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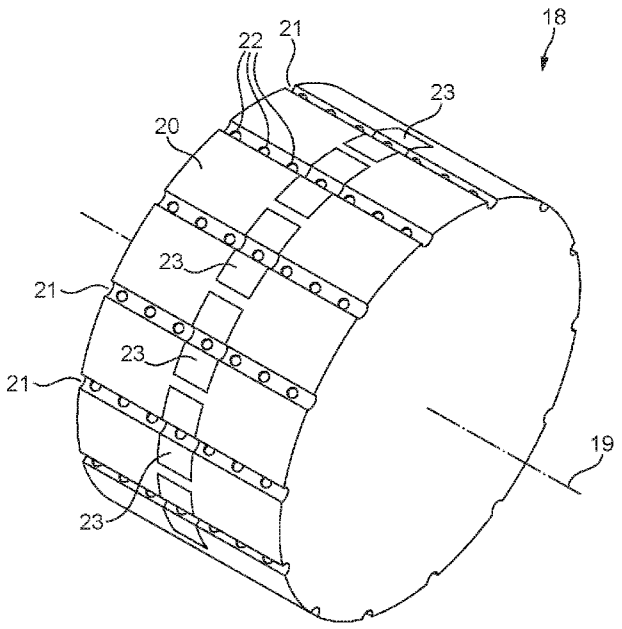

FIG. 3

(57) Abstract: The present disclosure relates to a drum (18) for a tobacco industry product manufacturing apparatus. The drum (18) comprises an axis (19) about which it rotates and a seat (23) adapted to carry components of tobacco industry products during use. The seat (23) is movable in a direction towards the axis (19) of the drum (18) in response to said components being pressed against the seat during use.

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Drum for a Tobacco Industry Product Manufacturing Apparatus

Technical Field

Embodiments of the invention relate to a drum for a tobacco industry product manufacturing apparatus, and to apparatus for manufacturing a tobacco industry product that includes a drum.

Background

Apparatus for manufacturing cigarettes includes a series of drums that convey components along a manufacturing path as the drums rotate. Components are transferred from one drum to next at a point where the circumferential surfaces of the drums are closest to each other. As the components are conveyed along the path they are subject to several processes, for example cutting, sliding, combining with other components, gluing, and rolling or wrapping with a paper patch. Cigarette components typically include filters, filter components and wrapped tobacco rods.

Summary

In accordance with some embodiments described herein, there is provided a drum for a tobacco industry product manufacturing apparatus, the drum comprising an axis about which the drum rotates and a seat adapted to carry components of tobacco industry products during use, wherein the seat is movable in a direction towards the axis of the drum in response to said components being pressed against the seat during use.

The seat may comprise a plate adapted to deflect inwards towards the axis of the drum in response to said components being pressed against the plate during use.

In some examples, the plate may be pivotally mounted to a pivot so that the plate is deflected about the pivot in a direction towards the axis of the drum in response to said components being pressed against the plate during use.

In other examples, the plate may be slidably mounted so that the plate slides in a direction towards the axis of the drum in response to said components being pressed against the plate during use.

The drum may further comprise a biasing member arranged to bias the plate in a direction away from the axis of the drum.

The biasing member may be a spring.

In other examples, the seat is resiliently deformable such that the seat deforms in response to said components being pressed against the seat during use.

The drum may comprise a circumferential surface and the seat may be arranged on the circumferential surface of the drum.

The seat may extend only partially across the circumferential surface of the drum in a direction parallel with the axis of the drum such that said components of tobacco industry products on the drum at least partially overlie the seat during use.

The seat may extend across the circumferential surface of the drum in a direction parallel with the axis of the drum such that the full length of each component is carried on the seat.

The drum may comprise a second seat that is aligned with the seat in the axial direction on the circumferential surface of the drum.

The seat and the second seat may be spaced from each other in a direction parallel with the axis of the drum.

The seat may comprise a surface having suction holes adapted to retain said components on said surface when suction is applied to the at least one suction hole during use.

The suction holes may be arranged to retain a paper patch.

The seat may comprise a flute adapted to receive elongate components of tobacco industry products.

The flute may comprise at least one suction hole adapted to retain said elongate components when suction is applied to the at least one suction hole during use.

A peripheral surface of the seat may be substantially level with a circumferential surface of the drum when the components are not pressed against the seat.

In one example, the drum is a transfer drum adapted to receive a paper patch in a first position and transfer said paper patch to a further drum in a second position during use, wherein the further drum is adapted to carry a collation of components and to receive a paper patch from the transfer drum during use.

In another example, the drum is a rolling drum adapted to receive a collation of components including elongate components and a paper patch and to carry said collation of components through a rolling mechanism to roll the paper patch about the elongate components to form tobacco industry products during use, and to transfer said tobacco industry products to a further drum during use.

In another example, the drum is a transfer drum adapted to receive components of tobacco industry products and to transfer said components to a further drum during use.

In yet another example, the drum is a transfer drum adapted to receive a collation of cylindrical components and paper patches and to transfer said components and paper patches to a further drum during use.

In accordance with some embodiments described herein, there is provided an apparatus for manufacturing tobacco industry products, the apparatus comprising a drum as described above.

Brief Description of Drawings

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

FIG. 1 shows a schematic diagram of a part of a tobacco industry product manufacturing apparatus;

FIG. 2 shows an example of a tobacco industry product manufactured by the apparatus of FIG. 1;

FIG. 3 shows a transfer drum of the tobacco industry product manufacturing apparatus of FIG. 1;

FIG. 4 shows a schematic cross-section of a seat of the transfer drum of FIG. 3;

FIG. 5 shows a schematic cross-section of an alternative seat of the transfer drum of FIG. 3;

FIG. 6 shows a schematic cross-section of an alternative seat of the transfer drum of FIG. 3;

FIG. 7a, FIG. 7b and FIG. 7c show plan views of alternative transfer drums of the tobacco industry product manufacturing apparatus of FIG. 1

FIG. 8 shows a schematic cross-section of two drums at the point where components are transferred from one drum to the other;

FIG. 9, shows a schematic cross-section of two drums at the point where components are transferred from one drum to the other;

FIG. 10 shows a schematic cross-section of a drum and a roll hand at the point where the roll hand interacts with the components on the drum; and

FIG. 11 shows a schematic cross-section of a tipping paper suction drum and a tipping drum of the apparatus of FIG. 1.

Detailed Description

FIG. 1 shows a part of a tobacco industry product manufacturing apparatus 1 that includes a tobacco rod feed drum 2 and a filter component feed drum 3. The tobacco rod feed drum 2 receives wrapped tobacco rods 5 that are travelling in a direction transverse to their length (i.e. sideways) in flutes formed in the peripheral surface of the tobacco rod feed drum 2. The filter component feed drum 3 receives filter components 6 from a hopper 4 in flutes formed in the peripheral surface of the filter component feed drum 3. The filter component feed drum 3 and the tobacco rod feed drum 2 feed filter components 6 and tobacco rods 5, respectively, onto a combining drum 45, such that the filter components 6 and tobacco rods 5 are axially aligned in flutes on the peripheral surface of the combining drum 45, ready to be wrapped to form an assembled smoking article.

As shown in FIG. 1, from the combining drum 45 the tobacco rods 5 and filter components 6 are transferred onto a tipping drum 7 where they are provided with a tipping paper patch before being transferred to a rolling unit 9 that rolls the tipping paper patch around the tobacco rods 5 and filter components 6 to form two assembled

tobacco industry products in back-to-back arrangement. The tipping paper patch is supplied to the tipping drum 7 by a tipping paper suction drum 10.

A web 13 of tipping paper passes through an adhesive applicator 11 that applies adhesive to one surface of the tipping paper web 13. The tipping paper web 13 is then received on the tipping paper suction drum 10, which uses suction to hold the web 13 of tipping paper against the peripheral surface of the tipping paper suction drum 10. A cutting unit 12 cuts the web 13 of tipping paper into patches on the tipping paper suction drum 10 and the patches are then transferred to the tobacco rods 5 and filter components 6 on the tipping drum 7.

In one example, the cutting unit 12 comprises a crush cutter. In this case, the cutting unit 12 comprises a rotary blade and the tipping paper suction drum 10 acts as an anvil against which the tipping paper web 13 is cut by the rotary blade, in a transverse direction (i.e. across the web 13), to form patches of tipping paper.

In an alternative embodiment, the cutting unit 12 uses a shear cutter to cut the web 13. In this case, the tipping paper suction drum 10 comprises edges that act with blades of the cutting unit 12 to shear cut the tipping paper web 13.

The cutting unit 12 may have several rotary blades which protrude from a shaft in a radial direction so that as the shaft rotates the blades successively engage the tipping paper suction drum 10 and cut the web 13 in a transverse direction (i.e. in the axial direction of the tipping paper suction drum 10 and cutting unit 12).

The cut patches of tipping paper on the tipping paper suction drum 10 already have adhesive applied to their outwards facing surface, so at the position where the tipping paper suction drum 10 rotates closest the tipping drum 7 the suction acting on the tipping paper patches is released and the patches are transferred from the tipping paper suction drum 10 to the tipping drum 7, specifically onto the tobacco rods 5 and filter components 6. The adhesive anchors the tipping paper patches to the tobacco rods 5 and filter components 6.

