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(54) **Device and method for manufacturing green bricks**

Vorrichtung und Verfahren zur Herstellung von Steinformlingen

Machine et méthode pour la fabrication de briques crues

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(56) References cited:

EP-A- 0 680 812 BR-A- 9 201 837

DE-A- 2 659 849 DE-U- 1 927 560

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Description

[0001] The present invention relates to a device for manufacturing green bricks from clay for the brick manufacturing industry comprising a circulating chain conveyor carrying mould containers combined to form mould container parts, means for arranging clay in the mould containers, one or more bottoms movable between the upright walls of the mould containers, one or more ejectors coupled to the movable bottoms for releasing the green bricks from the mould containers by displacing the bottoms, and means for discharging green bricks released from the mould containers. The invention also relates to a mould container part according to the preamble of claim 1 suitable for manufacturing such green bricks and a method wherein such a mould container is used

[0002] Such a device is for instance known from the European patent 0 680 812 of applicant. The known device is highly suitable for production of large numbers of green bricks for the brick manufacturing industry, wherein the green bricks are pressed out of the mould containers in efficient and certain manner by means of the movable bottoms.

[0003] BR-A-9 201 837 discloses a method for manufacturing green bricks from clay for the brick manufacturing industry, wherein clay is arranged in a deformable state in mould containers, after which it is transported. One or more green bricks of clay are released from one or more mould containers by displacing one or more bottoms movable between upright walls of the container.

[0004] The form and dimensions of the movable bottoms correspond in the known device of European patent 0 680 812 to those of the mould cavities in the mould containers. A drawback here is that the peripheral edge of a movable bottom is subject to wear as a result of frequent sliding along the upright walls of the associated mould container. Furthermore, because the clearance between the movable bottom and the upright walls of the mould container is minimal, the mould container and/or movable bottom can be damaged by wear or when the movement of the bottom has a deviation or when hard portions in the clay become wedged between the peripheral edge of the bottom and the walls.

[0005] In practice a small deformation will occur in the green bricks at the position of the join between the movable bottom and the upright wall. In Manufacture in the known device this defoliation occurs at the position of the edges of the green brick, which in many cases is considered undesirable. This means that some of the green bricks are occasionally rejected by the customer.

[0006] A further drawback of the known device is that when it is necessary to change brick form or brick size, the combination of mould container part and movable bottoms have to be changed. Manufacture of a green brick of for instance larger dimensions requires the use of mould containers with larger mould cavities and accordingly larger movable bottoms. This is particularly a factor for relatively small differences in brick size because

of shrinkage differences depending on the composition of the raw material used. All mould containers, including all movable bottoms, must also be changed in such cases, which is labour-intensive and moreover reduces the efficiency of the device as a result of the relatively long change-over time.

[0007] It is an object of the present invention to provide a device for manufacturing green bricks from clay and a mould container therefore, in which at least one of the above stated drawbacks is obviated.

[0008] Said object is achieved with the device according to claim 1, as well as a method for manufacturing green bricks from clay for the brick manufacturing industry according to claim 12. According to a first aspect of the present invention there is provided for this purpose a mould container part for manufacturing green bricks from deformable clay for the brick manufacturing industry, the mould container part comprising:

- a number of mould containers combined to form a unit, wherein each mould container defines a number of upright walls and is provided with a bottom movable between the walls,
- an ejector coupled to the movable bottom for releasing the green brick of deformable clay from the mould container by displacing the movable bottom;
- wherein the movable bottom of a mould container takes a smaller form than the area defined by the walls of the mould container for the purpose of providing an intermediate space between the peripheral edge of the movable bottom and the inner side of at least one of said upright walls, and a fixed bottom part is provided on one or more upright walls of a mould container in order to at least partially fill the intermediate space.

[0009] According to a second aspect of the present invention, there is provided for this purpose a device for manufacturing green bricks from clay for the brick manufacturing industry, comprising:

- a circulating chain conveyor carrying mould containers combined to form mould container parts according to the first aspect described one paragraph above, wherein each mould container part comprises one or more mould containers;
- means for arranging deformable clay in mould containers;
- one or more bottoms movable between the upright walls of the mould containers; and
- means for discharging green bricks released from the mould containers.

[0010] By opting for a form and/or dimensions of the movable bottom of the mould container that are sufficiently smaller than the area defined by the walls of the mould container, i.e. smaller than the form and/or dimensions of the green brick manufactured with the mould

container, an intermediate space is provided and the bottoms therefore no longer scrape along the inner side of the upright wall(s) of the mould container during the knock-out stroke and the return stroke of the ejectors, whereby wear to the mould container and/or the movable bottoms does not occur at this location, with the result of an extended lifespan of the mould containers and the bottoms.

[0011] A pressing device for plate-like green bricks is described per se in the German document DE 19 27 560 U. The document shows a mould with a movable bottom, wherein an intermediate space is provided between the edges of the movable bottom and the edges of the mould. The pressing device is however a device for manufacturing green bricks of cured material such as concrete. The cured material is not deformable.

[0012] From the German Offenlegungsschrift DE 26 59 849 A is also known a mould container for manufacturing a concrete test piece. The mould container is provided with a bottom with a fixed part and a movable part. The movable bottom part has dimensions such that an intermediate space is present between the area defined by the walls of the mould container and the peripheral edge of the movable bottom part. In its starting position the movable bottom part lies flush with the fixed bottom part. The movable bottom part is used to press the concrete test piece out of the mould container when it is completely cured. This document therefore also relates to manufacture of green bricks of cured concrete. The manufacture of green bricks from deformable clay by first arranging the clay in mould containers of a circulating conveyor and subsequently removing the mould containers is not known herefrom.

[0013] Depending on, among other factors, the degree of deformability of the clay when it is released from the mould containers, said intermediate space preferably amounts to between 0.3 cm and 3 cm, and still more preferably to between 0.5 cm and 1.5 cm. At these values of the intermediate space it is possible to prevent the peripheral edge of the movable bottom coming into contact with the upright walls of the mould container, while the green brick of relatively soft clay, i.e. of relatively easily deformable clay, can nevertheless be removed in correct manner from the mould container.

[0014] The clay applied in the brick manufacturing industry with the described device and method for manufacturing green bricks from clay is relatively easily deformable. The deformable clay has in such a case a deformability such that the remaining height measured in a plunger device according to the Pfefferkorn measuring method, as will be set forth below, amounts to about 9 mm or more. The remaining height amounts in practice to less than 17 mm, since at higher values the clay has too little deformability.

[0015] According to a preferred embodiment, the device or the mould container part is provided on one or more upright walls of a mould container with a fixed bottom part in order to at least partially fill the intermediate

space. In this embodiment there is therefore a fixed bottom part and a movable bottom part, wherein the fixed bottom part is provided on one or more of the upright walls of the mould container. In the starting position the fixed bottom part and the movable bottom are preferably situated practically at the same height, so that the clay in the mould container acquires a substantially smooth exterior.

[0016] The mould containers can be used to manufacture difference brick shapes and/or brick sizes with the same movable bottoms. If for instance after manufacture of a series of bricks a series of larger bricks must be manufactured, only the mould containers need exchanging for mould containers with a larger mould cavity and a wider fixed bottom part, while the movable bottoms can remain fitted.

[0017] At the position of the edge of the fixed bottom part and the peripheral edge of the movable bottom a deformation can in some cases occur in similar manner as mentioned above. The position of the deformation on the green brick differs however from the position of the deformation which can occur when the above stated known device is applied. In the present embodiment the deformation is situated some distance from the edges of the brick, which is perceived in most cases as less intrusive. The chance of rejection of the finally formed green brick is hereby relatively small.

[0018] It is not otherwise the case that the fixed bottom part between the peripheral edge of a movable bottom and the upright walls of the mould cavity must have a constant width everywhere. A further preferred embodiment comprises a first fixed bottom part attached to a first wall and a second fixed bottom part which is attached to a second wall and which is less wide than the first bottom part. The eventual choice of width of the fixed bottom parts depends on the form and dimensions, for instance the length-width ratio, of the green bricks to be manufactured.

[0019] In a further preferred embodiment of the device or the mould container part, the fixed bottom part is embodied to provide an open connection between the spaces on either side of the movable bottom. This has the purpose of reducing underpressure in the mould cavities during the ejecting movement of the movable bottoms. Underpressure can after all impede knock-out of the green bricks.

[0020] In a further preferred embodiment, the movable bottom has dimensions such that the intermediate space is provided all around the movable bottom. In this embodiment the fixed bottom part is preferably also arranged all around.

[0021] According to a further preferred embodiment, the fixed bottom part is provided with a chamfered side. The chamfered side functions as positioning edge so as to facilitate assembly of the mould container parts.

