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(54) **DEVICE FOR SUPPLYING AT LEAST ONE POWDERY SUBSTANCE, IN PARTICULAR FOR PRESSES FOR FORMING CERAMIC PARTS**

(57) The invention relates to a device for supplying at least one powdery substance, particularly for presses for shaping ceramic parts, with means for gradually unloading or supplying the powdery substances into the cavities of the lower female mould (19) which comprises an outer peripheral rack (1) or frame for supporting one or more receptacles (2) which have a substantially rectangular upper mouth (4), a lower outlet (5) with a surface area smaller than that of the mouth (4), an inverted frus-

toconical shape, and a height greater than the thickness or height of the rack (1). Said receptacle (2) or receptacles can be removable and movable horizontally to be placed at different positions inside the rack (1), which includes attachment plates (6) that can be moved and secured in different positions for that purpose. And a procedure for the operation of said device in a press for forming ceramic parts.

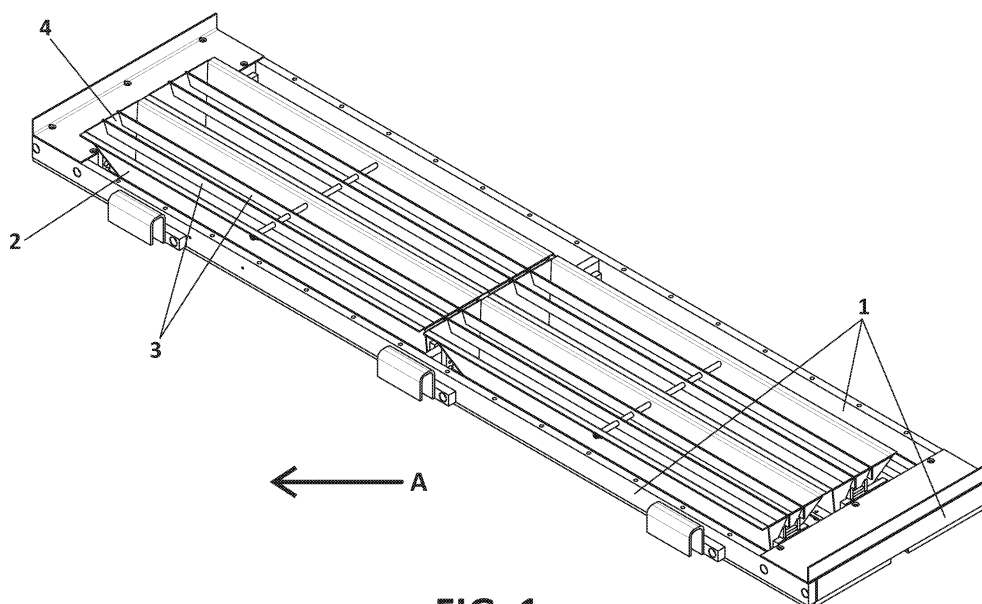


FIG. 1

Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to the technical field of devices for supplying and distributing powdery substances for the manufacture of flat ceramic articles such as cladding tiles and paving tiles that require forming in presses of the raw material that composes them.

BACKGROUND OF THE INVENTION

[0002] In the manufacture of flat ceramic articles, such as tiles, slabs and base plates, it is common to use forming presses that comprise a lower bed and an upper press cross, penetrating molds made up of two semi-molds, one upper male provided with a plurality of upper compacting punches, and another lower female with a matrix of housings or alveolos, also provided with a plurality of lower compacting punches, in which a rough or semi-processed powdery substance such as earth or clay is disposed, to from which, through the pressing action of the punches, compacted pieces of a material called sponge cake (bizcocho) are formed from that moment, which is subsequently subjected to further treatments, such as enameling, decoration and heating to obtain flat ceramic articles which are correspondingly finished.

[0003] To carry out the compacted parts, a load as homogeneous as possible of the powdery substance is required in the cavities of the matrix in order to obtain a pressed body with a density with the least possible variations, since this later affects the quality of the ceramic article which is correspondingly finished. In industrial practice it is very difficult to achieve a totally homogeneous load in all the cells of the matrix of the female mold.

[0004] In a stage prior to compaction and molding, the powdery substance is stored externally and it is necessary to supply and distribute it uniformly on the matrix provided with housings or receiving cells (alveolos) for the female molds of the press.

[0005] For this purpose, a filling hopper is usually used for the device for supplying and distributing the powdery substance, which comprises at least one mobile trolley or conveyor provided with a supporting frame and various crossbars or projections to serve as a support and displace on the mold matrix what is usually called a grill (due to its similarity to said utensil), and various elements that are used in the process of manufacturing and obtaining the cake (bizcocho), such as, for example, and in addition, one or more scrapers, combs or blades that serve as elements of trailing excess powdery substance that may remain on the surface of the female mold, and/or a pusher that in the prior position with respect to the grill with respect to a direction of advance horizontally pushes a previously shaped sponge cake (bizcocho) out of the area of the cell (alveolos) in which it has been pressed, leaving the latter free to receive a new charge of powdery substance.

[0006] The aforementioned grill essentially consists of a perimeter frame in whose internal area a grid of various shapes (linear parallel, grill...) is arranged with substantially the same or less height or thickness than that of said perimeter frame. This grill is incorporated into the mobile trolley or conveyor superiorly and by means of various coupling or connection means, generally by means of clamps or claws with an inverted "U" shape, in such a way that the grill is held by gravity and removably fixed to the frame bearing.

[0007] In a first stage of manufacturing, the grill and the conveyor carriage are positioned horizontally and superiorly in an area immediately prior to the location of the first of the cavities (alveolos) of the matrix of the female mold, and in said position the externally stored powdery substance is deposited and loaded on the grill; the lower part of the grill is completely supported and flushed with the upper surface of the matrix of the female mold, with a generally flat finish or elements or preferably in an inverted "L" shape, called scrapers, among others denominations, of a resistant material and suitable to withstand abrasion and friction inevitably derived from friction and sliding between surfaces in direct contact.

