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

(11) **EP 4 190 548 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.06.2023 Bulletin 2023/23

(21) Application number: **21212003.4**

(22) Date of filing: **02.12.2021**

(51) International Patent Classification (IPC):
B31F 1/07 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B31F 1/07; B31F 2201/0717; B31F 2201/0733; B31F 2201/0766; B31F 2201/0774; B31F 2201/0787; B31F 2201/0792

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

(71) Applicant: **Pack Service S.r.l.**
55016 Porcari (LU) (IT)

(72) Inventor: **DELLA MAGGIORA, Alberto**
55015 Montecarlo (Lucca) (IT)

(74) Representative: **Mazzitelli, Maria**
Racheli S.r.l.
Viale San Michele del Carso, 4
20144 Milano (IT)

(54) **PROCESS FOR THE PRODUCTION OF TISSUE ARTICLES**

(57) A description is given of a process for producing a product in tissue paper from a web (21) formed by two or more layers, comprising the steps consisting of: loading a reel (20) of said multilayer web (21) made up of overlapping layers (21a, 21b, 21c) in a loading and unwinding station (1); unwinding the reel (20) to feed the web (21) to a first embossing station (3) composed of two opposing cylindrical rollers (13, 23) both having micro-points close one to the other in relief, suitable for performing a first embossing of the tip-to-tip type; wherein said web (21) in output from the first embossing station (3) is fed to a second embossing station (4) composed of two opposing cylindrical rollers (14, 24) characterised by undulated reliefs suitable for performing a second undulated embossing on said previously embossed web (21).

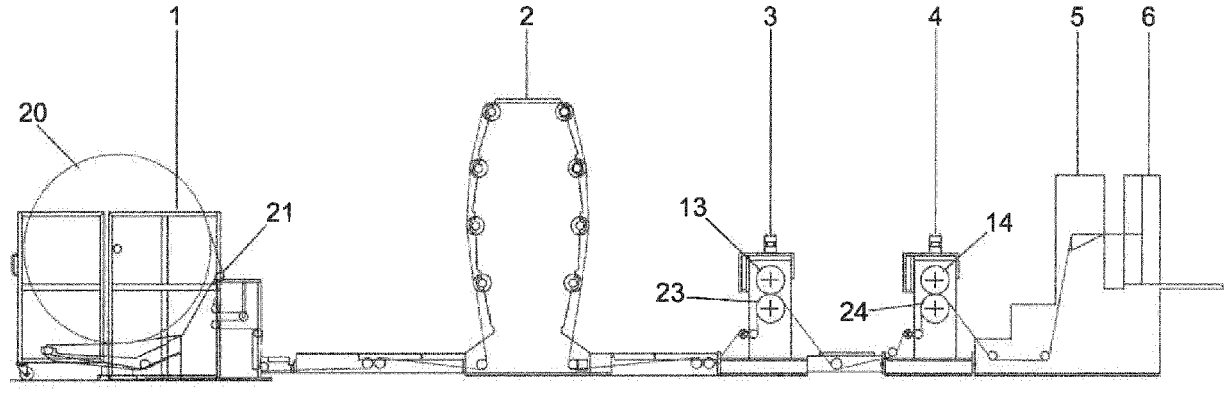

FIG.1

EP 4 190 548 A1

Description

[0001] The present invention relates in general to a process and a system intended to produce tissue paper. More particularly, the present invention relates to a process for producing tissue products comprising two or more webs having improved features.

Background of the invention

[0002] The term "tissue" generally refers to those paper products intended for hygiene and sanitary use in both private and public places. In particular, when talking about tissue, reference is made to products such as toilet paper and kitchen rolls, but also to handkerchiefs, napkins, medical sheets, facial tissues and so on. Generally, as in the common case of kitchen napkins or handkerchiefs, these products are made up of several layers or webs joined one to the other.

[0003] The production and processing of these products takes place in plants equipped with specific machinery used in the paper industry and divided into different sections, subdividing the process into a series of continuous steps, listed below as an example.

[0004] Production begins with the loading of a reel, consisting of several overlapping webs of paper, onto an unwinding unit, consisting of a system of rollers that keep the webs taut and direct them towards a second station which, optionally, may be represented by a printing unit.

[0005] The printing unit typically carries out flexographic printing, commonly referred to as "flexo" printing, which is carried out in the case wherein an article with a printed decoration is to be produced, generally in colour. If this is not the case, the webs are instead directed to an embossing unit. The embossing process gives the paper a special "engraving" that gives the finished product both aesthetic and functional features.

