(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 944 579 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
22.03.2017 Bulletin 2017/12

(21) Application number: **15164744.3**

(22) Date of filing: **22.04.2015**

(51) Int Cl.:
B65B 3/14 *(2006.01)* ***B65B 61/02*** *(2006.01)*
B65B 61/18 *(2006.01)* ***B65D 75/58*** *(2006.01)*
B65B 9/02 *(2006.01)* ***B26D 1/04*** *(2006.01)*
B26D 3/08 *(2006.01)*

(54) **INCISION UNIT TO MANUFACTURE A SINGLE-DOSE BREAK-OPEN PACKAGE**

SCHNEIDEINHEIT ZUR HERSTELLUNG EINER EINZELDOSIS-AUFBRECHVERPACKUNG

UNITÉ D'INCISION POUR FABRIQUER UN EMBALLAGE À OUVERTURE PAR RUPTURE POUR DOSE UNIQUE

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **22.04.2014 IT BO20140230**

(43) Date of publication of application:
18.11.2015 Bulletin 2015/47

(73) Proprietor: **Easysnap Technology S.r.l.**
40017 San Giovanni in Persiceto (IT)

(72) Inventor: **Burattini, Christian**
40017 San Giovanni in Persiceto (IT)

(74) Representative: **Maccagnan, Matteo et al**
Studio Torta S.p.A.
Via Viotti, 9
10121 Torino (IT)

(56) References cited:
WO-A2-2008/038074 **WO-A2-2010/100531**
US-A1- 2005 178 086

EP 2 944 579 B1

Description

FIELD OF THE ART

[0001] The present invention relates to an incision unit for a packaging machine for single-dose break-open packages.

PRIOR ART

[0002] A sealed single-dose break-open package normally consists of a sheet made of a semirigid plastic material and of a sheet made of a flexible plastic material arranged on top of and sealed to each other in order to define a sealed pocket containing a dose of product; the semirigid plastic material sheet centrally has an incision which guides a controlled breaking of the semirigid plastic material sheet. In use, in order to open the package, a user simply needs to grip the package itself with his/her fingers and bend the package until the semirigid plastic material sheet breaks at the incision.

[0003] Patent application WO2008038074A1 suggests a packaging machine which manufactures sealed single-dose break-open packages. In such a packaging machine, a strip made of a semirigid plastic material and a strip made of a flexible plastic material are unwound from respective reels and fed to a forming station. A pattern is printed on the outer surface of the semirigid plastic material strip and an incision is cut into the semirigid plastic material strip upstream of the forming station; in particular, two incisions are cut at different times (i.e. not simultaneously) into the opposite surfaces of the semirigid plastic material strip, which incisions are opposite and aligned by means of two incision devices arranged one next to the other in the conveying direction of the semirigid plastic material strip. After that, the semirigid plastic material strip and the flexible plastic material strip are arranged on top of each other in the forming station and then sealed in a longitudinal sealing station in order to define a tube adapted to contain the product. A dosing device is arranged at the longitudinal sealing station to feed the product between the two strips which were longitudinally sealed. A transversal sealing station is arranged downstream of the longitudinal sealing station to perform a transversal sealing so as to close the pocket of each sealed single-dose package. Finally, a cutting station is arranged downstream of the transversal sealing station, where the two strips are cut transversely so as to separate, in sequence, the sealed single-dose packages.

[0004] However, it has been noted that, when operating at high speed in the above-described packaging machine, the incision of the semirigid plastic material strip not always has an optimal quality (in particular, the two incisions cut into the opposite surfaces of the semirigid plastic material strip are not always perfectly aligned to each other).

DESCRIPTION OF THE INVENTION

[0005] It is the object of the present invention to provide for an incision unit for a packaging machine which manufactures a single-dose break-open package, which incision unit is free from the above-described drawbacks, and in particular is easy and cost-effective to be implemented.

[0006] According to the present invention, an incision unit to manufacture a single-dose break-open package is provided as defined in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The present invention will now be described with reference to the accompanying drawings, which show a non-limiting embodiment thereof, in which:

- figure 1 shows a top perspective view of a sealed single-dose break-open package;
- figure 2 shows a bottom perspective view of the package in figure 1;
- figure 3 shows a cross-section of a semirigid plastic material sheet of the package in figure 1;
- figure 4 shows a diagrammatic perspective view, with parts removed for clarity, of a packaging machine manufactured according to the present invention for producing the package in figure 1;
- figures 5-8 are four diagrammatic top views, with parts removed for clarity, of an incision unit of the packaging machine in figure 4 during four different operation moments;
- figure 9 is a diagrammatic section view, with parts removed for clarity, of a printing unit of the packaging machine in figure 4; and
- figure 10 is a diagrammatic perspective view, with parts removed for clarity, of a dosing unit of the packaging machine in figure 4.

PREFERRED EMBODIMENTS OF THE INVENTION

[0008] In figures 1 and 2, reference numeral 1 indicates as a whole a sealed single-dose break-open package. Package 1 comprises a sheet 2 made of a semirigid plastic material and rectangular in shape, and a sheet 3 made of a flexible plastic material, which is arranged on top of and sealed to the semirigid plastic material sheet 2 in order to define a sealed pocket 4 containing a dose of a fluid product 5. By way of example, the fluid product 5 could be a sanitizing gel.

[0009] The semirigid plastic material sheet 2 centrally has a pre-weakened zone 6 which guides a controlled breakage of sheet 2 so as to determine the formation of an outlet opening for product 5 through sheet 2. In other words, in use, in order to open package 1 a user needs to grip package 1 with his/her fingers and bend package 1 until the semirigid plastic material sheet 2 breaks at the pre-weakened zone 6.

[0010] As shown in figure 3, the pre-weakened zone 6 comprises an internal incision 7 which is cut through an inner surface 8 (i.e. facing pocket 4) of the semirigid plastic material sheet 2 and an outer incision 9 which is cut through an outer surface 10 of the semirigid plastic material sheet 2. According to a preferred embodiment, each incision 7 or 9 is of variable depth along its length so as to determine a progressive breaking of the semirigid plastic material sheet 2; in particular, each incision 7 or 9 has a maximum depth at a central portion.

[0011] In figure 4, reference numeral 11 indicates as a whole a packaging machine to produce sealed single-dose packages 1 similar to that described above and shown in figures 1 and 2. The packaging machine 11 shown in figure 4 produces three sealed packages 1 at a time, i.e. operates in parallel on three adjacent tracks to produce three sealed packages 1 at a time; according to other variants (not shown), the packaging machine 11 could obviously operate in parallel on a different number of tracks arranged one next to the other (e.g. two, four, six tracks but also a single track).

[0012] The packaging machine 11 (shown in figure 4) comprises a frame (not shown) resting on the floor by means of a plurality of resting feet (not shown) and supports a pair of unwinding devices 12 and 13. The unwinding device 12 supports a reel 14 from which it progressively unwinds a strip 15 of semirigid (yet elastically deformable) plastic material which is fed to a forming station 16, and the unwinding device 13 supports a reel 17 from which it progressively unwinds a strip 18 made of a flexible plastic material which is also fed to the forming station 16.

[0013] A printing unit 19 is arranged between the unwinding device 12 of the semirigid plastic material strip 15 and the forming station 16, where the outer surface 10 of the semirigid plastic material sheet 2 is printed.

[0014] An incision unit 20 is arranged downstream of the printing unit 19 and upstream of the forming station 16, and transversely cuts the semirigid plastic material strip 15 in order to define the incisions 7 and 9 at the pre-weakened zone 6 along the semirigid plastic material strip 15.

[0015] According to a preferred embodiment, the semirigid plastic material strip 15 is continuously fed through the incision unit 20; to this end, the incision unit 20 comprises a conveying device 21 provided with a pair of feeding dandy rollers 22. The feeding dandy rollers 22 are movable against the action of elastic means to allow the semirigid plastic material strip 15 to temporarily stop inside the incision unit 20.

[0016] As shown in figure 4, the semirigid plastic material strip 15 provided with the incisions 7 and 9 is then fed to the forming station 16, which is arranged downstream of the incision unit 20 and where the semirigid plastic material strip 15 is arranged on top of and sealed to the flexible plastic material strip 18.

[0017] The two strips 15 and 18 arranged one on top of the other are sealed to each other by means of a longitudinal roller sealing device 23 which performs a longitudinal sealing (both laterally and centrally), i.e. parallel to a conveying direction, so as to define a plurality of tubes arranged one next to the other. In the embodiment shown in figure 4, the longitudinal sealing device 23 comprises two twin sealing assemblies arranged one on top of the other, each of which has a contrast roller 24 and four sealing rollers 25 which are electrically heated and spaced apart from one another.

