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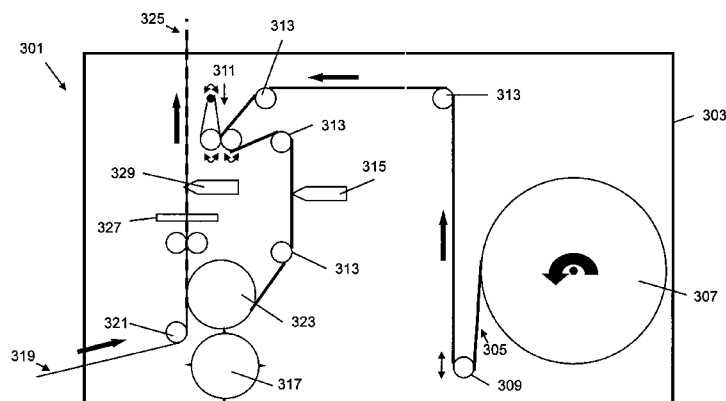
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(54) Title: PATCH APPLICATOR APPARATUS AND METHOD

Fig. 3



(57) Abstract: There is provided an apparatus (301) and method for spaced application of patches of a first material (305) onto a web of a second material (319). A web of the first material is introduced via clamping means (311) for clamping the web of the first material. The clamping means are arranged to drive the web of the first material at a constant speed as the web of the first material is introduced. Glue is applied to the web of the first material. The glued web of the first material 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. 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.

PATCH APPLICATOR APPARATUS AND METHOD

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.

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.

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 or tipping paper, for example for the addition of flavourings, such as menthol, or for labelling. One material may be polypropylene.

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 WO2009/022232, and heated cigarettes such as those marketed by the R.J. Reynolds Tobacco Company under the brand names Premier® and Eclipse®.

According to a first aspect of 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 including clamping means for clamping the web of the first material, the clamping means arranged to drive the web of the first material at a constant speed as the web of the first material is introduced; 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.

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.

In one embodiment, the apparatus is for use in the manufacture of smoking articles, the first material is a heat conducting material and the second material is a paper-like material.

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 from becoming clogged with glue. The spacing
5 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.

In the embodiment in which the apparatus is for use in the manufacture of smoking articles, the apparatus may further comprise a second glue applicator for applying glue to the web of the paper-like material for securing the web of paper-like material with the spaced heat
10 conducting patches to a component in a finished smoking article.

Preferably, the second glue applicator is located downstream of the transfer drum. Alternatively, the second glue applicator may be located upstream of the transfer drum. Preferably, the second glue applicator is arranged to apply lines of glue to the heat conducting patches spaced on the web of paper-like material. In an embodiment of a finished smoking
15 article which includes a combustible heat source, the second glue applicator may be arranged to apply lines of glue to the heat conducting patches spaced on the web of paper-like material, for securing each heat conducting patch to a combustible heat source in a finished smoking article.

Preferably, the clamping means is arranged to drive the web of the first material as it is
20 introduced at a speed dependent upon the length of each patch of first material and the spacing between patches of the first material on the web of second material. More preferably, the clamping means is arranged to drive the web of the first material as it is introduced at a speed dependent upon the ratio of the length of each heat conducting patch length to the length between patches. In the embodiment in which the apparatus is for use in the manufacture of
25 smoking articles, the clamping means is preferably arranged to drive the web of the heat conducting material as it is introduced at a speed dependent upon the ratio of the length of each heat conducting patch to the spacing between heat conducting patches on the web of paper-like material. Even more preferably, the clamping means is arranged to drive the web of the heat conducting material as it is introduced at a speed dependent upon the ratio of the length of each
30 heat conducting patch to the length of a finished smoking article without a mouthpiece. Thus, the spacing of the glued patches of the first material on the web of second material can be controlled by the input speed of the web of the second material, as set by the clamping means.

In an embodiment of the apparatus, the clamping means comprises two movable pinch drive rollers arranged to clamp together to control the input speed of the web of the first
35 material. The apparatus may further comprise an additional movable roller or rollers for taking up any slack in the web of the first material.

The apparatus may further comprise a cam for repeatedly accelerating the web of the first material downstream of the clamping means. This allows the glued patches to be unequally spaced on the web of the second material. Thus, the size and control of the cam may determine the spacing of the glued patches on the web of the second material. The cam may be a
5 mechanical cam or an electronic cam.

In one embodiment, the apparatus further comprises perforation means for perforating the web of the second material. In the embodiment in which the apparatus is for use in the manufacture of smoking articles, the perforation means may be arranged to perforate the web of the second material in a direction corresponding to the circumferential direction of a finished
10 smoking article. Alternatively, the perforation means may be arranged to perforate the web of the second material in a direction corresponding to the longitudinal direction of a finished smoking article.

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
15 evenly spaced. Alternatively, the cutter blade or blades of the cutter may be unevenly spaced. Preferably, the cutter blades move at a speed, relative to the glued web of the first material which assists with forming a neat cut.

In an alternative embodiment, the glued web of the first material is arranged to repeatedly accelerate as the glued web of the first material enters the cutter. This may be
20 achieved by locating the cutter downstream of a cam. In that embodiment, preferably, the cutter blade or blades are unevenly spaced in accordance with the acceleration of the web of the first material. Alternatively, the cutter blade or blades may be evenly spaced. Preferably, the cutter blades move at a speed, relative to the glued web of the first material, which assists with forming a neat cut.

25 Preferably, the means for introducing the web of the first material comprises a bobbin. Preferably, the means for introducing the web of the second material comprises a bobbin.

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.
30 Preferably, the first and second materials are flexible webs of material, 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. The second material may be another
35 suitable, stiffer paper, for example, tipping paper.

