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(54) A METHOD OF MANUFACTURING BLANKS FOR PACKAGING

(57) A method of manufacturing a repeating array of blanks for forming packaging articles, the method comprising the steps of:
a) continuously feeding a web of substrate along a press from an input end thereof;
b) securing a continuous web of plastics material to the substrate to form a laminate; and
c) applying perforations and/or cuts to the web of substrate to form said repeating array of blanks,

wherein step a) precedes step b) and step c) precedes or succeeds step b).

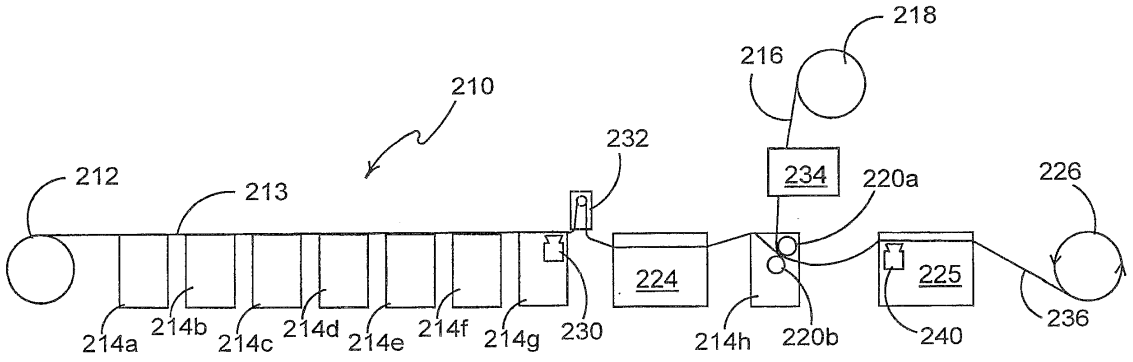

FIGURE 3

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Description

[0001] The present invention relates to a method of manufacturing blanks for packaging. More particularly, the present invention relates to a method of manufacturing a repeating array of blanks for forming packaging articles such as sandwich wedges or baguette packages. It also relates to the apparatus for manufacturing blanks according to the method and to blanks formed according to the method.

[0002] In recent years, paperboard packaging has supplanted the use of clear plastic trays and wedges in applications such as the sale of pre-prepared sandwiches, baguettes, wraps and the like. This has occurred largely due to a perception amongst customers that paperboard is a more environmentally friendly material from which to produce packaging, and also because it enables the retailer to have a greater surface area available for the printing of product information and promotional material on the package without having to adhere multiple additional labels to the package.

[0003] However, these foodstuffs often contain liquids and fatty material. So, to prevent this material soaking into the paperboard, it is typically coated with a layer of polyethylene (PE) or the like on the inner face of the package to act as a barrier to this migration. Unfortunately, PE is not biodegradable, and also makes it more difficult to recycle the paperboard.

[0004] The blanks for forming the carton are made by die cutting standard sized sheets of paperboard in a process which is not continuous, adding to the cost of manufacture.

[0005] To enable the potential purchaser to view the food item they are about to buy, but to protect the food item from contamination and to extend its shelf life, a clear plastic window is also provided in the carton. This window is formed from a separate sheet of plastics material that is glued to the inner face of the carton. Since this is an additional step to the carton manufacturing process, it increases the cost of the carton, as well as making recycling yet more problematic.

[0006] It is therefore desirable to provide an improved method of manufacturing blanks for cartons such as sandwich wedges and baguette wraps. The present invention seeks to overcome, or at least mitigate, the problems of the prior art.

[0007] Accordingly, one aspect of the present invention provides a method of manufacturing a repeating array of blanks for forming packaging articles, the method comprising the steps of:

a) continuously feeding a web of substrate along a press from an input end thereof;
b) securing a continuous web of plastics material to the substrate to form a laminate; and
c) applying perforations and/or cuts to the web of substrate to form said repeating array of blanks,

wherein step a) precedes step b) and step c) precedes or succeeds step b).

[0008] The method may further comprise the step d) of printing the web of substrate with indicia.

[0009] The method may further comprising the step e) of turning the web of substrate after step d) and before step b).

[0010] The web of plastics may be secured to the web of substrate by adhesive.

[0011] The adhesive may be applied to the web of substrate in a further step f), step f) preceding step b).

[0012] In step c) the perforations and/or cuts may be applied only to the web of substrate.

[0013] In step c) at least one cut may be applied to the web of paper to define the edges of at least one aperture or window in the web of substrate.

[0014] The web of plastics material may be a biodegradable plastics material, optionally polymerised lactic acid resin.

[0015] The web of plastics material may have a thickness in the range of 12 μm to 75 μm.

[0016] The substrate may have a mass per unit area in the range of 100 g/m^2 to 200 g/m^2.

[0017] The substrate may be paper.

[0018] The method optionally comprises the further step h) before step b) of applying a corona discharge treatment to the web of plastics material.

[0019] The method optionally comprises the further step i) after step b) and step c) of monitoring the laminate to ensure the web of plastics material, web of substrate, and perforations and/or cut lines are correctly aligned.

[0020] Step c) may precede step b).

[0021] In step c) a shock air die cut unit may be employed to remove substrate encircled by the at least one cut to form the window or aperture.

[0022] The web of substrate may be fed along a path between step c) and step b) in which the or each turn diverts the substrate through less than or equal to 90°.

[0023] Step b) may precede step c) in which case the perforations and/or cuts may be provided in the web of substrate only.

[0024] The web of substrate may be perforated and/or cut from the underside in a back-cutting process.

[0025] The method may further comprise a step of adjusting the tension of one portion of the web of substrate separately from another portion thereof prior to step b).

[0026] The method may further comprise a step of diverting the laminate through in excess of 90°, preferably approaching 180° after step b)

[0027] A second aspect of the present invention provides a press apparatus configured to manufacture a repeating array of blanks for forming packaging articles according to the method of the first aspect of the present invention, the apparatus comprising:

a) a drive system for continuously feeding a web of substrate along the press from an input end thereof;
b) a laminating station for securing a continuous web

of plastics material to the substrate to form a laminate; and

c) a die cut unit for applying perforations and/or cuts to the web of substrate to form said repeating array of blanks;

wherein the laminating station is upstream or downstream of the die cut unit in the direction of feed of the web of substrate.

[0028] The press apparatus may further comprise a print station for printing the substrate with indicia.

[0029] The press apparatus may further comprise a turn bar for turning the web of substrate between the print station and the laminating station.

[0030] The press apparatus may further comprise an adhesive applicator to apply adhesive to the web of substrate or the web of plastics material.