[0018] A dosing unit 26 to feed a dose of product 5 into each tube between the semirigid plastic material strip 15 and the flexible plastic material strip 18 is arranged in the forming station 16 and at the longitudinal sealing device 23. The dosing unit 26 comprises three twin feeding ducts 27, each of which is vertically arranged between two sealing rollers 25 of the longitudinal sealing device 23 and feeds the doses of product 5 between the semirigid plastic material strip 15 and the flexible plastic material strip 18.

[0019] Finally, the forming station 16 comprises a transversal roller sealing device 28, which is arranged downstream of the longitudinal sealing device 23 and transversely seals together the two strips 15 and 18 in order to define a series of pockets 4 (shown in figure 1) along each tube, each of which contains a dose of product 5. According to a preferred embodiment, the transversal sealing device 28 comprises a contrast roller 29 and a sealing roller 30, which is electrically heated and cooperates with the contrast roller 29.

[0020] Finally, a cutting device 31 is arranged downstream of the forming station 16 so as to cut transversely the strips 15 and 18 arranged one on top of the other and sealed so as to separate in sequence the sealed single-dose packages 1. An outlet conveyor belt 32 is arranged under the cutting device 31, on which the sealed single-dose packages 1 fall by gravity once they have been separated from the strips 15 and 18 arranged on top of and sealed to each other.

[0021] The flexible plastic material strip 18 is normally pre-printed, whereas, as previously said, the semirigid plastic material strip 15 is printed inside the packaging machine 11 by using the printing unit 19; according to an alternative embodiment, the printing unit 19 is not present (or is disabled), therefore the semirigid plastic material strip 15 is also pre-printed (or without prints). The flexible plastic material strips 15 and/or 18 are generally provided with reference notches, which are read by special optical sensors to synchronize the several operations appropriately, so that the printed zones are correctly centered in the finished sealed single-dose packages 1. The reference notches are preferably printed in the zones of strips 15 and/or 18 which are discarded by the cutting device 31 so as not to be present in the finished sealed single-dose packages 1.

[0022] As shown in figure 9, the printing unit 19 of the semirigid plastic material strip 15 comprises a conveying device 33 (diagrammatically shown) which feeds the semirigid plastic material strip 15 along a (substantially

vertical) conveying direction C, and a printing device 34 arranged in a fixed position along the conveying device 33 and facing the outer surface 10 of the semirigid plastic material strip 15 so as to print a pattern on the strip 15 itself. The printing device 34 is a heat transfer printing device and comprises a printing head 35, which is movable perpendicularly to the conveying direction C along a printing direction S so as to contact the semirigid plastic material strip 15; in other words, in use, the printing head 35 is movable along the printing direction S, which is orthogonal to the conveying direction C and orthogonal to the semirigid plastic material strip 15 so as to come into contact with the outer surface 10 of the semirigid plastic material strip 15. Therefore, in use, the printing head 35 contacts the semirigid plastic material strip 15 with a given pressure so as to print a pattern on the semirigid plastic material strip 15.

[0023] The printing device 34 further comprises a fixed contrast plate 36 (i.e. in a fixed position), which is independent and separate from the conveying device 33, is arranged in a fixed position along the conveying device 33, and is arranged parallel to and facing the printing device 34 so that the semirigid plastic material strip 15 is arranged between the contrast plate 36 and the printing device 34. When the printing head 35 moves towards the semirigid plastic material strip 15, the printing head 35 presses the semirigid plastic material strip 15 against the contrast plate 36 and therefore the printing head 35 may exert a given pressure on the outer surface 10 of the semirigid plastic material strip 15, which pressure is required to carry out the printing process properly.

[0024] The contrast plate 36 comprises a plurality of nozzles 37, each of which opens up onto the semirigid plastic material strip 15 and is adapted to release a compressed air blow. In particular, each nozzle 37 consists of a through hole, which is obtained through the contrast plate 36 and receives the compressed air by means of a pipe 39 connected to a compressed air source 40. The compressed air blown by the nozzles 37 creates a pressurized air cushion 38 at the inner surface 8 of the semirigid plastic material strip 15, which inner surface 8 is opposite to the outer surface 10 and thus opposite to the printing device 34. The air cushion 38 thus made creates a deformable contrast which allows the printing head 35 to create a constant and even pressure against the outer surface 10 of the semirigid plastic material strip 15; in other words, the air cushion 38 is deformed in a variable and dynamic manner so as to adapt perfectly to the shape of the printing head 35, thus ensuring a completely even contact between the printing head 35 and the outer surface 10 of the semirigid plastic material strip 15. In summary, the contrast plate 36 comprises a plurality of nozzles 37, which open up onto the inner surface 8 of the semirigid plastic material strip 15 and are adapted to release a compressed air blow to create the pressurized air cushion 38 at the inner surface 8 of the semirigid plastic material strip 15, opposite to the printing device 34; the air cushion 38 forms a deformable contrast against which the printing head 35 pushes the semirigid plastic material strip 15. Thereby, the printing head 35 may operate under the most favorable conditions allowing a high quality pattern to be obtained in very short times (i.e. also when the packaging machine 11 operates at high speed).

[0025] According to a preferred embodiment, in order to maximize the effectiveness of the contrasting action of the air cushion 38, the compressed air is fed to the nozzles 37 with a pressure from 2 to 6 bar (preferably from 3 to 5 bar).

[0026] According to an alternative embodiment (not shown), the printing device 34 may use a printing technology other than heat transfer (e.g. it might use ink-jet); in this case, the printing head 35 is fixed (i.e. does not translate perpendicularly to the semirigid plastic material strip 15).

[0027] As shown in figure 4, the incision unit 20 cooperates with the conveying device 21 which feeds the semirigid plastic material strip 15 along the conveying direction C. The incision unit 20 comprises two support plates 41, which are arranged along the conveying device 21 downstream of the feeding dandy rollers 22 so that the feeding dandy rollers 22 cyclically allow the semirigid plastic material strip 15 to temporarily stop between the two support plates 41. The two support plates 41 are arranged on opposite sides of the semirigid plastic material strip 15; therefore, each support plate 41 faces a corresponding surface 8 or 10 of the semirigid plastic material strip 15.

[0028] As shown in figures 5-8, the incision unit 20 is provided with six incision devices 42, each of which cuts an incision 7 or 9 (shown in figure 3) into a corresponding surface 8 or 10 of the semirigid plastic material strip 15; in particular, three incision devices 42a, which are arranged one next to the other, cut respective inner incisions 7 into the inner surface 8 of the semirigid plastic material strip 15 and three incision devices 42b, which are arranged one next to the other, cut respective outer incisions 9 into the outer surface 10 of the semirigid plastic material strip 15. Each incision device 42 comprises a cutting element 43 supported by a support plate 41 and facing the corresponding surface 7 or 9 of the semirigid plastic material strip 15, and a contrasting element 44 supported by the other support plate 41 and facing the corresponding surface 9 or 7 of the semirigid plastic material strip 15. Each cutting element 43 is provided with a blade (not shown in detail) which is preferably V-shaped; in contrast, each contrast element 44 is flat so as to provide the blade of the corresponding cutting element 43 with an even contrast.

[0029] The two support plates 41 are mechanically connected together so as to move synchronously along a translation direction T which is orthogonal to the conveying direction C; in particular, the two support plates 41 are mounted so as to be movable on corresponding rails 45 so as to translate (slide) together along the translation direction T, which is orthogonal to the conveying direction C. In other words, the two support plates 41 are

provided with corresponding slides, which are slidingly coupled to the rails 45 so as to translate (slide) along the translation direction T under the control of an actuating device 46 (e.g. of the electric or pneumatic type). The six incision devices 42 are arranged one next to the other and are aligned along the translation direction T. The actuating device 46 cyclically moves the two support plates 41 forward and backward along the translation direction T between a first position (shown in figures 5 and 6), in which the incision devices 41a cut the inner incisions 7 into the inner surface 8 of the semirigid plastic material strip 15, and a second position (shown in figures 7 and 8), in which the incision devices 41b cut the outer incisions 9 into the outer surface 10 of the semirigid plastic material strip 15.

[0030] Each support plate 41 supports the cutting elements 43 of an incision device 42a or 42b and the contrast elements 44 of the other incision device 42b or 42a; in other words, each support plate 41 supports both three cutting elements 43 and three contrast elements 44.

[0031] A support plate 41 is movably mounted on corresponding rails 47 so as to translate (slide) cyclically forward and backward towards the other support plate 41 and along an incision direction I, which is orthogonal to both the conveying direction C and the translation direction T. In other words, a support plate 41 is provided with corresponding slides which are slidingly coupled to the rails 47 so as to translate (slide) along the incision direction I under the control of an actuating device 48 (e.g. of the electric or pneumatic type).

[0032] In a preferred embodiment shown in the accompanying figures, each incision device 42 comprises an adjusting organ 49 (e.g. a micrometer) to adjust the depth of incision 7 or 9 by varying the relative position between the corresponding cutting element 43 or the corresponding contrast element 44 and the respective support plate 41. Each adjusting organ 49 is coupled to the cutting element 43 or to the contrast element 44 of the same incision device 42 and is adapted to adjust the distance between the cutting element 43 or the contrast element 44 and the semirigid plastic material strip 15.

