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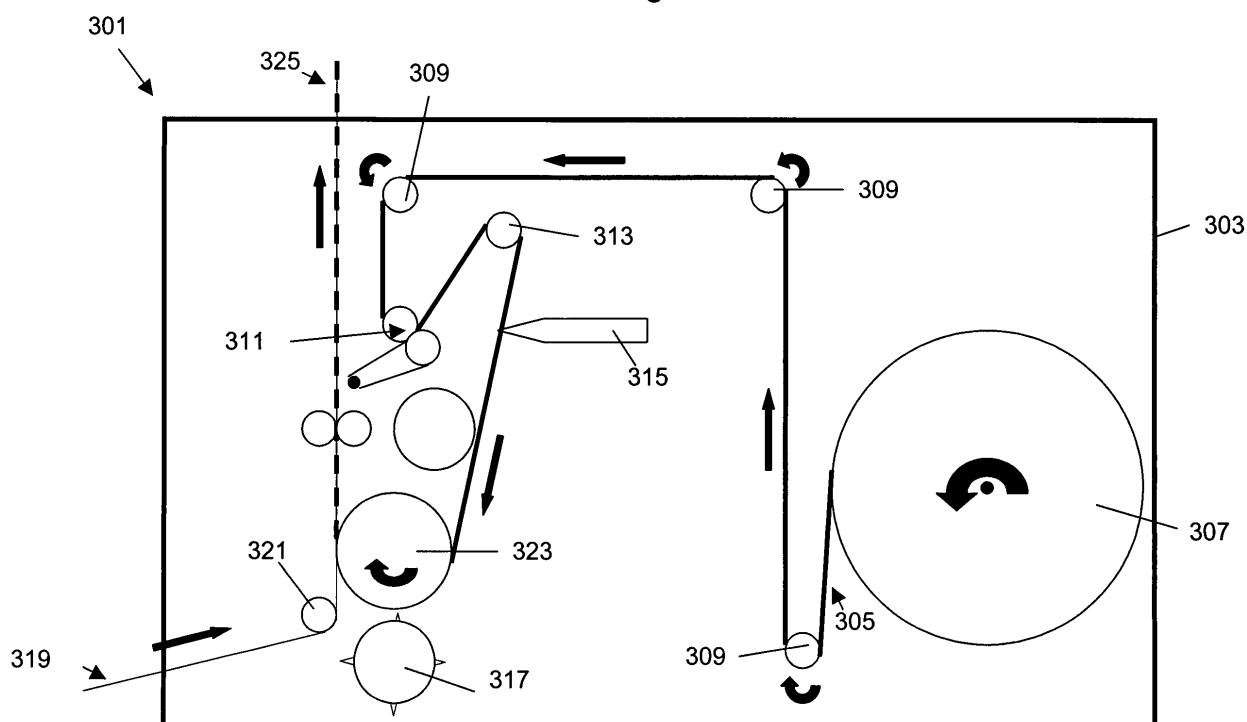
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(54) **Patch applicator apparatus and method**

(57) There is provided an apparatus and method for the spaced application of patches of a first material 305 onto a web of a second material 319. A web of the first material 305 is introduced. Glue is applied to the web of the first material. The glued web of the first material 305 is cut, to form glued patches of the first material. A web of the second material is introduced. Finally, the glued

patches of the first material are applied to the web of the second material 319. The method and apparatus may be particularly useful for the manufacture of smoking articles. The method and apparatus may be particularly useful for the application of heat conducting patches to a web of paper-like material during the manufacture of smoking articles.

Fig. 3



Description

[0001] The present invention relates to an apparatus and method for spaced application of patches of a first material onto a web of a second material. Particularly, but not exclusively, the present invention relates to an apparatus and method for spaced application of heat conducting patches onto a web of paper-like material, for use in the manufacture of smoking articles.

[0002] Throughout the specification, the term "smoking articles" should be inferred to mean, not only conventional smoking articles, in which the substrate, usually tobacco, is combusted, but also other smoking articles, for example heated smoking articles, in which the substrate is heated rather than combusted and which rely on aerosol formation from the heated substrate, and distillation-based smoking articles.

[0003] The method and apparatus may be used in a number of different applications. For example, in the manufacture of packaging of some consumer goods, it may be necessary to apply spaced patches of one packaging material onto another packaging material. In the manufacture of smoking articles, it may be necessary to apply spaced patches of one material onto a web of paper-like material, such as cigarette paper, for example for the addition of flavourings, such as menthol, or for labelling. One material may be polypropylene.

[0004] The method and apparatus are, however, particularly useful in the manufacture of heated smoking articles such as those described in granted patents US4,714,082, US5,819,751 and US5,040,551, distillation-based smoking articles such as those described in pending patent application EP07253142.9, and heated cigarettes such as those marketed by the R.J. Reynolds Tobacco Company under the brand names Premier® and Eclipse®.

[0005] According to the invention, there is provided apparatus for spaced application of patches of a first material onto a web of a second material, the apparatus comprising: means for introducing a web of the first material; a glue applicator for applying glue to the web of the first material; a cutter comprising at least one cutter blade for cutting the glued web of the first material to form glued patches of the first material; means for introducing the web of the second material; and a transfer drum for applying the glued patches of the first material to the web of the second material.

[0006] The term "glue" used in this specification, is used to mean any substance that causes something to adhere, including adhesives, pastes, cements and other sticky substances.

