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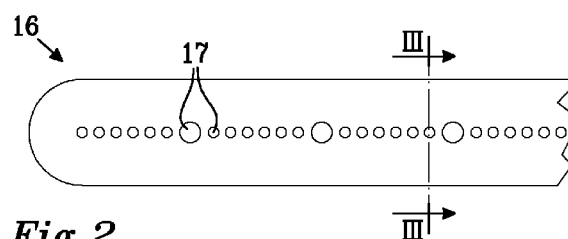
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(54) Title: DISINTEGRABLE HYDROENTANGLED MOIST WIPE OR HYGIENE TISSUE AND METHOD FOR PRODUCING IT



(57) Abstract: A disintegrable moist wipe or hygiene tissue comprising a hydraulically entangled nonwoven material having a plurality of material weakenings (21) extending as a continuous line in MD, wherein the basis weight of the nonwoven material is lower in the weakenings than in the surrounding areas. The material weakenings (21) have a width less than 1 mm and are located with a distance between 10 and 40 mm from each other. A method for manufacturing the disintegrable wipe or hygiene tissue comprises hydroentangling a fibrous web in a hydroentangling station comprising at least one jet strip (16) having a plurality of jet orifices (17) therein, wherein the inlet diameter (d) of the jet orifices varies along the length of the jet strip (16) so that jet orifices (17) with a spacing of 10 to 40 mm therebetween have a larger inlet diameter (d) than the rest of the jet orifices having a smaller inlet diameter. Alternatively the hydroentangling station comprises at least one conventional jet strip having jet orifices with a relatively smaller inlet diameter (d) and further comprises at least one subsequent jet strip having jet orifices with a relatively larger inlet diameter (d), wherein the jet orifices of the subsequent jet strip are arranged with a spacing of 10 to 40 mm there between.

DISINTEGRABLE HYDROENTANGLED MOIST WIPE OR HYGIENE TISSUE AND METHOD FOR PRODUCING IT

TECHNICAL FIELD

- 5 The present disclosure refers to a moist wipe or hygiene tissue comprising a hydraulically entangled nonwoven material. It is especially related to wipes or hygiene tissue intended to be disintegrated when flushed in a sewer. It further refers to a method for making the flushable wipe or hygiene tissue.

10 BACKGROUND OF THE INVENTION

- For many kinds of wipes or hygiene tissues used for personal care, there is a strong desire that the wipe or hygiene tissue can be flushed in the sewer without causing problems with blocked pipes and filters. Pre-moistened wipes or hygiene tissue, are commonly used for cleansing different parts of the human body. Examples of specific
15 uses are baby care, hand wiping, feminine care and toilet paper or a complement to toilet paper.

- Since a long period of time often elapses from the time of manufacture of pre-moistened wipes until the time of use, they must have a sufficient structural integrity for their intended
20 wiping function during such period. Adding a wet strength agent to the wipe will provide such wet integrity. However, wipes or hygiene tissue having a high wet strength will not disintegrate or break up into small fibre clumps when flushed in conventional household toilet systems, which may cause plugging of the drainage system.

- 25 Previously, flushable pre-moistened wipes and toilet papers, which were on the market, were flushable due to their small size. They could move along the drainage and sewage pipes, but were not readily dispersible and could therefore cause problems with blocked pipes and filters. Nowadays disintegrable materials are available for use in flushable wipes and hygiene tissue.

30

WO 02/44454 discloses a laminate nonwoven web that is flushable. The nonwoven web is produced by providing first and second nonwoven layers on a moving support and laminating the two layers by pattern hydroentanglement. Hydroentanglement manifolds

with jet clusters are used having a plurality of jet orifices separated from each other. The jet clusters thus organized in separate and distinct clusters creates alternating strongly bonded areas and weakly bonded areas along MD. These weakly bonded areas allow the laminate to delaminate and thus making it flushable.

5

US 2012/0199301 discloses a flushable moist wipe or hygiene tissue comprising a hydroentangled nonwoven material. The moist wipe has a relatively low strength in CD and a length in MD which exceeds the width in CD with at least 25%. The low strength CD strength makes it possible for the wipe to disintegrate when flushed in a sewer.

