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(54) MOULDING APPARATUS FOR MANUFACTURING AGGLOMERATED CORK STOPPERS

(57) The present invention concerns the field of machines for manufacturing stoppers formed from agglomerated cork, and more specifically its object is a moulding apparatus able to be automatically converted for manufacturing agglomerated cork stoppers in two different heights.

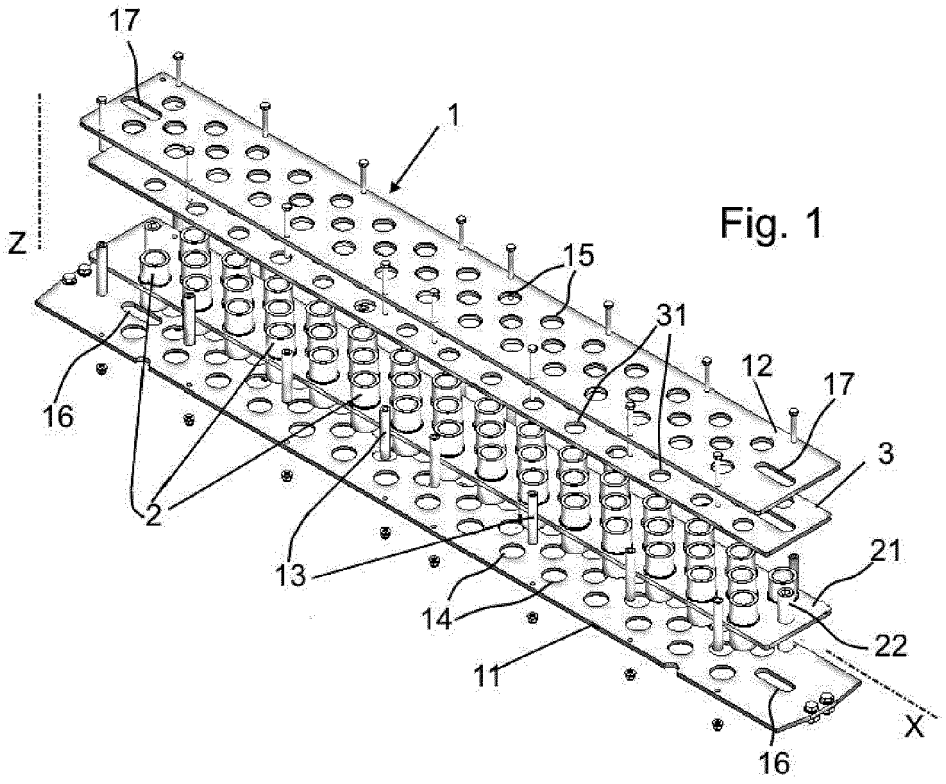

Fig. 1

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Description

[0001] The present invention concerns the field of machines for manufacturing stoppers formed from agglomerated cork, and more specifically its object is a moulding apparatus for manufacturing agglomerated cork stoppers in two different heights.

[0002] As known, cork stoppers are manufactured according to different methods, dependent on the quality of the raw material available. High quality productions foresee that stoppers be manufactured in a single piece from a compact cork matrix coming directly from the tree bark, whereas lower quality products foresee the use of agglomerated cork granules coming from the machining waste of high quality stoppers or from batches of quality not suitable for single-piece stoppers; such granules are bound by a matrix of non-toxic glue.

[0003] There are different techniques for manufacturing agglomerated cork stoppers. In one of these, doses of agglomerated cork granules mixed with glue are fed inside moulds comprising moulding bushes. The agglomerated cork with glue is then pressed and subsequently transferred in a furnace for the time necessary for solidification. After the suitable cooling, the stopper is extracted from the moulding bush by thrusting of a rod-shaped extraction body. The preparation of the correct dose of granules to be introduced into the corresponding mould takes place through dosing machines. Moreover, the moulding system for stoppers comprises transportation means consisting of chains to which the moulds are fixed in series. Such means move the moulds according to a cycle that comprises the passage through the dosing machine, the passage in the furnace and finally in the extraction area.

[0004] A known mould for manufacturing agglomerated cork stoppers comprises a framework formed from two elongated plates and a series of moulding bushes aligned and juxtaposed between such plates. On the latter there are holes, each hole corresponding to a single bush. The bushes are fixed to a common displacement actuator that allows the movement thereof along a line from a configuration in which the bushes are arranged in a corresponding manner to the holes of at least one fixed plate, to allow the loading of the doses of cork granules, to a translated configuration in which the bushes are closed by the inner faces of the plates, to allow the moulding step.

[0005] In order to improve the flexibility of such moulds, making it possible to change the size parameters of the stoppers that can be produced such as in particular the height (axial size), in a relatively simply manner, solutions have been proposed in which the loading capacity of the bushes can be changed through the insertion of elements that vary the axial length of the bushes, selected to be of the desired thickness and replaceable as a function of the specific requirements. An example of this is provided by the description of Italian patent no. 1391079 to the same Applicant.

[0006] Solutions of this kind are undoubtedly profitable, but in order to change the height of the stopper between different production batches they still demand for dismounting operations that, as well as requiring manpower and representing potential risk factors for failures or malfunctions, involve machine downtimes that reduce productivity, even more so where, as often occurs, the batches are small and consequently the change in size is imposed frequently. The possibility of a free variation of the length in any value of a determined range - and therefore being able to obtain stoppers of a wide and practically continuous distribution of sizes - is also in many cases more a theoretical than a real advantage, since the lengths of the stoppers are standardised to a few formats that cover the vast majority of requirements.

[0007] A further solution is provided by Italian patent application no. 102014902295540 (former reference FI2014A000223, herein incorporated for reference), which the present applicant devised to obtain better results in terms of flexibility, productivity and reliability. Such a document indeed discloses a mould for manufacturing agglomerated cork stoppers, comprising a pair of fixed plates that are parallel and spaced apart, distributions of holes formed on the plates and mutually corresponding from plate to plate, and a plurality of cylindrical moulding bushes defining respective seats, in a number corresponding to that of the holes and arranged between the fixed plates, fixedly connected to each other by means of an actuation member adapted for moving them between an opening position, in which the correspondence between the holes of the fixed plates and the seats of the bushes is obtained, and a closure position in which the seats of the bushes are shut by the solid part of the fixed plates.

[0008] The mould also comprises an adjustment plate in contact with one of the fixed plates and in turn carrying a distribution of holes corresponding to that of the fixed plates, whereby the bushes abut at an axial end on the adjustment plate and at the opposite end on a fixed plate. A releasable locking system is adapted to lock the adjustment plate to the adjacent fixed plate when the respective holes are mutually aligned. Between the actuation member and the adjustment plate it is possible to insert and disinsert a pulling element that can make the adjustment plate pulled by the movement of the actuation means of the bushes or inedependent with respect to it, consequently determining a moulding space of greater or lesser height.

[0009] The pulling element is slidable in a direction orthogonal to the plane of the actuation motion along a guide structure fixedly connected to the actuation member, between a first configuration, spaced and disengaged from the adjustment plate, corresponding to a configuration for obtaining stoppers having a lower height, and a second configuration in which it engages with the adjustment plate, corresponding to a configuration for obtaining stoppers of greater height, the two configurations being reversibly locked by a stop ring operating in

abutment on the pulling ring.

[0010] This adjustment system makes it possible to convert a single mould to the production of two different stopper sizes, with an acceptable constructive complication and with a relatively simple manoeuvre. Nevertheless, it is still necessary for a staff operator to personally act on each active mould, modifying the configuration, tampering with the releasable locking system between the adjustment plate and the adjacent fixed plate and also the (numerous, as many as the number of holes) lifting heads or rods that have a different configuration depending on whether the stopper to be made is of one height or the other. Such a size change manoeuvre therefore takes indeed a certain time, especially if, as frequently occurs in common installation environments, it is obstructed by the need to work in restricted spaces.

[0011] The object of the present invention is therefore that of providing a double height moulding system for manufacturing in agglomerated cork, which allows even easier and in any case quicker conversion from the configuration for manufacturing so-called "tall" stoppers to that for manufacturing so-called "short" stoppers, and vice-versa.

[0012] Such an object and other significant accessory advantages are accomplished by the automatic moulding apparatus for manufacturing agglomerated cork stoppers according to the present invention, the essential characteristics of which are defined by the first of the attached claims.

