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(54) **Filter quality control device**

(57) The present invention relates to a quality control device for determining the position of a shaped object located within a filter of a smoking article. The device comprises: a tube for longitudinally accommodating the filter to be controlled, a closing element for closing one end of the tube, the closing element provided with reference means for checking the position of the shaped object on the end surface of the filter when the filter is ac-

commodated into the tube, wherein a portion of the closing element is at least partially transparent, the reference means being arranged on the at least partially transparent portion of the closing element for indicating a desired position for the shaped object on the end surface of the filter. Further, the invention refers to a method to control the position of a shaped object located within a filter of a smoking article.

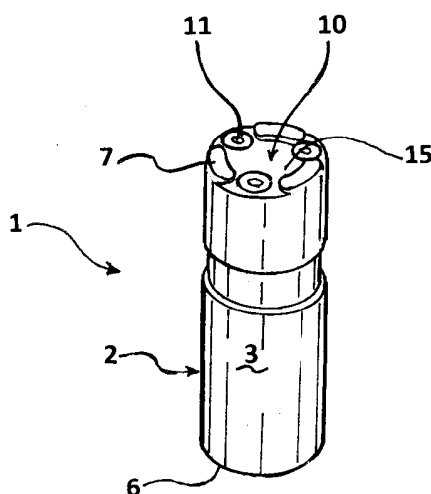


FIG.1

Description

[0001] The present invention relates to a device for determining the position of a shaped object in a filter of a smoking article.

[0002] The invention further relates to a method for determining the position of a shaped object in a filter of a smoking article.

[0003] Smoking articles comprising shaped objects in their filters are known in the art. Shaped objects may for example be used to add a flavor to the smoking article or modify the tobacco smoke or for decorative purposes. Moreover, shaped objects can be colored, so that one of the ends of the shaped object can be clearly visible from the outside of the filter, for example to build brand equity.

[0004] The visual aspect of a smoking article may be important to consumers, in particular when it comes to the aspect of the filter. Therefore, a misplaced shaped object is often a cause of filter rejection. In order to avoid the rejection of a large number of products, it is desirable to detect such a quality defect as early as possible during the production process.

[0005] For this purpose, today, a machine operator randomly samples filters in the production process to check whether the shaped object is correctly placed. The position of the shaped object in the filter is visually checked and the experience and training of the technician are the "tools" to evaluate whether the filter is to be accepted or rejected.

[0006] As today, such sampling is done while the production process keeps running at high speed and it is desired to perform the sampling and visual quality control of the filter as quickly as possible. There is therefore a need for a quality control device for determining the position of a shaped object that performs a quick and reliable quality control.

[0007] According to the invention, a quality control device for determining the position of a shaped object that is located within a filter of a smoking article is provided, the device comprising:

- a tube for longitudinally accommodating the filter to be controlled,
- a closing element for closing one end of the tube, the closing element provided with reference means for checking the position of the shaped object on an end surface of the filter when the filter is accommodated into the tube,
- wherein a portion of the closing element is at least partially transparent, the reference means being arranged on the at least partially transparent portion of the closing element for indicating a desired position for the shaped object on the end surface of the filter.

[0008] The smoking article can be a conventional smoking article including a tobacco rod, that is attached to the filter via a tipping paper. Alternatively, the smoking

article may be a non-conventional smoking article, such as a smoking article to be used for example in conjunction with a system for electronic smoking, tobacco heating instead of burning or others.

[0009] The term "filter" is used throughout the specification to indicate a section of the smoking article that is configured to remove at least partially gas phase or particulate phase smoke constituents or both gas phase and particulate phase smoke constituents from the mainstream smoke drawn through the filter.

[0010] The filter of the invention may include one filter segment, or a plurality of filter segments, for example up to five filter segments. Each segment of the filter may have a different longitudinal length. The filter segments may be abutting in the longitudinal direction or may be separated by empty or filled spaces. Where two or more segments are provided, the filter segments may be of the same construction and materials as each other but, more preferably, the individual segments have a different construction, or contain different filtration materials or additives.

[0011] The shaped object is included in a filter segment and one of its ends is visible from the outside of the filter.

[0012] In a preferred embodiment of the invention, the shaped object contains flavouring material.

[0013] The term "shaped object" is used to indicate a visible object in the filter such as for example a thread, a capsule, different types of filtration material, longitudinally extending cavities within the filtration material or indicia provided on the open end of the smoking article, such as for example a dye or print. Such a shaped object may have, for example, a circular, semi-circular, oval, annular, triangular, rectangular, pentagonal, hexagonal, the shape of type font, star-shaped, sickle shaped, linear or wavy shape.

