



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
04.10.2023 Bulletin 2023/40

(51) International Patent Classification (IPC):
A24D 1/20 ^(2020.01) **A24C 5/01** ^(2020.01)

(21) Application number: **22165616.8**

(52) Cooperative Patent Classification (CPC):
A24D 1/20; A24C 5/01

(22) Date of filing: **30.03.2022**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(54) **E-VAPING DEVICE AEROSOL GENERATING HEAT STICK**

(57) This invention relates to an e-vaping device aerosol generating heat stick comprising: an aerosol generating segment (3), a cooling segment (14), a filter segment (9), wherein it comprises: at least a one-piece hollow tube (11) disposed so that: the cooling segment (14) is surrounded by a first longitudinal portion (15) of the

one-piece hollow tube (11), the filter segment (9) is surrounded by a second longitudinal portion (16) of the one-piece hollow tube (11), the aerosol generating segment (3) is not surrounded by the one-piece hollow tube (11).

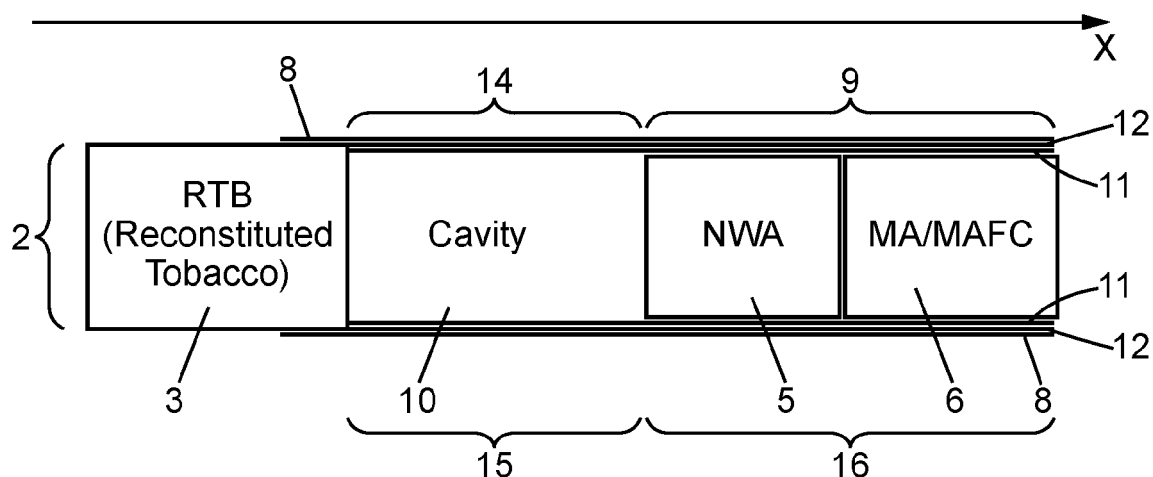


FIG. 2

Description

FIELD OF THE INVENTION

[0001] The invention relates to the technical field of e-vaping device tobacco heat stick or more generally speaking of e-vaping device aerosol generating heat stick.

[0002] The technical field of aerosol generating heat stick or heat-not-burn aerosol generating article (hereafter sometimes referred as "tobacco heat stick") for heat-not-burn devices comprising an aerosol generating substance formed as a rod with a sealed closure thereon. This aerosol generating substance may be a homogenized tobacco material or a reconstructed tobacco substrate or a non-tobacco aerosolizable material such as for instance foam.

BACKGROUND OF THE INVENTION

[0003] Reduced-risk devices have become popular alternatives to traditional tobacco products such as cigarettes. By contrast to these traditional products, which rely on combustion of tobacco, reduced-risk devices typically produce a vapor or aerosol for inhalation by a user.

[0004] Heated substrate aerosol generating devices, also known as heat-not-burn devices, are one class of reduced-risk device. In a heated substrate aerosol generating device, a substrate containing tobacco or other suitable material is heated to a temperature that is sufficiently high to generate an aerosol from the material but not so high as to cause combustion of the material. This aerosol contains the components of the material sought by the user but not the undesired by-products of combustion that are generated when the material combusts.

[0005] A typical heated substrate aerosol generating device contains a heating chamber or oven that defines a cavity adapted to receive a stick of the substrate to be heated. The substrate is heated inside the cavity in order to generate the desired aerosol, and can be removed and replaced once the substrate is spent. Heated substrate aerosol generating devices are typically formed with a very compact construction so as to provide a hand-held device that is convenient to store and carry.

[0006] Generally, heat stick comprises a tobacco segment (or other aerosol generating segment), a cooling segment, and a filter segment. Tobacco segment and cooling segment are manufactured by dedicated making machines, and filter segment is manufactured by several making machines, and by a combining machine. In the end, all manufactured segments are combined by a multi segment maker with paper wrapper. Manufacturer unit needs therefore to have several different machines among which at least, segment makers, a filter combiner, a paper tube maker, and a multi segment maker.

[0007] According to a prior art, a classic e-vaping device tobacco heat stick comprises:

- > a tobacco segment,
- > a cooling segment, made of a paper tube,
- > a filter segment, surrounded by a plug wrap paper.

[0008] This kind of tobacco heat stick is complex to manufacture since it needs:

- > a step of filter segment making,
- > a step of filter segment combining,
- > a step of making paper tube,
 - with the need for a specific manufacturing machine therefore,
- > a complex step of assembling three segments together:

- a tobacco segment,
- a paper tube,
- a filter segment,
 - requesting therefore a complex specific assembling machine.

[0009] Therefore, the invention deals with the technical problem of how to make simpler manufacturing of such e-vaping device tobacco heat stick?

[0010] The technical solution proposed by the invention provides a differently structured e-vaping device tobacco heat stick (or other aerosol generating heat stick) which is simpler and easier to manufacture.

