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

VERBESSERTE STAPELBARE INEINANDERGREIFENDE ZUSAMMENKLAPPBARE KISTEN

CAISSE DÉMONTABLE EMPILABLE À INTERVERROUILLAGE AMÉLIORÉE

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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) with the collapsible sides in said idle position when the upper crate is rotated by 90° with respect to the lower crate;

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 with the collapsible sides in said idle position 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).

Patentansprüche

1. Zusammenklappbare Kiste (C) umfassend:

- eine Bodenwand (10), umfassend eine Oberseite (10a) und eine Unterseite (10b);
- eine Längsachse (Y-Y) und eine Querachse (X-X); wobei die Querachse (X-X) senkrecht zu der Längsachse (Y-Y) ist;
- ein Paar von zusammenklappbaren Längsseiten (11, 12) und ein Paar von zusammenklappbaren Querseiten (13, 14); wobei jedes Paar von zusammenklappbaren Seiten (11, 12, 13, 14) zwei einander zugewandte zusammenklappbare Seiten umfasst; wobei jede zusammenklappbare Seite (11, 12, 13, 14) eine an der Bodenwand (10) angeschlagene Kante und eine freie Kante (11c, 12c, 13c, 14c) umfasst; wobei jede

zusammenklappbare Seite (11, 12, 13, 14) eine Betriebsstellung einnehmen kann, in der die zusammenklappbare Seite (11, 12, 13, 14) senkrecht zu der Bodenwand (10) ist, und eine Ruhestellung, in der die zusammenklappbare Seite (11, 12,13, 14) parallel zu der Bodenwand (10) ist; wobei jede zusammenklappbare Seite (11, 12, 13, 14) eine erste Seite umfasst, die der Bodenwand (10) zugewandt ist, wenn sich die zusammenklappbare Seite (11, 12, 13, 14) in ihrer Ruhestellung befindet, und eine zweite Seite (41, 42, 43, 44), die der entgegengesetzten Richtung relativ zu der ersten Seite (11a, 12a, 13a, 14a) zugewandt ist;

- Nutzentriermittel (2) und Federzentriermittel (3); wobei die Nutzentriermittel (2) auf der zweiten Seite (41, 42, 43, 44) der zusammenklappbaren Seiten (11, 12; 13, 14) eines Paares von zusammenklappbaren Seiten (11, 12, 13, 14) herausgearbeitet sind; wobei die Federzentriermittel (3a, 3b, 3c, 3d) auf der Unterseite (10b) der Bodenwand (10) angeordnet sind;

wobei die Nutzentriermittel (2) derart ausgebildet sind, dass ein Federzentriermittel (3a, 3b, 3c, 3d) einer oberen Kiste in ein Nutzentriermittel (2) einer gleichen, zusammenklappbaren unteren Kiste (C) mit den zusammenklappbaren Seiten in Ruhestellung einsteckbar ist, wenn die obere Kiste in Bezug auf die untere Kiste um 90° gedreht ist;

dadurch gekennzeichnet, dass

die Nutzentriermittel (2), die auf dem mindestens einen Paar von Seiten (11, 12, 13, 14) angeordnet sind, drei U-förmige Sitze (2a, 2b, 2c) umfassen, wovon zwei seitliche Sitze (2a, 2b) und einer ein zentraler Sitz (2c) ist; wobei jeder der drei Sitze (2a, 2b, 2c) zwei parallele Abschnitte (22, 23, 24, 25) und einen Querabschnitt (21, 26) umfasst.

2. Zusammenklappbare Kiste (C) nach Anspruch 1, wobei die Bodenwand (10) vier Ecken (18a, 18b, 18c, 18d) umfasst; wobei die Federzentriermittel (3) vier Füßchen (3a, 3b, 3c, 3d) umfassen; wobei jedes Füßchen (3a, 3b, 3c, 3d) an einer Ecke (18a, 18b, 18c, 18d) angeordnet ist, L-förmig ausgestaltet ist und eine Längsseite (31, 32) und eine Querseite (33) aufweist.

3. Zusammenklappbare Kiste (C) nach Anspruch 2, wobei die Längsseite (31, 32) und die Querseite (33) eines jeden Füßchens (3a, 3b, 3c, 3d) getrennt sind; wobei die Längsseite (31, 32) in zwei voneinander getrennte Abschnitte geteilt ist; wobei die zwei Abschnitte einen ersten Abschnitt (31) in der Nähe der Querseite (33) und einen zweiten Abschnitt (32) umfassen; wobei der zweite Abschnitt (32) länger als der erste Abschnitt (31) ist.

4. Zusammenklappbare Kiste (C) nach einem der Ansprüche 1 bis 3, wobei die drei Sitze (2a, 2b, 2c) gleichmäßig voneinander beabstandet sind und die beiden seitlichen Sitze (2a, 2b) symmetrisch relativ zu einer durch die Querachse (X-X) hindurchgehenden Ebene sind; wobei jeder seitliche Sitz (2a, 2b) einen langen parallelen Abschnitt (22) und einen kurzen parallelen Abschnitt (23) in benachbarter Position zu dem zentralen Sitz (2c) umfasst.

5. Zusammenklappbare Kiste (C) nach Anspruch 4, wobei die parallelen Abschnitte (24, 25) des zentralen Sitzes (2c) einen Hauptabschnitt (24) umfassen, der sich von dem Querabschnitt (26) zu der freien Kante der Seite (11, 12) erstreckt; wobei der Hauptabschnitt (24) eine Länge aufweist, die gleich dem kurzen parallelen Abschnitt (23) der seitlichen Sitze (2a, 2b) ist.

6. Zusammenklappbare Kiste (C) nach Anspruch 5, wobei die parallelen Abschnitte (24, 25) des zentralen Sitzes (2c) einen getrennten Endabschnitt (25) umfassen; wobei der Hauptabschnitt (24) und der getrennte Abschnitt (25) einen Gesamtabstand gleich der Länge des parallelen langen Abschnitts (22) der seitlichen Sitze (2a, 2b) bedecken; wobei der getrennte Endabschnitt (25) eine Länge gleich der Länge des ersten Abschnitts (31) des Füßchens (3a, 3b, 3c, 3d) der Federzentriermittel (3) aufweist.

7. Zusammenklappbare Kiste (C) nach einem der Ansprüche 2 bis 6, wobei mindestens einer der U-förmigen Sitze (2a, 2b, 2c, 2d) der Nutzentriermittel (2) einen Endabschnitt (28) umfasst, der parallel zu dem Querabschnitt (21, 26) ist und in der Nähe der freien Kante (11c, 12c, 13c, 14c) der zusammenklappbaren Seite (11, 12, 13, 14) angeordnet ist; wobei der Endabschnitt (28) eine Länge aufweist, die gleich groß oder größer als die Querseite (33) der Füßchen (3a, 3b, 3c, 3d) der Federzentriermittel (3) ist.

8. Zusammenklappbare Kiste (C) nach einem der Ansprüche 1 bis 7, wobei die freie Kante (11c, 12c, 13c, 14c) der zusammenklappbaren Seiten (11, 12, 13, 14) von mindestens einem Paar von zusammenklappbaren Seiten (11, 12, 13, 14) eine Reihe von Auskragungen (S) und eine Reihe von Ausnehmungen (R) umfasst; wobei die Auskragungen (S) und Ausnehmungen (R) derart ausgebildet sind, dass wenn die zusammenklappbaren Seiten (11, 12, 13, 14) sich in ihrer Ruhestellung befinden, die Auskragungen (S) der freien Kante (11c, 12c, 13c, 14c) einer zusammenklappbaren Seite (11, 12, 13, 14) sich in die Ausnehmungen (R) der freien Kante (11c, 12c, 13c, 14c) der gegenüberliegenden zusammenklappbaren Seite (11, 12, 13, 14) einschieben.

9. Zusammenklappbare Kiste (C) nach einem der An-

sprüche 1 bis 8, wobei die zusammenklappbaren Seiten des Paares von Längsseiten (11, 12) eine Länge von 3/2 der Länge der zusammenklappbaren Seiten des Paares von Querseiten (13, 14) aufweisen.

10. Stapel von Kisten, umfassend eine Reihe von überlappenden Schichten von Kisten (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50); wobei jede Schicht fünf Kisten (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50) mit zusammenklappbaren Seiten in Ruhestellung umfasst, nach einem der Ansprüche 1 bis 9; wobei die fünf Kisten (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50) einer jeden Schicht derart angeordnet sind, dass drei Kisten (C3, C4, C5; C30, C40, C50) nebeneinander liegend angeordnet sind und die Längsachse (Y3-Y3, Y4-Y4, Y5-Y5; Y30-Y30, Y40-Y40, Y50-Y50) parallel ist und zwei Kisten (C1, C2; C10, C20) eine koinzidente Längsachse (Y1-Y1, Y2-Y2; Y10-Y10, Y20-Y20) senkrecht zu den Längsachsen (Y3-Y3, Y4-Y4, Y5-Y5; Y30-Y30, Y40-Y40, Y50-Y50) der drei nebeneinanderliegenden Kisten (C3, C4, C5; C30, C40, C50) aufweisen.