The tipping drum 7 then transfers the tobacco rods 5 and filter components 6 and the tipping paper patch into the rolling unit 9 that rolls the tipping paper patch around the tobacco rods 5 and filter components 6 to form tobacco industry products. The rolling

unit 9 comprises a rolling drum that receives and carries the tobacco rods and filter components 6 and the tipping paper patch past a stationary roll hand, which pushes the tobacco rods 5 and filter components 6 and the tipping paper patch out of flutes in the rolling drum and rolls them over the surface of the rolling drum so that the tobacco rods 5 and filter components 6 are rolled between the rolling drum and the roll hand, thereby wrapping the tipping paper patch around the tobacco rods 5 and filter components 6 to join them together.

The rolled tobacco industry products are then conveyed by further drums for packaging.

Referring to FIG. 2, two tobacco industry products are manufactured at the same time, as explained above, by arranging two tobacco rods 5 at either end of a double-length filter component 6 on the combining drum (45, see FIG. 1). The tobacco rods 5 and filter component 6 are joined together by wrapping a tipping paper patch 8 about them, and then cutting through the filter component 6 along line 14 to separate the two tobacco industry products.

As explained above, filter components 6, tobacco rods 5, tipping paper patches 8, and wrapped tobacco industry products, collectively 'components', are transferred between successive drums as the components travel through the apparatus 1 to manufacture tobacco industry products. The components 5, 6, 8 are transferred from one drum to the next at the point where the peripheral surfaces of the drums are closest, and at these transfer points the components 5, 6, 8 are in contact with the flutes of both drums.

The drums are arranged such that at each transfer point compressive pressure is applied on the components 5, 6, 8 to ensure smooth and reliable transfer. That is, the components 5, 6, 8 are pushed into the flutes of the downstream drum so that the suction applied in the flute can take effect on the components 5, 6, 8 before the upstream drum moves away. During transfer, suction acts on the components 5, 6, 8 from either the upstream drum, the downstream drum, or, for short time, both the upstream and downstream drums.

In addition, when the tipping paper patch 8 is applied to the filter components 6 and tobacco rod components 5 on the tipping drum 7, the tipping paper suction drum 10

and the tipping drum 7 are arranged to press the tipping paper patch 8 onto the filter components 6 and tobacco rods 5 on the tipping drum 7, to ensure that the tipping paper patches 8 are adequately anchored onto the filter components 6 and tobacco rods 5. During this transfer, pressure may be applied to the components 5, 6, 8 on the tipping drum 7.

In various examples each filter component 6 may comprise one or more filter segments. For example, the filter rod 6 may be formed of any combination of cellulose acetate segments, plasticised cellulose acetate segments, paper segments, non-wrapped cellulose acetate segments, plastic components, ceramic components, or metallic segments. These filter segments are generally cylindrical and/or tubular, and may have a cylindrical outer surface that fits within the flutes of the drums and can be rolled by the rolling drum 9 to create a wrapped tobacco industry product. The filter segments may each have a wrapper, typically called a plug wrap, which holds the material of the filter segment in the desired shape before the filter segment is provided to the apparatus of FIG. 1.

In this example, the tobacco industry product comprises a wrapped tobacco rod 5 which comprises a tobacco material wrapped in a wrapper, for example a paper wrapper. The tobacco industry product also comprises a filter component 6. In this example, the filter component 6 comprises a first filter segment 15 being made of plasticized cellulose acetate through which smoke or vapour can pass and which removes constituents from the smoke or vapour. A second segment 16 of the filter component 6 comprises a tubular member made from plastics, the plastics tubular member having passages therethrough to allow smoke or vapour to pass through the filter section. A third filter segment 17 comprises a tubular member made of paper.

As is apparent from FIG. 2, each filter component 6 supplied to the apparatus of FIG. 1 is symmetrical so that after the filter component 6 is cut along line 14 there are two identical tobacco industry products.

It will be appreciated that other filter sections have different combinations of components, and it is possible to arrange such components in a multitude of ways using drums that receive, move and position components in the same flute so that they can be wrapped to join them into tobacco industry products.

The filter component 6 is attached to the end of a tobacco rod 5 by a tipping paper patch 8 that circumscribes the join between the filter component 6 and tobacco rod 5. The tipping paper patch 8 is adhered to the outer surface of the filter component 6 and the tobacco rod 5. The tipping paper patch 8 may extend over the whole of the filter component 6 and partially over the tobacco rod 5. Alternatively, the tipping paper patch 8 may extend partially onto the filter component 6 and partially onto the tobacco rod 5.

As explained above, the tobacco industry products manufactured by the apparatus 1 of FIG. 1 may include components or segments having a high hardness, for example components made of plastic, ceramic or metal. In this case, during transfer of the components between drums, such components are placed under pressure which may damage the components or the drum, or the transfer won't be successful or reliable.

Similarly, if components are delicate, fragile, or brittle, then the components may be damaged, broken, or deformed by the pressure applied to the components as they are transferred between drums. For example, a tubular component made of paper, once deformed, may split and be damaged and/or not return to its circular form. Similarly, a plastic component may be cracked or broken by the pressure.

Similarly, pressure is applied to components on the tipping drum 45 when the tipping paper patches 8 are transferred onto the tipping drum 45 from tipping paper suction drum 10. Pressure is also applied to the components on the tipping drum 7 to ensure that the tipping paper patches 8 are adequately anchored to the filter components 6 and tobacco rods 6.

The drum 18 shown in FIG. 3 may be used in the tobacco industry product manufacturing apparatus shown in FIG. 1. Alternatively, the drum 18 may be used in other parts of the apparatus 1 for manufacturing tobacco industry products described with referent to FIG. 1.

Specifically, the drum 18 shown in FIG. 3 may be adapted to supply any one or more components of tobacco industry products, for example tobacco rods, filter rods, filter segments, tipping paper patches. Alternatively, the drum 18 may be an assembly drum on which components are collated, for example the tipping drum 7. Alternatively, the drum 18 may be a processing drum on which components are processed, for example the rolling drum 9.

The drum 18 is adapted to rotate about an axis 19. The drum 18 has a circumferential surface 20 that includes a series of flutes 21 sized to receive and retain tobacco and/or filter components as the drum 18 rotates.

Each flute 21 includes at least one suction hole 22 that holds the components in the flute 21 when suction is provided to the suction hole 22. In this example, each flute 21 includes several suction holes 22, so that multiple components can be retained in the flute 21. However, multiple suction holes 22 may be provided to retain a single elongate component. Turning off the suction applied to the suction holes 22 will allow the components to leave the flute 21.

A suction manifold (not shown) can be used to provide suction to the suction holes 22 during pre-defined portions of the rotation of the drum 18, and to switch off the suction to the suction holes 22 in other pre-defined portions of the rotation of the drum 18.

As shown in FIG. 3, the drum 18 comprises at least one seat 23 on which the components are carried during use. The at least one seat 23 is movable in a direction towards the axis 19 of the drum 18 in response to pressure applied to the at least one seat 23 during use. That is, when components are pressed against the seat 23 during use the seat 23 moves towards the centre of the drum 18.

The term “the seat is movable in a direction towards the axis” means that at least a part of the seat moves in a direction towards the axis. As will become clear hereinafter, that may be achieved through movement in a straight line towards the axis, through rotation relative to the axis, or through deformation that causes a part of the seat to move towards the axis. This term is not limited to a linear movement towards the axis.

For example, the components may be pressed against the seat 23 when the components are transferred onto the drum 18, when the components are transferred off of the drum 18, or when a process is performed on the components whilst on the drum 18, for example the rolling action described with reference to FIG. 1. The drum 18 may receive components from an upstream drum, in which case the pressure is generated by the interaction of the drum 18, the upstream drum, and the component therebetween. Alternatively or additionally, components may be transferred from the drum 18 to a

downstream drum, in which case the pressure is generated by the interaction of the drum 18, the downstream drum, and the component therebetween.

The seat 23 moves in response to the pressure so that the components are not damaged and can be more reliably transferred from one drum to another, or a process can be performed on components being carried by the drum 18 without damaging the components.

Alternatively or additionally, the moveable seat 23 can prevent irreversible deformation of certain kinds of component while at the same time ensuring that sufficient pressure is provided to reliably transfer or process the components. In addition, the moveable seat 23 can prevent the apparatus 1 from jamming when particularly hard components are used.

As previously explained, suction holes 22 are provided in each flute 21. In this example, as illustrated in FIG. 3, suction holes 22 are provided within the flute 21 in the seat 23, and within the flute 21 outside of the seat 23. It will also be appreciated that suction holes 22 may alternatively or additionally be provided on the circumferential surface 20 of the drum 18 or in the circumferential surface of the seat 23.

FIG. 4 shows a partial cross-section of a first example of the drum of FIG. 3, in the area of a seat 23. As shown in FIG. 4, the seat 23 includes a plate 24 that can be deflected in a direction towards the axis 19 of the drum 18.