[0011] New E-vaping device tobacco heat stick according to embodiments of the invention comprises:

- > a tobacco segment,
- > a cooling segment, which is preferably only a void cavity surrounded by a first length of a one-piece hollow tube,
- > a filter segment, surrounded by a second length of the same one-piece hollow tube.

[0012] This new kind of tobacco heat stick is much easier to manufacture since it only needs:

- > a step of filter segment making,
- > a step of one-piece hollow tube making with insertion of filter segment within one-piece hollow tube,
 - which is done during the filter segment combining step,
 - and which no more needs a specific manufacturing machine therefore,
- > a simple step of assembling only two segments together:
 - a tobacco segment,
 - with the made one-piece hollow tube already including the filter segment,
 - requesting therefore only a simple usual assembling machine, such as a simple cigarette

maker.

[0013] A one-piece hollow tube means a tube manufactured in a single piece, not two hollow tubes, each manufactured separately, and then both assembled together by sticking, welding or other fixing means.

[0014] According to another prior art, described in patent application WO 2021/170672 (see figure 1), it is disclosed a tobacco heat stick cooling segment which is void, but there is no "one-piece" hollow tube which surrounds both cooling segment and filter segment without surrounding tobacco segment:

- > External tube surrounds the full length of the tobacco stick,
- > Tubes 26 and 34 are not one-piece and they don't surround filter segment 42.

[0015] According to still another prior art, described in patent application US 10117459 (see figure 1), it is disclosed a tobacco heat stick cooling segment which is void (expansion chamber 8), but there is no "one-piece" hollow tube which surrounds both cooling segment and filter segment without surrounding tobacco segment:

- > External tube 12 surrounds the full length of the tobacco stick,
- > Tubes 24 and 28, respectively surrounding cooling segment and filter segment, are not one-piece,
- > Besides, cooling segment appears to be between two filter segments (44 & 26) and not abutting against tobacco rod.

SUMMARY OF THE INVENTION

[0016] The object of the present invention is to alleviate at least partly the above mentioned drawbacks.

[0017] Although global structure of the two other pieces of prior art seems somewhat closer to our proposed invention than classical prior art, there are in them, still:

- > Neither a "one-piece hollow tube" whose longitudinal extension surrounds both cooling and filter segments without surrounding tobacco segment,
 - Which is a key element to make heat stick structure simpler, and thereby heat stick easier to manufacture,
 - Especially by suppressing the complex multi segment combiner and replacing it by a simpler machine, such as a simple cigarette maker,
 - > Nor any easier manufacturing process is contemplated, since on the contrary:
 - In said another prior art, the 2 tubes in cooling segment makes the heat stick harder to manufacture,
 - In said still another prior art, the void cooling segment in the middle of filter segment also

makes the heat stick harder to manufacture.

[0018] This object is achieved with an e-vaping device aerosol generating heat stick comprising: an aerosol generating segment, a cooling segment, a filter segment, wherein it comprises: at least a one-piece hollow tube disposed so that: the cooling segment is surrounded by a first longitudinal portion of the one-piece hollow tube, the filter segment is surrounded by a second longitudinal portion of the one-piece hollow tube, the aerosol generating segment is not surrounded by the one-piece hollow tube.

[0019] The heat stick is an elongate heat stick with a longitudinal axis. The heat stick is preferably a cylindrical heat stick, with circular right cross section, having a longitudinal axis orthogonal to its circular right cross section.

[0020] This object is also achieved with a method of manufacturing an e-vaping device aerosol generating heat stick, according to any of preceding claims, wherein it comprises: one or more steps of filter segment making, a step of one-piece hollow tube making with insertion of filter segment within one-piece hollow tube, a step of assembling a aerosol generating segment with the made one-piece hollow tube already including the filter segment.

[0021] Preferably, the step of one-piece hollow tube making with insertion of filter segment within one-piece hollow tube is performed by a hollow tube maker and combiner, and/or the step of assembling a aerosol generating segment with the made one-piece hollow tube already including the filter segment is performed by a simple cigarette maker instead of being performed by a multi segment combiner.

[0022] Preferred embodiments comprise one or more of the following features, which can be taken separately or together, either in partial combination or in full combination.

[0023] Preferably, the cooling segment is made of a void cavity filling completely inside of the first longitudinal portion of the one-piece hollow tube.

[0024] Hence, the heat stick structure is even simpler, and its manufacturing process even easier, all the more that there is no more need for a paper tube maker which can be suppressed, and which besides does not need to be replaced by any other manufacturing machine.

[0025] Preferably, the one-piece hollow tube is made of a single material.

[0026] Hence, the heat stick structure is even simpler, and its manufacturing process even easier.

[0027] Preferably, the cooling segment is surrounded by the first longitudinal portion of the one-piece hollow tube, along whole longitudinal extension of the cooling segment.

[0028] Hence, heat stick obtained is more robust, although keeping its simple structure.

[0029] Preferably, the filter segment is surrounded by the second longitudinal portion of the one-piece hollow tube, along whole longitudinal extension of the filter segment.

ment, the filter segment is in contact with the second longitudinal portion of the one-piece hollow tube, along whole longitudinal extension of the filter segment.

[0030] Hence, heat stick obtained is more robust, although keeping its simple structure.

[0031] Preferably, the aerosol generating segment is not surrounded by the one-piece hollow tube along any longitudinal extension of the aerosol generating segment.

[0032] Hence, the aerosol generating segment is well separated from the rest of the heat stick at this earlier manufacturing stage, therefore leading to an even simpler heat stick structure and to an even easier way to manufacture it.

[0033] Preferably, the e-vaping device aerosol generating heat stick also comprises: an external hollow tube disposed so as to: surround the one-piece hollow tube, along whole longitudinal extension of the one-piece hollow tube, surround at least part of longitudinal extension of the aerosol generating segment, but preferably not whole longitudinal extension of the aerosol generating segment, for instance surround between 10% and 50% of longitudinal extension of the aerosol generating segment, advantageously between 20% and 40% of longitudinal extension of the aerosol generating segment, for example about 30% of longitudinal extension of the aerosol generating segment.

