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(54) **Batching machine for cork granules for the manufacturing of agglomerated stoppers**

(57) Cork granules Batching machine for manufacturing agglomerated stoppers, comprising a plurality of cradles (16) for containing cork granules (17) to be compacted in order to obtain the batch to be used in the manufacturing of stoppers. Adjustment means (23) are associated with cradles (16) to regulate the predetermined load volume for the cradles (16) and adjust the amount of granules present in each batch formed by the machine. Said adjustment means (23) comprise means for varying the height of the load volume.

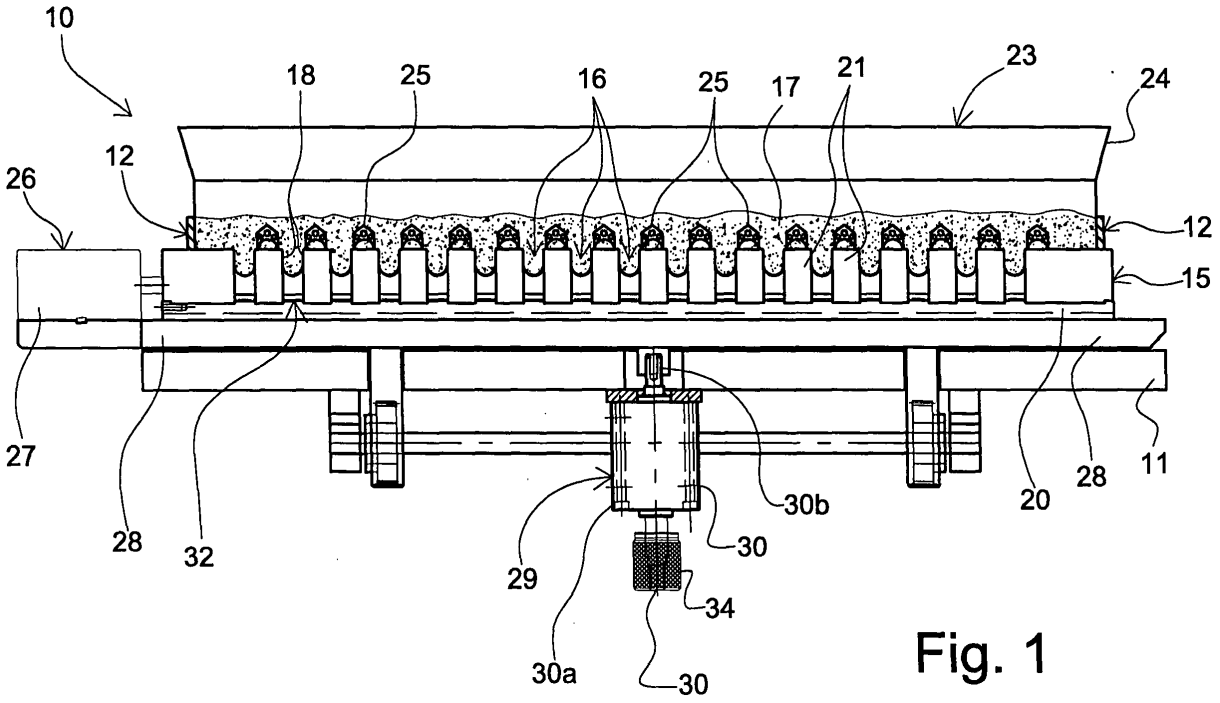


Fig. 1

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Description

[0001] The present invention relates to the field of cork agglomerate stoppers manufacturing machines. and in particular, the invention concernes a cork granule batching machine for manufacturing agglomerated stoppers.

[0002] Cork stoppers are manufactured in a variety of ways, according to the quality of the raw materials available. High quality production involves manufacturing stoppers in one piece from a matrix of compact cork obtained directly from the tree bark, while products of lesser quality use agglomerated cork granules obtained from high quality stopper production waste, or from lots that do not possess the required quality for one-piece stoppers. Said granules are bonded with a non-toxic adhesive matrix.

[0003] A variety of methods are known for producing agglomerated stoppers. For example a certain amount of granules mixed with adhesive, herein referred to as "rod", can be extruded through an extruder comprising a heated tube, having the same diameter as the stopper to be manufactured, where the adhesive is solidified. A piston pushes the rod towards the extruder exit. This rod is cut to form the stoppers with the required length. The density of the stopper is obviously the same as the density of the "rod", that is, by the amount of granules in the volume that forms the "rod". This density depends on, to a certain extent, the compression force and the friction of the agglomerate against the walls of the extruder.

