



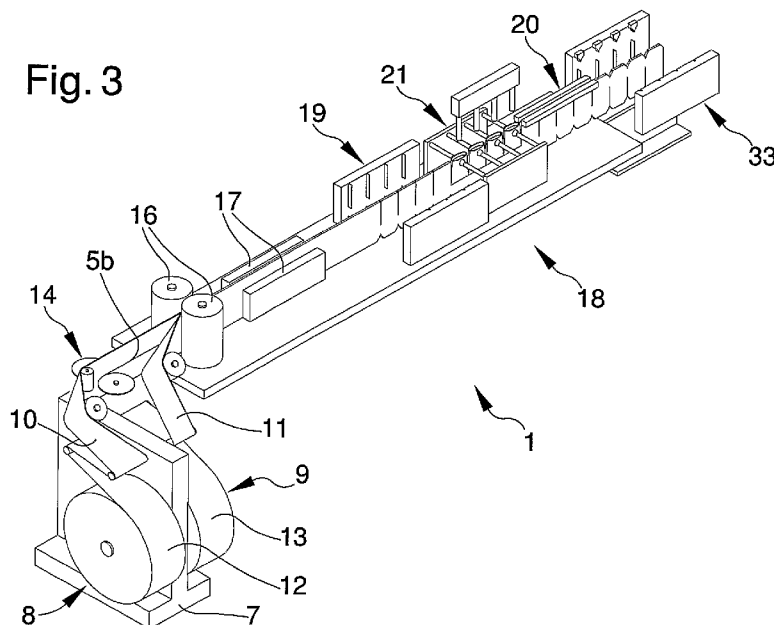
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(54) Title: PACKAGING MACHINE FOR MAKING UP SINGLE-DOSE PACKS WITH BREAK OPENING



(57) Abstract: The packaging machine for making up single-dose packs with break opening, comprises: - a first feeding device of a first tape of semi-rigid plastic material; a second feeding device of a second tape of flexible plastic material; a scoring device of the first tape which is arranged downstream of the first feeding device, is of the continuous type and comprises scoring means intended to be in constant and longitudinal contact with the first tape; - superimposition means of the first tape on the second tape arranged downstream of the scoring device; - a forming station of a single-dose pack, arranged downstream of the superimposition means, comprising: - a first and a second sealing device for sealing the first tape with the second tape to define at least a sealed containment pocket and - a dosing station, positioned between the first and the second sealing device, for feeding a dose of product in the pocket.

PACKAGING MACHINE FOR MAKING UP SINGLE-DOSE PACKS WITH BREAK OPENING

Technical Field

The present invention relates to a packaging machine for making up single-dose
5 packs with break opening.

Background Art

As is known, the single-dose packs with break opening are composed of a layer
of semi-rigid plastic material superimposed on and sealed to a flexible plastic
material so as to define a sealed pocket containing a dose of product. Generally,
10 the layer of semi-rigid material has a central pre-cut to guide and make
subsequent breaking easier.

An example of packaging machine for making up single-dose sealed packs with
break opening is described by the patent WO2008/038074 and comprises a first
and a second feeding device of a first tape of semi-rigid plastic material and of a
15 second tape of flexible plastic material respectively.

The first and the second tapes are then superimposed on one another by means
of superimposition means.

Upstream of the superimposition means is envisaged a scoring device of the
first tape.

20 More particularly, the scoring device is made up of two plates moving in
direction of reciprocal approach/moving away, arranged on opposite sides of the
first tape, having scoring elements suitable for cross scoring (i.e., at right angles
to its extension) the first tape itself. To allow scoring the first tape, upstream of
the scoring device, a pair of dandy rollers are provided suitable for permitting
25 the temporary stop of the first tape between the pair of plates. Downstream of
the superimposition means a first hot-sealing device is arranged suitable for the
longitudinal sealing (i.e., parallel to their extension) of the two superimposed
tapes, defining a sort of tube. Downstream of the first sealing device a second
hot-sealing device is then arranged suitable for cross sealing the tapes to define
30 along the tube one or more containment pockets of a respective dose of product.
Between the first and the second sealing devices are placed product dosing
means.

More in particular, the dosing means remain placed between the two tapes following the longitudinal seal made by the first sealing device and dispense the dose of product inside the tube after the cross seal made by the second sealing device which practically speaking defines the bottom of the relative pocket.

- 5 Once the dose of product has been dispensed, the tapes continue to move forward towards the second sealing device, which seals the pocket containing the dose of product at the same time defining the bottom of the next pocket.

The sealed pockets made this way are then aligned with each other longitudinally.

- 10 The machine described in WO2008/038074 also envisages an additional sealing device, arranged downstream of the second sealing device suitable for making a cross seal wider than that made by the second device itself.

Downstream of the additional sealing device is then provided a cutting device suitable for separating in succession the single-dose sealed cutting packs.

- 15 A drawback of this known packaging machine consists in its high complexity and, in particular, in the high complexity of the scoring device. The need to temporarily block the first tape to allow the plates to make the cut in fact calls for the use and the combination of a large number of components; this results in a high manufacturing cost, difficult maintenance and a high probability of
20 malfunctions which could cause failure to make or incorrectly make the cut.

Another drawback of the packaging machine described above consists in the fact that the particular arrangement and realisation shape of the sealing devices and of the dosing means can contaminate the product contained in the single-dose pack, considerably reducing its storage period.

- 25 In fact, it can occur that, while the second sealing device seals the top of the product containment pocket, the dosing means are still in the dispensing phase.

- At least a part of the product to be packed therefore comes into direct contact with the sealed edges of the containment pocket and, at least for some types of products (food, cosmetics or the like), the heat produced by the second sealing
30 device causes the considerable deterioration of the product itself, with the concrete risk of contaminating the contents and negatively affecting its correct storage.

Another drawback consists in the complex making of the cross seals on the tapes, which requires two sealing devices arranged in series the one with the other.

Yet another drawback of the described packaging machine consists in the fact
5 that the sequence of the phases which it carries out and, therefore, the movements of the various devices making it up, are controlled by electronic means which, besides being difficult to calibrate, are costly and complicated to manage.

Object of the Invention

10 The object of the present invention is to provide a packaging machine for making up single-dose packs with break opening, which has a scoring device that is much simpler in terms of manufacture and operation compared to that of the packaging machine described in WO2008/038074. The object of the present invention is therefore to make a scoring device which is made up of just a small
15 number of components, that is easy to service and adjust and which is reliable in terms of operation.