10

EP 1 333 868 discloses flushable pre-moistened absorbent products comprising mechanically weakened web, wherein the mechanically weakened region comprises at least 20% of the total area of the product. The mechanical weakening can be accomplished by cutting, slitting, perforating, tensioning, ring rolling and the like.

15

US 2005/0211803 discloses a system and method for changing the orientation of fibres in a hydroentangled nonwoven to improve the isotropy of the web. The hydroentanglement system comprises at least one jet strip with closely spaced jet orifices angled at least 5 degrees from the vertical. The orientation of the fibres is made to balance the strength

20 properties of the nonwoven material.

US 2007/0226970 discloses a system and method for reducing jet streaks in a hydroentangled nonwoven. A first jet strip is provided having a first row of jet orifices each having a first diameter. A second jet strip is provided downstream of the first jet strip, the
25 second jet strip having a second row of jet orifices each having a second diameter which is smaller than the first diameter. The jet orifices with the second smaller diameter impart a smaller impact force on the fabric.

30

SUMMARY OF THE INVENTION

The object of the present invention is to provide a moist wipe or hygiene tissue which has sufficient structural integrity for its intended wiping function, but which is readily

35 disintegrable when flushed in a sewer. This object has according to the invention been

solved by the fact that the moist wipe or hygiene tissue comprising the hydraulically entangled material has a plurality of material weakenings each extending as a continuous line in MD, wherein the basis weight of the nonwoven material is lower in the weakenings than in the surrounding areas, the material weakenings having a width less than 1 mm
5 and being located with a distance between 10 and 40 mm from each other.

The continuous line may have an optional shape, such as straight, curved, zigzag or sinusoidal shape.

10 In the hydroentangling process the fibres entangle with one another providing bonding strength to the fibrous web without the use of chemical bonding agents. The wipe or hygiene tissue may contain no or a small amount of wet strength agent. A "small amount" in this is defined as up to 0.1 wt%, wt% being an abbreviation for weight percent, of a wet
15 strength agent added calculated on the dry weight of the wipe or hygiene tissue. High amounts of a wet strength agent will deteriorate the flushability of the wipe or hygiene tissue and make it more difficult to break up and disperse in a sewer.

The fibres used in the material can be natural fibres, especially cellulose pulp fibres, and manmade staple fibres. Mixtures of cellulose pulp fibres and manmade staple fibres are
20 often used in hydroentangled materials. Staple fibres are cut lengths from filaments. Depending on the planned use, different fibre lengths of the staple fibres are used. In a wetlaid hydroentangled fibrous web, staple fibres with a length between 3 and 25 mm, preferably between 3 and 15 mm, may be used. For a drylaid fibrous web longer fibres may be used.

25 Other natural fibres than pulp fibres may also be included in the fibrous web, such as cotton fibres, sisal, hemp, ramie, flax etc. These natural fibres usually have a length of more than 4 mm.

30 Cellulose pulp fibres can be selected from any type of pulp and blends thereof. Preferably the pulp is characterized by being entirely natural cellulose fibres and can include wood fibres as well as cotton. Preferred pulp fibres are softwood papermaking pulp, although hardwood pulp and non-wood pulp, such as hemp and sisal may be used. The length of pulp fibres may vary from less than 1 mm for hardwood pulp and recycled pulp, to up to 6

mm for certain types of softwood pulp. Pulp fibres are advantageous to use since they are inexpensive, readily available and absorbent.

The amount of cellulose pulp fibres in the web may be at least 50% by weight and the
5 amount of manmade staple fibres may be at least 10% by weight.

For producing a moist wipe or hygiene tissue the wipe is wetted with a liquid composition prior to packaging. The liquid composition may contain a major proportion of water and other ingredients depending on the intended use. Wetting compositions useful in moist
10 wipes and hygiene tissue are well-known in the art.

The fibre weight of the disintegrable wipe or hygiene tissue as disclosed herein may comprise 50-90 wt% of pulp fibres. In addition to pulp fibres, the disintegrable wipe or hygiene tissue further comprises manmade fibres and/or natural fibres with a length
15 between 3 and 25 mm. As mentioned above, the manmade fibres may have a length between 3 and 25 mm, preferably between 3 and 15 mm.

