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(54) **MULTI-PUNCH PRESS**

MEHRFACHLOCHPRESSE

PRESSE À MULTIPLES POINÇONS

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Description

Background of the invention

[0001] The invention relates to a multi-punch press, in particular a press having a conveying system that supplies a sheet to a punching unit that separates from the sheet a plurality of disks leaving a continuous reject grid that is removed from the conveying system.

[0002] Specifically but not exclusively, the invention can be applied in the field of forming closures for containers, in particular metal closures, such as for example crown caps, aluminium caps, etc.

[0003] EP 0616861 A1 shows a press as in the preamble of claim 1.

[0004] The prior art comprises a mechanical press for crown caps, having two rows, which are parallel and staggered in relation to one another, of punch dies arranged for shearing circular disks from a metal sheet, wherein the sheet advances in an indexed manner, performing a step forward when the dies are open, whereas at each dwell of the sheet the dies close to shear the disks. The known press comprises a mechanical system that drives the movements of the sheet and of the dies.

[0005] The aforesaid press of the prior art nevertheless has some drawbacks.

[0006] In the first place the known press is configured and is suitable for conveying in an indexed manner only sheets of set dimensions.

[0007] Further, the known press is provided with an indexed conveyor that is relatively lengthy and expensive to manufacture and install.

[0008] Another drawback is the need for frequent periodical maintenance to keep wear under control, in particular wear to parts subjected to indexed motion, in order to ensure the precision required by the application.

Summary of the invention

[0009] One object of the invention is to make a multi-punch press that is able to remedy one or more of the aforesaid drawbacks.

[0010] One advantage is to supply a versatile multi-punch press that is able to work with sheets of various dimensions.

[0011] One advantage is to provide a multi-punch press in which wear to parts subjected to indexed motion is relatively reduced.

[0012] One advantage is to make available a constructionally simple and cheap multi-punch press.

[0013] One advantage is to enable sketched sheets (lithographed metal sheets) to be machined precisely in which the punches have to be centred with respect to the sketches on the sheet.

[0014] These objects and advantages and still others are obtained by the press according to one or more of the claims set out below.

Brief description of the drawings

[0015] The invention can be better understood and implemented with reference to the attached drawings that illustrate some embodiments thereof by way of non-limiting examples.

Figure 1 is a perspective view of one press embodiment made in accordance with the present invention.

Figure 2 is a view of the press of figure 1 from another perspective.

Figure 3 is a perspective view of the closed-loop conveyor that supplies the sheets in an indexed manner to the press of figure 1.

Figure 4 is a schematic side view of the conveyor of figure 3.

Figure 5 is a schematic plan view of the side zone of two sheets supplied in an indexed manner by the conveyor of figure 3.

Figure 6 shows the sheets of figure 5 in the next step.

Figure 7 is a perspective view of the punching unit of the press in figure 1 in an open configuration.

Figure 8 is a section of one of the gripping members carried by the conveyor of figure 3 for taking the sheets.

Figure 9 is a schematic plan view of a sheet positioned in the press of figure 1 ready for being taken by the conveyor of figure 3.

Figure 10 shows a dwell phase following a sheet-changing step with sheets of defined length (standard length).

Figure 11 shows a dwell phase following a sheet-changing step with sheets of lesser length than the length of figure 10.

Detailed description

[0016] With 1 there has been indicated overall a mechanical multi-punch press, in particular for producing crown caps.

[0017] The press 1 may be suitable for machining sheets 2, in particular sheets of metal material (sheets of metal), such as for example sheets of tin-plated bands, chrome-plated bands, aluminium, etc. The sheets 2 being machined may comprise, in particular, lithographed sheets (with sketches 3) or coated sheets (without sketches). The sheets 2 being machined may already comprise, for example, the sketches 3 (lithographs) of the crown caps to be formed ordered in a regular (hexagonal) position.

[0018] The press 1 may be configured, in particular, for performing, in use, a continuous machining cycle.

[0019] In particular, the press 1 may comprise at least one magazine 4 of stacked sheets. In this specific case the press 1 comprises two magazines 4 of stacked sheets (arranged on pallets), for example positioned on the two sides of an inlet of the press where there can be arranged

(see example) a continuous supplier of sheets 2.

[0020] As in this case, the sheets 2 in the magazines 4 may be taken, one by one, by a gripping device 5 (for example of the suction cup type) of the press that sends the sheets 2 to a introducing zone into a sheet path inside the press.

[0021] The press 1 may comprise, as in this embodiment, a lubricating device 6 (for example of the roller type) that lubricates the sheets, operating in particular before arriving at a conveyor that will supply the sheets in an indexed manner to a die (pressing or punching unit) of the press.

[0022] The press 1 may comprise, in particular, a movement device (for example comprising pushing means) that may be arranged for moving (pushing) the sheets 2 from the aforesaid introducing zone to the lubricating device 6.

[0023] The press 1 may comprise, as in this case, positioning means for positioning the sheet with precision with respect to the die. The positioning means may comprise a conveying device 7 (for example of the flexible member type, in particular of the belt type) that conveys the sheets 2, one by one, to a positioning zone defined by adjustable aligning means and/or abutting means, arranged in particular for interacting in contact with the sheets 2 (in particular one sheet at a time). The aforesaid aligning/abutting means may comprise, for example, side positioners 8 (for example two or four, two per side) for aligning the sheet and a front abutment 9 for stopping the sheet in the correct position. The side positioners 8 may be sprung (at least one or two thereof).

[0024] The press 1 may comprise, as said, at least one movable conveyor 10 for supplying in an indexed manner a sheet 2 to be sheared via a die or punching unit 11. This conveyor 10 may comprise, as in this embodiment, a conveyor of the running closed loop type.

[0025] The sheet 2, once positioned correctly in the positioning zone, is grasped on both sides (right and left) by gripping means 12 (for example of the gripper type) fitted on the aforesaid conveyor 10. The gripping means 12 may be arranged, in particular, for taking the sheet 2 near two adjacent corners (the two rear corners) in a zone of the sheet 2 that is not intended for punching.

[0026] The conveyor 10 may comprise, in particular, at least two closed loop flexible elements 13 (right and left) arranged parallel alongside one another spaced apart from one another. The gripping means 12 may be associated with (fitted integrally on) each of the two flexible elements 13.

[0027] In particular, the flexible elements 13 may comprise two (steel) closed loop conveying belts, which are movable in an indexed manner, which by virtue of the gripping means 12 convey the sheets 2 to the die (punching unit 11) where the caps are sheared and formed.

[0028] The press 1 may thus comprise, as said, the aforesaid gripping means 12 (grippers) that may be arranged spaced apart from one another along the conveyor 10 and may be movable integrally with the conveyors to maintain a sheet 2 gripped during shearing and then release the sheet 2 after shearing as a reject grid.

[0029] The gripping means 12 may comprise two or more gripping members (for example of the gripper type) arranged on the closed-loop conveyor 10. Driving the gripping members (opening and closing) may be, in particular, of known type and is accordingly not described in greater detail. The gripping members may be, for example, at least four or five in number.

[0030] The gripping means 12 may be spaced apart from one another so as to enable cyclically a sheet-changing step in the punching unit 11 wherein there is simultaneously at least one of the gripping means 12 (in the specific case two gripping members alongside one another, right and left) that grips a sheet arranged upstream of the punching unit 11 and at least another of these gripping means 12 (in the specific case two gripping members alongside one another, right and left) that grips a reject grid arranged downstream of the punching unit 11 (figure 6).

[0031] Each gripping member may comprise (figure 8) two gripper elements 14 that are movable in relation to one another (for example around a reciprocal rotation pivot 15). Each gripping member may comprise elastic means 16 interposed between the gripper elements 14 to make gripping sprung.

[0032] The gripping means 12 is provided with driving means (as said, also of known type) for activating (closing) and deactivating (opening) the gripping means (for example to take the gripping means 12 to a release and to a gripping position) at the correct moment during movement of the flexible elements 13, so as to take a sheet 2 to be sheared upstream of the die (in the positioning zone) and release a reject grid R already rejected downstream of the die.

[0033] The die (punching unit 11) may comprise, as in this embodiment, two rows of punches that are parallel and staggered in relation to one another, operationally associated with two corresponding rows of dies.

[0034] The die (punching unit 11) may comprise, in particular (figure 7), a movable upper plate 17, (fixed to an upper carriage), to which various forming punches are connected, a central plate 18 (fixed to a base) that carries sliding seats for the forming punches, and a movable lower plate 19 (fixed to a lower carriage), that carries the corresponding shearing and forming dies and may carry extracting means (pneumatic and/or spring and/or mechanical driven).

