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(54) **Device and method for producing embossed cover elements for packaging**

(57) Device for producing embossed cover elements for emballages, which cover elements are embossed in and die-cut from a pseudo-endless sheet material which runs through the device in a longitudinal direction at temporary standstill of the sheet material, the device com-

prising at least one M ($M \geq 1$) die-cutting tools and M x N ($N \geq 2$) embossing tools, wherein N different embossing tools are combined with each die-cutting tool in the longitudinal direction.

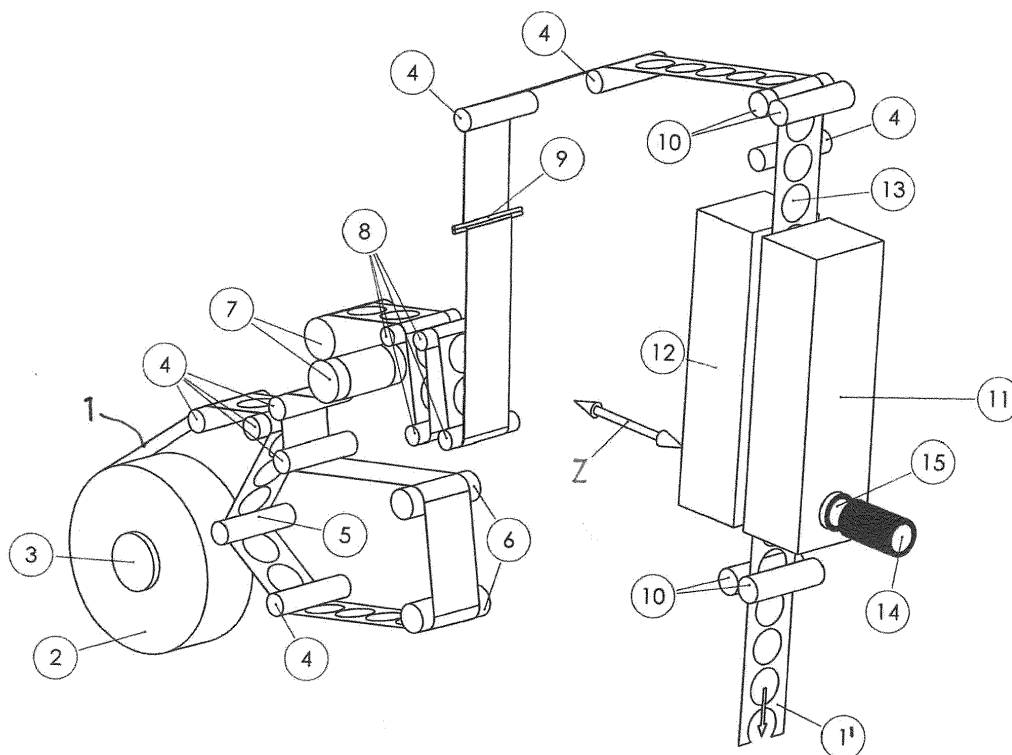


Figure 1

Description

[0001] Subject of the invention is a device and method for producing embossed cover elements, such as lids or labels, for emballage.

[0002] After filling of product to cup and heat seal of lid to cup, heat-sealable printed lid is becoming an integral part of final product emballage. As such, it has a function to secure product from contamination and atmospheric influences, but at the same time has an aesthetic function because the final product is very often in shelves in position that buyer firstly notices the lid. So, it is important to keep the quality effects given by printing process. This request for keeping the printing quality is opposite to everyday practice which is applied in most cases where the lids needs to be embossed during die-cutting process to achieve easy separation of each lid in a column, what is an absolute request for filling and lid covering/labeling machines. Quality of printing is lost by whole lid surface embossing because surface is becoming relief what affects colour shine and intensity.

[0003] From EP 0 960 024 B2 and EP 1 790 470 A2 it is known how to achieve partial embossing at lids or labels. In EP 1 790 470 A2 disadvantages of EP 0 960 024 A2 and a process of embossing which is done while the foil is moving are explained. EP 1 790 470 A2 also enables partial embossing while foil is stationary.

[0004] It is an object of the invention, to provide a method and a device for producing partially embossed printed heat-sealable lids and labels for emballage where the maximum precision of embossing position and height is achieved.

[0005] This object is solved by a device according to claim 1 and a method according to claim 9. Advantageous embodiments and aspects of the invention are subject of the dependent claims.