[0022] According to a particularly advantageous embodiment of the invention, a mould container part is coupled releasably to a chain part connectable to the chain

conveyor. The chain, which is formed by the different, successively coupled chain parts, remains mounted on the conveyor. When the ejectors required for displacing the movable bottoms of the mould containers of a mould container part are moreover fixed to the chain part, and the movable bottoms are thereby also only connected to the chain part, it is possible to change rapidly and simply between different forms and dimensions of the green bricks for manufacture. For change-over it is after all only necessary to release the mould container part from the chain part and arrange a new mould container part on the chain part, wherein the ejectors and movable bottoms can therefore remain mounted on the chain part.

[0023] Further advantages, features and details of the present invention will be elucidated on the basis of the following description of some preferred embodiments thereof. Reference is made in the description to the drawing, in which:

Figure 1 shows a schematic view in perspective of a first preferred embodiment of the invention;

Figure 2 shows a partly cut-away view in perspective of two mould container parts and chain parts in coupled position;

Figure 3 is a partly cut-away view in perspective of a mould container part of figure 2 in uncoupled position;

Figure 4 shows a cross-section of a mould container in a mould container part, provided with a movable bottom according to a preferred embodiment of the invention;

Figures 5A-5D show top views of mould containers according to further preferred embodiments of the invention;

Figure 6 is a view in perspective of another preferred embodiment of the mould container;

Figure 7 shows a cross-section through the mould container of figure 6; and

Figures 8A-8D show some views of a Pfefferkorn measuring apparatus for determining the deformability of the clay used.

[0024] The device 1 for manufacturing green bricks for the brick manufacturing industry comprises a chain conveyor 2. Placed on the chain conveyor is a large number of mould containers combined into units in the form of mould container parts 3. The mould container parts 3 are coupled to each other and provided with rollers 15 rotatable over girders 14 (figure 2) and thus together form the chain of chain conveyor 2. The chain is driven by one of the chain wheels 13 or by both chain wheels 13 (wherein for the sake of clarity only the right-hand chain wheel is shown in figure 1). The direction of transport of the chain conveyor is to the left (in figure 1) in the shown embodiment. A conveyor rotating to the right is of course equally possible.

[0025] Above the mould containers is placed a reservoir 4 for clay which is kept in continuous movement by

an agitator 5 which is driven by the electric motor 6. Clay is supplied to reservoir 4 by a circulating conveyor 7. The clay is carried out of reservoir 4 into the mould container and then pressed down by pressing device 8 which is pivotable about a shaft 9. The excess clay is also trimmed using means which are not drawn.

[0026] The device 1 comprises a further conveyor 10 with which take-off plates 11 can be supplied. Conveyor 10 also ensures that a take-off plate 11 is placed on top of each passing mould container part 3. Take-off plates 11 remain pressed against the respective mould container parts 3 by a holding mechanism 12 when they pass over the left-hand chain wheel (not drawn). After turning over of the mould container part 3, the green bricks V still lie on plates 11. A knock-out mechanism to be further described presses the green bricks V out of the mould containers per mould container part. The green bricks V herein remain lying on plates 11 after they have been released from the mould containers.

[0027] A mould container part 3 consists of a mould container 16 which is provided with a row of mould cavities (in figures 1, 2 and 3 respectively sixteen, fifteen and fifteen mould cavities). Mould container 16 is mounted on bridge-like support elements 50, 51 provided on the top side of a support plate 27. According to the first embodiment (figures 2 and 3), support plate 27 is releasably mounted and according to another embodiment (figures 6 and 7) is welded to or formed integrally with a chain part 17. A chain part 17 consists of two support elements 22 which are provided with ears 18, 19, 20 and between which connecting elements 21 are arranged. Ears 18, 19, 20 function here as links of chain conveyor 2.

[0028] In the embodiment shown in figures 2 and 3, support plate 27 and chain part 17 are coupled to each other by providing support plate 27 with protrusions 25 and 25' which can engage on respective support elements 22 and additional support elements 26 of chain part 17. Using nut-bolt connection 23 and openings 33 the mould container part 3 and chain part 17 can then be fixed to each other.

[0029] The different mould cavities 31 are combined into a unit in mould container 16. In the shown embodiments each mould container 16 is provided with a displaceable bottom 29 (direction of displacement P3, figure 3). The movement of displaceable bottoms 29 is driven by ejectors 24. These are under bias of spring 30 which centres the ejector such that a separate guiding is not necessary in chain part 17. Ejectors 24 are operated by a per se known drive device (not shown) during release of the green bricks. The movable bottom is provided on the underside with a number of pins 68 of predetermined height, while the top side of support plate 27 is likewise provided with corresponding pins 67 of predetermined height. The height of both pins 67, 68 determines the extreme position to which the movable bottom 29 can be displaced downward. In an embodiment which is not shown the lower pins 67 are provided on a displaceable strip. The strip is herein provided with pins 67 of different

heights, so that the displacement of the strip and the stroke of movable bottom 29 can be adjusted.

[0030] Figure 4 shows a cross-section through a mould container 16 according to a first embodiment of the invention. Mould container 16 comprises a fixed bottom part, while a separate movable-bottom 29 is provided in the mould container for sliding up and downward between the upright walls of the mould container.

[0031] Mould container 16 consists of at least one left-hand upright wall 41, a right-hand upright wall 40, a rear wall 42 and a front wall 43. In the embodiment shown in figure 3 the mould container 16 is constructed from a left-hand and right-hand upright wall 41 and a number of successively placed rear and front walls 42,43.

[0032] Mould container 16 is preferably manufactured from plastic of relatively low weight, while the other components are made largely of steel. Although the rectangular form of the mould container and mould cavities shown here is the most usual, other forms are also possible. Cheeks 56, 57 are screwed fixedly to either side of the mould container in the embodiment shown in figures 2 and 3. Mould container 16 can be fixed using cheeks 56,57 to respective support elements 50,51 by respective bolts 49. The mould container can be replaced by another mould container by unscrewing bolts 49, placing another mould container on support elements 50,51 and once again tightening bolts 49. Ejectors 24 and the associated structural parts remain coupled to the chain conveyor during the change. Change-over is thus less time-consuming since uncoupling and recoupling to the chain conveyor can be dispensed with.

[0033] Further provided in plate 27 at the position of each mould container 16 is an opening 28 through which the ejector 24 of movable bottom 29 is provided. The movable bottom can be displaced up and downward by ejector 24. When the green bricks must be released, i.e. when the mould containers are oriented such that the open side is directed downward (figure 1), ejectors 24 press the movable bottom 29 downward from a starting position (i.e. direction P_3 in figure 4) so that the clay present in mould container 16 is pressed onto take-off plates 11. The thus released green brick of clay is then discharged with a discharge conveyor 52 (figure 1).

[0034] A fixed bottom part in the form of respective strips 44,45 is arranged against the inner side of walls 40,41 of mould container 16, this such that in the starting position the fixed bottom part 44,45 forms, together with movable bottom 28, a practically closed bottom: The top side of bottom 29 is moreover flush with the top side of the fixed bottom parts 44,45 in order to ensure a flat side of the green brick. In this situation there is minimal intermediate space between the peripheral edge 53 of movable bottom 29 and the strips 44,45. When bottom 29 is pressed outward by ejector 24 (direction P_3), the bottom presses the whole green brick along the upright walls 40-43 and out of mould container 16. Bottom 29 itself herein remains far removed from the upright walls, so that the chance of damage or wear is virtually precluded.

[0035] Different mould containers must be applied subject to the dimensions of the green bricks for manufacturing-Mould containers can be exchanged simply and quickly by unscrewing bolts 49, replacing the mould containers by new mould containers and fixedly screwing these new mould containers to support elements 50,51 again with bolts 49. In order to manufacture green bricks of different size it is therefore only necessary to unscrew and replace mould containers 16 with mould containers defining a different mould cavity (i.e. larger, smaller or of different shape). The other components of device 1, such as for instance ejectors 24 and movable bottoms 29, can here remain undisturbed.

[0036] The form and dimensions of the finally produced green brick is determined by the form and dimensions of the mould cavity defined in the mould container. The distance a between the upright walls 40 and 41 determines for instance the lengthwise dimension of the green brick. For the manufacture of relatively long green bricks, mould containers are mounted which have a relatively great mutual distance a, while for the manufacture of relatively short green bricks, the mutual distance a between the upright walls 40,41 can be small. The same applies of course for the mutual distance between the upright walls 42 and 43 which defines the transverse dimension of the green bricks.

[0037] The thickness d of the strips 44,45 fixed against walls 40,41 depends on the distance a between these walls 40,41. At a relatively great mutual distance a for the manufacture of more elongate bricks, the thickness d of strips 44,45 will have to be greater to be able to continue to ensure a good connection of the strips to the movable bottom 29.