[0006] In general, an embossing unit is made up of a pair of counter-rotating metal cylinders whose axes are superimposed on a common vertical plane, having particular raised engravings. In this way, by making the paper pass through the two cylinders, a certain decorative pattern is applied to the sheet.

[0007] A typical processing that takes place in this step is represented by tip-to-tip embossing. In this case, the cylinders have raised parts made up of micro-points close one to the other. When the webs are fed to the embossing unit, the two engraved cylinders are perfectly in phase of point against point one in relation to the other. In the case of several webs fed simultaneously, the two cylinders also perform a bonding pressure between the points to promote adhesion, in addition to the possible application of adhesives.

[0008] The web obtained after embossing is then normally conveyed first to a folding station, where the paper is folded into various sizes and formats, and finally to a band knife that performs the cutting of the paper in the ways established according to the product to be made.

[0009] From what has just been described, it can be seen how the aesthetic and functional features are strongly dependent on the processing carried out in the embossing station. However, these features of the known and widely commercially available products are sometimes not optimal.

[0010] It has in fact been noted by the Applicant that standard products made according to the art have, for example, non-optimal softness levels, which could be bettered by an improved embossing process.

Summary of the invention

[0011] The obj ect of the present invention is therefore to provide a process that enables a tissue product to be produced with improved functional and aesthetic features.

[0012] A further object of the present invention is to provide a system for carrying out a process in order to obtain a tissue product with improved functional and aesthetic features.

[0013] Yet another purpose of the present invention is to provide a tissue product that has improved functional and aesthetic features.

[0014] These and other objects are achieved by a process for the production of tissue products according to the invention having the features listed in the appended independent claim 1, by a production system according to claim 6 and by a product according to claim 8.

[0015] Advantageous embodiments of the invention are disclosed by the dependent claims.

[0016] Substantially, the present invention relates to a process for the production of a product in tissue paper from a web formed of two or more layers, comprising the steps consisting of: loading a reel of said multilayer web made up of superimposed layers in a loading and unwinding station; unwinding the reel to feed the web to a first embossing station composed of two opposing cylindrical rollers, both having in relief micro-points one close to the other, suitable for performing a first tip-to-tip embossing; wherein said web in output from the first embossing station is fed to a second embossing station composed of two opposing cylindrical rollers characterised by undulated reliefs suitable for performing a second undulated embossing on said previously embossed web.

[0017] The invention likewise relates to a system for carrying out the process described herein.

Brief description of the drawings

[0018] Further features of the invention will be made clearer by the following detailed description, referring to a purely illustrative, and therefore non-limiting, embodiment thereof illustrated in the accompanying drawings, wherein:

Figure 1 is a schematic view of a system suitable for performing a double embossing process according

to the invention;

Figure 2 is a schematic representation of a first embossing station of the system according to the invention;

Figure 3 is a schematic representation of a second embossing station of the system according to the invention;

Figure 4 is a photographic representation of the rollers of the second embossing station;

Figure 5 shows a section of web in output from the first embossing station having a dotted pattern; and

Figure 6 shows a napkin made by the process according to the present invention.

Detailed description of the invention

[0019] A preferred embodiment of the process of producing tissue material subjected to a double embossing step will now be described in detail with reference to the accompanying drawings.

[0020] Figure 1 is a schematic representation of a system in which a tissue product with improved functional and aesthetic features is produced. The process starts from a reel loading and unwinding station, denoted in the drawing by reference numeral 1. A reel 20 formed of a multilayer web 21 comprising two or more overlapping layers of tissue paper is loaded into this station. Preferably, the reel contains two to four overlapping layers.

[0021] In the production phase, the reel 20 is unwound so as to feed the web 21 to the subsequent processing stations. The web 21, depending on the composition of the reel 20, may thus comprise several overlapping layers that are still separated one from the other.

[0022] The system illustrated in Fig. 1 shows the presence of a printing station 2 suitable for performing flexographic or "flexo" processing in a conventional manner. However, the printing station 2 is optional and not necessary for the purposes of the present invention, in that the web 21, after having been unwound from the reel 20, can be made to move forwards directly towards a first embossing station 3.

[0023] Preferably, before arriving at the first embossing station 3, by a process known and not shown in the diagram of the system, several layers are separated from the web 21 and adhesive is applied between them.