[0007] Preferably, the glue applicator is arranged to apply spaced glue areas to the web of the first material. This is advantageous because the glue need not cover all the web of the first material, so that only some of each patch of the first material is applied with glue. In addition, this is advantageous because glue can be avoided along the lines at which the cutter will cut the web of the first material. This prevents the cutter becoming clogged with glue. The spacing of the glue areas may be equal to the required first material patch size. Alternatively, the glue applicator may be arranged to apply a continuous stream of glue to the web of the first material.

[0008] Preferably, the apparatus further comprises drive means for setting the input speed of the web of the first material. The input speed of the web of the first material may determine the size of each glued patch of the first material.

[0009] Preferably, the transfer drum is arranged to receive the web of the second material at a faster speed than the glued patches of the first material, such that the glued patches of the first material are spaced on the web of the second material. Thus, the spacing of the glued patches of the first material can be controlled by the relative speeds of the web of the second material and the glued patches of the first material, at the transfer drum. Therefore, in the embodiment in which drive means is provided for setting the input speed of the web of the first material, the size of each glued patch of the first material may be set by the drive means and the spacing of the glued patches of the first material on the second material may be set by the speed of the web of the second material relative to the input speed of the first material.

[0010] In one preferred embodiment, the apparatus further comprises a rotatable cam for feeding the glued patches of the first material towards the transfer drum, the cam being arranged to continually shift the incoming glued patches of the first material between a first longer path and a second shorter path, thereby alternately accelerating and decelerating the glued patches as the glued patches are fed towards the transfer drum. This allows the glued patches to be unequally spaced on the web of the second material. Thus, the size and rotational speed of the cam determines the spacing of the glued patches on the web of the second material.

[0011] The apparatus may comprise further cams, if more than two different spacings are required between glued patches of the first material on the web of the second material.

[0012] In one embodiment, the apparatus further comprises perforation means for perforating the web of the second material.

[0013] In one embodiment, the cutter is arranged to receive the glued web of the first material at a constant speed. In that embodiment, preferably, the cutter blade or blades of the cutter are evenly spaced, so that the glued patches of the first material are one size. Alternatively, the cutter blade or blades of the cutter may be unevenly spaced, so that the glued patches of the first material are more than one size. Preferably, the cutter blades move at the same speed as the glued web of the first material. This assists with forming a neat cut.

[0014] In an alternative embodiment, the glued web of the first material is arranged to alternately accelerate and decelerate as the glued web of the first material enters the cutter. This may be achieved by locating the cutter downstream

of a cam. If more than one cam is used, the glued web of first material may have a variety of speeds as it enters the cutter.

[0015] In that embodiment, the cutter blade or blades of the cutter may be evenly spaced, so that the glued patches of the first material are more than one size. Alternatively, the cutter blades may be unevenly spaced, in accordance with the acceleration and deceleration of the web of the first material, so that the glued patches of the first material are one size. Preferably, the cutter blades move at the same speed as the glued web of the first material. This assists with forming a neat cut.

[0016] Preferably, the means for introducing the web of the first material is a drum. The drum may comprise a roller. Preferably, the means for introducing the web of the second material is a drum. The drum may comprise a roller.

[0017] The web of first material may comprise a ribbon, a strip or a band. The web of second material may comprise a ribbon, a strip or a band. The first and second materials may be the same material. More preferably, however, the first and second materials are different materials. Preferably, the first and second materials are generally sheet-like, having any suitable width, length and thickness. In one preferred embodiment, the first material is a material which is an efficient conductor of heat. The first material may be a metallic material. The first material may be aluminium foil. In one preferred embodiment, the second material is a paper-like material. The second material may be cigarette paper.

[0018] According to the invention, there is also provided apparatus for spaced application of patches of a first material onto a web of a second material, the apparatus comprising: means for introducing a web of the first material; a glue applicator for applying glue to the web of the first material; means for introducing a web of the second material; and cutting and transferring means, the cutting and transferring means being arranged to receive the glued web of the first material, to cut the glued web of the first material to form glued patches of the first material and to apply the glued patches of the first material to the web of the second material. The apparatus may further comprise a rotatable cam at the input to the cutting and transferring means, the rotatable cam being arranged to alternately accelerate and decelerate the glued web of the first material as it inputs the cutting and transferring means, resulting in two different spacings between glued patches of the first material on the web of the second material.

[0019] According to the invention, there is also provided a method for spaced application of patches of a first material onto a web of a second material, the method comprising the steps of: introducing a web of the first material; applying glue to the web of the first material; cutting the glued web of the first material to form glued patches of the first material; introducing the web of the second material; and applying the glued patches of the first material to the web of the second material.

[0020] Preferably, the step of applying glue to the web of the first material comprises applying spaced glue areas to the web of the first material. This is advantageous because the glue need not cover all the web of the first material. In addition, this is advantageous because glue can be avoided along the line at which the cutter will cut the web. This prevents the cutter becoming clogged with glue. The spacing of the glue areas may be equal to the required first material patch size. Alternatively, the step of applying glue to the web of the first material may comprise applying a continuous stream of glue to the web of the first material.

[0021] Preferably, the step of applying the glued patches of the first material to the web of the second material comprises applying the glued patches of the first material spaced apart on the web of the second material. The glued patches of the first material may be equally spaced on the web of the second material. Alternatively, the glued patches of the first material may be unequally spaced on the web of the second material.

[0022] The glued patches of the first material may all be the same size. Alternatively, the glued patches of the first material may be different sizes.