[0004] Another method for agglomerated stopper production involves the introduction of specific batches of granule agglomerate mixed with adhesive into moulds consisting of moulding bushes. The agglomerate with the adhesive is then pressed and successively transferred to an oven for the time required for solidification. After a suitable cooling period, the stopper is extracted from the moulding bush by pushing with a rod-shaped extraction element. The preparation of the correct granule batch to be introduced into the corresponding mould is carried out by batching machines.

[0005] A commonly known type of batching machine comprises a base frame that supports a box-like casing that extends in a longitudinal direction on a horizontal plane. A slide is arranged at the bottom of the box-like casing. Also the slide has a longitudinal shape, and on it a plurality of cradles are set, open on the upper side. Said cradles are arranged in a row along the longitudinal direction and are conceived to contain the cork granules mixed with adhesive which drop through gravity from a loading hopper located above the box-shaped casing. Then, fixed to the box-shaped casing there is a plurality of closing elements designed to close the upper side of the cradles. These closing elements are spaced in the same way as the cradles. The slide is attached to an oleodynamic cylinder that allows for a horizontal translation movement from a first position where the cradles are open at the top, to allow the granules to fall into the cradles, to a second position where the cradles are closed by the respective upper closing elements. The slide and the oleodynamic cylinder that allows its horizontal translation are attached to a same structure which can translate vertically by means of another oleodynamic cylinder when the cradles are in the second position, that is, when they are closed by the upper closing elements. In this way the vertical size of the volume of the cradles can be varied from a predetermined load volume of granules (given by the volume of the cradles once moved under the closing elements) to a given granule compacting volume defined with the cradles when they reach the upper end of stroke of the vertical translation, thus forming the correct amount and density of the batch to produce the stopper. Once the granule batches have been compacted, these are pushed out of the cradles through corresponding openings defined on the side of the box-shaped casing.

[0006] In order to vary the granule batch density, the amount of granules must be varied before compacting. To achieve this, the volume of cradles with the load is adjusted by varying the width of the cradles through inserting metal plates between the side walls of the box-shaped casing and the said cradles.

[0007] However, this adjustment system presents a significant drawback. In order to ensure the insertion of the adjustment plates between the slide and the box-shaped casing, and the relative sliding action thereof, the positioning of the plates requires quite a considerable dimensional tolerance. This results in the fact that some cork granules enter between the plates, the slide and the box-shaped casing, this inevitably leading to seizure problems, making it necessary to stop the production in order to clean the machine.

[0008] The main aim of the present invention is to resolve the problem described in the aforesaid type of batching machine concerning to the adjustment of cradles load volume.

[0009] With this aim, an important object of the present invention is to provide a cork granules batching machine for manufacturing agglomerated stoppers that is able to reduce the number of machine stops caused by slide seizure problems.

[0010] Another important object of the present invention is to provide a cork granules batching machine for manufacturing agglomerated stoppers that is able to reduce the size tolerance around the cradles.

[0011] Another important object of the present invention is to provide a cork granules batching machine for manufacturing agglomerated stoppers that allows easy adjustment of the cradle load volume.

[0012] These objects are achieved with a cork granules batching machine for manufacturing agglomerated stoppers that comprises

- a plurality of cradles for containing cork granules, arranged in a row along a common direction,
- a plurality of upper closing elements for said cradles,
- a first means of relative translation in a substantially

horizontal direction for said cradles in relation to the closing elements, from a first position wherein the cradles are open at the top to a second position with the same cradles closed by the upper closing elements,

- a device for loading cork granules from the above into the cradles when these are set in the first position,
- a second means of relative translation in a substantially vertical direction for the cradles in relation to the closing elements from said second position to a third compacting position, said second relative translation means being able to vary the volume of the cradles vertically from a predetermined granule load volume defined in the second position, to a given granule compacted volume, defined in the third position,
- adjustment means for said predetermined load volume in order to adjust the amount of granules present in each batch formed by the machine,

characterised in that said adjustment means for the predetermined load volume comprise means for varying the height of the load volume.

[0013] Further characteristics and advantages of a cork granules batching machine for manufacturing agglomerated stoppers according to the present invention will be made apparent from the following description of an embodiment thereof provided as a non-limiting example with reference to the appended drawings wherein:

- Figure 1 shows a schematic front view of the machine according to the invention, illustrating the internal part concerning a slide with cradles, shown in a first position, that is, in the position the granule loading position;
- Figure 2 shows a schematic front view of a portion of the machine in figure 1, illustrating the internal part concerning the slide with the cradles, shown in a second position;
- Figure 3 shows a schematic side view, in partial cross-section, of the machine in the previous figures shown in said second position;
- Figure 4 shows a schematic front view of a portion of the machine in the previous figures illustrating the internal part concerning the slide with the cradles, shown in a third position referring to the cork granule compacting action.

