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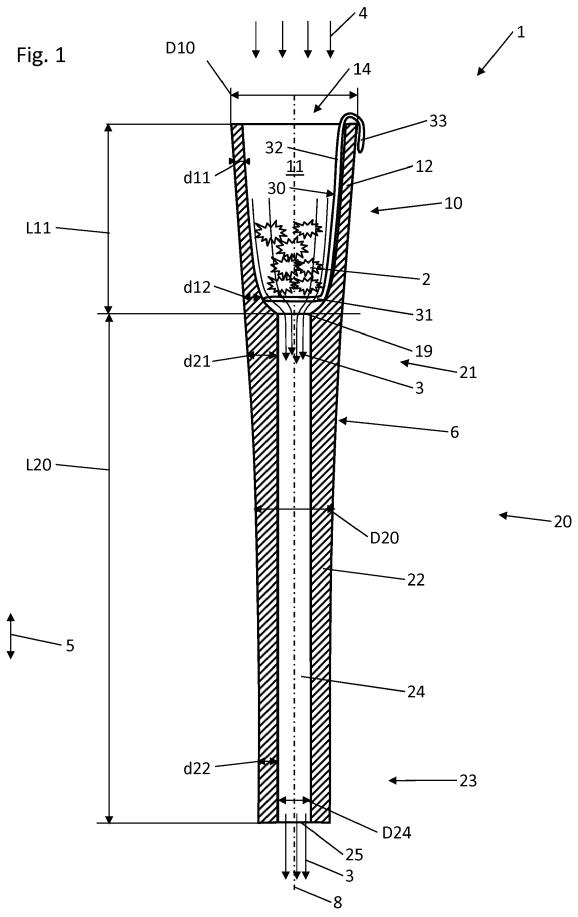
(54) SMOKING DEVICE

(57) The present invention relates to a smoking device (1), which comprises a combustion section (10) and an exhaust line (20). The combustion section includes a combustion chamber (11) for housing tobacco (2) and the exhaust line has an inlet portion (21) and an outlet portion (23) comprising an inhalation opening (25). The exhaust line is forming a canal (24) surrounded by a tube wall (22). The intake, the combustion chamber, the exhaust opening, the canal and the inhalation opening are aligned with the longitudinal axis. The combustion section or the combustion section and the exhaust line is/are substantially made from a ceramic material. Such ceramic material could be for example, but not limited to, earthenware, stoneware or porcelain or porcelain containing kaolin.

Fig. 1



EP 3 281 538 A1

Description

Technical field

[0001] The present invention relates to a smoking device, wherein the smoking device is adapted for consuming tobacco or similar suitable substances. Additionally, restraining means are disclosed wherein said restraining means are configured for being used in said the smoking device.

Prior art

[0002] Generally, for at least thousands of years various forms of smoking devices have been used by humans. These smoking devices mostly have been pipes, since these devices can be used multiple times and can be filled with various combustible substances as desired by the consumer.

[0003] In the present times, the majority of tobacco consumers use cigarettes, which have been introduced to Europe in the seventeenth century. Cigarettes or cigars can only be used once, since their structure disintegrates during the incineration process of the tobacco.

[0004] The US-American patent 2,594,680 discloses a smoking device for smoking tobacco in loose form. Said device has an open end and an elongated tubular receptacle for containing tobacco adapted to burn within said open end. Additionally, the smoking device comprises a cage which projects over said open end to retain ashes and to protect from the burning tobacco. In order to charge the smoking device, the open end is filled with tobacco. The cage is adapted to be retracted in longitudinal direction.

Disadvantages of the prior art

[0005] Smoking devices according to the prior art come with multiple disadvantages with regard to manufacturing costs, structural complexity and usability. For example, pipes usually have a large receptacle for housing tobacco, which is connected to a mouthpiece via a thin channel. After using a pipe several times the thin channel may become obstructed by deposit components of the smoke, like tar. This requires regular cleaning. The same disadvantage applies as well to the smoking device of the US-patent, wherein such device is expensive to manufacture due to its technical complexity. Finally, cigarettes and cigars can only be used once.

Problem to be solved

[0006] It is a task of the present invention to provide a smoking device, which allows a flexible and multiple use of said device. Furthermore the smoking device according to the invention shall be relatively efficient with regard to manufacturing efforts and costs. An optional or additional task of the present invention is to provide restraining means for achieving additional benefits for the use of the smoking device according to the invention.

Summary of the invention

[0007] The task of the invention as mentioned above is solved by a smoking device according to claim 1. Furthermore, the optional or additional task is solved by restraining means according to claim 13.

[0008] According to one embodiment, the smoking device comprises a combustion section and an exhaust line, wherein the incineration of tobacco or any suitable substance is taking place within the combustion section, and wherein the generated flue gas, e.g. smoke, can be conducted through the exhaust line towards an inhalation opening, for example a mouthpiece, for inhalation purposes.

[0009] The combustion section includes a combustion chamber for housing tobacco or any suitable substance. For such reason, the combustion chamber is surrounded by a combustion wall, therefore forming a substantially rotational body having a longitudinal axis. Additionally, the combustion chamber includes two openings, wherein the first opening is adapted as an intake for charging the combustion chamber with the smoking substance and for allowing air to reach the combustion chamber. The second opening is embodied as an exhaust opening for discharging the flue gas towards the exhaust line.

[0010] According to one arrangement of said embodiment, the combustion chamber comprises only one sole exhaust opening for discharging the flue gas. In particular, the exhaust opening is centrally aligned with the longitudinal axis of the combustion chamber.

[0011] The exhaust line has an inlet portion and an outlet portion comprising an inhalation opening for facilitating the inhalation of the flue gas. The exhaust line is forming a canal surrounded by a tube wall, which is connecting the exhaust opening of the combustion chamber with the inhalation opening. The inlet portion is located in an area of the exhaust line which is adjoining a neighboring area of the exhaust opening of the combustion section.

[0012] According to a further embodiment, the intake, the combustion chamber, the exhaust opening, the canal and the inhalation opening are aligned with the longitudinal axis. Optionally, the combustion wall and the tube wall are also aligned with the longitudinal axis.

[0013] According to a further arrangement of said embodiment, the entire smoking device is mainly aligned with one single longitudinal axis, in particular to the longitudinal axis of the combustion chamber, thus, the structure of the smoking device is rotationally symmetric to the longitudinal axis. Such measure simplifies the manufacturing process of the smoking device drastically, since the complexity of the geometric structure is very low compared to a non-rotationally symmetric structure.

[0014] According to one further embodiment of the invention, the combustion section or the combustion sec-

tion and the exhaust line is/are substantially made from a ceramic material. Such ceramic material could be for example, but not limited to, earthenware, stoneware or porcelain or porcelain containing kaolin. By using a ceramic material additional cost effects are achieved with respect to the manufacturing process. Usually, ceramic materials are widely available, wherein the financial effort for obtaining such materials is low.

[0015] Such choice of ceramic materials in combination with the rotationally symmetric structure of the smoking device comes with a synergistic effect: the manufacturing of a rotationally symmetric structure can be easily performed with a ceramic material, e.g. by injection molding, wherein the casting of the ceramic material in a rotationally symmetric structure is very beneficial for the characteristic behavior of ceramic materials, e.g. length deviation, during drying, hardening and/or burning of the ceramic material itself.

