

(19)



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(11)

EP 0 943 544 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
22.09.1999 Bulletin 1999/38

(51) Int Cl.⁶: **B65B 29/02, B65B 9/04**

(21) Application number: **99830142.8**

(22) Date of filing: **17.03.1999**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
 MC NL PT SE**

Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **20.03.1998 IT BO980184**

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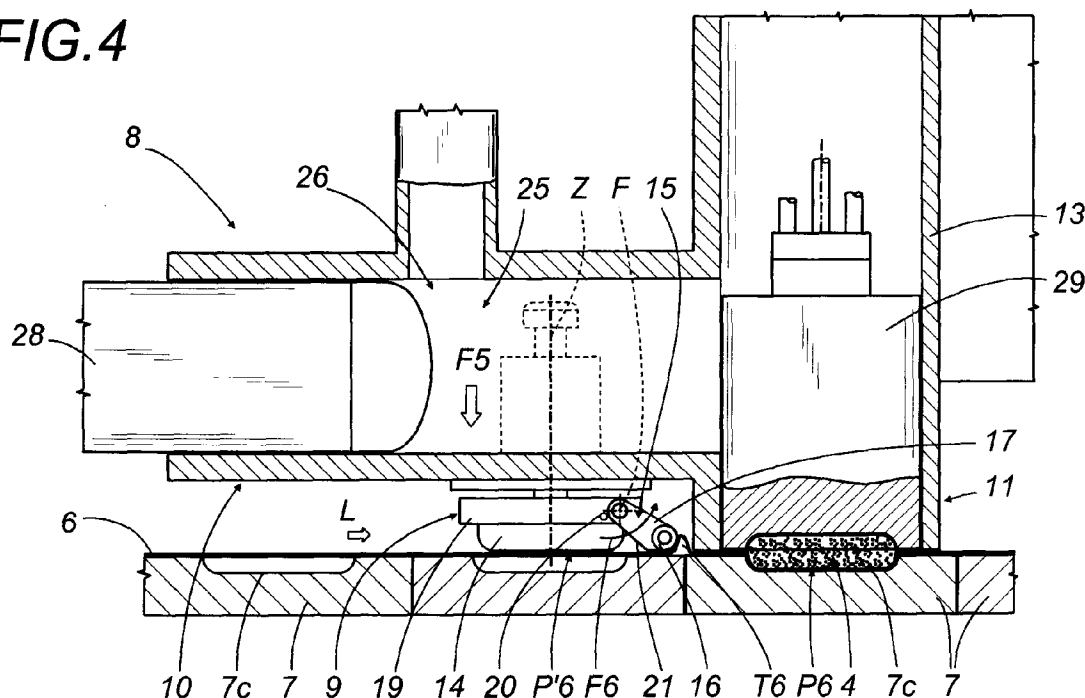
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(54) **A preforming device for machines that make and package pods containing products for infusion**

(57) A preforming device that can be used on machines for making pods (1) containing products for infusion comprises, close to a forming head (14), means (15) for feeding a web (6) along a feed line (L), operating in the zone of the web (6) located between the forming head (14) and a pressing chamber (13), when the form-

ing head (14) is in a non-operating position; said means (15) feed an extra section (T6) of the web (6) towards the pressing chamber (13), then release the web (6) when the forming head (14) moves into an operating position, allowing correct forming of the lower half of the pod (1) without inducing stresses on the lower web.

FIG.4

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Description

[0001] The present invention relates to a preforming device for machines that make and package pods containing products for infusion.

[0002] In the market of products for infusion, such as coffee, tea and camomile, there has been a significant increase in the use, in household or office machines (for medium - small scale use), of single-use pods comprising two portions of filter paper placed one above the other and sealed together to hold the dose of suitably compressed product between them in a circular configuration.

[0003] An example of a machine which makes these pods is described in patent application IT - B095A 000584, which envisages a station for unwinding a first web of filter paper that is fed, in preset steps, along a feed line defining a direction of feed which envisages several stations, normally arranged at least in pairs, since a single web is used to make at least two parallel lines of pods, although in this case, for the purpose of clarity, they are described individually.

[0004] The stations envisage: a set of moulds (defining a conveyor belt) positioned one after another, each shaped in such a way that it defines one half or concave lower portion of the pod matrix, above which the web of filter paper is positioned, fed in step with the moulds; a station for preforming the filter paper on the moulds; a station for defining a product dose, connected to and feeding a station that presses said dose on the filter paper, and designed to create the circular pod; a station which feeds a second web of filter paper over the first web upon which the product is positioned; a station which joins the two webs of filter paper; a station which cuts the individual pods to size and, finally, a station which packages each pod in an individual airtight wrapper. Obviously, the same sequence of stations applies in the case of two or more parallel rows of pods.

[0005] The zone of particular interest in this description is the preforming station, attached to vertically mobile devices, positioned above the line consisting of the moulds and the first web of filter paper; said devices comprise not only the preforming station, but also the dosing station and the station which presses the product dose.

[0006] The dosing station comprises at least one chamber which extends horizontally, the top of which is connected to a product feed hopper and equipped with a piston, mobile in both directions parallel with the direction of feed, and designed to push the dose into the pressing station.

[0007] The preforming station, located immediately upstream of the dosing and pressing stations relative to the direction of feed, comprises a forming head, shaped in such a way that it matches the concavity of the moulds below, and mobile along its vertical axis irrespective of the movement of the mobile device to which it is attached.

[0008] The pressing station comprises a chamber which extends vertically and is cylindrical in shape, within which a product dose pressing cylinder slides in both directions, fed transversally by the piston; the pressing cylinder having a pressing head with a recess that defines the upper half of the pod forming matrix.

