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(54) **A METHOD AND MACHINE FOR MANUFACTURING A CAPSULE FOR SMOKING ARTICLES, A CAPSULE FOR SMOKING ARTICLES, AND USE OF THIS CAPSULE IN AN AUTOMATIC MACHINE**

(57) The present invention relates to a method for manufacturing a capsule (1) for smoking articles. The capsule (1) comprises: a longitudinal development axis (H), a side wall (2) having a predetermined dimension, a lower end edge (20) and an upper end edge (21), a bottom (3), an opening (4) to allow the introduction of a product, and a closing element (5), arranged to close the opening (4).

The method comprises the steps of:

e) providing the side wall (2) of the capsule (1); and

f) filling the capsule (1) with a product;

In particular, the method also includes the steps of:

g) determining the amount of product to be introduced into the capsule (1) before step b);

and

h) arranging the bottom (3) and/or the closing element (5) at a definite distance (D) from the lower end edge (20) and/or the upper end edge (21) based on the quantity of product determined in step c).

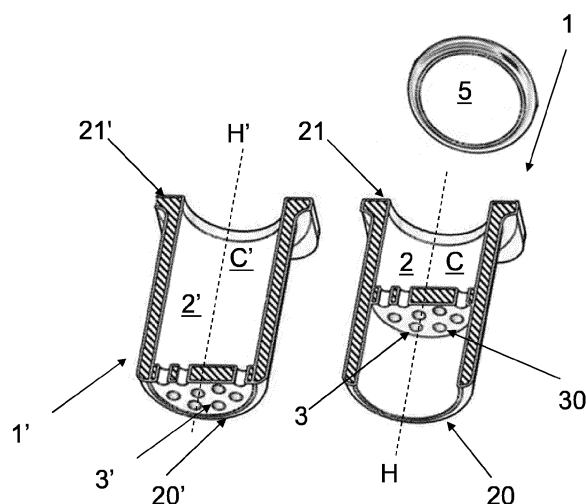


Fig. 2

Description

[0001] The present invention relates to a method and a machine for manufacturing a capsule for smoking articles, a capsule for smoking articles and the use of this capsule in an automatic machine in the tobacco sector.

[0002] As is known, new generation smoking articles increasingly require the use of a capsule containing a liquid or powder product for generating aerosols. Such capsules are usually arranged in dedicated housings in the smoking articles.

[0003] The capsules are defined by a casing, for example, with a cylindrical cross-section, having a mainly longitudinal development, and comprising a side wall, a bottom and an opening, opposite the bottom and occluded by a closing element. A chamber is therefore defined between the side wall, the bottom and the closing element to receive the liquid or solid product.

[0004] The casing is usually made of plastic material, and is obtained by molding the side wall and the bottom wall in a single body, while the closing element is made separately in order to be arranged to close the opening following the filling of the chamber.

[0005] For processing such capsules, dedicated automatic machines are known, which provide several stations that are consecutive (filling, closing, control stations, etc.).

[0006] It is known that, today, the needs of the market are increasingly changing, therefore, they require different products in different quantities (depending on the aromas, the type of product and the needs of the end user), to be packaged in dedicated capsules. In fact, the volume of the chamber defined within the capsule must be as suitable as possible for the quantity of product to be contained. In some cases, for example, once the product has been inserted into the capsule, the chamber must be filled as much as possible with the product, so that as little empty space as possible remains in the chamber.

[0007] The fact that the volume of the chamber is as suitable as possible for the quantity of product to be contained guarantees an optimal "experience of use" of the product in the smoking article, that is, it allows an optimal generation of aerosols once the capsule is inserted into the smoking article, and consequently a high quality perceived by the end user (smoker).

[0008] A problem linked to the requirement described above consists in the fact that the automatic machines must be adapted each time to the capsule to be processed: in fact, these machines comprise several operating groups dedicated to the specific format of the capsules themselves (for example: suitably sized seats, gripping means and dedicated treatments...). The adaptation of automatic machines to a different type of capsule than the one already in use (i.e. the so-called "format change") is particularly expensive and involves considerable downtime.

[0009] The object of the present invention is to overcome the above-mentioned problem.

[0010] This object is achieved by means of a method and a machine for manufacturing a capsule for smoking articles, a capsule for smoking articles and the use of this capsule in an automatic machine, in accordance with the attached claims.

[0011] Advantageously, the method, the machine, the capsule and the use of the capsule proposed with the invention eliminate the time and costs due to the adaptation of the automatic machines of the known art.