[0031] A further print station may be configured to apply adhesive to the web of substrate, the print station being upstream of the laminating station.

[0032] The die cut unit may be configured to apply the perforations and/or cuts only to the web of substrate.

[0033] The die cut unit may be configured to cut an aperture or window in the web of substrate.

[0034] The press apparatus may further comprise a corona discharge located unit upstream of the laminating unit to treat the web of plastics material.

[0035] The press apparatus may further comprise a camera after the die cut unit and laminating unit configured to monitor the laminate to ensure the web of plastics material, web of substrate, and perforations and/or cut lines are correctly aligned.

[0036] The die cut unit may be located upstream of the laminating station and/or may be a shock air die cut unit.

[0037] A substrate path may be provided between the die cut unit and laminating station comprising at least one roller that diverts the substrate through less than or equal to 90°.

[0038] The laminating station may be located upstream of the die cut unit.

[0039] The cutter of the die cut unit may be located at the underside of the path of the laminate web.

[0040] The press apparatus may further comprise a tension adjuster arranged to adjust the tension of one portion of the web of substrate separately from another portion thereof.

[0041] The press apparatus may further comprise a roller to divert the laminate through in excess of 90°, preferably approaching 180° downstream of the lamination station.

[0042] A third aspect of the present invention provides a web of laminate material comprising a repeating array of blanks for forming packaging articles manufactured according to the method of the first aspect of the present invention.

[0043] A fourth aspect of the present invention provides carton formed from a blank manufactured according to the method of the first aspect of the present invention

[0044] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a partially schematic side view of a prior art apparatus;

Figure 2 is a partially schematic side view of apparatus according to one embodiment of the present invention;

Figure 3 is a partially schematic side view of apparatus according to a further embodiment of the present invention;

Figure 4 is a partially schematic side view of apparatus according to a third embodiment of the present invention.

Figure 4A is a perspective view of a portion of the apparatus of Figure 4.

Figure 5 is a view of a web of blanks formed according to the method of the present invention; and

Figure 6 is a cross-section through the web of Figure 4 along the line 5-5.

Figure 7 is a view of a different web of blanks formed according to the method of the present invention.

[0045] With reference to Figure 1, a known flexographic (flexo) press 10 comprises an unwind roll 12 of a substrate such as paper or paperboard 13 (hereinafter referred to generally as "paper") to be printed, and a series of print stations 14a-14h, there being in this embodiment eight, at which individual ink colours, adhesives and other liquid or semi-liquid coatings can be applied to the paper 13. The number of stations varies from one upwards, but typically 7-12 stations are used for consumer packaging. In addition, it is known to produce a laminate material 22 by feeding a web of plastics film (e.g. OPP (oriented polypropylene) or polyethylene) 16 into the press from a plastics roll 18, applying adhesive to the paper 13 at print station 14h, and pressing the paper 13 and film 16 together at a nip roller 20 to secure them together. The laminate material 22 is then fed into a die cut and master control/sheeting unit 24 to have cuts, and/or perforations provided therein according to the intended use of the laminate. It is then wound onto a rewind roll 26 for transportation or storage.

[0046] Alternatively, it is known for the sheeting unit to cut the reel into multiple sheets of labels for later use.

[0047] This process is typically employed for the production of self-adhesive labels that have a layer of plastic applied thereto for protection (e.g. labels for milk cartons). The labels are secured to a layer of release liner

throughout the process. At the die cut unit, the cutter is set up so as to cut through both layers of the laminate material against the release liner, which is left intact.

[0048] Figure 2 is a schematic side view of an eight colour ultraviolet (UV) flexo press, which has been adapted and reconfigured according to an embodiment of the present invention. Of course, the number of print stations and colours printed may be increased or decreased as desired, and alternative forms of presses, such as rotogravure, litho, or non-UV flexo could be employed. A suitable press that may be adapted is the 4150 model, manufactured by Mark Andy, Inc of St. Louis, Missouri. Like numerals have been used for parts similar to the prior art press 10, but with the addition of the prefix "1".

[0049] The press 110 comprises an unwind roll 112 of substrate 2, in this embodiment of paper 113, typically having a mass per unit area of between 100 and 200 g/m^2. For the manufacture of sandwich cartons for triangular cut sandwiches ("wedge packs"), this would typically be between 150 and 200 g/m^2, e.g. 170 g/m^2 whereas for more flexible tubular filled baguette cartons it would typically be between 100 and 150 g/m^2, e.g. 115 g/m^2, for reasons discussed below. In other embodiments different substrates such as OPP or PLA (polymerised lactic acid), polyester, PET, cellulose or other biodegradable/recyclable films may be used. The illustrated paths of webs through the press 110 have been simplified for the sake of clarity, and would in reality be more complex (see e.g. Figure 4). The press includes a mechanised drive system (not shown) to feed the webs of paper and plastics film through the press under tension. The drive is capable of adjusting the tension of the webs to produce a good quality finished product without the webs tearing.

[0050] The web of paper 113 is fed down the press. At print stations 114a to 114g various colour inks are applied to the top side of the paper 113 (which will ultimately be the outer face of the finished packaging article formed from the blanks of the process according to the present invention). As well as being used to provide product information and marketing information on the outer face of the finished cartons, the printing stations additionally print markers, such as die cut markers, to be used by later stages of the carton production process, that do not themselves form part of the present invention. The print stations 114a to 114g may also apply varnishes and lacquers (typically this would be the seventh station 114g in the case of an eight station press).

[0051] In this embodiment, each print station 114a to 114g has an associated UV curing device to cure one coat of ink before the next is applied. In other embodiments different inks (e.g. water based inks) may be used and the UV curing devices may be dispensed with, or replaced by IR heaters and/or ovens.

[0052] At the penultimate (seventh) station 114g, a camera 130 is also provided directed at a register print area of the web 113 to ensure the alignment of the various ink colours applied at stations 114a to 114g, and to check that markers (Figure 5, 136) used for the later die cut stage are correctly located.

[0053] The web of paper 113 is then fed through a turnbar 132 to turn it over so that the printed face now faces downwards to be fed into the final print station 114h. Lamination adhesive (Figure 5, 146) is applied to the upper face of the web from a storage reservoir (not shown) using an anilox roller, impression cylinder and plate (also not shown) such that an even coating of adhesive 146 is applied over the entire upper face of the web 113, except for areas where windows or apertures are to be cut from web. At these locations, an additional margin of approx. 1 - 5 mm (preferably about 2mm) is left around the intended window area, where no adhesive is applied. This ensures that the adhesive does not find its way onto externally visible areas of the plastics film web 116 when this is applied to the paper web 113, spoiling its appearance.

