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(54) **Edge embosser set for tissue paper roll convertion**

(57) **EDGE EMBOSSER SET FOR CONVERTING PAPER TISSUE,** having three processing stations, two for engraving (1) and (2) and one for joining (3), between which there are continuous strips of ordinary paper, wherein (P1) is a lower or inner strip and (P2) is an upper or outer strip, so that they can both be embossed with any pattern in the two first stations (1) and (2), and then both are joined by their edges through station (3) forming a finished continuous strip of paper (P3); each engraving station (1 and 2) comprises a pair of rolls, one made of rubber (4A-4B) and the other of engraved steel (5A-5B), where the latter are pulled by the corresponding continuous inner and outer strip of paper (P1 or P2) passing between each pair and guided by casters (6, 7, 8 and 9); said joining station (3) is placed after the two engraving stations (1-2), and it also comprises two rollers, a wheel roller (10) and a pulled counter-wheel roller (11), between which the continuous strips of paper (P1 and P2) are aligned, so that they can be joined by their edges and, thus, said wheel roller (10) presents, along its length, various rings (12) mounted on O-rings (13), each ring constituting the protruding means for supplementary pressure and the realization of the fastening bands by mechanical lamination (F).

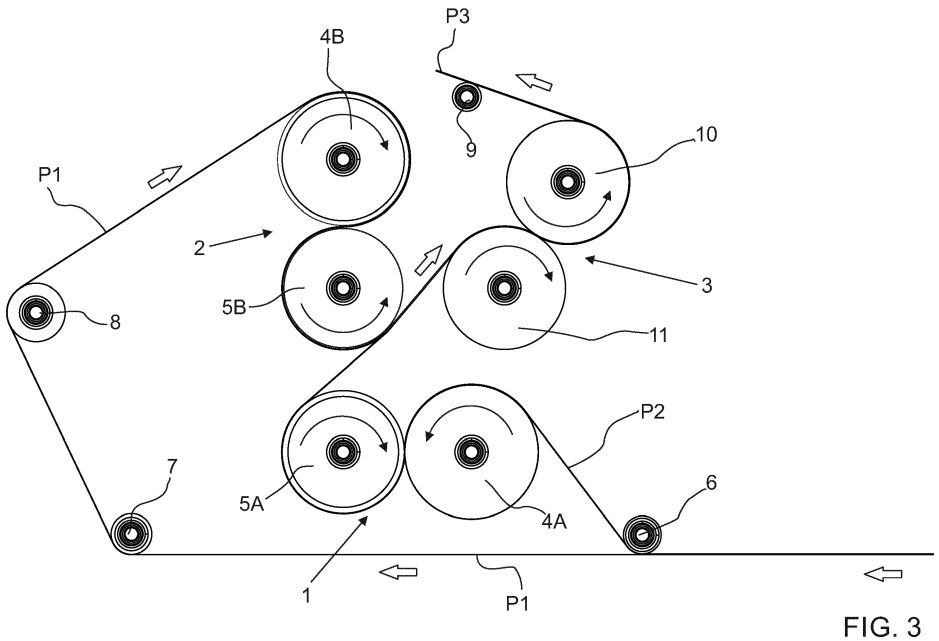


FIG. 3

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## Description

### TECHNICAL SECTOR

**[0001]** The present invention more particularly refers to a technical and functional improvement in the mechanical arrangement of a set of embossing rollers called Edge Embossing, also known as Ply Bonding. This set has at its main objective bond at least two plies of tissue paper by using mechanical pressure between them. Therefore the use of glue is not required being replaced by the Edge Embossing System, so the product turns to be a glue free tissue paper roll. On top of having a mechanical bond purpose, the Edge Embossing also can be used to enrich the product look and appearance with decorative patterns. These set can be used for converting and bonding the at least two ply tissue paper rolls such as bath tissue, kitchen towel, face tissue and others with similar characteristics.

### STATE OF THE ART

**[0002]** As it is acknowledged, currently embossing is a widely used technique to modify texture, hand-feel, volume and appearance of tissue paper, such as bath tissue, kitchen towel, facial tissues, napkins and others. They can all be converted to one, two or more plies product rolls. Each ply undergoes an independent embossing process which is a similar process to that of printing, that by the mechanical means used exert pressure on the smooth surface of the material causing a plurality of raised deformations. These combined raised deformations form an embossing pattern, since from a simpler definition such as geometric details to the most elaborate artworks. Thus, paper embossing technology turned out to be an efficient resource to modify the characteristics of a tissue paper, mainly when it is made up of two or more plies, but also to serve as a mean to bond the plies together.

**[0003]** In other words, by modifying the paper texture, the volume is also substantially increased. The tissue paper no longer will have that "compact" effect, being replaced by a "lighter and fluffier" appearance. With regards to the appearance, embossing undoubtedly defines decorated surfaces on both sides of the paper. Of course the "die" used for embossing allows for a variety of relief combinations which contribute to obtain all sorts of drawings, which significantly improves the appearance of the paper, inclusively suggesting its good quality and origin, thus providing more resources to establish the trademark of the product with the final consumer.

**[0004]** Currently many differently tissue paper embossing devices are known, all of which combine a series of rollers, engraved or not, some metallic and others made of rubber, and some are also known as Edge Embossing and counter Edge Embossing, which are really engraved, although, regardless of these features, each machine has its specific characteristics with regard to the finished product, as taught in these documents:

BRPI0512124A of 04/19/2005
SUPPORT EQUIPMENT FOR RELIEF ENGRAVING ROLLERS, AND METHOD FOR EXCHANGING ONE OR MORE RELIEF ENGRAVING ROLLERS.

BRPI1101330A2
PI0813705-6 A2 of 04/14/2008
DEVICE FOR TREATING PAPER WEB OR SHEET THICKNESS

US2010181040A1 publication of 07/22/2010
DEVICE FOR TREATING PAPER ROLLS

WO2009010999A1 of 04/14/2008
DEVICE FOR TREATING PAPER ROLLS

WO2010016081A1 of 07/16/2009
ROLLER FOR TREATING TEXTURE OF PAPER MATERIAL

**[0005]** In general, existing devices provide the necessary means to bond at least two continuous plies of tissue paper. The bonding of the two or more plies of paper is made by a mechanical process. The engraved steel rings have continuous not straight patterns that in physical contact with the counter steel cylinder bond the paper sheets. These sheets undergoes a higher supplementary "compression" (mechanical lamination) between the engraved rings (cylinder) and a counter cylinder. These protruding rings are mounted on a o-ring that allows the lateral edges of the two paper plies to be adequately pressed against each other so its fibers are practically break producing a "claw" effect joining and bonding the paper plies together.