The apparatus may further comprise means for introducing a web of a third material

including further clamping means for clamping the web of the third material, the further clamping means arranged to drive the web of the third material at a constant speed as the web of the third material is introduced; a further glue applicator for applying glue to the web of the third material; a further cutter comprising at least one cutter blade for cutting the glued web of the third material to form glued patches of the third material; and a further transfer drum for applying the glued patches of the third material to the web of the second material.

In this embodiment, patches of the first material and patches of the third material may be independently applied to the web of the second material. The two types of patches can have any position and size. The first and third materials may be the same or different. The web of third material may comprise a ribbon, a strip or a band. The third material may be a flexible web of material, having any suitable width, length and thickness.

According to the first aspect of 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 including clamping means for clamping the web of the first material, the clamping means arranged to drive the web of the first material at a constant speed as the web of the first material is introduced; 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 cam located upstream of the cutting and transferring means, wherein the cam is arranged to repeatedly accelerate the glued web of the first material as it is input to the cutting and transferring means, resulting in two different spacings between glued patches of the first material on the web of the second material.

According to the first aspect of 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 including clamping means for clamping the web of heat conducting material, the clamping means arranged to drive the web of heat conducting material at a constant speed as the web of heat conducting material is introduced; 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.

Preferably, the clamping means is arranged to drive the web of the heat conducting material as it is introduced at a speed dependent upon the ratio of the required length of each

heat conducting patch to the spacing between heat conducting patches on the web of paper-like material. Thus, the spacing of the glued patches of the heat conducting material on the web of paper-like material can be controlled by the input speed of the web of the heat conducting material, as set by the clamping means.

5 In one embodiment, the apparatus further comprises perforation means for perforating the web of paper-like material. The perforation means may be arranged to perforate the web of the paper-like material in a direction corresponding to the circumferential direction of a finished smoking article. Alternatively, the perforation means may be arranged to perforate the web of paper-like material in a direction corresponding to the longitudinal direction of a finished
10 smoking article.

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 flexible webs of material, having any suitable width, length and thickness. In one preferred embodiment, the heat conducting material is a metallic
15 material. The heat conducting material may be aluminium foil. In one preferred embodiment, the paper-like material is cigarette paper. The second material may be another suitable, stiffer paper, for example, tipping paper.

According to a second aspect of 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
20 comprising the steps of: introducing a web of the first material via clamping means for clamping the web of the first material, the clamping means arranged to drive the web of the first material at a constant speed as the web of the first material is introduced; 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
25 material to the web of the second material.

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 from
30 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.

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
35 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.

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.

5 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 flexible webs of material, 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
10 may be aluminium foil. In one preferred embodiment, the second material is a paper-like material. The second material may be cigarette paper. The second material may be another suitable, stiffer paper, for example tipping paper.

The method may further comprise introducing a web of a third material via further clamping means for clamping the web of the third material arranged to drive the web of the third
15 material at a constant speed as the web of the third material is introduced; applying glue to the web of the third material; cutting the glued web of the third material to form glued patches of the third material; and applying the glued patches of the third material to the web of the second material

According to the second aspect of the invention, there is also provided a method for
20 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 via clamping means for clamping the web of the heat conducting material, the clamping means arranged to drive the web of the heat conducting material at a constant speed as the web of the heat conducting material is introduced; applying glue to the web of heat
25 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.

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
30 material and the paper-like material are flexible webs of material, 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. The second material may be another suitable, stiffer paper, for example, tipping paper.

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

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;

5 Figure 3 shows a schematic view of a first embodiment of the apparatus;

Figure 4 shows a schematic view of a second embodiment of the apparatus; and

Figure 5 shows a schematic view of a third embodiment of the apparatus.

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 or tipping 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 WO2009/022232, and heated cigarettes such as those marketed by the R.J. Reynolds Tobacco Company under the brand names Premier® and Eclipse®.

The distillation-based smoking article described in WO2009/022232 is shown in Figure 1. The smoking article 101 comprises a combustible heat source 103, an aerosol-generating substrate 105 and an elongate expansion chamber 107 that are overwrapped in an outer paper wrapper 111, and a mouthpiece 109 in abutting coaxial alignment. 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 downstream of the combustible heat source 103 and comprises a cylindrical plug of homogenised tobacco material 115 comprising glycerine as an aerosol former and circumscribed by plug wrap 117. A heat-conducting element 119, consisting of an overwrap 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 paper wrapper 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.

Figure 1 shows one embodiment of a particular distillation-based smoking article. Various modifications are possible, however. For example, one or more of the following modifications may be made if desired. The heat source may comprise additional or differently

arranged airflow channels. The aerosol-generating substrate may comprise any suitable material. Additional aerosol-generating substrates may also be included, for example including different tobacco material or flavourings. A barrier material may be included between the heat source and the aerosol-generating substrate. Instead of one expansion chambers, two shorter expansion chambers may be provided. Any suitable mouthpiece may be included, or the mouthpiece may be omitted completely. Tipping paper may be omitted. The perforations may be omitted, or may be positioned adjacent the heat conducting element, such that a consumer is able to see the aluminium foil through the perforations. Or, the perforations may extend in a longitudinal direction instead of around the smoking article's circumference.

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 a paper web, to form the heat conducting elements 119.

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

Referring to Figure 2a, 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.

Referring to Figure 2b, 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).

Referring to Figure 2c, the aluminium patches 205 are applied to paper web 209. Glued areas 207 are shown dotted in Figure 2c, because the patches have been turned so that each glued area is on the rear face of the aluminium patch 205, to adhere it to the paper web 209. In addition, a further glue line 210 is applied to each aluminium patch 205. This additional glue line will be used to secure the aluminium patch 205 to the heat source 103. Referring to Figure 1, the glue line 210 is preferably positioned between the front end of the aluminium and the back end of the heat source so as to secure the aluminium patch to the downstream end of the heat source 103. In this embodiment, the width 501+505 of the paper web 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.