[0006] For die-cutting process a time is used while the pseudo-endless sheet material (e.g. plastic or aluminum or sandwich foil, as used in the prior art) is stationary. The device comprises M ($M \geq 1$) die-cutting tools and M x N ($N \geq 2$) embossing tools, wherein N different embossing tools are combined with each die-cutting tool in the longitudinal direction. "Combined" means that the several embossing tools which are associated with one die-cutting tool are aligned with the die-cutting tool in the longitudinal direction, such that (supposed that the transport of the sheet material and the timing of actuating the tools are correctly determined) the embossing tools and the associated die-cutting tool act on the same sheet material portions.

[0007] Elements (tools) for embossing are applying partial embossing at N lids or labels in foil longitudinal direction. Preferably, partial embossing of lids or labels is done in a single tool portion which consists of elements for partial embossing and die-cutting elements (tools). Most preferably, the embossing tools and die-cutting tools are arranged in a common single tool housing.

[0008] In an embodiment of the invention, the N different embossing tools associated to the die-cutting tool are differently engraved, with same shape and number of gravure male/female elements but at different positions and/or with different shapes of gravures at one or more embossing elements. In a further embodiment, the embossing tools and the or each die-cutting tool are all moveable in the same single direction, normally to the plane of the sheet material.

[0009] Die-cutting elements are preferably moved by excenter while elements for partial embossing are moved pneumatically, relatively in relationship to die-cutting elements. Elements for embossing are synchronized with die-cutting elements and actuated preferably at every N strokes of die-cutting, where N is number of elements for embossing counting by the height of the tool, one stroke of embossing elements is done, and, in embodiments of the invention, as many lids or labels in transversal direction as tool has transversal nests M. So, there is totally NxM elements for (partial) embossing, and each of them has different position of engraved elements what ensures separation of lids or labels.

[0010] Although the invention will mainly be applied in methods and machines where the lids or labels, respectively, are partially embossed, it can also be applied for fully embossed lids or labels, i.e. for producing lids or labels wherein essentially the entire surface is embossed. Preferably, partially embossed lids or labels are printed and heat-sealable, whereas the invention is not limited to printed and heat-sealable foils or lids and labels, respectively.

[0011] With the proposed method of partial embossing it is possible to emboss lid or label near the edge of lid but also to apply any different imprint, anywhere at the printed lid or label (for example: company logo, text, picture on lid and similar).

[0012] In case of deactivating of elements for partial embossing, it is possible to use die-cutting tool as a standard tool with other types of embossing where the foil is embossed with rotating elements with patterns which are not in register.

[0013] At least in certain embodiments, the present invention provides significant advantages: Compared to prior art arrangements, where tools for embossing and die-cutting are separated and there is a distance between these two tools, in the arrangement proposed herein it is easier to make accurate positioning of the foil in relationship to moving parts of the tools. Furthermore, the proposed solution no longer requires an adoption of die-cutting machine for acceptance of two tools. Furthermore, the present invention overcomes the problem that the embossing tool is moved by an excenter and at the same time the position of elements for embossing has to be changed to avoid that partial embossing to be positioned at the same place on lid or label, what would cause mutual sticking of lids instead of separation. Insofar, the control of the method and device disclosed herein is simplified and less susceptible to disturbances.

[0014] Drawings:

Figure 1: Device for partial embossing and die-cutting of printed heat-sealable lids from printed foil (schematic illustration)

Figure 2: Tool for partial embossing and die-cutting of printed heat-sealable lids from printed foil (schematic illustration)

Figure 3: Schematic diagram of a correct stacking of lids produced with a device according to the invention

Figure 4: Front view of two embossing tools which are aligned with one die-cutting tool

Figure 5: Layout of the embossing and the die-cutting tools

Figure 6: Perspective view of a single tool portion with integrated embossing tools and die-cutting tools.

[0015] Fig. 1 schematically illustrates an arrangement for producing cover elements (lids or labels or similar) from a sheet material (foil) 1, as an embodiment of the invention. After placing a printed reel 2 at unwinder shaft 3, foil 1 is transported through the machine to tool portion 11, 12 for partial embossing and for die-cutting. Drawing of foil 1 through the machine is done by unwinder pulling unit 7 and by infeed and outfeed tool pulling units 10. Web transport is achieved with idle rollers 4. Tension control is achieved by load cell 5 which compares given tension with real values and accordingly correct the braking force at unwinder. Foil is guided by web guide device which is not fully shown at drawing and is marked as 6. It ensures moving of the web always on the same line, even when the input reel is incorrectly coiled. Compensator mechanism 8 ensures the condition for foil to be stationary in the tool by accumulating the excess of foil which is created by non-stop foil unwinding. Infeed tool unit 10 is pulling the excess in uniform tacts which are number of tool strokes per time unit.