[0034] Preferably, the e-vaping device aerosol generating heat stick also comprises: a supplementary tube disposed so to: surrounding the one-piece hollow tube, along whole extension of the one-piece hollow tube, be as long as the one-piece hollow tube, be in contact with the one-piece hollow tube, along whole extension of the one-piece hollow tube, be in a single material different from single material of the one-piece hollow tube.

[0035] Preferably, the one-piece hollow tube and/or the supplementary tube is or are made of: a material which belongs to the list consisting of: a non-wrapped acetate, an acetate tow wrapped with paper, a crimped paper.

[0036] Hence, the one-piece hollow tube and/or the supplementary tube allow for improving simplicity and efficiency of cooling and filter segments.

[0037] Preferably, thickness of the one-piece hollow tube is equal or less than 4mm, is preferably between 0.5mm and 4mm, is more preferably between 1mm and 3mm.

[0038] Hence, the volume left for the cooling function is made bigger, without notably reducing robustness of hollow tube or while allowing for keeping sufficient robustness of hollow tube.

[0039] Preferably, the first longitudinal portion of the one-piece hollow tube comprises one or more perforations, the perforations being preferably distributed along a radial perimeter of the first longitudinal portion of the one-piece hollow tube.

[0040] Hence, cooling function of cooling segment is made more efficient.

[0041] Preferably, an internal diameter of the one-piece hollow tube is constant over a whole length of the one-piece hollow tube.

[0042] Hence, the heat stick structure is even simpler, and its manufacturing process even easier.

[0043] Preferably, there is no filter segment between the cooling segment and the aerosol generating segment, and preferably the cooling segment abuts against the aerosol generating segment.

[0044] Hence, the heat stick structure is even simpler, and its manufacturing process even easier.

[0045] Preferably, the aerosol generating segment is a solid substrate.

[0046] Hence, the heat stick structure is even simpler, and its manufacturing process even easier.

[0047] Preferably, said cooling segment is cylindrical with a circular right cross-section.

[0048] Preferably, said aerosol generating heat stick is a tobacco heat stick.

[0049] Advantageously, the heat tobacco stick comprises a tobacco rod (or the heat stick another aerosol generating rod), extended by a mouthpiece. The mouthpiece includes a cooling or spacing element and a filter which can include a single or multiple filter segments.

During vaping, the tobacco rod is heated, and inhalation takes place at the free end of the mouthpiece. The tobacco rod contains an aerosol generating substrate and a tubular wrapper that covers the aerosol generating substrate. The aerosol generating substrate comprising homogenized tobacco material (also sometimes referred as "reconstituted tobacco"). The homogenized tobacco material may take various forms such as shreds, strips, powder, foam, sheet and combinations thereof. The homogenized tobacco material may be formed from sheet using a cast sheet process, a paper-making process or an extrusion or combinations thereof. The homogenized tobacco material usually comprises a mixture of tobacco powder and/or fibers and aerosol forming agent or humectant such as any one or more of: glycerin, propylene glycol, water. The material may further comprise a binder such as cellulose derivatives or gum and/or flavoring agents in small amounts. The aerosol generating substrate may further comprise tobacco lamina and/or cellulose fiber. The tubular wrapper is preferably a paper wrapper which is rolled and longitudinally sealed to form a sealed seam.

[0050] Further features and advantages of the invention will appear from the following description of embodiments of the invention, given as non-limiting examples, with reference to the accompanying drawings listed hereunder.

BRIEF DESCRIPTION OF THE DRAWINGS

[0051]

Fig. 1 shows a side view of an example of a heat stick according to a prior art.

Fig. 2 shows a side view of an example of a heat stick according to an embodiment of the invention.

Fig. 3 shows a side view of an example of a heat stick according to another embodiment of the invention.

Fig. 4 shows a side view of an example of a heat stick according to still another embodiment of the invention.

Fig. 5 shows a side view of an example of a heat stick according to again another embodiment of the invention.

Fig. 6 shows a workflow of an example of a heat stick manufacturing process according to a prior art.

Fig. 7 shows a workflow of an example of a heat stick manufacturing process according to an embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0052] Fig. 1 shows a side view of an example of a heat stick according to a prior art. X is the longitudinal axis of a heat stick 1.

[0053] The heat stick 1 comprises several parts which are coaxial with one another and which are longitudinally successively spaced apart from one another: a tobacco rod 3 made of reconstituted tobacco (or an aerosol generating rod 3 made of another product), a cooling segment 14 comprising a paper tube 4, a filter segment 9 comprising a first filtering portion 5 and a second filtering portion 6 longitudinally spaced apart from each other. The first filtering portion 5 is located longitudinally between the paper tube 4 and the second filtering portion 6. The second filtering portion 6 is the part of the heat stick 1 which is closest to the free end of mouthpiece not represented here. The first filtering portion 5 can be made of NWA which is non-wrapped acetate, and the second filtering portion 6 can be made of MA which is mono acetate or of MAFC which is mono acetate flavored capsule.

[0054] The cooling segment is made of the paper tube 4. The filter segment 9 is made of first filtering portion 5 and second filtering portion 6 both surrounded by a hollow tube 7 made of plug wrap paper. The filter segment 9, the cooling segment 14 and part of the tobacco rod 3, are surrounded by an external hollow tube 8 so as to assemble together in the heat stick 1, the parts of this heat stick 1 being: a tobacco rod 3 made of reconstituted tobacco (or an aerosol generating rod 3 made of another product), a cooling segment 14 comprising a paper tube 4, a filter segment 9 comprising a first filtering portion 5 and a second filtering portion 6 longitudinally spaced apart from each other.

[0055] Fig. 2 shows a side view of an example of a heat stick according to an embodiment of the invention. X is the longitudinal axis of a heat stick 1 which is an elongate heat stick.

