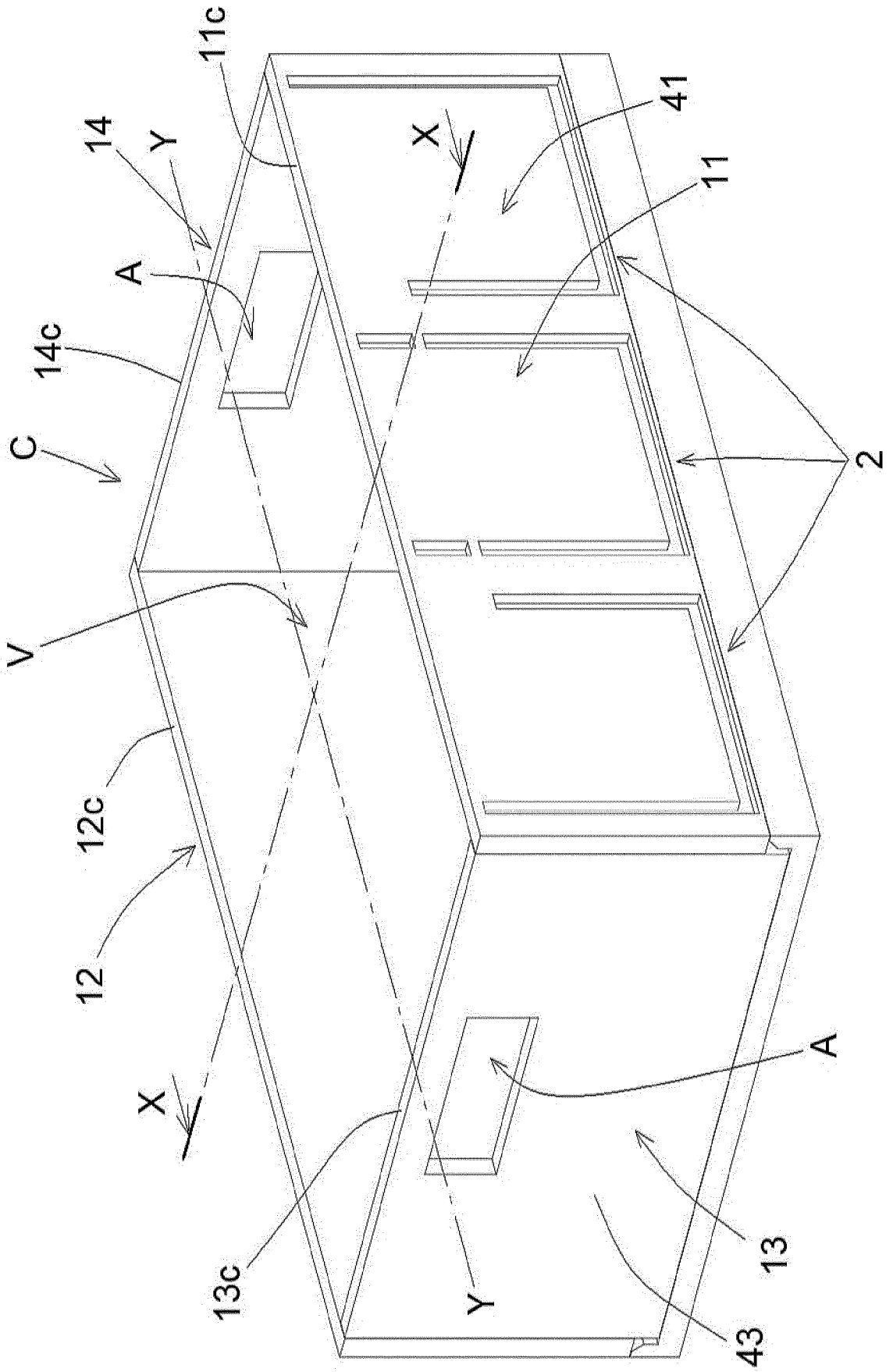

FIG. 1

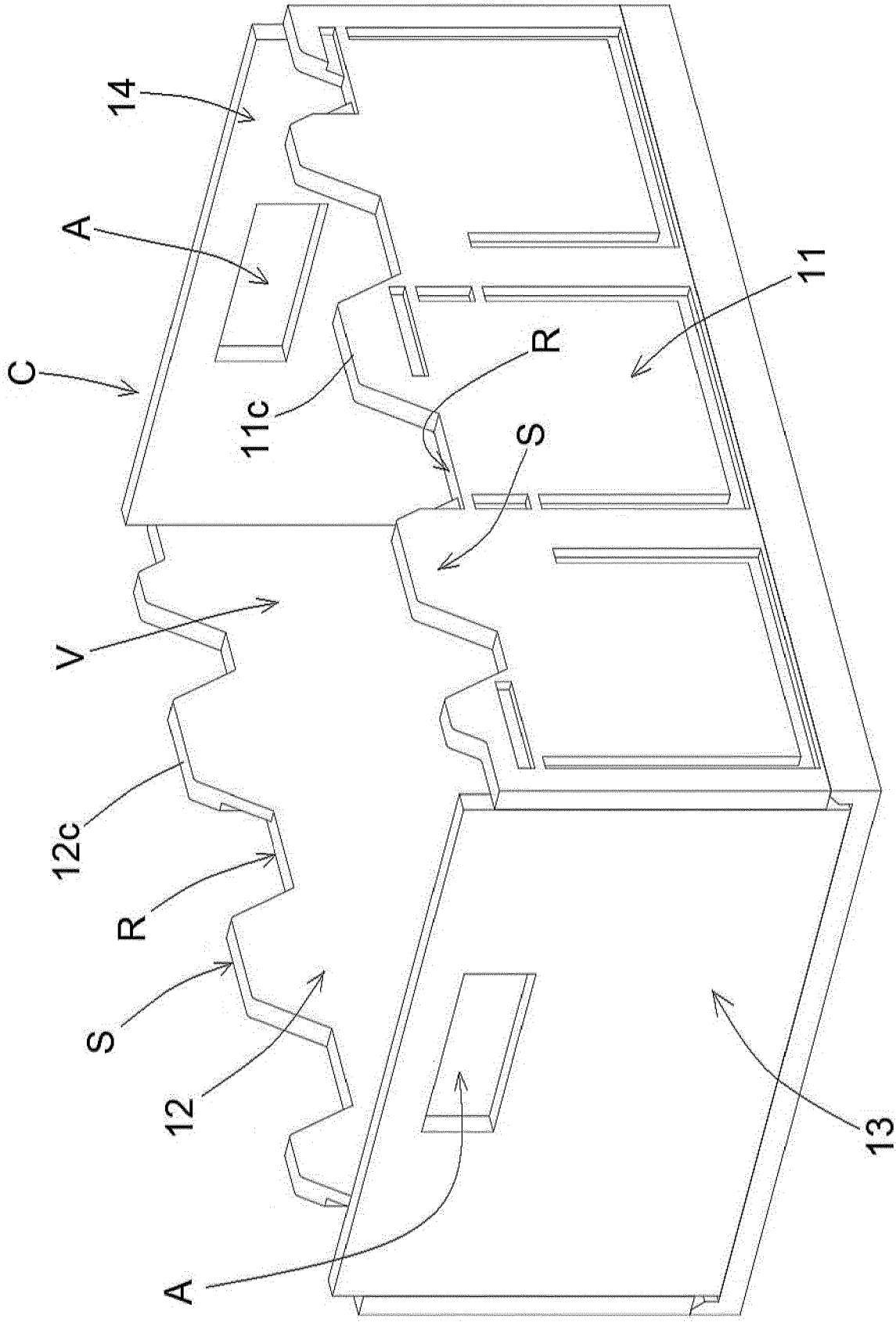

FIG. 1A