[0023] The web of first material may comprise a ribbon, a strip or a band. The web of second material may comprise a ribbon, a strip or a band. The first and second materials may be the same material. More preferably, however, the first and second materials are different materials. Preferably, the first and second materials are generally sheet-like, having any suitable width, length and thickness. In one preferred embodiment, the first material is a material which is an efficient conductor of heat. The first material may be a metallic material. The first material may be aluminium foil. In one preferred embodiment, the second material is a paper-like material. The second material may be cigarette paper.

[0024] According to the invention, there is also provided apparatus for spaced application of heat conducting patches onto a web of paper-like material, for use in the manufacture of smoking articles, the apparatus comprising: means for introducing a web of heat conducting material; a glue applicator for applying glue to the web of heat conducting material; a cutter for cutting the glued web of heat conducting material to form glued patches of heat conducting material; means for introducing the web of paper-like material; and a transfer drum for applying the glued patches of heat conducting material to the web of paper-like material.

[0025] In one embodiment, the apparatus further comprises perforation means for perforating the web of paper-like material.

[0026] The web of heat conducting material may comprise a ribbon, a strip or a band. The web of paper-like material may comprise a ribbon, a strip or a band. Preferably, the heat conducting material and the paper-like material are generally sheet-like, having any suitable width, length and thickness. In one preferred embodiment, the heat conducting material is a metallic material. The heat conducting material may be aluminium foil. In one preferred embodiment, the

paper-like material is cigarette paper.

[0027] According to the invention, there is also provided a method for spaced application of heat conducting patches onto a web of paper-like material, for use in the manufacture of smoking articles, the method comprising the steps of: introducing a web of heat conducting material; applying glue to the web of heat conducting material; cutting the glued web of heat conducting material to form glued patches of heat conducting material; introducing the web of paper-like material; and applying the glued patches of heat conducting material to the web of paper-like material.

[0028] The web of heat conducting material may comprise a ribbon, a strip or a band. The web of paper-like material may comprise a ribbon, a strip or a band. Preferably, the heat conducting material and the paper-like material are generally sheet-like, having any suitable width, length and thickness. In one preferred embodiment, the heat conducting material is a metallic material. The heat conducting material may be aluminium foil. In one preferred embodiment, the paper-like material is cigarette paper.

[0029] Features described in relation to one aspect of the invention may also be applicable to another aspect of the invention.

[0030] The invention will be further described, by way of example only, with reference to the accompanying drawings in which:

Figure 1	shows a distillation-based smoking article;
Figures 2a, 2b and 2c	show the steps performed by the apparatus of the invention;
Figure 3	shows a schematic view of a first embodiment of the apparatus; and
Figure 4	shows a schematic view of a second embodiment of the apparatus.

[0031] As discussed above, the invention provides an apparatus and method for spaced application of patches of a first material onto a web of a second material. One particularly useful application of the apparatus and method of the invention is the application of heat conducting patches, for example of aluminium foil, onto a web of paper-like material, for example of cigarette paper, for use in the manufacture of heated smoking articles such as those described in granted patents US4,714,082, US5,819,751 and US5,040,551, distillation-based smoking articles such as those described in pending patent application EP07253142.9, and heated cigarettes such as those marketed by the R.J. Reynolds Tobacco Company under the brand names Premier® and Eclipse®.

[0032] The distillation-based smoking article described in EP07253142.9 is shown in Figure 1. The smoking article 101 comprises a combustible heat source 103, an aerosol-generating substrate 105, an elongate expansion chamber 107 and a mouthpiece 109 in abutting coaxial alignment, which are overwrapped in an outer wrapper of cigarette paper 111. The combustible heat source 103 is cylindrical and comprises a central airflow channel 113 which extends longitudinally through the heat source 103. The aerosol-generating substrate 105 is located immediately downstream of the combustible heat source 103 and comprises a cylindrical plug of homogenised tobacco material 115 comprising glycerine as aerosol former and circumscribed by filter plug wrap 117. A heat-conducting element 119, consisting of a tube of aluminium foil, surrounds and is in contact with a rear portion of the combustible heat source 103 and an abutting front portion of the aerosol-generating substrate 105. The elongate expansion chamber 107 is located downstream of the aerosol-generating substrate 105 and comprises a cylindrical open-ended tube of cardboard 121. The mouthpiece 109 is located downstream of the expansion chamber 107 and comprises a cylindrical plug of cellulose acetate tow 123 circumscribed by filter plug wrap 125. In this embodiment, the outer wrapper of cigarette paper 111 includes perforations 127 around its circumference, just upstream of the heat conducting element 119. The smoking article 101 is circumscribed by tipping paper 129.

[0033] The apparatus and method of the present invention may be used during the manufacture of the smoking articles of Figure 1, for application of aluminium foil to cigarette paper, to form the heat conducting elements 119.

[0034] Figures 2a, 2b and 2c show the steps of one embodiment of the method of the invention, for application of aluminium foil to cigarette paper, to form the heat conducting elements 119 on smoking articles such as the smoking article illustrated in Figure 1.

[0035] Referring to Figure 2a, firstly, glue areas 201 are periodically applied to a web of first material in the form of aluminium foil web 203. In this embodiment, the width 501 of the web 203 corresponds to the circumference of the finished smoking articles. In this embodiment, the periodicity 503 of the glue areas corresponds to the desired length of each heat conducting element 119 in the finished smoking article (see Figure 1). Alternatively, a continuous stream of glue may be applied to the aluminium foil web 203.