In Figure 2c, the patches 205 are not equally spaced on the paper web 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 paper web 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 paper web 209 will be discussed further below.

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 bobbin 307, aluminium foil dancing roller 309, clamping means in the form of pinch drive rollers 311, fixed rollers 313, glue applicator 315, a cutter in the form of patch cutting drum 317, means for introducing the 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. The embodiment of Figure 3 also includes perforation means 327 and additional glue applicator 329. In Figure 3, the thick line is used to indicate the web of aluminium foil, the thin line is used to indicate the paper web, and the thin line with spaced thick portions is used to indicate the web of paper with applied patches of aluminium foil.

Operation of the apparatus of Figure 3 is as follows. Aluminium foil web is fed from feed bobbin 307 to the input 305. Then, the aluminium foil web is fed around dancing roller 309 which, as shown by the arrow, can move up and down to affect the tension in the foil web. Then, the aluminium foil web is fed in the direction of the arrows via fixed rollers 313 to the pinch drive rollers 311. The fixed rollers 313 may also be known as free floating idle rollers. The pinch drive rollers 311 drive the first material web at the correct input speed and the dancing roller 309 takes up any slack in the incoming web. More specifically, the two pinch drive rollers may clamp against one another to clamp, drive and secure the incoming web so as to meter out

the first material at the correct speed. The dancing roller 309 ensures there is tension in the web, by taking up any slack. In this embodiment, the input speed of the incoming aluminium web is determined according to the ratio of patch length to the length of the smoking article without the mouthpiece. That input speed of the aluminium web is set by the pinch drive rollers
5 311 according to this ratio.

After the pinch drive rollers 311, the glue applicator 315 applies glue areas 201 or lines of glue, or a continuous or intermittent stream of glue to the web, as shown in Figure 2a. The glue applicator 315 may be 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
10 varying the glue control. This may be controlled electronically.

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
15 drum 323, the web is cut into individual aluminium patches 205, as shown in Figure 2b. Preferably, suction is applied at the entry to the patch transfer drum 323 to adhere the web and the patches to the drum. The blade preferably travels alongside the aluminium foil web as it cuts it, thereby ensuring a neat cut. That is to say, the patch cutting drum 317 and the patch transfer drum 323 are preferably moving at the same speed at their interface. The individual patches
20 (glue side out) pass in a clockwise direction around the patch transfer drum. Preferably, air is blown outwards at the exit of the patch transfer drum 323, which assists the patches to move off the drum. Paper is fed into paper input drum 321 from a paper feed bobbin (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 air blown outwards at the exit of the patch
25 transfer drum 323 assists the application of the patches to the paper. The glue may then be dried by heaters (not shown).

Once the patches have been applied to the paper, perforation means 327 forms perforations in the paper web (as shown at 211 in Figure 2c). This forms the perforations in the finished smoking article (see 127 in Figure 1). As already mentioned, the perforations may
30 extend along the longitudinal axis of the smoking article instead of around the smoking article's circumference, in which case, the perforation means 327 may be set up accordingly. The perforations may allow a user to peel off part of the paper overwrap from the heat source. This prevents the paper overwrap from burning, when the smoking article is lit. The perforations may alternatively be applied in a separate unit comprising a knife and a counter drum, either
35 upstream of downstream of the transfer drum 323.

Glue applicator 329 is used to apply an additional line of glue to each patch (see 210 in

Figure 2c). That glue line may be used for securing the patch to the heat source, to keep the components together and maintain the integrity of the smoking article. If the perforations extend in a longitudinal direction of the smoking article, the user can peel off the paper overwrap over the heat source by tearing along the perforations from the upstream end. The glue line will prevent the entire paper overwrap being removed. Glue applicator 329 may also be used to apply any glue necessary for later steps in the manufacturing process. To seal the glue applicator 329 when not in use, a movable pad comes in contact with the paper to press one patch against the glue gun nozzle so that the glue does not dry up.

An additional unit (not shown) may also be supplied to apply printing or other markings to the paper web before input 319 or in the region of additional glue applicator 329.

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 paper, and the thin line with spaced thick portions is used to indicate the web of paper with applied patches of aluminium foil. The apparatus 301' comprises backplate 303, aluminium foil input 305 from aluminium foil feed bobbin 307, aluminium foil dancing roller 309, pinch drive rollers 311, fixed rollers 313, glue applicator 315, patch cutting drum 317, paper input 319, paper input drum 321, patch transfer drum 323, paper output 325, perforation means 327 and additional glue applicator 329. In this embodiment, however, the apparatus additionally includes electronic cam 401 (shown schematically in Figure 4).

Operation of the apparatus of Figure 4 is as follows. Aluminium foil web is fed from feed bobbin 307 to the input 305. Then, the aluminium foil web is fed around dancing roller 309 which can move up and down to affect the tension in the foil web. Then, the aluminium foil web is fed in the direction of the arrows via fixed rollers 313 to the pinch drive rollers 311. The pinch drive rollers 311 drive the first material web at the correct input speed and the dancing roller 309 takes up any slack in the incoming web. After the pinch drive rollers 311, the aluminium foil web is fed via cam 401 past the glue applicator 315, which applies glue areas 201 or lines of glue, or a continuous or intermittent glue stream, to the web, as shown in Figure 2a.

Then, the glued aluminium foil web proceeds towards the patch cutting drum 317 and the patch transfer drum 323. 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, suction may be applied at the entry to the patch transfer drum 323 to adhere the web and the patches to the drum. Again, the patch transfer drum 323 and cutting drum 317 are preferably moving at the same speed at the interface, and ensures a neat cut. The individual patches (glue side out) pass in a clockwise direction around the patch transfer drum. Again, air may be blown outwards at the exit of the patch transfer drum 323,

which assists the patches to move off the drum. Paper is fed into paper input drum 321 from a paper feed bobbin (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. Once the patches have been applied to the paper, perforation means 327 may form
5 perforations in the paper web. Glue applicator 329 may be used to apply additional line of glue 210 or any glue necessary for later steps in the manufacturing process. An additional unit (not shown) may also be supplied to apply printing or other markings to the paper web before input 319 or in the region of additional glue applicator 329.

