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(54) **HEAT NOT BURN DEVICE FOR GRINDING AND VAPORIZING A SMOKABLE SUBSTANCE**

(57) Electronic smoking device (1) comprising at least one input (2) for a smokable substance (3), a mouth piece (4) and a heating section (5) being arranged in between the input (2) and the mouth piece (4), wherein the device (1) also comprises a substance transport path (S) from the input (2) to the heating section (5), and a fluid flow path (F) from the heating section (5) to the mouth piece (4).

According to the invention the electronic smoking device (1) comprises a grinder (6), which is also arranged in the substance transport path (S) between the input (2) and the heating section (5), wherein a smokable substance (3) inserted into the device (1) is crushed by the grinder (6) into pieces, to be releasable into the heating section (5).

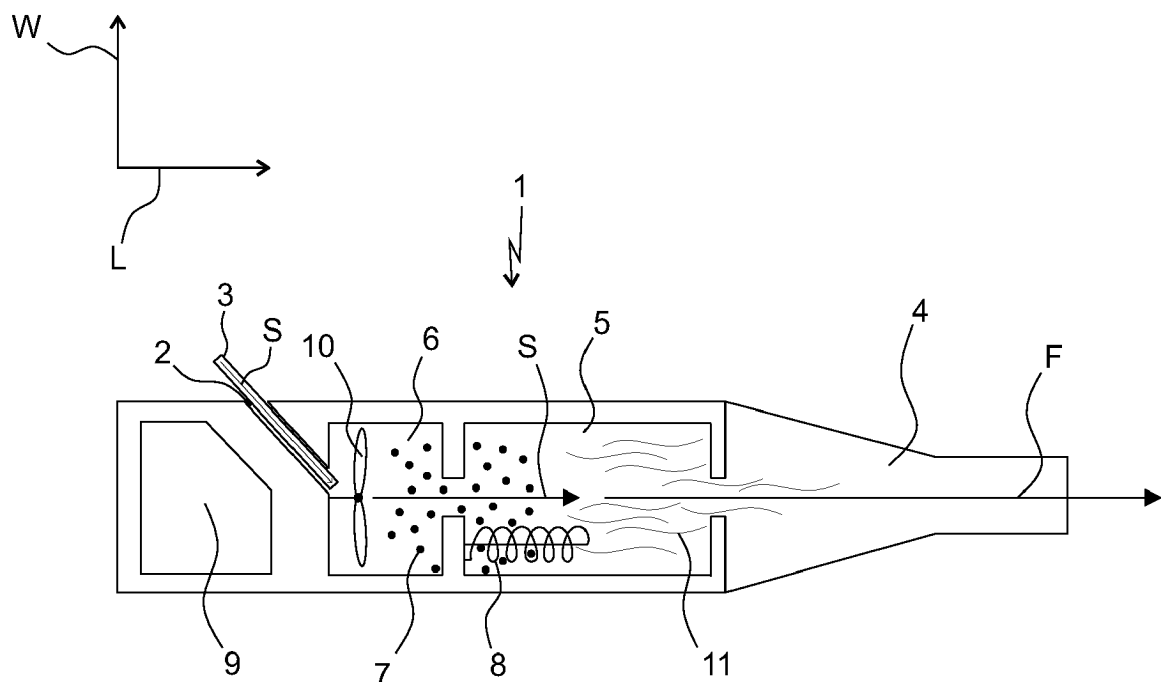


Fig. 1

Description

[0001] Electronic smoking device comprising at least one input for a smokable substance, a mouth piece and a heating section being arranged in between the input and the mouth piece, wherein the device also comprises a substance transport path from the input to the heating section, and a fluid flow path from the heating section to the mouth piece.

[0002] Electronic smoking devices for heating smoking articles and thereby producing an inhalable vapour for a consumer are known from the state of the art. Mostly such electronic smoking devices comprise a cavity in which a rod formed smoking article in form of a cigarette can be inserted. Usually the electronic smoking device further comprises a heating mechanism by which at least a part of the inserted smoking article is heated. A smokable substance inside the smoking article, which usually is tobacco or a derivative thereof, also gets heated and releases inhalable vapour for a consumer.

