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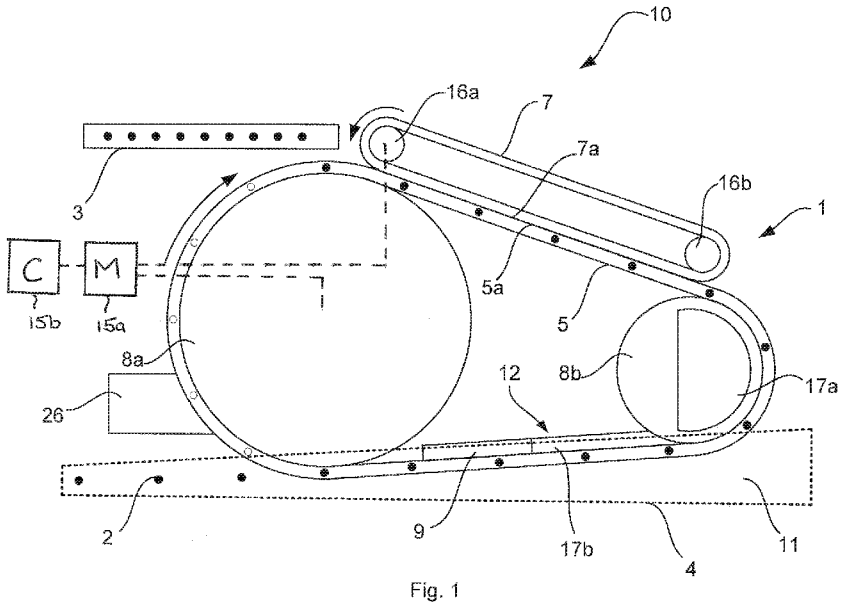


Fig. 1

(57) Abstract: The present invention relates to an apparatus (1) for delivering objects (2) from an object feed mechanism (3) into filter plug material as it passes through a garniture (4) of a machine (10) for making filter rods for use in the manufacture of smoking articles. The apparatus comprises an object transporter (5) configured to receive objects (2) from the object feed mechanism (3) and carry them along a transport path from the object feed mechanism (3) towards the garniture (4) as the object transporter (5) is driven. The apparatus (1) further comprises an object retainer (7) facing the object transporter (5) along the transport path to retain the objects received from the object feed mechanism (3) between the object transporter (5) and the object retainer (7). The object retainer (7) is configured so that it moves together with the object transporter (5) to reduce the friction between the object retainer (7) and the objects (2) received by the object transporter (5) from the object feed mechanism (3).

WO 2019/220118 A1

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Apparatus for Delivering Objects into Filter Plug Material

Technical Field

The present invention relates to an apparatus for delivering objects from an object feed mechanism into filter plug material as it passes through a garniture of a machine for making filter rods. The present invention also relates to a machine for making filter rods for use in the manufacture of tobacco industry products comprising the apparatus of the invention.

Background

Filter rods used in the manufacture of filtered cigarettes conventionally comprise a plug of cellulose acetate tow wrapped with a paper plug wrap. Known filter rod making machines comprises a garniture which receives a flow of tow and a ribbon of filter paper and forms a paper wrapped elongate filter rod, which is subsequently cut into filter rod segments. The garniture usually has a tongue which compresses the filter tow therethrough. This type of filter making machine and in particular the garniture and tongue elements are well known *per se* to those skilled in the art.

It is also known that some filters contain objects, such as capsules, to impart flavour and which can contain a flavourant. In order to locate these objects in the filter, an apparatus is used to transfer the objects from a feeding mechanism into the actetate tow. However, objects can sometimes be damaged whilst being transferred from the feeding mechanism to the acetate tow and so the rate of feed of the objects needs to be moderated to reduce the potential for damage to occur.

Summary of the Invention

In accordance with embodiments of the invention described herein, there is provided an apparatus for delivering objects from an object feed mechanism into filter plug material as the filter plug material passes through a garniture of a machine for making filter rods for use in the manufacture of tobacco industry products, the apparatus comprising: an object transporter configured to receive objects from the object feed mechanism and carry the objects along a transport path from the object feed mechanism towards the garniture as the object transporter is driven; and an object retainer facing the object transporter along at least a part of the transport path to retain the objects received from the object feed mechanism between the object transporter and the object retainer, wherein the object retainer is moveable together with the object

transporter to control friction between the object retainer and the objects carried by the object transporter.

