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(54) Title: PROCESS FOR SPLICING PORTIONS OF A WEB MATERIAL AND CORRESPONDING DEVICE

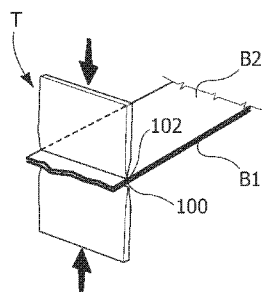


FIG. 4

(57) Abstract: Successive portions (B1, B2) of web material fed to a treatment station, such as a defibrator for cellulose material in web, are spliced to one another by : - forming in said portions (B1, B2), respectively, a trailing edge (100) and a leading edge (102) to be spliced together; - setting the aforesaid trailing edge (100) and leading edge (102) in a condition where they are aligned to one another; and - making a seam (104), for example of an overlock type, between the trailing edge (100) and the leading edge (102) in a condition where they are aligned to one another.

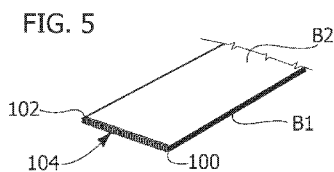


FIG. 5

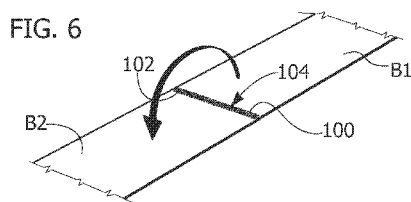


FIG. 6



SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, —
GW, ML, MR, NE, SN, TD, TG).

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**"Process for splicing portions of a web material and
corresponding device"**

TEXT OF THE DESCRIPTION

5 Field of the invention

The description relates to techniques for carrying out splicing of successive portions of a web material.

The description has been developed with particular attention to its possible use in the sector of
10 manufacture of sanitary articles.

Description of the prior art

In various technical sectors, for example in the manufacture of sanitary articles, there arises the need to carry out an operation of splicing of successive
15 portions of a web material.

For example, in absorbent sanitary articles such as nappies for newborns and babies, diapers for incontinence, hygienic tampons and the like, absorbent elements can be used comprising an absorbent pad made
20 of or comprising a cellulose-based aerated fibrous material (fluff) obtained from a compact web material fed to a defibrator device. Devices of this type are described, for example in US-A-4 673-136 or in EP-A-2 039 827.

25 These devices are fed with a web material to be defibrated that is wound off supply reels. To ensure continuity of feed, recourse is had to stations in which it is possible to install at least two supply reels designed follow one another in the function of
30 delivery of the material in such a way that: whilst the web material is being delivered starting from one reel, it is possible to proceed to inserting in the supply station a "new" reel designed to follow in the function of delivery of the web material the reel that is
35 currently active when the web material wound on the

latter is completely or almost completely run out; once the "new" reel has taken over from the "old" one in the function of delivery, what remains of the "old" reel (usually the core on which the web material was wound) is removed from the supply station, and then another "new" reel is inserted in the supply station.

Continuous delivery of the web material is then ensured by this mechanism of exchange, which can be implemented according to various criteria. For example, the defibrator device can present two inlets for supply of the web material to be defibrated: the supply of the web material starting from a reel that is running out can thus be stopped, still leaving a terminal portion of web led into the supply inlet that is currently deactivated, at the same time activating the other inlet, through which the web material taken from the "new" reel reaches the defibrator device.

In any case, whatever the solution adopted to ensure continuity of the supply to the defibrator device, there arises the need to connect the "head" of the portion of web that is wound off a new reel to the "tail" of a preceding portion of web.

Operating in a conventional way, the performance of said action of splicing implies the performance of the sequence of operations schematically represented in Figures 1 to 3.

In the first place, the trailing part of the "old" web, designated by B1, and the leading part of the "new" web, designated by B2, are subjected to a trimming operation in cutting devices T1 and T2 (in general distinct from one another) to cause the aforesaid trailing and leading parts, which originally have an irregular profile, to present end edges 100, 102 that are rectilinear or, in any case, regular, and that can be set alongside one another (see Figure 2)

and then be spliced with a stretch of adhesive tape B (Figure 3).

Said operation can be performed in a completely manual way or resorting to at least partially automated equipment, for example of the type described in US-A-2007/0113984.

Object and summary of the invention

Both when performed in a totally manual way and when conducted in an at least partly automated way, the sequence of operations described previously is as a whole demanding and requires in any case a certain skill and a certain experience on the part of the operator.

In particular, this traditional mode of operation implies in a practically compulsory way that the operation of splicing be conducted in a position where the machine is accessible with relative ease by the operator, when, instead, it would be desirable to have a greater degree of freedom in the choice of the area of the machine where the splicing operation is to be carried out.

Again, in order to be able to ensure in a firm and reliable way the connection of two portions B1 and B2 of a web material in conditions such as to withstand the longitudinal stress of supply to the defibrator, the adhesive tape B must present dimensions and other characteristics (for example, the amount of adhesive applied), which are such that the tape B, as it is fed to the defibrator device, may cause an undesirable contamination of the material resulting from the treatment of the web.