[0016] Hence, by applying one or a combination of the embodiments as mentioned above, a smoking device is obtained, which is easy to manufacture at very low costs. Furthermore, the smoking device can be reused multiple times. Firstly, tobacco is to be inserted in the combustion chamber, where it is incinerated. After the incineration process the remaining ashes in the combustion chamber can be removed by turning the smoking device upside down and slightly knocking on the combustion walls of the combustion section. Thus, ashes fall out.

[0017] According to another, not limiting embodiment, the ceramic material is adapted such, that it is suitable for industrial, automated manufacturing. Such material can be, for example, but not limited to it, technical ceramics like oxide ceramics, silicate ceramics or preferably a composite ceramic containing oxide ceramics and silicate ceramics. Further materials could be used preferably: magnesium silicate (e.g. type C221, 230), alkaline earth metal alumina silicate (e.g. C410, C520, C530), alkaline alumina silicate (e.g. type C140) or alumina-silicon oxide (C610, C620, C780).

[0018] By varying quantity and type of the raw materials of the ceramic material a plurality of multi-phased types of ceramics having different characteristics can be manufactured. Silicate ceramics are mostly adapted for automated, industrial manufacturing.

[0019] According to an embodiment of the invention, a thickness of the combustion wall of the combustion section, in the following named "combustion thickness", is less strong then a first, so called "tube thickness" of the tube wall, wherein the first tube thickness is measured in an area of the inlet portion. By this it is achieved, that the smoking device has a high resistance against breaking in the area of the inlet portion, wherein the area of the smoking device being subject to thermal stress is designed relatively delicate for enabling an enhanced conduction of thermal energy away from the combustion chamber towards the surrounding ambient medium. As a consequence, the inlet portion is thickened compared to the combustion section, and thereby providing a blocking function for the heat flow reaching from the combustion walls towards the tube walls. By this a major advantage is obtained with regard to usability of the smoking device, since the consumer is not threatened by burns when holding an overheated exhaust line.

[0020] Furthermore, according to another aspect, the combustion wall of the combustion chamber is varying along the longitudinal direction, in particular the first combustion thickness, which is measured in an area of the intake, is smaller than a second combustion thickness of the combustion wall, which is measured in an area of the exhaust opening. This optimizes the load distribution within the structure of the combustion chamber.

[0021] Optionally, the thickness of the tube wall is not constant in longitudinal direction. For example, the first thickness of the tube wall is larger than a second tube thickness of the tube wall, wherein the second tube thickness is measured in an area of the inhalation opening of the exhaust line.

[0022] According to a preferred embodiment of the invention the entire smoking device has, at least partially, a conical outer shape with a substantially continuous outer surface. That means the outer diameter of the smoking device in an area of the combustion chamber is larger than an outer diameter of the smoking device in an area of the inhalation opening, wherein the diameter of the smoking device is decreasing in longitudinal direction starting from the intake towards the inhalation opening. In particular, the entire smoking device has a truncated conical shape.

[0023] Optionally, the outer surface does not comprise, in a longitudinal sectional view, a step or any relevant irregularity of the surface, and a maximum outer diameter of combustion section is larger than a maximum outer diameter of the exhaust line.

[0024] According to another aspect, the outer surface has, in a longitudinal sectional view, at least partially a concave shape.

[0025] By applying parts of or all of the teaching with regard to the external form of the smoking device, the manufacturing process can be simplified; for example, the shape of required molds is very simple, thus the smoking device can be produced very cost-efficiently. Beside such cost advantage, the entire stability and resistance against breaking of the smoking device is improved due to an optimized load distribution within the structure of the smoking device.

[0026] According to one aspect of the invention, the inner diameter of the canal is between 2,5 mm to 3,5 mm, preferably 2,8 mm to 3,2 mm. In order to develop such teaching, it was required to perform a vast number of tests, since the diameter of the canal is drastically influencing the incineration process and the smoking experience of the user.

[0027] In the following paragraph an embodiment of the combustion chamber is presented, wherein such combustion chamber provides the most beneficial incineration of the tobacco or suitable substance in means of

constant incineration, heat dissipation and mass flow of intake air and flue gas. That means, the combustion process within the combustion chamber moves constantly from the intake towards the bottom of the combustion chamber, wherein an imaginary plane of the combustion front is substantially perpendicular to the longitudinal axis:

[0028] For obtaining such benefits, combustion section of the smoking device is designed such, that the inner diameter of the combustion chamber, being measured at an area of the intake is 16 mm to 13 mm, preferably 14 mm to 15 mm, most preferably 14,5 mm. Additionally or alternatively, a length of the combustion chamber - which is measured between the intake and the exhaust in longitudinal direction - is 13 mm to 27 mm, preferably 15 mm to 25 mm, most preferably circa 15 mm or 25 mm.

[0029] Additionally or alternatively, the first combustion thickness is less than 1,5 mm, preferably less than 1,25 mm, most preferably less than 1 mm.

[0030] Additionally or alternatively, the exhaust line has a length of 40 mm to 80 mm, preferably of 50 mm to 70 mm, most preferably 55 mm to 65 mm.

[0031] For improving manufacturing characteristics of the smoking device, the combustion section and the exhaust line are integrally formed as one piece from the same material. By this the entire smoking device can be manufactured in one substantial manufacturing step - neglecting smaller auxiliary steps, for example cleaning of the interims product; a further substantial assembly is not required.

[0032] Alternatively, the combustion section and the exhaust line can be formed as at least two separate components, for example a combustion head and an exhaust line stick. Both parts comprise a so-called connection arrangement, by which the combustion section and the exhaust line can be connected to each other and thus jointly forming the smoking device.

[0033] According to an aspect of said alternative embodiment, the combustion section and the exhaust line are designed such, that an outer shape of the connection arrangement has a continuous transition and/or a transition without steps.

[0034] For example, the connection arrangement is formed as a plug-in arrangement; the combustion section can be at least partially plugged into the exhaust line by a movement in longitudinal direction, or vice versa.

[0035] The two-part composition of the smoking device allows manufacturing of the combustion section from a different material then the exhaust line. For example, it might be beneficial to manufacture the combustion section, being subject to thermal stress, from a heat resistant material, in especially from a ceramic material, wherein the exhaust line can be manufactured from a different, for example less expensive material, a material having favorite haptic characteristics, for example wood, glass, etc.

[0036] According to another embodiment, the combustion section is designed such, that the combustion chamber forms an intake portion with a first inner surface adjoining the intake and an exhaust portion with a second inner surface leading to the exhaust opening. Additionally, the smoking device comprises restraining means for preventing particles, e.g. particles of the tobacco or incinerated particles thereof, to reach into the canal. The restraining means comprise an effective portion, which is - when being placed in the combustion chamber - at least partially located within the exhaust portion. The effective portion is the very part of the restraining means, which effectively withholds tobacco, suitable substances, and/or ash from getting into the exhaust line, and subsequently in the mouth of the consuming person. The effective portion of the restraining means has the functionality of a strainer or filter.