Another object of the present invention is to provide a packaging machine which allows performing sealing and dosing operations in a reliable and easy way, avoiding any risk of contamination of the product contained in a sealed
20 pack.

Yet another object of the present invention is to considerably simplify the means that carry out the seals at right angles to the tapes with respect to the known packaging machine described above.

Another object still of the present invention is to provide a packaging machine
25 of mechanical type, i.e., in which the various devices and means making it up are mechanically controlled.

The above objects are achieved by the present packaging machine for making up single-dose packs with break opening, comprising:

- at least a first feeding device of a first tape of semi-rigid plastic material;
- 30 - at least a second feeding device of a second tape of flexible plastic material;
- at least a scoring device of said first tape arranged downstream of said first feeding device;

- superimposition means of said first tape on said second tape arranged downstream of said scoring device;
- at least a forming station of at least a single-dose pack, arranged downstream of said superimposition means, comprising:
 - 5 - at least a first and a second sealing device of said first tape with said second tape to define at least a sealed containment pocket and
 - at least a dosing station, positioned between said first and said second sealing device, for feeding a dose of product in said pocket;

characterised by the fact that said scoring device is of the continuous type and
10 comprises scoring means intended to be in constant and longitudinal contact with said first tape.

Brief Description of the Drawings

Other characteristics and advantages of the invention will become evident from the following description, provided purely as an example but not limited to the
15 annexed drawings in which:

- figure 1 is an axonometric view of a single-dose pack with break opening;
- figure 2 is a sectional view of the pack of figure 1;
- figure 3 is an axonometric view of the assembly drawing of a packaging machine according to the invention;
- 20 figure 3a is an axonometric view of a part of the assembly drawing of a packaging machine according to the invention in an alternative embodiment;
- figure 4 is a raised side view of the scoring device of the packaging machine according to the invention;
- figure 4a is a top plan view of the scoring device in an alternative embodiment;
- 25 figure 5 is a plan schematic view of the grip plates of the packaging machine according to the invention;
- figure 6 is a raised front view of the forming station of the packaging machine according to the invention;
- figure 7 is an axonometric view of the first sealing device in the packaging
30 machine according to the invention;
- figure 8 is a raised side view of the dosing station in the packaging machine according to the invention;

figure 8a is a sequence of raised side views which schematically shows the product dosing sequence;

figure 9 is an axonometric view of the second sealing device in the packaging machine according to the invention;

5 figure 10 is an axonometric view of the cutting and unloading station in the packaging machine according to the invention;

figure 11 is a raised side view of the unloading element in the packaging machine according to the invention.

Embodiments of the Invention

10 With particular reference to such figures, globally indicated by 1 is a single-dose sealed pack with break opening, illustrated in the figures 1 and 2.

The pack 1 comprises a first layer 2 of semi-rigid plastic material and a second layer 3 of flexible plastic material, which is superimposed and sealed to the first layer 2 to define a sealed pocket 4 containing a dose of product P.

15 The first and the second layer 2 and 3 have a substantially rectangular shape and the first layer 2, in its median area, has a first and a second cut 5a, 5b crossways to its extension, i.e., parallel to the shorter sides and at right angles to the longer sides.

The cuts 5a, 5b guide the breakage of the first layer 2, which occurs as a result
20 of the folding of the first layer itself, to allow the product P to come out.

In the figure 3 by the number 6 is indicated a packaging machine as a whole for making up single-dose sealed packs 1 of the type of that described and shown in the figures 1 and 2. The machine 6 comprises a frame 7 which rests on the ground and supports a first and a second feeding device 8 and 9, which allow
25 feeding a first tape 10 made of semi-rigid plastic material and a second tape 11 made of flexible plastic material respectively.

More in particular, the first feeding device 8 supports a first reel 12 from which unwinds gradually the first tape 10 and, similarly, the second feeding device 9 supports a second reel 13 from which unwinds the second tape 11.

30 In an alternative embodiment of the machine 6 shown in figure 3a, the first and the second reel 12 and 13, supported by the first and by the second feeding devices 8 and 9 respectively, are arranged substantially horizontal, meaning

with their axis positioned vertically.

Advantageously, the machine 6 shown in the figure 3a comprises, besides the first and the second reels 12 and 13, also an auxiliary reel 12a, this too formed from the first tape 10.

- 5 More in particular, when the first tape 10 that forms the first reel 12 is close to running out, its end section is connected to the initial section of the first tape 10 that forms the auxiliary reel 12a, in such a way that the machine 6 can quickly restart its operation without having to wait for the first reel 12 to be changed.

10 Downstream of the first feeding device 8 a scoring device 14 is positioned of the first tape 10.

According to the invention, the scoring device 14 is of the substantially continuous type and comprises scoring means 15 suitable for contacting in a substantially constant and longitudinal way the first tape 10 and, therefore, defining along the first tape 10 at least a longitudinal and continuous cut 5a, 5b.

- 15 More in particular, the scoring means 15 are composed of at least a cutting disc operating in rotation and defining a cutting surface suitable for longitudinally contacting (i.e., parallel to its extension) the first tape 10.

In use, the position of the cutting disc 15 with respect to the first tape 10 is therefore fixed.

- 20 Preferably, the scoring device 14 comprises adjustment means for adjusting the position of the cutting disc 15 with respect to the first tape 10. The adjustment means, not visible in detail in the illustrations, make it possible to move the cutting disc 15 closer and away from the first tape 10 to change the depth of the cut 5a,5b.

- 25 In a particular embodiment shown in figure 4a, the cutting disc 15 comprises one or more neutral areas 15a devoid of cutting edge and suitable for defining at least two cuts 5a,5b separated the one from the other.

Advantageously, the cutting disc 15 comprises a plurality of neutral areas devoid of cutting edge and angularly equidistant the one from the other.

- 30 More in detail, the cutting disc 15 comprises, at its outer profile, a plurality of recesses defining the above mentioned neutral areas.

In the preferred embodiment shown in figure 4, the scoring means 15 comprise

two cutting discs opposite each other and designed to longitudinally contact the opposite faces of the first tape 10 to define the first cut 5a and the second cut 5b respectively. Preferably, the cutting surfaces defined by the two cutting discs 15 are substantially coplanar the one to the other.

- 5 The two cutting discs 15 can have respective cutting angles (i.e., the angle defined by the cutting edge of each cutting disc) different the one from the other.

Downstream of the scoring device 14, the machine 6 comprises superimposition means 16 for superimposing the first and the second tapes 10 and 11.