For example, with reference (without this implying any limitation of the scope of the present description - it will be appreciated that the considerations made herein also apply to user devices different from a

defibrator) to the defibration of cellulose webs, the adhesive material of the tape B can "dirty" the teeth of the defibrator and contaminate the aerated cellulose material or fluff resulting from the action of
5 defibration for an interval of time that may even be quite long after the area of splicing has materially entered the defibrator.

The object of the invention is to overcome the drawbacks outlined above.

10 According to the invention, said object is achieved thanks to a process having the characteristics recalled specifically in the ensuing claims. The invention also regards a corresponding device.

The claims form an integral part of the technical
15 teaching provided herein in relation to the invention.

Brief description of the annexed drawings

The invention will now be described, purely by way of non-limiting example, with reference to the annexed drawings, wherein:

20 - Figures 1 to 3 have already been described previously;

- Figures 4 to 6 illustrate successive steps of implementation;

- Figure 7, comprising four parts designated by
25 7A, 7B, 7C, and 7D illustrates various modes of use of embodiments; and

- Figure 8 is a general perspective view of one embodiment.

Detailed description of embodiments

30 Illustrated in the ensuing description are various specific details aimed at an in-depth understanding of the embodiments. The embodiments may be provided without one or more of the various details, or with other methods, components, materials, etc. In other
35 cases, known structures, materials, or operations are

not illustrated or described in detail so that various aspects of the embodiments will not be obscured.

The reference to "an embodiment" or "one embodiment" in the framework of the present description indicates that a particular configuration, structure, or characteristic described in relation to the embodiment is comprised in at least one embodiment. Hence, phrases such as "in an embodiment" or "in one embodiment" that may be present in various points of this description do not necessarily refer to one and the same embodiment. Furthermore, particular conformations, structures, or characteristics can be combined adequately in one or more embodiments.

The references used herein are only for convenience and hence do not define the sphere of protection or the scope of the embodiments.

Various embodiments enable splicing of two successive portions, B1 and B2, of a web material.

As already considered previously with reference to Figures 1 to 3, these may be two portions of a web that are to be fed to a treatment device, such as, for example, a defibrator device. For this reason, parts or elements that are identical or equivalent to parts or elements already described with reference to Figures 1 to 3 are designated in Figure 4 and in the subsequent figures by the same references that already appear in Figures 1 to 3; the corresponding description will consequently not be repeated.

In various embodiments, formed in the two portions, B1 and B2, subjected to splicing are a trailing edge 100 and a leading edge 102 to be spliced together. Said trailing edge 100 and leading edge 102 are arranged in a condition where they are aligned to one another and then connected with a seam 104 made between said trailing edge 100 and said leading edge

102 kept in a condition where they are aligned to one another.

The fact of resorting to a seam, for example using a thread (with one or more ends), enables a firm
5 connection to be ensured between the two portions B1 and B2, thus avoiding the need to resort to materials (such as the tape B of Figure 3, and in particular to the adhesive applied thereon), which may contaminate the material undergoing treatment.

10 In various embodiments, the seam 104 can be made with a thread of a material substantially similar to the material constituting the portions of web B1, B2. For example, in the case of portions of web of cellulose material, the seam can be made with a thread
15 of cotton or the like.

In various embodiments, it is possible to use threads of natural, synthetic or mixed (polyester/cotton) fibres, with particular reference to a thread that is 100% cotton. In various embodiments,
20 it is possible to use a thread 100% cotton art. 401/30 produced by the firm Cucirini Tre Stelle S.p.A. of Settala (province of Milan).

In various embodiments, as may be appreciated more fully from Figures 4 and 5, the edges 100, 102 are
25 provided in a condition where they are aligned to one another. For this purpose, the two portions of web B1, B2 are set on top of one another and subjected, as illustrated in Figure 4, to a common, for example simultaneous, cutting operation represented
30 schematically by a cutting device T. The device T acts on the end margins of the portions B1 and B2, which have an irregular pattern, giving rise to two rectilinear edges 100, 102 set on top of one another.

The seam 104 that connects said edges can then be
35 made (Figure 5) in the form of an end-on seam such as

to involve only the parts of the portions B1, B2 adjacent to the edges 100, 102.

In various embodiments, the seam 104 is made with stitches that extend according to a helical path in the common direction of extension of the edges 100 and 102 in the condition where they are set on top of one another.

In various embodiments, the seam 104 can be a seam of the type commonly referred to as "overlock".

10 A seam 104 of the above sort presents the advantage of anchoring the edges 100 and 102 of the portions of web B1 and B2 without hindering the possibility of relative orientation about the direction of common extension of the edges 100 and 102 set
15 aligned on top of one another.

In this way, once the seam 104 has been made, it is possible to impart on the portions of web B1 and B2, initially set on top of one another (Figures 4 and 5), a relative movement of opening like a book
20 (schematically represented in Figure 6) such as to lead the portions B1 and B2 in conditions of at least substantial coplanarity.