[0037] According to one embodiment of the restraining means, the effective portion has a roundish shape, wherein an effective diameter of the effective portion and an inner diameter of the exhaust portion are determined such, that the restraining means, when mounted within the combustion chamber, are circumferentially supported by the second inner surface providing a venting gap in longitudinal direction between the effective portion and the exhaust opening.

[0038] The combination of the smoking device as described and the restraining means, in especially wherein the restraining means are located in the combustion chamber with the venting gap, provides for the first time a smoking device to consumers, wherein the device is usable multiple times, it can be easily charged with tobacco, ashes can be discharged quickly and the smoking experience - based on a very beneficial aerodynamic behavior- is smooth, non-hitting and non-throat-aching.

[0039] During multiple tests it was found out that the best smoking experience is provided, if the venting gap is between 0,5 mm to 3 mm, preferably 1 mm to 2 mm, most preferably 1,5 mm.

[0040] According to another, alternative or additional aspect, the intake portion has at least partially a truncated cone shape, which merges into the exhaust portion, wherein in a longitudinal sectional view the first inner surface is at least partially inclined with respect to the longitudinal axis about an angle alpha such, that an inner diameter of the combustion chamber decreases in a longitudinal direction from the intake towards the exhaust portion.

[0041] Optionally, the exhaust portion has at least partially a, preferably roundish, half-cup shape and leads from the intake portion to the exhaust opening.

[0042] Furthermore, the second inner surface in a longitudinal sectional view can at least be partially inclined with respect to the longitudinal axis about an angle beta, wherein angle beta is larger than angle alpha.

[0043] According to an additional or alternative aspect, the second inner surface in a longitudinal sectional view has at least partially one radius and/or a parabolic and/or hyperbolic shape.

[0044] Optionally, the combustion chamber is de-

signed such, that the second inner surface in an area of the exhaust opening in longitudinal sectional view is at least partially inclined with respect to the longitudinal axis about an angle beta of 20° to 60°, preferably 30° to 50° mm, most preferably 35° to 45° degrees.

[0045] These mentioned geometrical features of the combustion chamber contribute - solely or in combination - to improve manufacturing and structural load characteristics of the smoking device.

[0046] For solving the second aspect of the problem of the invention, restraining means for a smoking device are disclosed, wherein such restraining means are adapted to be used in a smoking device as described above and wherein the restraining means comprise an effective portion which has a roundish shape with an effective diameter.

[0047] According to one embodiment of the restraining means, the restraining means comprise a holder which is attached to the effective portion. When the restraining means are mounted within the combustion chamber, the holder extends at least partially in longitudinal direction through the combustion chamber and protrudes the intake.

[0048] Furthermore, the holder comprises a hook portion, which interacts with the combustion wall for fixing a position of the restraining means with respect to the combustion section. This enables the consumer to easily remove the restraining means from the combustion chamber of the smoking device and thereby facilitating the cleaning or exchange of the restraining means.

[0049] According to another aspect, the effective portion of the restraining means is formed from a wire, which is rolled up in a spiral-coil-formed shape. By this, the effective portion is flexible in a radial direction. Thereby a quick and firm mounting procedure of the restraining means is obtained. Additionally, the manufacturing process of the restraining means is simplified.

[0050] According to one option, the wire of the restraining means is made from steel, in particular from steel wire. Such a steel can have a thickness of at least 0,5 mm to 1 mm, preferably 0,7 mm to 0,9 mm, most preferably 0,8 mm.

[0051] Optionally, the effective portion of the restraining means is manufactured such, that the single windings of the effective portion are mainly spaced with respect to each other by a gap of at least 0,05 mm to 0,5 mm, preferably 0,1 mm to 0,3 mm, most preferably 0,15 mm. By this it is ensured that most particles are prevented from getting into the canal, while a sufficient airflow through the smoking device is provided.

[0052] The embodiments as described above can be combined with each other in a meaningful manner. Hence, the invention is not necessarily limited to embodiments shown above and in the following.

Description of figures

[0053] The attached figures display various embodiments and thereby serve in conjunction with the description for explaining the principles of the invention. Single features depicted in the figures are shown relatively with regard to each other and therefore are not necessarily to scale.

[0054] Similar or same elements in the figures, even if displayed in different embodiments, are represented with the same reference numbers.

Fig. 1 depicts a first embodiment of the smoking device in an overview;

fig. 2 shows a detailed view on the combustion section and the inlet portion of the smoking device according to fig. 1;

fig. 3 is a detailed view on the combustion section of a second embodiment of the smoking device;

fig. 4 is a detailed view on of the combustion section of a third embodiment of the smoking device;

fig. 5 shows a fourth embodiment of the smoking device; and

fig. 6 shows a sixth embodiment of the smoking device.

Embodiments

[0055] With the help of fig. 1 a first embodiment of the smoking device 1 is presented. Overall, the structure of the smoking device 1 is designed rotationally symmetrical with a longitudinal axis 8 and comprises a combustion section 10 and an exhaust line 20.

[0056] In the following, any given information with regard to location or spatial arrangements is referenced to the longitudinal axis 8, for example, a longitudinal direction 5 is substantially parallel to the longitudinal axis 8 and a radial direction is substantially perpendicular to the longitudinal axis 8. Additionally, any terms like "upside/downside", "upper/lower" shall be understood in accordance to the position of the smoking device 1 in the figures.

[0057] The combustion section 10 and the exhaust line 20 are connected with each other and integrally formed as one piece from the same ceramic material.

[0058] The combustion section 10 houses the combustion chamber 11, which is adapted for receiving tobacco 2. Said combustion chamber 11 is at least partially formed by a combustion wall 12, which is a structural component of the combustion section 10 and is surrounding the combustion chamber 11.

[0059] A bottom area of the combustion section 10 is connected with an inlet portion 21 of the exhaust line 20, wherein the exhaust line 20 further comprises a tube wall 22 forming a canal 24 and an outlet portion 23 having an inhalation opening 25. Hence, an intake 14 of the com-

bustion chamber 11 is aerodynamically connected with the inhalation opening 25 of the outlet portion 23 of the exhaust line 20.

[0060] Furthermore - as also shown in fig. 2 -, restraining means 30 are placed within the combustion section 10, wherein the restraining means 30 comprise an effective portion 31, a holder 32 and a hook portion 33. When placed in the combustion chamber 11, the restraining means 30 is supported by an inner surface 18 of the combustion chamber 11 such, that a venting gap v is formed between an exhaust opening 19 of the combustion chamber 11 and the effective portion 31. Meanwhile, the holder 32 extends through the combustion chamber 11, and is protruding the intake 14 of the combustion section 10 with the hook portion 33. The hook portion 33 provides additional fixing of the restraining means 30 to the combustion section 10.

[0061] The restraining means 30 are made from a steel wire having a thickness s, wherein the effective portion 31 is formed by coiling the steel wire in form of a spiral. The manufacturing of the restraining means 30 is configured such, that a gap g is formed between the single windings of the coil of the effective portion 31, wherein the gap g has a size of at least 0,05 mm to 0,5 mm, preferably 0,1 mm to 0,3 mm, most preferably 0,15 mm.

