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(54) Device for manufacturing green bricks from clay, and method for application thereof

(57) The present invention relates to a device (1) for manufacturing green bricks from clay for the brick manufacturing industry, comprising: at least one mould container part (2) in which at least one mould container (4) is arranged for forming a green brick (6) from clay therein, a substantially beam-like mould container part guide member (8) in which the mould container part (2) can be received for displacement in lengthwise direction of the mould container part guide member (8) between a filling position and a turning position, wherein at least a part of the mould container part guide member can be revolved about a longitudinal axis (10) thereof between the turning position and a release position, so that the mould container part (2) which can be received in the revolvable part can thereby be revolved between the turning position, in which the mould container part (2) with its at least one mould container (4) is directed substantially upward, and the release position in which the mould container part (2) with its at least one mould container (4) is directed substantially downward.
The invention further relates to a method for applying such a device.

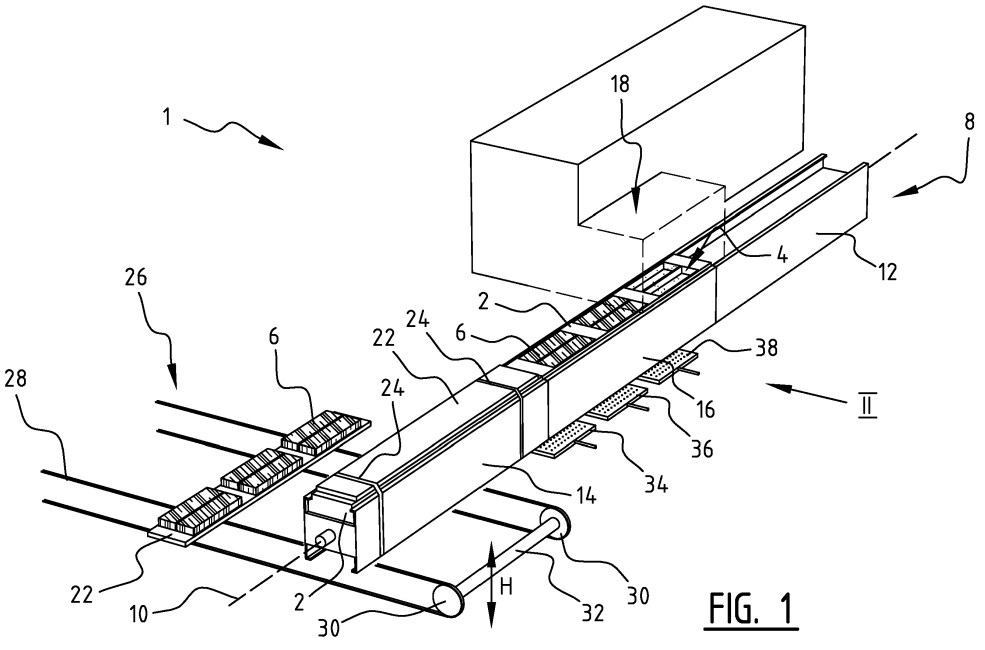

FIG. 1

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Description

[0001] The invention relates to a device for manufacturing green bricks from clay for the brick manufacturing industry and to a method for application thereof.

[0002] The invention relates more particularly to a mould container pressing device for manufacturing special bricks. Special bricks are understood to mean all bricks whose form varies from the usual beam-like model. Such special bricks include for instance bricks with a chamfered side for use in a non-right angled corner of a building. Other variants of special bricks are for instance bricks with a rounded corner, a cut-away portion, and so on.

[0003] Since such special bricks are only used to limited extent, large production runs are unnecessary and often even undesirable for reasons of storage. Such special bricks are generally only made to order.

[0004] When a batch of special bricks is required, several mould containers of a 'normal' mould container pressing device are usually modified. During this conversion process the 'normal' mould container pressing device - which during operation can manufacture up to several tens of thousands of bricks per hour - is inoperative for some considerable time. After manufacture of the desired batch of special bricks the conversion process must moreover take place in reverse sequence in order to make the mould container suitable once again for normal bricks. Production is then also halted for a considerable period of time.

[0005] There is therefore a need for a device for manufacturing green bricks from clay for the brick manufacturing industry which is particularly suitable for manufacturing limited quantities of special bricks.

[0006] EP-A-0 408 150 discloses a device for manufacturing green bricks from clay for the brick manufacturing industry, comprising at least one mould container part in which at least one mould container is arranged for forming a green brick from clay therein, and a mould container part guide member in which the mould container part can be received for displacement between a filling position and a turning position.

[0007] Known from NL-1030716 of applicant is a device for manufacturing limited quantities of special bricks which makes use of a horizontally disposed chain conveyor formed from connected mould container parts.

[0008] The invention now has for its object to provide a device of the above described type, wherein the stated drawbacks do not occur, or at least do so to lesser extent.

[0009] Said object is achieved with the device for manufacturing green bricks from clay for the brick manufacturing industry according to claim 1.

[0010] Such a device is able to fill several mould container parts per minute. Depending on the number of mould containers per mould container part it is hereby feasible to manufacture up to about 1000 green bricks per hour. Such a production capacity is amply sufficient for the production of special bricks.

[0011] The device comprises only a limited number of mould container parts, which are moreover easily interchangeable. The limited number of mould container parts is advantageous in respect of working hours and cost when the mould containers have to be modified to a specific brick shape and the mould container parts with modified mould containers then have to be arranged in the pressing device.

[0012] Depending on the desired production capacity, a brick manufacturer can apply one or more dummy containers if desired, whereby it is possible to save on the costs of manufacturing the desired mould containers. Such dummy mould container parts are mould container parts which lack mould containers suitable for the production of the desired form of brick. If desired, such dummy mould container parts are not provided with any mould container at all.

[0013] In addition, such a device can be given a compact construction. A separate device for the production of special bricks is also provided, this avoiding a normal mould container pressing device - which during operation can manufacture up to several tens of thousands of bricks per hour - having to be out of operation for some time for the purpose of modifying several mould containers.

[0014] According to a preferred embodiment, the longitudinal axis of the mould container part guide member around which it can be revolved is situated within the periphery of the mould container part guide member. The mould container part can hereby be turned in a limited height between the turning position and the release position.

