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(54) **COMPRESSION CHANNEL AND METHOD OF COMPRESSING A BODY OF MATERIAL**

(57) A compression channel (206) for receiving and compressing a body of material for use in a smoking article is disclosed. The compression channel comprises an inlet (208) for receiving the body of material, a first compression portion (210) configured to receive the body of material from the inlet, and compress the body of material as it passes therethrough and a second compression portion (212) configured to receive the body of material from the first compression portion, and compress the body of material as it passes therethrough, wherein the first and second compression portions are configured such that a maximum compression force applied to the body of material in the first compression portion is greater than a maximum compression force applied to the body of material in the second compression portion.

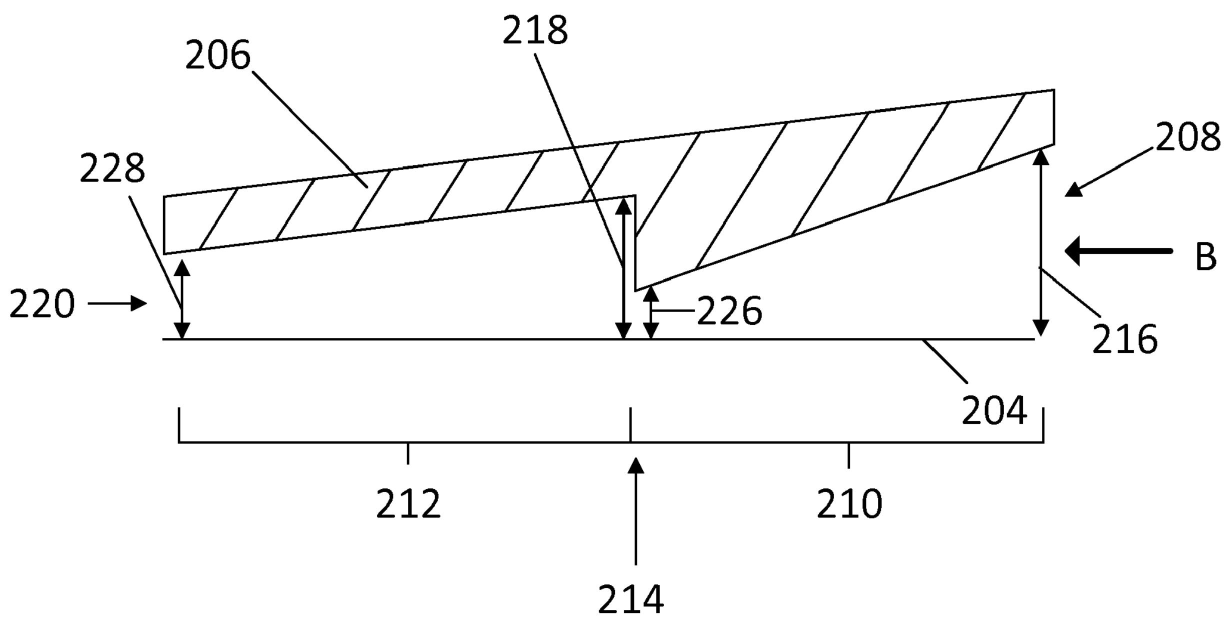


Fig. 2a



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## Description

**[0001]** This invention relates generally to a compression channel for receiving and compressing a body of material and a method of compressing a body of material. In particular but not exclusively, this invention relates to a compression channel for compressing a material for use in a smoking article.

**[0002]** Manufacture of some components for smoking articles typically involves the processing of bands of material. For example, a sheet or web of material (e.g. in the form of a tobacco cast leaf band (TCL) or a sheet or foil of filter materials, e.g. polylactic acid (PLA) or cellulose acetate) may be used to create components for smoking articles - for example 'rods' (elongate rods of aerosol-forming substrate wrappers) for Heat-Not-Burn smoking articles or filters for conventional cigarettes.

**[0003]** Such components have various roles in a smoking article, including cooling down the air drawn into the smoking article, following heating by the heat source, before it reaches the user.

**[0004]** Fig. 1 illustrates part of a typical apparatus for manufacturing such rod components. The sheet or web of material (not shown) is fed into a converging device or funnel 102, typically having a funnel shape, in the direction of arrow A (after having been submitted to various treatments including for instance crimping). The converging funnel 102 (also called 'insertion cone') gathers and compresses the sheet or web of material.

**[0005]** The converging device 102 is located upstream to an entrance of a rod-forming means (not shown). As the compressed sheet or web of material approaches the outlet of the converging funnel 102, it is located on a wrapping material 104. The wrapping material 104, with the compressed sheet or web of material thereon, is pulled or driven by a garniture tape (not shown) from the outlet of the converging funnel 102 to the rod-forming means via a compression channel 106 (or tongue device).

**[0006]** The compression channel 106 applies increased converging and compressing forces to the sheet or web of material prior to it entering the rod-forming means. The compression channel 106 has usually a 'half-funnel' shape (i.e. a funnel cut in two along it's symmetric axis), so that above the sheet or web of material, there is a half funnel shape, and at the bottom there is the wrapping material (usually paper).

**[0007]** Towards the exit of the compression channel 106, the garniture tape and hence the wrapping material 104 takes progressively a 'U' shape that will achieve compressing the sheet or web of material into a rod of the determined diameter. The wrapping material 104 is folded, closed and glued on itself with a seam glue line, forming a continuous cylindrical rod. This continuous rod is then cut into discrete sticks creating the desired components that are used as a component in a smoking article or used as part of the manufacturing process for producing a smoking article.

**[0008]** However, the sheet or web of material foil inside the rod (and the sticks), even if crimped, compressed and wrapped, presents remaining expansion forces, which stress the glue seams, and could, from time to time, lead to diameter variations or even to openings of the wrapping paper.

**[0009]** It would be desirable to provide a compression channel and a method of compressing a body of material, which overcomes the above problems.

**[0010]** US5025814A discloses a filter rod for cigarette manufacture including a plurality of strands of reconstituted tobacco material.