The object retainer may be moveable along at least a part of the transport path.

In another embodiment, the apparatus further comprises a motor to drive the object retainer. The motor can also be configured to drive the object transporter.

The object transporter and object retainer are preferably driven at the same speed.

In other embodiments, the object retainer may be configured to be driven along at least part of the transport path by the object transporter.

The object transporter and the object retainer may be in contact with each other along at least part of the transport path so that the object retainer is configured to be driven by the object transporter due to friction. The friction may be caused by contact between the object retainer and the object transporter. Alternatively, it is envisaged that the object retainer and the object transporter may cooperate in some other way to effect transfer of drive, such as by complementary elements on the object transporter and object retainer that engage each other.

The object transporter may comprise at least one recess, the or each recess being configured to retain one or more objects received from the object feed mechanism. It is also envisaged that the object retainer may also comprise a recess to enable objects received in the object transporter to protrude therefrom into the recess in the object retainer along the transport path. The recess in the object transporter and/or the object retainer may comprise a series of compartments to enable an object to be received in each compartment.

The object transporter may be an endless object transport belt and the object retainer may be an endless object retainer belt. The belts may be flexible, may be made from an elastomeric material and extend around rollers, one or more of which may be driven, in order to drive the object transport belt and the object retention belt along endless paths, respectively.

The apparatus may further comprise a mechanism for pushing objects from the object transporter into the filter plug material as said object transporter passes through a garniture of a machine for making filter rods.

In accordance with another embodiment described herein, there is provided a machine for making filter rods for use in the manufacture of tobacco industry products, the machine comprising a garniture configured to receive filter plug material and filter wrapping material to form a wrapped elongate filter rod, an object feed mechanism for feeding objects to be inserted into the filter plug material in the garniture, and the apparatus for transporting objects from the object feed mechanism to the filter plug material according to the invention.

Brief Description of the Drawings

So that the invention may be more fully understood, embodiments thereof will now be described by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 shows a schematic cross-sectional side view of an embodiment of a machine for making filter rods for use in the manufacture of tobacco industry products comprising a garniture, a feed mechanism, and an embodiment of an apparatus according to the invention;

Fig. 2a shows a schematic cross-section of an object transporter of the apparatus shown in Fig. 1;

Fig. 2b shows a schematic cross-section of an object transporter used in an alternative embodiment of the apparatus; and

Fig. 2c shows a schematic cross-section of an object transporter used in an alternative embodiment of the apparatus.

Detailed Description

Referring to Fig. 1, an embodiment of a machine 10 for making filter rods for use in the manufacture of tobacco industry products such as smoking articles is shown. It comprises an apparatus 1, also according to an embodiment of the invention. The machine 10 comprises a garniture 4 which is configured to receive filter plug material and filter wrapping material to form a wrapped elongate filter rod, and a feed mechanism 3 for feeding objects 2 to be inserted into the filter plug material in the garniture 4.

The embodiment of the apparatus 1, shown in Fig. 1, is for delivering an object 2 from the object feed mechanism 3 into filter plug material as it passes through the garniture 4 of the machine 10 for making filter rods for use in the manufacture of smoking articles. The objects 2 are held in the object feed mechanism 3 until they are fed into the filter plug material, usually at predetermined intervals. The objects 2 may be held in the object feed mechanism 3 by, for example, but not limited to, suction. The apparatus 1 comprises an object transporter 5, examples of which are shown in Figs. 2a-2c, configured to receive objects 2 from the object feed mechanism 3 and carry them along a transport path from the object feed mechanism 3 towards the garniture 4 as the object transporter 5 is circulated along an endless path. The apparatus 1 further comprises an object retainer 7 positioned so that a length of the object retainer 7 faces the object transporter 5 along at least of a part of the transport path to retain the objects 2 received from the object feed mechanism 3 between the object transporter 5 and the object retainer 7. The object retainer 7 is moveable together with the object transporter 5 to control friction between the object retainer 7 and the objects 2 carried between the object transporter 5. The object retainer 7 may be moveable along at least a part of the transport path.

In the embodiments shown in the Figures, the object transporter 5 is an object transport belt 5 and the object retainer is an object retention belt 7, each of which can be made from a flexible elastomeric material. However, it will be understood that the object transporter 5 and/or the object retainer 7 may alternatively be for example, a linked chain, such as a chain of rollers.

