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(54) STICK PACK POUCH PRODUCTION METHOD AND MACHINE, AND STICK PACK POUCH

(57) The stick pack pouch production method comprises following steps: conveying a tensioned foil (13) from a supply bobbin (10); cutting the foil (13) longitudinally into parallel strips (15); bending each strip (15) around a tube (17) while conveyed in a vertical conveyance path through bending deflectors (16), causing two side edge regions of each strip (15) contact and weld to each other creating a longitudinal weld line (27), providing a foil tubular conduct (15a); repeatedly at regular intervals, collapsing and welding each foil tubular conduct (15a) below the tube (17), forming a chain of stick pack pouches (1); and cutting transversally the chain of stick pack pouches (1), producing individual items, wherein in a setting portion preceding the conveyance vertical portion the method further comprises perforate the foil (13) and introducing one plastic spout (24) on each perforation (22) located in correspondence of one of the strips (15). A machine to implement the production method and a stick pack pouch (1) are disclosed.

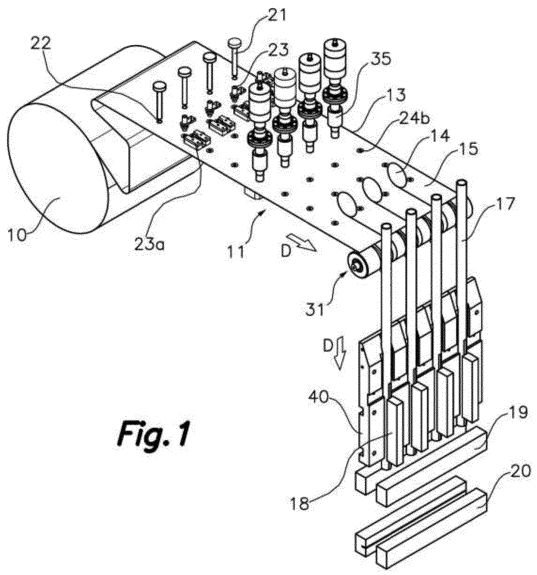

Fig. 1

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Description

Technical field

[0001] The present invention concerns, according to a first aspect, to a production method of a stick pack pouch including a closed plastic spout or nozzle topped by a sealing plug and a machine for its implementation.

[0002] According to a second aspect, the present invention refers to a machine configured to implement the production method.

[0003] According to a third aspect, the present invention refers to a stick pack pouch obtained by the production method and/or the machine.

State of the Art

[0004] As it is well known in the art, a stick pack pouch is used for holding dry powders or liquids or small solid unit products and comprises a flexible pouch obtained from a foil sheet, having a flattened tube configuration containing a quantity of the product and including one longitudinal weld line with a longitudinal fin, and two transverse weld lines sealing hermetically the flattened tube configuration.

[0005] Document GB2311759 discloses a multiple automatic packing machine capable of continuously and repeatedly carrying out the steps of slitting a wide sheet-like packing material into a predetermined number of packing films fed from a supply bobbin, seal-moulding each of the packing films into a bag-like configuration by a vertical sealer and a lateral sealer, filling a material to-be-packed into each of the packing films which were seal moulded into a bag-like configuration, withdrawing each of the packing films by lowering the lateral sealer a portion equal to the length of the bag in a state that each of the packing films are laterally sealed, raising the lowered lateral sealer back to a location before carrying out the lateral sealing operation by laterally opening the lateral sealer, and cutting a centre line portion of the lateral seal of each of the packing films.

[0006] Document WO2005044665 relates to a vertical forming, filling, and sealing machine for manufacturing a flexible reclosable stand-up package having a zipper seal incorporated therein, the machine comprising: a) a forming tube having an entrance portion above a former section and an exit portion below the former section; b) a device for dispensing a supply of zipper seal mechanism toward the machine, the zipper seal mechanism having first and second interlocking opposing members, each including a profile portion which interlocks with a complementary profile portion on the opposing member and a tab portion extending away from the profile portion; c) a channel formed in a surface of the forming tube and extending along the longitudinal axis of the forming tube from the entrance portion to the exit portion, wherein the channel is proportioned to receive the interlocked profile portions of the zipper seal mechanism; d) a roller mechanism for splaying the first and second tab portions away from one other so as to lie adjacent to an exterior surface of the forming tube; e) a first heat seal mechanism for sealing a portion of each of the tab portions to an adjacent surface of a thermoplastic film prior to the former section; f) a former mechanism for forming the thermoplastic sheet into a tubular shape about the forming tube; g) a second heat seal mechanism for forming a back sealing on the tubular shape of thermoplastic film thereby creating a film tube; and h) an apparatus for imparting a crease in the film tube.

[0007] Document US20160145023 discloses a stick pack pouch comprising: a foil sheet having side edges and first and second edges extending transversely between the side edges, a fin that has a longitudinal sealing joint extending between the side edges to form the foil sheet into a tube, wherein the tube has a front side and a back side, and wherein the fin is on the back side, first and second transverse sealing joints sealing the first and second edges, respectively, a weakened pattern which extends over/across at least a portion of the fin, the back side of the tube, and the front side of the tube, wherein the weakened pattern enables the package to be opened along the pattern and wherein the weakened pattern includes nonlinear portions on the front side, back side, or front and back sides of the tube.

[0008] In order to provide new functionalities to the stick pack pouches known in the art, the present invention provides a production method and a machine to manufacture a stick pack pouch including a pouring spout topped by a sealing plug, as well as a stick pack pouch obtainable by the method production method and/or the machine, wherein the stick pack pouch is in the form of a flattened tube sealed at both ends by transverse welds lines and has two opposite largest walls, wherein one of the largest walls includes a longitudinal sealing joint, and the pouring spout protrudes from an area of the other largest walls opposite to the wall that includes the longitudinal sealing joint.

Disclosure of the invention

[0009] With this object in view, and according to a first aspect, the present invention provides a stick pack pouch production method that comprises the following conventional steps, as per the known prior art:

- conveying a tensioned foil in a conveyance direction following a conveyance path, the conveyance path including a vertical portion aimed to shape the stick pack pouch;
- cutting the foil longitudinally in the horizontal portion of the conveyance path into several parallel strips, each strip being defined between two side edge regions;
- bending each strip around a suspended vertical tube, in the vertical portion of the conveyance path, while conveyed in the conveyance direction in the vertical

portion of the conveyance path through bending deflectors, causing the two side edge regions of each strip contact and weld to each other by a longitudinal welder creating a longitudinal weld line, in general with a longitudinal fin, providing a foil tubular conduct with a lower portion of the suspended vertical tube located inside it;

- repeatedly at regular intervals, collapsing and welding each foil tubular conduct below the suspended vertical tube, causing two facing inner surfaces of the foil tubular conduct contact and weld to each other interrupting the foil tubular conduct and producing a transverse weld line;
- supplying a quantity of a product into the foil tubular conduct above the transverse weld line through the suspended vertical tube and closing the foil tubular conduct with another weld line, whereby each strip becomes a chain of stick pack pouches each one hermetically sealed between two transverse weld lines and filled with a quantity of the product; and
- cutting transversally the chain of stick pack pouches, producing individual stick pack pouches or sets of several chained stick pack pouches, delimited by transverse weld lines.

[0010] The production method of the present invention further comprises the following steps not disclosed in the prior art:

- providing the conveyance path with a horizontal or slightly slopped setting portion preceding the vertical portion thereof;
- repeatedly at the regular intervals, creating a plurality of perforations on the foil in the setting portion, each perforation being positioned in a transverse portion of the foil intended to become one of the strips, and being positioned in a longitudinal portion of the foil intended to become a portion of a stick pack pouch comprised between two transverse weld lines;
- inserting one closed plastic spout or nozzle on each perforation in the setting portion, a tubular portion of each plastic spout protruding downwards from the foil and a flat ring portion of each plastic spout completely overlapping an edge region surrounding the correspondent perforation;
- welding the flat ring portion to the edge region in the setting portion; and
- conveying the plurality of parallel strips of the foil to the vertical portion of the conveyance path by supporting an outer surface of the plurality of parallel strips on a roller comprising two roller members with a gap between them or a perimetral recess in a central area thereof, the gap or the recess being sized with regard to the protruding tubular portions of the plastic spouts welded to the foil so as to avoid the contact of the roller with the protruding tubular portions which pass on them.

[0011] In the proposed production method, the plastic spouts are preferably inserted into the perforations of the foil from the above, thereby the tubular portion of each plastic spout, which can be cylindrical or otherwise, protrudes downwards from a downwardly oriented outer surface of the foil, and the flat ring portion of each plastic spout, which has for example a circular or other configuration, is overlapped to an upwardly oriented inner surface of the foil.

[0012] The terms inner surface and outer surface of the foil are used herein with reference to the surfaces of the foil that will be in the inner and outer sides of the finished stick pack pouches, respectively.

[0013] In an embodiment, the longitudinal cutting of the foil into strips is performed by foil cutters oriented in a longitudinal direction of the setting portion of the conveyance path.

[0014] For example, along the vertical conveyance path, in an upper part thereof, each strip placed against the suspended vertical tube is supported on a central annular area located between the bending deflectors and forming integral part thereof.