[0033] In a preferred embodiment shown in the accompanying figures, the adjusting organs 49 are all arranged on the same support plate 41 so as to facilitate the access by an operator to the adjusting organs 49; in other words, if all the adjusting organs 49 are arranged on the same support plate 41, it is sufficient to allow an operator to access said support plate 41 in order to act on all the adjusting organs 49.

[0034] The operation of the incision unit 20 is described below with reference to figures 5-8.

[0035] Firstly, the semirigid plastic material strip 15 is arranged at the incision devices 42a (figure 5), i.e. is arranged between the incision devices 42a. At this point and as shown in figure 6, the two support plates 41 are approached each other by operating actuator 48, which translates a support plate 41 along the rails 47 and in the incision direction I; such a relative movement between the two support plates 41 leads the incision devices 42a to cut the inner surface 8 of the semirigid plastic material strip 15 (by approaching together the corresponding cutting elements 43 and contrast elements 44) so as to cut the inner incisions 7 (the incision devices 42b also perform an incision movement, although without practical effects since the semirigid plastic material strip 15 is not present between the incision devices 42b).

[0036] Once the cutting of the inner incisions 7 into the inner surface 8 of the semirigid plastic material strip 15 has been completed, the support plates 41 are brought back to their initial distance (figure 5); the two support plates 41 are then translated together by operating actuator 46 so as to move the two support plates 41 laterally in the translation direction T in order to invert the incision devices 42 coupled to the semirigid plastic material strip 15. In other words, firstly the incision devices 42a are coupled to the semirigid plastic material strip 15 (figure 5), whereas at the end of the lateral translation of the two support plates 41, the incision devices 42b are coupled to the semirigid plastic material strip 15 (figure 7).

[0037] At this point and as shown in figure 8, the two support plates 41 are approached each other by operating actuator 48, which translates a support plate 41 along the rails 47 and in the incision direction I; such a relative movement between the two support plates 41 leads the incision devices 42b to cut the outer surface 10 of the semirigid plastic material strip 15 (by approaching together the corresponding cutting elements 43 and contrast elements 44) so as to cut the outer incisions 9 (the incision devices 42a also perform an incision movement, although without practical effects since the semirigid plastic material strip 15 is not present between the incision devices 42a).

[0038] Once the cutting of the outer incisions 9 into the outer surface 10 of the semirigid plastic material strip 15 has been completed, the cycle of the incision unit 20 is completed and the semirigid plastic material strip 15 is fed from the conveying device 21 along the conveying direction C.

[0039] The semirigid plastic material strip 15 does not move (i.e. is stationary in the same position) between the cutting of the inner incisions 7 into the inner surface 8 of the semirigid plastic material strip 15 and the cutting of the outer incisions 9 into the outer surface 10 of the semirigid plastic material strip 15, since the incision devices 42 supported by the two support plates 41 perform a lateral translation; thereby, the incisions 7 and 9 have an almost perfect alignment with respect to each other since it is totally free from possible errors due to the incorrect positioning of the semirigid plastic material strip 15.

[0040] As shown in figure 10, the dosing unit 26 comprises a tank 50 holding the fluid product 5 and three feeding ducts 27, each of which originating from tank 50 and ending with a delivery mouth 51 which is arranged at the longitudinal sealing device 23. A pump 52 is arranged along each feeding duct 27 so as to feed the fluid product 5 from tank 50 towards the delivery mouth 51.

[0041] Each pump 52 is a volumetric pump of peristaltic type (i.e. is a peristaltic pump) so as to provide for a precise dosing of product 5. According to a preferred embodiment, each peristaltic pump 52 has an impeller which supports a plurality of thrust elements (not less than four thrust elements and preferably eight thrust elements).

[0042] According to a preferred embodiment, tank 50 is pressurized at a pressure which is higher than the atmospheric pressure; such a feature allows the suction of product 5 by the peristaltic pumps 52 to be enhanced thus avoiding the occurrence of "voids" along the feeding ducts 27 and increasing the precision of dosing product 5. In particular, tank 50 has at least one nozzle 53, which is arranged in an upper portion of tank 50 and is adapted to blow a compressed air jet into tank 50, which keeps the internal volume of tank 50 under pressure (i.e. pressurized).

[0043] According to a preferred embodiment, a shutoff valve 54 is included, which is arranged along each feeding duct 27 upstream of the corresponding peristaltic pump 52. The shutoff valves 54 allow the flow of product 5 along the feeding ducts 27 to be stopped when the packaging machine 11 is stopped (with the packaging machine 11 stopped and in the absence of the shutoff valves 54, a small amount of product 5 would continue to flow by gravity along the feeding ducts 27).

[0044] The dosing unit 26 allows the fluid product 5 (in particular a sanitizing gel) to be dosed with high precision (of the order of $\pm$2-3%) even in the case of very small amounts (e.g. of the order of one millimeter of fluid product in each single-dose package 1). Such a result is also achieved, *inter alia*, by using peristaltic pumps 52 which maintain a high precision even in the case of low volumetric capacity.

[0045] The above-described packaging machine 11 has three production lines arranged one next to the other and operating in parallel; a different number of production lines can obviously be provided as a function of the throughput required (e.g. a single production line or two, four or more production lines).

[0046] In known packaging machines, dosing very small doses of fluid product (of the order of one millimeter of fluid product in each single-dose package) might result in a relatively low precision (with an error of the order of $\pm$6-8%). To solve this problem, a dosing unit 26 may be used, comprising: a tank 50 holding a fluid product 5; at least one feeding duct 27, which originates from tank 50 and ends with a delivery mouth 51; and a peristaltic pump 52 which is arranged along the feeding duct 27 so as to feed the fluid product 5 from tank 50 to the delivery mouth 51, where tank 50 is pressurized at a pressure which is higher than the atmospheric pressure.

[0047] Preferably, tank 50 has at least one nozzle 53, which is arranged in an upper portion of tank 50 and is adapted to blow a compressed air jet into tank 50. Preferably, the peristaltic pump 52 has an impeller which supports at least four thrust elements. Preferably, the peristaltic pump 52 has an impeller which supports eight thrust elements. A shutoff valve 54 is preferably provided, which is arranged along the feeding duct 27 upstream of pump 52.

[0048] In known packaging machines, it has been noted that, when operating at high speed, the pattern of the semirigid plastic material strip has not always an optimal quality. In particular, the pattern might be incomplete, i. e. have some larger or smaller zones with no printing, due to a non-optimal contact between a printing head of a printing device and the semirigid plastic material strip during the printing process. In order to improve the contact between the printing head and the semirigid plastic material strip, it has been suggested to decrease the distance between the printing device and a fixed contrast opposed to the printing device so as to increase the pressure with which the printing head pushes the semirigid plastic material strip against the contrast; however, such a solution might determine the occurrence of an excessive mechanical stress on the printing head, which stress might lead in a short time to breakage of the printing head. In order to solve this problem, a printing unit 19 may be used, comprising: a conveying device 33, which feeds strip 15 along a conveying direction C; a printing device 34 facing a first surface 10 of strip 15 so as to print a pattern on strip 15; and a contrast plate 36, which is parallel to and faces the printing device 34 so that strip 15 is arranged between the contrast plate 36 and the printing device 34, where the contrast plate 36 comprises at least one nozzle 37, which opens up onto a second surface 8 of strip 15 and is adapted to release a compressed air blow. The compressed air blown by nozzle 37 preferably creates a pressurized air cushion 38 at the second surface 8 of strip 15 opposite to the printing device 34. The contrast plate 36 preferably comprises a plurality of nozzles 37 spaced apart from one another. Preferably, the printing device 34 is a heat transfer printing device. The printing device 34 preferably comprises a printing head 35 which is movable along a printing direction S orthogonal to the conveying direction C and orthogonal to strip 15. The compressed air is preferably fed to nozzle 37 with a pressure from 2 to 6 bar. The compressed air is preferably fed to nozzle 37 with a pressure from 3 to 5 bar.

Claims

1. A unit (20) for the incision of a strip (15) made of a plastic material to cut two distinct incisions (7, 9) into two opposite surfaces (8, 10) of the strip (15) in a packaging machine (11) to manufacture a sealed single-dose break-open package (1); the incision unit (20) comprises:

   a conveying device (21), which feeds the strip (15) along a conveying direction (C);
   two support plates (41), which are arranged on opposite sides of the strip (15), so that each sup-

port plate (41) faces a corresponding surface (8; 10) of the strip (15); and
at least two incision devices (42), each of which cuts an incision (7; 9) into a corresponding surface (8; 10) of the strip (15) and comprises a cutting element (43), which is supported by a support plate (41), and a contrast element (44), which is supported by the other support plate (41);
the incision unit (20) is **characterised in that**:

the two support plates (41) are mobile so as to translate together along a translation direction (T), which is orthogonal to the conveying direction (C);
the two incision devices (42) are arranged one next to the other and are aligned along the translation direction (T); and
a first actuating device (46) is provided, which cyclically moves the two support plates (41) forward and backward along the translation direction (T) between a first position, in which a first incision device (42a; 42b) is operated so as to cut a first incision (7; 9), and a second position, in which a second incision device (42b; 42a) is operated so as to cut a second incision (9; 7), which is opposite to the first incision (7, 9).