[0035] The die may comprise, for example, guide means (for example spherical bushings) for guiding the lower plate 19 with respect to the central plate 18. The upper and lower plates 17 and 19 close to shear the metal sheet and form the crown caps. When the die is reopened, the caps are detached from the tools by the extracting means and can then be evacuated by evacuating means, for example with evacuation of blown air (by means of an electric fan), and last conveyed, for example, to a collecting hopper.

[0036] The die (punching unit 11) is arranged for receiving the sheet 2 that advances in an indexed manner and for shearing the sheet in the sheet dwell phases, separating in several sheet dwell phases (corresponding to shearing or blow steps of the die) a plurality of disks according to a regular, in particular hexagonal, arrangement, leaving a continuous conveyable reject grid.

[0037] It is known that, in order for the reject grid R to be continuous and conveyable, a minimum width of material of the sheet must be left between one sheared hole and the other, for example about 0.2 millimetres of width of material. The minimum width can be variable and depend on various factors (material of the sheet, thickness of the sheet, etc).

[0038] The press 1 may comprise, as in this case, a stacking device 20 (of known type) that stacks the various reject grids R. Each reject grid R constitutes a continuous conveyable chip to be eliminated.

[0039] The press 1 may comprise first driving means 21 for opening and closing the die or punching unit 11. Such driving means 21 may comprise, in particular, a motor (for example an electric motor) with a rotation shaft. The motor may be used, for example, to rotate a flywheel (which is known and not illustrated) the energy of which can be used for moving the carriage/s of the die, in particular via a mechanism (for example of the connecting rod type) that transforms a continuous rotational motion into a reciprocating rectilinear motion of the plate-holding carriage/s. It is however possible to use presses with other types of drive (hydraulic presses, servo presses without flywheels, etc).

[0040] The press 1 may comprise second driving means 22 for advancing in an indexed manner the movable conveyor 10. The second driving means 22 is distinct from and drivable independently of the first driving means 21. Driving means is defined as means configured for transferring a source of energy (in chemical, electric, thermal etc form) into mechanical energy. The second driving means 22 in this embodiment is distinct from the first driving means 21 so, in particular, there is no mechanical servo system for subordinating the indexed advancement motion of the sheets to the opening and closing motion of the die, or vice versa.

[0041] The second driving means 22 may comprise, in particular, at least one sheet advancement motor (distinct from the die opening and closing motor) that may have a rotor connected mechanically to a rotation axis of a winding element 23 on which the closed-loop conveyor 10 is wound. This winding element 23 may comprise, for example, a wheel or a pulley for winding the (steel) conveying belt of the conveyor 10.

[0042] The aforesaid rotor of the drive motor of the conveyor 10 may be, for example, coaxial with the rotation axis of the aforesaid winding element 23 (pulley) in direct drive transferring the rotation motion directly to this element without interposing a transmitting unit.

[0043] The aforesaid second driving means 22 may comprise, more in particular, an electric motor, for example a brushless motor or a motor with a reduction gear without clearance.

[0044] The press 1 may comprise, as in this embodiment, a programmable electronic control means (electronic processor) that is suitable for receiving a value L of the length of the sheet 2 to be sheared to calculate a regular sheet advancement step Pn on the basis of the aforesaid received value L and for controlling the second driving means 22 so as to advance the sheet 2 in an indexed manner several times in succession (with the normal or nominal advancement step Pn during the shearing of the sheet, but for the first step Pc of sheet-changing that may be different from the normal step Pn) through the die (punching unit 11) with the aforesaid normal, nominal or regular calculated advancement step Pn.

[0045] The press 1 may comprise, as in this embodiment, programmable electronic control means (electronic processor) that is suitable for receiving a value of the length L of the sheet to be sheared, to calculate a sheet-changing advancement step Pc on the basis of the aforesaid received value L, and to control the second driving means 22 in such a manner as to advance simultaneously (in the first sheet-changing step), only once both the sheet to be sheared, to start punching thereof, and the reject grid that has just finished punching, with the aforesaid calculated sheet-changing advancement step Pc.

[0046] The motion supplying the sheet 2 to the die thus comprises rapid advancement, with a sheet-changing step Pc, for the transit from the sheet that it has just finished shearing to the next sheet the shearing of which has not yet started. The first shearing blow on the new sheet, which occurs at the end of advancement with sheet-changing step Pc, will be performed only by the first row of punches 24 whereas the subsequent shearing blows will affect both rows of punches apart from the last shearing blow that will affect only the second row of punches 25. The advancement steps between the first and the last shearing blow will all be constant and the same as the normal advancement step Pn during shearing. After the last shearing blow, a new rapid advancement step Pc for sheet-changing will be performed to remove the reject grid R that has just finished shearing and a new sheet is introduced inside the die. The machining cycle thus proceeds continuously.

[0047] One embodiment of the sheet-changing step Pc is illustrated in figures 5 and 6.

[0048] The sheet 2 to the right of figure 5 is arranged in the position of the last blow, in which the second (rear) row of punches 25 operates, whereas the first (front) row of punches 24 performs an empty blow. The sheet 2 to the left of figure 5 is a whole sheet, not yet sheared, ready for entering the punching unit 11 at the next step, which will be the sheet-changing step Pc or rapid advancement step, which in this case will be slightly more than the normal or nominal advancement step Pn.

[0049] In figure 6 the situation is shown, starting from that of figure 5, after the performance of the rapid ad-

vancement sheet-changing step Pc. The sheet 2 on the right has already gone completely past the entire punching unit 11 and therefore it consists entirely of a reject grid R (which will be stacked and then eliminated) still maintained gripped by the (gripper) gripping means 12 of the conveyor 10. The sheet 2 on the left has just entered the punching unit 11 and undergoes shearing by the (front) first row of punches 24, whereas the second (rear) row of punches 25 performs an empty blow.

[0050] The aforesaid value of the normal advancement step Pn may be determined in such a manner as to obtain the maximum possible number of caps (optimising the material of the sheet 2) at the same time leaving a conveyable reject grid. It is further desirable to avoid the formation of waste on the edge of the sheet (the so-called "crescents", having the shape of circular segments) due to the shearing of small portions of the sheet 2 that could move without control and damage the machine (in particular the die or unit 11). It must in particular be avoided that before and after performance of the sheet-changing step Pc there are (front or rear edge) portions of one or other of the two sheets 2 arranged in such a manner as to undergo the shearing of the punches perform empty blows: the latter have in fact to perform empty blows without forming "crescents".

[0051] If the rear sheet (left sheet in figures 5 and 6) has a different length from the front sheet, the programmable electronic control means may calculate and perform immediately the suitable sheet-changing step Pc for positioning correctly the rear sheet for the first blow in the punching unit 11, taking account of the value of the length of the rear sheet. This value may be inserted by the user (by means of a user interface), and/or measured by sensor means arranged in the press 1 upstream of the punching unit 11, and/or determined by the electronic processor on the basis of information received relating to the type of sheet being machined.

[0052] The sheet-changing step Pc could be calculated by the following formula:

$$Pc = Dp - (Pn * n),$$

where Dp is the distance between two consecutive gripping members (grippers), i.e. the gripping members associated with two consecutive sheets (first and second sheet), Pn is the nominal or normal sheet advancement step during shearing and n is the number of steps or blows of the die per sheet.

[0053] The press 1 may comprise, for example, programmable electronic control means (electronic processor) for coordinating together the first and the second driving means 21 and 22 in such a manner that the die (punching unit 11) is opened and closed whilst the sheet 2 is respectively in the advancement and dwell phase.

[0054] The press 1 may comprise, for example, means for controlling the first driving means and/or the second driving means on the basis of a signal indicating the length L of the sheet to be sheared and/or on the basis of a signal supplied by sensor means arranged upstream of the punching unit for detecting the position or the transit of the sheet to be sheared.

[0055] In use, the (suction cup) removing means, with a (vertical) movement removes the upper sheet 2 of one of the two magazines 4 and translates the upper sheet 2 (horizontally) to the introduction position in the lubricating device 6. The sheet 2 is then introduced into the lubricating device 6 by means of the pusher. After traversing the lubricating device 6, the sheet 2 is raised in the upper part of the press 1, in particular as far as a shaft above the conveying device 7 with a linear module. The sheet 2 rotates around the upper shaft with the help of guides and of rollers and then reaches the zone of the press preceding the die. Possible sheets with defects (for example double or non-correctly lithographed sheets) are diverted to a reject magazine without interrupting the machining cycle.

[0056] The sheet 2, before being gripped by the gripping means 12 mounted on the conveyor 10 (on the flexible elements 13), has to be positioned with accuracy with respect to the die by means of the side and frontal positioning means (side positioners 8 and front abutment 9). After positioning, the sheet 2 is grasped by the gripping means 12 (grippers) fitted on the flexible elements 13 (steel conveyor belts) that supply the die in an indexed manner at the command of the second driving means 22 (sheet advancement electric motor).

