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(54) **POWDER INHALER COMPRISING PROPELLANT**

(57) A powder inhalation device with a propellant according to various embodiments may include a housing pipe, a carrier chamber disposed at one end portion of the housing pipe and filled with the propellant, a mouthpiece portion disposed at the other end portion of the housing pipe, a first valve disposed between the carrier chamber and the housing pipe and a powder supply configured to supply powder into the housing pipe.

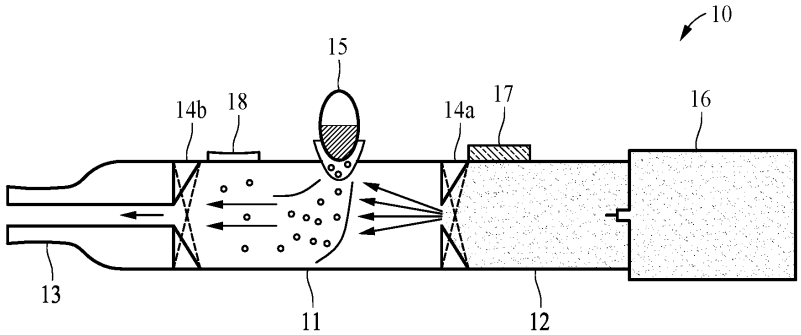

FIG. 1

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Description

Technical Field

[0001] The following embodiments relate to a powder inhalation device with a propellant.

Background Art

[0002] Recently, demands for alternative articles to overcome disadvantages of general cigarettes have increased. For example, there is an increasing demand for a device (e.g., a cigarette-type electronic cigarette) that generates an aerosol by electrically heating a cigarette stick. Accordingly, research on an electrically heating-type aerosol generating device and a cigarette stick (or an aerosol generating article) applied thereto is being actively conducted. For example, Korean Patent Application Publication No. 10-2017-0132823 discloses a non-combustion type flavor inhaler, a flavor inhalation component source unit, and an atomizing unit.

Disclosure of the Invention

Technical Goals

[0003] According to various embodiments, a powder inhalation device with a propellant may be provided.

Technical Solutions

[0004] A powder inhalation device with a propellant according to various embodiments may include a housing pipe, a carrier chamber disposed at one end portion of the housing pipe and filled with the propellant, a mouthpiece portion disposed at the other end portion of the housing pipe, a first valve disposed between the carrier chamber and the housing pipe and a powder supply configured to supply powder into the housing pipe.

[0005] According to an embodiment, the powder inhalation device may further include a second valve disposed between the mouthpiece portion and the housing pipe.

[0006] According to an embodiment, the powder inhalation device may further include a carrier cartridge disposed at an opposite end portion to one end portion of the carrier chamber facing the housing pipe.

[0007] According to an embodiment, pressure inside the carrier chamber may be higher than atmospheric pressure.

[0008] According to an embodiment, the powder inhalation device may further include an inhalation detection sensor, wherein the inhalation detection sensor may be configured to open and close the first valve by detecting an inhaling action of a user.

[0009] According to an embodiment, the powder supply may be disposed between the first valve and the second valve.

[0010] According to an embodiment, the powder supply may include a powder cartridge capable of accommodating powder and a powder spray.

[0011] According to an embodiment, the powder spray may be disposed inclined toward the mouthpiece portion.

[0012] According to an embodiment, the powder spray may include a streamlined structure.

[0013] According to an embodiment, the carrier chamber and the carrier cartridge may further include an excipient, and the excipient may include an aerosol forming substrate or flavoring agent.

[0014] According to an embodiment, the powder cartridge may include a plurality of powder capsules including powder, and the powder supply may further include a crushing unit configured to crush the powder capsules supplied by the powder cartridge.

[0015] According to an embodiment, the powder may include nicotine.