[0012] Specific embodiments of the invention and further advantages will be made evident in the following description, with the aid of the attached drawings, in which:

- Figure 1 illustrates a perspective view, from below, of a capsule according to the invention, in a first embodiment, and of a standard capsule;
- Figure 2 illustrates a view similar to that of Figure 1 with the capsules in cross-section, and a closing element of the capsule according to the invention;
- Figure 3 illustrates a perspective view, from below, of a capsule according to the invention, in a second embodiment, and of a standard capsule;
- Figure 4 illustrates a view similar to that of Figure 3 with the capsules in cross-section, and a closing element of the capsule according to the invention;
- Figure 5 and Figure 6 illustrate as many side views of the capsules in cross-section according to the embodiments of Figure 2 and Figure 4, respectively;
- Figure 7 is a schematic and exemplary view of a machine according to the invention.

[0013] With reference to the attached figures, reference 1 indicates a capsule for a smoking article (not illustrated) according to the present invention. Smoking article means, in particular, an article (so-called "new generation" article) wherein at least part of the aerosol generation is given by the heating of a product (liquid and/or solid, in particular, granular or powder). This type of smoking article usually has a housing for containing the capsule.

[0014] With reference to the figures, the capsule 1 for a smoking article according to the invention comprises a longitudinal development axis H (the direction of which is indicated in Figures 2, 4, 5 and 6) and a side wall 2 having a predetermined dimension, a lower end edge 20 and an upper end edge 21, opposite each other. The capsule 1 also comprises a bottom 3 and an opening 4 (preferably opposite the bottom 3 as in the attached figures) to allow the introduction of a product (for example in powder, granule or liquid form) into the capsule 1, and an closing element 5 (illustrated, by way of example, only in Figures 2 and 4) designed to close the opening 4 (once the product has been inserted).

[0015] In particular, the bottom 3 and/or the closing element 5 are arranged at a definite distance D (indicated only in Figures 5 and 6) from the lower end edge 20 and/or from the upper end edge 21, on the basis of the quantity

of product contained.

[0016] In other words, the bottom 3 and/or the closing element 5 are arranged more internally to the capsule 1 than the lower end edge 20 and/or the upper end edge 21.

[0017] In the attached figures, the lower end edge 20 and the upper end edge 21 are defined by respective edges of the side wall 2.

[0018] The fact that the side wall 2 has a predetermined dimension means that it defines a predetermined cross-section and a predetermined height (i.e. longitudinal development) of the capsule 1. The term "predetermined" size means equal to that of a standard capsule 1', as will be made clear below with reference to the use of the capsule 1. Consequently, the upper end edge 21 and the lower end edge 20 also correspond to those of a standard capsule 1'.

[0019] Advantageously, inside the capsule 1 according to the invention there is a chamber C (indicated only in Figures 2, 4, 5 and 6) defined by the bottom 3, the side wall 2 and the closing element 5, once arranged to close the opening 4, to receive a product (not shown) whose volume is the optimal one for the quantity of product to be contained. In other words, the bottom 3 and/or the closing element 5 are arranged at a definite distance D from the lower end edge 20 and/or from the upper end edge 21, so that the volume of the chamber C defined in the capsule 1 (i.e. the capsule (1)) is substantially completely occupied by the product. In other words, the aforementioned distance D is chosen in such a way that as little empty space (air) as possible remains in the capsule (i.e. in the inner volume/chamber C defined thereby) once the product has been introduced. Preferably, both the bottom 3 and the closing element 5 contact the product once the capsule has been made.

[0020] The fact that the product substantially occupies the entire volume of the chamber C is often an optimal condition for the use of the product in the smoking article, allowing an optimal generation of aerosols once the capsule is inserted into the smoking article, and a consequent high quality perceived by the end user (smoker).

[0021] Preferably, it is the bottom 3 that is arranged more internally to the capsule 1 than the lower end edge 20. Advantageously, this aspect is simple to produce, since usually the side wall 2 and the bottom 3 are made simultaneously, in particular, they are molded in a single body and are, therefore, mutually fixed.

[0022] The attached figures allow comparison of a standard capsule 1' with a capsule 1 according to the invention (in two different embodiments) wherein the bottom 3 is arranged more internally than the lower end edge 20. In the standard capsule 1', the chamber C' that contains the product, necessarily develops from the upper end edge 21' to the lower end edge 20', contrary to the case of the capsule 1 according to the invention, as previously clarified.

[0023] For example, the bottom 3 of the capsule 1 according to the invention is arranged between 1/2 and 1/4 of the longitudinal development axis H (or rather, "of the

height") of the capsule 1, preferably between 1/2 and 1/3, measurement calculated from the lower end edge 20. In the attached figures, the bottom 3 is arranged at about 1/2 of the longitudinal development axis H of the capsule 1.

[0024] A similar argument may be made for the closing element 5, which could be arranged more internally to the capsule 1 respect to the upper end edge 21 of the capsule 1 itself (situation not illustrated).

[0025] The capsule 1 may have, for example, a longitudinal development (or rather, a height) of about 2 centimeters.

[0026] According to one embodiment, the product is a solid product in powder or granule form. In this case, for example, the bottom 3 has a plurality of holes 30 (which allow the passage of air) (see Figures 1, 2 and 5).