The plate 24 is pivoted to the drum 18 at a pivot 25 arranged such that when pressure is applied to the component 26 and the plate 24 in the direction of arrow 30, the plate 24 is deflected towards the axis 19 of the drum 18, i.e. the plate 24 is deflected inwards.

In this particular example, a recess or aperture 27 is formed within the peripheral surface 20 of the drum 18 and the plate 24 is attached to the drum 18 at a pivot 25 located at one side of the recess or aperture 27.

A biasing means, in this example a compression spring 28, is provided between the plate 24 and a part 29 of the drum 18. The compression spring 28 urges the plate 24 away from the axis 19 of the drum 18.

The plate 24 has a rest position where the plate 24 is disposed when no pressure is applied to the plate 24 by the components 26. In this rest position the plate 24 is level with the circumferential surface 20 of the drum 18.

The biasing means, for example the compression spring 28, defines the pressure required for the plate 24 to deflect, and the distance that the plate 24 deflects for a given pressure. Therefore, the biasing means 28 can be selected so that components are subjected to an appropriate compressive force during use of the drum 18 in the apparatus 1. The magnitude of the appropriate compressive force will depend on the kinds of component being processed, in particular how susceptible they are to damage, or how incompressible they are.

Also shown in FIG. 3 and FIG. 4, the drum 18 has a flute 21 that is adapted to retain the components 26. The flute 21 comprises a groove that extends across the circumferential surface 20 of the drum 18, including through the area defined by the seat 23.

As previously explained with reference to FIG. 3, the flute 21 may include one or more suction holes 22 for retaining the components 26. The suction holes 22 may be located in the seat 23, or in a part of the flute 21 outside of the seat 23. Alternatively or additionally, suction holes 22 may be located on the circumferential surface 20 of the drum 18 outside of the flute 21, for example to retain a cut patch of paper on the circumferential surface 20 of the drum 18.

FIG. 5 shows a partial cross-section of a further example of the drum 18 of FIG. 3, in the area of a seat 23. As shown in FIG. 5, the seat 23 includes a plate 24 that can be deflected in a direction towards the axis 19 of the drum 18.

In this example, the plate 24 is slidably mounted in the drum 18 so that the plate 24 can slide towards the axis 19 of the drum 18 when pressure is applied to the plate 24 in the direction of arrow 30 during transfer and/or processing of components 26. A biasing member, in this example a compression spring 28, is provided between the plate 24 and a part 29 of the drum 18 so that the plate 24 is biased away from the axis 19 of the drum 18.

In this particular example, a recess or aperture 27 is formed within the peripheral surface 20 of the drum 18 and the plate 24 is attached to the drum 18 at rails 31 that

allow the plate 24 to slide towards the axis 19 of the drum 18. In one example, the rails 31 are grooves and the plate 24 includes protrusions that fit within the grooves and permit the sliding movement. In other examples, the rails may comprise linear bearings, or low friction liners. In some examples, the rail may be a shaft and the plate 24 may include a sliding bushing that receives the shaft.

The plate 24 has a rest position where the plate 24 is disposed when no pressure is applied to the plate 24 by the components 26. In this rest position the plate 24 is level with the circumferential surface 20 of the drum 18.

The biasing means, for example the compression spring 28, defines the pressure required for the plate 24 to deflect, and the amount the plate 24 deflects for a given pressure in the direction of arrow 30. Therefore, the biasing means 28 can be selected so that components 26 are subjected to an appropriate compressive force during use of the drum 18 in the apparatus 1. The magnitude of the appropriate compressive force will depend on the characteristics of the components 26.

Also shown in FIG. 3 and FIG. 5, the drum 18 has a flute 21 that is adapted to retain the components 26. The flute 21 comprises a groove that extends across the circumferential surface 20 of the drum 18, including through the seat 23.

As previously explained with reference to FIG. 3, the flute 21 may include one or more suction holes 22 for retaining the components 26. The suction holes 22 may be located in the seat 23, or in a part of the flute 21 outside of the seat 23. Alternatively or additionally, suction holes 22 may be located on the circumferential surface 20 of the drum 18 outside of the flute 21, for example to retain a cut patch of paper on the circumferential surface 20 of the drum 18.

FIG. 6 shows a partial cross-section of a further example of the drum 18 of FIG. 3, in the area of a seat 23. As shown in FIG. 6, in this example the seat 23 includes a plug 31 that comprises a resiliently deformable material that is received in a recess 27 formed in the circumferential surface 20 of the drum 18.

In this way, the plug 31 deforms when pressure is applied to it via components 26, in the direction of arrow 30. This pressure causes a portion of the plug 31 that holds the components 26 to be deflected towards the axis 19 of the drum 18. The resiliently

deformable material of the plug 31 means that some pressure will be maintained on the components 26, and the plug 31 will return to its normal shape after the pressure has been removed.

The resiliently deformable material of the plug 31 may be a rubber or other resilient polymer material. The plug 31 may be retained in the recess 27 in the circumferential surface 20 of the drum 18 by, for example, an adhesive, a fastener, or chemical bond.

The recess 27 in the circumferential surface 20 of the drum 18 that receives the plug 31 may be larger than the plug 31 in its uncompressed state. In this way, the plug 31 can be deformed within the recess 27 when pressure is applied to the plug 31 in the direction of arrow 30, allowing the outer surface of the plug 31 to be deflected towards the axis 19 of the drum 18.

Also shown in FIG. 3 and FIG. 6, the drum 18 has a flute 21 that is adapted to retain the components 26. The flute 21 comprises a groove that extends across the circumferential surface 20 of the drum 18, including through the seat 23, in this example through the plug 31.

As previously explained with reference to FIG. 3, the flute 21 may include one or more suction holes 22 for retaining the components 26. The suction holes 22 may be located in the seat 23, or in a part of the flute 21 outside of the seat 23. Alternatively or additionally, suction holes 22 may be located on the circumferential surface 20 of the drum 18 outside of the flute 21, for example to retain a cut patch of paper on the circumferential surface 20 of the drum 18.

As shown in FIG. 7a, the seats 23 may have a width that extends partially across the circumferential surface 20 of the drum 18. In particular, the seats 23 may only be provided in locations where relevant components are located during use. For example, when assembling a two-up tobacco industry product, such as that shown in FIG. 2, the delicate or incompressible components are located centrally on the circumferential surface 20 of the drum 18, and so it is in this position that the seats 23 are located so that the relevant components are aligned with a seat 23 during use of the drum 18.

In another example, shown in FIG. 7b, the seats 23 may extend across the circumferential surface 20 of the drum 18, so that the whole of each tobacco industry

product is aligned with the seat 23 on the drum 18. This may be appropriate if all of the components of the tobacco industry product are delicate or incompressible.

Alternatively, as illustrated in FIG. 7c, multiple seats 23 may be provided for each flute 21. This may be provided if, for example, the tobacco industry product includes multiple spaced apart components that are delicate or incompressible and so need to be aligned with a seat 23 during use of the drum 18.

In the examples of FIG. 7a, FIG. 7b and FIG. 7c, the seats 23 may be deflectable plates 24 as described with reference to FIG. 4 or FIG. 5, or the seats 23 may be deformable plugs 31, as described with reference to FIG. 6.

As shown in FIG. 8, in some examples consecutive drums 18a, 18b of the tobacco product manufacturing apparatus 1 may be provided with moveable seats 23, as described above. In particular, in the example shown, both the upstream drum 18a that initially carries the components 26 and the downstream drum 18b that carries the components 26 after transfer may be provided with any of the seats 23 described with reference to FIGS. 4 to 7c. In this way, during transfer from the upstream drum 18a to the downstream drum 18b components 26 are not subjected to the same pressure because one or both of the seats 23 move towards the axis of their respective drums 18a, 18b in the direction of arrows 32.

FIG. 9 shows a similar arrangement to that of FIG. 8, but only one of the drums 18a is provided with moveable seats 23. In this example, the upstream drum 18a is provided with movable seats 23, and the downstream drum 18b comprises flutes 21. However, it will be appreciated that the downstream drum 18b may alternatively be provided with movable seats 23.

FIG. 10 shows a rolling drum 18c that is adapted to carry components 26 to a roll hand 33, where the components 26 are rolled between the roll hand 33 and the circumferential surface 20 of the rolling drum 18c. In this example, the rolling drum 18c has a movable seat 23 so that pressure applied to the components 26 between the roll hand 33 and the drum 18c causes the seat 23 to move towards the axis 19 of the rolling drum 18c in the direction of arrow 32, to avoid damage of the components or jamming of the apparatus.

FIG. 11 shows a tipping paper suction drum 18d that is adapted to carry cut patches of tipping paper 8 and to transfer the cut patches of tipping paper 8 to the tipping drum 18e. In this example, the tipping paper suction drum 18d is provided with at least one movable seat 23 that moves towards the axis 19 of the tipping paper suction drum 18d as the tipping paper patches 8 are pressed onto the components 26 on the tipping drum 18e.

However, in the example of FIG. 11, it will be appreciated that the tipping drum 18e may additionally or alternatively comprise movable seats 23.