In operation, filter plug material, usually in the form of cellulose acetate filter tow, is drawn from a source (not shown), stretched in a set of stretching rollers (not shown) and compressed through a stuffer jet (not shown) and the garniture 4. As shown, the object feed mechanism 3 is arranged to deliver objects 2 to the object transport belt 5. In one embodiment, the feed mechanism 3 may be a rotatable horizontally orientated disk. As the disk rotates, objects 2 may be forced radially outward and when an object 2 aligns with the object transport belt 5, suction may be removed from the object 2 so that it falls under gravity from the feed mechanism 3 onto the object transport belt 5. Preferably, the object transport belt 5 has a recess or channel 6 to receive the objects 2. In some embodiments, there may be a mechanism for ejecting or pushing the object 2 from the feed mechanism 3 into or onto the object transport belt 5 so that the transfer

of the object 2 is not solely reliant on gravity, such as an object remover, for example but not limited to, a tongue or air jet.

The objects 2 are pushed or ejected from the transport belt 5 directly into the filter plug material passing through the garniture 4. In some embodiment, the objects 2 may fall from the object transport belt 5 into the filter plug material passing through the garniture 4 under the effect of gravity. The filter plug material is then paper wrapped in the garniture 4 to form an elongate rod which contains a desired number of objects 2, for example, one, two, three, or four.

The filter rod segments can be subsequently used in tobacco industry products manufacture to make tobacco industry products having one or more objects 2 in the filter. In one exemplary tobacco industry product manufacturing process, for example of cigarettes, a filter rod segment containing two objects 2 is axially aligned with two paper wrapped tobacco rods positioned at opposing ends of the filter rod. A tipping paper is then wrapped around the tobacco rods and filter rod to join them together. The wrapped filter rod is then transversely cut through its centre, between the two objects 2, thereby forming a pair of filtered cigarettes, each having an object 2 in its filter.

The objects 2 may be, for example but not limited to, frangible flavourant-containing capsules. Each capsule may be substantially spherical, may be formed from gelatin or carrageenan and may contain a flavourant. By applying pressure to the outside of the filter the capsule can be ruptured, thereby releasing the flavourant, which acts to flavour the smoke drawn through the filter of the cigarette.

The garniture 4 comprises a first section 11 which is tapered along its length so as to radially compress the filter plug material as the filter plug material passes through the garniture 4. An opening 12 is formed in the first section 11 which is wide and long enough to receive a section of the object transport belt 5 of the apparatus 1 as it circulates along its endless path.

Referring back to the apparatus 1 shown in Fig. 1, by driving the object retention belt 7 in addition to the object transport belt 5, a difference in velocity between the object 2 in the recess or channel 6 of the object transport belt 5 and the object retention belt 7 is controlled, preferably to eliminate or reduce the velocity difference, thereby reducing or controlling friction between them. Therefore, in any contact between an object 2 in or

on the object transport belt 5 and the object retention belt 7, friction between the object 2 and the object retention belt 7 will be reduced, thereby also reducing the likelihood of damage to any of the objects 2.

The apparatus 1 further comprises a motor 15a. The motor 15a may be configured to drive only the object transport belt 5 around an endless path over rollers 8a, 8b so that it completes a full circuit passing from the feed mechanism 3 to the garniture 4 and back to the feed mechanism 3.

However, the motor 15a in some embodiments drives the object retention belt 7 in addition to the object transport belt 5. Therefore, the motor 15a drives the object retention belt 7 around its endless path over rollers 16a, 16b. A transmission system may be used to couple the motor 15a to each of the object transport belt 5 and the object retention belt 7. The object transport belt 5 and the object retention belt 7 being driven by the same motor 15a means that the belts 5, 7 can be driven at substantially the same speeds relatively easily.

In another embodiment of the invention, the apparatus 1 comprises separate motors to drive the object transport belt 5 and the object retention belt 7. In this embodiment, the apparatus 1 may further comprise a controller 15b to drive the motors such that the object transport belt 5 and the object retention belt 7 are driven at substantially the same speed.

In some embodiments of the invention, the motor 15a drives the object transport belt 5 and the object retention belt 7 is driven by the object transport belt 5. That is, a surface 5a of the object transport belt 5 lies in contact with a surface 7a of the object retention belt 7 along the transport path so that the drive from the motor 15a is transferred from the object transport belt 5 to the object retention belt 7, preferably due to friction between them.