[0014] The term "flavouring material" is herein used to indicate a substance, compound or a mixture of substances capable of triggering a sensation involving the taste of a consumer.

[0015] Additionally, the shaped object may be coloured due to the natural colour of the shaped object, the colour of the flavouring material or due to an added colorant.

[0016] Advantageously, by means of the invention, it is very easy and quick to check whether the shaped object is correctly positioned into the filter.

[0017] The operator, in order to check the position of the shaped object, inserts the filter into the tube and thus visually compares the actual position of the shaped object and the position of the reference means on the closing element which indicates the desired position of the shaped object. The reference means enhance the precision of the comparison with respect of the use of the naked eyes, because the desired position of the shaped object is always visible to the operator and any deviation from the same is clearly noticeable. This significantly increases the speed of such a quality check compared to state of the art quality assurance tools. Hence, it is possible for the machine operator to very quickly take counter

measures at the machine in order to rectify the machine settings to again produce filters according to the specification. This means, that during the high speed of the manufacturing process, a higher number of filters may be sampled as. Moreover, the invention provides for an objective reference for the quality, irrespective of the operator's skill.

[0018] According to an embodiment of the invention, the reference means comprise a visual pattern on the at least partly transparent portion of the closing element, so that the operator can visually compare the position of the shaped object and the position of the visual pattern thus verifying whether the shaped object is correctly positioned into the filter. Preferably, the visual pattern is located on the side of the closing element that is facing the filter in the tube. This allows a very close proximity of the reference means and the shaped object which in return reduces the parallax error when determining the position of the shaped object on the end of the filter, that is, it reduces the possible reading error caused by looking at the quality control device under an angle of incidence other than zero degree.

[0019] Preferably, the visual pattern comprises one or more areas realized on the closing element. In this way, the operator can easily control if the shaped object is correctly positioned into the filter simply comparing the pattern of the reference means, for example the area(s) realized on the portion of the closing element, with the area defined by the shaped object's end which is visible from the outside of the filter. This visual comparison is possible due to the at least partial transparency of the portion of the closing element where the reference means are arranged, so that the filter, and thus the shaped object's end, inserted in the tube is visible.

[0020] According to an embodiment of the invention, the reference means comprise a coloured area having a colour that is different from the colour of an area of the closing means provided adjacent to the reference means. For example, the area may be coloured black, white, red, yellow or green and combinations thereof. Alternatively or in combination, the reference means comprise an opaque area having an opacity that is different from the opacity of an area of the closing element provided adjacent to the reference means. More preferably, the reference means include an area which is more opaque than the adjacent area in the closing element.

[0021] In a preferred embodiment of the invention, the reference means comprise a screen printed area defined in at least one predetermined area of the closing element. For example, the area in which it is desired that the shaped object is positioned when the filter is inserted into the tube is made darker than the surrounding area.

[0022] By looking at the closing element, the operator can easily check if the shaped object in the filter is positioned at the desired location, in other words whether the area defined by the shaped object's end is superimposed to the dark area of the reference means, or contrarily whether the area defined by the shaped object's end is

positioned outside or partially outside the desired location.

[0023] The closing element may be further provided with a protecting element, for example a plastic transparent film applied on an internal surface of the closing means for protecting the checking means from wear, staining or from being damaged during use. The provision of the protecting element is particularly preferred when the reference means are screen printed on the closing element such that the ink may otherwise be rubbed off or scratched of during regular use.

[0024] Preferably, the reference means include an area that correlates to a preset tolerance value range of the actual position of the shaped object, and preferably correlates to a preset upper and lower value of tolerance values of the actual position of the shaped object. Preferably, the range of values of tolerances is colour coded onto the reference means, for example green indicating "in tolerance" and red meaning "outside of tolerance". Different shades or degrees of opacity can be considered as well, that is, the darker part indicates "in tolerance" and the brighter part indicates "outside of tolerance".

[0025] For example, the size of the area realized on the closing element can be larger or can substantially have the same dimension of the area defined by the shaped object's end. In the latter case, the device is preferably used when the tolerances on the shaped object position are very low, so that the accepted out-of-alignment value is very small. The superposition between shaped object and reference means are in this example required to be substantially complete. In case of a larger area, the requirements are not so stringent, due to the fact that a complete superposition of the area defined by the shaped object's end and the reference means' area is more easily achieved. Thus, such an arrangement allows for a simple way to generate a range of possible tolerances and thus of accepted out-of-alignment values. This also allows for making different quality assessments with the same tool, depending on what quality target ranges are preset for different products or production runs.

