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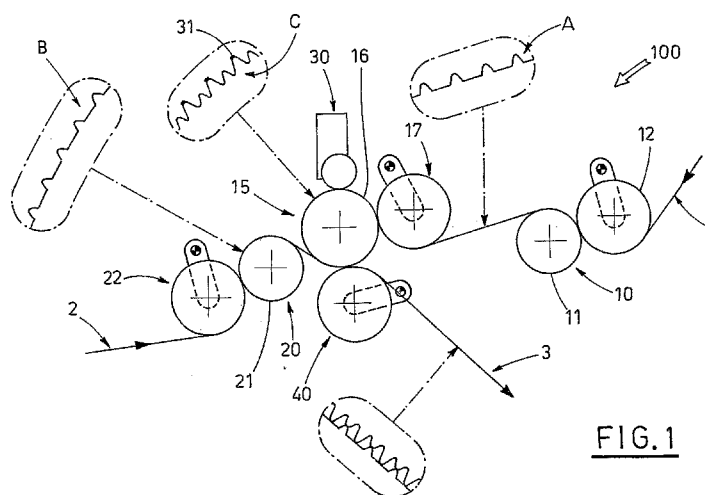


FIG. 1

(57) Abstract: The method for realising multi-ply embossed paper comprises following stages: passing a first sheet (1) through a first embossing roller (10), perimetally provided with a first embossing die (11), in order to perform a first embossing operation (A) in cooperation with a counter-rotating first presser roller (12); passing a second sheet (2) through a second embossing roller (20) perimetally provided with a second embossing die (21) in cooperation with a counter-rotating second presser roller (22), in order to perform a second embossing operation (B); further passing the first sheet (1) through a third embossing roller (15), providing with a third embossing die (16), in order to perform on the first sheet (1) a further embossing operation (C) in cooperation with a counter-rotating third presser roller (17); coupling embossed relief surfaces of the first sheet (1) and the second sheet (2) and joining the first sheet (1) and the second sheet (2) using coupling means (40) arranged downstream of the third presser roller (17), in order to obtain a corresponding multi-ply embossed paper (3).



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A METHOD FOR REALISING EMBOSSED PAPER AND A DEVICE FOR CARRYING OUT THE METHOD

TECHNICAL FIELD

5 The invention concerns the technical sector relating to production of articles made of embossed paper, such as for example table-cloths, napkins, serviettes, kitchen towels, toilet paper.

In particular, the invention relates to a method and a device for realising multi-ply embossed paper.

10

BACKGROUND ART

Single-use articles of the above-described type are normally realised in the prior art with two or three layers of paper glued to one another. The paper used for this purpose is usually of the "tissue" type, subjected to a
15 embossing process.

As is known, embossing consists in a permanent deformation impressed by means of special embossing rollers on an originally-smooth sheet of paper, in order to obtain reliefs distributed in a predetermined pattern or design, which ripple the sheet.

20 Subsequently, points of glue are applied on at least one of the sheets, which glue points are distributed in a predetermined pattern, using an applicator roller operating tangentially to the embossing roller with an appropriate regulation thereof, and counter-rotating with respect thereto.

25 The two or more sheets destined to constitute the corresponding layers of the article are then coupled according to a predetermined joining design, in

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which the glue points of the first sheet can contact, for example, the tops of the reliefs of the second sheet, or the valleys of the second sheet.

The glue used for this operation is in a water solution and is a quick-dry type, and can be mixed with colorant substances; in this case, the glue points produce spots of colour which help bring out the decoration on the surface of the article.

Further decorations can be obtained on one or both of the sheets of the more external layers by a printing process, in general performed before the embossing operation and the joining operation of the layers.

One of the most requested qualities of the above-cited products is that they should provide a robust structure as well as a large volume of free internal space between the two sheets, which make the sheet sturdy while at the same time guaranteeing a good liquid-absorbing capacity.