[0013] The characteristics and advantages of the automatic moulding apparatus according to the present invention will become apparent from the following description of an embodiment thereof, given as a non-limiting example with reference to the attached drawings, in which:

- figure 1 and figure 2 are axonometric views of a mould adapted for operating in the moulding apparatus according to the invention, in an exploded configuration, figure 2 showing the mould in a broken and enlarged view;
- figure 3 is a side view of a moulding station of the apparatus comprising a mould in accordance with the previous figures, the mould being broken and configured for making "tall" stoppers, the mould being in a lifted configuration;
- figure 4 again shows a side view of a first end area of the station, configured for manufacturing "short" stoppers, still with the mould in a lowered configuration;
- figures 5a to 5l represent respective steps of the sequence with which the station, shown in side view, works to obtain "tall" stoppers; and
- figures 6a to 6i represent respective steps of the sequence with which the station, shown in side view, works to obtain "short" stoppers.

[0014] With reference to said figures, the moulding apparatus according to the invention provides the use of an actual mould, a frame 1 of which is formed from a pair of fixed plates 11, 12 elongated according to a longitudinal direction X. The plates 11 and 12 are kept integrally parallel and spaced (according to a height direction Z) by support columns 13 arranged along the longitudinal sides and comprise respective distributions of holes 14, 15 in mutually corresponding (centered) positions between the two plates. The holes 14, 15 are representative of the number of cork stoppers that can be obtained with the mould and are adapted to correspond with cylindrical stopper moulding bushes, indicated with 2 and arranged between the two plates with the respective central axes rising in the height direction Z.

[0015] The bushes 2 are fixedly connected to a central movable plate 21 for opening/closing the mould inside which the bushes themselves are mounted and that is arranged parallel to the two fixed plates 11, 12, roughly at half the height of the space defined between them. The central plate is intended to move alternately along a direction of actuation in the longitudinal direction X, driving the bushes, between a closure position and an opening position, which will be discussed further hereinafter. The movement is controlled by drive means that in turn will be described shortly, and is guided/controlled with respect to the fixed plates by peg structures 22, fixedly connected to the central plate 21 one on each longitudinal end of the mould and that slidably engage in slots 16, 17 formed in the fixed plates.

[0016] A further volumetric or adjustment plate 3, having a profile that in turn copies that of the previous plates, is arranged between the two fixed plates but in this case in direct contact and juxtaposition with one of them, for example and in particular the upper one 12 (the reference being to the configuration of use in which the plates are horizontal and indeed at different heights). The adjustment plate 3 in turn carries a distribution of holes 31 substantially corresponding, in number, size and position, to the distributions of holes on the fixed plates (and to the seats defined by the bushes).

[0017] The bushes 2 are therefore positioned in axial abutment between the lower fixed plate 11 and the adjustment plate 3. The latter is in turn movable along the direction of actuation X from a first to a second position with a run corresponding to the relative run between the central plate 21 and the fixed plates, thanks to slots 32 like the slots 16, 17 that slidably engage with the pegs 22. In particular, the first position is displaced leftwards (spatial reference as in figures 3 to 6) or more generally speaking in correspondence to the opening position of the central plate 21, while the second position is displaced rightwards as per the closing position of the central plate 21.

[0018] The assembly described above, which as stated represents the actual mould, is intended to cooperate, in a moulding station of the apparatus, with an overlying known loading drawer, not shown overall. The drawer, from which the agglomerated cork intended for forming

the stoppers is indeed supplied to the mould, has a bottom determined by a shutter 5 in turn plate-shaped and with which the upper plate 12 is adapted for being arranged in contact. The shutter 5 is in turn movable in an alternate manner according to the longitudinal or actuation direction X, between a closure position and open position, in which it respectively blocks the flow of agglomerated cork and allows it to flow towards the holes and consequently the underlying bushes if they are in turn in the suitable position.

[0019] The mould is supported towards and in the station by a transportation system that allows it to be lifted, said system in turn not being represented being it known *per* se and in any case of an obvious nature to the skilled person, adapted for moving the assembly of the mould between a lowered transit, or inactive configuration, and a lifted or loading configuration in which the upper plate 12 makes contact with the shutter 5.

[0020] In the station the mould also cooperates with an actuation system that according to the preferred solution foresees four linear actuators, typically in the form of respective oil-hydraulic cylinders, arranged in pairs at respective longitudinal ends of the frame 1 to act by thrust on the corresponding ends of the central plate 21, on the shutter 5 and if necessary on the volumetric plate 3, when the mould is in the raised/lifted configuration. In particular, at a first end, the one on the left when observing the mould like in figure 3, there is a cylinder 6 for closing the central plate 21 and, thereabove, a cylinder 7 for closing the shutter 5; at a second end opposite the first, on the other hand, there is a cylinder 8 for opening the central plate 21 and thereabove a cylinder 9 for opening the shutter 5.

[0021] The actuation engagement between cylinders and elements of the mould actuated, as mentioned in a raised configuration of the mould itself, acts through respective thrust members 6a and 6a', 7a and 7a', 8a, 9a mounted on respective movable stems of the cylinders. Starting from the thrust members at the right (second) end, which remain unchanged both in the configuration for a "tall" stopper and in the configuration for a "short" stopper, the thrust member 8a of the cylinder 8 for opening the central plate 21 is a block of reduced thickness in height, adapted for abutting on the end of the plate itself and only on it; the thrust member 9a of the cylinder 9 for opening the shutter 5 on the other hand is preferably C-shaped, whereby the abutment on the end of the same shutter is entrusted to a top arm, while a lower arm is intended for actuating the adjustment plate 3 below. The two arms are spaced by a slit that is adapted for receiving the upper fixed plate 12 in some actuation conditions, as will be seen in detail when describing how the mould works.

[0022] Passing to the thrust members of the first (left, as seen in the figures) end, these are subject to replacement (it is the only replaceable part of the apparatus) to carry out a conversion as a function of the stopper height to be obtained. In particular, the thrust member 6a of the cylinder 6 for closing the central plate 21 has, in a first configuration for obtaining "tall" stoppers (figure 3) an extension in the height direction Z such as to abut not only on the end of the aforementioned plate, but also on the volumetric plate 3. In a second configuration for obtaining "short" stoppers (figure 4), on the other hand, it is foreseen for there to be a thrust member 6a' of reduced thickness in height, adapted for abutting on the end of the plate 21 and only on that.

[0023] Finally, as far as the cylinder 7 for closing the shutter is concerned, in the configuration for "tall" stoppers (figure 3) this has a thrust member 7a of reduced extension in the height direction Z, such as to abut only on the end of the shutter 5 and only on that, and to slide substantially in contact with the upper end of the "tall" thrust member 6a. On the other hand, in the configuration for "short" stoppers (figure 4) it is foreseen for there to be a thrust member 7a' of increased thickness in height, adapted for abutting simultaneously on the end of the shutter 5 and on that of the adjacent volumetric plate 3. The thrust member 7a', with respect to the thrust member 7a, can therefore have a part projecting at the bottom, in any case spaced from the "short" thrust member 6a'. Advantageously, in both cases, the thrust member 7a or 7a' can comprise a rear portion that rests for reference and guiding purposes on the stem of the actuator 6.

[0024] In practice, in both configurations, the thrust members are in general configured so that the forwards displaced actuation configuration of a thrust member at one end takes the actuated element in abutment on a thrust member at the opposite end.

[0025] With particular reference to figures 5a to 6i, the operative behaviour of the moulding apparatus for agglomerated cork stoppers according to the invention, and namely of a station thereof, is as follows.

[0026] Firstly, the circumstance in which stoppers of greater height must be manufactured (figures 5a to 5l) will be considered. The mould, driven by chain transporter system of a known type, reaches the moulding station and stops in it, in a lowered configuration (figure 5a). In this step all of the cylinders are in a backwards displaced position. The mould is then lifted (figure 5b) and opened (figure 5c), if it is not already in such a condition, as a result of the advancement of the thrust member 8a of the cylinder 8 and consequent abutment of the actuation plate 21 on the thrust member 6a of the cylinder 6 at the opposite end.

[0027] Figure 5d shows the next step, in which by means of the movement of the cylinder 9 and through the relative thrust member 9a (more precisely the top arm thereof) the shutter 5 opens, going into abutment on the thrust member 7a of the cylinder 7 at the opposite end. Such movement is permitted thanks to the slit of the thrust member 9a, said slit housing the fixed upper plate 12 not allowing it to cause mechanical hindrance. Once it is at its end stop, the thrust member 9a through its lower arm ensures with certainty that the volumetric plate 3 is also in an opening (or first) position, in this case abutting

on the thrust member 6a (which in this configuration for this purpose is indeed of increased height) of the cylinder 6. At this point, the mould is opened, with the holes of the volumetric or adjustment plate 3 centered with those of the bushes, and can thus be loaded for the formation of "tall" stoppers.