Effects

[0016] A powder inhalation device with a propellant according to an embodiment may transfer nicotine to a user in a similar manner to a conventional nicotine inhalation device that generates an aerosol. The powder inhalation device with a propellant according to an embodiment may provide a metered dose of a medium. The effects of the powder inhalation device with a propellant according to an embodiment may not be limited to the above-mentioned effects, and other unmentioned effects may be clearly understood from the following description by one of ordinary skill in the art.

Brief Description of Drawings

[0017]

FIGS. 1 and 2 are diagrams schematically illustrating a powder inhalation device with a propellant according to an embodiment.

FIGS. 3A and 3B are diagrams schematically illustrating a powder spray according to an embodiment.

FIG. 4 is a diagram schematically illustrating a powder spray according to another embodiment.

Best Mode for Carrying Out the Invention

[0018] The terms used in various embodiments are selected from among common terms that are currently widely used, in consideration of their function in the disclosure. However, the terms may become different according to an intention of one of ordinary skill in the art, a precedent, or the advent of new technology. Also, in particular cases, the terms are discretionally selected by the applicant of the disclosure, and the meaning of those terms will be described in detail in the corresponding part of the detailed description. Therefore, the terms used in the disclosure are not merely designations of the terms,

but the terms are defined based on the meaning of the terms and content throughout the disclosure.

[0019] It will be understood that when a certain part "includes" a certain component, the part does not exclude another component but may further include another component, unless the context clearly dictates otherwise. Also, terms such as "unit," "module," etc., as used in the specification may refer to a part for processing at least one function or operation and may be implemented as hardware, software, or a combination of hardware and software.

[0020] Hereinbelow, embodiments of the present disclosure are described in detail with reference to the accompanying drawings so that the embodiments may be readily implemented by one of ordinary skill in the art to which the present disclosure pertains. However, the present disclosure may be implemented in many different forms and is not limited to the embodiments described herein.

[0021] Hereinafter, embodiments of the disclosure are described in detail with reference to the drawings.

[0022] FIGS. 1 and 2 are diagrams schematically illustrating a powder inhalation device 10 with a propellant according to an embodiment.

[0023] Referring to FIG. 1, the powder inhalation device 10 including the propellant may include a housing pipe 11, a carrier chamber 12, a mouthpiece portion 13, a first valve 14a, a second valve 14b, and a powder supply 15.

[0024] In an embodiment, the housing pipe 11 may form a path for transferring the propellant, an excipient and/or powder to the mouthpiece portion 13. The housing pipe 11 may have the form of a hollow pipe.

[0025] In an embodiment, the carrier chamber 12 may be disposed at one end portion of the housing pipe 11 in the longitudinal direction. The carrier chamber 12 according to an embodiment may be filled with the propellant therein.

[0026] In an embodiment, the inside of the carrier chamber 12 may maintain a state of high pressure. The propellant filled in the carrier chamber 12 according to an embodiment may exist in a gaseous state at atmospheric pressure but may be stored in a liquid state inside the carrier chamber 12 due to the high pressure. The pressure inside the carrier chamber 12 may be higher than atmospheric pressure, desirably a pressure of 2 times the atmospheric pressure (2 bar), and more desirably a pressure of 6 times the atmospheric pressure (6 bar). The propellant according to an embodiment may be HFA-134a (1, 1, 1, 2-Tetrafluorodthane), propylene glycol (co-solvents propylene glycol), polyethylene glycol, HAF227 (1, 1, 1, 2, 3, 3, 3-heptafluoropropane), 152a(1, 1-Difluoroethane), and/or ethanol or a mixture thereof.