[0054] By carefully selecting the type of anilox roller used, the amount of adhesive 146 applied to the web 113 is adjusted so the minimum amount that provides a "fibre tear" adhesion (as opposed to a lower level of adhesion that causes delamination of film 116 without damaging the paper fibres of the web 113).

[0055] A plastics film web 116 is fed from a second roll 118 and is fed into the final (eighth) print station 114h via a corona treatment device 134. The corona treatment device 134 promotes the adhesion of the adhesive to the film web 116. The plastics film web 116 is either the same width as the paper web 113, or slightly narrower. A compostable, biodegradable film is preferably used. In particular a "bioplastic" film such as polymerised lactic acid (PLA) resin film is used. Such film is supplied by Polyfilms of Mantes la Ville, France (formerly the Treofan Group of Raunheim, Germany) under the trade name Biophan^{RTM}. An alternative supplier is Sidaplax of Northampton, UK which supplies film under the Earth First^{RTM} trade name. The film web 116 has a typical thickness of 20 μm (the current minimum thickness achievable) and is oriented on a single axis as a result of the extrusion process used in its manufacture. In other embodiments the film web may range in thickness up to 50 μm.

[0056] In the final (eighth) print station, the plastics film web 116 is brought together with the paper web 113 at a laminating station just after the adhesive 146 has been applied thereto. At the laminating station, the two films are fed through nip rollers 120a and 120b so that the plastics film web 116 is secured to the paper web 113 and a laminate 122 of the two materials is formed. In other embodiments it is envisaged that the film web 116 may be heat-adhered to the paper web 113, except where windows are to be cut from the paper web 113. It is also possible that the adhesive may be applied to the film web 116 instead of the paper web 113.

[0057] The laminate is then fed to a die-cut and master control/sheeting unit 124 where perforations and/or cut lines are provided in the paper web 113 only, by "back-cutting" the paper web from the underside. This is

achieved by using a die cutting roller to cut against the film web 116 in the manner of a backing or liner, by carefully controlling the weight applied to the laminate 122 from above so that only the paper web 113 is cut through, leaving the film web 116 intact. With reference to Figure 5 it can be seen that perforations 138 are provided where the blank is to be folded, whereas uninterrupted cut lines 141 are provided where windows 142 are to be provided in the blank. Thus, the material bounded by the cut lines 141 detaches from the laminate 122 under gravity, leaving behind the film web 116 to form a transparent "pane" in the window. The outer periphery of the blank is not cut at this stage. When the process is used for the production of elongate baguette "tubes" the sides of the web 116 are trimmed to the required width as part of the cutting process, however.

[0058] After die cutting, the laminate 122 passes a second camera and strobe 140 in the die cut and master control/sheeting unit 124 to enable an operator to check for registration of the perforations and cuts to the print, and for alignment of the lamination.

[0059] Thereafter the laminate is wound anticlockwise onto a rewind roll 126 (so the printed face is outermost, and can be transferred to another location for the separation, erection and loading of the blanks 150, which processes do not form part of the present invention. Alternatively, one or more of these processes may be carried out in-line with the processes of the present invention, if the complete carton manufacturing process is carried out at a single site. The ink printing steps may be carried out at a separate location from the lamination step, and the die-cutting step may be carried out at a separate location from the lamination step, with rolls of part-processed material being transported as required, within the scope of the present invention.

[0060] Referring to Figures 5 and 6, a section of the finished laminate 122 having three blanks 150 partially formed therein, and a cross-section through one of those blanks are illustrated respectively. The width of the web can be varied, dependent upon the blanks to be manufactured, and blanks may also be produced two or more abreast on the web or staggered in order to make optimum use of the area. Standard machine widths are 333 mm, 406 mm (16") and 508 mm (20").

[0061] In this embodiment, the individual partially formed blanks are those that of a known basic design of sandwich wedge having a clear window 142 on one face. However, such blanks are not, in the prior art, provided in series on an elongate web, and have a separate clear plastics window patch over the window which is adhered to the paper surrounding window only in the immediate vicinity of the window. In the prior art, a separate layer of polyethylene (PE) or the like is co-extruded with the board on its inner face to act as a moisture/fat barrier in the prior art, but does not extend over the window. In addition, in the prior art, score lines are provided where the blank is to be folded, instead of perforations in the paper web.

[0062] By contrast, the plastics film web 116 of the blanks in Figure 5 acts both as a barrier to fats and liquids, as well as acting as the "pane" in the window 142. Furthermore, one layer of plastics film can be heat-sealed to a facing layer in an appropriately designed blank to erect and substantially hermetically seal the carton formed from the blank.

[0063] Figure 7 shows an array of two partially formed blanks 450 for forming a tubular baguette package, having a generally known layout of panels 480a - 480e forming the tube, a pair elongate panels 482a and 482b for forming a heat seal seam along the underside of the pack, and a plurality of panels indicated generally at 484 for forming gusseted ends for heat sealing. As in the blanks of Figure 5, a window is formed in the blanks, with the film laminate being the "pane" in the window. Like parts are labelled the same as in Figure 5, but with the prefix "4" instead of "1".

[0064] Instead of the use of score lines to delineate the edges of the panels, the substrate only is perforated (see e.g. perforation lines 438) to promote folding, whilst also enabling the hermetic sealing of the pack, when erected. In the blank of Figure 7 there is no separation between each successive blank on the web. The blanks are intended to be separated at a different location from the that of the apparatus shown. However, in other embodiments, separation could occur in-line the processes described above and below.

[0065] The preferred use of lower mass/unit area paper for baguette packs stems partially from the need to heat seal four or more laminate layers together when erecting typical baguette pack blanks. Thinner paper enables the heat to be transferred more effectively through the layers, and heat-sealing can be achieved more rapidly.

[0066] Turning now to Figure 3, a further embodiment of the process of the present invention is illustrated. In this embodiment, like numerals are used for equivalent parts, but with the prefix "2". Only differences with respect to the first embodiment are discussed in detail.

[0067] The apparatus may also be used to produce a variety of partially formed blanks including those illustrated in Figures 5, 6 and 7.

[0068] The press further differs from press 110 in that the die cut unit 224 is separated from the master control and sheeting unit 225 and is located upstream of the eighth print station 214h. The die cut unit 224 also incorporates a "shock air" device such as those of the type provided by Gerhardt A/S of Kastrup, Denmark. This comprises a rotary die (not shown) that cuts waste material into small sections and has conduits therein through which compressed air is supplied to actively blow the waste material away from the rest of the web 213 to a suitable collection point, thereby enhancing the separation of waste material, and preventing it building up in areas where it may clog operation of the press 210.