[0028] Once the loading and compacting of the material through pressing rods has indeed been carried out in a known way (the feeding and pressing system being in turn of a traditional type, see e.g. the previously cited FI2014A000223, or patent IT1218538), the cylinder 8 pulls back its thrust member 8a (figure 5e) to now act as end stop abutment for the closure movement of the central plate 21, pushed by means of the forward movement of the thrust member 6a of the cylinder 6 as shown in figure 5f, in which it can also be seen that this movement also pushes along the volumetric plate 3 to the second position. This simultaneous displacement is clearly in turn for the production of stoppers of greater height. Indeed, the holes of the volumetric plate 3 determine an elongation of the volume of the respective bushes, and by moving the two parts in a coordinated manner such a volume is shut in the closure position, in this case, by the upper fixed plate 12. In the same figure 5f it is also possible to see the rearwards movement of the cylinder 9 that by carrying the thrust member 9a in the rearwards position helps the rightwards (as seen in the figures) movement of the volumetric plate, eventually determining, again with its lower arm, a stop abutment thereof. With this movement, the slit of the thrust member 9a frees itself from the engagement with the upper fixed plate 12. The mould is thus loaded and closed.

[0029] The cylinder 6 now makes its thrust member 6a move back to free the mould (figure 5g), which can be lowered to the final configuration of the cycle (figure 5h). The cylinder 7 moves forward to close the shutter (figure 5i) and with the subsequent movement back of the same cylinder (figure 5l) the cycle ends, arranging the station for the start of the next cycle.

[0030] Now be it considered the circumstance in which stoppers of lower height must be produced (figures 6a to 6i). The cycle clearly has similar overall evolution with respect to what has already described, with analogous steps of arrival and lifting of the mould (figures 6a and 6b) and of opening of the mould by the thrust member 8a of the cylinder 8 (figure 6c). Also in this case, the subsequent movement is represented by the opening of the shutter 5 by the thrust member 9 (figure 6d); here, however, the volumetric plate 3 is secured in abutment in the opening (first) position by abutment with the thrust member 7a' of the cylinder 7 for closing the shutter. Indeed, the movement of the volumetric plate 3 is now disengaged from the thrust member 6a' of the cylinder 6 for closing the central plate.

[0031] The mould can at this point be loaded, with the pressing rods lifting in this case flush with the upper end of the bushes. The closure of the central plate 21 now takes place as shown in figure 6e: the forwards movement of the thrust member 6a' interferes with only the central plate 21, the rightwards movement of which to the closing position is assisted by the withdrawal/rearward movement of the cylinder 8 that also here acts as end stop abutment thereof. The cylinders 7, 9 for closing/opening the shutter remain stationary and with them the volumetric plate 3 (in the first position) and the upper fixed plate 12. In such a situation, stoppers of lower height (which corresponds to the net height of the bush) are thus made because the bushes indeed slide, in their actuation motion driven via the central plate 21 by the thrust member 6a', with respect to the adjustment plate 3 that remains stationary, and it is the latter, with its solid part, that shuts the opening of the bushes in the closure position.

[0032] The mould, closed and loaded, must be freed by making the cylinder 6 move rearwards (figure 6f), and then it is lowered (figure 6g). The cylinder 7 for closing the shutter operates with the thrust member 7a' making the shutter itself move forward until it abuts on the top arm of the thrust member 9 (figure 6h) and finally with the withdrawal of the same cylinder 7 the end of cycle is reached according to figure 6i.

[0033] In both configurations, the movement of the central plate 21, and with it of the bushes 2, will therefore take place between an opening position, in which the bushes, and more specifically the relative seats, correspond with the holes of the fixed plates and it is thus possible to carry out the loading of the doses of cork granules, and a closure position, to allow the moulding step, in which the bushes are closed by the inner face of the lower plate 11 and by the inner face of the upper plate 12, or by the inner face of the adjustment plate 3 depending on the circumstances.

[0034] The two heights of stoppers that can be made are typically 39 mm and 45 mm, by means of an adjustment plate having a height of 6 mm, these being the most common standards in the field, but obviously, based on the same principle, different sizes can be obtained.

[0035] Therefore, it is clear that with the adjustment system according to the invention the result of making the moulding apparatus suitable for making two different sizes of stoppers with a very fast and easy conversion is obtained; such conversion between the two arrangements consisting only in the replacement of two thrust members of the actuation cylinders and a minimal variation of the operative sequence that can easily and obviously be set on the control means of the apparatus. In practice, the mould does not undergo any intrinsic change of configuration, remaining the same (of simplified structure with respect to the system known previously and with the volumetric plate always remaining mechanically independent) for the two options, the different functionality of which being handled by the actuation system.

[0036] The adjustment plate 3 arranged in the upper part of the mould also makes it possible to avoid the replacement of the lifting heads, a simple adjustment of the

pressing rods being sufficient.

[0037] The present invention has been described up to now with reference to a preferred embodiment thereof. It should be understood that there can be other embodiments that derive from the same inventive core, all covered by the scope of protection of the claims given below.

Claims

1. A moulding apparatus for manufacturing agglomerated cork stoppers, comprising: mould transportation means to at least one moulding station; said mould comprising a pair of fixed plates (11, 12) parallel and spaced in a height direction (Z), distributions of holes formed in said plates and adapted to become mutually centered between plate and plate, a plurality of cylindrical moulding bushes (2) defining respective seats, in a number that corresponds to the number of said holes and arranged between the fixed plates with respective axes parallel with said height direction (Z), said bushes being made mutually integral by a central plate (21) adapted to displace the bushes along a direction of actuation (X) orthogonal with the height direction (Z) for a relative run between an opening position, in which an alignment between the holes of the fixed plates and the seats of the bushes (2) is obtained, and a closure position in which said seats of the bushes become shut by the fixed plates, the mould further comprising an adjustment plate (3) in contact with either of the fixed plates (12), having in turn a distribution of holes (31) matching the distribution of holes in said fixed plate and adapted to be displaced along said direction of actuation (X) for a run from a first to a second position corresponding to the relative run between the central plate (21) and the fixed plates, whereby said bushes (2) abut at an axial end on said adjustment plate (3) and at the opposite end on a fixed plate, the adjustment plate (3) being free to slide in said direction of actuation (X) from the first to the second position independently from said central plate (21) to keep its holes disaligned or aligned to the seats of the bushes and consequently define in either case a moulding space with greater or lower height; agglomerated cork loading means for loading the cork in said mould (1) arranged in said moulding station; wherein said moulding station further provides drive means (6, 7, 8, 9) of at least said central plate (21) and said adjustment plate (3), comprising thrust means adapted to push the plates at respective ends according to said direction of actuation (X) to displace them accordingly, and adapted to be configured in a first configuration, for obtaining stoppers of greater height, in which the thrust on said central plate (21) from said opening position to said closing position carries along also said adjustment plate (3) from the first to the second position, whereby the moulding space is defined between the two fixed plates (11, 12), and in a second configuration, for obtaining stoppers of reduced height, in which the thrust on said central plate from said opening position to said closing position does not affects said adjustment plate (3) that remains in the first position, whereby the molding space is defined between a fixed plate and the same adjustment plate (3), the apparatus further comprising control means programmed to control at least said drive means (6, 7, 8, 9) according to respective different operating sequences depending on the fact that the same drive means are configured in either said first or said second configuration.

2. The apparatus according to claim 1, wherein said adjustment plate (3) is adjacent with an upper fixed plate (12), at a higher elevation along said height direction (X).

3. The apparatus according to claim 2, wherein said cork loading means comprise a shutter (5) movable in said direction of actuation (X) between an opening or loading position and a closing position, said drive means comprising: at a first end, a central plate closure linear actuator (6) for closing said central plate (21) and, thereabove, a shutter closure linear actuator (7); at a second end opposed to the first end, a central plate opening linear actuator (8) for opening said central plate (21) and, thereabove, a shutter opening linear actuator (9); and wherein said closure actuators (6, 7) provides replaceable thrust means comprising: in said first configuration, a central plate closure thrust member (6a) having an increased height, adapted to push at the same time the central plate (21) and said adjustment plate (3), and a shutter closure thrust member (7a) having a reduced height adapted to push only the shutter (5); in said second configuration, a central plate closure thrust member (6a') of reduced height, adapted to push only the central plate (21), and a shutter closure thrust member (7a') having an increased height, adapted to push at the same time the shutter (5) and the adjustment plate (3).