It will be appreciated that FIG. 8, FIG. 9 and FIG. 11 are schematic illustrations and the interaction between the two drums is slightly expanded for clarity reasons. In application, the components will be slightly compressed as they pass from one drum to another as the drums are closer together than in these illustrations.

In other examples, the drum 18 may be adapted to carry formed tobacco industry products. For example, the drum 18 may be adapted to carry an assembled and wrapped cigarette or other tobacco industry product in a position downstream of the rolling drum (9, see FIG. 1).

In each of the above examples the drum 18 may have flutes 21 of the type previously described, in which components 26 are carried. The flutes 21 and or the circumferential surface 20 of the drum 18 may include suction holes 22 for retaining components 26. In other examples, the drum 18 may not include flutes 21. For example, if the shape of the components 26 is not cylindrical then another shape recesses may be provided in the circumferential surface 20 of the drum 18, or there may be no flute 21 or recess at all. For example, for carrying paper components it may be appropriate to carry the paper components flat against the circumferential surface 20 of the drum 18, in which case flutes 21 are not required.

It will be appreciated that the seat 23 of any of the examples described herein may be removable from the drum 18, so that the seats 23 can be easily replaced, for example for maintenance or to change the machine for manufacturing a different product.

In the examples described with reference to FIG. 4 and FIG. 5 the seat 23 comprises a plate 24. As described and illustrated, the plate 24 is not planar, but rather curves with

the circumference of the drum 18. However, it will be appreciated that the plate 24 may take any shape, and is not limited to a planar, straight or curved shape.

The examples described above, particularly those described with reference to FIGS. 8, 9, 10 and 11, are particular examples of drums 18 with movable seats 23 that may be employed within the tobacco industry product manufacturing apparatus 1 of FIG. 1. However, it will be appreciated that such drums 18 may be used in any of the applications of the tobacco industry product manufacturing apparatus where components are transferred from one drum to another.

As used herein, the term "tobacco industry product" is intended to include smoking articles comprising combustible smoking articles such as cigarettes, cigarillos, cigars, tobacco for pipes or for roll-your-own cigarettes, (whether based on tobacco, tobacco derivatives, expanded tobacco, reconstituted tobacco, tobacco substitutes or other smokable material), electronic smoking articles such as e-cigarettes, heating devices that release compounds from substrate materials without burning such as tobacco heating products, hybrid systems to generate aerosol from a combination of substrate materials, for example hybrid systems containing a liquid or gel or solid substrate; and aerosol-free nicotine delivery articles such as lozenges, gums, patches, articles comprising breathable powders and smokeless tobacco products such as snus and snuff.

In one example, the drum for a tobacco industry product manufacturing apparatus described previously is used to make a tobacco industry product that is a smoking article for combustion, selected from the group consisting of a cigarette, a cigarillo and a cigar.

In another example, the drum is used to make a tobacco industry product that is a non-combustible smoking article.

In another example, the drum is used to make tobacco industry product that is a heating device which releases compounds by heating, but not burning, a substrate material. The material may be for example tobacco or other non-tobacco products, which may or may not contain nicotine. In one embodiment the heating device is a tobacco heating device. The drum may alternatively be used to make a consumable for a heating device.

In another embodiment the drum is used to make a tobacco industry product that is a hybrid system to generate aerosol by heating, but not burning, a combination of substrate materials. The substrate materials may comprise for example solid, liquid or gel which may or may not contain nicotine. In one embodiment, the hybrid system comprises a liquid or gel substrate and a solid substrate. The solid substrate may be for example tobacco or other non-tobacco products, which may or may not contain nicotine. In one embodiment the hybrid system comprises a liquid or gel substrate and tobacco.

The various embodiments described herein are presented only to assist in understanding and teaching the claimed features. These embodiments are provided as a representative sample of embodiments only, and are not exhaustive and/or exclusive. It is to be understood that advantages, embodiments, examples, functions, features, structures, and/or other aspects described herein are not to be considered limitations on the scope of the invention as defined by the claims or limitations on equivalents to the claims, and that other embodiments may be utilised and modifications may be made without departing from the scope of the claimed invention. Various embodiments of the invention may suitably comprise, consist of, or consist essentially of, appropriate combinations of the disclosed elements, components, features, parts, steps, means, etc, other than those specifically described herein. In addition, this disclosure may include other inventions not presently claimed, but which may be claimed in future.'

Claims

1. A drum for a tobacco industry product manufacturing apparatus, the drum comprising an axis about which the drum rotates and a seat adapted to carry components of tobacco industry products during use, wherein the seat is movable in a direction towards the axis of the drum in response to said components being pressed against the seat during use.

2. A drum according to claim 1, wherein the seat comprises a plate adapted to deflect inwards towards the axis of the drum in response to said components being pressed against the plate during use.

3. A drum according to claim 2, wherein the plate is pivotally mounted to a pivot so that the plate is deflected about the pivot in a direction towards the axis of the drum in response to said components being pressed against the plate during use.

4. A drum according to claim 2, wherein the plate is slidably mounted so that the plate slides in a direction towards the axis of the drum in response to said components being pressed against the plate during use.

5. A drum according to any of claims 2 to 4, wherein the drum further comprises a biasing member arranged to bias the plate in a direction away from the axis of the drum.

6. A drum according to claim 5, wherein the biasing member is a spring.

7. A drum according to claim 1, wherein the seat is resiliently deformable such that the seat deforms in response to said components being pressed against the seat during use.

8. A drum according to any preceding claim, wherein the drum comprises a circumferential surface and the seat is arranged on the circumferential surface of the drum.

9. A drum according to claim 8, wherein the seat extends only partially across the circumferential surface of the drum in a direction parallel with the axis of the drum

such that said components of tobacco industry products on the drum at least partially overlie the seat during use.

10. A drum according to claim 8, wherein the seat extends across the circumferential surface of the drum in a direction parallel with the axis of the drum such that the full length of each component is carried on the seat.

11. A drum according to any of claims 8 to 10, wherein the drum comprises a second seat that is aligned to the seat in the axial direction on the circumferential surface of the drum.

12. A drum according to claim 11, wherein the seat and the second seat are spaced from each other in a direction parallel with the axis of the drum.

13. A drum according to claim any preceding claim, wherein the seat comprises a surface having suction holes adapted to retain said components on said surface when suction is applied to the at least one suction hole during use.

14. A drum according to claim 13, wherein the suction holes are arranged to retain a paper patch.

15. A drum according to any preceding claim, wherein the seat comprises a flute adapted to receive elongate components of tobacco industry products.

16. A drum according to claim 15, wherein the flute comprises at least one suction hole adapted to retain said elongate components when suction is applied to the at least one suction hole during use.

17. A drum according to any preceding claim, wherein a peripheral surface of the seat is substantially level with a circumferential surface of the drum when said components are not pressed against the seat.

18. A drum according to any preceding claim, wherein the drum is a transfer drum adapted to receive a paper patch in a first position and transfer said paper patch to a further drum in a second position during use, wherein the further drum is adapted to

carry a collation of components and to receive a paper patch from the transfer drum during use.

19. A drum according to any of claims 1 to 17, wherein the drum is a rolling drum adapted to receive a collation of components including elongate components and a paper patch and to carry said collation of components through a rolling mechanism to roll the paper patch about the elongate components to form tobacco industry products during use, and to transfer said tobacco industry products to a further drum during use.

20. A drum according to any of claims 1 to 17, wherein the drum is a transfer drum adapted to receive components of tobacco industry products and to transfer said components to a further drum during use.

21. A drum according to any of claims 1 to 17, wherein the drum is a transfer drum adapted to receive a collation of cylindrical components and paper patches and to transfer said components and paper patches to a further drum during use.

22. Apparatus for manufacturing tobacco industry products, the apparatus comprising a drum according to any of claims 1 to 21.

23. A drum for a tobacco industry product manufacturing apparatus substantially as described with reference to the accompanying figures.

24. Apparatus for manufacturing tobacco industry products substantially as described with reference to the accompanying figures.