- 10 More in particular, the superimposition means 16 are composed, as shown in figure 3, of a pair of parallel rollers, idle or motorised, having the side surfaces substantially in contact with each other and between which slide the tapes 10 and 11.

- The rotation axis of the rollers 16 is substantially vertical and the tapes 10, 11
15 exiting from them lie on a substantially vertical plane and move along a substantially horizontal direction.

- Advantageously, downstream of the superimposition means 16 are arranged forward movement means 17 for feeding the superimposed tapes 10 and 11 towards a forming station 18 on which are formed a succession of single-dose
20 packs 1.

More in particular, as shown in figure 5, the forward movement means 17 are composed of a pair of motorised grip plates, parallel the one to the other and facing one another and positioned on opposite sides with respect to the tapes 10 and 11.

- 25 The grip plates 17 are movable in direction of reciprocal approach and moving away respectively to grip and release the tapes 10 and 11 and are movable, for a predefined stroke, along a forward direction substantially at right angles to the direction of reciprocal approach/moving away and substantially parallel to the tapes 10 and 11.

- 30 The direction of reciprocal approach/moving away of the grip plates 17 is shown in the illustration 5 with the reference number A, while the forward direction is indicated by the reference number B.

The grip plates 17 move in the direction of forward movement B towards the forming station 18 when they are in near configuration, meaning when they retain the tapes 10 and 11, and move in the opposite direction, meaning towards the superimposition means 16, when they are in away configuration, meaning
5 when they have released the tapes 10 and 11.

The forward movement of the tapes 10 and 11 towards the forming station 18 is therefore of the intermittent type.

In the preferred embodiment shown in the illustrations, the stroke completed by the grip plates 17 in the direction of forward movement, the latter being
10 substantially horizontal, corresponds to the forward movement of a section of the tapes 10 and 11 equal to the space occupied by four single-dose packs 1 arranged in series. It is obvious for a technician of the sector to change as required the extension of the stroke of the grip plates 17. The forming station 18 is arranged downstream of the forward movement means 17 and comprises a
15 first and a second sealing device 19 and 20 respectively, suitable for sealing the first tape 10 to the second tape 11 to define at least a sealed pocket 4. The forming station 18 also comprises a dosing station 21, placed between the first and the second sealing devices 19 and 20, to feed a dose of product inside the pocket 4.

20 Usefully, the first sealing device 19 performs at least a pair of cross seals 22a (i.e., perpendicular to the extension of the tapes 10 and 11) and a first longitudinal seal 22b (i.e., parallel to the extension of the tapes 10 and 11) intersecting the cross seals 22a to define, between the tapes 10 and 11, an open containment chamber 23.

25 More in detail, the cross seals 22a are made substantially vertically and the first longitudinal seal 22b is made horizontally at the base of the pack 1, the containment chamber 23 being therefore open at the top.

Advantageously, the first sealing device 19 comprises at least a pair of first plates 24, parallel with and opposite each other, and arranged on opposite sides
30 with respect to the tapes 10 and 11. The first plates 24 are movable in the direction of reciprocal approach/moving away to tighten and release the tapes themselves.

More particularly, the sealing of the tapes 10 and 11 is by hot-sealing and at least one of the first plates 24 has a heatable open profile 25a, 25b.

The open profile 25a, 25b comprises at least a pair of first sides 25a suitable for cross sealing the tapes 10 and 11 to define the cross seals 22a and a second side
5 25b, connecting together the first sides 25a, suitable for longitudinally sealing the tapes 10 and 11 to define the first previously-mentioned longitudinal seal 22b.

In the preferred embodiment shown in the figure 7, one of the first two plates 24 has a plurality of open profiles 25a, 25b adjacent to one another and having
10 substantially U-shapes, suitable for defining four containment chambers 23 adjacent to one another and separated by respective cross seals 22a.

Advantageously, the first sealing device 19 comprises first cutting means 26, 27 for the partial cut of the tapes 10 and 11.

More in particular, the first cutting means 26, 27 comprise at least a first blade
15 26 associated integral with one of the first plates 24 at one of the first sides 25a of the relative open profile 25a, 25b.

The first blade 26 protrudes outwards and extends only along a portion of the relative first side 25a to partially intercept the cross seals 22a.

Usefully, the other of the first plates 24 has at least a recess 28 to house the first
20 blade 26 with the first plates 24 moved near to one another.

The first cutting means 26, 27 also comprise at least a first cutting element 27 arranged at the intersection between the first side 25a supporting the first blade 26 and the second side 25b of the open profile 25a, 25b; the first cutting
25 element 27 is shaped so as to chamfer the angle that forms between the cross seals 22a and the first longitudinal seal 22b.

In the preferred embodiment shown in the figure 7, one of the first plates 24 supports four first blades 26 and four first cutting elements 27 so as to partially separate the four containment chambers 23 defined by the first plates 24.

Advantageously, the first sealing device 19 also comprises first extraction
30 means of the scraps, not shown in detail in the illustrations, produced by the cutting of the tapes 10 and 11 and, in particular, by the first cutting elements 27.

As mentioned above, downstream of the first sealing device 19 is arranged the

dosing station 21.

The dosing station 21 comprises grip means 29, 30 for gripping the first and/or the second tapes 10 and 11 for the opening of the relative containment chamber 23.

5 More in particular, the grip means 29, 30 comprise a structure 29 supporting at least a pair of suction cups 30, parallel with and facing each other and arranged at opposite sides of the tapes 10 and 11. The suction cups 30 are mobile in the direction of reciprocal approach and away movement between a grip
10 configuration, in which they are closer to one another to contact the first and the second tapes 10 and 11 respectively, and an opening configuration, in which they are distant from one another to move the tapes 10 and 11 away from each other, opening the relative containment chamber 23.

The dosing station 21, furthermore, comprises at least a dispenser nozzle 31 for dispensing the product P mobile vertically between a raised configuration, in
15 which it is positioned above with respect to the tapes 10 and 11, and a lowered configuration in which it is positioned inside the containment chamber 23, with the suction cups 30 in opening configuration, to perform the filling of the chamber itself with a dose of the product P.

In the preferred embodiment shown in figure 6, the dosing station comprises
20 four nozzles 31 arranged in series the one to the other to feed the four containment chambers 23 described above at the same time.

As can be seen in figure 8a, each nozzle 31 comprises a cap 32 for temporarily closing the exit gap of the product P.