[0015] Preferably, in the vertical portion of the conveyance path, the flat ring portions of the spouts welded to each strip are facing a flat vertical surface of the suspended vertical tube during the formation of the foil tubular conduct and the protruding tubular portion of the plastic spouts are received and guided in a longitudinal slot formed in a vertical support member.

[0016] Another embodiment of the production method includes the additional step of pressing portions of each strip comprised between two consecutive plastic spouts against the suspended vertical tube with a pressure front portion of a pressure member moveably connected to the support member while the strip is conveyed in the conveyance direction along the vertical portion of the conveyance path, in order to avoid eventual creasing of the portions of the strips comprised between two consecutive plastic spouts.

[0017] The pressing is performed by applying a pressure force to the pressure member with a bias element and moving back the pressure front portion of the pressure member out from the conveyance path against the pressing force by a contact of the moving plastic spouts on a slanted slide portion adjacent an upper side of the pressure front portion of the pressure member.

[0018] According to a second aspect, the present invention provides a machine for implementing the disclosed production method, the machine including the following known devices already used in the prior art:

- a conveyor comprising multiple parallel rollers to support and convey a tensioned foil from a supply bobbin in a conveyance direction following a conveyance path including a vertical portion;
- longitudinal foil cutters configured to cut the foil into several parallel strips, each strip being defined between two side edge regions;

- bending deflectors arranged around an upper portion of suspended vertical tubes, the bending deflectors being configured to bend each strip around one upper portion of the suspended vertical tubes while the strip is conveyed in the conveyance direction in the vertical portion of the conveyance path, and to contact to each other two side edge regions of each strip;
- longitudinal welders arranged adjacent to a lower portion of the suspended vertical tubes and configured to weld to each other the two side edge regions in contact of each strip by a longitudinal weld line, forming a foil tubular conduct around the lower portion of each suspended vertical tube; and
- transverse welding jaws placed underneath the suspended vertical tubes movable between an open position, in which the transverse welding jaws do not interfere with the foil tubular conducts, and a closed position in which the transverse welding jaws collapse the foil tubular conducts, causing two facing inner surfaces of each foil tubular conducts contact and weld to each other sealing the foil tubular conduct at both ends thereof by a transverse weld line, thereby forming a stick pack pouch.

[0019] The machine of the present invention comprises the following additional elements not disclosed in the prior art:

- a horizontal or slightly slopped setting portion provided in the conveyance path preceding the vertical portion in the conveyance direction;
- punchers arranged in the setting portion and configured to create a plurality of perforations on the foil;
- spout inserters arranged in the setting portion and configured to introduce one automatically fed closed plastic spout on each perforation, so that a tubular portion of each plastic spout protrudes downwards from the foil;
- welders arranged in the setting portion and configured to weld a flat ring portion of each spout to an edge region of the foil surrounding the correspondent perforation;
- configurations provided in supporting rollers placed in a transition between the horizontal or slightly slopped setting portion and the vertical portion of the conveyance path and configured to allow unobstructed passage for the plastic spouts protruding from the strips of the foil;
- configurations provided in the bending deflectors and configured to allow unobstructed passage for the plastic spouts protruding from the strips of the foil; and
- a slot formed in vertical support members arranged in the vertical portion of the conveyance path and configured to allow unobstructed passage for the plastic spouts protruding from the strips of the foil.

[0020] In an embodiment, the foil cutters are also placed in the setting portion of the conveyance path.

[0021] For example, the bending deflectors include an intermediate annular area configured to support the strip when it's being bent, and the annular area further includes a central annular depression aimed to receive the tubular portion of the plastic spout.

[0022] Optionally, each suspended vertical tube includes a flat vertical surface at least on its upper portion configured and positioned to face a longitudinal portion of each strip including the flat ring portion of each plastic spout.

[0023] In an embodiment, in the vertical portion of the conveyance path a vertical support member is provided, and the vertical support member has a longitudinal slot defined therein and configured for receiving and guiding the tubular portion of the plastic spouts protruding from the strip of foil.

[0024] In another embodiment, the machine further comprises a pressing device including one or more pressure members moveably connected to the support member. Each pressure member comprises a pressure front portion configured to pass through a space over the support member in alignment with the longitudinal slot or through an opening formed in the support member in alignment with the longitudinal slot. A bias element is provided which is configured to exert a pressing force on the pressure member biasing the pressure member to move for pressing with the pressure front portion the strip against the suspended vertical tube while the strip is conveyed in the conveyance direction along the vertical portion of the conveyance path. The pressure member further comprises a slanted slide portion adjacent an upper side of the pressure front portion configured for being contacted by the plastic spouts in order to make the pressure member to move back out of the conveyance path against the pressing force and let the plastic spouts to pass by.

[0025] By means of the pressing device, eventual creasing of the portions of the strips comprised between two consecutive plastic spouts is avoided.

[0026] According to a third aspect, the present invention provides a stick pack pouch which can be produced by the method according the first aspect and/or by the machine according to the second aspect, the stick pack pouch having the form of a flattened tube containing a quantity of a product being hermetically sealed, and comprising:

- two transverse weld lines at both ends thereof;
- two opposite largest walls;
- one longitudinal weld line on one of the largest walls; and
- a closed plastic spout protruding from an area of the other largest wall opposite to the wall that includes the longitudinal weld line.

[0027] In an embodiment, the plastic spout is topped

by a sealing plug.

[0028] Optionally, the longitudinal weld line is formed in a longitudinal fin.

[0029] For example, the transverse weld lines are straight or have a given shape with curved edges or with several straight sections.

Brief description of the drawings

[0030] The foregoing and other features and advantages will be more fully understood from the following detailed description of several illustrative and non-limitative embodiments with reference to the accompanying drawings, in which:

Fig. 1 is a schematic perspective view that illustrates in a simplified way all the steps of the production method according to an embodiment of a first aspect of the present invention and the main characteristics of a machine according to an embodiment of a second aspect of the present invention implementing the method;

Fig. 1A is a schematic cross-sectional view of a closed plastic spout inserted in a perforation of a tensioned foil from which the stick pack pouch will be formed;

Fig. 2 is a rear perspective view of a part of the machine that corresponds to a vertical portion of a conveyance path, illustrating the main components that allow the strips including a protruding plastic spout to be moved there along;

Figs. 3A to 3E are cross sectional views illustrating successive stages in the formation of a tubular pouch from a foil strip as it moves through the vertical section of the machine illustrated in Figs. 1 and 2;

Fig. 4A is a cross sectional view illustrating some elements in the conveyance path of a machine according to another embodiment of the second aspect of the present invention including a pressing device performing a further step of the production method of the present invention;

Fig. 4B is a cross sectional view of a pressure member belonging to the pressing device; and

Figs. 5A TO 5C are perspective views showing both sides of a stick pack pouch according to an embodiment of a third aspect of the present invention obtained by the proposed production method and/or by using the proposed machine.

Detailed description of several embodiments

[0031] Figs. 1 and 2 allow seeing the main steps of a production method according to an embodiment of a first aspect of the present invention for producing stick pack pouches 1 having a closed plastic spout 24.

[0032] The production method comprises, initially, conveying a tensioned foil 13 in a conveyance direction D from a supply bobbin 10 following a conveyance path, wherein the conveyance path includes one horizontal or slightly slopped setting portion and a vertical portion, with the horizontal or slightly slopped setting portion preceding the vertical portion in the conveyance direction.

[0033] Along the setting portion the method comprises first repeatedly creating at regular intervals a plurality of perforations 22 on the foil 13, for example by using punchers 21 in a drilling station, then introducing one closed plastic spout 24 or nozzle in each perforation 22, for example by using spout inserters 23, 23a in a spout insertion station, so that a tubular portion 24a of each plastic spout 24 protrudes downwards from the foil 13 and a flat ring portion 24b of each plastic spout 24 completely overlaps an edge region of the foil 13 surrounding the correspondent perforation 22, then welding the flat ring portion 24b to the edge region of the foil 13, for example by using a welder 35 in a welding station, and finally cutting the foil 13 longitudinally into several parallel strips 15, for example by using longitudinal foil cutters 14 in a cutting station, so that each strip is defined between two side edge regions.

[0034] Each perforation 22 is positioned in a transverse portion of the foil 13 which after cutting will be one of the strips 15.

[0035] As can be seen in Fig. 1 the plastic spouts 24 are preferably inserted into the perforations 22 from above the foil 13, so that the flat ring portion 24b is overlapped to an upwardly oriented inner surface of the foil 13.

[0036] For example, the welding operation of the plastic spouts can be performed by ultrasound welding or by heat welding. In the case of using heat welding, the plastic spouts could be fed to the welding station pre-heated.

[0037] As per a preferred embodiment, the foil cutters 14 performing the longitudinal cutting of the foil 13 into strips 15 are oriented in a longitudinal direction in the setting portion of the conveyance path.

[0038] Once the foil 13 is longitudinally cut into parallel strips 15, the production method comprises conveying the foil 13 from the setting portion to the vertical portion of the conveyance path by supporting a downwardly oriented outer surface of the plurality of parallel strips 15 on a roller comprising two roller members 31a, 31b with a gap 31c between them, the gap 31c being sized with regard to the protruding tubular portions 24a of the plastic spouts 24, so that the gap 31c avoids contact of the roller members 31a, 31b with the protruding tubular portions 24a which pass between them.