[0014] With reference to the above figures, a cork granules batching machine, according to the invention, for use in the manufacturing of agglomerated stoppers by means of moulding bushes, is gnerally identified by the numeral 10 and comprises a support frame 11 for a box-shaped casing 12 that is developed in a longitudinal direction in a substantially horizontal orientation. As clearly shown in figure 3, said box-shaped casing 12 has a bottom 13 and two opposite longitudinal sides 14; the upper part of the box-shaped casing being open at the top. Inside the box-shaped casing 12 a slide 15 is arranged, also developed in a mainly longitudinal direction, whereon a plurality of cradles 16 are set, adapted to contain the cork granules; the cork granules are identified by the numeral 17. Said cradles 16 are arranged in a row along the longitudinal direction of the slide 15 and are defined by two vertical side walls 18, and by a bottom 19, in this embodiment having a substantially semi-cylindrical shape with the concave part facing upwards. In particular, the slide 15 has a longitudinal base 20 on which a plurality of parallelepiped elements 21 is arranged in a row, equally spaced, and whose opposite facing sides form the side walls 18 of the respective cradles 16. Respective intermediate elements 22 rest on the longitudinal base 20 between said parallelepiped elements 21. The upper ends of said intermediate elements 22 form the said bottoms 19 of the cradles 16.

[0015] A device 23 for loading the cork granules 17 from a the above into the cradles 16 is positioned above the box-shaped casing 12 in direct communication with the interior of the same casing 12. In this embodiment, said loading device 23 comprises a hopper 24 positioned with the discharge opening over the upper opening of the box-shaped casing 11; commonly known granule mixing means (not shown in the figures) are associated to said hopper 24 that allow for an uniform distribution of the product.

[0016] A plurality of closing elements 25 for the cradles 16 is fixed on the box-shaped casing 12, spaced in the same way as the cradles. These closing elements 25 close the cradles 16 when these are set in a specific position, as will be described in more detail below. In particular, in this embodiment, said upper closing elements 25 have a semicylindrical shape with the concave part facing downwards.

[0017] The machine 10 also comprises a first means of relative translation 26 for the cradles 16 in a substantially horizontal direction, in relation to the closing elements 25, to run from a first position (visible in figure 1) wherein the cradles 16 are open at the top to receive the cork granules from the hopper, to a second position (visible in the figures 2 and 3) where the same cradles are closed by the upper closing elements 25. When the cradles are in the first position, the upper closing elements 25 are centred on the parallelepiped bodies 21 of the slide 15 between which the cradles are defined. In the example herein described, the first means of relative translation 26 comprise a translation actuator 27, such as an oleodynamic cylinder, attached with its own liner to a support plane 28 and with the actuation rod fixed to one end of the slide 15, the said slide being slidable along said support plane 28.

[0018] Furthermore, the machine 10 comprises a second relative translation means 29 for the cradles 16 in a substantially vertical direction in relation to the closing elements 25 to run from said second position to a third compacting position (visible in figure 4). Said second

means of relative translation 29 are able to vertically vary the volume of the cradles 16 from a predetermined load volume of granules, defined when the cradles are in the second position, to a given volume of compacted granules defined when the cradles are in the third position. In this embodiment, the second means of relative translation 29 comprise a translation actuator 30 such as an oleodynamic cylinder whose liner 30a is fixed to the support frame 11 and an end 30b of the vertical actuation rod is attached to the support plane 28 of the slide 15.

[0019] When the cradles are in the first position, that is when the upper closing elements 25 are centred on the parallelepipeds 21 of the slide 15, the granules from the hopper 24 fill the cradles 16 (because they are open at the top). The load volume of the cradles 16 is defined by the space delimited by the side walls 18 and the bottom 19 of the cradles and by the upper closing elements 25 when the slide 15 has been moved to the second position. The width of the upper closing elements 25 is basically the same as the distance between the side walls 18 of the cradles. Once this space has been delimited, the slide 15 is moved upwards through the second means of vertical translation 29, so that the bottom 19 of the cradles 16 approaches the upper closing elements 25, this resulting in a compacting action on the cork granules 17. That corresponds to a variation of the load volume until the compacted volume defined in the third position is reached. The granules compacted in this manner for the "batch" that must be pushed out from the corresponding cradles through a corresponding opening 31 provided on the sides of the box-shaped casing 12, by means of thrusting elements not shown in the figures.