In this connection it will be appreciated that, in Figures 4 and 5, the representation of the portion B2 in a position overlying the portion B1 (i.e., with the portion B2 that lies "on top of" the portion B1) is provided merely by way of example. Various embodiments are very well suited to being implemented both with the portion B1 that is "on top of" the portion B2, and with
25 the portions B1 and B2 that lie in a plane that is not horizontal, for example a vertical plane or a plane that is oblique with respect to the vertical direction. Various embodiments enable in fact the operation of splicing to be carried out with any spatial orientation
30 and arrangement of the portions B1 and B2.
35

Figure 7 is a schematic representation of a station for supply of web material (by way of non-limiting example, this could be a station for supply of a web of cellulose to a defibrator device of the type
5 described in the introductory part of the present description) in which two reels 10A and 10B are present, represented in an ideal view in side elevation.

In particular, the parts A) and B) of Figure 7
10 refer to a station for supply of web material to a treatment station D not illustrated (for example, a defibrator) set on the right-hand side with respect to the reels 10A and 10B. The parts C) and D) of Figure 7 refer, instead, to a station for supply of web material
15 to a treatment station D located on the left-hand side with respect the reels 10A and 10B.

According to a current terminology used in the sector, the parts A) and B) may be said as referring to a "right" machine, whilst the parts C) and D) may be
20 said as referring to a "left" machine.

As regards the representations regarding a "right" machine, part A) refers to an operating condition in which the device D is currently fed as web coming from the reel 10B, while the reel 10A is the "new" reel, the
25 leading portion B2 of which is to be connected to the trailing portion B1 of the residue of a web previously unwound towards the device D starting from a reel that was in the position that is now occupied by the reel 10A.

30 Part B) of Figure 7 refers to a complementary condition: the device D is currently fed starting from the reel 10A, while the reel 10B is the "new" reel the leading portion B2 of which is to be spliced to the trailing portion B1 of a web that has been previously
35 fed towards the device D.

What has just been said likewise applies to parts C) and D) corresponding to a "left" machine.

In particular, in part C) the device D is currently fed starting from the reel 10A, while the
5 reel 10B is the "new" reel.

In part D) the device is currently fed by the reel 10B, while the "new" reel is the reel 10A.

From an observation of the various parts A) to D) of Figure 7 it may be noted that, whatever the mode of
10 supply ("right" machine or "left" machine) and irrespective of whether the "new" reel is in the position designated by 10A or else in the position designated by 10B, it is possible to reproduce the same geometry of superposition of the end edges of the
15 portions B1 and B2 in a condition where they are aligned.

From an observation of the various parts A) to D) of Figure 7 it may likewise be noted that, in the embodiments represented herein, the trailing portion B1
20 of an "old" web previously fed to the device D comes to be set on top of the leading portion B2 of the "new" web, whilst in the representation of Figures 4 and 6 the relative arrangement of the portions B1 and B2 is opposite (portion B2 initially on top of the portion
25 B1).

Likewise, the fact that the reels 10A and 10B are reels with horizontal axis has a purely exemplifying nature, since the orientation of the reels in question can be virtually any: as has already been said, various
30 embodiments enable in fact the operation of splicing to be performed with any spatial orientation and arrangement of the portions B1 and B2.

Persons skilled in the sector will on the other hand appreciate that what has been illustrated in
35 Figure 7 applies also to the case where the device D is

not provided with two lines of supply of the web material but with a single line of supply of said material so that the leading portion B2 of the "new" reel (whichever this may be) is to be spliced to the trailing portion B1 of the reel that currently performs the function of supply of the web with a function of so-called "flying" splicing. Such a "flying" splicing can be performed by setting (according to criteria in themselves known) between the supply station 10A, 10B and the device D fed thereby an accumulation structure (for example, of the festoon type) which is designed to accumulate inside it a buffer of web material. This buffer is used to continue to feed the web material to the device D, whilst its trailing portion B1 is kept momentarily still in order to carry out the operation of splicing with the leading portion B2 of the "new" reel. A festoon accumulation device of the above sort is known, for example, from EP-A-1 013 585.

The possibility of operating in one and the same splicing condition even with different machines (and the fact that the mechanism of splicing is the same irrespective of whether the portion B1 is set on top of the portion B2 or vice versa) enables production of a splicing device 1000 of the type illustrated in Figure 8 according to a single spatial organization of the component parts, hence without the need of having to specialize the device 1000 according to the characteristics of the machine to which it is associated.

The device 1000 basically comprises two functional units, namely,

- a cutter 1002, operated in translation by a motor-driven belt 1004; and
- a sewer 1006, which is mobile on a guide structure 1008.

In the embodiments considered herein by way of example, both the cutter 1002 and the sewer 1006 are assumed as being mobile in the horizontal direction.

In various embodiments, the cutter 1002 translates
5 in front of an alignment structure 1010 (which can, for example, be opened and closed via a jack 1012 and adjusted micrometrically by an adjustment device), which can receive inside it the portions B1 and B2 according to the modes schematically represented in
10 Figure 4.