[0039] Alternatively, the downwardly oriented outer surface of the plurality of parallel strips 15 are supported on a roller having a perimetral recess in a central area thereof, with the perimetral recess being sized with regard to the protruding tubular portions 24a of the plastic spouts 24, so that the perimetral recess avoids contact of the roller with the protruding tubular portions 24a which pass on them.

[0040] The production method then comprises bending each strip 15 around a suspended vertical tube 17 while the strip 15 is conveyed in the conveyance direction

in the vertical portion of the conveyance path through bending deflectors 16. In the vertical portion of the conveying path, each strip 15 is preferably supported on an annular area 16a located between the bending deflectors 16 while the tubular protruding portions 24a of the plastic spouts 24 are received and let to pass by without contact in a central annular depression 16b formed in the annular area 16a (see Fig. 3B).

[0041] The bending deflectors 16 cause the two side edge regions of each strip 15 contact and weld to each other in cooperation with a longitudinal welder 18 which creates a longitudinal weld line 27 providing a foil tubular conduct 15a with a lower portion of the suspended vertical tube 17 located inside it.

[0042] During the step of formation of the foil tubular conducts 15a, and also when the stick pack pouches are almost finished, the tubular portions 24a of the plastic spouts 24 are guided by a longitudinal slot 41 defined in a support member 40 (see Fig. 3D) placed at a lower part of the vertical portion of the conveyance path.

[0043] Eventually, and depending on the manner the two side edge regions of each strip 15 are contacted to each other, the longitudinal weld line 27 leaves a longitudinal fin 27a.

[0044] During the formation of the foil tubular conduct 15a in the vertical portion of the conveyance path, the flat ring portions 24b welded to each strip 15 are preferably facing a flat vertical surface 17a of the suspended vertical tube 17 (see Figs. 3A, 3B and 3C).

[0045] Once the strips 15 are formed into the foil tubular conducts 15a, the production method comprises collapsing and welding repeatedly at regular intervals each foil tubular conduct 15a below the suspended vertical tube 17, causing two facing inner surfaces of the foil tubular conduct 15a contact and weld to each other thereby interrupting the foil tubular conduct and producing transverse weld lines 25, 26.

[0046] A next step of the production method comprises supplying a quantity of a product into the foil tubular conduct 15a above each newly formed transverse weld line 25 through the suspended vertical tube 17 and then closing the foil tubular conduct 15a above the filled quantity of a product with another transverse weld line 26, whereby each strip 15 becomes a chain of stick pack pouches 1, each one being hermetically sealed between two transverse weld lines 25, 26 and filled with a quantity of the product.

[0047] During the step of creating the plurality of perforations 22 to the foil 13, each perforation 22 is further positioned in a longitudinal portion of the foil 13 which will form part of a stick pack pouch 1 comprised between the two transverse weld lines 25, 26, so that each finished stick pack pouch 1 includes one closed plastic spout 24.

[0048] Finally, the production method comprises cutting transversally the chain of stick pack pouches 1, thereby producing individual stick pack pouches 1 delimited by two transverse weld lines 25, 26 or a chain of several stick pack pouches 1 that can be separated later.

[0049] Figs. 4A and 4B illustrate another embodiment of the production method of the present invention which comprises the additional step of pressing portions of each strip 15 comprised between two consecutive plastic spouts 24 against the suspended vertical tube 17 while the strip 15 is conveyed in the conveyance direction along the vertical portion of the conveyance path, wherein the pressing is performed by means of a pressure front portion 52 of a pressure member 51 moveably connected to the support member 40 in a pressing device 50.

[0050] A pressure force is applied to the pressure member 51 by means of a bias element, and the pressure front portion 52 of the pressure member 51 is moved back out from the conveyance path against the pressing force by a contact of the moving plastic spouts 24 on a slanted slide portion 57 adjacent an upper side of the pressure front portion 52 of the pressure member 51.

[0051] Eventual creasing of the portions of the strips 15 comprised between two consecutive plastic spouts 24 is avoided by the pressure exerted by the pressure members 51.

[0052] Figs. 1 and 2 show a machine according to an embodiment of a second aspect of the present invention which is configured to implement the production method and produce stick pack pouches 1 having a closed plastic spout 24.

[0053] The machine comprises a conveyor 11 including multiple parallel rollers 30, 31 to support and convey a tensioned foil 13 supplied from a supply bobbin 10 in a conveyance direction D following a conveyance path which includes a horizontal or slightly slopped setting portion and a vertical portion. A drilling station, a spout insertion station, a welding station, and a cutting station are arranged in the horizontal or slightly slopped setting portion of the conveyance path which precedes the vertical portion in the conveyance direction D.

[0054] The drilling station includes punchers 21 configured to create a plurality of perforations 22 on the foil 13, the spout insertion station includes spout inserters 23, 23a configured to introduce one closed plastic spout 24, automatically fed, on each perforation 22. The plastic spout 24 has a tubular portion 24a and a flat ring portion 24b at an end thereof. As better shown in Fig. 1A, once the plastic spout 24 is inserted in the correspondent perforation 22, the tubular portion 24a protrudes downwards from the foil 13 and the flat ring portion 24b completely overlaps an edge region surrounding the perforation 13. The welding station includes welders 35 configured to weld the flat ring portion 24b of each plastic spout 24 to the correspondent edge region of the foil 13.

[0055] Before the plastic spout 24 is inserted in the perforation 22, the tubular portion 24a is already closed, for example with a sealing plug 28 (Fig. 1A), or alternatively with a breakable membrane or a breakable closure (not shown).

[0056] The cutting station comprises longitudinal foil cutters 14 configured to cut the foil into several parallel strips 15, with each strip 15 being defined between two

side edge regions. The punchers 21 are arranged so that each perforation 22 is positioned in a transverse portion of the foil which will be part of one of the strips 15.

[0057] The conveyor 11 comprises a roller 31 placed between the horizontal or slightly slopped setting portion and the vertical portion of the conveyance path. A downwardly oriented outer surface of the plurality of foil parallel strips 15 is supported on the roller 31. The roller 31 is comprised of one pair of roller members 31a, 31b with a gap 31c in between. The gap 31c has a shape complementary to the protruding tubular portions 24 of the plastic spouts 24 and is configured to avoid the contact of the roller members 31a, 31b with the protruding tubular portions 24a, as better shown in Fig. 3A. Alternatively, the roller could have a perimetral recess in a central area thereof sized with regard to the protruding tubular portions 24 of the plastic spouts 24 for the same purpose.

[0058] In the vertical portion of the conveyance path a plurality of suspended vertical tubes 17 are located, with each suspended vertical tube 17 being arranged adjacent each pair of roller members 31a of the roller 31. Each suspended vertical tube 17 includes a flat vertical surface 17a on its upper portion, configured and positioned to face a longitudinal portion of each strip 15 where the flat ring portion 24b of the plastic spouts 24 is welded, as shown in Figs. 3A and 3B.

[0059] Bending deflectors 16 are arranged below the roller 31 and around an upper portion of the suspended vertical tubes 17. Each bending deflector 16 is configured to bend one of the strips 15 around an upper portion of one of the suspended vertical tubes 17 while the strip 15 is conveyed in the conveyance direction in the vertical portion of the conveyance path, as better shown in Fig. 3B, and to make the two side edge regions of each strip 15 to contact to each other. The bending deflectors 16 include an intermediate annular area 16a configured to support the strip 15 when it is being bent. The annular area 16a further includes a central annular depression 16b aimed to receive the tubular portion 24a of the plastic spouts 24.

[0060] In the vertical portion of the conveyance path, and below the bending deflectors 16, support members 40 and longitudinal welders 18 are located. Each support member 40 is arranged adjacent one side of one of the suspended vertical tubes 17, and each longitudinal welder 18 is arranged in front of the correspondent support member 40 and adjacent to another opposite side of the correspondent suspended vertical tube 17, as shown in Fig. 1.

[0061] Fig. 3D shows a longitudinal slot 41 defined in the support member 40 for receiving and guiding the protruding tubular portion 24a of the plastic spouts 24. The longitudinal welders 18 are configured to weld to each other the two side edge regions in contact of each strip 15 by means of a longitudinal weld line 27, thereby each strip 15 is formed into a foil tubular conduct 15a around a lower portion of each suspended vertical tube 17.

[0062] Underneath the suspended vertical tubes 17 transverse welding jaws 19, 20 are arranged. The transverse welding jaws 19, 20 are movable between an open position (Fig. 1) in which the transverse welding jaws do not interfere with the foil tubular conducts 15a located therebetween, and a closed position (not shown) in which the transverse welding jaws collapse the foil tubular conducts 15a, causing two facing inner surfaces of each foil tubular conduct 15a contact and weld to each other, thereby sealing the foil tubular conduct 15a repeatedly at the regular intervals by transverse weld lines and forming stick pack pouches closed at both ends thereof.