[0020] The machine also comprises adjustment means 32 for the predetermined load volume defined between each cradle 16 and the corresponding upper closing element 25, in order to adjust the amount of granules present in each batch. According to the invention, said adjustment means 32 comprise means for varying the height of the load volume, that is, means that can vary the relative vertical position of the bottom 19 in relation to the side walls 18 of the cradle 16 before the machine is started up.

[0021] In this embodiment, said means for varying the height of the load volume comprise one or more plates 33 (three are shown in the figures purely as an example) of a given thickness inserted between the longitudinal base 20 and the intermediate elements 22 (that define the bottom 19 of the cradles 16) to provide for a discrete adjustment. To increase the volume height, one or more plates 33 must be removed manually, whereas one or more plates must be added to lower the height of the volume; the maximum height of the load volume is obtained when no plates are present.

[0022] Referring to this example, the actuation rod of the translation actuator 30 has a first end 30b attached to the support plane 28 of the slide 15 and a second end 30c, projecting from the side of the liner 30a opposite the side from which projects the first end 30b, on which a vertical end of stroke abutment 34 is fixed. Advantageously, the means for varying the height of the load volume comprise further plates 35 of a given thickness, in number and thickness equal to those positioned between the longitudinal base 20 and the intermediate elements 22; said further plates 35 inserted between said end of stroke abutment 34 and the liner 30a of the translator actuator 30; a variation in the number of the plates 33 under the intermediate elements 22 must correspond to an equal variation of the further plates 35 between the end of stroke abutment 34 and the liner 30a.

[0023] The adjustment of the load volume of cradles, obtained by varying the relative vertical position of the bottom in relation to the walls, allows for an optimized dimensioning of the cradles and slide so that it is possible to perform a coupling between the box-shaped casing 12 and the slide 15 with sufficiently narrow lateral tolerances to prevent the penetration of the cork granules which would lead to machine seizure.

[0024] The use of plates with a given thickness for insertion under the bottoms to reduce the load volume (or for removal if the volume is to be increased) allows a very simple adjustment. Moreover, it is obvious that said means for varying the height of the load volume can be different from the illustrated example, as mentioned in the following examples (not shown in the figures). For example, a threaded element can replace the plates, screwed into a corresponding vertical hole formed in the longitudinal base, and presenting a support head for a respective intermediate element; by screwing said threaded element, the head will be translated vertically and therefore also the intermediate element on which the bottom is defined, thus obtaining a continuous adjustment instead of a discrete adjustment.

[0025] In the examples described, the load volume adjustment can be obtained only manually when the machine is stopped. However it is obvious that it is also possible to achieve automatised load volume height adjustment. For example, the longitudinal base on which the cradles are positioned, can be structured in a manner to internally house an element that transversally connects all the intermediate elements with the bottom, which is connected cinematically with automatic vertical translation means, that can be of any type, oleodynamic, pneumatic, or electromechanical. Alternatively, considering the aforesaid example concerning the threaded elements positioned under the bottoms, it is possible to insert a horizontal worm screw that will engage with said threaded elements and that is actuated by an electric motor associated with the longitudinal base.

[0026] It is also obvious that the first and second means of translation described in the example above can comprise elements of different type and structure, such as pneumatic or electromechanical actuators.

[0027] The example described relates to a cork granules batching machine to be used in processes for manufacturing agglomerated stoppers by means of moulding bushes. The same inventive concept is also advanta-

geously applicable on batching machines for preparing the "rods" of cork granules for manufacturing stoppers through extrusion, as described in the introduction in relation to known art.

[0028] The cork granules batching machine thus conceived can be subjected to numerous modifications and variants while remaining within the scope of the invention; furthermore, all details can be replaced by other technically equivalent elements, while remaining within the protective scope of said invention.

[0029] In practise, on condition that the materials employed are compatible with the specific use, all materials and dimensions can be of any type according to technical requirements and state of the art.

[0030] Where any of the characteristics and techniques described in any of the claims are followed by reference signs, these have been included for the purpose of providing examples simply to increase the clarity of the claims and consequently, they have no limiting effect on the interpretation of each element they identify.