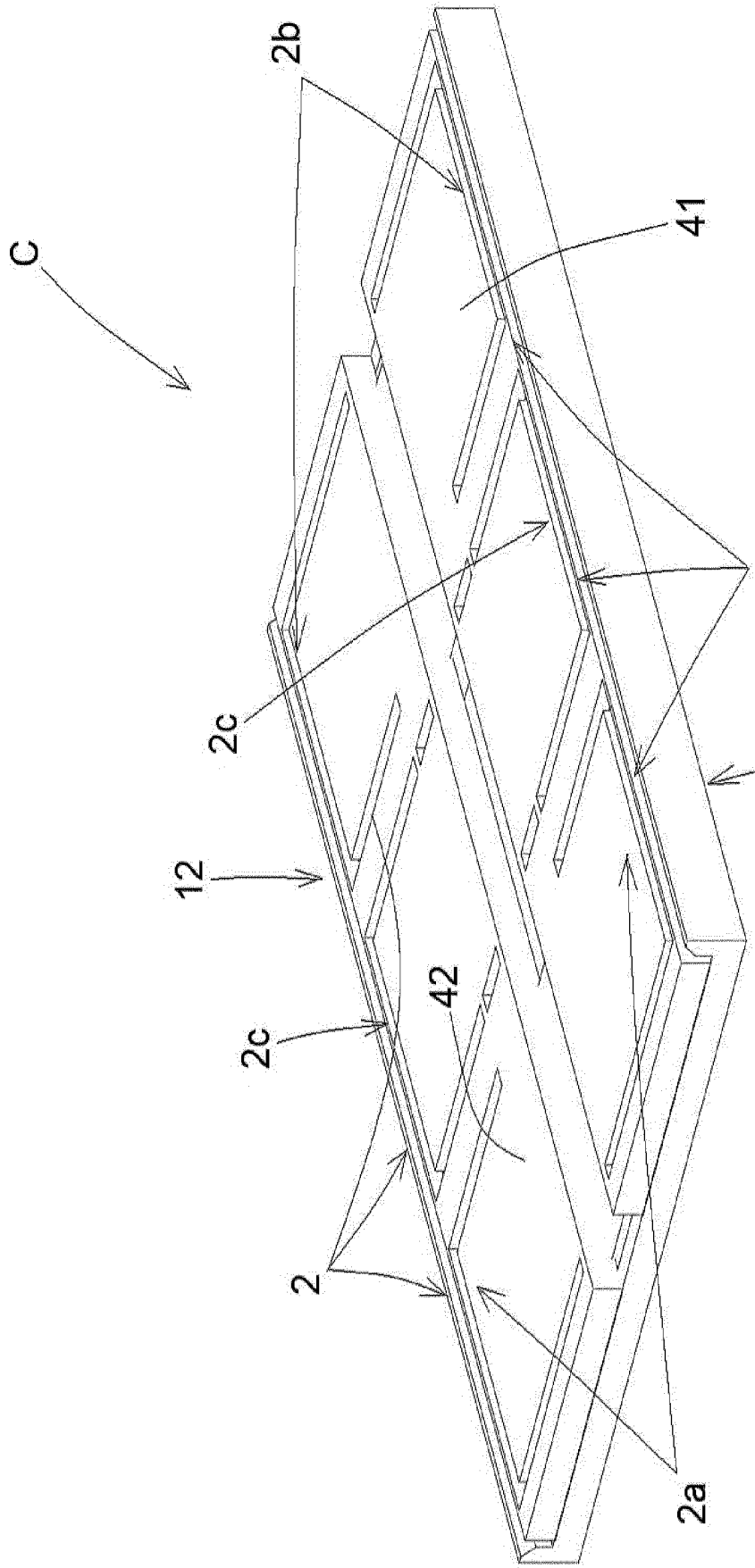

FIG. 2

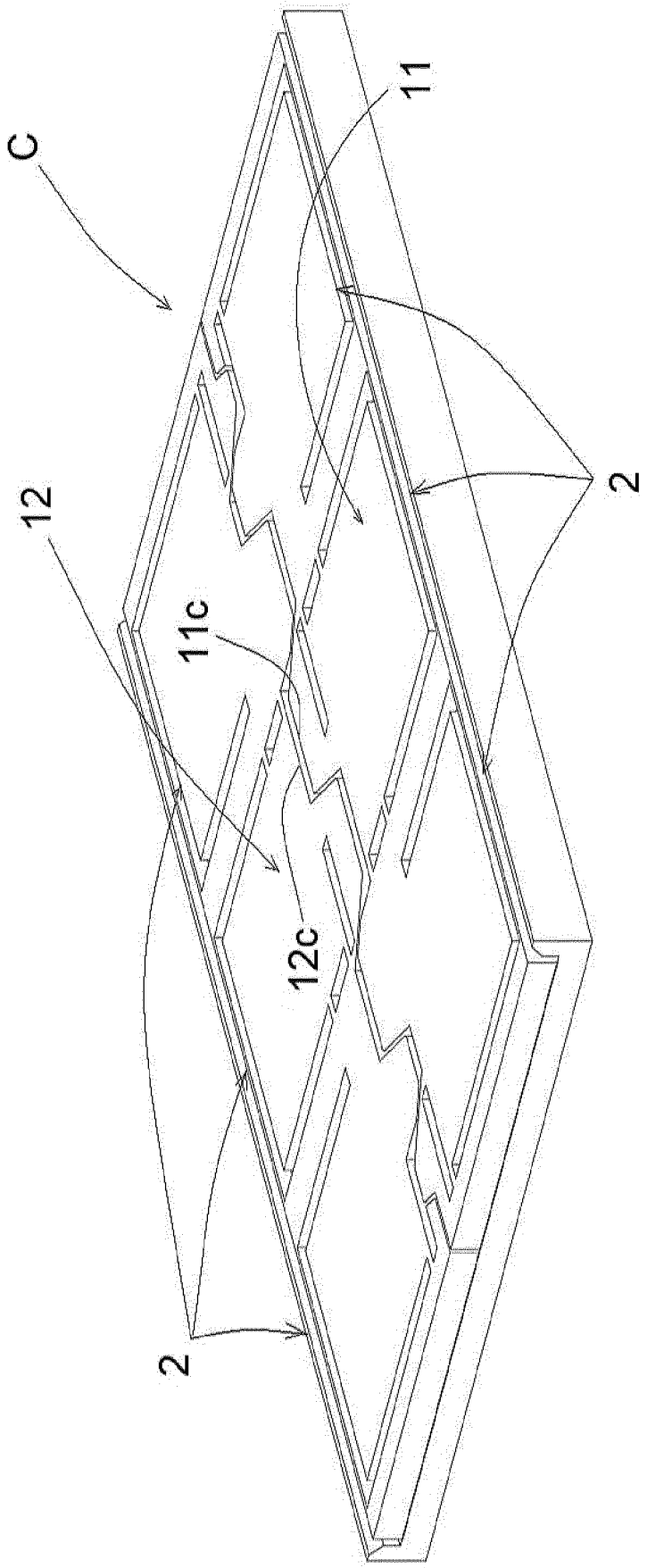

FIG. 2A

