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

(11) EP 1 504 867 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
10.10.2007 Bulletin 2007/41

(51) Int Cl.:
B28B 5/02 *(2006.01)* ***B28B 13/06*** *(2006.01)*

(21) Application number: **04077244.4**

(22) Date of filing: **05.08.2004**

(54) **Device for manufacturing green bricks for the brick manufacturing industry**

Vorrichtung zur Herstellung von Steinformlingen für die Ziegelindustrie

Machine pour la fabrication de briques crues utilisées dans l'industrie manufacturière des briques

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR

(30) Priority: **06.08.2003 NL 1024056**
19.02.2004 NL 1025525

(43) Date of publication of application:
09.02.2005 Bulletin 2005/06

(73) Proprietor: **Beheermaatschappij De Boer Nijmegen B.V.**
6541 BS Nijmegen (NL)

(72) Inventor: **Kosman, Wllhelmus Jacobus Maria**
6562 DA Groesbeek (NL)

(74) Representative: **Hylarides, Paul Jacques**
Arnold & Siedsma
Sweelinckplein 1
2517 GK The Hague (NL)

(56) References cited:
EP-A- 0 917 938
EP-A- 1 000 000
JP-A- 60 122 110
NL-A- 8 006 763

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 1 504 867 B1

Description

[0001] The present invention relates to a device for manufacturing green bricks from clay for the brick manufacturing industry, comprising a circulating conveyor carrying mould containers for the purpose of transporting the mould containers, clay arranging means for arranging clay in mould containers, and means for covering the open side of the mould containers with drying plates.

[0002] Such a device is known from for instance the European patent application EP-A-0 917 938 of applicant. In the known device the mould containers are combined to mould container parts, wherein each mould container part comprises two parts for mutual releasable coupling, wherein the first stationary part comprises the walls of the mould containers and the second movable part comprises the movable bottoms of the mould containers. The known device is manufactured wholly from steel and is suitable for manufacturing large numbers of green bricks, wherein each green brick is ejected from the relevant mould container by the movable bottom.

[0003] Although the known device is per se suitable for manufacture of green bricks of different sizes, for instance by replacing the stationary part, and in some cases also the movable part, of the mould container part with another stationary mould container part or movable part, the change-over nevertheless requires rather a lot of work. The construction of the known device is moreover quite complicated and costly. The known device is hereby less suitable for manufacture of relatively small series of green bricks of different sizes.

[0004] Also known are devices in which the mould containers do not have a movable bottom and the green bricks must be released from the mould containers under the influence of gravity. The release of the green bricks is frequently unsatisfactory here, for instance in the case of rich clay types and pressed bricks.

[0005] It is an object of the present invention to obviate the above stated drawbacks and to provide a device wherein relatively small series of green bricks can be manufactured in efficient and simple manner.

[0006] According to claim 1, from which the preamble is known from EP-A-0 917 938., there is provided a device for manufacturing green bricks from clay for the brick manufacturing industry, comprising:

- a circulating conveyor carrying mould containers for the purpose of transporting the mould containers;
- clay arranging means for arranging clay in mould containers;
- means for covering the open side of the mould containers with drying plates;
- holders which are coupled to the conveyor and on which the mould containers are arranged;

wherein the mould containers are arranged displaceably relative to the conveyor so as to displace the mould containers downward at the release stage in which the open side of the mould containers is oriented substantially downward, and in which the holders are adapted to abruptly stop the downward displacement in order to thereby release the green bricks present in the mould containers onto the associated drying plate. Instead of holding the first part of the mould container parts stationary and releasing the green bricks using a movable bottom, according to the invention the mould containers are coupled movably to the conveyor, or at least the holders arranged on the conveyor, such that these mould containers can move downward during releasing. By then causing the downward moving mould containers to stop, or at least to slow down, the green bricks will be forced with more certainty out of the mould containers.

[0007] In a specific preferred embodiment of the invention, the holders are embodied to guide the mould containers therein so as to cause the holders to fall at the release stage and wherein the holders comprise at least one stop for abrupt braking of the falling movement of the holders for the purpose of thereby ejecting the green bricks present in the mould containers onto the associated drying plate. At the release stage the mould containers fall downward under the influence of gravity until the mould containers are arrested by the stop of the holder. Depending on the embodiment thereof, the stop ensures that the downward movement of the mould container is slowed considerably or even stopped abruptly. Owing to the inertia of the green bricks in the mould containers, they are released with great certainty from the mould containers.

[0008] According to another preferred embodiment of the invention, the holders comprise ejectors movable relative to the conveyor, to which ejectors the mould containers can be coupled, wherein the ejectors are adapted to displace the mould containers coupled thereto during the release stage and to eject the green bricks present in the mould containers onto the associated drying plate.

[0009] Instead of holding the first part of the mould container parts stationary and releasing the green bricks using a movable bottom, according to this embodiment the mould containers are mounted directly on the ejectors. The ejecting movement of the ejector provides for a knock-out force to be exerted on the clay in the mould cavities of the mould container such as to ensure that the green brick is released and comes to lie on the drying plate.

[0010] Use is preferably made of already existing devices for manufacturing green bricks. This is not however essential. A machine specially suitable for this purpose can also be applied. In both cases however it is recommended to apply mould containers of relatively low weight. Only relatively modest demands need hereby be made of the construction of the ejector mechanism. According to a particularly advantageous embodiment, the mould containers are manufactured from plastic, such as preferably polyethylene. An example of a particularly suitable plastic is a plastic known under the trade name "Hakorit".

[0011] According to a further preferred embodiment, the ejectors are adapted to thrust the mould containers coupled thereto outward and inward during the release stage. Thrusting outward of the mould container preferably takes place when the open side (covered by the cover plate) of the mould container is oriented sideways or downward to enable release of the green bricks, partly under the influence of gravity.

[0012] In a further preferred embodiment, the device comprises an ejecting and vibrating mechanism engaging on the mould containers and/or conveyor for the purpose of causing lateral vibration of the mould containers during the release stage. Before, during and/or just after the ejecting movement the mould containers are shaken back and forth in such an embodiment with the purpose of enhancing release of the green brick, for instance in the unlikely event that (a part of) the green brick threatens to adhere to the walls or the bottom of the mould container. Vibration preferably takes place substantially sideways and transversely of the transporting direction of the conveyor.

[0013] In order to simplify change-over of the device for the manufacture of series of green bricks of different dimensions, the mould containers are arranged releasably on the ejectors. When green bricks of other dimensions must therefore be manufactured, the different mould containers can be thus be exchanged simply and rapidly.

[0014] In a further preferred embodiment, the mould container comprises:

- upright walls which define one or more mould cavities;
- a coupling element which can be fixed to the walls,

wherein the coupling element can be connected to one or more of the ejectors.

[0015] In a further embodiment, the coupling element comprises a coupling plate provided with recesses in both longitudinal edges. The recesses are provided to enable simple attachment of the mould container to the coupling plate. The coupling element itself and the ejector are here preferably formed such that they provide a dovetail coupling. It is hereby possible to couple a mould container to or uncouple it from an ejector by a single sliding movement. This further shortens the change-over time of the device.

