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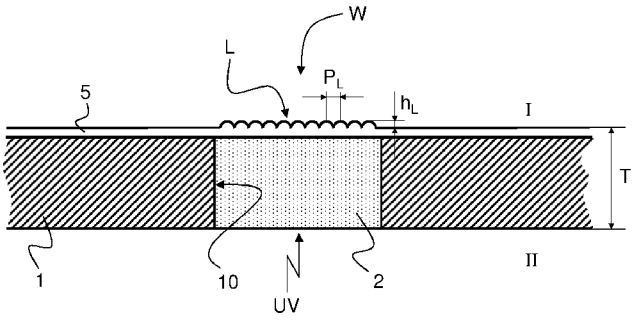

Fig. 1D

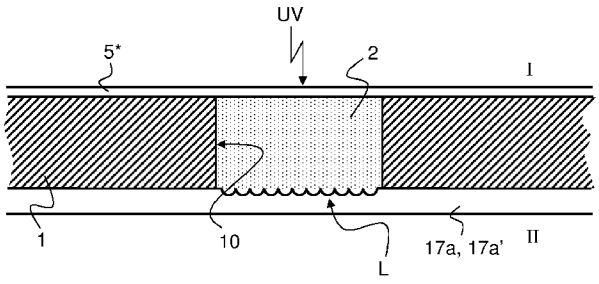

Fig. 2D

(57) Abstract: There is described a method of creating a transparent polymer window (W) with a field of lenses (L) in a security paper substrate (1), the method comprising the steps of (i) providing a security paper substrate (1), (ii) forming an opening (10) into the security paper substrate (1), (iii) laminating a transparent film (5; 5*) onto a first side (I) of the security paper substrate (1) in such a way as to close the opening (10) at one end, and (iv) filling the opening (10) with transparent polymer material (2). In one embodiment, the transparent film (5) comprises a field of lenses (L) and is laminated onto the first side (I) of the security paper substrate (1) in such a way as to form lenses (L) on the first side (I) of the security paper substrate (1) in register with the opening (10). In another embodiment, the field of lenses (L) is replicated into the transparent polymer material (2) applied in the opening (10) in such a way as to form lenses (L) on a second side (II) of the security paper substrate (1), opposite to the first side (I), in register with the opening (10). Also described is a device designed to fill the opening (10) formed into the security paper substrate (1) with the transparent polymer material (2) and a processing machine comprising the same.

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CREATION OF A TRANSPARENT POLYMER WINDOW WITH A FIELD OF LENSES IN A SECURITY PAPER SUBSTRATE

TECHNICAL FIELD

The present invention generally relates to the creation of a transparent polymer window with a field of lenses in a security paper substrate.

BACKGROUND OF THE INVENTION

The lamination of transparent films onto a side of a security paper substrate is known from International (PCT) Publications Nos. WO 2008/104904 A1, WO 2009/112989 A1 and WO 2010/001317 A1 in the name of the present Applicant, which publications are all incorporated herein by reference in their entirety.

Further improvements of these known solutions are required, especially with a view to create a transparent polymer window with a field of lenses in the security paper substrate.

SUMMARY OF THE INVENTION

A general aim of the invention is therefore to improve the solutions of the prior art.

More specifically, an aim of the present invention is to provide such a solution that can suitably allow for the creation of a transparent polymer window with a field of lenses in a security paper substrate.

These aims are achieved thanks to the solutions recited in the claims.

In particular, there is claimed a method of creating a transparent polymer window with a field of lenses in a security paper substrate, the features of which are recited in independent claims 1 and 2. Advantageous embodiments of this method form the subject-matter of the dependent claims.

There is also claimed a device designed to fill an opening formed into a security paper substrate with transparent polymer material, which opening is closed at one end by a transparent film that is laminated onto a first side of the security paper substrate, the features of which device are recited in independent claim 12. Further advantageous embodiments of this device form the subject-matter of the dependent claims.

There is also claimed a processing machine comprising (i) a laminating system designed to laminate a transparent film onto a first side of the security paper substrate in such a way as to close one end of an opening formed into a security paper substrate and (ii) a device in accordance with the invention designed to fill the opening with transparent polymer material.

Further advantageous embodiments of the invention are discussed below.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of the present invention will appear more clearly from reading the following detailed description of embodiments of the invention which are presented solely by way of non-restrictive examples and illustrated by the attached drawings in which:

Figures 1A-D are schematic sectional views illustrating successive steps of an embodiment of a method of creating a transparent polymer window with a field of lenses in a security paper substrate in accordance with a first embodiment of the invention ;

Figures 2A-E are schematic sectional views illustrating successive steps of an embodiment of a method of creating a transparent polymer window with a field of lenses in a security paper substrate in accordance with a second embodiment of the invention ;

Figure 3 is a schematic side view of a device designed to fill an opening formed into a security paper substrate with transparent polymer material, which opening is closed at one end by a transparent film that is laminated onto a first side of the security paper, in accordance with a first variant of the invention ; and

Figure 4 is a schematic side view of a device designed to fill an opening formed into a security paper substrate with transparent polymer material, which opening is closed at one end by a transparent film that is laminated onto a first side of the security paper, in accordance with a second variant of the invention.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

The present invention will be described in the particular context of the creation of transparent polymer windows into security paper substrates which are provided in the form of successive sheets, the security paper substrates being provided with an opening which is closed at one end by a transparent film that is laminated onto a first side of the security paper substrate.

As such, the formation of transparent windows by punching or cutting a hole (for instance by laser cutting) into security paper sheets followed by the lamination of a transparent film onto a first side of the security paper sheets so as to close one end of the opening is known from International (PCT) Publications Nos. WO 2008/104904 A1, WO 2009/112989 A1 and WO 2010/001317 A1 in the name of the present Applicant, which publications are all incorporated herein by reference in their entirety. Such a solution is sold by the Applicant under the trademarks OptiNota® H and OptiWindows®.

This process is schematically illustrated by Figures 1A-C and 2A-C in the context of two distinct embodiments of the invention.