2. An incision unit (20) according to claim 1, wherein each support plate (41) supports the cutting element (43) of an incision device (42) and the contrast element (44) of the other incision device (42).

3. An incision unit (20) according to claim 1 or 2, wherein each cutting element (43) comprises a blade.

4. An incision unit (20) according to claim 3, wherein each blade is V-shaped and each contrast element (44) is flat.

5. An incision unit (20) according to any of the claims from 1 to 4, wherein each incision device (42) comprises an adjusting organ (49), which is coupled to the cutting element (43) or to the contrast element (44) and adjusts the distance between the cutting element (43) or the contrast element (44) and the strip (15).

6. An incision unit (20) according to claim 5, wherein the adjusting organs (49) are all arranged on a same support plate (41).

7. An incision unit (20) according to any of the claims from 1 to 6, wherein at least one support plate (41) is mobile so as to cyclically move forward and backward, due to a second actuating device (48), towards the other support late (41) and along an incision direction (I), which is perpendicular to the strip (15) and perpendicular to both the conveying direction (C) and the translation direction (T).

8. An incision unit (20) according to any of the claims from 1 to 7, wherein the conveying device (21) comprises at least one feeding dandy roller (22), which is arranged upstream of the support plates (41) and is mobile so as to allow the strip (15) to temporarily stop between the two support plates (41).

9. A packaging machine (11) to manufacture a sealed single-dose break-open package (1);
the package consists of a first sheet (2) made of a semirigid plastic material, which is arranged on top of and sealed to a second sheet (3) made of a flexible plastic material, so as to define a sealed pocket (4) containing a dose of a product (5), and has a pair of incisions (7, 9) to guide a controlled breaking of the first sheet (2);
the packaging machine (11) comprises:

a first unwinding device (12) to feed a first strip (15) made of a semirigid plastic material;
a second unwinding device (13) to feed a second strip (18) made of a flexible plastic material;
an incision unit (20) to cut two incisions (7, 9) into the first strip (15) made of a semirigid plastic material;
a forming station (16), which is arranged downstream of the incision unit (20) so as to arrange the first strip (15) made of a semirigid plastic material on top of the second strip (18) made of a flexible plastic material;
a first longitudinal sealing device (32) to longitudinally and laterally seal the two strips (15, 18) to one another, so as to define at least one tube;
a dosing unit (26), which is arranged in the forming station so as to feed a dose of a product (5) into the tube between the first strip (15) made of a semirigid plastic material and the second strip (18) made of a flexible plastic material;
a second transverse sealing device (28), which is arranged downstream of the dosing device (26) so as to transversely seal the two strips (15, 18) to one another in order to define, along the tube, a series of pockets (4), each containing a dose of product (5); and
a cutting device (31), which is arranged downstream of the forming station (16) so as to transversely cut the tube in order to separate, in sequence, the sealed single-dose packages (1);
the packaging machine (11) is **characterised in that** the incision unit (20) is manufactured according to any of the claims from 1 to 8.

10. A method for the incision of a strip (15, 18) made of a plastic material to cut two distinct incisions (7, 9)

into two opposite surfaces (8, 10) of the strip (15) in a packaging machine (11) to manufacture a sealed single-dose break-open package (1); the incision method comprises the steps of:

conveying the strip (15) along a conveying direction (C) and between two support plates (14), so that each support plate (41) faces a corresponding surface (8; 10) of the strip (15); and
cutting the strip (15) by means of at least two incision devices (42), each cutting an incision (7, 9) into a corresponding surface (8; 10) of the strip (15);
the incision method is **characterised in that** it comprises the further steps of:

translating the two support plates (41) together along a translation direction (T), which is orthogonal to the conveying direction (C); and
cyclically moving the two support plates (41) forward and backward along the translation direction (T) between a first position, in which a first incision device (42a; 42b) is operated so as to cut a first incision (7; 9), and a second position, in which a second incision device (42b; 42a) is operated so as to cut a second incision (9; 7), which is opposite to the first incision (7, 9).

11. A method for the incision of a strip (15) made of a semirigid material according to claim 10, wherein the two incision devices (42) are arranged one next to the other and are aligned along the translation direction (T).

12. A method for the incision of a strip (15) made of a semirigid material according to claim 10 or 11, wherein the strip (15) made of a semirigid material is temporarily stopped during the strip incision step.

Patentansprüche

1. Schneideinheit (20) zum Einkerben eines aus einem Kunststoffmaterial hergestellten Bands (15), um in zwei gegenüberliegenden Oberflächen (8, 10) des Bands (15) zwei separate Einkerbungen (7, 9) zu schneiden, in einer Verpackungsmaschine (11) zur Herstellung einer versiegelten Einzeldosis-Aufbrechverpackung (1); wobei die Schneideinheit (20) aufweist:

eine Fördervorrichtung (21), die das Band (15) entlang einer Förderrichtung (C) zuführt;
zwei Trägerplatten (41), die an gegenüberliegenden Seiten des Bands (15) angeordnet sind, so dass jede Trägerplatte (41) gegenüber einer entsprechenden Oberfläche (8; 10) des Bands (15) angeordnet ist; und
mindestens zwei Einkerbungsvorrichtungen (42), von denen jede eine Einkerbung (7; 9) in eine entsprechende Oberfläche (8; 10) des Bands (15) schneidet und ein Schneidelement (43), das von der einen Trägerplatte (41) gehalten wird, und ein Kontrastelement (44), das von der anderen Trägerplatte (41) gehalten wird, aufweist;
wobei die Schneideinheit (20) **dadurch gekennzeichnet ist, dass**
die zwei Trägerplatten (41) mobil sind, um sich gemeinsam entlang einer Verschiebungsrichtung (T), die orthogonal zu der Förderrichtung (C) ist, zu verschieben;
die zwei Einkerbungsvorrichtungen (45) nebeneinander angeordnet sind und entlang der Verschiebungsrichtung (T) ausgerichtet sind; und
eine erste Betätigungsvorrichtung (46) bereitgestellt ist, die die zwei Trägerplatten (41) entlang der Verschiebungsrichtung (T) zyklisch vorwärts und rückwärts bewegt zwischen einer ersten Position, in welcher eine erste Einkerbungsvorrichtung (42a; 42b) arbeitet, um eine erste Einkerbung (7; 9) zu schneiden, und einer zweiten Position, in welcher eine zweite Einkerbungsvorrichtung (42b; 42a) arbeitet, um eine zweite Einkerbung (9; 7), die der ersten Einkerbung (7, 9) gegenüberliegt, zu schneiden.

2. Schneideinheit (20) nach Anspruch 1, wobei jede Trägerplatte (41) das Schneidelement (43) der einen Einkerbungsvorrichtung (42) und das Kontrastelement (44) der anderen Einkerbungsvorrichtung (42) hält.

3. Schneideinheit (20) nach Anspruch 1 oder 2, wobei jedes Schneidelement (43) eine Klinge aufweist.

4. Schneideinheit (20) nach Anspruch 3, wobei jede Klinge V-förmig ist und jedes Kontrastelement (44) flach ist.

5. Schneideinheit (20) nach einem der Ansprüche 1 bis 4, wobei jede Einkerbungsvorrichtung (42) ein Anpassungselement (49) aufweist, das mit dem Schneidelement (43) oder dem Kontrastelement (44) gekoppelt ist und den Abstand zwischen dem Schneidelement (43) oder dem Kontrastelement (44) und dem Band (15) anpasst.

6. Schneideinheit (20) nach Anspruch 5, wobei alle Anpassungselemente (49) an derselben Trägerplatte (41) angeordnet sind.

7. Schneideinheit (20) nach einem der Ansprüche 1 bis 6, wobei mindestens eine Trägerplatte (41) mobil ist,

um sich mit Hilfe einer zweiten Betätigungsvorrichtung (48) zyklisch vorwärts und rückwärts zu der anderen Trägerplatte (41) hin und entlang einer Einkerbungsrichtung (I), die senkrecht zu dem Band (15) und senkrecht sowohl zu der Förderrichtung (C) wie auch der Verschiebungsrichtung (T) ist, zu bewegen.

8. Schneideinheit (20) nach einem der Ansprüche 1 bis 7, wobei die Fördervorrichtung (21) mindestens einen Zuführungsdandyroller (22) aufweist, der stromaufwärts der Trägerplatten (41) angeordnet ist und mobil ist, um einen temporären Stopp des Bands (15) zwischen den zwei Trägerplatten (41) zu erlauben.