[0016] According to a preferred embodiment, a single coupling element is mounted on the whole row of ejectors. In this embodiment it therefore suffices to fix a single continuous plate transversely of the transporting direction of the conveyor, whereafter the mould container(s) can be coupled to the plate. Conversely, in another embodiment a separate coupling element and a separate mould container is mounted per ejector. The mould containers are herein mounted individually on the ejectors.

[0017] In a further preferred embodiment, a mould container also comprises one or more bottoms to be arranged in the mould cavities, wherein spacers are provided between the coupling element and the bottoms. The spacers provide for a correct spacing between the relevant ejector and bottom of the mould container. The depth of the cavity in the mould container, and thereby the size of the green brick, is adjusted subject to the distance between the ejector and the bottom provided by the spacer.

[0018] According to a further preferred embodiment, the take-off means are adapted to displace the associated drying plates substantially synchronously with the ejecting movement of mould containers. The drying plates must co-displace with the mould containers during the ejecting movement in order to prevent the green bricks falling out prematurely.

[0019] According to a further preferred embodiment there is provided a device for manufacturing green bricks from clay, comprising:

- a circulating conveyor carrying mould containers;
- a clay reservoir arranged above the conveyor;
- means for carrying clay out of the reservoir into the mould containers;
- means for pressing and trimming clay in the mould containers,
- means for discharging green bricks released from the mould containers and means for supplying and placing drying plates for the green bricks;
- movable ejectors arranged on the conveyor,

wherein the movable ejectors are adapted so as to arrange an ejector plate on the row of ejectors, to which ejector plate a mould container provided with one or more mould cavities is coupled such that the mould container co-displaces with the ejectors in a first application, and so as to arrange the separate bottoms in a second application wherein mould container is provided with one or more mould cavities such that the separate bottoms are movable in the mould cavities.

[0020] According to this preferred embodiment of the invention there is provided a device which is not only suitable for manufacturing large series of green bricks using mould containers provided with movable bottoms, but which is also suitable for manufacturing relatively small series of green bricks using mould containers co-displacing with the ejectors. It is noted that a single conveyor can be simultaneously provided with both the above stated stationary mould containers and the co-displacing mould containers. In practice however, a choice will usually be made for either the co-displacing mould containers or the stationary mould containers.

[0021] The invention also relates to the use of the above described device.

[0022] Further advantages, features and details of the present invention will be elucidated on the basis of the description of several preferred embodiments thereof. Reference is made in the description to the annexed drawings, in which:

- figure 1 shows a schematic, partly cut-away view in perspective of a first preferred embodiment of the invention;
- figure 2 shows the preferred embodiment of the mould container element in more detail;
- figures 3-5 show a number of cross-sections clarifying the release of the mould containers;
- figure 6 shows a cross-section of a mould container element in uncoupled position;
- figure 7 is a perspective view of a preferred embodiment which is provided with a vibrating mechanism; and
- figures 8-10 show a number of cross-sections clarifying the release of the mould containers according to the second preferred embodiment of the invention.

[0023] The device 1 for manufacturing the green bricks for the brick manufacturing industry comprises an upright chain conveyor 3 which performs a circulating movement in the direction of arrow P_1. Such a chain conveyor is already known per se and is described for instance in EP-A-0 917 938 of applicant, the content of which may be deemed incorporated herein by reference.

[0024] The chain of the conveyor is formed by a number of connected mould container elements 4, each provided with a number of mould containers 14 (sixteen in the embodiment of figure 1). Placed above mould containers 4 is a reservoir 5 for clay which is kept in continuous movement by an agitator 6 which is driven by an electric motor 7. Clay is added to reservoir 5 by a circulating conveyor 8. The clay is carried out of reservoir 5 into the mould containers and then pressed down by the pressing device 9 which is pivotable around shaft 10. The excess clay is also trimmed using means which are not drawn. The device 11 arranges drying plates 12 onto a mould container part such that, at the so-called release stage after the mould container part has been turned over, green bricks 13 come to lie on the plates after being released from mould containers 14.

[0025] Figure 2 shows a two-part embodiment of mould container element 4 according to the invention. The first part 4A comprises a number of separate mould containers 14, while the second part 4B is formed by a chain part 15 of chain conveyor 13. Chain part 15 is here provided with an ejector mechanism, as elucidated herein below.

[0026] Chain part 15 of chain conveyor 3 comprises ears 18 and 19 which serve as links of the conveyor. Different ejectors 24 are arranged in a row on chain part 15. A displaceable ejector plate 23, which is mounted on ejectors 24, is driven by ejectors 24. These latter lie under bias of springs 25 which centre the ejectors such that no separate guiding is necessary in chain part 15. Ejectors 24 are operated by displacing an element 20 during release of the green bricks. Element 20 is in turn displaced by a separate drive device (not shown).

[0027] The part 15 with ejector plate 23 is fastened to the chain part by means of bolts, and can be quickly removed and replaced by a complete steel mould container with movable ejector bottoms.

[0028] Ejectors 24 ensure that the displaceable ejector plate 23 is displaced up and downward (arrow P_2). In the device known from EP-A-0 917 938, the respective ejector bottoms press the clay in one ejecting movement out of the respective mould cavities of the mould containers, wherein the mould containers themselves remain stationary relative to the chain conveyor. However, according to the preferred embodiment of the invention shown in figure 2 separate mould containers 14 or an integrally formed mould container provided with a number of mould cavities 14 are coupled fixedly to a single movable ejector plate 23. Owing to the fixed attachment the mould containers 14 will co-displace with the displacement of the movable ejector plate 23. Mould containers 14 are hereby no longer stationary relative to the chain conveyor but can be moved by displacing the movable ejector plate.

[0029] The displacement of the mould containers is shown in more detail in figures 3-5. These figures show cross-sections, wherein in each case on the left-hand side of the drawing (left of the dash-dot line) an embodiment is shown which is suitable for manufacture of a relatively large green brick v, while in each case on the right-hand side of the drawing an embodiment is shown which is suitable for manufacture of a relatively small green brick v'. The operation of the two embodiments is otherwise wholly identical.

[0030] Figure 3 shows a mould container 14 which consists of upright walls 16 and a coupling part 17. Also provided is a spacer 41 or 41' to which is fixed a bottom 42 or 42' respectively. Spacer 41 in the right-hand part of figure 3 is larger than spacer 41' shown in the left-hand part of the figure. This means that in the embodiment shown in the right-hand part of figure 3 the bottom 42 is positioned relative to the upright walls 16 such that a relatively shallow cavity is created for manufacturing bricks, while in the embodiment shown in the left-hand part of the figure the bottom 42' is positioned such that a relatively large cavity is created, with which relatively large bricks can therefore be manufactured.

[0031] Figure 3 shows the situation wherein the movable ejector plate is situated in its starting position, wherein the open side of mould container 14 is covered by means of one of the above mentioned drying plates 12. Drying plate 12 ensures that the clay is held in place in the cavity of mould container 14.

[0032] Figure 4 shows the final situation where the movable ejector plate is displaced downward in the direction of arrow P_3. During this displacement a dynamic force is exerted on the green bricks and mould container 14. This dynamic force ensures that the green brick is more readily released from mould container 14 than would be the case if the green brick had to be released only under the influence of gravity. The situation in which the green brick v,v' is released is shown in figure 5. The released green brick here rests on the drying plate and can then be discharged, for instance to a drying house

where the green brick undergoes a drying process. After having released the green brick, ejector 24 once again returns the movable ejector plate (coupling element) 23 to the starting position shown in figure 3.