[0008] In a second stage, the transporting carriage begins to move and advance horizontally in a direction towards and over the location of all the cells (alveolos) in the matrix of the female mold, in such a way that it positions the grill completely on said cells (alveolos), whose compaction punch bottom is in a raised position and flush with the surface of the female mold. Once said position has been reached by the grill and its powdery substance load, the lower compacting punch descends allowing the entry of the powdery substance by gravity into the corresponding cells (alveolos).

[0009] In a third stage, and with the load supplied to the cells (alveolos), the transport trolley begins a horizontal movement of recoil to its initial position, during which there is a withdrawal by drag of the excess of powdery substance deposited in the previous phase on the cells (alveolos) and protruding from its top edge.

[0010] This stage ends with the arrival of the transporter car and the grill to the initial starting position in the first stage.

[0011] The supply and distribution of the powdery substance is carried out by dragging the mobile trolley or conveyor that moves the loaded grill to the mold matrix and the mere action of gravity on said substance that is deposited in a single phase and in a joint on the entire surface of all the alveolos, and a subsequent movement of drag and sweep of the mobile carriage on the mold matrix.

[0012] This determines that the load as the distribution of the powdery substance over the entire alveolo (socket) is of an irregular density and homogeneity, since at present there are irregularities in the same socket, as a consequence of the different quantity and density of the powdery substance in a given point which differs from that of another point, depending on the amount and den-

sity of substance that in the previous process of loading the grill from external storage and in the first stage has been placed on said grill, and the fact that the transfer to the alveolo occurs in a block and unit of time on all the alveolos and on their entire surface.

DESCRIPTION OF THE INVENTION

[0013] The object of the present invention is to overcome the drawbacks of the state of the art detailed above, by means of a device for supplying at least one powdery substance, particularly for presses for forming ceramic pieces, which dispenses with the conventional grill and replaces it by means that allow a progressive supply and gradual distribution of the powdery substance by means of a continuous flow by curtain in the cells (alveolos) during the entire second stage referred to above and with the additional difference that instead of what is referred to with the conventional procedure in said second stage; according to the invention, the lower compaction punches are in a rest position from the beginning of the second stage, leaving the alveolos exposed to receive the powdery substance in conformity and since the transporting carriage and the device object of the invention start the advance in the second stage, and throughout the entire horizontal displacement phase of it.

[0014] With all this, a practical advantage is obtained derived from said progressive, gradual and successive loading of the cavity of the alveolos cells, which produces a greater homogeneity of the density of the powdery substance that is deposited in them in a more uniform and controlled way, with a better result of the subsequent compaction to which said substance will be subjected.

BRIEF DESCRIPTION OF THE FIGURES

[0015] Aspects and embodiments of the invention are described below on the basis of schematic drawings, in which

- Figure 1 is a top perspective view of the device according to the invention;
- Figure 2 is a view of the top and of side elevations of the device according to the invention;
- Figure 3 is a top perspective view of the progressive discharge means comprising the device according to the invention and an explosion view of some parts thereof;
- Figure 4 is a top perspective view of the external perimeter frame or support frame of the device object of the invention, of various elements that it comprises, and an explosion view of some parts thereof;
- Figure 5 is a top perspective view of the device object

of the invention and of a pusher comprising in one of its embodiments in a position prior to it with respect to a direction of advance (A);

- 5 Figure 6 is a schematic section in the side elevation of a ceramic part forming press in which the device object of the invention is positioned in the first manufacturing stage;

- 10 **[0016]** In these figures references identify the following elements:

- A direction of advance
1 rack
15 2 receptacle
3 longitudinal linear strips
4 top mouth of the receptacle
5 lower mouth of the receptacle
6 latch plates for the receptacle
20 7 outer ribs of the receptacle
8 means for locking and unlocking the latch plates
9 pusher
10 scrapers
11 longitudinal linear scraper inside the frame
25 12 platen
13 closing or cover elements
14 grooves in the upper opening of the receptacle
15 through element of immobilization of the strips
16 claws or clamps
30 17 device filling hopper
18 upper male mold
19 bottom female mold
20 press bench
21 press traverse
35 22 socket, cells, alveoli
23 longitudinal linear element of the free end of the pusher

WAYS TO CARRY OUT THE INVENTION

- 40 **[0017]** The device being the object of the invention is intended to be used in presses for shaping ceramic pieces that comprise at least one mobile carriage or a conveyor provided with a supporting frame and various crossbars or projections to serve as a support and to displace on the matrix of the lower female mold (19); the device itself object of the present invention and other additional elements.

- 50 **[0018]** The device for supplying at least one powdery substance, particularly presses for shaping ceramic pieces, the embodiment which is shown in figure 1, comprises a frame/rack (1) or an external perimetral frame which serves for support of various elements inside, which are used in the process of manufacturing and obtaining the sponge cake (bizcocho), such as, for example, and additionally, one or more scrapers, combs or blades that serve as drag elements for excess powdery substance that may remain on the surface of the lower female mold

(19), and/or a pusher that in the anterior position with respect to the grill with respect to a direction of advance (A) of the device during its operation in the forming press.

[0019] Inside said frame (1) there are arranged, among others, progressive discharge means of at least one powdery substance, configured in one or more receptacles (2), four in the embodiment shown in Figure 1, which have an upper outlet (4) with a substantially rectangular area, a lower outlet (5) whose surface is smaller than that of the outlet (4), an inverted truncated-pyramidal shape, and a height greater than the thickness or height of the frame (1).

[0020] Said receptacle (2) or receptacles can be removable according to the embodiment shown in the figures.