[0069] Since there is no plastics film web 216 in place at the time the die cutting operation takes place, it is possible to both use shock air, and to cut the paper web 213

from above in the conventional manner, to provide both perforations 138 and cut lines 141.

[0070] However, by cutting prior to lamination with the film web 216, the paper web 213 is weakened between the die cut unit 224 and the nip rollers 220a and 220b at the final (eighth) print station 214h where the lamination occurs. Thus, for this section of the process it is desirable to have a feed path that is as straight as possible, and which is as short as possible, in order to reduce the risk of the web tearing (sharp turns in the feed path promote the initiation of tears along perforation lines). Thus, at each turn the paper web 213 is diverted through the minimum possible angle, preferably by less than 90°. In addition, larger rollers are used at turns to minimise the amount of stress the paper web 213 undergoes. Of course the tension of the web also needs to be monitored closely to reduce the risk of tearing.

[0071] At the final (eighth) print station, adhesive and film web 216 application occurs as in the first embodiment. The finished laminate web 236 that is then wound onto the rewind roll 226 is substantially indistinguishable from the laminate 136 of the first embodiment, ready for the further separation and erecting and loading steps required to produce a finished carton. As in the first embodiment, subsequent processes may be carried out in line with the processes of the present invention. In addition the ink printing steps may occur at a different location from the laminating step and the die cutting step may also occur at a different location.

[0072] Referring to Figures 4 and 4A, only the end of a nine station press apparatus 310 according to another embodiment of the present invention is shown. The general layout of the press apparatus 310 is similar to that of the Figure 3 embodiment and like numerals are, where possible, used for like parts, but with the addition of the prefix "3" instead of "2". The press apparatus 310 of this embodiment incorporates a number of developments that have been found to enhance its reliability and improve the quality of the finished laminate web 336. The apparatus may be used to produce a variety of partially formed blanks including those illustrated in Figures 5, 6 and 7.

[0073] Working in a downstream direction, the apparatus differs from that of Fig. 3 in the following ways: the die cut unit 324 incorporates an additional gear driven roller 358 to enhance feed of the substrate 313. The die cut unit 324 further includes a hopper extraction system 360 for continuously removing the waste substrate from the shock air device.

[0074] By cutting a window in the approximate centre of the substrate, it has been found that a consistent amount of tension in the substrate web 313 is difficult to maintain. In turn this can lead to wrinkles forming in the finished laminate. In order to counteract this, a fixed tension bar 362 is provided in the final (ninth) print station 314i immediately upstream of the adhesive application. The tension bar 362 is shown in more detail in Figure 4A and comprises a curved, smooth polished low friction plate (e.g. a stainless steel, chrome plated, or PTFE coated plate) 364. The plate 364 is supported on its rear face by two adjustable supports 366, 368 at each end of the plate and one adjustable support 370 in the centre. Each support may be individually extended or retracted such that one portion of the substrate web 313 may be forced to travel a greater distance over the plate than the remainder to increase or decrease its amount of tension at that location.

[0075] Typically, where a window 141, 441 has been cut from the centre of the substrate web 313, the central support 370 is extended to increase the tension in this portion of the web up to the same level as the sides to prevent wrinkles occurring (cutting the window typically decreases the tension). Of course, in arrangements when the window in the substrate is off-centre, other sections of the plate 364 may be extended to ensure the correct portion of the web is tensioned. Additional supports may be provided for this purpose, or the location(s) of the support altered.

[0076] Various arrangements may be provided to achieve adjustment, but in a preferred embodiment, threaded supports and complementary nuts (not shown) may be used. The bar can, in other embodiments, be replaced by a curved roller to adjust the tension. However, a roller cannot be as easily adjusted as a stationary bar. The bar may also be employed in the press apparatus of Figure 2 or Figure 3.

[0077] The Figure 4 embodiment further differs from that of Figure 3 in that downstream of the nip roller where the film web 316 is laminated with the substrate web 313, a "chiller" UV lamp device 364 is provided to cure the adhesive. The device includes a pair of rollers 366 and 368 that successively divert the laminate web 336 through angles in excess of 90° in opposite senses, preferably approaching 180°. Such a diversion results in the tension in the web being used to force the two web layers into closer contact at the same time as curing occurs. This may advantageously ensure a more accurate register between the layers of the laminate 336 and an improved bond between them. The chiller UV lamp and roller arrangement may also be employed in the press apparatus of Figure 2 or Figure 3. In some embodiments, a single roller diverting the web through greater than 90° may be sufficient.

[0078] It will therefore be appreciated that the present invention provides a cost-effective method and apparatus for forming packaging blanks for foodstuffs, in particular perishable "convenience" foodstuffs such as sandwiches, baguettes, wraps and the like, and other foodstuffs requiring hermetic sealing such as cheese. However, it is envisaged that the method and apparatus could be used for the production of packaging blanks for other purposes, such as pharmaceutical goods, small hardware items such as fasteners, electrical goods, and a multitude of other products normally packaged in blister packs and the like.

[0079] It will be understood that numerous changes

may be made with the scope of the present invention. For example, the inks, lacquers, varnishes adhesives, paper and plastics material used may be altered according to the particular requirement for the end-use of the blanks. For example the laminate may comprise two webs of plastics material instead of paper and plastic. The laminate film may be adhered to the substrate by heat sealing, UV curing, or by having a self adhesive layer provided thereon. One or both of the webs may itself be a laminate. For example it is desirable to use a laminate of PE/EVOH (Ethylene-Vinyl Alcohol Copolymer)/PE in the case of packaging for cheese. The physical layout of the press may be altered to optimise the path of the webs therethrough.

Claims

1. A method of manufacturing a repeating array of blanks for forming packaging articles, the method comprising the steps of:

   a) continuously feeding a web of substrate along a press from an input end thereof;
   b) securing a continuous web of plastics material to the substrate to form a laminate; and
   c) applying perforations and/or cuts to the web of substrate to form said repeating array of blanks,
   wherein step a) precedes step b) and step c) precedes or succeeds step b).

2. The method of claim 1 wherein the web of plastics is secured to the web of substrate by adhesive.

3. The method of claim 2 wherein the adhesive is applied to the web of substrate in a further step f), step f) preceding step b).

4. The method of any preceding claim wherein in step c) the perforations and/or cuts are applied only to the web of substrate, preferably wherein in step c) at least one cut is applied to the web of paper to define the edges of at least one aperture or window in the web of substrate.

