

(19)



(11)

EP 4 520 671 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
12.03.2025 Bulletin 2025/11

(51) International Patent Classification (IPC):
B65B 9/20 (2012.01)

(21) Application number: **23196221.8**

(52) Cooperative Patent Classification (CPC):
B65B 9/2056; B65B 29/00; B65B 51/306;
B65B 51/225

(22) Date of filing: **08.09.2023**

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

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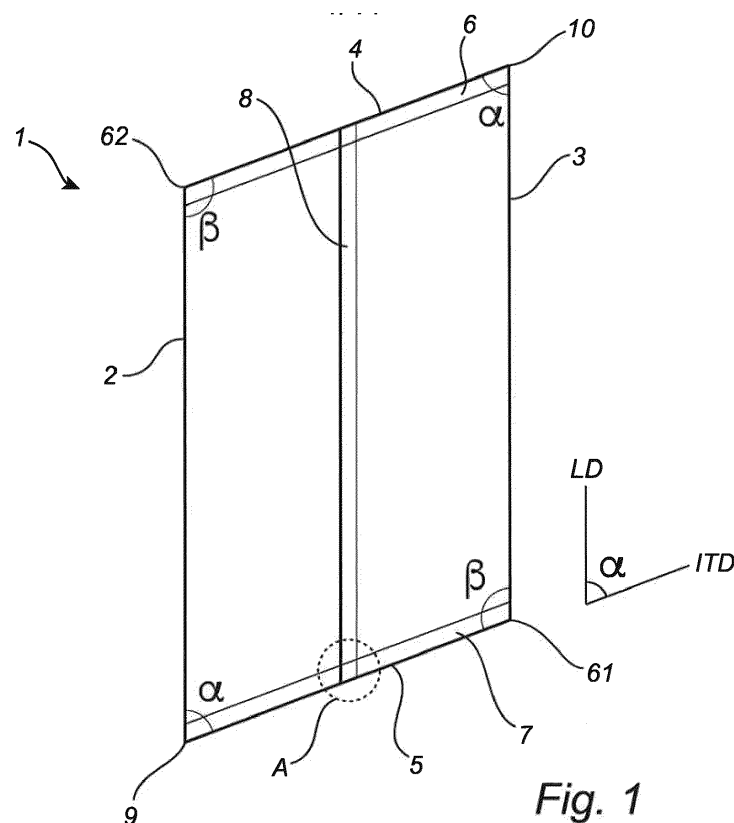
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(54) AN ORAL POUCHED PRODUCT

(57) The present disclosure relates to an oral pouched product (1) comprising a filling material and a saliva-permeable pouch of packaging material enclosing the filling material, the oral pouched product (1) having two longitudinal sides (2, 3) in a longitudinal direction (LD), and two inclined transverse end sides (4, 5) in an inclined transverse direction (ITD), wherein at least one of the two longitudinal sides (2, 3) is a fold in the packa-

ging material, and wherein the inclined transverse direction (ITD) is non-perpendicular to the longitudinal direction (LD), which inclined transverse end sides (4, 5) are sealed edges forming inclined transverse end seals (6, 7) of the packaging material.

Further, the disclosure relates to an apparatus (20) for producing oral pouched products and a method for producing an oral pouched product (1).

**Fig. 1**

Description

TECHNICAL FIELD

[0001] The present disclosure relates to an oral pouched product. It further relates to an apparatus for producing oral pouched products and a method for producing an oral pouched product.

BACKGROUND

[0002] Pouched products for oral use may be produced by measuring portions of a filling material, e.g. a smokeless tobacco composition, and inserting the portions into a nonwoven tube.

[0003] Pouched non-tobacco products for oral use may contain nicotine, i.e. they are pouched nicotine-containing smokeless products for oral use. Alternatively, the pouched non-tobacco products for oral use may lack nicotine, i.e. they are pouched nicotine-free smokeless products for oral use. Further, pouched products for oral use may contain other active agents, such as caffeine, taurine, cannabinoids, ginseng and branched-chain amino acids.

[0004] Pouched smokeless low-tobacco-containing products for oral use may contain added nicotine, i.e. nicotine in addition to the nicotine of the tobacco. Alternatively, they contain no added nicotine and the nicotine is provided solely by the tobacco in the product.

[0005] US 4,703,765 discloses a device for packaging precise amounts of finely divided tobacco products, such as snuff tobacco or the like, in a tubular packaging material into which snuff portions are injected via a fill tube, the tubular packing material thereby having a vertical orientation. Downstream from the tube, sealing means are positioned for transverse sealing of the packaging material, as well as cutting means for severing the packaging material in the area of the transverse seal to thus form discrete or individual portion packages.

[0006] When manufacturing individual pouched smokeless products for oral use, they may be sealed and cut apart thereby forming rectangular "pillow shaped" pouched products. Generally, each final pouched product includes parallel transverse seals at opposite ends and a longitudinal seal orthogonal to the transverse seals. The seals must be of sufficient strength to preserve the integrity of the pouched product during use, though without disturbing the consumer's experience.

[0007] When forming pillow shaped pouched products by sealing, it has been observed that there may be a weak region in the seals at the parallel transverse ends. This may lead to rupture of the seal with the consequence that some of the filling material may leak out.

SUMMARY

[0008] An object of the present disclosure is to overcome or ameliorate at least one of the disadvantages of

the prior art, or to provide a useful alternative.

[0009] According to a first aspect, the present disclosure provides an oral pouched product according to claim 1. The oral pouched product comprises a filling material and a saliva-permeable pouch of packaging material enclosing the filling material, the oral pouched product having two longitudinal sides extending in a longitudinal direction LD and two inclined transverse end sides extending in an inclined transverse direction ITD. At least one of the two longitudinal sides is a fold in the packaging material. The inclined transverse direction ITD is non-perpendicular to the longitudinal direction LD, which inclined transverse end sides are sealed edges forming inclined transverse end seals of the packaging material. Both the longitudinal sides may be folds in the packaging material.

[0010] It has been found that a pouch comprising two inclined transverse end sides which are sealed edges forming inclined transverse end seals may reduce the risk that the end seals become weakened during manufacturing. When the end seal is inclined, the influence of the filling material when impacting the end seal during filling may be reduced since the impact force may be distributed over a larger surface area. Consequently, a stronger seal strength may be achieved in the inclined transverse end sides.

[0011] The oral pouched product may have a shape that will be appreciated by the user. It will fit well in the mouth of the user, such as between the upper or lower gum and the lip. The oral pouched product as disclosed herein, has a shape that may be easy to produce in an effective manner and may have relatively strong sealed ends. The filling material may be distributed in a suitable way.

[0012] The two longitudinal sides may be opposite sides of the pouched product. The two longitudinal sides may be parallel. The two inclined transverse end sides may be opposite sides of the pouched product. The two inclined transverse end sides may also be parallel. Thus, in an embodiment the oral pouched product has the shape of a rhombus or a rhomboid.

[0013] The filling material may comprise a smokeless tobacco or a tobacco-free material, which may be nicotine-containing or nicotine free. The filling material may thus contain an active agent which may be nicotine. The filling material may also be referred to as filling composition.

[0014] Alternatively, the filling material may be present in the form of particles. For instance, the filling material may be a particulate filling material such as particles of microcrystalline cellulose. Further, the pouched product may contain active agents which may include caffeine, taurine, cannabinoids, ginseng and branched-chain amino acids or combinations thereof.

[0015] Optionally, the oral pouched product may comprise a longitudinal seal in the longitudinal direction LD. Longitudinal seals of pouched products facilitate the production of the pouched products. When a longitudinal

seal is located between the two longitudinal sides, both longitudinal sides may be folds in the packaging material.

[0016] In various embodiments there will be an overlapping part of the longitudinal seal and the transverse end side seals. A weak region may be present in the overlapping part as a result of some of a sealing agent or a material that provides sealability having been consumed during a first sealing step. Consequently, the strength of the seal may be reduced. This may affect the next sealing step when there is less sealing agent in the overlapping part of the longitudinal seal and the transverse seal. In the overlapping part, the strength of the seal may be weaker. It may then be an advantage that, during filling, the filling material will impact an inclined transverse seal, which is non perpendicular to a direction of travel of the packaging material during filling and sealing, since the impact force on the inclined transverse seal will be reduced compared to the impact force on a seal which is perpendicular to the direction of travel DT. The impact force on the inclined transverse seal will be reduced since the inclined transverse seal will be longer than a seal which is perpendicular to the direction of travel. The filling material will thus impact a larger area and the force will be spread over a larger area and will therefore be lower on a transverse inclined seal compared to a perpendicular seal. This may further result in an improved seal strength.

[0017] The problem with seal strength, as mentioned above, may be a problem when the packaging material may be made of a thin material or a material in the form of for example nonwoven having a low surface density. Further, the packaging material may comprise for example regenerated cellulose fibres, which themselves are not binding. A sealing agent may be used for the sealability of the packaging material and the seal strength may be reduced in such a material. The seal strength may especially be decreased in an overlapping area of two seals. It may be difficult to achieve a dense seal, since the sealing agent may be partly depleted in the overlapping part from a first sealing step, before a second sealing step. A sealing agent may also be partly depleted when manufacturing the nonwoven material. Further, it may be difficult to achieve a dense seal if the filler material is blown into the pouched product against an end seal. The filler material may for example be pneumatically assisted in the supply into the pouched product and the seal may be damaged by the filling material impacting the end seal. Such problems may be avoided with the product of the disclosure.

[0018] Optionally, the longitudinal seal may be located between the two longitudinal sides. This location of the longitudinal seal provides an oral pouched product which provides a pleasant mouth comfort and mouthfeel.

[0019] Optionally, the longitudinal seal may be located centrally between the two longitudinal sides. This has been found to hinder deformation of the pouched product. For example, the centrally located longitudinal seal may resist skewing of the pouched product.

[0020] Optionally, the oral pouched product may comprise two diagonally opposite corners, each may have an angle α of 30 to 70° and two diagonally opposite corners, each may have an angle β of 110 to 150°. β may be 180 minus α °. The angle 30 to 70° has been shown to provide a good filling performance of the filling material in the oral pouched product.

[0021] The oral pouched product has also shown improved sealing strength with angles α of 30 to 70°. Alternatively, the angle α may be 35-65°. The angle β may be 115 to 145°.

[0022] The oral pouched product may have a rhombus form or a rhomboid form. The four sides of the oral pouched product may have a rhombus form or a rhomboid form.

[0023] Optionally, each of the inclined transverse end seals may have a width w of 0.1 to 3.5 mm, wherein the width extends in the longitudinal direction LD. For an ultrasonic seal, the width w may be 0.1 to 2.0 mm. For a heat seal, the width w may be 0.5 to 3.5 mm.

[0024] Optionally, each of the two longitudinal sides may have a length of 20 to 45 mm and each of the two inclined transverse end sides may have length of 20 to 45 mm. Preferably, the two longitudinal sides may be longer than the two inclined transverse end sides.