[0009] In practice, the succession of stages for preforming and definition of the pod envisages, once a first portion of the web has been preformed and brought under the forming head: lowering of the device to the point at which the pressing chamber is near to the mould (housing the preformed first portion), whilst the subsequent station, comprising units which feed the second web and sealing parts, locks the part of the web downstream of the pressing station; feeding of a given quantity of the product into the dosing chamber with the piston in the back position; a horizontal forward movement of the doser piston with the product dose which falls, under the action of gravity, into the pressing chamber, that is to say, onto the first, preformed portion of the web; vertical lowering of the pressing cylinder so as to form the product dose and, finally, lowering of the paper forming head onto the portion of the web upstream of that located at the pressing chamber, relative to the machine direction of feed.

[0010] When the latter operation is completed, all of the devices rise again, allowing the web to continue to move in the direction of feed, so as to repeat the cycle described above.

[0011] It has been noticed that, during the use of such machines, during the filter paper preforming stages, stresses are created on the web of filter paper, caused in particular by the forming operation performed by the forming head. Said stresses can be reduced around the zone of the web to be preformed upstream of the preforming head (that is to say, from where the web is fed), but they remain present around the zone between the preforming head and the pressing chamber since, as indicated above, the web is held by the sealing station located downstream of the pressing station.

[0012] If they are excessive, during the preforming stage, said stresses may cause the filter paper to break (especially in the zone between the forming head and the pressing chamber), or may fail to prevent the elastic return of the filter paper, which can subsequently lead to unevenness in the definition of the pod in the pressing station and in the subsequent station for sealing the first web to the second, upper web.

[0013] In an attempt to overcome this disadvantage, particularly in those cases in which a web is used to make at least two parallel rows of pods (the most commonly used configurations), longitudinal incisions were made in the web prior to the preforming stage, close to the zones affected by said preforming (as described in particular in another patent application IT - B093A 000194). This system significantly reduces the stresses along directions transversal to the direction of feed, although the stresses along directions longitudinal to the

web remain and cannot be reduced by making further transversal cuts in the web, since such cuts would create difficulties during the final stage of cutting and defining the individual pod, as well as necessitating a further stage and another station on the machine.

[0014] The aim of the present invention is, therefore, to overcome the above-mentioned disadvantages by providing a preforming device for machines of the above-mentioned type, which can be used to preform the filter paper in such a way that the concave configuration is correctly obtained, without altering the basic structure of the preforming station and maintaining the productivity of the preforming, dosing and presser units unchanged.

[0015] The technical features of the present invention, in accordance with the above aims, are apparent in the claims herein, and the advantages are more clearly described in the detailed description below, with reference to the accompanying drawings, which illustrate an embodiment of the invention, without limiting the scope of its application, and in which:

- Figure 1 illustrates part of a machine for the production of pods containing products for infusion, equipped with the preforming device made according to the present invention;
- Figures 2 to 5 are side views with some parts cut away of a scaled-up detail from Figure 1, showing the operating zone of the device disclosed; each figure also illustrates an operating stage of the device disclosed;
- Figure 6 is a top plan view of the device illustrated in Figure 1, seen from point A in Figure 1, with some parts cut away to better illustrate others;
- Figure 7 illustrates a pod obtained using the machine equipped with the device disclosed by the present invention;
- Figure 8 is a side view of a scaled-up detail from Figure 4, with some parts cut away to better illustrate others;
- Figure 9 is a wider schematic side view of the operating zone illustrated in Figures 1 to 4, showing an operating detail which comes after a pressing station.

[0016] With reference to the accompanying drawings, and in particular with reference to Figure 1, the preforming device disclosed by the present invention can be applied to machines for making and packaging pods 1 (one of which can be seen in Figure 7) containing products for infusion, such as tea, coffee, camomile, etc.

[0017] Each pod 1 comprises (again see Figure 7) two lengths 2 and 3 of filter paper, joined together and holding a dose 4 of pressed product.

[0018] Figure 1 shows only part of the machines that make such pods 1, that is to say, the part which concerns the present description, in which there is a station 5 which feeds a web 6 of filter paper from a reel 5b in pre-

set steps along a defined line in a direction of feed L, the line comprising the following: a plurality of moulds 7 (defining a belt) arranged one after another, below the web 6 and in phase with the feed movement of the latter.

[0019] As can also be seen in Figures 2 to 5, each mould 7 has a recess 7c, which defines the matrix for the lower half of the pod 1 to be made.

[0020] For greater clarity, the present description refers to individual operating stations although, as can be seen in Figures 1 and 6, the machines may be configured to include several pairs of stations since, for increased productivity, two or more parallel rows of pods can be made; this fact does not affect the scope of the inventive concept of the present invention, which may be applied in any machine operating situation.

[0021] In Figures 1 to 6, the numeral 8 indicates a unit or device located above the web 6 being fed, which is vertically mobile between a position (see Figure 2) in which it is separated from the web 6 and a position (see Figures 3, 4 and 5) in which it is close to the web. This mobile device 8 comprises a station 9 which preforms the web 6, a product dosing station 10 and a dose 4 pressing station 11.

[0022] More specifically (see Figures 2 to 5), the preforming station 9 comprises a forming head 14 located below the dosing station 10 and upstream of the pressing station 11 relative to the direction of feed L.

[0023] The forming head 14 has a support structure 19 attached to drive means (not illustrated, being of the known type and not part of the subject matter of the present invention), designed to allow the head to move along its vertical axis Z, independently of the device 8, between a raised non-operating position, in which the head 14 is separated from a corresponding mould 7 opposite it, and an operating position, in which the head 14 fits into the recess 7c of the mould 7, with a portion P'6 of web being formed between them.