The fibre weight of the disintegrable wipe or hygiene tissue may comprise 10-50 wt% of manmade fibres and/or natural fibres with a length between 3 and 25 mm.
20

The fibre weight of the disintegrable wipe or hygiene tissue may substantially consist of, or consist of, 50-90 wt% of pulp fibres, and manmade fibres and/or natural fibres with a length between 3 and 25 mm as balance, such that the pulp fibres and the manmade fibres and/or natural fibres with a length between 3 and 25 mm together make up 100% of
25 the fibre weight.

The material weakenings may have a width of at least 100 μm .

The material weakenings may have a width between 200 and 900 μm , preferably between
30 300 and 800 μm .

The material weakenings may have a basis weight in the range of 10%-90% of the basis weight in the surrounding areas, preferably in the range of 20%-80% of the basis weight in the surrounding areas, more preferably in the range of 30%-70% of the basis weight in the
35 surrounding areas, most preferably in the range of 40%-60% of the basis weight in the surrounding areas.

- The invention further refers to a method for manufacturing a nonwoven material suited for forming a disintegrable moist wipe or hygiene tissue, the method comprising the steps of: dry-, wet- or foam-forming a fibrous web on a moving support, hydroentangling the fibrous
- 5 web in a hydroentangling station to form a hydroentangled nonwoven web, the hydroentangling station comprising at least one jet strip having a plurality of jet orifices therein, wherein the inlet diameter of the jet orifices varies along the length of the jet strip so that jet orifices with a spacing of 10 to 40 mm therebetween have a larger inlet diameter than the rest of the jet orifices having a smaller inlet diameter,
- 10 or alternatively that the hydroentangling station comprises at least one jet strip having jet orifices with a relatively smaller inlet diameter and further comprises at least one subsequent jet strip having jet orifices with a relatively larger inlet diameter, wherein the jet orifices of the subsequent jet strip are arranged with a spacing of 10 to 40 mm there between,
- 15 wherein weakenings extending in MD are formed in the hydroentangled web in the areas just opposite the jet orifices having the larger inlet diameter.

- The larger jet orifices may have an inlet diameter between 120 and 400 μm or between 150 and 300 μm . The smaller jet orifices have an inlet diameter between 80 and 145 μm .
- 20 If the jet orifice has a non-circular cross-section, the diameter is determined as the diameter of a corresponding circular cross-section having the same cross-sectional area.

BRIEF DESCRIPTION OF THE DRAWINGS

- 25 The invention will below be described with reference to some embodiments shown in the accompanying drawings.
- Figure 1 illustrates schematically a method for producing a hydroentangled nonwoven material.
- Figure 2 is a schematic drawing of a jet strip with jet orifices of varying size.
- 30 Figure 3 is a schematic section through a jet strip with a jet orifice on an enlarged scale.
- Figure 4 illustrates schematically a wipe or hygiene tissue with weakenings in MD.

DETAILED DESCRIPTION

One example of a method according to the invention for producing a hydroentangled nonwoven material is shown in Figure 1. A slurry comprising fibres of optional kind is wetlaid on a moving forming fabric 10 by a headbox 11. The slurry may besides water
5 contain conventional papermaking additives such as wet and/or dry strength agents, retention aids and dispersing agents. A special variant of wetlaying or wetforming is foamforming, wherein the fibres are dispersed in a foamed liquid containing water and a surfactant. The liquid or foam is sucked through the forming fabric 10 by means of suction
10 boxes 12 arranged under the forming fabric, so that a fibrous web 14 is formed on the forming fabric 10. Foamforming is described in for example WO 96/02702 A1. An advantage of foamforming is that it requires less liquid to be pumped and sucked through the forming fabric as compared to traditional wetforming without foam. The fibrous web may also be an airformed web.