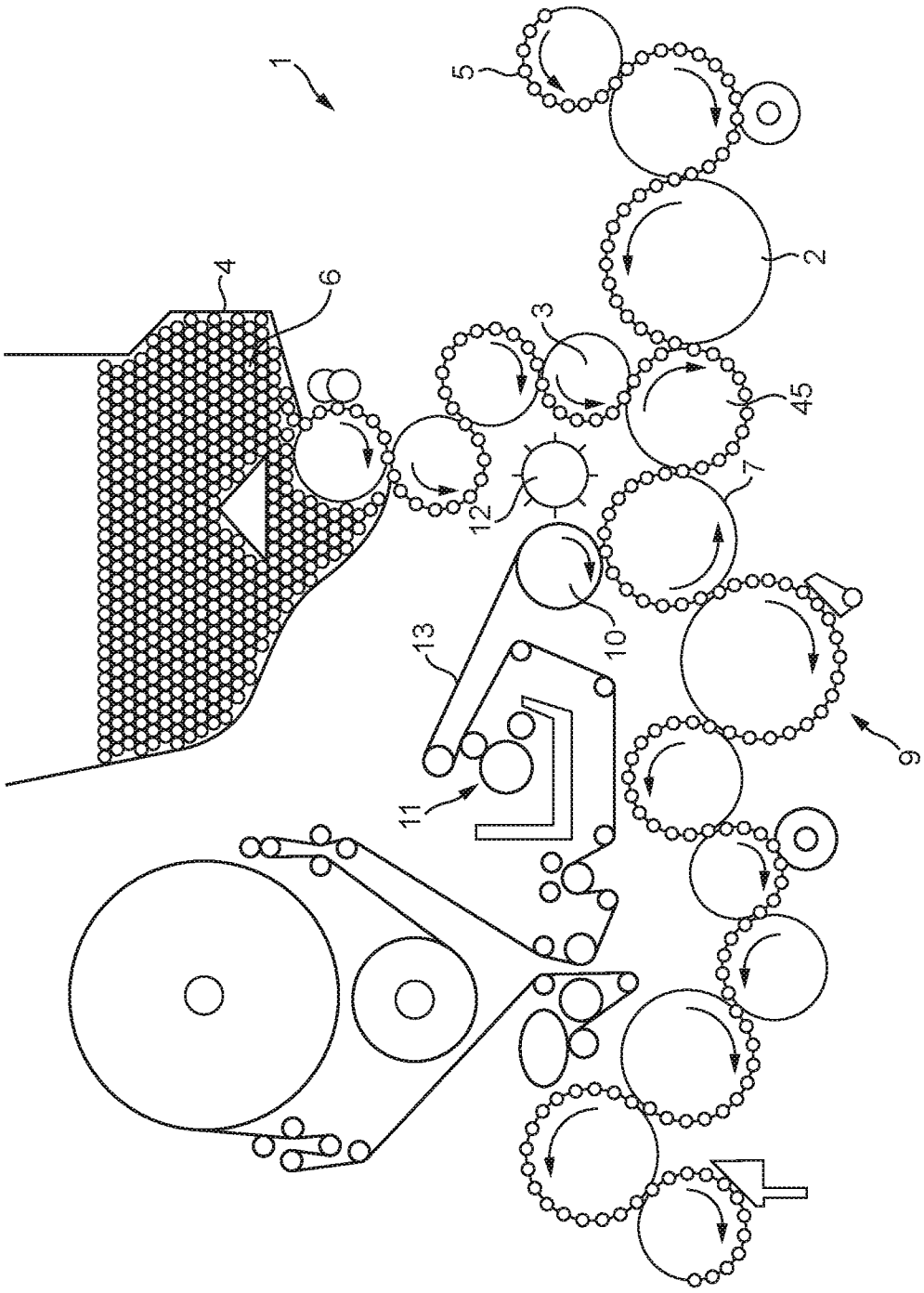

FIG. 1

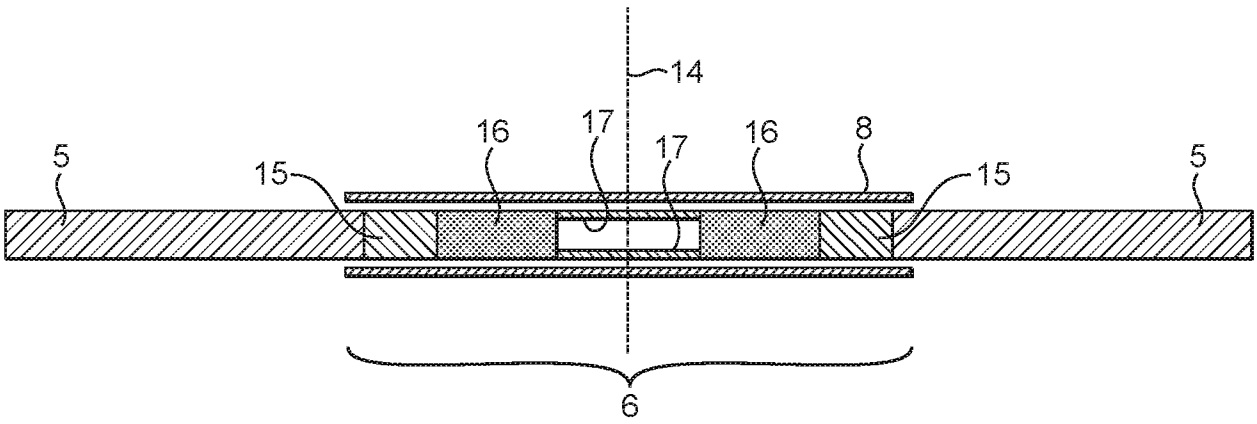

FIG. 2

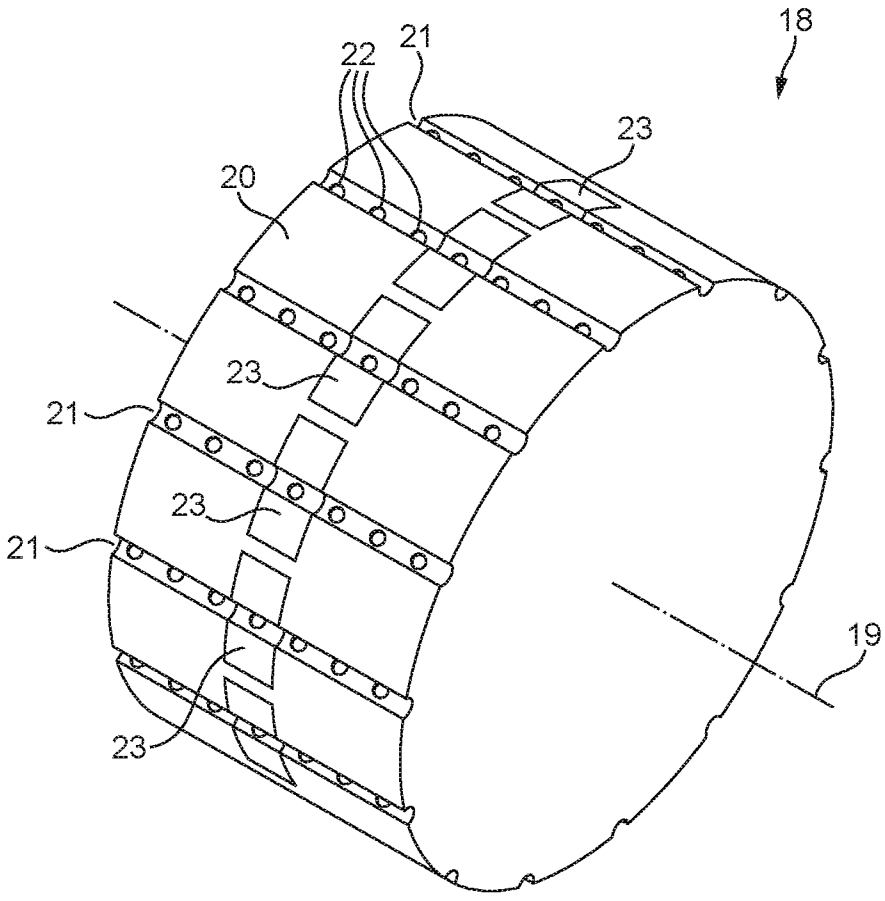

FIG. 3

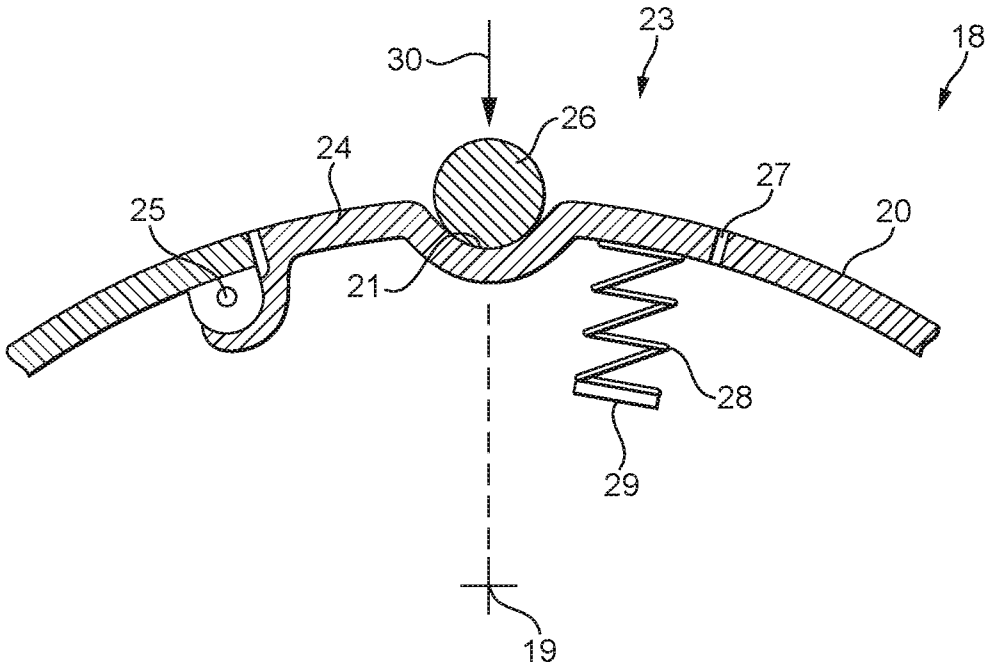
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FIG. 4