[0027] In an embodiment, the carrier chamber 12 may further include an excipient. An excipient according to an embodiment may include an aerosol forming substrate and/or a flavoring agent. An aerosol forming substrate according to an embodiment may refer to a material capable of forming an aerosol. The aerosol may include a volatile compound. The aerosol forming substrate may be solid or liquid. For example, a solid aerosol forming substrate may include solid materials based on tobacco raw materials such as tobacco sheets, cut tobacco leaves, reconstituted tobacco, and the like, and a liquid aerosol forming substrate may include a liquid composition based on nicotine, a tobacco extract, and/or various flavoring agents. However, the scope of the present disclosure is not limited to these examples. A flavoring agent according to an embodiment may include, for example, at least one of menthol, Cis-3-Hexenol, linalool, hexanal, eucalyptol, methyl salicylate, guaiacol, orange oil, lemon oil, star anise oil, peppermint oil, spearmint oil, lime oil, or ginger oil.

[0028] In an embodiment, the mouthpiece portion 13 may be disposed at the other end portion of the housing pipe 11 in the longitudinal direction. The other end portion of the housing pipe 11 in the longitudinal direction may refer to the end portion opposite to the carrier chamber 12. The mouthpiece portion 13 according to an embodiment may be a part that the mouth of the user of the powder inhalation device 10 contacts to inhale the powder.

[0029] In an embodiment, the first valve 14a and the second valve 14b may open when the user of the powder inhalation device 10 starts inhaling the powder and may close when the user ends inhaling the powder.

[0030] In an embodiment, the first valve 14a may be disposed between the housing pipe 11 and the carrier chamber 12. It may be desirable that the inside of the carrier chamber 12 according to an embodiment be maintained at a pressure higher than atmospheric pressure, and it may be desirable that the pressure inside the housing pipe 11 according to an embodiment be maintained lower than the pressure inside the carrier chamber 12. In this case, when the user's inhalation starts and the first valve 14a is opened, a liquid-type propellant filled in the carrier chamber 12 may vaporize and flow into the housing pipe 11 through the first valve 14a.

[0031] In an embodiment, the second valve 14b may be disposed between the housing pipe 11 and the mouthpiece portion 13. The second valve 14b according to an embodiment may be opened only when the user bites the mouthpiece portion 13 and inhales so that the user may inhale the powder only when desired.

[0032] In an embodiment, the powder supply 15 may supply powder into the housing pipe 11. The powder supply 15 according to an embodiment may be disposed between the first valve 14a and the second valve 14b. The powder supply 15 according to an embodiment may spray powder into a path formed by the housing pipe 11. Referring continuously to FIG. 1, in an embodiment, the powder supply 15 may spray powder from a direction perpendicular to the path formed by the housing pipe 11. Referring to FIG. 2, in an embodiment, the powder supply 15 may be disposed tilted obliquely to the path formed

by the housing pipe 11. In this case, since the initial spray direction of the powder supplied by the powder supply 15 and the moving direction of the propellant transferred along the housing pipe 11 form an acute angle, more efficient transfer may be possible.

[0033] Referring continuously to FIGS. 1 and 2, the powder inhalation device 10 according to an embodiment may further include a carrier cartridge 16.

[0034] In an embodiment, the carrier cartridge 16 may refill the carrier chamber 12 with a propellant. The carrier cartridge 16 according to an embodiment may be disposed at the opposite end portion to one end portion of the carrier chamber 12 facing the housing pipe 11. The carrier cartridge 16 according to an embodiment may include the same propellant material as the propellant material filled in the carrier chamber 12. The propellant according to an embodiment may be HFA-134a (1, 1, 1, 2-Tetrafluorodthane), propylene glycol (co-solvents propylene glycol), polyethylene glycol, HAF227 (1, 1, 1, 2, 3, 3, 3-Heptafluoropropane), 152a (1, 1-Difluoroethane) and/or ethanol or a mixture thereof.

[0035] Referring continuously to FIGS. 1 and 2, the powder inhalation device 10 according to an embodiment may further include a controller 17 and a switch 18.

[0036] In an embodiment, the controller 17 may control the overall operation of the powder inhalation device 10. Specifically, the controller 17 may control the operation of components included in the powder inhalation device 10. In addition, the controller 17 may verify a state of each of the components of the powder inhalation device 10 to determine whether the powder inhalation device 10 is in an operable state.