11. Stapel von Kisten nach Anspruch 10, wobei jede Schicht (Q1, Q2) in Bezug auf die benachbarte obere Schicht (Q2) und/oder die benachbarte untere Schicht (Q1) um 180° gedreht ist.

Revendications

1. Caisse rabattable (C) comprenant :

- une paroi de fond (10) comprenant une face supérieure (10a) et une face inférieure (10b) ;
- un axe longitudinal (Y-Y) et un axe transversal (X-X) ; ledit axe transversal (X-X) étant perpendiculaire au dit axe longitudinal (Y-Y) ;
- une paire de rebords longitudinaux rabattables (11, 12) et une paire de rebords transversaux rabattables (13, 14) ; chaque paire de rebords rabattables (11, 12; 13, 14) comprenant deux rebords rabattables opposés entre eux; chaque rebord rabattable (11, 12, 13, 14) comprenant un bord pivoté à ladite paroi de fond (10) et un bord libre (11c, 12c, 13c, 14c) ; chaque rebord rabattable (11, 12, 13, 14) pouvant assumer une position opérationnelle où ledit rebord rabattable (11, 12, 13, 14) est perpendiculaire à ladite paroi de fond (10), et une position de repos où ledit rebord rabattable (11, 12, 13, 14) est parallèle à ladite paroi de fond (10) ; chaque rebord rabattable (11 ,12, 13, 14) comprenant une première face, orientée vers ladite paroi de fond (10), lorsque ledit rebord rabattable (11, 12, 13, 14) est dans sa position de repos, et une seconde face (41, 42, 43, 44) orientée vers le côté opposé par rapport à ladite première face (11a, 12a, 13a, 14a) ;
- des moyens de centrage femelles (2) et des moyens de centrage mâles (3) ; lesdits moyens de centrage femelles (2) étant réalisés sur la seconde face (41, 42, 43, 44) des rebords rabattables (11, 12; 13, 14) d'une paire de rebords rabattables (11, 12; 13, 14) ; lesdits moyens de centrage mâles (3a, 3b, 3c, 3d) étant disposés sur ladite face inférieure (10b) de la paroi de fond (10) ;

où lesdits moyens de centrage femelles (2) sont configurés de sorte qu'un moyen de centrage mâle (3a, 3b, 3c, 3d) d'une caisse supérieure puisse être introduit à l'intérieur d'un moyen de centrage femelle (2) d'une caisse rabattable identique supérieure (C) avec les rebords rabattables dans ladite position de repos, lorsque la caisse supérieure est pivotée de 90° par rapport à la caisse inférieure ;
caractérisée en ce que
lesdits moyens de centrage femelles (2), disposés sur au moins une paire de rebords (11, 12, 13, 14), comprennent trois emplacements (2a, 2b, 2c) en forme de « U », dont deux latéraux (2a, 2b) et un central (2c) ; chaque emplacement des dits trois emplacements (2a, 2b, 2c) comprenant deux segments parallèles (22, 23, 24, 25) et un segment transversal (21, 26).

2. Caisse rabattable (C) selon la revendication 1, où ladite paroi de fond (10) comprend quatre arêtes (18a, 18b, 18c, 18d) ; lesdits moyens de centrage mâles (3) comprenant quatre pieds (3a, 3b, 3c, 3d) ; chaque pied (3a, 3b, 3c, 3d) étant disposé sur une arête (18a, 18b, 18c, 18d) et ayant une forme en « L » et présentant un côté longitudinal (31, 32) et un côté transversal (33).

3. Caisse rabattable (C) selon la revendication 2, où ledit côté longitudinal (31, 32) et ledit côté transversal (33) de chaque pied (3a, 3b, 3c, 3d) sont séparés entre eux ; ledit côté longitudinal (31, 32) étant partagé en deux segments séparés entre eux ; lesdits deux segments comprenant une première section (31) à proximité du côté transversal (33) et une seconde section (32) ; ladite seconde section (32) étant plus longue par rapport à ladite première section (31).

4. Caisse rabattable (C) selon l'une quelconque des revendications de 1 à 3, où lesdits trois emplacements (2a, 2b, 2c) sont équidistants entre eux et les deux emplacements latéraux (2a, 2b) sont symétriques entre eux par rapport à un plan passant par l'axe transversal (X-X) ; chaque emplacement latéral (2a,2b) comprenant un segment parallèle long (22) et un segment parallèle court (23), adjacent à l'em-

placement central (2c).

5. Caisse rabattable (C) selon la revendication 4, où lesdits segments parallèles (24, 25) de l'emplacement central (2c) comprennent une section principale (24), qui se déploie depuis le segment transversal (26) vers le bord libre du rebord (11,12) ; ladite section principale (24) ayant la même longueur que celle du segment parallèle court (23) des emplacements latéraux (2a, 2b).

6. Caisse rabattable (C) selon la revendication 5, où les segments parallèles (24, 25) de l'emplacement central (2c) comprennent une section séparée (25) d'extrémité ; ladite section principale (24) et ladite section séparée (25) d'extrémité couvrant une distance totale égale à la longueur du segment parallèle long (22) des emplacements latéraux (2a, 2b) ; ladite section séparée (25) d'extrémité ayant la même longueur que celle du premier segment (31) du pied (3a, 3b, 3c, 3d) des moyens de centrage mâles (3).

7. Caisse rabattable (C) selon l'une quelconque des revendications de 2 à 6, où au moins l'un des dits emplacements (2a, 2b, 2c) en forme de « U » des moyens de centrage femelles (2) comprennent une section d'extrémité (28) parallèle au segment transversal (21, 26) et disposée à proximité du dit bord libre (11c, 12c, 13c, 14c) du rebord rabattable (11, 12, 13, 14) ; ladite section d'extrémité (28) ayant une longueur égale ou majeure à celle du côté transversal (33) des pieds (3a, 3b, 3c, 3d) des moyens de centrage mâles (3).

8. Caisse rabattable (C) selon l'une quelconque des revendications de 1 à 7, où ledit bord libre (11c, 12c, 13c, 14c) des rebords rabattables (11, 12, 13, 14) d'au moins une paire de rebords rabattables (11, 12, 13, 14) comprend une série de saillies (S) et une série de cavités (R) ; lesdites saillies (S) et cavités (R) étant configurées de manière que lorsque les rebords rabattables (11, 12, 13, 14) sont dans leur position de repos, les saillies (S) du bord libre (11c, 12c, 13c, 14c) d'un rebord rabattable (11, 12, 13, 14) s'introduisent dans les cavités (R) du bord libre (11c, 12c, 13c, 14c) du rebord rabattable (11, 12, 13, 14) opposé.

9. Caisse rabattable (C) selon l'une quelconque des revendications de 1 à 8, où les rebords rabattables de la paire de rebords longitudinaux (11, 12) ont une longueur égale à 3/2 de la longueur des rebords rabattables de la paire de rebords transversaux (13, 14).

10. Pile de caisse comprenant une série superposée de couches de caisses (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50) ; chaque couche comprenant cinq caisses (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50) ayant les bords rabattables dans ladite position de repos, selon l'une quelconque des revendications de 1 à 9 ; lesdites cinq caisses (C1, C2, C3, C4, C5, C10, C20, C30, C40, C50) de chaque couche étant disposées de manière que trois caisses (C3, C4, C5; C30, C40, C50) soient juxtaposées et aient l'axe longitudinal (Y3-Y3, Y4-Y4, Y5-Y5; Y30-Y30, Y40-Y40, Y50-Y50) parallèle entre elles, et deux caisses (C1, C2; C10, C20) ayant axe longitudinal (Y1-Y1, Y2-Y2; Y10-Y10, Y20-Y20) coïncidant entre elles et perpendiculaire par rapport aux axes longitudinaux (Y3-Y3, Y4-Y4, Y5-Y5; Y30-Y30, Y40-Y40, Y50-Y50) des trois caisses (C3, C4, C5; C30, C40, C50) juxtaposées entre elles.

11. Pile de caisses selon la revendication 10, où chaque couche (Q1, Q2) est pivotée de 180° par rapport à la couche adjacente supérieure (Q2) et/ou adjacente inférieure (Q1).