[0024] The first embossing station 3 is formed in a standard manner and comprises substantially a pair of counter-rotating cylinders 13, 23 with their axes superimposed on a vertical plane. Fig. 2 is a schematic representation of the embossing step in station 3, showing three separate layers 21a, 21b, 21c, of a web 21 entering the pair of cylinders 13, 23. Figure 2 shows, purely for an illustrative purpose in an emphasised manner, the three separate layers 21a, 21b, 21c of a web 21; obviously the layers could be in a different number.

[0025] The cylinders 13, 23 of the first embossing station 3 typically both have in relief micro-points close one to the other and are installed "in mirror mode", so as to match, at the time of passage of the layers of the web 21, the points of the first cylinder 13 with those of the other, thus obtaining on the paper a pattern made up of small dots (tip-to-tip embossing). At the same time, this embossing system allows gluing of the superimposed webs passing between the cylinders 13, 23, thus forming in output a single compact web 21 formed by several layers.

[0026] In the preferred case of micro-points placed at a constant distance on the cylinders 13, 14, the pattern consists of small points placed at the same distances one from the other, as shown in Fig. 5. However, alternative patterns can be imprinted on the basis of the arrangement of the reliefs on the cylinders.

[0027] The web 21 in output from the first embossing station 3 is directed towards a second embossing station 4. The second embossing station 4 (Fig. 3) is also made up of a pair of opposing cylinders 14 and 24, but characterised by reliefs with an undulated trend, as in the embodiment shown in Figure 4.

[0028] The paper web 21, already bearing a microdots pattern impressed by the first embossing station 3, is thus embossed again. The result obtained is a particularly soft web, also bearing a characteristic "wave" pattern. The product obtained in this way has improved features from both the functional and from the aesthetic point of view. At the end of this phase, the product is compacted and reduced in thickness.

[0029] This phase is unique in that no product currently on the market is pressed and therefore reduced in thickness. On the contrary, known products on the market are embossed with the intention of obtaining volume.

[0030] The paper web 21 is subsequently directed first to an appropriate folding unit 5 and then to a cutting unit, in order to perform conventional folding and cutting operations. A product obtained by this process can be, for example, a napkin (or table linen) having a wave pattern as shown in Fig. 6.

[0031] The processing gives the product high functional features, including:

- maximum resistance due to the high quantity of material used;
- maximum softness, obtained in the final stage through pressing;
- very high absorbency and consequently excellent resistance to breaking and tearing.

[0032] Thanks to this combination, the processed tissue paper acquires features that make it very similar to a nonwoven fabric, repositioning tissue at a higher level from the point of view of quality.

[0033] Compared to the common and similar articles that can be found on the market, produced with tissue paper, the table linen with wave pattern is qualitatively superior and therefore suitable for an elite market, which includes restaurants and luxury hotels, events and ceremonies as well as "away from home". These articles

are also suitable for the cleaning sector due specifically to the outstanding qualities acquired by the manufacturing process.

[0034] Ultimately, the process according to the present invention makes it possible to obtain a product in which the quality of the table linen with wave pattern is tangible and appreciable even to the touch. The sensation is that of a cloth product, resistant, soft and elegant, thanks to the particular production technique, unique and innovative, that enhances to the maximum the value of tissue paper, until now used only for commercial products of wide consumption, certainly not of excellent quality.

[0035] The present invention is not limited to the particular embodiment described above and illustrated in the accompanying drawings, but numerous detailed modifications can be made thereto, within the reach of the person skilled in the art, without thereby going beyond the scope of the invention itself, as defined in the appended claims.

List of reference numerals

[0036]

1:	loading and unwinding station
2:	printing station
3:	first embossing station
4:	second embossing station
5:	folding unit
6:	cutting unit
13:	first cylinder of the first embossing station
14:	first cylinder of the second embossing station
20:	reel
21:	web
21a:	web layer
21b:	web layer
21c:	web layer
23:	second cylinder of the first embossing station
24:	second cylinder of the second embossing station

Claims

1. A process for the production of a product in tissue paper from a web (21) formed by two or more layers comprising the steps consisting of:

- loading a reel (20) of said multilayer web (21) made up of overlapping layers (21a, 21b, 21c) in a loading and unwinding station (1);
- unwinding the reel (20) to feed the web (21) to a first embossing station (3) composed of two opposing cylindrical rollers (13, 23), both having micro-points in relief close one to the other, designed to carry out a first embossing of the tip-to-tip type;

characterised in that said web (21) in output from the first embossing station (3) is fed to a second embossing station (4) composed of two opposing cylindrical rollers (14, 24) having undulated reliefs apt to carry out a second undulated embossing on said web (21) previously embossed and at the same time compact the layers (21a, 21b, 21c), reducing the overall thickness thereof.