[0038] The intermediate space between the inner wall and the movable bottom is at least 3 mm in order to prevent contact between the peripheral edge of the movable bottom and the upright walls of the mould container. The width b of the strip is in that case at least 3 mm. So as to enable the greatest possible variation of mould cavities at determined dimensions of a movable bottom, the strip width can be varied from the said minimum values to a maximum value which depends, among other things, on the composition of the clay, the form of the mould container and the knock-out speed. Too great a width can result in the green bricks not being pressed properly out of the mould cavities, or the surface of the green bricks being damaged during knock-out.

[0039] In practice the optimal width d of strips 44,45 depends on the differences in brick size which have to be processed by device 1. If for instance relatively small differences in the brick dimensions occur because of the shrinkage differences, which depend on the raw material used, for instance varying from 232 mm, 230 mm, 228 mm etc., the strips can be given quite a thin form. It has been found in practice that a strip width d of between 0.3 cm and 3 cm, or better still between 0.5 cm and 1.5 cm, produces satisfactory results.

[0040] In order to avoid initial underpressure in the

mould container, one or more of the strips 44-45,47-48 are provided in a further preferred embodiment with an air gap 54. This provides an open connection between the space above movable bottom 29 and the space below movable bottom 29. The green brick being sucked fast against the walls of the mould containers or against the bottom is hereby avoided.

[0041] Figures 5A-5D show different preferred embodiments of the mould container with a fixed bottom part and a movable bottom. Figure 5A shows the embodiment in which a strip 44,45,47,48 is arranged along the four walls 40-43 of the mould container, wherein the different strips all have the same width. In figure 5B is shown an embodiment in which strips 44,45,47,48 are likewise arranged along the four upright walls 40-43, but in this embodiment the strips 44,45 along the end surface of the mould container are wider than the strips 47,48 along the longitudinal sides 47,48 of the mould container. Figure 5C shows a further preferred embodiment in which strips are arranged only along front wall 41 and the left-hand side wall 42, while in figure 5D an embodiment is shown in which a strip is arranged only on front wall 41. Which embodiment is preferred in a particular situation depends on the desired brick size.

[0042] In the embodiment shown in figure 4, the top side of the movable bottom and the underside of strip 44,45 are provided with respective chamfered edges 55 and 63 for simplifying placing of the mould containers on a chain part 17 provided with ejectors and movable bottoms 29.

[0043] Figures 6 and 7 show another preferred embodiment of the invention. In this embodiment the support plate 27 is welded to chain part 17. The exchangeable part of mould container part 3 is here the mould container 66. The mould container is manufactured from lightweight material, such as plastic, and can be coupled simply and quickly using a rapid-action coupling 60 to support elements 50,51 of support plate 27. Rapid-action coupling 60 comprises a number of pins 61 which protrude laterally from walls 40,41 and on which can engage hooks 62 arranged rotatably on support elements 50,51. In practice it is possible to suffice with three to six rapid-action couplings 60 per longitudinal side, i.e. a total of six to twelve rapid-action couplings 60. In order to exchange a mould container 16, only the rapid-action couplings 60 have to be opened so that the mould container is uncoupled from chain part 17, a new mould container 16 has to be placed on support elements 50,51 and the rapid-action couplings of the new mould container 16 closed. When the mould container also has a sufficiently low weight (when plastic is used a weight of about 40-50 kg can be realized), the mould containers can be exchanged within a few minutes by a limited number of (for instance two) people.

[0044] Use is made of relatively easily deformable clay in the manufacture of the green bricks. The degree of deformability of the clay is important. If the clay is too soft an impression of the movable bottom will result in the

green brick, which is of course undesirable. If the clay is too hard however, the mould containers are not completely filled, so that the green brick, particularly close to the edges thereof, acquires a rounded form. This is also undesirable. The clay applied must therefore preferably have a deformability such that the remaining height measured in the method for determining the clay consistency, to be further described below, amounts to between 9 and 17 mm. The remaining height must be more than 9 mm so that the clay is not too soft, but must be less than 17 mm since otherwise the clay threatens to become too hard.

[0045] In 1924 Pfefferkorn introduced a measuring method for providing a measure for clay consistency. This measuring method is generally applied in the European ceramics industry. The relation of the Pfefferkorn remaining height and the moisture content of a clay mass is found to be practically linear in a wide consistency range. The above mentioned recommended remaining heights are brought about by performing a measuring method using a measuring apparatus as shown for instance in figures 8A-8D.

[0046] The measuring apparatus 70 comprises a stand with base plate 71, a guide part with ratchet blocking under spring bias 72, a disc with vertical guide rod 73 (total falling weight 780 g, maximum drop height 100 mm) and a brass cylinder with a diameter of 33 mm and a height of 40 mm 74 with stamp 75 for removing the bar of clay for testing. In order to measure a quantity of clay, the measuring apparatus 70 must be disposed vertically with the guide rod in vibration-free manner. The guide rod has thin oil applied thereto. In order to prevent adhesion of clay to the underside of the disc, bottom plate, brass cylinder and stamp, these elements are lightly oiled with a mixture consisting of 90% kerosine and 10% olein. The clay for testing is kneaded and arranged in the brass cylinder while avoiding moisture loss, and levelled with a scraper knife. Using the stamp the bar of clay is then removed. The bar of clay for testing is now placed in the middle under the disc on the base plate, and the disc is then locked. After the drop of the disc the remaining height of the test piece is measured. An optimum manufacturing result can be achieved if the clay has a deformability corresponding to the remaining height of between 9 mm and 17 mm when measurement is carried out with the above described Pfefferkorn measuring method.

[0047] It is noted that the clay is arranged by pouring it from above into mould containers of a circulating conveyor. When the movable bottoms then push the clay out of the mould containers, since the time period between arranging of the clay in the mould containers and removal thereof is relatively short (typically less than a few minutes), the clay has almost the same deformability when it is released from the mould containers as when it is arranged therein. According to the invention the clay is therefore removed very quickly after forming, and therefore when it is still in plastic state.

[0048] The present invention is not limited to the described and illustrated embodiments, but also includes all embodiments which fall within the scope of the appended claims.

Claims

1. Mould container part (3) for manufacturing green bricks from deformable clay for the brick manufacturing industry, the mould container part comprising:

- a number of mould containers (16) combined to form a unit, wherein each mould container defines a number of upright walls (40, 41, 42, 43) and is provided with a bottom (29) movable between the walls
- an ejector (24) coupled to the movable bottom (29) for releasing the green brick of deformable clay from the mould container by displacing the movable bottom;

characterized in that the movable bottom (29) of a mould container (16) takes a smaller form than the area defined by the walls of the mould container for the purpose of providing an intermediate space between the peripheral edge of the movable bottom and the inner side of at least one of said upright walls, and a fixed bottom part is provided on one or more upright walls of a mould container in order to at least partially fill the intermediate space.

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

- a circulating chain conveyor (2) carrying mould containers combined to form mould container parts (3) according to claim 1, wherein each mould container part (3) comprises one or more mould containers (16);
- means for arranging deformable clay in mould containers (16);
- one or more bottoms (29) movable between the upright walls of the mould containers; and
- means for discharging green bricks released from the mould containers.

3. Device or mould container part as claimed in any of the foregoing claims, wherein the intermediate space amounts to between 0.3 cm and 3 cm.

4. Device or mould container part as claimed in any of the foregoing claims, wherein the fixed bottom part comprises a strip, the surface of which directed toward the mould cavity lies substantially flush with the movable bottom in the starting position.

5. Device or mould container part as claimed in any of

the foregoing claims, wherein the intermediate space amounts to between 0.5 and 1.5 cm.

6. Device or mould container part as claimed in any of the foregoing claims, comprising a first fixed bottom part attached to a first wall and a second fixed bottom part which is attached to a second wall and which is less wide than the first bottom part.

7. Device or mould container part as claimed in any of the claims 1-8, wherein the fixed bottom part is embodied to provide an open connection between the spaces on either side of the movable bottom (29).

8. Device or mould container part as claimed in any of the foregoing claims, wherein an intermediate space is provided around the whole movable bottom (29).

9. Device or mould container part as claimed in any of the foregoing claims, wherein the fixed bottom part is provided with a chamfered side.

10. Device or mould container part as claimed in any of the foregoing claims, wherein a mould container part (3) is coupled releasably to a chain part connectable to the chain conveyor (2).

11. Device or mould container part as claimed in claim 12, wherein ejectors (24) of the movable bottoms (29) of a mould container part (3) are fixed to the chain part.

12. Method for manufacturing green bricks from clay for the brick manufacturing industry using the mould container part of claim 1, the method comprising of:

- arranging clay in deformable state in one or more mould containers (16);
- transporting the clay arranged in the mould containers (16);
- causing one or more green bricks of clay to be released from one or more mould containers (16) by displacing one or more bottoms (29) movable between the upright walls (40, 41, 42, 43) of the mould containers (16), such that during said displacement of the movable bottom (29) the peripheral edge thereof remains clear of said inner side of said at least one upright wall (40, 41, 42, 43).