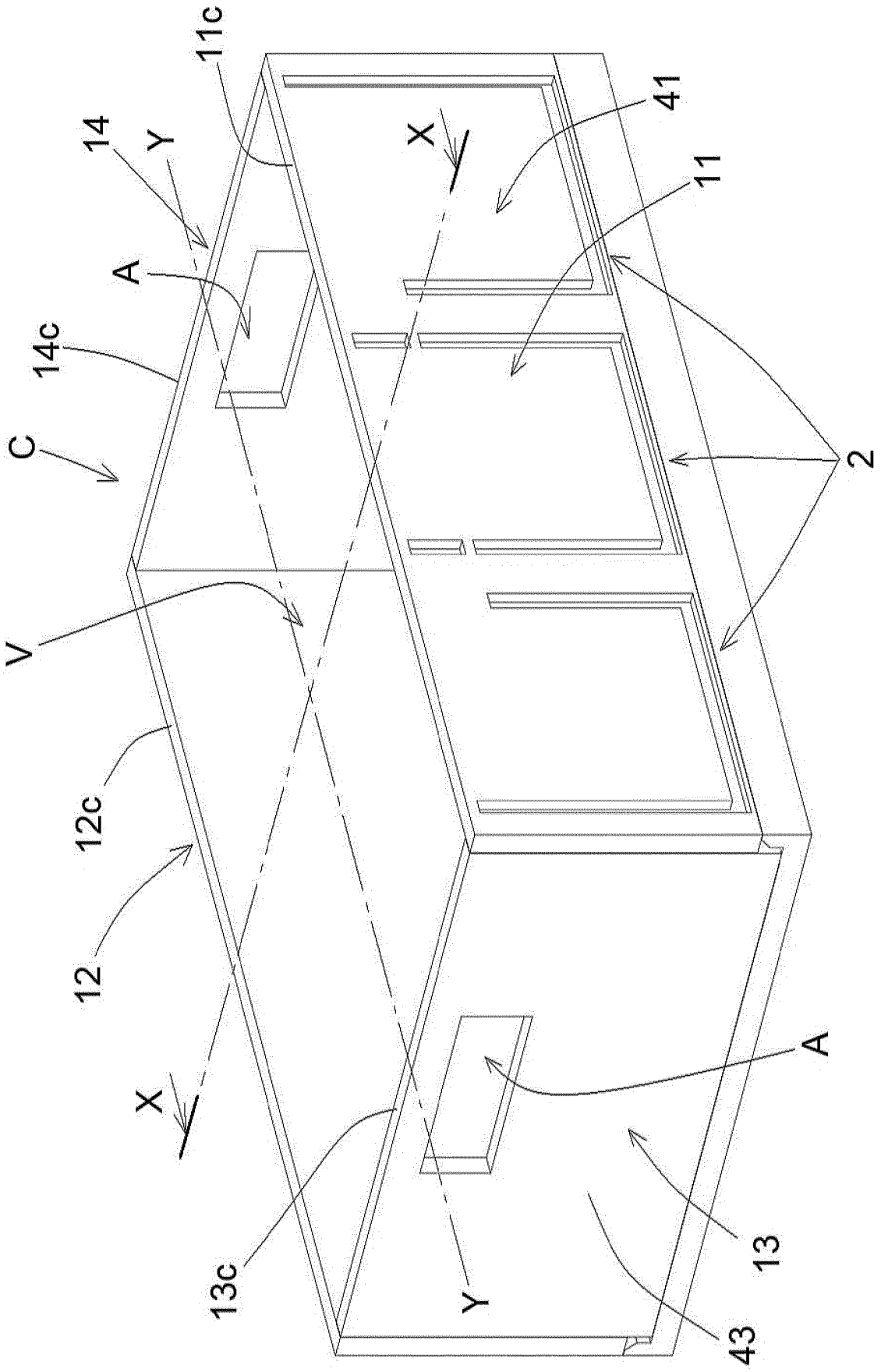


FIG. 1

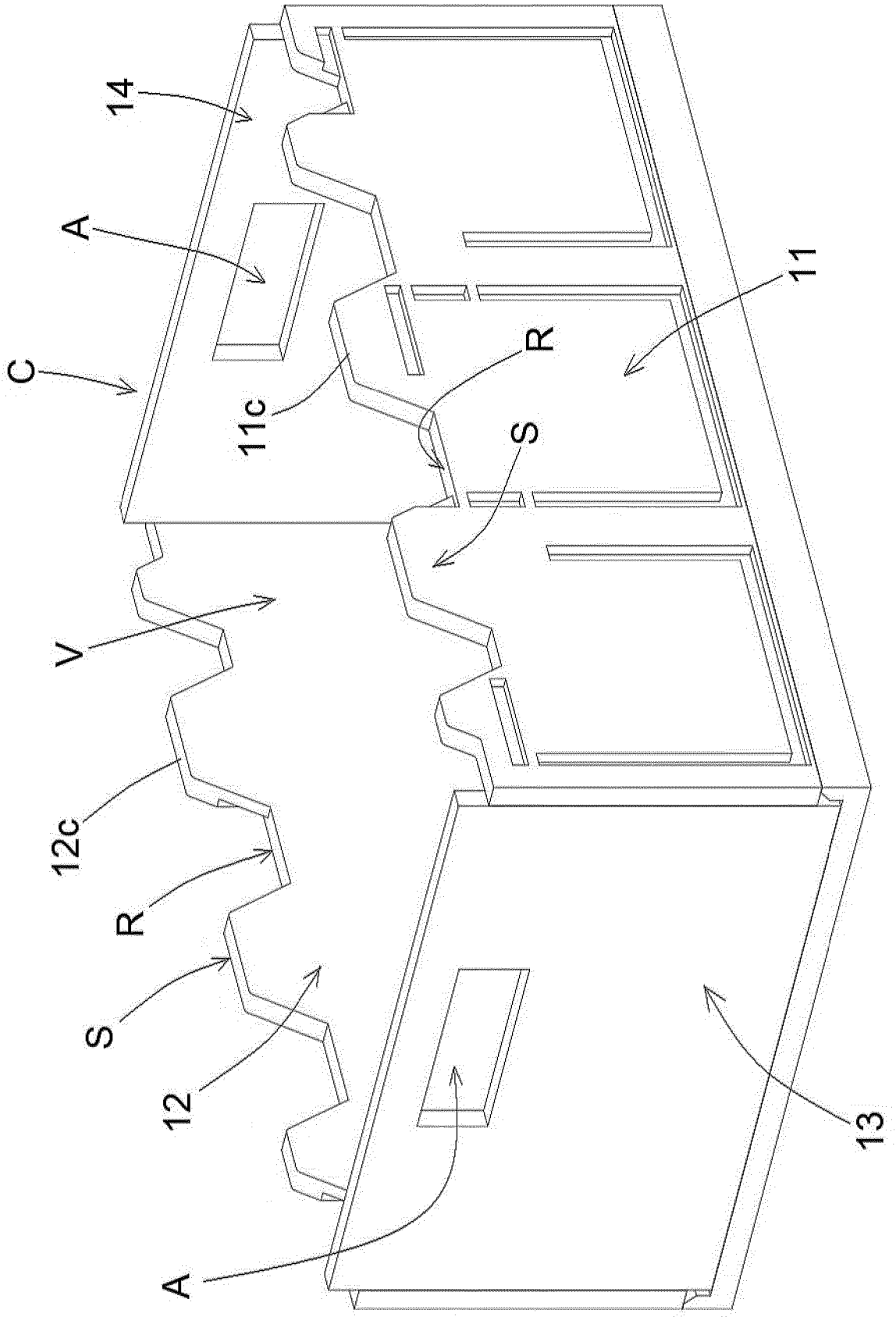


FIG. 1A

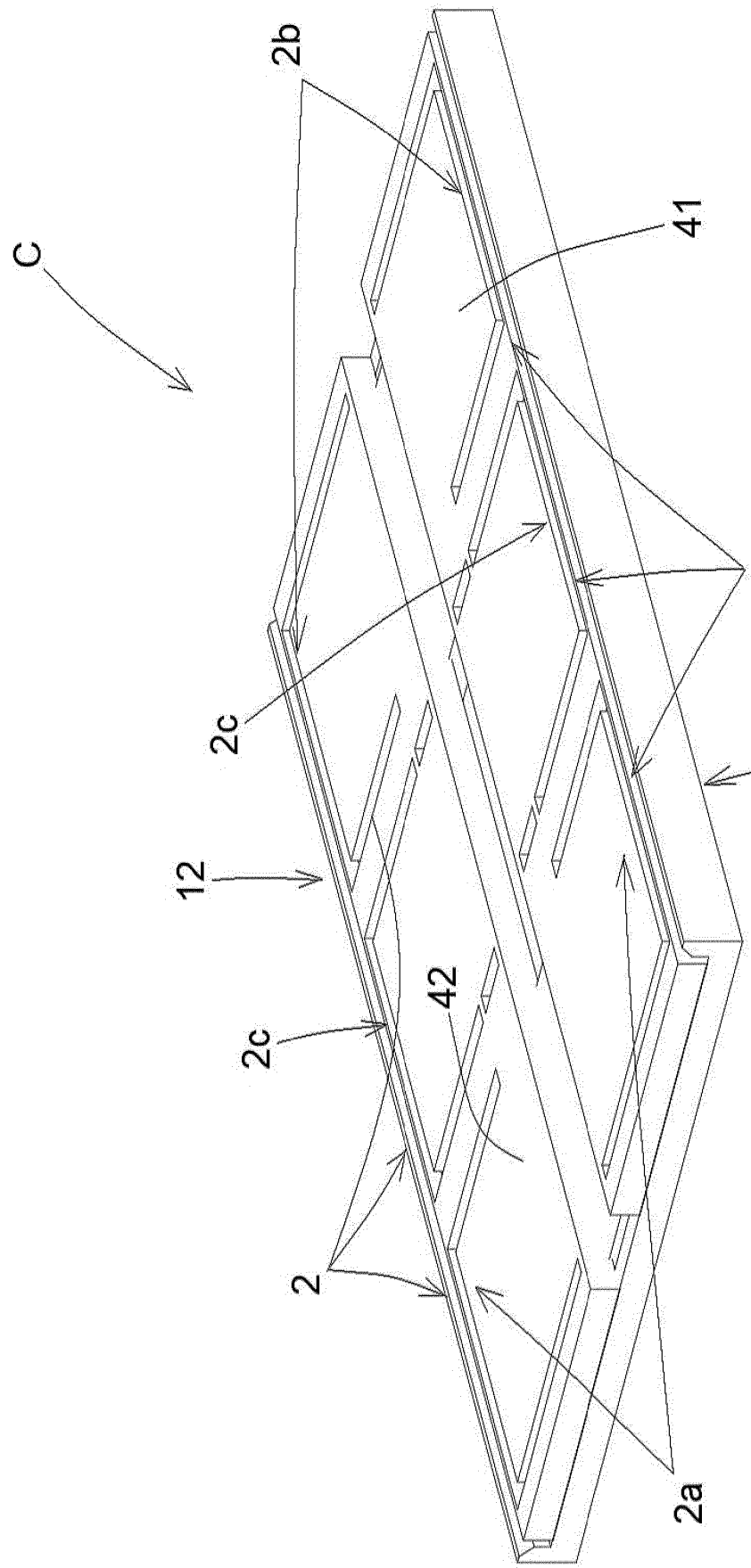


FIG. 2

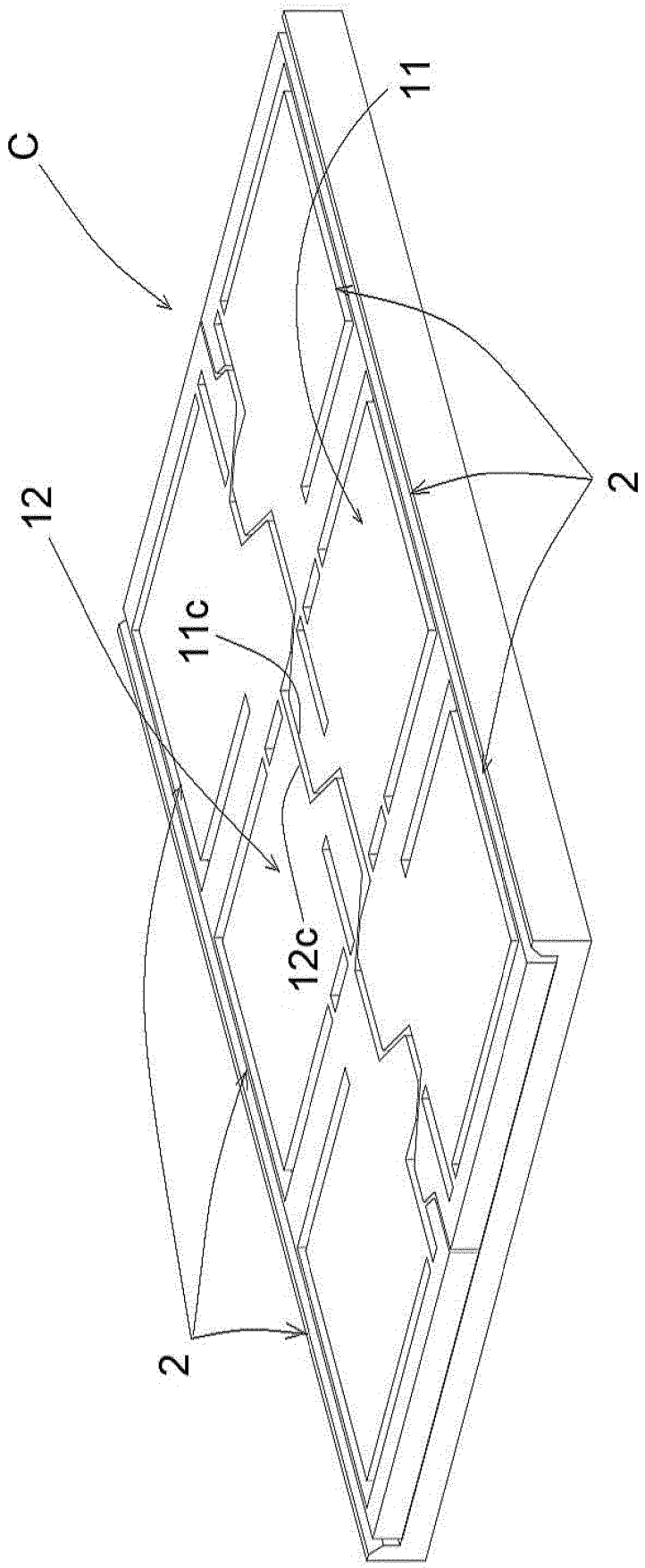


