

(19)



(11)

EP 4 563 014 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
04.06.2025 Bulletin 2025/23

(51) International Patent Classification (IPC):
A24D 1/20 (2020.01)

(21) Application number: **24208015.8**

(52) Cooperative Patent Classification (CPC):
A24D 1/20

(22) Date of filing: **22.10.2024**

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

(30) Priority: **24.10.2023 CN 202311388212**

(71) Applicant: **Smoore International Holdings Limited
George Town, Grand Cayman, KY1-1111 (KY)**

(72) Inventors:
• **LIAO, Guimin**
Shenzhen, Guangdong (CN)
• **LIN, Zhiwen**
Shenzhen, Guangdong (CN)
• **ZHANG, Hongguo**
Shenzhen, Guangdong (CN)
• **CAO, Huan**
Shenzhen, Guangdong (CN)
• **QI, Xiaohong**
Shenzhen, Guangdong (CN)

(74) Representative: **Gevers Patents
De Kleetlaan 7A
1831 Diegem (BE)**

(54) **AEROSOL GENERATING ARTICLE**

(57) The embodiments of the present application provide an aerosol generating article, comprising a substrate section, a filter section, and a cooling section having an airflow channel. The cooling section is disposed between the substrate section and the filter section, a first airflow path passing through at least the airflow channel is formed between the substrate section and the filter section, the cooling section comprises at least one

heat conduction member and a body having the airflow channel, the body has an outer surface and an inner surface located within the airflow channel, and at least one of the outer surface of the body and the inner surface of the body is provided with the heat conduction member. The aerosol generating article according to the embodiments of the present application has a good cooling effect.

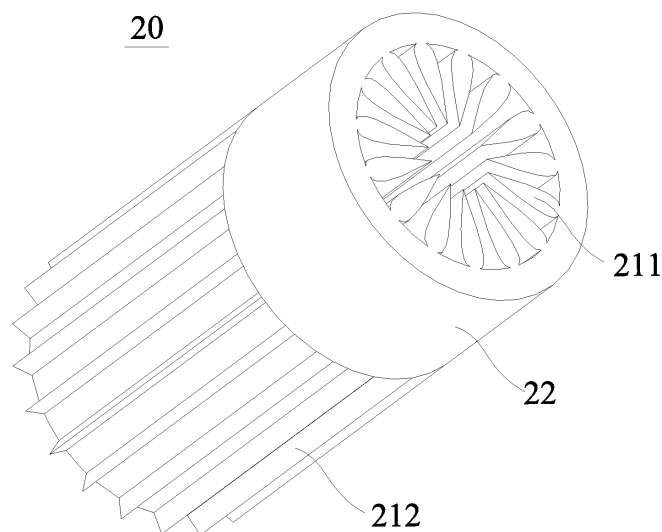


FIG. 8

EP 4 563 014 A1

Description

TECHNICAL FIELD

[0001] The present application relates to the field of aerosol generating technology, and in particular, to an aerosol generating article.

BACKGROUND

[0002] A Heat Not Burning (HNB) article is an aerosol generating article by heating an aerosol-generating substrate (a treated plant leaf product) without burning it. The Heat Not Burning article produces an aerosol by heating the aerosol-generating substrate at high temperature, but this temperature is insufficient to cause the aerosol-generating substrate to burn, so that the aerosol required by a user can be formed.

[0003] A cooling section of the Heat Not Burning article can reduce the temperature of the aerosol, so that the aerosol flowing out of an inhalation port can reach a suitable temperature. The cooling section is generally a hot airflow condensing member, that is, it achieves the effect of reducing the temperature of the aerosol by means of solid heat transfer. However, the cooling sections in the related art have a low heat dissipation rate and a poor cooling effect, resulting in a poor user experience.

SUMMARY

[0004] In view of the above, it is a main objective of embodiments of the present application to provide an aerosol generating article with a good cooling effect.

[0005] In order to achieve the above objective, the technical solution in the embodiments of the present application is implemented as follows.

[0006] The embodiments of the present application provide an aerosol generating article, comprising: a substrate section, a filter section and a cooling section having an airflow channel.