15 The fibrous web 14 is hydroentangled in a hydroentangling station 15 while it is supported on the forming fabric 10. Alternatively the fibrous web is transferred to a second support member, for example a second forming fabric or a perforated drum, before hydro-entanglement. The hydroentangling station 15 includes at least one jet strip 16 having a plurality of jet orifices 17 therein. In the embodiment of Fig. 1 three jet strips 16 are
20 provided. Very fine water jets under pressure are directed against the fibrous web 14 from these jet strips 16 to provide an entangling of the fibres and thus form a hydroentangled nonwoven web 19. Suction boxes 18 are arranged under the forming fabric 10 just opposite the hydroentangling station 15. The dewatered hydroentangled nonwoven web 19 is then brought to a drying station (not shown) before the finished material is reeled up
25 and converted to the desired product. The hydroentangled nonwoven material is converted into wipes or hygiene tissue having appropriate dimensions

A simple jet strip 16 for the purpose of one embodiment of the present invention is schematically illustrated in Fig. 2. The orifices 17 in the jet strip are typically very small,
30 between 80 and 145 μm , and closely spaced. The orifices in the jet strip 16 are arranged in rows and provide a "curtain" or "wall" of the liquid that is directed from the orifices onto the fibrous web.

According to one embodiment of the invention the diameter of the jet orifices 17 varies
35 along the length of the jet strip 16, so that jet orifices with a spacing of 10 to 40 mm there

between have a larger diameter than the rest of the jet orifices having a smaller diameter. The smaller diameter may be in the range of 80 to 145 μm , while the larger diameter may be in the range of 120 and 400 μm , preferably between 150 and 300 μm . Preferably only one larger jet orifice is arranged between each group of smaller jet orifices, as is

- 5 illustrated in Figure 2, but there may of course be a group of two or more larger jet orifices between each group of smaller jet orifices.

A section through a jet strip 16 with a jet orifice 17 is shown in Fig. 3. The water jet passing through the jet orifice 17 is indicated with the numeral 22. As shown in Fig. 3 the
10 inlet 17a to the jet orifice 17 has a smaller diameter d than the outlet 17b. All diameters referred to with respect to the jet orifices are with respect to the inlet diameter d . Often the jet orifices 17 have a cylindrical portion from the inlet 17a and then expands towards the outlet 17b.

- 15 The water jets from the orifices having the larger size will result in the effect that a larger proportion of fibres just opposite these larger orifices will be washed aside to the adjacent areas located opposite the group of orifices having the smaller size. In addition, or alternatively, a larger proportion of the fibres may be washed out from the areas opposite these larger orifices as compared to from the adjacent areas located opposite the group of
20 orifices having the smaller size. Thus narrow material weakenings 21 having a lower basis weight than the surrounding areas will be formed in the hydroentangled nonwoven web 19. These material weakenings 21 extend as continuous lines in the MD, i.e. machine direction, of the nonwoven web and will have a width substantially corresponding to twice the inlet size of the jet orifices 17 having the larger inlet size. Typically the material
25 weakenings 21 will have a width less than 1 mm and greater than 100 μm . The material weakening may have a width between 200 and 900 μm , preferably between 300 and 800 μm . The width of the material weakening is measured in an enlarged image of the material, e.g. a microscope image, and should be taken as an average of ten measurement points along a sample of the web. The transition between the material weakening
30 and the surrounding areas is determined from the image and is typically determined as where the basis weight is halfway between that of the material weakening and that of the surrounding areas.

The jet strips 16 may in one embodiment oscillate, wherein the material weakenings 21 that are produced will have e.g. a sinusoidal shape. The term continuous line includes lines of optional shape, such as straight, curved, zigzag or sinusoidal shape.

- 5 Fig. 4 illustrates schematically a wipe or hygiene tissue 20 made from a hydroentangled nonwoven web 19 having material weakenings 21 extending in the MD.

Two or more jet strips 16 may be provided in the hydroentangling station 15, wherein Fig. 1 shows three jet strips. There may be the same or different fluid pressures in the different
10 jet strips. Especially there may be a lower pressure in the first jet strip, a higher pressure in the second jet strip and an even higher pressure in the last jet strip. One example of a suitable pressure in the first jet strip may be between 20 and 50 bars, preferably between 20 and 40 bars and between 50 and 120 bars in the final jet strip.