FIG. 2A

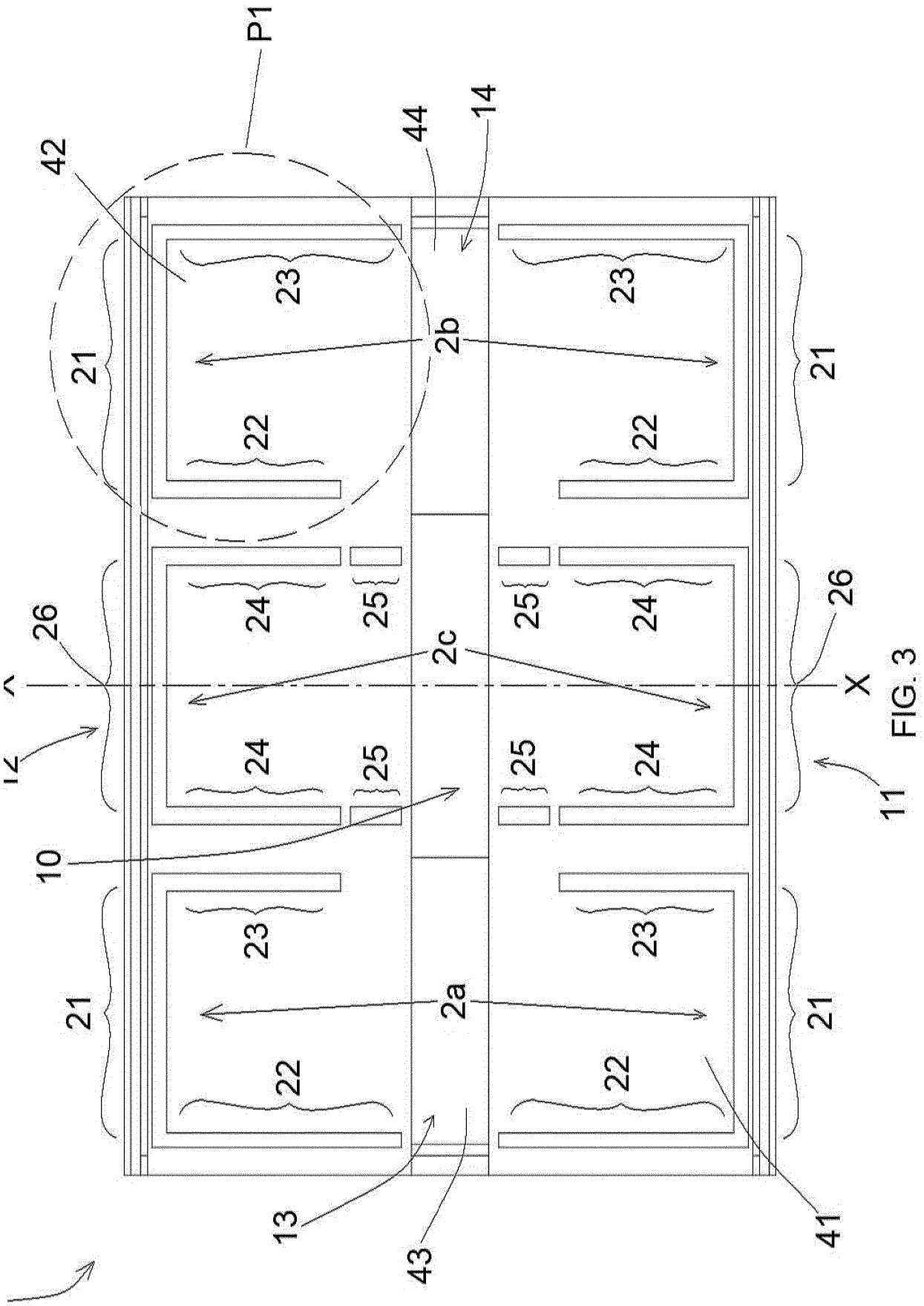

P1
42
44
14
23
23
21
2b
21
22
22
26
24
25
25
24
26
2c
X
24
25
25
24
10
11
23
23
21
2a
21
22
22
13
43
41