13. Method as claimed in claim 12, wherein during release of the mould containers (16) the clay has a deformability such that remaining height measured in a plunger device in accordance with the Pfefferkorn measuring method amounts to between about 9 mm and 17 mm.

14. Method as claimed in claim 12 or 13, wherein a de-

vice as claimed in any of the claims 1-11 is applied.

Patentansprüche

1. Formbehälterteil (3) für die Herstellung von Steinformlingen aus verformbarem Ton für die Ziegel herstellende Industrie, wobei das Formbehälterteil umfasst:

- eine Anzahl von Formbehältern (16), die zu einer Einheit zusammengefasst sind, wobei jeder Formbehälter eine Anzahl von aufrechten Wänden (40, 41, 42, 43) bildet und mit einem Boden (29) versehen ist, der zwischen den Wänden beweglich ist,
- einen Auswerfer (24), der mit dem beweglichen Boden (29) gekoppelt ist, um den Steinformling aus verformbarem Ton aus dem Formbehälter zu entlassen, indem der bewegliche Boden bewegt wird;

dadurch gekennzeichnet, dass der bewegliche Boden (29) eines Formbehälters (16) eine kleinere Form einnimmt als die von den Wänden des Formcontainers eingeschlossene Fläche, so dass ein Zwischenraum zwischen der äußeren Kante des beweglichen Bodens und der inneren Seite von mindestens einer der aufrechten Wände besteht, und dass ein fester Bodenteil an einer oder mehrerer der aufrechten Wände eines Formbehälters ausgebildet ist, so dass der Zwischenraum zumindest teilweise ausgefüllt ist.

2. Vorrichtung zum Herstellen von Steinformlingen aus Ton für die Ziegel herstellende Industrie, umfassend:

- einen umlaufenden Kettenförderer (2), der Formbehälter trägt, die miteinander kombiniert sind, um Formbehälterteile (3) gemäß Anspruch 1 zu bilden, wobei jedes Formbehälterteil (3) einen oder mehrere Formbehälter (16) umfasst;
- Mittel zum Anordnen von verformbarem Ton in den Formbehältern (16);
- einen oder mehrere Böden (29), die beweglich zwischen den aufrechten Wänden der Formbehälter angeordnet sind; und
- Mittel zum Abführen der Steinformlinge, die aus den Formbehältern entlassen wurden.

3. Vorrichtung oder Formbehälterteil gemäß einem der vorhergehenden Ansprüche, wobei der Zwischenraum sich auf zwischen 0,3 cm und 3 cm bemisst.

4. Vorrichtung oder Formbehälterteil gemäß einem der vorhergehenden Ansprüche, wobei der feste Bodenteil einen Streifen umfasst, dessen Oberfläche zu der Formvertiefung gerichtet ist und der im Wesent-

lichen bündig mit dem beweglichen Boden in der Ausgangsposition abschließt.

5. Vorrichtung oder Formbehälterteil gemäß einem der vorhergehenden Ansprüche, wobei der Zwischenraum sich auf zwischen 0,5 cm und 1,5 cm bemisst.

6. Vorrichtung oder Formbehälterteil gemäß einem der vorhergehenden Ansprüche, umfassend einen ersten festen Bodenteil, der mit einer ersten Wand verbunden ist, und einen zweiten festen Bodenteil, der mit einer zweiten Wand verbunden ist, und der weniger breit ist als der erste Bodenteil.

7. Vorrichtung oder Formbehälterteil gemäß einem der Ansprüche 1 bis 8, wobei der feste Bodenteil so ausgeführt ist, dass eine offene Verbindung zwischen den Räumen zu jeder Seite des beweglichen Bodens (29) geboten wird.

8. Vorrichtung oder Formbehälterteil gemäß einem der vorhergehenden Ansprüche, wobei ein Zwischenraum rund um den ganzen beweglichen Boden (29) besteht.

9. Vorrichtung oder Formbehälterteil gemäß einem der vorhergehenden Ansprüche, wobei der feste Bodenteil mit einer abgeschrägten Seite versehen ist.

10. Vorrichtung oder Formbehälterteil gemäß einem der vorhergehenden Ansprüche, wobei das Formbehälterteil (3) lösbar mit einem Kettenteil verbunden ist, das mit dem Kettenförderer (2) verbunden werden kann.

11. Vorrichtung oder Formbehälterteil gemäß Anspruch 12, wobei die Auswerfer (24) der beweglichen Böden (29) eines Formcontainerteils (3) fest mit dem Kettenteil verbunden sind.

12. Verfahren zum Herstellen von Steinformlingen aus Ton für die Ziegel herstellende Industrie unter Verwendung des Formcontainerteils gemäß Anspruch 1, wobei das Verfahren die folgenden Schritte umfasst:

- Anordnen von Ton in verformbarem Zustand in einem oder mehreren Formbehältern (16);
- Transportieren des in dem Formbehälter angeordneten Tons (16);
- Bewirken, dass einer oder mehrere der Steinformlinge aus Ton aus einem oder mehreren Formbehältern (16) entlassen werden, indem einer oder mehrere Böden (29) zwischen den aufrechten Wänden (40, 41, 42, 43) der Formbehälter (16) bewegt werden, so dass während der Bewegung des beweglichen Bodens (29) die äußere Kante davon frei bleibt von der inneren

Seite der zumindest einen aufrechten Wand (40, 41, 42, 43).

13. Verfahren gemäß Anspruch 12, wobei während des Entleerens der Formbehälter (16) der Ton eine Verformbarkeit hat, so dass die verbleibende Höhe die in einer Kolbenvorrichtung gemäß dem Pfefferkorn-Messverfahren gemessen wird, sich auf zwischen 9 mm und 17 mm bemisst.
14. Verfahren gemäß Anspruch 12 oder 13, wobei eine Vorrichtung gemäß einem der Ansprüche 1 bis 11 verwendet wird.

Revendications

1. Partie de contenant formant moule (3) pour fabriquer des briques crues à partir d'argile déformable pour l'industrie de la fabrication de briques, la partie de contenant formant moule comprenant :

- un certain nombre de contenants formant moule (16) combinés pour former une unité, dans laquelle chaque contenant formant moule définit un certain nombre de parois droites (40, 41, 42, 43) et est prévu avec un fond (29) mobile entre les parois,
- un éjecteur (24) couplé au fond mobile (29) pour démouler la brique crue d'argile déformable du contenant formant moule en déplaçant le fond mobile;

caractérisée en ce que le fond mobile (29) d'un contenant formant moule (16) prend une plus petite forme que la région définie par les parois du contenant formant moule afin de fournir un espace intermédiaire entre le bord périphérique du fond mobile et le côté interne d'au moins l'une desdites parois droites, et une partie de fond fixe est prévue sur une ou plusieurs des parois droites d'un contenant formant moule pour remplir au moins partiellement l'espace intermédiaire.

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

- un convoyeur à chaîne circulant (2) supportant des contenants formant moule combinés afin de former des parties de contenant formant moule (3) selon la revendication 1, dans lequel chaque partie de contenant formant moule (3) comprend un ou plusieurs contenants formant moule (16);
- des moyens pour agencer l'argile déformable dans les contenants formant moule (16) ;
- un ou plusieurs fonds (29) mobiles entre les parois droites des contenants formant moule; et

- des moyens pour décharger des briques crues démoulées des contenants formant moule.

3. Dispositif ou partie de contenant formant moule selon l'une quelconque des revendications précédentes, dans lequel l'espace intermédiaire est compris entre 0,3 cm et 3 cm.

4. Dispositif ou partie de contenant formant moule selon l'une quelconque des revendications précédentes, dans lequel la partie de fond fixe comprend une bande, dont la surface dirigée vers la cavité de moule est sensiblement de niveau avec le fond mobile dans la position de départ.

5. Dispositif ou partie de contenant formant moule selon l'une quelconque des revendications précédentes, dans lequel l'espace intermédiaire est compris entre 0,5 et 1,5 cm.

6. Dispositif ou partie de contenant formant moule selon l'une quelconque des revendications précédentes, comprenant une première partie de fond fixe fixée sur une première paroi, et une deuxième partie de fond fixe qui est fixée sur une deuxième paroi et qui est moins large que la première partie de fond.

7. Dispositif ou partie de contenant formant moule selon l'une quelconque des revendications 1 à 6, dans lequel la partie de fond fixe est mise en oeuvre pour fournir un raccordement ouvert entre les espaces de chaque côté du fond mobile (29).

8. Dispositif ou partie de contenant formant moule selon l'une quelconque des revendications précédentes, dans lequel un espace intermédiaire est prévu autour de la totalité du fond mobile (29).