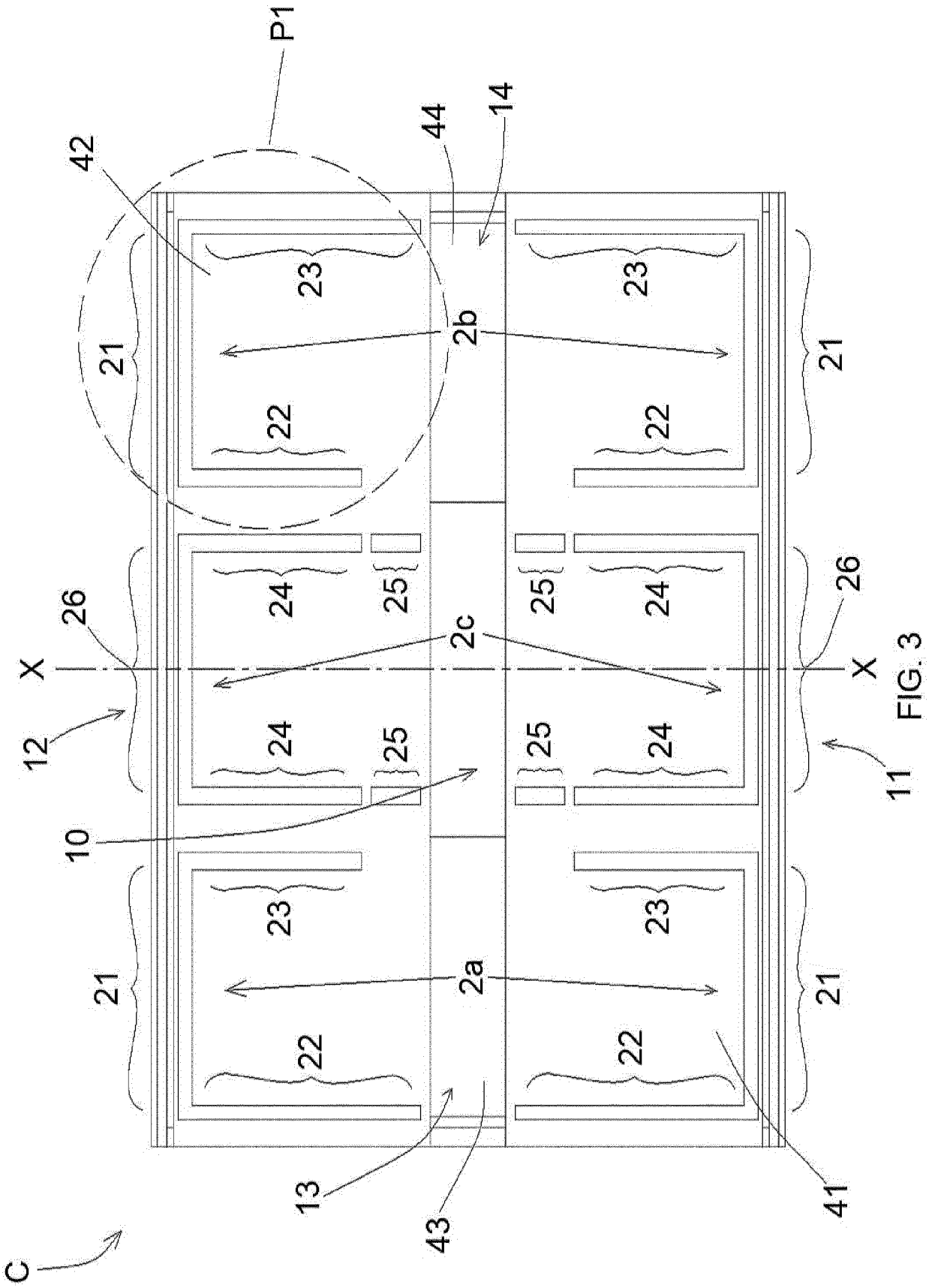

FIG. 3

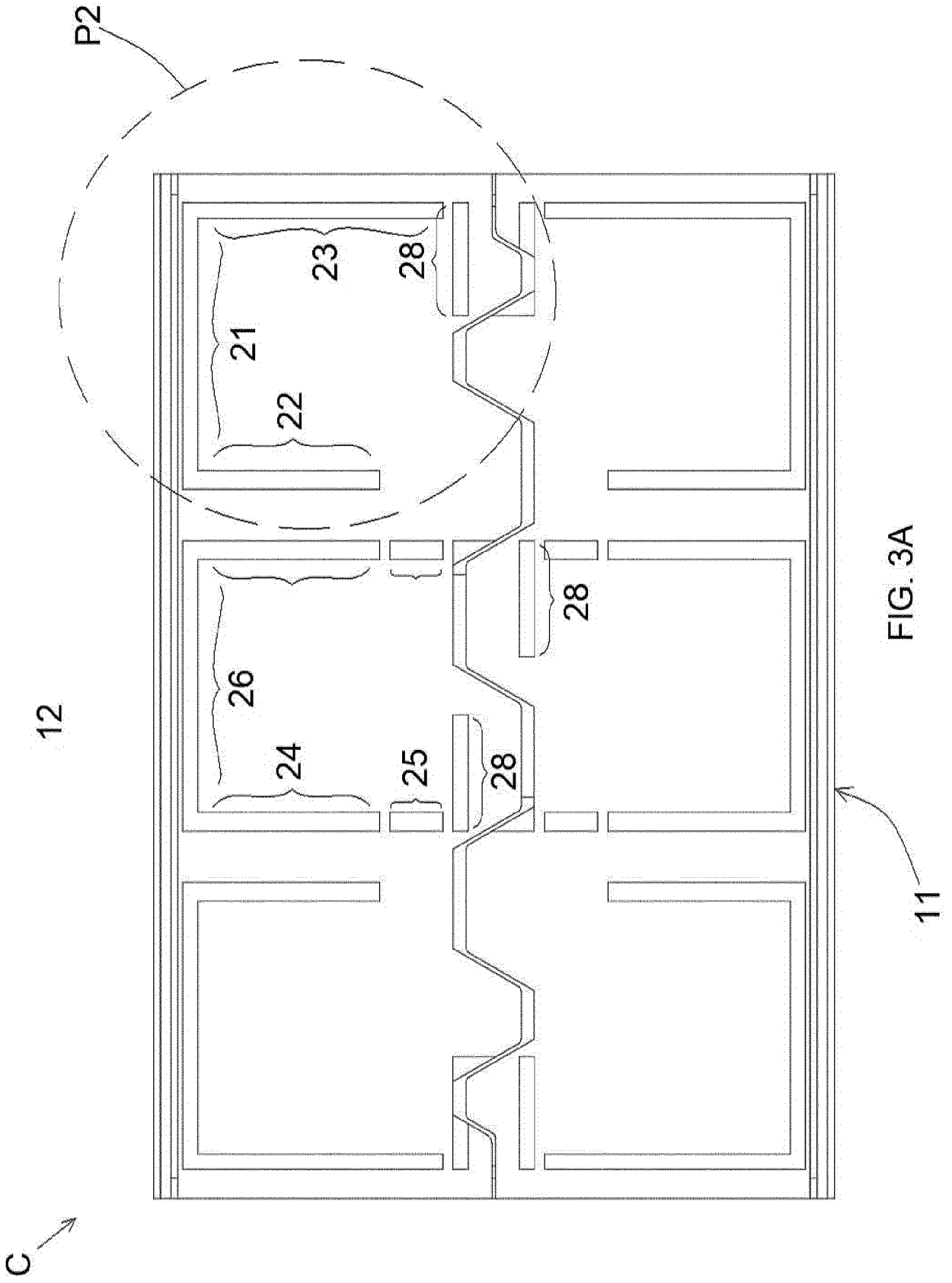

FIG. 3A