- 15 Hydroentangling may occur in several steps and from one or both sides of the fibrous web. The fibrous web may be transferred to another forming fabric between two subsequent hydroentangling steps.

In an alternative embodiment, each jet strip 16 has orifices of equal diameter, wherein the
20 web is firstly entangled using a conventional jet strip 16 where all orifices 17 have a relatively smaller diameter, i.e. preferably in the range of 80 and 145 μm , and in a subsequent step the web is hydroentangled using a jet strip 16 where all orifices 17 have a relatively larger diameter, i.e. preferably in the range of 120 and 400 μm . The orifices 17 in the jet strip 16 in the subsequent step are located with spacing of between 10 and 40
25 mm. In a conventional jet strip, the spacing between the jet orifices is in the range of 0.4-1 mm or 0.6 to 0.8 mm.

The difference in diameter d between the relatively smaller and the relatively larger orifices 17 should be at least 20 μm , preferably at least 40 μm and most preferably at
30 least 60 μm .

The fibre type and proportion of different types of fibres used for forming the hydro-entangled web may determine what pressure is suitable in the jet strips. For example a high proportion of pulp fibres will usually require a lower pressure than a lower proportion
35 of pulp fibres.

A wipe or hygiene tissue 20 produced from the hydroentangled nonwoven material 19 according to the invention having material weakenings 21 extending in MD will result in a wipe or hygiene tissue that is strong in MD, which direction preferably is used as wiping direction. The wiping direction may be indicated to the user, for example by making the wipe or hygiene tissue longer in the direction. This reduces the risk for breaking or poking during use.

The wipe or hygiene tissue is weaker in the CD due to the material weakenings 21. This direction is usually under less stress during wiping. The lower strength in CD makes it possible for the wipe to break up and disperse in the sewage after use. An appropriate wet strength in CD is below 200 N/m, preferably below 160 N/m and more preferably below 120 N/m. A wet strength in this range will ensure that the wipe will be disintegrated when flushed. The wet strength in CD should further be sufficient to allow the wipe to be drawn out of a dispenser opening without breaking. Depending on the dimensions of the dispenser opening the wet strength in CD is more or less important. The wet strength is measured in water according to the test method SS-EN ISO12625-5:2005.

EXAMPLES

- 20 Trials have been made by hydroentangling fibrous webs having the following fibre composition:
- 80 wt% cellulose pulp + 10 wt% lyocell fibers 1.7 dtex x 12 mm + 10 wt% PLA:poly(lactic acid) fibers 1.7 dtex x 12 mm.
- 25 The entanglement was made in a first step with three jet strips on both sides of the web with standard entanglement nozzles having an inlet hole diameter of 120 μ m and a spacing between holes of 0.6 mm. The basis weight of the hydroentangled nonwoven was as specified in Table 1 below. The machine speed was 140 m/min.
- 30 In a subsequent step the webs were hydroentangled from one side with one strip having a hole diameter of 180 or 240 μ m and a spacing between holes of 20 or 40 mm. The entangling pressure was 60 or 100 bars. See Table 1 below.

A reference material (Ref. 1) with the same fibre composition as the samples was produced by hydroentanglement in the first step as described above, but the subsequent step was not applied.

- 5 The disintegration time according to French standard NF Q 34-020 and the wet tensile strength in CD were measured for the webs. A disintegration index was calculated as disintegration time / wet tensile strength CD (sec x m/N). The results are given in Table 1 below. As mentioned above, wet strength was measured in water according to the test method SS-EN ISO12625-5:2005. Since the length of the strip when measuring wet strength was longer than the distance between the water jets of the subsequent step, at least two material weakenings were included in the wet strength measurement.

All the samples 1-8 have a lower disintegration index than the reference sample. See last two columns of the table.