9. Verpackungsmaschine (11) zu Herstellung einer versiegelten Einzeldosis-Aufbrechverpackung (1); wobei die Verpackung eine aus einem halbsteifen Kunststoffmaterial hergestellte erste Schicht (2) aufweist, welche oberhalb einer aus einem biegsamen Kunststoffmaterial hergestellten zweiten Schicht (3) angeordnet und mit ihr auf eine Weise versiegelt ist, um eine versiegelte Tasche (4), die eine Dosis eines Produkts (5) enthält, zu definieren, und welche ein Paar Einkerbungen (7, 9) aufweist, um ein kontrolliertes Brechen der ersten Schicht (2) zu führen; wobei die Verpackungsmaschine (11) aufweist:

eine erste Abspulvorrichtung (12) zum Zuführen eines aus einem halbsteifen Kunststoffmaterial hergestellten ersten Bands (15);
eine zweite Abspulvorrichtung (13) zum Zuführen eines aus einem biegsamen Kunststoffmaterial hergestellten zweiten Bands (18);
eine Schneideinheit (20) zum Schneiden von zwei Einkerbungen (7, 9) in das aus einem halbsteifen Kunststoffmaterial hergestellte erste Band (15);
eine stromabwärts der Schneideinheit (20) angeordnete Formstation (16) zum Anordnen des aus einem halbsteifen Kunststoffmaterial hergestellten ersten Bands (15) oberhalb des aus einem biegsamen Kunststoffmaterial hergestellten zweiten Bands (18);
eine erste Längsversiegelungsvorrichtung (32), um die zwei Bänder (15, 18) längs und lateral miteinander zu versiegeln, um mindestens einen Schlauch zu definieren;
eine in der Formstation angeordnete Dosierungseinheit (26), um in den Schlauch zwischen dem aus einem halbsteifen Kunststoffmaterial hergestellten ersten Band (15) und dem aus einem biegsamen Kunststoffmaterial hergestellten zweiten Band (18) eine Dosis eines Produkts (5) zu laden;
eine stromabwärts der Dosierungsvorrichtung (26) angeordnete zweite Transversalversiegelungsvorrichtung (28), um die zwei Bänder (15, 18) transversal miteinander zu versiegeln, um entlang des Schlauchs eine Reihe von Taschen (4) zu definieren, von denen jede eine Dosis des Produkts (5) enthält; und
eine stromabwärts der Formstation (16) angeordnete Schneidvorrichtung (31), um den Schlauch transversal zu schneiden, um die versiegelten Einzeldosis-Verpackungen (1) der Reihe nach zu trennen;
wobei die Verpackungsmaschine (11) **dadurch gekennzeichnet ist, dass** die Schneideinheit (20) nach einem der Ansprüche 1 bis 8 hergestellt ist.

10. Verfahren zum Einkerben eines aus einem Kunststoffmaterial hergestellten Bands (15, 18), um in zwei gegenüberliegende Oberflächen (8, 10) des Bands (15) zwei separate Einkerbungen (7, 9) zu schneiden, in einer Verpackungsmaschine (11) zur Herstellung einer versiegelten Einzeldosis-Aufbrechverpackung (1); wobei das Einkerbungsverfahren die folgenden Schritte aufweist:

Zuführen des Bands (15) entlang einer Förderrichtung (C) und zwischen zwei Trägerplatten (14), so dass jede Trägerplatte (41) gegenüber einer entsprechenden Oberfläche (8; 10) des Bands (15) angeordnet ist; und
Schneiden des Bands (15) unter Verwendung von mindestens zwei Einkerbungsvorrichtungen (42), von denen jede eine Einkerbung (7, 9) in eine entsprechende Oberfläche (8; 10) des Bands (15) schneidet;
wobei das Einkerbungsverfahren **dadurch gekennzeichnet ist, dass** es die folgenden weiteren Schritte aufweist:

gemeinsames Verschieben der zwei Trägerplatten (41) entlang einer Verschiebungsrichtung (T), die orthogonal zu der Förderrichtung (C) ist; und
zyklisches Bewegen der zwei Trägerplatten (41) vorwärts und rückwärts entlang der Verschiebungsrichtung (T) zwischen einer ersten Position, in welcher eine erste Einkerbungsvorrichtung (42a; 42b) arbeitet, um eine erste Einkerbung (7; 9) zu schneiden, und einer zweiten Position, in welcher eine zweite Einkerbungsvorrichtung (42b; 42a) arbeitet, um eine zweite Einkerbung (9; 7), die der ersten Einkerbung (7, 9) gegenüberliegt, zu schneiden.

11. Verfahren zum Einkerben eines aus einem halbsteifen Kunststoffmaterial hergestellten Bands (15) nach Anspruch 10, wobei die zwei Einkerbungsvorrichtungen (42) nebeneinander angeordnet sind und

entlang der Verschiebungsrichtung (T) ausgerichtet sind.

12. Verfahren zum Einkerben eines aus einem halbsteifen Kunststoffmaterial hergestellten Bands (15) nach Anspruch 10 oder 11, wobei das aus einem halbsteifen Kunststoffmaterial hergestellte Band (15) während des Einkerbungsschritts temporär gestoppt wird.

Revendications

1. Unité (20) pour l'incision d'une bande (15) composée d'une matière plastique pour pratiquer deux incisions distinctes (7, 9) dans deux surfaces opposées (8, 10) de la bande (15) dans une machine de conditionnement (11) pour fabriquer un emballage unidose scellé à ouverture par rupture (1) ; l'unité d'incision (20) comprenant :

un dispositif de transport (21) qui fait avancer la bande (15) dans une direction de transport (C) ;
deux plaques de support (41), qui sont disposées sur des côtés opposés de la bande (15) de telle sorte que chaque plaque de support (41) soit orientée vers une surface correspondante (8 ; 10) de la bande (15) ; et
au moins deux dispositifs d'incision (42) qui pratiquent chacun une incision (7 ; 9) dans une surface correspondante (8 ; 10) de la bande (15) et comprennent un élément coupant (43) qui est supporté par une plaque de support (41), et un élément de contre appui (44) qui est supporté par l'autre plaque de support (41) ;
l'unité d'incision (20) étant **caractérisée en ce que** :

les deux plaques de support (41) sont mobiles de sorte à se déplacer ensemble dans une direction de translation (T), qui est orthogonale à la direction de transport (C) ;
les deux dispositifs d'incision (42) sont disposés l'un à côté de l'autre et sont alignés dans la direction de translation (T) ; et
un premier dispositif d'actionnement (46) est présent, lequel déplace de façon cyclique les deux plaques de support (41) vers l'avant et vers l'arrière dans la direction de translation (T) entre une première position, dans laquelle un premier dispositif d'incision (42a ; 42b) est actionné de sorte à pratiquer une première incision (7 ; 9), et une seconde position dans laquelle un second dispositif d'incision (42b ; 42a) est actionné de sorte à pratiquer une seconde incision (9 ; 7) qui est à l'opposé de la première incision (7, 9).

2. Unité d'incision (20) selon la revendication 1, dans laquelle chaque plaque de support (41) supporte l'élément coupant (43) d'un dispositif d'incision (42) et l'élément de contre appui (44) de l'autre dispositif d'incision (42).

3. Unité d'incision (20) selon la revendication 1 ou 2, dans laquelle chaque élément coupant (43) comprend une lame.

4. Unité d'incision (20) selon la revendication 3, dans laquelle chaque lame a une forme de V et chaque élément de contre appui (44) est plat.

5. Unité d'incision (20) selon l'une quelconque des revendications 1 à 4, dans laquelle chaque dispositif d'incision (42) comprend un organe d'ajustement (49), qui est couplé à l'élément coupant (43) ou à l'élément de contre appui (44) et ajuste la distance entre l'élément coupant (43) ou l'élément de contre appui (44) et la bande (15).

6. Unité d'incision (20) selon la revendication 5, dans laquelle les organes d'ajustement (49) sont tous disposés sur une même plaque de support (41).

7. Unité d'incision (20) selon l'une quelconque des revendications 1 à 6, dans laquelle au moins une plaque de support (41) est mobile de sorte à se déplacer de façon cyclique vers l'avant et vers l'arrière, grâce à un second dispositif d'actionnement (48), vers l'autre plaque de support (41) et dans une direction d'incision (I), qui est perpendiculaire à la bande (15) et perpendiculaire à la fois à la direction de transport (C) et à la direction de translation (T).

8. Unité d'incision (20) selon l'une quelconque des revendications 1 à 7, dans laquelle le dispositif de transport (21) comprend au moins un rouleau presseur d'alimentation (22) qui est disposé en amont des plaques de support (41) et est mobile de sorte à permettre à la bande (15) de s'arrêter temporairement entre les deux plaques de support (41).