[0026] Moreover, also in the embodiment of the invention where the area of the reference means is comparable in size with the shaped object's end area, different tolerances can be required, for example accepting different out of alignment values, or sizes of "non-overlap", between the area of the reference means and the shaped object's end area.

[0027] According to a preferred embodiment, the closing element is removably fixed to an end of the tube. The closing element can be removed from the tube in order to change the closing element, for example to replace the closing element with a different closing element or in case of wear or breakage. Additionally, the removal might be necessary to clean the device; due to the fact that at least a partial transparency of the closing element is necessary for the proper functioning of the device, dirt can easily hinder this property. Due to the removable connection between the tube and the closing element, for

example dust becomes easily removable, particularly from the inside of the tube.

[0028] Advantageously, the portion of the closing element in which the reference means are provided is made of transparent material, like for example glass or transparent plastic such as for example polymethylmethacrylate (PMMA).

[0029] A substantially completely transparent portion of the closing element in which the reference means are realized allows for the best visibility of the reference means on the closing element. Therefore, preferably, the portion of the closing element in which the reference means are realized comprises transparent material.

[0030] In a preferred embodiment, the reference means comprise a sector of a substantially ring-shaped area realized on the portion of the closing element. More preferably, the reference means comprise a complete ring-shaped area. Alternatively or in addition, the reference means comprises a circular area. Commonly, the area defined by the shaped object at the end of the filter is substantially a circle. The comparison of such a circle with a circular area realized on the closing element is simpler than with areas having different geometries. The same consideration applies to a ring-shaped area, where the comparison between the circular area defined by the shaped object and the inner or outer circumference of the ring is simple. In addition, the width of the ring area can define the accepted tolerance on the shaped object location. Examples for a ring shaped area is a concentric filter or a recessed filter.

[0031] Further, the invention relates to a method for determining the position of a shaped object located within a filter of a smoking article, the method comprising:

- providing a quality control device internally provided with a tube and having a closing element closing an end of the tube,
- defining a desired position of the shaped object in the filter,
- providing on a predetermined portion of the closing element reference means for indicating the desired position for the shaped object in the filter abutting onto the closing element when the filter is inserted in the tube,
- inserting the filter in the tube, and
- comparing the actual position of the shaped object and the position of reference means in order to control whether the position of the shaped object is correct.

[0032] As already mentioned, the evaluation of whether a filter has to be rejected or not due to the shaped object's misplacement is simple and reliable with the method of the invention.

[0033] Preferably, according to a further embodiment, the method of the invention also comprises

- providing a plurality of quality control devices, each control device being provided with a tube having an inner diameter different from one another, and
- selecting the quality control device having a dimension of the inner diameter of the tube suitable for accommodating the filter.

[0034] Alternatively or in addition, the method comprises

- providing a plurality of closing elements for being associated to the shaped object position control device, each closing element being provided with reference means comprising a different pattern,
- checking a plurality of filters having more than one shaped object or comprising shaped objects of different geometries using the appropriate closing element for each shaped object or different filter, wherein the checking comprises selecting the appropriate closing element for each different shaped object or each different filter.

[0035] Preferably, the method according to the invention, further comprises

- providing a plurality of closing elements for being associated to the shaped object position control device, each closing element being provided with reference means comprising a different pattern,
- selecting a tolerance of the positioning of the shaped object in the filter with respect to the desired position,
- selecting a closing element of the plurality depending on the selected tolerance for the position of the shaped object in the filter.

[0036] According to a further aspect, the invention relates to a system for determining the position of a shaped object located within a filter of a smoking article, the system comprising a plurality of shaped object position control devices, each device being realized according to the aspect above described, wherein each control device of the plurality of control devices comprises a tube with an inner diameter that is different from the inner diameter of the remaining control devices of the system.

[0037] According to a different aspect, the invention comprises a system for determining the position of a shaped object located within a filter of a smoking article, the system comprising a quality control device realized according to the previous aspect and further comprising a plurality of closing element removably applicable to an end portion of the shaped object position control device, each closing element of the plurality of closing elements being provided with reference means defined in a portion of the closing element forming a different pattern from one another so that different filters may be checked or different separate shaped objects on the same filter.