FIG. 3

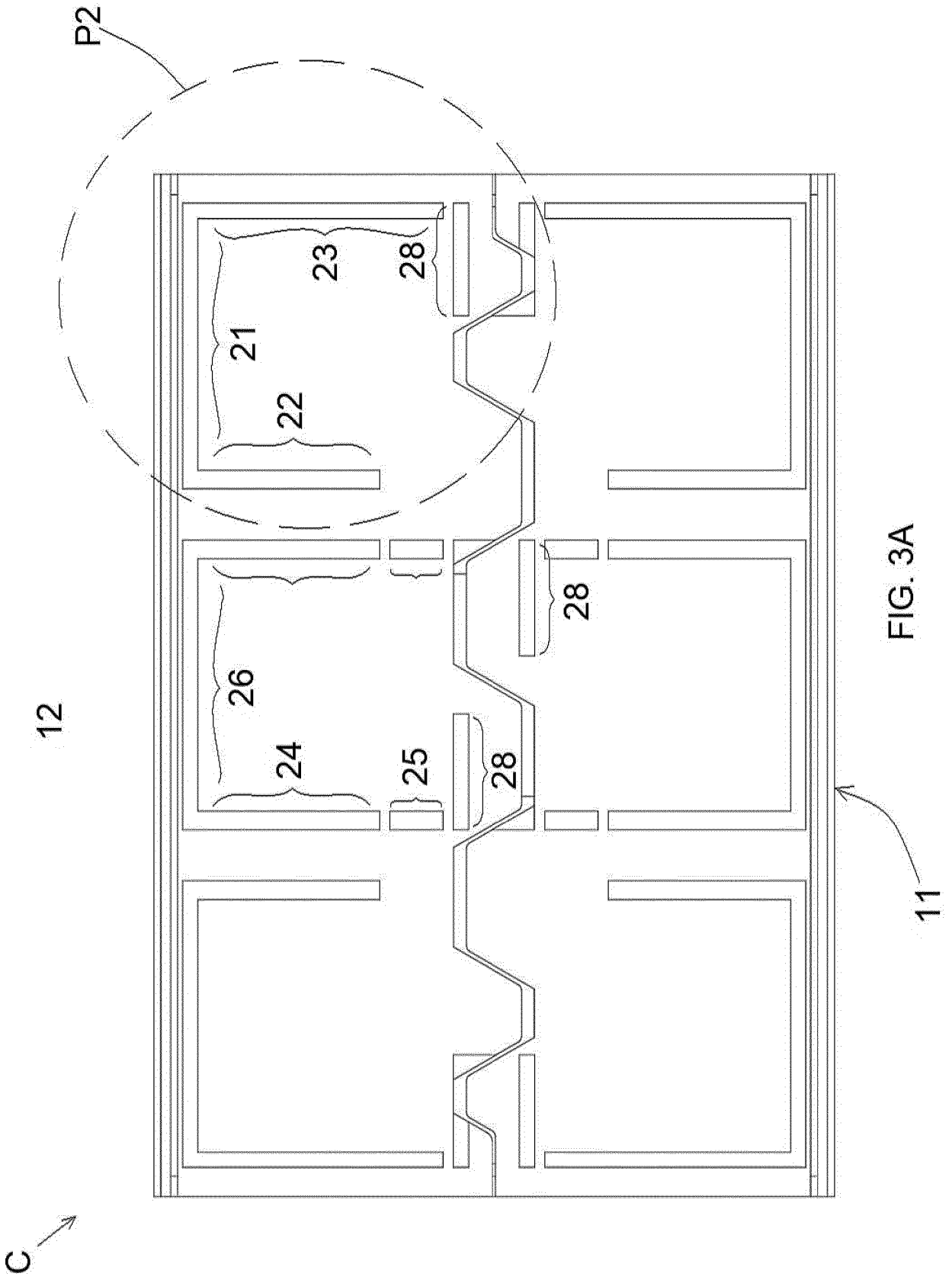


FIG. 3A

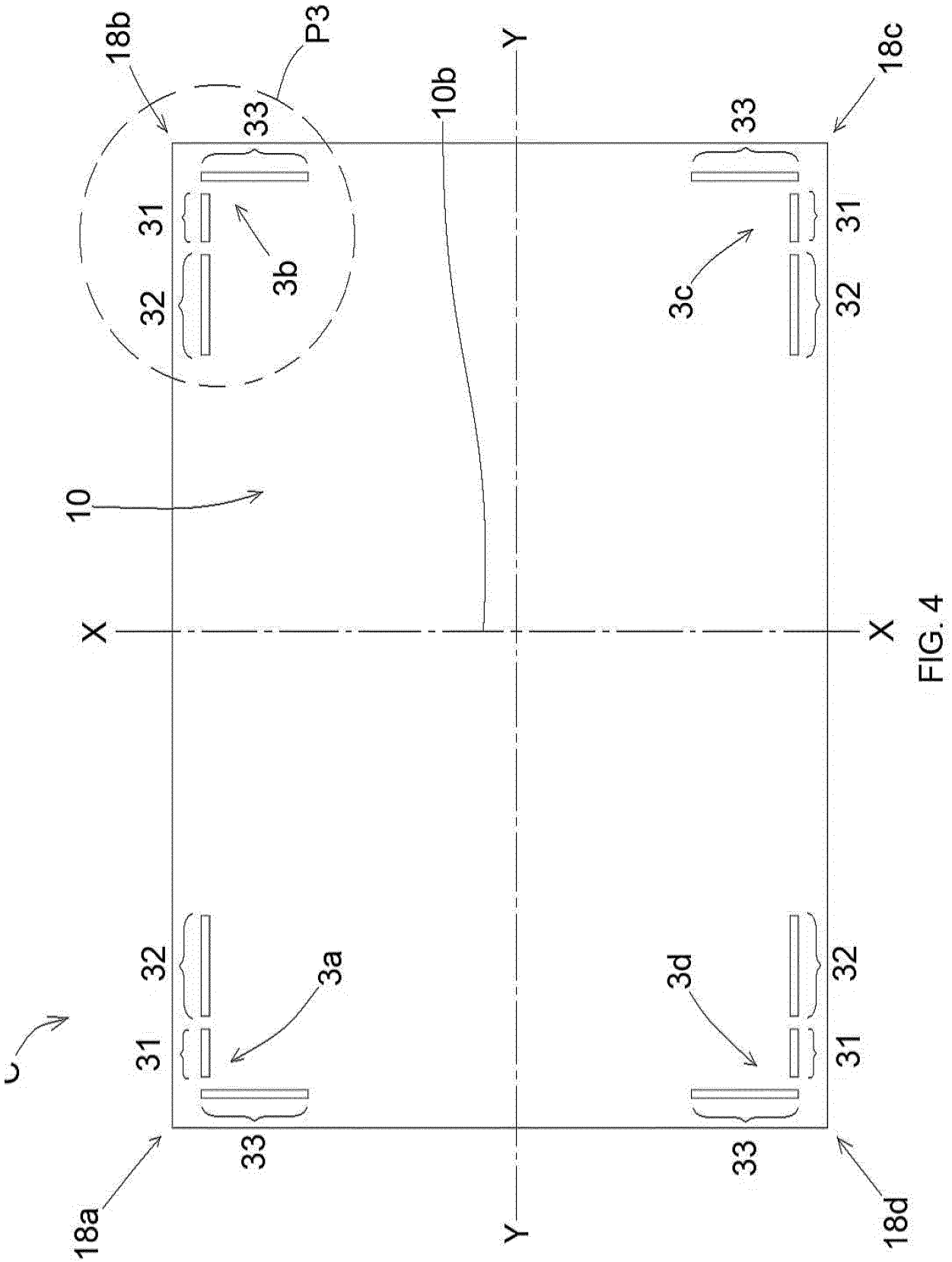

18b
P3
33
10b
Y
18c
33
31
3b
32
3c
31
32
10
X
X
32
3a
3d
32
31
31
33
33
18a
Y
18d