9. Machine de conditionnement (11) pour fabriquer un emballage unidose scellé à ouverture par rupture (1) ;
l'emballage se composant d'une première feuille (2) composée d'une matière plastique semi-rigide qui est disposée sur une seconde feuille (3) composée d'une matière plastique souple, et scellée à cette dernière, de sorte à définir une poche scellée (4) contenant une dose d'un produit (5) et comportant une paire d'incisions (7, 9) pour guider une cassure contrôlée de la première feuille (2) ;
la machine de conditionnement (11) comprenant :

un premier dispositif de déroulage (12) pour faire

avancer une première bande (15) composée d'une matière plastique semi-rigide ;
un second dispositif de déroulage (13) pour faire avancer une seconde bande (18) composée d'une matière plastique souple ;
une unité d'incision (20) pour pratiquer deux incisions (7, 9) dans la première bande (15) composée d'une matière plastique semi-rigide ;
un poste de formage (16), qui est disposé en aval de l'unité d'incision (20) de sorte à disposer la première bande (15) composée d'une matière plastique semi-rigide sur la seconde bande (18) composée d'une matière plastique souple ;
un premier dispositif de scellement longitudinal (32) pour sceller longitudinalement et latéralement les deux bandes (15, 18) l'une à l'autre de sorte à définir au moins un tube ;
une unité de dosage (26) qui est disposée dans le poste de formage de sorte à introduire une dose d'un produit (5) dans le tube entre la première bande (15) composée d'une matière plastique semi-rigide et la seconde bande (18) composée d'une matière plastique souple ;
un second dispositif de scellement transversal (28) qui est disposé en aval du dispositif de dosage (26) de sorte à sceller transversalement les deux bandes (15, 18) l'une à l'autre de sorte à définir, le long du tube, une série de poches (4) contenant chacune une dose de produit (5) ; et
un dispositif coupant (31) qui est disposé en aval du poste de formage (16) de sorte à couper transversalement le tube afin de séparer, en séquence, les emballages unidoses scellés (1) ;
la machine de conditionnement (11) étant **caractérisée en ce que** l'unité d'incision (20) est fabriquée selon l'une quelconque des revendications 1 à 8.

10. Procédé pour l'incision d'une bande (15, 18) composée d'une matière plastique pour pratiquer deux incisions distinctes (7, 9) dans deux surfaces opposées (8, 10) de la bande (15) dans une machine de conditionnement (11) pour fabriquer un emballage unidose scellé à ouverture par rupture (1) ; le procédé d'incision comprenant les étapes consistant à :

transporter la bande (15) dans une direction de transport (C) et entre deux plaques de support (14) de telle sorte que chaque plaque de support (41) soit orientée vers une surface correspondante (8 ; 10) de la bande (15) ; et
couper la bande (15) au moyen d'au moins deux dispositifs d'incision (42) qui pratiquent chacun une incision (7, 9) dans une surface correspondante (8 ; 10) de la bande (15) ;
le procédé d'incision étant **caractérisé en ce qu'**il comprend les autres étapes consistant à :

déplacer les deux plaques de support (41) ensemble dans une direction de translation (T), qui est orthogonale à la direction de transport (C) ; et
déplacer de façon cyclique les deux plaques de support (41) vers l'avant et vers l'arrière dans la direction de translation (T) entre une première position, dans laquelle un premier dispositif d'incision (42a ; 42b) est actionné de sorte à pratiquer une première incision (7 ; 9), et une seconde position dans laquelle un second dispositif d'incision (42b ; 42a) est actionné de sorte à pratiquer une seconde incision (9 ; 7) qui est à l'opposé de la première incision (7, 9).

11. Procédé pour l'incision d'une bande (15) composée d'une matière semi-rigide selon la revendication 10, dans lequel les deux dispositifs d'incision (42) sont disposés l'un à côté de l'autre et sont alignés dans la direction de translation (T).

12. Procédé pour l'incision d'une bande (15) composée d'une matière semi-rigide selon la revendication 10 ou 11, dans lequel la bande (15) composée d'une matière semi-rigide est arrêtée temporairement pendant l'étape d'incision de bande.