**[0011]** US5387285A discloses a fluid injection device and method of injecting and distributing a fluid to a continuous, multifilament filter tow used in the manufacture of filters for smokable tobacco products.

**[0012]** US9232820B2 discloses an apparatus for inserting one or more objects into a filter component of a tobacco rod.

**[0013]** JP04125321 B2 discloses an apparatus for manufacturing a filter from a tow.

**[0014]** According to a first aspect of the invention there is provided a compression channel for receiving and compressing a body of material for use in a smoking article, wherein the compression channel comprises:

an inlet for receiving the body of material;
a first compression portion configured to receive the body of material from the inlet, and compress the body of material as it passes therethrough; and
a second compression portion configured to receive the body of material from the first compression portion, and compress the body of material as it passes therethrough;
wherein the first and second compression portions are configured such that a maximum compression force applied to the body of material in the first compression portion is greater than a maximum compression force applied to the body of material in the second compression portion.

**[0015]** Aptly, the junction between the first and second compression portions is configured such that the compression force applied to the body of material is reduced after the junction.

**[0016]** Aptly, the compression channel is configured to provide a maximum compressive force to the body of material at an end of the first compression portion proximate the junction.

**[0017]** Aptly, at least one dimension of the cross-section of the first compression portion decreases from an end of the first compression portion proximate the inlet towards an end of the first compression portion proximate the junction.

**[0018]** Aptly, at least one dimension of the cross-section of the first compression portion at an end proximate the junction is smaller than a corresponding at least one dimension of the cross-section of the second compression portion at an end proximate the junction.

**[0019]** Aptly, at least one dimension of the cross-section of the first compression portion at an end proximate the junction is smaller than a corresponding at least one dimension of the cross-section of the second compression portion at an end distal from the junction.

**[0020]** Aptly, at least one dimension of the cross-section of the second compression portion decreases from an end of the second compression portion proximate the junction towards an end of the second compression portion distal from the junction.

**[0021]** Aptly, the compression channel is configured to compress the body of material against a wrap material as it travels therethrough.

**[0022]** Aptly, the at least one dimension of the first or second compression portion is a distance between the wrap material and an opposing interior surface of the first or second compression portion respectively.

**[0023]** Aptly, a cross-sectional area of the first compression portion decreases from an end of the first compression portion proximate the inlet towards an end of the first compression portion proximate the junction.

**[0024]** Aptly, a cross-sectional area of the first compression portion at an end proximate the junction is smaller than a cross-sectional area of the second compression portion at an end proximate the junction.

**[0025]** Aptly, a cross-sectional area of the first compression portion at an end proximate the junction is smaller than a cross-sectional area of the second compression portion at an end distal from the junction.

**[0026]** Aptly, a cross-sectional area of the second compression portion decreases from an end of the second compression portion proximate the junction towards an end of the second compression portion distal from the junction.

**[0027]** Aptly, an end of the second compression portion distal from the junction is configured as an outlet of the compression channel.

**[0028]** Aptly, the cross-sectional area of the second compression portion at the outlet substantially corresponds to the cross-sectional area of a rod for use in a smoking article.

**[0029]** Aptly, the first compression portion and the second compression portion have a substantially circular, semi-circular, U, C or D shaped cross-section.

**[0030]** Aptly, the first compression portion includes an elongate protrusion extending into the channel of the first compression portion and along at least a portion of the length of the first compression portion.

**[0031]** Aptly, the extension of the protrusion into the channel increases from the end of the first compression portion proximate the inlet towards the end of the first compression portion proximate the junction.

**[0032]** Aptly, the compression channel further comprises cooling means, for cooling the body of material as it passes therethrough.

**[0033]** Aptly, the compression channel further comprises means for projecting an air-jet within the compression channel.

**[0034]** Aptly, the compression channel further comprises coupling means for coupling the compression channel to an adjacent funnel apparatus.

**[0035]** According to a second aspect of the invention there is provided a system for compressing a body of material, the system comprising:

a funnel apparatus; and
a compression chamber according to the first aspect of the invention coupled to the outlet of the funnel apparatus;
wherein the compression chamber is configured to receive a body of material from the outlet of the funnel apparatus.

**[0036]** According to a third aspect of the invention there is provided a method of compressing a body of material for use in a smoking article, the method comprising:

applying a first compressive force to the body of material; and
applying a second compressive force to the body of material after the first compressive force,
wherein the first compressive force is greater than the second compressive force.

**[0037]** Aptly, the first compressive force is applied to the body of material by passing the body of material through a first portion of a compression channel.

**[0038]** Aptly, the second compressive force is applied to the body of material by passing the body of material through a second portion of the compression channel.

**[0039]** Aptly, the method further comprises releasing the first compressive force applied to the body of material to allow the body to relax. Aptly the second compressive force is applied to the body of material after the first compressive force is released.

**[0040]** Aptly, the maximum compression force applied to the body of material in the first compression portion is greater than a maximum compression force applied to the body of material in the second compression portion.

**[0041]** Aptly, the compression channel used in the third aspect of the invention corresponds to the compression channel of the first aspect of the invention.

**[0042]** Certain embodiments of the invention provide the advantage that a compression channel is provided that is configured to receive and compress a body of material.

**[0043]** Certain embodiments of the invention provide the advantage that a compression channel is provided that is configured to help suppress expansion forces in the compressed material.

**[0044]** As used herein, the term "compression channel" is used to describe a channel for compressing a body of material. Specifically, an interior surface of the compression channel compresses the body of material as it travels through the compression channel (with the compression channel being a static apparatus in itself). The compression channel may otherwise be termed a 'choke', or a 'bottleneck'. As used herein, the term compression portion is used to describe a portion of the compression channel that compresses the body of material.

**[0045]** As used herein, the term body of material is used to describe a sheet or web of material, which is gathered (by virtue of being passed through a funnel portion) into a 'body'.