[0033] Owing to the above mentioned dynamic force exerted on the green bricks as a consequence of the displacement of the whole mould container 14, there results a better release compared to the release from mould containers where the green bricks have to drop from the mould container solely by means of the force of gravity. If the release is still not wholly satisfactory, it may be necessary to take additional measures to enhance the release process.

[0034] Shown in figures 1 and 7 is a further preferred embodiment for this purpose, in which a vibrating mechanism 32 engages on mould container element 4. In the shown preferred embodiment vibrating mechanism 32 comprises a frame 33 which spans mould container part 4. Frame 33 is provided on either side with stop members 34 which are situated at the position of the side walls of the mould container part. The distance between stop members 34 is greater than the length of the mould container part. Frame 33 is reciprocally movable by means of drive 36. The direction of movement of frame 33 preferably lies substantially transversely of the transporting direction of the conveyor as indicated by arrow P_4. Due to the repeated movement of frame 33 the stop members 34 strike alternately against the side walls 35 of the mould container part 4 which is spanned at that moment by frame 33. As a result the relevant mould container part is as it were shaken back and forth, whereby the green bricks in mould cavities 14 are also shaken back and forth. This ensures better release of the green bricks.

[0035] Figure 7 also shows that the vibrating mechanism is situated at a position of the conveyor in which the open side of the mould containers is directed upward. Although the shaking also ensures in this embodiment that the green bricks come to lie more loosely in the mould cavities, so that later release is improved, in another preferred embodiment the vibrating mechanism 32 is disposed such that the vibration takes place during the release process itself. Vibrating mechanism 32 is herein disposed at the position where the mould containers are directed downward.

[0036] Vibrating mechanism 32 therefore ensures that before, during and/or after the displacement process of mould containers 14 shown in figures 3-5, mould containers 14 also undergo an additional displacement in a direction perpendicularly thereof (arrow P_4), whereby the process of releasing the green bricks out of mould container 14 is enhanced still further. For a further description of an embodiment of the vibrating mechanism, reference is made to EP 1 000 000 B of the present applicant, the content of which is deemed incorporated herein.

[0037] In a further preferred embodiment, mould containers 14 are manufactured from plastic, for instance polyethylene (PE) as available under the trade name "Hakorit" (supplier Kors Kunststoffen B.V.). Such plastic mould containers have a relatively low weight, so that only relatively low structural requirements need be made of the applied ejector mechanism.

[0038] Figure 6 shows the situation where mould container 14 is removed from ejector plate 23. In the shown embodiment the coupling part 17 of mould container 14 is provided with recesses 30 which engage on corresponding protrusions 31 on ejector plate 23. The form of the ejector plate and the connecting piece hereby define a so-called dovetail connection, whereby a mould container can be coupled to or uncoupled from the ejector mechanism by means of only a simple sliding movement. This enables rapid and simple exchange of mould containers 14, for instance for the manufacture of different sizes of brick.

[0039] Figures 8-10 show another preferred embodiment of the invention in which the mould containers can move downward under the influence of gravity. Shown is a mould container 44 which consists of upright walls 46 to which are fixed one or more spacers 41,41'. Fixed to spacers 41,41' is a bottom 42 or 42'. Spacer 41 in the right-hand part of figure 8 is larger than spacer part 41' shown in the left-hand part of the figure. This means that in the embodiment shown in the right-hand part of figure 8 the bottom 42 is positioned relative to the upright walls 16 such that a relatively shallow cavity is created for the manufacture of bricks, while in the embodiment shown in the left-hand part of the figure the bottom 42' is positioned such that a relatively large cavity is created with which relatively large bricks can therefore be manufactured.

[0040] Mould container 44 is arranged on a steel holder 43 mounted on the conveyor. The upright walls 50 of holder 43 are provided on their outer ends with one or more protruding parts 45. The mutual distance between upright walls 50 is greater than the distance between the upright walls 46 of mould container 44, so that this latter can be guided between walls 50. Walls 50 are moreover of a form such that they are provided on their outer ends with an upper protruding part 51 and a lower protruding part 47.

[0041] Figure 8 shows the situation where mould container 44 is situated in its starting position, wherein the open side of mould container 44 is covered by means of one of the above mentioned drying plates 12. Drying plate 12 ensures that the clay is held in place in the cavity of mould container 44.

[0042] Figure 9 shows the final situation where mould container 44 is displaced downward in the direction of arrow P_5 under the influence of gravity. A corresponding displacement is carried out by drying plate 12. The displacement of mould container 44 is limited in that the protruding part 51 of mould container 44 comes to lie on the protrusion 45 of holder 43. Because protrusion 45 functions as stop, the downward movement of mould container 44 is stopped abruptly. As a result of the inertia of the clay in the mould container, a dynamic force is exerted on the clay such that the green brick is released

from mould container 14 with a high degree of certainty. The situation in which the green brick v,v' is released is shown in figure 10. The released green brick here rests on drying plate 12 and can then be discharged, for instance to a drying house where the green brick undergoes a drying process. After having released the green brick, a mechanism (not shown) once again returns mould container 44 to the starting position shown in figure 8.

[0043] In other preferred embodiments of the invention which are not shown, the embodiment in which the mould containers drop downward under the influence of gravity is combined with a vibrating mechanism, as described above with reference to figures 1 and 7. In other further embodiments which are not shown, the embodiments of figures 3-6 and 8-10 are furthermore combined. In this combined embodiment the mould containers are displaced by ejectors until they come up against a stop, so that a very abrupt slowing of the mould containers occurs.

[0044] The rights sought are not defined by the above described preferred embodiments of the invention. The rights are rather defined by the following claims.

Claims

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

   - a circulating conveyor (3) carrying mould containers (14) for the purpose of transporting the mould containers;
   - clay arranging means (5) for arranging clay in mould containers;
   - means (11) for covering the open side of the mould containers with drying plates (12);

   characterized by

   - holders (43) which are coupled to the conveyor (3) and on which the mould containers are arranged, wherein the mould containers are arranged displaceably relative to the conveyor (3) so as to displace the mould containers downward at the release stage in which the open side of the mould containers is oriented substantially downward, and in which the holders (43) are adapted to abruptly stop the downward displacement in order to thereby release the green bricks present in the mould containers onto the associated drying plate (12).

2. Device as claimed in claim 1, wherein the holders (43) are embodied to guide the mould containers therein so as to cause the holders to fall at the release stage and wherein the holders comprise at least one stop (34) for abrupt braking of the falling movement of the holders for the purpose of thereby ejecting the green bricks (13) present in the mould containers onto the associated drying plate.

3. Device as claimed in claim 1 or 2, wherein the holders (43) comprise ejectors (24) movable relative to the conveyor, to which ejectors the mould containers can be coupled,
   wherein the ejectors are adapted to displace the mould containers (14) coupled thereto during the release stage and to eject the green bricks present in the mould containers onto the associated drying plate (12).