[0037] In an embodiment, the controller 17 may include at least one processor. The processor may be implemented as an array of a plurality of logic gates or may be implemented as a combination of a general-purpose microprocessor and a memory in which a program executable by the microprocessor is stored. In addition, it is to be understood by one of ordinary skill in the art to which the present disclosure pertains that the processor may be implemented in other types of hardware.

[0038] For example, the controller 17 may include an inhalation detection sensor. The inhalation detection sensor according to an embodiment may control the opening and closing of the first valve 14a and/or the second valve 14b by detecting when the user of the powder inhalation device 10 intends to inhale or perform an inhaling action. In this case, since power needs to be supplied in order for the inhalation detection sensor to operate, the powder inhalation device 10 may further include a battery (not shown) capable of supplying power.

[0039] In an embodiment, the first valve 14a and/or the second valve 14b may be manually opened and closed. The switch 18 according to an embodiment may be disposed at a position where the thumb or index finger may be placed when the user grips the powder inhalation device 10, and when the switch 18 is clicked during inhalation, the first valve 14a and/or the second valve 14b may be opened so that the powder may be transferred.

[0040] Hereinafter, the shape of the powder supply 15 according to various embodiments is described with reference to FIGS. 3A, 3B, and 4.

[0041] FIGS. 3A, 3B, and 4 are diagrams schematically illustrating the powder supply 15 according to an embodiment.

[0042] The powder supply 15 according to an embodiment may include a powder cartridge 152 in which powder may be accommodated and a powder spray 154.

[0043] Referring to FIGS. 3A and 3B, in an embodiment, the powder cartridge 152 may accommodate powder particles MP. The powder particles MP may include a medium that may be transferred to the user. The powder cartridge 152 according to an embodiment may include powder, and the powder according to an embodiment may include one cigarette's worth of nicotine medium or more.

[0044] The powder cartridge 152 according to an embodiment may include an opening through which the powder particles MP are discharged. Through the opening of the powder cartridge 152, the powder particles MP may be transferred to the powder spray 154.

[0045] In an embodiment, the powder spray 154 may include an opening through which the powder particles MP are discharged. Through the opening of the powder spray 154, the powder particles MP may be transferred into the housing pipe 11.

[0046] Referring to FIG. 3A, the powder spray 154 according to an embodiment may include a streamlined structure. Since the powder spray 154 according to an embodiment may be inserted and disposed on the path formed by the housing pipe 11, when the propellant is transferred toward the mouthpiece portion 13, it may be desirable that the powder spray 154 have a streamlined structure in order to minimize resistance due to the powder spray 154.

[0047] Referring to FIG. 3B, the powder spray 154 according to an embodiment may include a tubular shape formed in the longitudinal direction. In order to minimize resistance due to the powder spray 154 on the path along which the propellant is transferred toward the mouthpiece portion 13, it may be desirable that the powder spray 154 have a narrow and long tubular shape.

[0048] The powder spray 154 according to an embodiment may be disposed tilted obliquely to the path formed by the housing pipe 11 (see FIG. 2). In this case, since the initial spray direction of the powder supplied by the powder supply 15 and the moving direction of the propellant transferred along the housing pipe 11 form an acute angle, more efficient transfer may be possible.

[0049] Referring to FIG. 4, the powder supply 15 according to an embodiment may include a powder cartridge 152 and a powder spray 154. The powder cartridge 152 according to an embodiment may include a plurality of powder capsules MC including a powder material. The powder cartridge 152 according to an embodiment may include an opening through which the powder capsule

MC is discharged. Through the opening of the powder cartridge 152, the powder capsules MC may be transferred to the powder spray 154.

[0050] Referring continuously to FIG. 4, the powder supply 15 according to an embodiment may further include a crushing unit 156. In an embodiment, the crushing unit 156 may crush the powder capsules MC discharged from the powder cartridge 152. Powder included in the powder capsules MC crushed by the crushing unit 156 according to an embodiment may be discharged and transferred into the housing pipe 11.