In the exemplary embodiment shown in Fig. 1, the transfer of drive from the object transport belt 5 to the object retention belt 7 would only happen along a linear portion of the endless paths between the rollers 8a, 8b, 16a, 16b about which each belt 5, 7 circulates. Transfer of drive from the object transport belt 5 to the object retention belt may be achieved due to the generation of a frictional force between the belts. Friction between the belts 5, 7 may be improved through the choice of an appropriate material

and/or, a friction enhancing coating. Alternatively, the belts 5, 7 may be provided with complementary engagement features that cooperate to effect transfer of drive from the transport belt 5 to the object retention belt 7.

In all of the above mentioned embodiments, and as illustrated in Fig. 1 by the curved arrows, the object transport belt 5 is mounted for circulation along an endless path in a first direction and the object retention belt 7 is mounted for circulation along an endless path in a direction opposite to the first direction. That is, the object transport belt 5 is mounted for circulation in the clockwise direction and the object retention belt 7 is mounted for circulation in the anticlockwise direction in the apparatus 1 as illustrated.

In the above embodiments of the invention, the apparatus 1 can be configured so that the object transport belt 5 and object retention belt 7 have the same velocity along the linear portion of their endless path where their surface 5a, 7a are in contact, i.e. along the object transport path from the feed mechanism towards the garniture.

Referring to Fig. 1, the object transport belt 5 is mounted for circulation in the clockwise direction about two rollers 8a, 8b. However, it will be understood that in an alternative embodiment, the object transport belt 5 may be mounted about more than two rollers 8 and may also extend over guide surfaces.

A first roller 8a is positioned proximate the ejection point of objects 2 from the object feed mechanism 3 such that the objects 2 begin their journey along the transport path at the first roller 8a. A second roller 8b is located substantially horizontally from the first roller 8a. However, in the present embodiment the rollers 8a, 8b have different radii and the centre of the second roller 8b is at a lower vertical height than the centre of the first roller 8a. Therefore, the transport path between the first roller 8a and the second roller 8b is inclined downwards which may result in an object 2 escaping the recess 6 in the object transport belt 5 between the first and second rollers 8a, 8b.

The recess 6 in the object transport belt 5 has a cross-sectional profile that is configured to retain the objects 2 received from the object feed mechanism 3. Embodiments of the object transport belt 5 and its recess 6 are shown in Figs. 2a to 2c. In each of the embodiments, the recess 6 extends through the thickness of the object transport belt 5 to form an aperture in the object transport belt 5.

In each of the embodiments, the recess 6 in the object transport belt 5 may be compartmentalised. That is, the recess 6 may be formed of a series of sections that extend along the object transport belt 5. Therefore, each object 2 can be received in an individual compartment. The compartments prevent the objects 2 from rolling along the recess 6 in the object transport belt 5 when they are travelling along a part of the transport path that is inclined to the horizontal and also prevent adjacent objects from coming into contact with each other. In an alternative embodiment, the recess 6 may extend around the object transport belt 5 to form a channel that extends in the same direction as the endless path along which the object transport belt 5 travels.

A cross-sectional view of a first object transport belt 5 and its recess 6 is shown in Fig. 2a. The cross-section of the object transport belt 5 is a truncated triangle having a shorter, roller contacting side 18 and a longer, object receiving side 19. The truncated triangular cross-section with its shorter side configured to contact the rollers 8a, 8b has the benefit of making the object transport belt 5 easier to manipulate, such that opening the belt 5 to deposit the object 2 in the tow is easier, as explained in more detail hereinafter.

The recess 6 of the first object transport belt 5 is formed by three sections 20. A first section 20a has a square cross-section configured to receive the object 2 which extends from the object receiving side 19. A second section 20b having a square cross-section which is smaller than that of the first section 20a extends from the roller contacting side 18 of the object transport belt 5. The first and second sections 20a, 20b are joined by a third section 20c extending between them. In the first object transport belt 5, the object 2 passes into the recess 6 and rests on the bottom surface 22 of the first section 20a.

A cross-sectional view of a second object transport belt 5 and its recess 6 is shown in Fig. 2b. The cross-section of the object transport belt 5 is a truncated triangle as described in relation to the first object transport belt shown in Fig. 2a. The recess 6 of the second object transport belt is formed by a single section 21 which also has a cross-section of a truncated triangle. In the second object transport belt, the object 2 passes into the recess 6 until it touches both inclined inner surfaces 23 of the object transport belt 5.