4. Device as claimed in any of the foregoing claims, wherein the mould containers (14) are manufactured from plastic.

5. Device as claimed in claim 3 or 4, wherein the ejectors (24) are adapted to thrust the mould containers coupled thereto outward and inward during the release stage.

6. Device as claimed in any of the foregoing claims, comprising a vibrating mechanism (32) engaging on the mould containers and/or conveyor for the purpose of causing lateral vibration of the mould containers during the release stage.

7. Device as claimed in any of the foregoing claims 3-6, wherein the mould containers (14) are arranged releasably on the ejectors (24).

8. Device as claimed in any of the foregoing claims, wherein a mould container (14) comprises:

   - upright walls (16) which define one or more mould cavities;
   - a coupling element (23) which can be fixed to the walls, wherein the coupling element can be connected to one or more of the ejectors (24).

9. Device as claimed in claim 8, wherein the coupling element comprises a coupling plate (23) provided with recesses in both longitudinal edges.

10. Device as claimed in any of the foregoing claims 3-9, wherein a separate coupling element and a separate mould container is mounted per ejector.

11. Device as claimed in any of the foregoing claims 3-9, wherein a single coupling element is mounted on the whole row of ejectors.

12. Device as claimed in any of the foregoing claims, wherein the coupling element is fastened to the conveyor with bolts.

13. Device as claimed in any of the claims 6-10, wherein

an ejector and the coupling element are formed in order to provide a dovetail coupling there between.

14. Device as claimed in any of the claims 8-13, wherein the mould container (44) also comprises one or more bottoms (42) to be arranged in the mould cavities, wherein spacers (41) are provided between the coupling element and the bottoms.

15. Device as claimed in claim 14, wherein the distance between the coupling element and the bottom provided by the spacer (41) is adjustable to the desired dimensions of the green bricks to be manufactured with the mould container.

16. Device as claimed in any of the foregoing claims, wherein the take-off means are adapted to displace the associated drying plate or drying plates (12) substantially synchronously with the ejecting movement of mould containers.

17. Device as claimed in any of the foregoing claims, wherein the conveyor (3) is manufactured from steel.

18. Device as claimed in any of the foregoing claims, wherein the conveyor is a chain conveyor, wherein the chain is formed by a number of successive mould container elements (4) attached pivotally to each other and bearing the mould containers (14) and ejectors (24).

19. Device as claimed in any of the preceding claims, comprising:

- a circulating conveyor (3) carrying mould containers (14);
- a clay reservoir (5) arranged above the conveyor;
- means for carrying clay out of the reservoir into the mould containers;
- means (9) for pressing and trimming clay in the mould containers,
- means for discharging green bricks (13) released from the mould containers and means for supplying and placing drying plates for the green bricks;
- movable ejectors (24) arranged on the conveyor,

wherein the movable ejectors (24) are adapted so as to arrange an ejector plate (23) on the row of ejectors 24), to which ejector plate a mould container provided with one or more mould cavities is coupled such that the mould container (14) co-displaces with the ejectors (24) in a first application and so as to arrange separate bottoms on the ejectors (24) in a second application, wherein the mould container is provided with one or more mould cavities such that said separate bottoms are movable in the mould cavities.

20. Use of the device as claimed in any of the foregoing claims for manufacturing green bricks from clay for the brick manufacturing industry.

Patentansprüche

1. Vorrichtung (1) zur Herstellung von Formlingen aus Ton für die Ziegelindustrie, mit:

- einer umlaufenden Fördervorrichtung (3), die Formbehälter (14) zum Zweck des Transportierens der Formbehälter trägt;
- Tonanordnungsmittel (5) zum Anordnen des Tons in den Formbehältern;
- Mittel (11) zum Abdecken der offenen Seite der Formbehälter mit Trocknungsplatten(12); ***gekennzeichnet durch***
- Halter (43), die an die Fördervorrichtung (3) gekoppelt sind und auf welchen die Formbehälter angeordnet sind, wobei die Formbehälter relativ zu der Fördervorrichtung (3) verschiebbar angeordnet sind, um die Formbehälter an der Freigabestufe nach unten zu verschieben, in welcher die offene Seite der Formbehälter im Wesentlichen nach unten gerichtet ist, und bei der die Halter (43) so ausgebildet sind, dass sie die nach unten Verschiebung abrupt stoppen, um **dadurch** die Formlinge, welche sich in den Formbehältern befinden, auf die zugehörige Trocknungsplatte (12) freizugeben.

2. Vorrichtung nach Anspruch 1, wobei die Halter (43) so ausgeführt sind, dass sie die Formbehälter darin führen, um zu bewirken, dass die Halter an der Freigabestufe fallen, und wobei die Halter wenigstens einen Anschlag (34) für das abrupte Bremsen der Fallbewegung der Halter aufweisen, um **dadurch** die in den Formbehältern vorhandenen Formlinge (13) auf die zugehörige Trocknungsplatte auszuwerfen.

3. Vorrichtung nach Anspruch 1 oder 2, wobei die Halter (43) Auswerfer (24) aufweisen, die relativ zu der Fördervorrichtung bewegbar sind, an welche Auswerfer die Formbehälter gekoppelt werden können, wobei die Auswerfer so ausgebildet sind, dass sie die an diese gekoppelten Formbehälter (14) während der Freigabestufe verschieben und die in den Formbehältern vorhandenen Formlinge auf die zugeordnete Trocknungsplatte (12) auswerfen.

4. Vorrichtung nach einem der vorstehenden Ansprüche, wobei die Formbehälter (14) aus Kunststoff hergestellt sind.

5. Vorrichtung nach Anspruch 3 oder 4, wobei die Auswerfer (24) so ausgebildet sind, dass sie die an diese gekoppelten Formbehälter während der Freigabestufe nach außen und innen stoßen.

6. Vorrichtung nach einem der vorstehenden Ansprüche, mit einem Vibrationsmechanismus (32) der mit den Formbehältern und/oder der Fördervorrichtung im Eingriff steht, um während der Freigabestufe eine seitliche Vibration der Formbehälter zu bewirken.

7. Vorrichtung nach einem der vorstehenden Ansprüche 3 bis 6, wobei die Formbehälter (14) auf den Auswerfern (24) lösbar angeordnet sind.

8. Vorrichtung nach einem der vorstehenden Ansprüche, wobei ein Formbehälter (14) aufweist:

- senkrechte Wände (16), die einen oder mehrere Formhohlräume begrenzen;
- ein Kupplungselement (23), das an den Wänden befestigt werden kann, wobei das Kupplungselement mit einem oder mehreren der Auswerfer (24) verbunden sein kann.

9. Vorrichtung nach Anspruch 8, wobei das Kupplungselement eine Kupplungsplatte (23) aufweist, die in beiden Längskanten mit Aussparungen versehen ist.

10. Vorrichtung nach einem der vorstehenden Ansprüche 3 bis 9, wobei pro Auswerfer ein separates Kupplungselement und ein separater Formbehälter montiert sind.

11. Vorrichtung nach einem der vorstehenden Ansprüche 3 bis 9, wobei ein einzelnes Kupplungselement auf der gesamten Reihe der Auswerfer montiert ist.