[0036] Referring to Figure 2b, secondly, the aluminium foil web is cut into individual glued patches of the first material in the form of aluminium patches 205, each of which will form a heat conducting element 119 in the finished smoking article. Each patch 205 includes a glued area 207. In this embodiment, the width 501 of each patch 205 corresponds to the circumference of the finished smoking articles. In this embodiment, the height 503 of each patch 205, which is equal to the periodicity of the glue areas, corresponds to the desired length of the heat conducting element 119 in the finished smoking article (see Figure 1).

[0037] Referring to Figure 2c, finally, the aluminium patches 205 are applied to cigarette paper 209. In this embodiment, the width 501+505 of the cigarette paper 209 corresponds to the circumference 501 of the finished smoking articles plus a margin 505 for gluing. Perforation lines 211, corresponding to perforations 127 in the finished smoking article (see Figure 1) may also be applied.

[0038] In Figure 2c, the patches 205 are not equally spaced on the cigarette paper 209. In fact, there are two different spacings 507 and 509 between the patches. This arrangement is particularly advantageous, as will now be described. It is common in smoking article manufacture to form double length rods of smoking material. Those double length rods are then cut in two, a double length filter mouthpiece is inserted in the centre and secured with tipping paper, and then the entire double length smoking article is cut to form two smoking articles. In this arrangement, each double length rod of smoking material must have the components in one half arranged in reverse order from the components in the other half. This is so that, when the filter mouthpiece is inserted in the centre, two correct smoking articles are produced. Thus, the aluminium patches 205 on the cigarette paper will need to have two different spacings, as shown in Figure 2c. The first spacing 507 corresponds to the spacing between aluminium patches in one double length rod. The second spacing 509 corresponds to the spacing between heat conducting patches on adjacent rods. The spacings of the patches 205 on the cigarette paper 209 will be discussed further below.

[0039] Figure 3 shows a schematic view of a first embodiment of the apparatus of the invention. The apparatus 301 comprises backplate 303, means for introducing the aluminium foil web in the form of aluminium foil input 305 from aluminium foil feed roll 307 and aluminium foil feed drums 309, drive means 311, further drum 313 and glue applicator 315, a cutter in the form of patch cutting drum 317, means for introducing the cigarette paper web in the form of paper input 319 and paper input drum 321, a transfer drum in the form of patch transfer drum 323, and paper output 325. In Figure 3, the thick line is used to indicate the web of aluminium foil, the thin line is used to indicate the web of cigarette paper, and the thin line with spaced thick portions is used to indicate the web of cigarette paper with applied patches of aluminium foil.

[0040] Operation of the apparatus of Figure 3 is as follows. Aluminium foil web is fed from feed roll 307 to the input 305. Then, the aluminium foil web is fed in the direction of the arrows via feed drums 309 to the drive means 311. The drive means 311 set the speed of the incoming web, according to the required speed at the patch cutting drum 317 and the patch transfer drum 323. After the drive means 311, the aluminium foil web is fed towards a further drum 313. After that drum, the glue applicator 315 applies glue areas 201 (or a continuous stream of glue) to the web, as shown in Figure 2a. The glue applicator 315 is constantly in contact with the web as it passes. If areas of glue are required, rather than a continuous stream of glue, this may be set, for example, by periodically varying the pressure of the glue in the glue applicator. This may be controlled electronically.

[0041] Then, the glued aluminium foil web proceeds towards the patch cutting drum 317 and the patch transfer drum 323. The patch cutting drum 317 comprises at least one blade parallel to the drum axis, for cutting the aluminium foil web substantially perpendicular to its length. As the glued aluminium foil web passes between the patch cutting drum 317 and the patch transfer drum 323, the web is cut into individual aluminium patches 205, as shown in Figure 2b. The blade travels alongside the aluminium foil web as it cuts it, thereby ensuring a neat cut. The individual patches (glue side out) pass in a clockwise direction around the patch transfer drum. They are adhered to the drum 323 by suction.

[0042] Cigarette paper is fed into paper input drum 321 from a paper feed roll (not shown). As the paper comes into contact with the individual aluminium patches 205 on the patch transfer drum 323, the patches are applied to the paper. The glue may then be dried by heaters (not shown).

[0043] In this embodiment, the length of each patch is determined by the input speed of the web into the patch cutting drum 317 and the patch transfer drum 323. This speed is set by the drive means 311. Typically, the speed of the patch transfer drum 323 is slower than the input speed of the web. There is therefore some slippage of the web as passes around the patch transfer drum 323. The speed of the patch transfer drum, particularly relative to the speeds of the paper input and the aluminium foil input will determine the periodicity of the individual aluminium patches 205 on the cigarette paper.

[0044] Figure 4 shows a schematic view of a second embodiment of the apparatus of the invention. Where appropriate, the same reference numerals as in Figure 3 are used. In addition, just as in Figure 3, the thick line is used to indicate the web of aluminium foil, the thin line is used to indicate the web of cigarette paper, and the thin line with spaced thick portions is used to indicate the web of cigarette paper with applied patches of aluminium foil. The apparatus 301' comprises backplate 303, aluminium foil input 305 from aluminium foil feed roll 307, aluminium foil feed drums 309, drive means 311, glue applicator 315, patch cutting drum 317, paper input 319, paper input drum 321, patch transfer drum 323 and paper output 325. In this embodiment, however, the apparatus additionally includes cam 401 (shown schematically in Figure 4).

[0045] Operation of the apparatus of Figure 4 is as follows. Aluminium foil web is fed from feed roll 307 to the input 305. Then, the aluminium foil web is fed in the direction of the arrows via feed drums 309 to the drive means 311. After the drive means 311, the aluminium foil web is fed past the glue applicator 315, which applies glue areas 201, or a continuous glue stream, to the web, as shown in Figure 2a. Again, the input speed of the web is set by the drive means 311.