A cross-sectional view of a third object transport belt 5 and its recess 6 is shown in Fig. 2c. The cross-section of the object transport belt 5 is generally square with chamfered edges 24 on the roller contacting side 18. The recess 6 of the third object transport belt extends vertically and diverges proximate the roller contacting side 18 to form a funnel shape. In the third object transport belt, the object 2 is held between two vertical inner surfaces 25 of the object transport belt 5.

In some cases the object 2 may still escape an open recess 6 if it is not received properly in the object transport belt 5. In order to prevent the objects 2 escaping from the recess 6 of the object transport belt 5 along the transport path between the first and second rollers 8a, 8b, the object retention belt 7 is provided to close off the recess 6. That is, the object retention belt 7 is proximate to or in contact with the object transport belt 5 along at least a portion of the transport path between the first and second rollers 8a, 8b so that the object 2 cannot leave the recess 6. Although not shown in the drawings, the object retention belt 7 may also be provided with a recess positioned so that objects protruding from the recess 6 in the object transport belt 5 will extend into the recess in the object retention belt 7. However, the surface of the object retention belt 7 facing the object transfer belt may be flat, particularly, if the objects received in the object transport belt 5 are likely to be wholly received with the recess 6 and so are unlikely to protrude therefrom.

The object retention belt 7 is mounted for circulation in the anticlockwise direction about two rollers 16a, 16b. However, it will be understood that in an alternative embodiment, the object retention belt 7 may be mounted about more than two rollers 16 to match the transport path of the object transport belt 5 over a longer distance or number of rollers 8, and that one or more guides for guiding the object retention belt 7 may be employed.

The first and second rollers 16a, 16b about which the object retention belt 7 rotates are located so that the object retention belt 7 extends parallel to the transport path of the object transport belt 5. In the present embodiment, the rollers 16a, 16b have the same radii so that the length of the object retention belt 7 can be minimised. However, it will be understood that, in an alternative embodiment, the radii of the first and second rollers 16a, 16b may differ.

Furthermore, the first and second rollers 16a, 16b may be located such that the surface 7a of the object retention belt 7 contacts the surface 5a of the object transport belt 5 along a portion of the transport path between the first and second rollers 8a, 8b of the object transport belt 5. The position of the object retention belt 7 relative to the object transport belt 5 prevents the objects 2 from escaping the recess 6 of the object transport belt 5 along the downwardly inclined transport path between the first and second rollers 8a, 8b of the object transport belt 5.

Once the object 2 reaches the second roller 8b due to the object transport belt 5 circulating about the first and second rollers 8a, 8b, the object retention belt 7 is no longer in a position in which it closes off the recess 6 in the object transport belt 5. Therefore, when the object transport belt 5 circulates about the second roller 8b, it is possible that the objects 2 escape from the recess 6 due to gravity and/or inertial forces. Therefore, the second roller 8b is configured such that the objects 2 in the recess 6 are retained in the recess 6 under vacuum pressure as the object transport belt 5 circulates around the roller 8b. In addition, the apparatus 1 may also be configured such that the objects 2 are retained in the recess 6 under vacuum pressure after the objects 2 have been carried along the transport path beyond the second roller 8b.

A first vacuum means within the second roller 8b is identified by the reference number 17a in Fig. 1. A second vacuum means located outside and downstream of the second roller 8b is identified by the reference number 17b in Fig. 1. The first and second vacuum means 17a, 17b may be integral. The vacuum means 17a, 17b allow the objects 2 to be held within the object transport belt 5 once the object retention belt 7 has been removed from the object transport belt 5.

As the object transport belt 5 circulates along its endless path and the objects 2 pass around the second roller 8b they enter the garniture 4. Once the objects 2 have passed beyond the vacuum means 17 they may fall under gravity into the filter plug material that is being drawn through the garniture 4. However, it some cases gravity alone is not sufficient to cause the objects 2 to pass from the object transport belt 5 to the filter plug material.

Therefore, the apparatus 1 may further comprise an ejection mechanism 9 which is shown schematically in Fig. 1. The ejection mechanism 9 is configured to eject objects 2

from the recess 6 of the object transport belt 5 into the filter plug material as the object transport belt 5 passes through the garniture 4 of the filter rod making machine 10.