[0024] The dosing chamber 10 comprises a holding chamber 25, with horizontal axis, which has a radial opening 26 from which the product is fed by a special hopper 27 (see Figure 1) located above said chamber. The chamber 25 houses dosing means 28 which are mobile in both directions along the chamber 25 and are designed to push the product towards the pressing station 11. The latter comprises a cylindrical pressing chamber 13 with vertical axis, open at the base and designed to position itself, when the device 8 is in the above-mentioned position close to the web, so that it is close to a mould 7 and relative portion P6 of preformed web. The web 6 is tensioned and held at a station which seals the web 6 to a second, upper web (not illustrated) which will form the upper section 2 of the finished pod. The sealing station is not illustrated, being of the known type and not part of the subject matter of the present invention.

[0025] The dose 4 pushed by the dosing means 28 falls, under the effect of gravity, onto the portion P6 of the web below and is pressed by a relative presser part

29 (configuration visible in Figures 3, 4 and 5), comprising a cylinder which is vertically mobile inside the pressing chamber 13. This cylinder 29 has a pressing operating head with a recess 29a defining the upper half of the matrix for forming the pods.

[0026] As can be observed in Figures 2 to 5, the numeral 15 indicates means for feeding the web 6 in the direction of feed L. These means 15 are located close to the forming head 14 and act upon the zone of the web 6 between the forming head 14 and the pressing chamber 13 to obtain: the feed of an extra section T6 of the web 6 towards the pressing chamber 13 when the head 14 is in the non-operating position (see Figures 3 and 4) then, the release of the web 6 when the forming head 14 makes contact with the portion P'6 of web to be preformed.

[0027] More specifically with reference to the construction of the machine (see also Figure 6), the feed means 15 are operatively connected to the forming head 14 and comprise a rubber coated roller 16 (Figure 6 shows two rollers, since the feed line consists of two rows of portions P'6 to be preformed) which makes contact with and feeds the web 6 of filter paper. The roller 16 is positioned transversally to the direction of feed L and each end is attached to one end of a corresponding support arm 17 and 18, located outside the web 6.

[0028] The other end of each arm 17 and 18 is pivoted at a point F to the support structure 19 of the forming head 14, so that as the head 14 moves down towards the mould 7 below, the extra section T6 of web can be fed and, when the head 14 is at a tangent to the web 6, the web 6 is released.

[0029] The initial position of the arms 17 and 18 and the feed roller 16 is defined by a pair of pins 20 attached on either side of the support structure 19 of the head 14 and located close to the pivot points F of the arms 17 and 18. In operation, these pins 20 define a relative stop and end of stroke element for a corresponding support arm 17 and 18 when the forming head 14 is in the non-operating position (visible in Figures 2 and 3), so as to obtain an initial or home position of the arms 17 and 18 set at an angle α to the vertical axis Z of movement of the forming head 14.

[0030] Obviously, the roller 16 may be set at a larger or smaller initial angle, depending on the quantity of filter paper, that is to say, the section T6, to be fed.

[0031] In addition, the lower surface 21 of each arm 17 and 18, which makes contact with the mould 7 below, has a wedge-shaped profile with the vertex pointing towards the mould, so as to raise the roller 16 relative to the web 6 when the forming head 14 is at a tangent to or in contact with the portion P'6 of the web, thus allowing almost all of the section T6 to be used for preforming the portion without the stresses caused by the pressure of the head 14 on the web 6.

[0032] In other words, the movement of the feed means 15, depending on the position of the head 14, may be summarised as follows: a first position, in which

the roller 16 simply makes contact with the web 6, with the device 8 in a lowered position and the head 14 in a raised position (Figure 3); a second position, in which the web 6 is fed by the roller 16, unwinding the extra section T6 of filter paper towards the pressing chamber 13, with the forming head 14 in contact with and at a tangent to the portion P'6 to be preformed (see Figures 4 and 8), and a third position, in which the web 6 is released as the forming head 14 passes between the intermediate and the lowered positions.

[0033] The machine thus configured, therefore, allows a method for preforming the first part of the pod 1 through:

- 15 - a first stage, in which the web 6 of filter paper is fed in small steps along the feed line in direction L, and above a plurality of moulds 7, the latter also moving forwards, in phase with the web 6 of filter paper (see Figure 2);
- 20 - a second stage, for positioning a preformed portion P6 of the filter paper with a relative mould 7 at the pressing station 11, and lowering of the device 8 (see arrow F2 in Figure 3);
- a third stage, in which a dose 4 of a product for infusion, from the relative station 10, is fed towards the pressing station 11 (see arrow F3 in Figure 3) with the dose dropping onto the portion P6 of filter paper;
- 25 - a fourth stage, in which the dose 4 fed onto the portion P6 of filter paper is pressed (see arrow F4 in Figure 3);
- a fifth stage, in which a further portion P'6 of filter paper is preformed in the mould 7 by the forming head 14 located upstream of the pressing station 11, which is still in the pressing configuration, relative to the direction of feed L. The method further comprises the following two successive sub-stages between the fourth and fifth stages:
- 30 - a first sub-stage, in which the extra section T6 of filter paper is fed, by the feed means 15, at the zone of the web 6 of filter paper located between the preforming station 9 and the pressing station 11 (see arrows F5 and F6 in Figure 4 and Figure 8) and
- 35 - a second sub-stage, in which the web 6 of filter paper is released by the feed means 15, at the fifth stage for preforming of the further portion P'6 of filter paper (see arrow F7 in Figure 5) with consequent take-up (total or, preferably, partial) of the section T6 towards the portion P'6 during the portion preforming stage (see arrow F8 in Figure 5).
- 40
- 45
- 50