FIG. 4

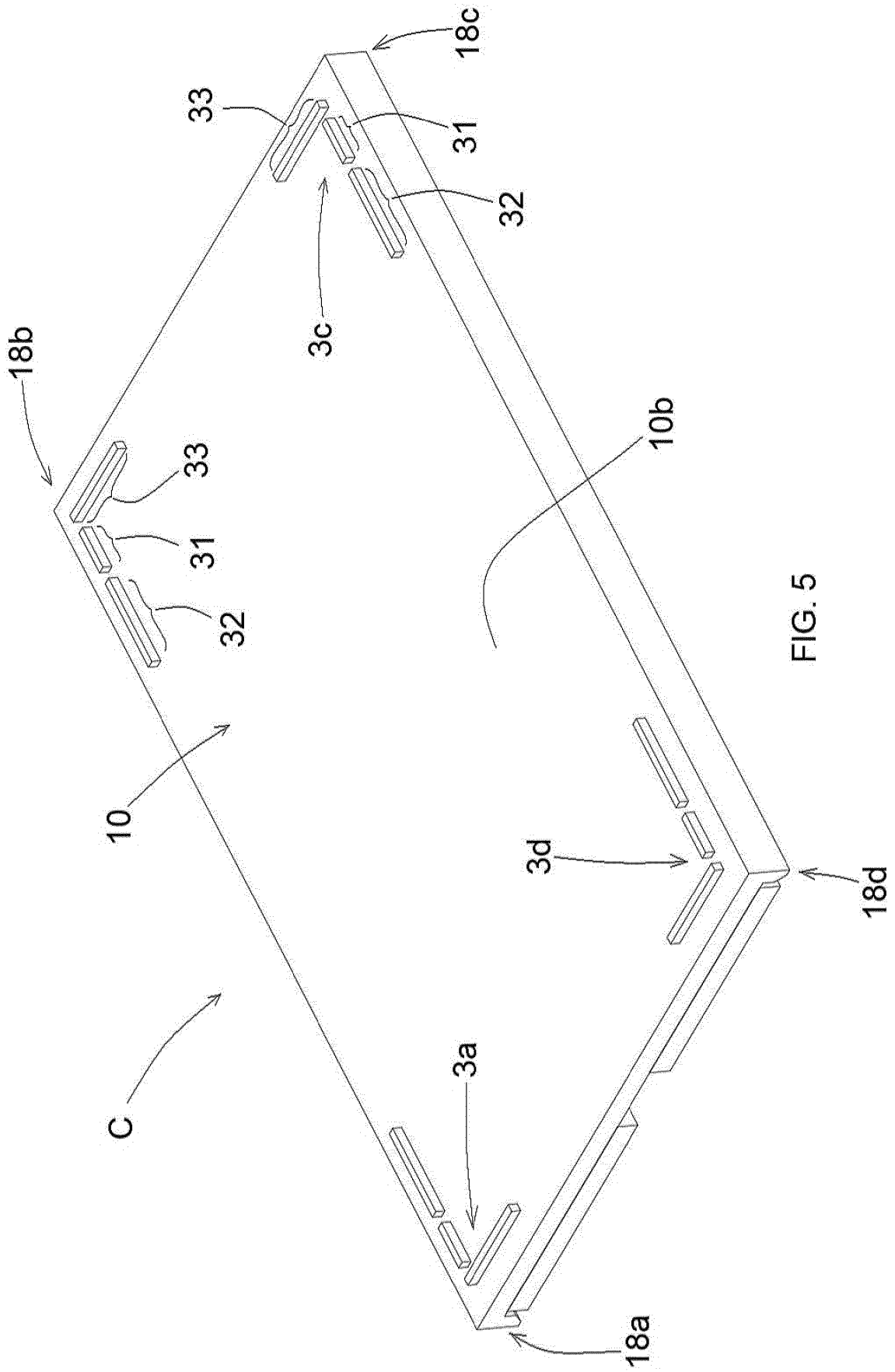


FIG. 5

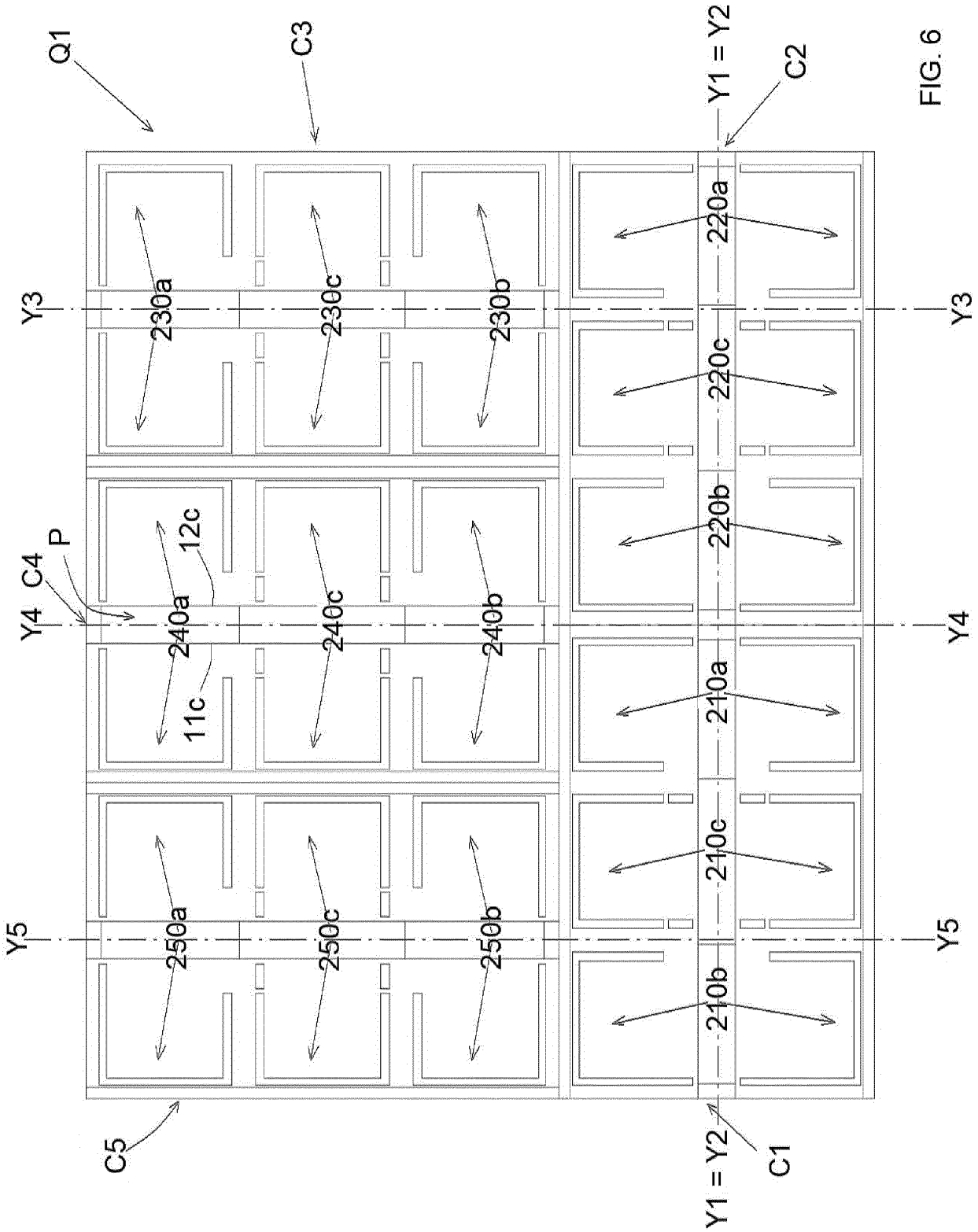

Q1
C3
Y1 = Y2
C2
220a
230a
230c
230b
Y3
Y3
220c
220b
P
C4
12c
Y4
240a
240c
240b
Y4
11c
210a
210c
Y5
250a
250c
250b
Y5
210b
C5
Y1 = Y2
C1