Suitably, control means are provided, not visible in detail in the illustrations,
25 suitable for opening and closing the caps 32 for dispensing the dose of product P with the nozzles 31 in lowered configuration.

Downstream of the dosing station 21 is arranged the second sealing device 20, which for each containment chamber 23 makes a second longitudinal seal 22c
30 of the tapes 10 and 11, defining the pocket 4 and forming a corresponding sealed single-dose pack 1.

More particularly, the second sealing device 20 is composed of a pair of second sealing plates which are arranged on opposite sides with respect to the tapes 10

and 11 and are facing and parallel to each other. The second plates 20 are mobile in the direction of reciprocal approach and moving away to tighten and release the tapes 10 and 11 respectively.

As shown in the figure 9, at least one of the second plates 20 has a heatable straight profile 25c, suitable for longitudinally sealing the tapes 10 and 11 to
5 define the second longitudinal seal 22c mentioned above.

Advantageously, downstream of the second sealing device 20 is arranged a cutting and unloading station 33 for cutting and unloading the single-dose pack 1 defined by the forming station 18.

10 More particularly, the cutting and unloading station 33 comprises second cutting means 34, 35, 36 suitable for separating each single-dose pack 1.

The second cutting means 34, 35, 36 comprise at least a pair of third plates 34, parallel and facing each other, mobile in the direction of reciprocal approach and moving away to tighten and to release the single-dose pack 1 respectively.

15 More in particular, the second cutting means 34, 35, 36 comprise at least a second blade 35 positioned on one of the third plates 34 and suitable for cross cutting the single-dose pack 1 at the part of the cross seals 22a not intercepted by the first blade 26 so as to separate the single-dose pack 1 itself. The other of the third plates 34 has at least a cavity, not shown in the illustrations, for
20 housing the second blade 35 with the third plates 34 moved near to one another.

Preferably, one of the third plates 34 has also at least a second cutting element 36, positioned above the second blade 35, shaped so as to chamfer the angle that forms between the cross seals 22a and the second longitudinal seal 22c. In the same way, the other of the third plates 34 has a corresponding hollow 37
25 suitable for receiving the second cutting element 36.

In the preferred embodiment shown in the figure 10, one of the third plates 34 supports four second blades 35 and four second cutting elements 36 so as to completely separate the four single-dose packs 1 arranged in succession and partially separated from the four first blades 26 of the first sealing device 19. In
30 the same way, the other of the third plates 34 has a corresponding number of cavities and hollows 37.

The cutting and unloading station 33, furthermore, comprises second extraction

means of the scraps produced by cutting the single-dose packs 1 and, in particular by the second cutting elements 36. These second extraction means are arranged at the third plates 34 and are not visible in detail in the illustrations.

Advantageously, the cutting and unloading station 33 comprises at least a supporting element 38, 39 for supporting the single-dose packs 1 separated in this way, arranged at the third plates 34, below these.

Following the cut of the single-dose packs 1, the latter fall by gravity on the supporting element 38, 39.

The supporting element 38, 39 has a substantially vertical locator surface 38 and a substantially horizontal supporting surface 39 adjacent and integral with each other.

Preferably, the cutting and unloading station 33 comprises at least an unloading element 40, 41 suitable for picking up the single-dose packs 1 cut in this way and supported by the supporting element 38, 39 to position them in a storage container 42.

More in particular, as shown in figure 11, the unloading element 40, 41 is made up of an arm 40 having at one extremity a suction-cup element 41. The arm 40 is moving sideways, in direction of reciprocal approach and moving away from the locator surface 38 for picking up and transporting the single-dose packs 1 supported by the supporting element 38, 39. Furthermore, the arm 40 is moving in rotation around a substantially horizontal axis to position the single-dose packs 1 thus picked up in the storage container 42.

Usefully, in the embodiment shown in the illustrations, the cutting and unloading station 33 comprises four unloading elements 40, 41 suitable for picking up the four single-dose packs 1 cut at the same time.

In the embodiment shown in the illustrations, the forming station 18 and the cutting and unloading station 33 are arranged in succession without interruption. Other embodiments cannot however be ruled out in which between the forming station 18 and the cutting and unloading station 33 are placed one or more auxiliary stations for carrying out additional operations, all of which having an extension equal to the predefined stroke completed by the grip plates 17.

Advantageously, the various devices making up the machine 6, and in

particular, the sealing devices 19 and 20, the nozzles 31 and the second cutting means 34, 35, 36, are mechanically controlled, i.e., by means of a system of lever mechanisms and cams not shown in the illustrations.

The operation of the present invention is as follows.

5 As described above, the forward movement of the tapes 10 and 11 occurs in an intermittent way.

More in particular, the grip plates 17 unwind the tapes 10 and 11 from the respective reels 12 and 13 for a distance equal to the stroke completed by the plates themselves.

10 During each stroke of the grip plates 17, the first tape 10 is scored longitudinally by the cutting discs 15.

Following the cut, the first tape 10 is superimposed on the second tape 11 by means of the pair of rollers 16.

15 When the tapes 10 and 11 reach the first sealing device 19, the first plates 24 move closer together to longitudinally seal the tapes themselves so as to define four containment chambers 23 open at the top and separated the one from the other.

20 The first plates 24 seal the tapes 10 and 11 during the return stroke of the grip plates 17, i.e., towards the superimposition means 16 and with the tapes themselves stopped.

At the same time as the sealing done by the first plates 24, the first blades 26 cut the tapes 10 and 11 at the cross seals 22a, partially separating the containment chambers 23.

25 The subsequent forward movement of the tapes 10 and 11 conveys the containment chambers 23 thus obtained to the dosing station 21.

During the return stroke of the grip plates 17, the suction cups 30 move in succession to the grip configuration and to opening configuration, so as to allow the nozzles 31 to move inside the relevant containment chambers 23.

30 With the nozzles 31 in lowered configuration, the control means move the relative caps 32 in such a way as to open and close the corresponding exit gaps to supply a relative dose of product P.

Before returning the nozzles 31 to raised configuration, as shown in the

sequence of figure 8a, the caps 32 are again closed to prevent dripping and possible contamination of the dispensed product P.

At the same time as the dispensing of the doses of product P, the first sealing device 19 makes the partial seal of the portions of the tapes 10 and 11 located
5 upstream of the containment chambers 23 arranged at the dosing station 21.

The subsequent stroke of the grip plates 17 in the direction of forward movement, towards the forming station 18, conveys the containment chambers 23 from the dosing station 21 to the second sealing device 20.