9. Dispositif ou partie de contenant formant moule selon l'une quelconque des revendications précédentes, dans lequel la partie de fond fixe est prévue avec un côté chanfreiné.

10. Dispositif ou partie de contenant formant moule selon l'une quelconque des revendications précédentes, dans lequel une partie de contenant formant moule (3) est couplée de manière amovible à une partie de chaîne pouvant se raccorder au convoyeur à chaîne (2).

11. Dispositif ou partie de contenant formant moule selon la revendication 12, dans lequel des éjecteurs (24) des fonds mobiles (29) d'une partie de contenant formant moule (3) sont fixés sur la partie de chaîne.

12. Procédé pour fabriquer des briques crues à partir d'argile pour l'industrie de la fabrication de briques

en utilisant la partie de contenant formant moule selon la revendication 1, le procédé comprenant les étapes consistant à :

- agencer l'argile à l'état déformable dans un ou plusieurs des contenants formant moule (16) ;
 - transporter l'argile agencée dans les contenants formant moule (16) ;
 - amener une ou plusieurs briques crues d'argile à se démouler d'un ou de plusieurs contenants (16) en déplaçant un ou plusieurs fonds (29) mobiles entre les parois droites (40, 41, 42, 43) des contenants formant moule (16), de sorte que pendant ledit déplacement du fond mobile (29), son bord périphérique reste dégagé dudit côté interne de ladite au moins une paroi droite (40, 41, 42, 43).
- 13.** Procédé selon la revendication 12, dans lequel, pendant le démoulage des contenants formant moule (16), l'argile a une déformabilité de sorte que la hauteur résiduelle mesurée dans un dispositif formant piston plongeur avec le procédé de mesure de Pfeferkorn est comprise entre environ 9 mm et 17 mm.
- 14.** Procédé selon la revendication 12 ou 13, dans lequel un dispositif selon l'une quelconque des revendications 1 à 11 est appliqué.