[0027] If the product is in powder or granule form, the closing element 5 may comprise or be made of filter material.

[0028] Alternatively, if the product is of the liquid type, the bottom 3 may be devoid of holes 30 (see Figures 3, 4 and 6).

[0029] The present invention also relates to the use of a capsule 1 according to any of the embodiments described above in an automatic machine of the tobacco sector (not shown), with the machine being arranged to process one or more standard capsules 1 for smoking articles. A standard capsule 1' means a capsule 1' (represented in the attached figures) comprising: a longitudinal development axis H' and a side wall 2' having the predetermined dimension defined above, a lower end edge 20' and an upper end edge 21', opposite each other; a bottom 3' arranged at the lower end edge 20', and an opening 4' to allow the introduction of a product into the standard capsule 1'; and a closing element (not illustrated) arranged at the upper end edge 21' to close the opening 4'.

[0030] The standard capsule 1' has, for example, a longitudinal development (i.e. a height) of about 2 centimeters.

[0031] In other words, the invention protects the use of the capsule 1 according to the invention, previously described, in an automatic machine of the tobacco sector arranged to process a standard capsule 1' having the same side wall 2' (i.e. the same cross-section and the same height), but with the bottom 3' arranged at the lower end edge 20', and the closing element arranged at the upper end edge 21'.

[0032] Advantageously, the use of the capsule 1 according to the invention described above avoids having to intervene to perform the adaptation of the machine in case it is necessary to process a capsule 1 containing a different quantity of product, that is, it avoids the so-called format change of the machine.

[0033] The machine (not illustrated) may comprise several stations, such as, for example: feeding empty casings, filling the casings with the product, preparing the closing element 5, welding, weight control, etc.

[0034] The present invention also relates to a method for manufacturing a capsule 1 for smoking articles, the capsule 1 has a longitudinal development axis H, and comprises a side wall 2 having a predetermined dimension (as previously described), a lower end edge 20 and an upper end edge 21, opposite each other. The capsule 1 also includes a bottom 3 and an opening 4, opposite the bottom 3 to allow the introduction of a product into the capsule 1, and a closing element 5 designed to close the opening 4.

[0035] The capsule 1 can be of the type described above.

[0036] The method includes the steps of:

- a) providing the side wall 2 of the capsule 1; and
- b) filling the capsule 1 with a product;

[0037] In particular, the method further includes the steps of:

- c) before step b), determining the quantity of product to be introduced into the capsule 1; and
- d) arranging the bottom 3 and/or the closing element 5 at a definite distance D from the lower end edge 20 and/or the upper end edge 21 based on the quantity of product determined in step c), in such a way that the capsule 1 is filled as much as possible with the product.

[0038] Step a) of preparing the side wall 2 may comprise the sub-step of setting the size of the side wall 2 equal to that of a standard capsule 1' (then setting the cross-section and height of the capsule 1 equal to the standard one).

[0039] Step b) of filling the capsule 1 with a product, liquid or solid, can be carried out with any suitable means, for example, by means of an automatic machine for the tobacco sector. This step preferably envisages substantially filling the entire volume of the chamber C defined between the bottom 3, the side walls 2 and the closing element 5 (the advantages of which have been previously described).

[0040] Step c) of determining the amount of product to be introduced into the capsule 1 may depend on the needs of the end user, the type of product used, etc.

[0041] Step d) of arranging the bottom 3 and/or the closing element 5 at a definite distance D from the lower end edge 20 and/or from the upper end edge 21 on the basis of the quantity of product determined may comprise the sub-step of setting the distance between the bottom 3 and the lower end edge 20 and/or between the closing element 5 and the upper end edge 21.

[0042] Preferably, step a) of preparing the side wall 2 of the capsule 1 comprises the sub-step of molding the side wall 2 of the capsule 1.

[0043] Preferably step d) of arranging the bottom 3 and/or the closing element 5 at a definite distance D from the lower end edge 20 and/or from the upper end edge

21 comprises the sub-step of molding the bottom 3. Preferably, the sub-step of molding the side wall 2 of the capsule 1, and the sub-step of molding the bottom 3 are performed simultaneously. Even more preferably, the side wall 2 and the bottom 3 are molded in one piece. This aspect is particularly simple and quick.

[0044] In addition, the step of providing the closing element 5 may comprise the sub-step of applying the closing element 5 on the opening 4 of the capsule 1.

[0045] The present invention also relates to a method for manufacturing at least one first capsule 1 and at least one second capsule 1' (cited above) for smoking articles having different quantities of product inside them, where the first capsule 1 and the second capsule 1' each have a longitudinal development axis H, H', and comprise a side wall 2, 2' having the same predetermined dimension, a lower end edge 20, 20' and an upper end edge 21, 21' opposite each other; a bottom 3, 3' and an opening 4, 4' to allow the introduction of a product into the first capsule 1 and into the second capsule 1'; and a closing element 5, 5' arranged to close the corresponding opening 4, 4'.