[0016] Fig. 2 schematically shows the tool portion 11 in some more detail. The foil 1 with printed lid patterns 13 runs from above into the tool portion 11, 12, and waste foil 1' leaves the bottom of the tool portion, after the lids have been cut-out from the foil. As shown in Fig. 1, the lids are fed-out of the tool portion in a direction which is perpendicular to the plane of the drawing, at the location of a die-cutting tool 18. Above the die-cutting tool 18 two different embossing tools 16, 17 are provided. Both embossing tools are aligned with each other and with the die-cutting tool along the longitudinal axis of the tool portions 11, 12, i.e. along the transport direction of the foil 1.

[0017] Both the die-cutting tool 18 and the embossing tools 16, 17 are constructed in a well-known manner and need, therefore, not be described here in more detail. What counts with respect to the advantageous effect of the invention, are the provision of two (or even more) embossing tools associated to one die-cutting tool, as well as the angular orientation of the embossing tools relative to each other and the timely operation scheme thereof, as mentioned further above and explained in more detail below.

[0018] According to a preferred embodiment of the invention, as schematically illustrated in Figures 3 and 4, by means of an alternating operation of the two embossing tools and a slight angular shift of the respective male and female pin/hole combinations which form a circumferential series of embossments in the lid, and unfavorable stacking of the lids in a lid storage portion is avoided. Such unfavorable stacking is shown in the upper part of Fig. 3, whereas an advantageous stacking, which allows for an easy separation of the lids from each other, is schematically shown in the lower part of the figure.

[0019] In Fig. 4, the embossing tools 16, 17 are shown in more detail, displaying the respective circumferential arrangement of embossing pins. With x and y the respective pin or hole, respectively, is designated which is the "12-o'clock" position of the respective tool 17 or 16. It can be seen that in tool 17 this is an outer pin or hole, respectively, whereas in tool 16 this is an inner pin (hole). Therefore, when operating both tools in an alternating manner and afterwards cutting the respective lids out and feeding them to a storage, they will be stacked according to the lower portion of Fig. 3, i.e. in an advantageous manner.

[0020] In Figures 5 and 6 a device 100 according to an embodiment of the invention is shown, which comprises three die-cutting tools 118a, 118b, 118c, and three corresponding sets of embossing tools 116a/117a, 116b/117b, and 116c/117c. As more generally already shown in Fig. 1, the respective parts of the die-cutting tools and embossing tools are arranged in a two-part tool portion 111, 112, wherein the two portions 111, 112 are connected to each other by cylindrical columns or guides, respectively (not specifically designated in the figures). While tool portion 112 is fixed to die cutting press portion, 111 is driven by press excenter and it is moving in Z-axis direction toward and backward the 112, sliding along to columns by means of linear ball cages.

[0021] Female parts of embossing and die cutting tool are placed in and fixed at portion 112. Male parts of die cutting tool are placed in and fixed to portion 111. Male parts of embossing tool are placed at 111 but they are not mechanically fixed to it. They are moving in the same time driven by press excenter which is moving tool portion 111 and by compressed air. That is why we state that moving of embossing tool male parts is relative to moving of die cutting tool male parts.

[0022] As illustrated in Fig. 4, the respective embossing tools which are associated to one die-cutting tool are slightly different, in the arrangement of the gravure elements (pins/holes) at their circumference.

[0023] Each embossing tool is punching every second stroke, whereas the associated cutting tool is punching with each stroke. In this way, as mentioned above, lids with different embossing patterns are produced in an alternating way and can be stacked in a manner which facilitates the separation thereof in a later step. In the arrangement of Figures 5

and 6, the whole device, including three die-cutting tools and six embossing tools, produces three lids per stroke. It is easily to be understood that different arrangements with an even larger number of die-cutting tools and sets of embossing tools can be implemented, producing even more lids per stroke.