4. The apparatus according to claim 3, wherein said shutter closure thrust member (7a) having a reduced height is adapted to slide over a top end of said central plate closure thrust member (6a) having an increased height, and wherein said shutter closure thrust member (7a') having an increased height has a downwards projecting part, spaced from the central plate closure thrust member (6a') of reduced height.

5. The apparatus according to claim 4, wherein said shutter closure thrust member (7a, 7a') comprises a rear portion that rests for reference and guide purposes on a stem od said central plate closure linear

actuator (6).

6. The apparatus according to any of the claims from 3 to 5, wherein said shutter opening linear actuator (9) comprises a C-shaped thrust member (9a), comprising a top arm for abutment on an end of the shutter (5), a lower arm for abutment on said adjustment plate (3) and a slit that spaces said arms and is adapted to accommodate said upper fixed plate (12).

7. The apparatus according to any of the claims from 3 to 6, wherein said transportation means comprise lifting means adapted to lift and lower said mould in said moulding station according to said height direction (Z) between a lowered arrival position and a lifted loading position in which said upper fixed plate (12) comes into contact with said shutter (5).

8. The apparatus according to any of the claims from 3 to 7, wherein said linear actuators (6, 7, 8, 9) are arranged so that an advanced, actuation position of a thrust member at an end of the actuated element causes the same element to abut on a corresponding thrust member at the opposite end.

9. The apparatus according to any of the previous claims, wherein said central plate (21) with said bushes (21) comprises at least one peg (22) that also projects in the height direction (Z) and slidably engaged with guiding slots (16, 17) formed in the fixed plates and elongated according to said direction of actuation (X).

10. The apparatus according to any of the claims from 3 to 9, wherein said programmed sequence controlling the drive means in said first configuration provides, starting from a situation in which all the linear actuators are in a rearwards displaced position: lifting the mould; make the central plate opening actuator (8) advance; make the shutter opening actuator (9) advance; load the mould; make the central plate closure actuator (6) advance, while or after the central plate opening actuator (8) and the shutter opening actuator (9) move or have moved rearwards; make the central plate closure actuator (6) move rearwards; lower the mould; make the shutter closure actuator (7) advance; make the shutter closure actuator (7) move rearwards; and wherein said programmed sequence controlling the drive means in said second configuration provides, starting from a situation in which all the linear actuators are in a rearwards displaced position: lifting the mould; make the central plate opening actuator (8) advance; make the shutter opening actuator (9) advance; load the mould; make the central plate closure actuator (6) advance, while or after the central plate opening actuator (8) moves or has moved rearwards and while the shutter opening actuator (9) is kept still in the advanced position; make the central plate closure actuator (6) and the shutter opening actuator (9) move rearwards; lower the mould; make the shutter closure actuator (7) advance; make the shutter closure actuator (7) move rearwards.

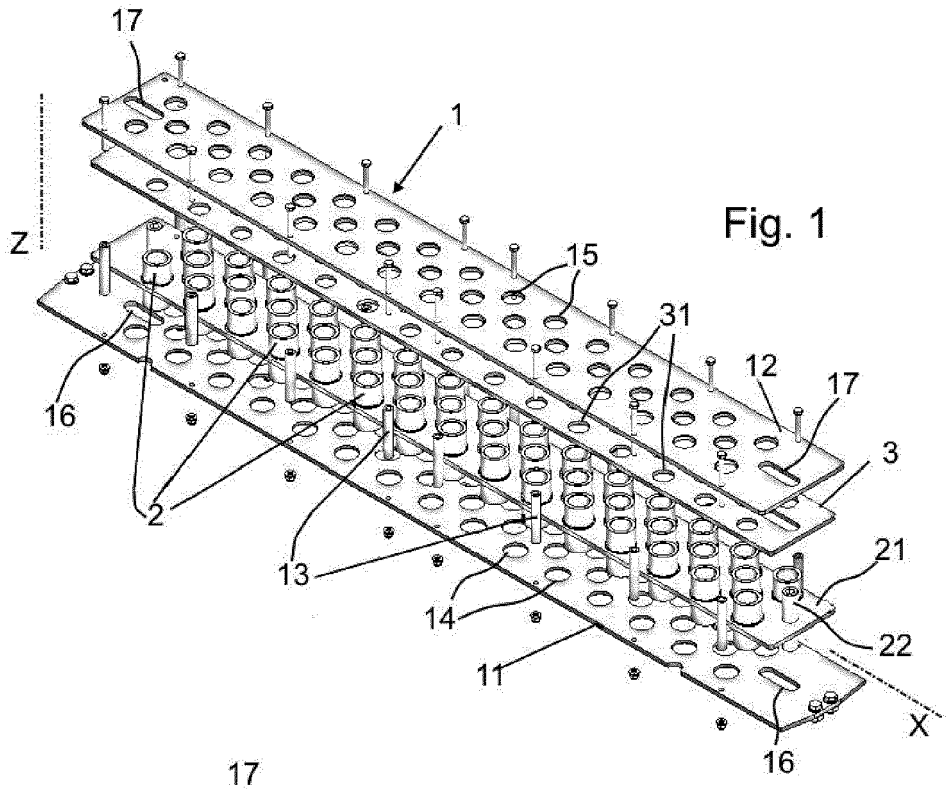
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Fig. 1

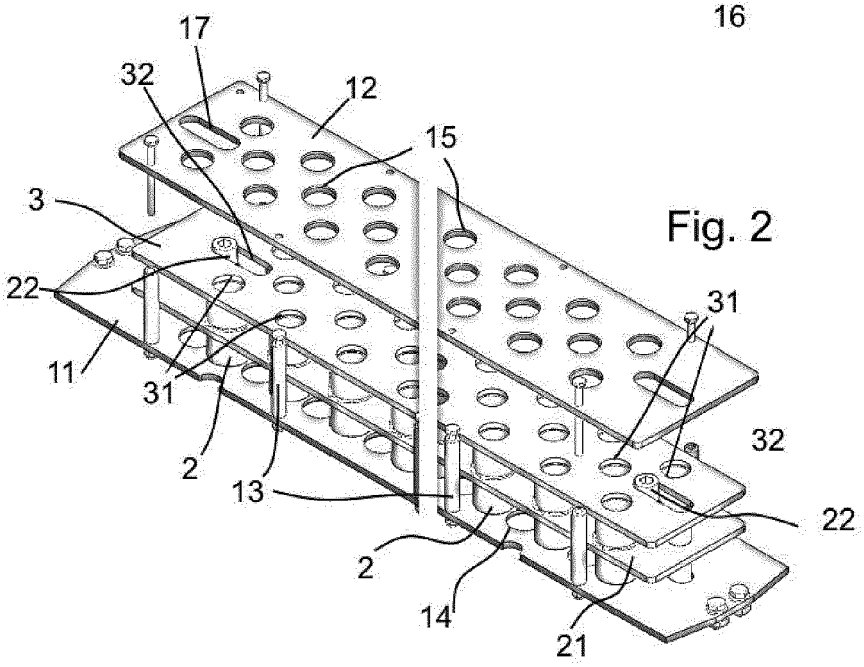
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Fig. 2