**[0006]** Such a mechanical bonding system is normally applied on the top side or visible side of the paper, such as exemplified in figures 1 and 2, where (F) indicates the joining bands between the two continuous layers of paper (P1 E P2). Hence, those engraved rings (wheels) affect the upper side or visible side of the paper, resulting in an interference in the texture which negatively affects the presentation of the set.

**[0007]** Therefore, the biggest drawback of this conventional equipment is undoubtedly the absence of a mechanical arrangement to improve positioning of the joining bands (F) between the two continuous paper layers, which directly affect the embossing in the outer ply of the finished product. The new set presented in this document apply mechanical pressure on the bottom sheet or inner ply of the tissue roll leaving the visible embossed part intact and uniform, without any volume variation so that the embossing pattern is not modified and thus the appearance of the set is substantially better.

OBJECTIVES OF THE INVENTION.

**[0008]** An improved construction especially focused and aimed to improve the mechanical bond of tissue paper plies, and providing the finished converted tissue paper roll an almost no visible embossing with no volume variation. These improved set have a totally different new mechanical arrangements by having a engraved rings cylinder and a counter steel cylinder in which they can produce the bonding bands (F) between the two layers of paper on the inner side, thus eliminating the aforementioned drawback on the embossing pattern. The embossing pattern in this case is not modified along all the width of the converted paper, thus preserving its visual appearance, a very important characteristic of the finished tissue paper product.

DESCRIPTION OF THE DRAWINGS

**[0009]** For a better understanding of the present set a detailed description thereof is presented below making a reference to the attached drawings:

**FIGURES 1** and **2** represent perspective views of a conventional embossed toilet paper roll with lateral fastening bands between the two layers, where these bands are visible from the upper side of the roll;

**FIGURE 3** illustrates a schematic side view of an embossing machine whose rollers are arranged to produce the join of the continuous layers of paper by the lower or inner side and keep the visible side if the paper unchanged;

**FIGURE 4** is a top corner isometric view of the machine illustrated in the previous figure;

**FIGURE 5** shows an enlarged view of detail "A" indicated in the previous figure, pointing out the pair of rollers responsible for the embossing of one of the continuous layers of paper;

**FIGURE 6** represents a lower corner isometric view of the machine illustrated in figure 3;

**FIGURES 7** and **8** are enlarged views of details "B" and "C" pointing out other rollers responsible for embossing and joining the continuous layers of paper;

**FIGURE 9** illustrates a schematic view of the pair of rollers and respective wheels responsible for joining the continuous layers of paper; and

**FIGURES 10** and **11** represent perspective views of an embossed toilet paper roll with lateral fastening bands between the two layers, wherein these bands are visible only from the lower side of the roll, and thus, the upper side (visible side) presents an unchanged embossing pattern.

**[0010]** According to these illustrations and their details, more particularly figures 3-8, in a preferred embodiment, this **EMBOSSER SET FOR PAPER PROCESSING** comprises three processing stations, two for engraving (1) and (2) and one for joining (3), between which there are continuous strips of ordinary paper, where (P1) is a lower or inner strip and (P2) is an upper or outer strip, so that they can both be embossed with any pattern in the two first stations (1) and (2), and then both are joined by their edges through station (3) forming a finished continuous strip of paper (P3).

**[0011]** Each engraving station (1 and 2) comprises a pair of rollers, one made of rubber (4A-4B) and the other of engraved steel (5A-5B), the latter being pulled by the corresponding continuous inner and outer strip of paper (P1 or P2) passing between each pair and guided by casters (6, 7, 8 and 9).

**[0012]** The joining station (3) is placed after the two engraving stations (1-2), and it also comprises two rollers, a wheel roller (10) and a pulled counter-wheel roller (11), between which the continuous strips of paper (P1 and P2) are aligned, so that they can be joined by their edges and, thus, said wheel roller (10) presents, along its length, various rings (12) mounted on O-rings (13), wherein each ring constitutes the protruding means for supplementary pressure and the realization of the fastening bands by mechanical lamination (F).

**[0013]** The quantity of rings (12) may vary according to the width of the strips of paper (P1 and P2), maintaining the same concept of assemblage, and each ring is a fastening point for two adjacent joining bands (F) which separate after the cut (C) applied in the processed layer and therefore many dimensional variations are possible, although maintaining the same operating concept.

**[0014]** Although this has not been illustrated, it is clear that the same concept of joining by mechanical lamination (F) on the edges can be adopted to make one or more joining bands at any point of the width of the paper.

**[0015]** The present set is characterized in that the stations (1, 2 and 3) are arranged in a cooperative sequence so that the lateral joining bands (F) are applied against the lower strip of paper (P1), hence on the lower or inner side of the continuous finished paper (P3) which, in turn, such as figures 10 and 11 illustrate, is rolled or folded to emboss (lower side) the lateral joining bands (F).

**[0016]** The relevant subject matter, **EMBOSSER SET FOR PAPER PROCESSING,** solves the aforementioned drawbacks, since figures 10 and 11 show that the solutions are advantageously achieved, since the embossing pattern (G1) of the upper strip of paper (P2) remains unchanged, which is the visible part thereof after folding or rolling.