15

Sample no	Basis weight [gsm]	Inlet hole diam. [µm]	Entangling pressure [bar]	Distance between water jets [mm]	Disintegration time [s]	% diff vs ref.	Wet tensile strength CD [N/m]	Disintegration index [sec x m/N]	% diff vs ref.
1	70,3	180	60	20	220	-15	21	10,7	10
2	70,1	240	60	20	168	12	18	9,3	22
3	68,5	180	100	20	178	7	19	9,4	22
4	69,6	240	100	20	180	6	17	10,4	13
5	68,7	180	60	40	146	23	18	8,2	31
6	77,6	240	60	40	145	24	25	5,8	51
7	70,1	180	100	40	168	12	21	8,2	32
8	70,2	240	100	40	141	26	21	6,8	43
Ref 1	71,7	-	-	-	191	N/A	16	11,9	N/A

Table 1

CLAIMS

1. A disintegrable moist wipe or hygiene tissue comprising a hydraulically entangled nonwoven material, *characterized in* that said wipe or hygiene tissue (20) has a plurality of material weakenings (21) each extending as a continuous line in MD,
5 wherein the basis weight of the nonwoven material is lower in said weakenings than in the surrounding areas, said material weakenings (21) having a width less than 1 mm and being located with a distance between 10 and 40 mm from each other.
- 10 2. A disintegrable moist wipe or hygiene tissue as claimed in claim 1, *characterized in* that the fibre weight of said wipe or hygiene tissue (20) comprises:
 - 50-90 wt% of pulp fibres, and
 - manmade fibres and/or natural fibres with a length between 3 and 25 mm.
- 15 3. A disintegrable moist wipe or hygiene tissue as claimed in claim 2, *characterized in* that the fibre weight of said disintegrable wipe or hygiene tissue (20) comprises 10-50 wt% of manmade fibres and/or natural fibres with a length between 3 and 25 mm.
- 20 4. A disintegrable moist wipe or hygiene tissue as claimed in claim 2 or 3, *characterized in* that the fibre weight of said disintegrable wipe or hygiene tissue (20) substantially consists of:
 - 50-90 wt% of pulp fibres, and
 - manmade fibres and/or natural fibres with a length between 3 and 25 mm as
25 balance.
5. A disintegrable moist wipe or hygiene tissue as claimed in claim 2, 3 or 4, *characterized in* that the fibre weight of said disintegrable wipe or hygiene tissue (20) consists of:
30
 - 50-90 wt% of pulp fibres, and
 - manmade fibres and/or natural fibres with a length between 3 and 25 mm as balance.
- 35 6. A disintegrable moist wipe or hygiene tissue as claimed in any of the preceding claim, *characterized in* that said material weakenings (20) have a width of at least 100 μ m.

7. A disintegrable moist wipe or hygiene tissue as claimed in any of the preceding claim, *characterized in* that said material weakenings (20) have a width between 200 and 900 μm .
- 5
8. A disintegrable moist wipe or hygiene tissue as claimed in any of the preceding claim, *characterized in* that said material weakenings (20) have a width between 300 and 800 μm .
- 10
9. A disintegrable moist wipe or hygiene tissue as claimed in any of the preceding claim, *characterized in* that said material weakenings (21) have a basis weight in the range of 10%-90% of the basis weight in the surrounding areas, preferably in the range of 20%-80% of the basis weight in the surrounding areas, more preferably in the range of 30%-70% of the basis weight in the surrounding areas, most preferably in the range of 40%-60% of the basis weight in the surrounding areas.
- 15
10. A method for manufacturing a nonwoven material suited for forming a disintegrable moist wipe or hygiene tissue according to any of claims 1-5, comprising the steps of:
- 20
- dry-, wet- or foam-forming a fibrous web (14) on a moving support (10), hydroentangling said fibrous web in a hydroentangling station (15) to form a hydroentangled nonwoven web (19),
- 25
- said hydroentangling station comprising at least one jet strip (16) having a plurality of jet orifices (17) therein, wherein the inlet diameter (d) of the jet orifices varies along the length of the jet strip (16) so that jet orifices (17) with a spacing of 10 to 40 mm therebetween have a larger inlet diameter (d) than the rest of the jet orifices having a smaller inlet diameter,
- 30
- or alternatively that said hydroentangling station comprises at least one jet strip having jet orifices with a relatively smaller inlet diameter (d) and further comprises at least one subsequent jet strip having jet orifices with a relatively larger inlet diameter (d), wherein said jet orifices of said subsequent jet strip are arranged with a spacing of 10 to 40 mm there between,
- 35
- and wherein weakenings (21) extending in MD are formed in the hydroentangled web in the areas just opposite the jet orifices (17) having the larger inlet diameter (d).