[0038] Using either systems of the invention, a wide variety of different filters can be checked.

[0039] Filters having diameter ranging between about 4 mm and 10 mm and also having a plurality of different shaped object's configurations, such as multiple shaped objects in the same filter, or filters having shaped object in specific locations, for example laterally with respect to the filter's center, can be easily evaluated.

[0040] In addition, it is possible that the tube, or at least a portion thereof, is made of an at least partially transparent material. In such case, it may be preferred that the mantle of the tube is also provided with additional markings for additional quality controls on the cylindrical section of the smoking article, for example, position of tipping paper, the spacing of verge lines or the size of spots on the cigarette paper.

[0041] Advantageously, in such an embodiment, a plurality of checks can be performed at the same time.

[0042] Further advantageous aspects of the invention become apparent from the following description of embodiments of the invention with the aid of the attached figures in which:

- Fig. 1 is a perspective view of a quality control device realized according to the present invention;
- Fig. 2 is a perspective view, where also the inner structure is made visible for clarity purposes, of the quality control device of Fig. 1;
- Fig. 3 is a lateral view in section of the quality control device of Figs. 1 and 2;
- Fig. 4 is a perspective view of an element of the quality control device of Figs. 1-3 in a disassembled configuration;
- Fig. 5 is a bottom view of the element of Fig 4;
- Fig. 6 is a bottom view of a detail, in enlarged scale, of the element of Figs. 4 and 5.

[0043] With initial reference to Figs. 1-3, a quality control device realized according to the teaching of the present invention is globally indicated with 1.

[0044] The quality control device 1 is used to control the position of a shaped object 60 present in a filter 50 for a smoking article.

[0045] The filter 50 generally comprises a cylindrical rod 53 and defines a first and a second end surface 51, 52. From one of the end surfaces 51, 52, or from both of them, the shaped object 60 is visible, at least for a portion of the shaped object 60. The filter 50 can have any shape or dimensions, and it is not described in further detail but has typically a cylindrical outer shape. The shaped object 60 present within the filter 50 can be any object suitable to be placed in a smoking article, it might be for example a thread, a capsule or a mark realized on the open end of the smoking article, such as for example a dye or print. Such a shaped object may have any shape, as long as it is at least visible from one of the end surfaces 51, 52 of the filter 50, for example the shaped object 60 might protrude from the open end of the filter or its "shadow" might result visible. In the depicted embodiment of Fig. 2, the portion of the shaped object 60 which is visible from end

surface 51 of filter 50 has a circular shape. Alternatively, the shaped object is not visible in the finished filter, however for the purpose of the quality control, the filter may be cut across such that the shaped object becomes visible in the cross-section. The cross-section of the filter thus cut may then be analyzed with the quality control device 1.

[0046] Quality control device 1 includes a tube 2 having a substantially cylindrical mantle 3 in which an inner diameter 4 and an outer diameter 5 are defined (see Fig. 3), as well as a first and a second open opposite ends 6, 7. The inner diameter 4 of the tube 2 is preferably so dimensioned to allow the introduction of the filter 50. A through hole 8 having diameter equal to the inner diameter 4 is thus defined in tube 2. The outer diameter 5 is arbitrary, preferably it has a size which is suitable to be gripped by an operator's hand.

[0047] Mantle 3 can be realized in any suitable material, for example transparent plastic like for example polymethylmethacrylate or glass and it is preferably at least partially transparent, more preferably it is substantially completely transparent.

[0048] The longitudinal length of the cylindrical mantle 3 is preferably set to be long enough to accommodate the filter 50 with minimal risk of accidental loss of the filter.

[0049] Further, the quality control device 1 includes a closing element 10 removably attached to one of the open ends 6, 7 of tube 2 in order to close the same (closing element 10 is visible in Fig. 1 attached to the tube 2, it has been removed from the device 1 depicted in Figs. 2 and 3, and it is shown in details in Figs. 4-6). The closing element 10 is for example attached to the tube 2 by means of fastening means 11, such as screws. In the depicted embodiment, fastening means 11 include screws which are inserted in holes 12 realized in the closing element 10 and in corresponding threaded bores 13 realized in the tube 2. Preferably, holes 12 are angularly spaced apart around an outer boundary of the closing element 10, so that the closing element 10 can be tight onto tube 2 in a uniform manner around its boundary, in order to avoid deformations.