12. Vorrichtung nach einem der vorstehenden Ansprüche, wobei das Kupplungselement an der Fördervorrichtung mit Schraubbolzen befestigt ist.

13. Vorrichtung nach einem der Ansprüche 6 bis 10, wobei ein Auswerfer und das Kupplungselement so ausgebildet sind, dass zwischen ihnen eine Schwalbenschwanzkupplung gebildet ist.

14. Vorrichtung nach einem der Ansprüche 8 bis 13, wobei der Formbehälter (44) auch einen oder mehrere Böden (42) aufweist, die in den Formhohlräumen angeordnet sind, wobei zwischen dem Kupplungselement und den Böden Abstandsstücke (41) vorgesehen sind.

15. Vorrichtung nach Anspruch 14, wobei der Abstand zwischen dem Kupplungselement und dem Boden, der durch das Abstandsstück (41) gebildet ist, auf die gewünschten Abmessungen der durch den Formbehälter herzustellenden Formlinge einstellbar ist.

16. Vorrichtung nach einem der vorstehenden Ansprüche, wobei die Abnahmemittel so ausgebildet sind, dass sie die zugeordnete Trocknungsplatte oder Trocknungsplatten (12) im Wesentlichen synchron mit der Auswerfbewegung der Formbehälter verschieben.

17. Vorrichtung nach einem der vorstehenden Ansprüche, wobei die Fördervorrichtung (3) aus Stahl hergestellt ist.

18. Vorrichtung nach einem der vorstehenden Ansprüche, wobei die Fördervorrichtung ein Kettenförderer ist, wobei die Kette durch eine Anzahl von aufeinander folgenden Formbehälterelementen (4) gebildet ist, die schwenkbar aneinander befestigt sind und die Formbehälter (14) die Auswerfer (24) tragen.

19. Vorrichtung nach einem der vorstehenden Ansprüche, mit:

- einer umlaufenden Fördervorrichtung (3), die Formbehälter (14) trägt;
- einem Tonvorratsbehälter (5), der oberhalb der Fördervorrichtung angeordnet ist;
- Mitteln zum Tragen von Ton aus dem Vorratsbehälter in die Formbehälter;
- Mitteln (9) zum Pressen und Abgleichen des Tons in Formbehältern,
- Mitteln zum Ausgeben der Formlinge (13) die aus den Formbehältern freigegeben worden sind und Mittel zum Zuführen und Plazieren von Trocknungsplatten für die Formlinge;
- bewegbaren Auswerfern (24), die auf der Fördervorrichtung angeordnet sind, wobei die bewegbaren Auswerfer (24) so ausgebildet sind, dass sie eine Auswerferplatte (23) auf der Reihe von Auswerfern (24) anordnen, wobei an die Auswerferplatte ein Formbehälter, der mit einem oder mehreren Formhohlräumen versehen ist, so gekoppelt ist, dass der Formbehälter (14) zusammen mit den Auswerfern (24) bei einer ersten Anwendung verschoben wird und so ausgebildet ist, dass separate Böden auf den Auswerfern (24) in einer zweiten Anwendung angeordnet sind, wobei der Formbehälter mit einem oder mehreren Formhohlräumen so versehen ist, dass separate Böden in den Formhohlräumen bewegbar sind.

20. Verwendung der Vorrichtung wie nach einem der vorstehenden Ansprüche beansprucht zur Herstellung von Formlingen aus Ton für die Ziegelindustrie.

Revendications

1. Dispositif (1) pour la fabrication de briques crues à partir d'argile pour l'industrie de fabrication de briques, comprenant :

- un convoyeur de circulation (3) supportant des récipients de moule (14) dans le but de transporter les récipients de moule ;
- des moyens d'agencement d'argile (5) pour agencer l'argile dans des récipients de moule ;
- des moyens (11) pour recouvrir le côté ouvert des récipients de moule avec des plaques de séchage (12);

caractérisé par

- des supports (43) qui sont couplés au convoyeur (3) et sur lesquels sont agencés les récipients de moule, dans lequel les récipients de moule sont agencés de façon déplaçable par rapport au convoyeur (3) afin de déplacer les récipients de moule vers le bas lors de l'étape de libération dans lequel le côté ouvert des récipients de moule est orienté sensiblement vers le bas, et dans lequel les supports (43) sont adaptés pour arrêter abruptement le déplacement vers le bas afin d'ainsi libérer les briques crues présentes dans les récipients de moule sur la plaque de séchage associée (12).

2. Dispositif selon la revendication 1, dans lequel les supports (43) sont réalisés pour guider les récipients de moule dans ceux-ci afin de forcer les supports à tomber lors de l'étape de libération et dans lequel les supports comprennent au moins une butée (34) pour freiner abruptement le mouvement de chute des supports dans le but d'ainsi éjecter les briques crues (13) présentes dans les récipients de moule sur la plaque de séchage associée.

3. Dispositif selon la revendication 1 ou 2, dans lequel les supports (43) comprennent des éjecteurs (24) mobiles par rapport au convoyeur, auxquels éjecteurs peuvent être couplés les récipients de moule, dans lequel les éjecteurs sont adaptés pour déplacer les récipients de moule (14) couplés à ceux-ci au cours de l'étape de libération et pour éjecter les briques crues présentes dans les récipients de moule sur la plaque de séchage associée (12).

4. Dispositif selon l'une quelconque des revendications précédentes, dans lequel les récipients de moule (14) sont fabriqués à partir de plastique.

5. Dispositif selon la revendication 3 ou 4, dans lequel les éjecteurs (24) sont adaptés pour pousser les récipients de moule couplés à ceux-ci vers l'extérieur et vers l'intérieur au cours de l'étape de libération.

6. Dispositif selon l'une quelconque des revendications précédentes, comprenant un mécanisme de vibration (32) entrant en prise sur les récipients de moule et/ou le convoyeur dans le but d'entraîner la vibration latérale des récipients de moule au cours de l'étape de libération.

7. Dispositif selon l'une quelconque des revendications précédentes 3 à 6, dans lequel les récipients de moule (14) sont agencés de façon libérable sur les éjecteurs (24).

8. Dispositif selon l'une quelconque des revendications précédentes, dans lequel un récipient de moule (14) comprend :

- des parois verticales (16) qui définissent une ou plusieurs cavités de moule ;
- un élément de couplage (23) qui peut être fixé aux parois, dans lequel l'élément de couplage peut être relié à un ou plusieurs des éjecteurs (24).

9. Dispositif selon la revendication 8, dans lequel l'élément de couplage comprend une plaque de couplage (23) pourvue d'évidements dans les deux bords longitudinaux.

10. Dispositif selon l'une quelconque des revendications précédentes 3 à 9, dans lequel un élément de couplage séparé et un récipient de moule séparé sont montés pour chaque éjecteur.

11. Dispositif selon l'une quelconque des revendications précédentes 3 à 9, dans lequel un élément de couplage unique est monté sur la rangée entière d'éjecteurs.

12. Dispositif selon l'une quelconque des revendications précédentes, dans lequel l'élément de couplage est fixé au convoyeur avec des boulons.

13. Dispositif selon l'une quelconque des revendications 6 à 10, dans lequel un éjecteur et l'élément de couplage sont formés afin de fournir un couplage en queue d'aronde entre ceux-ci.