[0015] According to a further preferred embodiment, the mould container part guide member comprises at least two sides arranged rotation-symmetrically in which a mould container part can be received, and wherein the longitudinal axis of the mould container part guide member around which it can be revolved is rotatable is arranged substantially on the rotation symmetry axis of the mould container part guide member. By rotating the mould container part guide member about the rotation axis mould container parts can be alternated at a determined position such that a loop of mould container parts can be realized. This considerably increases the production capacity.

[0016] According to yet another preferred embodiment, the mould container part guide member comprises at least two parts which are rotatable about a longitudinal axis of the mould container part guide member and which are at least as long as the length of the mould container part.

[0017] Because the length of the rotatable part is at least as long as the length of a mould container part, a mould container part can be received wholly in the rotatable part of the mould container part guide member. The mould container part can hereby be rotated between the turning position and the release position using the mould container part guide member. By applying two rotatable parts revolution can take place at two positions, this pro-

viding the option of forming a loop of mould container parts which progress successively through a series of positions in order to form green bricks in the mould containers of the mould container parts.

[0018] According to yet another preferred embodiment, at least one part rotatable about the longitudinal axis of the mould container part guide member is arranged close to an outer end of the mould container part guide member. The device can hereby be given a compact form.

[0019] According to a further preferred embodiment, a rotatable part is arranged close to both outer ends of the mould container part guide member. The loop option is combined here with a compact construction of the device.

[0020] According to yet another preferred embodiment, the mould container part guide member comprises at least one fixed, non-rotatable part in which a mould container part can be received with its at least one mould container directed substantially upward, and wherein clay arranging means are arranged above this fixed part for arranging clay in the mould container therewith. The non-rotatable part is a fixed part which can be additionally strengthened and supported in simple manner in order to be able to absorb the forces with which clay is pressed into the mould container of the mould container part during use by the clay arranging means.

[0021] According to yet another preferred embodiment, a mould container part received in the mould container part guide member is displaceable in lengthwise direction of the mould container part guide member between at least a filling position and a turning position, wherein in the turning position the mould container part is situated in a rotatable part of the mould container part guide member. The mould container part can be displaced in translating manner in lengthwise direction of the mould container part guide member.

[0022] According to a further preferred embodiment, the device further comprises displacing means for displacing a mould container part received in the mould container part guide member at least from the filling position to the turning position. The displacing means for displacing the mould container part are for instance a hydraulic cylinder or a gear rack which is arranged on the mould container part and on which one or more drivable pinions can be engaged.

[0023] According to yet another preferred embodiment, the mould container part guide member comprises one substantially rigid beam-like body which can be rotated as one whole about the longitudinal axis thereof between the turning position and the release position. Although the production speed is reduced when the mould container part guide member is manufactured integrally, a very compact device can however be realized in this way. For some brick manufacturers extra compactness at the expense of production speed is a decisive factor in the manufacture of special bricks.

[0024] According to a further preferred embodiment, the device further comprises: spraying means for spraying the mould container with a cleaning liquid, air displacing means for partially suctioning dry and/or blowing dry the mould container cleaned using cleaning liquid, and sand-covering means for arranging a sand layer against one or more walls of the cleaned mould container, wherein the spraying means and/or air displacing means and/or sand-covering means are arranged displaceably on a guide.

[0025] After release of a green brick formed in the mould container there sometimes remains contamination in the form of clay and sand residues. In order to prevent these contaminants being left to cure in the mould container, and thus having an adverse effect on the shape of subsequent green bricks to be formed in this mould container, once the green bricks have been released the mould containers are cleaned and once again prepared for the purpose of forming a subsequent green brick therein. The spraying means remove the larger contaminants, after which the mould container is partially dried with the air displacing means. Sand is then arranged in the still slightly moist mould container and remains adhered to the walls to some extent, this accelerating the release from the mould container of the subsequent green brick to be formed.

[0026] The invention further relates to a method for manufacturing green bricks from clay for the brick manufacturing industry, comprising the steps of:

- filling a mould container arranged in a mould container part with clay in a filling position in order to form a green brick from clay therein, wherein the mould container part is received for displacement in a substantially beam-like mould container part guide member;
- displacing the mould container part received in the mould container part guide member from the filling position to a turning position;
- in the turning position, rotating at least the part of the mould container part guide member in which the mould container part is situated in the turning position about a longitudinal axis of the mould container part guide member;
- wherein rotating the mould container part guide member comprises of rotating the mould container part guide member from the turning position to a release position so that the mould container part received in the rotatable part is thereby rotated from the turning position, in which the mould container part with its at least one mould container is directed substantially upward, to the release position in which the mould container part with its at least one mould container is directed substantially downward;
- collecting in the release position one or more green bricks formed in the mould container of the mould container part and being released therefrom. The mould container part is arranged translatably in lengthwise direction of the mould container part guide member.

[0027] According to a preferred embodiment, the method further comprises the steps of:

- placing a plate part on the mould container part with one or more mould containers filled with clay;
- wherein the plate part is held against the mould container part during rotation of the mould container part guide member from the turning position to the release position; and
- displacing downward away from the mould container part the plate part held thereagainst during rotation in substantially the release position, in which the mould container part is directed with its at least one mould container substantially downward, so that the one or more green bricks which are released from their respective mould container can be discharged on the plate part for further processing.

[0028] According to a further preferred embodiment of the method, a plurality of mould container parts are received adjacently of each other in the mould container part guide member such that, when a mould container part is displaced forward in the mould container part guide member in lengthwise direction thereof, a mould container part located in front thereof is also displaced forward. The mould container parts, and particularly the mould containers arranged therein, are thus advanced stepwise within the loop through which they progress.

[0029] Depending on the desired production capacity, a brick manufacturer can if desired apply one or more dummy containers which lack mould containers suitable for the production of the desired brick shape. If desired, such dummy mould container parts are not provided with any mould container at all and serve only for the pushing along process in the loop of the mould container parts provided with desired mould containers.