In accordance with a first embodiment of the invention as illustrated by Figures 1A-D, the security paper substrate 1 is first provided with an opening 10, namely a through-hole. This can be performed by punching or cutting (for instance by means of a suitable mechanical cutting tool or by means of a laser beam) a hole through the thickness of the security paper substrate 1. This opening 10 can exhibit any desired shape and/or dimensions. The opening 10 is then closed at one end by a transparent film 5 that is laminated onto a first side I of the security paper substrate 1 as illustrated by Figure 1C, which lamination can be performed according to the principle taught by International (PCT) Publications Nos. WO 2008/104904 A1, WO 2009/112989 A1 and WO 2010/001317 A1.

According to this first embodiment, the transparent film 5 is already provided with a field of lenses L and the transparent film 5 is laminated in such a way as to close the opening 10 and form the lenses L on the first side I of the security paper substrate 1 in register with the opening 10. The lenses L can exhibit any desired shape and may for instance consist of a parallel

arrangement of semi-cylindrical lenses or a two-dimensional array of individual lens elements, such as hemispherical or hexagonal lenses.

Subsequent to the lamination of the transparent film 5, the opening 10 is filled with transparent polymer material 2. This transparent polymer material 2 is preferably a UV-curable polymer material which is cured by UV radiation, in this first embodiment, from a second side II of the security paper substrate 1, opposite to the first side I.

As a result of the filling of the opening 10 with the transparent polymer material 2 there is formed a transparent polymer window W in the security paper substrate which exhibits a thickness T (including the lenses L) in the order of magnitude of the thickness of the security paper substrate 1. The security paper substrate 1 thus provided with the transparent polymer window W can suitably be printed on the second side II with patterns, in register with the lenses L, so as to interact with the lenses L and form an optically-variable security feature that is observable through the window W and lenses L, from the first side I of the security paper substrate 1.

Figures 2A-E illustrate a second embodiment of the invention wherein the security paper substrate 1 is first provided, like in the first embodiment, with an opening 10 (Figure 2B) which is then closed at one end by a transparent film 5* that is laminated onto a first side I of the security paper substrate 1 (Figure 2C). In contrast to the first embodiment, the transparent film 5* is not provided with any lenses L.

Subsequent to the lamination of the transparent film 5*, the opening 10 is likewise filled with transparent polymer material 2. In contrast to the first embodiment, the transparent polymer material 2 is subjected to a further processing step as illustrated by Figure 2D which consists in the replication of a field of lenses L into the transparent polymer material 2 applied in the opening 10 in such a way as to form lenses L on a second side II of the security paper substrate 1, opposite to the first side I, in register with the opening 10.

The replication of the lenses L into the transparent polymer material 2 is preferably carried out by pressing the second side of the security paper substrate 1, in the area of the transparent polymer material 2, against a lens

replicating medium which is schematically illustrated in Figure 2D and designated by reference numeral 17a, respectively 17a'. This lens replicating medium 17a, 17a' can in particular take the shape of a suitable plate provided with a corresponding recessed area (or alternatively a relief area) structured to form the lenses in the transparent polymer material 2.

Like in the first embodiment, the transparent polymer material 2 is preferably a UV-curable polymer material. In this other embodiment, the transparent polymer material 2 is however preferably cured by UV radiation from the first side I of the security paper substrate 1 through the transparent film 5*, while the security paper substrate 1 is in contact with a surface of the lens replicating medium 17a, 17a' (see Figure 2D).

As a result of the filling of the opening 10 with the transparent polymer material 2 there is formed a transparent polymer window W in the security paper substrate which exhibits a thickness T (including the lenses L) in the order of magnitude of the thickness of the security paper substrate 1. In contrast to the first embodiment, the lenses L are formed on the second side II of the security paper substrate 1. The security paper substrate 1 thus provided with the transparent polymer window W can suitably be printed on the first side I with patterns, in register with the lenses L, so as to interact with the lenses L and form an optically-variable security feature that is observable through the window W and lenses L, from the second side II of the security paper substrate 1

As this will be appreciated hereinafter, the transparent polymer material 2 is preferably applied by screen-printing using one or more screen-printing units as application unit(s). More than one application units may be necessary in order to suitably apply transparent polymer material 2 in a quantity sufficient to fill the opening 10.

The lenses L preferably have a lens pitch P_L of the order of 10 to 50 µm and a lens height h_L of the order of 10 to 20 µm. In comparison, the overall thickness T of the security paper substrate is of the order of 60 to 120 µm.

Figure 3 is illustrative of a first variant of a device designed to fill the opening 10 formed into the security paper substrate 1 with transparent polymer material 2. This device can suitably be located downstream of a laminating

system (not shown) – such as discussed e.g. in International (PCT) Publication No. WO 2008/104904 A1 – that is designed to laminate the transparent film 5, respectively 5*, onto the first side I of the security paper substrate 1 in such a way as to close one end of the opening 10 formed in the security paper substrate 1 as discussed above.

The device of Figure 3 is in particular designed to be located after cutting of the laminated film 5, respectively 5*, which is preferably cut by means of a laser beam designated schematically by reference B in Figure 3. Cutting of the laminated film is preferably carried out in accordance with the teaching of International (PCT) Publication No. WO 2010/001317 A1. Reference numeral 50 in Figure 3 schematically illustrates an output of the laminating system (upstream of the location where the laminated film 5, respectively 5*, is cut), while reference numeral 55 schematically illustrates an accelerating drum used to separate the sheets prior to applying the transparent polymer material 2.

In the context of Figure 3, the security paper substrate 1 is transferred to an application system A comprising a first cylinder 13 which supports the first side I of the security paper substrate 1. This application system A further comprises a first application unit 14 designed to cooperate with the first cylinder 13 and the second side II of the security paper substrate 1 in order to apply the transparent polymer material 2 in the opening 10 formed in the security paper substrate 1. This application unit 14 is preferably designed as a screen-printing unit. A suitable screen-printing unit is for instance disclosed in European Patent Publication No. EP 0 723 864 A1 in the name of the present Applicant, which is incorporated herein by reference in its entirety.