A further requisite for the paper used for the above-described products is a greater softness and a more delicate tactile sensation.

A further requisite is to obtain, with a simple embossing operation, more complex decorative effects, which make the product pleasant and original, and which are obtained without any need to have recourse to printing operations.

20

SUMMARY OF THE INVENTION

The aim of the present invention is to provide a method and a device for realising embossed paper which satisfies the above-described requirements.

25 The above-mentioned aim is entirely attained by a method for realising multi-ply embossed paper and a corresponding device which actuates the

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method, comprising operating stages of: passing a first sheet through a first embossing die of a first embossing roller, performing a first embossing operation in cooperation with a counter-rolling first presser roller; passing a second sheet through the second embossing die of a second embossing roller, thus performing a second embossing operation; a further passing of a the first sheet through a third embossing die of a third embossing roller, performing a further embossing operation on the first sheet; applying, on the embossed relief surface of the first sheet, a first layer of glue by means of an applicator group; a mutual coupling of the embossed relief surfaces of the first and the second sheets, and a joining of the first and second sheets using coupling means arranged downstream of the third presser roller, in order to obtain the multi-ply embossed paper.

BRIEF DESCRIPTION OF THE DRAWINGS

15 The characteristics of the invention will better emerge from the following description of a preferred embodiment thereof, in accordance with what is set out in the claims and with the aid of the single table of drawings, in which figure 1 illustrates a schematic perspective view of a configuration of a embossing device made according to the present invention.

20

DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

With reference to figure 1, and to a preferred though not exclusive embodiment of the invention, 100 denotes, in its entirety, a diagram of a device for realising multi-ply embossed paper 3 in a continuous sheet, and in particular two-ply embossed paper. However, as will become evident during the following description, the invention can also be intuitively applied to the production of multi-ply embossed paper.

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The device 100 is supplied with a first continuous sheet 1 of paper, preferably a tissue paper, from a first direction, and a second continuous sheet 2 of the same paper from a second direction. The sheets 1, 2 are infed in known ways from reel supply groups or from preceding work stations of the tissue paper, along different embossing trajectories which reciprocally converge.

The device 100 includes a first embossing roller 10 along the trajectory of the first sheet 1, which embossing roller 10 is provided on its lateral surface with a first embossing die 11. The first roller 10 intercepts the first sheet 1 at the line of action of a counter-rotating first presser roller 12 which cooperates with the first roller 10 in order to compress the sheet 1 against the first die 11. In this way a first embossing operation is performed on the first sheet 1, in which a series of relief points are impressed on the sheet with a given frequency and a given design, defined by the above-cited first die 11. The result of the embossing is indicated by A in a detail of figure 1.

Similarly, a second embossing roller 20 is provided on the trajectory of the second continuous sheet 2, which second embossing roller 20 is provided on a lateral surface thereof with a second embossing die 21. The second roller 20 intercepts the second sheet 2 at the line of action of a second counter-rotating presser roller 22 which cooperates with the second embossing roller 20 to compress the sheet 2 against the second die 21. In this way a second embossing operation is performed on the second sheet 2, with which a series of relief points are impressed on the sheet with a given frequency and a given design, defined by the above-described second die 21. According to the desired effect to be obtained, the second die 21 can be of a frequency, design and depth which are equal to the first die 11, or can differ from the first die. The result of the embossing is indicated by B in a detail of figure 1.

The device 100 further includes a third embossing roller 15, arranged

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along the trajectory of the first sheet 1 downstream of the first embossing roller 10. The third roller 15 is provided, at the lateral surface thereof, with a third embossing die 16, and intercepts the first sheet 1 on exiting from the first roller 10 in order to perform thereon, in cooperation with a third
5 counter-rotating presser roller 17, a further embossing operation, indicated by C in a detail of figure 1.