[0024] In the embodiment of Figures 5 and 6, the embossing tools are pneumatically driven and comprise pneumatic connectors, providing compressed air at the exact moment of actuating the respective tool, controlled by an electropneumatic valve (not shown) whereas the embossing tools are pneumatically driven, the male die-cutting parts which are connected to plate 111 (but omitted in Fig. 6) are moved by means of a rod end 119 which is mechanically connected to an excenter mechanism of a die-cutting press. However, it can easily be understood that in other embodiments the tools can be driven in another way, e.g. by electrical motors or hydraulically.

[0025] The implementation of the invention is not restricted to the above embodiment, nor to those aspects of the process and device which are highlighted further above, but is defined by the appended claims.

List of reference numerals:

[0026]

1	foil
1'	waste foil
2	printed reel
3	unwinder shaft
4	idle rollers
5	load cell
6	web guide device
7	pulling unit
8	compensator
9	correction foil
10	pulling unit
11; 111	lower plate of the tool portion
12; 112	upper plate of the tool portion
13	printed foil
14	lids
15	embossing lid
16; 116a; 116b; 116c	embossing tool
17; 117a; 117b; 117c	embossing tool
18; 118a; 118b; 118c	die-cutting tool
Z	direction of movement of the upper part of the tool
100	device
119	tool end

Claims

1. Device for producing embossed cover elements for emballages, which cover elements are embossed in and die-cut from a pseudo-endless sheet material which runs through the device in a longitudinal direction at temporary standstill of the sheet material, the device comprising M ($M \geq 1$) die-cutting tools and M x N ($N \geq 2$) embossing tools, wherein N different embossing tools are combined with each die-cutting tool in the longitudinal direction.
2. Device of any of the preceding claims, wherein the N different embossing tools associated to the die-cutting tool are differently engraved, in particular with same shape and number of gravure male/female elements but at different positions and/or with different shapes of gravures at one or more embossing elements.
3. Device of claim 1 or 2, wherein the M die-cutting tools are aligned essentially in a transversal direction of the pseudo-endless sheet material orthogonally to the longitudinal direction.
4. Device of claim 3, wherein the die-cutting tools and embossing-tools are basically circular with coincident circumferential lines, and the centers of adjacent die-cutting tools of the M die-cutting tools aligned in transversal direction are offset relative to each other such that the area of the sheet material can be optimally exploited for delivering a

maximum number of cover sheets, and the centers of adjacent embossing tools of the M x N embossing tools in transversal direction are correspondingly offset to each other.

- 5 **5.** Device of any of the preceding claims, wherein the embossing tools are adapted for providing a partial embossment in sheet material portions which are predefined as cover elements, in particular in an outer ring of each of the cover element portions.
- 10 **6.** Device of any of the preceding claims, wherein the embossing tools and the or each die-cutting tool are integral parts of a single tool portion and arranged in a common tool housing.
- 15 **7.** Device of any of the preceding claims, wherein the embossing tools are driven pneumatically.
- 20 **8.** Device of any of the preceding claims, wherein the embossing tools and the or each die-cutting tool are all moveable in the same single direction, normally to the plane of the sheet material.
- 25 **9.** Method for producing embossed cover elements for emballages, which cover elements are embossed in and die-cut from a pseudo-endless sheet material which runs through an embossing and die-cutting device in a longitudinal direction at temporary standstill of the sheet material, wherein a device according to one of the preceding claims is operated such that each of $N \geq 2$ embossing tools, which are combined with one die-cutting tool in the longitudinal direction, is actuated at every N^{th} die-cutting stroke.
- 30 **10.** Method of claim 9, wherein for the embossing and die-cutting of the cover elements a single register mark on the sheet material is used for controlling the position of both the embossments and the die-cuts.