[0025] Optionally, the inclined transverse end seals may have a measured maximum value of shear seal strength of from 30 to 45 N, determined with the ASTM F88 method for seal strength. The method will be referred to below together with results achieved by the seal strength test. Different nonwoven materials than the one tested below in the Examples may obtain different values. Higher values may for example be obtained.

[0026] Optionally, the packaging material may comprise a nonwoven material. The nonwoven material may comprise cellulose fibres, such as regenerated cellulose fibres, and a sealing agent. The regenerated cellulose fibres may be viscose fibres or lyocell fibres.

[0027] Sealing of the pouched product for oral use may for example be performed by means of heat sealing or by ultrasonic sealing. It may be desirable that the pouch material comprises a component, a sealing agent, which is reactive to the heat or ultrasonic energy, such that this component contributes to the sealing of the pouch.

[0028] Herein, the term sealing agent refers to an adhesive substance, generally a polymer, such as a polymer having long chains, in solid form, such as powder, film or fibre, or as a foam, or in a liquid form, such as an emulsion, dispersion or solution, used for sealability between for example two nonwoven layers.

[0029] Optionally, the sealing agent may be a fibrous sealing agent or a non-fibrous sealing agent.

[0030] Herein, the term fibrous sealing agent refers to thermoplastic fibres used for thermal sealing, e.g., of materials comprising fibres of a higher softening point or non-melting fibres.

[0031] The fibrous sealing agent may be thermoplastic fibres. The thermoplastic fibres may be used for providing

sealability, such as for heat sealing or ultrasonic sealing. The thermoplastic fibres may be selected from the group consisting of polypropylene (PP), polyethylene (PE), polylactic acid (PLA), polyethylene terephthalate (PET), polyhydroxyalkanoate (PHA), polybutylene succinate (PBS) and any combination thereof. The fibres may be referred to as homofibres. The thermoplastic material may be bicomponent fibres, wherein one component of the fibres may be thermoplastic. Bicomponent fibres may be selected from PP/PE, e.g., with PP in the core and PE in the sheath, and PLA/co-PLA, e.g., with PLA in the core and co-PLA in the sheath. The bicomponent fibres may be combined with the thermoplastic homofibres mentioned herein.

[0032] The non-fibrous sealing agent may be a polymer non-fibrous sealing agent. The polymer non-fibrous sealing agent may be selected from the group consisting of the polymers polypropylene (PP), polyethylene (PE), polylactic acid (PLA), polyethylene terephthalate (PET), polyhydroxyalkanoate (PHA), polybutylene succinate (PBS), vinyl acetate polymer, acrylate polymer, vinyl acrylate polymer, vinyl acetate ethylene copolymers, styrenebutadiene copolymers and vinyl acetate ethylene copolymers and any combination thereof. The polymer non-fibrous sealing agent may be thermoplastic. The polymer non-fibrous sealing agent may be selected from solution based sealing agents, liquid based sealing agents, liquid dispersions and adhesive.

[0033] The heat applied or the ultrasonic energy will melt thermoplastic fibres or thermoplastic polymers, which will then solidify. The heat sealing or ultrasonic sealing may be used for thermal bonding of thermoplastic fibres or thermoplastic polymers. Further, when a non-thermoplastic non-fibrous sealing agent is used, a cross-linking reaction may be performed. The heat applied or the ultrasonic energy may contribute to the sealing of the non-thermoplastic non-fibrous sealing agent.

[0034] A facilitated production may thus be attained for producing the oral pouch product. Seals in the form of heat seals made by heat sealing or ultrasonic sealing may be used for production of the oral pouched product. The inclined transverse seals may be sealed by heat sealing or ultrasonic sealing. The longitudinal seal may also be sealed by heat sealing or ultrasonic sealing. Heat sealing may be preferred for the sealing of the longitudinal seal.

[0035] When the filling step is performed, the step of filling may take place after an inclined transverse end seal of the pouch has been made. The inclined transverse end seal may still be warm or uncured and may be sensitive to the force from the filling material supplied and impacting the transverse end seal. Since the seal has an inclined transverse direction, the force from the filling material on the inclined transverse end seal will be lower compared to the force on an end seal in a perpendicular direction in relation to the direction of travel of the packaging material during filling and sealing.

[0036] Other examples for forming the seals may be

needle punching or by gluing with adhesive.

[0037] According to a second aspect, the present disclosure provides an apparatus for producing oral pouched products, the oral pouched products comprising a packaging material and filling material enclosed by the packaging material, the apparatus comprising:

- a filling material supply unit for supplying the filling material;
- a first sealing device comprising an anvil and a horn, the anvil having a first operation surface and the horn having a second operation surface, the first operation surface and the second operation surface having a length extension in a length extension direction LED, and the first operation surface and the second operation surface being arranged opposite to each other during the operation of the first sealing device; and
- one or more web supply units for supplying and advancing a web of the packaging material in a direction of travel DT between the anvil and the horn;

the length extension direction LED being, non-perpendicular to the direction of travel DT.

[0038] Inclined transverse end seals of oral pouched products may be formed.

[0039] Optionally, the direction of travel DT is preferably substantially vertical.

[0040] Optionally, the direction of travel DT extends between the anvil and the horn. Optionally, the direction of travel extends between the operation surface of the anvil and the operation surface of the horn.

[0041] The first operation surface and the second operation surface may be sealing surfaces. Further, at least one of the first operation surface and the second operation surface may comprise a cutting portion for cutting a seal.

[0042] The apparatus is used for producing oral pouched products. The oral pouched products may be produced by sealing and cutting a packaging material comprising a filling material. The sealing may be performed in an inclined transverse direction ITD which will be advantageous for the reasons explained above.

[0043] Optionally, the apparatus may comprise a forming unit for forming a tubular web of the web of the packaging material. A production step may be facilitated by the possibility to form a tubular web of the packaging material.

[0044] Optionally, the apparatus may comprise at least a second sealing device for making a longitudinal seal in a direction of travel DT. The longitudinal seal may extend in a direction parallel to the longitudinal side edges of the pouched product.

[0045] Optionally, the length extension direction LED may form an angle α of 30 to 70° with the direction of travel DT. The angle 30 to 70° has been shown to provide a good filling performance of the filling material in the oral pouched product. The oral pouched product has also

shown improved sealing strength with angles of 30 to 70°. Alternatively, the angle α may be 35 to 65°.

[0046] Optionally, the filling material supply unit may comprise a dosing tube having a length extending in the direction of travel DT. Thus, the dosing tube may have a longitudinal axis extending in the direction of travel DT.

[0047] Optionally, the dosing tube may comprise an opening, extending in a plane OP that is non-perpendicular to the direction of travel DT.

[0048] When the dosing tube has an inclined opening, the supply of the filling material will be supplied with a force which will be directed not only in the direction of travel DT, but also in an inclined or transverse direction. An inclined opening may yield a less focused stream since the supply of the filling material may also be directed in transversal directions or inclined transversal directions and not only in the direction of travel DT. This may reduce the force acting on the transverse end seal. This may further enhance the seal strength.

[0049] Optionally, the plane OP of the opening may form an angle γ of 30 to 70° with the direction of travel DT. Alternatively, the angle γ may be 35 to 65°.

[0050] Optionally, the plane OP of the opening may be substantially parallel to the length extension direction LED. However, the plane of the opening of the dosing tube and the length direction of the first operation surface and the second operation surface need not be parallel.

[0051] Optionally, the sealing device may be a heat sealing device or an ultrasonic sealing device.

[0052] According to a third aspect, the present disclosure provides a method for producing an oral pouched product comprising a filling material and a saliva-permeable pouch enclosing the filling material, the method comprising

- supplying and advancing at least one web of packaging material;
- supplying the filling material to the at least one advancing web of packaging material; and
- sealing and cutting the at least one web of packaging material, to which the filling material has been supplied and which is advancing in the direction of travel DT, in an inclined transverse direction ITD, wherein the inclined transverse direction ITD is non-perpendicular to the direction of travel DT.

[0053] A plurality of pouches may be provided with the method.

[0054] Optionally, the method may comprise:

sealing the at least one web of packaging material in the direction of travel DT.

Longitudinal seals of pouched products may facilitate the production of the pouched products.

[0055] Optionally, the inclined transverse direction ITD may form an angle α of 30 to 70° with the direction of travel DT. Alternatively, the angle α may be 35 to 65°.

[0056] Optionally, the method may further comprise:

- forming the at least one advancing web of packaging material into a tubular web around a dosing tube, wherein opposite longitudinal edges of the web forming an overlapping part or a juxtaposed part;
- sealing of the tubular web in the direction of travel DT along the overlapping part or the juxtaposed part; and
- supplying the filling material through the dosing tube, thereby providing an advancing tubular web of packaging material containing the filling material.

[0057] When opposite longitudinal edges of the web form an overlapping part, a seal may be created in which two opposite longitudinal edges of the web are faced towards each other so that the inner surface of one edge is faced to the outer surface of one edge.

[0058] When opposite longitudinal edges of the web form a juxtaposed part, a fin seal is created in which the two opposite longitudinal edges of the web are faced towards each other so that the inner surfaces of the edges of the tubular web are faced towards each other. This creates a fin which is then folded over.

[0059] Optionally, the inclined transverse direction ITD may be substantially parallel with a plane of an opening OP of the dosing tube at a discharge end of the dosing tube. The discharge end supplies the filling material from the dosing tube into the packaging material. When the dosing tube is used for the method according to the disclosure, the opening of the discharge end of the dosing tube may be close to the transversal end seal when the filling material is supplied into the tubular web and the opening of the dosing tube may also be close to the anvil and the horn. When the inclined transverse direction ITD is parallel, or substantially in parallel, with the opening of the dosing tube, the risk that the dosing tube will hit the anvil and the horn during their displacement may be reduced. When the plane of the opening of the dosing tube is parallel to the inclined transverse direction ITD it means that the plane of the opening surface of the dosing tube has an opening extending in an inclined transverse direction ITD.

[0060] The opening of the dosing tube may have a surface in a plane which is parallel with the inclined transverse direction IDT. The inclined transverse direction IDT is the direction of the inclined transverse end seals formed by the method. The inclined transverse end seals are formed by the first operation surface of the horn and the second operation surface of the anvil which are inclined with the inclined transverse direction IDT in relation to the direction of travel DT.

[0061] In order to avoid that the opening, or the periphery of the opening, collides with the operation surface of the horn and the operation surface of the anvil, when the opening of the dosing tube is close to the horn and anvil, the extension of the plane of the opening of the dosing tube may be parallel with the inclined transverse

direction.

[0062] Optionally, the inclined transverse direction ITD and the plane of the opening surface may not be parallel with each other.

[0063] Optionally, the method may comprise cutting the tubular web of the packaging material in a sealed area of the inclined transverse end seal.

[0064] Optionally, the packaging material may comprise nonwoven material, said nonwoven material comprising cellulose fibres, such as regenerated cellulose fibres, and a sealing agent.

[0065] Nonwoven material can be dry-laid bonded nonwoven or wetlaid nonwoven. Nonwovens are fabrics that are neither woven nor knitted. Methods for the manufacturing of nonwoven materials are commonly known in the art. Further information on nonwovens is found in "Handbook of Nonwovens" by S. Russel, published by Woodhead Publ. Ltd., 2007.