In the embodiment of Figure 3, the input speed of the incoming aluminium web is
10 determined according to the ratio of patch length to the length of the smoking article without the mouthpiece. The input speed is set at the pinch drive rollers 311. In addition, the faster that the paper web proceeds, the faster that the patches are applied to keep the same application pitch (periodicity). 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).

However, in order to have a varied periodicity, the speeds of the aluminium web must be constantly varied. In the embodiment of Figure 4, the pinch drive rollers 311 input the web at a constant speed and the electronic cam 401 allows varied periodicity, like that shown in Figure 2c. By virtue of the cam 401, the tension in the web varies periodically. The pinch drive rollers 311 operate to adapt the constant input speed at the pinch drive rollers 311 to the varying input
15 speed at the patch transfer drum 323. The dancing roller 309 takes up any slack. There is no backwards movement that could smear the glue patches. The cam 401 matches the speed of the transfer drum so that the aluminium web does not pull back faster than the speed at which the transfer drum brings it forward. So, the input speed of the incoming aluminium web is set by the pinch drive rollers 311 and is determined according to the ratio of patch length to the length
20 of the smoking article without the mouthpiece, the cam 401 allows for two spacings between patches, and the dancing roller 309 takes up the slack in the web as the tension varies.

This allows the apparatus to produce a patched paper web, like that shown in Figure 2c, with alternating large and small spaces between patches.

The programmed cam profile at the pinch drive rollers 311 may be varied to vary the size
30 of the two different spacings (507 and 509) between patches. If more than two different spacings are required, the electronic cam may be controlled appropriately.

Figure 5 shows a schematic view of a third embodiment of the apparatus of the invention. Where appropriate, the same reference numerals as in Figures 3 and 4 are used. In addition, just as in Figures 3 and 4, the thick line is used to indicate the web of aluminium foil, the thin line is used to indicate the paper web, and the thin line with spaced thick portions is
35 used to indicate the paper web with applied patches of aluminium foil. The apparatus 301"

comprises backplate 303, aluminium foil input 305 from aluminium foil feed bobbin 307, aluminium foil dancing roller 309, pinch drive rollers 311, fixed rollers 313, glue applicator 315, patch cutting drum 317, paper input 319, paper input drum 321, patch transfer drum 323, paper output 325, perforation means 327 and additional glue applicator 329. In this embodiment, the apparatus additionally includes mechanical cam mechanism 601 comprising fixed roller 603 and movable roller 605.

Operation of the apparatus of Figure 5 is as follows. Aluminium foil web is fed from feed bobbin 307 to the input 305. Then, the aluminium foil web is fed around dancing roller 309, which can move up and down to control the tension in the foil web. Then, the aluminium foil web is fed in the direction of the arrows via fixed rollers 313 to the pinch drive rollers 311. After the pinch drive rollers 311, the aluminium foil web is fed through cam mechanism 601.

Cam mechanism 601 comprises first, fixed wheel 603 having protrusion 603a and second wheel 605 on movable frame 605a. The fixed wheel 603 rotates and, as protrusion 603a abuts frame 605a, frame 605a and roller 605 move upward and away from roller 605 (see arrow). This sets a longer path for the incoming web. Then, as the fixed wheel continues to rotate, the protrusion 603a rotates past frame 605a, at which time the frame 605a and roller 605 move downward back to their original positions (see arrow). That returns the incoming web to its original path. The input speed of the incoming aluminium web is determined according to the ratio of patch length to the length of the smoking article without the mouthpiece, the pinch drive rollers provide the drive for the web, the cam mechanism allows for two spacings between patches, and the dancing roller 309 takes up the slack in the web as the tension varies.

After the cam mechanism 601, the aluminium foil web is fed past the glue applicator 315, which applies glue areas 201 or lines of glue, or a continuous or intermittent glue stream, to the web, as shown in Figure 2a. To avoid glue smearing the aluminium web is not pulled backward over the gun nozzle. Then, the glued aluminium foil web proceeds towards the patch cutting drum 317 and the patch transfer drum 323. 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, suction may be applied at the entry to the patch transfer drum 323 to adhere the web and the patches to the drum. Again, the patch transfer drum 323 and cutting drum 317 are preferably moving at the same speed at the interface, so that the cutting blade travels alongside the aluminium foil web, and ensures a neat cut. The individual patches (glue side out) pass in a clockwise direction around the patch transfer drum. Again, air may be blown outwards at the exit of the patch transfer drum 323, which assists the patches to move off the drum.

Paper is fed into paper input drum 321 from a paper feed bobbin (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. Once the patches have been applied to the paper, perforation means 327 may form perforations in the paper web. Glue applicator 329 may be used to apply additional line of glue 210 or any glue necessary for later steps in the manufacturing process. An additional unit (not shown) may also be supplied to
5 apply printing or other markings to the paper web before input 319 or in the region of additional glue applicator 329.

The mechanical cam mechanism 601 in the Figure 5 embodiment allows varied periodicity, like that shown in Figure 2c. As the cam mechanism operates, the incoming web is repeatedly accelerated. The tension in the web downstream of cam mechanism 601 stays
10 constant. The pinch drive rollers 311 operate to link the constant input speed at the pinch drive rollers 311 to the varying input speed at the patch transfer drum 323.

This allows the apparatus to produce a patched paper web, like that shown in Figure 2c, with alternating large and small spaces between patches, by rotation of a cam. The operation of the cam mechanism 601, in particular, the size and rotation speed of the cam may be varied to
15 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.