## Claims

1. **EDGE EMBOSSER SET FOR CONVERSTING PAPER TISSUE,** having three processing stations, two for engraving (1) and (2) and one for joining (3), between which there are continuous strips of ordinary paper, wherein (P1) is a lower or inner strip and (P2) is an upper or outer strip, so that they can both be embossed with any pattern in the two first stations (1) and (2), and then both are joined by their edges through station (3) forming a finished continuous strip of paper (P3); each engraving station (1 and 2) comprises a pair of rollers, one made of rubber (4A-4B) and the other of engraved steel (5A-5B), the latter being pulled by the corresponding continuous inner and outer strip of paper (P1 or P2) passing between each pair and guided by casters (6, 7, 8 and 9); said joining station (3) is placed after the two engraving stations (1-2), and it also comprises two rollers, a wheel roller (10) and a pulled counter-wheel roller (11), between which the continuous strips of paper (P1 and P2) are aligned, so that they can be joined by their edges and, thus, said wheel roller (10) presents, along its length, various rings (12) mounted on O-rings (13), each ring constituting the protruding means for supplementary pressure and the realization of the fastening bands by mechanical lamination (F); it is **characterized in that** the stations (1, 2 and 3) are arranged in a cooperative sequence so that the lateral joining bands (F) can be applied against the lower strip of paper (P1), thus on the lower or inner side of the finished continuous paper (P3) which, in turn, is rolled or folded to emboss (lower side) the lateral joining bands (F).

2. **EMBOSSER SET FOR PAPER PROCESSING,** in conformity with claim 1, **characterized in that** one or more joining bands (F) can be optionally produced by mechanic lamination at any points of the width of the finished continuous paper width (P3).