[0003] However, due to the smoking article only being partially inserted inside the heating cavity of the electronic smoking device, a temperature gradient from the heated part inside the cavity towards the part of the smoking article outside the device occurs. Also the heat distribution inside the smokable substance is usually not homogeneous, since the heat is applied to the smoking article via certain contact points between it and the heating mechanism of the smoking device. Therefore the smokable substance might not be heated sufficiently and thus the full vapour generating potential of the smoking article is not used.

[0004] Additionally the taste of the inhalable vapour changes with the progression of smoking a smoking article, since the vapour intensity decreases and smokable substance arranged at the contact points to the heating mechanism might get overheated and therefore create roasted or burnt flavours.

[0005] To minimize the waste of smokable substance and also to flatten flavour variation during the smoking process it would be advantageous if the smokable substance would be heated homogeneously and therefore heat gradients in the smoking article would be minimized.

[0006] Therefore the object of the invention is to provide an electronic smoking device which provides a constant smoke taste experience for a consumer, as well as an effective and full combustion of smokable substance inside a smoking article to minimize waste. This objective is achieved by an electronic smoking device according to claim 1, as well as a method according to claim 15.

[0007] According to the invention the electronic smoking device comprises a grinder, which is also arranged in the substance transport path between the input and the heating section, wherein a smokable substance inserted into the device is crushed by the grinder into pieces, to be releasable into the heating section.

[0008] The grinder could be a mechanism which minimizes the particle size. Therefore the particle size of the

smokable substance could vary during its movement along the substance transport path. It is conceivable that the particle size between the input of the smoking device and the grinding mechanism therefore bigger than the particle size between the grinder and the heating section of the smoking device.

[0009] The grinder preferably minimizes the particle size of the smokable substance inserted into the input of the device to a particle size which is combustible in the heating section. It is thus conceivable that the initial size of the smokable substance particles is too large to fit inside the heating section of the smoking device. Preferably the ungrounded form of the smokable substance fits into the heating section, but is too large to fit through the substance transport path between the grinding mechanism and the heating section.

[0010] The smokable substance therefore preferably comprises a solid character. Preferably the smokable substance comprises the form of a filament which is introduced into the device the smokable substance could also comprise the shape of dried tobacco pieces in natural and/or compressed form. The smokable substance might also comprise the shape of chunks, and preferably elongated pieces and/or rods.

[0011] It is conceivable that the maximum transportable particle size through the substance transport path is larger in between the input of the smoking device and the grinding mechanism, than in between the grinder and the heating section. Thus only ground smokable substance is able to pass through the substance transport path into the heating section of the device.

[0012] It is conceivable that due to the grinding of the smokable substance it comprises a powdery form and thus can be homogeneously distributed inside the heating section. Further, the smokable substance is not bound in a predetermined form, as it would occur in a conventional cigarette, but it can freely move inside the heating section. The free movement of smokable substance inside the heating section could result in a better heat distribution through the smokable substance, since the particles being in contact with the heating mechanism change upon their movement inside the heating section.

[0013] Additionally small particles faster comprise a homogeneous temperature distribution inside, whereas larger chunks might comprise temperature gradients inside which lead to insufficient and uneven combustion.

[0014] It is conceivable that not all of the smokable substance is combusted at once, but that it is gradually fed through the grinder into the heating section. The amount of feed can preferably be adjusted by a consumer, whereby a higher feed rate preferably corresponds to a stronger inhalable smoke.

[0015] Compared to conventional cigarettes, not all of the smokable substance is burned at once, but rather a portion of the smokable substance is fed into the heating section with a continuous supply, preferably resulting in a more even and controlled combustion.

[0016] The grinding and heating mechanism, are pref-

erably arranged in different chambers. The smoking device therefore preferably comprises a first chamber with the grinding mechanism and a second chamber with the heating mechanism. A design of the smoking device with two chambers is particularly advantageous, as no unground chunks of the smokable substance can get into the heating section and thus the combustion of the smokable substance takes place according to the previously mentioned advantages.

[0017] Another advantage of the heating and grinding mechanism being arranged in two different chamber is, that no substitutes and/or ash from the smokable substance sticks to grinding mechanism, which in result minimizes maintenance need and/or complexity of the device. In a preferred embodiment the substance transport path and fluid flow path are connected to each other, thereby creating a continuous flow path from the input to the mouth piece.