**[0046]** For the avoidance of doubt, any of the features described herein apply equally to any aspect of the invention. Within the scope of this application it is expressly envisaged that the various aspects, embodiments, examples and alternatives set out in the preceding paragraphs, in the claims and/or in the following description and drawings, and in particular the individual features thereof, may be taken independently or in any combination. Features described in connection with one aspect or embodiment of the invention are applicable to all aspects or embodiments, unless such features are incompatible.

**[0047]** The invention will now be further described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 illustrates a schematic perspective view of a typical apparatus used in the manufacture of rod components for smoking articles;
Figure 2a illustrates a longitudinal cross-section of a compression channel;
Figure 2b illustrates the compression channel of Figure 2a as viewed in direction B;
Figure 3a illustrates a longitudinal cross-section of another compression channel;
Figure 3b illustrates the first compression portion of the compression channel of Figure 3a as viewed in direction C;
Figure 4a illustrates a longitudinal cross-section of a funnel apparatus, for coupling with either of the compression channels of Figures 2a or 3a; and
Figure 4b illustrates the adjacent funnel apparatus of Figure 4a as viewed in direction D.

**[0048]** Referring now to Figs. 2a and 2b, there is shown a compression channel 206 for receiving and compressing a body of material for use in a smoking article. The compression channel 206 includes an inlet 208 for receiving the body of material (not shown). In this example, the body of material is a sheet or web of material, which has been gathered and compressed. The body of material is received from a converging funnel (not shown) in the direction indicated by arrow B.

**[0049]** The compression channel 206 further includes a first compression portion 210 configured to receive the body of material from the inlet 208 and compress the body of material as it passes therethrough. The compression channel 206 further includes a second compression portion 212 configured to receive the body of material from the first compression portion 210 and compress the body of material as it passes therethrough (i.e. the first compression portion 210 is an upstream compression portion and the second compression portion 212 is a downstream compression portion). In this example, the compression channel 206 includes a junction 214 between the first compression portion 210 and the second compression portion 212. That is, the body of material passes (or travels through) the junction 214 as it passes from the first compression portion 210 to the second compression portion 212.

**[0050]** In this example, the first and second compression portions 210, 212 have a substantially C-shaped cross-section. That is, the first and second compression portions 210, 212 have a curved profile, with an open-mouth. The open-mouth of the first and second compression portions 210, 212 extends longitudinally to accommodate a garniture tape (not shown), on which a wrap material 204 is situated. In use, the garniture tape drives the wrap material 204 (with the body of material thereon) through the compression channel. In this example, the compression channel 206 is configured to compress the body of material against the wrap material 204 as it travels through the compression channel 206.

**[0051]** In this example, at least one dimension of the cross-section of the first compression portion 210 decreases from an end of the first compression portion proximate the inlet 208 towards an end of the first compression portion proximate the junction 214. In this example, the at least one dimension of the first compression portion 210 is a distance between the wrap material 204 and an opposing interior surface of the first compression portion 210. Specifically, in this example, the at least one dimension is the internal height of the first compression portion 210, which decreases from a height 216 proximate the inlet 208 to a height 226 proximate the junction 214.

**[0052]** In this example, the cross-sectional area of the first compression portion 210 also decreases from the end of the first compression portion proximate the inlet 208 towards an end of the first compression portion proximate the junction 214. Specifically, in this example, all dimensions of the cross-section scale with the change in the height of the cross-section (except for the width of the open-mouth region of the compression channel as shown in Fig. 2b). That is, the curved profile of the cross-section of the first compression portion 210 also decreases from the end of the first compression portion proximate the inlet 208 towards the end of the first compression portion proximate the junction 214, as shown in Fig. 2b.

**[0053]** As the body of material travels through the first compression portion 210 (driven by the wrap material) the reduction in the height of the first compression portion 210 (and in this example, the reduction in cross-section) acts to gradually compress the body of material against the wrap material. Specifically, as the body of material travels through the compression chamber, the sloped interior surface of the first compression portion directs the body of material inwardly (i.e. towards the wrap material) to compress the body of material.

**[0054]** In this example, in the same manner as the first compression portion 210, at least one dimension of the cross-section of the second compression portion 212 decreases from an end of the second compression portion proximate the junction 214 towards an end of the second compression portion distal from the junction. The at least one dimension of the second compression portion is a distance between the wrap material 204 and an opposing interior surface of the second compression portion 212. In this example, in the same manner as with the first compression portion 210, the at least one dimension of the second compression portion 212 is the internal height of the second compression portion 212, which decreases from a height 218 proximate the junction 214 to a height 228 distal from the junction 214.

**[0055]** In the same manner as per the first compression portion 210, the cross-sectional area of the second compression portion 212 decreases from the end of the second compression portion proximate the junction 214 towards the end of the second compression portion distal from the junction 214. As the body of material travels through the second compression portion 212 the reduction in the height of the second compression portion 212 (and in this example, the reduction in cross-section) acts to gradually compress the body of material against the wrap material 204.

**[0056]** In this example, the end 220 of the second compression portion 212 distal from the junction 214 is configured as an outlet of the compression channel. The cross-sectional area of the second compression portion 212 at the outlet 220 substantially corresponds to the cross-sectional area of a rod for use in a smoking article. That is, the second compression portion 212 is configured to compress the body of material to the required cross-section to be wrapped as a rod. In use, from the outlet 220, the compressed body of material will be passed to a rod-shaping apparatus, where the wrapping material 104 is folded, closed and glued on itself with a seam glue line, forming a continuous cylindrical rod.

**[0057]** In this example, the height of the cross-section of the first compression portion 210 at the end proximate the junction 214 is smaller than the height of the cross-section of the second compression portion at the end proximate the junction 214. In this example, the cross-sectional area of the first compression portion 210 at the end proximate the junction 214 is also smaller than the cross-sectional area of the second compression portion 212 at the end proximate the junction 214.