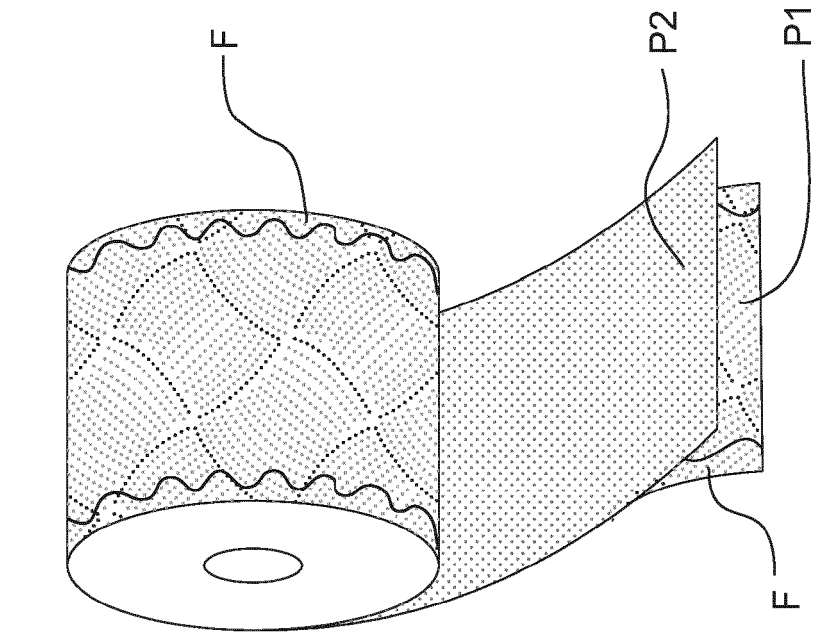



FIG. 2

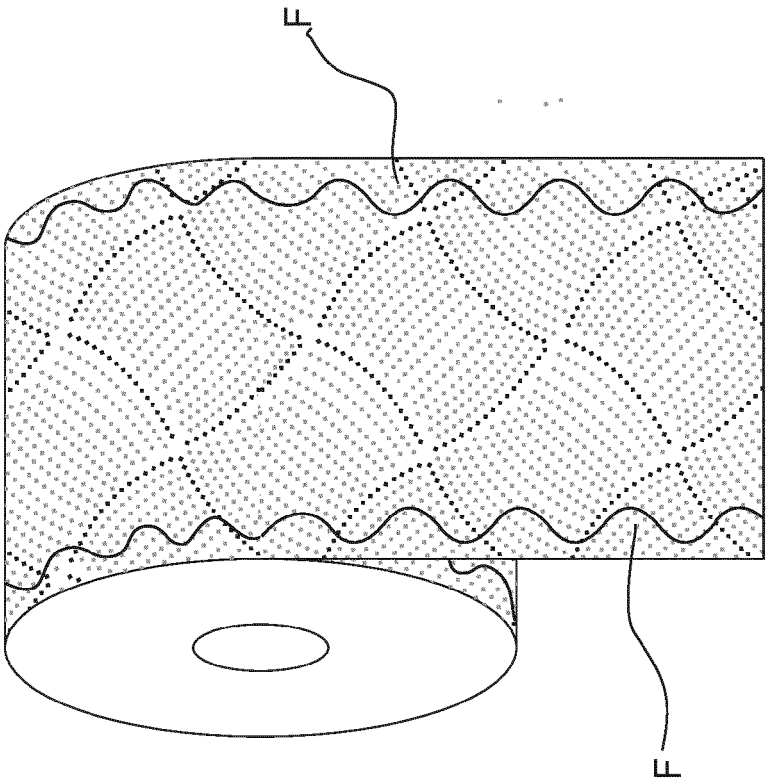



FIG. 1

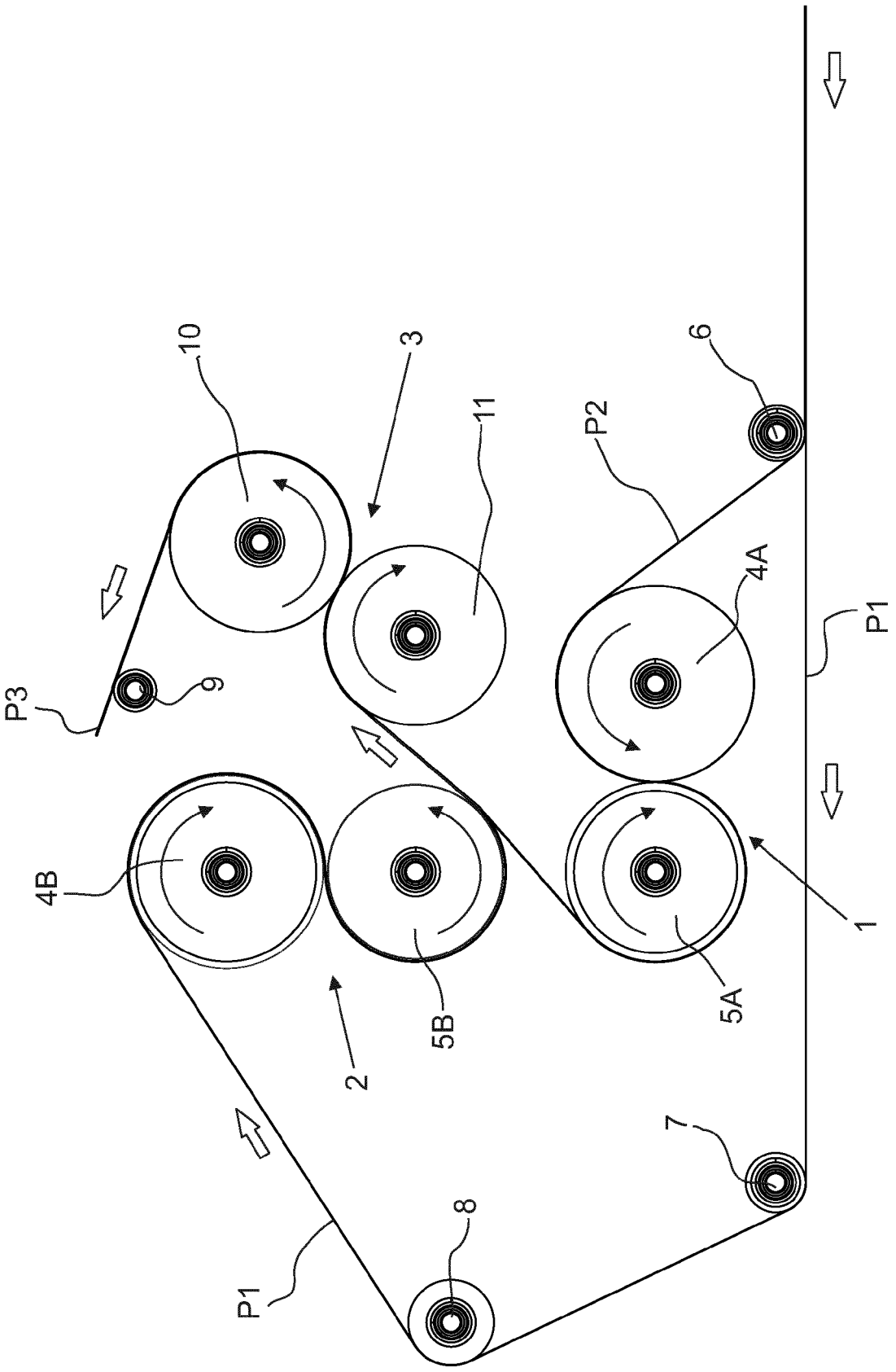
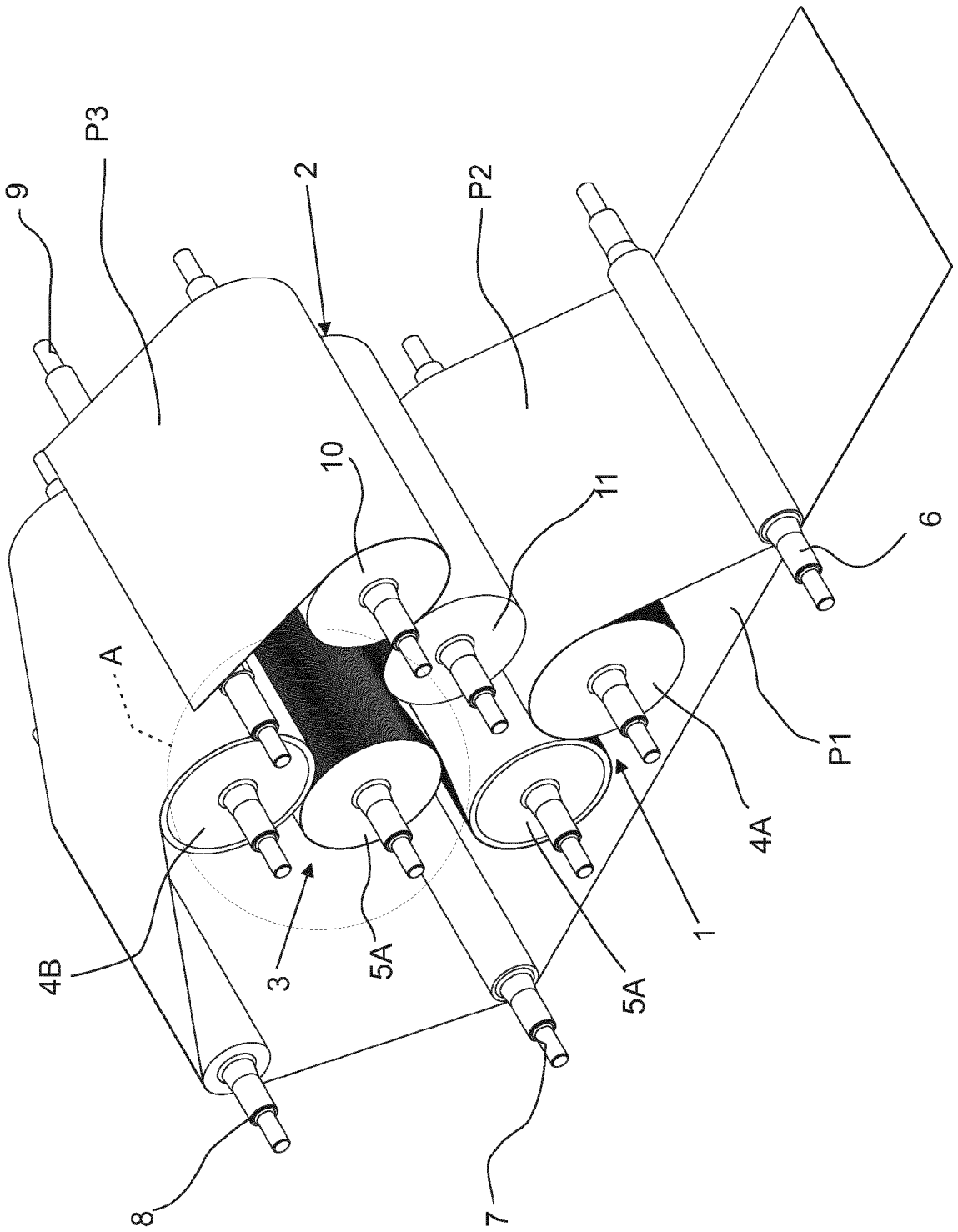