14. Dispositif selon l'une quelconque des revendications 8 à 13, dans lequel le récipient de moule (44) comprend également un ou plusieurs fonds (42) destinés à être agencés dans les cavités de moule, dans lequel des entretoises (41) sont prévues entre l'élément de couplage et les fonds.

15. Dispositif selon la revendication 14, dans lequel la distance entre l'élément de couplage et le fond prévu

par l'entretoise (41) est réglable selon les dimensions souhaitées des briques crues destinées à être fabriquées avec le récipient de moule.

16. Dispositif selon l'une quelconque des revendications précédentes, dans lequel les moyens d'extraction sont adaptés pour déplacer la plaque de séchage ou les plaques de séchage (12) associée(s) de façon sensiblement synchrone avec le mouvement d'éjection de récipients de moule.

17. Dispositif selon l'une quelconque des revendications précédentes, dans lequel le convoyeur (3) est fabriqué à partir d'acier.

18. Dispositif selon l'une quelconque des revendications précédentes, dans lequel le convoyeur est un convoyeur à chaîne, dans lequel la chaîne est formée par un nombre d'éléments de récipient de moule successifs (4) fixés les uns aux autres de façon pivotante et supportant les récipients de moule (14) et éjecteurs (24).

19. Dispositif selon l'une quelconque des revendications précédentes, comprenant :

- un convoyeur de circulation (3) supportant des récipients de moule (14) ;
- un réservoir d'argile (5) agencé au-dessus du convoyeur;
- des moyens pour transporter l'argile hors du réservoir dans les récipients de moule ;
- des moyens (9) pour comprimer et ébarber l'argile dans les récipients de moule,
- des moyens pour décharger les briques crues (13) libérées à partir des récipients de moule et des moyens pour fournir et placer des plaques de séchage pour les briques crues ;
- des éjecteurs mobiles (24) agencés sur le convoyeur, dans lequel les éjecteurs mobiles (24) sont adaptés afin d'agencer une plaque d'éjecteur (23) sur la rangée d'éjecteurs (24), à laquelle plaque d'éjecteur est couplé un récipient de moule pourvu d'une ou plusieurs cavités de moule de sorte que le récipient de moule (14) se déplace conjointement aux éjecteurs (24) dans une première application et afin d'agencer des fonds séparés sur les éjecteurs (24) dans une seconde application, dans lequel le récipient de moule est pourvu d'une ou plusieurs cavités de moule de sorte que lesdits fonds séparés soient mobiles dans les cavités de moule.

20. Utilisation du dispositif selon l'une quelconque des revendications précédentes pour fabriquer des briques crues à partir d'argile pour l'industrie de fabrication de briques.