Claims

1. Cork granules batching machine for manufacturing agglomerated stoppers, comprising

   - a plurality of cradles (16) for containing cork granules (17), arranged in a row along a common direction,
   - a plurality of upper closing elements (25) for said cradles (16),
   - first means of relative translation (26) in a substantially horizontal direction for said cradles (16) in relation to said upper closing elements (25) from a first position with said cradles (16) open at the top to a second position with said cradles (16) closed by said upper closing elements (25),
   - a device for loading (23) cork granules (17) from the above into said cradles (16) when said cradles (16) are set in said first position,
   - second means of relative translation (29) in a substantially vertical direction for said cradles (16) in relation to said upper closing elements (25) from said second position to a third compacting position, said second means of relative translation (29) being able to vary the volume of the cradles (16) vertically from a predetermined load volume of granules defined in said second position to a given compacted volume of the granules defined in said third position,
   - adjustment means (23) for said predetermined load volume in order to adjust the quantity of granules present in each batch formed by the machine,

   characterised in that said adjustment means (23) of said predetermined load volume comprise means for varying the height of the load volume.

2. Batching machine according to claim 1, **characterised in that** each cradle (16) comprises side walls (18) and a bottom (19), said means for varying the height of the load volume of said cradles (16) comprising means for varying the respective vertical position of said bottom, (19) in relation to said side walls (18).

3. Batching machine according to claim 2, **characterised in that** said cradles (16) are arranged in a row along a longitudinal slide (25) comprising a longitudinal base (20) on which there is positioned a plurality of parallelepiped elements (21) arranged in a row and equally spaced, and whose opposite facing sides form the side walls (18) of said cradles (15), respective intermediate elements (22) being positioned between said parallelepiped elements (21), the upper ends thereof (21) defining said bottoms (18), said means for varying the height of the load volume of said cradles (16) being positioned between said longitudinal base (20) and said intermediate elements (22).

4. Batching machine according to claim 3, **characterised in that** said means for varying the height of the load volume of said cradles (16) comprise, for each cradle (16), one or more plates (33) of a given thickness for insertion between said longitudinal base (20) and the corresponding intermediate element (22) provided with a bottom (19) to carry out discrete adjustment of the height of the cradles (16), it being necessary to remove said one or more plates (33) manually to increase the height of the load volume, and vice versa, one or more plates (33) being added to lower the height of the load volume.

5. Batching machine according to claim 3 or 4, **characterised in that** it comprises a support frame (11) for a box-shaped casing (12), open at the top, which extends in a longitudinal direction on a substantially horizontal plane, and inside which is contained said slide (15), a plurality of said upper closing elements (25) of the cradles (16) being fixed on said box-shaped casing (12) and spaced in the same way as the cradles (16), said upper closing elements (25) being centred on said parallelepiped elements (21) of said slide (15) when said cradles (16) are in said first position, the width of said upper closing elements (25) being substantially the same as the distance between the side walls (18) of said cradles (16), said slide (15) being positioned to slide on a support plane (28) on which are set said first means of relative translation (27), said second means of relative translation (29) being set between said support plane (28) and said frame (11).

6. Batching machine according to claim 4 or 5, **characterised in that** said second means of relative translation (29) comprise a vertical end of stroke abutment (34) to which there are associated further one or more plates (35) in number and thickness equal to the plates (33) positioned between said longitudinal base (20) and said intermediate elements (22).

7. Batching machine according to claim 6, **characterised in that** said second means of relative translation (29) comprise a translation actuator cylinder (30) whose liner (30a) is fixed to said support frame (11) and whose actuation rod presents a first end (30b) fixed to a support plane (28) of said slide (15) and a second end (30c), projecting from the side of said liner (30a) opposite the side from which projects said first end (30b), on which (30c) there is fixed said vertical end of stroke abutment (34) with said further one or more plates (35).

8. Batching machine according to one of the claims from 5 to 7, **characterised in that** said first means of relative horizontal translation (26), comprise a translation actuator cylinder (27) fixed by its own liner to said one support plane (28) and with the actuation rod fixed to an end of said slide (15).

9. Batching machine according to one of the claims from 5 to 8, **characterised in that** said device for loading cork granules (17) from the above (23) for said cradles (16) comprise a hopper (24) positioned with its discharge opening over the upper opening of said box-shaped casing (11).

10. Batching machine according to one of the previous claims, **characterised in that** said bottoms (19) and said closing element (25) have a substantially semicylindrical shape with concave surfaces facing upwards and downwards respectively.