The second sealing device 20 longitudinally seals the tapes 10 and 11, the latter
10 being stopped, so as to close the relative containments chambers 23 and thus obtain corresponding sealed pockets 4.

At the same time as the second longitudinal seal made by the second sealing device 20, the first sealing device 19 and the nozzles 31 make the partial seal of the tapes 10 and 11 and fill the containment chambers 23 placed in succession
15 the one with the other immediately upstream of the sealed pockets 4 respectively.

The further stroke of the grip plates 17 conveys the single-dose packs 1 thus formed and partially joined the one to the other to the cutting and unloading station 33.

20 During the relative return stroke of the grip plates 17, and therefore with the tapes 10 and 11 stopped, the second cutting means 34, 35, 36 separate the single-dose packs 1 completely the one from the other, the single-dose packs 1 falling by gravity resting on the supporting element 38, 39.

Similarly to what has been previously described, the operation of the second
25 cutting means 34, 35, 36 occurs at substantially the same time as that of the sealing devices 19 and 20 and of the nozzles 31 on the sections upstream of the tapes 10 and 11.

The plates making up the first and the second sealing devices 19 and 20, as well as those supporting the second cutting means 35, 36 are therefore mechanically
30 connected the one to the other and move substantially in synchronism.

The single-dose packs 1 having therefore been separated the one from the other, the unloading elements 40, 41 pick up the single-dose packs 1 resting on the

supporting element 38, 39 and position them inside the container 42.

As can be seen from the previous description, the packaging machine according to the invention allows achieving the preset objects.

In this respect, it is pointed out that the machine according to the invention
5 allows, with respect to the state of the art, considerably simplifying the scoring phase of the semi-rigid material and, at the same time, carrying out the sealing and dosing operations in a practical, easy and functional way, ensuring the perfect preservation of the product contained in the packs thus obtained and avoiding any risk of contamination.

CLAIMS

- 1) Packaging machine (6) for making up single-dose packs (1) with break opening, comprising:
- at least a first feeding device (8) of a first tape (10) of semi-rigid plastic material;
 - at least a second feeding device (9) of a second tape (11) of flexible plastic material;
 - at least a scoring device (14) of said first tape (10) arranged downstream of said first feeding device (8);
 - superimposition means (16) of said first tape (10) on said second tape (11) arranged downstream of said scoring device (14);
 - at least a forming station (18) of at least a single-dose pack (1), arranged downstream of said superimposition means (16), comprising:
 - at least a first and a second sealing device (19, 20) of said first tape (10) with said second tape (11) to define at least a sealed containment pocket (4) and
 - at least a dosing station (21), positioned between said first and said second sealing device (19, 20), for feeding a dose of product (P) in said pocket (4);
- 20 characterised by the fact that said scoring device (14) is substantially of the continuous type and comprises scoring means (15) intended to be substantially in constant and longitudinal contact with said first tape (10).
- 2) Machine (6) according to claim 1, characterised by the fact that said scoring means comprise at least a cutting disc (15) that can be operated in rotation and defining a cutting plane suitable for longitudinally contacting said first tape (10).
- 3) Machine (6) according to claim 2, characterised by the fact that said scoring device (14) comprises adjustment means of the position of said cutting disc (15) with respect to said first tape (10).
- 4) Machine (6) according to one or more of the preceding claims, characterised by the fact that said cutting disc (15) comprises one or more neutral areas (15a) lacking of cutting edge so as to define on said first tape (10) at least two cuts

- (5a, 5b) substantially at a distance the one from the other.
- 5) Machine (6) according to claim 4, characterized by the fact that said cutting disc (15) has, at its outer profile, one or more recesses defining said neutral areas (15a).
- 5 6) Machine (6) according to one or more of the claims from 2 or 5, characterised by the fact that said scoring means comprise two of said cutting discs (15) opposite one another and intended to longitudinally contact the opposite faces of said first tape (10) to define a first and a second cut (5a, 5b) respectively.
- 10 7) Machine (6) according to claim 6, characterised by the fact that the cutting planes defined by said cutting discs (15) are substantially coplanar the one with the other.
- 8) Machine (6) according to claim 6 or 7, characterized by the fact that said cutting discs (15) have different cutting angles.
- 15 9) Machine (6) according to one or more of the previous claims, characterised by the fact that said first sealing device (19) makes at least a pair of cross seals (22a) at a distance the one from the other and a first longitudinal seal (22b) intersecting said cross seals (22a) to define an open containment chamber (23) opened at the opposite side of said first longitudinal seal (22b).
- 20 10) Machine (6) according to claim 9, characterised by the fact that said first sealing device (19) comprises at least a pair of first sealing plates (24) arranged parallel and facing one another, said first plates (24) being mobile in a direction of reciprocal approach/moving away to tighten/release said tapes (10, 11) to/from one another.
- 25 11) Machine (6) according to claim 10, characterised by the fact that at least one of said first plates (24) has a heatable open profile (25a, 25b) comprising at least a pair of first sides (25a) suitable for cross sealing said tapes (10, 11) to define said cross seals (22a) and a second side (25b), joining together said first sides (25a), suitable for longitudinally sealing said tapes (10, 11) to define said first
30 longitudinal seal (22b).
- 12) Machine (6) according to one or more of the previous claims, characterised by the fact that said first sealing device (19) comprises partial first cutting

means (26, 27) of said tapes (10, 11).

13) Machine (6) according to claims 11 and 12, characterised by the fact that said partial first cutting means (26, 27) comprise at least a first blade (26) associated with one of said first plates (24) at one of said first sides (25a), said
5 first blade (26) being protruding towards the outside and only extending along a portion of the relative first side (25a) to partially intercept said cross seals with said first plates (24) moved reciprocally closer, the other of said first plates (24) having at least a recess for housing said first blade (26) with said first plates (24) moved reciprocally closer.

10 14) Machine (6) according to one or more of the previous claims, characterised by the fact that said dosing station (21) comprises grip means (29, 30) for gripping at least one between said first tape (10) and said second tape (11) movable for the opening of said containment chamber (23).

15 15) Machine (6) according to claim 14, characterised by the fact that said grip means (29, 30) comprise at least a pair of suction cups (30), parallel and facing one another, mobile in direction of reciprocal approach/moving away between a grip configuration, in which they are moved reciprocally closer to contact said first and said second tape (10, 11) respectively, and an opening configuration, in which they are distanced to move said tapes (10, 11) away from each other
20 opening said containment chamber (23).