5. The method of any preceding claim wherein the substrate is paper.

6. The method of any preceding claim comprising the further step h) before step b) of applying a corona discharge treatment to the web of plastics material.

7. The method of any one of claims 1 to 6 wherein step b) precedes step c), preferably wherein the perforations and/or cuts are provided in the web of substrate only.

8. The method of claim 7 wherein the web of substrate is perforated and/or cut from the underside in a back-cutting process.

9. A press apparatus configured to manufacture a repeating array of blanks for forming packaging articles according to the method of claim 1, the apparatus comprising:

   a) a drive system for continuously feeding a web of substrate along the press from an input end thereof;
   b) a laminating station for securing a continuous web of plastics material to the substrate to form a laminate; and
   c) a die cut unit for applying perforations and/or cuts to the web of substrate to form said repeating array of blanks;
   wherein the laminating station is upstream or downstream of the die cut unit in the direction of feed of the web of substrate.

10. The press apparatus of claim 9 further comprising an adhesive applicator to apply adhesive to the web of substrate or the web of plastics material.

11. The press apparatus of any one of claims 9 to 10 wherein the die cut unit is configured to apply the perforations and/or cuts only to the web of substrate, preferably wherein the die cut unit is configured to cut an aperture or window in the web of substrate.

12. The press apparatus of any one of claims 9 to 11 further comprising a corona discharge unit located upstream of the laminating unit to treat the web of plastics material.

13. The press apparatus of any one of claims 9 to 12 wherein the laminating station is located upstream of the die cut unit.

14. The press apparatus of claim 13 wherein the cutter of the die cut unit is located at the underside of the path of the laminate web.

15. A carton formed from or at least partially formed blank manufactured according to the method of any one of claims 1 to 8.

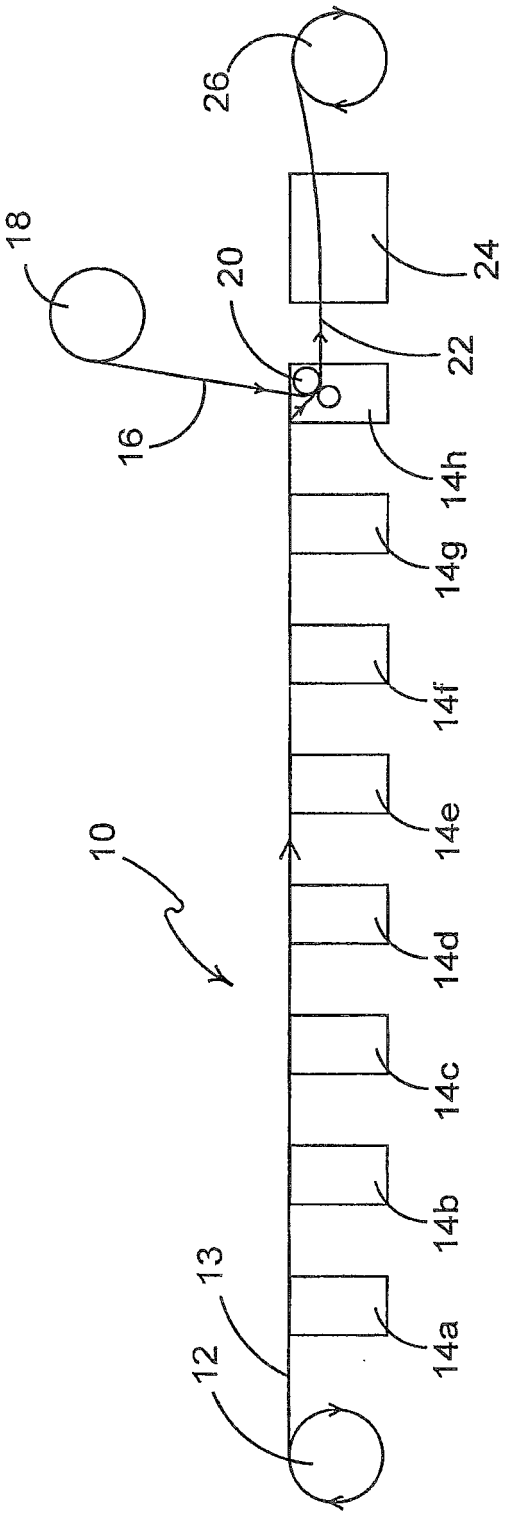

FIGURE 1
Prior Art

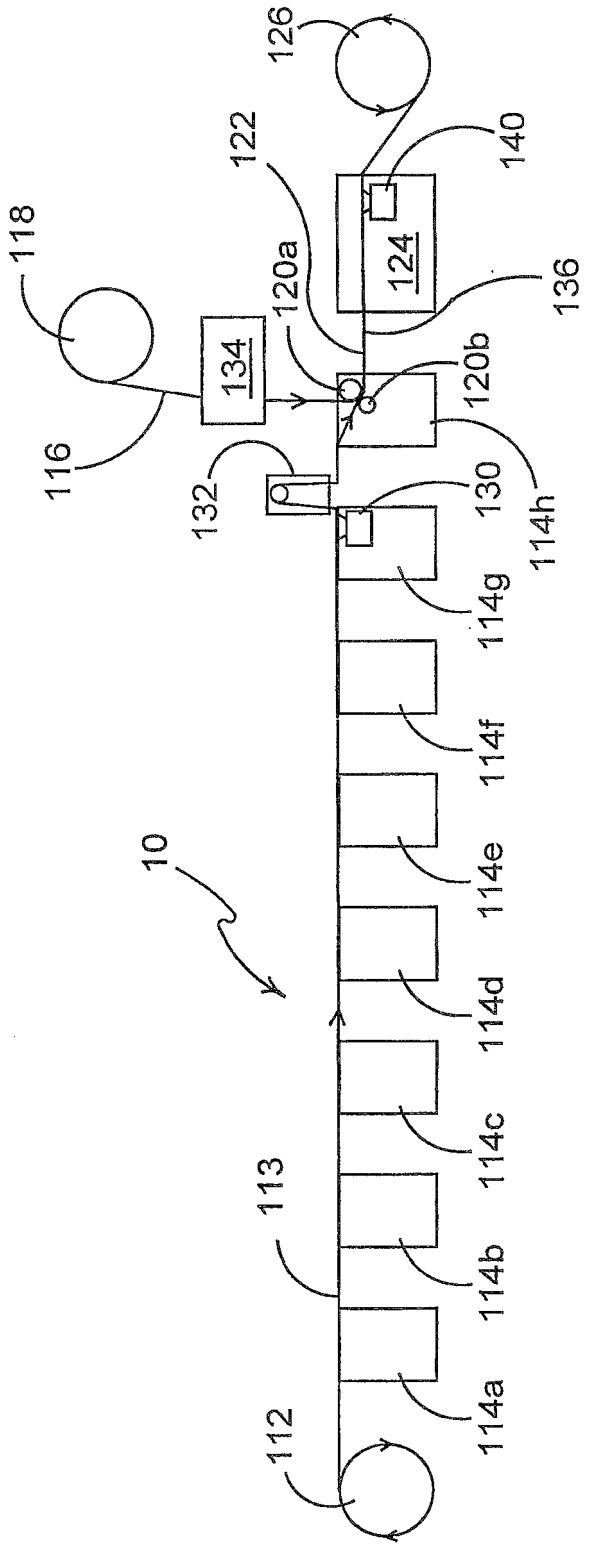
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FIGURE 2