[0057] Owing to the system of supplying in an indexed manner with a motor independent of the motor of the die, it is possible to machine sheets with different lengths, in particular with lengths other than a standard length.

[0058] In particular, machining sheets of different lengths could be useful if there is no need to centre a figure sketched in the sheet, for example for coated but not lithographed sheets (without sketches 3). In this case (absence of sketches on the sheet and thus absence of the obligation to centre punches on the sketches) it is possible, in particular, to define a minimum chip Sm (minimum width of material between one sheared hole and the other) below which the continuity/conveyability of the reject grid is not guaranteed (for example Sm = 0.2 mm). On the basis of the set Sm value, it is possible to calculate a variation Vp with respect to the normal or nominal sheet advancement step Pn (for example Vp = +/-0.3 mm).

[0059] In the case of sheets having a length L containing n steps (or blows), the overall Vc variation that can be tolerated over the total length L of the sheet will be Vc = n * Vp. For example, for Vp = +/- 0.3 mm and for a sheet containing 27 steps (n = 27), as in the illustrated example (figure 6), Vp = +/- 8.1 mm. In practice, it is possible to maintain the same number n of steps or of blows (for example 27 blows) for sheets of differing lengths L within a set range (for example L +/- 8.1mm).

[0060] In this case, the operator could enter in the memory of the processor a different effective measurement of the length L of the sheet to be processed (for

example the operator could use the operator interface to enter this measurement), and, indicating the new measurement, the press 1 arranges itself (automatically) to divide the steps in the condition that is acceptable for the new sheet. In this case the second sheet advancement driving means 22 (brushless motor) will modify the normal advancement step Pn. The press 1 is thus able to adapt the normal sheet advancement step Pn to the variation in the length L of the sheet.

[0061] Substantially it has been seen that the press 1 in question can vary the normal sheet advancement step Pn and/or the sheet-changing step Pc according to the type of sheet to be processed, in particular according to the length L of the sheet. The second sheet advancement driving means 22 is in fact able to modify each advancement step in an indexed manner, remaining anyway in phase with the opening and closing of the die.

[0062] In the case of a permanent change in the size of the sheet to be processed in the press, it is sufficient to set up different programming of the drive of the second driving means 22 for sheet advancement without constructing or replacing mechanical parts.

[0063] It is further possible to modify in a simple manner (with different programming of the driving of the second sheet advancement driving means 22) the "rapid" sheet-changing step Pc that occurs during the transit from one sheet to the other, in particular in order not to lose productive capacity in the case of a slightly shorter sheet, for example by maintaining the same number n of steps also for sheets of lesser lengths. If, for example, the second (rear) sheet to be sheared is slightly shorter than the first (front) sheet that has already been sheared, it is possible to set, without interrupting the machining cycle, the driving of the second (electric) sheet advancement driving means 22 to perform a sheet-changing step Pc of greater amount than a second sheet that is as long as the first sheet.

[0064] In figure 10 the sheet-changing step is shown for two sheets of the same set length L (for example a length standard for 27-blow sheets). In figure 11 the sheet-changing step is shown for two sheets that are slightly shorter than in figure 10 (in particular two sheets shorter than once the shearing step). As the distance Dp between the gripping means 12 is fixed, the distance D between one sheet and the next sheet will be greater in the second case (shorter sheets in figure 11) than in the first case (figure 10). Further, the sheet-changing step Pc will also be greater in the second case (shorter sheets) than in the first.

[0065] The electronic control system of the motor enables a desired motion law to be selected and set (advancement according to time) of the sheet 2 that traverses the punching unit 11. In particular, it will be possible to ensure the sheet-movement start and finish moments and positions. The sheet dwell time can include the period in which the sheet is sheared, i.e. when the drive (first driving means 21) of the punching unit 11 closes the elements of the die (carriages for the lower and upper dies 19 and 17).

Claims

1. Press (1) comprising:

- at least one punching unit (11) arranged for receiving a sheet (2) that advances in an indexed manner and for shearing the sheet in dwell phases thereof, separating into several phases a plurality of disks from the sheet according to a regular arrangement and leaving a continuous conveyable reject grid (R);
- at least one movable conveyor (10) arranged for supplying a sheet (2) to be sheared through said punching unit (11);
- gripping means (12) spaced apart from one another along said conveyor (10) and movable together therewith for maintaining a sheet (2) gripped;
- first driving means (21) for opening and closing said punching unit (11);
- second driving means (22) for moving said movable conveyor (10) in an indexed manner;

wherein said gripping means (12) is arranged for maintaining a sheet (2) gripped during shearing and for releasing it after shearing as a reject grid, and said second driving means (22) is distinct from said first driving means (21);
characterized in that said conveyor (10) is a closed-loop conveyor and said gripping means comprises two or more gripping members (12) arranged on said closed-loop conveyor (10) and spaced apart from one another so as to cyclically have a sheet-changing step in the punching unit (11) wherein there is simultaneously at least one of said gripping members that grips a sheet (2) arranged upstream of said punching unit (11) and at least another one of said gripping members that grips a reject grid arranged downstream of said punching unit (11).

2. Press according to claim 1, wherein said two or more gripping members are of the gripper type.

3. Press according to claim 1 or 2, wherein said second driving means (22) comprises at least one motor having a rotor connected mechanically to a rotation axis of a winding element (23) on which said closed-loop conveyor (10) is wound.

4. Press according to claim 3, wherein said rotor is coaxial with said rotation axis transferring the rotation motion directly to said winding element (23) without interposing a transmission unit.

5. Press according to any preceding claim, wherein

said second driving means (22) comprises an electric motor.

6. Press according to claim 5, wherein said electric motor comprises a brushless motor or a motor with a zero backlash reduction gear.

7. Press according to any preceding claim, comprising programmable electronic control means for receiving a value of the length (L) of the sheet to be sheared, for calculating a regular advancement step (Pn) of the sheet on the basis of said value, and for controlling said second driving means (22) in such a manner as to advance the sheet in an indexed manner several times in succession through said punching unit (11) at said calculated regular advancement step (Pn).

8. Press according to any preceding claim, comprising programmable electronic control means for receiving a value of the length (L) of the sheet to be sheared, for calculating a sheet-changing advancement step (Pn) on the basis of said value, and for controlling said second driving means (22) so as to advance simultaneously, one at a time, both the sheet to be sheared, to start punching thereof, and the reject grid that has just finished punching, with said calculated sheet-changing advancement step (Pc).

9. Press according to any preceding claim, comprising programmable electronic control means for coordinating together said first and second driving means (21; 22) such that said punching unit (11) is respectively open and closed whilst the sheet (2) is respectively in advancement phase and dwell phase.

10. Press according to any preceding claim, comprising means for controlling said first driving means (21) and/or said second driving means (22) on the basis of a signal indicating the length (L) of the sheet to be sheared and/or on the basis of a signal provided by sensor means arranged upstream of the punching unit (11) to detect the position or the transit of the sheet to be sheared.

11. Press according to any preceding claim, wherein said punching unit (11) comprises two rows of punches that are parallel and staggered in relation to one another.

12. Press according to any preceding claim, wherein said gripping means (12) comprises at least four or five of said gripping members.

13. Press according to any preceding claim, wherein said at least one conveyor (10) comprises at least two closed-loop flexible elements (13) arranged parallel next one to the other at a reciprocal distance, said gripping means being associated with each of said at least two flexible elements (13).

Patentansprüche

1. Presse (1), umfassend:

- mindestens eine Stanzeinheit (11), die zur Aufnahme eines Bogens (2), der sich in einer indexierten Weise und zum Abscheren des Bogens in Verweilphasen davon vorwärts bewegt, Trennen einer Vielzahl von Scheiben von dem Blatt in mehrere Phasen gemäß einer regelmäßigen Anordnung und zum zurücklassen eines kontinuierlichen, förderbaren Ausschussgitters (R);
- mindestens einen beweglichen Förderer (10), der ausgebildet ist einen zu scherenden Bogens (2) durch die Stanzeinheit (11) zuzuführen;
- Greifmittel (12), die entlang des Förderers (10) voneinander beabstandet sind und zusammen mit diesem beweglich sind, um ein Blatt (2) ergriffen zu halten;
- erste Antriebsmittel (21) zum Öffnen und Schließen der Stanzeinheit (11)
- zweite Antriebsmittel (22) zum Bewegen des beweglichen Förderers (10) in einer getakteten Weise;

wobei die Greifeinrichtung (12) dazu angeordnet ist, ein Blatt (2) während des Scherens ergriffen zu halten und es nach dem Scheren als ein Ausschussgitter freizugeben, und wobei das zweite Antriebsmittel (22) von dem ersten Antriebsmittel (21) getrennt ist; **dadurch gekennzeichnet, dass** der Förderer (10) ein Endlosförderer ist und das Greifmittel zwei oder mehr Greifelemente (12) umfasst, die auf dem Endlosförderer (10) angeordnet sind und voneinander beabstandet sind, um zyklisch einen Blatt-Wechselschritt in der Stanzeinheit (11) zu bewirken, wobei gleichzeitig mindestens eines der Greifelemente, das ein Blatt (2) ergreift, stromaufwärts der Stanzeinheit (11) angeordnet ist, und mindestens ein anderes der Greifelemente, das ein Ausschussgitter ergreift, stromabwärts der Stanzeinheit (11) angeordnet ist.