16) Machine (6) according to claim 14 or 15, characterised by the fact that said dosing station (21) comprises at least a dispenser nozzle (31) moving between a raised configuration, in which it is positioned above said tapes (10, 11), and a lowered configuration, in which it is positioned inside said containment
25 chamber (23), the latter being opened by said grip means (29, 30), to fill the chamber itself with a dose of product (P).

17) Machine (6) according to claim 16, characterised by the fact that said nozzle (31) comprises a cap (32) for temporarily closing the exit gap of the product (P).

18) Machine (6) according to claim 17, characterised by the fact that it
30 comprises control means suitable for opening and closing said cap (32), for dispensing said dose of product (P), with said nozzle (31) in lowered configuration.

- 19) Machine (6) according to one or more of the previous claims, characterised by the fact that said second sealing device (20) performs a second longitudinal seal (22c) of said tapes (10, 11) to close said containment chamber (23), defining said sealed pocket (4) and forming a single-dose pack (1).
- 5 20) Machine (6) according to one or more of the previous claims, characterised by the fact that said second sealing device comprises a pair of second sealing plates (20), arranged parallel and facing one another, mobile in direction of reciprocal approach/moving away to tighten/release said first and said second tape (10, 11) to/from each other, at least one of said second sealing plates (20)
- 10 comprising a substantially straight heatable profile suitable for longitudinally sealing said tapes (10, 11) to define said second longitudinal seal (22c).
- 21) Machine (6) according to one or more of the previous claims, characterised by the fact that it comprises at least one cutting and unloading station (33) of said single-dose pack (1) arranged downstream of said second sealing device
- 15 (20).
- 22) Machine according to claim 21, characterised by the fact that said cutting and unloading station (33) comprises second cutting means (34, 35, 36) suitable for separating said single-dose pack (1).
- 23) Machine according to claim 22, characterised by the fact that said second
- 20 cutting means (34, 35, 36) comprise at least a pair of third plates (34), parallel and facing one another, mobile in direction of reciprocal approach/moving away respectively to tighten the one to the other and to release said single-dose pack (1), on one of said third plates (34) being positioned at least a second blade (35) suitable for cross cutting said single-dose pack (1), with said third plates (34)
- 25 brought reciprocally closer, at the part of said cross seals (22a) not intercepted by said at least one first blade (26) so as to separate the single-dose pack itself, the other of said third plates (34) presenting at least a cavity for housing said second blade (35) with said third plates (34) brought reciprocally closer.
- 24) Machine (6) according to claim 22 or 23, characterised by the fact that said
- 30 cutting and unloading station (33) comprises at least a supporting element (38, 39) for supporting said single-dose pack (1) separated in this way, arranged at said second cutting means (34, 35, 36) and below these, said supporting element

(38, 39) having a substantially vertical locator surface (38) and a substantially horizontal supporting surface (39) adjacent and integral the one with the other.

25) Machine (6) according to claim 24, characterised by the fact that said cutting and unloading station (33) comprises at least an unloading element (40, 41) suitable for picking up said single-dose pack (1) cut in this way and supported by said supporting element (38, 39) to position it in a storage container (42).

26) Machine (6) according to claim 25, characterised by the fact that said unloading element (40, 41) is made up of an arm (40) with at one extremity a suction-cup element (41), said arm (40) being mobile sideways, in direction of approach/moving away from said locator surface (38) for the picking up and the transport of said single-dose pack (1) and being mobile in rotation around a substantially horizontal axis for the positioning of the single-dose pack (1) picked up this way in said storage container (42).

27) Machine (6) according to one or more of the previous claims, characterised by the fact that it comprises forward movement means (17) of said first and second tape (10, 11) placed between said superimposition means (16) and said first sealing device (19) for feeding said tapes (10, 11) towards said forming station (18).

28) Machine (6) according to claim 27, characterised by the fact that said forward movement means comprise a pair of grip plates (17), parallel and facing one another, arranged on opposite sides with respect to said tapes (10, 11), said grip plates (17) being mobile in direction of reciprocal approach/moving away respectively to grip and release said tapes (10, 11) and being mobile, for a preset stroke, along a direction of forward movement substantially at right angles to the direction of reciprocal approach and moving away and substantially parallel to said tapes (10, 11).

29) Packaging machine (6) for making up single-dose packs (1), comprising:

- at least a first feeding device (8) of a first tape (10) of semi-rigid plastic material;
- at least a second feeding device (9) of a second tape (11) of flexible plastic material;

- superimposition means (16) of said first tape (10) on said second tape (11) arranged downstream of said scoring device (14);
- at least a forming station (18) of at least a single-dose pack (1), arranged downstream of said superimposition means (16),

5 characterised by the fact that said forming station (18) comprises:

- at least a first and a second sealing device (19, 20) for sealing said first tape (10) with said second tape (11) to define at least a sealed containment pocket (4); said first sealing device (19) being suitable to perform at least a pair of cross seals (22a) at a distance
10 the one from the other and a first longitudinal seal (22b) intersecting said cross seals (22a) to define a containment chamber (23) opened at the opposite side of said first longitudinal seal (22b) and said second sealing device (20) being suitable for closing said containment chamber (23) to define said sealed
15 containment pocket (4);
- and at least a dosing station (21), positioned between said first and said second sealing device (19, 20) for feeding a dose of product (P) in said pocket (4) and comprising at least a dispenser nozzle (31) moving between a raised configuration, in which it is
20 positioned above said tapes (10, 11), and a lowered configuration, in which it is positioned inside said containment chamber (23) to fill the chamber itself with a dose of product (P).

30) Machine (6) according to claim 29, characterised by the fact that said dosing station (21) comprises grip means (29, 30) for gripping at least one
25 between said first tape (10) and said second tape (11) movable for the opening of said containment chamber (23).

31) Machine (6) according to claim 30, characterised by the fact that said grip means (29, 30) comprise at least a pair of suction cups (30), parallel and facing one another, mobile in direction of reciprocal approach/moving away between a
30 grip configuration, in which they are moved reciprocally closer to contact said first and said second tape (10, 11) respectively, and an opening configuration, in which they are distanced to move said tapes (10, 11) away from each other

opening said containment chamber (23).