[0030] According to yet another preferred embodiment, the method further comprises of performing the successive steps, after release of a formed green brick from the mould container, of: 1) spraying the mould container with a cleaning liquid using spraying means; 2) partially suctioning dry and/or blowing dry the mould container cleaned with cleaning liquid using air displacing means; and 3) arranging a sand layer against one or more walls of the cleaned mould container using sand-covering means.

[0031] According to yet another preferred embodiment of the method, the mould container part with the at least one cleaned and sand-covered mould container is revolved from a further turning position to a position in which its at least one mould container is directed substantially upward so that it can be filled with clay in a filling position.

[0032] According to yet another preferred embodiment of the method, the step of releasing from the mould container a green brick formed from clay therein is accelerated by vibrating the mould container part and/or aerating from the bottom of the mould container the green brick formed therein.

[0033] According to a further preferred embodiment of the method, a device as described above is applied.

[0034] Preferred embodiments of the present invention are further elucidated in the following description with reference to the drawing, in which:

Figure 1 is a perspective view of a device according to a first preferred embodiment of the invention;
Figure 2 is a side view of the device shown in figure 1 in a state following on from the state shown in figure 1;
Figure 3 is a perspective view of the device shown in figures 1 and 2 during the step of the revolving;
Figure 4 is a perspective view of the device shown in figures 1-3 after the mould container parts have been revolved;
Figure 5 is a side view of the state shown in figure 4;
Figure 6 is a side view of a step following on from the state shown in figure 5;
Figure 7 is a side view of a step following on from the state shown in figure 6;
Figure 8 is a side view of a step following on from the state shown in figure 7; and
Figure 9 is a perspective view of a device according to an alternative preferred embodiment of the invention.

Figure 1 shows a mould container pressing device 1, wherein mould container parts 2 are arranged in a mould container part guide member 8. In the shown embodiment the mould container part guide member 8 is divided into three parts, respectively the rotatable parts 12, 14 arranged on the outer ends of the mould container part guide member 8 and the fixed part 16 arranged between rotatable parts 12, 14. Fixed part 16 is supported (not shown) so that it can absorb pressure forces exerted by clay arranging means 18 when clay is pressed into mould containers 4. Once clay has been pressed into mould containers 4 and possible surplus clay has been trimmed by trimming means (not shown) on the upper side of mould container part 2, a green brick 6 of clay is situated in mould container 4 of mould container part 2. In figure 1 a mould container part 2 is also received in rotatable part 14. Arranged on this mould container part 2 is a drying plate 22 which is held fixedly on the upper side of mould container part 2 using tensioning means 24, so that during rotation of rotatable part 14 with mould container part 2 received therein the green bricks 6 are held in their respective mould container 4. Revolution takes place by rotating rotatable part 14 about rotation axis 10.

[0035] Arranged under rotatable part 14 of the mould container part guide member 8 is a discharge conveyor 26 which in the shown embodiment comprises two chains 28 tensioned between chain wheels 30 which are mutually connected via shaft 32. Discharge conveyor 26 is adjustable in the height H and can also be driven for the

purpose of discharging a drying plate 22 with green bricks 6 present thereon on discharge conveyor 26.

[0036] The successive steps of applying the device will be further elucidated with reference to figures 2-8.

[0037] In the state shown in figure 1 the last two mould containers 4 of mould container part 2 in fixed part 16 are as yet unfilled. Figure 2 shows the situation of mould container parts 2 shown in figure 1, although clay has now also been pressed by clay arranging means 18 into the rearmost mould containers 4 of mould container part 2 situated at position B. The side view of figure 2 shows that in the state shown in figure 1 mould container parts 2 are situated at positions B, C, E and F. The positions of A and D are free in this shown state of the loop process.

[0038] A drying plate 22 is arranged at position C on top of mould container part 2 and held fast on rotatable part 14 with tensioning means 24 (figures 1 and 3). When rotatable part 14 then rotates via arrow R_2, tensioning means 24 prevent drying plate 22 sliding off mould container part 2. Rotatable part 14 is rotated about 180°, whereby mould container part 22, which in figure 2 is directed with its mould containers 4 substantially upward, is located at position D in the state shown in figures 4 and 5 and mould containers 4 are directed substantially downward.

[0039] The mould container part guide member 8 has a bent edge on which mould container parts 2 situated on the underside of the mould container part guide member 8, i.e. mould container parts 2 which are directed with their mould containers 4 substantially downward, support.

[0040] Discharge conveyor 26 is adjustable in the height H and, after mould container part 2 is revolved from position C to position D, is placed in the vicinity of drying plate 2 or even held thereagainst, after which tensioning means 24 are released. When discharge conveyor 26 is then displaced downward away from mould container part 2 at position C, the green bricks 6 formed in mould containers 4 of this mould container part 2 will be released from mould containers 4 under the influence of the force of gravity and come to lie on drying plate 2.

[0041] Although the time for release of green bricks 6 from mould containers 4 wholly on the basis of gravitation force is acceptable in the manufacture of special bricks, this release process can be accelerated if desired by using release-enhancing means (not shown). Such means are for instance vibrating means and/or aerating means which supply air from the bottom of mould container 4.

[0042] Green bricks 6 lying on drying plate 22 can be discharged via discharge conveyor 26 for further processing, such as drying and firing thereof.

[0043] Once mould container part 2 has revolved from position C to position D, position C is left clear. In the shown embodiment a mould container part 2 is also revolved from position F to position A (figure 3). This results in the state shown in figure 4, in which mould container parts 2 are situated at positions A and B on the upper side of the mould container part guide member 8, and position C is free.

[0044] Figure 5 shows a side view of the state shown in figure 4.

[0045] The successive steps of the loop process will be elucidated in more detail with reference to figures 6-8.

[0046] Following on from the state shown in figure 5, the mould container part 2 situated at position A is moved one step forward in the translation direction T_1. The foremost mould container 4 of mould container part 2, which was situated at position A in figure 5, hereby displaces to a position under clay arranging means 18 (figure 6). Mould container part 2, which was situated wholly at position B in figure 5, is also displaced one step forward in the direction of position C, such that in figure 6 the foremost mould container 4 of this mould container part 2 is already situated at position C.