2. Process according to claim 1, wherein said layers of the web (21) coming from said reel (20) vary in a number from two to four.

3. Process according to claim 1 or 2, wherein said overlapping layers (21a, 21b, 21c) are separated before entering said first embossing station (3) in order to apply adhesive between them.

4. Process according to any one of the preceding claims, further comprising a flexographic printing step in a printing station (2) provided between said loading and unwinding station (1) and said first embossing station (3).

5. Process according to any one of the preceding claims, wherein the web (21) in output from the second embossing station (4) is folded in a folding station (5) and subsequently cut in a cutting station (6) provided downstream of said folding station (5).

6. System for producing products in tissue paper comprising:

- a station for loading and unwinding (1) a reel (20) of a multilayer paper web (21);
- a first embossing station (3), placed downstream of said station for loading and unwinding (1) said web (21), composed of two opposing cylindrical rollers (13, 23), both having embossed micro-points in relief close one to the other, apt to carry out a first embossing of the tip-to-tip type on the web (21);
- a second embossing station (4) downstream of said first embossing station (3) composed of two opposing cylindrical rollers (14, 24) having undulated reliefs apt to carry out a second undulated embossing on said web (21) previously embossed.

7. System for producing products in tissue paper according to claim 6, further comprising:

- a printing station (2) placed in line between said loading and unwinding station (1) and said first embossing station (3), apt to carry out printing on a web (21) coming from said reel (20);
- a folding station (5) for carrying out folding on the web (21) in output from said second embossing station (4);

- a cutting station (6) for carrying out a cut on said web (21) in output from said folding station (5).

8. Product in tissue paper composed of a multilayer web (21) directly obtained by means of a process according to any one of claims 1 to 5.