[0046] Then, the glued aluminium foil web proceeds towards the patch cutting drum 317 and the patch transfer drum 323 via the cam 401. As the glued aluminium foil web passes between the patch cutting drum 317 and the patch transfer drum 323, the web is cut into individual aluminium patches 205, as shown in Figure 2b. Again, the cutting blade travels alongside the aluminium foil web, at the same speed, to ensure a neat cut. The individual patches (glue side out) pass

in a clockwise direction around the patch transfer drum. They are adhered to the drum 323 by suction.

[0047] Cigarette paper is fed into paper input drum 321 from a paper feed roll (not shown). As the paper comes into contact with the individual aluminium patches 205 on the patch transfer drum 323, the patches are applied to the paper, as shown in Figure 2c.

[0048] The embodiment in Figure 4 further includes a perforation drum 407, and two additional glue applicators 409. The perforation drum 407 is used to perforate the cigarette paper, so as to form the perforations 127 in the finished smoking article. The additional glue applicators 409 are used to apply glue for later steps in the manufacturing process. The perforation drum and the additional glue applicators may also be provided in the Figure 3 embodiment.

[0049] In the embodiment of Figure 3, the length of each aluminium foil patch is determined by the input speed as set by the drive means 311, and the periodicity of the aluminium foil patches on the cigarette paper is set simply by the relative speeds of the aluminium foil web and paper inputs. Clearly, the faster the cigarette paper is proceeding with respect to the aluminium foil web input, the larger the spacing of the aluminium foil patches on the paper. In that case, with a constant speed, the aluminium foil patches will be evenly spaced on the paper (i.e. not as shown in Figure 2c). In order to have a varied periodicity, the speeds of the two inputs must be constantly varied.

[0050] The cam in the Figure 4 embodiment allows varied periodicity, like that shown in Figure 2c, without the need to vary the input speeds of the paper and aluminium foil web. Instead, the cam 401 rotates thereby moving the foil input to the patch transfer drum 323 between the two positions 403, 405. As the foil is diverted by the cam (route 403 in Figure 4), the input to the patch transfer drum will be decelerated. Effectively, web feeding into the drum 323 is pulled back under tension as the web reaches route 403. So, there will be a larger space between aluminium foil patches. As the foil returns to its usual path because the cam has rotated away from the foil (route 405 in Figure 4), the input to the patch transfer drum will be accelerated. Effectively, the tension in the web is released. So, there will be a smaller space between aluminium foil patches. This allows the apparatus to produce a patched cigarette paper web, like that shown in Figure 2c, with alternating large and small spaces between patches, without variation of the input feeds, and only with constant rotation of a cam.

[0051] The size and rotation speed of the cam 401 may be varied to vary the size of the two different spacings (507 and 509) between patches. If more than two different spacings are required, further cams can be used, as necessary.

[0052] Since the patch cutting drum 317 in Figure 4 is between the cam 401 and the transfer drum 323, the spacings of the blades on the cutting drum must be considered carefully. The blade speed ought to match the web speed, to ensure a neat cut of the web and to prevent damage to the web. If the blades are equally spaced, the resulting patches will be different sizes, because of the varying input speed of the foil web. On the other hand, if the blades are unequally spaced, appropriately to take account of the varying input speed, the resulting patches may all be one size.

[0053] The invention has been described in relation to the application of spaced application of patches of a first material onto a web of a second material, for use in the manufacture of smoking articles. However, the invention may be used wherever patches of one material are required on another material. One application of this is in the packaging of some consumer goods, for example chewing gum packaging. The two materials may comprise a ribbon, a strip or a band. The two materials are generally sheet-like and may have any suitable length, width and thickness. The two material webs are preferably able to be wound onto a roller or drum. The first and second materials may be different materials or the same material.

Claims

1. Apparatus for spaced application of patches of a first material onto a web of a second material, the apparatus comprising:

- means for introducing a web of the first material;
- a glue applicator for applying glue to the web of the first material;
- a cutter comprising at least one cutter blade for cutting the glued web of the first material to form glued patches of the first material;
- means for introducing the web of the second material; and
- a transfer drum for applying the glued patches of the first material to the web of the second material.

2. Apparatus according to claim 1, wherein the glue applicator is arranged to apply spaced glue areas to the web of the first material.

3. Apparatus according to claim 1 or claim 2, further comprising drive means for setting the input speed of the web of the first material.

4. Apparatus according to any preceding claim, wherein the transfer drum is arranged to receive the web of the second material at a faster speed than the glued patches of the first material, such that the glued patches of the first material are spaced on the web of the second material.

5. Apparatus according to any preceding claim, further comprising a rotatable cam for feeding the glued patches of the first material towards the transfer drum, the cam being arranged to continually shift the incoming glued patches of the first material between a first longer path and a second shorter path, thereby alternately accelerating and decelerating the glued patches as the glued patches are fed towards the transfer drum.

6. Apparatus according to any preceding claim, further comprising perforation means for perforating the web of the second material.

7. A method for spaced application of patches of a first material onto a web of a second material, the method comprising the steps of:

introducing a web of the first material;
applying glue to the web of the first material;
cutting the glued web of the first material to form glued patches of the first material;
introducing the web of the second material; and
applying the glued patches of the first material to the web of the second material.