[0063] The punchers 21, the transverse welding jaws 19, 20 and a foil advancing device are coordinated through a control unit to position the perforations 22 in a longitudinal portion of the foil 13 which will be a wall of a stick pack pouch comprised between two transverse weld lines and on one side of the stick pack pouch opposite the longitudinal weld line.

[0064] A data acquisition system associated to the machine acquires data related to the operating conditions of the drilling station, plastic spout insertion station and welding station which ensures the quality of the positioning and welds of the plastic spouts to the tensioned foil 13, which enables the centralization of all these data in a control unit, for consultation of such data or transfer them into a local or remote-control device.

[0065] Furthermore, it should be understood that the above-mentioned drilling station, spout insertion station and welding station of the setting portion, could be included in an independent apparatus to be operatively coupled to a conventional machine producing stick pack pouches, in combination with some additional modifications in the rollers, the bending deflectors and the support members of the vertical portion of the conveyance path contributing to shape the stick pack pouches in order to allow unobstructed passage for the plastic spouts protruding from the foil strips, endowing then the conventional machine with the functionalities of the present invention.

[0066] Fig. 4A shows a machine according to another embodiment of the present invention which comprises, in addition to the features described above, a pressing device 50 associated to the support member 40 located below the bending deflectors 16 in the vertical portion of the conveyance path.

[0067] The pressing device 50 comprises one or more pressure members 51 pivotably connected to the support member 40 by a pivot pin 49, wherein each pressure member 51 comprises, as better shown in Fig. 4B, a pressure front portion 52, a body member 53 carrying a counterweigh 54 at a rear end thereof spaced apart from the pressure front portion 52, and a support arm 55 having a pivot hole 56 located above of and in between the pressure front portion 52 and the counterweigh 54. The support arm 55 has a slanted slide portion 57 adjacent an upper side of the pressure front portion 52. The pivot hole 56 is configured to receive the pivot pin 49 in the assembled condition shown in Fig. 4A.

[0068] In the illustrated embodiment the machine includes, for example, three of the pressure members 51 and the support member 40 has two openings 42 formed in alignment with the longitudinal slot 41. The pressure front portion 52 of the uppermost of the pressure members 51 is configured to pass through a space over the support member 40 in alignment with the longitudinal slot 41 and the pressure front portion 52 of each one of the other two pressure members 51 is configured to pass through one of the openings 42 of the support member 40.

[0069] In any case, the counterweight 54 acts as a bias element exerting a pressing force that makes each pressure member 51 to pivot for pressing with the pressure front portion 52 the strip 15 against the suspended vertical tube 17 while the strip 15 is conveyed in the conveyance direction along the vertical portion of the conveyance path. The slanted slide portion 57 adjacent the pressure front portion 52 of each pressure member 51 is configured for being contacted by the moving plastic spouts 24 in order to make the pressure member 51 to pivot back out from the conveyance path against the pressing force exerted by the counterweight 54 to let the plastic spouts 24 to pass by.

[0070] Alternatively, the pressure member 51 can be moveably connected to the support member 40 by linear or otherwise guide elements, for example, so as to move into and out from the conveyance path. Alternatively, the bias element exerting the pressing force can be an elastic element, such as a spring or a rubber member, for example.

[0071] The pressure exerted by the pressure members 51 avoids the portions of the strips 15 comprised between two consecutive plastic spouts 24 to crease.

[0072] In the illustrated embodiment, each pressure member 51 further includes an adjusting screw 58 coupled to a threaded hole 59 formed in the body member 53, and the adjusting screw 58 has a tip 60 configured and arranged to make contact with a stop element 43 attached to the support member 40. Furthermore, the counterweight 54 is preferably comprised of a plurality of weight elements 54a fastened together by a fasten screw 61 coupled to a threaded hole 62 formed in the body member 53.

[0073] By selecting the number and size of weight elements 54a in the counterweight 54 and acting on the adjusting screw 58 the pressure exerted by the pressure members 51 can be adjusted.

[0074] Referring now to Figs. 5A and 5B, reference numeral 1 generally designates a stick pack pouch according to an embodiment of a third aspect of the present invention, which can be made according to the production method of the present invention and/or using the machine of the present invention.

[0075] The stick pack pouch 1 of the present invention is hermetically sealed, contains a quantity of a product and includes a closed plastic spout 24 for pouring the product. The stick pack pouch 1 has the configuration of a flattened tube defining two opposite largest walls and comprises two transverse weld lines 25, 26 at opposite ends thereof. A longitudinal weld line 27 is located along one of the two opposite largest walls, and the closed pouring plastic spout 24 protrudes from an area of the other of the largest walls opposite to the wall that includes the longitudinal weld line 27.

[0076] In an embodiment, the longitudinal weld line 27 includes a longitudinal fin 27a.

[0077] In a preferred embodiment the plastic spout 24 of the stick pack pouch 1 is closed by a sealing plug 28. Alternatively, the plastic spout 24 can be closed with a breakable membrane or a breakable closure.

[0078] Optionally, the transverse weld lines 25, 26 of the stick pack pouch 1 are straight or could have a given shape with curved edges or with several straight sections.

[0079] The scope of the invention is defined in the attached claim.

Claims

1. A stick pack pouch production method comprising the following steps:

   • conveying a tensioned foil (13) from a supply bobbin (10) in a conveyance direction (D) following a conveyance path, the conveyance path including at least a vertical portion;
   • cutting the foil (13) longitudinally into several parallel strips (15), each strip being defined between two side edge regions;
   • bending each strip (15) around a suspended vertical tube (17) while conveyed in the conveyance direction in the vertical portion of the conveyance path through bending deflectors (16) causing the two side edge regions of each strip (15) contact and weld to each other by a longitudinal welder (18) creating a longitudinal weld line (27), thereby providing a foil tubular conduct (15a) with a lower portion of the suspended vertical tube (17) located inside it; and
   • repeatedly at regular intervals, collapsing and welding each foil tubular conduct (15a) below the suspended vertical tube (17), causing two facing inner surfaces of the foil tubular conduct (15a) contact and weld to each other interrupting the foil tubular conduct and producing a transverse weld line (25, 26);
   • supplying a quantity of a product into the foil tubular conduct (15a) above the transverse weld line (25, 26) through the suspended vertical tube (17) and closing the foil tubular conduct (15a) with another transverse weld line (25, 26), whereby each strip (15) becomes a chain of stick pack pouches (1), each one being hermetically sealed between two transverse weld lines and

filled with a quantity of the product; and
• cutting transversally the chain of stick pack pouches (1), producing individual stick pack pouches (1) or sets of chained stick pack pouches (1) delimited by two transverse weld lines (25, 26),

characterized in that the method further comprises the following steps:

• providing the conveyance path with a horizontal or slightly slopped setting portion preceding the vertical portion in the conveyance direction;
• repeatedly at the regular intervals, creating in the setting portion a plurality of perforations (22) on the foil, each perforation (22) being positioned in a transverse portion of the foil (13) which will be one of the strips (15), and being positioned in a longitudinal portion of the foil (13) which will form part of a stick pack pouch (1) comprised between two of the transverse weld lines (25, 26);
• introducing one plastic spout (24) on each perforation (22), a tubular portion (24a) of each plastic spout (24) protruding downwards from the foil (13) and a flat ring portion (24b) of each plastic spout (24) completely overlapping an edge region surrounding the correspondent perforation (22);
• welding the flat ring portion (24b) to the edge region by a welder (35) in a welding station; and
• conveying the foil (13) from the setting portion to the vertical portion of the conveyance path by supporting a downwardly oriented outer surface of the plurality of parallel strips (15) on a roller comprising two roller members (31a, 31b) with a gap (31c) between them or a perimetral recess in a central area thereof, the gap (31c) or the perimetral recess being sized with regard to the protruding tubular portions (24a) of the plastic spouts (24) so as to avoid the contact of the roller with the protruding tubular portions (24a) which passes thereon.

2. The production method according to claim 1, wherein the plastic spouts (24) are inserted into the perforations (22) from above the foil (13), the flat ring portion (24b) being overlapped to an upwardly oriented inner surface of the foil (13).

3. The production method according to claim 1 or 2, wherein each strip (15) placed against the vertical tube (17) is supported on a central annular area (16a) located between the bending deflectors (16) and forming integral part thereof, and the tubular protruding portions (24a) of the plastic spouts (24) are received in a central annular depression (16b) formed in the annular area (16a).

4. The production method according to claim 1, 2 or 3 wherein the flat ring portions (24b) welded to each strip (15) are facing a flat vertical surface (17a) of the suspended vertical tube (17) during the formation of the foil tubular conduct (15a).

5. The production method according to claim 4, wherein the tubular portion (24a) of the plastic spout (24) is guided by a longitudinal slot (41) formed in a vertical support member (40) during the formation of the foil tubular conduct (15a).

6. The production method according to claim 5, further comprising the additional step of pressing portions of each strip (15) comprised between two consecutive plastic spouts (24) against the suspended vertical tube (17) with a pressure front portion (52) of a pressure member (51) moveably connected to the support member (40) while the strip (15) is conveyed in the conveyance direction along the vertical portion of the conveyance path, by applying a pressure force to the pressure member (51) with a bias element and moving back the pressure front portion (52) of the pressure member (51) out from the conveyance path against the pressing force by a contact of the moving plastic spouts (24) on a slanted slide portion (57) adjacent an upper side of the pressure front portion (52) of the pressure member (51).