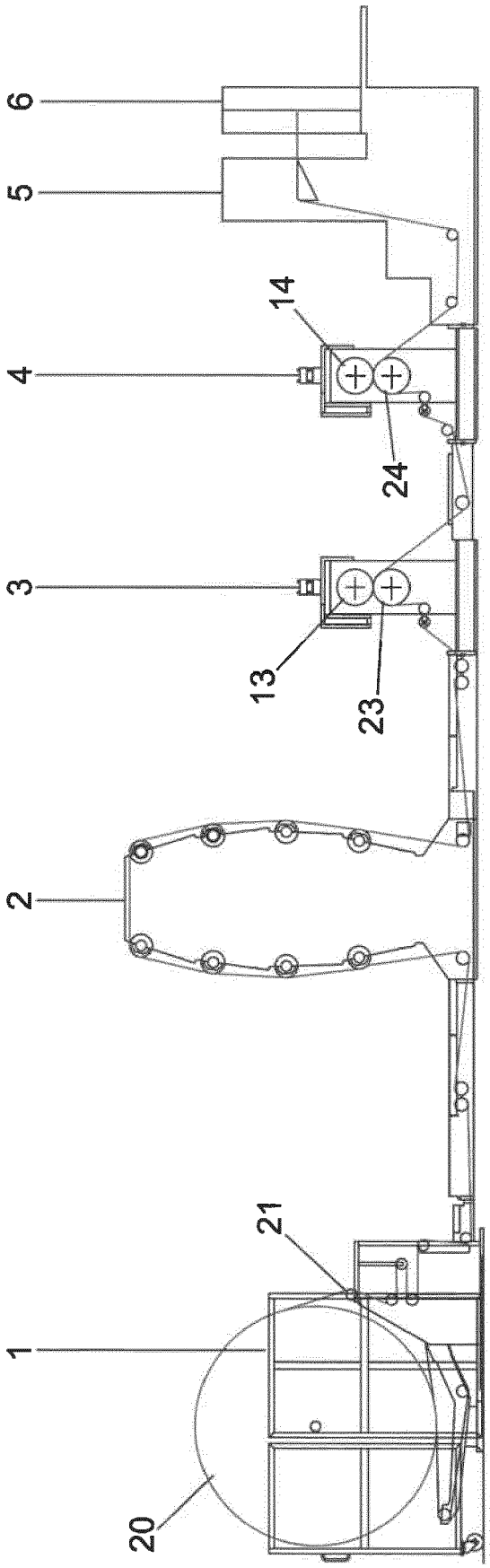

FIG.1

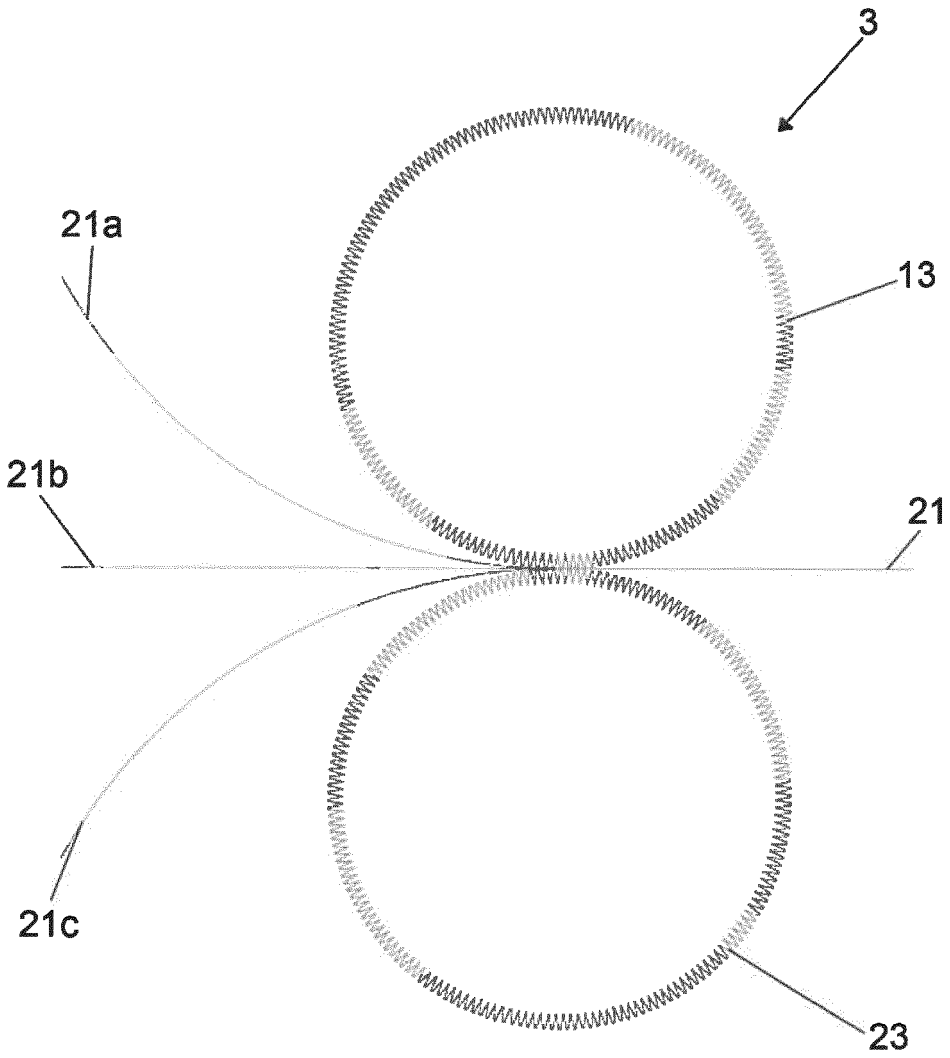

FIG.2

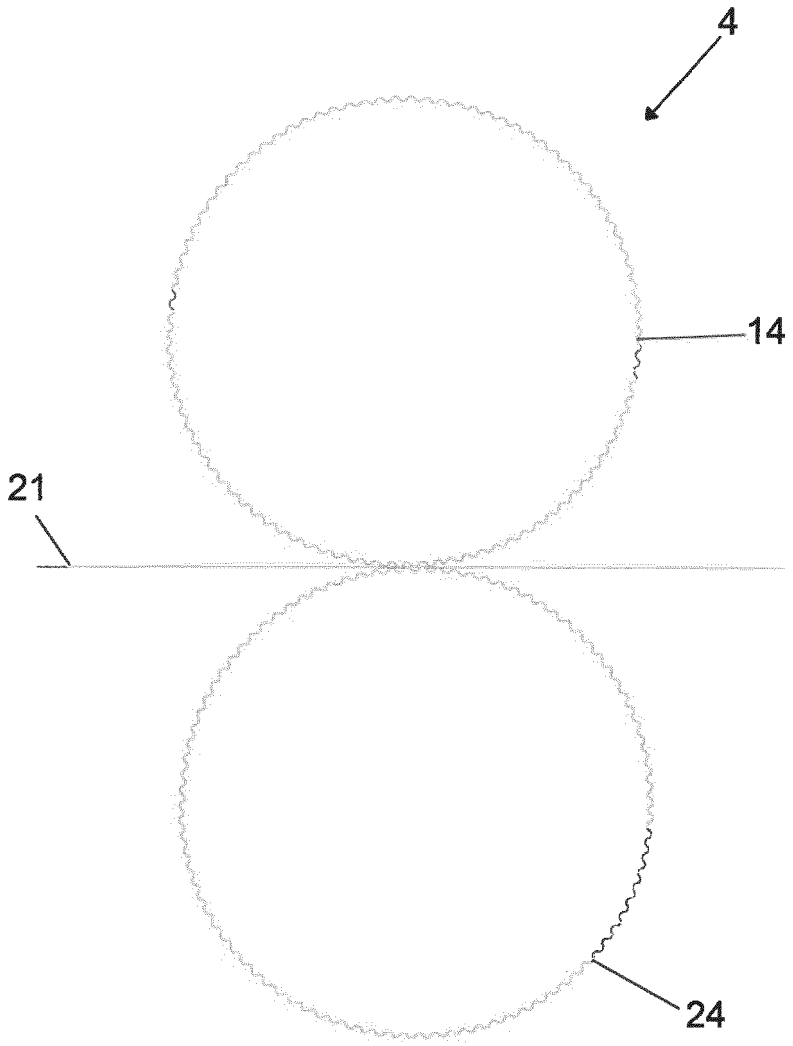

FIG.3

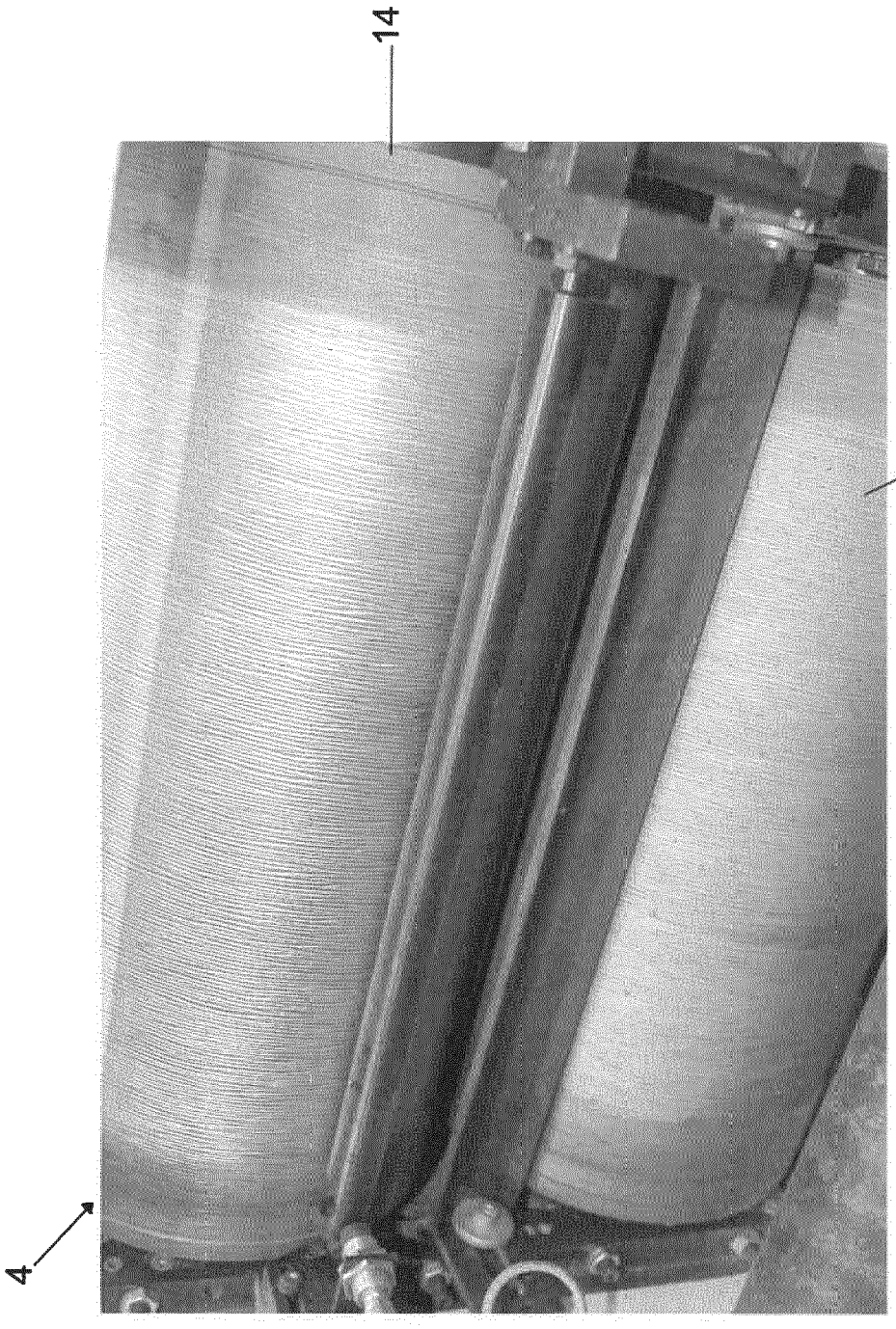

FIG.4

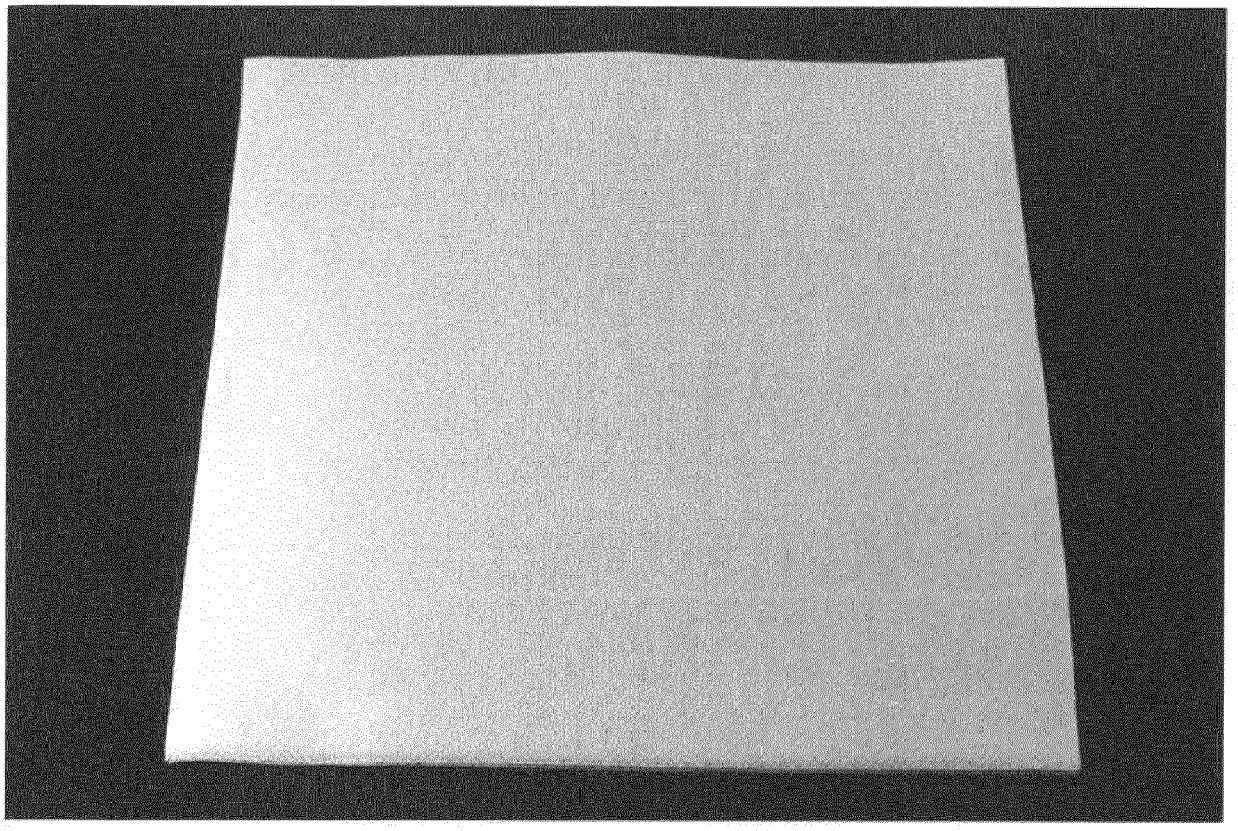

FIG.5

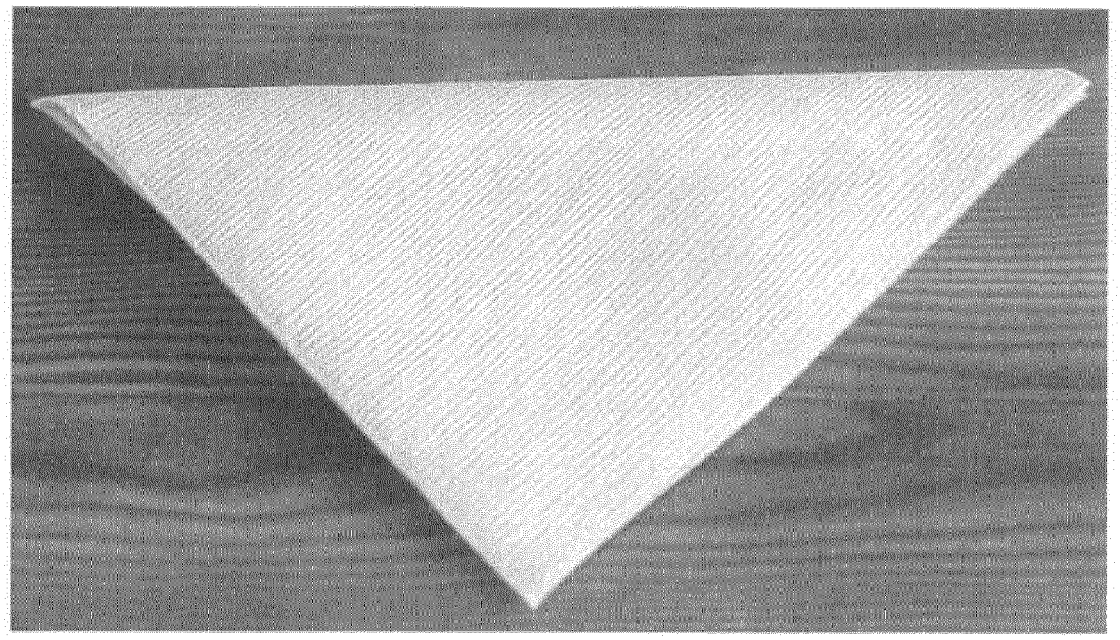

FIG.6

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 21 21 2003