[0021] For this, the receptacle has connection means such as external ribs on its lower external part, in correspondence with grooves in some coupling platens (6) arranged inside the frame (1).

[0022] Said coupling platens (6) in turn can have means for locking and unlocking their position and are horizontally movable on the inside of the frame (1) in order to be able to locate the receptacle (2) in different positions and enable, for example the use and parallel adjustment of several receptacles with different sizes of the outlet (4).

[0023] The frame (1) comprises coupling means to an external conveyor element that displaces the device object of the invention in the forming press, which can be configured as shown in Figures 1 and 2 in the form of claws or shaped clamps in the form of an inverted "U" in various locations of said exterior of said frame (1).

[0024] Also, and according to the embodiment shown in FIG. 4, the frame (1) internally includes coupling plates (6) for the receptacle (2), additional fastening means for scraper elements (11) arranged inside the frame (1) and in a position posterior to the receptacle or receptacles in a forward direction (A), to reinforce the sweep and removal of powdery substance left over during the operation procedure of the device in the forming press, as well as upper closure or cover elements (13) intended to prevent the undesired or accidental entry of powdery substance in certain areas of the device object of the invention.

[0025] The device object of the invention, whose embodiment is shown in figure 3, may comprise one or more longitudinal strips (3) in the outlet (4) of the receptacle (2), which are removably fixed in respective grooves (14) made in the upper ends of the outlet (4), and contribute to a better distribution of the powdery substance inside the receptacle (2).

[0026] In turn, said strips (3) can be immobilized to each other by a passage element (15) that interconnects them with each other and immobilizes them in the body of the receptacle by means of threaded fastening elements that fix the through element (15) on the outside of the sides of the outlet (4) of the receptacle (2), to prevent the accidental exit of the strips (3) from the grooves (14)

and also keep them equidistant from each other in their central area, for which the passing element at the same time it can incorporate intermediate spacer elements with a larger section or diameter than the connection through holes, in such a way that they keep the strips (3) in the same position relative to each other despite the forces that may affect them during the procedure of operation of the device in the forming press.

[0027] The device being the object of the invention according to the embodiment shown in Figure 3, incorporates in the lower outlet (5) of the receptacle (2) scraper perimeter elements (10), some or all of which have a section in the form of an inverted "L" or "V"; they comprise a material capable of supporting friction and serve the purpose of adjusting and closing the perimeter of said outlet (5) with the surface of the lower female mold (19); said scrapers (10) comprise a platen (12) preferably removable to facilitate replacement by wear, to which the aforementioned material capable of withstanding friction, the material including, for example, polymers, is solidly attached.

[0028] In the embodiment illustrated in figure 5, the device being the object of the invention comprises a pusher element (9) with a depth equal to or greater than that of the frame (1), located outside said frame (1) and in an anterior position with respect to a direction of advance (A).

[0029] Said pusher (9) presents frontally at its free end at least one longitudinal linear element (23) whose purpose is to move successively the compacted parts or already formed cakes (bizcocho) out of the forming press, once each third stage of the operation of the device according to the invention in the forming press ends, for which, once said third stage has been completed, the lower compacting punches rise to expose said compacted pieces or bizcocho to an advance of the device during an initial phase of the second stage, and then descend for the phase of supply and distribution of powdery substance to the alveoli/cells (22) that takes place during said second stage progressively as the device advances over each part of the cavity of the alveolos (22).

[0030] Finally, the device object of the invention whose embodiment is shown in figure 6 is fed from a filling hopper (17) that pours onto it from an external storage at least one powdery substance, and once loaded on the device this begins its advance in a forming press comprising a lower bed (20) and an upper press cross (21), penetrating molds made up of two semi-molds, an upper male (18) provided with a plurality of upper compacting punches, and another lower female (19) with a matrix of housings or alveolos (22), also provided with a plurality of lower compacting punches, in which the device being the object of the invention supplies and distributes at least one powdery substance, starting from of which, through the subsequent pressing action of the punches, compact pieces of the material called sponge cake (bizcocho) are formed, which are subsequently subjected to treatments such as enamelling, decoration and firing to obtain fin-

ished ceramic articles.

[0031] In accordance with what is described in the foregoing, the present invention overcomes the drawbacks of the state of the art referred to above and provides an evolutionary alternative by means of an improved device.