[0050] When attached to the tube 2, two parts of the closing element 10 are defined: a working part corresponding to the part of the closing element facing the through hole 8, and a boundary part outside the hole 8, for example facing the mantle 3.

[0051] Preferably, fastening means 11 are located in correspondence of the boundary part of the closing element 10, not covering the working part, in order to avoid any visible obstacle in the use of the working part.

[0052] According to the invention, a portion of the closing element 10 is realized in a material which is at least partially transparent. Preferably, this at least partially transparent portion is located in the working part of the closing element 10. More preferably, the entire closing element 10 is realized in the at least partially transparent material in order to use a single material for the closing element 10, thus simplifying its construction. Preferably,

the material is fully transparent.

[0053] With now reference to Figs. 4, 5, and 6, where the closing element 10 is depicted in details and in a disassembled configuration, closing element 10 comprises a first and a second face 14, 15, one opposed to the other, the first face 14 facing, or in contact with, the filter 50 when the latter is inserted in the through hole 8. The second face 15 is pointing towards the operator using the quality control device 1, when in use.

[0054] Closing element 10 comprises reference means 20 for checking the position of the shaped object 60 on the end surface 51 of the filter 50 when the filter is accommodated into the tube 2. Reference means 20 are located in correspondence of the partially transparent portion. Preferably, reference means 20 are disposed in correspondence of the working part of the closing element 10. Advantageously, reference means 20 are realized in correspondence of the first face 14 of the closing element 10, so that they are substantially protected from accidental scratching or stain.

[0055] Reference means 20 preferably include a visual pattern 21 realized on the at least partially transparent portion of the closing element 10. Preferably, the visual pattern 21 comprises one or more areas. In the depicted embodiment, it comprises two areas as better shown in Fig. 6, a first reference area 22 and a second alignment area 23.

[0056] In the depicted embodiment where the shaped object 60 located within the filter 50 defines a circular area in the end surface 51 of the filter (see Fig. 2), the first reference area 22 comprises a circle, whose center is located substantially along the longitudinal axis X of the through hole 8, when the closing element 10 is mounted on tube 2. Alternatively, the first reference area 22 has a different geometrical shape, the shape being substantially the same as the shape of the area defined by the shaped object 60 on the end surface 51 of filter 50.

[0057] The dimensions of the visual pattern 21, such as of the first reference area 22, for example the diameter of the circle, are selected according to the desired tolerances: the lower the tolerances the closer the dimensions of the visual pattern 21 to the dimensions of the visible portion of the shaped object 60 located within the filter 50 to be checked. Therefore, the closing element 10 comprises a visual pattern 21 which is selected according to the required tolerances which may vary depending on the filter type and characteristics.

[0058] Preferably, the second alignment area 23 comprises an annular surface concentric to the circle defined by the first reference area 22. The second alignment area 23 is used to check the vertical alignment of the filter 50 when inserted into the tube 2. When the filter 50 is inserted on the tube 2, the end surface 51 of the filter is in abutment to the closing element 10 and the outer boundary of the filter should preferably lie within the annular area 23 in order to have a good alignment between filter and tube. The width of such an annular area 23 therefore also depends on the accepted tolerances, the wider the

area of the ring 23, the lower the tolerances.

[0059] Visual pattern 21, according to a preferred embodiment, is screen printed on the closing element 10. Alternatively, the visual pattern is glued, painted, etched, engraved, drawn, or otherwise realized on the closing element 10.

[0060] In order to be visible with respect to the remaining of the closing element 10, preferably first and second areas 22, 23 are more opaque than the remaining of the closing element 10. Alternatively, the two areas 22, 23 might have a different colour than the rest of the closing element 10.

[0061] The reference area 23 preferably comprises a plurality of sub-areas having different colour or opacity. For example, such sub-areas are concentric, the central sub area being a circle, while the outer sub-areas being ring-shaped. Preferably, the colour or degree of opacity of each sub-area indicates as a code the tolerance achieved in case of an overlap of such sub-area by the shaped object 60.

[0062] According to a preferred embodiment of the invention, a system of quality control devices 1 is provided. For a given tube 2, a plurality of closing elements 10 are associated to it, each of the closing elements 10 having different reference means 20 all having substantially the same shape but designed for achieving a pre-set tolerance different from one another. For example, each closing element of the plurality includes a first reference area 22 which is circular, but having a diameter different from the diameters of the other reference areas in the other closing elements of the plurality. The diameters range from a diameter substantially identical to the diameter of the visible portion of the shaped object 60 located within the filter 50 to be checked, to a diameter larger than the identical diameter. For example, the diameter may be 10 percent or 20 percent or 30 percent, 100 percent or 200 percent larger than the diameter of the first reference area, depending on the acceptable tolerance range.