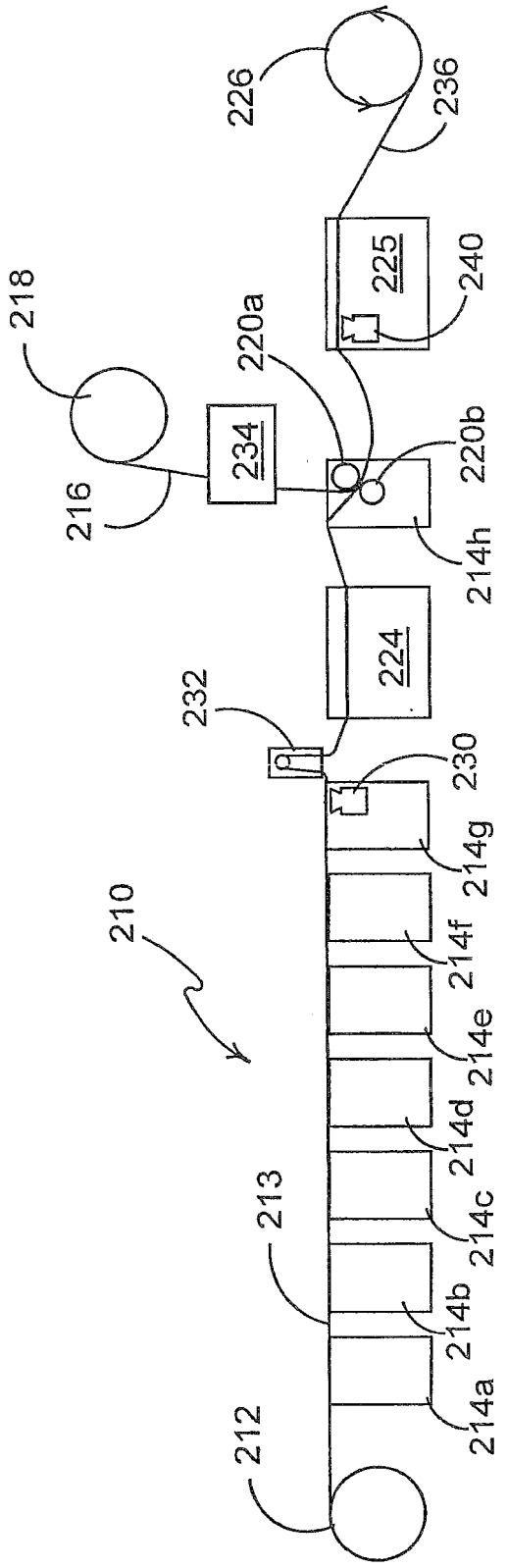
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FIGURE 3

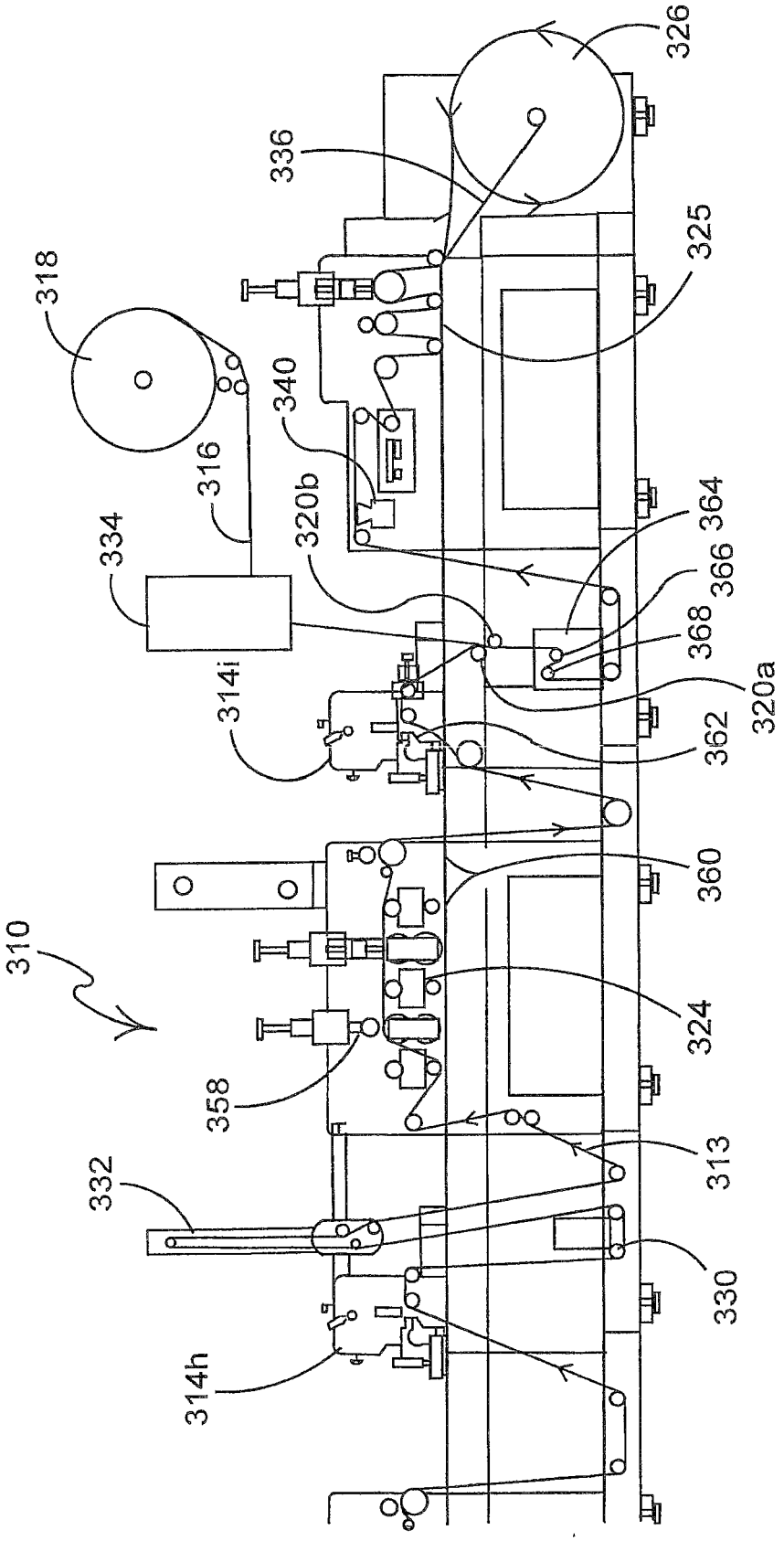
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FIGURE 4