FIG. 6

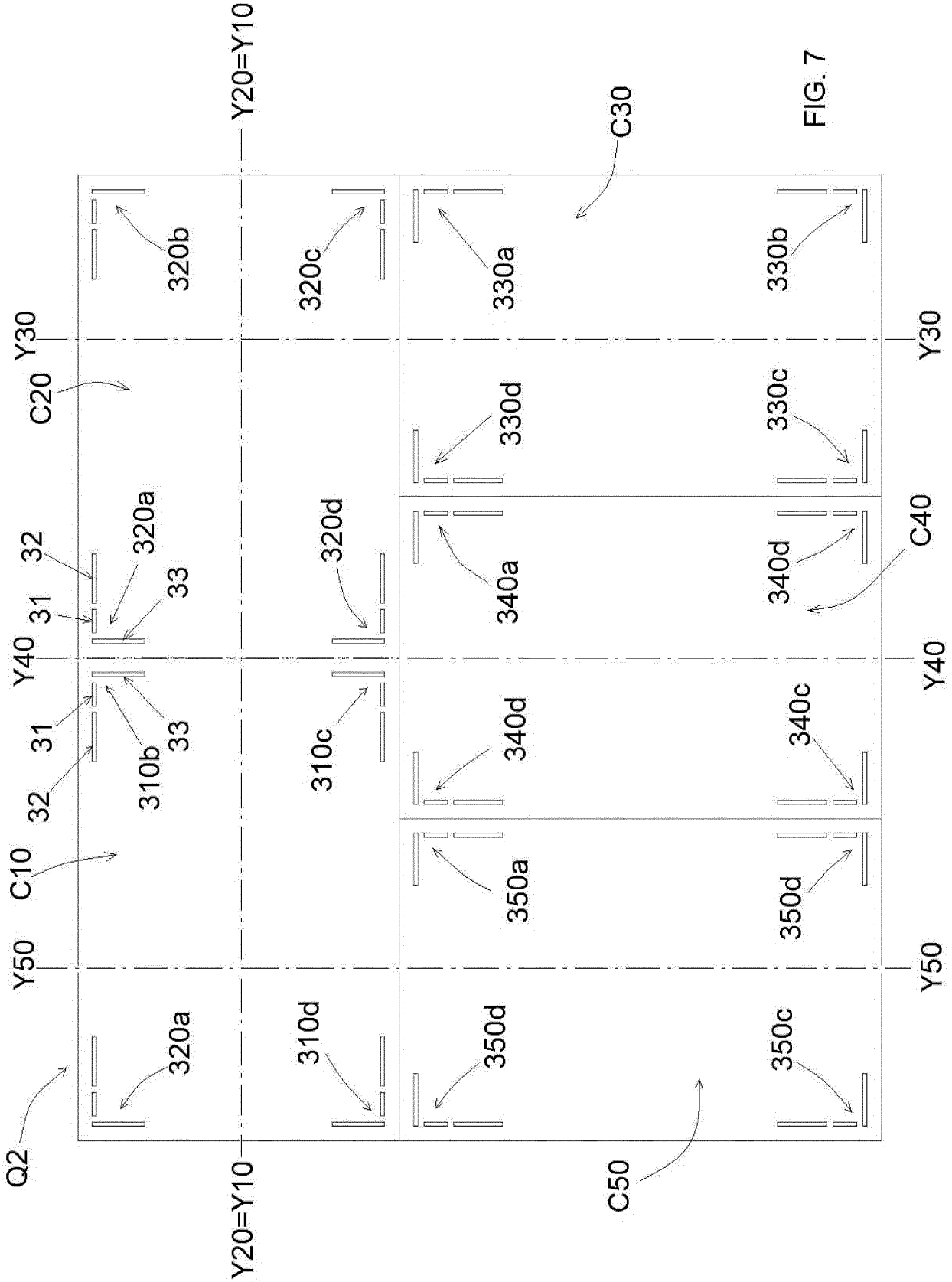
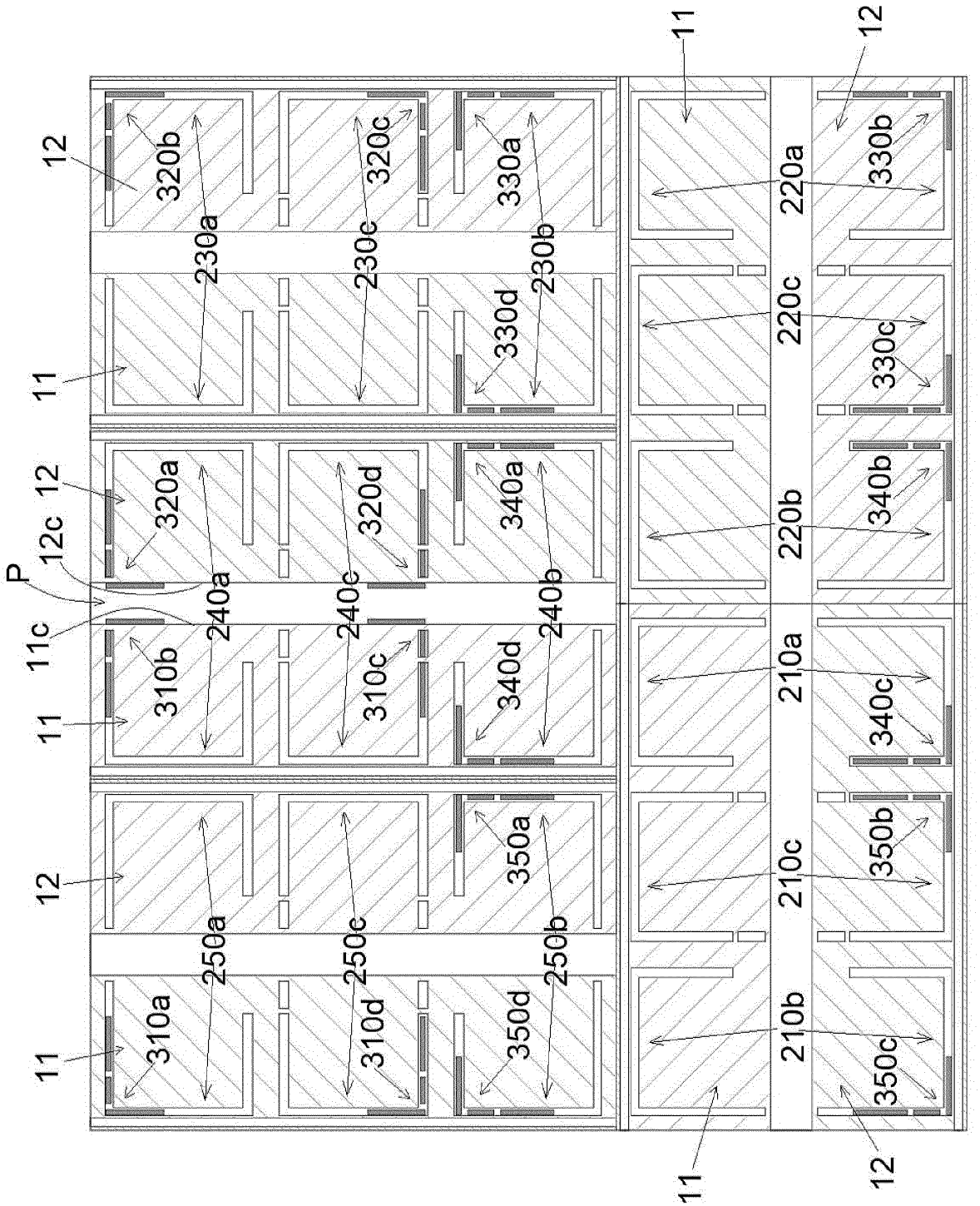

Y20=Y10
C30
320b
320c
330a
330b
Y30
C20
330d
330c
32
320a
33
320d
340a
340d
C40
31
Y40
310b
310c
340d
340c
C10
350a
350d
Y50
320a
310d
350d
350c
Q2
C50
Y20=Y10