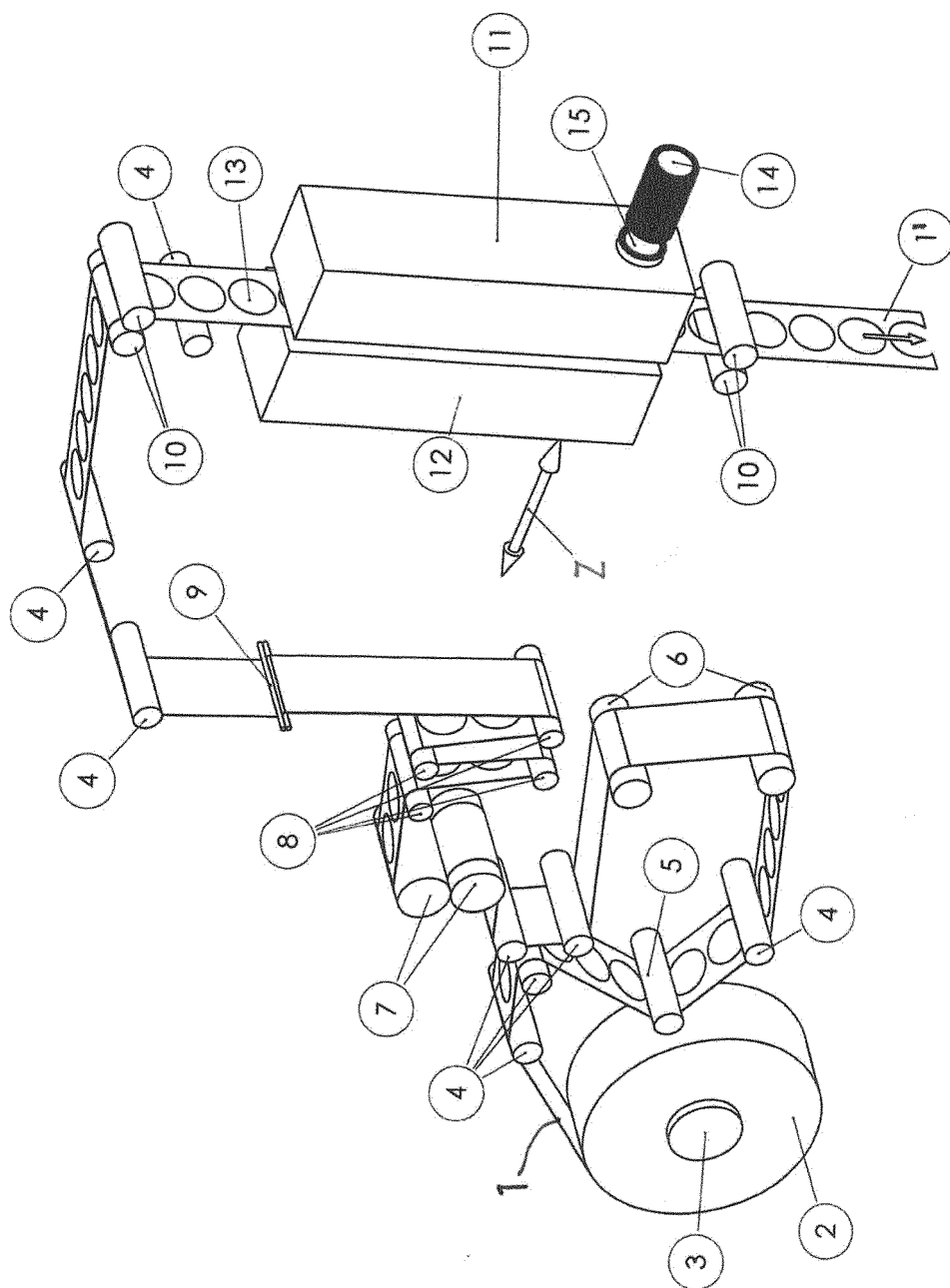


Figure 1

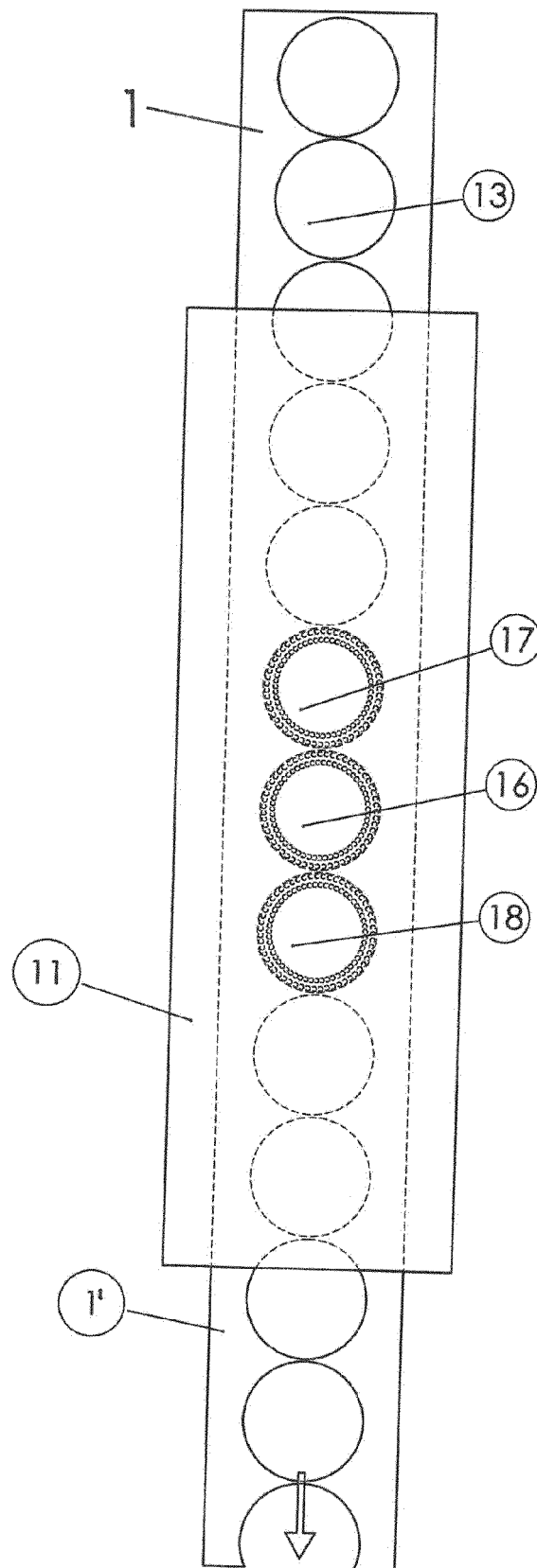


Figure 2

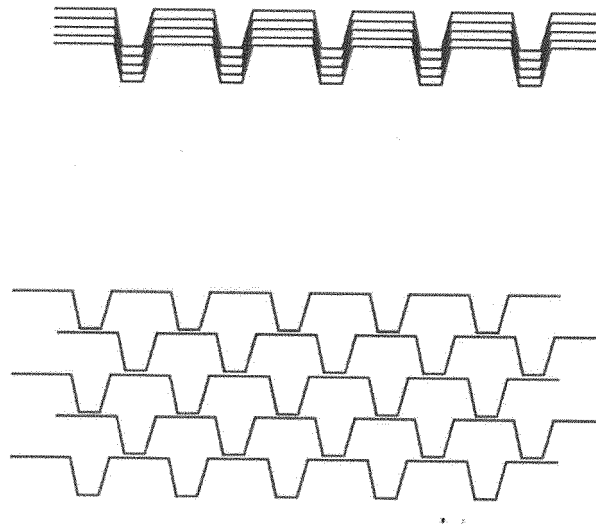


FIGURE 3

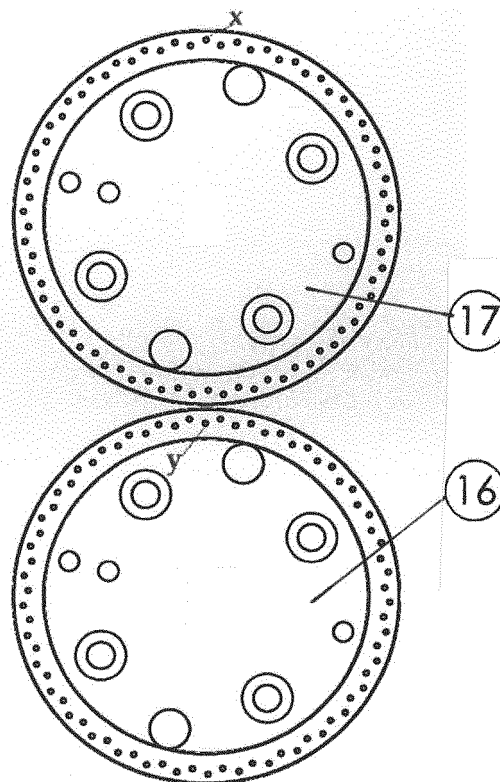