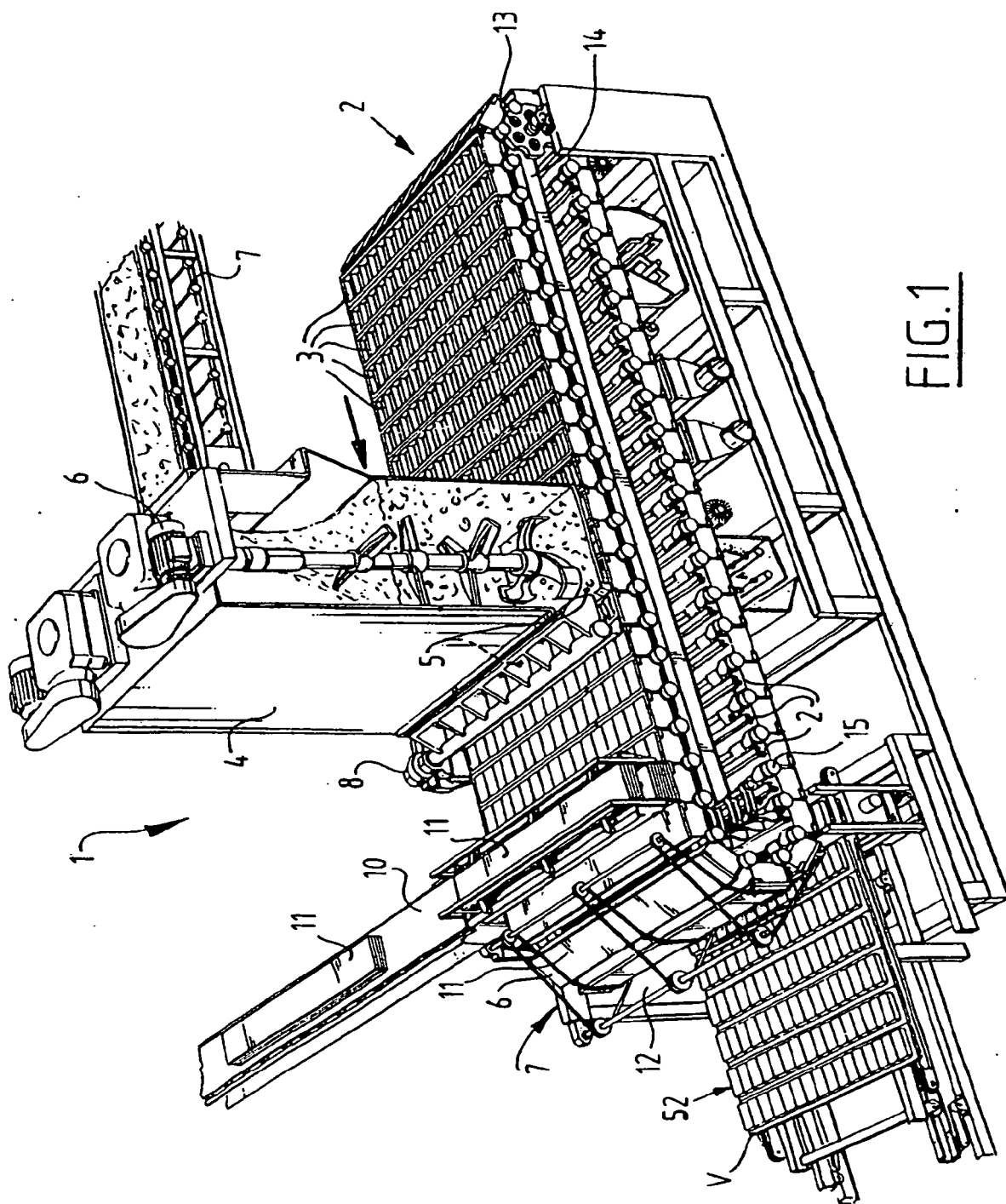


FIG. 1

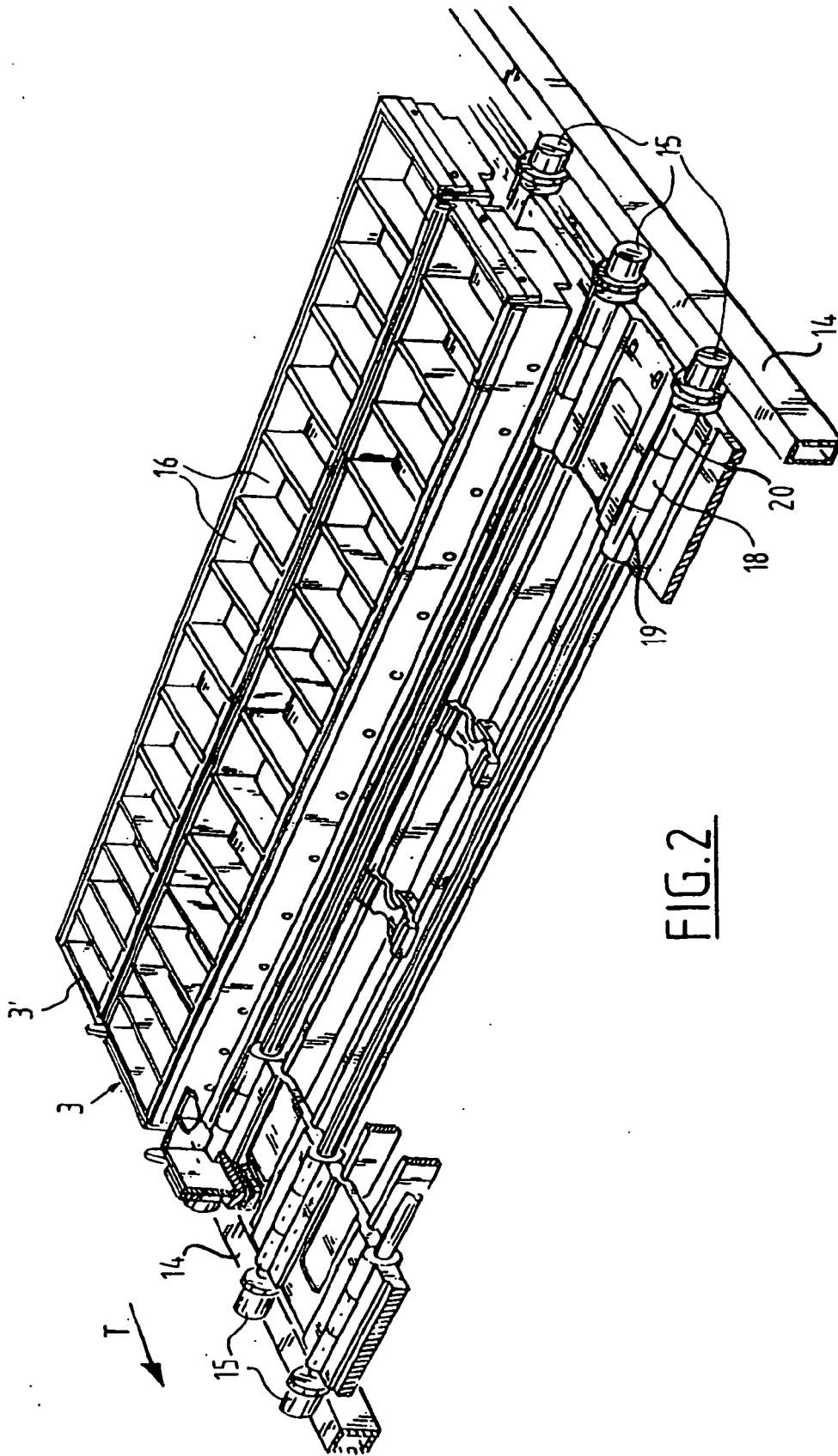


FIG. 2

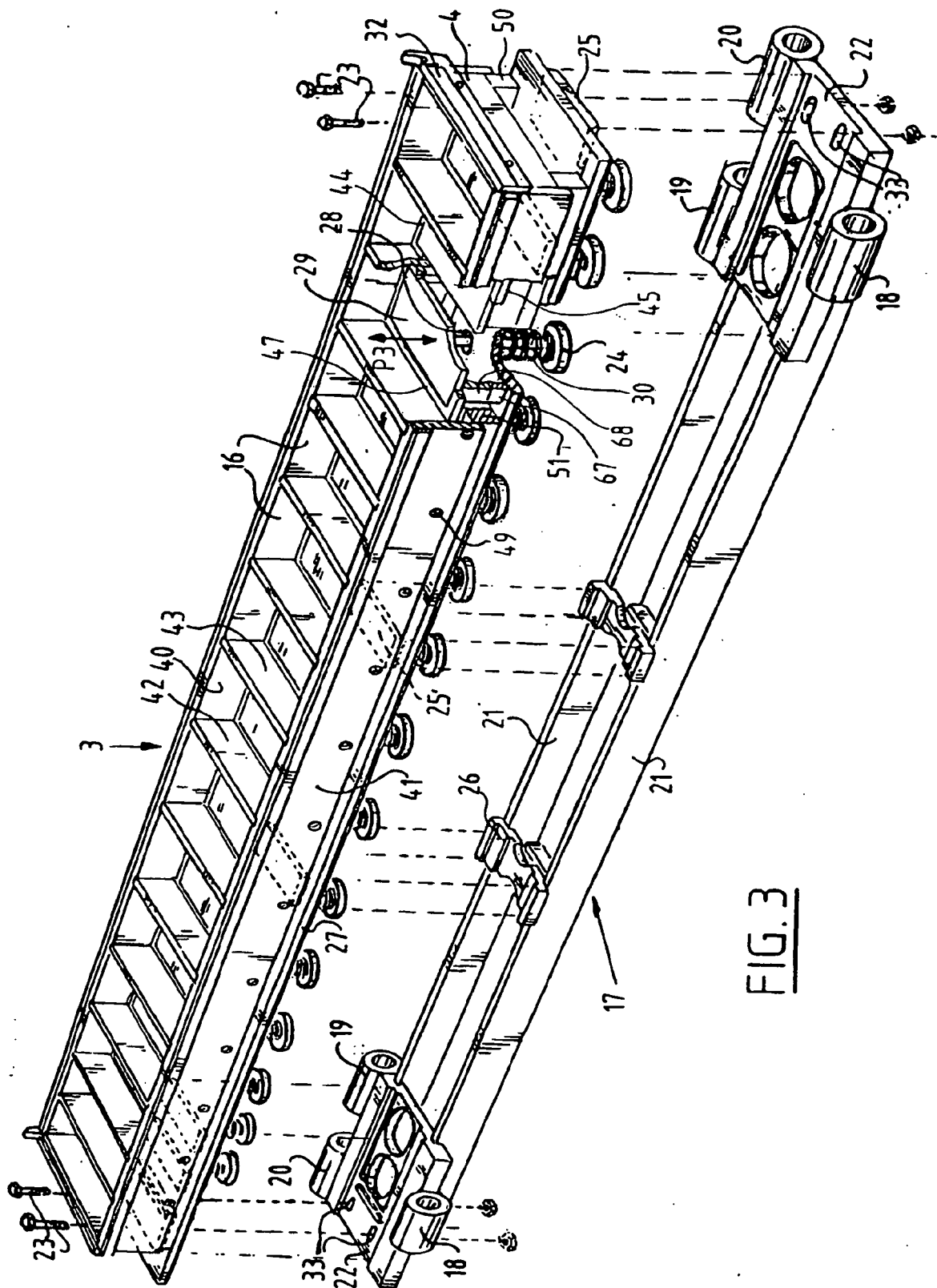
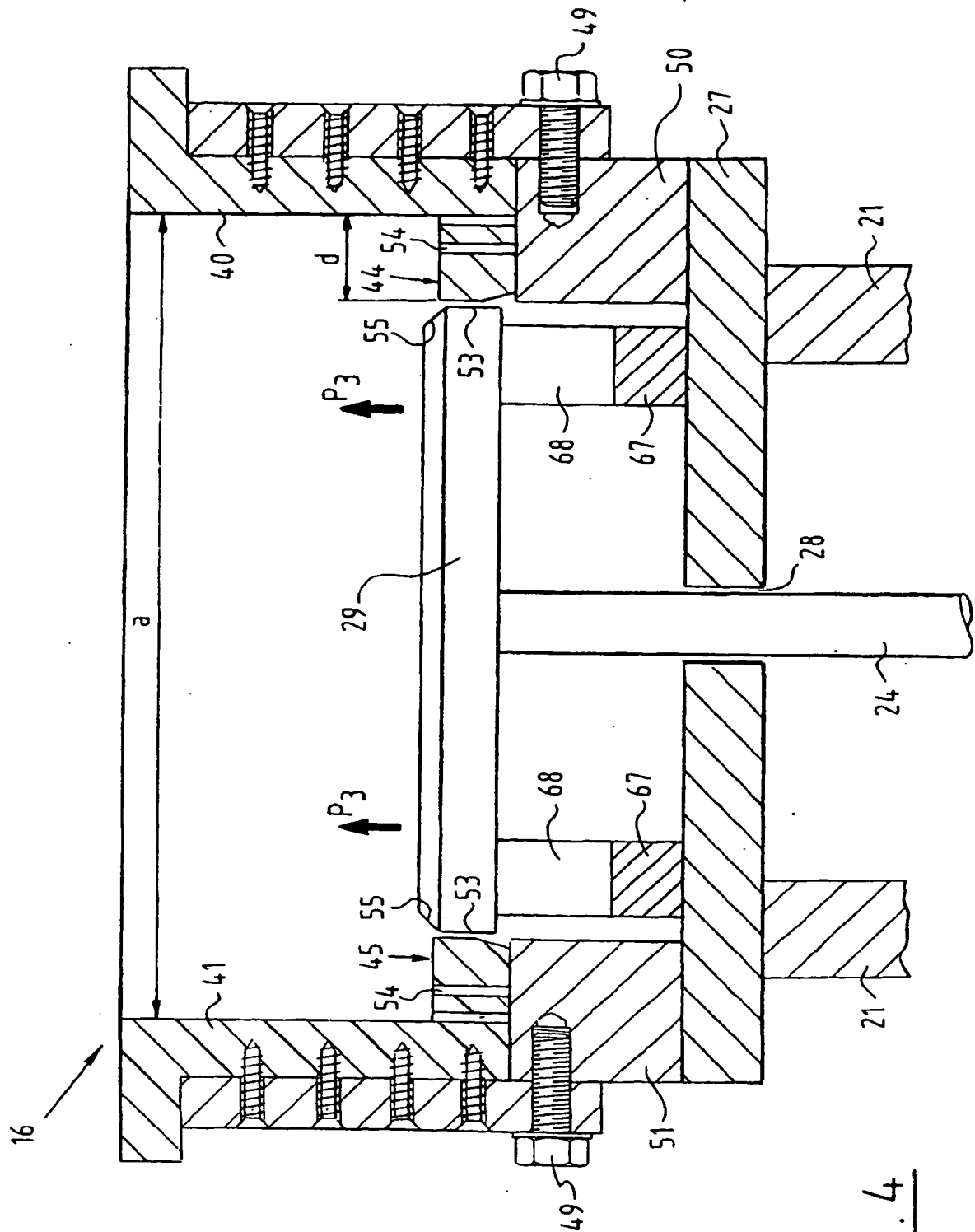