[0046] The method includes the steps of:

- a) preparing the side wall 2 of the first capsule 1 and preparing the side wall 2' of the second capsule 1';
- b) introducing a product (for example, in powder or liquid form) into the first capsule 1; introducing a product (for example in powder or liquid) into the second capsule 1'.

[0047] In particular, the method also comprises the steps of:

- c) determining the quantity of product to be introduced into the first capsule 1 and into the second capsule 1' before step b), the aforementioned quantities of product being different from each other and
- d) arranging the bottom 3 of the first capsule and/or the closing element 5 of the first capsule at a first distance D from the lower end edge 20 and/or from the upper end edge 21 of the first capsule on the basis of the quantity of product determined in step c) so that the capsule 1 is as full as possible with the product; and arranging the bottom 3' of the second capsule 1' and/or the closing element 5' of the second capsule 1' at a second distance D' from the lower end edge 20' and/or from the upper end edge 21' of the second capsule 1' on the basis of the quantity of product determined in step c) so that capsule 1' is as full as possible with the product (i.e. so that the volume of the chamber C of the first capsule 1 and the volume of the chamber C' of the second capsule 1' is substantially completely occupied by the product). The first distance D and the second distance D' are different from each other.

[0048] Advantageously, the above method allows the production of two capsules, first 1 and second 1' with the

same side walls 2, 2', but with a chamber C, C' having a different internal volume. In this way it is ensured that each chamber C, C' is filled as much as possible with product, avoiding or minimizing the presence of air inside them.

[0049] Preferably, both the bottom 3, 3' and the closing element 5, 5' contact the product once the capsule 1, 1' has been made.

[0050] The present invention also relates to a machine M for manufacturing a capsule 1 for smoking articles; the capsule 1 has a longitudinal development axis H and comprises a side wall 2 having a predetermined dimension, a lower end edge 20 and an upper end edge 21, opposite each other; a bottom 3 and an opening 4 to allow introduction of a product into the capsule 1; and a closing element 5 arranged to close the opening 4.

[0051] The machine M (illustrated schematically and by way of example in Figure 7) comprises: means A for feeding the at least one side wall 2 of the bottom 3 of the capsule 1; a station R for filling the capsule 1 with a product; a station S for closing the capsule 1 by arranging the closing element 5 at a definite distance D from the upper end edge 21; and a control and management unit U, connected to the filling station R to determine the quantity of product to be introduced into the capsule 1 by the filling station R.

[0052] In particular, the control and management unit U is connected to the closing station S and arranged to determine the distance D based on the quantity of product, so that the capsule 1 is filled as much as possible with the product.

[0053] Advantageously, the machine M according to the invention ensures that the formed capsule 1 is completely filled (i.e. as much as possible) with the product, avoiding or - in any case reducing to a minimum - the presence of air inside (this entails the same advantages already described for the capsule and for the methods proposed above).

[0054] The machine M can implement the methods described above, namely the method for manufacturing a capsule 1 and the method for manufacturing two capsules 1, 1' as mentioned above.

Claims

1. A method for manufacturing a capsule (1) for smoking articles, the capsule (1) has a longitudinal development axis (H) and comprises a side wall (2) with predetermined dimensions, a lower end edge (20) and an upper end edge (21), opposite each other; a bottom (3) and an opening (4) allowing introduction of a product into the capsule (1); and a closing element (5) provided for closing the opening (4); the method comprising the steps of:

a) providing the side wall (2) of the capsule (1); and

b) filling the capsule (1) with a product;

the method being **characterized in that** it also comprises the steps of:

c) before step b), determining the quantity of product to be introduced into the capsule (1); and

d) arranging the bottom (3) and/or the closing element (5) at a definite distance (D) from the lower end edge (20) and/or the upper end edge (21) based on the quantity of product determined in step c), in such a way that the capsule (1) is filled as much as possible with the product.

2. The method of the preceding claim, wherein the step a) of providing the side wall (2) of the capsule (1) comprises the sub-step of molding the side wall (2) of the capsule (1), and wherein the step d) of arranging the bottom (3) and/or the closing element (5) at a definite distance (D) from the lower end edge (20) and/or the upper end edge (21) comprises the step of molding the bottom (3).

3. The method of any one of the preceding claims, wherein the step d) of providing the closing element (5) comprises the sub-step of applying the closing element (5) on the opening (4) of the capsule (1).

4. A capsule (1) for a smoking article, the capsule (1) comprises a longitudinal development axis (H) and a side wall (2) with predetermined dimensions, a lower end edge (20) and an upper end edge (21), opposite each other; a bottom (3) and an opening (4) allowing introduction of a product into the capsule (1); and a closing element (5) provided for closing the opening (4); once the product has been inserted; the capsule (1) being **characterized in that** the bottom (3) and/or the closing element (5) are arranged at a definite distance (D) from the lower end edge (20) and/or the upper end edge (21) based on the quantity of product inserted so as to be substantially in contact with the product.