[0066] Nonwoven properties depend, for instance, on the fibres used, the method used for web production and the method used for bonding of the web.

[0067] In view of the fibres used, nonwovens may be classified as staple fibre nonwoven or continuous filament nonwoven.

[0068] In view of the web production method used, nonwovens may be classified as wet-laid, dry-laid, spun laid or melt blown nonwoven.

[0069] Continuous filament nonwoven may comprise spun laid or melt blown webs.

[0070] Staple fibre nonwoven may comprise dry-laid or wet-laid webs.

DEFINITIONS

[0071] "Oral" and "oral use" is used herein as a description for use in the oral cavity, such as by buccal placement. The product is then intended for placement within the oral cavity, such as between the gum and the upper or lower lip, such that the product as a whole is contained in the oral cavity.

[0072] As used herein "pouched product" or "oral pouched product" refers to a portion of smokeless tobacco composition or non-tobacco composition packed in a saliva-permeable pouch material intended for oral use, such as by buccal placement in the oral cavity. The oral pouched product may alternatively be referred to as a portion-packed (pouched) product for oral use. The pouched product for oral use is not intended to be swallowed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0073] The present disclosure will be further explained hereinafter by means of non-limiting examples and with reference to the appended drawings, wherein:

Figure 1 shows schematically an oral pouched product according to the disclosure.

Figure 2 shows schematically an enlarged area of part A of figure 1.

Figures 3a-3g illustrate an apparatus according to the disclosure for manufacturing of portion-packed oral pouched products.

Figure 4 shows schematically a part of the apparatus of the disclosure.

Figure 5 shows schematically a sealing device of the disclosure.

Figure 6 shows schematically an embodiment of a discharge end of a dosing tube of the disclosure.

[0074] The drawings are schematic and not necessarily drawn to scale. A reference numeral is not always repeated for a feature occurring in several figures. Like reference numerals refer to like elements throughout the description, unless expressed otherwise.

DETAILED DESCRIPTION

[0075] The disclosure will, in the following, be exemplified by embodiments. It should however be realized that the embodiments are included in order to explain principles of the disclosure and not to limit the scope of the disclosure, which scope is defined by the appended claims.

[0076] Figure 1 illustrates an oral pouched product 1 comprising a filling material and a saliva-permeable pouch of packaging material enclosing the filling material. The oral pouched product 1 has two longitudinal sides 2, 3 extending in a longitudinal direction LD. At least one of the two longitudinal sides 2, 3 is a fold in the packaging material. The oral pouched product 1 further comprises two inclined transverse end sides 4, 5 extending in an inclined transverse direction ITD. The inclined transverse direction is non-perpendicular to the longitudinal direction LD. The inclined transverse end sides 4, 5 are sealed edges forming inclined transverse end seals 6, 7 of the packaging material.

[0077] In the embodiment, the two longitudinal sides 2, 3 are opposite sides of the pouched product 1. The two longitudinal sides 2, 3 are parallel. The two inclined transverse end sides 4, 5 are opposite sides of the pouched product 1. The two inclined transverse end sides 4, 5 are also parallel.

[0078] The oral pouched product 1 may comprise a longitudinal seal 8 in the longitudinal direction LD. The longitudinal seal 8 may be located centrally between the two longitudinal sides 2, 3. When a longitudinal seal 8 is located between the two longitudinal sides 2, 3, the two longitudinal sides 2, 3 may be two folds in the packaging material.

[0079] The oral pouched product 1 may comprise two diagonally opposite corners 9, 10, each having an angle α and two diagonally opposite corners 61, 62, each having an angle β . α may be from 30 to 70° and β may be from 110 to 150°. β may be 180° minus α °. These values of the angles provide a good spreading degree of the filling

material in the oral pouched product. The filling material may reach into the corners and the filling material may not influence with excessive force on the central part of the inclined transverse end seals.

[0080] The oral pouched product 1 may have a rhombus shape or a rhomboid shape.

[0081] Figure 2 shows an enlarged part of the area A of figure 1. When there is a longitudinal seal 8 in the oral pouched product 1, an overlapping part 11 of the seal 8 in the longitudinal direction and the seal 7 in the inclined transverse direction may form a weak part of the seal. In figure 2, the overlapping part 11 is located between the two longitudinal sides 2, 3. When filling a tubular web with filling material, the material will hit the first formed sealed end. When the sealed end has an inclined transverse direction in relation to the direction of travel DT (shown in figure 3a to 3f for example), the force may be lower when the filling material hits the sealed end. When a longitudinal seal 8 is located between the two longitudinal sides 2, 3, and the inclined transverse end seal has an inclined transverse direction in relation to the longitudinal direction LD, the filling material may therefore not achieve the same pressure on an overlapping part 11 located between the two longitudinal sides as would be the case in for example a rectangular pouch product.

[0082] The inclined transverse end seals 6, 7 may have a width w, wherein the width w extends in the longitudinal direction LD. This is shown in Figure 2. The inclined transverse end seals 6, 7 may have a width w of 0.1 to 3.5 mm. For an ultrasonic seal, the width w may be 0.1 to 2.0 mm. For a hot seal, the width w may be 0.5 to 3.5 mm. Each of the two longitudinal sides 2, 3 may have a length of 20 to 45 mm and each of the two inclined transverse end sides 4, 5 may have length of 20 to 45 mm.

[0083] The inclined transverse end seals 6, 7 may be sealed by heat sealing or ultrasonic sealing. The longitudinal seal 8 may also be sealed by heat sealing or ultrasonic sealing. Heat sealing may be preferred for the sealing of the longitudinal seal 8.

[0084] An apparatus 20 for producing oral pouched products is shown in figure 3a. The oral pouched products comprise a packaging material and filling material enclosed in the packaging material. The apparatus comprises:

- a filling material supply unit 30 for supplying the filling material 29;
- a first sealing device comprising an anvil 13 and a horn 15, the anvil 13 having a first operation surface 63 and the horn 15 having a second operation surface 65, the first operation surface 63 and the second operation surface 65 having a length extension in the length extension direction LED (shown in figure 4), the first operation surface 63 and the second operation surface 65 being arranged opposite to each other during the operation of the first sealing device, and
- one or more web supply units for supplying and

advancing a web 25 of the packaging material 27 in a direction of travel DT between the anvil 13 and the horn 15,

5 the length extension direction LED being, non-perpendicular to the direction of travel DT. Inclined transverse end seals of the oral pouched products may be obtained.

[0085] Optionally, the direction of travel DT is preferably substantially vertical.

10 **[0086]** The direction of travel DT extends between the anvil 13 and the horn 15, as can be seen in figure 3a. Further, the direction of travel DT extends between the operation surface 63 of the anvil 13 and the operation surface 65 of the horn 15.

15 **[0087]** The apparatus in figure 3a further comprises a forming unit 31 for forming a tubular web 32 of the web 25 of the packaging material 27. The web 25 of the packaging material may be a planar web.

20 **[0088]** The apparatus may comprise a second sealing device 33 for making a longitudinal seal in a direction of travel DT, which is shown in figure 3a.

25 **[0089]** In figure 5, showing a sealing device 12, a portion 16 of filling material has been enclosed by the packaging material 27 (shown in figure 3a) forming a tubular web 32. The inclined transverse direction ITD is shown in figure 5. The inclined transverse end seal 41 is shown having an inclined transverse direction. The lowest seal 7 can be seen in the lower part of the figure. The seal 41 may be a seal which will be cut and divided into two seals 6, 7 for separating the pouches.

30 **[0090]** The first operation surface 63 of the anvil 13 and the second operation surface 65 of the horn 15 may be configured for simultaneously sealing and cutting of the packaging material 27. The sealing operation is utilized to provide the oral pouched product with one or more seals. The cutting operation is utilized to cut the packaging material 27, e.g. to separate two consecutive pouched products from each other.

35 **[0091]** The first and second operation surfaces 63, 65 may be arranged to allow passage of the packaging material 27. This is shown in figure 5 wherein a gap 17 is formed between the operation surfaces 63, 65 of the anvil 13 and the horn 15.

40 **[0092]** In the illustrated embodiment of figure 3a, the inclined transverse end seal 41 is formed by the device as shown in figures 3a to 3g and in figure 5. Reference is now made to figure 5. The packaging material 27 may form a tubular web 32, which may comprise a longitudinal seal 8. At the desired location of the inclined transverse end seal 41 there is no filling material. At the desired location of the material of the tubular web, the tubular web is to be sealed together in the inclined transverse end seal 41. The length extension direction LED are in the same direction as the inclined transverse direction ITD, which can be seen in figure 4. The inclined transverse direction and the length extension direction LED are non-perpendicular the direction of travel DT.

45 **[0093]** When a seal 41 has been, or is in the process of

being, formed, filling material 29 will be supplied to the tubular web 32 from the dosing tube 50.

[0094] The formed seal 41 may be cut into two seals 6, 7 to form two consecutive pouched products which may be separated from each other. A cutting edge 18 on the first operation surface 63 of the anvil 13 is shown in figure 5. The cutting edge may cut the seal formed between the first operation surface 63 and the second operation surface 65.

[0095] A main direction of the anvil 13 defines a first direction D_1 . A second direction D_2 is perpendicular to the first direction D_1 . The second direction D_2 coincides with the direction of travel DT but pointing in the opposite direction.

[0096] It is now referred to figure 3a. The operation surfaces 63, 65 of the anvil 13 and the horn 15 are brought into contact with the packaging material and may be pressed to each other into contact with the packaging material and sealing may be performed.

[0097] In the following reference is made to the movement of the anvil 13 and the horn 15. The first operation surface 63 of the anvil 13 will follow the movement of the anvil 13 and the second operation surface 65 of the horn 15 will follow the movement of the horn 15. The first operation surface 63 is included in the anvil 13 and the second operation surface is included in the horn 15.

[0098] The anvil 13 and the horn 15 are arranged to be displaced in a reciprocating way in relation to the tubular web 32 in the first direction D_1 , between a first position, illustrated in figure 3a, being in contact with the tubular web 32 and a position, illustrated in figure 3c, being out of contact with the tubular web 32.

[0099] Further, the anvil 13 and the horn 15 are adapted to follow the tubular web 32 when moving in the direction of travel DT, i.e. in a direction opposite to the second direction D_2 , while performing the sealing and simultaneous cutting, in order to be able to follow the tubular web 32 to a downstream position, illustrated in Figure 3b.

[0100] The anvil 13 moves along a path 37 which has a first portion 37a parallel to and adjacent to the tubular web 32, a second portion 37b moving the anvil 13 away from the tubular web 32, a third portion 37c bringing the anvil 13 back upstream and a fourth portion 37d bringing the anvil 13 back into contact with the tubular web 32. The horn 15 follows a corresponding path 39, having corresponding portions 39a, 39b, 39c, 39d. See paths 37, 39 illustrated in Figure 3a. The paths 37, 39 are further described below.