**[0058]** That is, the junction 214 between the first and second compression portions 210, 212 is configured such that the compression force applied to the body of material is reduced after the junction. In other words, as the body of material travels through the compression chamber 206, the compression chamber applies a first compressive force to the body of material in the first compression portion. The first compressive force is released to allow the body of material to relax (i.e. as the body of material travels past the junction) and a second compressive force is applied to the body of material after releasing the first compressive force, wherein the first compressive force is greater than the second compressive force.

**[0059]** By reducing the compressive force applied to the body of material as it passes through the junction, the body of material is allowed to relax prior to the final compression through the second chamber, which brings the body of material to the required diameter prior to wrapping.

**[0060]** In this example, the height 226 of the cross-section of the first compression portion 210 at the end proximate the junction 214 is smaller than the height 228 of the cross-section of the second compression portion 212 at the end distal from the junction 214. Similarly, the cross-sectional area of the first compression portion 210 at the end proximate the junction 214 is smaller than the cross-sectional area of the second compression portion 212 at the end distal from the junction 214.

**[0061]** As such, the first and second compression portions 210, 212 are configured such that a maximum compression force applied to the body of material in the first compression portion 210 is greater than a maximum compression force applied to the body of material in the second compression portion 212. That is, the first compression portion 210 is configured to 'over-compress' the body of material relative to the compression required for the final product being delivered from the outlet of the compression chamber 206.

**[0062]** Specifically in this example, the compression channel 206 is configured to provide a maximum compressive force to the body of material at the end of the first compression portion 210 proximate the junction 214. That is, the height of the internal surface of the compression channel 206 is at a minimum at the end of the first compression portion 210 proximate the junction 214 to provide a maximum compressive force to the body of material.

**[0063]** By 'over-compressing' the body of material in the first compression portion 210 and then allowing the body of material to relax, the compression chamber 206 is configured to reduce the expansion force (elastic reaction force) exerted by the body of material against the wrapping or glue on the rods.

**[0064]** There are a number of physical mechanisms which may contribute to this effect. For example, the 'over-compression' of the body of material may lead to plastic deformation, which limits the potential elastic reaction force of the body of material when wrapped. Alternatively or in addition, heat created by frictions resulting from the 'over-compression' may melt and glue together sections of the body of material. Alternatively or in addition, 'over-compression' of the body of material may help to create 'bounds/locks' between layers of the body of material.

**[0065]** Referring now to Fig. 3a, there is shown an alternative compression channel 306 for receiving and compressing a body of material for use in a smoking article. The compression channel 306 has corresponding features (indicated by the prefix 3-) to the compression channel 206, which will not be described again in detail. Fig. 3b illustrates the first compression channel 310 of the compression channel 306 as viewed in direction C.

**[0066]** In this example, the first compression portion 310 includes an elongate protrusion 330 extending into the channel of the first compression portion and along at least a portion of the length of the first compression portion 310. In this example the elongate protrusion 330 extends along the full length of the first compression portion 310.

**[0067]** The distance by which the protrusion 330 extends into the channel increases from the end of the first compression portion 310 proximate the inlet 308 towards the end of the first compression portion proximate the junction 314. That is in this example, the decrease in height of the first compression portion, which provides the 'over-compression' is provided by an increase in the length of the protrusion 330. As the body of material travels through the first compression portion 310, it is increasingly compressed as the length of the protrusion increases. The maximum compressive force is applied to the body of material at the end of the first compression portion 310 proximate the junction 314 (i.e. where the length of the protrusion is at its maximum). The body of material is then relaxed and further compressed in the same manner as described with regards to compression channel 206 (i.e. the height of the second compression channel decreases from height 318 to height 328).

**[0068]** In both examples of compression channels 206, 306 described above the compression channels further include coupling means for coupling the compression channel to an adjacent funnel apparatus. Figures 4a and 4b illustrate a funnel apparatus 400, which gathers a sheet or web of material (not shown) as it enters through inlet 402, after the sheet or web of material has been submitted to various treatments including for instance crimping. The sheet or web of material is then compressed to form a body of material, which the compression channels 206, 306 are configured to receive from an outlet 404 of the funnel apparatus 400. Any suitable coupling means may be used to couple a compression channel to the outlet of the funnel apparatus. For example, the coupling means may be a recess on an exterior surface configured to receive a screw or bolt 406, to couple the funnel apparatus to the exterior surface.

**[0069]** Various modifications to the detailed arrangements as described above are possible. For example, the first and second compression portions may have any suitable shape of cross-section. For example, they may have a substantially circular, semi-circular, U, C or D shaped cross-section. The first and second compression portions may have different cross-section shapes. Either, both or neither of the compression portions may include a protrusion in the manner described for the example of Figures 3a and 3b. Each of the compression portions may include any number of protrusions.

**[0070]** The compression channel may be made from any suitable material, for example metal (e.g. stainless steel or aluminium) or hard plastic.

**[0071]** The compression channel may be configured to have any suitable dimensions. The dimensions of the compression channel may be selected in accordance with the product being produced. For example, when being used to produce a filter for use in a cigarette, or a rod for use in a heat-not-burn product, the cross-sectional area of the second compression portion 212 at the outlet 220 may have a width or height of substantially between 6 and 8mm (aptly 7mm). Alternatively, when being used for producing a cigar (or products related thereto) the cross-sectional area of the second compression portion 212 at the outlet 220 may have a width or height of substantially between 10 and 12mm (aptly 11mm).

**[0072]** The compression channel may be configured to over-compress the body of material by any suitable amount. For example, the compression channel may be configured to over-compress the body of material by between 10 and 60% (or aptly between 30 and 40%). That is, the compression channel may be configured such that the cross-sectional area of the first compression portion at an end proximate the junction is substantially 10-60% less than the cross-sectional area of the second compression portion at an end distal from the junction. Similarly, the compression channel may be configured such that the at least one dimension of the first compression portion at an end proximate the junction is substantially 10-60% smaller than the corresponding at least one dimension of the second compression portion at an end distal from the junction. That is, for the examples given above, the width or height of the first compression portion at an end proximate the junction may be between substantially 2.4mm and 7.2mm when producing a filter for use in a cigarette, or a rod for use in a heat-not-burn product or between substantially 4mm and 10.8mm when producing a cigar (or products related thereto).