Downstream of the first cylinder 13, there is preferably provided a second cylinder 17 which cooperates with the second side II of the security paper substrate 1. This second cylinder 17 carries on its circumference a lens replicating medium 17a (as schematically illustrated in Figure 2D) designed to replicate a field of lenses L into the transparent polymer material 2 applied in the opening 10 as discussed above. The application unit 14 may be adapted to supply a slight excess of transparent polymer material 2 sufficient to fill the recessed portion of the lens replicating medium 17a.

A pressure roller 18 is advantageously further provided in order to cooperate with the first side I of the security paper substrate 1 and press the security paper substrate 1 against the circumference of the second cylinder 17, thereby ensuring proper replication of the lenses L into the transparent polymer material 2.

The device further comprises a UV-curing unit 19 cooperating with the second cylinder 17 in order to cure the UV-curable polymer material 2 from the first side I of the security paper substrate 1, through the transparent film, while the security paper substrate 1 is in contact with the lens replicating medium 17a.

Subsequent to the replication of the lenses L, the security paper substrate 1 is transferred to a suitable sheet gripper system 60 comprising, as is conventional in the art, a pair of endless chains 62 carrying spaced-apart gripper bars, which endless chains 62 are driven into rotation between pairs of chain wheels, one pair being illustrated in Figure 3 and designated by reference numeral 61.

The second cylinder 17 with its lens replicating medium 17a may be omitted in case of formation of the transparent polymer window W in accordance with the first embodiment illustrated by Figures 1A-D. In such a case, it would be appropriate to provide the UV-curing 19 in such a way as to be associated with the first cylinder 13 and cure the UV-curable polymer material 2 from the second side II of the security paper substrate 1.

Figure 4 is illustrative of a second variant of a device designed to fill the opening 10 formed into the security paper substrate 1 with transparent polymer material 2. This device can suitably be located downstream of a laminating system (not shown) – such as discussed e.g. in International (PCT) Publication No. WO 2008/104904 A1 – that is designed to laminate the transparent film 5, respectively 5*, onto the first side I of the security paper substrate 1 in such a way as to close one end of the opening 10 formed in the security paper substrate 1 as discussed above.

The device of Figure 4 is in particular designed to be located prior to cutting of the laminated film 5, respectively 5*. In Figure 4, the laminated film 5,

respectively 5*, is cut subsequent to the application of the transparent polymer material 2 into the opening 10 formed into the security paper substrate 1. Cutting of the laminated film is once again preferably carried out by means of a laser beam designated schematically by reference B in Figure 4. In essence, cutting of the laminated film can again be carried out in accordance with the teaching of International (PCT) Publication No. WO 2010/001317 A1. Reference numeral 50 in Figure 4 likewise schematically illustrates an output of the laminating system (upstream of the location where the laminated film 5, respectively 5*, is cut), while reference numeral 55 schematically illustrates an accelerating drum used to separate the sheets subsequent to the application of the transparent polymer material 2.

In contrast to the variant of Figure 3, it should therefore be appreciated that the security paper substrate 1 is fed through the device while individual sheets of the security paper substrate 1 are still linked to one another by the transparent film that is laminated onto the security paper substrate 1. Sheets of security paper substrate 1 are separated at the downstream end of the device illustrated in Figure 4.

Components 13', 14' (as well as 14'' and 14'''), 17', 18', 19' have the same purpose as components 13, 14, 17, 18, 19 of Figure 3.

In contrast to the device of Figure 3, the application system A' of the device of Figure 4 includes multiple application units 14', 14'', 14''' (advantageously designed as screen-printing units) which are each adapted to apply a portion of the transparent polymer material 2 necessary to fill the opening 10. In this case, it may be appropriate to further provide intermediate UV-curing units 15', 15'' between the first and second application units 14', 14'' and between the second and third application units 14'', 14'''.

Various modifications and/or improvements may be made to the above-described embodiments without departing from the scope of the invention as defined by the annexed claims.

In particular, it may be appropriate to further provide an additional application unit cooperating directly with the circumference of the second cylinder 17, 17' of Figures 3 and 4, upstream of the location where the security

paper substrate 1 is contacting the second cylinder 17, 17' so as to apply a small amount of transparent polymer material 2 in the recessed portion of the lens replicating medium 17a, 17a'.

LIST OF REFERENCE NUMERALS USED THEREIN

1	security paper substrate
I	first side of security paper substrate 1
II	second side of security paper substrate 1, opposite to the first side I
T	thickness of security paper substrate 1 (in the range of 60 to 120 μm)
W	transparent polymer window formed in security paper substrate 1
L	field of lenses formed onto window W (in register with opening 10)
P_L	lens pitch (spacing between adjacent lenses – preferably in the range of 10 to 50 μm)
h_L	lens height (preferably in the range of 10 to 20 μm)
2	transparent polymer material (in particular UV-curable polymer material) used to fill the opening 10 formed into the security paper substrate 1
5	transparent film laminated onto first side I of security paper substrate 1 (first embodiment – Figures 1A-D) / transparent film carrying field of lenses L
5*	transparent film laminated onto first side I of security paper substrate 1 (second embodiment – Figures 2A-E)
10	opening (through-hole) formed into thickness of security paper substrate 1
A	application system (first variant – Figure 3)
13	cylinder cooperating with application unit 14 and supporting first side I of security paper substrate 1 (first variant – Figure 3)
14	application unit, in particular screen-printing unit (first variant – Figure 3)
17	lens replicating cylinder (second cylinder) carrying at least one lens replicating medium 17a on its circumference and cooperating with the second side II of the security paper substrate 1 (first variant – Figure 3)
17a	lens replicating medium (e.g. lens replicating plate) carried by lens replicating cylinder 17

18 pressure roller cooperating with the first side I of the security paper substrate 1 and pressing the security paper substrate against the circumference of the lens replicating cylinder 17

19 UV-curing unit cooperating with the lens replicating cylinder 17 to cure the UV-curable polymer material 2 from the first side I of the security paper substrate 1, through the transparent film 5*

A' application system (second variant – Figure 4)

13' (first) cylinder cooperating with application units 14', 14", 14"' and supporting first side I of security paper substrate 1 (second variant – Figure 4)

14' (first) application unit, in particular screen-printing unit (second variant – Figure 4)

14" (second) application unit, in particular screen-printing unit (second variant – Figure 4)