The third embossing die 16 is arranged and realised such that the embossing performed thereby does not superpose on the embossing produced by the first die 11. The structure and frequency of the points of
10 the third die 16 are also in this case different to those of the first die 11, such as to create special effects on the first sheet 1, both in terms of volume and decoration, which substantially depend on the various combinations obtainable by varying the die frequencies.

Downstream of the third presser roller 17 the device 100 includes
15 applicator means 30 of a first layer of glue on the embossed surface in relief of the first sheet 1. The applicator means 30 are of a known type which is commonly used in the sector, and will not be further described in detail. The applicator means 30 operate on the first sheet 1 while the first sheet 1 is still in contact with the third die 16, but could also
20 advantageously operate in another position. They could, for example, be arranged at the second embossing die 21 and act on the relief-embossed surface of the second sheet 2.

The glue is preferably applied on the points of the die realised on the sheet 1 by embossing, and can be augmented by a colorant substance such as
25 to emphasis the decoration which results from the embossing operations.

The trajectories of the first sheet 1 and the second sheet 2 converge at the embossing roller 15, the second sheet 15 being superposed on the first sheet 1 on the lateral surface of the above-mentioned third roller 15. A fourth coupling presser roller 40 is located immediately downstream of the

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superposing position, which fourth presser roller is destined to compress the two sheets in order to stabilise them permanently in a coupling, with the aid of the layer of glue applied previously, in order to produce a continuous sheet of embossed multi-ply paper 2 according to the invention.

- 5 The method of the device 100, in the above-described embodiment thereof, thus substantially comprises the following operating stages:

passing the first sheet 1 through the first embossing die 11 of the first embossing roller 10, performing a first embossing operation A in cooperation with the first counter-rotating presser roller 12;

- 10 passing the second sheet 2 through the second embossing die 21 of the second embossing roller 20, performing a second embossing operation B;

further passing the first sheet 1 through the third embossing die 16 of the third embossing roller 15, performing a further embossing operation C on the first sheet 1;

- 15 applying a layer of glue 31 on the embossed relief surface of the first sheet 1, by means of an applicator group 30;

mutually coupling the embossed relief surfaces of the first sheet 1 and the second sheet 2, and joining them together using coupling means 40 arranged downstream of the third presser roller 17 in order to obtain the

- 20 multi-ply embossed paper 3.

The pressure exerted by the three rollers can be advantageously varied, such as to obtain different depths of embossing, and, consequently, different volumes of the resulting paper, apart from emphasising, to a greater or lesser degree, the decorative effects obtained. For example, by

25 suitable combinations of frequencies of the die and depths of embossing, it is possible to obtain, on the resulting embossed paper, even complex patterns, which give the paper a particularly pleasing and original look.

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By way of example, a combination of die frequencies which provide an original pattern effect is one having a frequency of 30 points per square centimetre for the first die 11, 40 points per square centimetre for the second die 21 and 9 points per centimetre for the third die 16.

- 5 The above-described method and the corresponding device enable a embossed paper 3 to be obtained which can fully satisfy the set aims of the invention, and provide producers of the paper with the opportunity to use a wide variety of combinations of embossing dies, such as to obtain new and constantly-varying decorative effects.
- 10 The above is intended as a non-limiting example, and any changes to details brought to stages of the method and/or the apparatus are to be considered as falling within the protective ambit as defined in the following claims.