In one embodiment, the ejection mechanism 9 may comprise a pneumatic nozzle (not shown) to direct a jet of air through the object transport belt 5 to displace the objects 2 from the recess 6. When the ejection mechanism 9 comprises a pneumatic nozzle the recess 6 must extend through the thickness of the object transport belt 5 so that the gas flow can travel through the belt 5 to force the object 2 out into the filter plug material. The pneumatic nozzle may be operated in bursts or continually.

In another embodiment, the ejection mechanism 9 may comprise a tongue (not shown) extending into the recess 6 of the object transport belt 5 to guide objects 2 out of the recess 6 into filter plug material as it passes through the garniture 4 of the filter rod making machine 10. Such ejection mechanisms are generally well known. The tongue may force the object transport belt 5 to deform so that it can no longer hold the object 2 in the recess 6. Alternatively, the tongue may form a projection that enters the recess 6 as the object 2 passes to directly contact the object 2 and push it out into the filter plug material as the object transport belt 5 passes through the garniture 4. In one embodiment, the ejection mechanism 9 may comprise a combination of mechanically spreading the belt and direct contact with the object 2.

In some cases, the object 2 may not be dislodged from the recess 6 of the object transport belt 5 into the filter plug material in the garniture 4. In these instances the object 2 will remain in the object transport belt 5 as it circulates around the first roller 8a back towards the object feeding mechanism 3.

In order to try to avoid these problems, the apparatus 1 may further comprise an object remover 26. The object remover may be located inside and/or outside of the first roller 8a and may comprise a vacuum port and/or ejection nozzle for removing any objects 2 remaining in the object transport belt 5 once the belt 5 has circulated out of the garniture 4. The object remover 26 may further comprise an object reclaimer so that the objects 2 may be replaced into the feed mechanism 3 to be used again.

In the embodiment shown in Fig. 1, the rollers 8a, 8b are positioned generally horizontal to one another such that the incline of the transport path from the first roller 8a to the second roller 8b is relatively shallow. However, it will be understood that in

alternative embodiments, the first and second rollers 8a, 8b may be placed in any desired position relative to each other. The orientation of the first and second rollers 8a, 8b does not matter as long as the object retention belt 7 is configured to close the recess or channel 6 in the object transport belt 5 over at least part of the transport path.

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 some embodiments, the tobacco industry product is a non-combustible smoking article. In some embodiments, the tobacco industry product 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 some embodiments, the heating device is a tobacco heating device.

In other embodiments, the tobacco industry product 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 some embodiments, 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 some embodiments, the hybrid system comprises a liquid or gel substrate and tobacco.

The objects referred to herein may contain a flavour or flavourant. The terms "flavour" and "flavourant" refer to materials which, where local regulations permit, may be used to create a desired taste or aroma in a product for adult consumers. They may include extracts (e.g., licorice, hydrangea, Japanese white bark magnolia leaf, chamomile, fenugreek, clove, menthol, Japanese mint, aniseed, cinnamon, herb, wintergreen,

cherry, berry, peach, apple, Drambuie, bourbon, scotch, whiskey, spearmint, peppermint, lavender, cardamon, celery, cascarilla, nutmeg, sandalwood, bergamot, geranium, honey essence, rose oil, vanilla, lemon oil, orange oil, cassia, caraway, cognac, jasmine, ylang-ylang, sage, fennel, piment, ginger, anise, coriander, coffee, or a mint oil from any species of the genus Mentha), flavour enhancers, bitterness receptor site blockers, sensorial receptor site activators or stimulators, sugars and/or sugar substitutes (e.g., sucralose, acesulfame potassium, aspartame, saccharine, cyclamates, lactose, sucrose, glucose, fructose, sorbitol, or mannitol), and other additives such as charcoal, chlorophyll, minerals, botanicals, or breath freshening agents. They may be imitation, synthetic or natural ingredients or blends thereof. They may be in any suitable form, for example, oil, liquid, or powder.

The present invention is intended to encompass an apparatus for delivering objects from an object feed mechanism that may be used in the manufacture of any tobacco industry product.

The drawings accompanying the various embodiments of the invention described herein are not necessarily illustrated to scale and the dimensions of certain features may be exaggerated for ease and clarity of illustration.