[0056] The heat stick 1 comprises several parts which are coaxial with one another and which are longitudinally successively spaced apart from one another: a tobacco

rod 3 made of reconstituted tobacco (or an aerosol generating rod 3 made of another product), a cooling segment 14 comprising a void cavity 10, a filter segment 9 comprising a first filtering portion 5 and a second filtering portion 6 longitudinally spaced apart from each other. The first filtering portion 5 is located longitudinally between the void cavity 10 and the second filtering portion 6. The second filtering portion 6 is the part of the heat stick 1 which is closest to the free end of mouthpiece not represented here. The first filtering portion 5 can be made of NWA which is non-wrapped acetate, and the second filtering portion 6 can be made of MA which is mono acetate or of MAFC which is mono acetate flavored capsule.

[0057] The cooling segment comprises the void cavity 10 surrounded by a first longitudinal portion 15 of a one-piece hollow tube 11. The filter segment 9 is made of first filtering portion 5 and second filtering portion 6 both surrounded by a second longitudinal portion 16 of the one-piece hollow tube 11. The one-piece hollow tube 11 is itself surrounded by a supplementary tube 12 over its whole length according to longitudinal axis X, so as to be coaxial with this second longitudinal portion 16 of the one-piece hollow tube 11 and so as to be in contact with, or so as to press against, this second longitudinal portion 16 of the one-piece hollow tube 11, over a whole cylindrical surface. The filter segment 9, the cooling segment 14 and part of the tobacco rod 3, are surrounded by an external hollow tube 8 so as to assemble together in the heat stick 1, the parts of this heat stick 1 being: a tobacco rod 3 made of reconstituted tobacco (or an aerosol generating rod 3 made of another product), a cooling segment 14, a filter segment 9, so that this external hollow tube 8 is in contact or presses against all these parts, over a whole cylindrical surface.

[0058] The one-piece hollow tube 11 can be made of:

- NWA which is non-wrapped acetate,
- Or acetate tow wrapped with paper,
- Or crimped paper.

[0059] The supplementary tube 12 can be made of:

- NWA which is non-wrapped acetate,
- Or acetate tow wrapped with paper,
- Or crimped paper.

[0060] The cooling segment 14 is made of:

- a void cavity 10,
- a first longitudinal portion 15 of a one-piece hollow tube 11 surrounding the void cavity 10,
- and optionally also a first longitudinal portion of a supplementary tube 12 surrounding the first longitudinal portion 15 of the one-piece hollow tube 11.

[0061] The filter segment 9 is made of:

- a first filtering portion 5,

- a second filtering portion 6 longitudinally spaced apart from the first filtering portion 5,
- a second longitudinal portion 16 of a one-piece hollow tube 11 surrounding both first filtering portion 5 and second filtering portion 6,
- and optionally also a second longitudinal portion of a supplementary tube 12 surrounding the second longitudinal portion 16 of the one-piece hollow tube 11.

[0062] The structure of the heat stick 1 is similar for all figures 2-3-4-5, except for the materials making the first filtering portion 5 and the second filtering portion 6.

[0063] Fig. 3 shows a side view of an example of a heat stick according to another embodiment of the invention. X is the longitudinal axis of a heat stick 1.

[0064] The heat stick 1 comprises several parts which are coaxial with one another and which are longitudinally successively spaced apart from one another: a tobacco rod 3 made of reconstituted tobacco (or an aerosol generating rod 3 made of another product), a cooling segment 14 comprising a void cavity 10, a filter segment 9 comprising a first filtering portion 5 and a second filtering portion 6 longitudinally spaced apart from each other. The first filtering portion 5 is located longitudinally between the void cavity 10 and the second filtering portion 6. The second filtering portion 6 is the part of the heat stick 1 which is closest to the free end of mouthpiece not represented here. The first filtering portion 5 can be made of MA which is mono acetate or of MAM which is mono acetate menthol, and the second filtering portion 6 can be made of a void cavity.

[0065] Fig. 4 shows a side view of an example of a heat stick according to still another embodiment of the invention. X is the longitudinal axis of a heat stick 1.

[0066] The heat stick 1 comprises several parts which are coaxial with one another and which are longitudinally successively spaced apart from one another: a tobacco rod 3 made of reconstituted tobacco (or an aerosol generating rod 3 made of another product), a cooling segment 14 comprising a void cavity 10, a filter segment 9 comprising a first filtering portion 5 and a second filtering portion 6 longitudinally spaced apart from each other. The first filtering portion 5 is located longitudinally between the void cavity 10 and the second filtering portion 6. The second filtering portion 6 is the part of the heat stick 1 which is closest to the free end of mouthpiece not represented here. The first filtering portion 5 can be made of a charcoal filter, and the second filtering portion 6 can be made of MA which is mono acetate or of MAM which is mono acetate menthol.

[0067] Fig. 5 shows a side view of an example of a heat stick according to again another embodiment of the invention. X is the longitudinal axis of a heat stick 1.

[0068] The heat stick 1 comprises several parts which are coaxial with one another and which are longitudinally successively spaced apart from one another: a tobacco rod 3 made of reconstituted tobacco (or an aerosol gen-

erating rod 3 made of another product), a cooling segment 14 comprising a void cavity 10, a filter segment 9 comprising a first filtering portion 5 and a second filtering portion 6 longitudinally spaced apart from each other.

5 The first filtering portion 5 is located longitudinally between the void cavity 10 and the second filtering portion 6. The second filtering portion 6 is the part of the heat stick 1 which is closest to the free end of mouthpiece not represented here. The first filtering portion 5 can be made of a charcoal filter, and the second filtering portion 6 can be made of MA which is mono acetate or of MAM which is mono acetate menthol, with a third filtering portion 13 located between first filtering portion 5 and second filtering portion 6, this third filtering portion 13 being made of a flavor containing capsule.

10 **[0069]** Fig. 6 shows a workflow of an example of a heat stick manufacturing process according to a prior art.