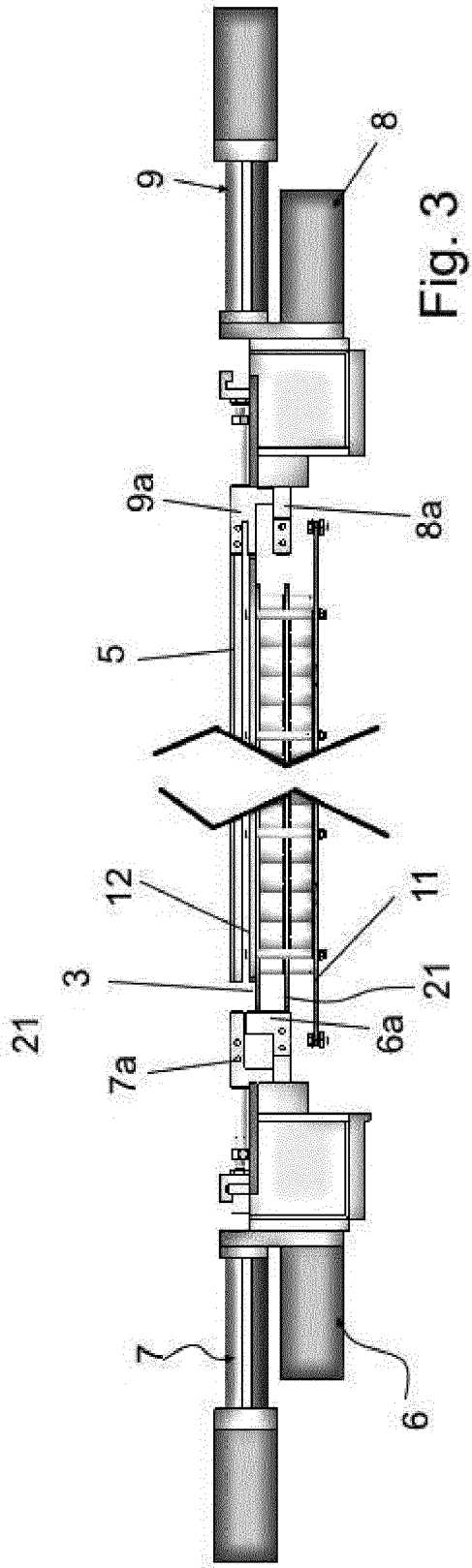

Fig. 3

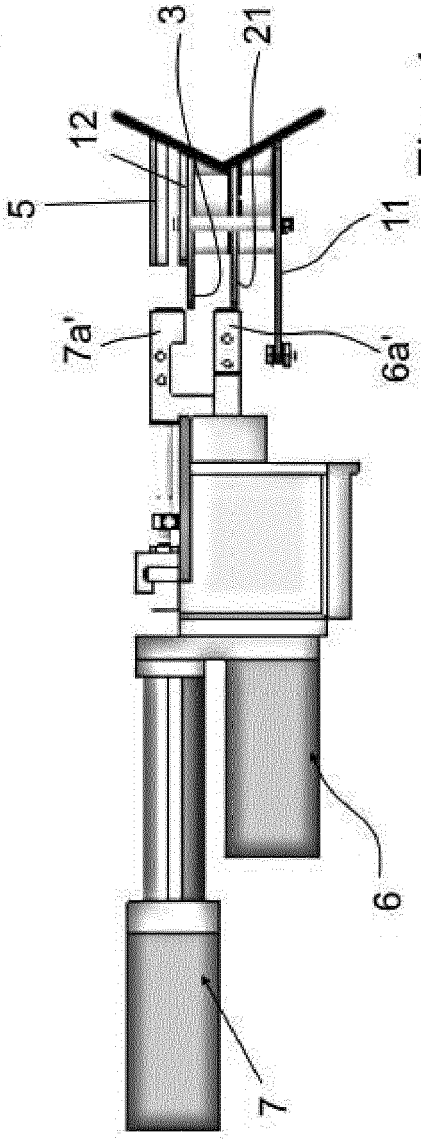

Fig. 4

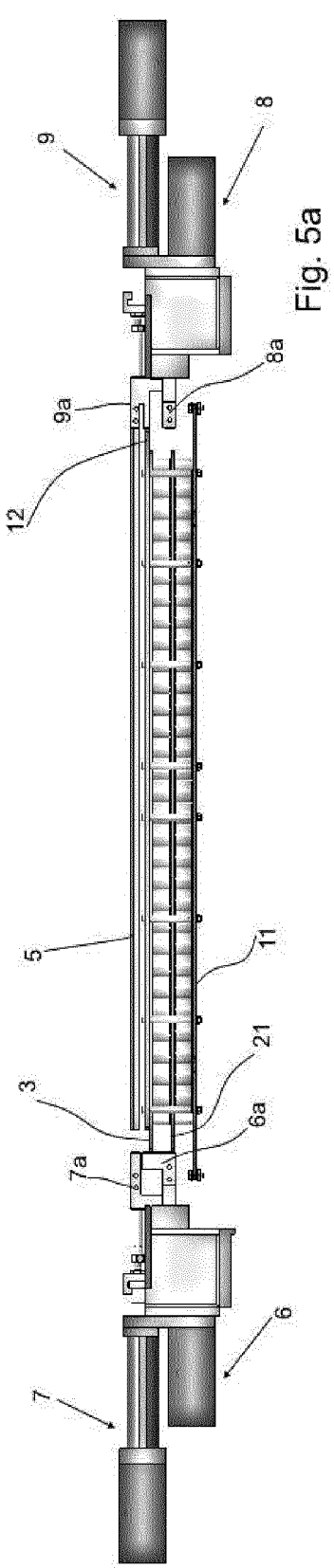

Fig. 5a

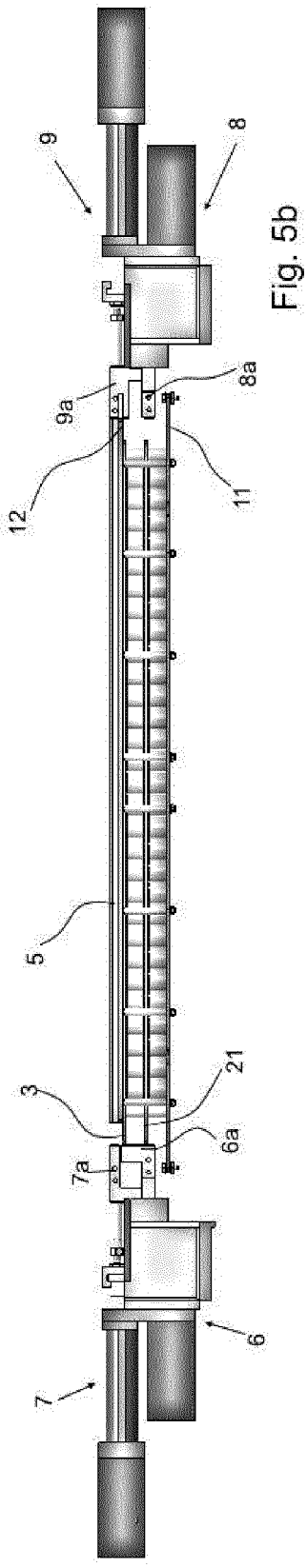

Fig. 5b

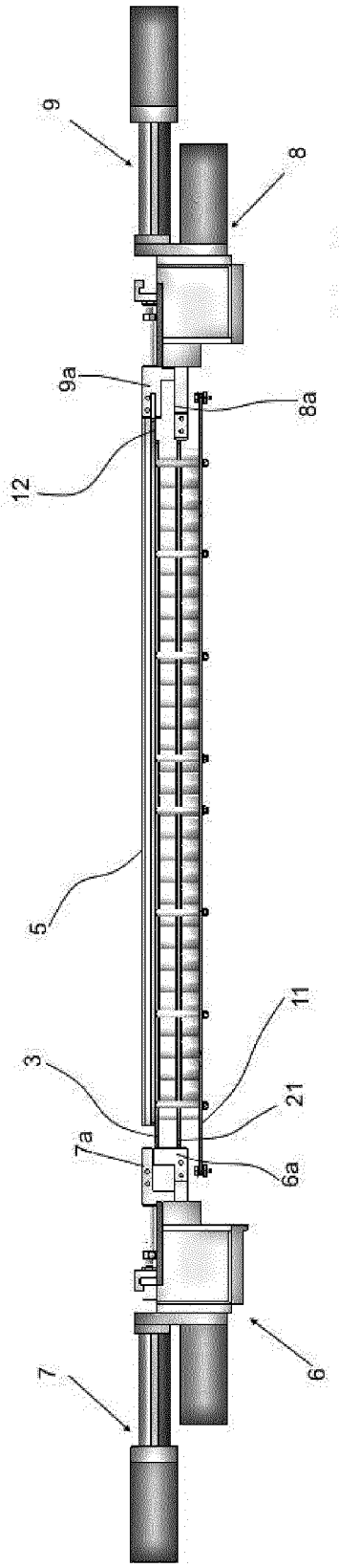

Fig. 5c

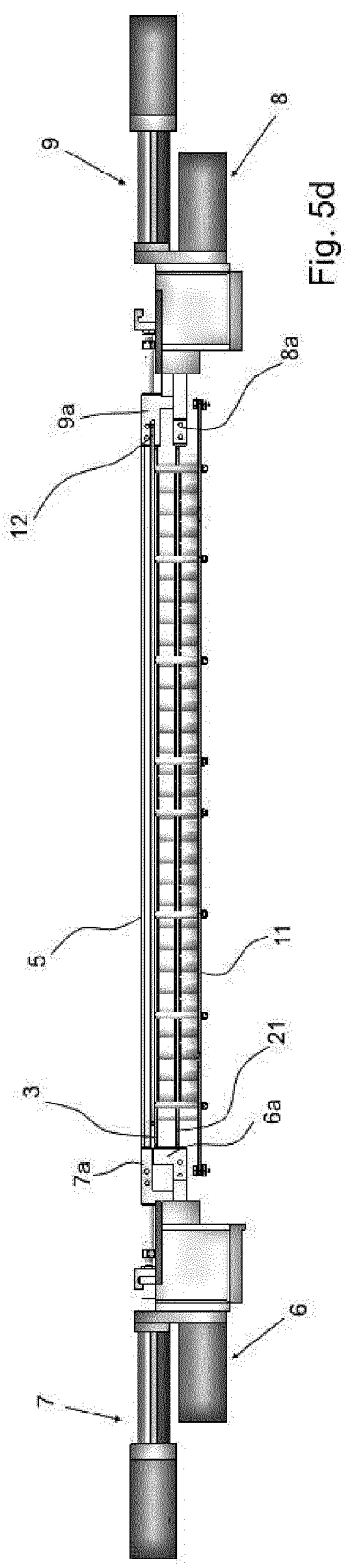

Fig. 5d

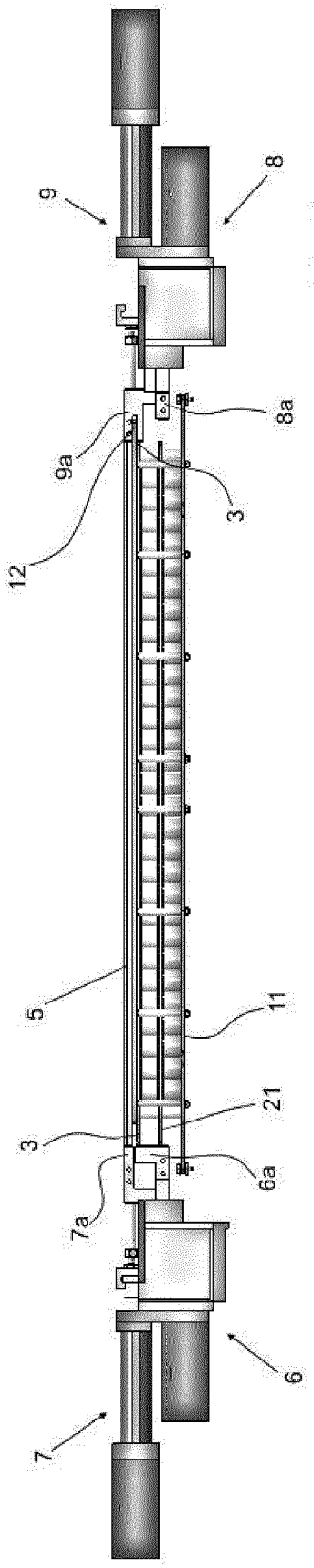

Fig. 5e

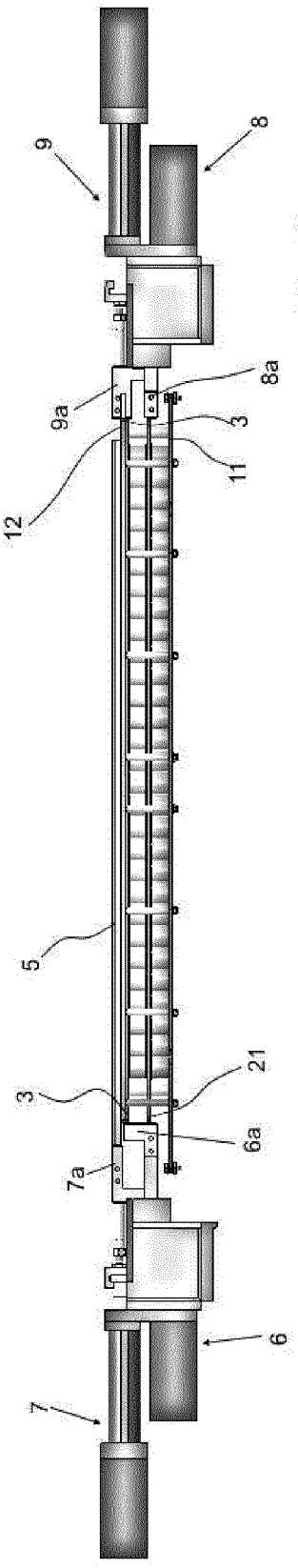

Fig. 5f

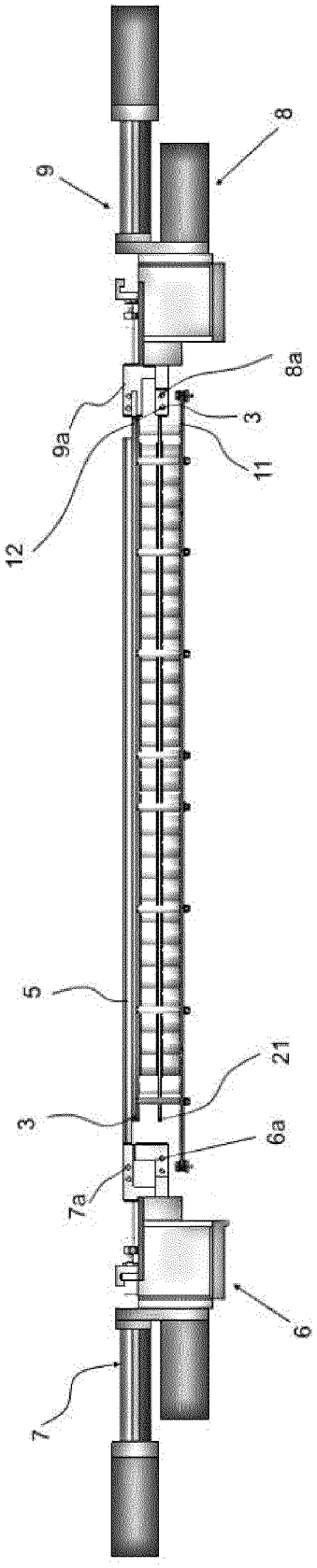

Fig. 5g

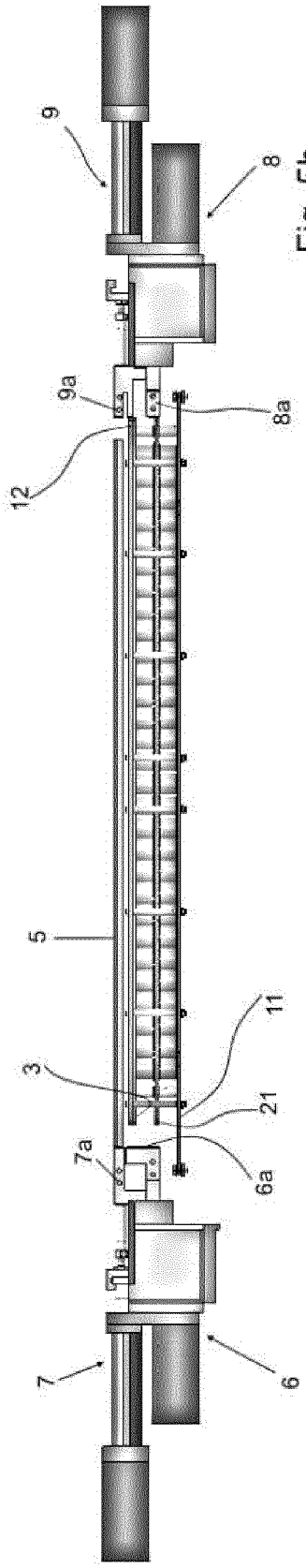

Fig. 5h