[0062] According to the embodiment, a preferred thickness s of the wire of the restraining means 30 can have a thickness of at least 0,5 mm to 1 mm, preferably 0,7 mm to 0,9 mm, most preferably 0,8 mm.

[0063] When tobacco 2 - as shown in fig. 1 - is placed and incinerated in the combustion chamber 11, while air is sucked through the smoking device 1, intake air 4 gets into the combustion chamber 11 and supports the combustion of tobacco 2. The combustion process generates flue gas 3, which reaches from the combustion chamber 11 into the canal 22 passing the inlet portion 21 of the exhaust line 20. Eventually, the flue gas 3 exits the smoking device 1 through the inhalation opening 25 of the outlet portion 23. With the help of the restraining means 30 it is prevented, that particles of the tobacco 2 or ash of the combustion reaches into the canal 24.

[0064] With the help of fig. 2 the following design details of the combustion section 10 are explained: according to the first embodiment, the combustion chamber 11 can be structured in an intake portion 15 and an exhaust portion 16, wherein both portions jointly form the combustion chamber 11. The intake portion 15 comprises the intake 14 and a first inner surface 17 of the combustion wall 12, and the exhaust portion 16 has the second inner surface 18 and is connected to the exhaust opening 19. The first inner surface 17 and the second inner surface 18 jointly form the inner combustion surface of the combustion section 10.

[0065] The intake portion 15 has mainly a truncated cone shape, wherein the neighbouring exhaust portion 16 has at least partially a, preferably roundish, half-cup shape and leads from the intake portion 15 to the exhaust opening 19. In a longitudinal sectional view, the second surface 18 is designed with two different radii R1 and R2. Preferably, the second radius R2 is smaller than the first radius R1.

[0066] Alternatively, the embodiment of the combustion chamber 11 can be described as well with the help of a general inclination angle of the first inner surface 17 and the second inner surface 18. Fig. 2 shows - in a longitudinal sectional view - that the second inner surface 18 is inclined with regard to the longitudinal axis 8 by an angle β, wherein the first inner surface 17 is inclined by an angle α. The present form of the embodiment of the smoking device 1 according to fig. 1 and fig. 2 is represented by the fact, that angle β is larger than angle α.

[0067] An inner diameter D16 of the exhaust portion 16 is smaller than an inner diameter D11 in an area of the intake 14.

[0068] The shape of the exhaust portion 16 is carefully determined according to an effective diameter D31, and vice versa, such, that a position of the effective portion 31 of the restraining means 30 in longitudinal direction 5 enables the existence of the venting gap v. Preferably, the venting gap is between 0,5 mm to 3 mm, preferably 1 mm to 2 mm, most preferably 1,5 mm.

[0069] The combustion section 10 is connected to the inlet portion 21 of the exhaust line 20, wherein a thickness d12 of the combustion wall 12 in an area of the exhaust portion 16 is larger than a thickness d11 of the combustion wall 12 in an area of the intake portion 15. Hence, the thickness of the combustion wall 12 is increasing from the intake 14 towards the exhaust opening 19.

[0070] A thickness d21 of the tube wall 12 in an area of the intake portion 21 is larger than thickness 12 of the combustion wall 12 of the exhaust portion 16. This design of the combustion wall 12 and/or of the tube wall 22 means a thickening of the combustion 12 towards the inlet portion 21. The thickened combustion wall 12 and/or tube wall 22 is functioning as a heat barrier for thermal energy generated by the combustion of tobacco 2. Thus, heat entering the combustion wall 12 is more likely to radiate into the ambient of the combustion section 10 passing the outer surface of the combustion section 10, than to be conducted through the combustion wall 12 into tube wall 22.

[0071] The various thicknesses d11, d12, d21, d22, of the combustion wall 12 or of the tube wall 22 and the outer diameters D10 of the combustion section 10 and the diameter D20 of the exhaust line 20 are carefully chosen such, that the outer surface 6 of the smoking device 1 is continuous and does not comprise any steps or further irregularity. Furthermore, the outer surface and the outer shape of the smoking device 1 have a slight concave form.

[0072] With the help of fig. 3 and fig. 4 alternative embodiments with regard to the shape of the combustion chamber 11 of the smoking device 1 are disclosed. Design details of these embodiments which are mainly the same as in the embodiments according to fig. 1 and fig. 2 will not be repeated, but only differing functional and/or

design features referring to the embodiment according to fig. 1 and fig. 2 are going to be outlined:

[0073] The combustion chamber 11 of the second embodiment of the smoking device 1 shown in fig. 3 has a slim structure wherein the second inner surface 18 of the exhaust portion 16 has, in longitudinal sectional view, only one radius R1, wherein the first inner surface 17 of the intake portion 15 comes with a truncated coned shape.

[0074] The dashed lines in fig. 3 present an alternative embodiment, wherein the first inner surface 17 and the second inner surface 18 are - in longitudinal sectional view - straight.

[0075] In contrast to the second embodiment according to fig. 3, the third embodiment according to fig. 4 has a rather small combustion chamber 11, wherein the radius R1 of the second surface 18 is smaller than the radius R1 in the embodiment according to fig. 3.

[0076] Alternatively - as shown with the dashed lines -, the entire radial inner surface of the combustion wall 12 is straight and comprises no radius or curve, but a flat bottom section.

[0077] A fourth and a fifth embodiment of the smoking device 1 are shown in fig. 5 and fig. 6, wherein both represent a two-parted version of the smoking device 1. The combustion section 10 is a sole component which can be connected via a connection arrangement 7 to the exhaust line 20. According to both embodiments, the combustion section 10 - also referred to as the combustion head - can be inserted with the help of a movement in longitudinal direction into the exhaust line 20.

[0078] According to the fourth embodiment shown in fig. 5, the connection arrangement 7 is designed such, that no steps or irregularity of the outer surface 6 are present; the outer surface 6 is smooth and comprises a slight concave form.

[0079] The present invention is not limited to the above-described embodiments and modifications and may be embodied in various forms within the gist thereof. For example, the technical features of the embodiments and modifications corresponding to the technical features according to the aspects described in the Summary of the Invention section may be replaced or combined as appropriate to solve some or all of the above-described problems or obtain some or all of the above-described effects. The technical features may also be omitted as appropriate unless they are described as being essential in this specification.