[0070] The first filter maker 21 manufactures the second filtering portion 6.

20 **[0071]** The second filter maker 22 manufactures the first filtering portion 5.

[0072] The filter combiner 23 assembles together first filtering portion 5 and second filtering portion 6 so that first filtering portion 5 and second filtering portion 6 abut against each other and are surrounded, so as to be in contact or to press against, by hollow tube 7.

25 **[0073]** The paper tube maker 24 manufactures the paper tube 4.

30 **[0074]** The multi segment combiner assembles together, in order to make the heat stick 1, all following parts:

- the tobacco rod 3 (or another aerosol generating rod 3),
- the paper tube 4,
- 35 - the filter segment 9,
- the external hollow tube 8.

40 **[0075]** Fig. 7 shows a workflow of an example of a heat stick manufacturing process according to an embodiment of the invention.

[0076] The first filter maker 21 manufactures the second filtering portion 6.

[0077] The second filter maker 22 manufactures the first filtering portion 5.

45 **[0078]** The hollow tube maker and combiner 26 assembles together first filtering portion 5 and second filtering portion 6 so that first filtering portion 5 and second filtering portion 6 abut against each other and are surrounded, so as to be in contact or to press against, by one-piece hollow tube 11 and by supplementary tube 12 which both extend further than first filtering portion 5, so as to encompass void cavity 10 as well.

[0079] There is no more need for any paper tube maker 24 which is therefore suppressed.

55 **[0080]** The multi segment combiner 26 is also suppressed and has been replaced by a cigarette maker 27 which is simpler and which assembles together, in order to make the heat stick 1, all following parts:

- the tobacco rod 3 (or another aerosol generating rod 3),
- the cooling segment 14 and the filter segment 9, already previously assembled together,
- the external hollow tube 8.

[0081] The suppression of the paper tube maker 24 and the replacement of a complex multi segment combiner by a simpler cigarette maker 27, both make the manufacturing process according to the invention much simpler, whereas the replacement of a filter combiner 23 by a hollow tube maker and combiner adds limited complexity. Therefore, all in all, the manufacturing process according to the invention is notably simpler than the manufacturing process according to the prior art. Moreover, the global structure of the heat stick according to the invention is on the whole simpler and easier to manufacture than the global structure of the heat stick according to prior art.

[0082] The invention has been described with reference to preferred embodiments. However, many variations are possible within the scope of the invention.

Claims

1. E-vaping device aerosol generating heat stick comprising:

- > an aerosol generating segment (3),
- > a cooling segment (14),
- > a filter segment (9),

wherein it comprises:

> at least a one-piece hollow tube (11) disposed so that:

- the cooling segment (14) is surrounded by a first longitudinal portion (15) of the one-piece hollow tube (11),
- the filter segment (9) is surrounded by a second longitudinal portion (16) of the one-piece hollow tube (11),
- the aerosol generating segment (3) is not surrounded by the one-piece hollow tube (11).

2. E-vaping device aerosol generating heat stick, according to claim 1, wherein the cooling segment (14) is made of a void cavity (10) filling completely inside of the first longitudinal portion (15) of the one-piece hollow tube (11).

3. E-vaping device aerosol generating heat stick, according to any of preceding claims, wherein the one-piece hollow tube (11) is made of a single material.

4. E-vaping device aerosol generating heat stick, according to any of preceding claims, wherein the cool-

ing segment (14) is surrounded by the first longitudinal portion (15) of the one-piece hollow tube (11), along whole longitudinal extension of the cooling segment (14).

5. E-vaping device aerosol generating heat stick, according to any of preceding claims, wherein:

- > the filter segment (9) is surrounded by the second longitudinal portion (16) of the one-piece hollow tube (11), along whole longitudinal extension of the filter segment (9),
- > the filter segment (9) is in contact with the second longitudinal portion (16) of the one-piece hollow tube (11), along whole longitudinal extension of the filter segment (9).

6. E-vaping device aerosol generating heat stick, according to any of preceding claims, wherein the aerosol generating segment (3) is not surrounded by the one-piece hollow tube (11) along any longitudinal extension of the aerosol generating segment (3).

7. E-vaping device aerosol generating heat stick, according to any of preceding claims, wherein it also comprises:

> an external hollow tube (8) disposed so as to:

- surround the one-piece hollow tube (11), along whole longitudinal extension of the one-piece hollow tube (11),
- surround at least part of longitudinal extension of the aerosol generating segment (3), but preferably not whole longitudinal extension of the aerosol generating segment (3).

8. E-vaping device aerosol generating heat stick, according to any of preceding claims, wherein it also comprises:

> a supplementary tube (12) disposed so to:

- surrounding the one-piece hollow tube (11), along whole extension of the one-piece hollow tube (11),
- be as long as the one-piece hollow tube (11),
- be in contact with the one-piece hollow tube (11), along whole extension of the one-piece hollow tube (11),
- be in a single material different from single material of the one-piece hollow tube (11).

9. E-vaping device aerosol generating heat stick, according to any of preceding claims, wherein:

> the one-piece hollow tube (11) and/or the supplementary tube (12) is or are made of:

◦ a material which belongs to the list consisting of:

- a non-wrapped acetate,

- an acetate tow wrapped with paper,
 - a crimped paper.
10. E-vaping device aerosol generating heat stick, according to any of preceding claims, wherein thickness of the one-piece hollow tube (11) is equal or less than 4mm, is preferably between 0.5mm and 4mm, is more preferably between 1mm and 3mm. 5
11. E-vaping device aerosol generating heat stick, according to any of preceding claims, wherein the first longitudinal portion (15) of the one-piece hollow tube (11) comprises one or more perforations, the perforations being preferably distributed along a radial perimeter of the first longitudinal portion (15) of the one-piece hollow tube (11). 10 15
12. E-vaping device aerosol generating heat stick, according to any of preceding claims, wherein an internal diameter of the one-piece hollow tube (11) is constant over a whole length of the one-piece hollow tube (11). 20
13. E-vaping device aerosol generating heat stick, according to any of preceding claims, wherein: 25
- > there is no filter segment between the cooling segment (14) and the aerosol generating segment (3),
 - > and preferably the cooling segment (14) abuts against the aerosol generating segment (3). 30
14. E-vaping device aerosol generating heat stick, according to any of preceding claims, wherein the aerosol generating segment (3) is a solid substrate. 35
15. Method of manufacturing an e-vaping device aerosol generating heat stick, according to any of preceding claims, wherein it comprises: 40
- > one or more steps of filter segment making (21, 22),
 - > a step of one-piece hollow tube making with insertion of filter segment within one-piece hollow tube (26), 45
 - > a step of assembling a aerosol generating segment with the made one-piece hollow tube already including the filter segment (27).