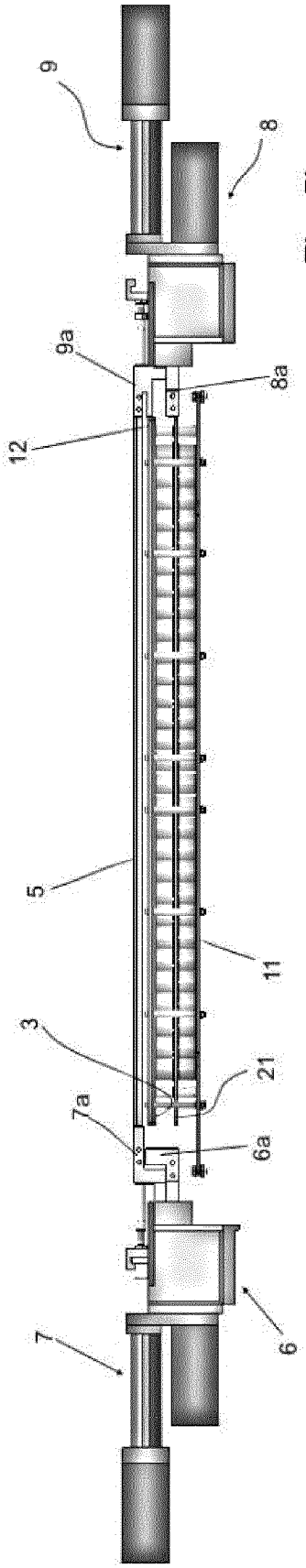

Fig. 5i

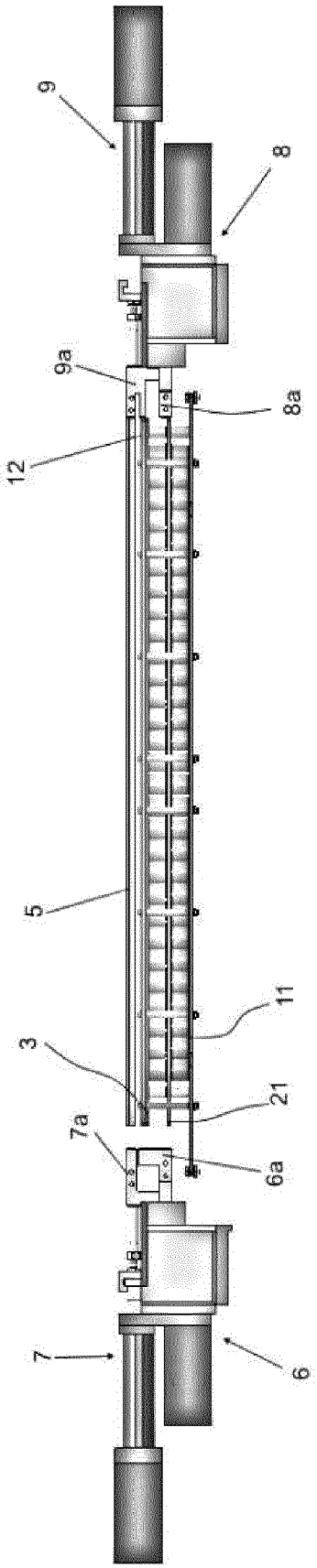

Fig. 5l

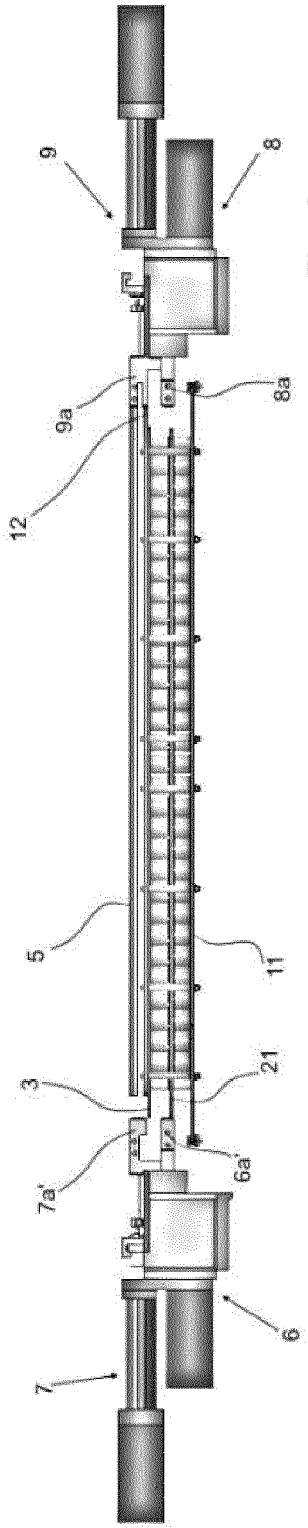

Fig. 6a

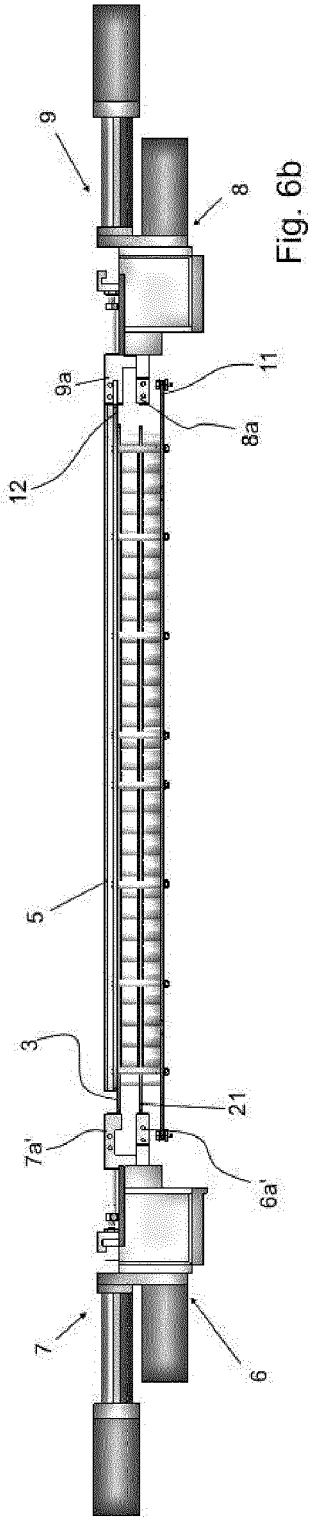

Fig. 6b

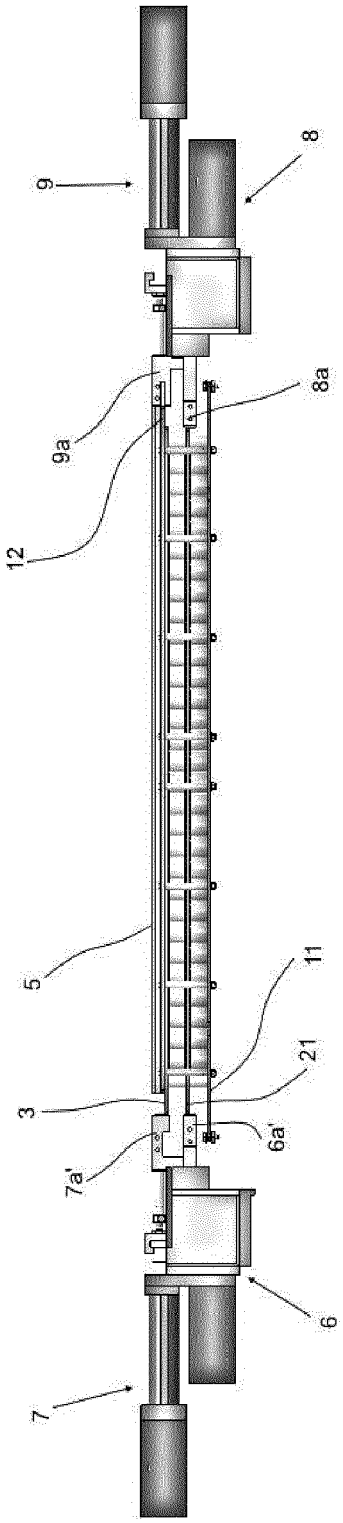

Fig. 6c

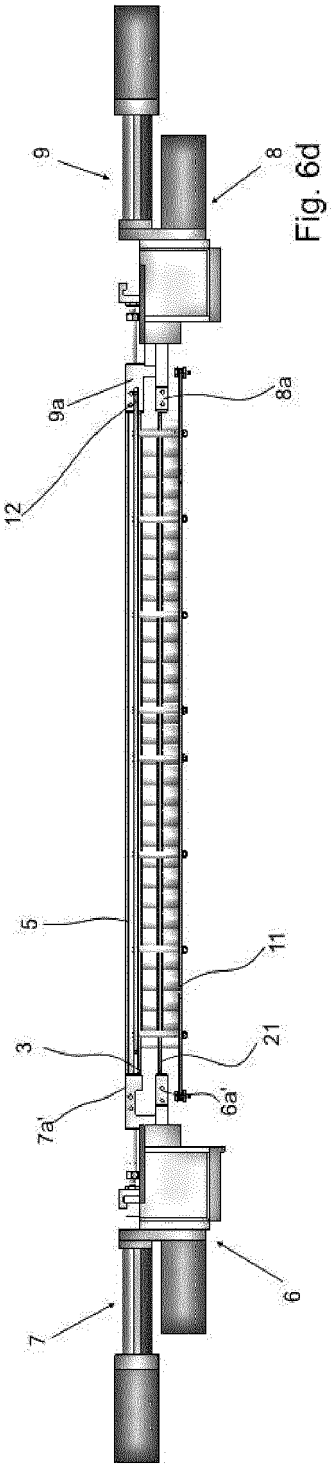

Fig. 6d

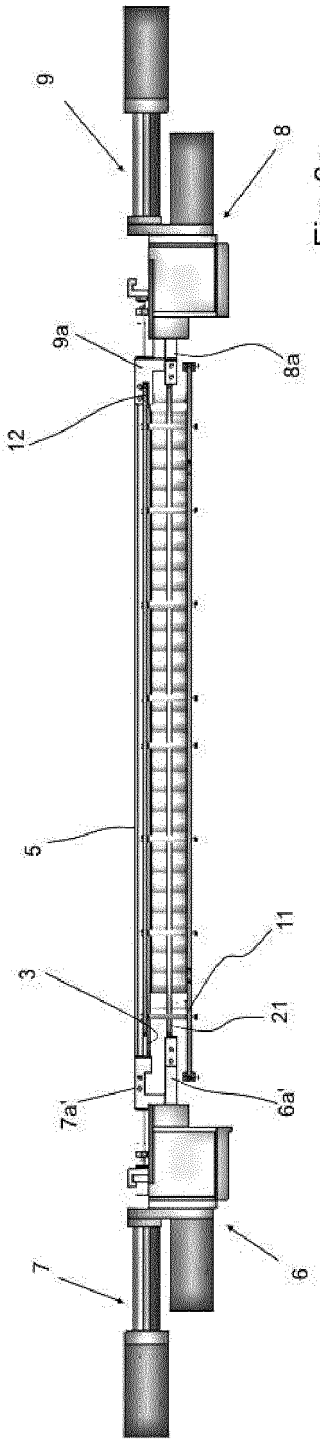

Fig. 6e

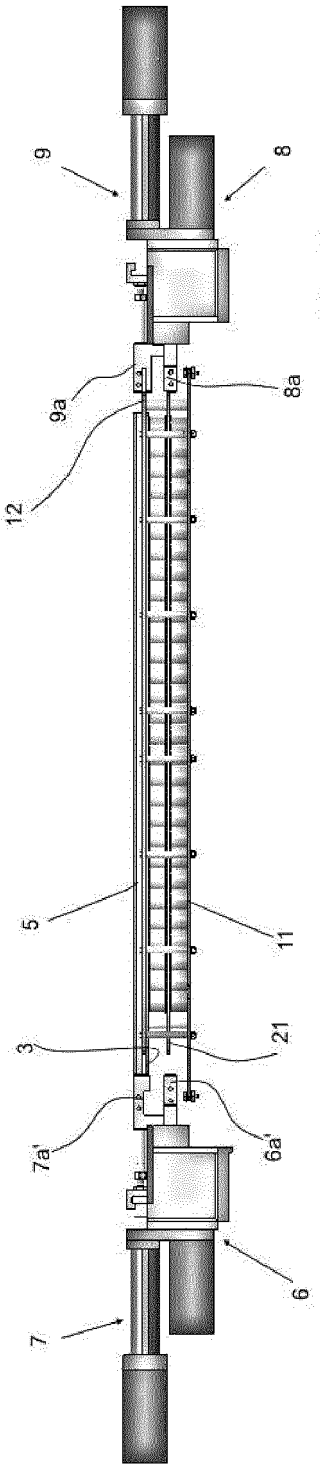

Fig. 6f

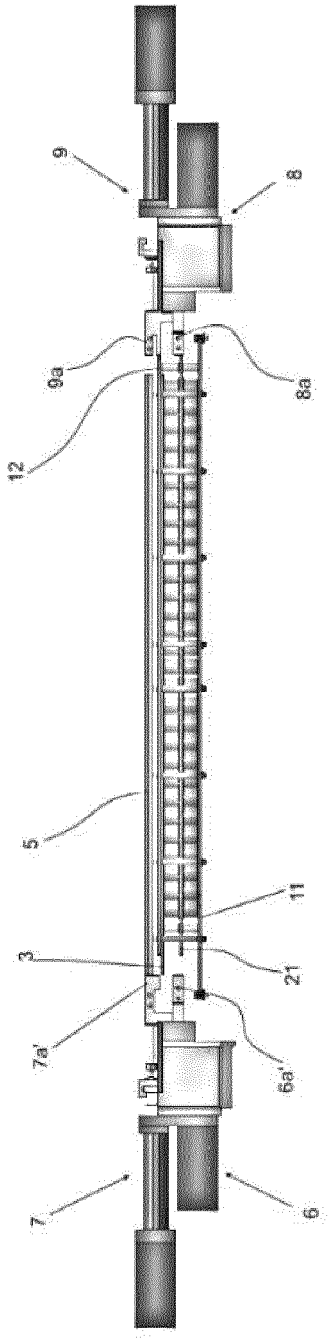

Fig. 6g

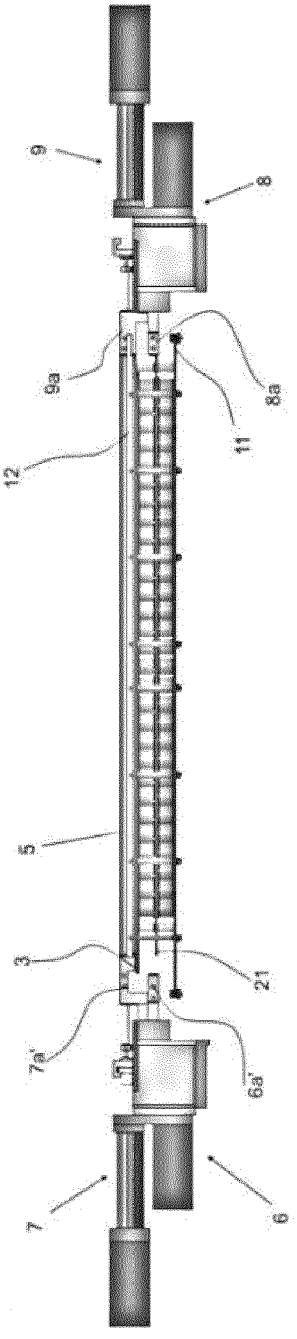