In various embodiments, the cutter 1002 also comprises a cutting head 1014, for example with rotary blades, which is able to describe a transverse path with respect to the portions B1 and B2 set on top of
15 one another in the alignment structure 1010 so as to perform the cutting operation that leads to formation of the edges 100 and 102.

The cutting head 1014 is actuated by a respective motor (for example, an electric motor) 1014A. In
20 various embodiments, the cutting head 1014 is equipped with a blade with a circular, or in various embodiments polygonal, shape.

The tests conducted by the present applicant show that the use of a rotary blade with polygonal, for
25 example hexagonal, profile enables a very precise and regular cutting action, without forming in the edges 100 and 102 projections or irregularities that may hinder formation of the seam 104.

Without wishing to be tied down to any specific
30 theory in this connection, the present applicant has reason to deem that this result is linked to the fact that a cutting head with polygonal blade is able to perform on the material constituting portions B1 and B2 set on top of one another a cutting action having a
35 scissors-like component of action.

In various embodiments, the sewer 1006 is a needle sewer that is able to make a seam 104 of the type described previously (for example, a seam of an overlock type). A sewer of this type is available under
5 the tradename of Modello F27 manufactured by the company Rimoldi & CF S.r.l. of Gallarate (province of Varese).

In various embodiments, the sewer 1006 is driven in a way co-ordinated with the cutter 1002 by two
10 motors 1016 and 1018 activated alternately for making, respectively, the forward stroke and the return stroke with respect to the edges 100 and 102.

The motor 1016 that controls the forward stroke (from right to left as viewed of Figure 8), during
15 which the seam 104 is made, draws the sewer by means of an intermittor device 1016A capable of detecting the condition in which the needle (or needles) of the sewer 1006 are inside the material constituting the portions B1 and B2 and caused advance of the sewer 1006 with an
20 intermittent movement - for example, with a sinusoidal pattern - such as cause the (relative) translation of the sewer 1006 with respect to the portions B1 and B2 to be carried out, in a substantial, if not exclusive, way when the needle or needles of the sewer 1006 are
25 extracted from the material of the portions B1 and B2. There is thus prevented hindering of the movement of translation of the sewer 1006 due to engagement of the needles in the materials that are being sewn and, conversely, a negative effect on the outcome of the
30 stitching operation due to the transverse movement of the sewer 1006.

The motor 1018 is instead activated for carrying out, usually with a fast movement of return, resetting of the device 1000, controlling the return stroke (from
35 left to right, once again as viewed in Figure 8) that

brings the sewer 1006 back into the initial position starting from which the operation of cutting of the stitching thread is started. Cutting of the thread of the sewer 1006 once the single seam 104 has been made
5 is carried out with known means normally included in the sewer 1006 itself.

Of course, without prejudice to the principle of the invention, the details of construction and the embodiments may vary, even significantly, with respect
10 to what has been illustrated purely by way of non-limiting example herein, without thereby departing from the scope of the invention as defined by the annexed claims.

CLAIMS

1. A method of splicing portions (B1, B2) of a web material fed to a handling station (D), including:

- forming in said portions (B1, B2) a tail edge (100) and a head edge (102), respectively, for splicing,
- arranging said tail (100) and head (102) edges in a side-by-side relationship, and
- providing a sewn seam (104) between said tail (100) and head (102) edges in a side-by-side relationship.

2. The method of claim 1, including:

- arranging said tail (100) and head (102) edges in a side-by-side relationship by superposing said two portions (B1, B2),
- providing said sewn seam (104) as a seam with stitches extending according to a helical trajectory around the common direction of said tail (100) and head (102) edges arranged in a side-by-side relationship by superposing said two portions (B1, B2).

3. The method of claim 2, including causing said two portions (B1, B2) spliced to each other by means of said sewn seam (104) to follow a book-like opening motion leading said portions (B1, B2) to a co-planar position in correspondence with said tail (100) and head (102) edges.

4. The method of claim 2 or claim 3, including:

- superposing said two portions (B1, B2), and
- subjecting said two superposed portions (B1, B2) to a cutting operation (T) to form said tail (100) and head (102) edges in a side-by-side relationship.

5. The method of any of the previous claims, including providing said sewn seam (104) as an overlock seam.

6. The method of any of the previous claims,

including:

- providing said sewn seam (104) with a needle sewing machine (1006) having a needle to penetrate said tail (100) and head (102) edges and with a relative
5 movement of said needle sewing machine (104) and said superposed portions (B1, B2), and

- providing said relative motion as an intermittent (1016A) motion including subsequent translation stretches of the relative motion effected
10 when the needle of the sewing machine (1006) is extracted from said tail (100) and head (102) edges.

7. The method of any of the previous claims, wherein said portions (B1, B2) are portions of a cellulose web material fed to a defibrator (D).

15 **8.** The method of any of the previous claims, wherein said sewn seam is made of a thread material selected out of natural synthetic or mixture fibres, preferably a 100% cotton or polyester/cotton thread.