FIG. 3



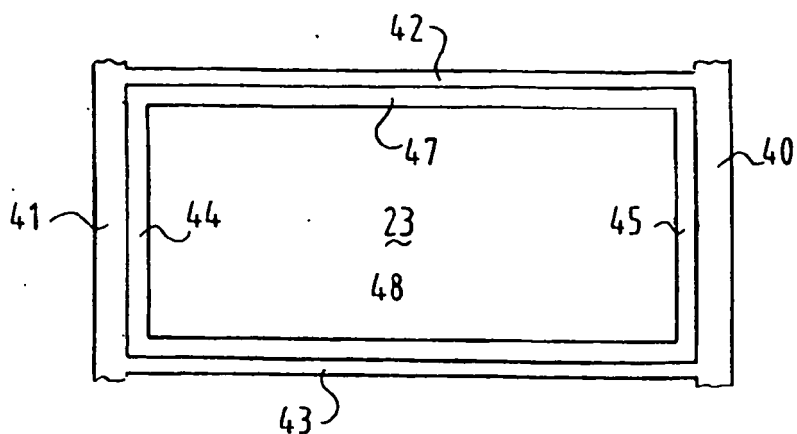


FIG. 5A

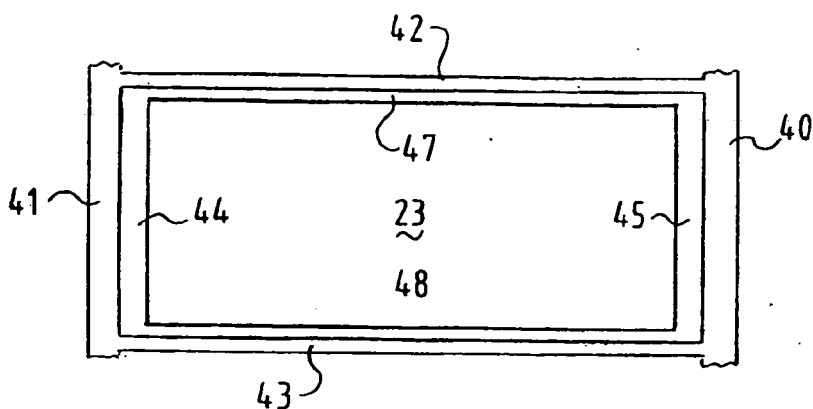


FIG. 5B

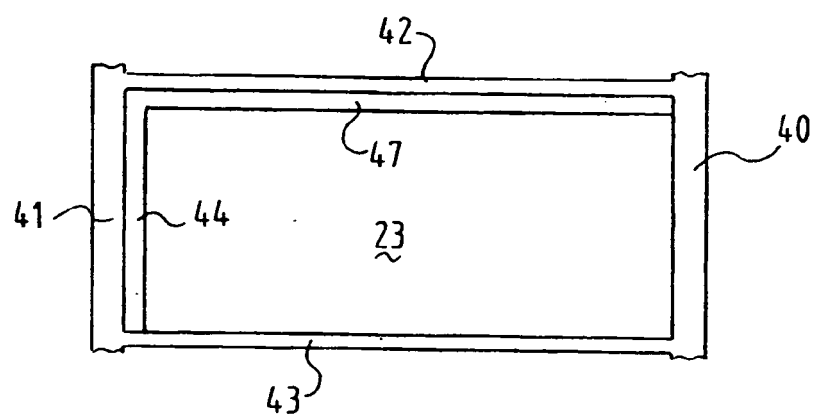


FIG. 5C

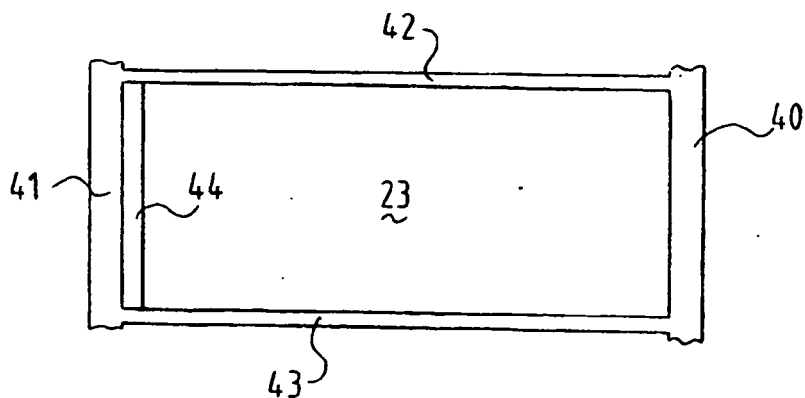


FIG. 5D

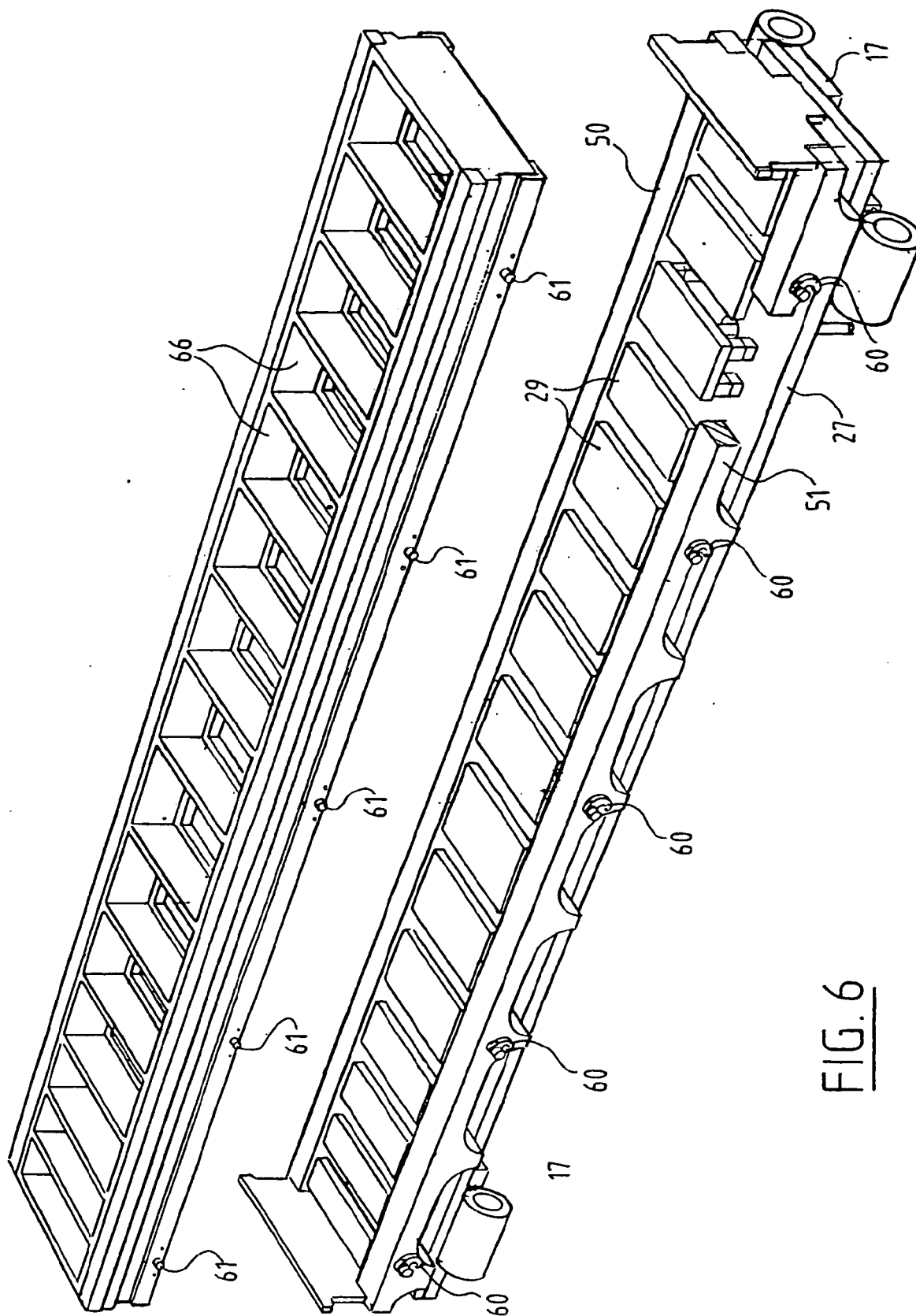


FIG. 6

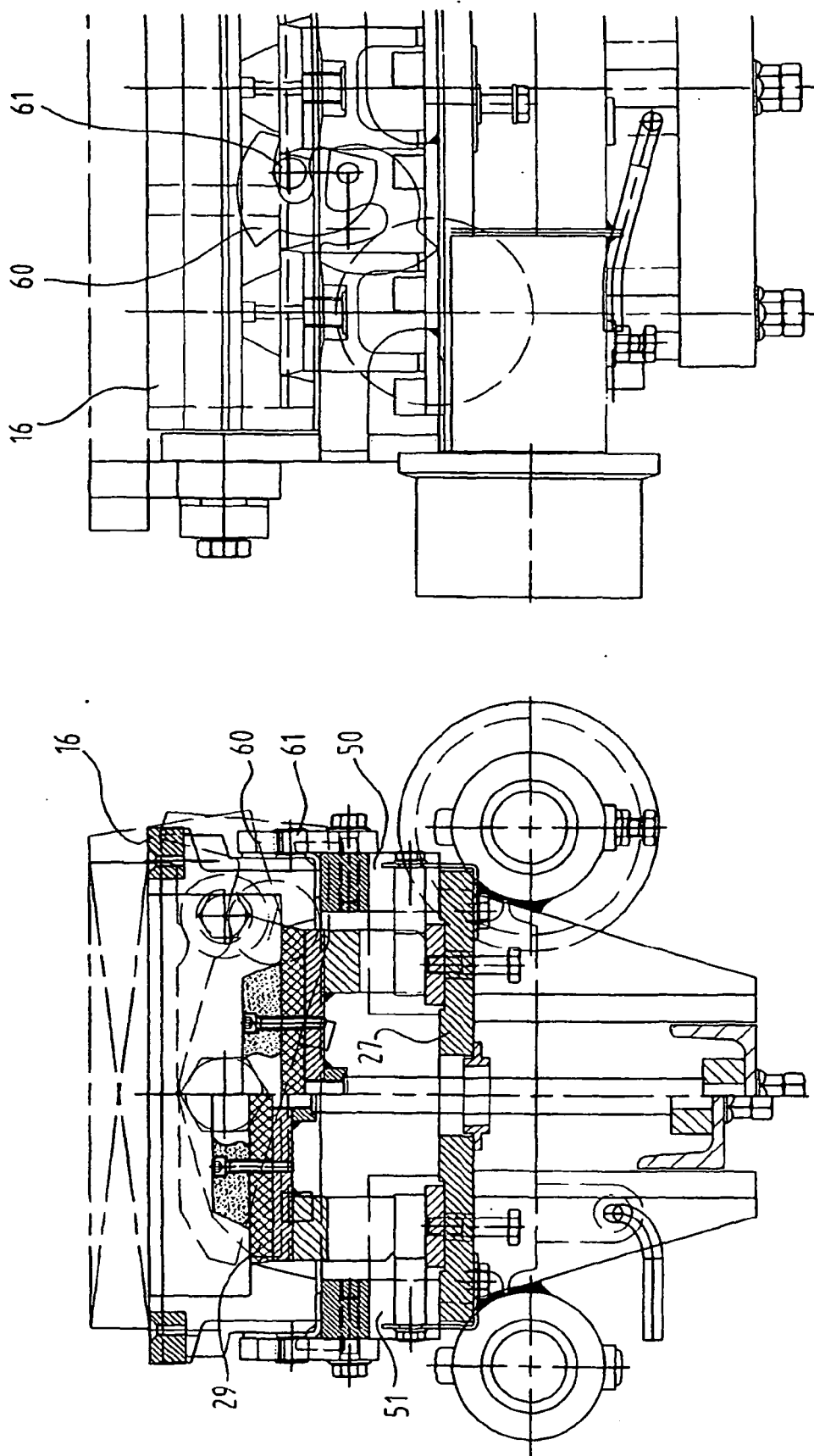