CLAIMS

- 1). A method for realising multi-ply embossed paper, the paper (3) comprising at least a first sheet (1) supplied from a first direction, and a second sheet (2) supplied from a second direction, **characterised in that** it comprises following stages: passing the first sheet (1) through a first embossing roller (10), perimetally provided with a first embossing die (11), in order to perform a first embossing operation (A) in cooperation with a counter-rotating first presser roller (12); passing the second sheet (2) through a second embossing roller (20) perimetally provided with a second embossing die (21) in cooperation with a counter-rotating second presser roller (22), in order to perform a second embossing operation (B); further passing the first sheet (1) through a third embossing roller (15), provided with a third embossing die (16), in order to perform on the first sheet (1) a further embossing operation (C) in cooperation with a counter-rotating third presser roller (17); coupling relief-embossed surfaces of the first sheet (1) and the second sheet (2) and joining the first sheet (1) and the second sheet (2) using coupling means (40) arranged downstream of the third presser roller (17), in order to obtain a multi-ply embossed paper (3).
- 2). The method of claim 1, **characterised in that** following the performing of the further embossing operation (C), and before performing the coupling, a layer of glue (31) is applied on the embossed relief surface of the first sheet (1) and/or the second sheet (2), by means of an applicator group (30).
- 3). The method of claim 2, **characterised in that** the layer of glue is applied on ends in relief of points of the die.
- 4). The method of claim 2 or 3, **characterised in that** the glue contains at least a colorant substance, destined to highlight a decorative motif obtained with the embossing operations.

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- 5) The method of one of claims from 1 to 4, **characterised in that** the coupling of the first sheet (1) and the second sheet (2) is done at the third embossing roller (15), with aid of a fourth counter-rotating presser roller (40).
- 5 6). A device for realising multi-ply embossed paper, the paper (3) comprising at least a first sheet (1) fed to the device (100) from a first direction, and a second sheet (2) fed from a second direction, **characterised in that** it comprises: a first embossing roller (10), provided at a lateral surface thereof with a first embossing die (11), destined to
10 intercept the first sheet (1) in order to perform thereon, in cooperation with a first counter-rotating presser roller (12), a first embossing operation (A); a second embossing roller (20), provided at a lateral surface thereof with a second embossing die (21), destined to intercept the second sheet (2) in order to perform thereon, in cooperation with a second counter-rotating
15 presser roller (22), a second embossing operation (B); a third embossing roller (15), arranged downstream of the first embossing roller (10) provided at a lateral surface thereof with a third embossing die (16), destined to intercept the first sheet (1) exiting from the first embossing roller (10) in order to perform thereon, in cooperation with a third counter-rotating
20 presser roller (17), a further embossing operation (C); means (40) for coupling the first sheet (1) and the second sheet (2) in order to obtain the multi-ply embossed paper, being arranged downstream of the third presser roller (17).
- 7). The device of claim 6, **characterised in that** the third embossing die (16) exhibits point frequencies which are different from those of the first embossing die (11) and the second embossing die (21).
25
- 8). The device of claim 6, **characterised in that** the first embossing die (11), the second embossing die (21) and the third embossing die (16) exhibit point frequencies which are different to one another.

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9). The device of one of claims from 6 to 8, **characterised in that** the means (40) for coupling the first sheet (1) and the second sheet (2) comprise a fourth counter-rotating presser roller acting on the third embossing roller (15).

5 10). The device of one of claims from 6 to 9, **characterised in that** it comprises applicator means (30) of a layer of glue on the embossed relief surface of the first sheet (1) and the second sheet (2).

11). The device of claim 10, **characterised in that** the applicator means (30) are arranged immediately downstream of the third presser roller (17).