**[0073]** The compression channel may be configured to allow the body of material to relax by any suitable amount as it travels across the junction. That is, the at least one dimension of the cross-section of the first compression portion at an end proximate the junction (or the cross-sectional area itself) may be between 30 and 80% (aptly between 50 and 60%) smaller than the corresponding at least one dimension of the cross-section of the second compression portion at an end proximate the junction. That is, for the examples given above, the width or height of the second compression portion at an end proximate the junction may be between substantially 3.4mm and 9mm when producing a filter for use in a cigarette, or a rod for use in a heat-not-burn product or between substantially 5.7mm and 13.5mm when producing a cigar (or products related thereto).

**[0074]** The compression channel may be configured to compress against a floor portion of the compression channel (i.e. as opposed to a wrap material) along at least part of the compression channel. In such examples, the at least one dimensions of the first and second compression channels is a distance between the two points on the interior surface of the first or second compression portion respectively.

**[0075]** The 'at least one dimension' of the first compression portion may or not correspond to the 'at least one dimension' of the second compression portion. That is, for example, the first compression portion may gradually compress the body of material through a reduction in an internal height of the first compression portion from the inlet to the junction, whereas the second compression portion may gradually compress the body of material through a reduction in a different dimension (e.g. the width of the second compression portion).

**[0076]** All dimensions of the dimensions of the cross sections of the compression portions may decrease from the first end of each compression portion to the second end of the respective compression portion. For example, the entire cross-section of the compression portions may scale with a decrease in internal height. Alternatively, only the height (or other dimension) may decrease, with other dimensions (for example width) remaining constant.

**[0077]** The at least one dimension of the first compression portion and the at least one dimension of the second compression portion may decrease across the first and second compression portion in any suitable way. For example, the dimensions may decrease linearly or nonlinearly across the first and second compression portions. The at least one dimension of the first compression portion and the at least one dimension of the second compression portion may decrease across the first and second compression portion by any suitable amount. For example, the at least one dimension of the cross-section of the first compression portion may decrease by between substantially 30 and 80% (aptly between 50 and 60%) from the end of the first compression portion proximate the inlet towards an end of the first compression portion proximate the junction. Similarly, the least one dimension of the cross-section of the second compression portion may decreases by between 10 and 60% (aptly between 30 and 40%) from the end of the second compression portion proximate the junction towards an end of the second compression portion distal from the junction.

**[0078]** For embodiments where the body of material is compressed by a protrusion, the first compression channel may or may not also be sloped. That is, the length of the protrusion may stay substantially constant and the height and/or cross-sectional area of the first compression portion may decrease from the end of the first compression portion proximate the inlet towards the end of the first compression portion proximate the junction.

**[0079]** The body of material may be in the form of a tobacco cast leaf band (TCL) or a sheet or foil of polylactic acid (PLA).

**[0080]** The compression channel may include a succession of several couples of chambers, each 'couple' including a first compression portion configured to 'over-compress' the body of material and a second compression portion configured to allow the body of material to relax from the 'over-compressed' state.

**[0081]** In the above described examples, heat may be generated within the compression channel due to frictional movement/forces. This is particularly problematic with PLA that may melt and lead to a blockage in the compression channel. In order to address this the compression channel may further comprise cooling means, for cooling the body of material as it passes therethrough. Any suitable or known cooling means may be used. For example, the cooling means may include means for projecting an air-jet within the compression channel. Alternatively (or in addition), the cooling means may include a cooling fluid circulation system. Such a system may circulate a cooling fluid along or around the compression channel (for example in contact with an external surface thereof), to dispense the heat generated within the compression channel.

**[0082]** It will also be appreciated by those skilled in the art that any number of combinations of the aforementioned features and/or those shown in the appended drawings provide clear advantages over the prior art and are therefore within the scope of the invention described herein.

**[0083]** The schematic drawings are not necessarily to scale and are presented for purposes of illustration and not limitation. The drawings depict one or more aspects described in this disclosure. However, it will be understood that other aspects not depicted in the drawings fall within the scope of this disclosure.

## Claims

1. A compression channel for receiving and compressing a body of material for use in a smoking article, wherein the compression channel comprises:

    an inlet for receiving the body of material;
    a first compression portion configured to receive the body of material from the inlet, and compress the body of material as it passes therethrough; and
    a second compression portion configured to receive the body of material from the first compression portion, and compress the body of material as it passes therethrough;
    wherein the first and second compression portions are configured such that a maximum compression force applied to the body of material in the first compression portion is greater than a maximum compression force applied to the body of material in the second compression portion.

2. A compression channel as claimed in claim 1, where-

in a junction between the first and second compression portions is configured such that the compression force applied to the body of material is reduced after the junction.

3. A compression channel as claimed in any preceding claim, wherein the compression channel is configured to provide a maximum compressive force to the body of material at an end of the first compression portion proximate the junction.

4. A compression channel as claimed in any preceding claim, wherein at least one dimension of the cross-section of the first compression portion decreases from an end of the first compression portion proximate the inlet towards an end of the first compression portion proximate the junction.

5. A compression channel as claimed in any preceding claim, wherein at least one dimension of the cross-section of the first compression portion at an end proximate the junction is smaller than a corresponding at least one dimension of the cross-section of the second compression portion at an end proximate the junction.

6. A compression channel as claimed in any preceding claim, wherein at least one dimension of the cross-section of the first compression portion at an end proximate the junction is smaller than a corresponding at least one dimension of the cross-section of the second compression portion at an end distal from the junction.

7. A compression channel as claimed in any preceding claim, wherein at least one dimension of the cross-section of the second compression portion decreases from an end of the second compression portion proximate the junction towards an end of the second compression portion distal from the junction.

8. A compression channel as claimed in any preceding claim, wherein the compression channel is configured to compress the body of material against a wrap material as it travels therethrough.