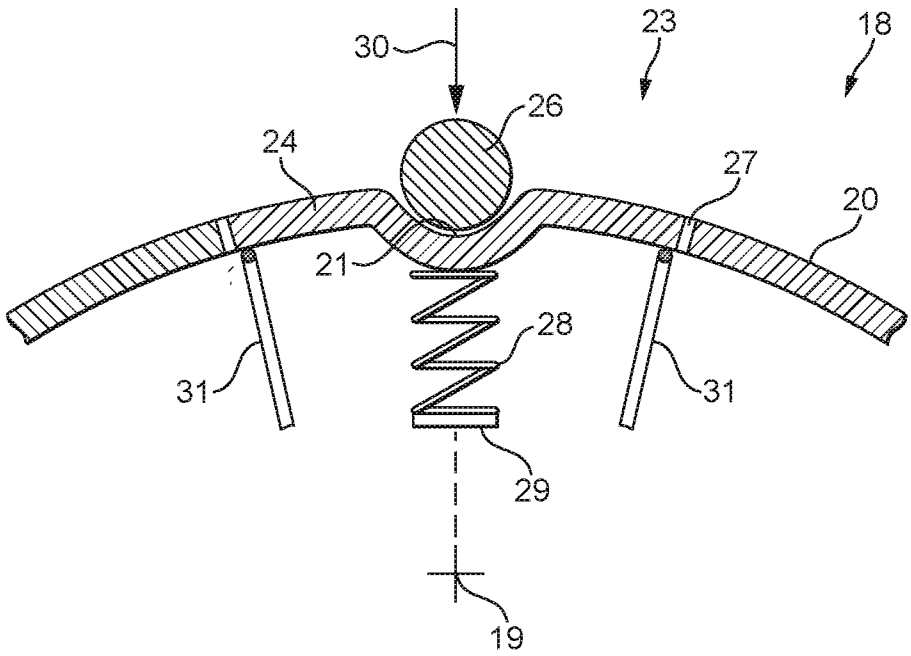
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FIG. 5