7. A machine to produce stick pack pouches (1), the machine comprising:

• a conveyor (11) comprising multiple parallel rollers (30) to support and convey a tensioned foil (13) from a supply bobbin (10) in a conveyance direction (D) following a conveyance path including at least a vertical portion;
• longitudinal foil cutters (14) configured to cut the foil into several parallel strips (15), each strip (15) being defined between two side edge regions;
• bending deflectors (16) arranged around an upper portion of suspended vertical tubes (17), the bending deflectors (16) being configured to bend each strip (15) around the upper portion of one of the suspended vertical tubes (17) while conveyed in the conveyance direction in the vertical portion of the conveyance path, and to make the two side edge regions of each strip (15) contact to each other;
• longitudinal welders (18) arranged adjacent to a lower portion of the suspended vertical tubes and configured to weld the two side edge regions in contact of each strip (15) to each other by a longitudinal weld line (27), forming a foil tubular conduct around the lower portion of each suspended vertical tube (17); and
• transverse welding jaws (19) placed under-

neath the suspended vertical tubes (17) and movable between an open position, in which the transverse welding jaws do not interfere with the foil tubular conducts (15a), and a closed position, in which the transverse welding jaws collapse the foil tubular conducts (15a) causing two facing inner surfaces of each foil tubular conduct (15a) contact and weld to each other sealing the foil tubular conduct (15a) at both ends by a transverse weld line (25, 26) and forming a stick pack pouch (1);

characterized in that:

• the conveyance path along which the tensioned foil (13) is conveyed by the conveyor (11) further comprises a horizontal or slightly slopped setting portion preceding the vertical portion in the conveyance direction (D);

wherein the following stations are included in the setting portion of the conveyance path:

• a drilling station comprising punchers (21) configured to create a plurality of perforations (22) on the foil (13), each perforation (22) being positioned in a transverse portion of the foil which will be part of one of the strips (15), the punchers (21) and the transverse welding jaws (19, 20) being coordinated through a control unit to position the perforations (22) in a longitudinal portion of the foil (13) which will be a wall of a stick pack pouch (1) comprised between two transverse weld lines (25, 26) opposite to another wall of a stick pack pouch (1) comprising the longitudinal weld line (27);
• a spout insertion station comprising spout inserters (23, 23a) configured to introduce one plastic spout (24), automatically fed, on each perforation (22), with a tubular portion (24a) of each plastic spout (24) protruding downwards from the foil (13) and a flat ring portion (24b) of each plastic spout (24) completely overlapping an edge region surrounding the correspondent perforation (13); and
• a welding station comprising welders (35) configured to weld each flat ring portion (24b) to the correspondent edge region of the foil (13);

and wherein:

• the conveyor (11) comprises a roller (31) placed between the setting portion and the vertical portion of the conveyance path and on which a downwardly oriented outer surface of the foil of the plurality of parallel strips (15) is supported, the roller (31) comprising two roller members (31a, 31b) with a gap (31c) between them or a perimetral recess in a central area thereof, the gap (31c) or the perimetral recess being complementary to the protruding tubular portions (24a) of the plastic spouts (24) and configured to avoid the contact of the roller (31) with the protruding tubular portions (24a).

8. The machine according to claim 7, wherein the bending deflectors (16) include an intermediate annular area configured to support the strip (15) when it is being bent, and the annular area (16a) further includes a central annular depression (16b) configured to receive the tubular portion (24a) of the plastic spouts (24).

9. The machine according to claim 7 or 8, wherein each suspended vertical tube (17) includes a flat vertical surface (17a) at least on its upper portion configured and positioned to face a longitudinal portion of each strip including the flat ring portion (24b) of the plastic spouts (24).

10. The machine according to claim 7, 8 or 9, wherein a longitudinal slot (41) is defined in a vertical support member (40) located in the vertical portion of the conveyance path for receiving and guiding the protruding tubular portion (24a) of the plastic spouts (24).

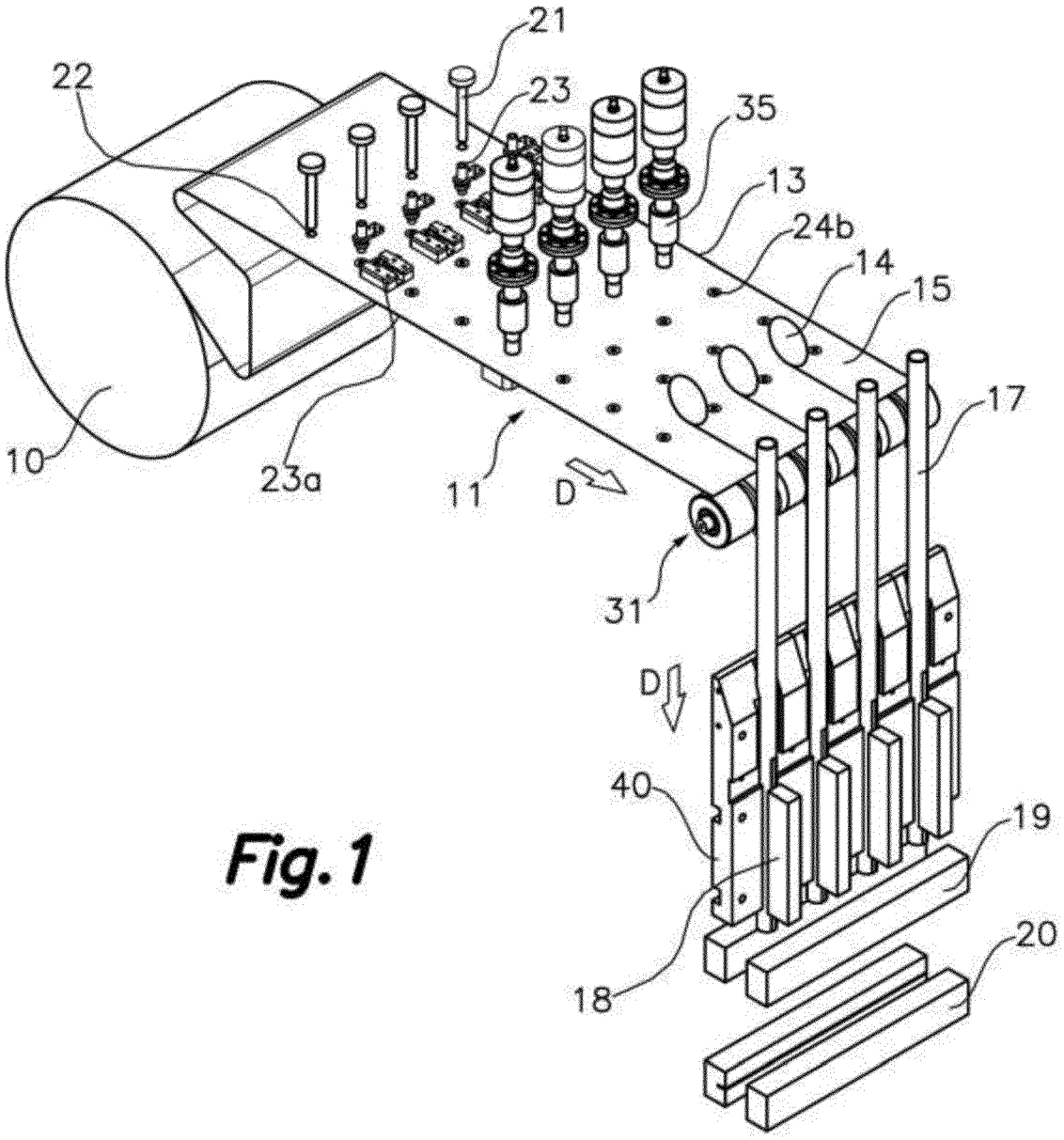
11. The machine according to claim 10, further comprising a pressing device (50) including at least one pressure member (51) moveably connected to the support member (40) and a bias member, wherein the pressure member (51) comprises a pressure front portion (52) configured to pass through a space over the support member (40) in alignment with the longitudinal slot (41) or through an opening (42) formed in the support member (40) in alignment with the longitudinal slot (41), the bias member is configured and arranged to exert a pressing force biasing the pressure member (51) to move for pressing with the pressure front portion (52) a portion of the strip (15) comprised between two consecutive plastic spouts (24) against the suspended vertical tube (17) while the strip (15) is conveyed in the conveyance direction along the vertical portion of the conveyance path, and a slanted slide portion (57) adjacent an upper side of the pressure front portion (52) is configured for being contacted by the plastic spouts (24) in order to make the pressure member (51) to move back out of the conveyance path against the pressing force and let the plastic spouts (24) to pass by.

12. The machine according to claim 11, wherein the pressure member (51) is pivotably connected to the support member (40) by a pivot pin (49) and the bias element exerting the pressing force is a counterweight (54) acting on the pressure member (51).