FIG. 3

FIG. 4



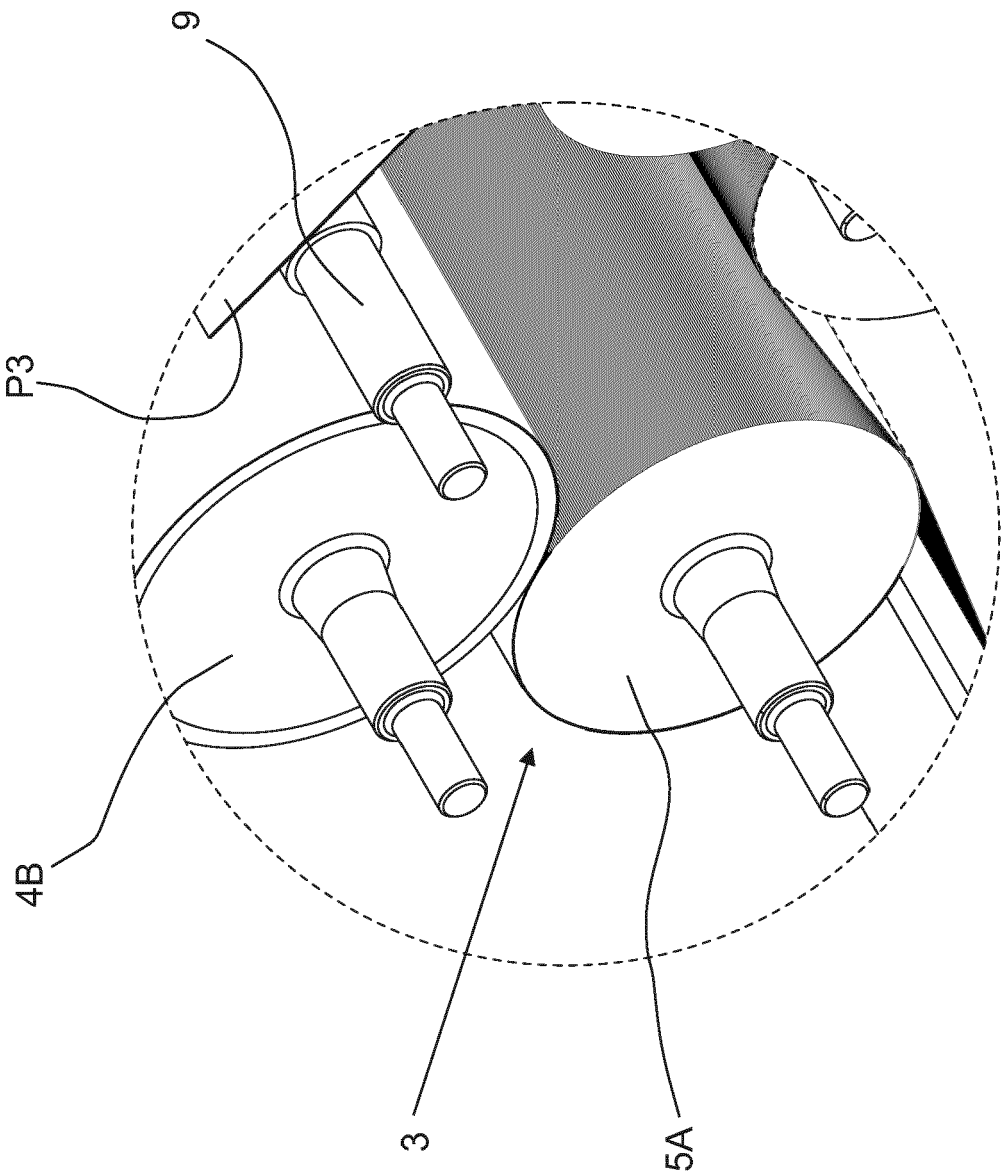



FIG. 5
det. A

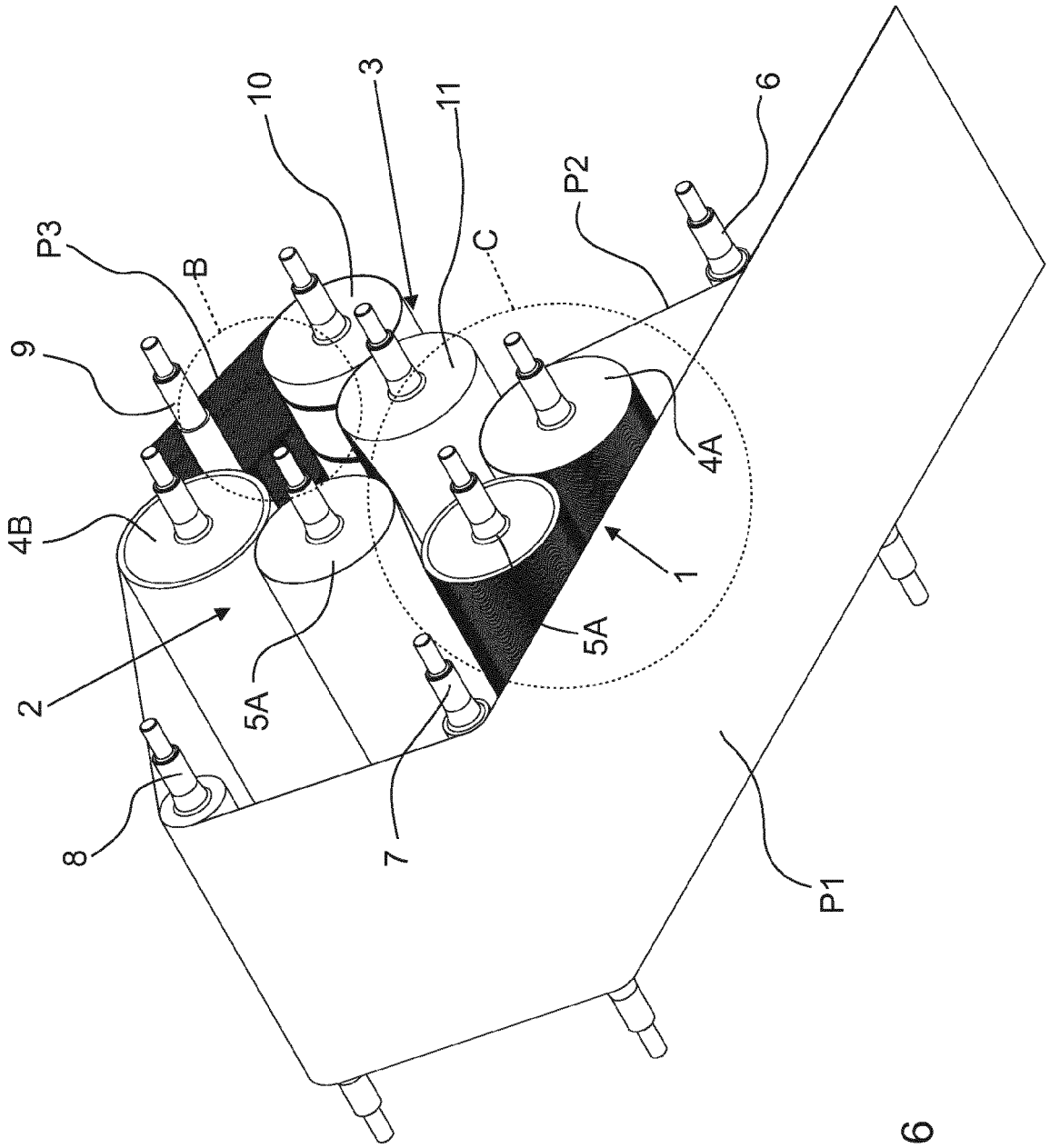



FIG. 6

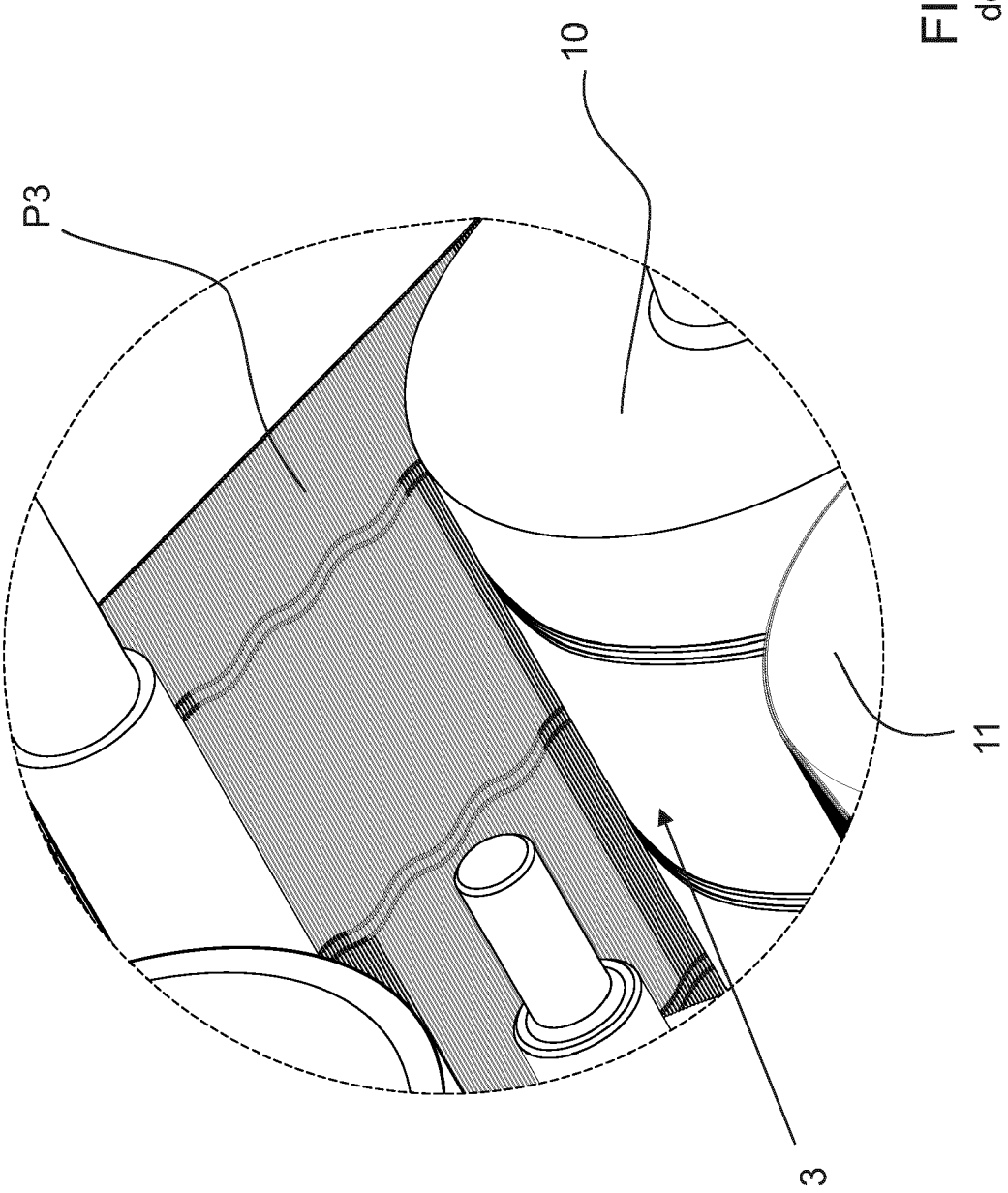



FIG. 7
det. B

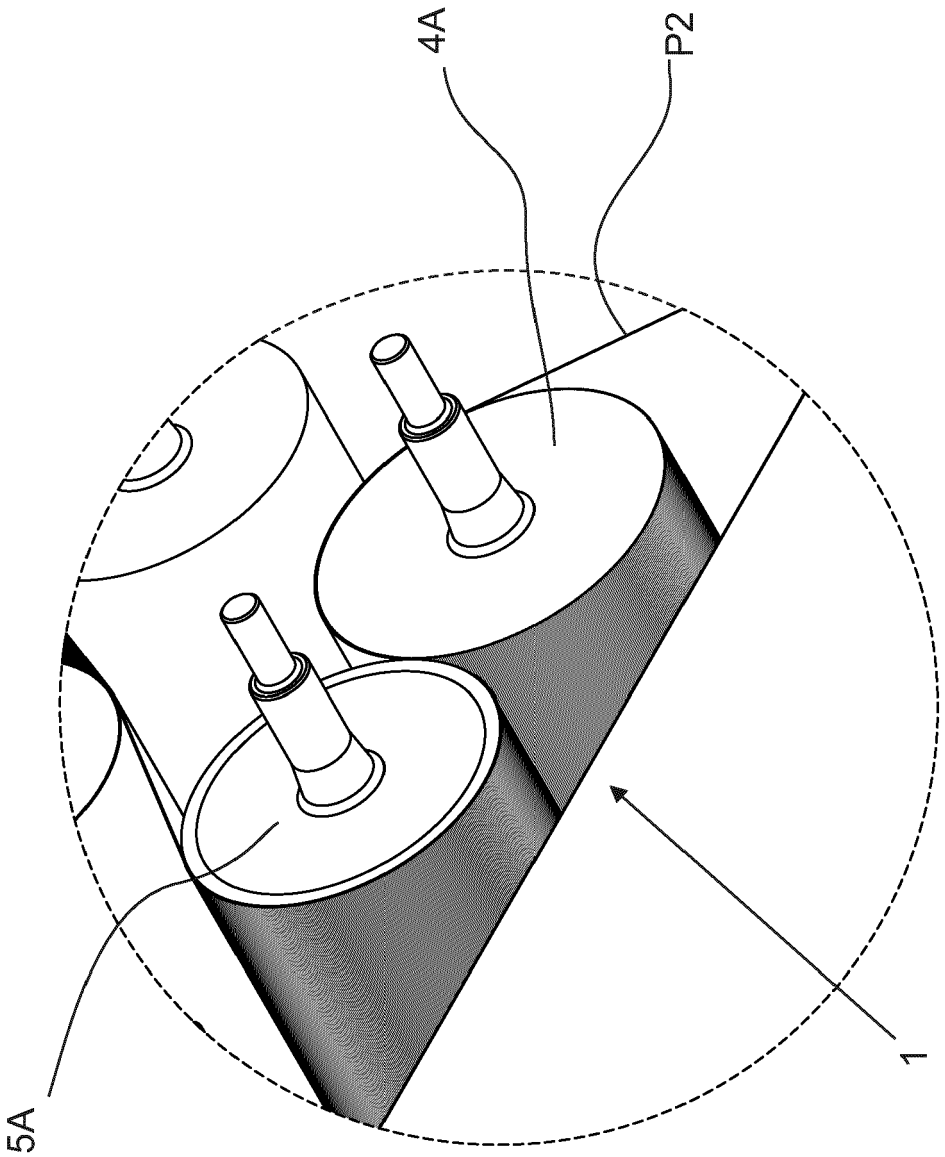



FIG. 8
det. C

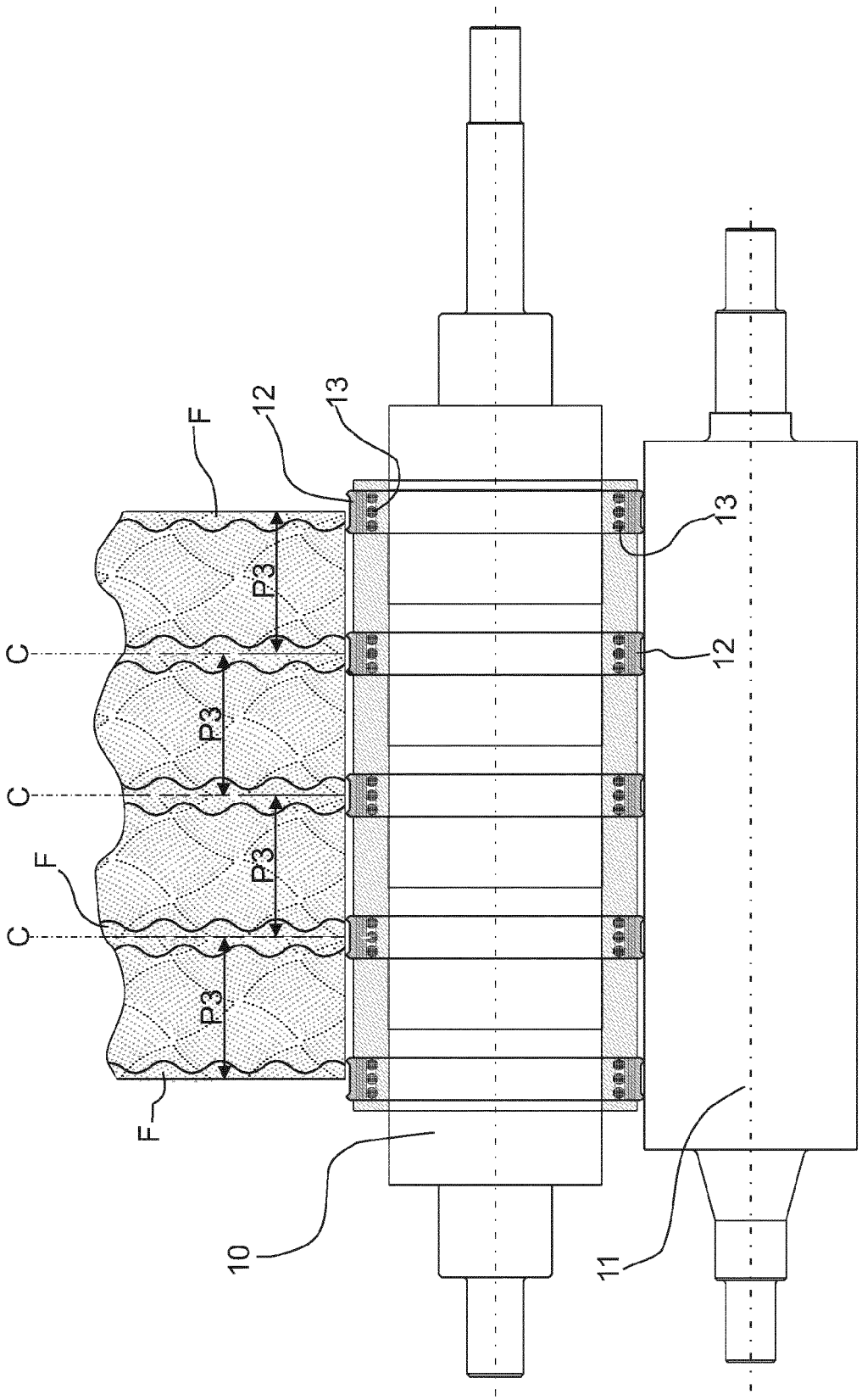



FIG. 9

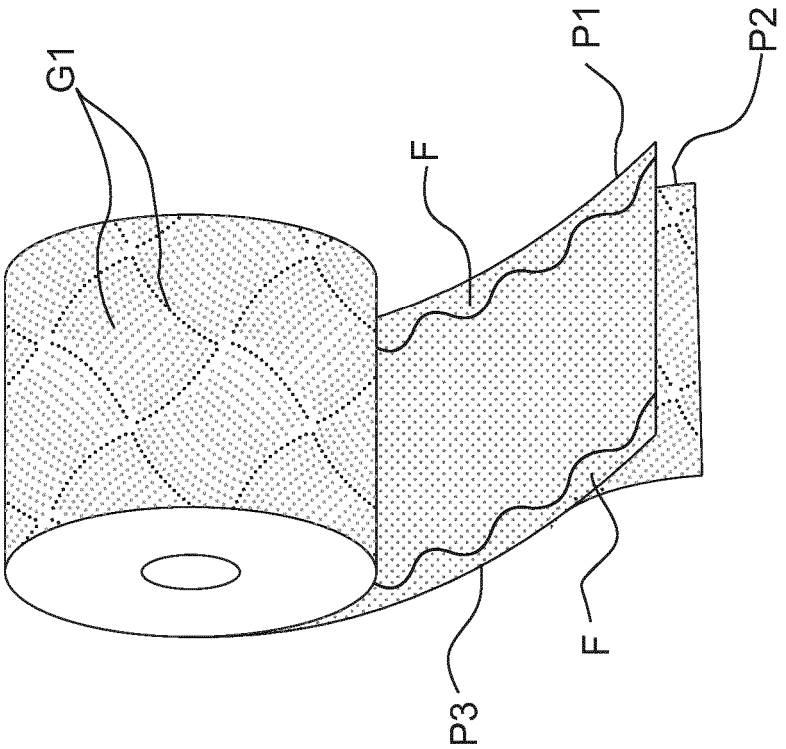



FIG. 11

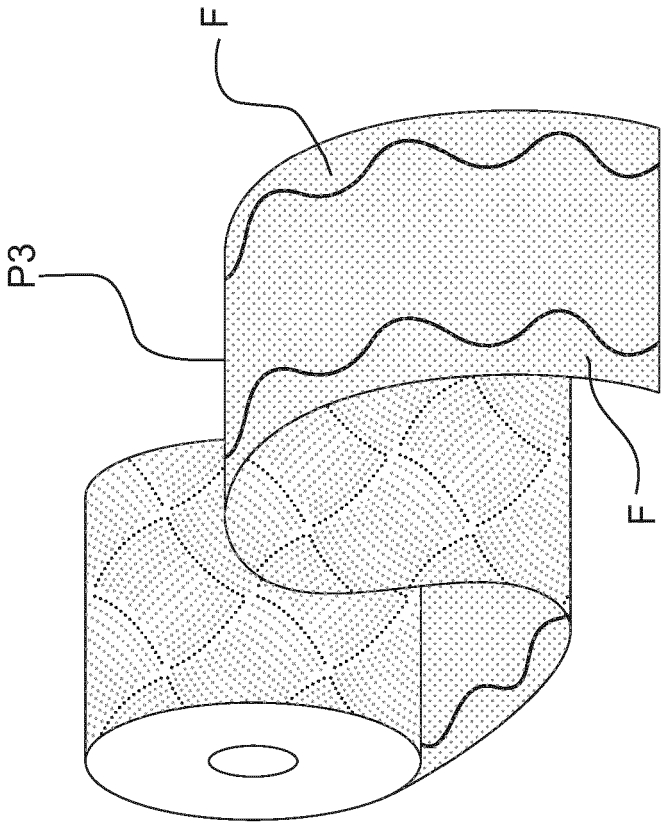



FIG. 10

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# EUROPEAN SEARCH REPORT

Application Number
EP 14 20 0321

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| Y | US 3 867 872 A (NYSTRAND ERNST DANIEL)<br>25 February 1975 (1975-02-25)<br>* the whole document * | 1,2 | INV.<br>B31F1/07<br>B31F5/02 |
| Y | EP 1 044 807 A2 (CARTOINVEST SOCIETA FINANZIARI [IT])<br>18 October 2000 (2000-10-18)<br>* paragraph [0027] - paragraph [0028]; figures 1,2 * | 1,2 | |
| Y | US 3 377 224 A (GRESHAM JAMES T ET AL)<br>9 April 1968 (1968-04-09)<br>* column 2, line 9 - line 17; figure 1 * | 2 | |
| | | | 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 | 29 June 2015 | Schelle, Joseph |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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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 14 20 0321

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
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29-06-2015

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| | | IT MI990797 A1 | 16-10-2000 |
| US 3377224 A | 09-04-1968 | NONE | |

EPO FORM P0459

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

## REFERENCES CITED IN THE DESCRIPTION

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- BR PI1101330 A2 **[0004]**
- BR PI08137056 A2 **[0004]**
- US 2010181040 A1 **[0004]**
- WO 2009010999 A1 **[0004]**
- WO 2010016081 A1 **[0004]**