References:

[0080]

1 smoking device
2 tobacco
3 flue gas
4 intake air
5 longitudinal direction
6 outer surface
7 connection arrangement
8 longitudinal axis
10 combustion section
11 combustion chamber
12 combustion wall
14 intake
15 intake portion
16 exhaust portion
17 first inner surface
18 second inner surface
19 exhaust opening
20 exhaust line
21 inlet portion
22 tube wall
23 outlet portion
24 canal
25 inhalation opening
30 restraining means
31 effective portion
32 holder
33 hook portion

L11 length combustion chamber
L20 length tube
D10 outer diameter combustion section
D11 diameter combustion chamber
D16 diameter exhaust portion
D20 outer diameter tube
D24 diameter
D31 effective diameter
d11 first combustion thickness
d12 second combustion thickness
d21 first tube thickness
d22 second tube thickness

v vent gap
s thickness of wire
g gap between windings
R1 radius
R2 radius

α angle
β angle

Claims

1. Smoking device (1) comprising

- a combustion section (10) having
  - a combustion chamber (11) for incinerating a suitable substance, e.g. tobacco (2), with a substantially rotational body,
  - a combustion wall (12) surrounding the combustion chamber (11),
  - an intake (14) for charging the combus-

tion chamber (11) with the substance and/or intake air (4), and
- not more than one single exhaust opening (19) for discharging flue gas (3), and

- an exhaust line (20) having

  - an inlet portion (21) adjoining an area of the exhaust opening (19) of the combustion section (10) and
  - an outlet portion (23) comprising an inhalation opening (25) for facilitating the inhalation of the flue gas (3),
  - wherein the exhaust line (20) forms a canal (24) surrounded by a tube wall (22) connecting the exhaust opening (19) with the inhalation opening (25).

- wherein the intake (14), combustion chamber (11), the exhaust opening (19), canal (24) and inhalation opening (25), and more particularly the combustion wall (12) and tube wall (22), are aligned with respect to one longitudinal axis (8), and
- wherein the combustion section (10) or combustion section (10) and the exhaust line (20) is/are substantially made from a ceramic material, more particularly from technical ceramics, porcelain, porcelain containing kaolin, earthenware or stoneware.

2. Smoking device (1) according to claim 1, wherein a first combustion thickness (d11) of the combustion wall (12) is smaller than a first tube thickness (d21) of the tube wall (22) being measured in the inlet portion (21).

3. Smoking device (1) according to claim 1 or 2, wherein the first combustion thickness (d11) measured in an area of the intake (14) is smaller than a second combustion thickness (d12) of the combustion wall (12) measured in an area of the exhaust opening (19).

4. Smoking device (1) according to claim 2 or 3, wherein the first tube thickness (d21) is larger than a second tube thickness (d22) of the tube wall (22) measured in the outlet portion (23).

5. Smoking device (1) according to one of the claims 2 to 4, wherein an inner diameter (D11) and the body of the combustion chamber (11), a diameter (D24) of the canal (24), the thicknesses (d11, d12, d21, d22) are determined such, that the smoking device (1) has at least partially a conical outer shape with a substantially continuous outer surface (6), more particularly, wherein the outer surface (6) does not comprise, in a longitudinal sectional view, a step or any relevant irregularity, and a maximum outer diameter (D10) of combustion section (10) is larger than a maximum outer diameter (D20) of the exhaust line (20).

6. Smoking device (1) according to one of the preceding claims, wherein a diameter (D24) of the canal (24) is between 2,5 mm to 3,5 mm, preferably 2,8 mm to 3,2 mm.

7. Smoking device (1) according to one of the preceding claims, wherein

- the inner diameter (D11) of the combustion chamber (11) measured at the intake (14) is 16 mm to 13 mm, preferably 14 mm to 15 mm, most preferably 14,5 mm,
- a length (L11) of the combustion chamber (11) measured from the intake (14) to the exhaust (19) in longitudinal direction (5) is 13 mm to 27 mm, preferably 15 mm to 25 mm, most preferably circa 15 mm or 25 mm,
- the first combustion thickness (d11) is less than 1,5 mm, preferably 1,25 mm, most preferably less than 1 mm, and/or wherein
- the exhaust line (20) has a length (L20) of 40 mm to 80 mm, preferably of 50 mm to 70 mm, most preferably 55 mm to 65 mm.

8. Smoking device (1) according to one of the preceding claims, wherein the combustion section (10) and the exhaust line (20) are integrally formed as one piece from the same material.

9. Smoking device (1) according to one of the preceding claims, wherein the combustion section (10) and the exhaust line (20) are formed as separate components, which can be assembled with a connection arrangement (7), and by this jointly forming the smoking device (1),

- more particularly wherein the combustion section (10) and the exhaust line (20) are designed such, that an outer shape of the connection arrangement (7) has a continuous transition and/or a transition without steps, and/or
- more particularly wherein the connection arrangement (7) is formed as a plug-in arrangement, wherein the combustion section (10) can be at least partially plugged into the exhaust line (20) by a movement in longitudinal direction (5), or vice versa.

10. Smoking device (1) according to one of the preceding claims, wherein the combustion chamber (11) forms an intake portion (15) with a first inner surface (17) adjoining the intake (14) and an exhaust portion (16) with a second inner surface (18) leading to the exhaust opening (19), the smoking device (1) com-

prising restraining means (30) with an effective portion (31), which is at least partially located within the exhaust portion (16) for preventing particles, i.e. of the substance or incinerated particles thereof, to reach into the canal (24).

11. Smoking device (1) according to claim 10, wherein the effective portion (31) has a roundish shape, wherein an effective diameter (D31) of the effective portion (31) and an inner diameter (D16) of the exhaust portion (16) are determined such, that the restraining means (30), when mounted within the combustion chamber (11), are circumferentially supported by the second inner surface (18) providing a venting gap (v) in longitudinal direction (5) between the effective portion (31) and the exhaust opening (19) of 0,5 mm to 3 mm, preferably 1 mm to 2 mm, most preferably 1,5 mm.