14"' (third) application unit, in particular screen-printing unit (second variant – Figure 4)

15' intermediate UV-curing unit located between first and second application units 14', 14"

15" intermediate UV-curing unit located between second and third application units 14", 14"'

17' lens replicating cylinder (second cylinder) carrying at least one lens replicating medium 17a' on its circumference and cooperating with the second side II of the security paper substrate 1 (second variant – Figure 4)

17a' lens replicating medium (e.g. lens replicating plate) carried by lens replicating cylinder 17'

18' pressure roller cooperating with the first side I of the security paper substrate 1 and pressing the security paper substrate against the circumference of the lens replicating cylinder 17'

19' UV-curing unit cooperating with the lens replicating cylinder 17' to cure the UV-curable polymer material 2 from the first side I of the security paper substrate 1, through the transparent film 5*

50 output of film laminating machine (e.g. OptiNota® H machine with OptiWindows® module – see e.g. WO 2008/104904 A1, WO 2009/112989 A1 and WO 2010/001317 A1)

B laser beam for cutting laminated film (see e.g. WO 2008/104904 A1, WO 2009/112989 A1 and WO 2010/001317 A1)

55 accelerating drum for separating the sheets

60 sheet gripper system

61 chain wheel of sheet gripper system 60

62 endless chains of sheet gripper system 60

CLAIMS

1. A method of creating a transparent polymer window (W) with a field of lenses (L) in a security paper substrate (1), the method comprising the following steps :

- providing a security paper substrate (1) ;
- forming an opening (10) into the security paper substrate (1) ;
- laminating a transparent film (5) which comprises a field of lenses (L) onto a first side (I) of the security paper substrate (1) in such a way as to close the opening (10) at one end and form lenses (L) on the first side (I) of the security paper substrate (1) in register with the opening (10) ; and
- filling the opening (10) with transparent polymer material (2).

2. A method of creating a transparent polymer window (W) with a field of lenses (L) in a security paper substrate (1), the method comprising the following steps :

- providing a security paper substrate (1) ;
- forming an opening (10) into the security paper substrate (1) ;
- laminating a transparent film (5*) onto a first side (I) of the security paper substrate (1) in such a way as to close the opening (10) at one end ;
- filling the opening (10) with transparent polymer material (2) ; and
- replicating a field of lenses (L) into the transparent polymer material (2) applied in the opening (10) in such a way as to form lenses (L) on a second side (II) of the security paper substrate (1), opposite to the first side (I), in register with the opening (10).

3. The method according to claim 1 or 2, wherein the opening (10) is formed by punching a hole into the security paper substrate (1) or by cutting a hole into the security paper substrate (1).

4. The method according to claim 3, wherein the opening (10) is formed by means of a mechanical cutting tool.

5. The method according to claim 3, wherein the opening (10) is formed by means of a laser beam.

6. The method according to any one of the preceding claims, wherein the transparent polymer material (2) is a UV-curable polymer material.

7. The method according to claims 1, wherein the transparent polymer material (2) is a UV-curable polymer material and wherein the UV-curable polymer material (2) is cured from a second side (II) of the security paper substrate (1), opposite to the first side (I).

8. The method according to claims 2, wherein the transparent polymer material (2) is a UV-curable polymer material and wherein the UV-curable polymer material (2) is cured from the first side (I) of the security paper substrate (1), through the transparent film (5*).

9. The method according to claim 8, wherein the UV-curable polymer material (2) is cured during the replicating step, while the second side (II) of the security paper substrate (1) is in a contact with a surface of a lens replicating medium (17a; 17a').

10. The method according to any one of the preceding claims, wherein the transparent polymer material (2) is applied by means of a least one application unit (14; 14', 14", 14"').

11. The method according to claim 10, wherein the transparent polymer material (2) is applied by means of one or more screen-printing units acting as the least one application unit (14; 14', 14", 14"').

12. A device designed to fill an opening (10) formed into a security paper substrate (1) with transparent polymer material (2), which opening (10) is closed at one end by a transparent film (5; 5*) that is laminated onto a first side

(I) of the security paper substrate (1), the device comprising an application system (A; A') including a first cylinder (13; 13') supporting the first side (I) of the security paper substrate (1) and at least a first application unit (14; 14') cooperating with a second side (II) of the security paper substrate (1), opposite to the first side (I), to apply the transparent polymer material (2) into the opening (10) while the security paper substrate (1) is being supported by the first cylinder (13; 13').

13. The device according to claim 12, further comprising a second cylinder (17; 17') located downstream of the first cylinder (13; 13'), which second cylinder (17; 17') cooperates with the second side (II) of the security paper substrate (1) and carries on its circumference a lens replicating medium (17a; 17a') designed to replicate a field of lenses (L) into the transparent polymer material (2) applied in the opening (10) in such a way as to form lenses (L) on the second side (II) of the security paper substrate (1) in register with the opening (10).

14. The device according to claim 13, further comprising a pressure roller (18; 18') cooperating with the first side (I) of the security paper substrate (1) and pressing the security paper substrate (1) against the circumference of the second cylinder (17; 17').

15. The device according to claim 13 or 14, wherein the transparent polymer material (2) is a UV-curable polymer material, the device further comprising a UV-curing unit (19; 19') cooperating with the second cylinder (17; 17') in order to cure the UV-curable polymer material (2) from the first side (I) of the security paper substrate (1), through the transparent film (5*).

16. The device according to any one of claims 12 to 15, wherein the application system (A') further includes at least a second application unit (14", 14"') cooperating with the second side (II) of the security paper substrate (1) to apply the transparent polymer material (2) into the opening (10) while the

security paper substrate (1) is being supported by the first cylinder (13'), and wherein each of the first and second application units (14', 14'', 14''') applies a portion of the transparent polymer material (2) necessary to fill the opening (10).

17. The device according to claim 16, wherein the transparent polymer material (2) is a UV-curable polymer material, the device further comprising at least one intermediate UV-curing unit (15', 15'') located between the at least first and second application units (14', 14'', 14''').

18. The device according to any one of claims 12 to 17, wherein each application unit (14; 14', 14'', 14''') is a screen-printing unit.