FIGURE 4

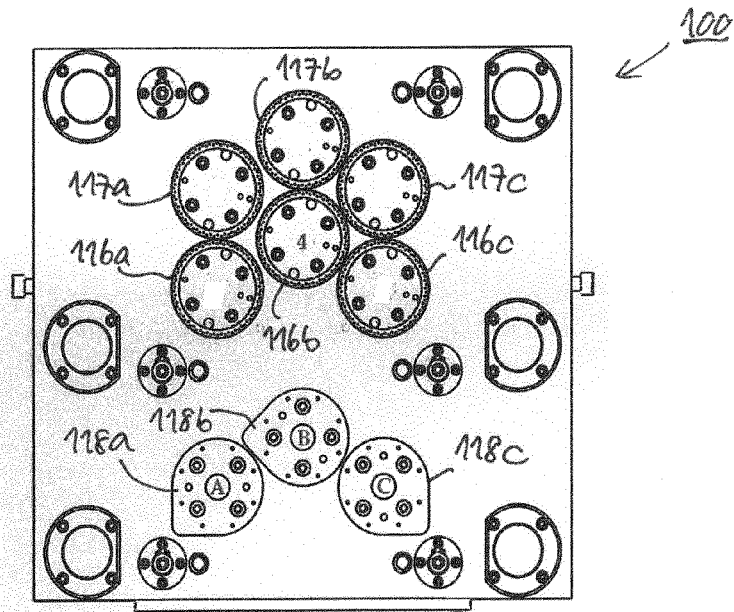


FIGURE 5

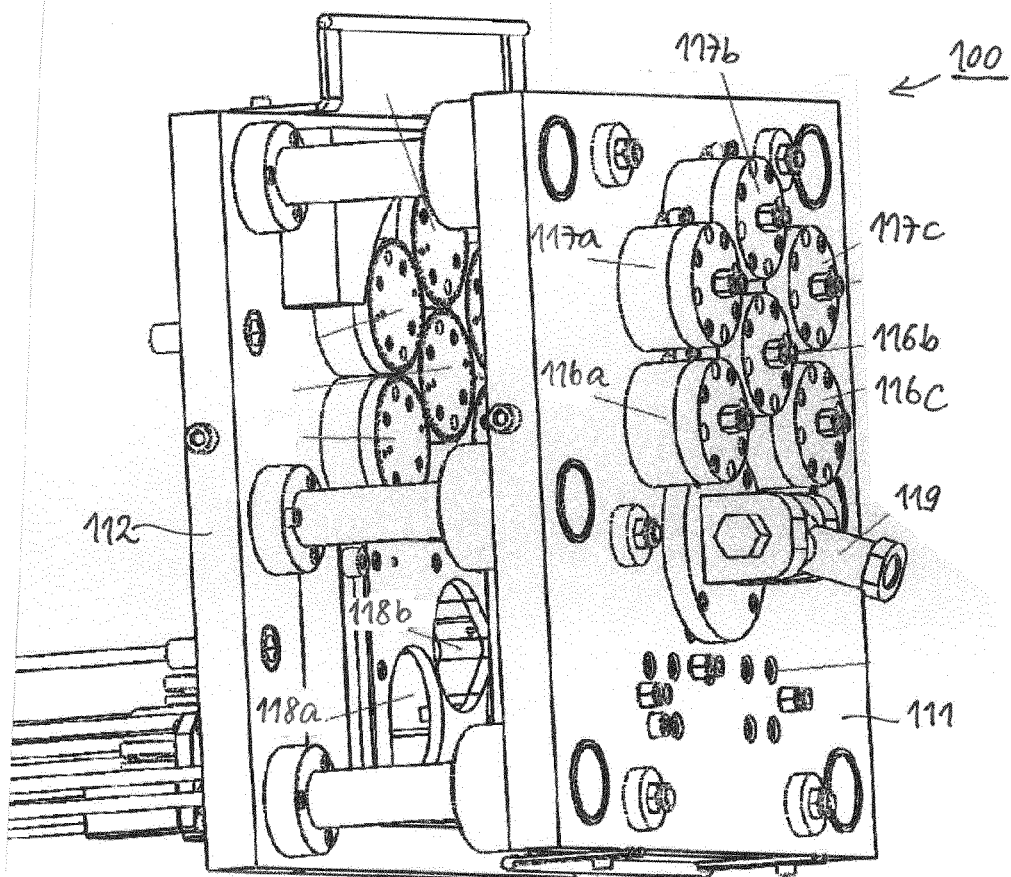


FIGURE 6



EUROPEAN SEARCH REPORT

Application Number
EP 14 18 3225

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 3 February 2015	Examiner Farizon, Pascal
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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