8. Apparatus for spaced application of heat conducting patches onto a web of paper-like material, for use in the manufacture of smoking articles, the apparatus comprising:

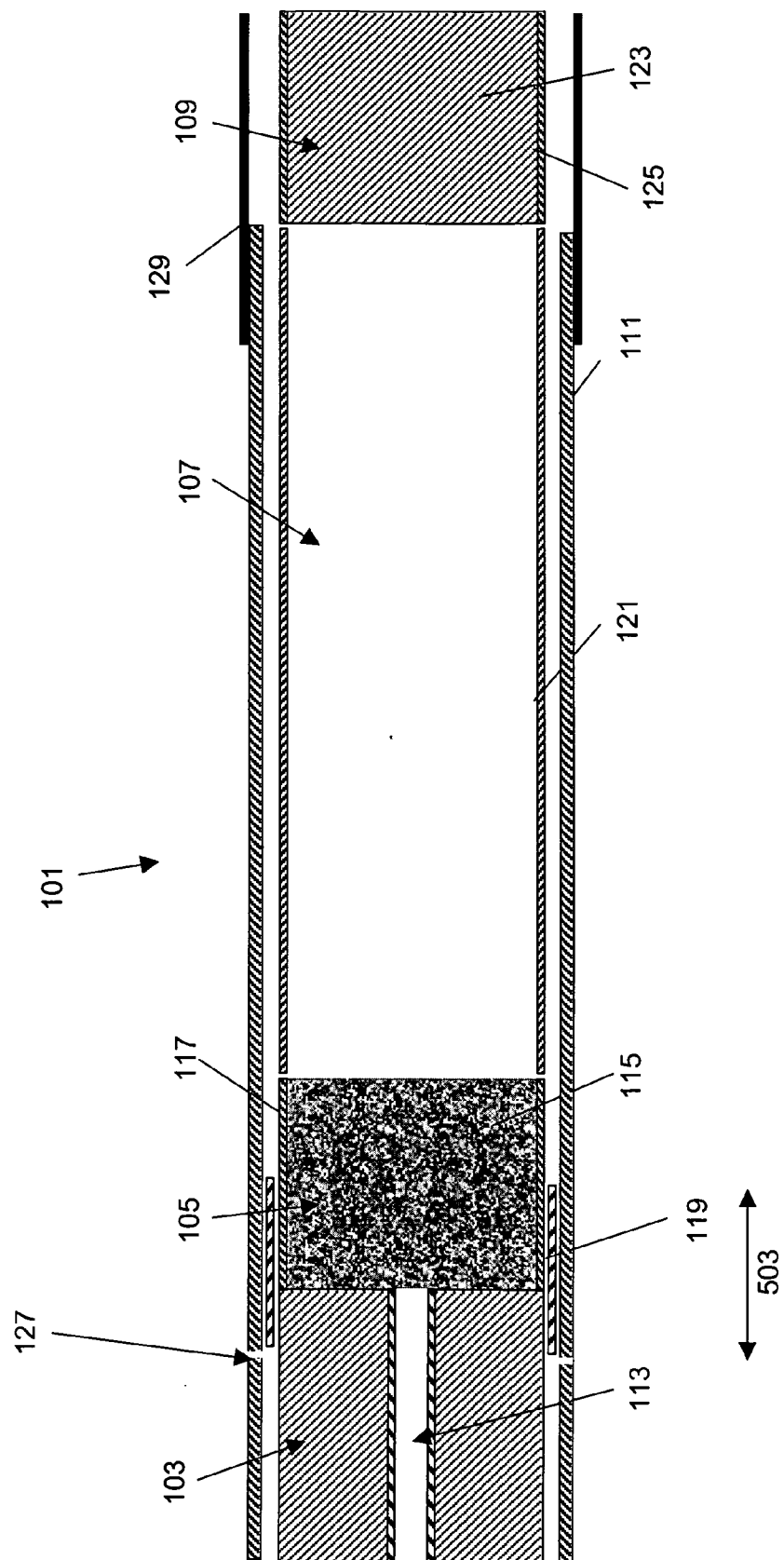
means for introducing a web of heat conducting material;
a glue applicator for applying glue to the web of heat conducting material;
a cutter for cutting the glued web of heat conducting material to form glued patches of heat conducting material;
means for introducing the web of paper-like material; and
a transfer drum for applying the glued patches of heat conducting material to the web of paper-like material.