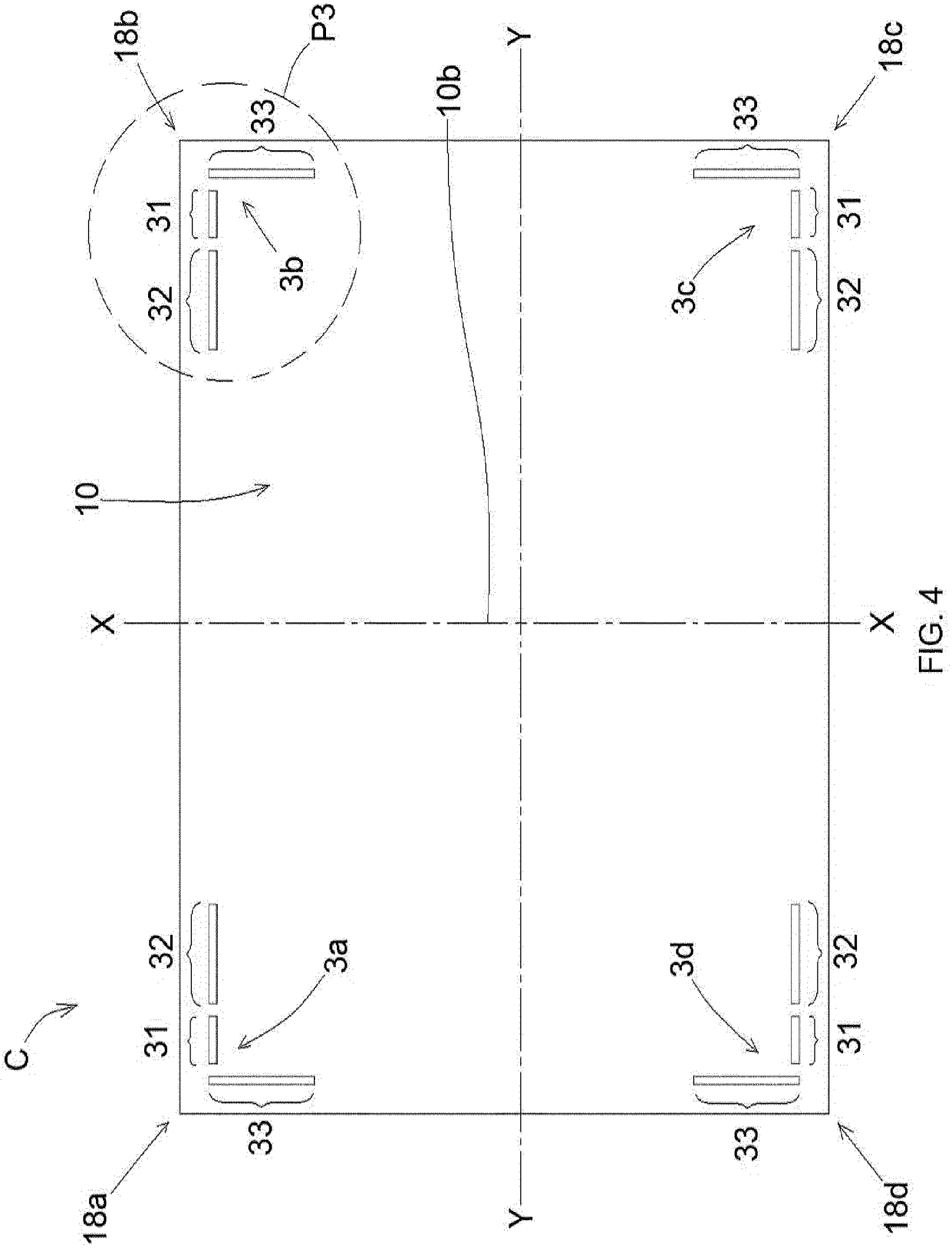
18b
P3
33
10b
Y
18c
33
31
3b
32
3c
31
32
10
X
X
32
3a
3d
32
31
31
C
33
33
18a
Y
18d