9. A device for splicing portions (B1, B2) of a
20 web material with the method of any of claims 1 to 8, including:

- an aligning structure (1010) to retain said superposed portions (B1, B2),

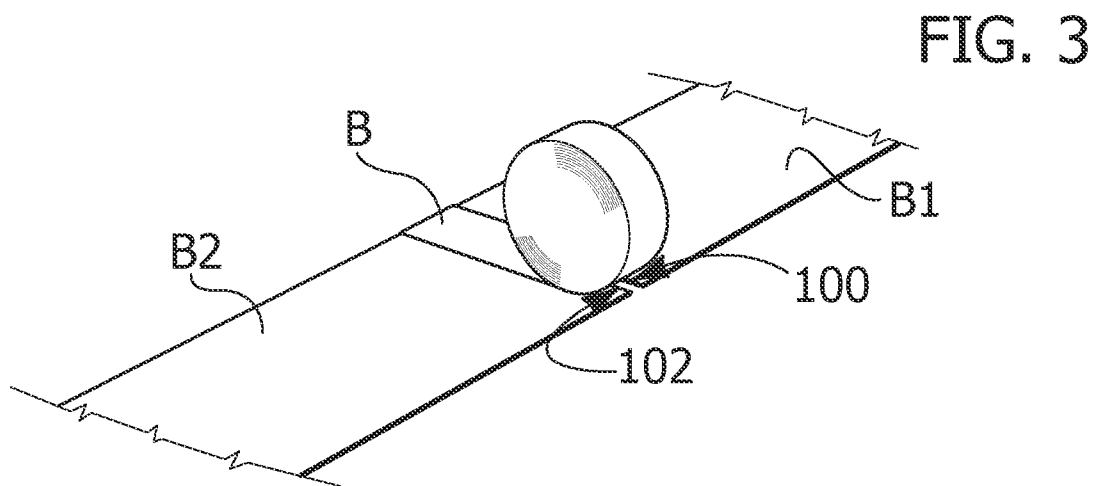
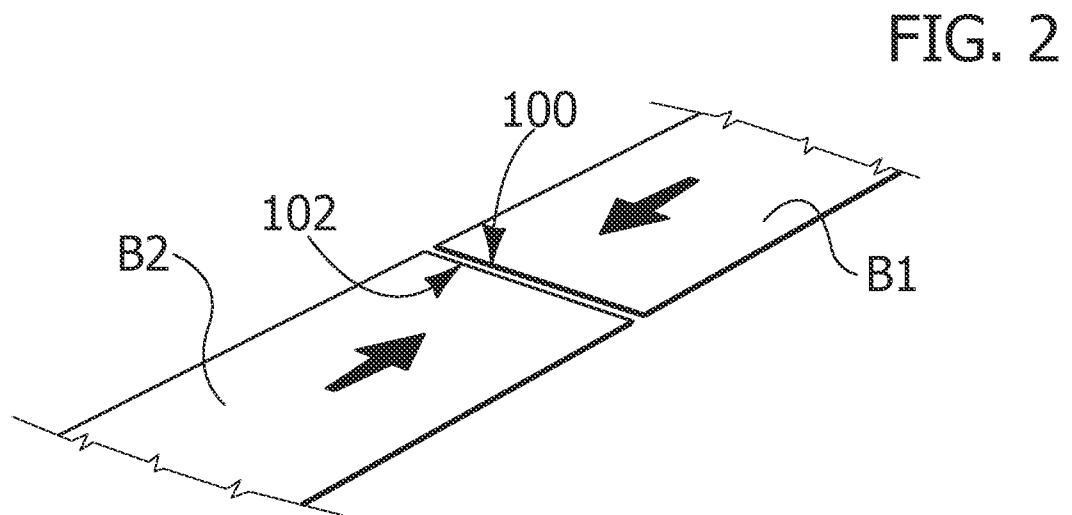
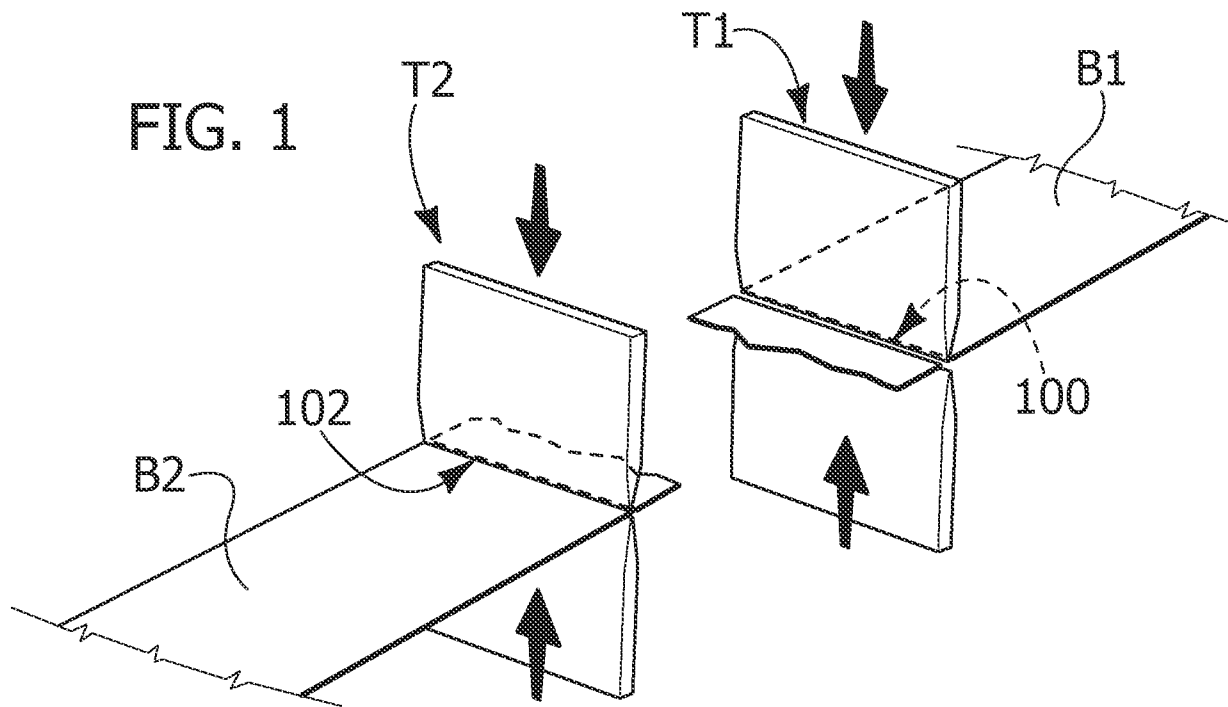
- a cutter (1002) for cutting said superposed
25 portions (B1, B2) retained in said aligning structure (1010) to form said tail (100) and head (102) edges in a side-by-side relationship, and