19. A processing machine comprising :

- a laminating system designed to laminate a transparent film (5; 5*) onto a first side (I) of the security paper substrate (1) in such a way as to close one end of an opening (10) formed into a security paper substrate (1) ; and
- a device in accordance with any one of claims 12 to 18 designed to fill the opening (10) with transparent polymer material (2).

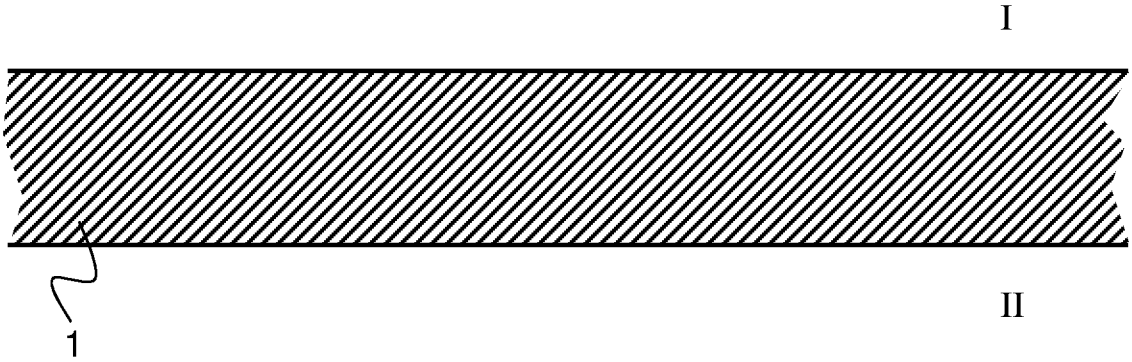

Fig. 1A

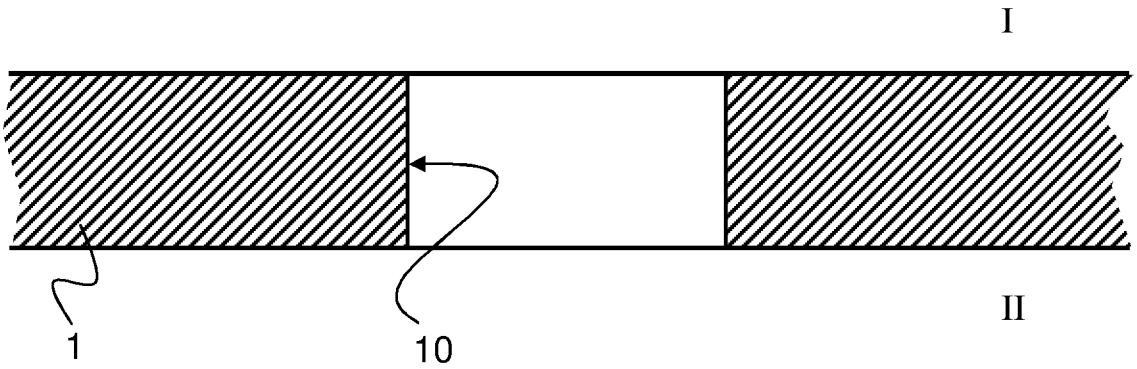