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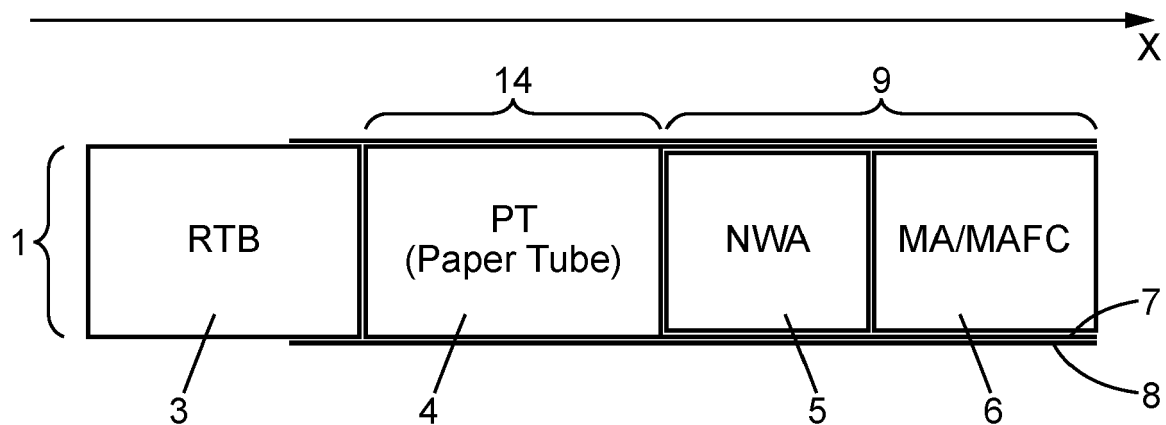