13. A stick pack pouch (1) configured as an hermetically sealed flattened tube containing a quantity of a product, the flattened tube defining two opposite largest walls with two transverse weld lines (25, 26) at opposite ends thereof and a longitudinal weld line (27) in one of the largest walls, **characterized in that** the flattened tube further comprises a closed plastic spout (24) having a tubular portion (24a) protruding from an area of the other of the largest walls opposite to the largest wall that includes the longitudinal weld line (27).

14. The stick pack pouch (1) according to claim 13, wherein the plastic spout (24) is closed by a sealing plug (28).

15. The stick pack pouch (1) according to claim 13 or 14, wherein the longitudinal weld line includes a longitudinal fin (27a).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24b
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23a
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D
31
D
40
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18
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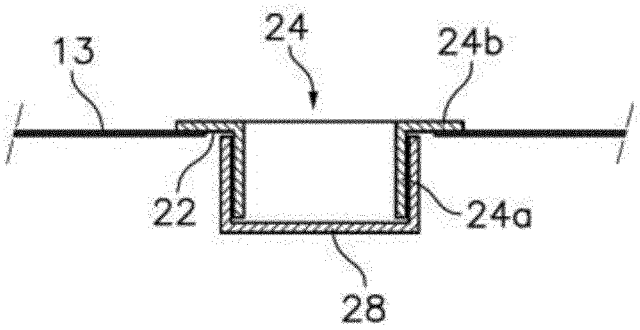
Fig. 1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13
24b
22
24a
28