2. Presse nach Anspruch 1, wobei die zwei oder mehr Greifelemente vom Greifertyp sind.

3. Presse nach Anspruch 1 oder 2, bei der die zweite Antriebseinrichtung (22) mindestens einen Motor aufweist, mit einem Rotor, der mechanisch mit einer Drehachse eines Wicklungselements (23) verbunden ist, auf dem der Endlosförderer (10) aufgewickelt wird.

4. Presse nach Anspruch 3, bei der der Rotor koaxial

mit der Rotationsachse ist, welche die Drehbewegung direkt auf das Wickelelement (23) überträgt, ohne Zwischenschaltung einer Übertragungseinheit.

5. Presse nach irgendeinem der vorhergehenden Ansprüche, bei der die zweite Antriebseinrichtung (22) einen Elektromotor umfasst.

6. Presse nach Anspruch 5, bei der der Elektromotor einen bürstenlosen Motor oder einen Motor mit einem spielfreien Untersetzungsgetriebe umfasst.

7. Presse nach irgendeinem der vorhergehenden Ansprüche, umfassend ein programmierbares elektronisches Steuerungsmittel zum Empfangen eines Wertes der Länge (L) des zu scherenden Bogens, zum Berechnen eines regelmäßigen Vorschubschrittes (Pn) des Bogens auf der Grundlage des genannten Wertes, und zum Steuern der zweiten Antriebseinrichtung (22) auf eine solche Weise, dass der Bogen in einer getakteten Weise mehrere Male nacheinander durch die Stanzeinheit (11) mit dem berechneten regelmäßigen Vorschubschritt (Pn) vorgeschoben wird.

8. Presse nach irgendeinem der vorhergehenden Ansprüche, mit einem programmierbaren elektronischen Steuerungsmittel zum Empfangen eines Wertes der Länge (L) des zu scherenden Bogens, zum Berechnen eines Bogenwechsel-Vorschubschrittes (Pn) auf der Basis dieses Wertes, und zum Steuern der zweiten Antriebsmittel (22), um gleichzeitig, einen nach dem anderen, sowohl das zu scherende Blatt vorwärts zu bewegen, um dessen Stanzen zu beginnen, als auch das Ausschussgitter, das gerade das Stanzen beendet hat, mit dem berechneten Blattwechselvorschubschritt (Pc) vorwärts zu bewegen.

9. Presse nach irgend einem der vorhergehenden Ansprüche, mit einem programmierbaren elektronischen Steuerungsmittel zum Koordinieren der ersten und zweiten Antriebsmittel (21; 22) derart, dass die Stanzeinheit (11) jeweils geöffnet und geschlossen ist, während der Bogen (2) jeweils in der Vorschubphase bzw. der Verweilphase ist.

10. Presse nach irgendeinem der vorhergehenden Ansprüche, umfassend Mittel zum Steuern der ersten Antriebseinrichtung (21) und/oder der zweiten Antriebseinrichtung (22) auf der Basis eines Signals, das die Länge (L) des zu scherenden Bogens angibt, und/oder auf der Grundlage eines Signals, das von einer Sensoreinrichtung geliefert wird, die stromaufwärts der Stanzeinheit (11) angeordnet ist, um die Position oder den Durchlauf des zu scherenden Bogens zu erfassen.

11. Presse nach irgendeinem der vorhergehenden Ansprüche, bei der die Stanzeinheit (11) zwei Reihen von Stempeln aufweist, die parallel und versetzt zueinander angeordnet sind.

12. Presse nach irgendeinem der vorhergehenden Ansprüche, bei der die Greifeinrichtung (12) mindestens vier oder fünf der genannten Greifelemente umfasst.

13. Presse nach irgendeinem der vorangehenden Ansprüche, bei der der mindestens eine Förderer (10) mindestens zwei in sich geschlossene flexible Elemente (13) aufweist, die parallel nebeneinander in einem gegenseitigen Abstand angeordnet sind, wobei das Greifmittel mit jedem der mindestens zwei flexiblen Elemente (13) zugeordnet ist.

Revendications

1. Presse (1) comprenant :

- au moins une unité de découpage (11) arrangée pour recevoir une feuille (2) qui avance de manière indexée et pour cisailler la feuille lors de phases d'arrêt de celle-ci, séparant en plusieurs phases une pluralité de disques de la feuille selon un arrangement régulier et laissant une grille de rebut (R) transportable de manière continue ;
- au moins un convoyeur mobile (10) arrangé pour amener une feuille (2) à cisailler à travers ladite unité de découpage (11) ;
- des moyens de préhension (12) espacés les uns des autres le long dudit convoyeur (10) et mobiles avec celui-ci pour maintenir une feuille (2) en prise ;
- de premiers moyens d'entraînement (21) pour ouvrir et fermer ladite unité de découpage (11) ;
- de deuxièmes moyens d'entraînement (22) pour déplacer ledit convoyeur mobile (10) de manière indexée ;

dans laquelle lesdits moyens de préhension (12) sont arrangés pour maintenir une feuille (2) en prise pendant le découpage et pour la relâcher après le découpage sous forme de grille de rebut, et lesdits deuxièmes moyens d'entraînement (22) sont distincts des premiers moyens d'entraînement (21) ;
caractérisée en ce que ledit convoyeur (10) est un convoyeur à boucle fermée et lesdits moyens de préhension comprennent deux ou plus organes de préhension (12) arrangés sur ledit convoyeur à boucle fermée (10) et espacés les uns des autres de manière à avoir cycliquement un pas de changement de feuille dans l'unité de découpage (11) dans laquelle il y a simultanément l'un au moins desdits or-

ganes de préhension qui met en prise une feuille (2) arrangée en amont de ladite unité de découpage (11) et au moins un autre desdits organes de préhension qui met en prise une grille de rebut disposée en aval de ladite unité de découpage (11).

2. Presse selon la revendication 1, dans laquelle lesdits deux ou plus éléments de préhension sont du type à pince.

3. Presse selon la revendication 1 ou 2, dans laquelle lesdits deuxièmes moyens d'entraînement (22) comprennent au moins un moteur ayant un rotor relié mécaniquement à un axe de rotation d'un élément d'enroulement (23) sur lequel le convoyeur à boucle fermée (10) est enroulé.

4. Presse selon la revendication 3, dans laquelle ledit rotor est coaxial par rapport audit axe de rotation transférant le mouvement de rotation directement à l'élément d'enroulement (23) sans intercaler d'unité de transmission.

5. Presse selon l'une quelconque des revendications précédentes, dans laquelle lesdits deuxièmes moyens d'entraînement (22) comprennent un moteur électrique.

6. Presse selon la revendication 5, dans laquelle ledit moteur électrique comprend un moteur sans balais ou un moteur avec un engrenage réducteur sans jeu.

7. Presse selon l'une quelconque des revendications précédentes, comprenant des moyens de commande électroniques programmables pour recevoir une valeur de la longueur (L) de la feuille à cisailler, pour calculer un pas d'avance régulier (Pn) de le feuille sur la base de ladite valeur, et pour commander les deuxièmes moyens d'entraînement (22) de manière à faire avancer la feuille de manière indexée plusieurs fois successivement à travers ladite unité de découpage (11) au pas d'avance régulier (Pn) calculé.

8. Presse selon l'une quelconque des revendications précédentes, comprenant des moyens de commande électroniques programmables pour recevoir une valeur de la longueur (L) de la feuille à cisailler, pour calculer un pas d'avance de changement de feuille (Pn) sur la base de ladite valeur, et pour commander lesdits deuxièmes moyens d'entraînement (22) de manière à faire avancer simultanément, une par une, à la fois les feuilles à cisailler, pour commencer leur découpage, et la grille de rebut dont le découpage vient d'être terminé, avec ledit pas d'avance de changement de feuille (Pn) calculé.

9. Presse selon l'une quelconque des revendications précédentes, comprenant des moyens de commande électroniques programmables pour coordonner entre eux lesdits premiers et deuxièmes moyens d'entraînement (21 ; 22) de telle sorte que ladite unité de découpage (11) soit respectivement ouverte et fermée pendant que la feuille (2) est respectivement dans une phase d'avance et une phase d'arrêt.