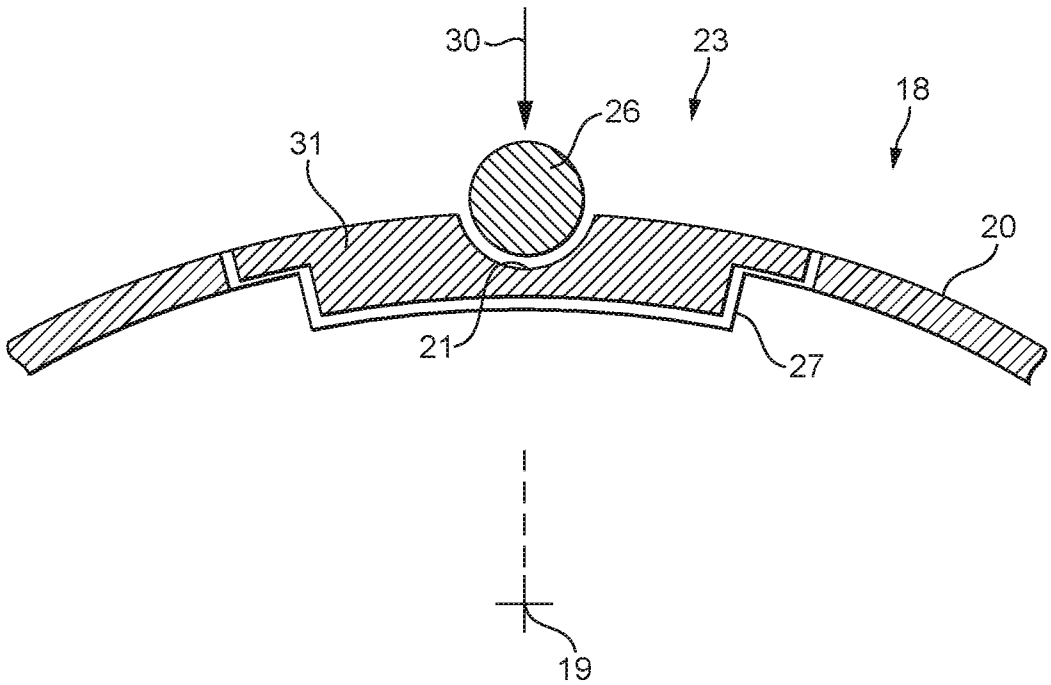

FIG. 6

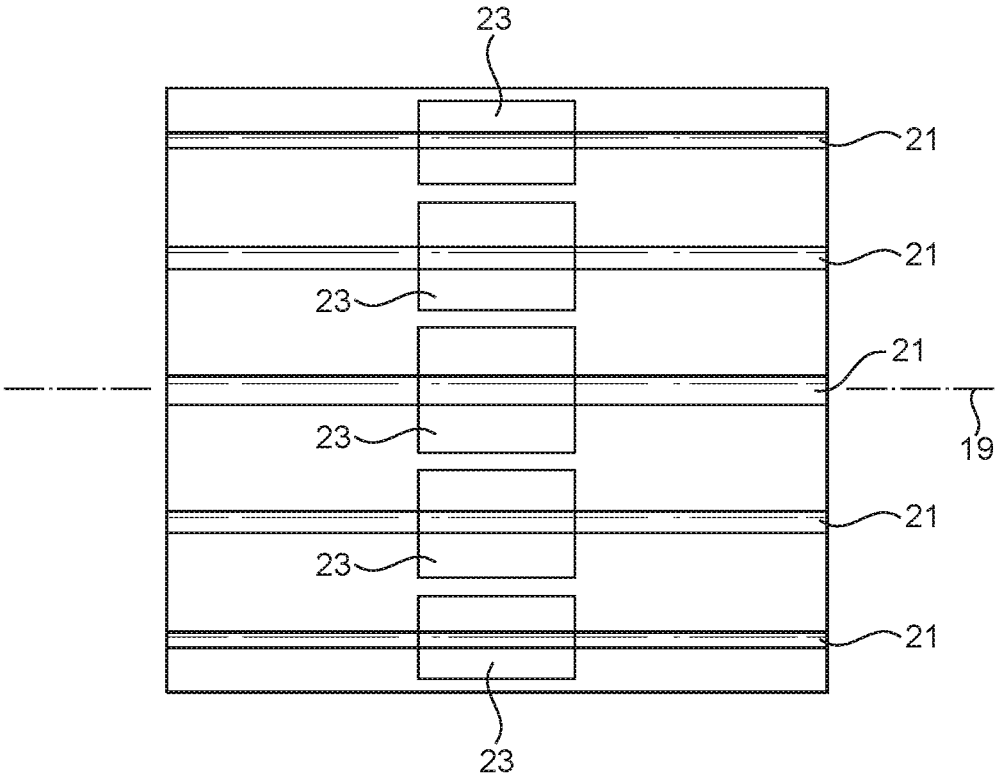

FIG. 7a

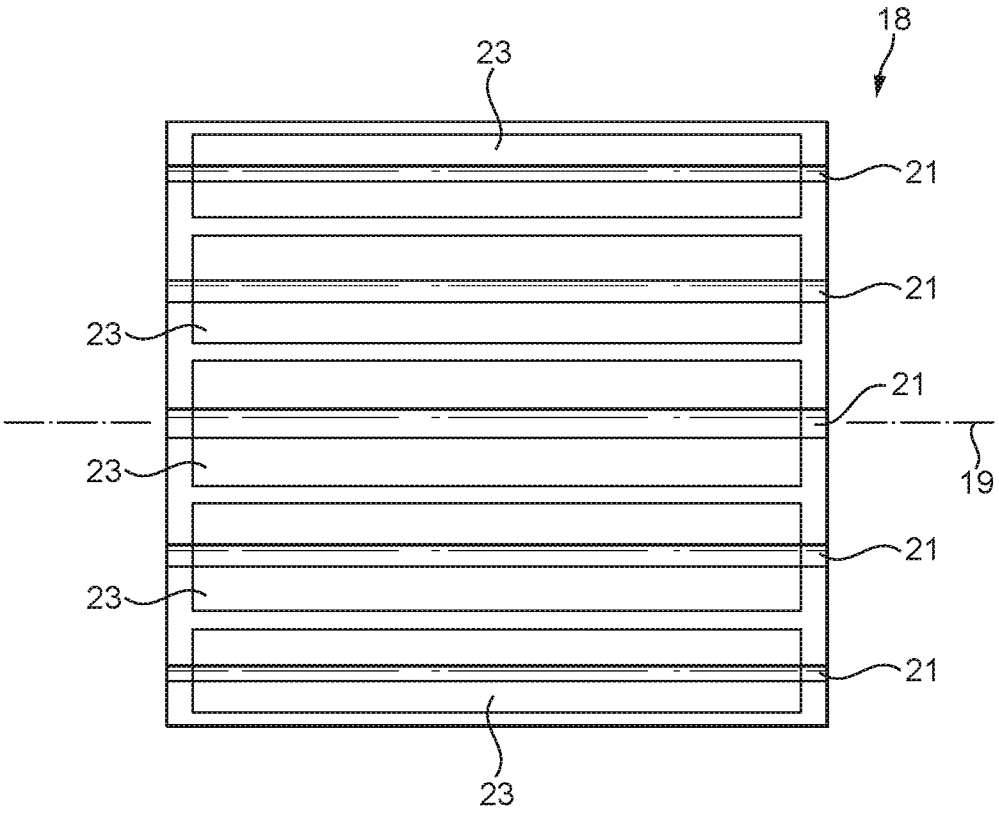

FIG. 7b

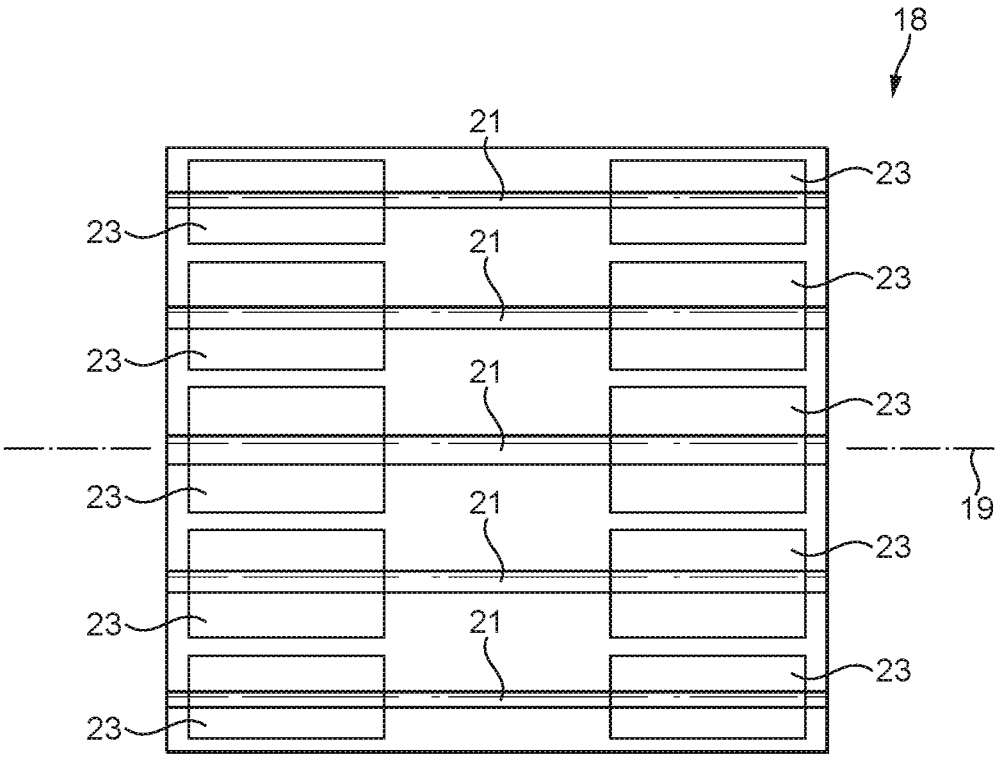

FIG. 7c

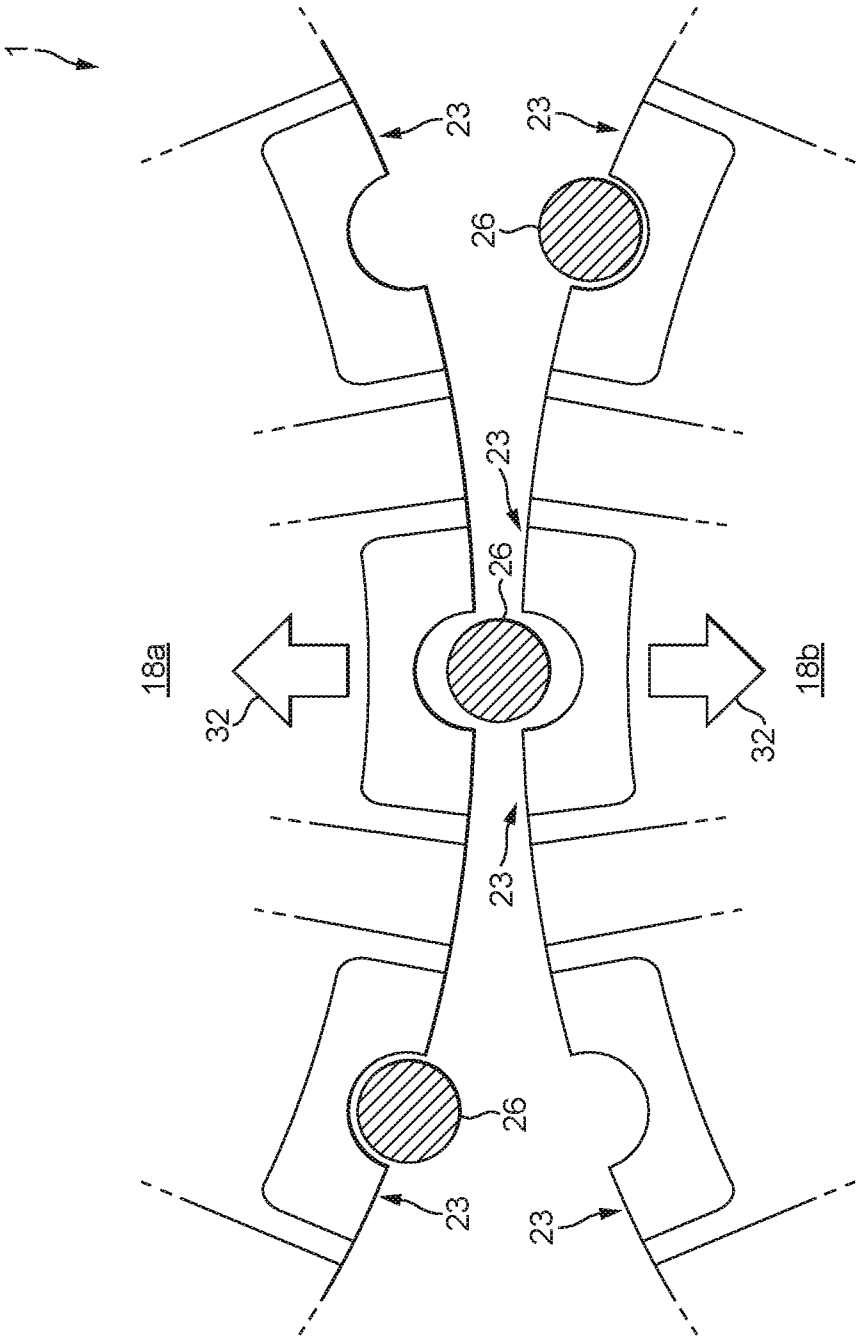

FIG. 8

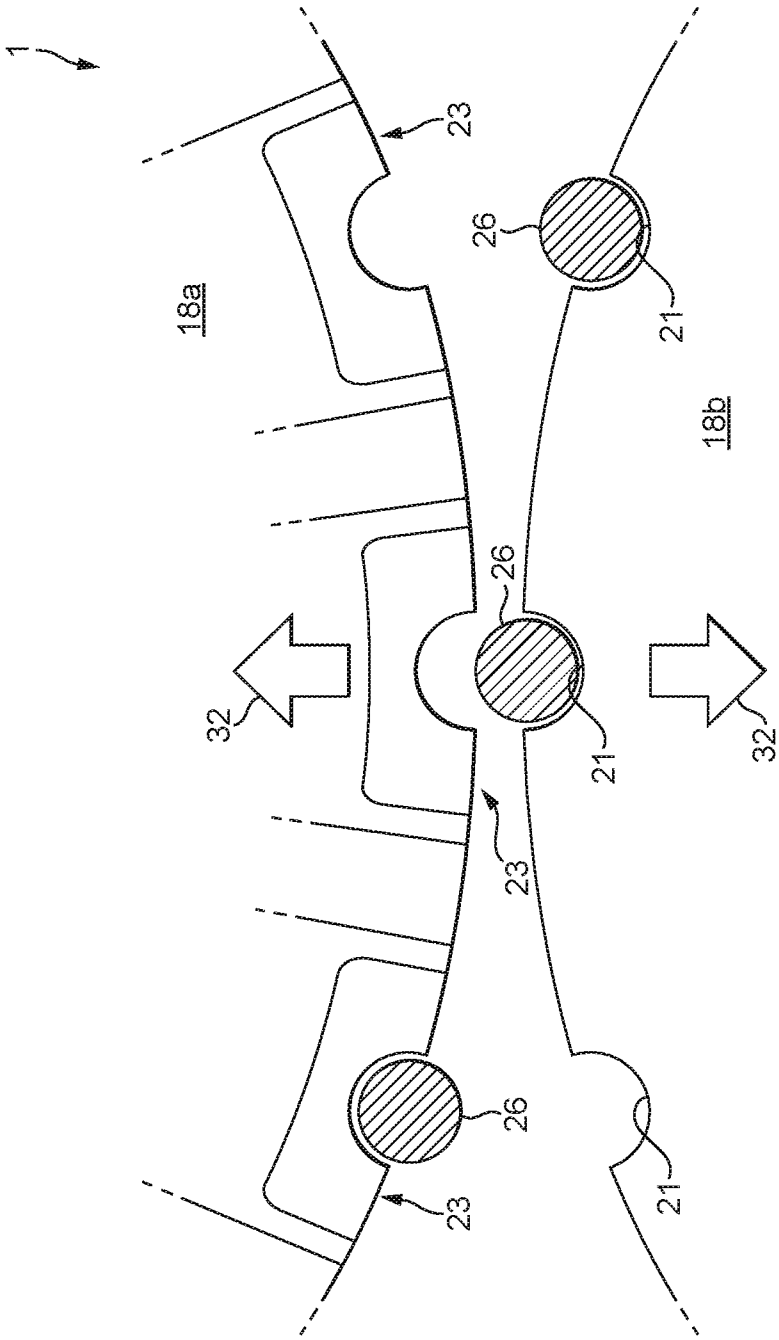

FIG. 9

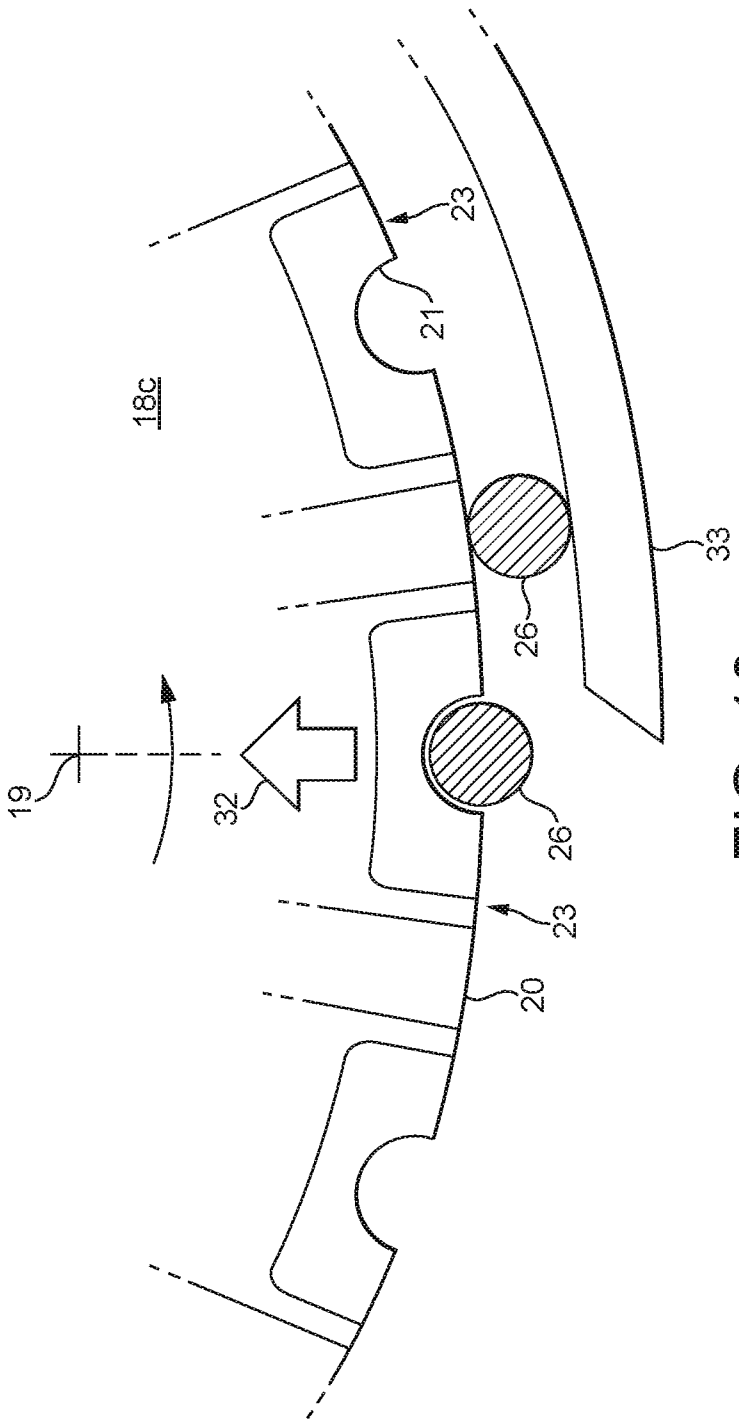

FIG. 10

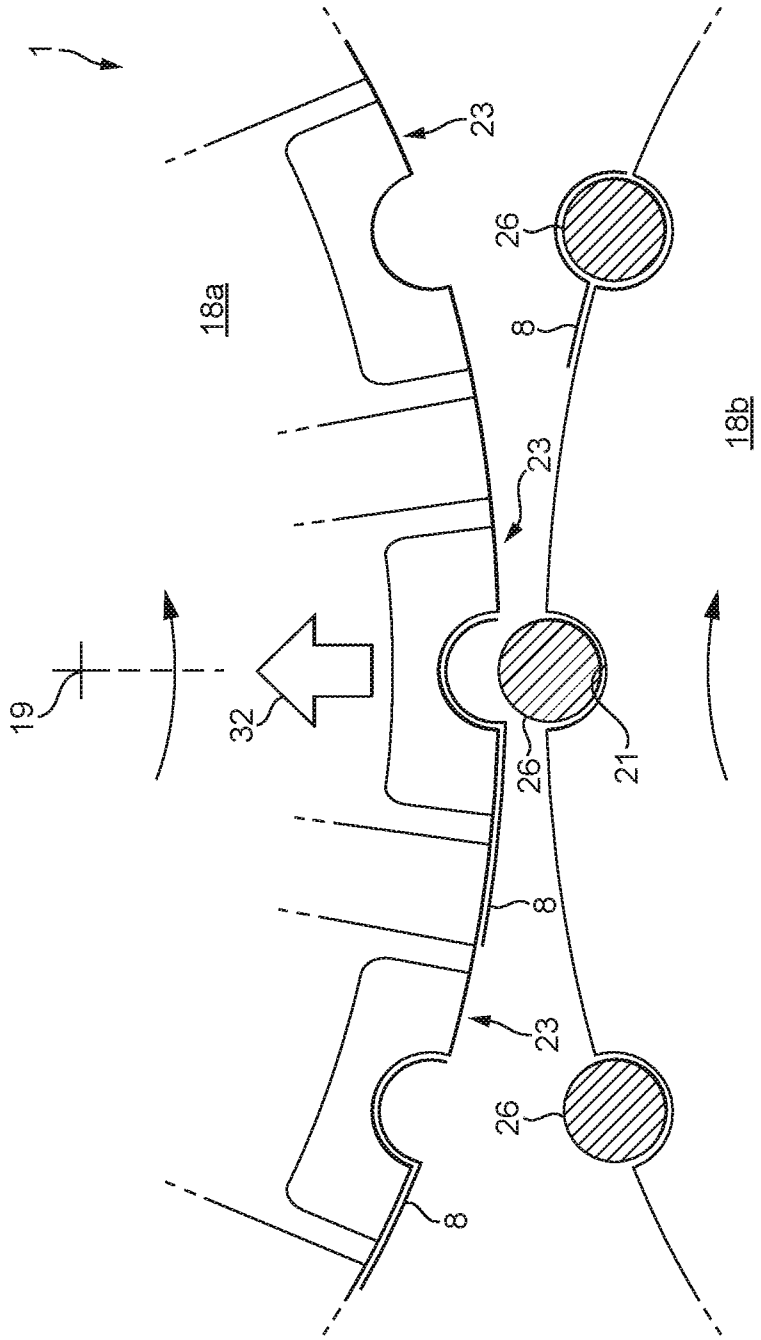

FIG. 11

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2017/051449

A. CLASSIFICATION OF SUBJECT MATTER
INV. A24C5/32
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A24C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2015/291301 A1 (CADIEUX EDMOND J [US] ET AL) 15 October 2015 (2015-10-15) paragraphs [0032], [0034] - [0036], [0049], [0051], [0053] - [0057], [0059], [0062], [0064], [0065], [0077]; figures 2b-d,3-5,7A,8,9	1,2,4-24
X	DE 25 17 299 A1 (SCHMERMUND MASCHF ALFRED) 6 November 1975 (1975-11-06) page 22, paragraph 3 - page 23, paragraph 2; figure 3	1,3,22

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

[X] See patent family annex.

* Special categories of cited documents :

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"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 July 2017	07/08/2017

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

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 395 280 A2 (PHILIP MORRIS [US]) 31 October 1990 (1990-10-31) column 6, line 48 - column 7, line 4; figures 4,7-10 column 8, line 58 - column 9, line 19 -----	1,2,4-8, 11,13, 15,16, 18,20-22
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2017/051449

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