[0063] Alternatively or in addition, for a given tube 2, a plurality of closing elements are preferably provided, each closing element 10 comprising reference means 20 and having a different shape than the reference means 21 of the other closing elements 10. In this way, it is possible to use the system of quality control devices to check the location of shaped objects 60 having different shapes or check the location of a plurality of different shaped objects 60 within the same filter 50.

[0064] Conversely, according to a different embodiment of the invention, another system of quality control devices 10 can be realized according to the invention. For a given closing element 10, a plurality of tubes 2 are preferably provided, each tube 2 having a through hole 8 whose diameter 4 is different from the diameters of the through holes 8 of the other tubes 2 of the plurality. In this way, filters 50 having different diameters can be accommodated in the device 1. However, a set of closing elements 10 may be arranged to fit on all of the tubes 2 of the plurality of tubes with different diameters.

[0065] The quality control device 1 of the invention is used to control the position of the shaped object 60 in the filter 50, in order to ascertain whether the shaped object 60 is correctly placed in the filter, or misalignments are present.

[0066] First, in case a system of devices 1 is available, the quality control device 1 having the tube 2 with an inner diameter 4 wide enough to accommodate the filter to be checked is selected from the plurality of available devices 1. The inner diameter 4 should also preferably not be much larger than the diameter of the filter, otherwise a shift between the axis of the filter and the axis of the tube might also be possible, reducing the accuracy of checking the location of the shaped object properly, due to a misalignment of the filter within the device 1. Preferably, the longitudinal axis of the filter 50 and the longitudinal axis X of tube 2 substantially coincide, when the filter 50 is inserted in tube 2.

[0067] Then, in case a system of devices 1 is available, depending on the shape of the shaped object 60 the position of the shaped object is checked and on the tolerances on the position required, a suitable closing element 10 among the plurality is selected. The shape of the chosen reference means 20 is preferably substantially similar or equal to the shape of the shaped object 60 visible from the end surface 51 of the filter 50, and the difference in size between the reference means 20 and the visible portion of the shaped object depends on the required tolerances. The closing element 20 and tube 2 so selected are then fixed one to the other using the provided fastening means 11. Alternatively, in case a system of devices 1 is not present, the selections above are omitted and the available device 1 is used.

[0068] The filter 50 to be checked is inserted in the tube 2 via the open end 6, as shown with an arrow in Figs. 2 and 3. The insertion of the filter 50 in the tube 2 is made in such a way that the end surface 51 of the filter from which the shaped object 60 is visible results in abutment to the closing element 10. The end surface 51 of the filter 50 abuts to the region of the closing element 10 which comprises the reference means 20 and which is partially transparent.

[0069] In the embodiment in which the reference means 20 include also an area to check the alignment of the filter 50 within the tube 2, such as the alignment annular area 23, the operator first checks the correct alignment of the filter 50 inside tube 2, determining whether the outer boundary of the filter 50, as visible from the partially transparent region of the closing element 10, is completely included within annular area 23. In case the boundary of filter 50 lies outside such annular area, a misalignment is present and a different tube 2 has preferably to be used, or the filter 50 should preferably be reinserted in tube 2. In case an alignment area 23 is not present, the above check may be omitted. In order to check the position of the shaped object 60, the operator then visually compares the overlapping between the area defined by the visible portion of the shaped object 60 and

the area(s) defined by the reference means 20. The amount of overlap of the two areas discriminates whether the shaped object 60 is correctly placed or not within filter 50. In the depicted embodiment, the operator checks whether the circle defined by the shaped object 60 overlaps the circle defined by the reference area 22.