[0018] In a preferred embodiment the connection point of the substance transport path and fluid flow path is arranged in the heating section. Preferably each particle functions as a connection point, due to its releasing of inhalable smoke upon heating.

[0019] It is conceivable that the substance transport path and the fluid flow path are connected to each other in the heating section. It is conceivable that the smokable substance releases inhalable smoke for a consumer while being heated inside the heating section. Therefore the substance transport path transmits to the fluid flow path during the heating of the smokable substance.

[0020] The fluid flow path is connected to the heating section in a manner that only the inhalable smoke can exit the heating section through it. Thereby the smokable substance, as well as residues and/or other particles are separated from the smoke. The separation of the inhalable smoke and the smokable substance is preferably realised by a filter element, which is preferably arranged in the heating section prior to the entry into the fluid flow path.

[0021] A suitable filter element could be a sieve, a porous material (ceramic or similar), a sponge, and/or holes in the heating section, which have a diameter smaller than the particle sizes of the smokable material.

[0022] It is conceivable that the substance transport path at least partially comprises a hole and/or pipe through which the substance is transported. It is conceivable that the chamber comprising the grinding mechanism and the chamber with the heating mechanism are arranged next to each other, wherein a substance transport path between them is preferably arranged as a connecting through hole. Thus the substance transport path might comprise different shapes along its path.

[0023] It is conceivable that the substance transport path is suited to transport a substance from the input of the electronic smoking device to the heating section, wherein the fluid transport path is preferably suited to guide an inhalable smoke from the heating section to the mouth piece of the smoking device.

[0024] The fluid flow path preferably comprises the shape of a pipe and/or tube to guide inhalable smoke from the heating section to the mouth piece. A consumer could than suck at the mouthpiece to inhale the inhalable smoke produced in the heating section. Thus the fluid flow path is preferably resistant against negative pressure, which is applied by the sucking of the consumer.

[0025] In a preferred embodiment the chamber with the grinding mechanism is closed with a closure, which therefore closes the part of the substance transport path between the input and the grinding mechanism. This closure could be openable or closable by a consumer, wherein a consumer would preferably open the closure to put smokable substance directly into the grinding mechanism and afterwards close the closure again. In this way, the chamber of the grinding mechanism preferably functions as a storage container, which is connected to the heating section via the substance transport path, whereby a consumer preferably actuates the grinding mechanism for a supply of smokable substance into the heating section.

[0026] In a preferred embodiment the substance transport path comprises a transport mechanism to transport the smokable substance. It is conceivable that the transport mechanism is arranged at least on parts of the substance transport path. The transport mechanism could be a screw drive, a conveyor, a gear drive and/or other suitable drive to transport smokable substance along the substance transport path.

[0027] In a preferred embodiment the heating mechanism comprises a heating element which is arranged inside the heating section. Thus the heating element is preferably arranged in that it is in direct contact with the smokable substance inside the heating section. The heating element therefore preferably comprises the shape of a spool, heating blade or similar element, which preferably has a surface area to be in contact with as much of the smokable.

[0028] Preferably the heating element is arranged in that it surrounds the heating section wherein the chamber walls of the heating section in which the smokable substance is arranged are preferably made of a material with high thermal conductivity to transmit the heat generated from the heating element to the smokable substance inside the chamber. The heating element could therefore be arranged in a spiral manner around the chamber of the heating section. The walls of the chamber are preferably made from at least a metallic compound, a ceramic compound or a similar compound with the capability of transferring heat from the heating element to the smokable substance.

[0029] In a preferred embodiment the heating section comprises an ash tray in which combusted residues of smokable substance are arranged. The ash tray is preferably arranged in the heating section in that it collects the residues from combusted smokable substance. Thereby the ash tray preferably accepts the used smokable material which does not release inhalable smoke

upon heating of it.

[0030] It is conceivable that the ash tray can be accessed from the outside of the device to be emptyable. Ash can preferably be released from the heating section through a closure which can be opened from a consumer. By removing the closure, a consumer could also gain access for cleaning the heating section and preferably also for cleaning the heating element.