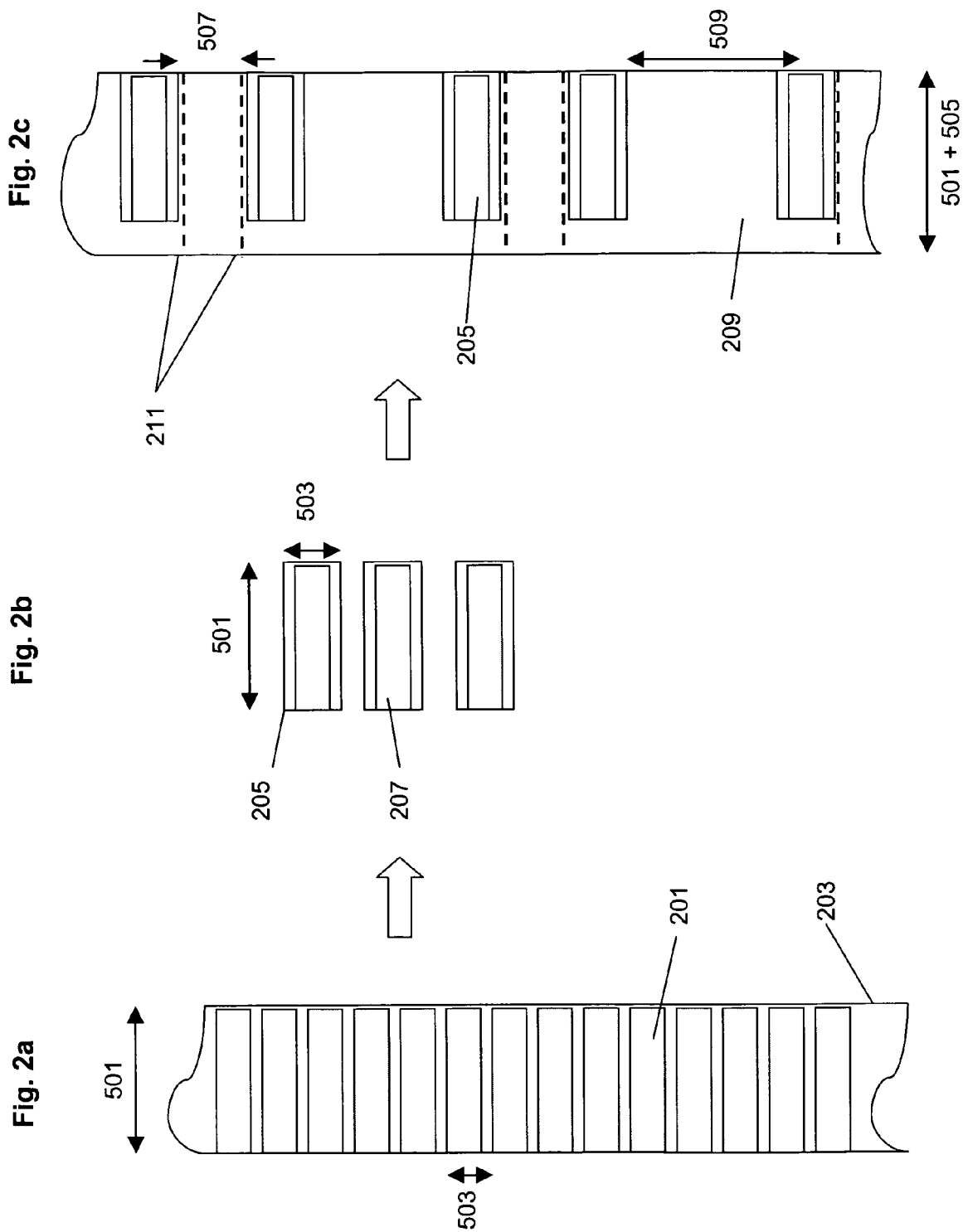
9. Apparatus according to claim 8, further comprising perforation means for perforating the web of paper-like material.

10. A method for spaced application of heat conducting patches onto a web of paper-like material, for use in the manufacture of smoking articles, the method comprising the steps of:

introducing a web of heat conducting material;
applying glue to the web of heat conducting material;
cutting the glued web of heat conducting material to form glued patches of heat conducting material;
introducing the web of paper-like material; and
applying the glued patches of heat conducting material to the web of paper-like material.