[0101] Figure 3a illustrates a start of the method. A longitudinal seal, e.g. like the longitudinal seal 8 illustrated in Figure 5, is continuously formed in the advancing tubular web 32 by the device 33 for making a longitudinal seal. The anvil 13 and the horn 15 assume the first position, in which they start sealing. A portion 16 of the filling material 29 is filled from above into the tubular web 32. The filling material is supplied from a dosing tube 50. The dosing tube 50 extends inside the tubular web 32.

The filling material moves downwards, e.g. by gravity, until it reaches the portion of the tubular web 32, which is immediately above the operation surface 63 of the anvil 13 and the operation surface 65 of the horn 15. The filling material may also be pneumatically assisted out from the dosing tube 50 by an air puff.

[0102] The anvil 13 and the horn 15 move downstream together with the tubular web 32 while performing the sealing along the respective first portions 37a, 39a of their paths. The filling material continues to be supplied from the dosing tube 50. The anvil 13 and the horn 15 then reach a second position being downstream of the first position but yet in contact with the tubular web 32. See Figure 3b. An inclined transverse end seal 41 is formed in the tubular web 32. The seal 41 may be cut by the cutting edge 18 thereby dividing the inclined transverse end seal 41 in two inclined transverse end seals, which may be the seals 6 and 7 of two oral pouched products 1. The filling material may be supplied at the same time as the seal is formed or after that the seal has been formed. The filling material may be supplied after the anvil 13 and the horn 15 have moved away from the tubular web 32.

[0103] The anvil 13 and the horn 15 are moved away from the tubular web 32 along the second portions 37b, 39b of their respective paths until they reach a respective third position, such that they are no longer in contact. The already formed inclined transverse end seal 41 prevents the portion 16 of the filling material from falling out. See Figure 3c.

[0104] As a next step, the anvil 13 and the horn 15 are moved back upstream along the third portions 37c, 39c of their respective paths to a fourth position being out of contact with the tubular web 32. See Figure 3d.

[0105] Then the anvil 13 and the horn 15 are moved back to the first position along the fourth portions 37d, 39d of their respective paths, such that they start forming a new inclined transverse end seal. See Figure 3e.

[0106] The anvil 13 and the horn 15 move along the respective first portions 37a, 39a of their paths together with the tubular web 32 while performing the sealing until the anvil 13 and the horn 15 reach the second position being downstream of the first position though still in contact with the tubular web 32. See Figure 3f. The tubular web 32 may be cut by the cutting edge 18, leaving an inclined transverse end seal 6 at the upper end of the pouched product 43 and a corresponding inclined transverse end seal 7 at the lower end of the next pouched product, which has been filled by a next portion 16 of the filling material.

[0107] Thereafter the anvil 13 and the horn 15 are moved away from the tubular web 32 along the second portions 37b, 39b of their respective paths until they reach a respective third position, illustrated in Figure 3g, such that they are no longer in contact, as is already described above for Figure 3c. The anvil 13 and the horn 15 continue to move along their paths 37, 39 described above, while the tubular web 32 moves in the direction of travel DT. The dosing tube 50 maintains the same posi-

tion during the sealing process. At the start of the filling of the filling material, the dosing tube opening 51 is close to the anvil 13 and the horn 15. During the filling of the tubular web 32, the tubular web 32 and the anvil 13 and the horn 15 will be moved in the direction of travel DT. The anvil 13 and the horn 15 and the seal which is formed will thus be moved away from the opening 51 of the dosing tube 50. For a further sealing step, such as for the upper seal of a pouched product 1 as is shown in figure 3e, the anvil 13 and the horn 15 are moved back to a position close to the opening 51 of the dosing tube 50.

[0108] In order to help in separating the tubular web 32 in the cut, the apparatus 20 may further comprise a pulling unit, illustrated in Figure 3f and 3g as a nip 47 between a pair of rollers 49, 51 arranged to pull the pouched product 43 in the direction of travel DT. Thereby the tubular web 32 is tensioned in a controllable way in order to make a separation of the pouched product 43 from the next pouched product easier. The distance z between the nip 47 and the cutting edge 18 when the sealing device is in the second position, see Figure 3f, roughly corresponds to the extension of the pouched product 43 in the direction of travel DT. Hence, if the apparatus 20 is utilized for manufacturing portion-packed oral pouched products of different sizes, the distance z is preferably adjustable. After passing the nip 47, the pouched product 43 is deposited on a conveyer 52. See Figure 3g.

[0109] A web of packaging material 32 is formed into a tubular web 32 around the dosing tube 50 in the embodiment of figure 4. Figure 4 shows schematically a cross section of a first operation surface 63 and a second operation surface 65, which have an inclined transverse direction ITD to the direction of travel DT. The first operation surface 63 and the second operation surface 65 are arranged in an inclined transverse direction ITD, for sealing the tubular web 32. A lower seal (not shown in figure 4) is made and the filling material is filled into the tubular web 32. Then a second seal (not shown) is made. The lower seal and the second seal, which may be an upper seal, may correspond to the inclined transverse end seals 6, 7 of the oral pouched product 1.

[0110] As previously explained, the dosing tube 50 may comprise an opening 51, which opening extends in a plane OP which forms an inclined transverse direction ITD, wherein the inclined transverse direction is non-perpendicular to the direction of travel DT. Further, the plane of the opening 51 of the dosing tube 50 may be essentially parallel to the length extension direction LED. The first operation surface 63 and the second operation surface 65 have a length extension in the length extension direction LED. However, the plane OP of the opening 51 of the dosing tube and the length extension direction LED need not be parallel with each other. The discharge end of the dosing tube 50 may be a bottom part or a lower part of the dosing tube if the dosing tube extends in the vertical direction. However, the dosing tube may be directed in another direction, such as a direction sloping in

relation to the vertical direction.

[0111] The inclined transverse direction ITD may be parallel with a plane of an opening surface of the dosing tube in the discharge end of the dosing tube 50. The plane OP of the opening 51 can be seen in figure 4. The first and second operation surfaces 63, 65 are arranged in an inclined transverse direction ITD. When the inclined transverse direction ITD and the plane OP of the opening are in parallel, it can be seen that the opening 51 of the dosing tube 50 and the anvil and horn extension fit well together. If the opening extension of a dosing tube would be perpendicular to the direction of travel DT, there is a risk that a part of the perimeter of the opening of the dosing tube would hit the operation surface of the anvil and the operation surface of the horn when the dosing tube is arranged close to the operation surface of the anvil and the operation surface of the horn. The opening of the dosing tube 50 of the disclosure may extend in a plane that has an inclined transverse direction and the opening will fit better to the operation surface 63 of the anvil 13 and the operation surface 65 of the horn 15.

[0112] Figure 6 illustrates a discharge end of a dosing tube. The opening 51 of the dosing tube 50 is extending in a plane OP non-perpendicular to the direction of travel DT. When the plane OP of the opening 51 of the dosing tube 50 has an inclined transverse direction ITD, the filling material which is supplied from the opening 51 of the dosing tube 50 will hit the seal 41 formed with the operation surface 63 of the anvil 13 and the operation surface 65 of the horn 15. When the filling material hits the seal 41, the seal 41 may still be warm and the first operation surface 63 and the second operation surface 65 may have been released from the tubular web 32. The seal may not have been completely cured and the seal may be sensitive to forces. The inclined transverse direction ITD of the opening ensures that some of the filling material will also be directed, at least partly, to the side of the tubular web, since the opening 51 is also directed to the transverse sides. The air force for supplying the filling material out of the opening of the dosing tube 50 in the direction of travel DT will be lower when the air and filling material may be directed both in the direction of travel and outwards from the side of the inclined opening 51, see the arrows in figure 6. Should the opening of the dosing tube be perpendicular to the direction of travel DT, the force would be directed only in the direction of travel DT and the force would be higher on a smaller surface area.

[0113] The plane OP of the opening may form an angle γ of 30 to 70° with the direction of travel DT.

[0114] In an embodiment, the operation surface 63 of the anvil 13 and the operation surface 65 of the horn 15 lie in a plane perpendicular to the plane of the drawing paper. The plane OP of the opening 51 of the dosing tube 50 may be substantially parallel to the plane of the operation surface 63 of the anvil 13 and the operation surface 65 of the horn 15 as shown in figure 3.

[0115] The plane OP of the opening 51 of the dosing tube 50 and the length extension direction LED of first

operation surface 63 and the second operation surface 65 may be parallel. However, the plane OP of the opening 51 of the dosing tube 50 and the length extension direction LED need not be parallel.

[0116] A method for producing an oral pouched 1 product comprising a filling material and a saliva-permeable pouch enclosing the filling material is provided. Figure 3a illustrates an apparatus 20 for producing oral pouched products. The method comprises

- supplying and advancing at least one web 25 of packaging material 27;
- supplying the filling material 29 to the at least one advancing web 25 of packaging material; and
- sealing and cutting the at least one web 25 of packaging material 27, to which the filling material 29 has been supplied, and which is advancing in a direction of travel DT, in an inclined transverse direction ITD, wherein the inclined transverse direction ITD is non-perpendicular to the direction of travel DT.

[0117] A plurality of pouches may be provided.

[0118] The method may comprise:

- forming the at least one advancing web of packaging material 27 into a tubular web 32 around a dosing tube 50, wherein opposite longitudinal edges of the web forming an overlapping part or a juxtaposed part;
- sealing of the tubular web 32 in the direction of travel DT along the overlapping part or a juxtaposed part; and
- supplying the filling material 29 through the dosing tube 50, thereby providing an advancing tubular web of packaging material containing the filling material.

[0119] The inclined transverse direction ITD may be parallel with a plane of an opening surface of the dosing tube in the discharge end of the dosing tube 50.

[0120] The method may comprise cutting the tubular web 32 of the packaging material in a sealed area of the inclined transverse end seal.

[0121] An increased sealing strength may be obtained with the present disclosure.

[0122] The seal strength has been measured according to ASTM F88, which will be explained further below.

EXAMPLES OR DESCRIPTION OF TEST METHODS

[0123] The seal strength has been measured according to ASTM F88.

[0124] Tests were made on SDH27 nonwoven.

[0125] Seal strength was measured on nonwoven samples sealed with an angle of 45° and comparison samples with an angle of 90°. Seal strength in machine direction was measured (T peel test) for the samples with 45° angle seal and 90° angle seal. When comparing nonwoven samples having the same distance between

the longitudinal sides, the seals of the nonwoven having a seal with an angle of 45° have a higher seal strength compared to the seal strength of seals of a nonwoven having a seal with an angle of 90°

[0126] Laboratory samples were prepared using an HS2 Heatsealer with sealing clamps 50x5mm. Nonwoven width was 25 mm. Seals were achieved at angles 45° (samples for the disclosure) and 90° (comparison samples). Seal resistance was tested on Instron Force Transducer. Travel speed was 10 mm/minute.

T peel test: When a 45° inclined seal is placed horizontally between force transducer clamps and adhesively disengaged vertically at 180° it will yield results similar to that of a 90° seal, placed in an equal fashion; 0.16-0.17 N/mm.