Fig. 1A

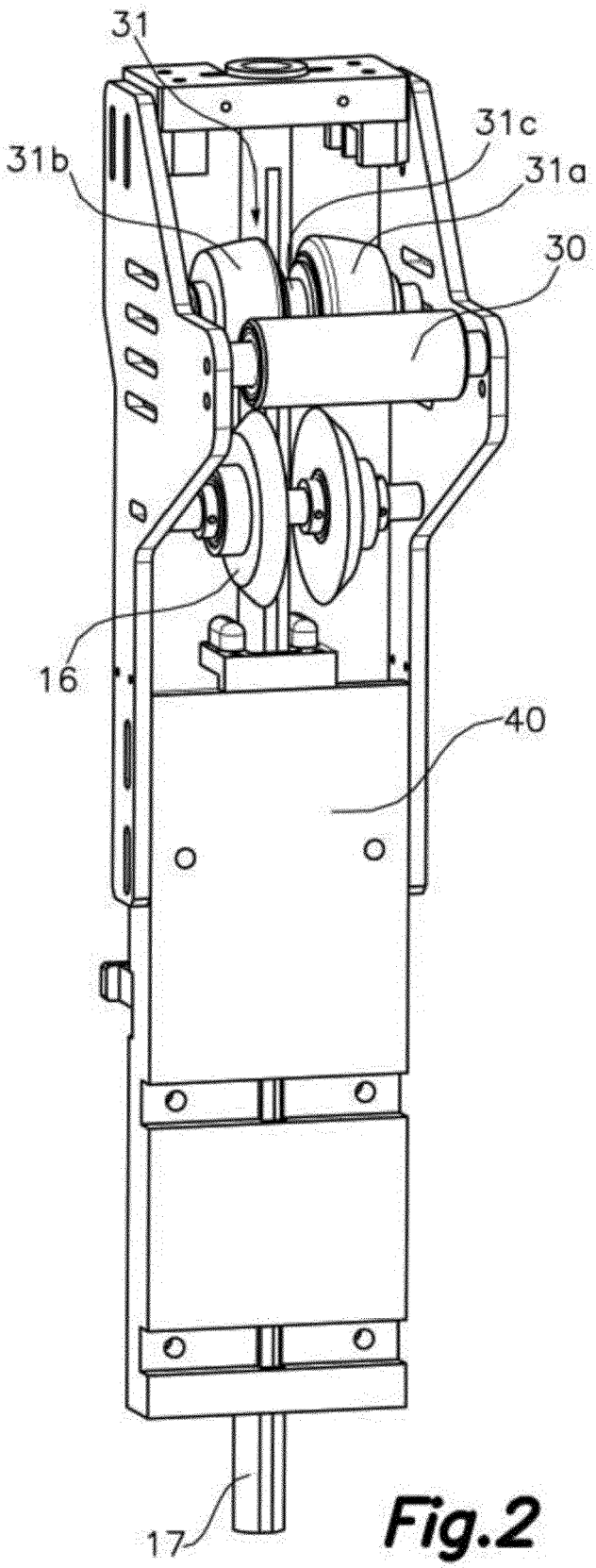


Fig.2

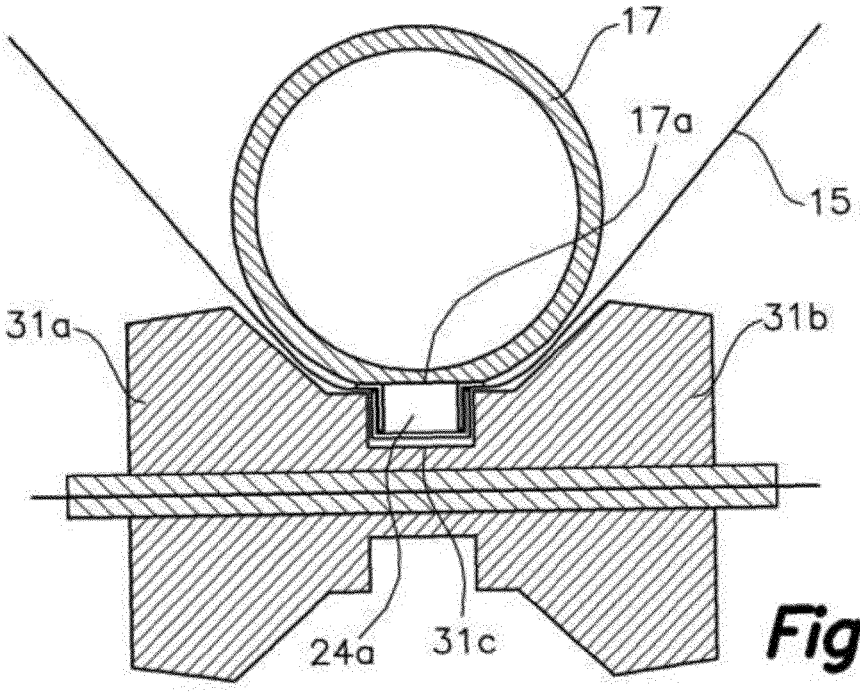


Fig.3A

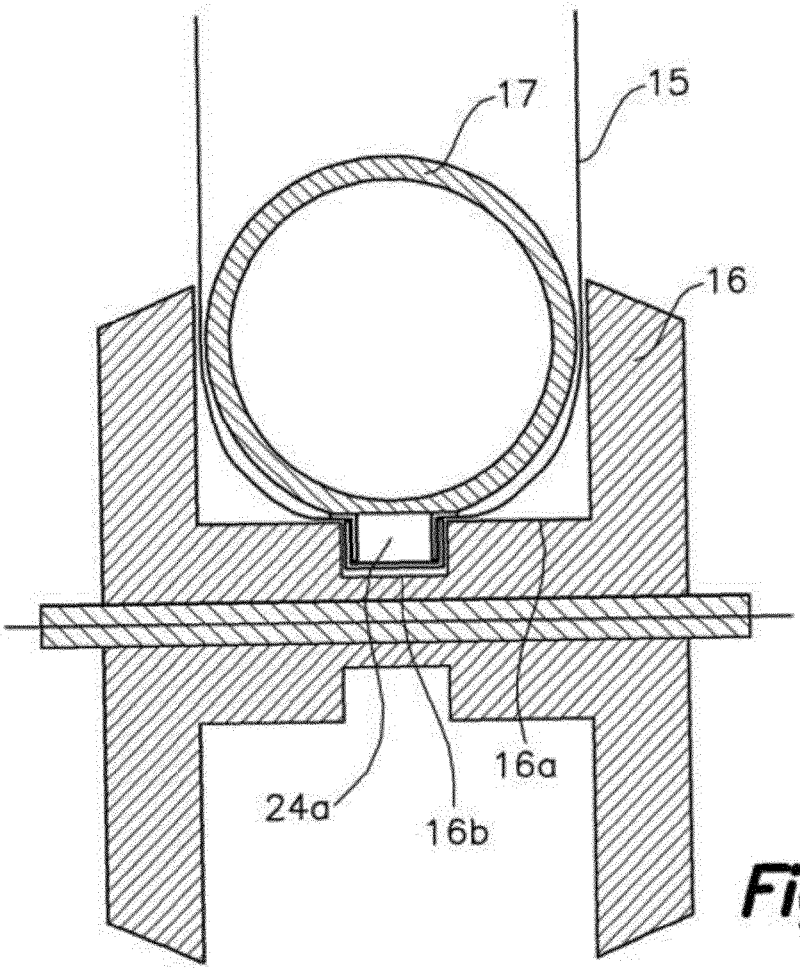


Fig.3B

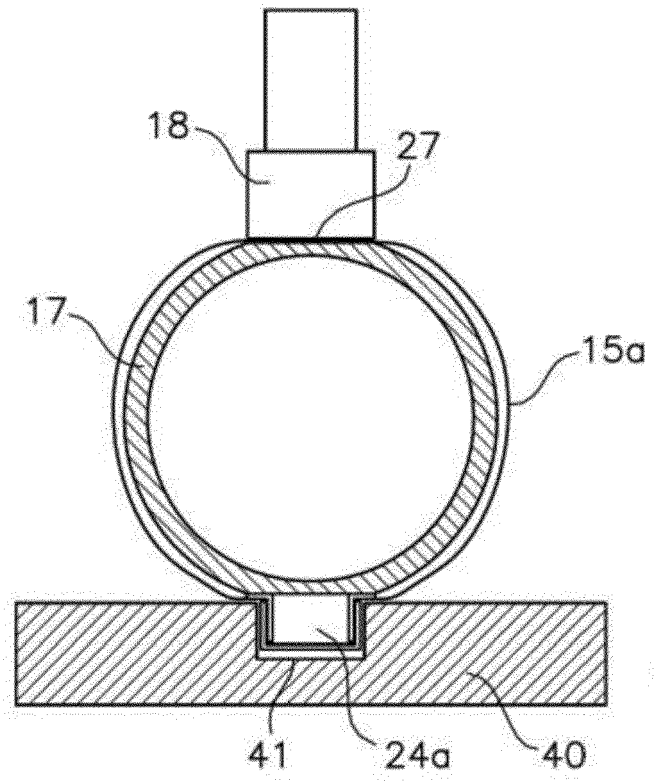


Fig.3C

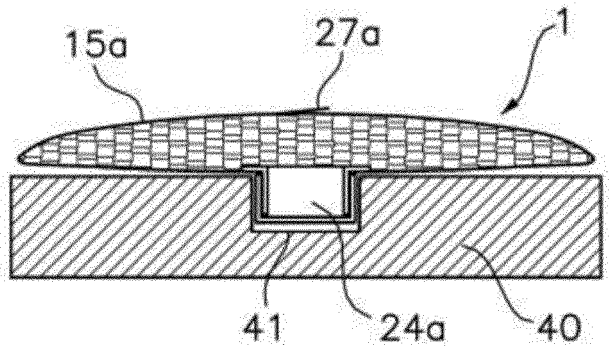


Fig.3D

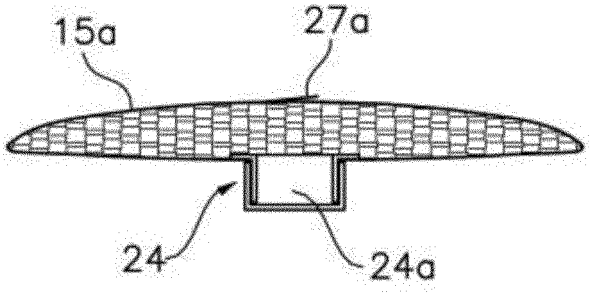
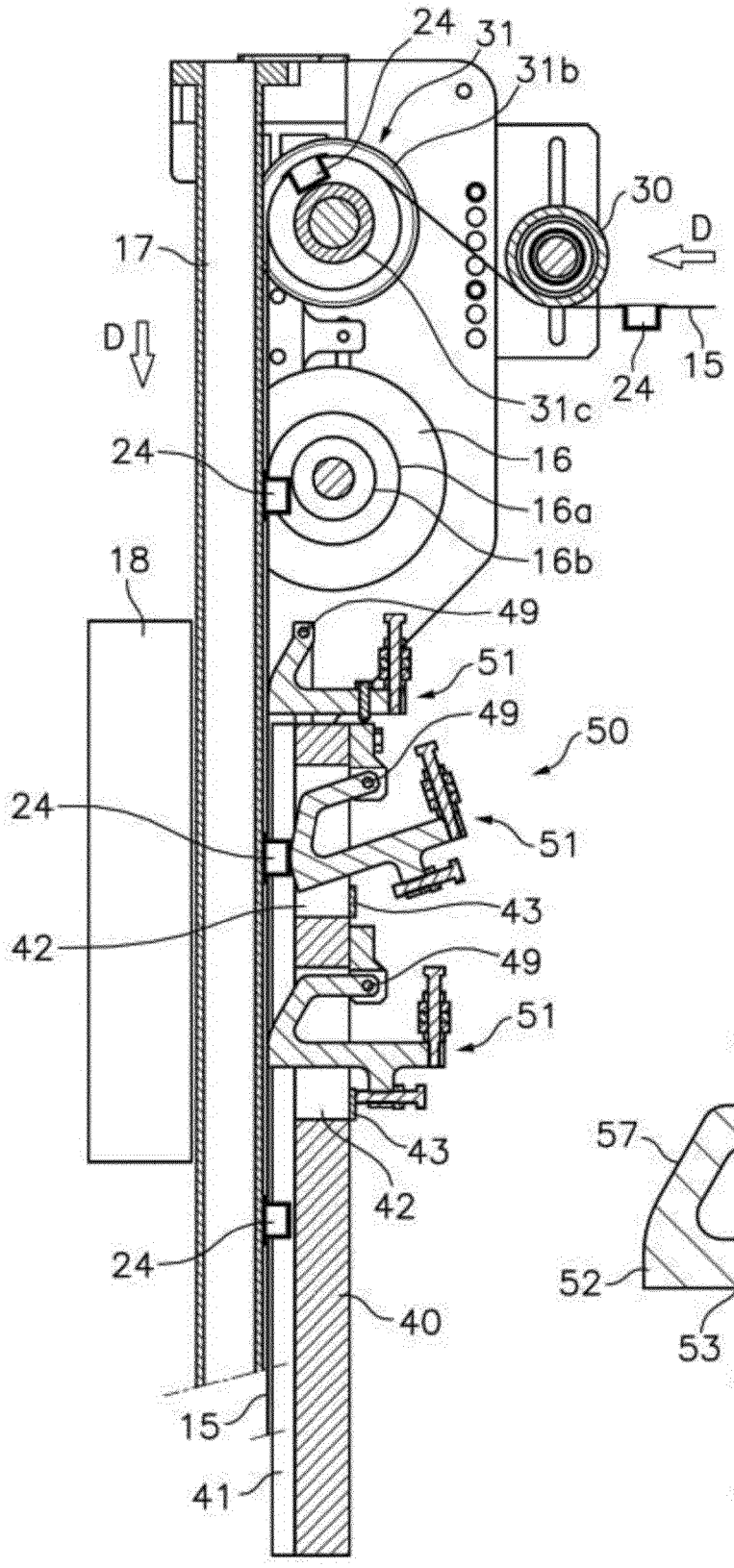


Fig.3E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17
D
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31c
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16a
16b
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15
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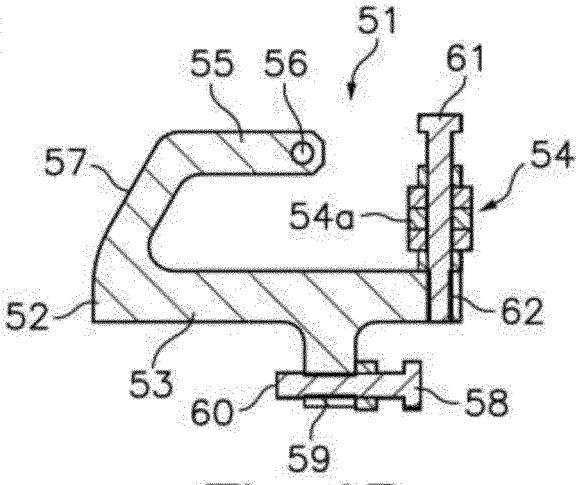
Fig.4A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55
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57
54
54a
52
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53
60
58
59