10. Presse selon l'une quelconque des revendications précédentes, comprenant des moyens pour commander lesdits premiers moyens d'entraînement (21) et/ou les deuxièmes moyens d'entraînement (22) sur la base d'un signal indiquant la longueur (L) de la feuille à cisailler et/ou sur la base d'un signal fourni par des moyens capteurs disposés en amont de l'unité de découpage (11) pour détecter la position ou le transit de la feuille à cisailler.

11. Presse selon l'une quelconque des revendications précédentes, dans laquelle ladite unité de découpage (11) comprend deux rangées de poinçons qui sont parallèles et décalées l'une par rapport à l'autre.

12. Presse selon l'une quelconque des revendications précédentes, dans laquelle lesdits moyens de préhension (12) comprennent au moins quatre ou cinq desdits organes de préhension.

13. Presse selon l'une quelconque des revendications précédentes, dans laquelle ledit au moins un convoyeur (10) comprend au moins deux éléments flexibles à boucle fermée (13) disposés parallèlement l'un près de l'autre à une distance mutuelle, lesdits moyens de préhension étant associés à chacun desdits au moins deux éléments flexibles (13).

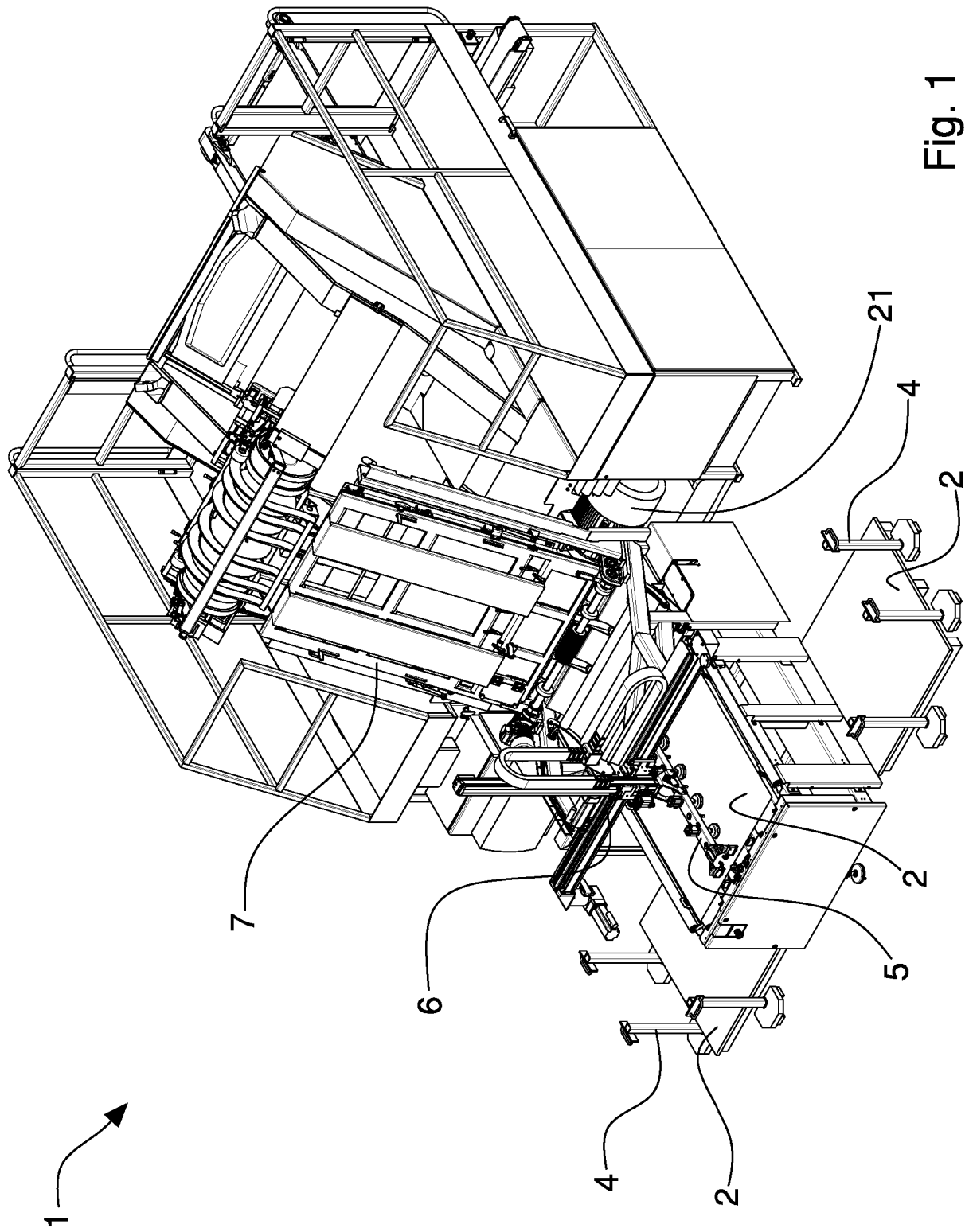


Fig. 1

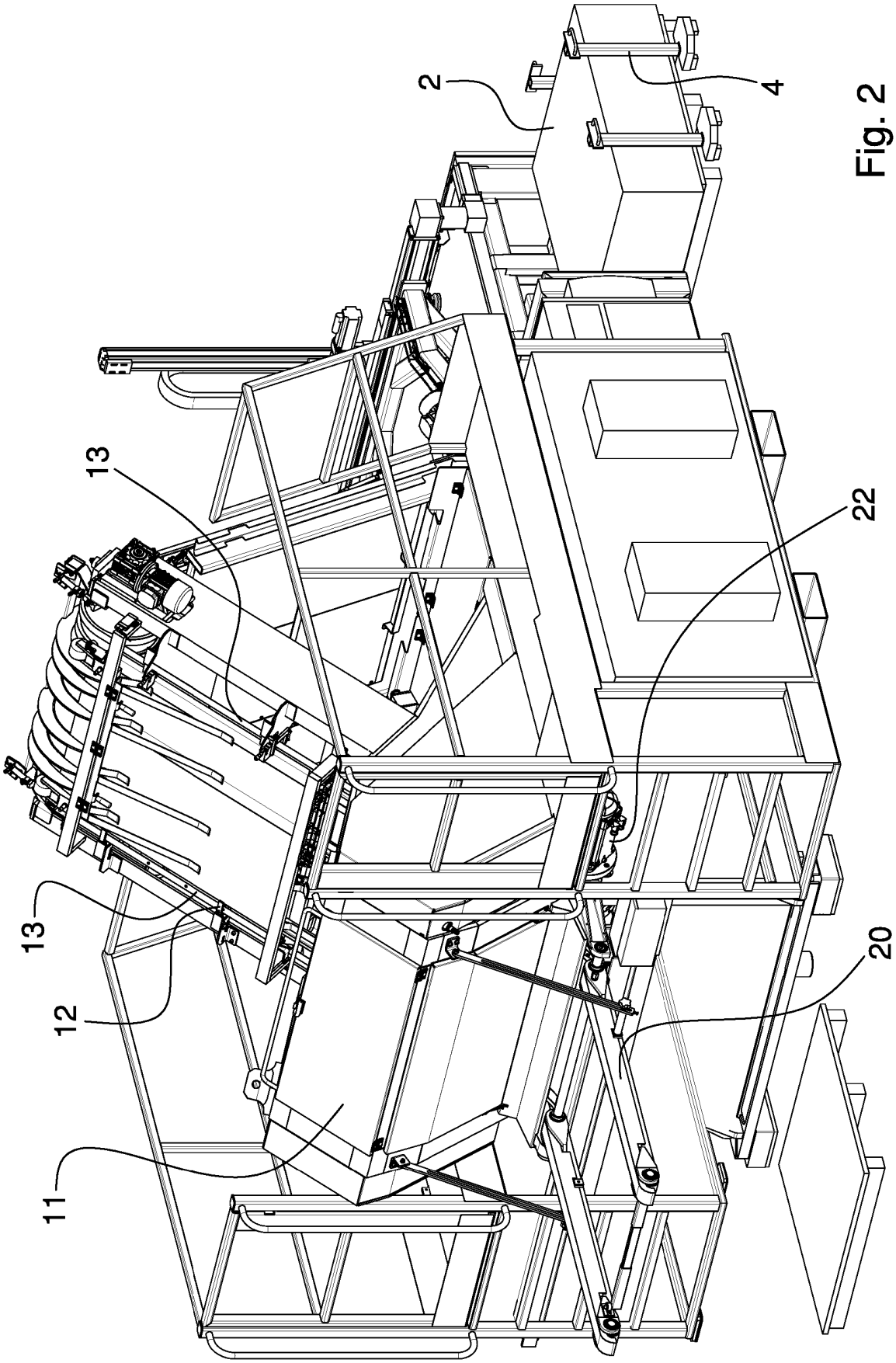


Fig. 2

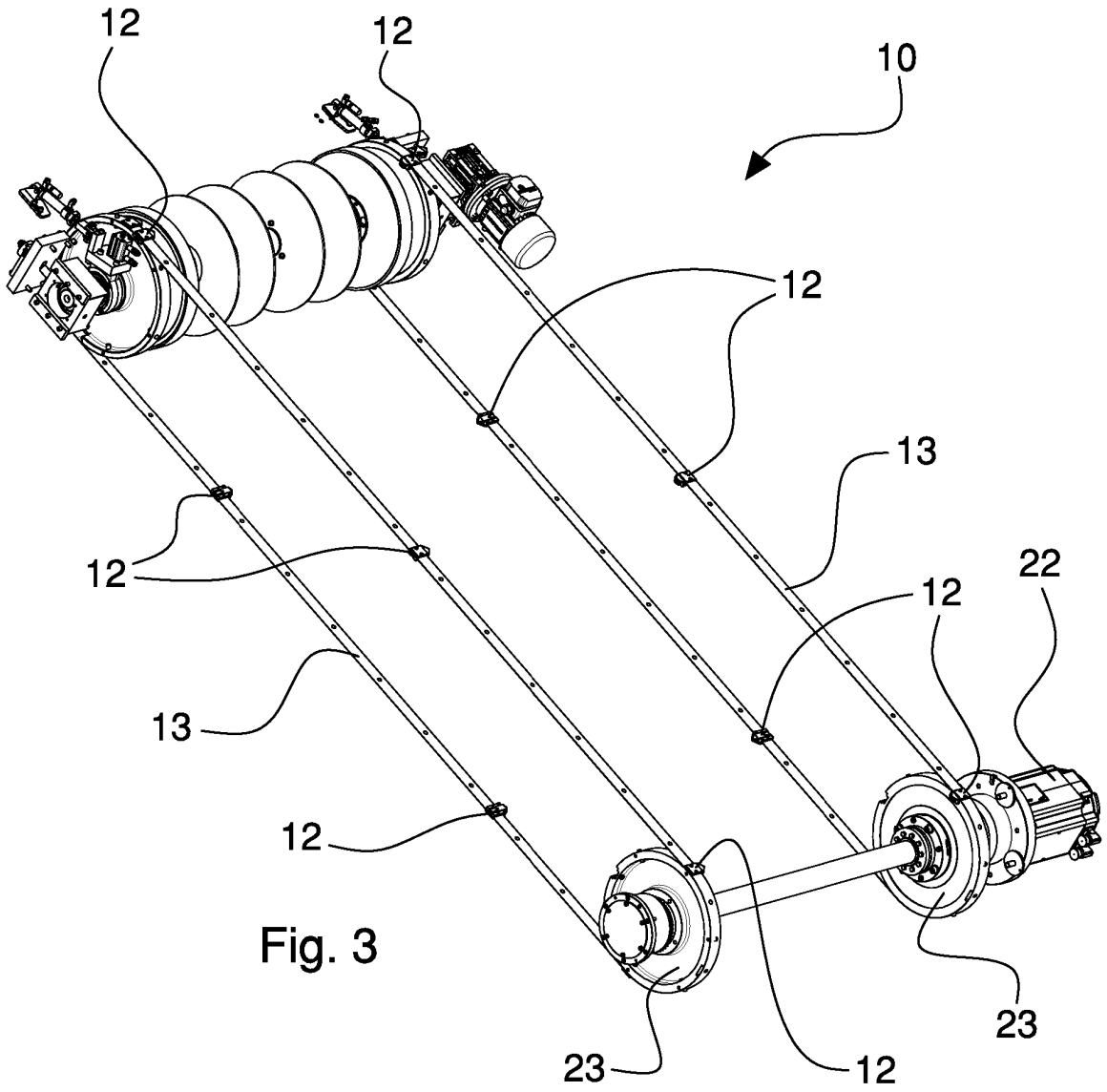


Fig. 3

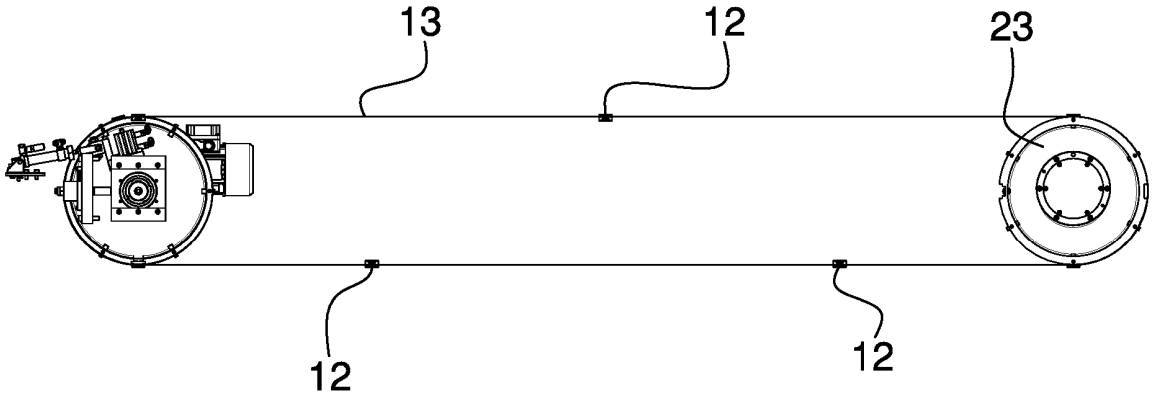
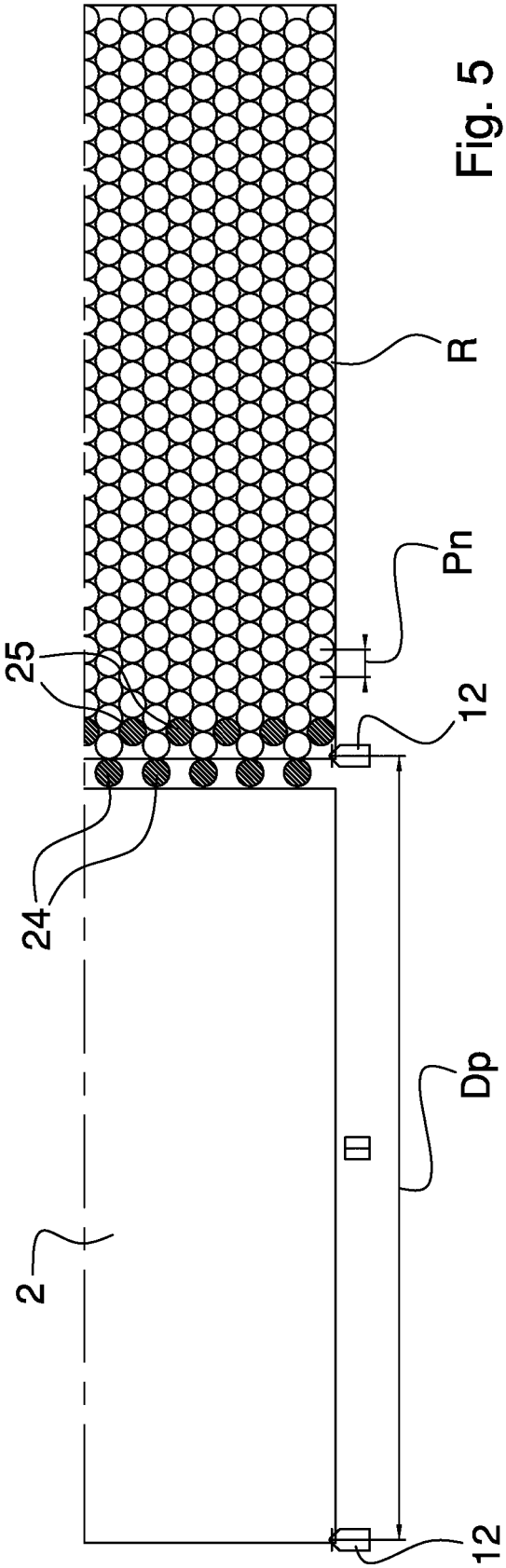