[0034] The extra section T6 is calculated so that its value is sufficient to keep the zone of the web 6, upstream and downstream of the pod 1 being formed (see also Figure 9), and at the pressing station 11, free of stresses, in the web 6 longitudinal direction during the product pressing stage. In other words, the section T6 is not completely used during the portion P'6 forming

stage: a small part of said section, labelled T'6, remains unused even after feeding and positioning of the portion P'6 under the pressing station 11. Figure 9 also shows that this part T'6 of the original section T6 is positioned between the pressing station 11 and the subsequent machine stations (that is to say, a station which feeds a second, upper web and the station which seals the two overlapping webs, not illustrated, being of the known type). This allows the elimination of any stresses on the part of the web 6 downstream of the pressing station 11 (elimination any damage by the sealing station that locks the webs) during the portion P'6 pressing stage, since the unused section T'6 may be used (that is to say, taken-up) during said pressing stage.

[0035] A device structured in this way, therefore, fulfils the above-mentioned aims thanks to the simple addition of a rubber-coated feed roller, in phase with the movement of the forming head, creating a sort of temporary magazine that can be used during the stage for preforming and pressing the portion of filter paper without high stress levels, thus avoiding breaks or unevenness in the product dose during the pressing stage and the risk of such occurrences during the subsequent sealing stage.

[0036] Moreover, the device thus designed does not affect machine construction costs and does not alter machine productivity, being directly connected to the forming head.

[0037] The present invention may be subject to numerous variations, all encompassed by the original design concept. Moreover, all parts may be substituted with technically equivalent elements.

Claims

1. A preforming device for machines for making and packaging pods (1) containing products for infusion, each pod (1) comprising two lengths (2, 3) of filter paper, joined together to hold a dose (4) of pressed product; it being possible to make said pods (1) on machines which include a station (5) which feeds a web (6) of filter paper in preset steps along a line in a direction of feed (L), the line comprising: a plurality of moulds (7) positioned one after another below the web (6) and in phase with the feed of the latter, each mould (7) having a recess (7c) defining the matrix for the lower half of the pod (1); at least one station (9) for preforming the web (6), at least one station (10) for dosing the product and feeding at least one station (11) for pressing the dose (4), the latter having a cylindrical pressing chamber (13), open at the base, and mobile between a raised position, in which it is separated from the web (6), and a lowered position, in which the cylindrical chamber (13) is close to the mould (7) and a relative portion (P6) of the web (6); the preforming station (9) being located upstream of the pressing chamber (13), relative to the direction of feed (L), and comprising a

forming head (14) mobile along its own vertical axis (Z) between a raised, non-operating position, in which the head (14) is separated from a corresponding mould (7) opposite it, and an operating position, in which the head (14) fits into the recess (7c) of the mould (7) with the portion (P6) of web being formed between them, the preforming device being characterised in that it comprises, near the forming head (14), means (15) which feed the web (6) in the direction of feed (L), operating in the zone of the web (6) between the forming head (14) and the pressing chamber (13), when the forming head (14) is in the non-operating position and designed to feed an extra section (T6) of the web (6) towards the pressing chamber (13) and, respectively, to release the web (6) when the forming head (14) passes from the non-operating position to the operating position.

2. The device according to claim 1, characterised in that the feed means (15) are operatively connected to the forming head (14) and are mobile with the latter, defining a series of successive positions, including:

- a first position, in which said means (15) simply make contact with the web (6), when the head (14) is in the raised position;
- a second position, in which the web (6) is fed by said means (15), thus unwinding the extra section (T6) of filter paper towards the pressing chamber (13), when the forming head (14) is in an intermediate position, in which it simply makes contact with the web (6); and
- a third position, in which the web (6) is released when the forming head (14) moves from the intermediate position to the lowered position.

3. The device according to claim 1, characterised in that the feed means (15) are operatively connected to the forming head (14) and comprise at least one roller (16), the latter making contact with and feeding the web (6) of filter paper, said roller being positioned transversally to the direction of feed (L) and attached at each end to one end of a corresponding support arm (17, 18); the other end of each arm (17, 18) being pivoted at a point (F) to a support structure (19) of the forming head (14) in such a way as to allow the respective feed of the extra section (T6) and release of the extra section (T6), depending whether the forming head (14) is in the non-operating position or the operating position.

4. The device according to claim 3, characterised in that the support structure (19) of the forming head (14) has pins (20) on either side, close to the pivot points (F) of the arms (17, 18), the pins being designed to define a stop and end of stroke element

for a corresponding support arm (17, 18) when the forming head (14) is in the non-operating position, thus obtaining an arm (17, 18) home position in which the latter are set at an angle to a vertical axis (Z) of movement of the forming head (14).

5. The device according to claim 3, characterised in that the lower surface (21) of each arm (17, 18), which makes contact with a mould (7) below, has a wedge-shaped profile with the vertex pointing towards the mould (7), being designed to allow the roller (16) to be raised when the forming head (14) is in the operating position. 10
6. The device according to claim 1, characterised in that the preforming station (9), the product dosing station (10) and pressing station (11) constitute a single unit (8) or device that is vertically mobile between a position in which they are separated from the web (6) and a position in which they are close to the web. 15 20
7. A method for preforming portions (P6) of filter paper for the production of pods (1) containing products for infusion; the method comprising the following stages: 25
 - a first stage, in which a web (6) of filter paper is fed in small steps along a line in a direction of feed (L) above a plurality of moulds (7), the latter moving forwards in phase with the web (6) of filter paper; 30
 - a second stage, in which a preformed portion (P6) of the filter paper is positioned with a relative mould (7) at a pressing station (11); 35
 - a third stage, in which a dose (4) of a product for infusion, from a station (10), is fed towards the pressing station (11);
 - a fourth stage, in which the dose (4) fed onto the portion (P6) of filter paper is pressed; 40
 - a fifth stage, in which a further portion (P'6) of filter paper is preformed in the relative mould (7) in a preforming station (9) located upstream of the pressing station (11), still in the pressing configuration, relative to the direction of feed (L), the method being characterised in that it further comprises the following two successive sub-stages, after the fourth stage: 45
 - a first sub-stage, in which an extra section (T6) of filter paper is fed by feed means (15), at the zone of the web (6) of filter paper between the preforming station (9) and the pressing station (11) prior to the fifth, preforming stage; and 50
 - a second sub-stage, in which the feed means (15) release the web (6) of filter paper at the start of the fifth stage for preforming the further portion (P'6) of filter paper. 55