In order to address various issues and advance the art, the entirety of this disclosure shows by way of illustration various embodiments in which the claimed invention(s) may be practiced and provide for a superior apparatus for delivering objects from an object feed mechanism into filter plug material as it passes through a garniture of a machine for making filter rods for use in the manufacture of tobacco industry products. The advantages and features of the disclosure are of a representative sample of embodiments only, and are not exhaustive and/or exclusive. They are presented only to assist in understanding and teach the claimed features. It is to be understood that advantages, embodiments, examples, functions, features, structures, and/or other aspects of the disclosure are not to be considered limitations on the disclosure 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 and/or spirit of the disclosure. Various embodiments may suitably comprise, consist of, or consist essentially of, various combinations of the disclosed elements, components, features, parts, steps, means, etc. In addition, the disclosure includes other inventions not presently claimed, but which may be claimed in future.

Claims

1. Apparatus for delivering objects from an object feed mechanism into filter plug material as the filter plug material passes through a garniture of a machine for making filter rods for use in the manufacture of tobacco industry products, the apparatus comprising:

an object transporter configured to receive objects from the object feed mechanism and carry the objects along a transport path from the object feed mechanism towards a garniture as the object transporter is driven; and

an object retainer facing the object transporter along at least a part of the transport path to retain the objects received from the object feed mechanism between the object transporter and the object retainer,

wherein the object retainer is moveable together with the object transporter to control friction between the object retainer and the objects carried by the object transporter.

2. Apparatus according to claim 1, comprising a motor to drive the object retainer.

3. Apparatus according to claim 2, wherein the motor is also configured to drive the object transporter.

4. Apparatus according to claim 1, wherein the object retainer is configured to be driven along at least part of the transport path by the object transporter.

5. Apparatus according to claim 4, wherein the object transporter and the object retainer are in contact with each other along at least part of the transport path so that the object retainer is configured to be driven by the object transporter due to friction.

6. Apparatus according to any one of the preceding claims, wherein the object transporter comprises at least one recess, the or each of the recesses being configured to retain one or more objects received from the object feed mechanism.

7. Apparatus according to any one of the preceding claims, wherein the object transporter is an endless object transport belt.

8. Apparatus according to any one of the preceding claims, wherein the object retainer is an endless retention belt.

9. Apparatus according to anyone of the preceding claims, further comprising a mechanism for pushing objects from the object transporter into the filter plug material as the object transporter passes through a garniture of a machine for making filter rods.

10. A machine for making filter rods for use in the manufacture of tobacco industry products, the machine comprising a garniture configured to receive filter plug material and filter wrapping material to form a wrapped elongate filter rod, an object feed mechanism for feeding objects to be inserted into the filter plug material in the garniture, and the apparatus for transporting objects from the object feed mechanism to the filter plug material according to any preceding claim.