[0127] T peel test: When positioning the seal inclined at 45°, allowing the nonwoven sample length to extend vertically at 180° the cohesive failure of the seal will be prolonged in length i.e. peel extension will increase compared to a 90° seal nonwoven sample, the seal positioned horizontally. The load exercised will also hence be limited to a smaller surface for the 45° sample; a 10 mm width following the obliqueness of the 5 mm high seal. Seal strength is 0.21 N/mm for the 45° angle sample compared to seal strength for the 90° angle sample which is 0.16-0.17 N/mm.

[0128] Single lap joint shear test: When measuring with a single lap joint shear test the seal strength for nonwoven sample with 90° seal, the measured maximum value of shear seal strength is 18.5 N and for the nonwoven sample with 45° seal, the seal strength the measured maximum value of shear seal strength is 40.5 N.

[0129] The T-peel test for the sample positioned with the seal at 45° a higher seal strength is obtained compared to sample positioned horizontally 90°.

[0130] The single lap joint shear will give higher measured maximum value of shear seal strength for the 45° seal sample than for the 90° sample.

Claims

1. An oral pouched product (1) comprising a filling material and a saliva-permeable pouch of packaging material enclosing the filling material, the oral pouched product (1) having two longitudinal sides (2, 3) extending in a longitudinal direction (LD), and two inclined transverse end sides (4, 5) extending in an inclined transverse direction (ITD), wherein at least one of the two longitudinal sides (2, 3) is a fold in the packaging material, and wherein the inclined transverse direction (ITD) is non-perpendicular to the longitudinal direction (LD), which inclined transverse end sides (4, 5) are sealed edges forming inclined transverse end seals (6, 7) of the packaging material.
2. The oral pouched product (1) according to claim 1,

wherein the oral pouched product comprises two diagonally opposite corners (9, 10), each having an angle (α) of 30 to 70°, and two diagonally opposite corners (61, 62), each having an angle (β) of 110 to 150°.

3. The oral pouched product (1) according to any of claims 1-2, wherein each of the inclined transverse end seals (6, 7) have a width (w) of 0.1 to 3.5 mm, wherein the width (w) extends in the longitudinal direction LD.

4. The oral pouched product (1) according to any of claims 1-3, wherein each of the two longitudinal sides (2, 3) has a length of 20 to 45 mm and each of the two inclined transverse end sides (4, 5) has length of 20 to 45 mm.

5. The oral pouched product (1) according to any of claims 1-4, wherein the packaging material comprises a nonwoven material, said nonwoven material comprising cellulose fibres, such as regenerated cellulose fibres, and a sealing agent.

6. An apparatus (20) for producing oral pouched products, the oral pouched products comprising a packaging material and filling material enclosed by the packaging material, the apparatus comprising:

- a filling material supply unit (30) for supplying the filling material (29);
- a first sealing device comprising an anvil (13) and a horn (15), the anvil (13) having a first operation surface (63) and the horn (15) having a second operation surface (65), the first operation surface (63) and the second operation surface (65) having a length extension in a length extension direction (LED), the first operation surface (63) and the second operation surface (65) being arranged opposite to each other during the operation of the first sealing device; and
- one or more web supply units for supplying and advancing a web (25) of the packaging material (27) in a direction of travel (DT) between the anvil (13) and the horn (15),

the length extension direction (LED) being non-perpendicular to the direction of travel (DT).

7. The apparatus according to claim 6, wherein the length extension direction (LED) forms an angle (α) of 30 to 70° with the direction of travel (DT).

8. The apparatus according to any of claims 6 to 7, wherein the filling material supply unit (30) comprises a dosing tube (50) having a length extending in the direction of travel (DT).

9. The apparatus (20) according to claim 8, wherein the dosing tube (50) comprises an opening (51) extending in a plane (OP) that is non-perpendicular to the direction of travel (DT).

10. The apparatus (20) according to claim 9, wherein said plane (OP) of the opening (51) forms an angle (γ) of 30 to 70° with the direction of travel (DT).

11. The apparatus (20) according to any of claims 9 to 10, wherein said plane (OP) of the opening (51) is substantially parallel to the length extension direction (LED).

12. A method for producing an oral pouched (1) product comprising a filling material and a saliva-permeable pouch enclosing the filling material, the method comprising

- supplying and advancing at least one web (25) of packaging material (27);
- supplying the filling material (29) to the at least one advancing web (25) of packaging material; and
- sealing and cutting the at least one web (25) of packaging material (27), to which the filling material (29) has been supplied and which is advancing in a direction of travel (DT), in an inclined transverse direction (ITD), wherein the inclined transverse direction (ITD) is non-perpendicular to the direction of travel (DT).

13. The method according to claim 12, wherein the inclined transverse direction (ITD) forms an angle (α) of 30 to 70° with the direction of travel (DT).

14. The method according to any of claims 12 to 13, further comprising:

- forming the at least one advancing web of packaging material into a tubular web (32) around a dosing tube (50), wherein opposite longitudinal edges of the web form an overlapping part or a juxtaposed part;
- sealing of the tubular web (32) in the direction of travel (DT) along the overlapping part or the juxtaposed part; and
- supplying the filling material (29) through the dosing tube (50), thereby providing an advancing tubular web of packaging material containing the filling material.

15. The method according to claim 14, wherein the inclined transverse direction (ITD) is substantially parallel with a plane (OP) of an opening (51) of the dosing tube (50) at a discharge end of the dosing tube (50).

16. The method according to any of claims 12 to 15, wherein the packaging material comprises a non-woven material, said nonwoven material comprising cellulose fibres, such as regenerated cellulose fibres, and a sealing agent.

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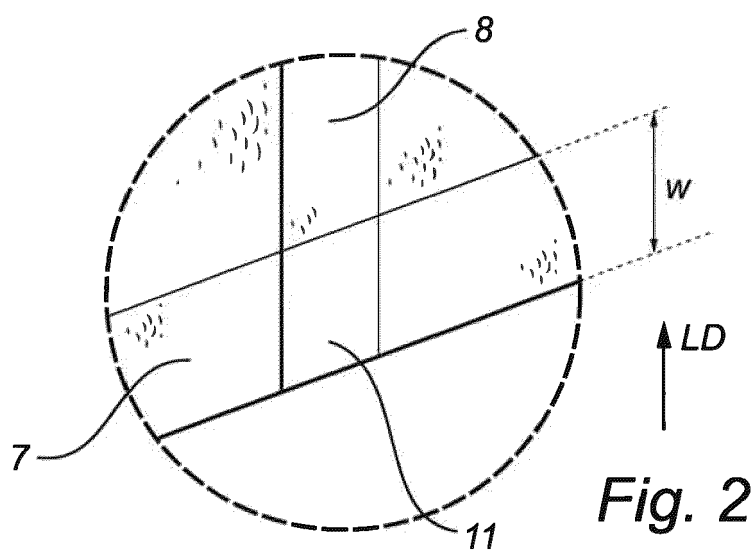
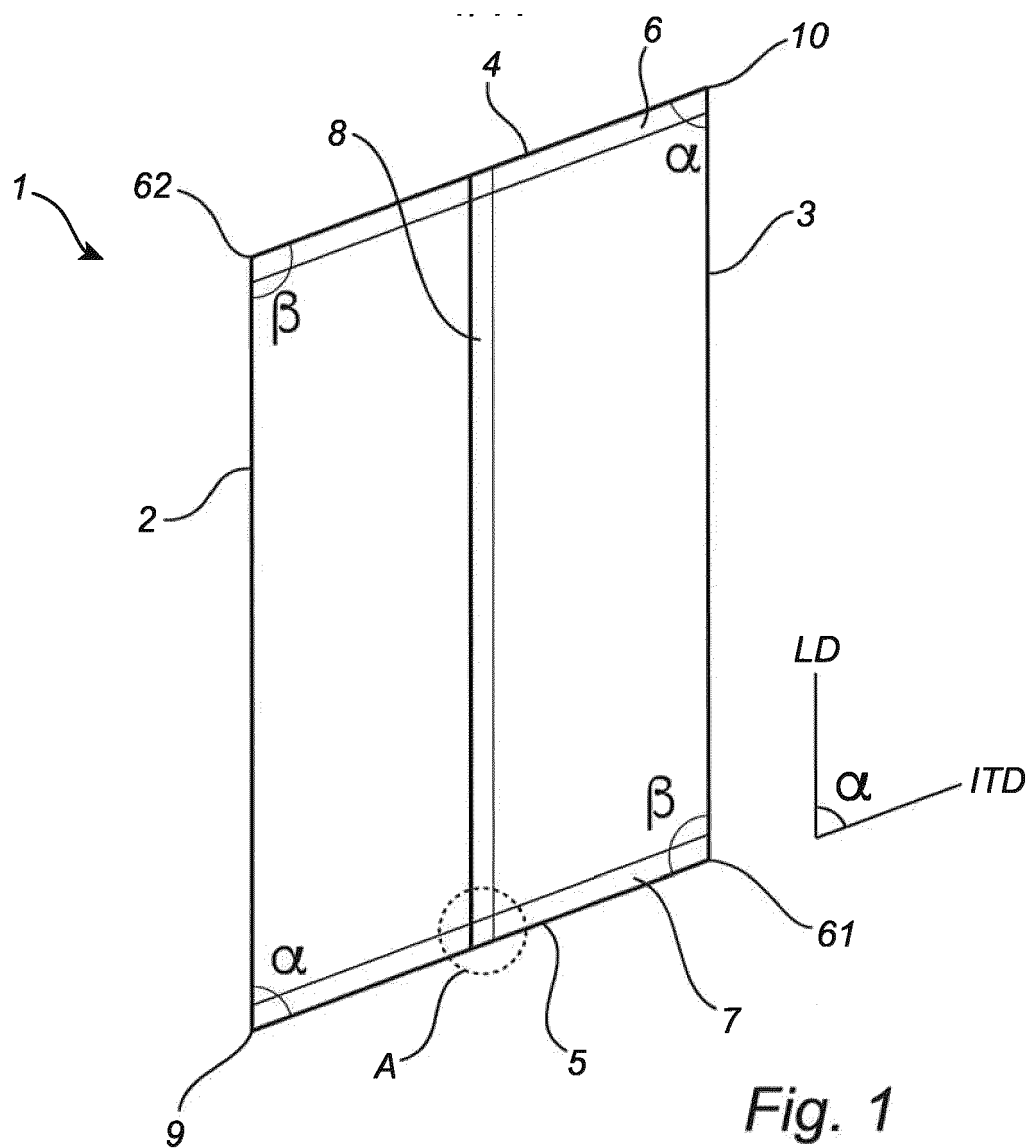
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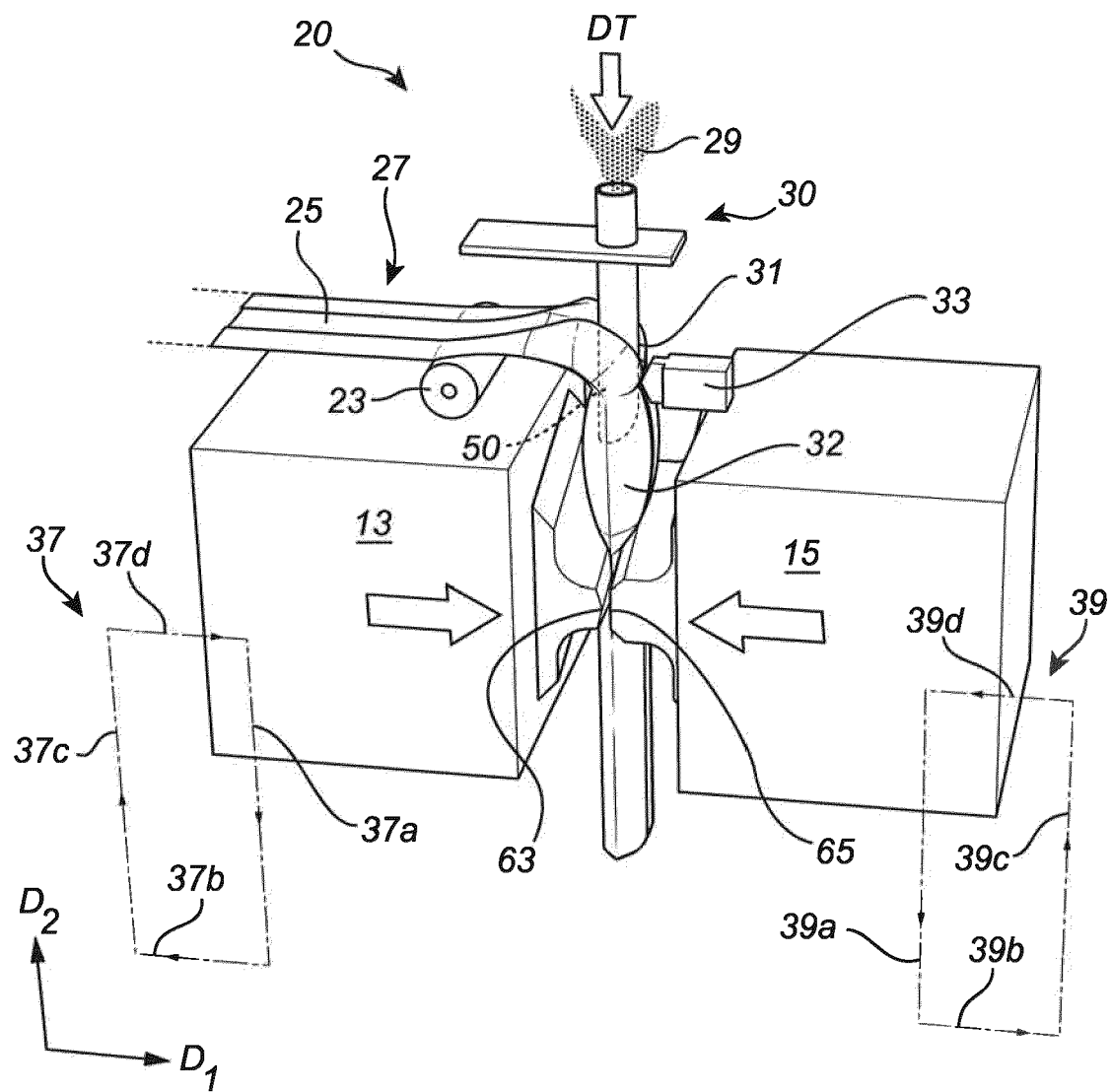