FIG. 1

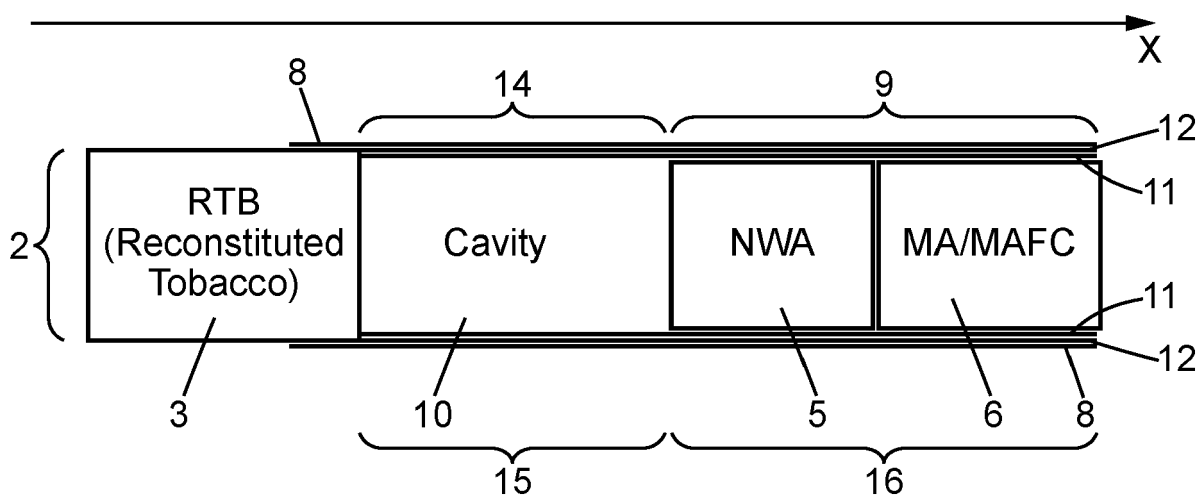


FIG. 2

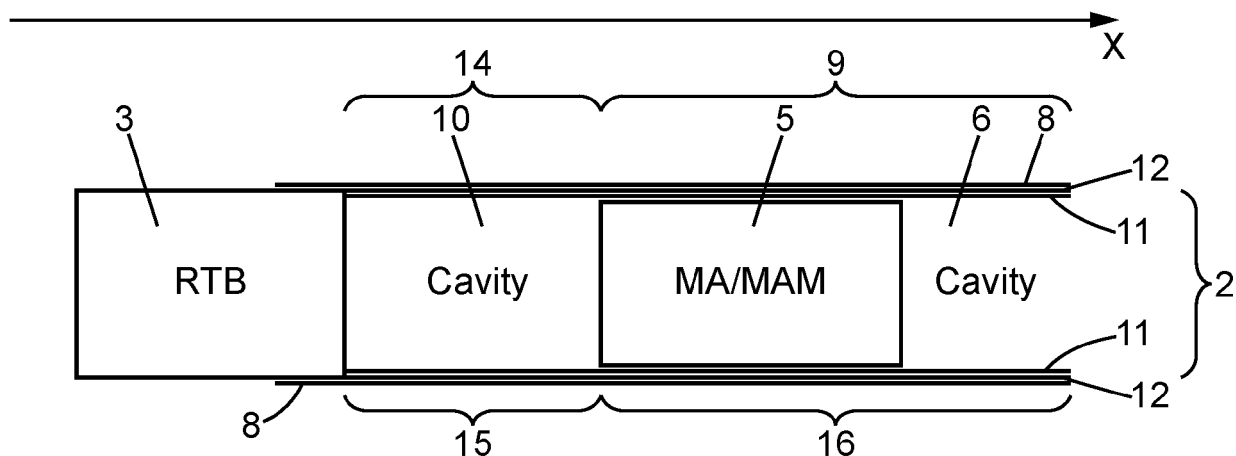


FIG. 3

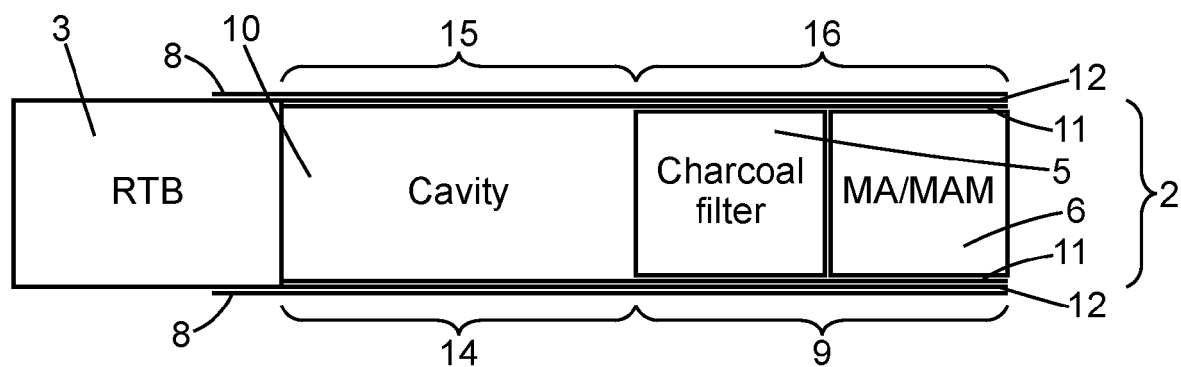


FIG. 4

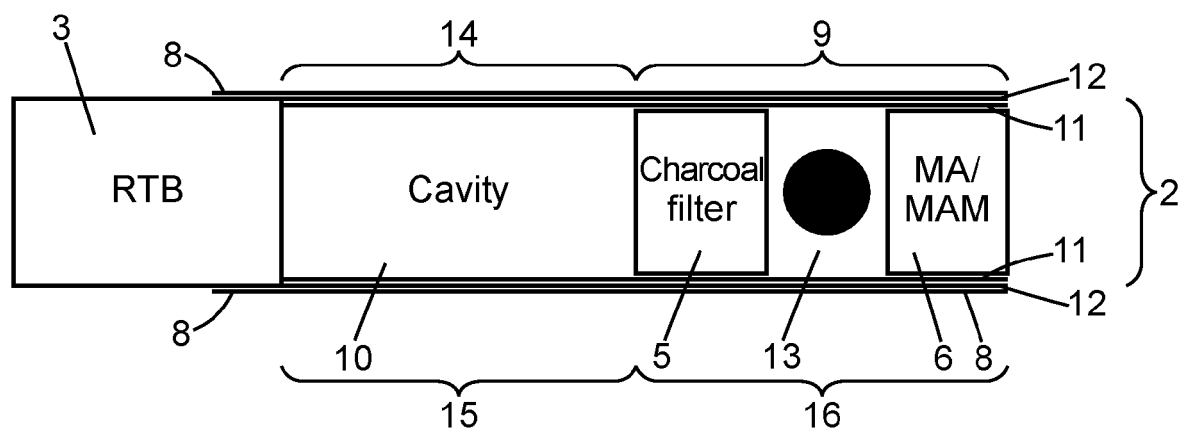
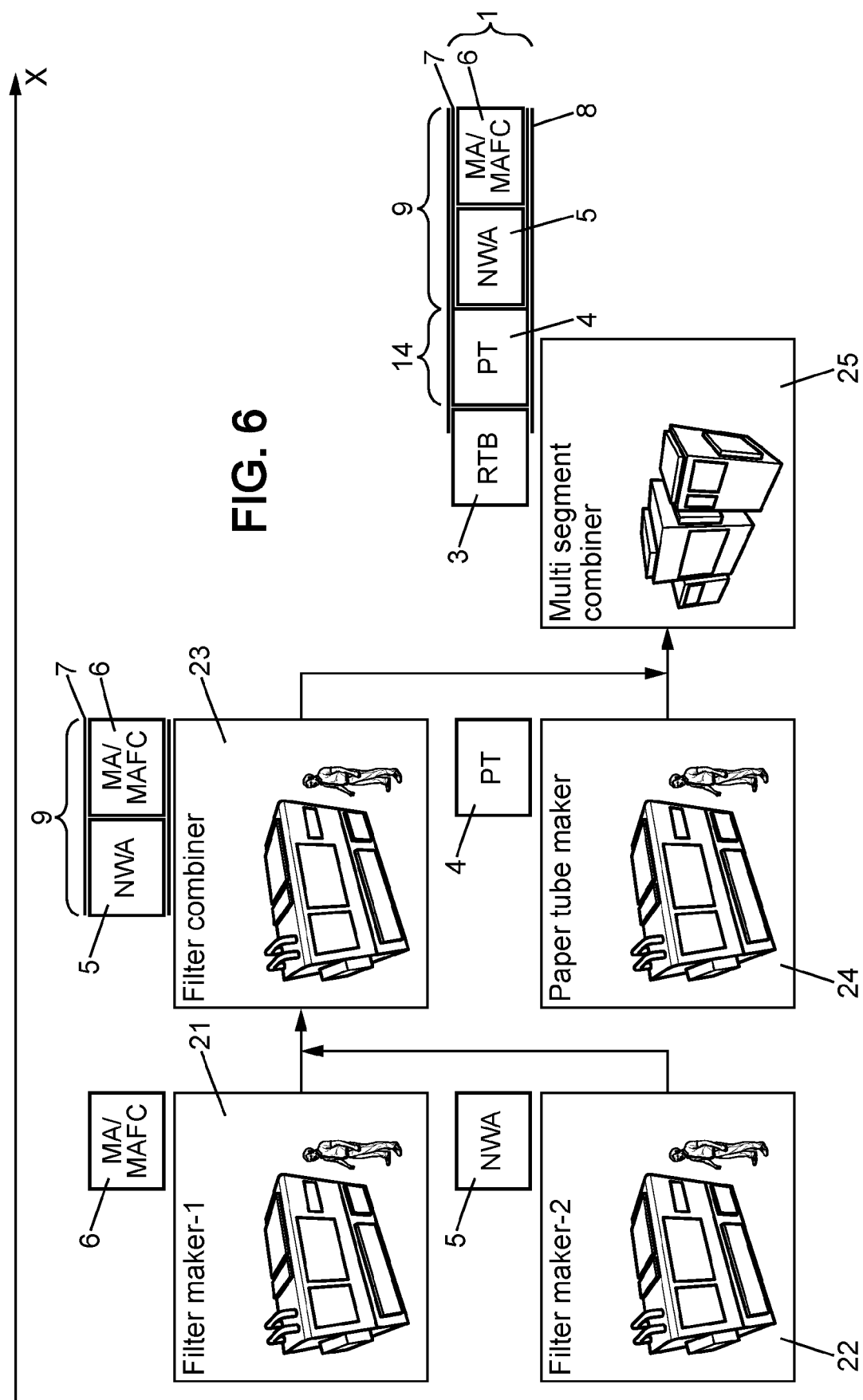
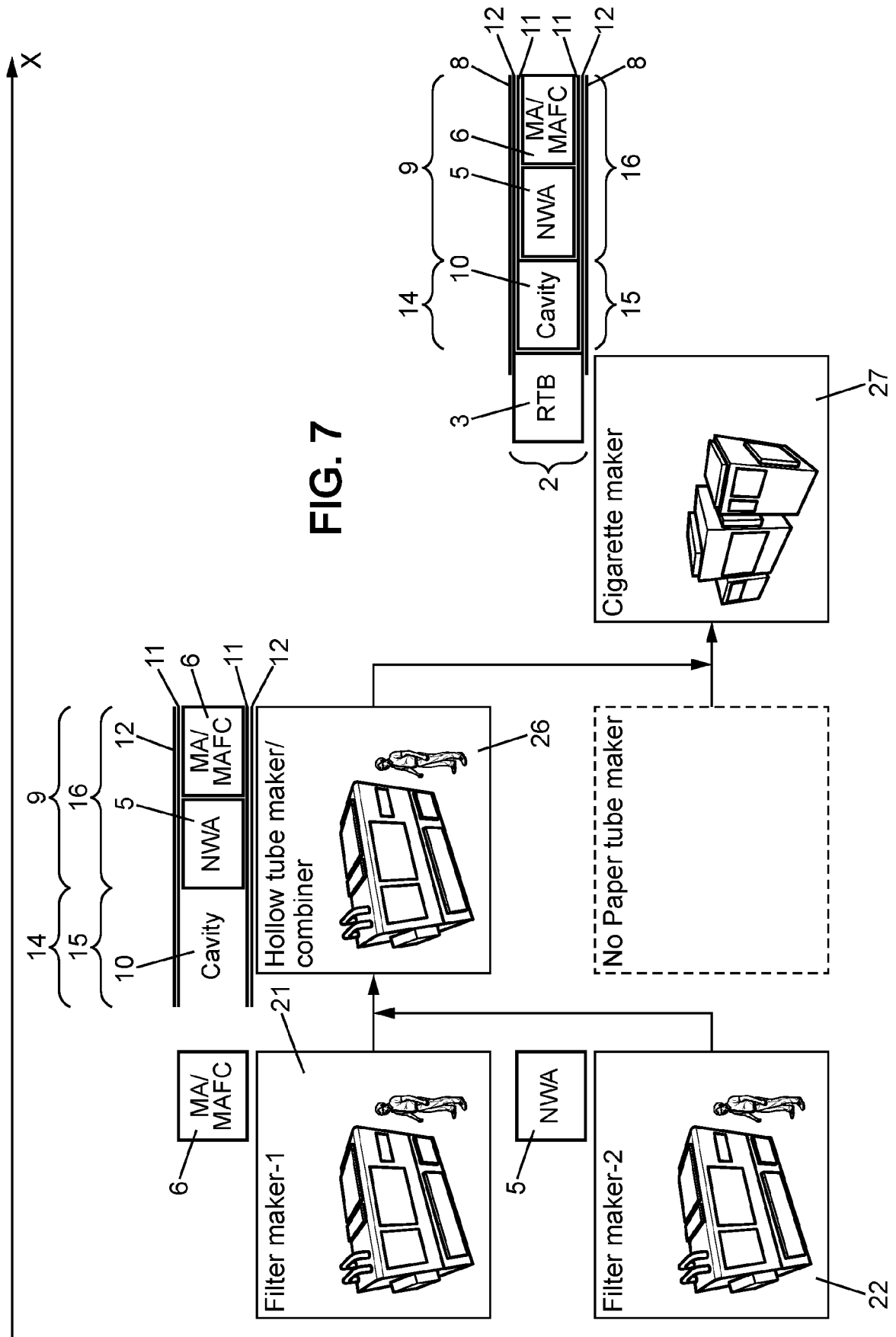


FIG. 5







EUROPEAN SEARCH REPORT

Application Number

EP 22 16 5616

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EPO FORM 1503 03:82 (P04C01)

Place of search

Munich

Date of completion of the search

27 September 2022

Examiner

Marzano Monterosso

CATEGORY OF CITED DOCUMENTS

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