FIG. 4

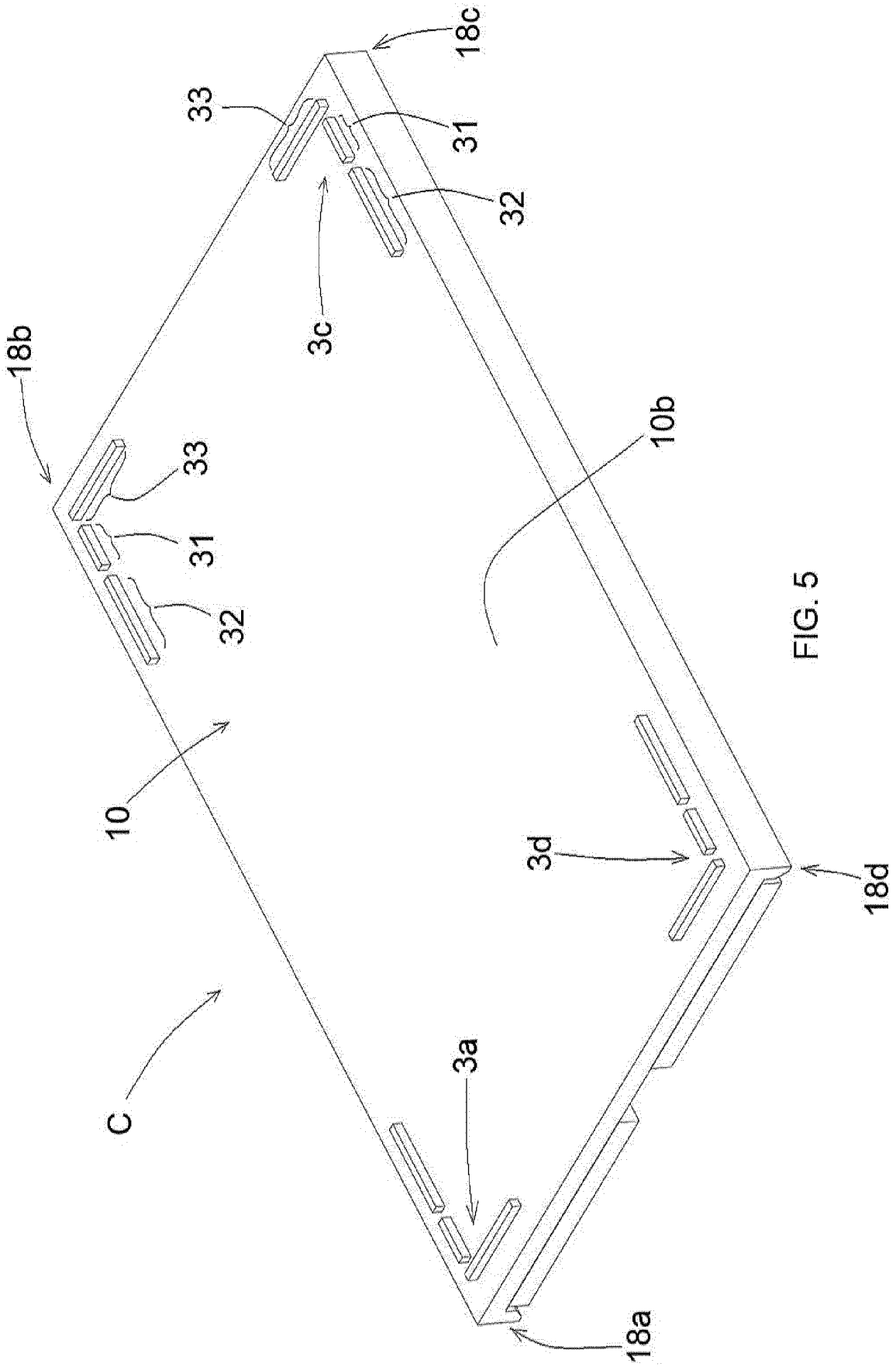

FIG. 5

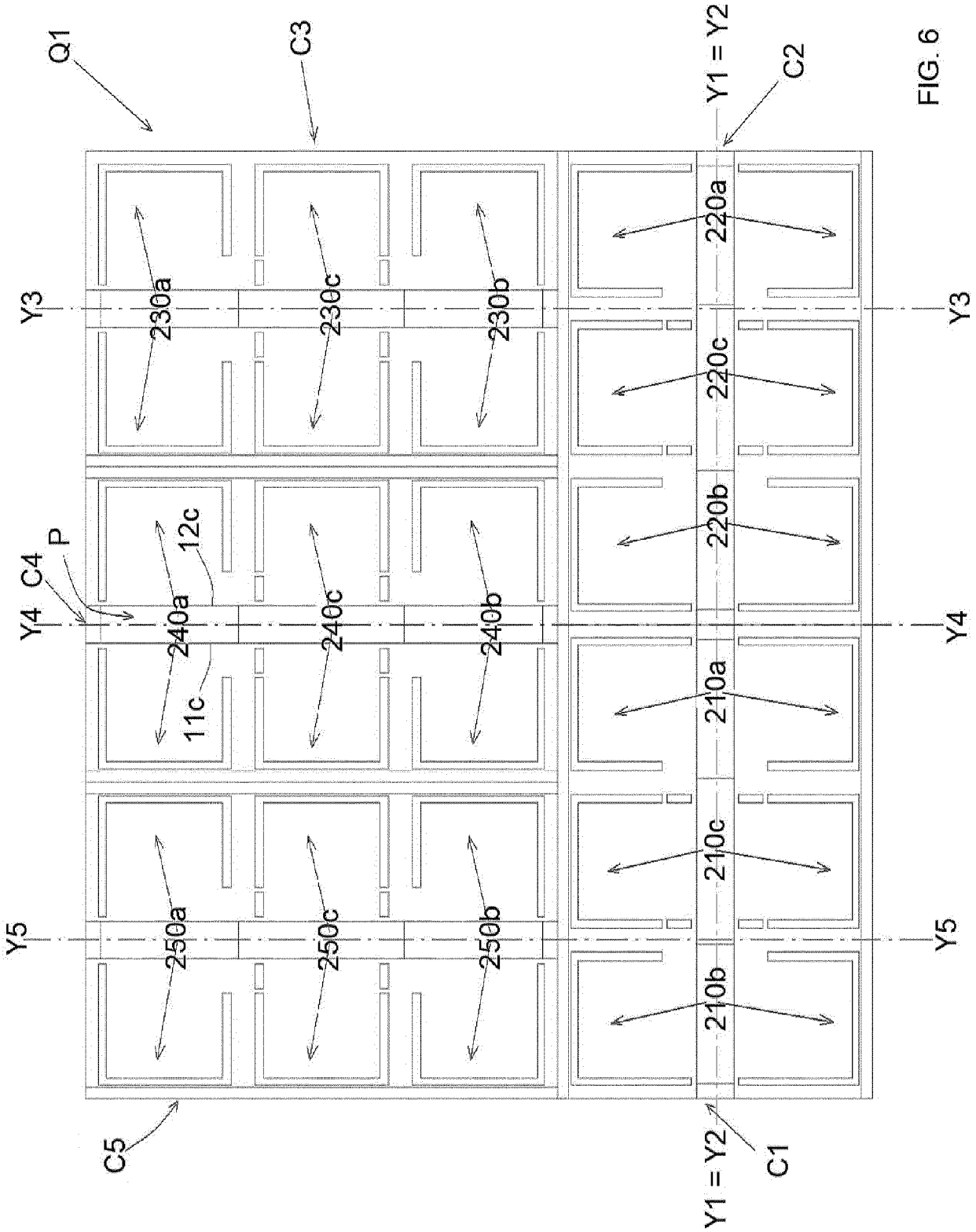
Q1
C3
Y1 = Y2
C2
220a
230a
230c
230b
Y3
Y3
220c
220b
P
C4
12c
Y4
240a
240c
240b
Y4
11c
210a
210c
Y5
250a
250c
250b
Y5
210b
C5
Y1 = Y2
C1