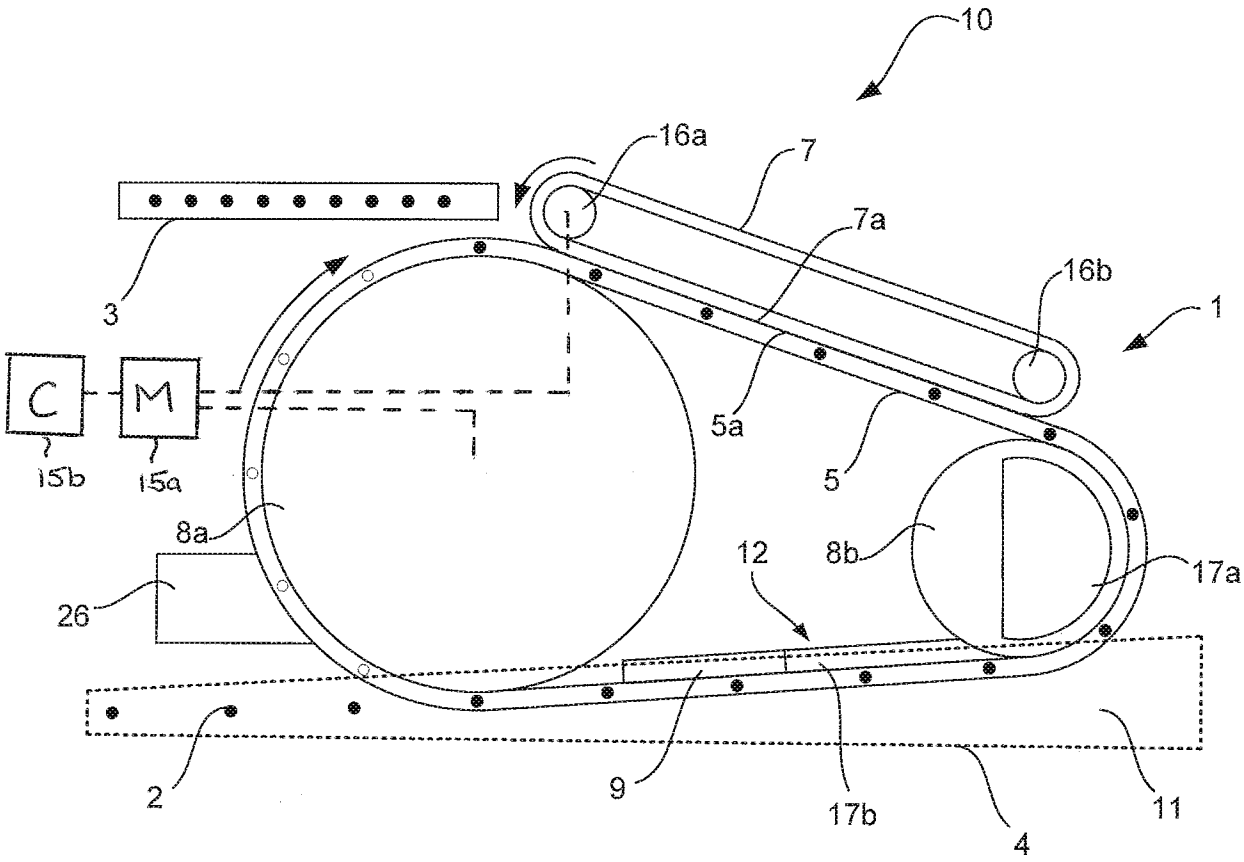


Fig. 1

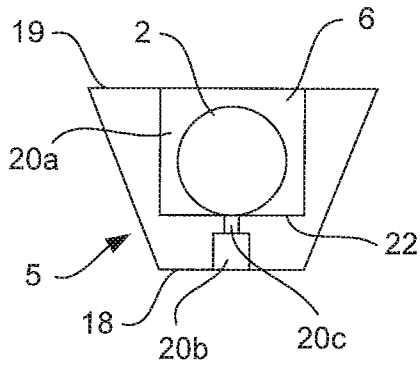


Fig. 2a

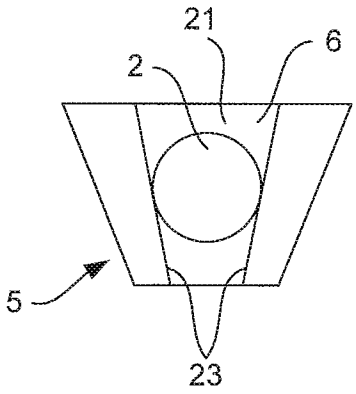


Fig. 2b

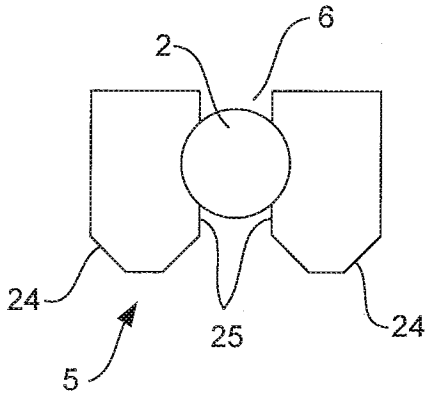


Fig. 2c

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2019/051341

A. CLASSIFICATION OF SUBJECT MATTER
INV. A24D3/02 A24D3/06
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)
A24D B65G

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 2013/109554 A1 (GAEDE H; HANSCH M; KRAUSE M; PUNZIUS J; SYRZISKO F; THEIVOGT K) 2 May 2013 (2013-05-02)	1-4,6-8
Y	paragraph [0067] - paragraph [0087];	9
A	figures 1-3,6	5

X	US 5 875 824 A (ATWELL CHARLES G [US] ET AL) 2 March 1999 (1999-03-02)	1-4,6,10
Y	column 3 - column 10; figures 1-2c	9
A		5

X	US 6 723 033 B1 (SCOTT GEORGE ROBERT [US] ET AL) 20 April 2004 (2004-04-20)	1-3,6,10
Y	column 4 - column 13; figures 1-4	9
A		5

Y	EP 2 975 950 A2 (PHILIP MORRIS PRODUCTS SA [CH]) 27 January 2016 (2016-01-27) paragraph [0046]; figure 4	9

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 July 2019	02/08/2019

Name and mailing address of the ISA/	Authorized officer
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1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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