5. The capsule (1) of the preceding claim, wherein the bottom (3), the side wall (2) and the closing element (5) define a chamber (C) having a volume for containing the product; the bottom (3) and/or the closing element (5) being arranged with respect to the lower end edge (20) and/or the upper end edge (21) in such a way that the volume of the chamber is substantially entirely occupied by the product.

6. The capsule (1) of claims 4 or 5, wherein the bottom (3) is arranged between 1/2 and 1/14 of the longitudinal development axis (H) of the capsule (1), preferably between 1/2 and 1/3, measured starting from the lower end edge (20).

7. The capsule (1) of any of the claims from 4 to 6, wherein the product is a powder or granular product and wherein the bottom (3) comprises a plurality of holes (30). 5
8. The capsule (1) of any of the claims from 4 to 7, wherein the product is a powder or granular product and wherein the closing element (5) comprises a filter material. 10
9. Use of a capsule (1) of any of the claims from 4 to 8 in an automatic machine of the tobacco industry, the machine being designed to work on a standard capsule (1') for smoking articles, the standard capsule (1') having a longitudinal development axis (H') and a side wall (2') with said predetermined dimensions, a lower end edge (20') and an upper end edge (21'), opposite each other; a bottom (3') arranged at the lower end edge (20'), an opening (4') for allowing introduction of a product in the standard capsule (1'); 15 20 and a closing element arranged at the upper end edge (21') for closing the opening (4').
10. A machine (M) for manufacturing a capsule (1) for smoking articles, the capsule (1) has a longitudinal development axis (H) and comprises a side wall (2) having a predetermined dimension, a lower end edge (20) and an upper end edge (21), opposite each other; a bottom (3) and an opening (4) to allow introduction of a product into the capsule (1); and a closing element (5) arranged to close the opening (4); 25 30 the machine (M) comprises:
- means (A) for feeding at least one side wall (2) and the bottom (3) of the capsule (1); 35
- a station for filling (R) the capsule (1) with a product;
- a station (S) for closing the capsule (1), arranging the closing element (5) at a definite distance (D) from the end edge from the upper end edge (21); 40
- a control and management unit (U), connected to the filling station (R) to determine the quantity of product to be introduced by the filling station (R); 45
- characterized in that:**
- the control and management unit (U) is connected to the closing station (S) and arranged to determine the distance (D) based on the quantity of product, so that the capsule (1) is filled as much as possible with the product. 50