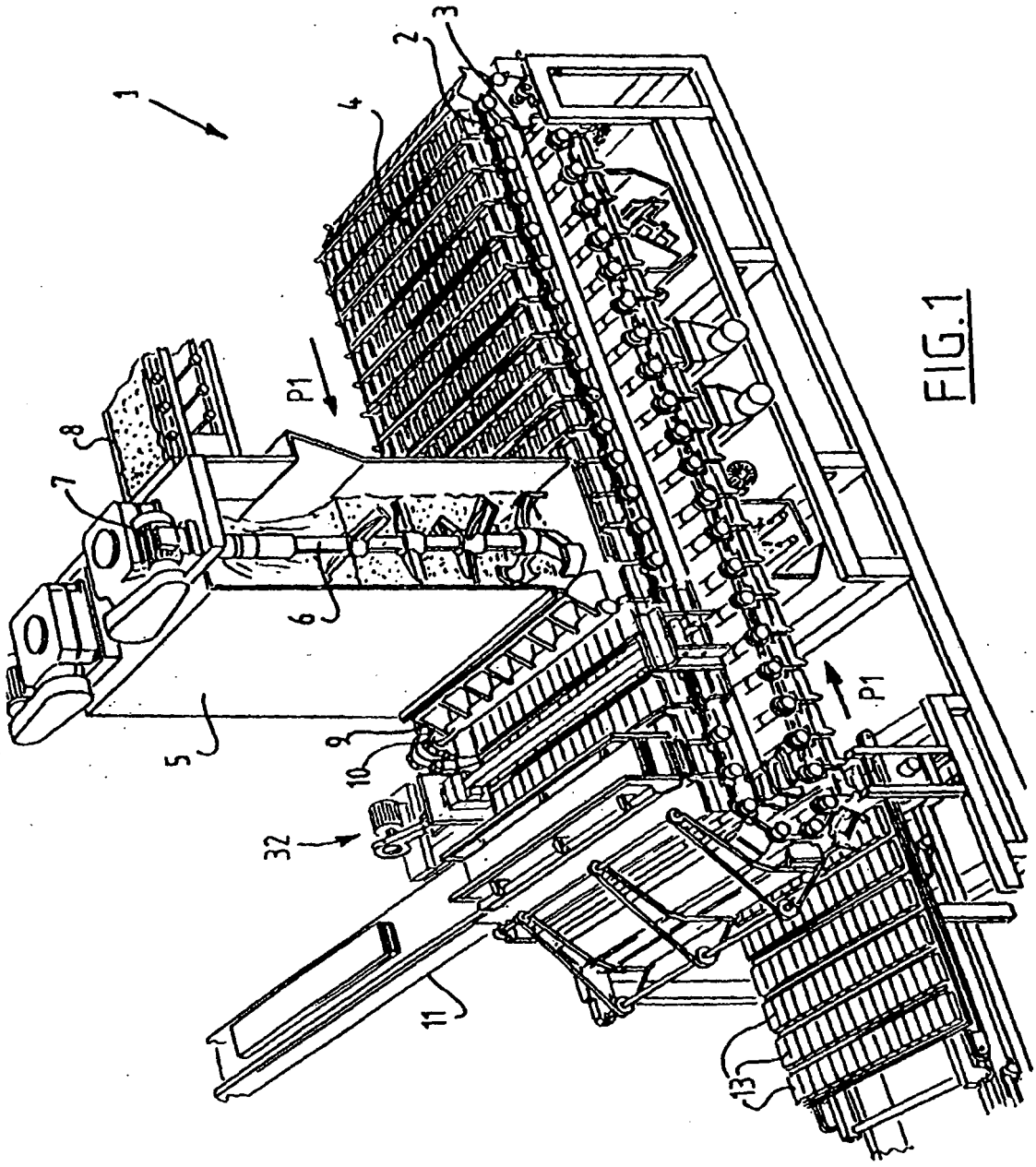


FIG.1

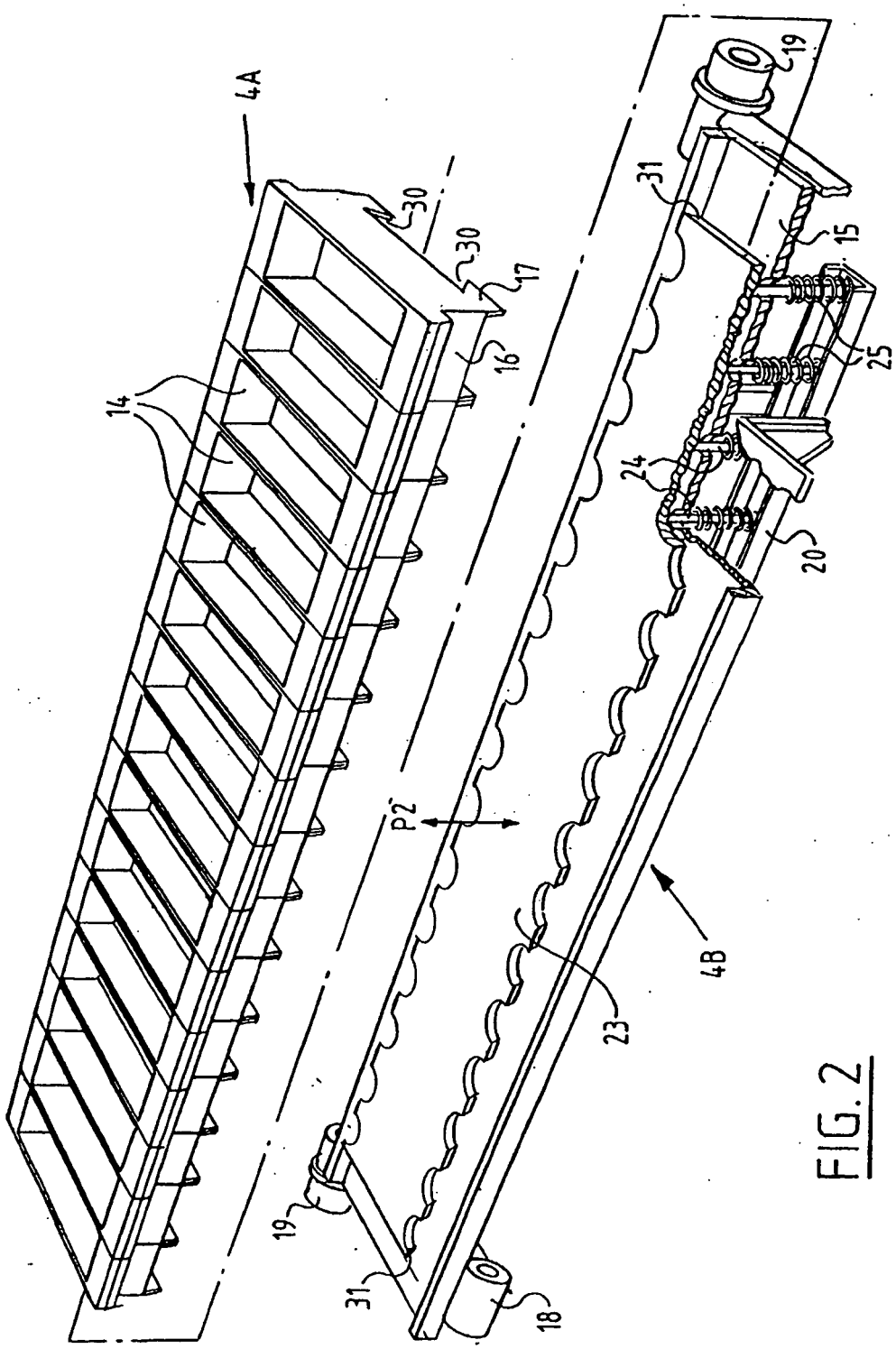


FIG. 2

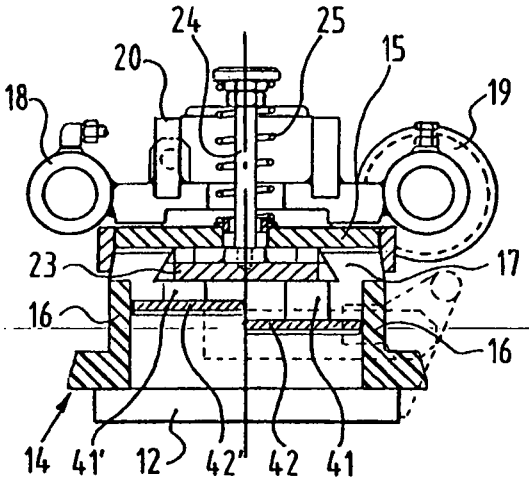


FIG. 3

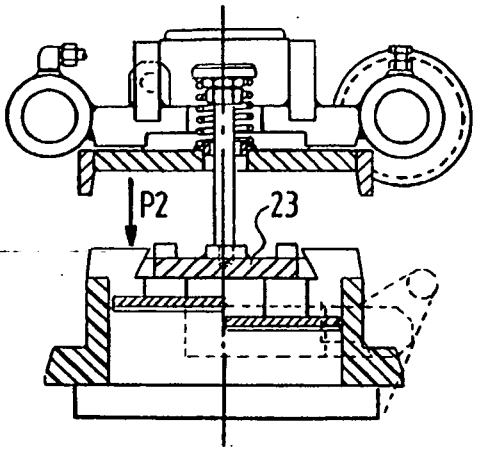


FIG. 4

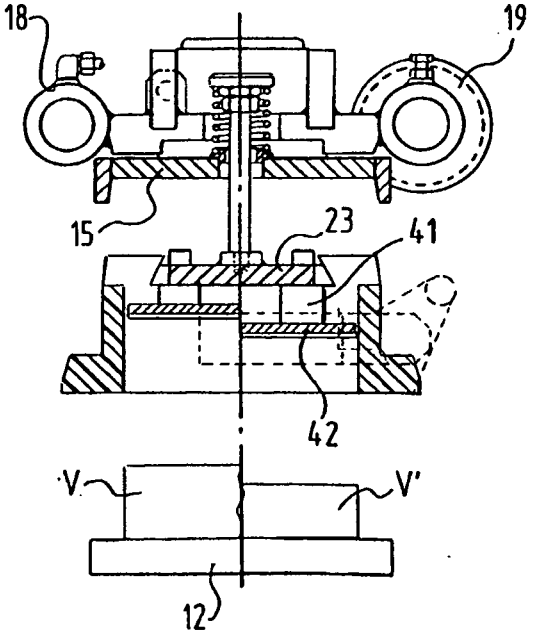


FIG. 5

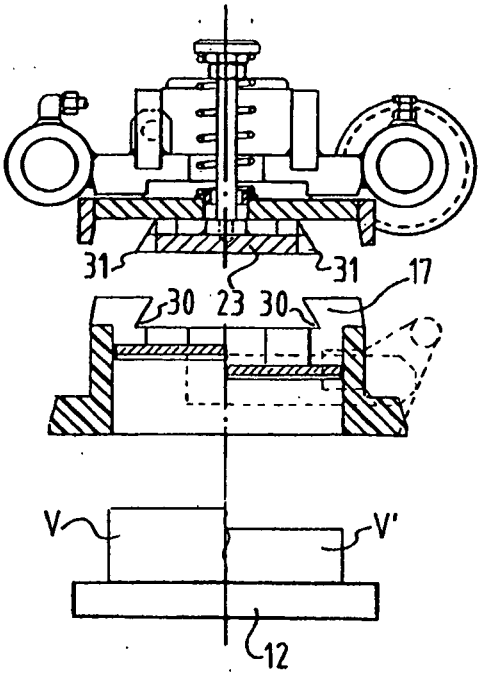


FIG. 6

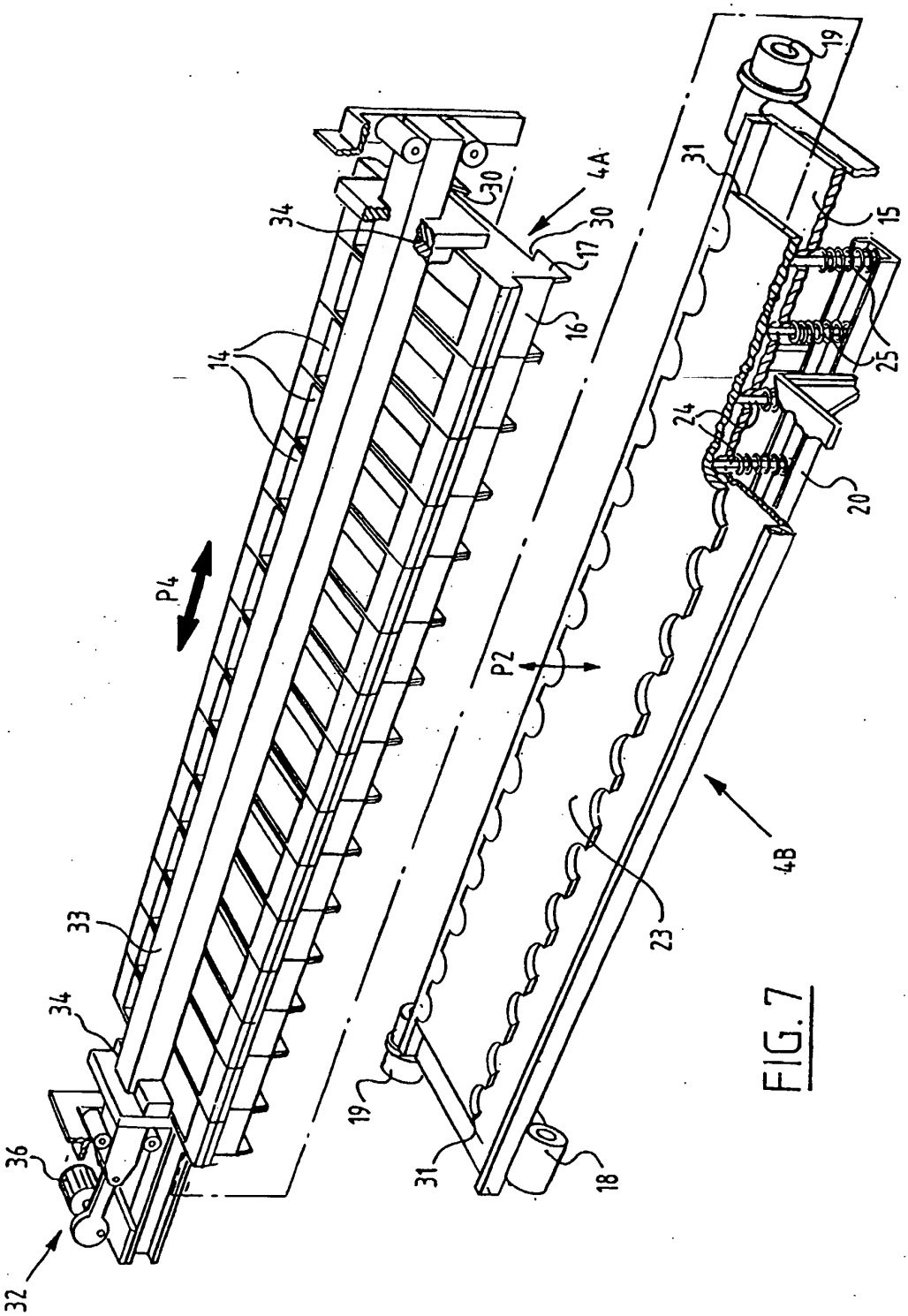


FIG. 7