8. The method according to claim 7, characterised in that the extra section (T6) is calculated in such a way that the value is sufficient to keep the zone of the web (6) upstream and downstream of the pod (1) being formed, at the pressing station (11), free of stresses, at least in the longitudinal direction of the web (6), during the pressing stage.

FIG.1

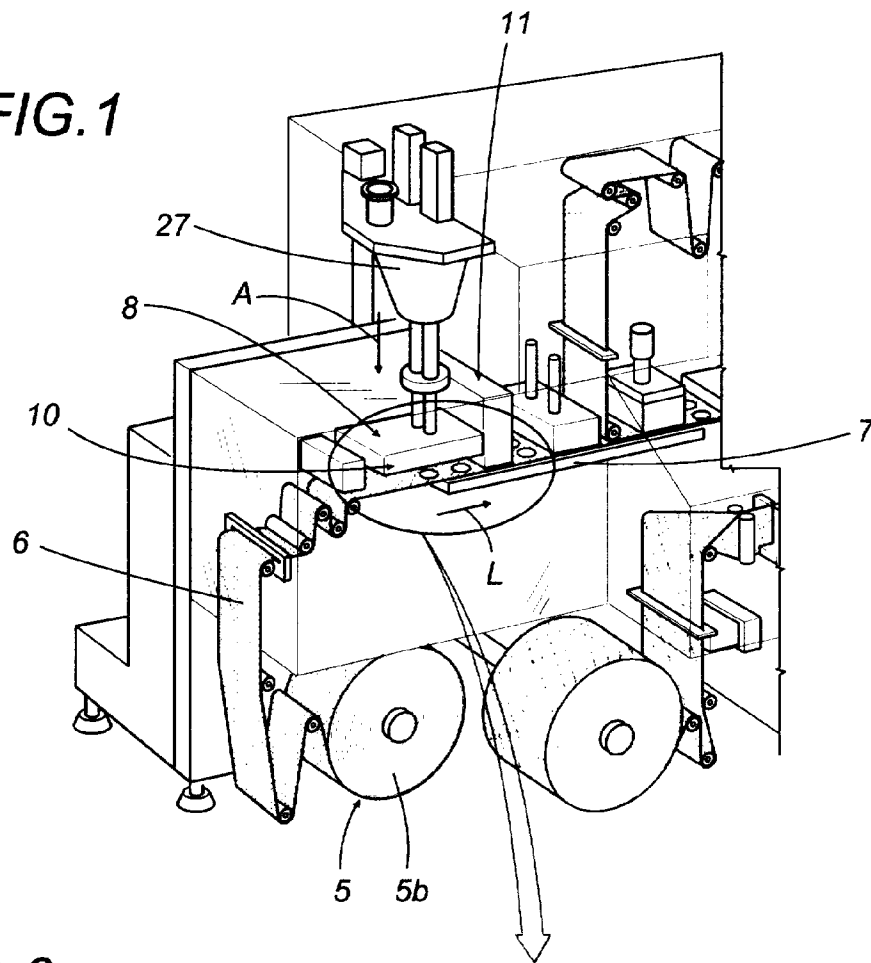


FIG.6

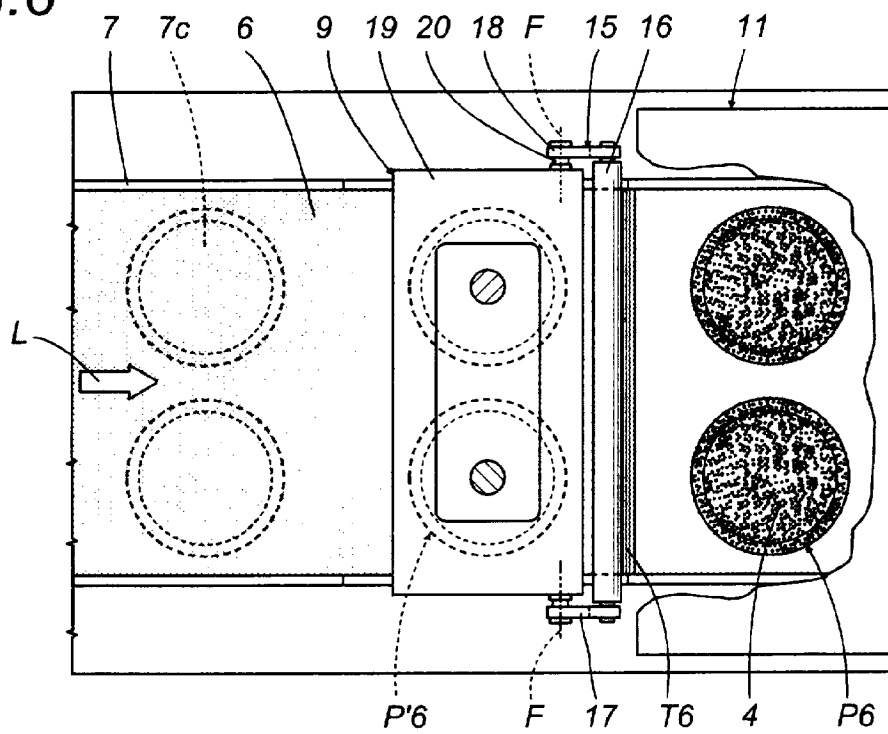


FIG.2

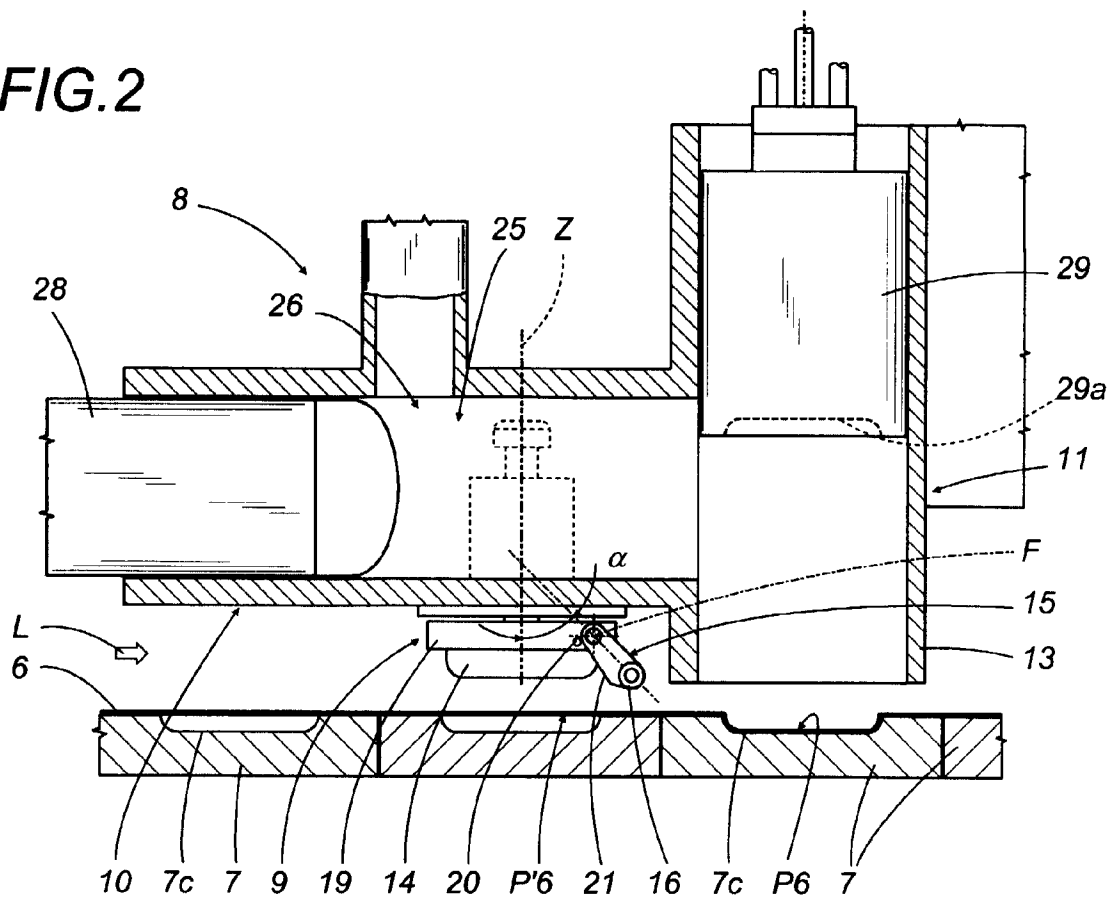


FIG.3

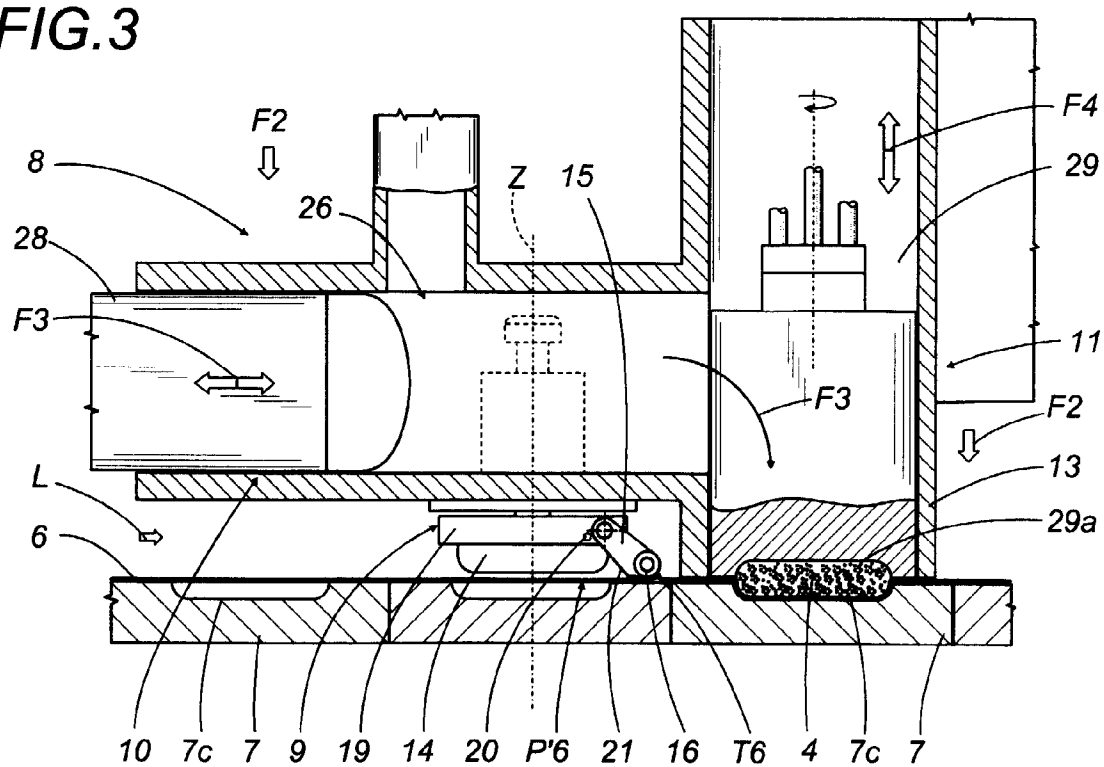


FIG.4

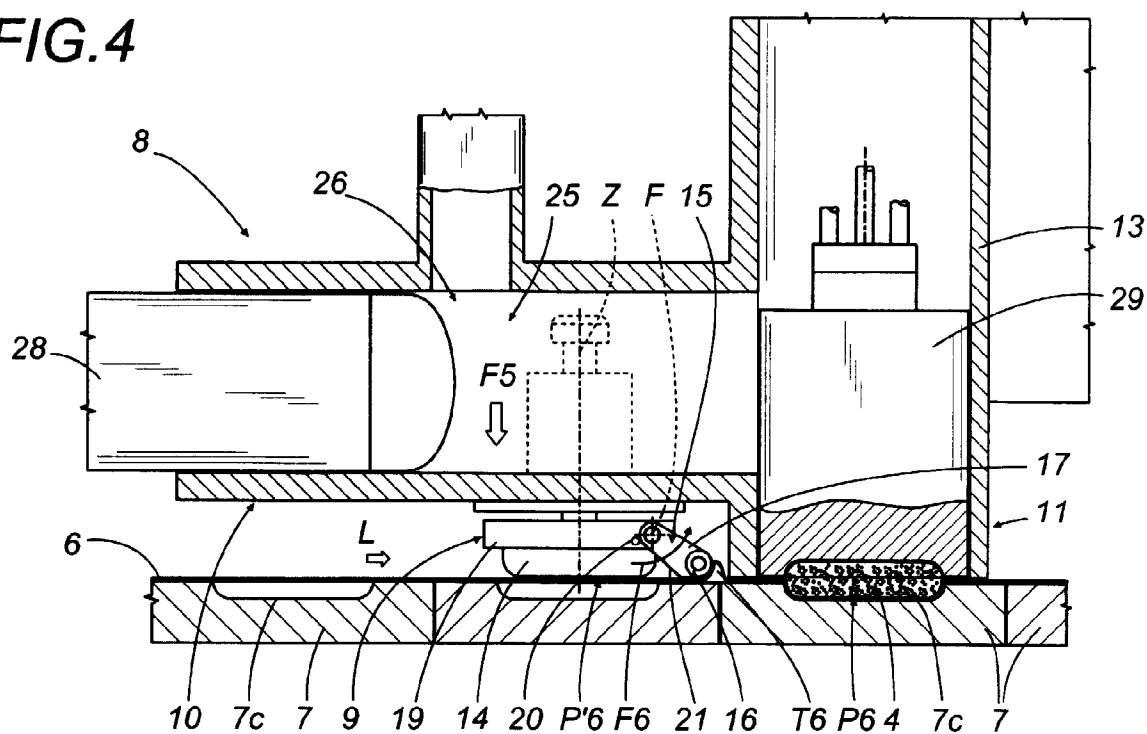


FIG.5

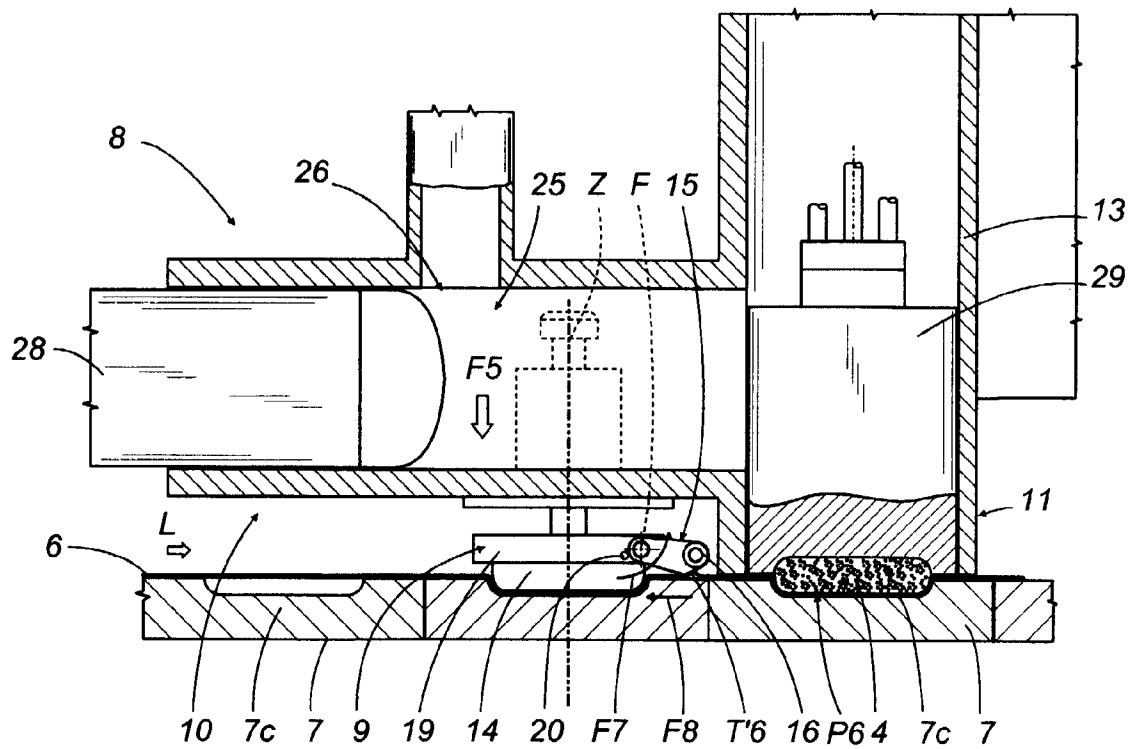