Fig. 4



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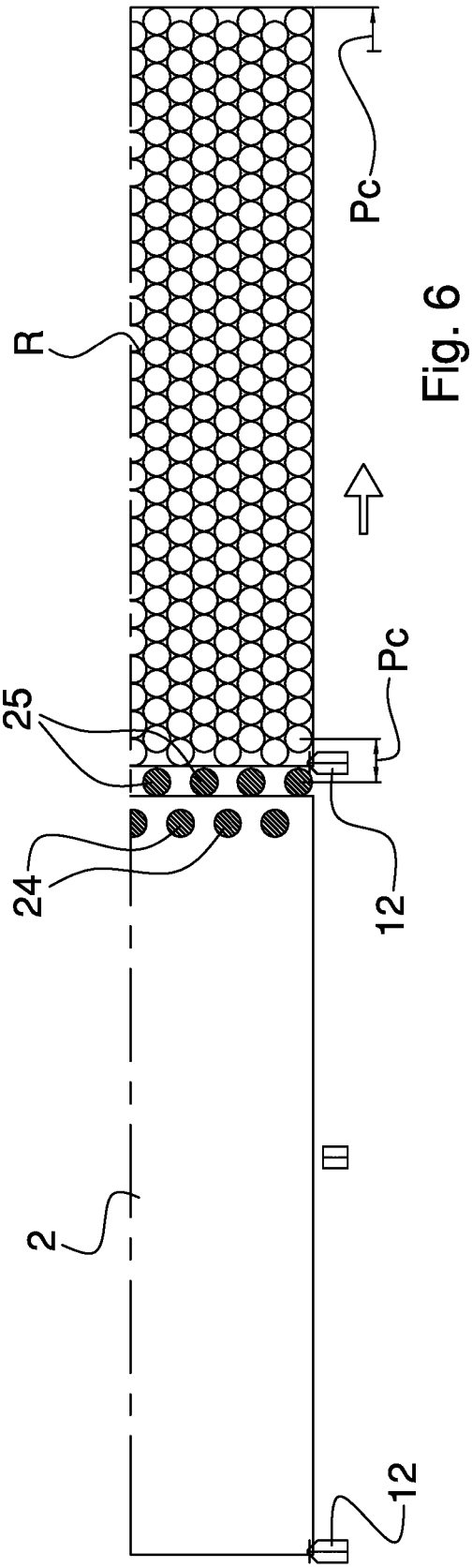