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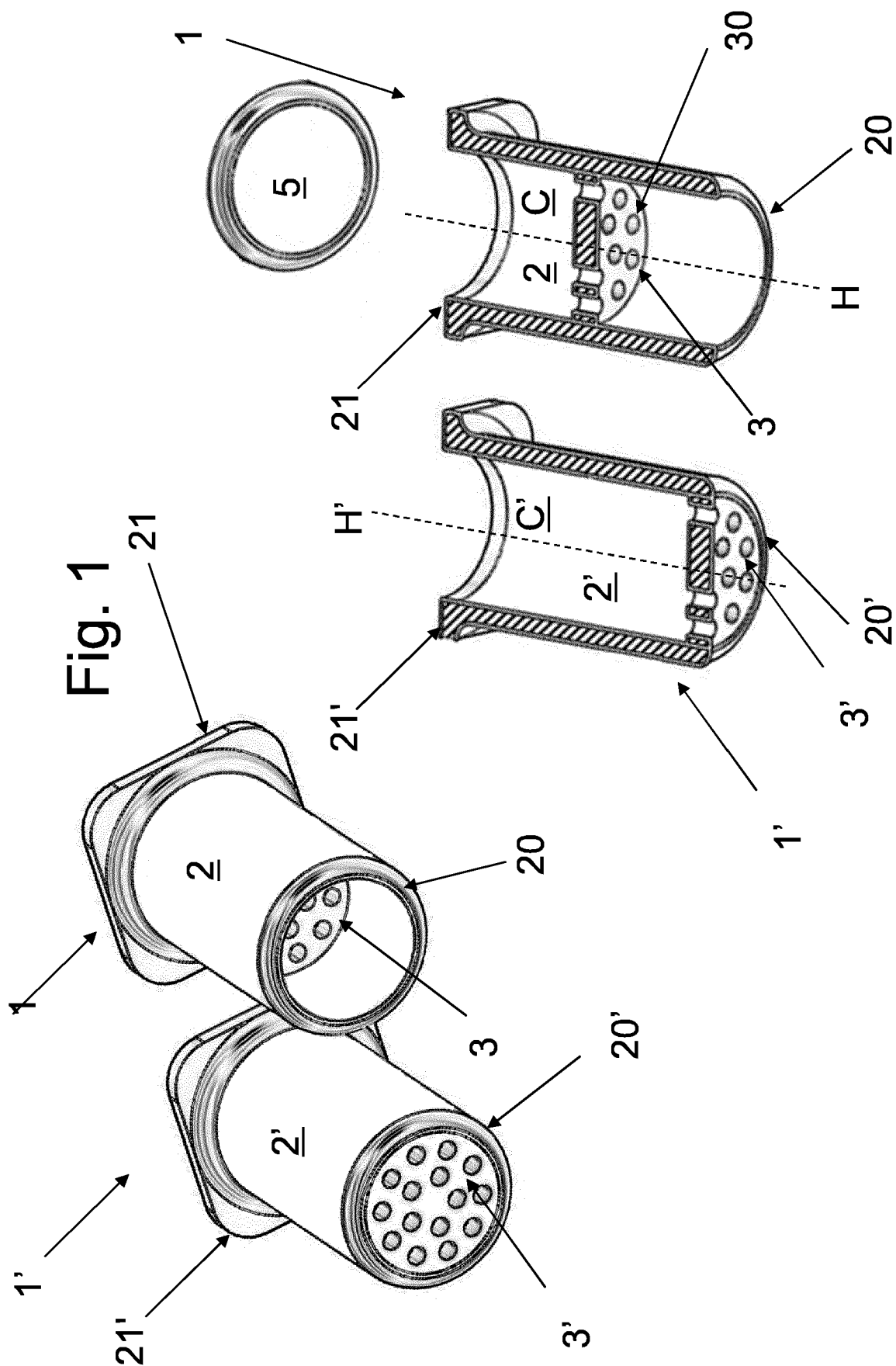
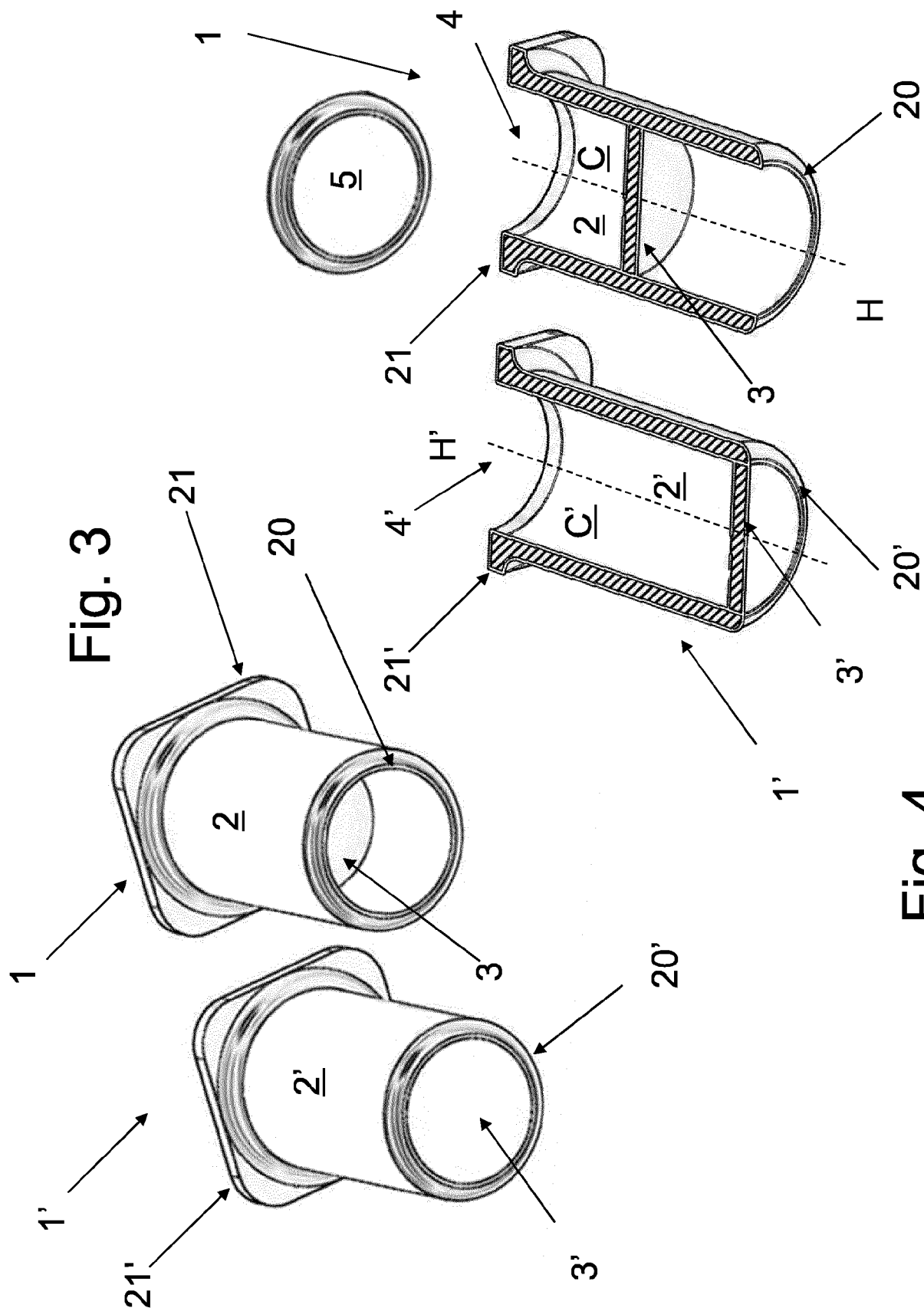