[0047] On the underside of the mould container part guide member 8 the mould container part 2, which was situated at position D in figure 5, is also shifted one step forward in the translation direction T_2, i.e. in the direction of position E. Mould container part 2 which was situated at position E in figure 5 is hereby also displaced one step in the direction of position F in figure 6.

[0048] In figures 5-8 the mould container parts 22 situated on the upper side of the mould container part guide member 8 are successively filled with clay until the state shown in figure 8 results. It is noted here that figure 8 and figure 2 are essentially identical, the only difference being that in figure 2 a drying plate 22 is arranged on top of the mould container part 2 situated at position C.

[0049] Contamination in the form of clay and sand residues sometimes remains after the release of a green brick 6 formed in mould container 4. In order to clean mould containers 4 and make them suitable for the production of new green bricks 6, a spraying step, a drying step and sand-covering step are successively performed, which will be elucidated in more detail with reference to figures 5-7.

[0050] In figure 5 the rearmost mould container 4 of mould container part 2 situated at position E is sprayed with a cleaning liquid, generally water, by a spraying means 34. Once this mould container part 2 has been displaced one step forward from the state shown in figure 5 to the state shown in figure 6, the mould container 4 that has just been sprayed is situated above air displacing means 36 which partially suction dry and/or blow dry the still moist mould container 4. This mould container 4 is then displaced one step forward again and in the subsequent step provided with a sand layer by sand-covering means 38 (figure 7). The sand remains adhered against the walls of the still slightly moist mould container 4 and thus forms a sand layer which enhances release from the mould containers 4 of a green brick 6 formed therein.

[0051] Figure 9 shows an alternative preferred embodiment, wherein the mould container part guide member 8 is made from a single part. In the shown embodiment only two mould container parts 22 are arranged in the mould container part guide member 8. When one mould

container part 22 is situated on the upper side so as to be there provided with clay in mould containers 4 by clay arranging means 18, the other mould container part 2 is situated on the underside above a guide 40 on which spraying means 34, air displacing means 36 and sand-covering means 38 are displaceably arranged. Guide 40 makes it possible for spraying means 34, air displacing means 36 and sand-covering means 38 to reach all mould containers 4, while the device according to this alternative embodiment of figure 9 can be given a very compact construction.

[0052] Although they show preferred embodiments of the invention, the above described embodiments are intended only to illustrate the present invention and not to limit the scope of the invention in any way. It is particularly noted that the skilled person can combine technical measures of the different embodiments, such as for instance the arranging of the spraying means and/or air displacing means and/or sand-covering means on a guide rail. The described rights are defined by the following claims, within the scope of which many modifications can be envisaged.

Claims

1. Device (1) for manufacturing green bricks from clay for the brick manufacturing industry, comprising:

   - at least one mould container part (2) in which at least one mould container (4) is arranged for forming a green brick (6) from clay therein;
   - a mould container part guide member (8) in which the mould container part (2) can be received for displacement between a filling position and a turning position;

   characterized in that

   - the mould container part guide member (8) is substantially beam-like, wherein the mould container part (2) can be received for displacement in lengthwise direction of the mould container part guide member (8); and
   - wherein at least a part of the mould container part guide member (8) can be revolved about a longitudinal axis (10) thereof between the turning position and a release position so that the mould container part (2) which can be received in the revolvable part can thereby be revolved between the turning position, in which the mould container part (2) with its at least one mould container (4) is directed substantially upward, and the release position in which the mould container part (2) with its at least one mould container (4) is directed substantially downward.

2. Device as claimed in claim 1, wherein the longitudinal axis (10) of the mould container part guide member (8) around which it can be revolved is situated within the periphery of the mould container part guide member (8).

3. Device as claimed in claim 1 or 2, wherein the mould container part guide member (8) comprises at least two sides arranged rotation-symmetrically in which a mould container part can be received; and

   - wherein the longitudinal axis (10) of the mould container part guide member (8) around which it can be revolved is arranged substantially on the rotation symmetry axis of the mould container part guide member (8).

4. Device as claimed in any of the foregoing claims, wherein the mould container part guide member (8) comprises at least two parts (12, 14) which are rotatable about a longitudinal axis (10) of the mould container part guide member (8) and which are at least as long as the length of the mould container part (2).

5. Device as claimed in claim 4, wherein at least one part rotatable about the longitudinal axis of the mould container part guide member (8) is arranged close to an outer end of the mould container part guide member (8), or wherein a rotatable part is arranged close to both outer ends of the mould container part guide member (8).

6. Device as claimed in either of the claims 4 or 5, wherein the mould container part guide member (8) comprises at least one fixed, non-rotatable part (16) in which a mould container part (2) can be received with its at least one mould container (4) directed substantially upward, and wherein clay arranging means (18) are arranged above this fixed part (16) for arranging clay in the mould container (4) therewith.

7. Device as claimed in any of the foregoing claims, wherein a mould container part (2) received in the mould container part guide member (8) is displaceable in lengthwise direction of the mould container part guide member (8) between at least a filling position and a turning position, wherein in the turning position the mould container part (2) is situated in a rotatable part of the mould container part guide member (8).

8. Device as claimed in claim 7, wherein the device further comprises displacing means for displacing a mould container part (2) received in the mould container part guide member (8) at least from the filling position to the turning position.

9. Device as claimed in any of the claims 1, 7 or 8, wherein the mould container part guide member (8) comprises one substantially rigid beam-like body

which can be rotated as a whole about the longitudinal axis thereof between the turning position and the release position.

10. Method for manufacturing green bricks from clay for the brick manufacturing industry, comprising the steps of:

- filling a mould container (4) arranged in a mould container part (2) with clay in a filling position (B) in order to form a green brick (6) from clay therein, wherein the mould container part (2) is received for displacement in a substantially beam-like mould container part guide member (8);
- displacing the mould container part (2) received in the mould container part guide member (8) from the filling position (B) to a turning position (C);
- in the turning position (C), rotating at least the part of the mould container part guide member (8) in which the mould container part (2) is situated in the turning position (C) about a longitudinal axis (10) of the mould container part guide member (8);
- wherein rotating the mould container part guide member (8) comprises of rotating the mould container part guide member (8) from the turning position (C) to a release position (D) so that the mould container part (2) received in the rotatable part is thereby rotated from the turning position, in which the mould container part (2) with its at least one mould container (4) is directed substantially upward, to the release position in which the mould container part (2) with its at least one mould container (4) is directed substantially downward;
- collecting in the release position one or more green bricks (6) formed in the mould container (4) of the mould container part (2) and being released therefrom.