Fig. 3a

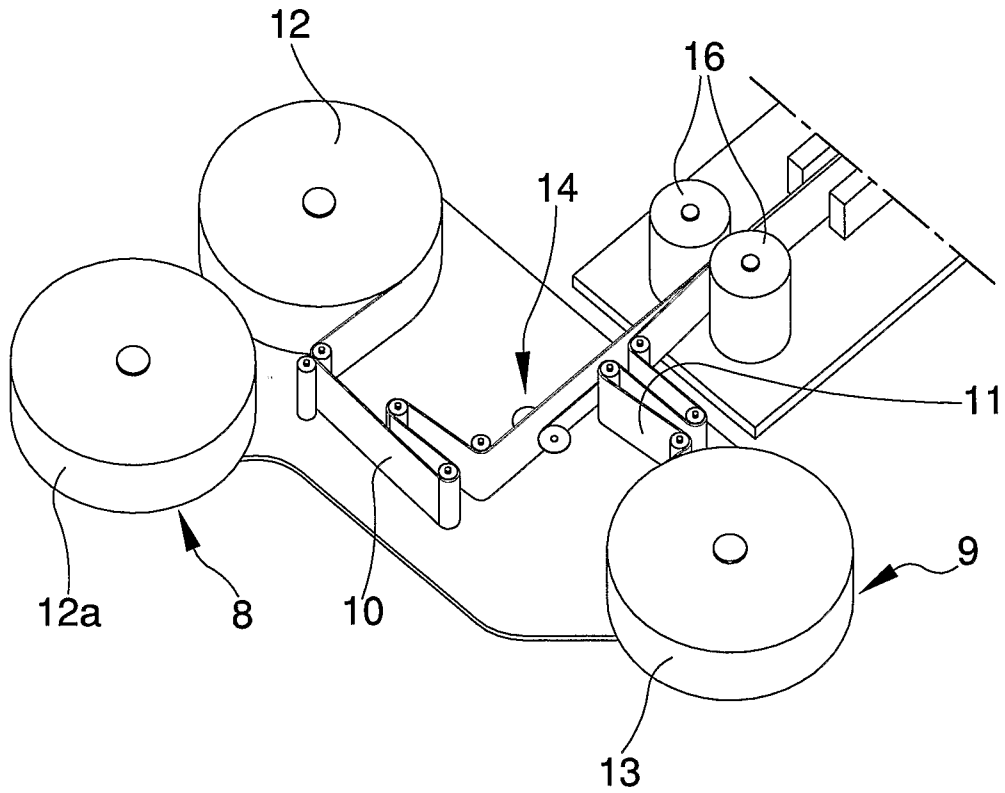


Fig. 4

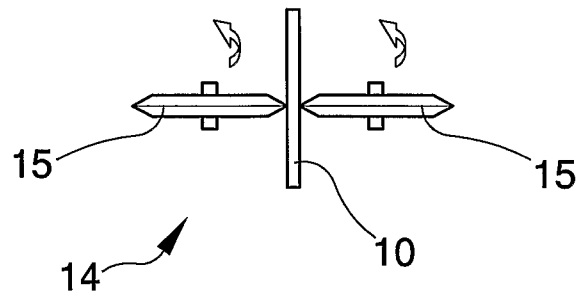


Fig. 4a

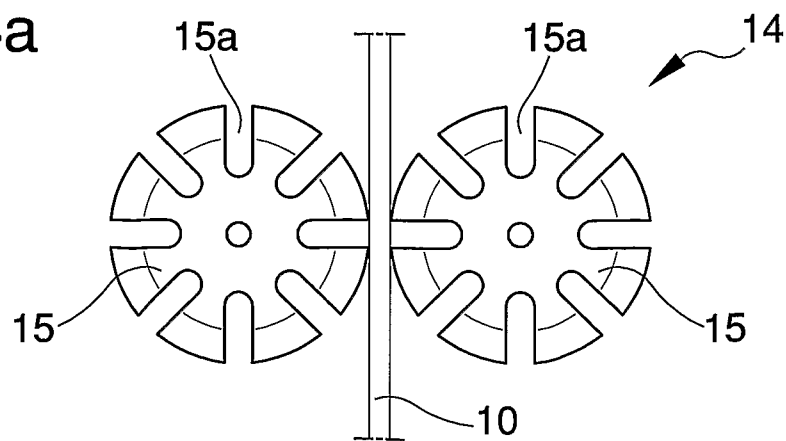


Fig. 7

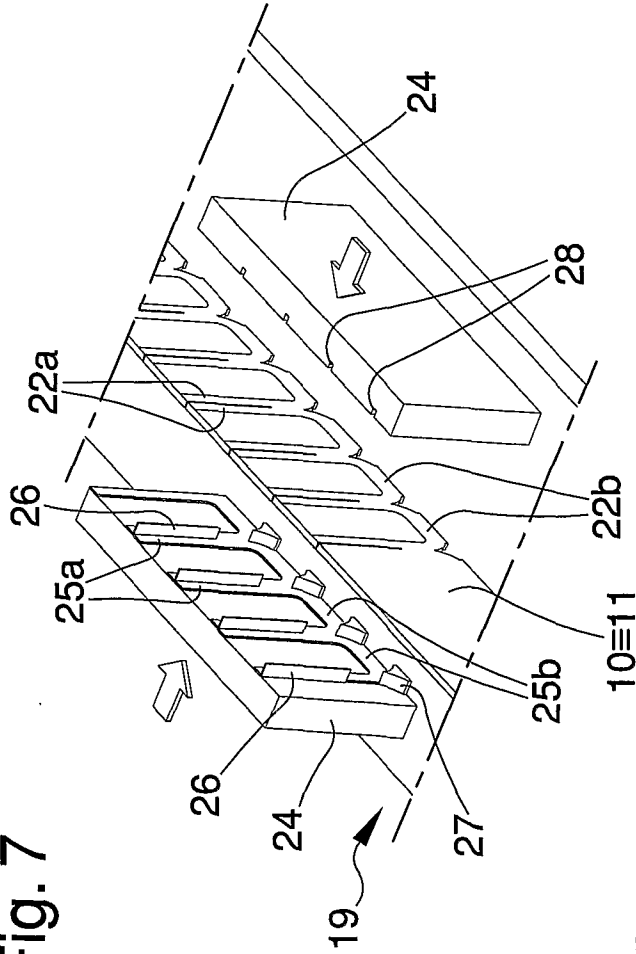


Fig. 8