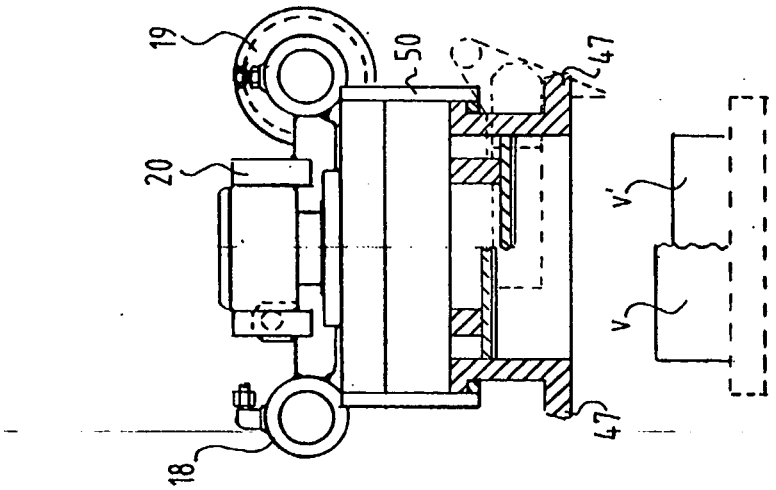


FIG.10

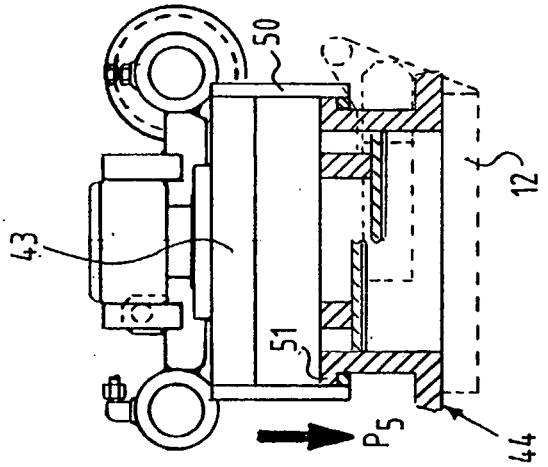


FIG. 9

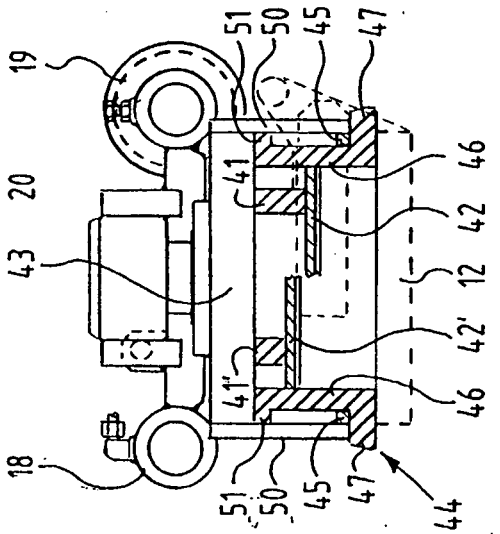


FIG. 8

REFERENCES CITED IN THE DESCRIPTION

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

Patent documents cited in the description

- EP 0917938 A **[0002] [0006] [0023] [0028]**
- EP 1000000 A **[0036]**