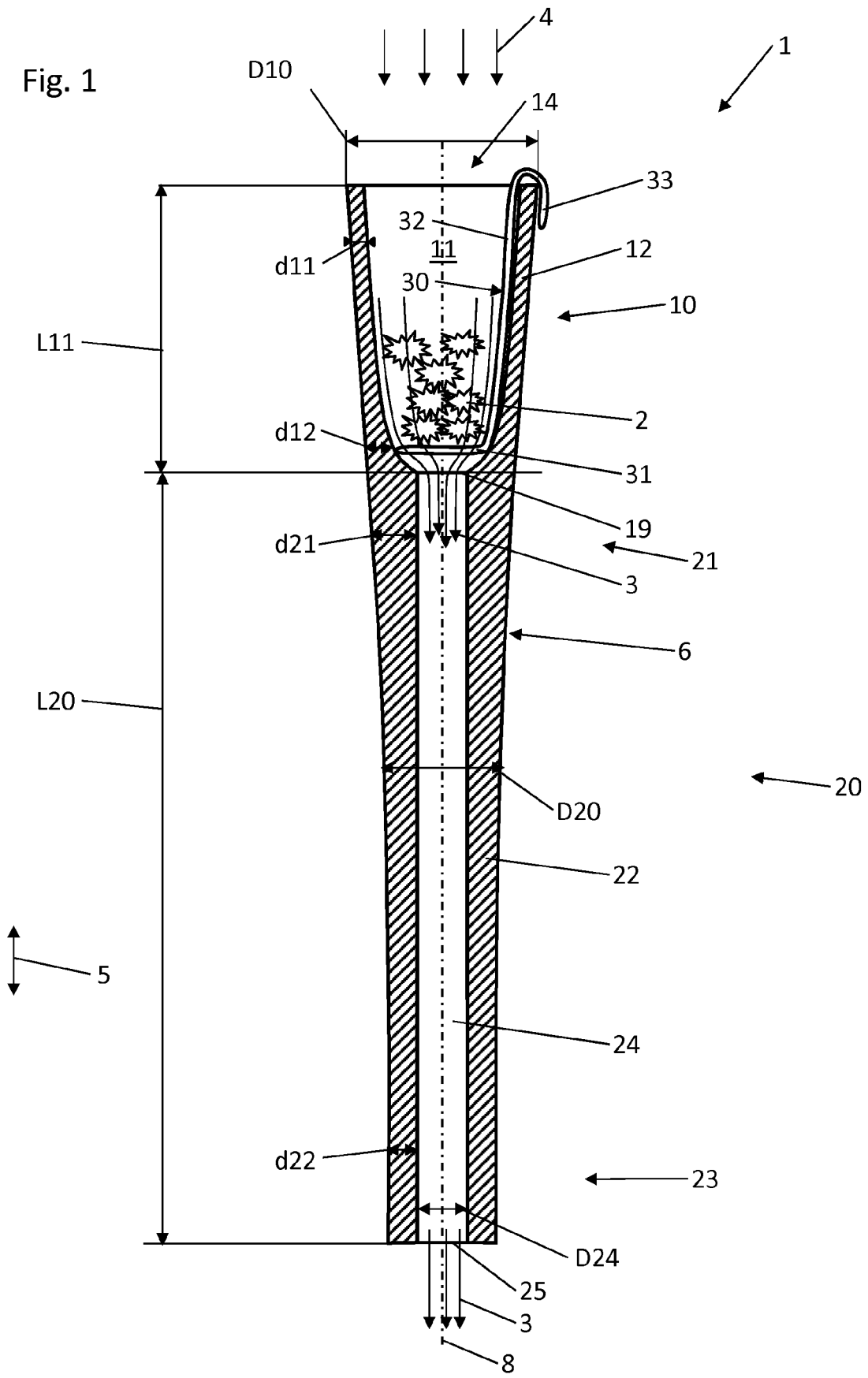
12. Restraining means (30) for a smoking device (1) according to claim 10 or 11 comprising an effective portion (31) having a roundish shape with an effective diameter (D31).

13. Restraining means (30) according to claim 12, comprising a holder (32) attached to the effective portion (31), wherein, when the restraining means (30) are mounted within the combustion chamber (11), the holder (32) extends at least partially in longitudinal direction (5) through the combustion chamber (11) and protrudes the intake (14), more particularly wherein the holder (32) comprises a hook portion (33) which interacts with the combustion wall (12) for fixing a position of the restraining means (30) with respect to the combustion section (10).

14. Restraining means (30) according to claim 12 or 13, wherein effective portion (31) is formed from a wire being rolled up in a spiral-coil-formed shape, more particularly wherein the wire is made from steel, and/or more particularly has a thickness (s) of at least 0,5 mm to 1 mm, preferably 0,7 mm to 0,9 mm, most preferably 0,8 mm.

15. Restraining means (30) according to claim 14, wherein the single windings of the effective portion (31) are spaced with respect to each other by a gap (g) of at least 0,05 mm to 0,5 mm, preferably 0,1 mm to 0,3 mm, most preferably 0,15 mm.

Fig. 1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D10
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D24
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Fig. 2

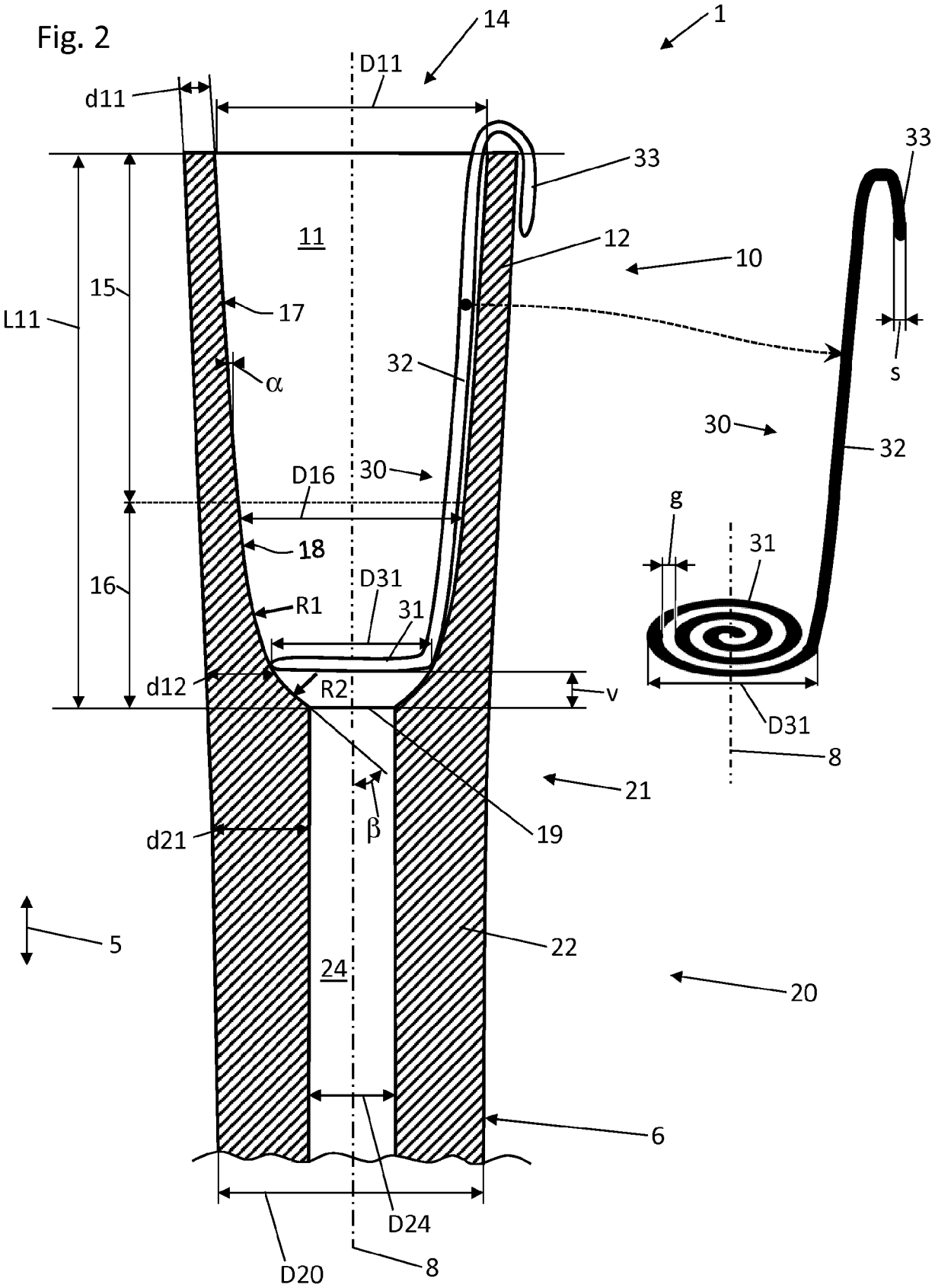
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Fig. 3