11. Method as claimed in claim 10, further comprising the steps of:

- placing a plate part (22) on the mould container part (2) with one or more mould containers (4) filled with clay;
- wherein the plate part (22) is held against the mould container part (2) during rotation of the mould container part guide member (8) from the turning position to the release position; and
- displacing downward away from the mould container part (2) the plate part (22) held thereagainst during rotation in substantially the release position, in which the mould container part (2) is directed with its at least one mould container (4) substantially downward, so that the one or more green bricks (6) which are released from their respective mould container (4) can be discharged on the plate part (22) for further processing.

12. Method as claimed in claim 10 or 11, wherein a plurality of mould container parts (2) are received adjacently of each other in the mould container part guide member (8) such that, when a mould container part (2) is displaced forward in the mould container part guide member (8) in lengthwise direction thereof, a mould container part (2) located in front thereof is also displaced forward.

13. Method as claimed in any of the claims 10-12, further comprising the successive steps, following release of a formed green brick (6) from the mould container (4), of:

1) spraying the mould container (4) with a cleaning liquid using spraying means (34);
2) partially suctioning dry and/or blowing dry the mould container cleaned with cleaning liquid using air displacing means (36); and
3) arranging a sand layer against one or more walls of the cleaned mould container (4) using sand-covering means (38).

14. Method as claimed in claim 13, wherein the mould container part (2) with the at least one cleaned and sand-covered mould container (4) is revolved from a further turning position (F) to a position in which its at least one mould container (4) is directed substantially upward so that it can be filled with clay in a filling position (B).

15. Method as claimed in any of the claims 10-14, wherein the step of releasing from the mould container (4) a green brick (6) formed from clay therein is accelerated by vibrating the mould container part (2) and/or aerating from the bottom of the mould container (4) the green brick (6) formed therein.

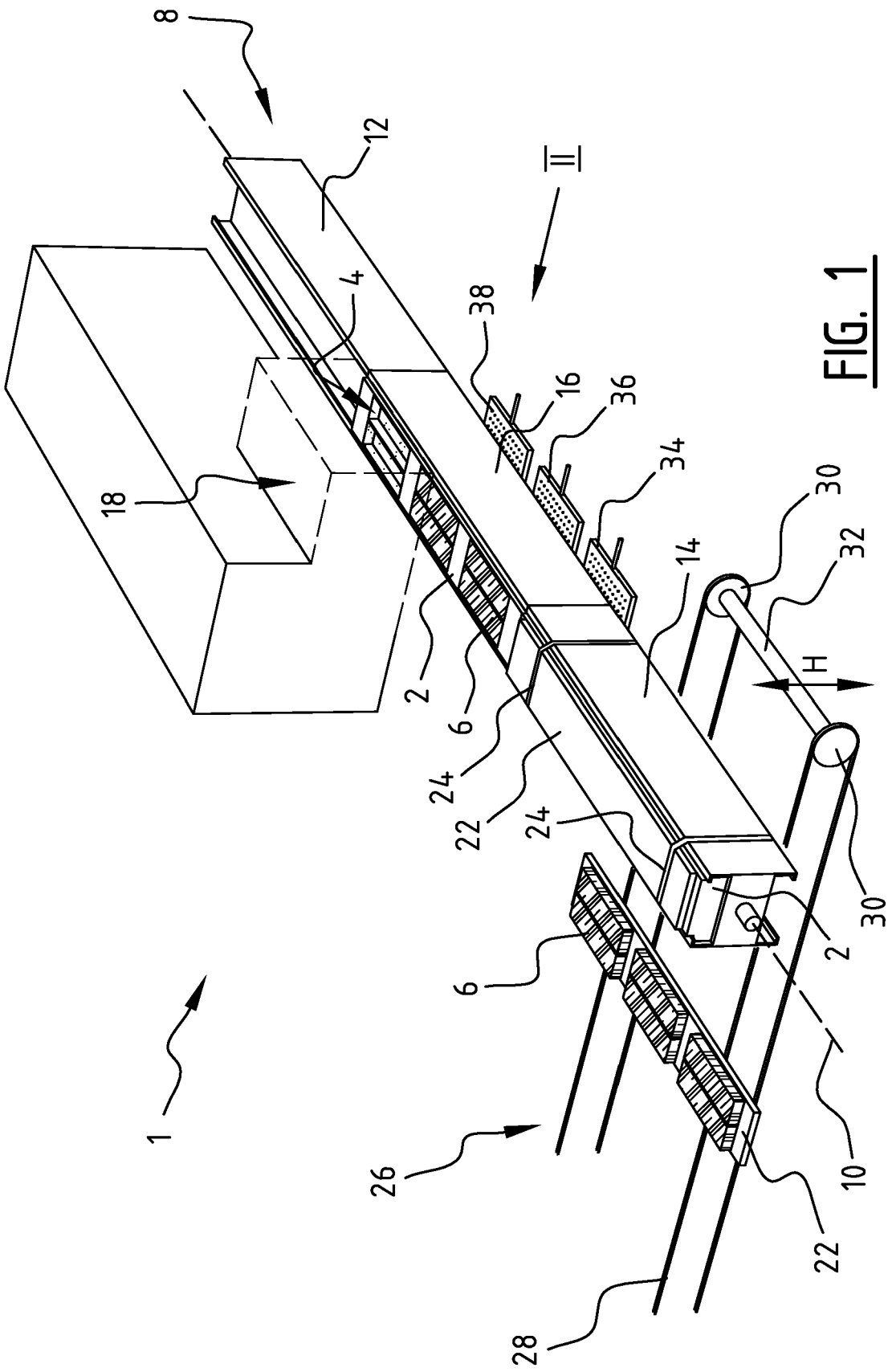
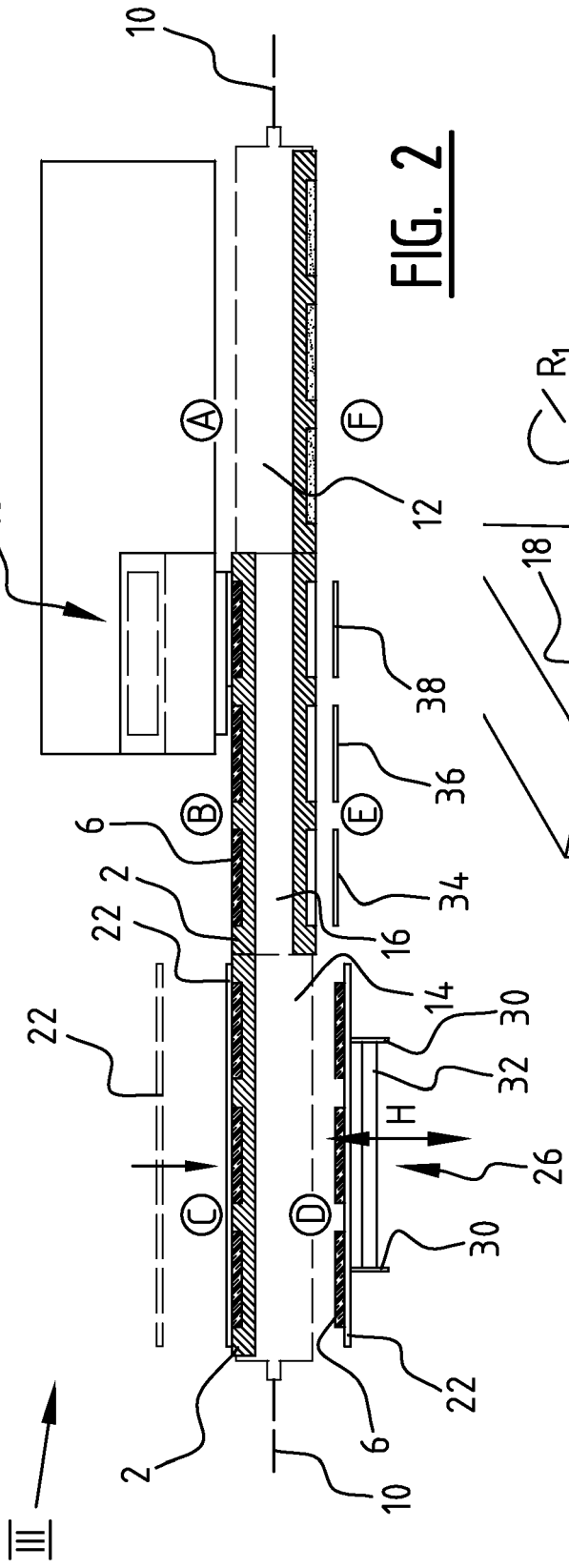