FIG. 8

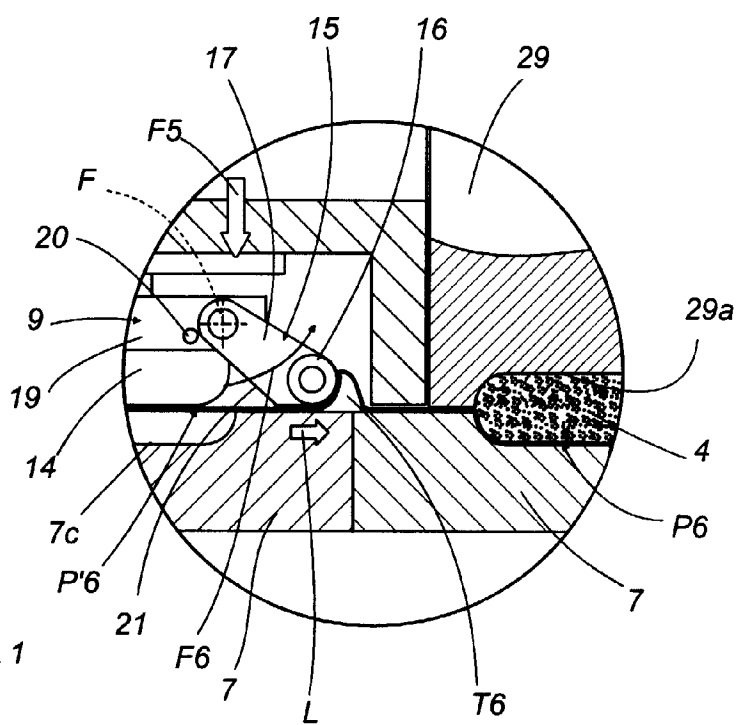


FIG.7

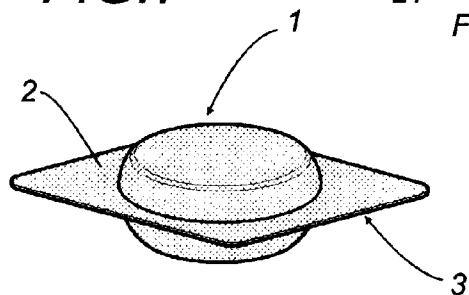
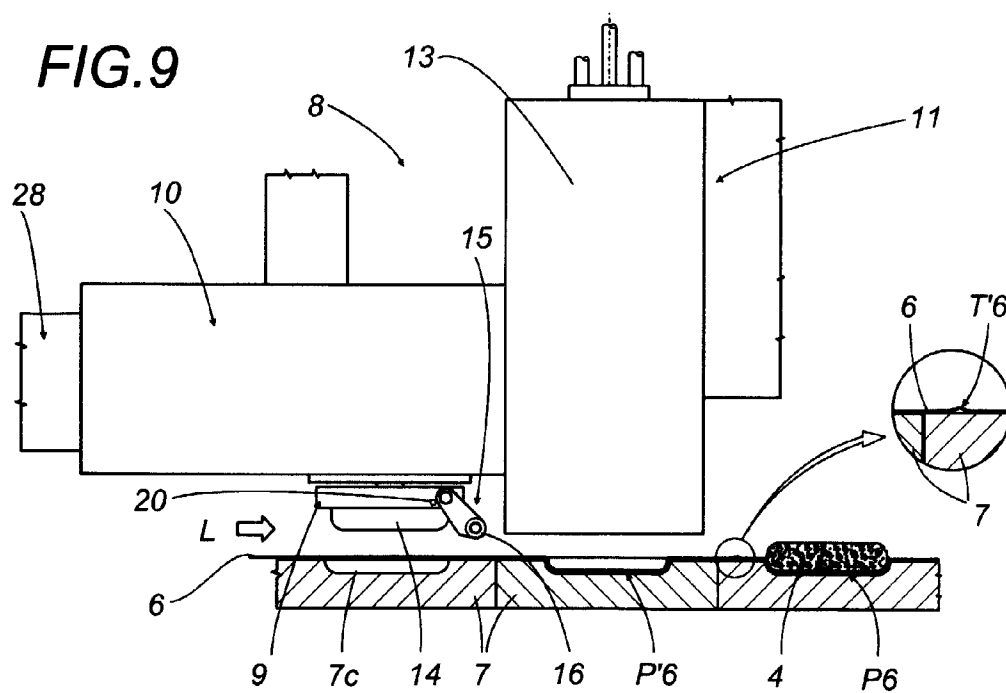


FIG.9





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 99 83 0142

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP 0 225 494 A (ROSSI) 16 June 1987 (1987-06-16) * abstract; figures 1,2 * -----	1,7	B65B29/02 B65B9/04
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			B65B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		8 July 1999	Claeys, H
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 99 83 0142

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