FIG. 7


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

FIG. 8

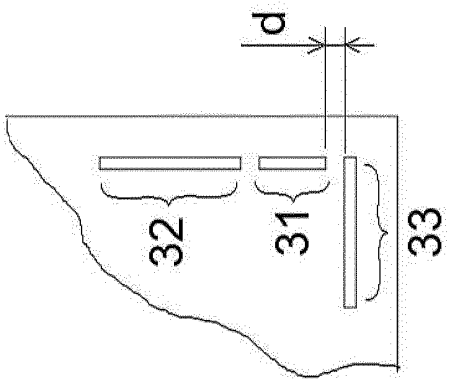

FIG. 11

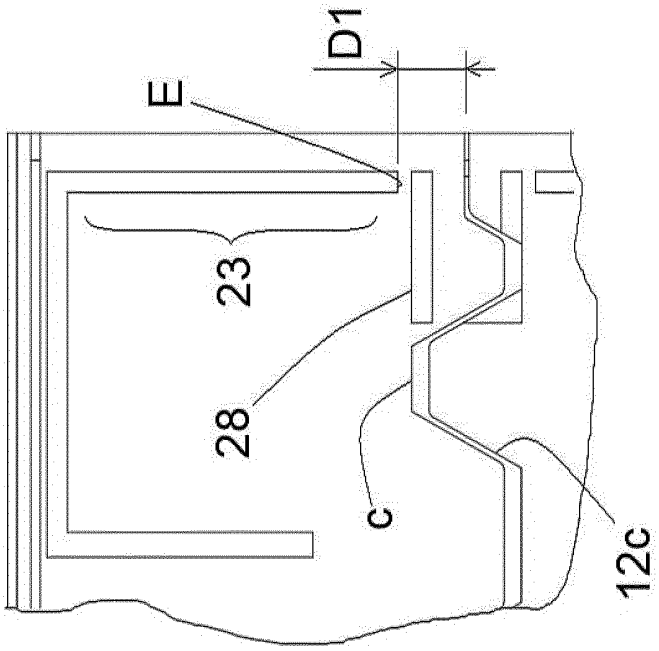

FIG. 10

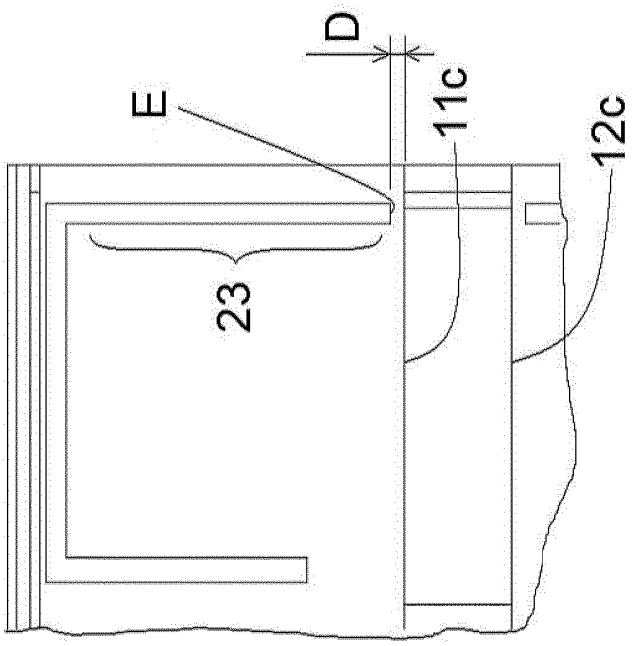

FIG. 9

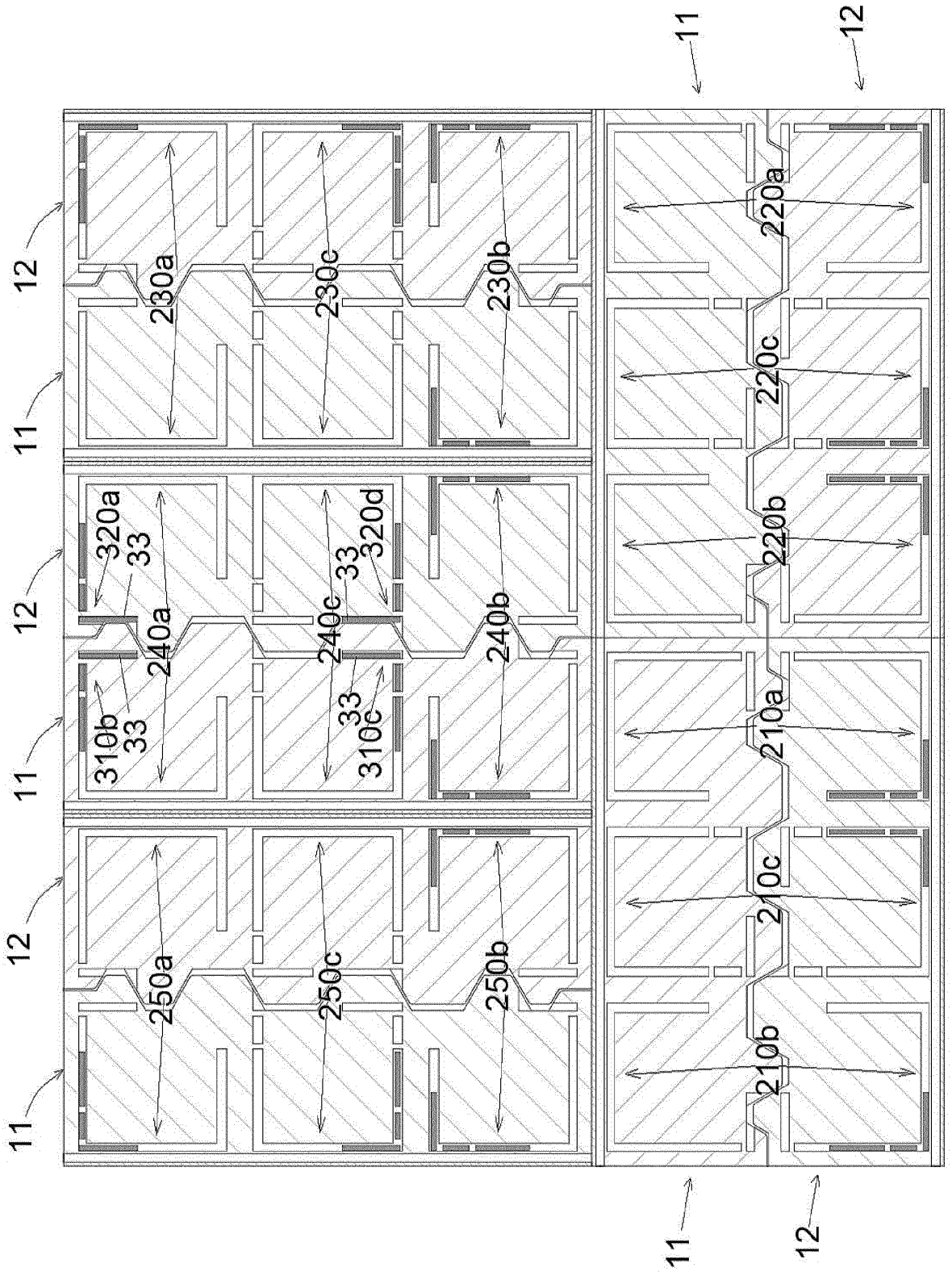
11
12
230a
230c
230b
220a
220c
220b
320a
33
320d
240a
240c
240b
310b
310c
210a
210c
210b
250a
250c
250b

FIG. 12

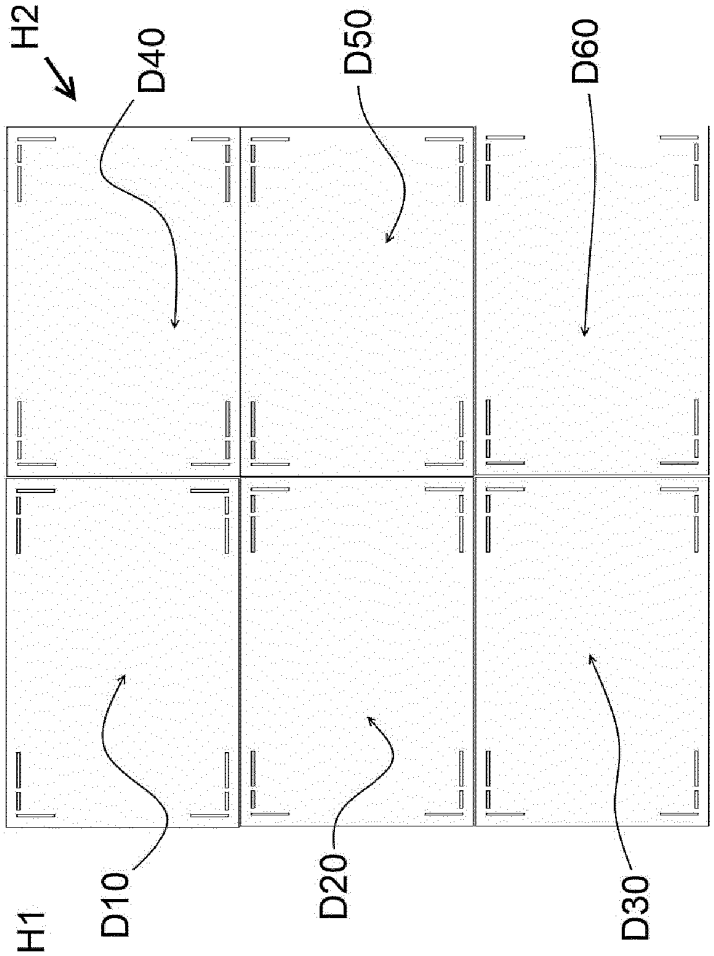

FIG. 14

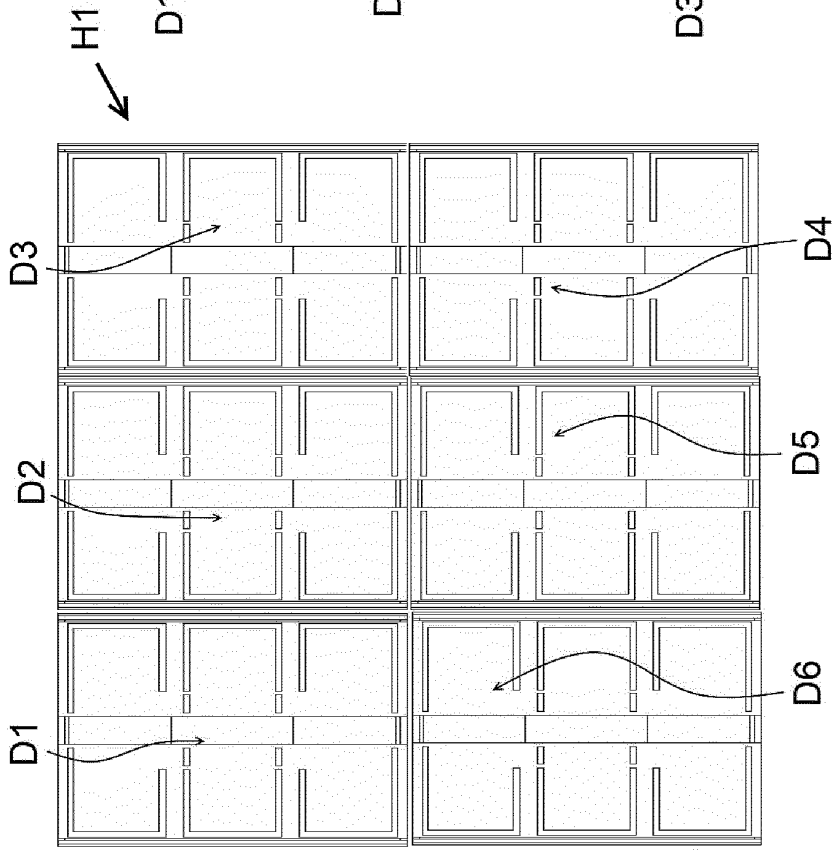

FIG. 13

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- EP 0928745 A **[0012]**