9. A compression channel as claimed in any of claims 4 to 8, wherein the at least one dimension of the first or second compression portion is a distance between the wrap material and an opposing interior surface of the first or second compression portion respectively.

10. A compression channel as claimed in any preceding claim, wherein a cross-sectional area of the first compression portion decreases from an end of the first compression portion proximate the inlet towards an end of the first compression portion proximate the junction.

11. A compression channel as claimed in any preceding claim, wherein a cross-sectional area of the first compression portion at an end proximate the junction is smaller than a cross-sectional area of the second compression portion at an end proximate the junction.

12. A compression channel as claimed in any preceding claim, wherein a cross-sectional area of the first compression portion at an end proximate the junction is smaller than a cross-sectional area of the second compression portion at an end distal from the junction.

13. A compression channel as claimed in any preceding claim, wherein a cross-sectional area of the second compression portion decreases from an end of the second compression portion proximate the junction towards an end of the second compression portion distal from the junction.

14. A compression channel as claimed in any preceding claim, wherein the first compression portion includes an elongate protrusion extending into the channel of the first compression portion and along at least a portion of the length of the first compression portion.

15. A compression channel as claimed in claim 14, wherein the extension of the protrusion into the channel increases from the end of the first compression portion proximate the inlet towards the end of the first compression portion proximate the junction.

16. A compression channel as claimed in claims 12, wherein the cross-sectional area of the first compression portion at an end proximate the junction is substantially 10-80% smaller than a cross-sectional area of the second compression portion at an end distal from the junction.

17. A method of compressing a body of material for use in a smoking article, the method comprising:

applying a first compressive force to the body of material; and
applying a second compressive force to the body of material after the first compressive force, wherein the first compressive force is greater than the second compressive force.