Claims

1. Device for supplying at least one powdery substance, in particular for presses for shaping ceramic pieces, of the type comprising at least one rack (1) or an external perimetral support frame **characterized in that** it comprises means for progressive discharge of at least one powdery substance. 5
2. Device according to claim 1, **characterized in that** the progressive discharge means of at least one powdery substance comprise at least one receptacle element (2) with an upper outlet (4) and a lower outlet (5). 10
3. Device according to claim 2, **characterized in that** the upper outlet (4) and the lower outlet (5) of the receptacle (2) have a substantially rectangular area. 15
4. Device according to claim 3, **characterized in that** the receptacle (2) has a height that is larger than the thickness or height of the rack (1). 20
5. Device according to claim 4, **characterized in that** the height of the receptacle (2) is equal to or larger than twice the thickness or height of the rack (1). 25
6. Device according to claims 4 or 5, **characterized in that** the height of the receptacle (2) is between 40 and 150 mm. 30
7. Device according to claims 2 to 6, **characterized in that** the outlet (4) of the receptacle (2) has a larger surface area than the outlet (5). 35
8. Device according to any of claims 2 to 7, **characterized in that** the receptacle (2) has a substantially inverted truncated-pyramidal shape. 40
9. Device according to any of claims 2 to 8, **characterized in that** the receptacle (2) is removable and immobilizable inside the rack (1) or the external perimetral support rack. 45
10. Device according to any of claims 2 to 9, **characterized in that** the outlet of the receptacle (2) comprises one or more longitudinal linear strips (3). 50
11. Device according to the preceding claim, **characterized in that** the strip or strips (3) are removable and immobilizable in the outlet (4) of the receptacle (2). 55
12. Device according to the preceding claim, **characterized in that** the removable strip or strips (3) are fixed by means of corresponding grooves (14) at the ends of the outlet (4) of the receptacle (2).
13. Device according to the preceding claims, **characterized in that** the removable strip or strips (3) are immobilized by a through element (15) that connects said strip or strips with the sides of the mouth (4) of the receptacle (2).
14. Device according to any of the preceding claims, **characterized in that** hooking plates (6) for the receptacle (2) are arranged on the internal part of the rack (1) or external perimetral support rack.
15. Device according to the preceding claim, **characterized in that** the coupling plates (6) for the receptacle (2) have grooves in correspondence with ribs (7) on the outside of the receptacle (2).
16. Device according to claims 14 or 15, **characterized in that** the coupling plates (6) for the receptacle (2) can be horizontally displaced and comprise locking and unlocking means (8) for fixing them at any point on the horizontal plane in which they are displaced.
17. Device according to any of the preceding claims, **characterized in that** the lower outlet (5) of the receptacle (2) incorporates one or more scraper perimetral elements (10) that comprise a material capable of supporting a friction.
18. Device according to the preceding claim, **characterized in that** at least one scraper perimetral element (10) comprises a platen (12).
19. Device according to the preceding claim, **characterized in that** the material capable of supporting friction is fixed jointly to the platen (12).
20. Device according to the preceding claims 17 to 19, **characterized in that** at least one material comprising the scraper perimetral element or elements (10) is a polymer.
21. Device according to the preceding claim, **characterized in that** the scraper perimetral element or elements (10) are removable.
22. Device according to the preceding claims, **characterized in that** the scraper perimetral element or elements (10) comprise holes in correspondence with other holes included in the lower outlet (5) of the receptacle (2) for their interconnection and fixing by means of through elements, particularly screws or

rivets.

23. Device according to previous claims 17 to 23, **characterized in that** at least one of the scraper peripheral elements (10) has an inverted "L" shaped section. 5
24. Device according to any one of the preceding claims, **characterized in that** it comprises a pusher element (9) with a depth equal to or larger than that of the device as a whole, located outside the rack (1) and in an anterior position with respect to a direction of advance (A), which presents a longitudinal linear element (23) frontally at its free end. 10
25. Device according to any of the preceding claims, **characterized in that** in addition to the receptacle (2) it comprises at least one longitudinal linear scraper element (11) located inside the rack (1) in a position posterior to the receptacle (2) with respect to a forward direction (A). 15 20
26. Device according to the preceding claim, **characterized in that** the scraper (11) is removable and immobilizable inside the rack (1). 25
27. Device according to any of the preceding claims, **characterized in that** the rack (1) externally comprises at least one claw or clamp (16) in the form of an inverted "U" for coupling the device to the transport carriage of the press for forming ceramic pieces. 30
28. Device according to any of the preceding claims, **characterized in that** at least a part of the interior area of the rack (1) comprises one or more closure or cover elements (13). 35
29. Device according to the preceding claim, **characterized in that** the closure or cover element or elements (13) is removable. 40
30. Device according to previous claims 28 or 29, **characterized in that** the closure or cover element or elements (13) comprise one or more platens. 45
31. Device according to the preceding claim, **characterized in that** the platen or platens of the closure or cover element (13) have an "L" shaped section.
32. Procedure for the operation of a device according to any of the preceding claims in a press for shaping ceramic pieces, comprising a first stage in which a conveyor carriage is positioned horizontally and superiorly in an area immediately prior to the location of the first of the alveolos of the matrix of the female mold, and in said position an externally stored powdery substance is deposited and charged on the device for supplying and distributing the powdery sub- 50 55

stance; in a second stage, the transporting carriage begins its displacement and horizontal advance towards and over the location of the alveolos of the matrix of the female mold, in such a way that it gradually and successively positions the device for supplying the powdery substance on different parts of said alveolos, and a third stage, in which the transporting carriage begins a horizontal displacement backwards to its initial position, during which there is a withdrawal by drag of the excess powdery substance deposited in the previous phase on the alveolos and protruding from its top edge; said stage ends with the arrival of the transporting carriage and the device for supplying and distributing the powdery substance to the initial exit position in the first stage, **characterized in that** the punch or punches of the lower compaction of the press are in a position lowered from at least the phase of the second stage immediately prior to the first overlap of the outlet(5) of the receptacle (2) or receptacles on it or the alveoli (22), in such a way that the entry and distribution of the powdery substance on the corresponding alveolo or alveolos (22) progressively, gradually and successively due to the combined effect of the gravity and the horizontal advance displacement of the supply device, and a supply of said powdery substance by means of a constant flow per curtain.