[0031] In a preferred embodiment the input and mouth piece, and thereby the substance transport path and fluid flow path are arranged in the same area and/or next to each other in the hull of the electronic smoking device. It is conceivable that the mouth piece thus comprises at least two holes, wherein in the first of holes the fluid flow path is arranged and in the second hole the substance transport path is arranged. Preferably the two holes are both arranged in the mouth piece of the smoking device, wherein a consumer could thereby feed smokable substance into the device while simultaneously sucking at the other hole to inhale the inhalable smoke.

[0032] It is also conceivable that the substance transport path and fluid flow path are arranged in the same hole in the hull, wherein in a respective embodiment a consumer would preferably put smokable material through the hole into the device and afterwards pull at the same hole with his mouth for inhaling the inhalable vapour.

[0033] In a preferred embodiment the input for the substance transport path and the output for the fluid flow path are arranged at opposite ends of the electronic smoking device, wherein the smokable substance is preferably inserted along the substance transport path at one end of the device and the inhalable smoke generated by heating the smokable substance is released from the device along the fluid flow path at an opposite end of the device.

[0034] In a preferred embodiment the grinder comprises at least one knife which chops the smokable substance into pieces. It is conceivable that the knife comprises at least one movable blade for chopping chunks of smokable substance into smaller pieces. It is conceivable that the grinding mechanism comprises a knife which is rotatably arranged, wherein the knife is preferably connected to a motor shaft and thus chops the smokable substance upon rotation of the motor.

[0035] It is conceivable that the shaft which is connected to the knife can also be moved by a manual force apply from a consumer. Therefore the electronic smoking device preferably comprises an interface by which a consumer can manually rotate the knife to chop the smokable substance.

[0036] It is also conceivable that the grinder functions similar to a pencil sharpener, wherein the smokable substance is preferably inserted into the smoking device in form of a longitudinal stab which is then preferably rotatable by a consumer inside the grinding mechanism to be divided in small particles.

[0037] In a preferred embodiment the grinder compris-

es a milling mechanism which grinds the substance into pieces. Preferably the milling mechanism comprises the form of a grinding mill, wherein the grinding mill preferably comprises at least von stationary part and at least one rotation part. The rotation part is preferably attaches to a motor and/or to a mechanical interface for being manually driven by a consumer. The smokable substance is preferably inserted in between the rotation and stationary part of the mill and thereby ground to particles of smokable substance.

[0038] In a preferred embodiment the pieces are smaller than 5mm, preferably smaller than 2mm, and most preferred smaller than 1mm. It is conceivable that the average size of the pieces is smaller than 1mm, for a better heat distribution inside the particles and thereby a more constant smoke generation.

[0039] In a preferred embodiment the smokable substance particles comprise a size of 0,5 mm to 5 mm.

[0040] In a preferred embodiment the input is configured to accept the smokable substance as a compressed tobacco product in one continuous part. It is conceivable that the smokable substance as one continuous part comprises the shape of a filament which is inserted into the smoking device and ground by the grinding mechanism to incontinuous parts of smokable substance.

[0041] It is also conceivable that the smokable substance comprises the form of a rod shaped piece which is inserted into along the substance transport path and ground to smaller pieces to be released into the heating section.

[0042] The smokable substance preferably contains nicotine, which is released into the inhalable smoke upon heating of the substance. The smokable substance preferably is made from dried and/or pressed natural tobacco. The smokable substance could also comprise additives such as binders, heat transmitters, taste enhancers and/or other typically used additives for smokable substance.

[0043] The smokable substance could also be made of at least one synthetically produces material which may also be enriched with nicotine. Synthetically produced tobacco products are particularly advantageous as they contain fewer harmful substances than conventional tobacco products and thus offer a less harmful smoking experience for a consumer.

[0044] In a preferred embodiment the electronic smoking device comprises a first transport mechanism to transport the smokable substance along the substance transport path from the input to the grinder.

[0045] In a preferred embodiment the electronic smoking device comprises a second transport mechanism to transport the smokable substance along the substance transport path from the grinder to the heating section.

[0046] It is conceivable that the first and/or the second transport mechanism can be a gear drive, a screw drive, a belt drive and/or similar drive to transport solid material in form of the smokable substance. The transport paths could also comprise a micro electric mechanical system

(MEMS) for transporting the smokable substance.