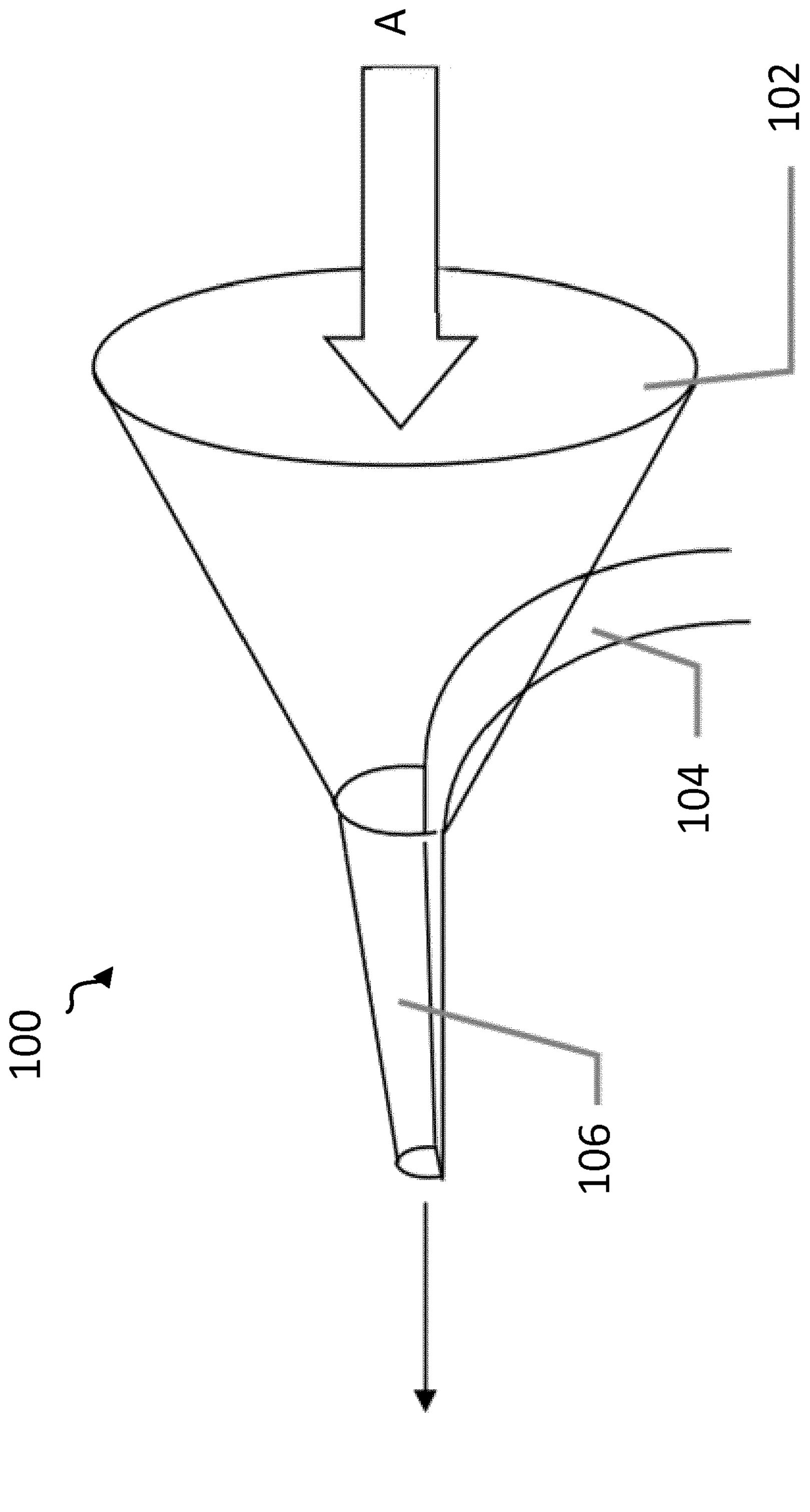


Fig. 1

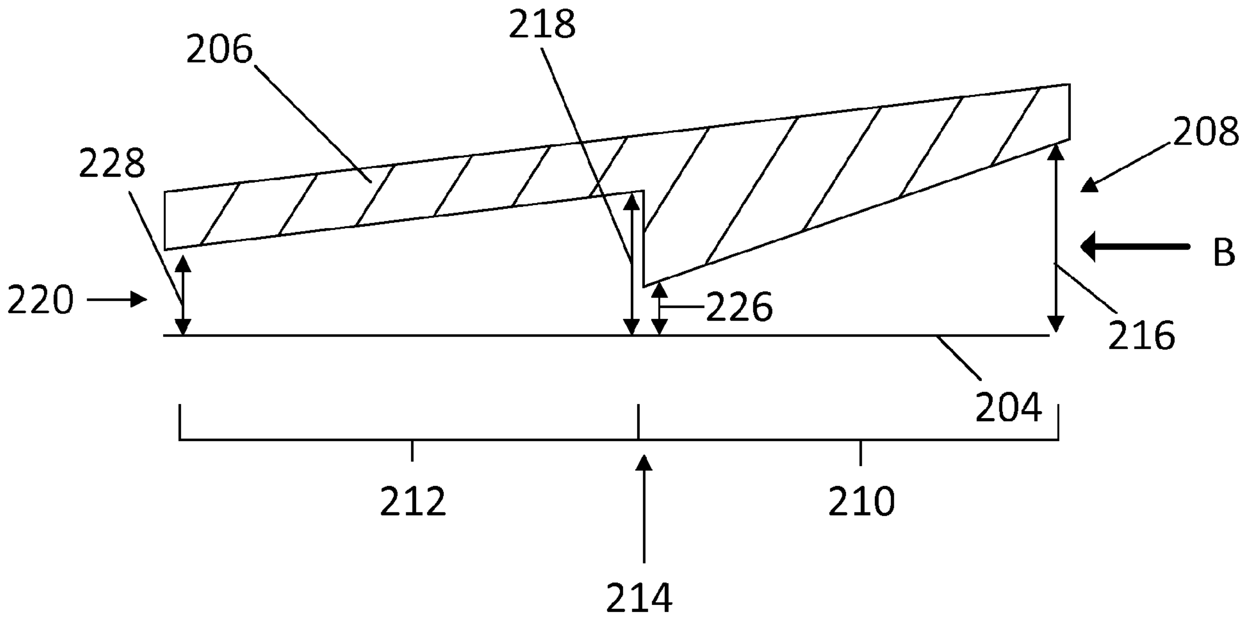


Fig. 2a

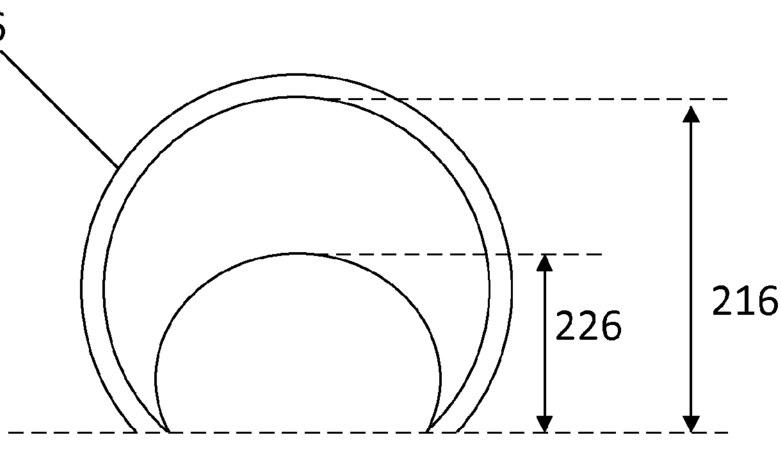


Fig. 2b

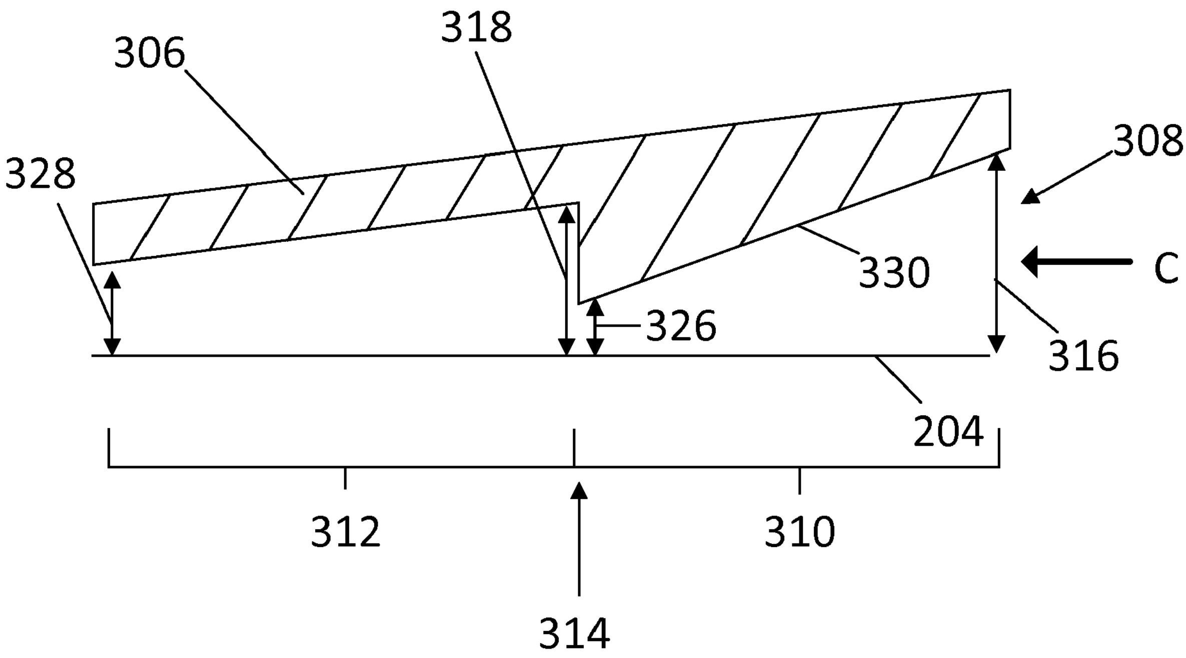


Fig. 3a

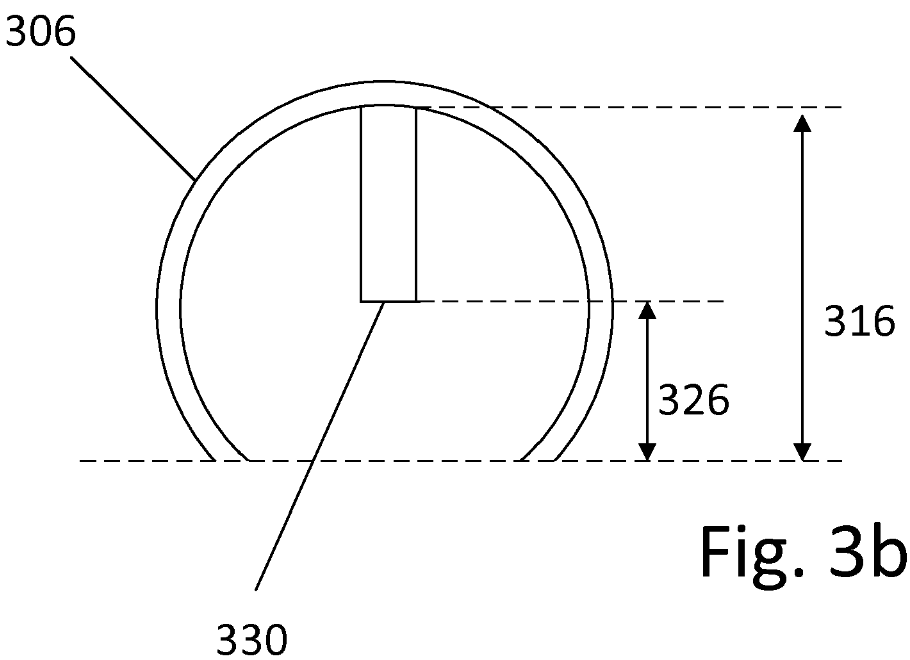