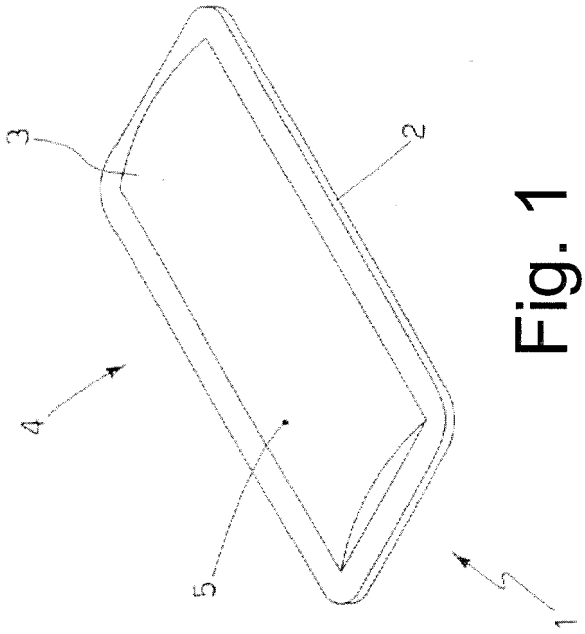


Fig. 1

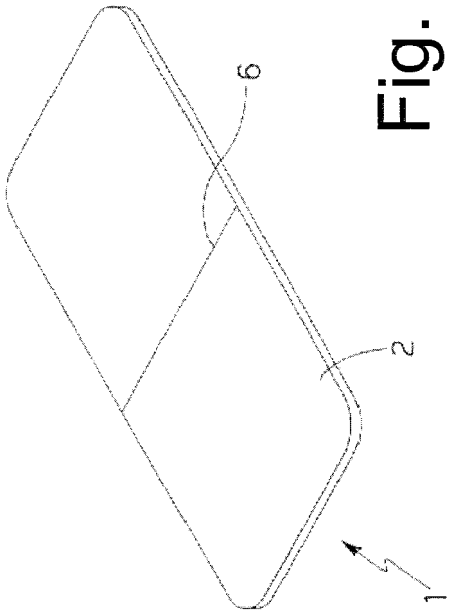


Fig. 2

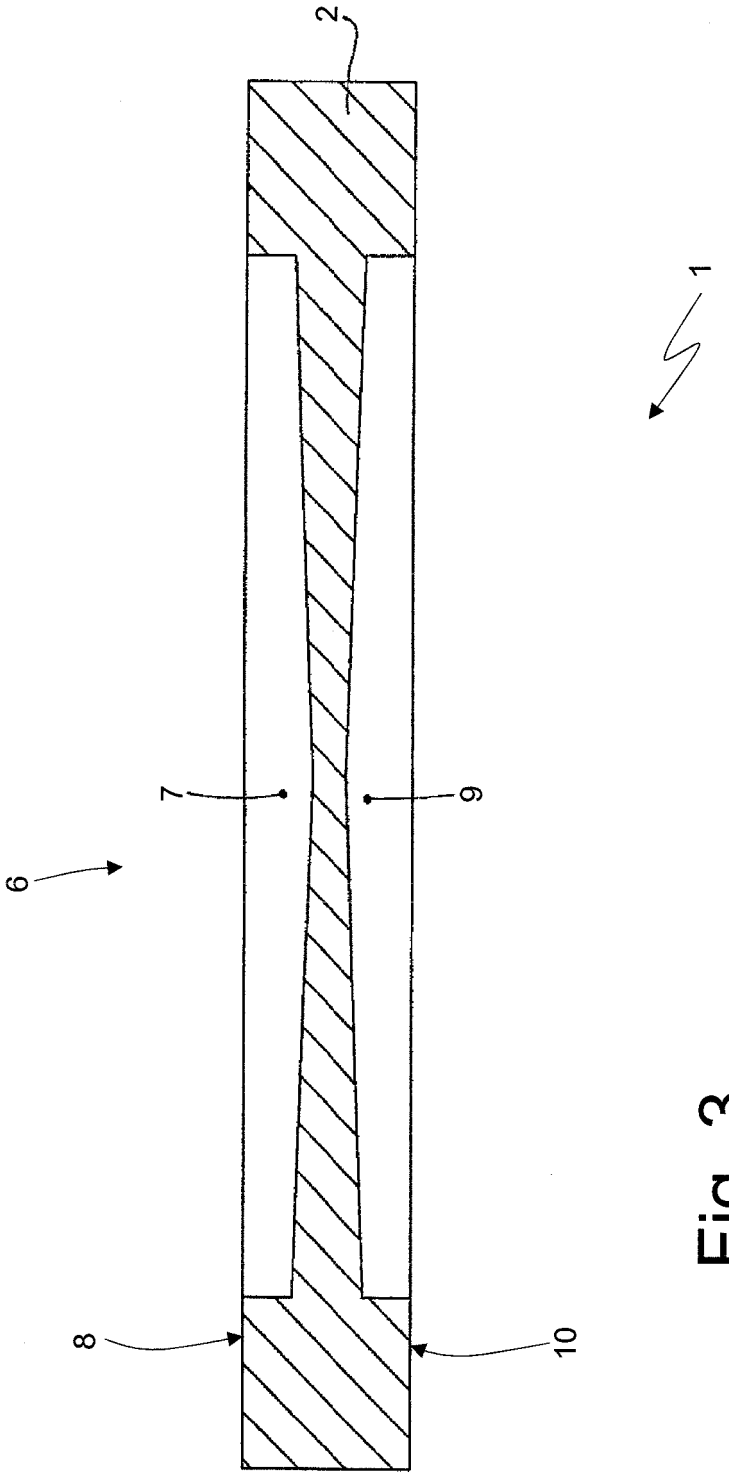


Fig. 3

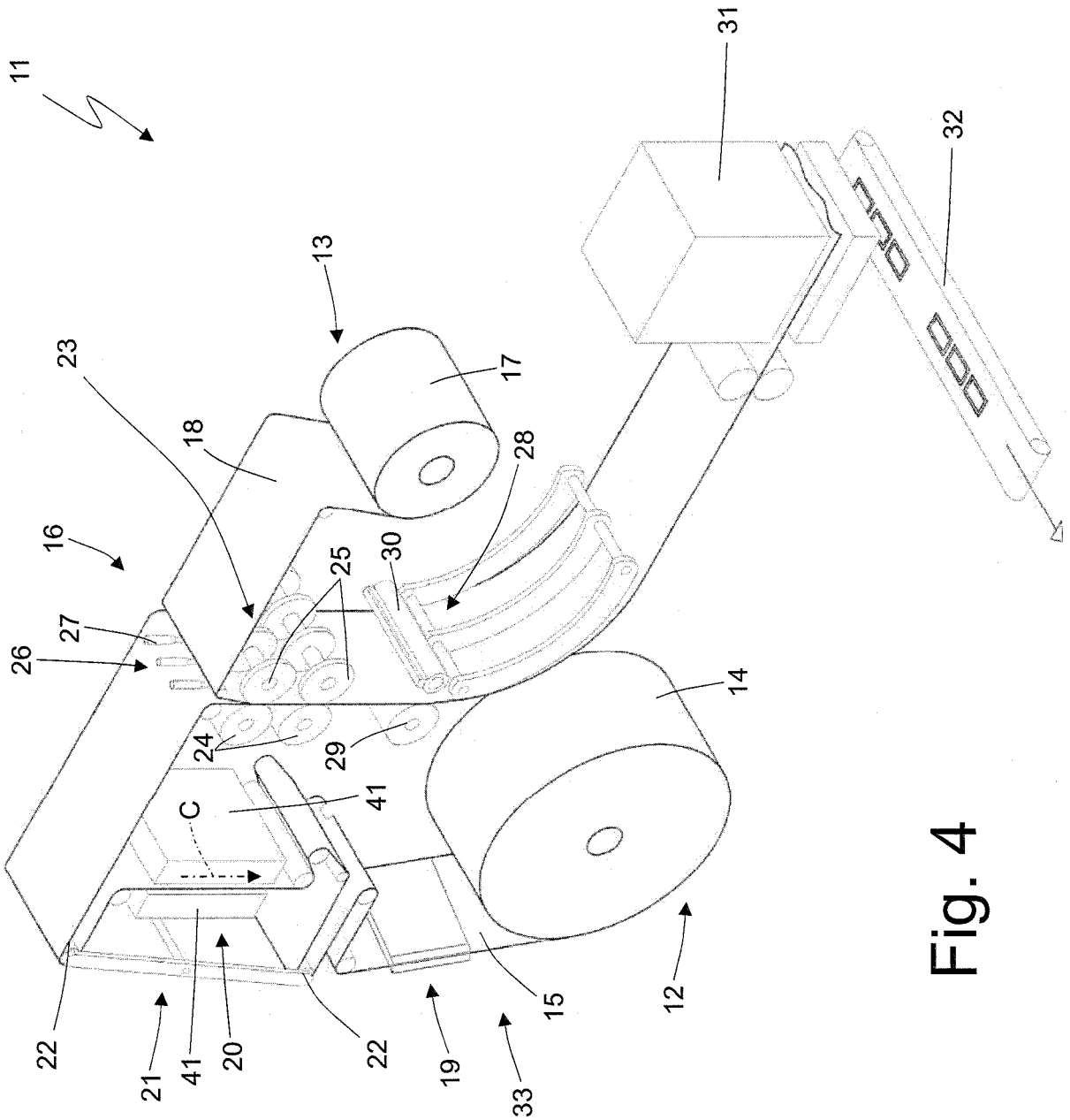

11
31
32
13
17
23
18
28
16
25
30
27
26
14
24
29
41
C
22
21
41
20
22
19
33
15
12

Fig. 4

Fig. 5

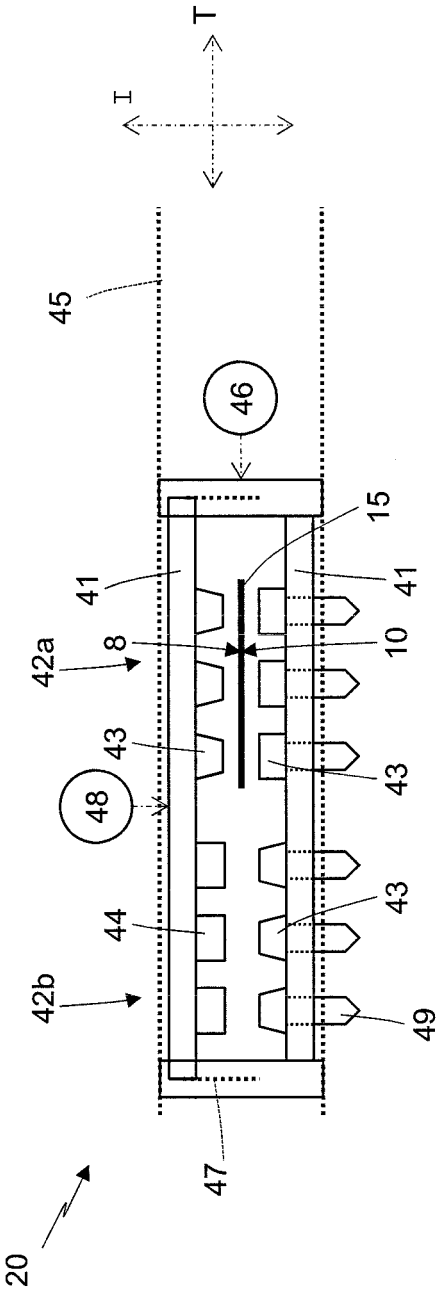

T
I
45
46
15
41
41
42a
8
10
43
43
48
43
44
43
42b
49
47
20

Fig. 6

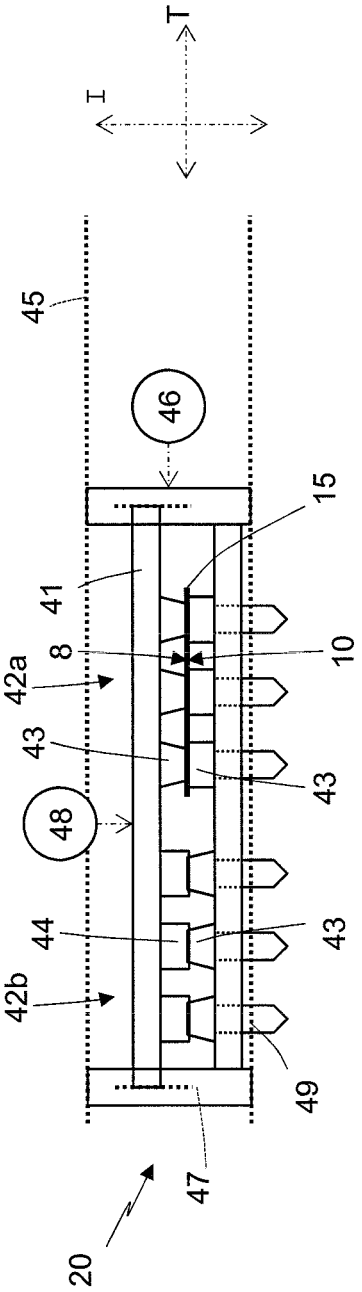

T
I
45
46
15
41
8
10
42a
43
43
48
44