FIG. 6

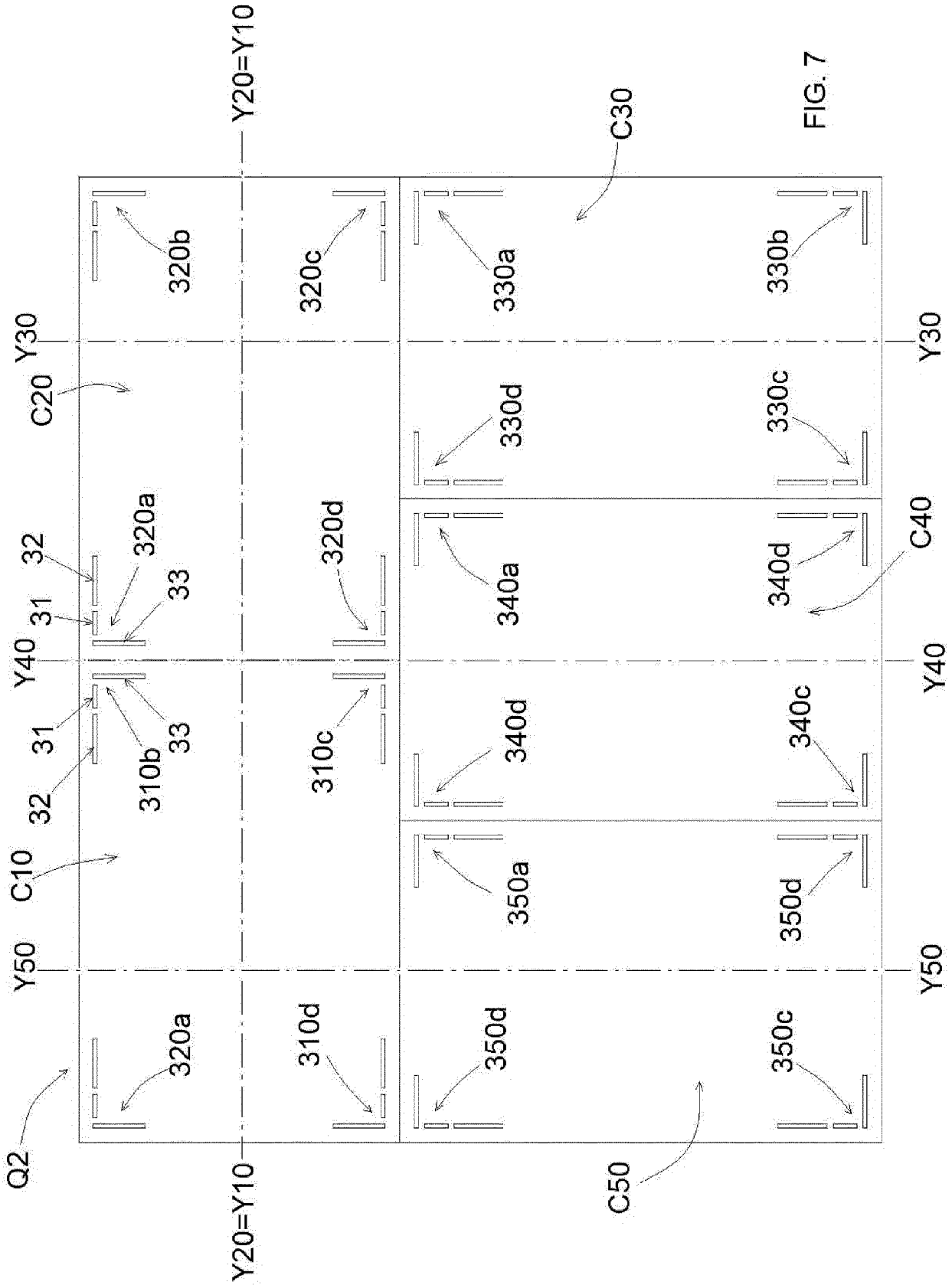
Y20=Y10
C30
320b
320c
330a
330b
Y30
C20
330d
330c
32
320a
33
320d
340a
340d
C40
31
Y40
310b
310c
340d
340c
C10
350a
350d
Y50
320a
310d
350d
350c
Q2
C50
Y20=Y10

FIG. 7

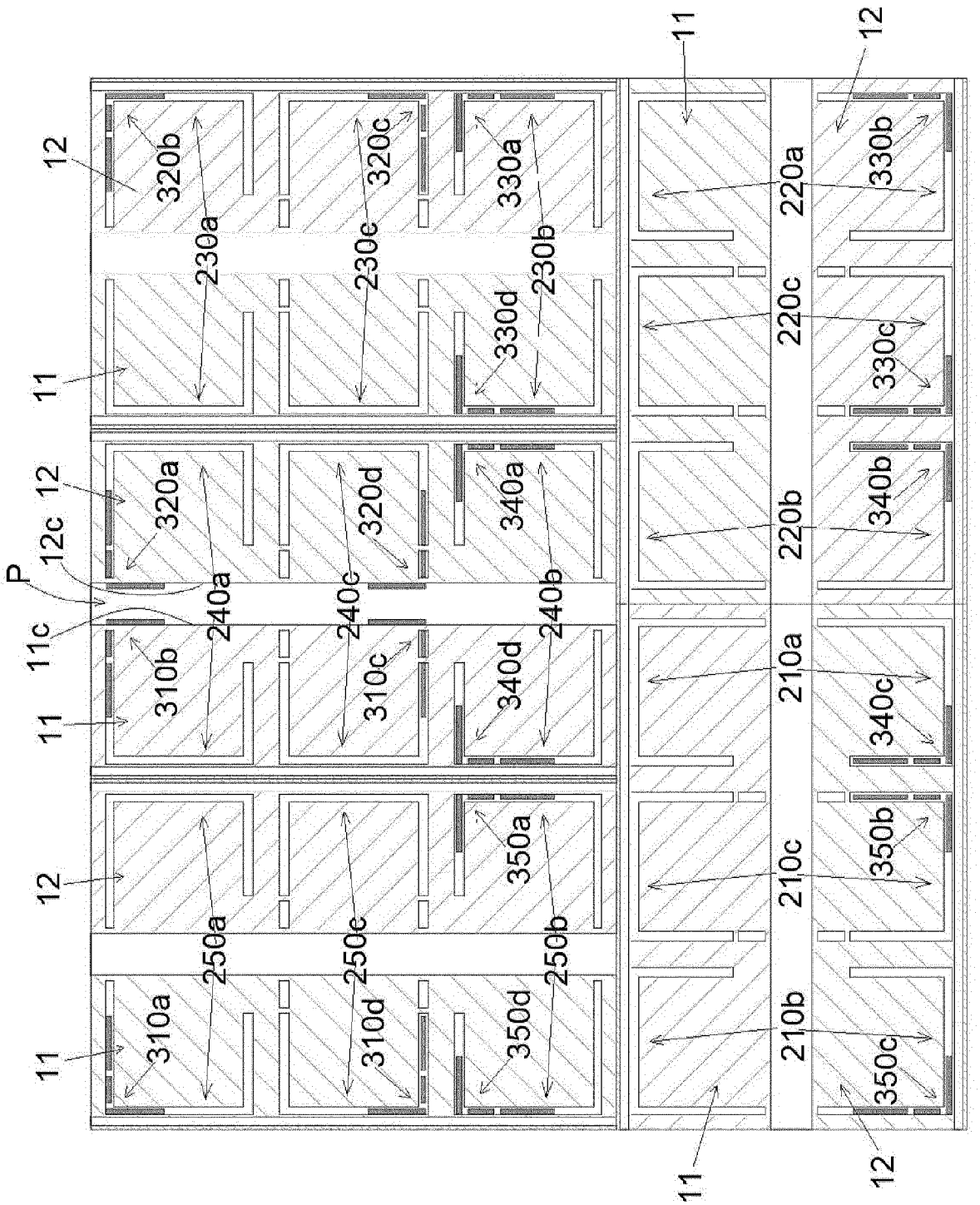
11
12
220a
330b
220c
330c
220b
340b
210a
340c
210c
350b
210b
350c
320b
230a
320c
230c
330a
230b
330d
320a
240a
320d
240c
340a
240b
340d
310b
310c
310a
250a
250c
350a
250b
350d
310d
P
12c
11c