Fig. 1





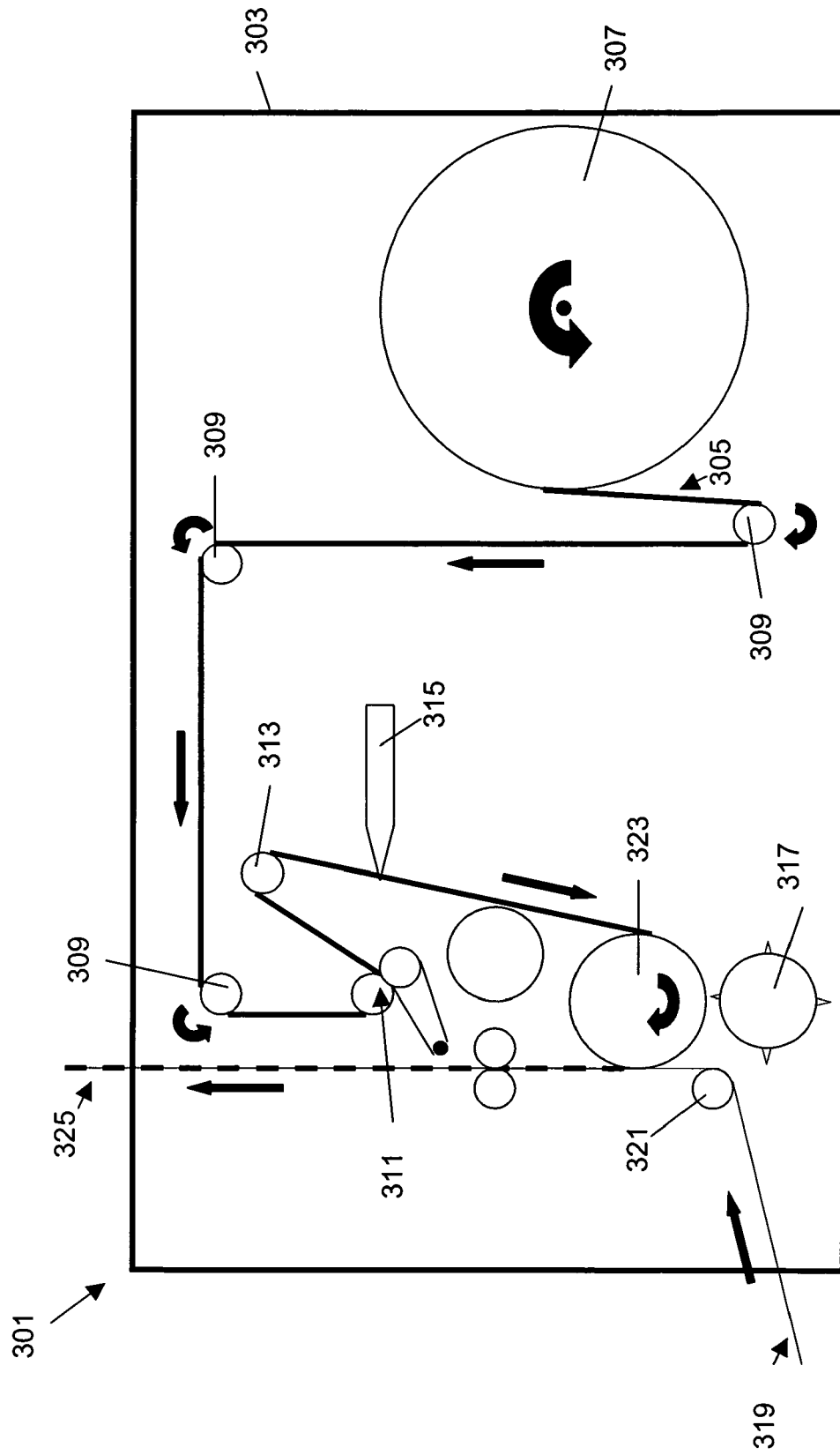
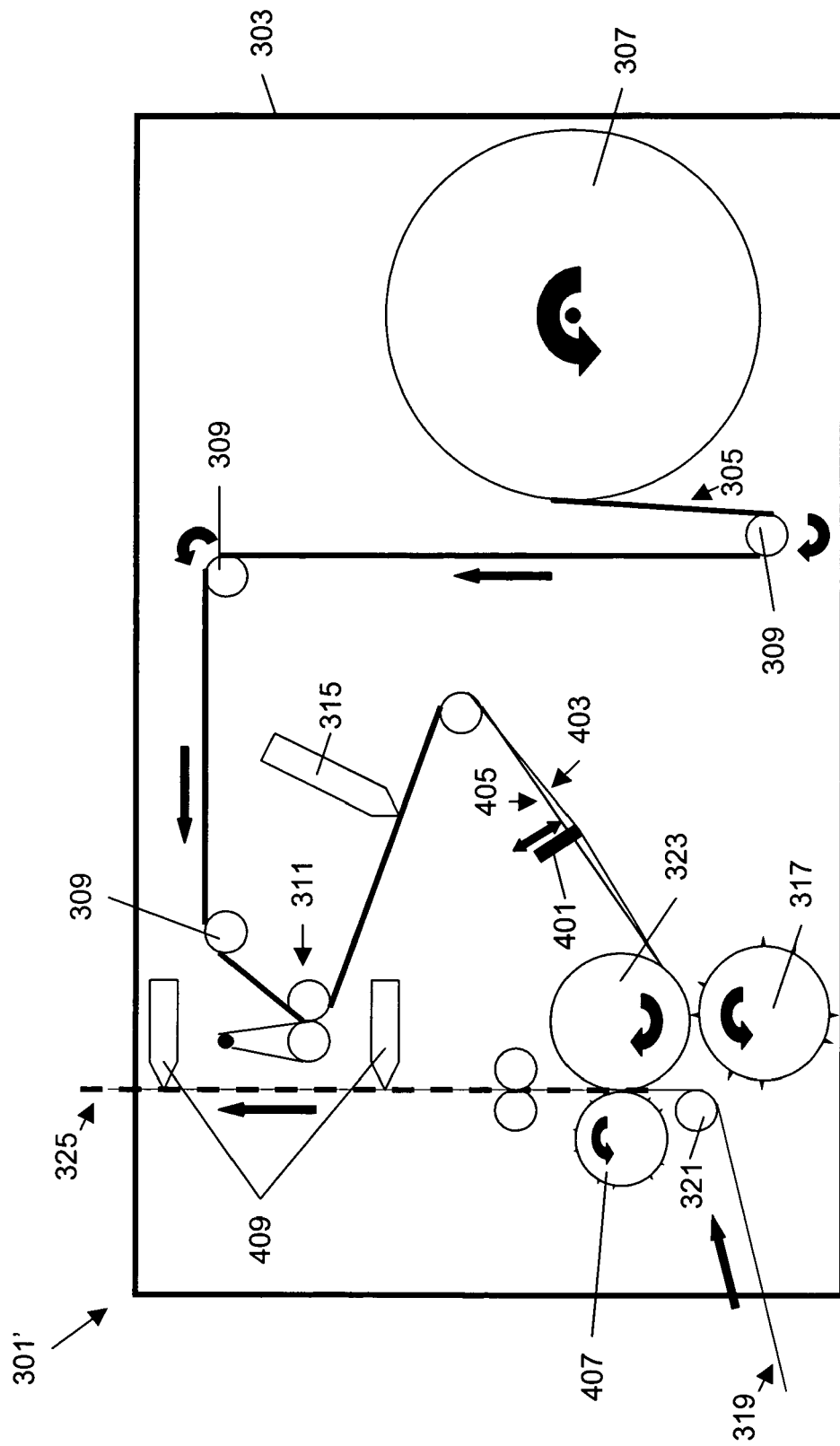


Fig. 3

Fig. 4





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 25 0842

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B65H
Place of search		Date of completion of the search	Examiner
The Hague		26 August 2008	Haaken, Willy
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 (03.02 (P04C01))

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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