Fig. 3a

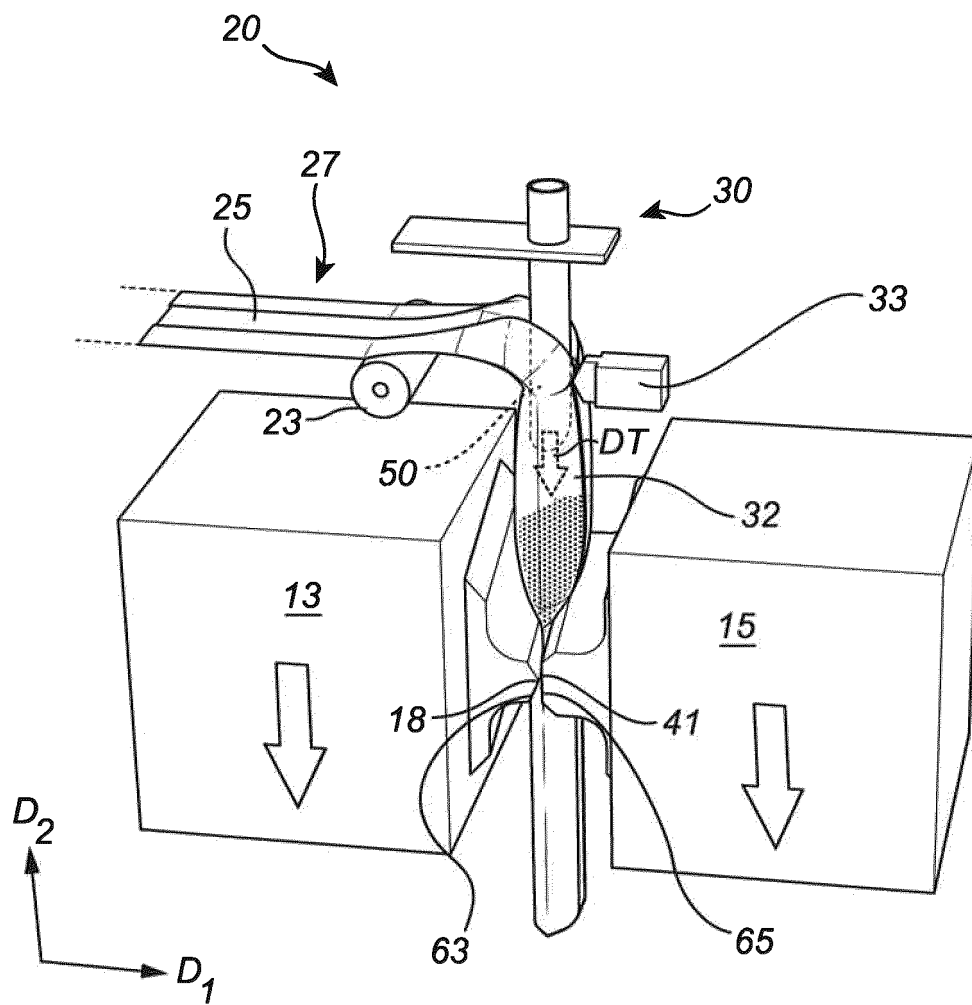


Fig. 3b

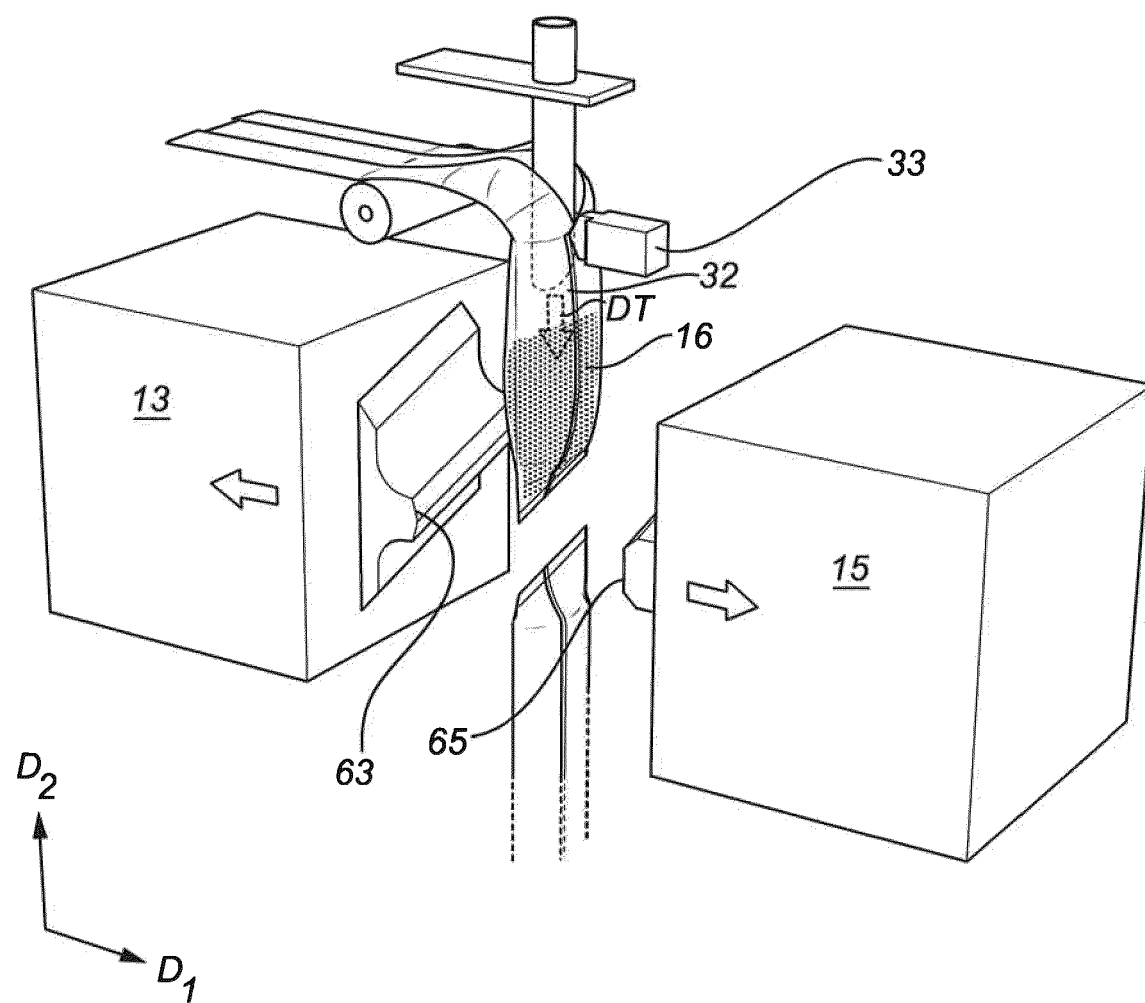


Fig. 3c

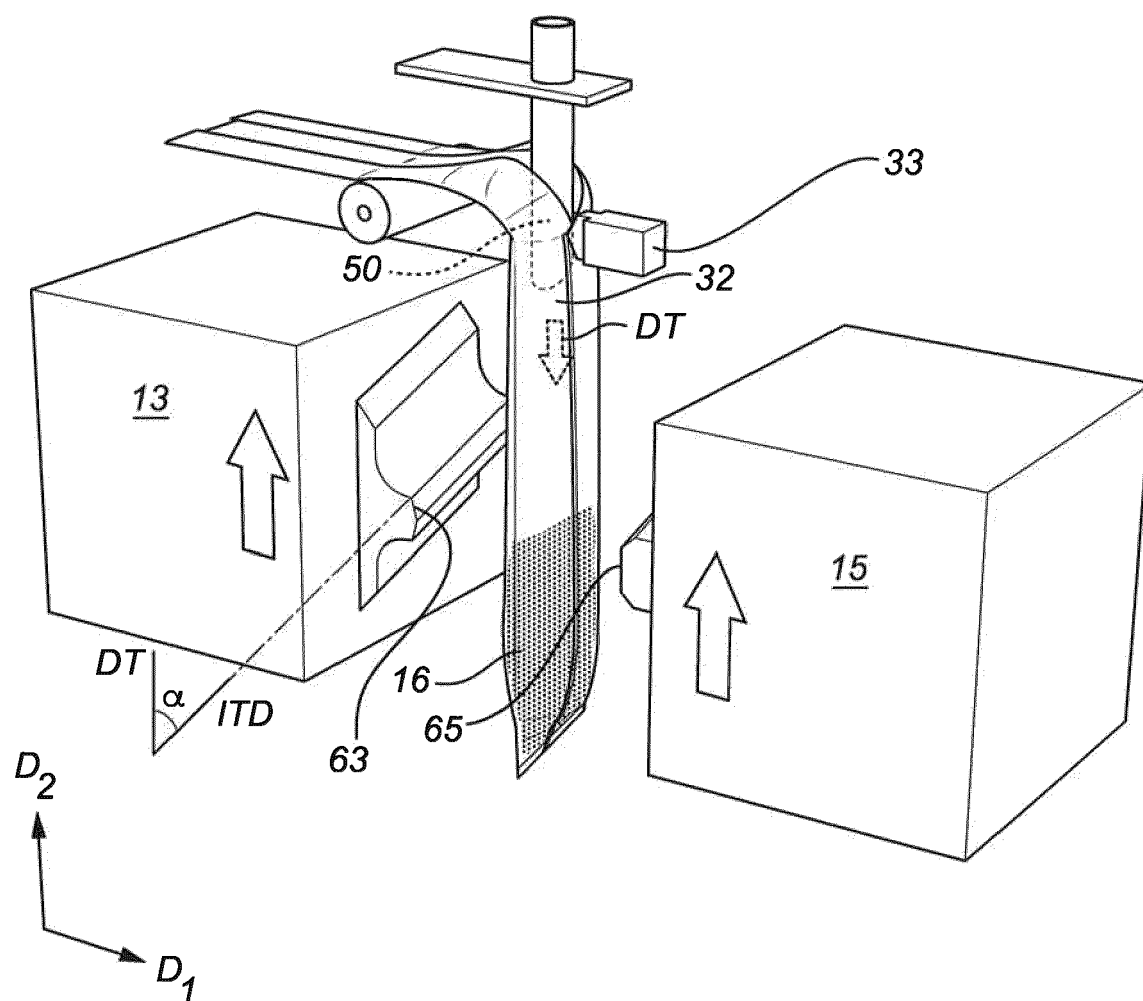
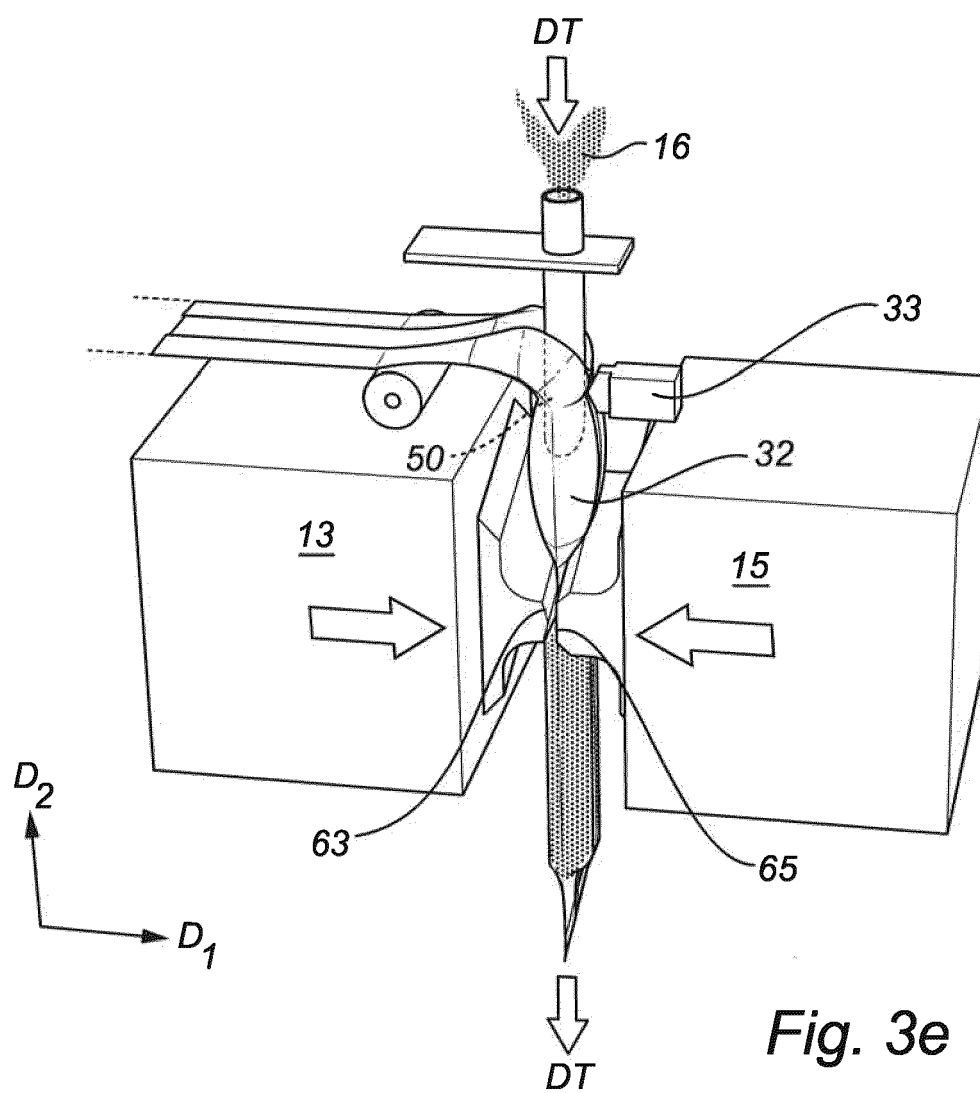