[0047] The first and second transport mechanisms preferably base on different technical principles. The first transport mechanism could especially be designed to transport large and rod formed pieces, wherein the second transport mechanism is preferably suited to transport particles and/or in generally incontinuous parts of smokable substance and/or powder. Therefore the first transport mechanism preferably comprises a gear wheel drive, wherein the second transport mechanism preferably comprises a screw drive.

[0048] It is also possible that the first and/or second transport mechanism could be based on a gravity transport of the substance, wherein the electronic smoking device therefore is particularly designed that the smokable substance is transported in it by gravitational force during usage.

[0049] In a preferred embodiment the heating section heats the pieces to form an inhalable smoke for a consumer. It is conceivable that the ground pieces of smokable substance are therefore at least partially in contact with the heating element of the heating section.

[0050] The inhalable smoke is released from moisture, oils and/or other additives inside the smokable substance, wherein preferably not all of the smokable substance is formed to inhalable smoke. It is conceivable that after a certain heating period the smokable substance does not release any more smoke and remains as residue (ash) inside the heating section, and preferably in an ash tray.

[0051] In a preferred embodiment the electronic smoking device further comprises a power supply unit, preferably in form of a battery. It is conceivable that the power supply unit allows a remote usage of the smoking device, wherein it preferably powers at least the heating mechanism. It is conceivable that the power supply also powers the transport mechanism, which is preferably driven with an electric motor.

[0052] In a preferred embodiment the electronic smoking device comprises a filter element, preferably arranged between the heating section and the mouth piece to filter smoke which flows along the fluid flow path. The filter element might be exchangeable in that it can be exchanged in between smoking sessions. A fresh filter before each smoking session might lead to a better taste experience for a consumer.

[0053] It is conceivable that the filter element is arranged inside the mouthpiece. The filter element could also be the interface between the smoking device and consumers' mouth and/or lips.

[0054] The filter element could be a HEPA filter, a micro pore filter, or a filter made from acetate. The filter could also comprise charcoal or other reacting and/or not reacting elements to improve the taste experience for a consumer.

[0055] In a preferred embodiment the filter element comprises a porous structure, wherein harmful constituents from smoke flowing through the filter element are

filtered out and thereby excluded from the smoke.

[0056] The objective of the invention is also reached by a method for vaporizing a smokable substance with an electronic smoking device according to the invention, wherein the method comprises the following steps:

first the smokable substance is inserted along the substance transport path (S) and through the input into the device;

then the smokable substance is crushed by the grinder into pieces;

afterwards the pieces are released from the grinder along the substance transport path into the heating section;

the pieces are heated in the heating section to release an inhalable smoke for a consumer which exits the device along the fluid flow path through the mouthpiece.

[0057] Further advantages and embodiments according to the invention are illustrated in the attached drawings.

[0058] Herein show:

Fig. 1 a first embodiment of an electronic smoking device in sectional cut view

Fig. 2 a second embodiment of an electronic smoking device in sectional cut view

[0059] Figure 1 and Figure 2 illustrate different embodiments of an electronic smoking device 1 according to the invention in a schematic and sectional cut view. The smoking device 1 extends in a longitudinal direction L and a width direction W, which are arranged perpendicular to each other. According to the longitudinal direction L the mouth piece 4 and the power supply unit 9 are arranged at opposite ends of the smoking device 1.

[0060] Figure 1 illustrates an embodiment of the smoking device 1 in which the input 2 for a smokable substance 3 is arranged at the opposite end of the device according to the mouthpiece 4. Thus the substance transport path S is arranged in that a substance 3 transported through the transport path S moves in the longitudinal direction L towards the mouthpiece 4. It is conceivable that a consumer therefore inserts the smokable substance 3 into the device 1 at least partially along the longitudinal direction L.

[0061] The smokable substance 3 is insertable into the device 1 through the input, wherein the substance 3 thus gets contact with the grinder 6 which crushes one chunk of the substance 3 into multiple smaller particles 7.

[0062] The grinder 6 preferably comprises a chamber in which it is arranged, as well as the grinding mechanism itself, which in case of the embodiment illustrated in figure

1 and figure 2 comprises rotating knives 10 to chop the tobacco into small pieces and/or particles 7.