Fig.4B

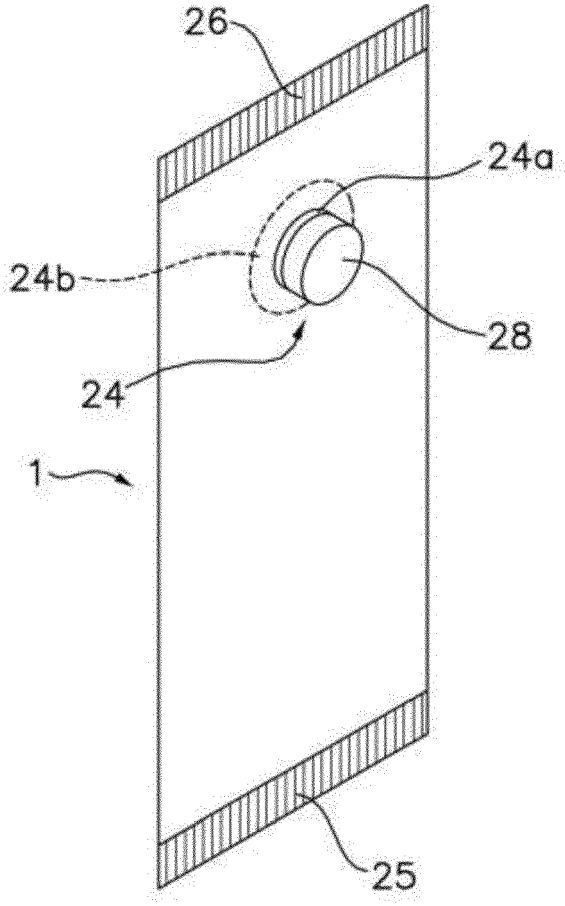

Fig.5A

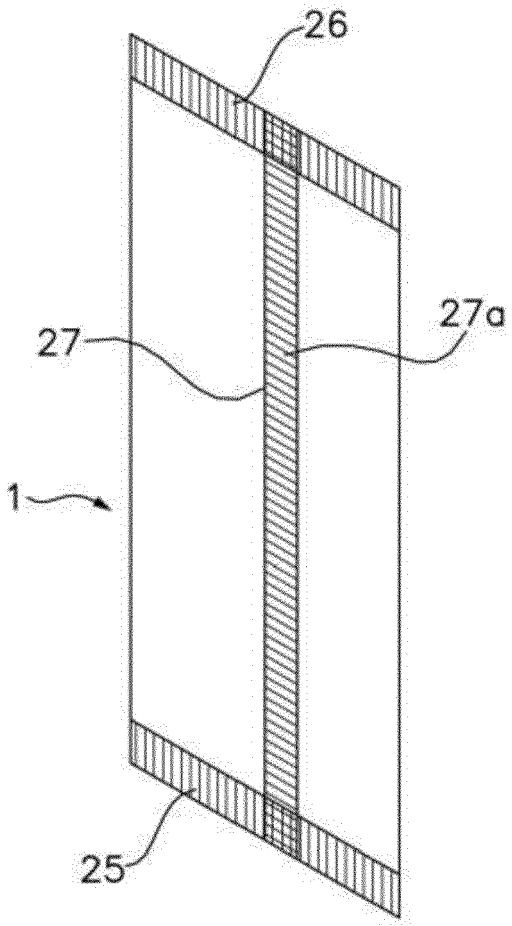

Fig.5B

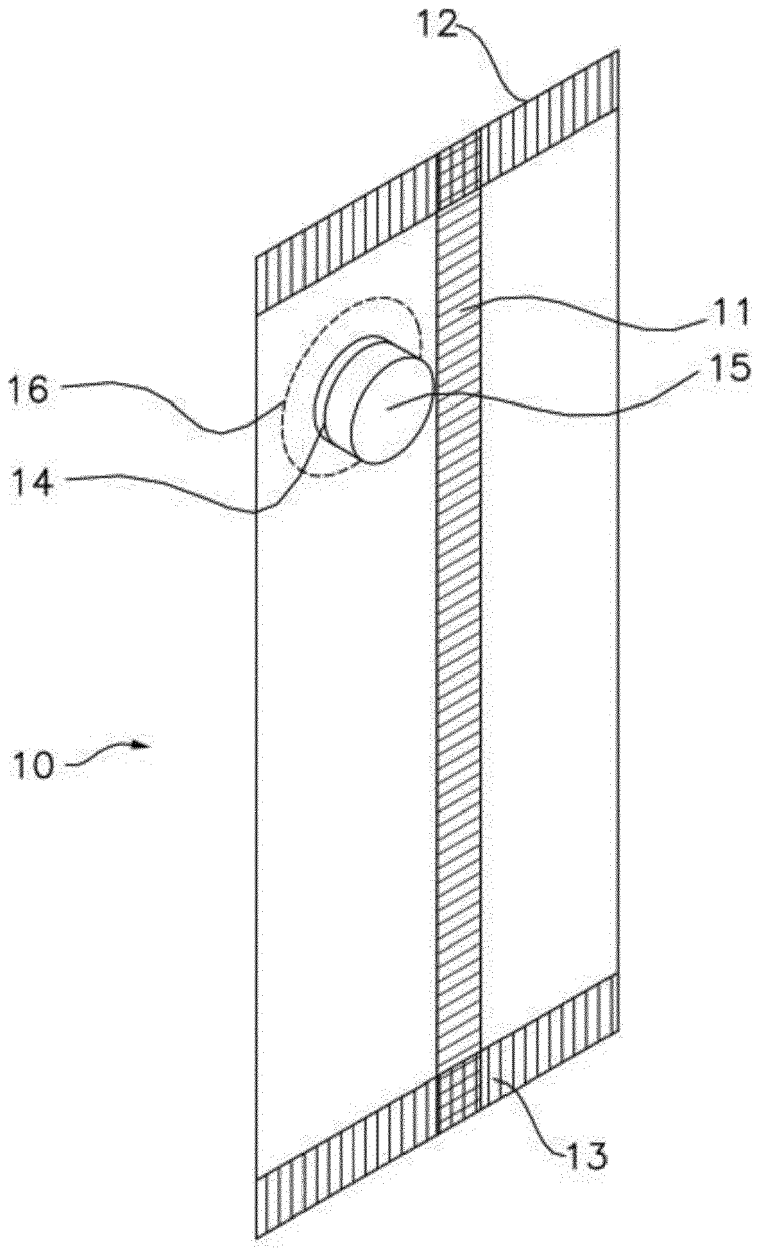

Fig.5C

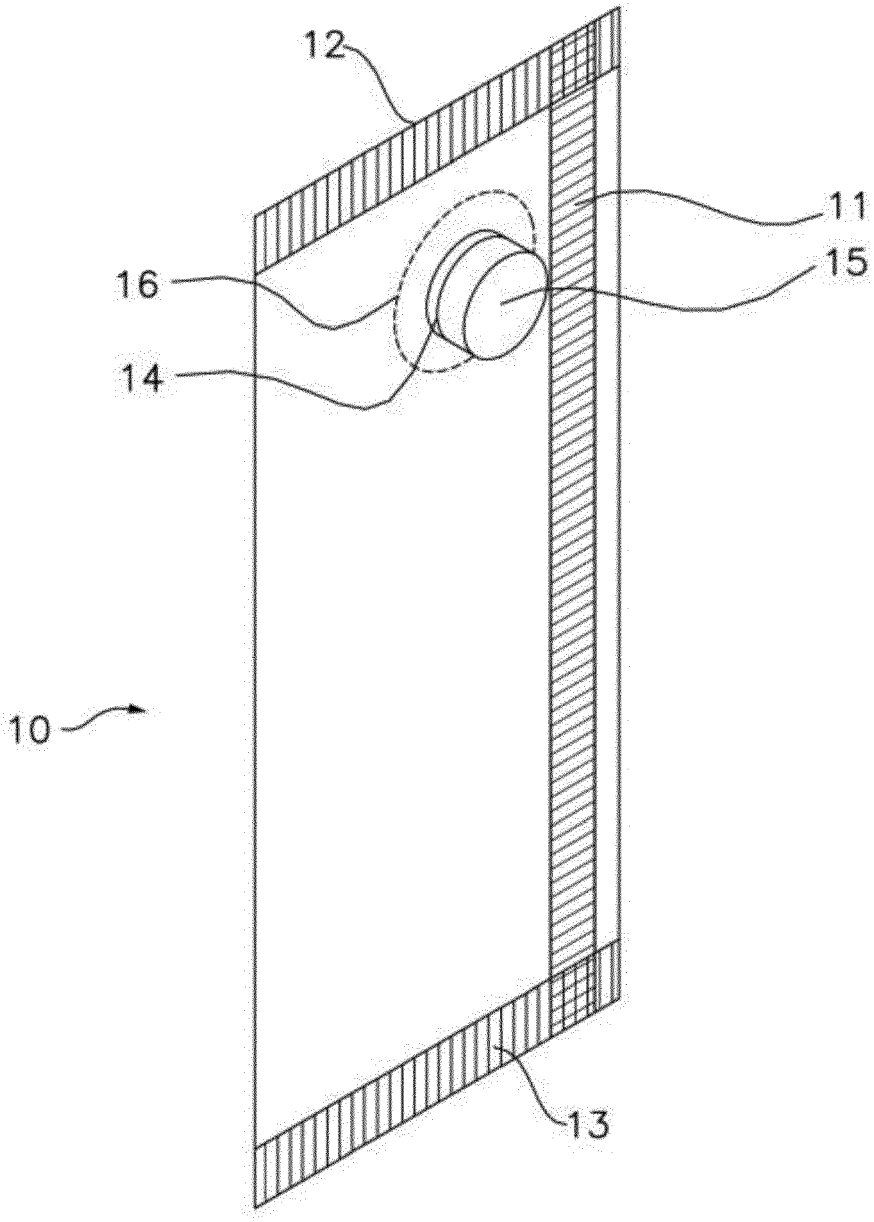

Fig.5D

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EUROPEAN SEARCH REPORT

Application Number
EP 21 38 2066

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2005/172576 A1 (MATSUNAGA SHINJI [JP] ET AL) 11 August 2005 (2005-08-11)	12-15	INV. B65B61/18
A	* figures 1,2,8 *	1-11	B65B9/213 B65B51/30
A,D	GB 2 311 759 A (SANKO KIKAI [JP]) 8 October 1997 (1997-10-08) * figure 8 *	1-11	B65B51/26 B65D75/58

TECHNICAL FIELDS SEARCHED (IPC)

B65B
B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 June 2021	Dick, Birgit

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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REFERENCES CITED IN THE DESCRIPTION

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