[0051] The powder material sprayed by the powder spray 154 according to the various embodiments may move toward the mouthpiece portion 13 together with the propellant discharged from the carrier chamber 12. Here, the propellant may be a highly evaporative material and may be quickly vaporized and/or evaporated simultaneously when discharged from the high-pressure carrier chamber, that is, the carrier chamber 12. Through the process as the above, only the powder material and excipient may reach the mouthpiece portion 13 and be inhaled by the user.

[0052] While the embodiments are described with reference to a limited number of drawings, it will be apparent to one of ordinary skill in the art that various alterations and modifications in form and details may be made in these embodiments without departing from the spirit and scope of the claims and their equivalents. For example, suitable results may be achieved if the described techniques are performed in a different order and/or if components in a described system, architecture, device, or circuit are combined in a different manner and/or replaced or supplemented by other components or their equivalents.

[0053] Therefore, other implementations, other embodiments, and/or equivalents of the claims are within the scope of the following claims.

Claims

1. A powder inhalation device with a propellant, the powder inhalation device comprising:

   a housing pipe;
   a carrier chamber disposed at one end portion of the housing pipe and filled with the propellant;
   a mouthpiece portion disposed at the other end portion of the housing pipe;
   a first valve disposed between the carrier chamber and the housing pipe; and
   a powder supply configured to supply powder into the housing pipe.

2. The powder inhalation device of claim 1, further comprising a second valve disposed between the mouthpiece portion and the housing pipe.

3. The powder inhalation device of claim 1, further comprising a carrier cartridge disposed at an opposite end portion to one end portion of the carrier chamber facing the housing pipe.

4. The powder inhalation device of claim 1, wherein pressure inside the carrier chamber is higher than atmospheric pressure.

5. The powder inhalation device of claim 1, further comprising an inhalation detection sensor,
   wherein the inhalation detection sensor is configured to open and close the first valve by detecting an inhaling action of a user.

6. The powder inhalation device of claim 2, wherein the powder supply is disposed between the first valve and the second valve.

7. The powder inhalation device of claim 1, wherein the powder supply comprises:

   a powder cartridge configured to accommodate powder; and
   a powder spray.

8. The powder inhalation device of claim 7, wherein the powder spray is disposed inclined toward the mouthpiece portion.

9. The powder inhalation device of claim 7, wherein the powder spray comprises a streamlined structure.

10. The powder inhalation device of claim 3, wherein the carrier chamber and the carrier cartridge further comprise an excipient, and the excipient comprises an aerosol forming substrate or flavoring agent.

11. The powder inhalation device of claim 7, wherein

    the powder cartridge comprises a plurality of powder capsules comprising powder, and
    the powder supply further comprises a crushing unit configured to crush the powder capsules supplied by the powder cartridge.