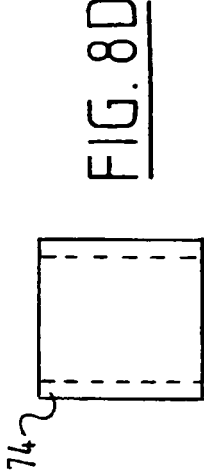
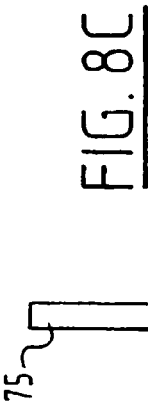
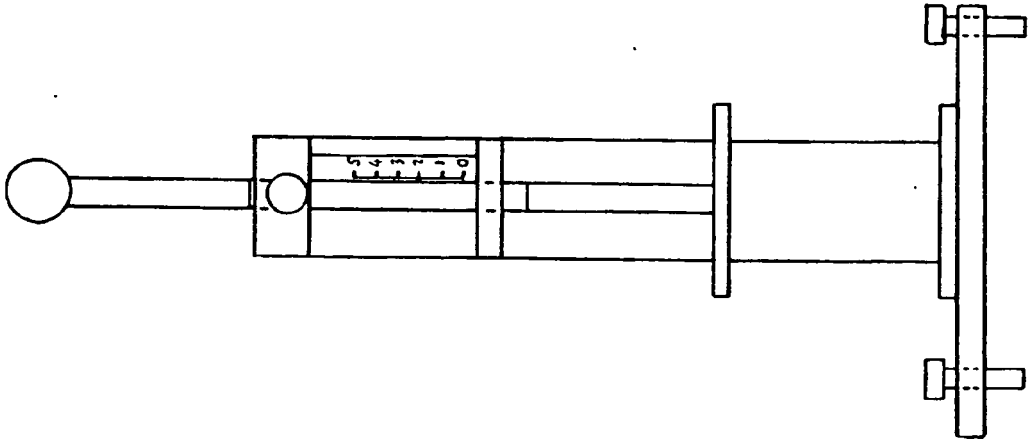
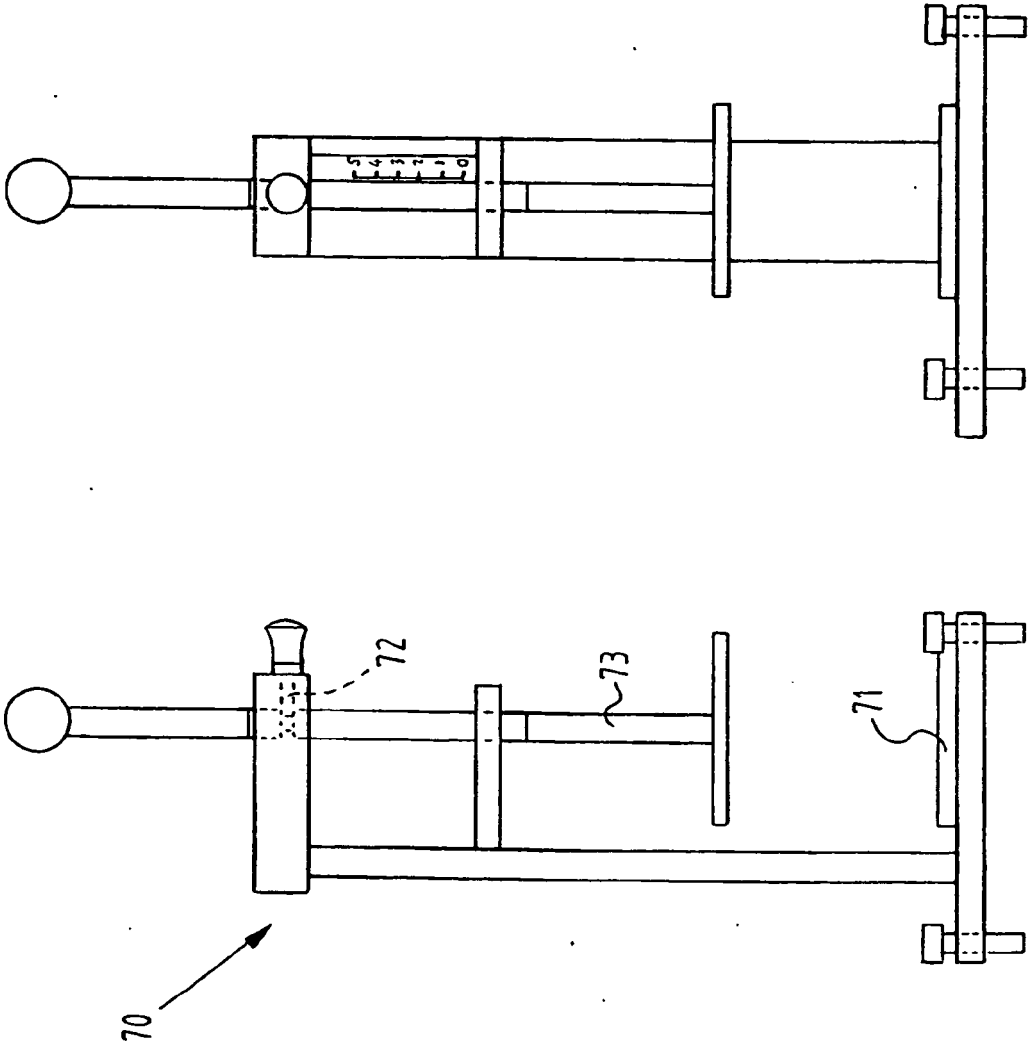


FIG. 7



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 0680812 A [0002] [0004]
- BR 9201837 A [0003]
- DE 1927560 U [0011]
- DE 2659849 A [0012]