Fig. 6h

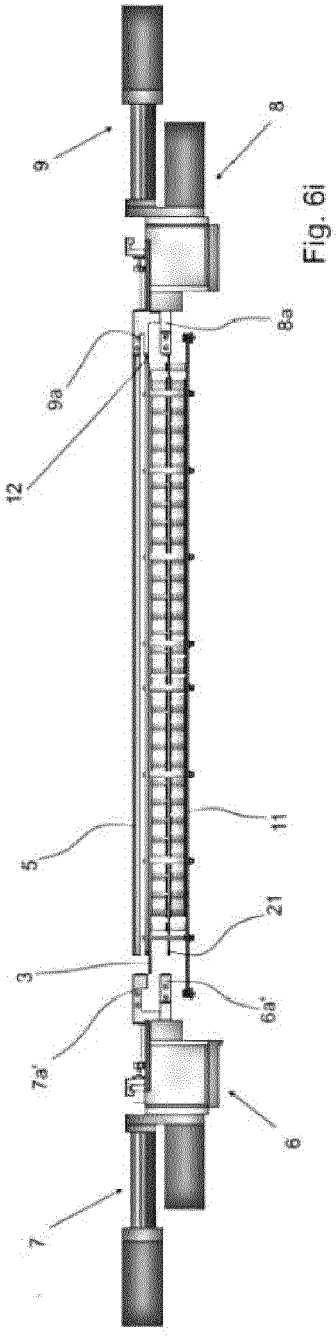

Fig. 6i

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EUROPEAN SEARCH REPORT

Application Number
EP 17 16 5014

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	IT 1 218 538 B (MEACCI SRL [IT]) 19 April 1990 (1990-04-19) * figures 2,3,5-8 * * page 11 *	1-10	INV. B27N5/00 B30B11/14
A	EP 2 177 331 A1 (MEACCI S R L [IT]) 21 April 2010 (2010-04-21) * figures 4,5,9,10 * * paragraphs [0024], [0039], [0041], [0042] *	1-10	
A	EP 1 977 871 A1 (MEACCI S R L [IT]) 8 October 2008 (2008-10-08) * figures 1-4 * * claim 1 * * paragraphs [0012], [0014] - [0018], [0020] - [0022], [0025] * * abstract *	1-10	
A	EP 2 409 945 A1 (MEACCI S R L [IT]) 25 January 2012 (2012-01-25) * figures 1-5 * * abstract * * claims 1,5,8,11,13 * * paragraphs [0021] - [0025], [0030] - [0034] *	1-10	TECHNICAL FIELDS SEARCHED (IPC) B27N B27J B30B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 August 2017	Baran, Norbert

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