43
42b
49
47
20

Fig. 7

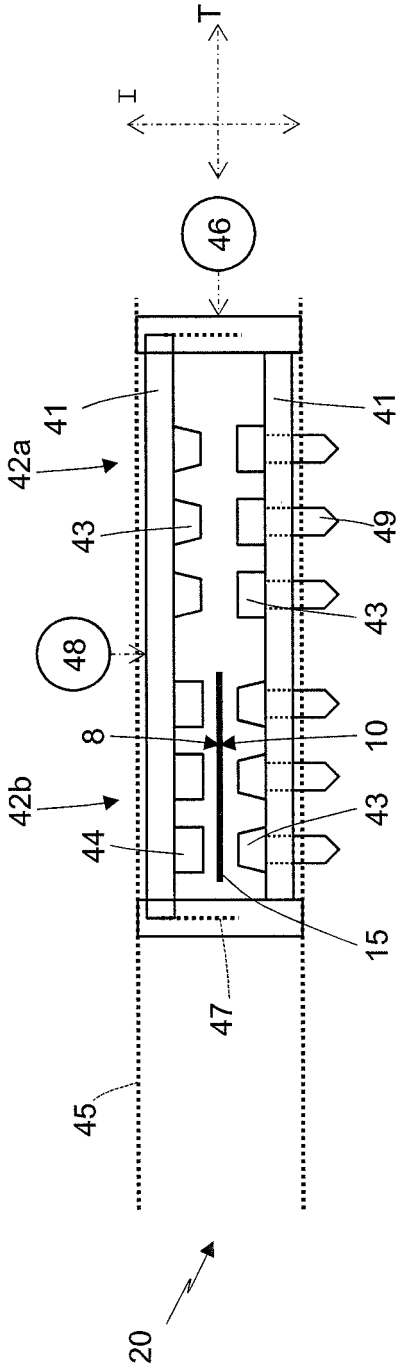
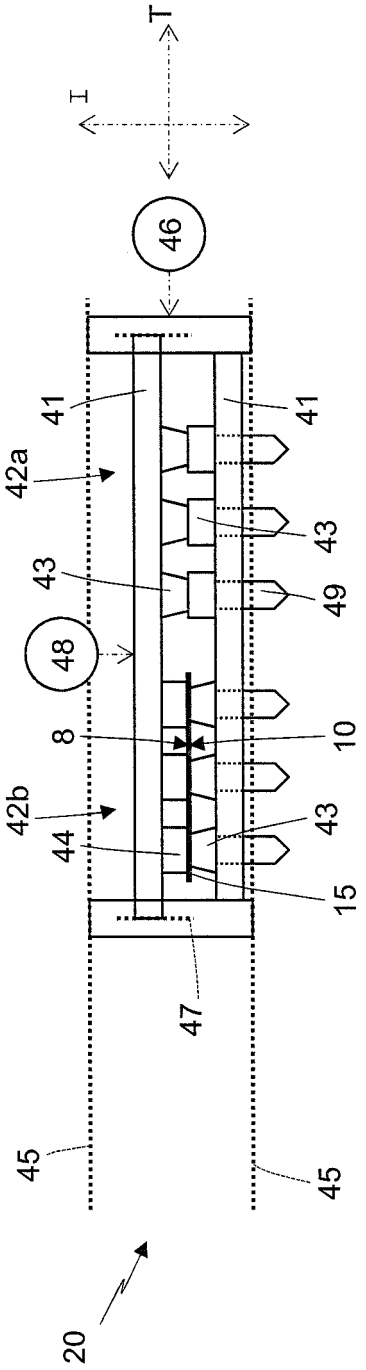

T
I
46
41
42a
43
49
48
8
10
42b
44
15
47
45
20

Fig. 8


T
I
46
41
42a
43
49
48
8
10
42b
44
15
47
45
20

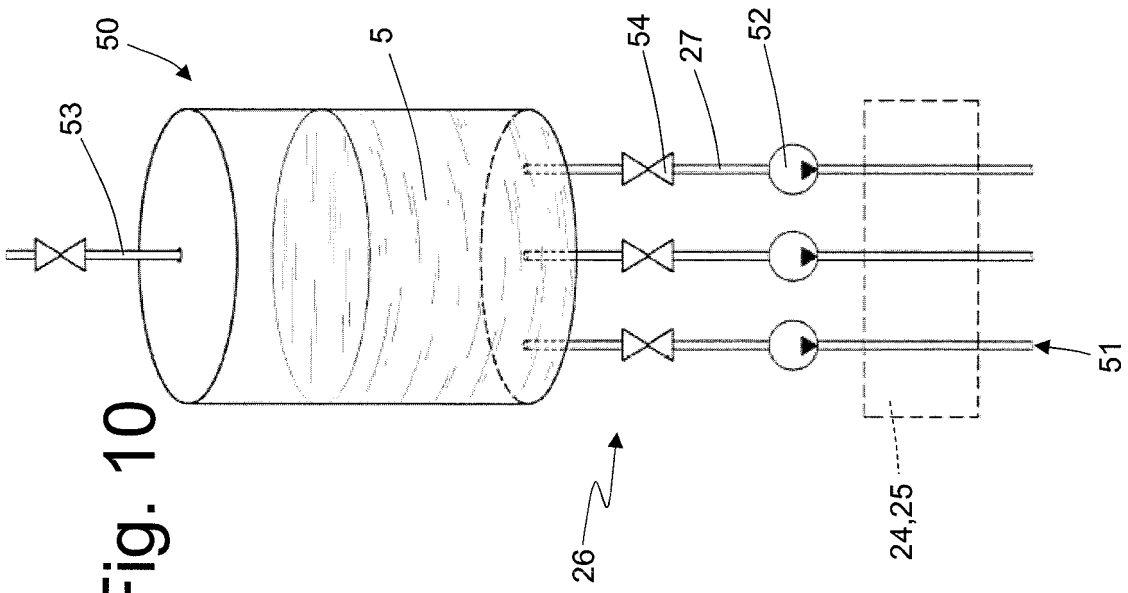

50
5
54
27
52
53
51
26
24,25

Fig. 10

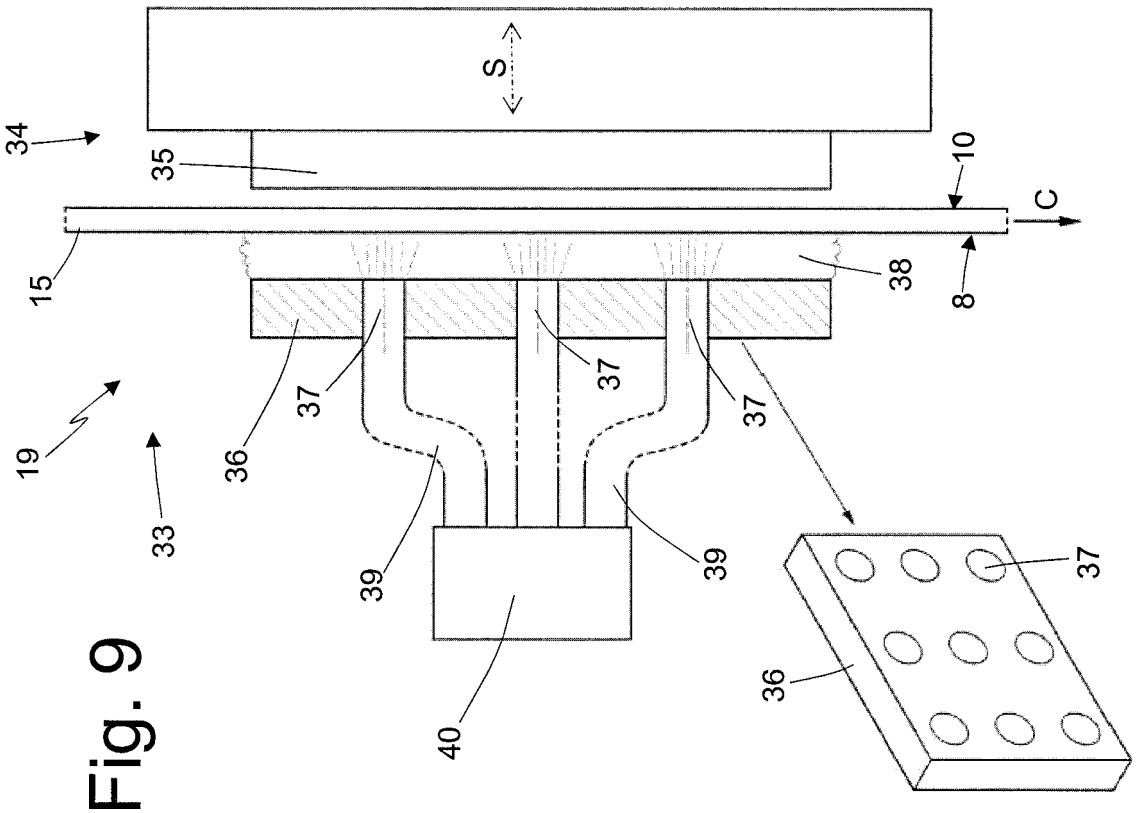

S
34
35
10
C
15
38
8
19
33
36
37
37
37
37
39
39
40
36
37

Fig. 9

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2008038074 A1 **[0003]**