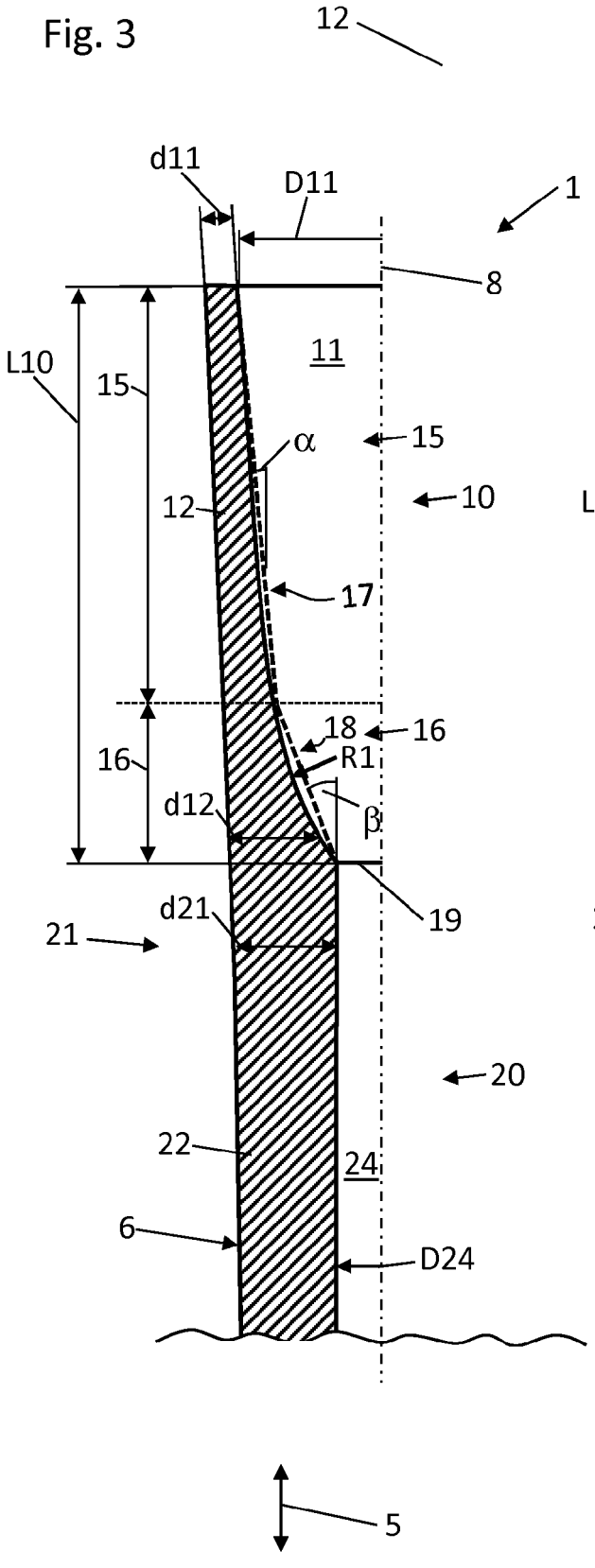
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Fig. 4

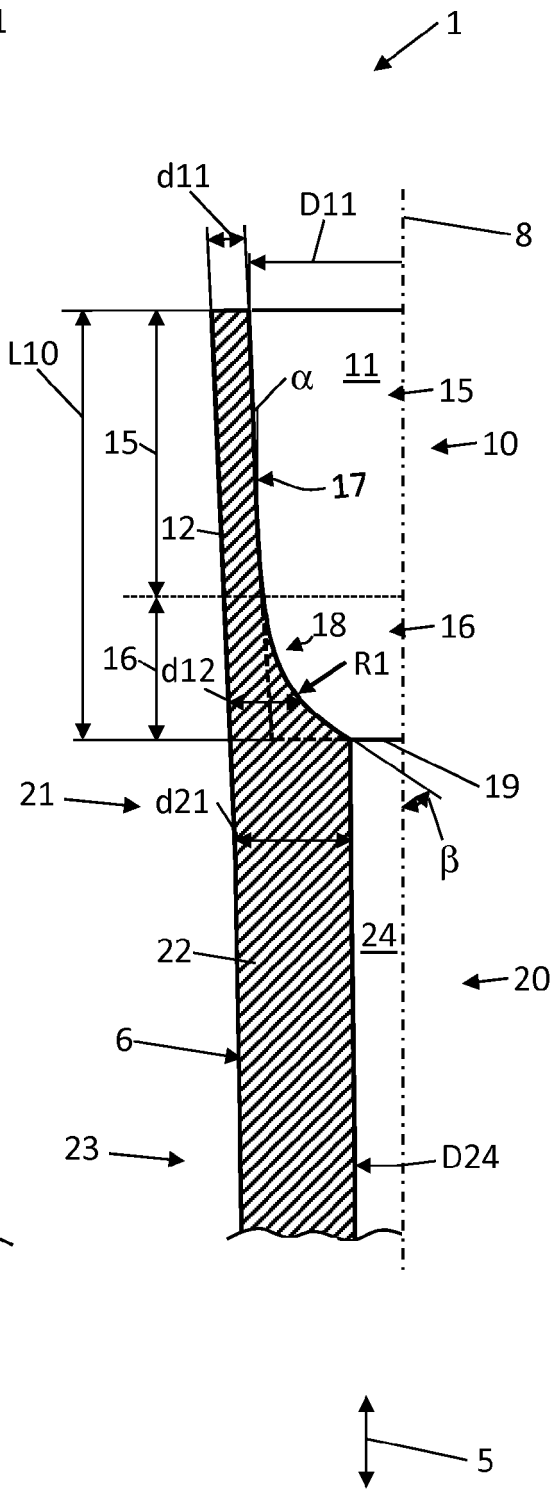
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Fig. 5