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 Y	IT BO20 110 502 A1 (INFIBRA S R L) 27 February 2013 (2013-02-27) * the whole document *	1,2,5,6, 8 3,4,7	INV. B31F1/07
A	EP 1 525 977 A1 (SCA HYGIENE PROD GMBH [DE]) 27 April 2005 (2005-04-27) * figures 1-6 *	1-8	
A	US 5 913 765 A (BURGESS WILLIAM H [US] ET AL) 22 June 1999 (1999-06-22) * figures 1-7 *	1-8	
Y A	US 6 277 226 B1 (SCHULZ GALYN [US]) 21 August 2001 (2001-08-21) * column 4, lines 57-62; figures 1, 2 *	3,4,7 1,2,5,6, 8	
A	US 9 388 531 B2 (G E D S A S DI GIANNI PAOLO & C [IT]) 12 July 2016 (2016-07-12) * figures 1, 2, 10-13 *	1-8	
			TECHNICAL FIELDS SEARCHED (IPC)
			B31F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 May 2022	Cardoso, Victor

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 21 2003

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-05-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
IT BO20110502 A1	27-02-2013	----------	
EP 1525977 A1	27-04-2005	NONE	
US 5913765 A	22-06-1999	NONE	
US 6277226 B1	21-08-2001	CA 2200254 A1	20-09-1997
		EP 0796727 A2	24-09-1997
		ES 2181941 T3	01-03-2003
		US 6277226 B1	21-08-2001
US 9388531 B2	12-07-2016	EP 2943333 A1	18-11-2015
		US 2015354138 A1	10-12-2015
		WO 2014108853 A1	17-07-2014

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82