- a sewing machine (1006) to provide said sewn seam (104) between said tail (100) and head (102) edges
30 in a side-by-side relationship.

10. The device of claim 9, wherein said sewing machine (1006) provides said seam (104) as an overlock seam.

11. The device of claim 9 or claim 10, wherein
35 said sewing machine (1006) is a needle sewing machine

(1006) having a needle to penetrate said tail (100) and head (102) edges and said sewing machine has coupled therewith an intermitter member (1016A) to provide a relative motion of said needle sewing machine (104) and
5 said superposed portions (B1, B2) as subsequent translation stretches of the relative motion effected when the needle of the sewing machine (106) is extracted from said tail (100) and head (102) edges.



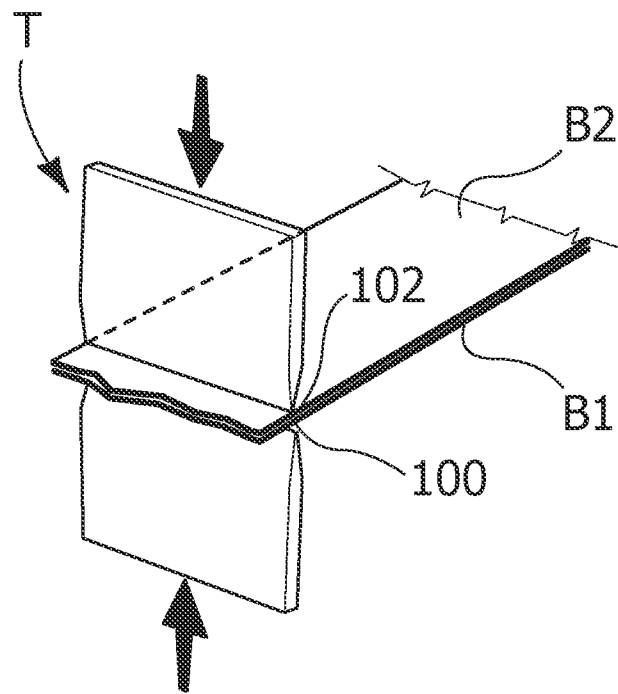


FIG. 4

FIG. 5

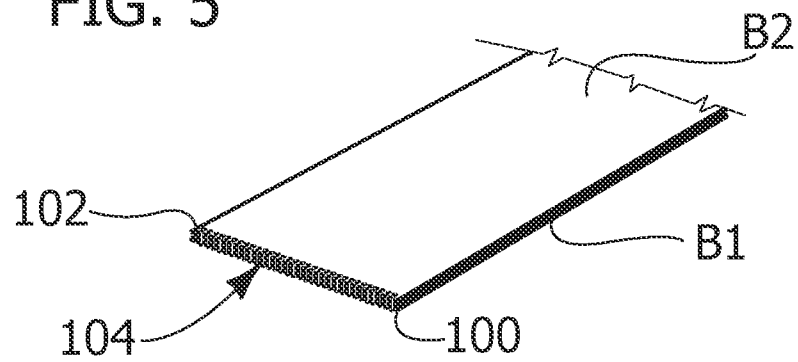


FIG. 6

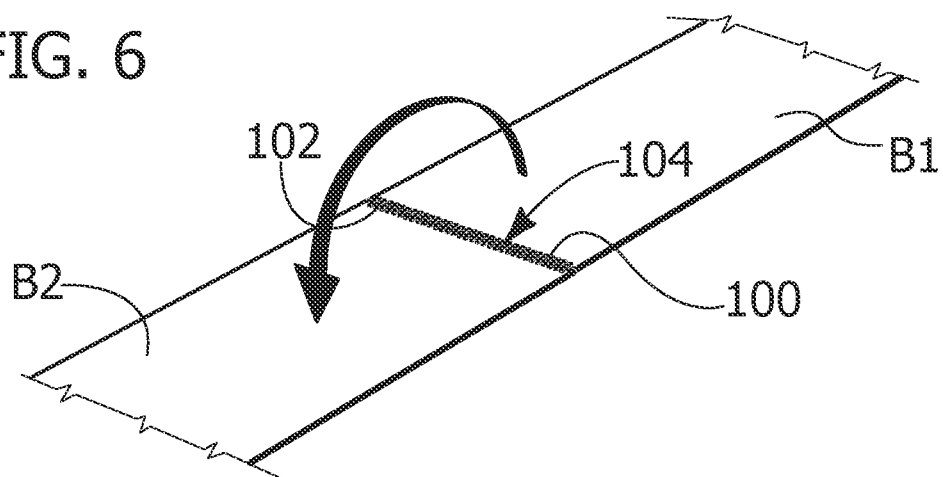


FIG. 7A

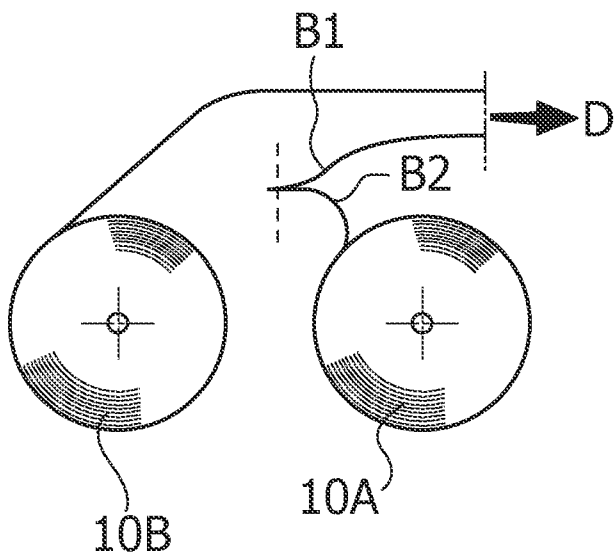


FIG. 7C

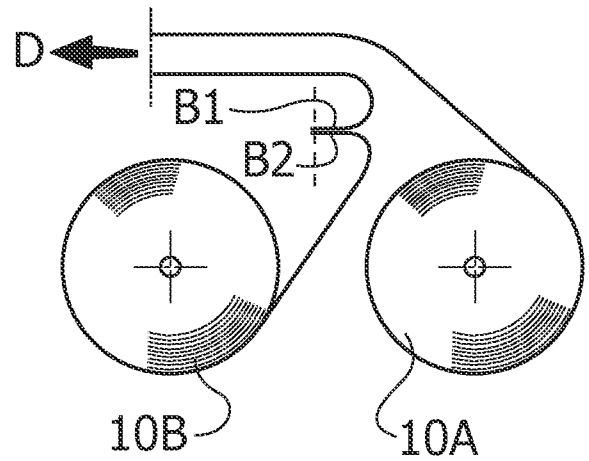


FIG. 7B

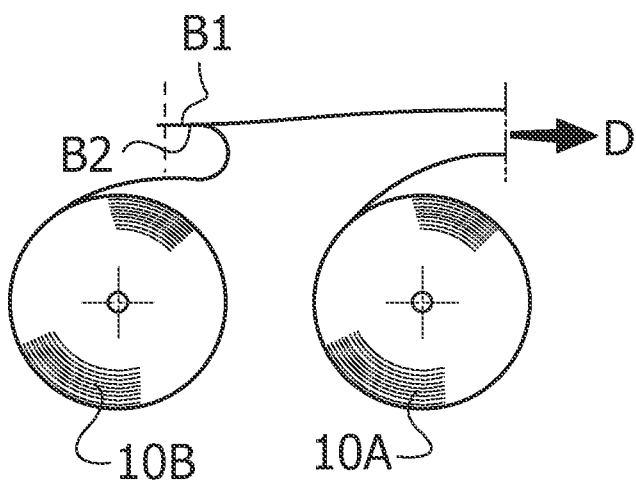


FIG. 7D

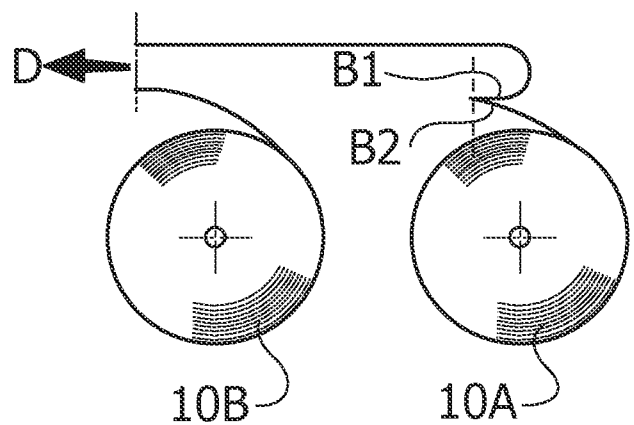
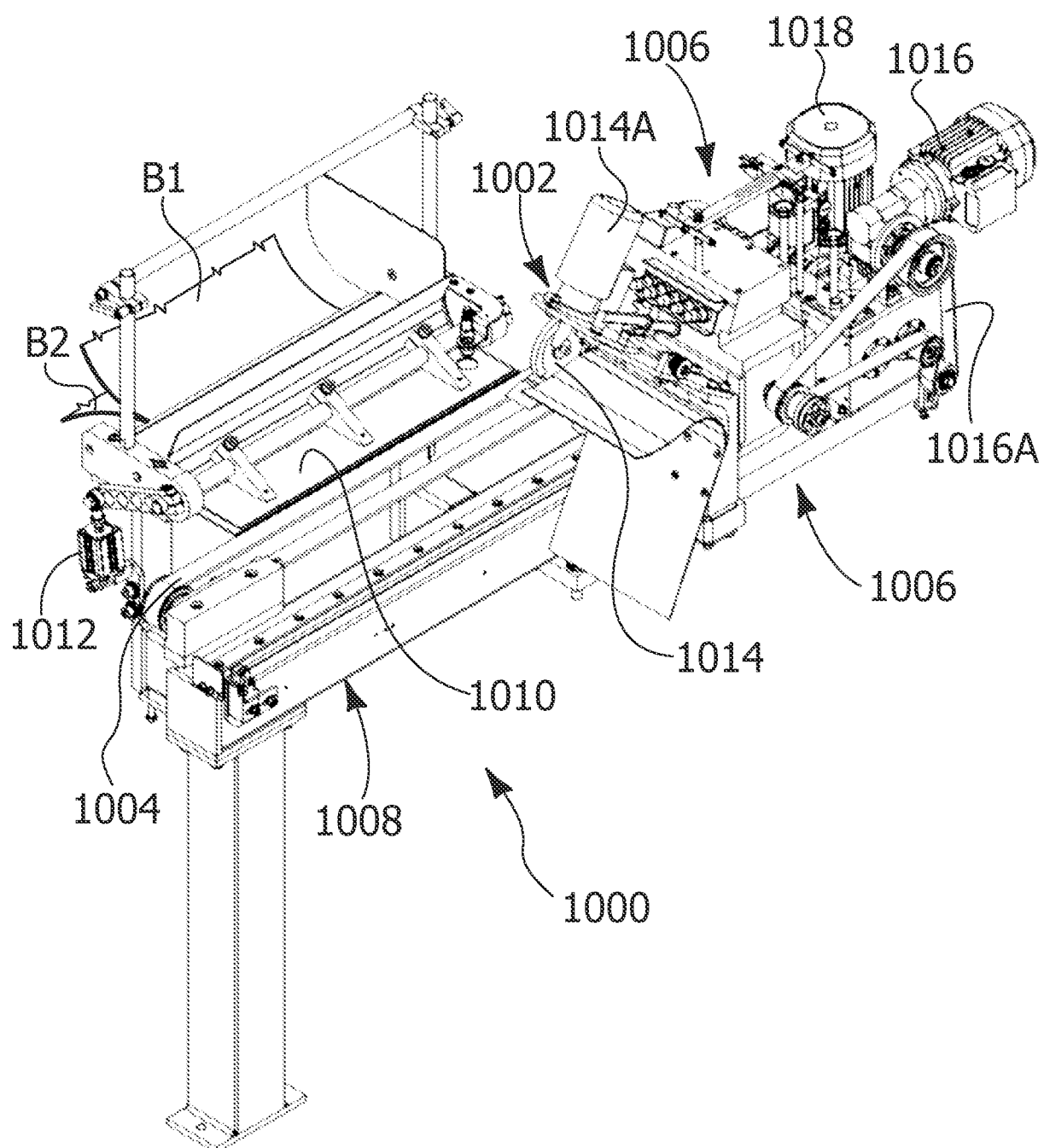


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2011/050928

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65H21/00
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)
B65H D06H

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	US 6 263 814 B1 (O'CONNOR LAWRENCE J [CA]) 24 July 2001 (2001-07-24) column 6, line 17 - column 7, line 26; figures 3-5	1-11
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Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

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Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2011/050928

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Information on patent family members

International application No

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