In Figures 3, 4 and 5, the spacings of the blades on the cutting drum must be considered carefully so that the web is cut correctly.

The invention has been described in relation to the application of spaced application of
20 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
25 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:

5 means for introducing a web of the first material including clamping means for clamping the web of the first material, the clamping means arranged to drive the web of the first material at a constant speed as the web of the first material is introduced;

a glue applicator for applying glue to the web of the first material;

10 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.

15 2. Apparatus according to claim 1 for use in the manufacture of smoking articles, wherein the first material is a heat conducting material and wherein the second material is a paper-like material.

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

4. Apparatus according to claim 2 or claim 3, further comprising a second glue applicator for applying glue to the web of the paper-like material for securing the web of paper-like material with the spaced heat conducting patches to a component in a finished smoking article.

25 5. Apparatus according to any of claims 2 to 4, wherein the clamping means is arranged to drive the web of the heat conducting material as it is introduced at a speed dependent upon the ratio of the length of each heat conducting patch to the spacing between heat conducting patches on the web of paper-like material.

30 6. Apparatus according to any preceding claim, further comprising a cam for repeatedly accelerating the web of the first material downstream of the clamping means.

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

8. Apparatus according to any of claims 2 to 6, further comprising perforation means for perforating the web of the second material in a direction corresponding to the circumferential direction of a finished smoking article.

5 9. Apparatus according to any of claims 2 to 6, further comprising perforation means for perforating the web of the second material in a direction corresponding to the longitudinal direction of a finished smoking article.

10. Apparatus according to any preceding claim, further comprising:

10 means for introducing a web of a third material including further clamping means for clamping the web of the third material, the further clamping means arranged to drive the web of the third material at a constant speed as the web of the third material is introduced;

a further glue applicator for applying glue to the web of the third material;

15 a further cutter comprising at least one cutter blade for cutting the glued web of the third material to form glued patches of the third material; and

a further transfer drum for applying the glued patches of the third material to the web of the second material.

11. 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:

20 means for introducing a web of heat conducting material including clamping means for clamping the web of heat conducting material, the clamping means arranged to drive the web of heat conducting material at a constant speed as the web of heat conducting material is introduced;

25 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

30 a transfer drum for applying the glued patches of heat conducting material to the web of paper-like material.

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

35 introducing a web of the first material via clamping means for clamping the web of the first material, the clamping means arranged to drive the web of the first material at a constant speed as the web of the first material is introduced;

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.

5

13. 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 via clamping means for clamping the web of the heat conducting material, the clamping means arranged to drive the web of the heat
10 conducting material at a constant speed as the web of the heat conducting material is introduced;

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;