FIG. 8

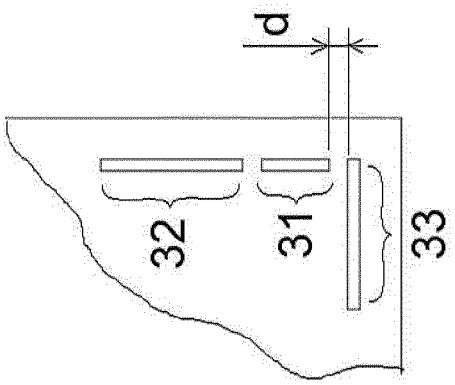

FIG. 11

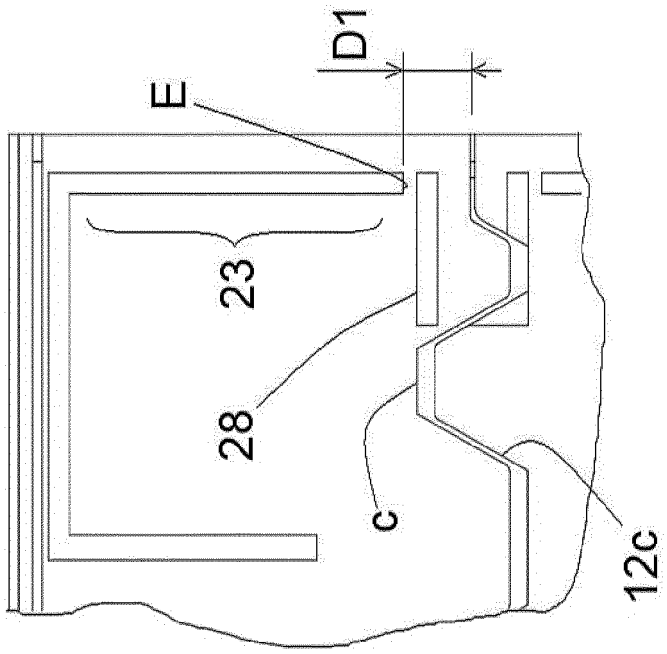

FIG. 10

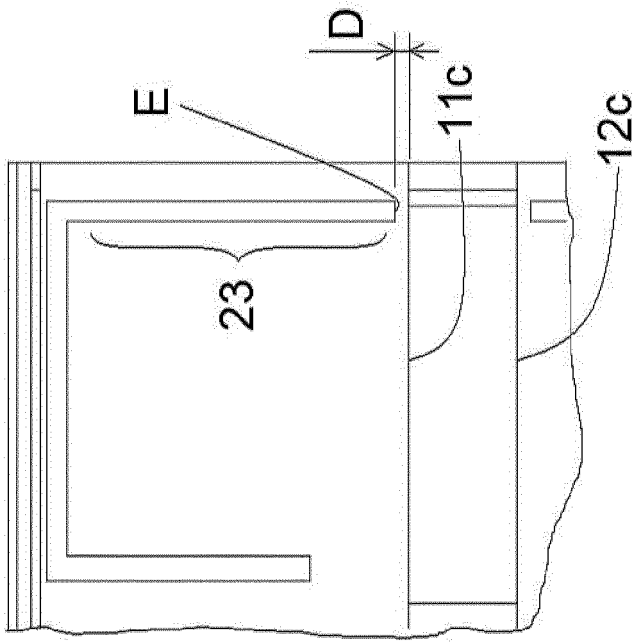

FIG. 9

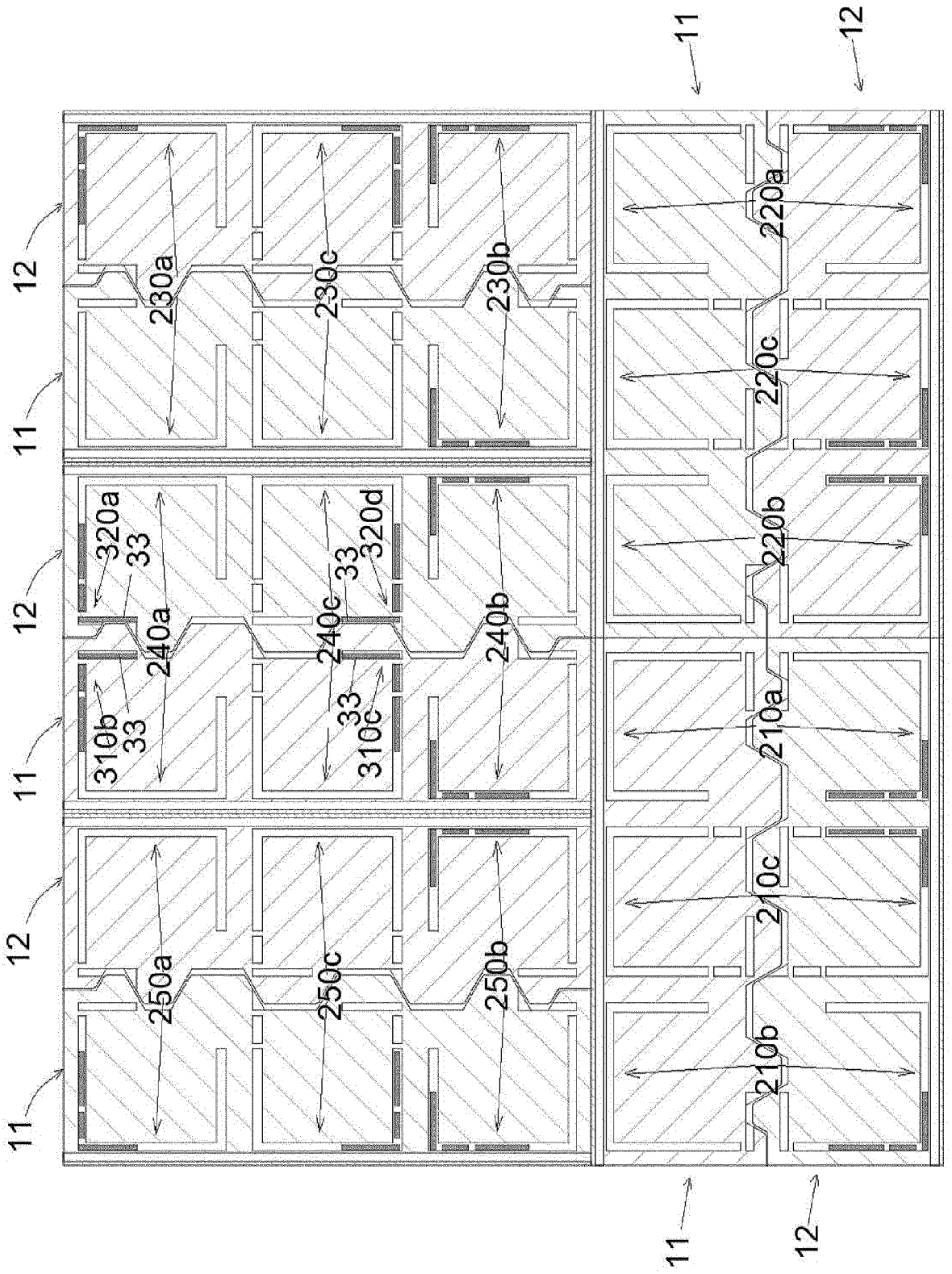
11
12
230a
230c
230b
220a
220c
220b
320a
33
320d
240a
240c
240b
310b
310c
210a
210c
210b
250a
250c
250b