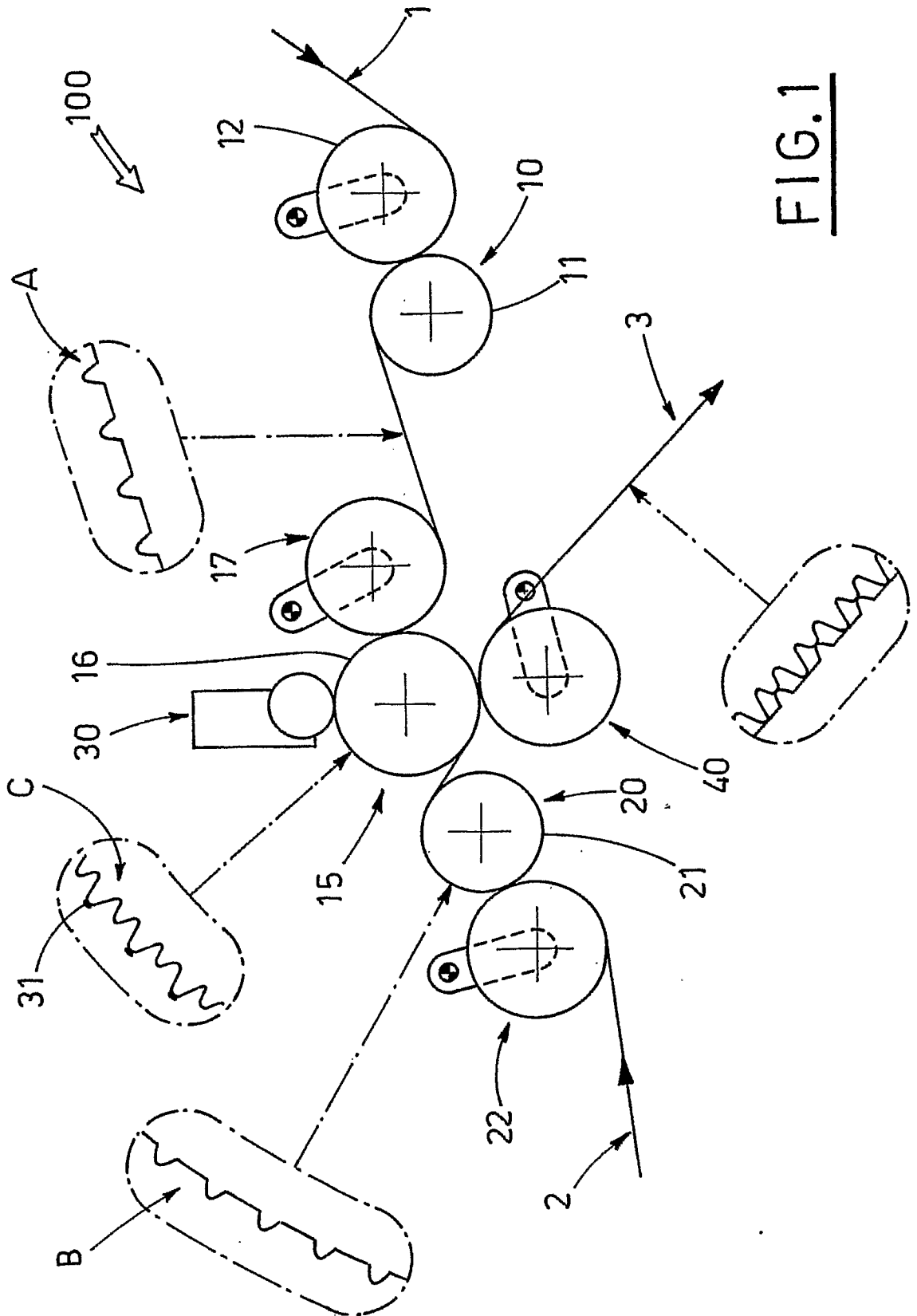


FIG.1

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2009/000555

A. CLASSIFICATION OF SUBJECT MATTER
INV. B31F1/07

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)
B31F

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/136186 A1 (SCA HYGIENE PROD GMBH [DE]; MORIN EMMANUELLE [FR]; HEIN FERDINAND [DE]) 28 December 2006 (2006-12-28) page 11, paragraph 2 - page 12, paragraph 2 figures 1,4	1-7,9-11
X	US 2003/026953 A1 (MULLER HEINZ-JURGEN [DE] MUELLER HEINZ-JUERGEN [DE]) 6 February 2003 (2003-02-06) paragraph [0046] - paragraph [0049] figures 1-4	1-3,5-11

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2006136186 A1	28-12-2006	AU 2005333449 A1 EP 1893810 A1	28-12-2006 05-03-2008
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