[0063] In figure 1 the substance transport path S of the chopped pieces 7 of smoking material 3 exceeds from the grinder 6 further along the longitudinal direction L and thus towards the mouthpiece 4. Substance particles 7 transported along the flow path S get into the heating section 5 which comprises a heating element 8, illustrated as a heating coil.

[0064] Particles 7 in the heating section 5 preferably get in contact with the heating element 8 and thus get heated to a temperature at which they start to release inhalable smoke 11. The smoke 11 then moves along the fluid flow path F towards the mouth piece 4 of the device 1. The heating element therefore is preferably arranged in between the substance transport path S and the fluid flow path F to connect them. The smoke 11 preferably flows along the fluid flow path F, which is arranged inside mouthpiece 4. The mouthpiece 4 thereby also functions as exit from the device 1 into a consumer's mouth.

[0065] Figure 2 shows a further embodiment of the device 1 with the same components in a different arrangement. The input 2 for the smokable substance 3 is arranged inside the mouth piece 4, wherein the substance 3 is inserted into the device 1 against the longitudinal direction L. The smokable substance 3 is inserted through the mouthpiece 4 of the device 1 into the grinder 6, which chops the smokable substance 3 with knives and/or blades 10 into pieces 7.

[0066] It is conceivable that the knives 10 of the grinder 6 spin around an axis which is arranged parallel to the longitudinal direction L. The grinder 6 and especially the knives 10 are arranged on the substance transport path S, and thus the knives 10 chop all of the smokable substance 3 which is transported along the substance transport path S through the grinder.

[0067] It is conceivable that the rotation of the knives 10 is driven by a motor (not illustrated), which is connected to the power supply unit 9, and wherein the motor might be controllable with an interaction from a consumer, who preferably adjusts the strengths of the inhalable smoke 11 according to an amount of smokable substance 3 ground by the grinder 6.

[0068] The chopped pieces 7 are afterwards transported from the grinder along the substance transport path S into the heating section 5. In contrast to Figure 1, the heating section illustrated in Figure 2 represents a reversal point, as the substance transport path S leads from the mouthpiece 4 into the heating section 5 in the opposite longitudinal direction L and the fluid flow F path leads from there in the longitudinal direction L back to the mouthpiece.

[0069] Inhalable smoke 11 generated in the heating section 5 preferably passes the grinder 6, which is preferably arranged next to the fluid flow path F in the width direction W. The fluid flow path F could therefore be a channel in between the heating section 5 and an outer

hull of the electronic smoking device 1.

[0070] In the arrangement of the electronic smoking device illustrated in figure 2 the mouthpiece 4 functions as input 2 for the smokable substance 3 as well as output for the inhalable smoke 11. It is conceivable that the mouthpiece 4 is detachable from the device 1 for cleaning purposes. This would also allow an easier cleaning of the input 2, as well as maintenance if some of the smokable substance 3 gets stuck in the input.

Reference signs

[0071]

15	1	electronic smoking device
	2	input in electronic smoking device
	3	smokable substance
	4	mouth piece
	5	heating section
20	6	grinder
	7	pieces of smokable substance
	8	heating element
	9	power supply unit
	10	knife of the grinder
25	11	inhalable smoke
	F	fluid flow path
	S	substance transport path
	L	longitudinal direction
30	W	width direction

Claims

- 35 1. Electronic smoking device (1) comprising at least one input (2) for a smokable substance (3), a mouth piece (4) and a heating section (5) being arranged in between the input (2) and the mouth piece (4), wherein the device (1) also comprises a substance transport path (S) from the input (2) to the heating section, and a fluid flow path (F) from the heating section (5) to the mouth piece (4)

characterized in that

- 45 the electronic smoking device (1) comprises a grinder (6), which is also arranged in the substance transport path (S) between the input (2) and the heating section (5), wherein a smokable substance (3) inserted into the device (1) is crushed by the grinder (6) into pieces of smokable substance (7), to be releasable into the heating section (5).

2. Electronic smoking device according to claim 1,

characterized in that

- 55 the substance transport path (S) and fluid flow path (F) are connected to each other, thereby creating a continuous flow path from the input (2) to the mouth piece (4).