11. A method as claimed in claim 10, *characterized in* that said larger jet orifices have an inlet diameter (d) between 120 and 400 μm and said smaller jet orifices have an inlet diameter (d) between 80 and 145 μm .

5

12. A method as claimed in claim 11, *characterized in* that said larger jet orifices have an inlet diameter (d) between 150 and 300 μm and said smaller jet orifices have an inlet diameter (d) between 80 and 145 μm .

10

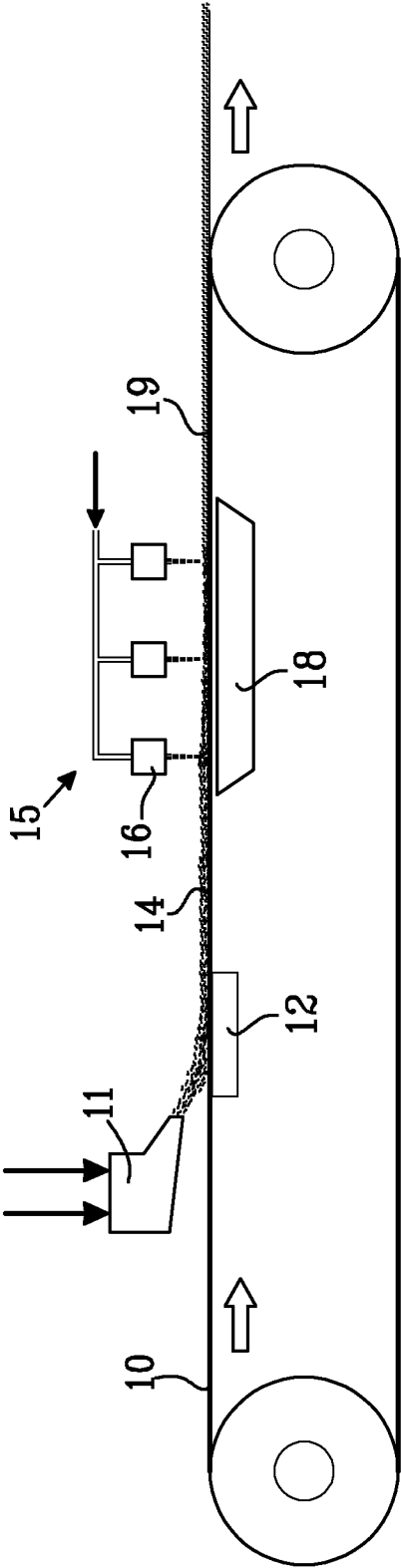


Fig. 1

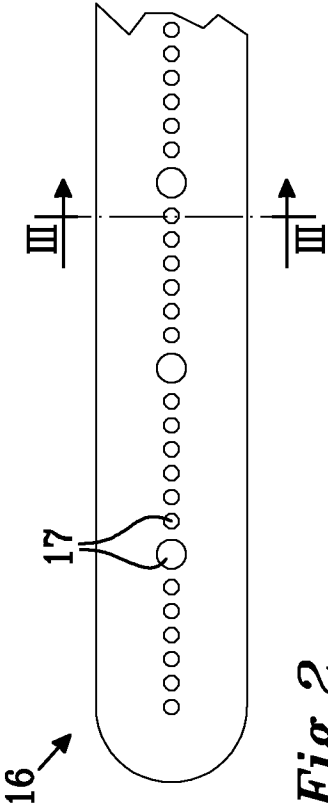


Fig. 2

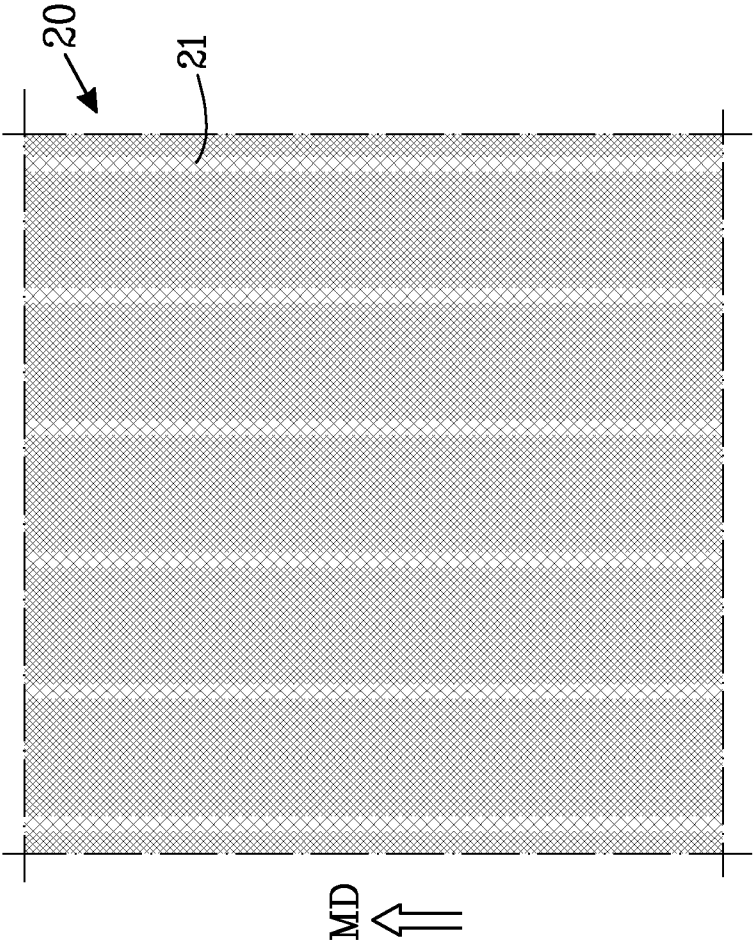


Fig. 4

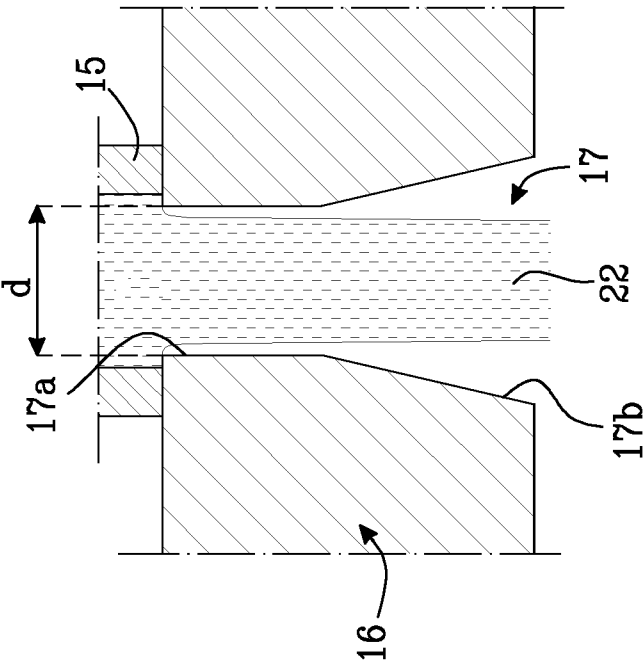


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2015/050670

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A47K, A61L, B05B, D04H, D21H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data, BIOSIS, COMPENDEX, INSPEC, MEDLINE, IBM-TDB, bibliotekssök

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02066089 A2 (PROCTER & GAMBLE), 29 August 2002 (2002-08-29); page 7, line 7 - page 8, line 26; page 9, line 7 - page 9, line 19; page 11, line 28 - page 12, line 5; page 14, line 15 - page 17, line 24; page 19, line 18 - page 19, line 27; figures 1-3,5-6	1-9
Y	--	10-12
Y	DE 102008060327 A1 (FLEISSNER GMBH), 10 June 2010 (2010-06-10); page 3, paragraph [0027]; page 4, paragraph [0032]; figures 5,10	10-12
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Further documents are listed in the continuation of Box C.



See patent family annex.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2015/050670

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International Patent Classification (IPC)

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A61L 15/62 (2006.01)

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