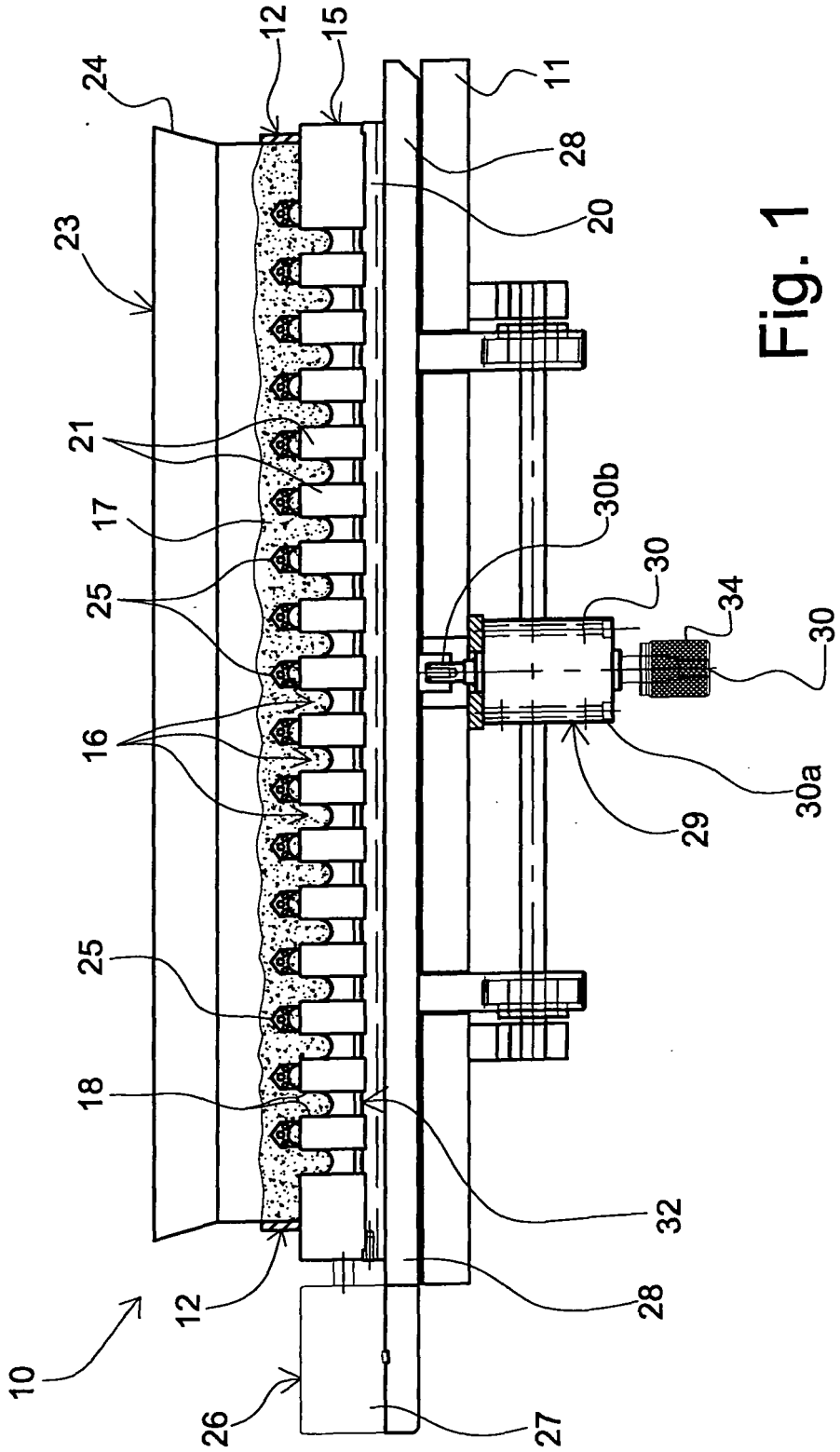

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Fig. 1

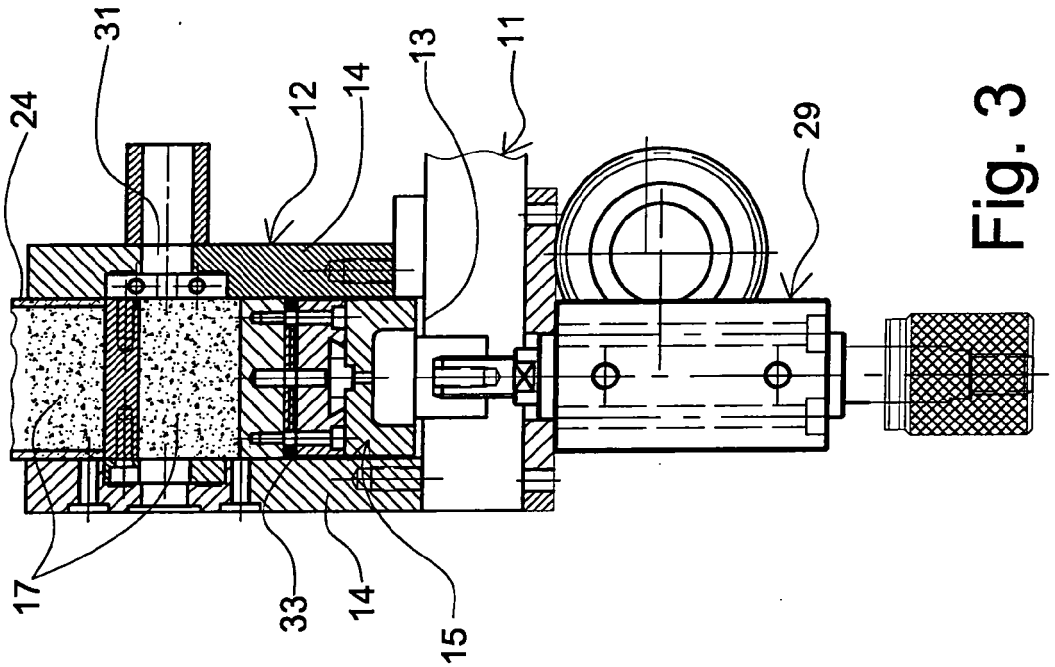

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Fig. 3

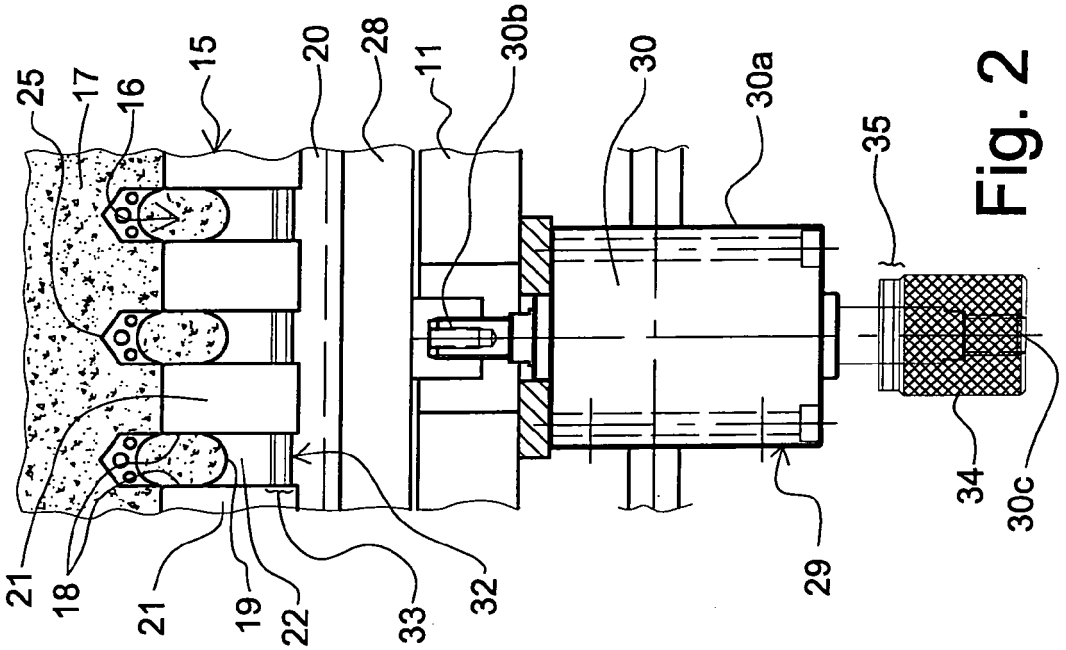

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Fig. 2

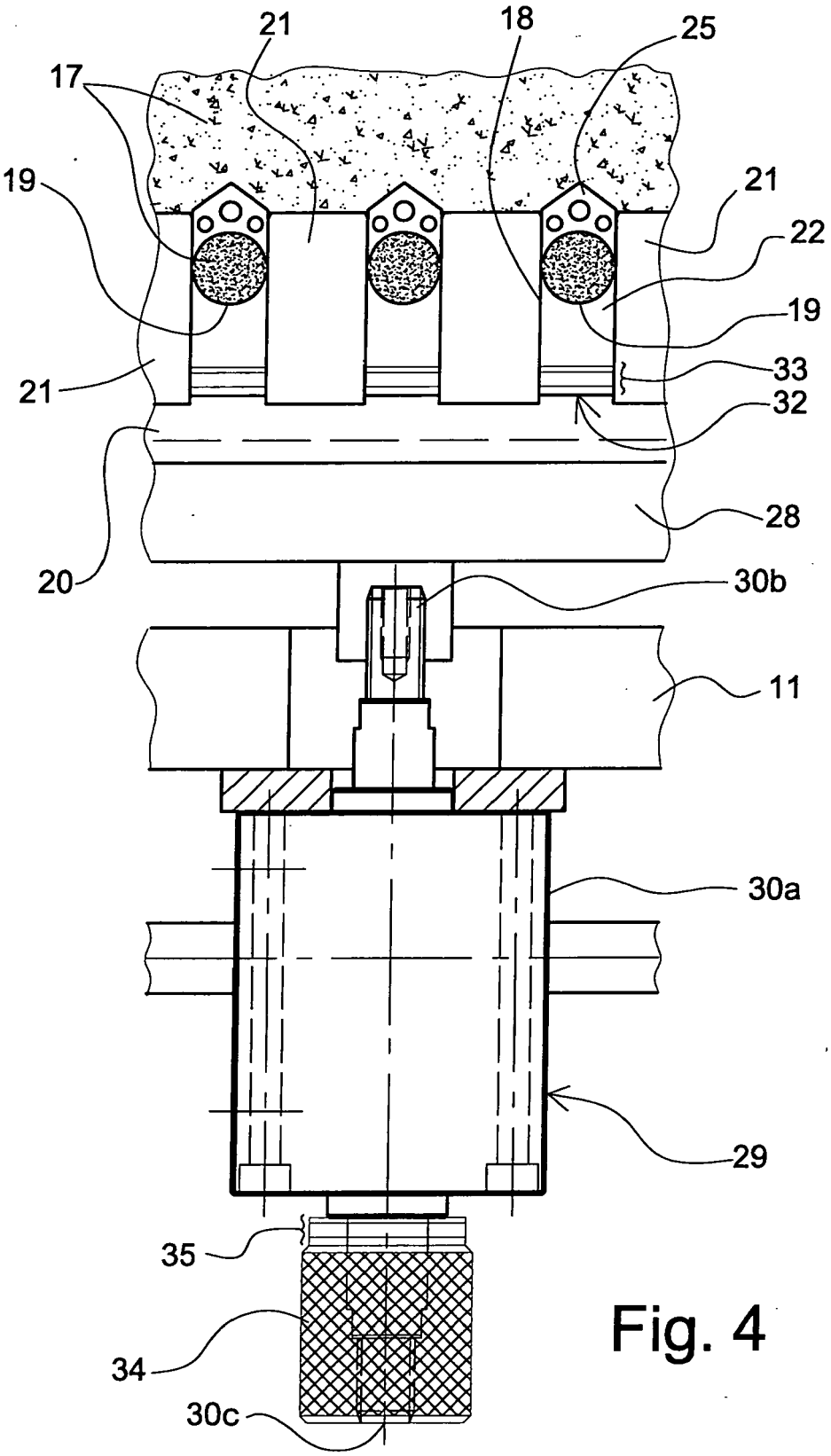


Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5199

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	FR 2 543 875 A1 (LIEGES STE CHAMPENOISE [FR]) 12 October 1984 (1984-10-12) * abstract * * page 1, line 1 - line 3 * * page 1, line 20 - line 28 * * page 5, line 19 - page 6, line 17; figures *	1-10	INV. B27N5/00 B27J5/00
A	IT 1 218 538 B (MEACCI SRL [IT]) 19 April 1990 (1990-04-19)		
A	FR 2 528 346 A1 (CATONNET ET LARROQUETTE SA [FR]) 16 December 1983 (1983-12-16)		

TECHNICAL FIELDS SEARCHED (IPC)

B27N
B27J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 August 2007	Söderberg, Jan-Eric

CATEGORY OF CITED DOCUMENTS

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30-08-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2543875 A1	12-10-1984	ES 8502019 A1	16-03-1985
		IT 1175988 B	12-08-1987
		PT 78398 A	01-05-1984
IT 1218538 B	19-04-1990	ES 2005680 A6	16-03-1989
		PT 87012 A	30-03-1989
FR 2528346 A1	16-12-1983	NONE	

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