3. Electronic smoking device according to claim 2, **characterized in that** the connection point of the substance transport path (S) and fluid flow path (F) is arranged in the heating section (5).
4. Electronic smoking device according to at least one of the claims 1-3, **characterized in that** the input (2) and mouth piece (4), and thereby the substance transport path (S) and fluid flow path (F) are arranged in the same area, or next to each other in the hull of the electronic smoking device (1).
5. Electronic smoking device according to at least one of the claims 1-4, **characterized in that** the grinder (6) comprises at least one knife (10) which chops the smokable substance (3) into pieces (7).
6. Electronic smoking device according to at least one of the claims 1-5, **characterized in that** the grinder (6) comprises a milling mechanism which grinds the substance into pieces (7).
7. Electronic smoking device according to at least one of the claims 1-5, **characterized in that** the input (2) is configured to accept the smokable substance (3) as a compressed tobacco product in one continuous part.
8. Electronic smoking device according to at least one of the claims 1-7, **characterized in that** the pieces (7) are smaller than 5mm, preferably smaller than 2mm, and most preferred smaller than 1mm.
9. Electronic smoking device according to at least one of the claims 1-8, **characterized in that** the electronic smoking device (1) comprises a first transport mechanism (8a) to transport the smokable substance (3) along the substance transport path (S) from the input (2) to the grinder (6).
10. Electronic smoking device according to at least one of the claims 1-9, **characterized in that** the electronic smoking device (1) comprises a second transport mechanism (8b) to transport the smokable substance (3) along the substance transport path (S) from the grinder (6) to the heating section (5).
11. Electronic smoking device according to at least one of the claims 1-10, **characterized in that** the heating section (5) heats the pieces (7) to form an inhalable smoke (11) for a consumer.
12. Electronic smoking device according to at least one of the claims 1-11, **characterized in that** the electronic smoking device (1) further comprises a power supply unit (9), preferably in form of a battery.
13. Electronic smoking device according to at least one of the claims 1-12, **characterized in that** the electronic smoking device (1) comprises a filter element (10), preferably arranged between the heating section (5) and the mouth piece (4) to filter smoke (11) which flows along the fluid flow path (F).
14. Electronic smoking device according to claim 13, **characterized in that** the filter element (10) comprises a porous structure, wherein harmful constituents from smoke (11) flowing through the filter element (10) are filtered out and thereby excluded from the smoke.
15. A method for vaporizing a smokable substance (3) with an electronic smoking device (1) according to claims 1-14, **characterized in that** first the smokable substance (3) is inserted along the substance transport path (S) and through the input (2) into the device (1); then the smokable substance (3) is crushed by the grinder (6) into pieces (7); afterwards the pieces (7) are released from the grinder (6) along the substance transport path (S) into the heating section (5); the pieces (7) are heated in the heating section (5) to release an inhalable smoke (11) for a consumer which exits the device (1) along the fluid flow path (F) through the mouthpiece (4).