Fig. 3d



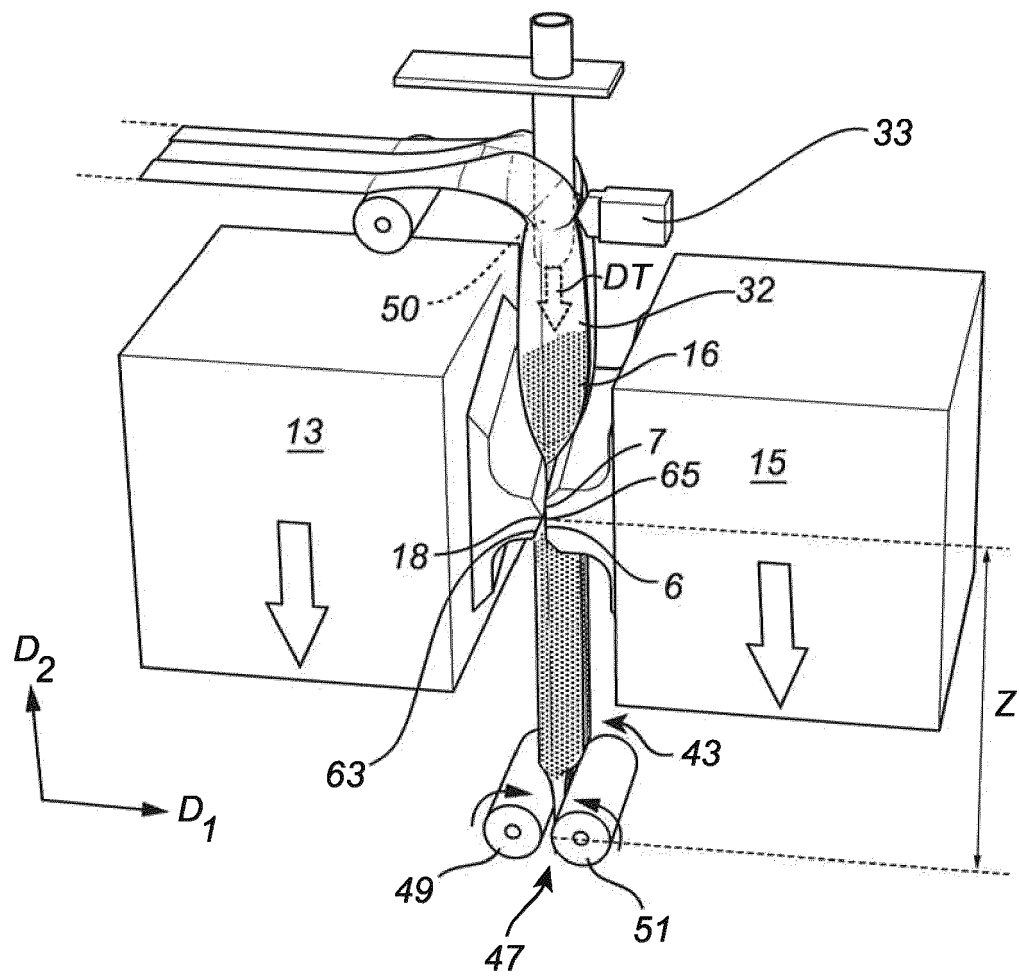


Fig. 3f

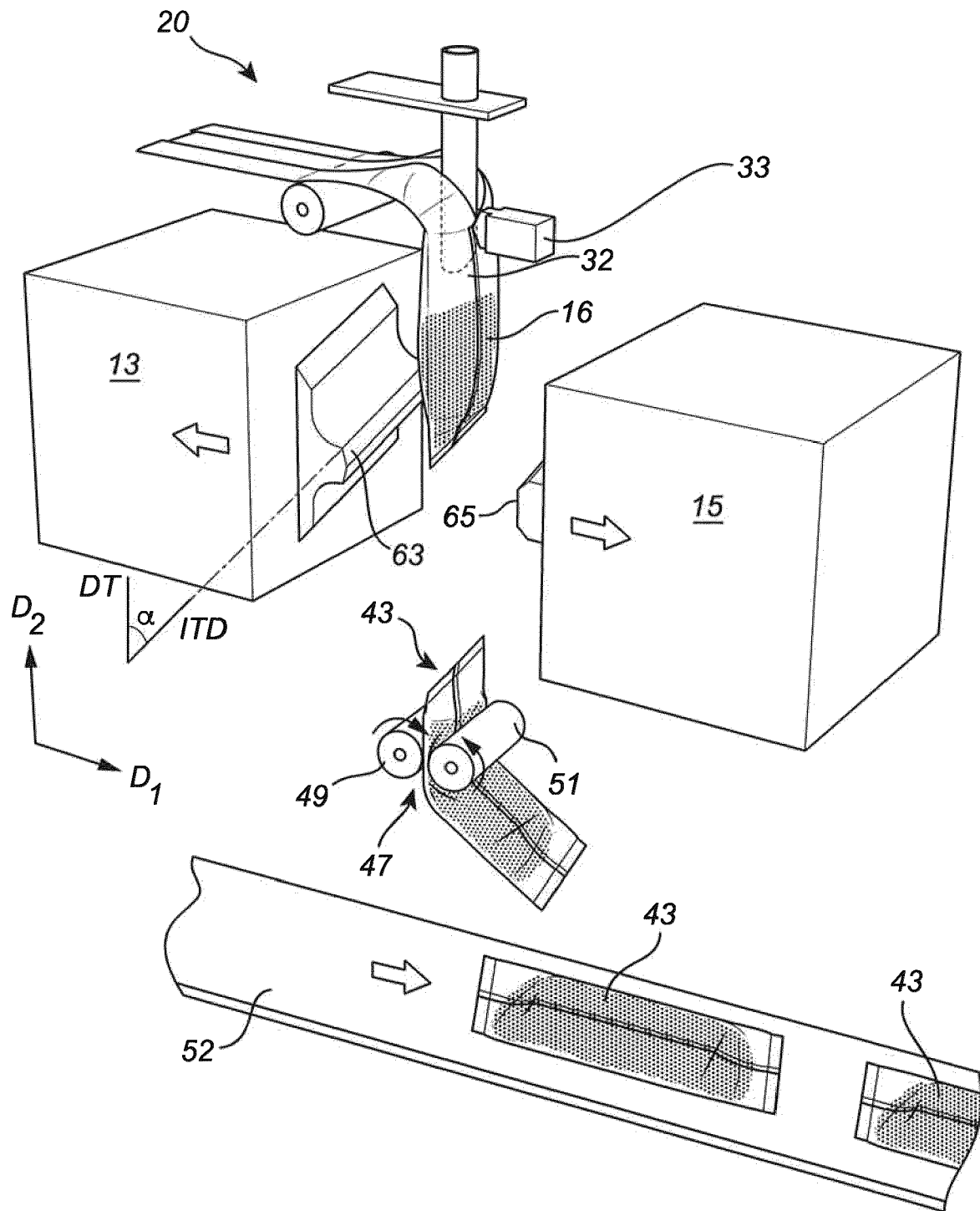


Fig. 3g

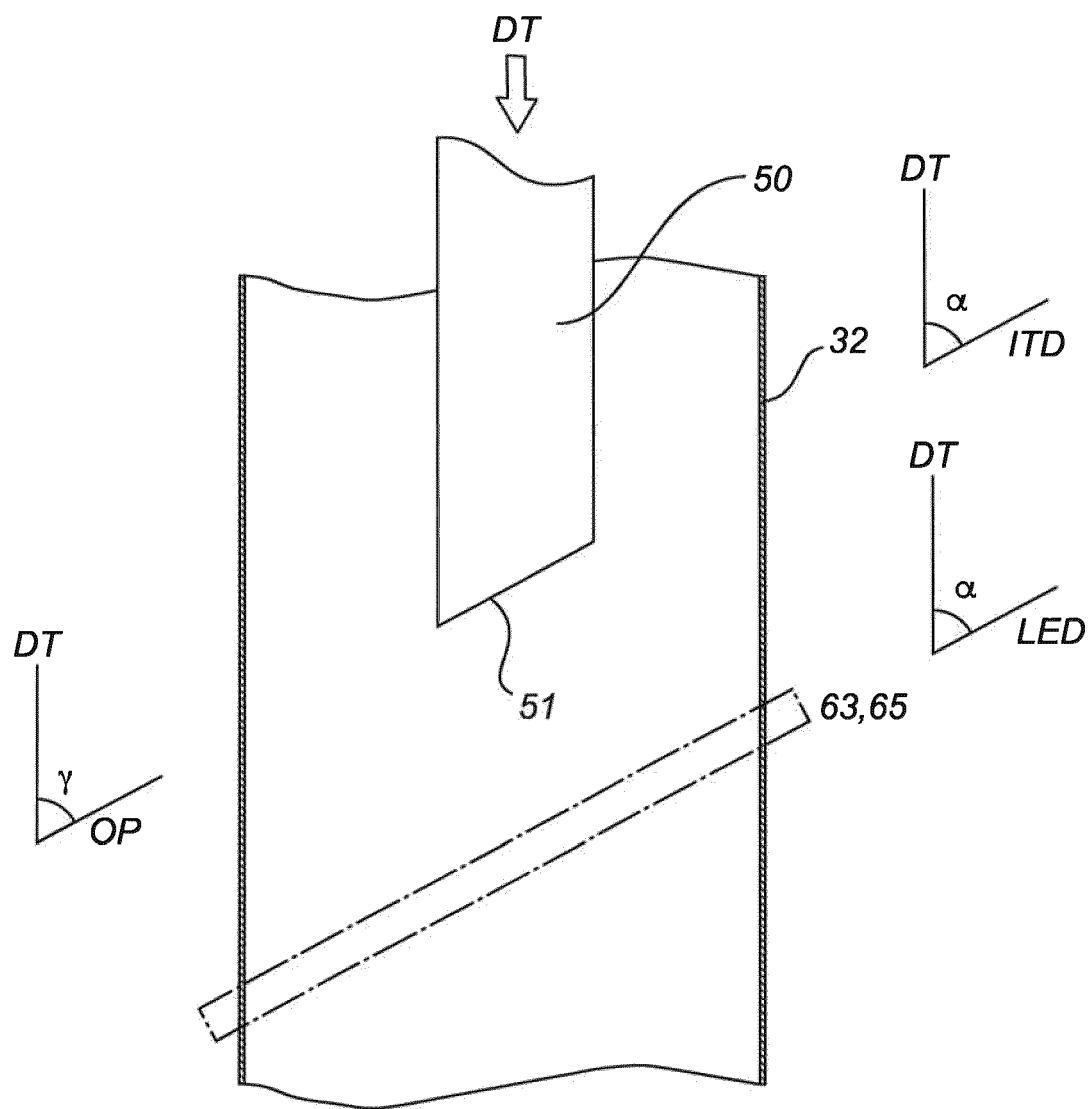


Fig. 4

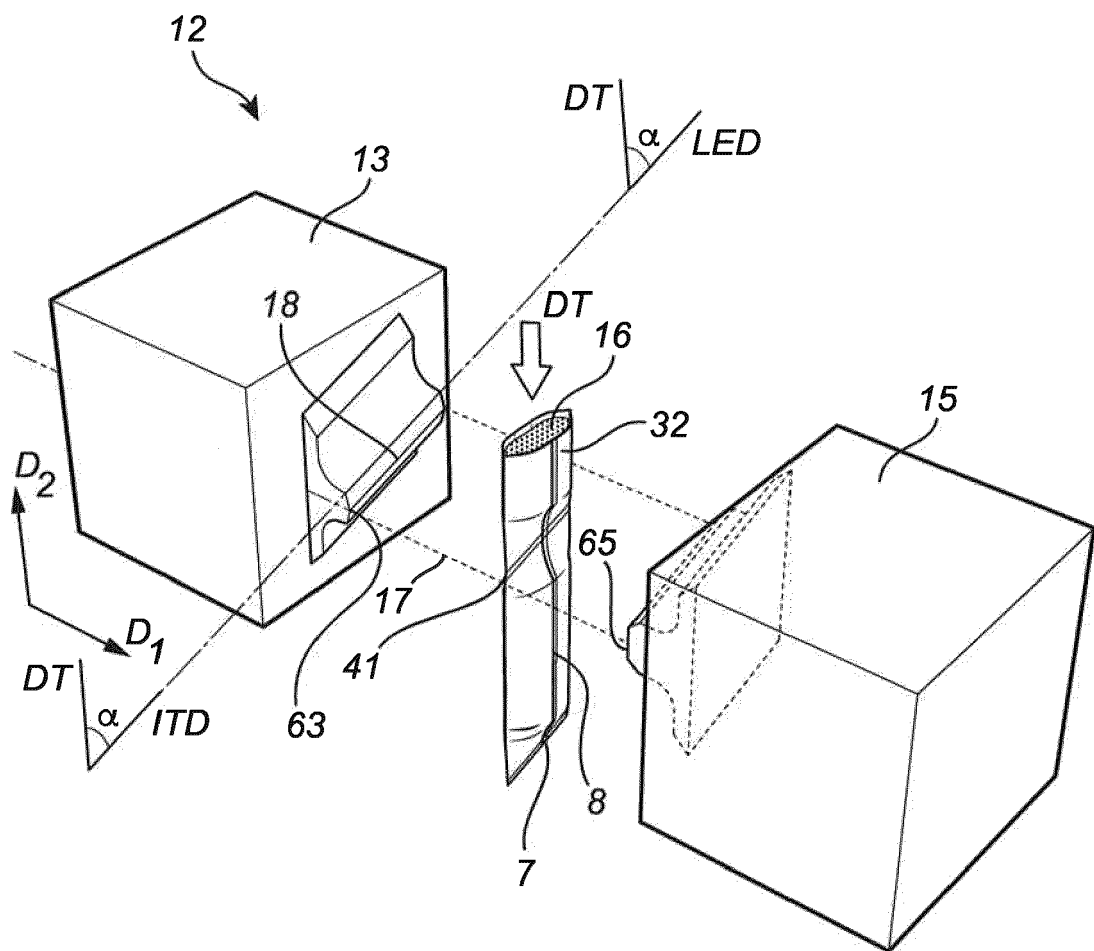


Fig. 5

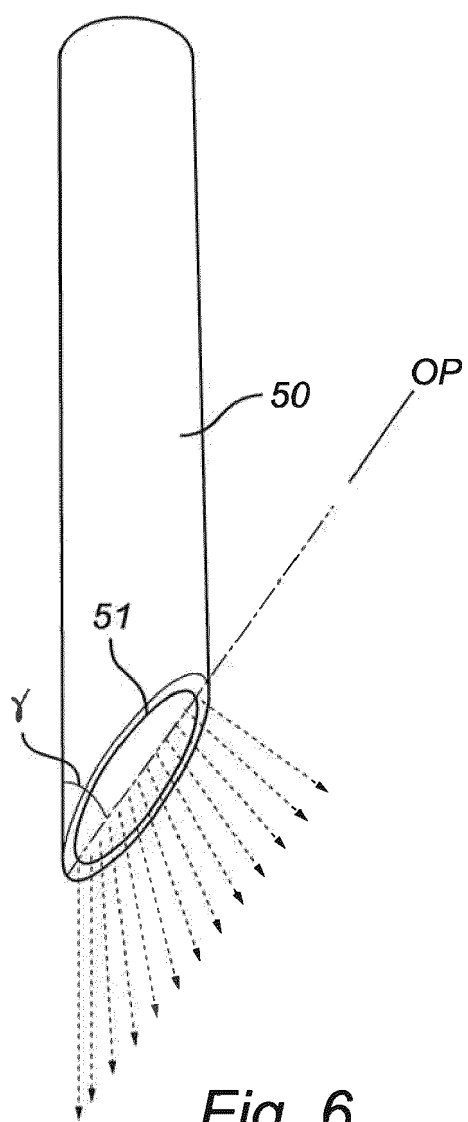


Fig. 6



EUROPEAN SEARCH REPORT

Application Number

EP 23 19 6221

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		22 March 2024	Damiani, Alberto
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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