Fig. 6

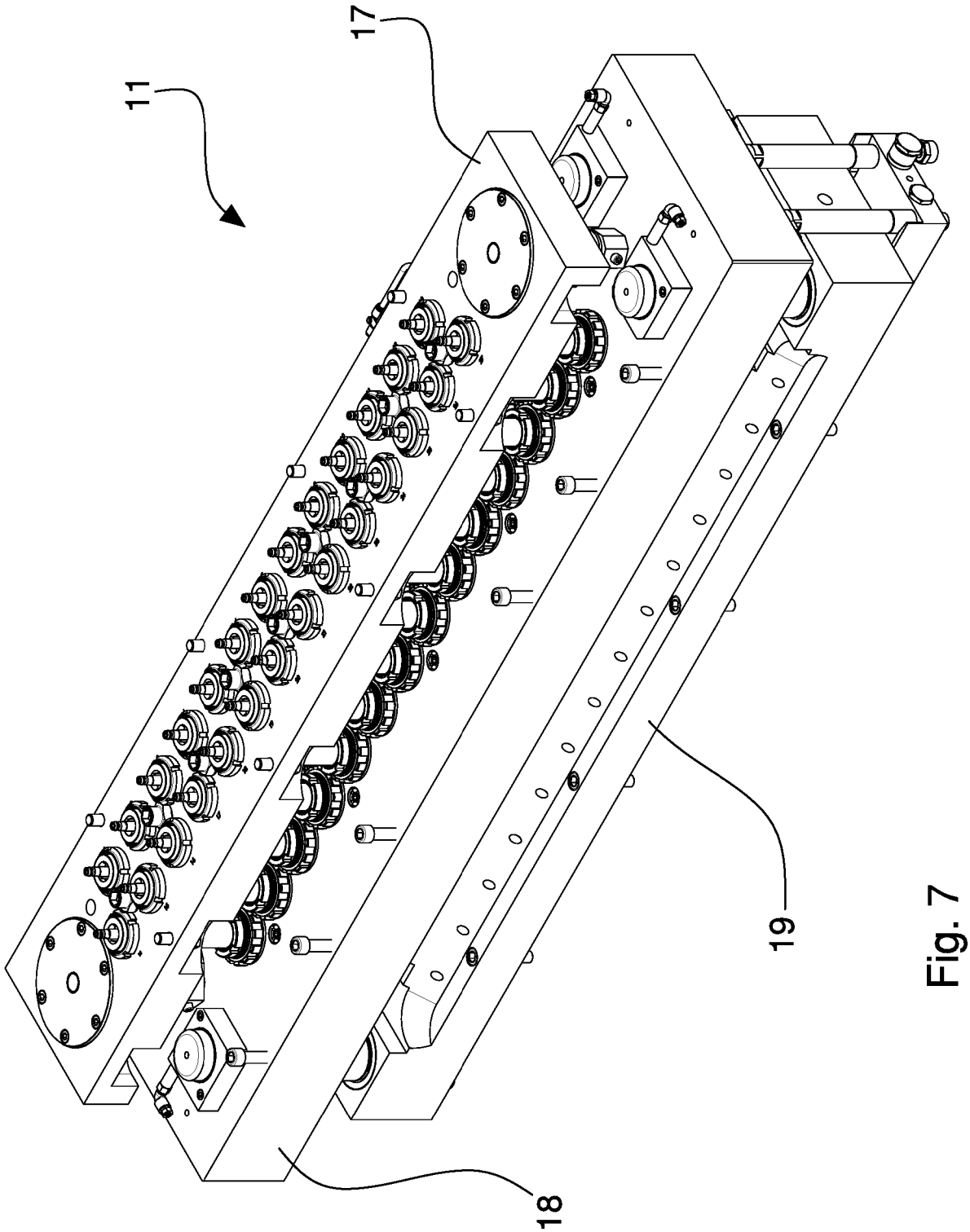

Fig. 7

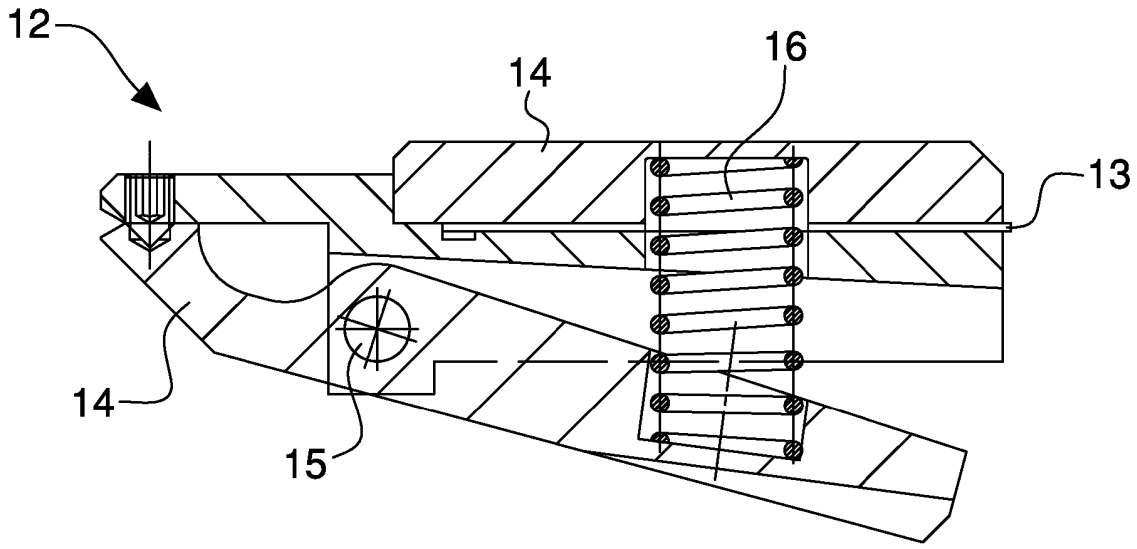

Fig. 8

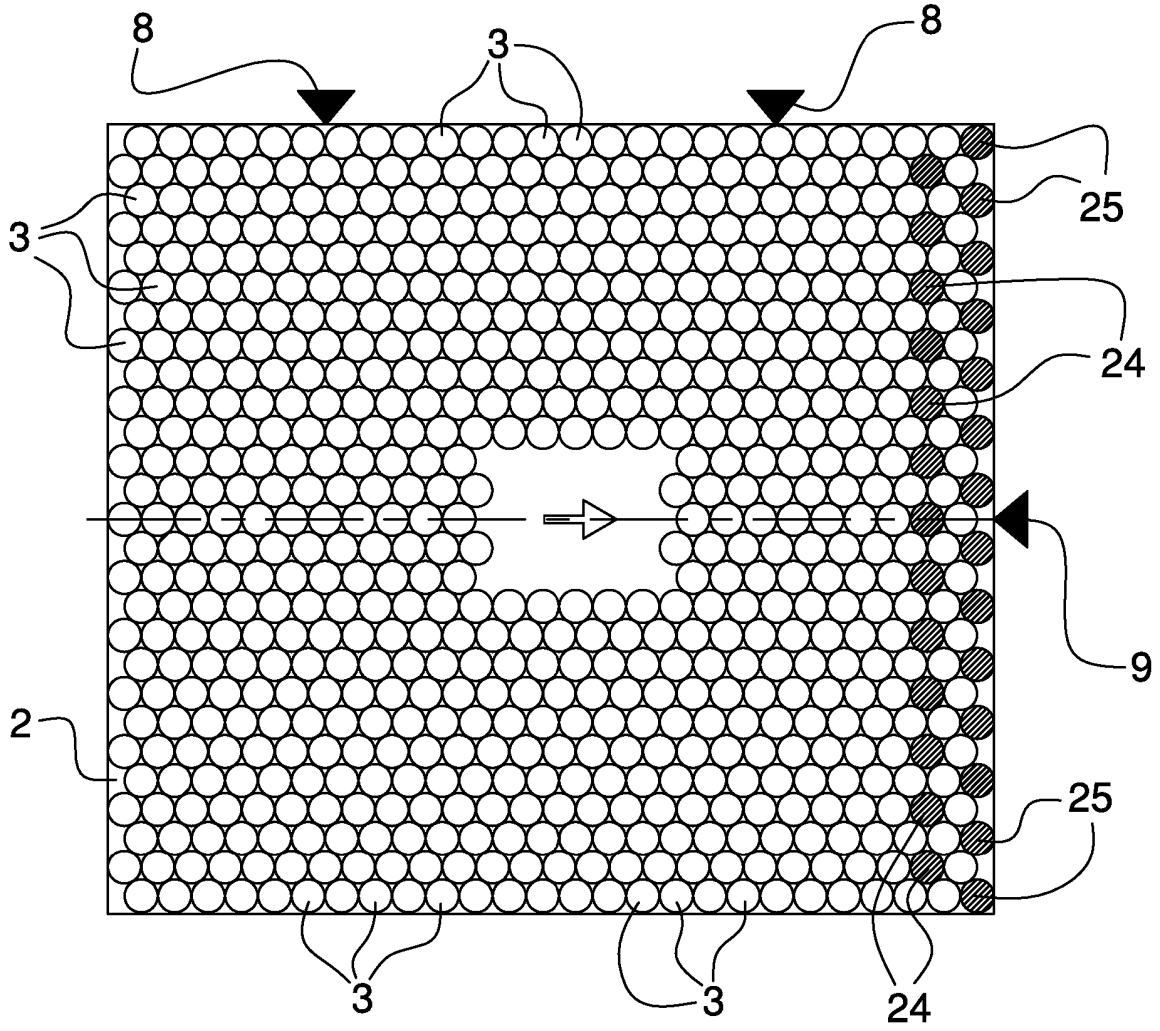

Fig. 9

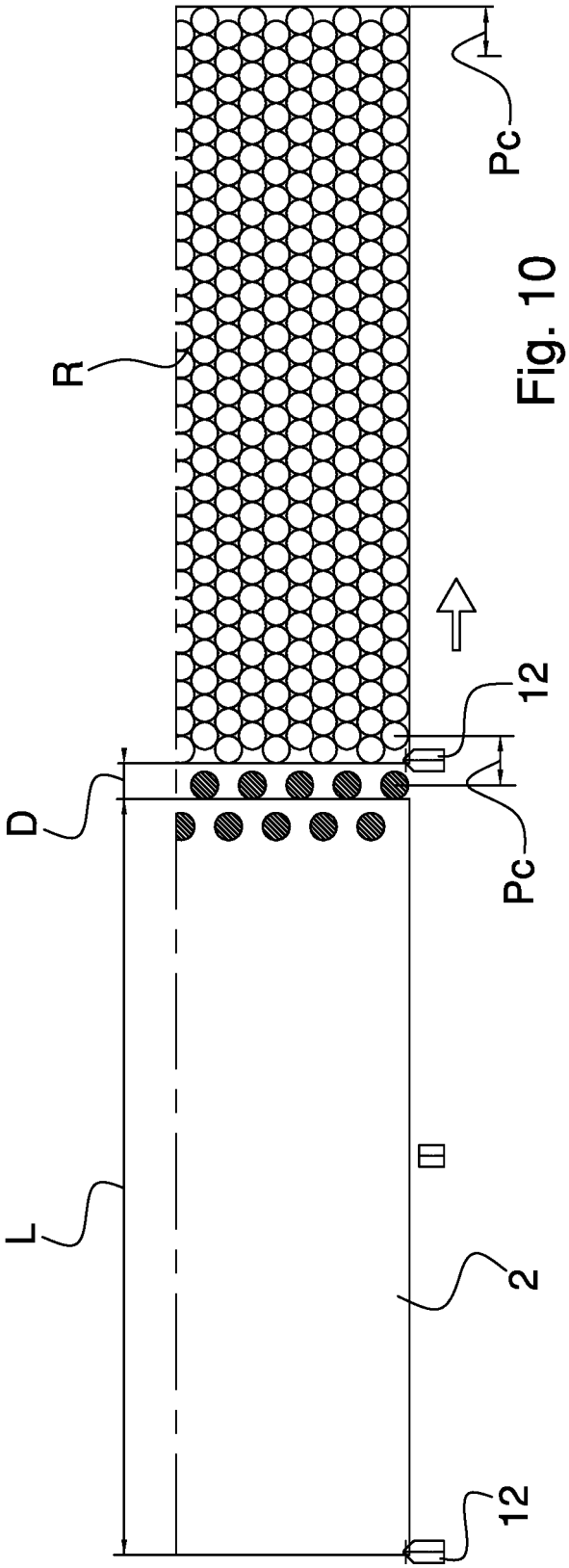

Fig. 10

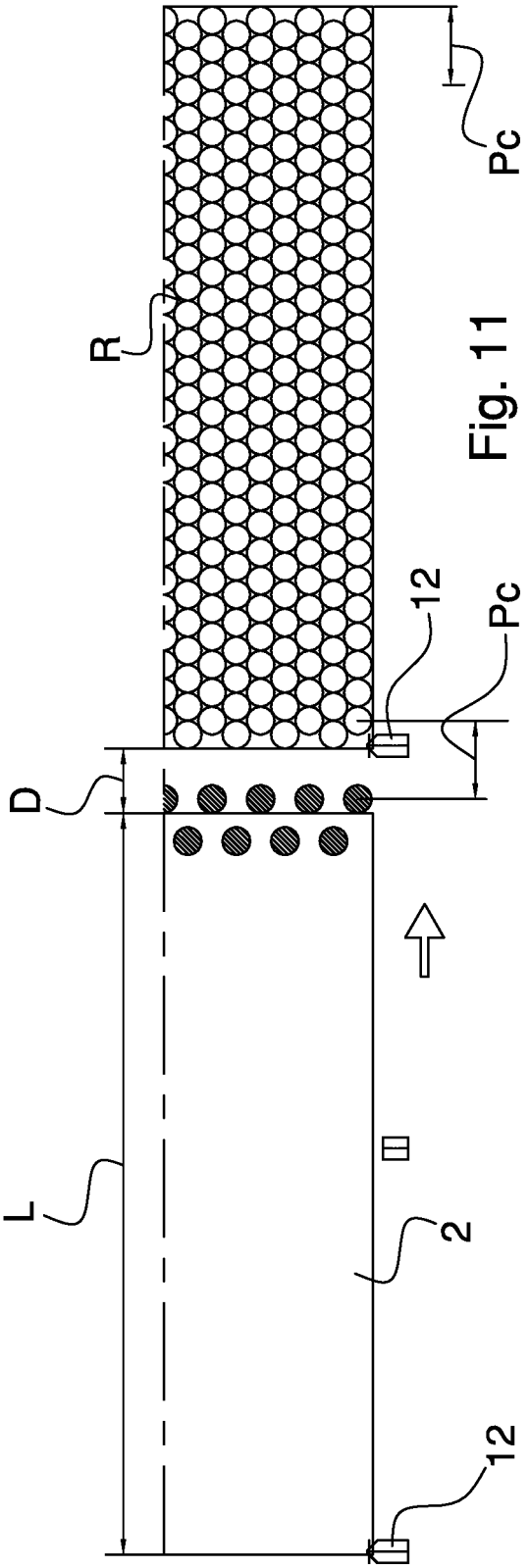

Fig. 11

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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