Fig. 2



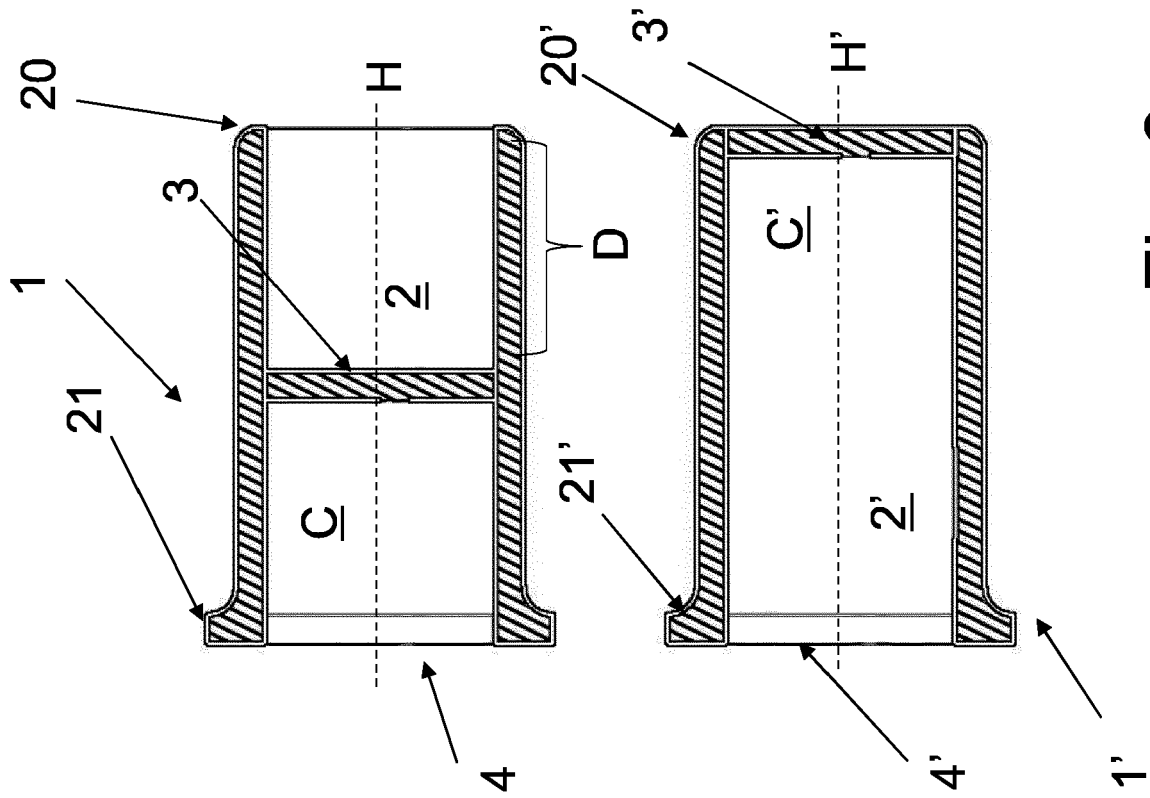


Fig. 6

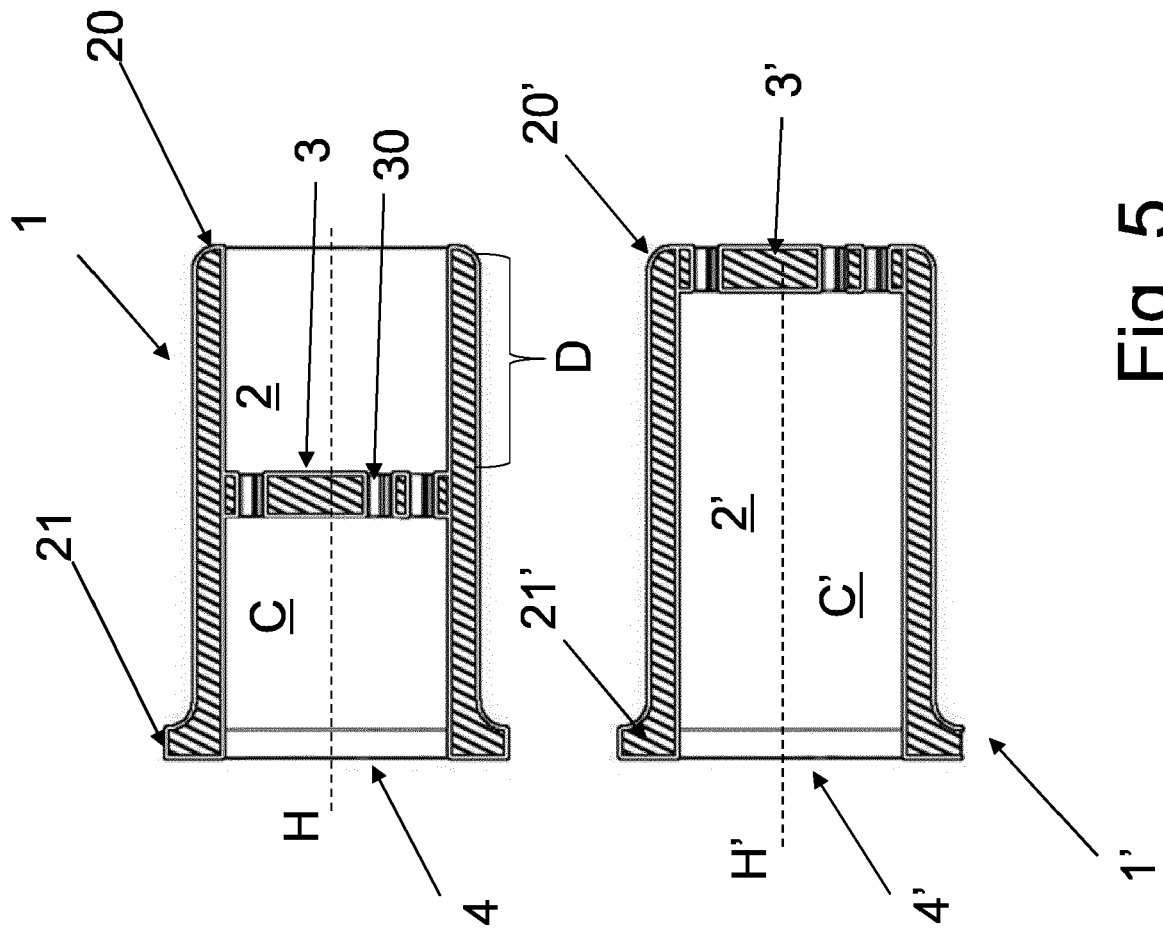


Fig. 5

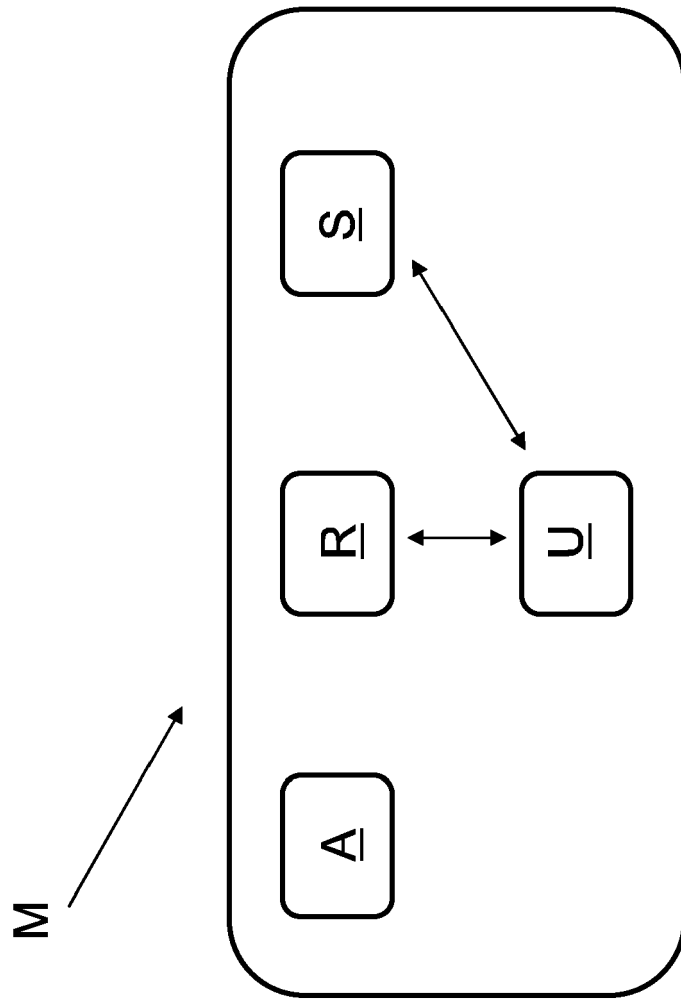


Fig. 7



EUROPEAN SEARCH REPORT

Application Number
EP 21 18 2749

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Y	* abstract * * figure 1 * * claim 1 * * paragraph [0010] * * paragraph [0022] * * paragraph [0020] *	5	
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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 23 September 2021	Examiner Damiani, Alberto
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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