FIG. 1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III

FIG. 2

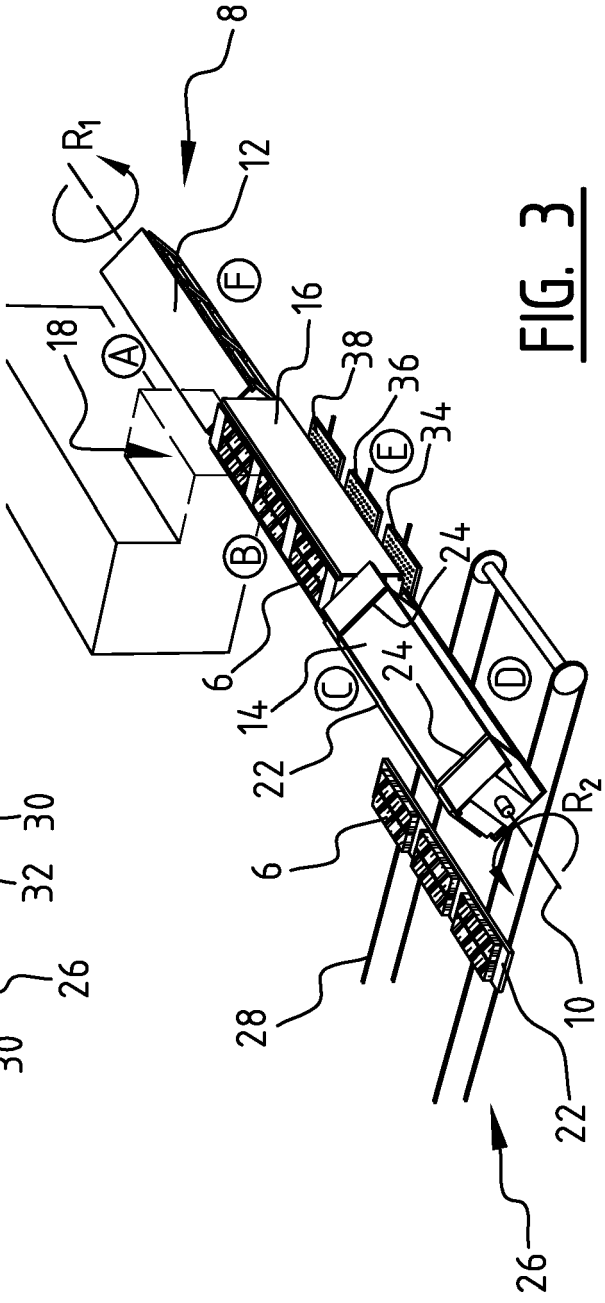
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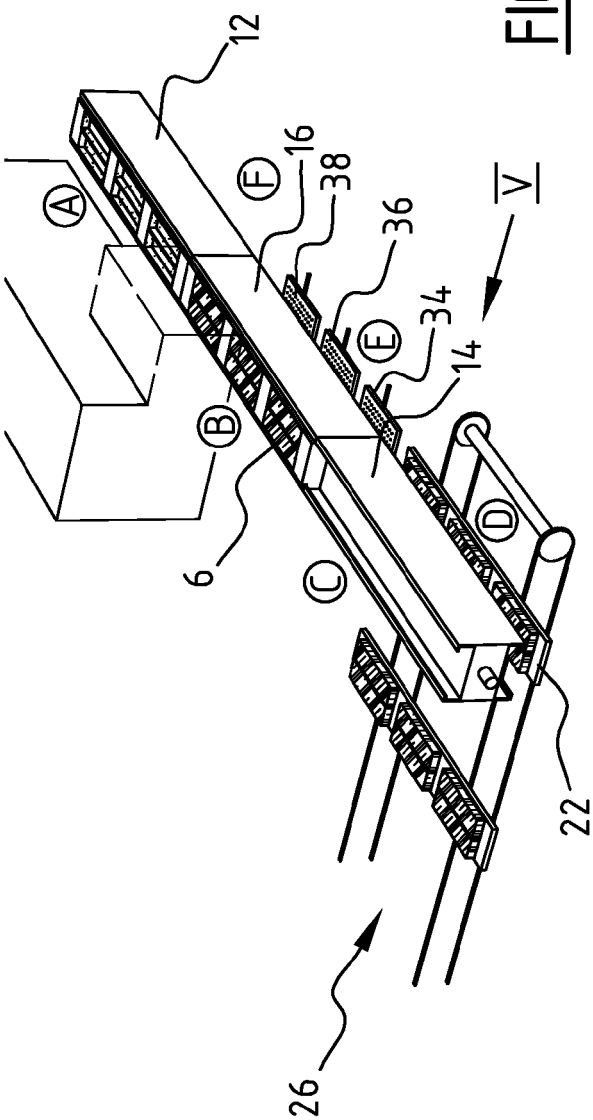
FIG. 3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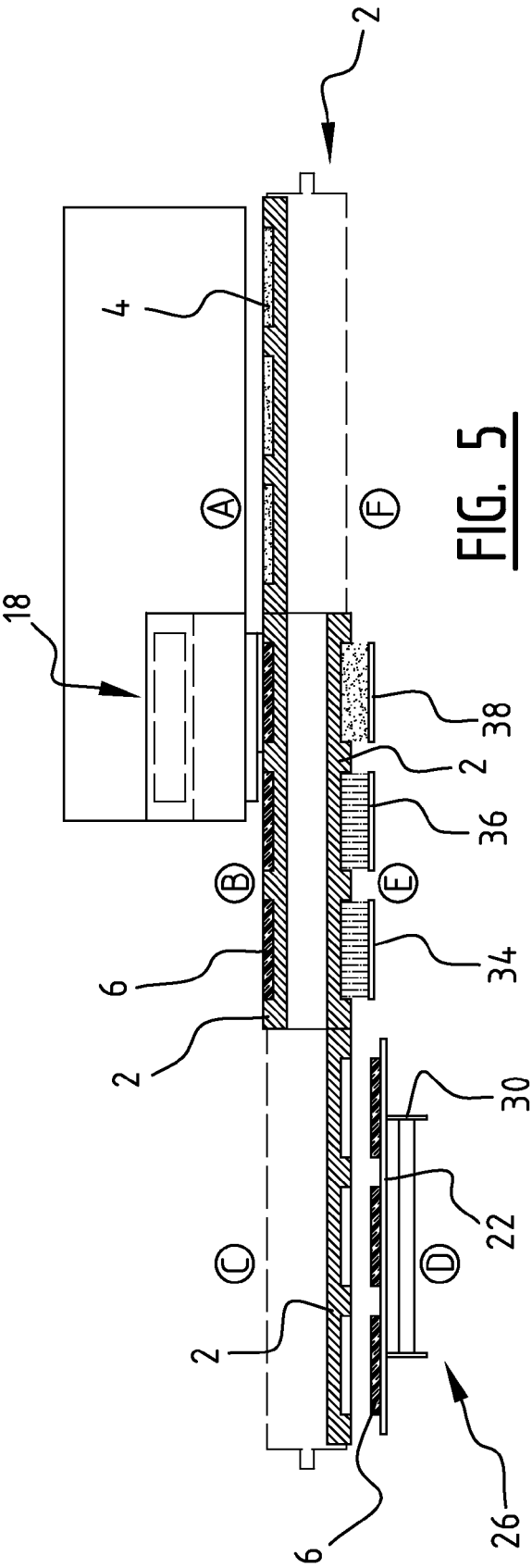
26

FIG. 4


2
4
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A
F
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E
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34
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C
D
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6
26