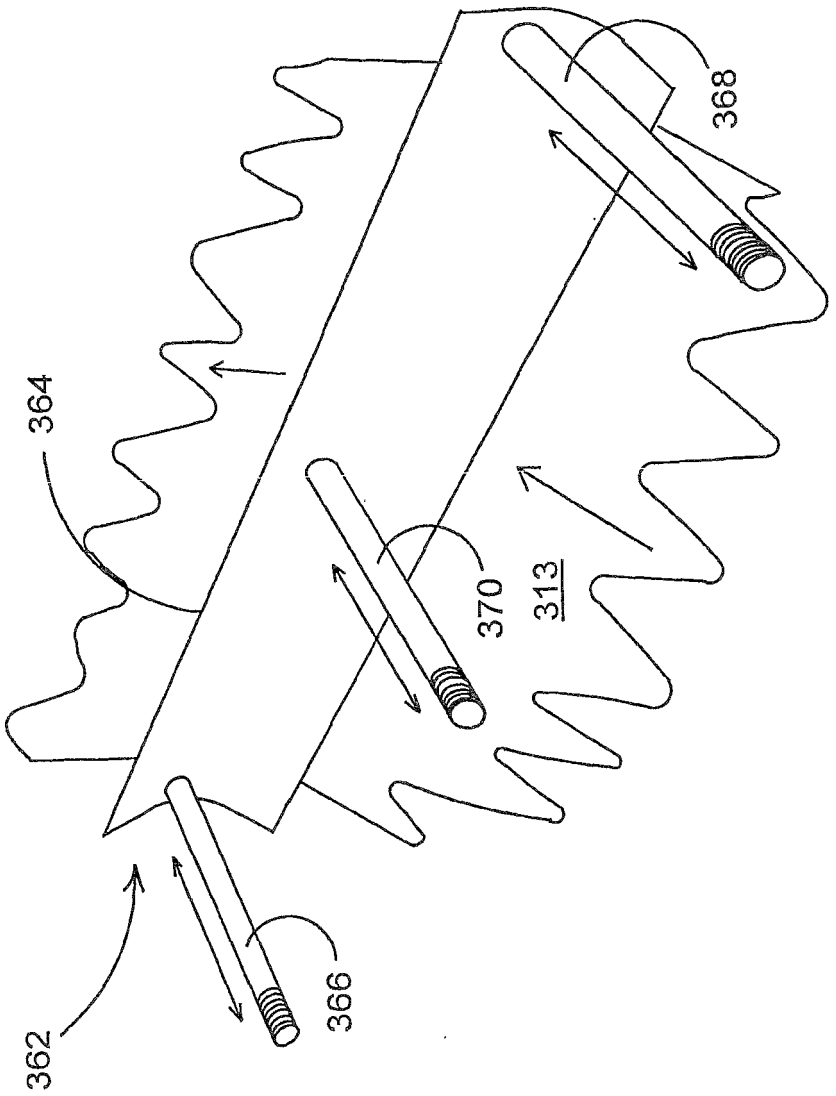


FIGURE 4A

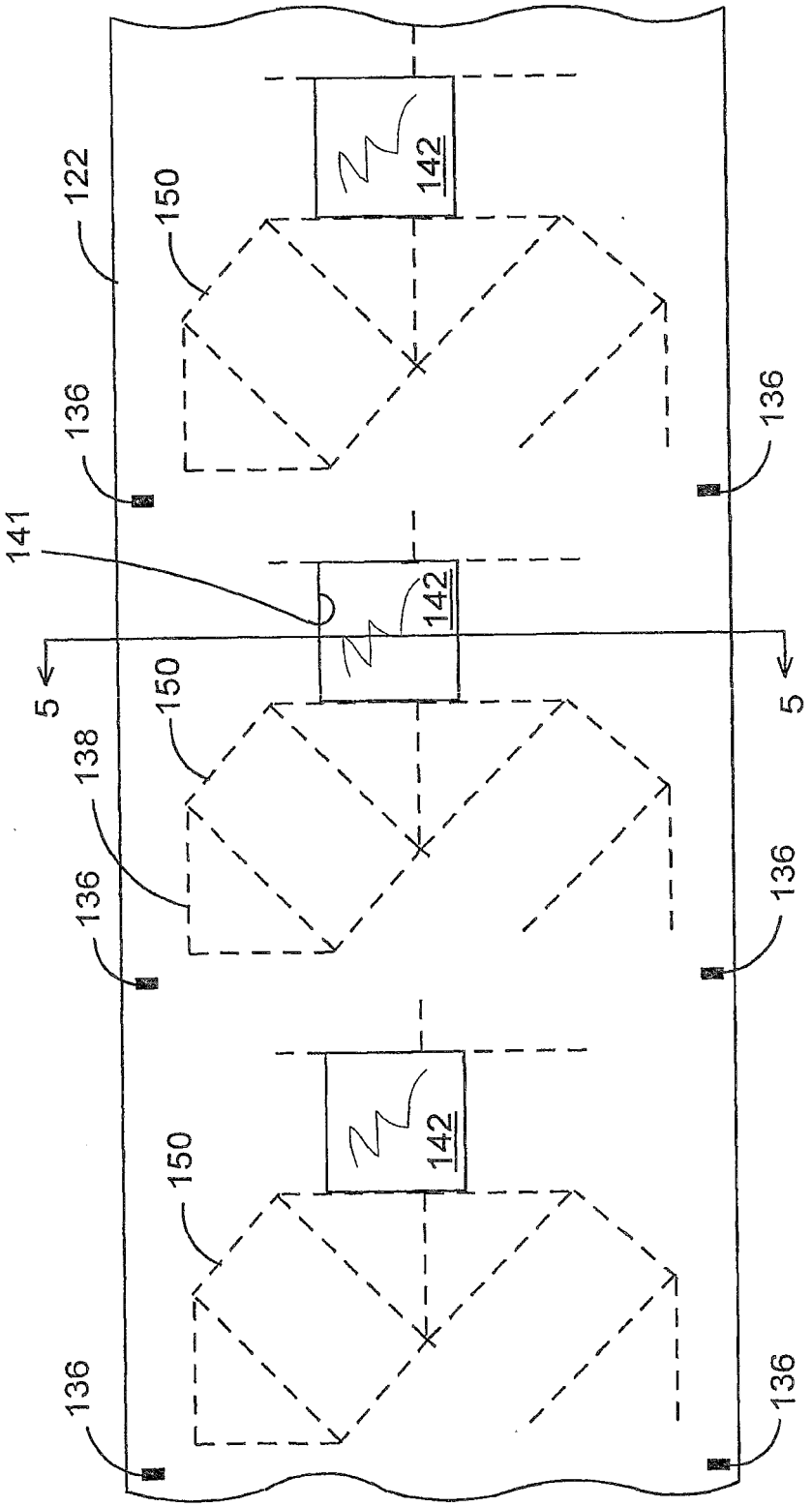


FIGURE 5

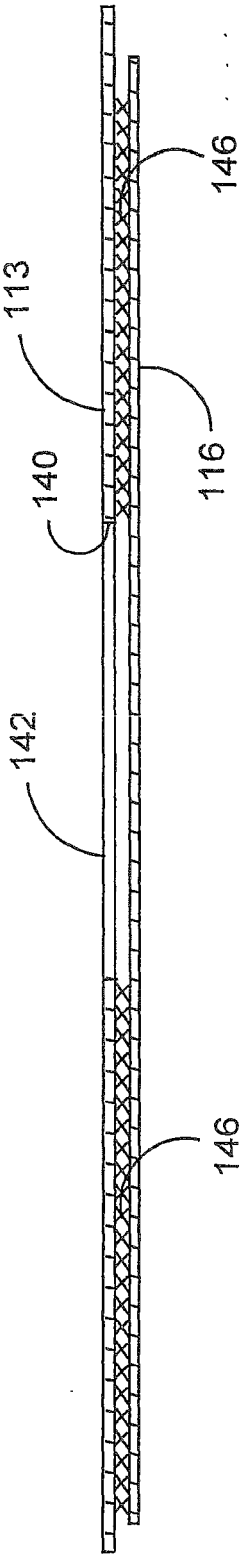
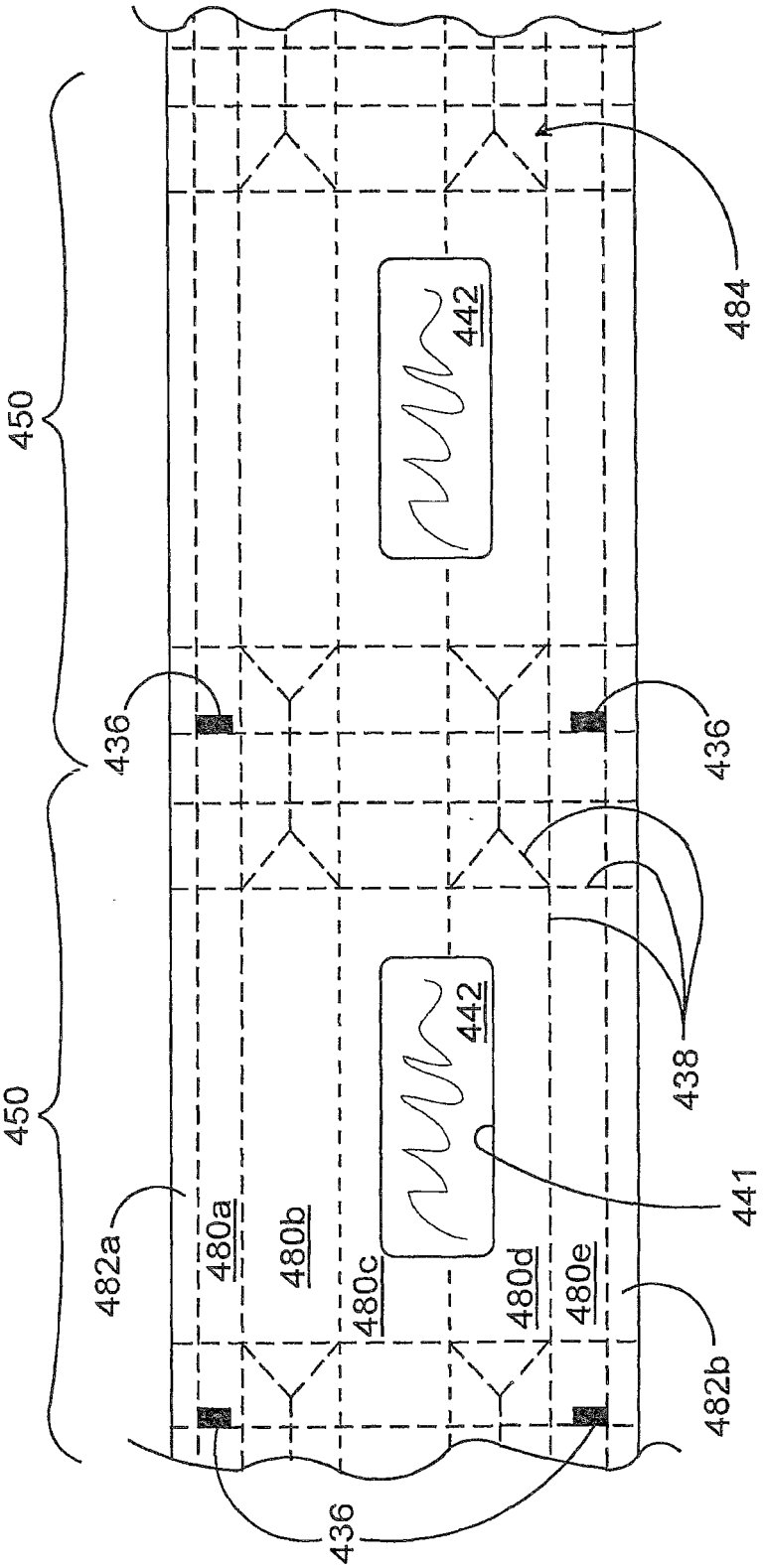


FIGURE 6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482b

FIGURE 7

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EUROPEAN SEARCH REPORT

Application Number
EP 15 19 7158

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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B31B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 January 2016	Johne, Olaf

CATEGORY OF CITED DOCUMENTS

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