Fig. 1B

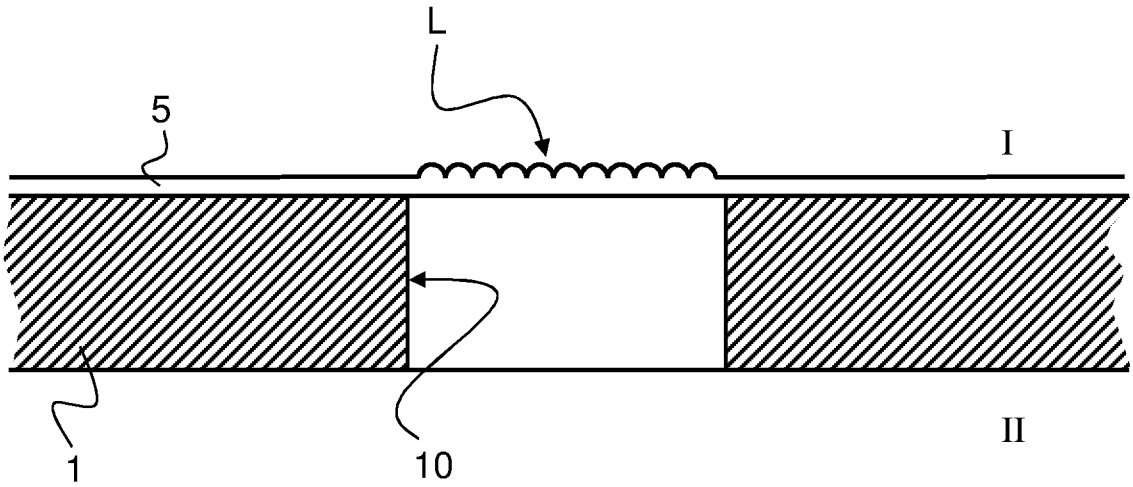

Fig. 1C

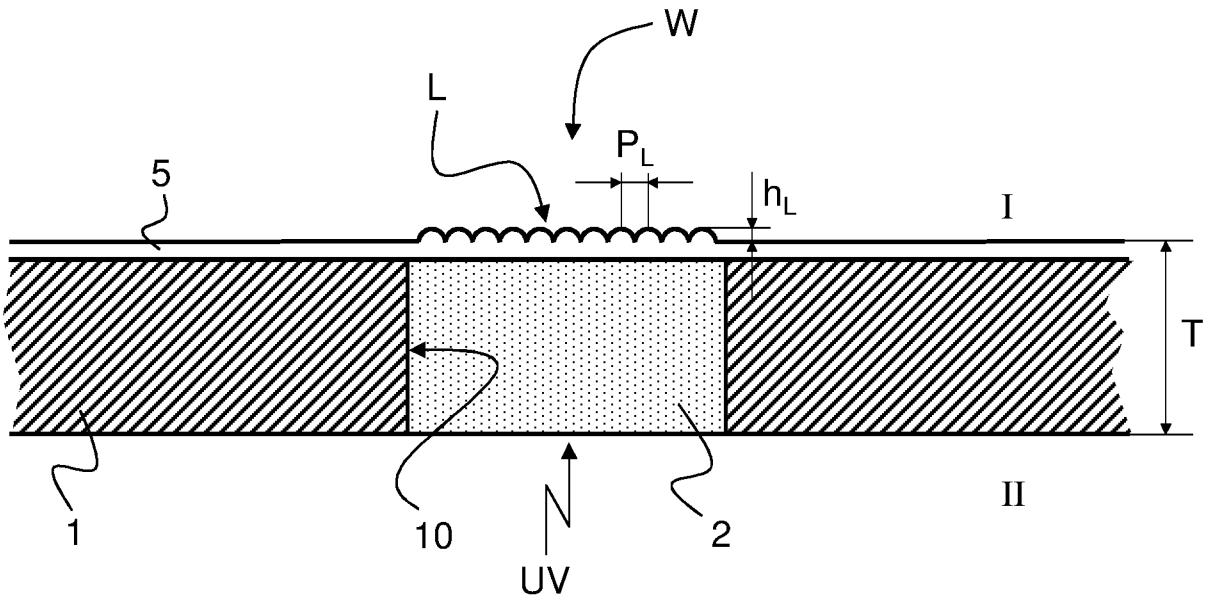

Fig. 1D

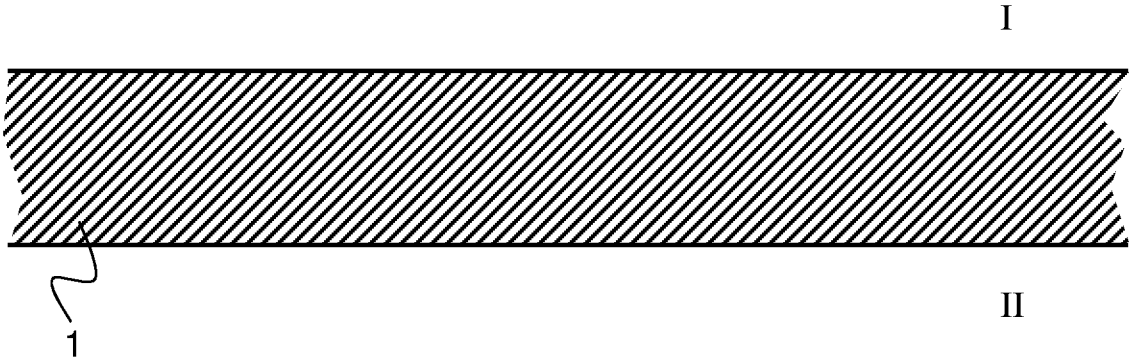

Fig. 2A

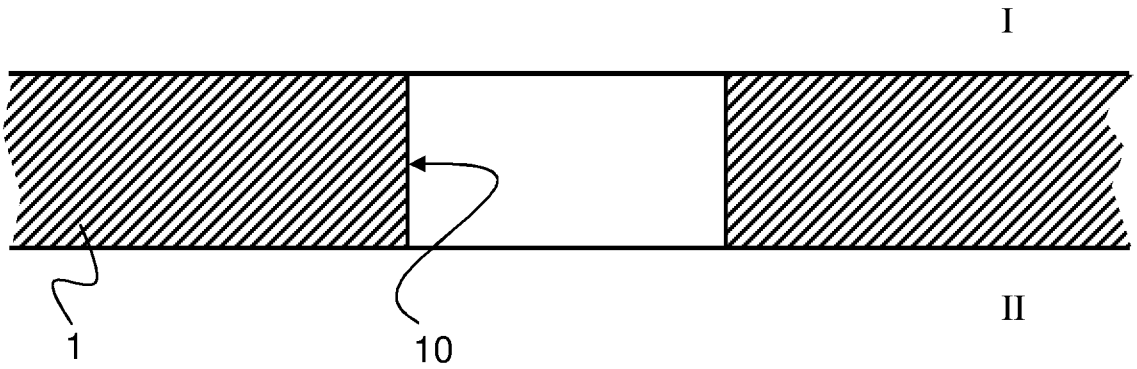

Fig. 2B

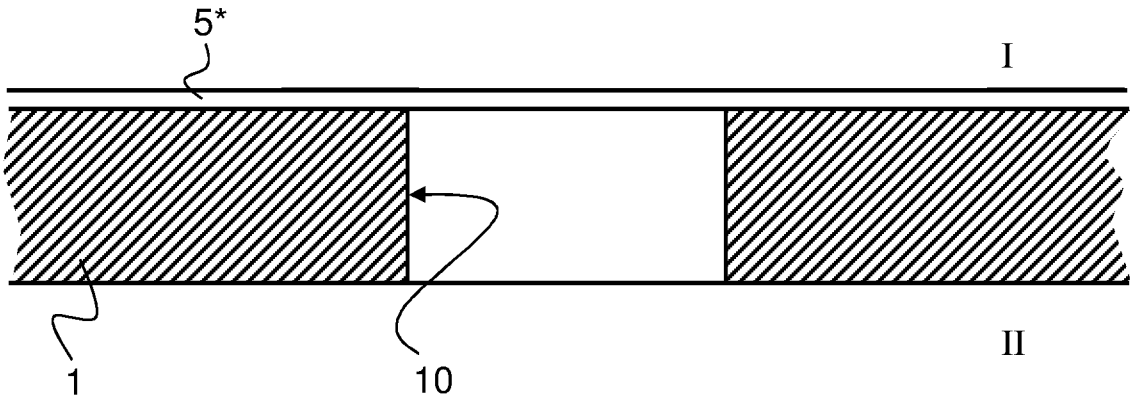

Fig. 2C

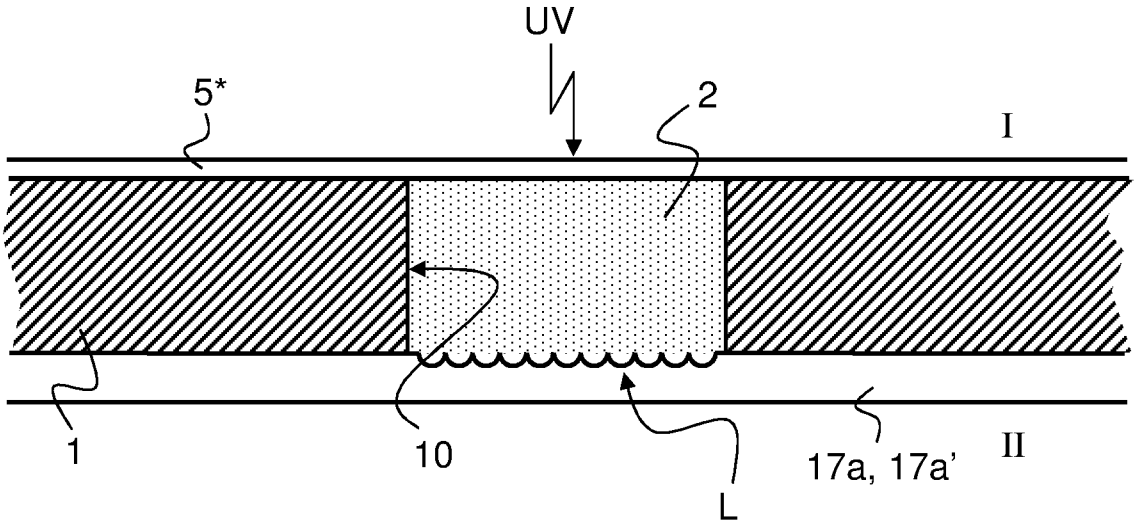

Fig. 2D

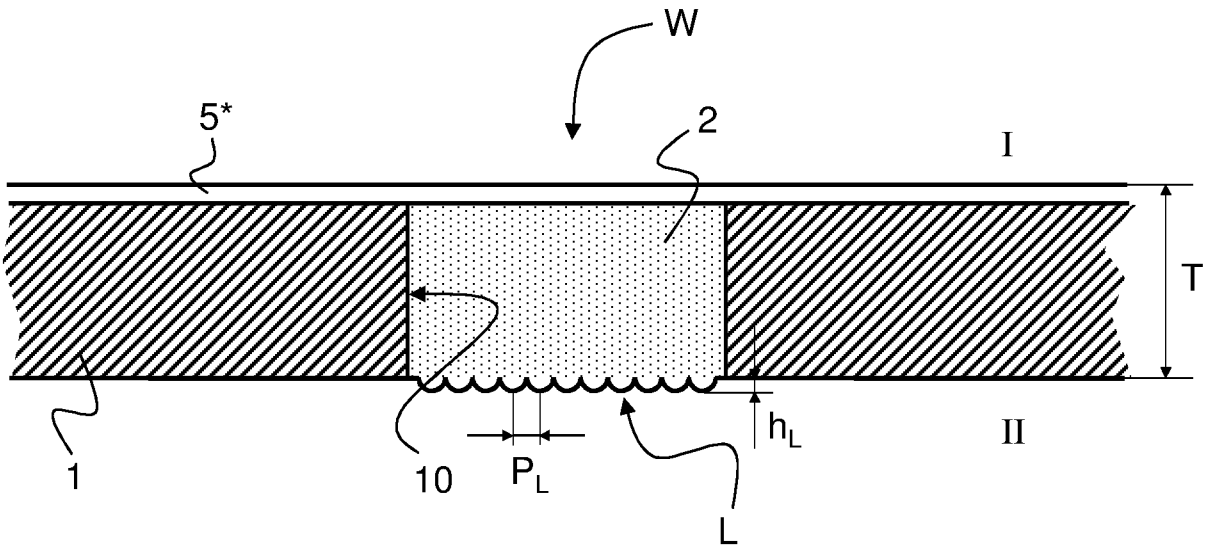

Fig. 2E

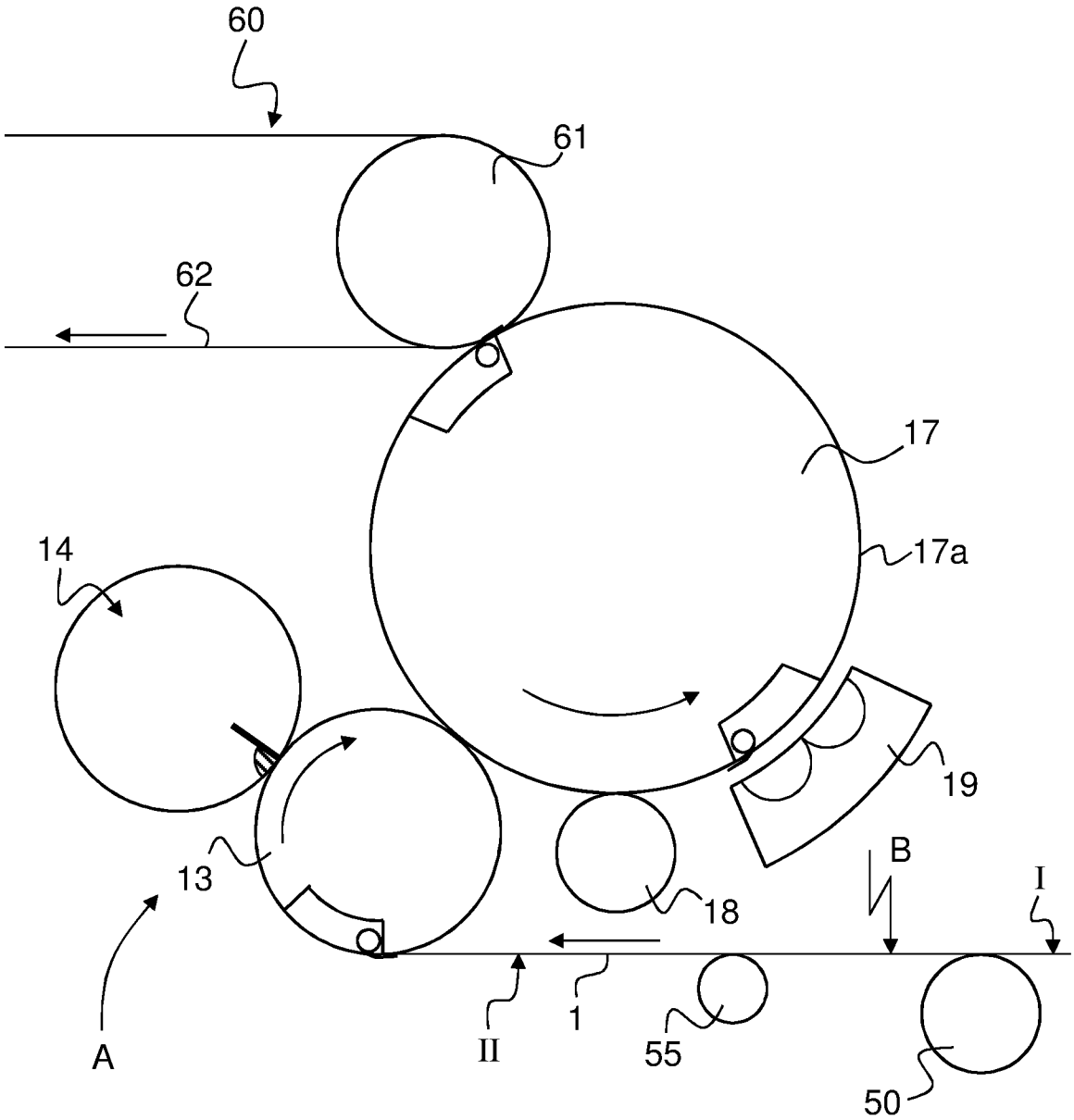

Fig. 3

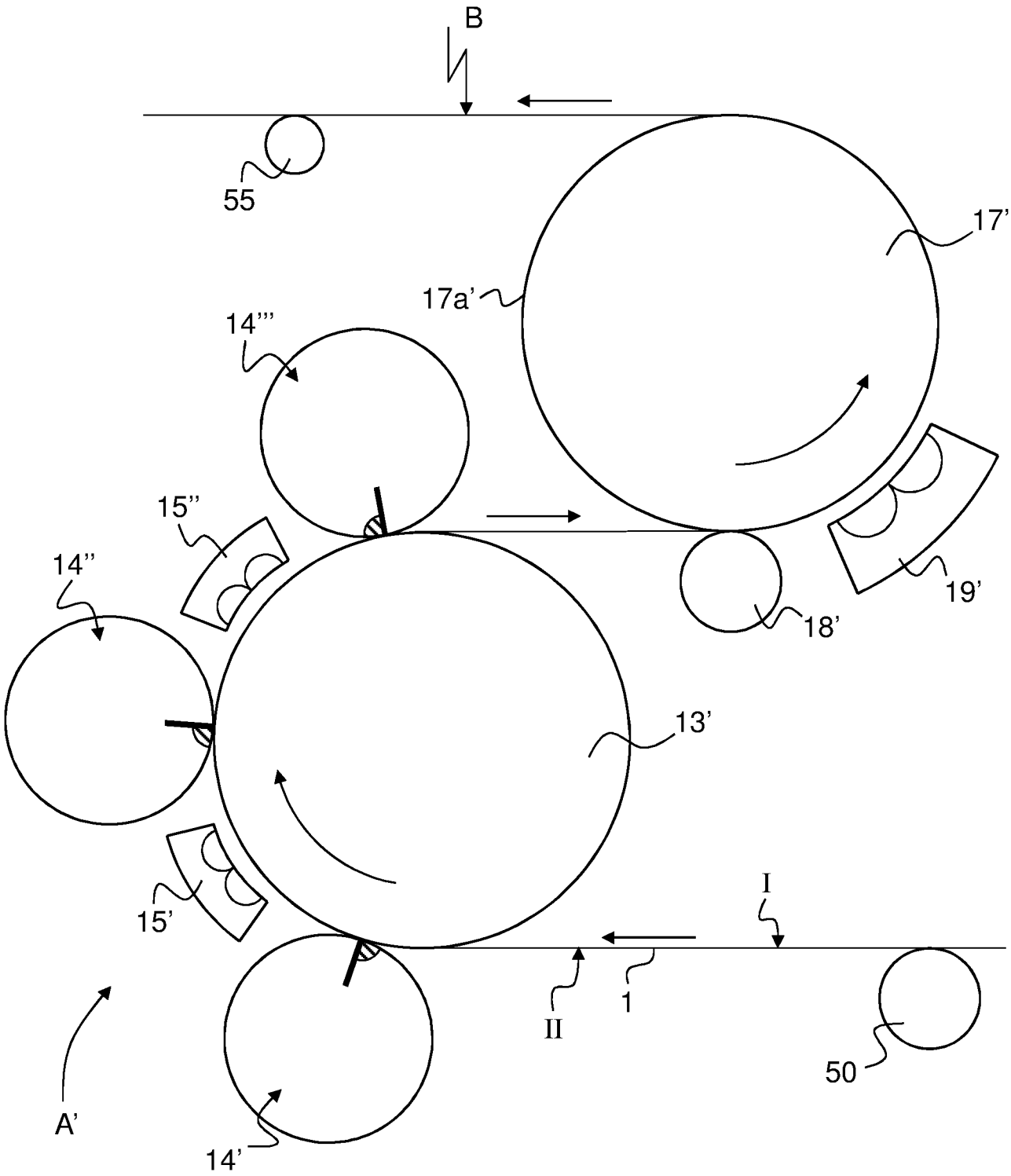

Fig. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2014/063806

A. CLASSIFICATION OF SUBJECT MATTER
INV. B32B38/04 B32B38/06 B42D25/29
ADD.

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)
B32B B42D B29D

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 practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	DE 10 2009 048145 A1 (GIESECKE & DEVRIENT GMBH [DE]) 7 April 2011 (2011-04-07) abstract; figures 1,2,9 paragraphs [0033], [0041], [0061], [0062], [0067], [0103]	1,3-8, 10-19
Y	DE 10 2004 026050 A1 (GIESECKE & DEVRIENT GMBH [DE]) 15 December 2005 (2005-12-15) abstract; figure 1 paragraphs [0019] - [0022], [0026], [0027], [0038], [0053], [0054], [0057], [0058], [0064]	1,3-8, 10-19

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 December 2014	19/12/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Lanaspeze, Jean

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INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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