12. The powder inhalation device of one of claim 1, wherein the powder comprises nicotine.

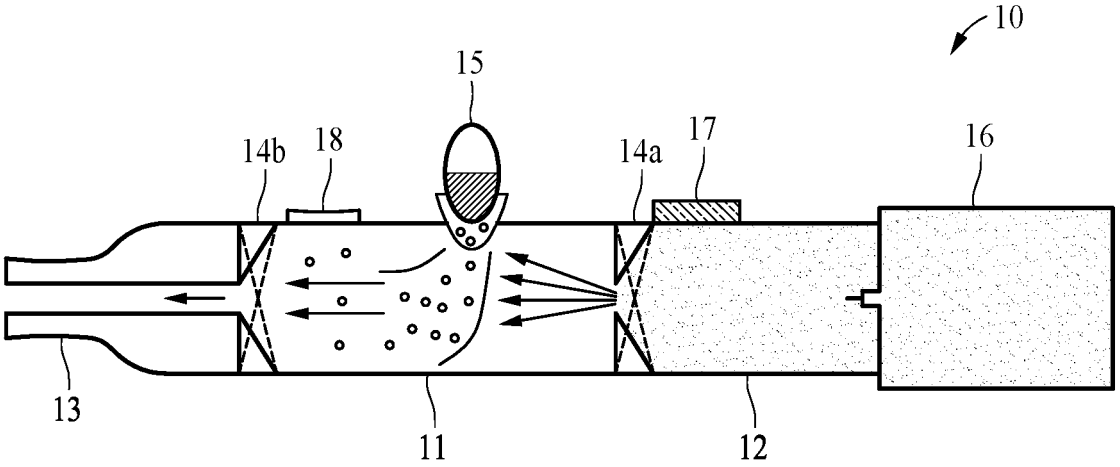

FIG. 1

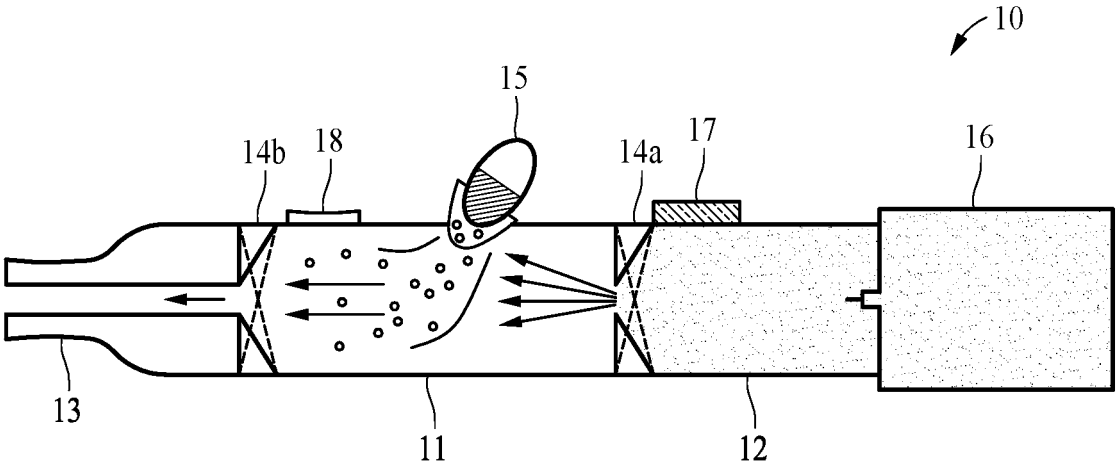

FIG. 2

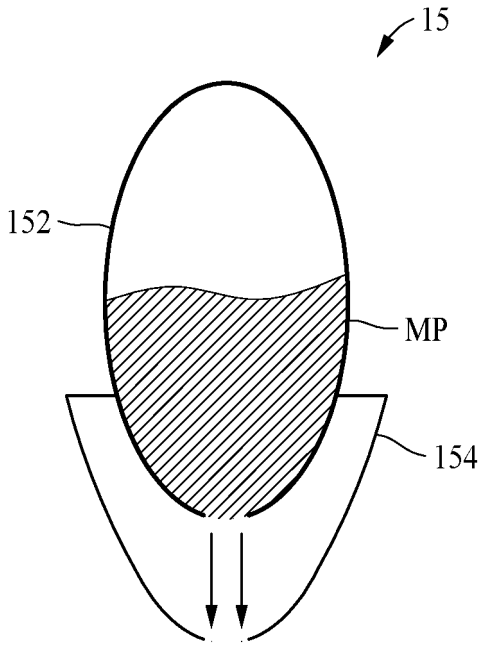

FIG. 3A

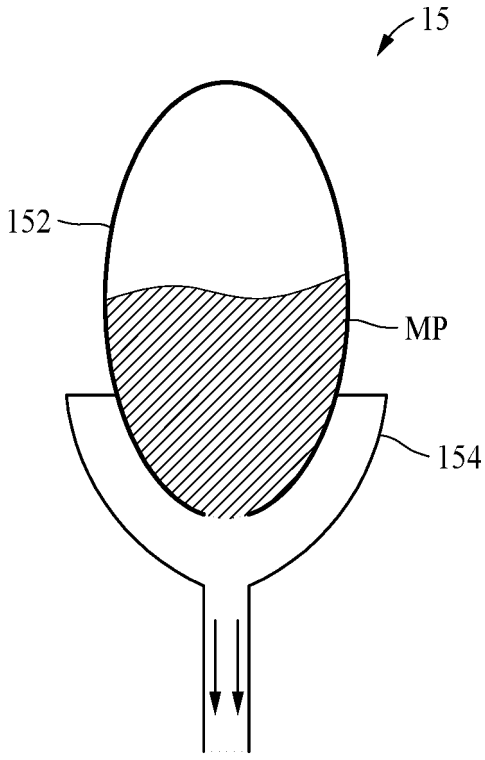

FIG. 3B

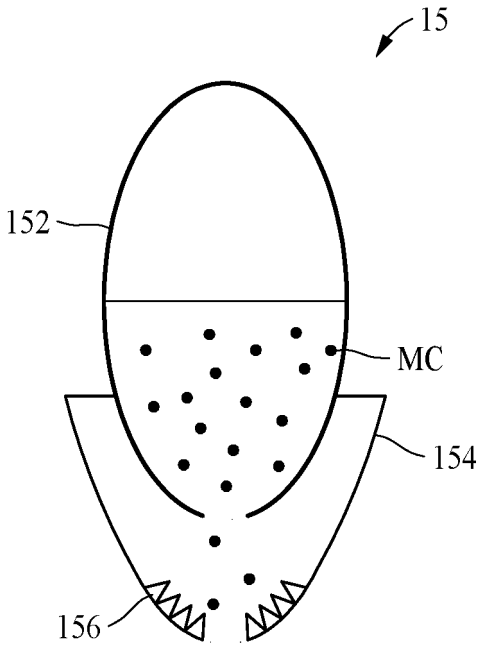

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/017529

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/05(2020.01)i; **A24F 7/00**(2006.01)i; **A24F 40/20**(2020.01)i; **A24F 40/485**(2020.01)i; **A24F 40/42**(2020.01)i; **A24F 40/51**(2020.01)i; **A24F 40/10**(2020.01)i; **A24F 40/40**(2020.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F 40/05(2020.01); A24B 15/16(2006.01); A24F 47/00(2006.01); A61M 15/00(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & keywords: 파우더 (powder), 추지ㄴ제 (propellant), 흡입 (inhalation), 밸브 (valve)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y		2-3,5-12
Y	KR 10-2021-0017296 A (KT & G CORPORATION) 17 February 2021 (2021-02-17) See claims 1-3 and 6; and figure 1.	2-3,5-6,10
Y	KR 10-2017-0140271 A (SANSA CORPORATION (BARBADOS) INC. et al.) 20 December 2017 (2017-12-20) See paragraphs [0022] and [0025]; and figure 1.	7-9,11-12
A	KR 10-2041904 B1 (TREND HIGH TECH) 07 November 2019 (2019-11-07) See entire document.	1-12
A	WO 2015-193498 A1 (PHILIP MORRIS PRODUCTS S.A.) 23 December 2015 (2015-12-23) See entire document.	1-12

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 February 2023	**13 February 2023**
Name and mailing address of the ISA/KR **Korean Intellectual Property Office** **Government Complex-Daejeon Building 4, 189 Cheongsa-ro, Seo-gu, Daejeon 35208** Facsimile No. **+82-42-481-8578**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2022)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2022/017529

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Form PCT/ISA/210 (patent family annex) (July 2022)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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