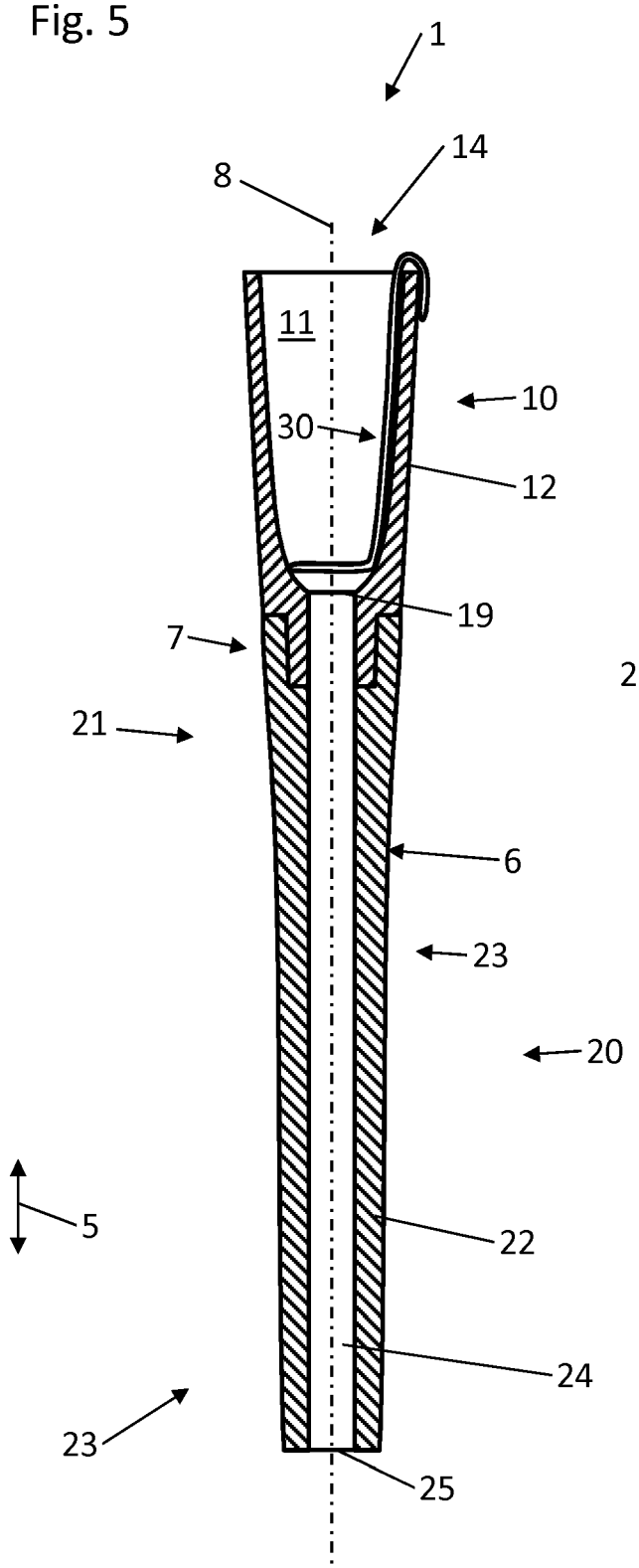
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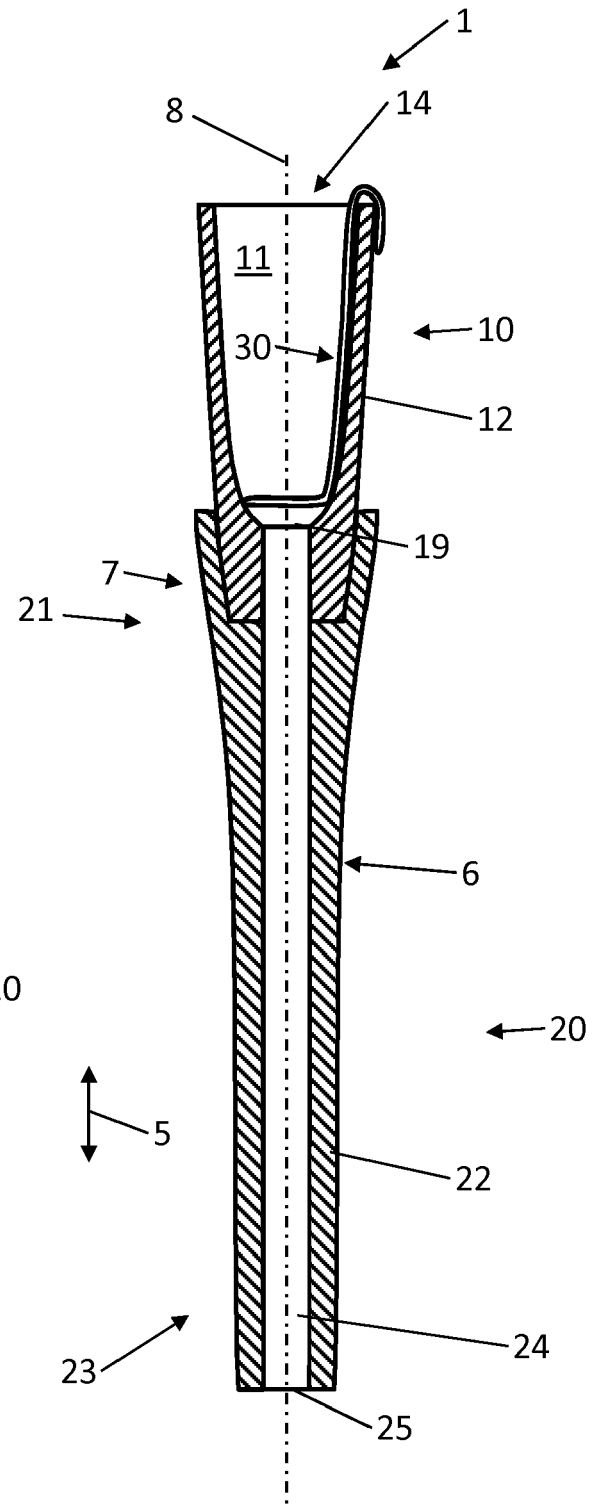
Fig. 6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PARTIAL EUROPEAN SEARCH REPORT

under Rule 62a and/or 63 of the European Patent Convention. This report shall be considered, for the purposes of subsequent proceedings, as the European search report

Application Number
EP 16 18 3602

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 2014/360513 A1 (MORGAN CHRISTOPHER D [US]) 11 December 2014 (2014-12-11) * paragraph [0028] - paragraph [0066] *	1,2,4-8 10,11	INV. A24F1/00 A24F1/28 A24F1/32
X	US 732 252 A (ASSMAN WILLIAM [US]) 30 June 1903 (1903-06-30) * page 1, line 23 - page 2, line 81 *	1-5,8-10	ADD. A24F1/30 A24F5/08
X Y	US 175 877 A (CHARLES ROSS, JR.) 11 April 1876 (1876-04-11) * the whole document *	1,2,5,8 10,11	
X	US 2009/235939 A1 (GONSALVES MARTIN T [US]) 24 September 2009 (2009-09-24) * paragraph [0022] - paragraph [0048] *	1,2,5, 8-11	
Y	US 2 052 237 A (MCALLASTER GEORGE R) 25 August 1936 (1936-08-25) * page 1, line 38 - page 2, line 34 *	10,11	

TECHNICAL FIELDS SEARCHED (IPC)

A24F

INCOMPLETE SEARCH

The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.

Claims searched completely :

Claims searched incompletely :

Claims not searched :

Reason for the limitation of the search:

see sheet C

Place of search	Date of completion of the search	Examiner
Munich	30 May 2017	Koob, Michael

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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INCOMPLETE SEARCH
SHEET C

Application Number
EP 16 18 3602

Claim(s) completely searchable:
1-11

Claim(s) not searched:
12-15

Reason for the limitation of the search:

In reply to the invitation to indicate the claims on which the search is to be based, the applicant failed to supply the requested indication in due time. Thus, the search report has been drawn up on the basis of the first independent claim of each category (Rule 62a(1) EPC): claims 1-11. The applicant's attention is drawn to the fact that the application will be further prosecuted on the basis of subject-matter for which a search has been carried out and that the claims should be limited to that subject-matter at a later stage of the proceedings (Rule 62a(2) EPC).

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 18 3602

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30-05-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 732252 A	30-06-1903	NONE	
US 175877 A	11-04-1876	NONE	
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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