15 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

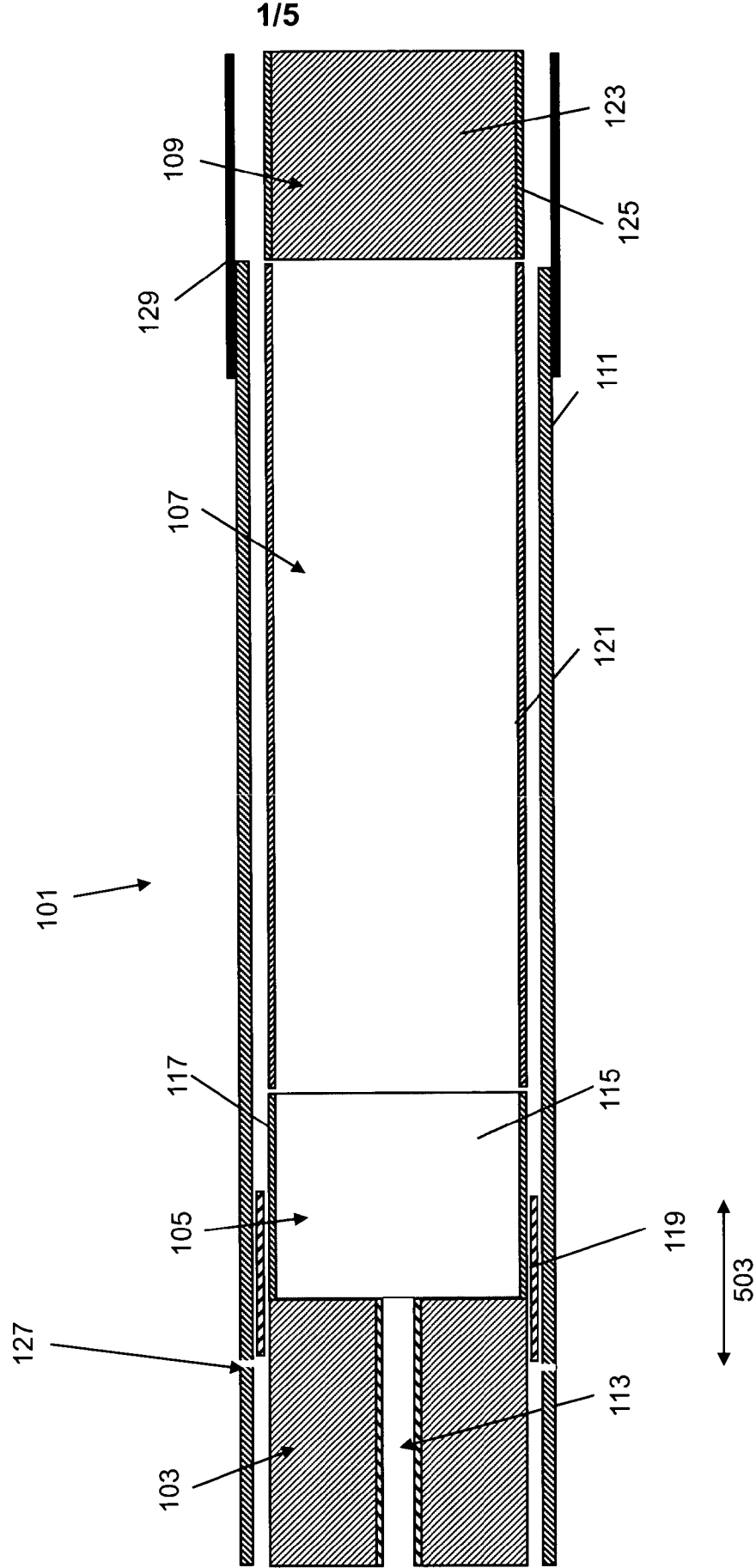


Fig. 2a

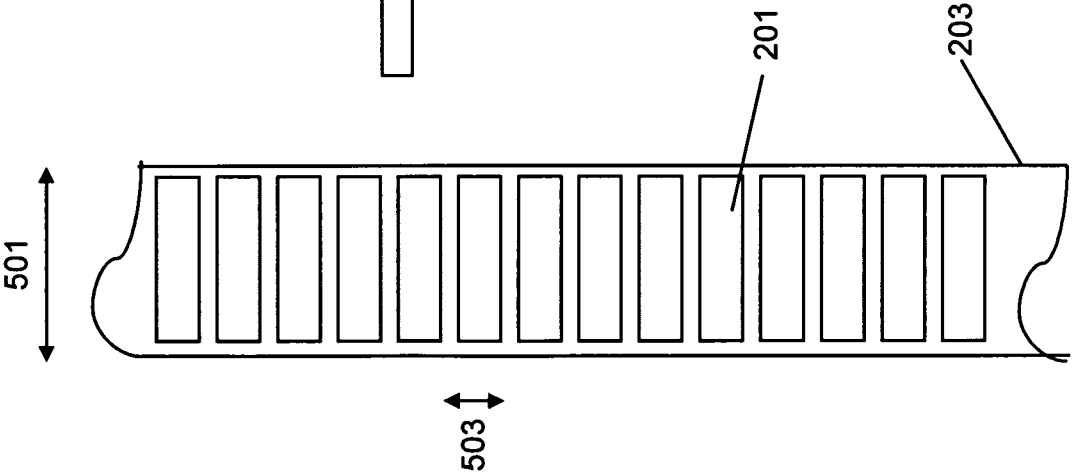


Fig. 2b

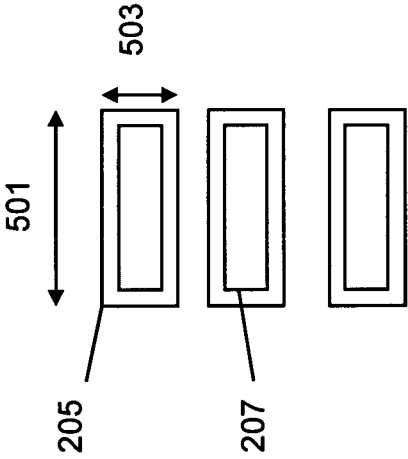


Fig. 2c

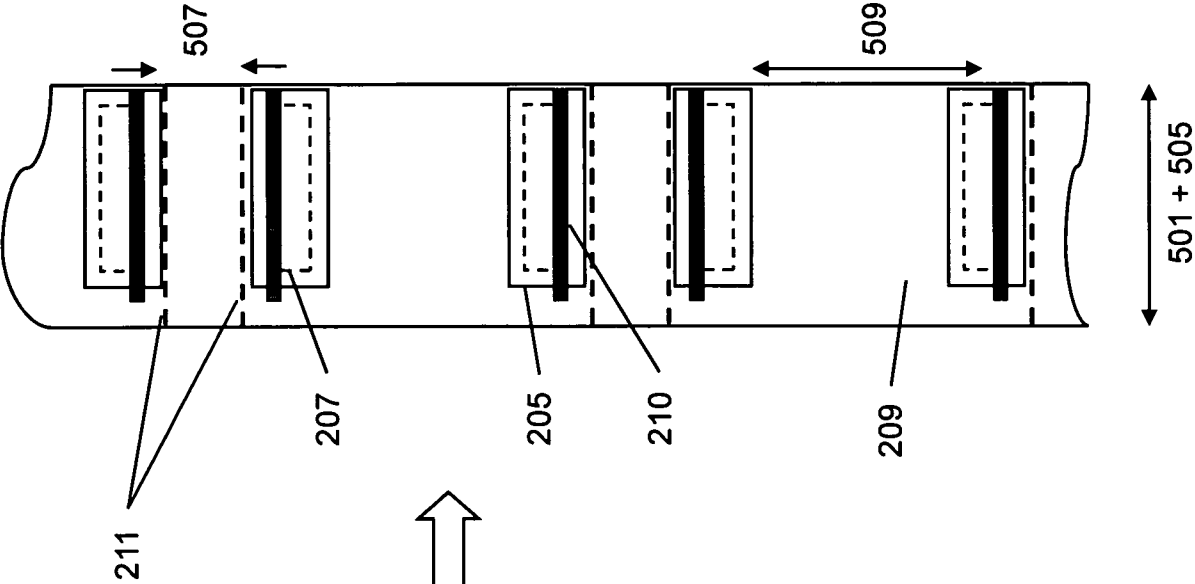


Fig. 3

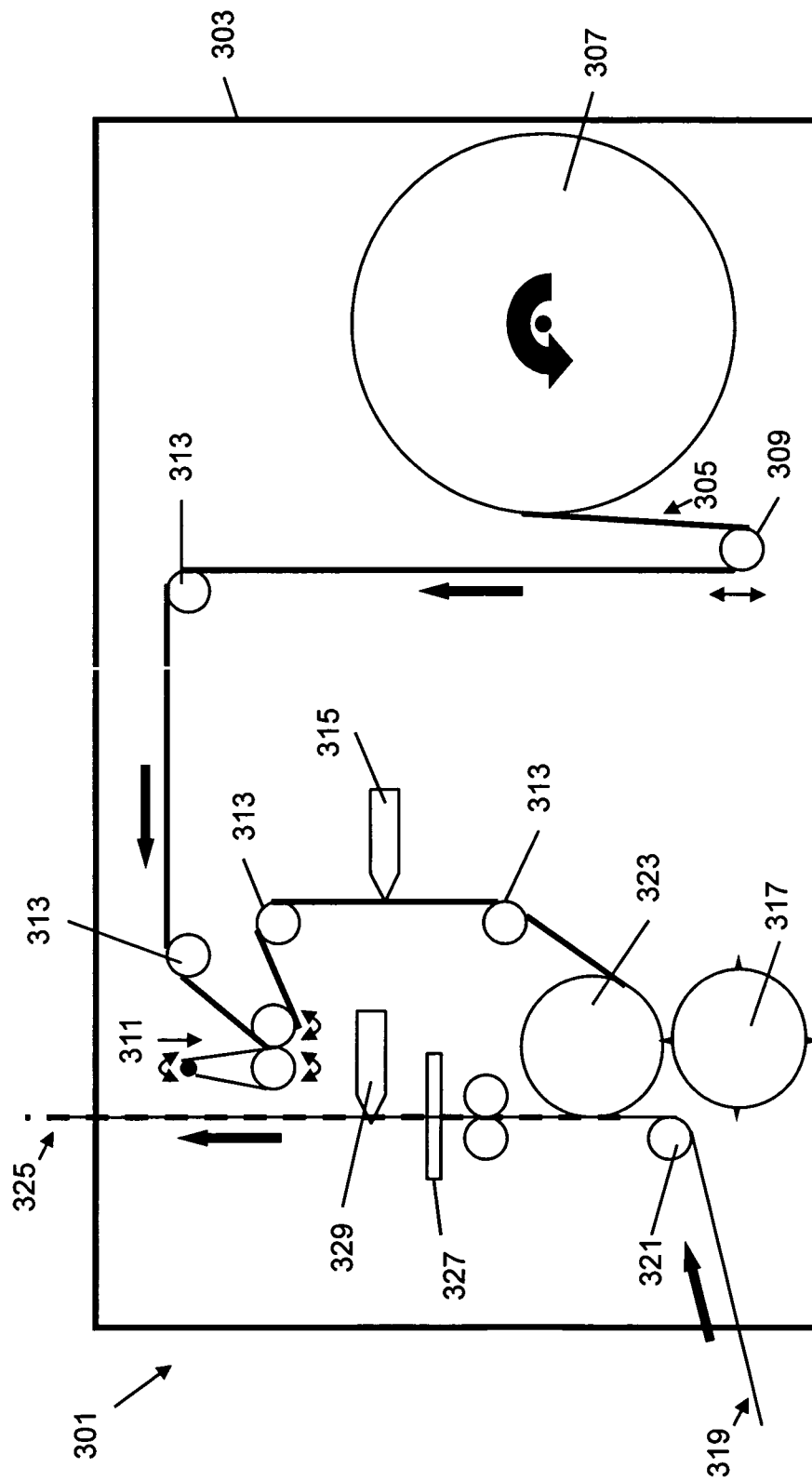
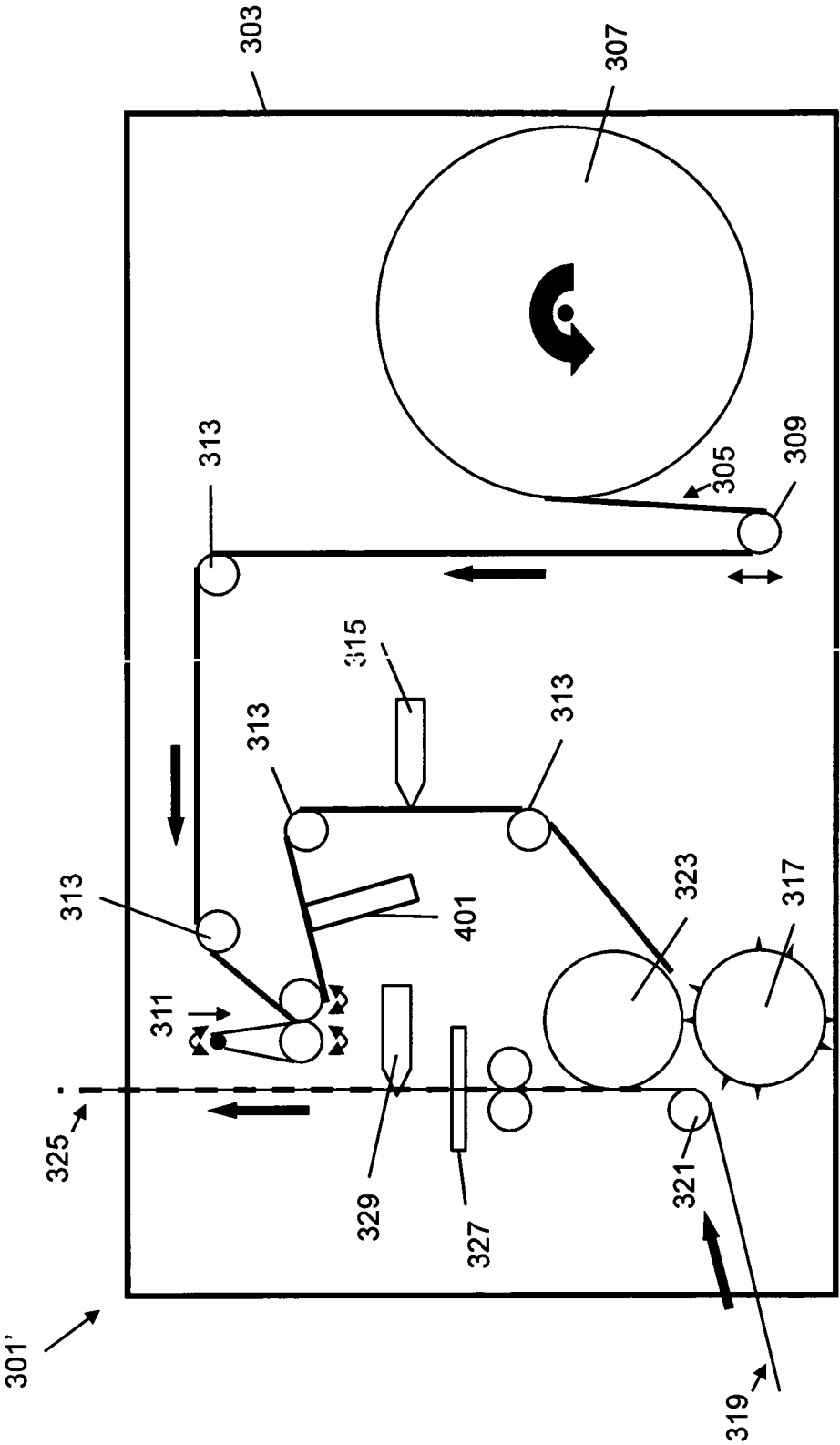
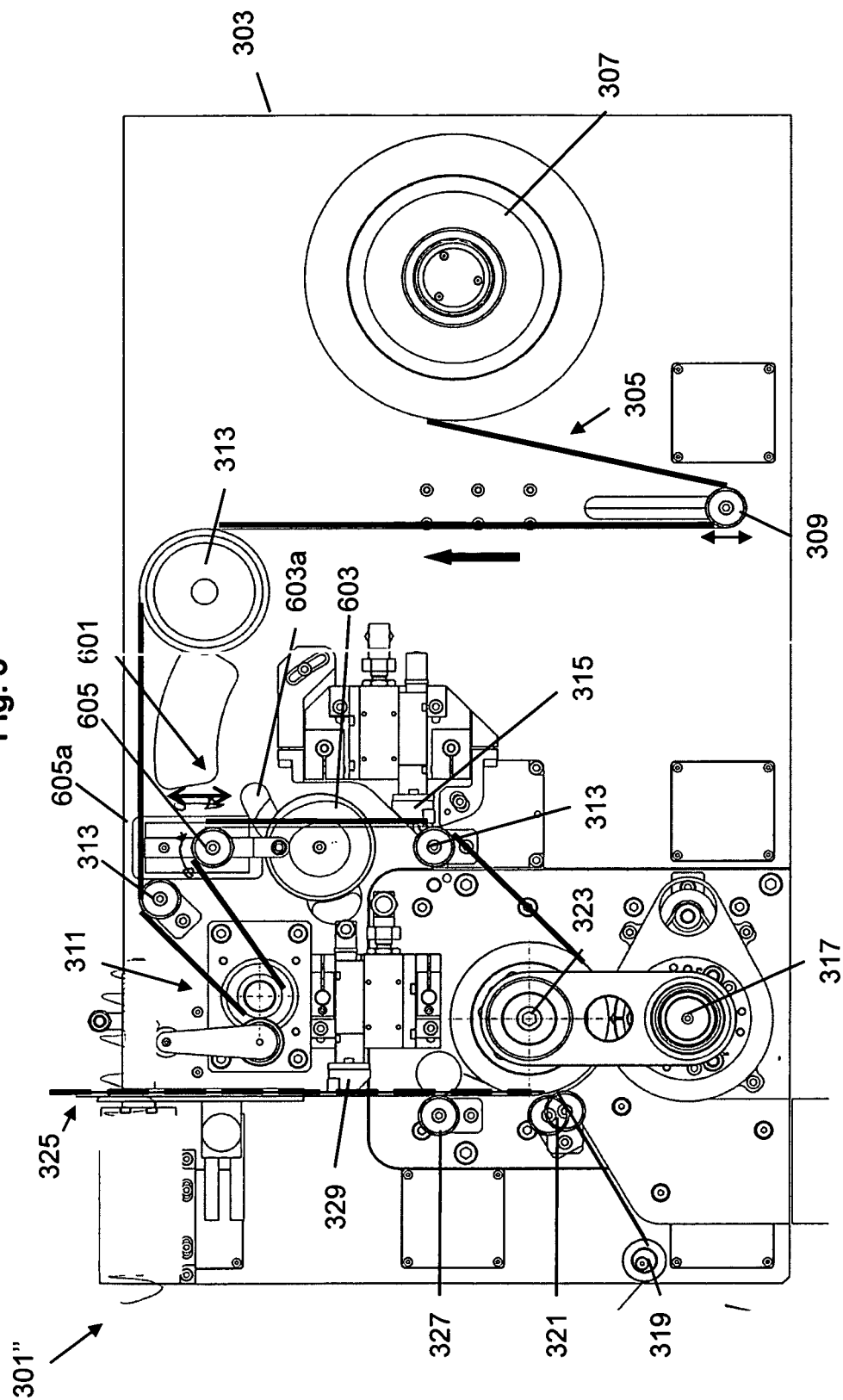


Fig. 4



5/5

Fig. 5



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/001770

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65H39/14

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

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)

EP0-Internal

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A	page 3, line 15 - page 8, line 8; figure 1	6
Y	WO 2005/035414 A (PROCTER & GAMBLE [US]; CHRISTIAN REBECCA HANSEN [US]; BLUMENTHAL JEFFER) 21 April 2005 (2005-04-21)	1-5,7-13
A	page 10, line 28 - page 11, line 19 page 13, line 13 - page 15, line 5; figures 8a-8c	6
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A	paragraph [0020] - paragraph [0023]; figures 1,2	6
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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