FIG. 5

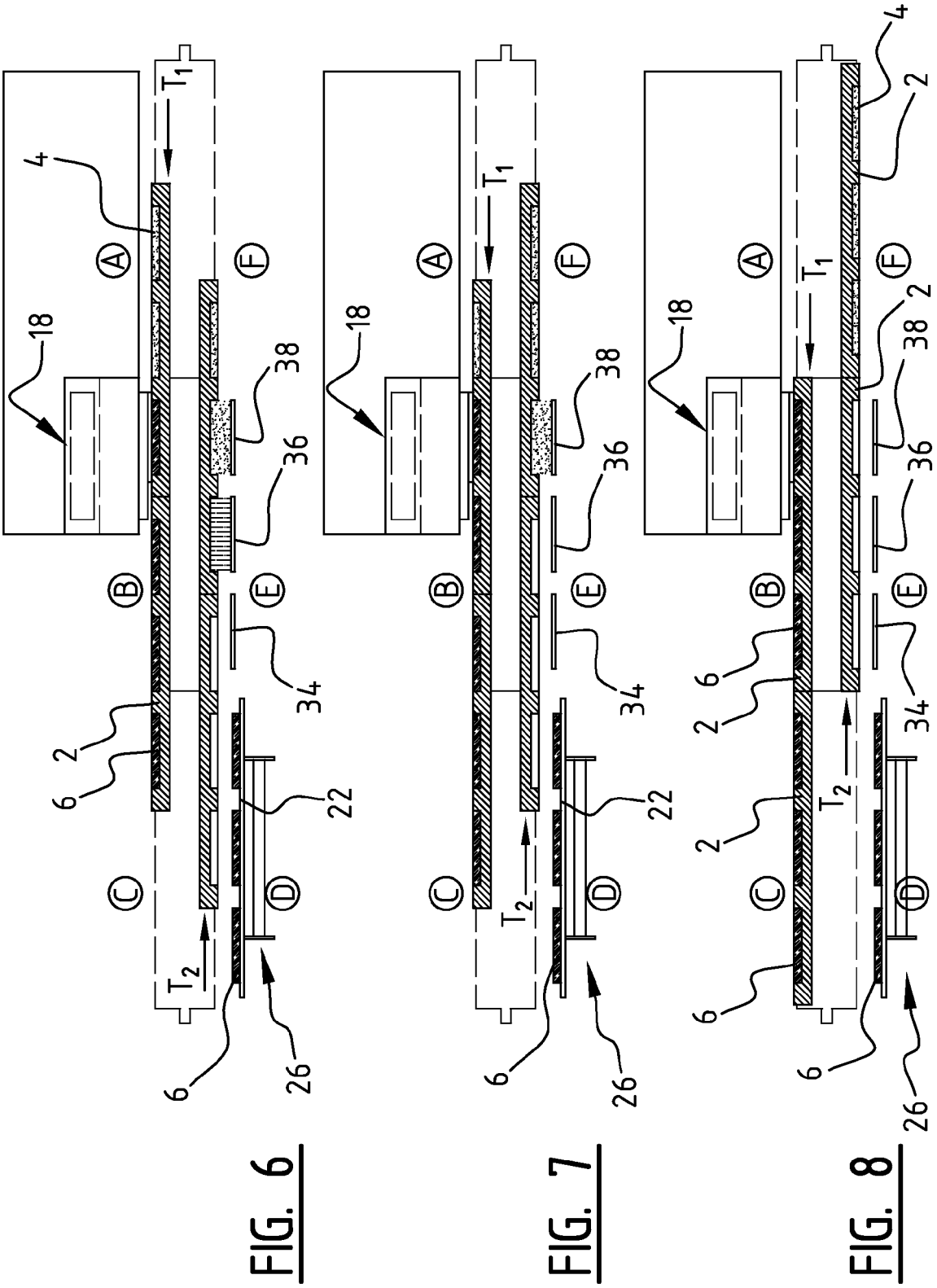

FIG. 6

FIG. 7

FIG. 8

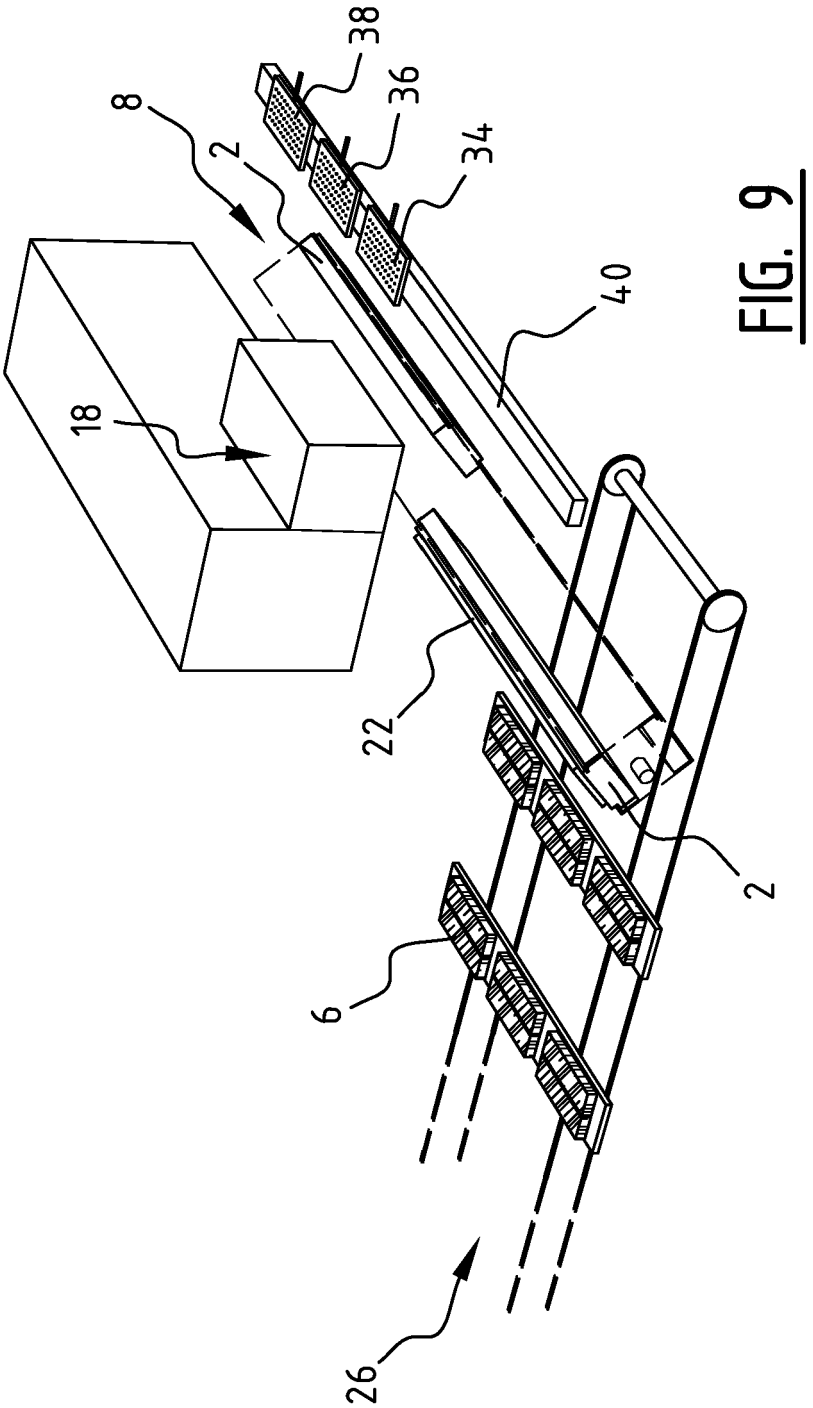

FIG. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 11 17 6821

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B28B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 October 2011	Orij, Jack

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