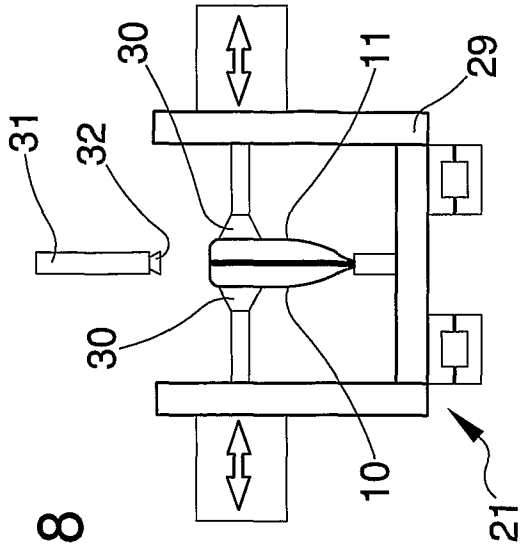


Fig. 8a

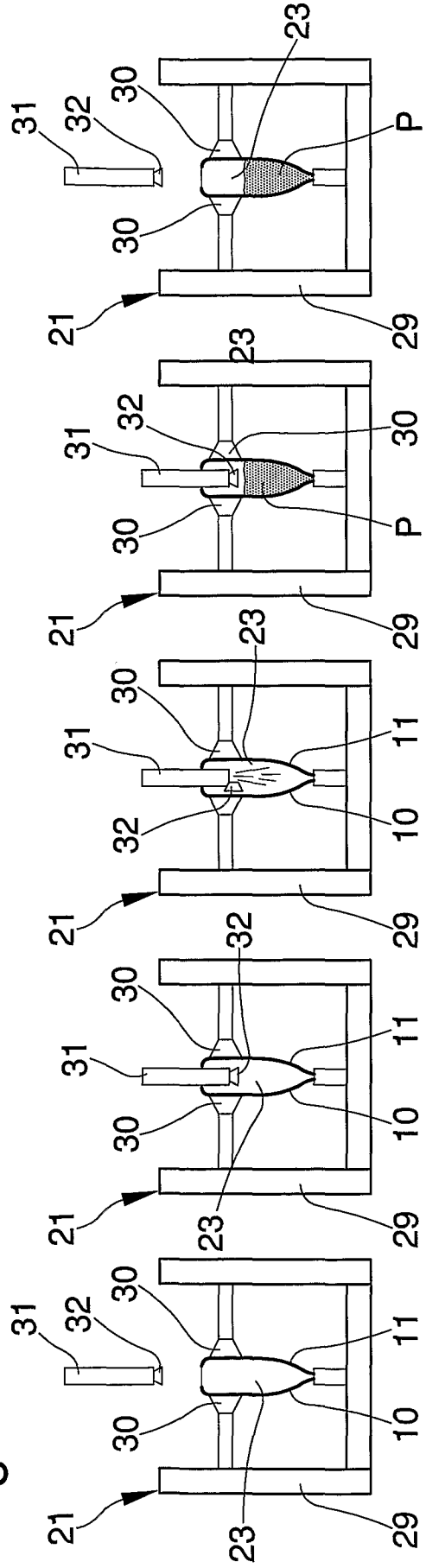


Fig. 9

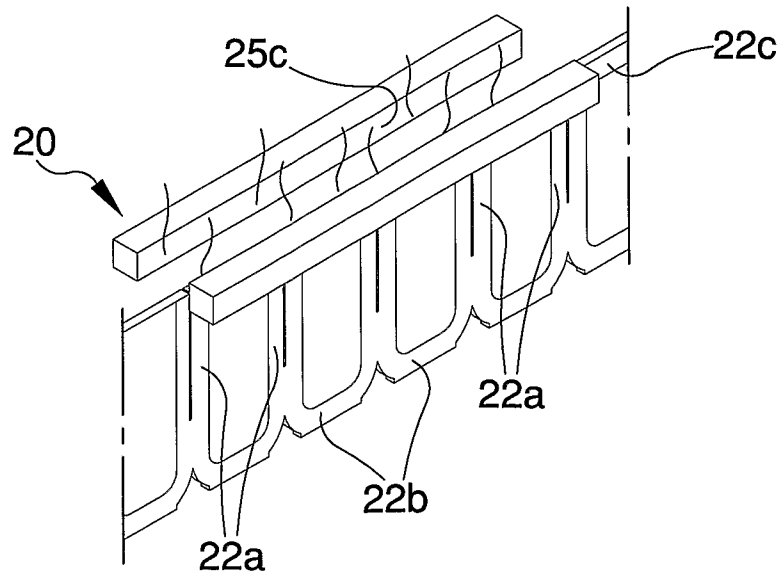


Fig. 10

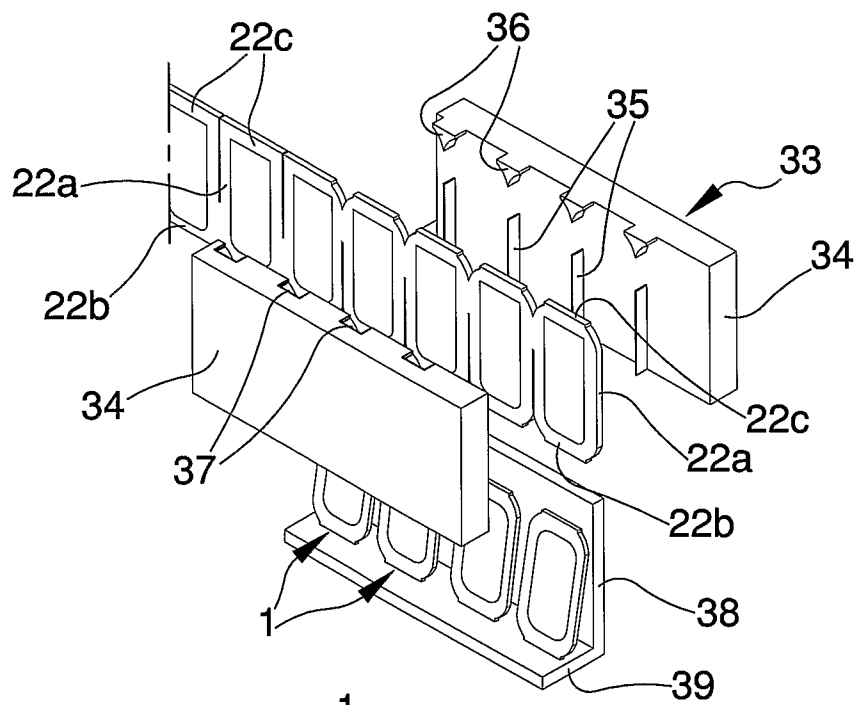


Fig. 11