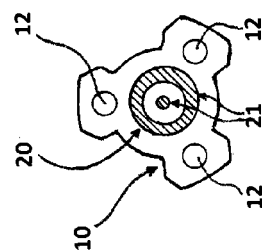
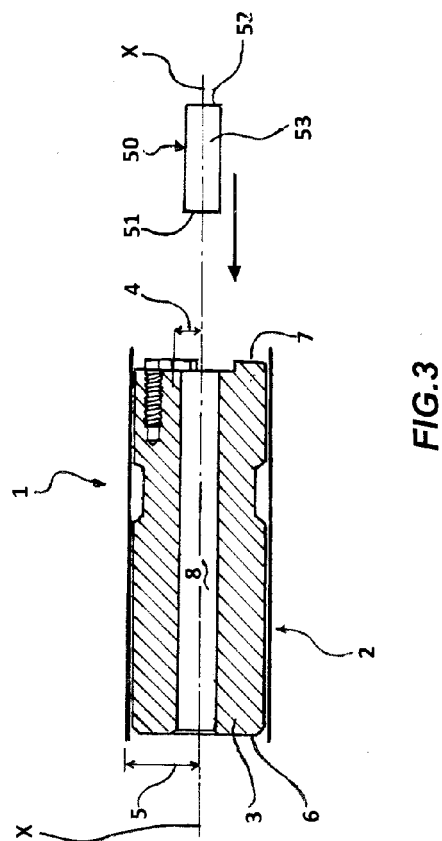
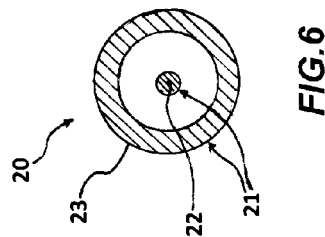
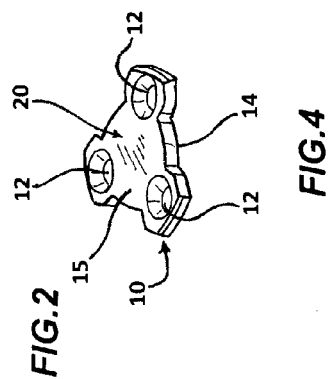
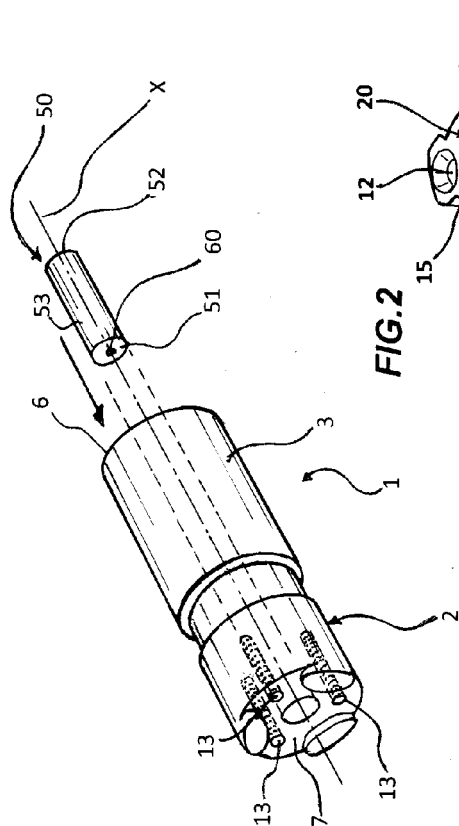
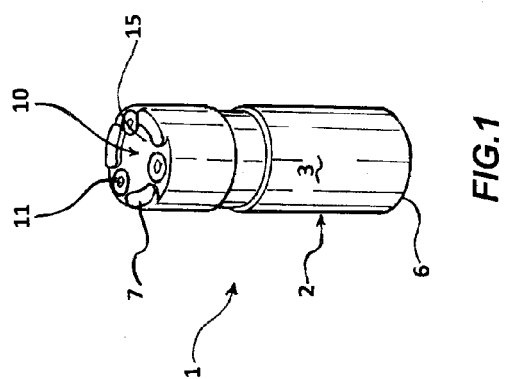
[0070] In case of complete overlap, the shaped object 60 results correctly located within filter 50. In case of only partial overlap, there is no correct placement, however the filter can be still considered to be acceptable if the overlap comprises at least a given percentage of the total area of the shaped object 60.

[0071] Alternatively, in case of an area 23 having sub-areas with different colours or opaqueness, the operator can check how many sub-areas the circle defined by the shaped objects 60 overlap. Depending on which sub-areas are overlapped, the filter can be rejected or accepted.