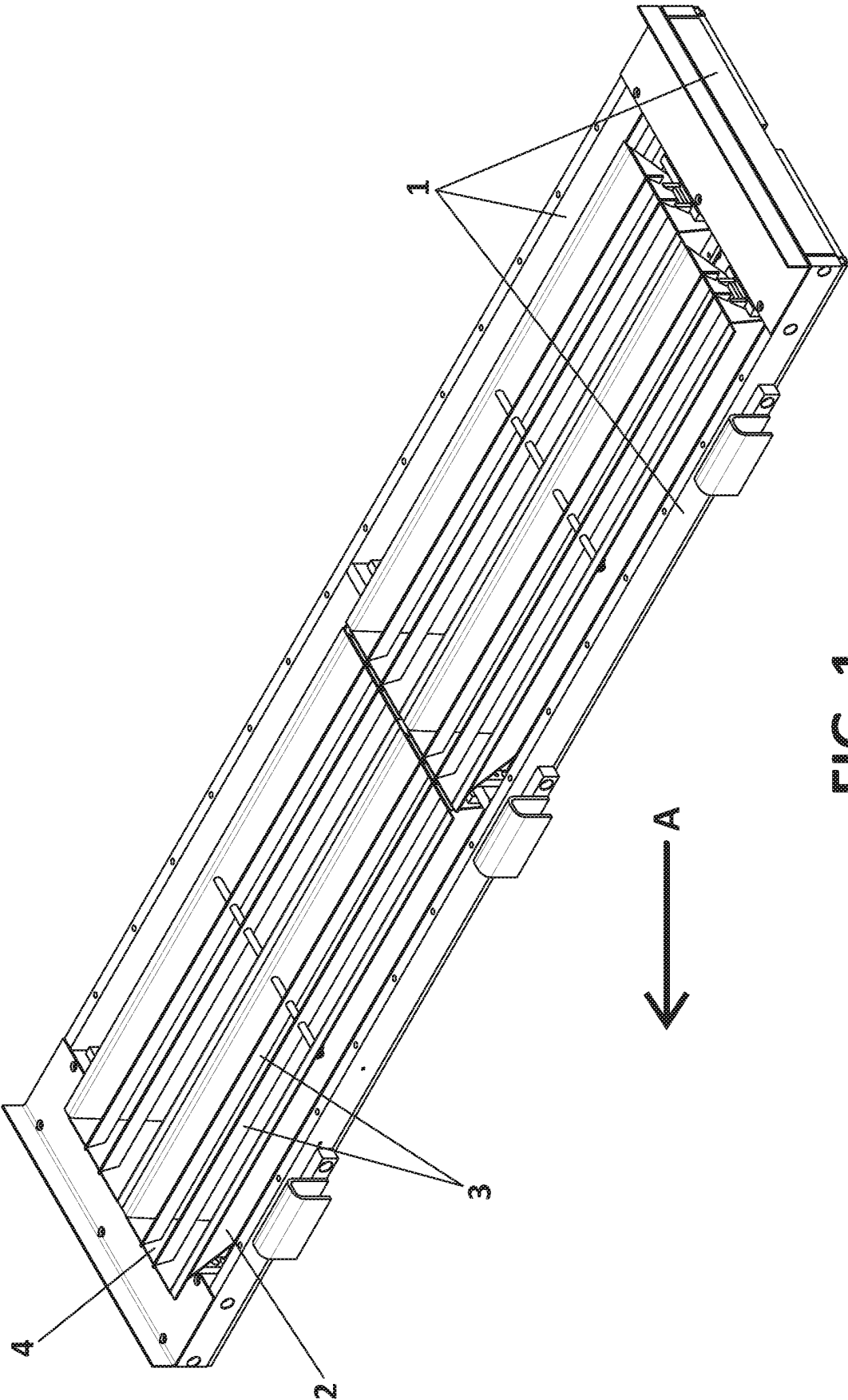


FIG. 1

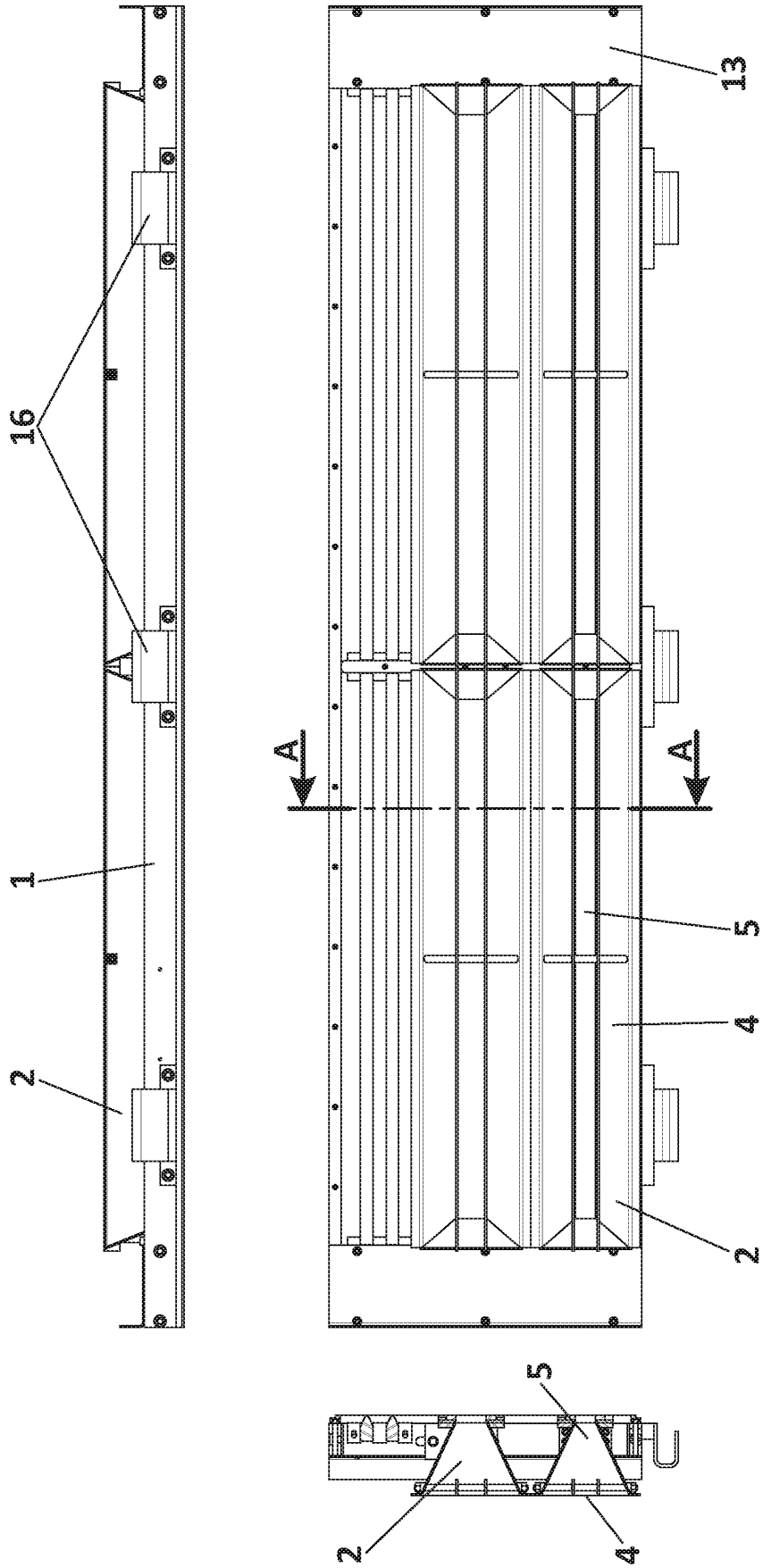


FIG. 2

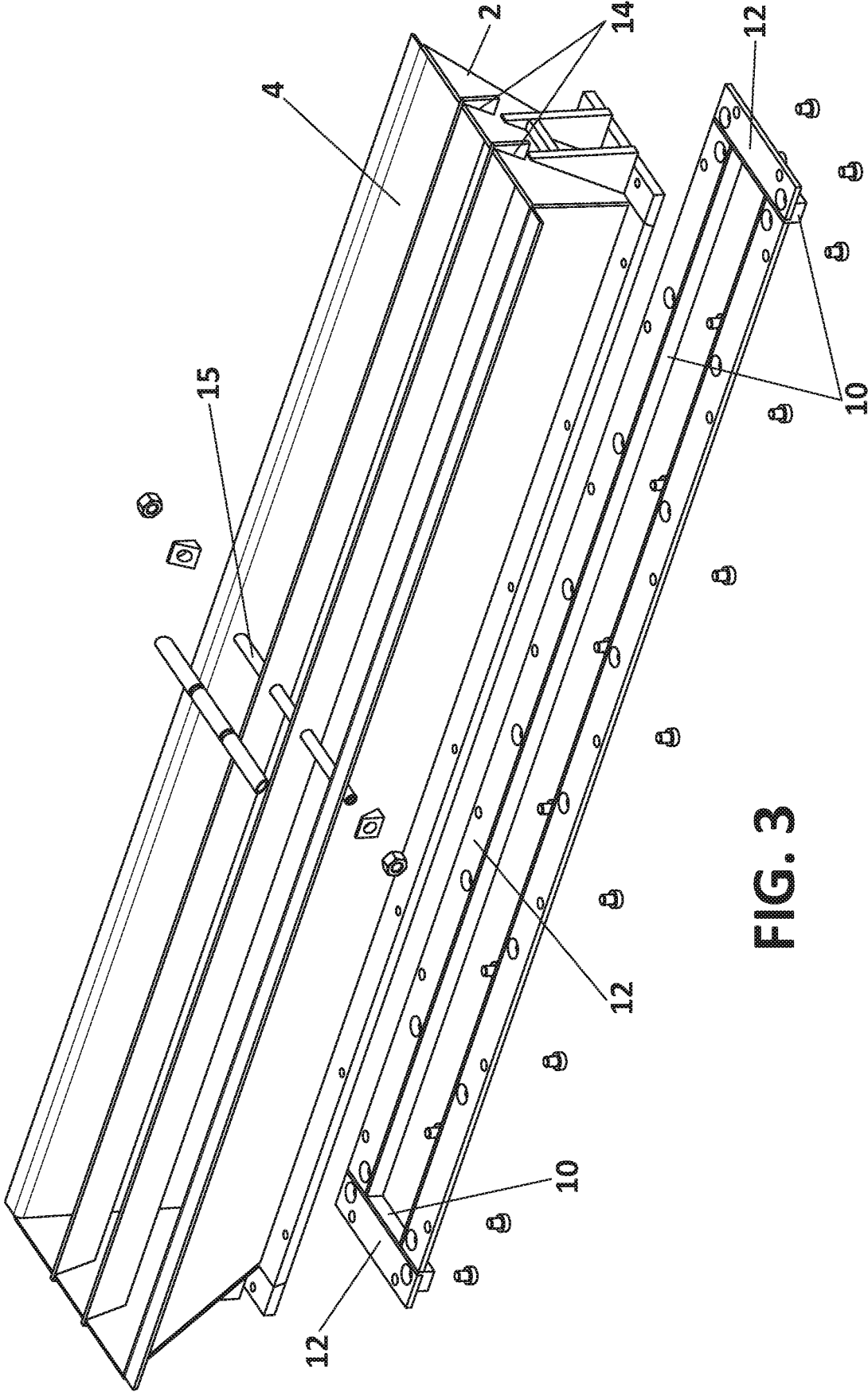


FIG. 3

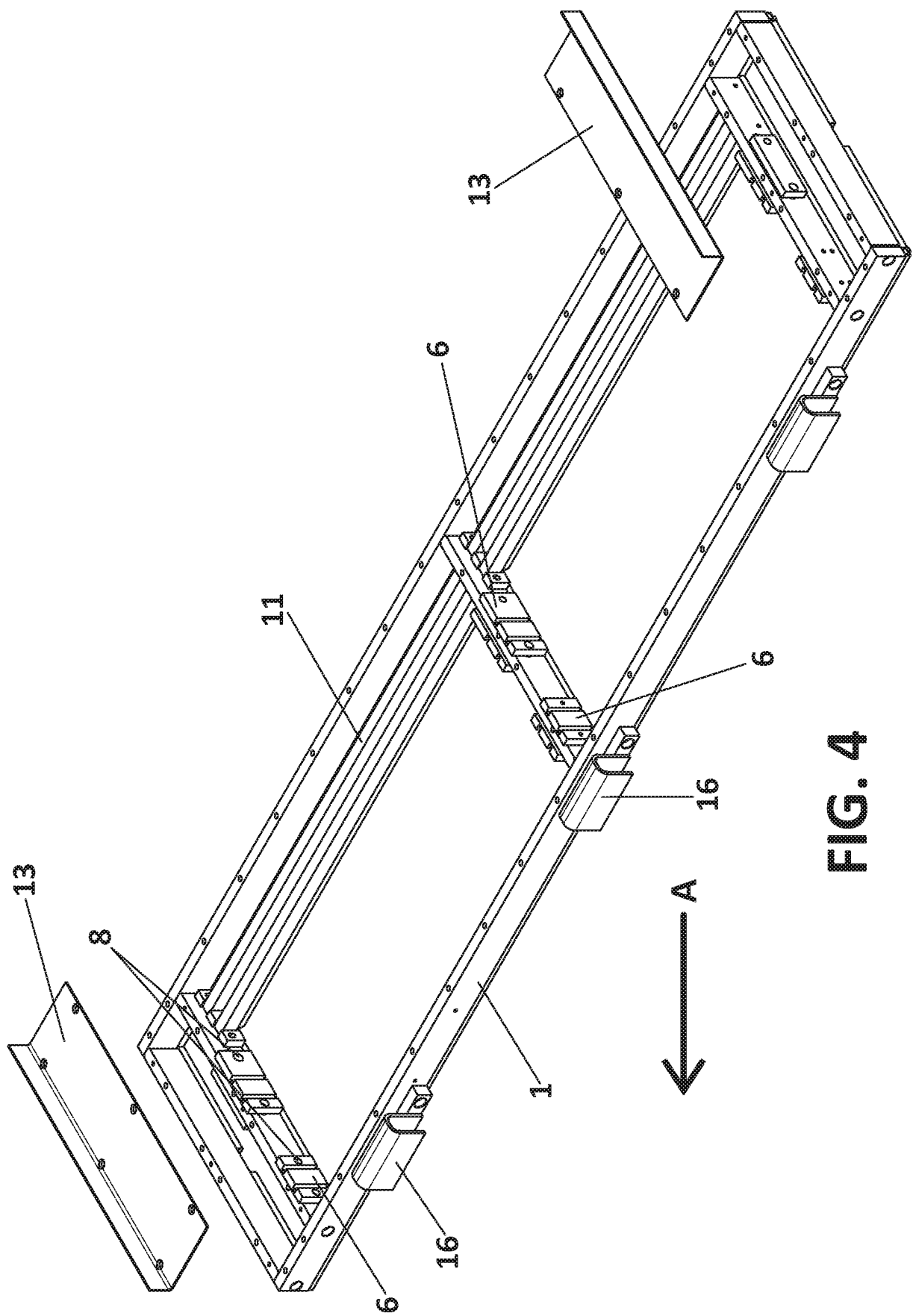


FIG. 4

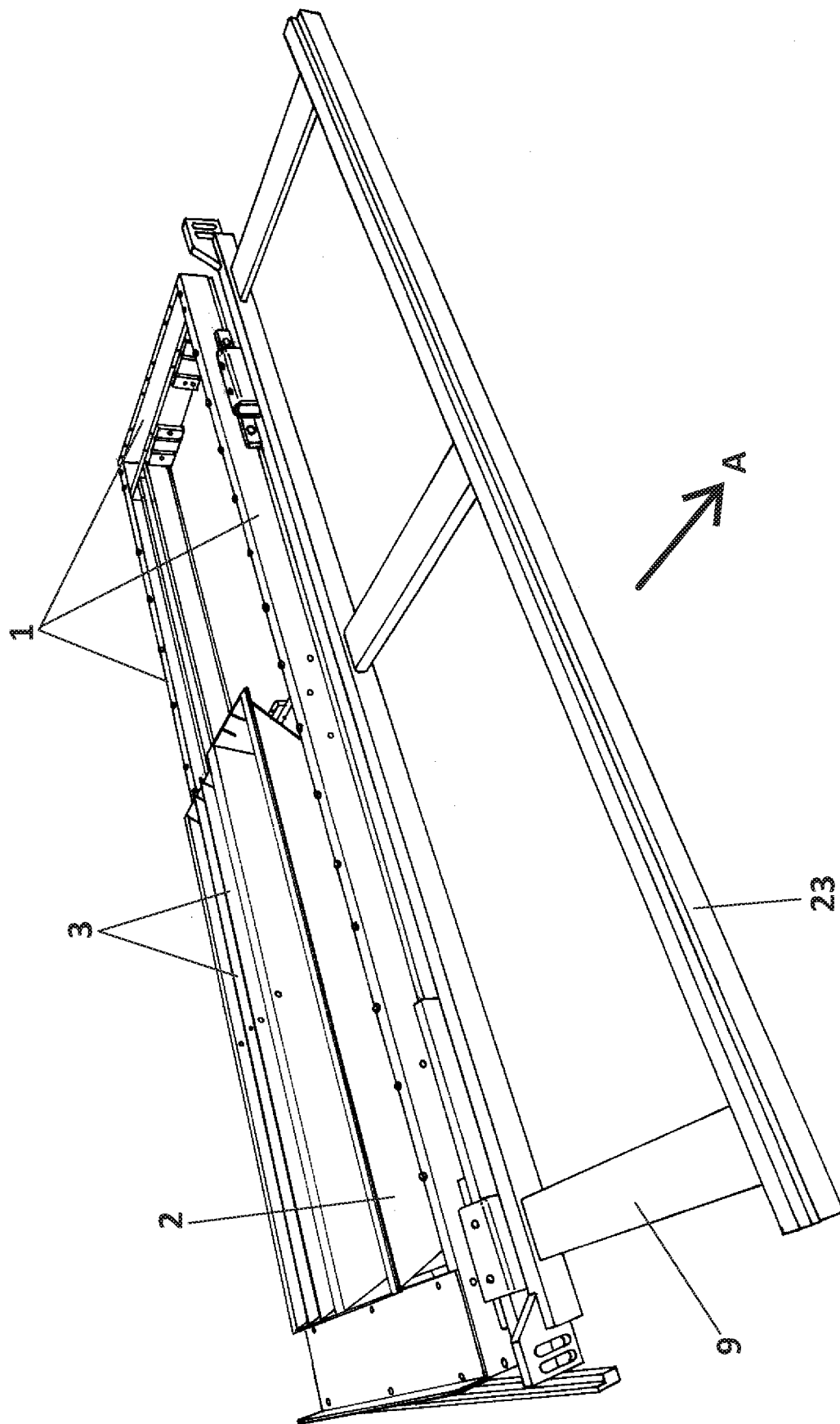
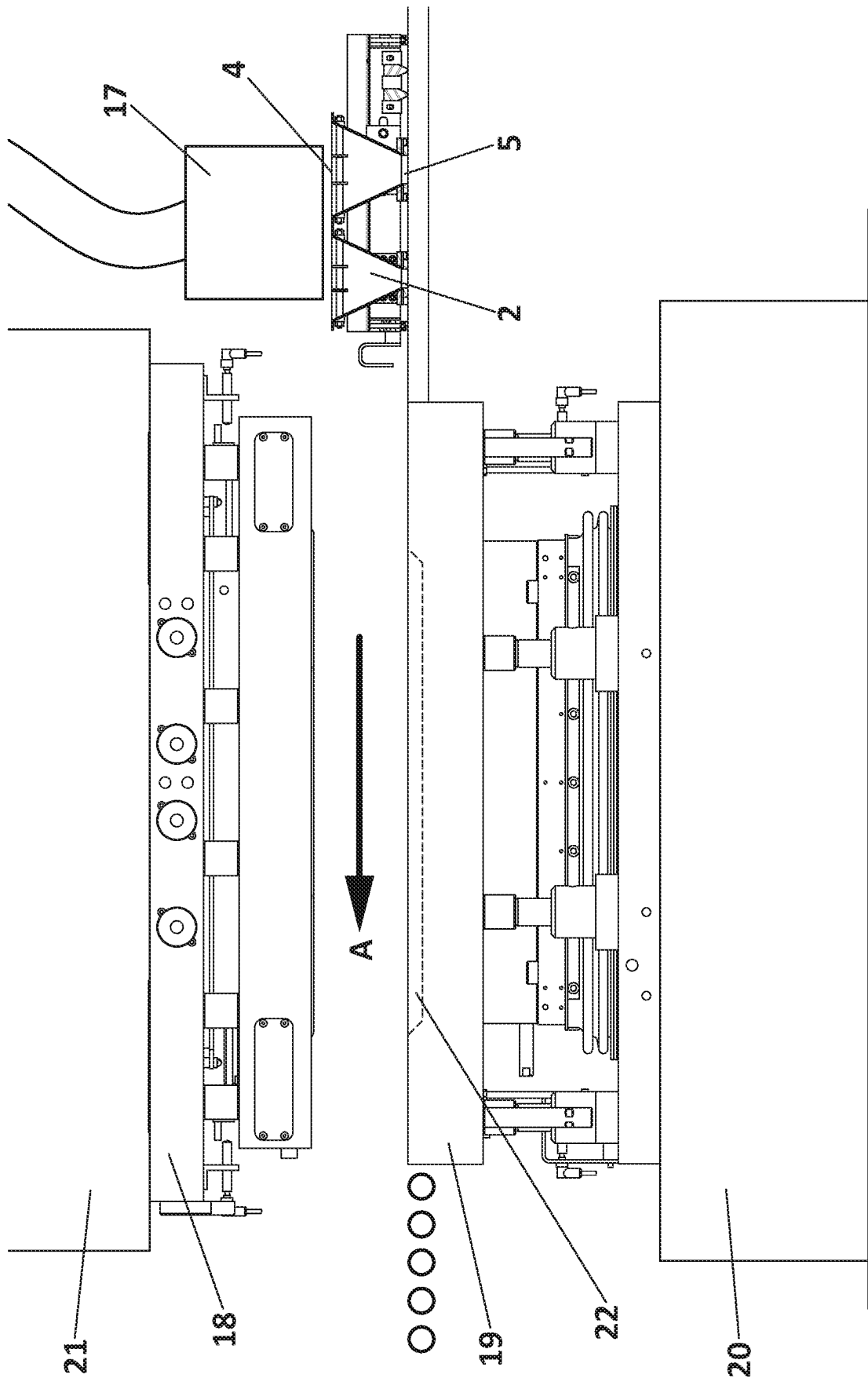


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2018/070813

A. CLASSIFICATION OF SUBJECT MATTER

B28B13/02 (2006.01)**B28B13/06** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B28B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 1323510 A1 (LB OFFICINE MECCANICHE SPA) 02/07/2003, Abstract and figures.	1-32
Y	ES 1186083U U (MACER S L) 26/06/2017, claims and figure 1.	1-32
X A	DE 3147687 A1 (LAEIS WERKE AG) 16/06/1983, Abstract and figures.	1, 2, 3, 8, 9, 17 7, 32
A	EP 2173542 A1 (LANGENSTEIN & SCHEMANN GMBH) 14/04/2010, claim 2 and figures.	10,11

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2018/070813

Information on patent family members

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
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