Fig. 3b

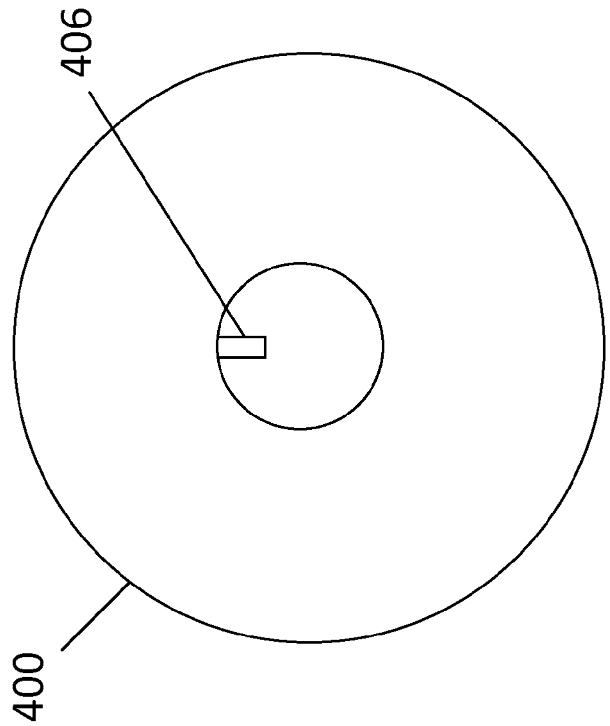


Fig. 4b

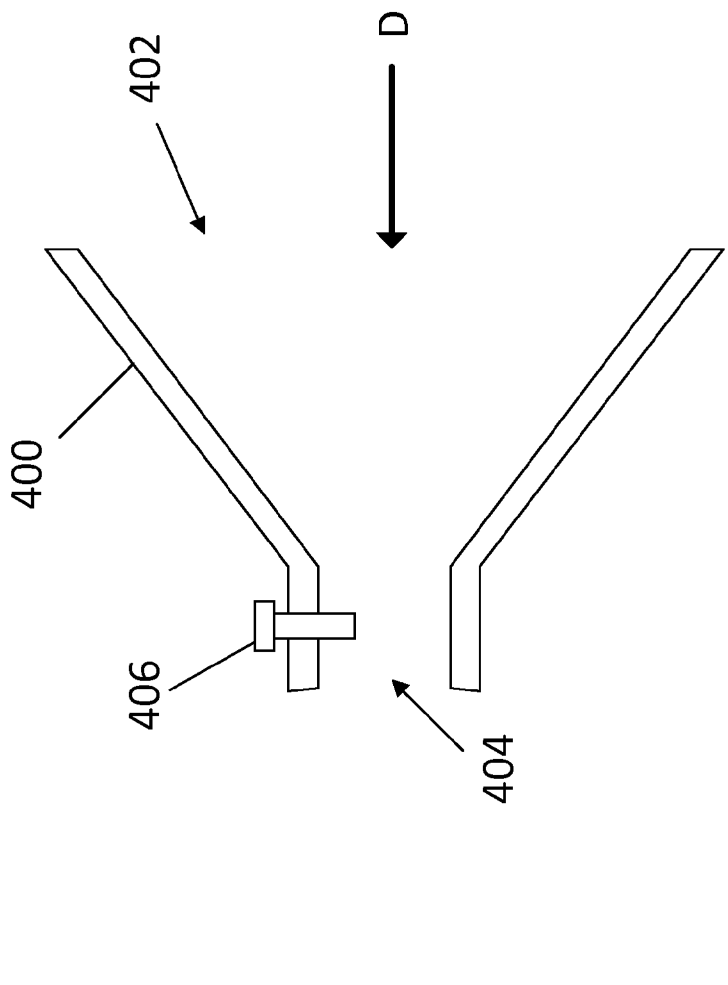


Fig. 4a

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Application Number
EP 18 19 0090

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