FIG. 12

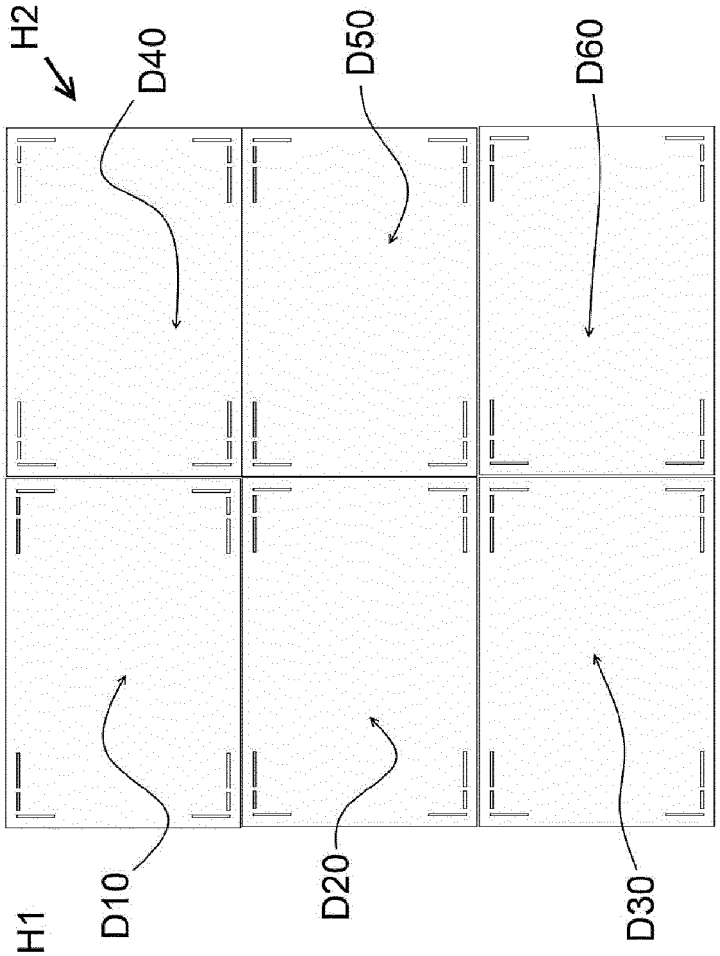

FIG. 14

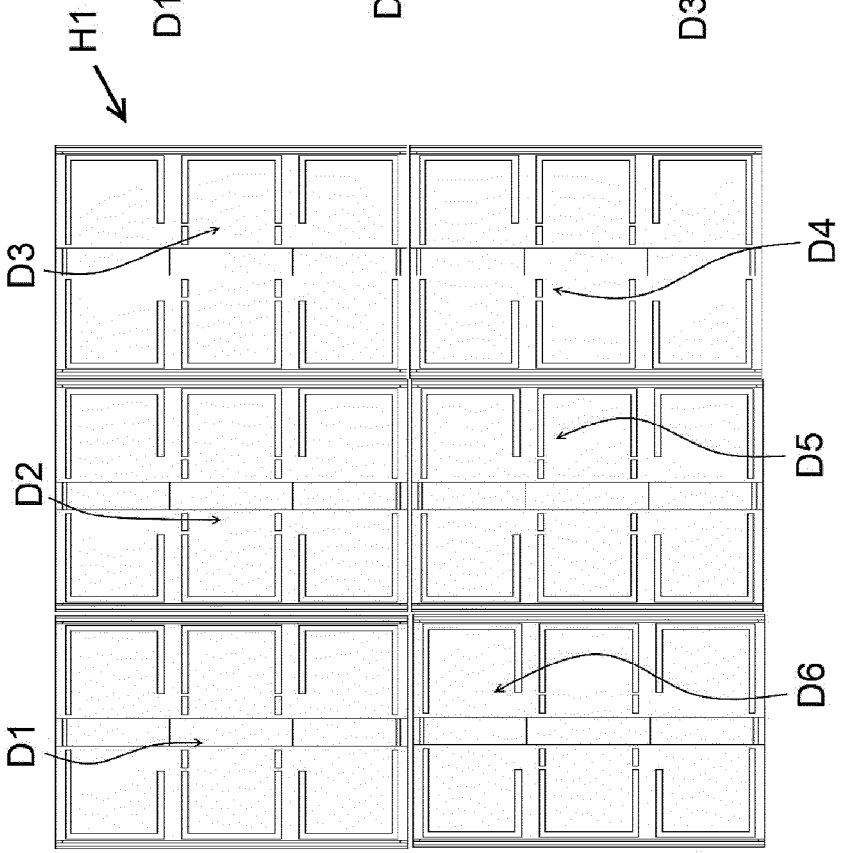

FIG. 13

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 20 1602

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	EP 0 759 400 A2 (MCKECHNIE UK LTD [GB]) 26 February 1997 (1997-02-26) * figures 5, 6 *	1,8-11	INV. B65D6/18
A,D	EP 0 928 745 A2 (MCKECHNIE UK LTD [GB]) 14 July 1999 (1999-07-14) * figures 5, 6 *	1,8-11	
A	DE 10 2010 024097 B3 (UTZ GEORG HOLDING AG [CH]) 14 July 2011 (2011-07-14) * figures 1, 2, 4 *	2,3	

TECHNICAL FIELDS SEARCHED (IPC)
B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 December 2019	Balz, Oliver

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 20 1602

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-12-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0759400 A2	26-02-1997	CA 2184319 A1	01-03-1998
		EP 0759400 A2	26-02-1997
		GB 2303616 A	26-02-1997
		US 5797508 A	25-08-1998
EP 0928745 A2	14-07-1999	DE 69606240 D1	24-02-2000
		EP 0928745 A2	14-07-1999
		GB 2330826 A	05-05-1999
DE 102010024097 B3	14-07-2011	CA 2801840 A1	22-12-2011
		DE 102010024097 B3	14-07-2011
		EP 2582585 A1	24-04-2013
		PL 2582585 T3	27-02-2015
		RU 2013102047 A	27-07-2014
		US 2013081971 A1	04-04-2013
		WO 2011157421 A1	22-12-2011

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 0759400 A **[0012]**
- EP 0928745 A **[0012]**