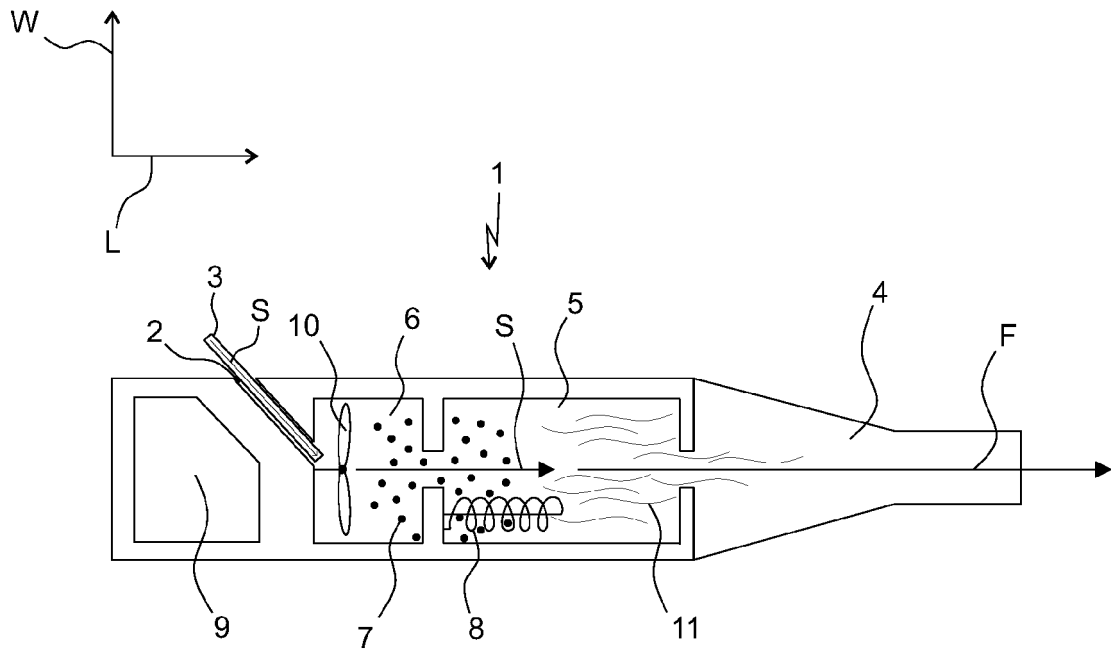


Fig. 1

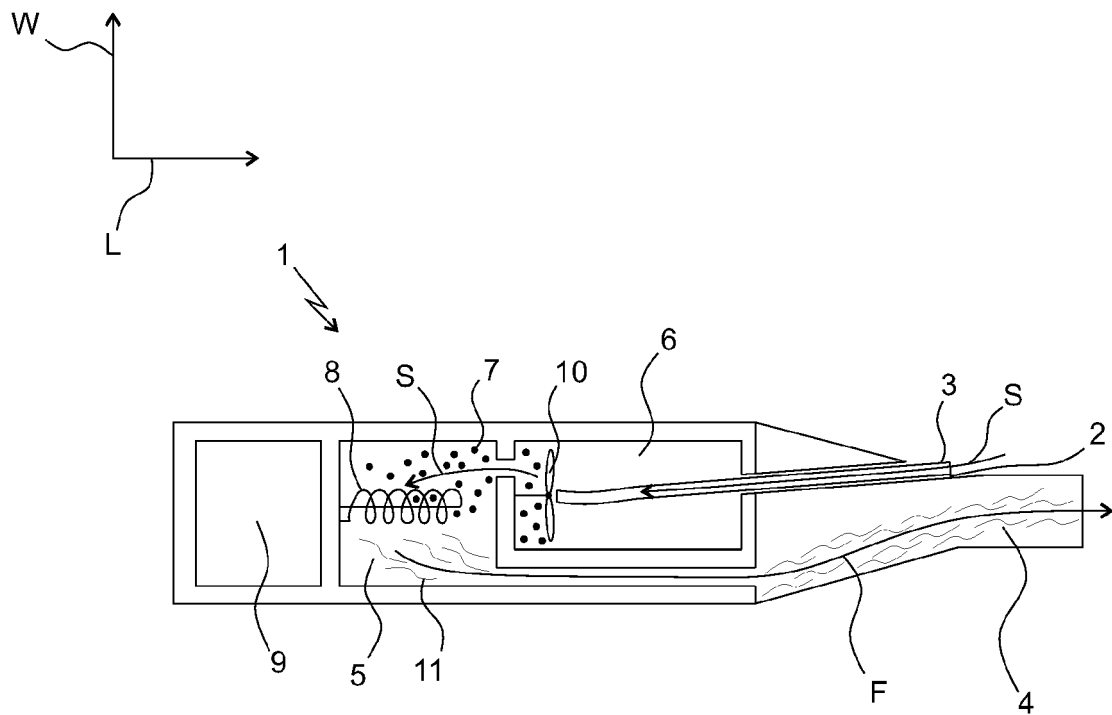


Fig. 2



EUROPEAN SEARCH REPORT

Application Number

EP 22 16 7953

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EPO FORM 1503 03.82 (P04C01)

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	US 2017/181470 A1 (LI YONGSHENG [CN]) 29 June 2017 (2017-06-29) * paragraph [0021] - paragraph [0033]; claims; figures *	1-15	INV. A24F40/40
A	WO 2019/191835 A1 (CANNAYAMA IND INC [CA]) 10 October 2019 (2019-10-10) * page 24, line 24 - page 28, line 8; claims; figures *	1-15	
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 October 2022	Examiner Marzano Monterosso
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention 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	

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 22 16 7953

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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