Claims

1. A quality control device (1) for determining the position of a shaped object (60) in a filter (50) of a smoking article, the device comprising:
 - a tube (2) for longitudinally accommodating the filter (50) to be controlled,
 - a closing element (10) for closing one end (6, 7) of the tube (2), the closing element (10) provided with reference means (20) for checking the position of the shaped object (60) on an end surface (51) of the filter (50) when the filter (50) is accommodated into the tube (2),
 - wherein a portion of the closing element (10) is at least partially transparent, the reference means (20) being arranged on the at least partially transparent portion of the closing element (10) for indicating a desired position for the shaped object (60) on the end surface (51) of the filter.
2. Quality control device according to the preceding claim, wherein the reference means (20) comprise a visual pattern (21) on the at least partially transparent portion of the closing element.
3. Quality control device according to claim 1, or 2, wherein the reference means (20) comprise an area (22, 23) with a colour or opacity that is different from the colour or opacity of an area of the closing element (10) provided adjacent to the reference means (20).
4. Quality control device according to any one of the preceding claims, wherein the reference means (20) comprise a screen printed area defined in at least one predetermined area of the closing element (10).

5. Quality control device according to any of the claims 2 to 4, wherein the area of the reference means (20) correlates to a preset tolerance value range of the actual position of the shaped object (60), and preferably correlates to a preset upper and lower value of tolerance values of the actual position of the shaped object (60),. 5
6. Quality control device according to any one of the preceding claims, wherein the closing element is removably fixed to an end (6, 7) of the tube (2). 10
7. Quality control device according to any one of the preceding claims, wherein the portion of the closing element (10) is made of transparent material. 15
8. Quality control device according to any of the preceding claims, wherein the reference means (20) comprise a sector (23) of a substantially ring-shaped area and/or a circular area realized on the portion of the closing element (10). 20
9. Method for determining the position of a shaped object (60) located within a filter (50) of a smoking article, the method comprising: 25
 - providing a quality control device comprising a tube (2) and a closing element (10), the closing element (10) closing an end (6, 7) of the tube (2),
 - defining a desired position of the shaped object (60) in the filter (50), 30
 - providing on a predetermined portion of the closing element (10) reference means (20) for indicating the desired position for the shaped object (60) in the filter (50) abutting onto the closing element (10) when the filter (50) is inserted in the tube (2), 35
 - inserting the filter (50) in the tube (2), and
 - comparing the actual position of the shaped object (60) and the position of reference means (20) in order to control whether the position of the shaped object (60) is correct. 40
10. Method according to claim 9, further comprising: 45
 - providing a plurality of shaped object position control devices, each control device (1) being provided with a tube (2) having an inner diameter different from one another, and
 - selecting the quality control device having a dimension of the inner diameter of the tube suitable for accommodating the filter. 50
11. Method according to claim 9 or 10, further comprising: 55
 - providing a plurality of closing elements for being associated to the shaped object position control device, each closing element (10) being provided with reference means (20) having a different pattern (21),
 - checking one or a plurality of filters comprising more than one shaped object or comprising shaped objects of different geometries, wherein the checking comprises selecting the appropriate closing element for each different shaped object or each different filter.
12. Method according to any of claims from 9 to 11, further comprising
 - providing a plurality of closing elements for being associated to the shaped object position control device, each closing element (10) being provided with reference means (20) having a different pattern (21),
 - selecting a tolerance of the positioning of the shaped object in the filter with respect to the desired position,
 - selecting a closing element (10) of the plurality depending on the selected tolerance for the position of the shaped object in the filter.
13. System for determining the position of a shaped object (60) located within a filter (50) of a smoking article, the system comprising a plurality of shaped object position control devices according to one or more of claims 1 to 8, wherein each control device (1) of the plurality of control devices comprises a tube (2) with an inner diameter that is different from the inner diameter of the remaining control devices of the system.
14. System for determining the position of a shaped object (60) located within a filter (50) of a smoking article, the system comprising a quality control device (1) according to one or more of claims from 1 to 8, and further comprising a plurality of closing elements removably attachable to an end of the shaped object position control device, each closing element (10) of the plurality of closing elements being provided with reference means (20) defined in portions of the closing element (10) forming a different pattern (21) from one another so that different filters may be checked or different separate shaped objects on the same filter.
15. Quality control device, method or system according to any preceding claim, wherein the shaped object (60) is at least one of a thread, a capsule or indicia and wherein the shape of the object is one of circular, semi-circular, oval, annular, triangular, rectangular, pentagonal, hexagonal, in the shape of type font, star-shaped, sickle shaped, linear or wavy.





EUROPEAN SEARCH REPORT

 Application Number
 EP 13 17 1243

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 November 2013	Examiner MacCormick, Duncan
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