[0007] The cooling section is disposed between the substrate section and the filter section. A first airflow path passing through at least the airflow channel is formed between the substrate section and the filter section. The cooling section comprises heat conduction members and a body having the airflow channel. The body has an outer surface and an inner surface located within the airflow channel, and at least one of the outer surface of the body and the inner surface of the body is provided with the heat conduction members.

[0008] In one example, at least one of the outer surface of the body and the inner surface of the body is provided with a plurality of the heat conduction members at intervals in a circumferential direction, and each of the heat conduction members extends in an extending direction of the cooling section.

[0009] In one example, the aerosol generating article comprises a tubular member having a cavity and air inlet

holes. The substrate section, the cooling section and the filter section are sequentially disposed within the cavity. At least a part of the body is spaced apart from the tubular member to form a spacing space. The spacing space is in communication with the air inlet holes and the airflow channel, to form a second airflow path passing through the spacing space and the airflow channel, between the air inlet holes and the filter section.

[0010] In one example, the outer surface of the body is provided with the heat conduction members located within the spacing space.

[0011] In one example, each heat conduction member comprises a first heat conduction member disposed on the inner surface of the body. The first heat conduction member has a first arcuate surface and a second arcuate surface which are curved toward each other on both sides of the first heat conduction member. One side of each of the first arcuate surface and the second arcuate surface is located on the inner surface of the body, and the other sides of the first arcuate surface and the second arcuate surface have a communal edge away from the body.

[0012] In one example, each heat conduction member comprises a first heat conduction member disposed on the inner surface of the body.

[0013] The first heat conduction member is a cuboid; or the first heat conduction member has a first end disposed on the inner surface of the body and a second end opposite to the first end, the width of the second end gradually decreasing in a direction away from the first end.

[0014] In one example, each heat conduction member comprises a second heat conduction member disposed on the outer surface of the body, the width of the second heat conduction member gradually decreasing in a direction away from the body.

[0015] In one example, the cooling section is integrally formed by injection molding of an organic polymer material and at least one of graphite and a metal material.

[0016] In one example, the metal material comprises at least one of iron, aluminum and copper; and/or the organic polymer material comprises at least one of fiber paper, silicone, a polylactic acid material, and a polyadipic acid material.

[0017] In one example, the surface area of the heat conduction members is greater than or equal to 40% of the surface area of the cooling section and less than or equal to 80% of the surface area of the cooling section; and/or, the thermal conductivity of the cooling section is greater than or equal to 2700 W/(m K) and less than or equal to 5300 W/(m K).

[0018] The embodiments of the present application provide an aerosol generating article, comprising: a substrate section, a filter section, and a cooling section having an airflow channel. The cooling section is disposed between the substrate section and the filter section, a first airflow path passing through at least the airflow channel is formed between the substrate section and the filter section, and at least one of an outer surface of a body

of the cooling section and an inner surface of the body of the cooling section is provided with heat conduction members. As a result, by providing the heat conduction members, the surface area of the cooling section can be greatly increased. In the case where the outer surface of the body is provided with the heat conduction members, the area of the outer surface of the cooling section in contact with the external environment can be significantly increased, so that the energy exchange between the cooling section and the external environment is sped up, thereby increasing the heat dissipation rate of the aerosol within the airflow channel by the cooling section. Thus, a better cooling effect can be achieved. On the other hand, in the case where the inner surface of the body is provided with the heat conduction members, the contact area between the cooling section and the aerosol within the airflow channel can be increased, so that the energy exchange between the cooling section and the aerosol can be sped up, so as to facilitate the cooling section to transfer the heat into the external environment. Thus, a better cooling effect can be achieved as well. It can be understood that, when both the outer surface and the inner surface of the body are provided with the heat conduction members, the surface area of the cooling section can be further increased, and thus the cooling effect of the cooling section can be further improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

FIG. 1 is a schematic view of an aerosol generating article according to an embodiment of the present application.

FIG. 2 is a schematic view of the aerosol generating article in FIG. 1 with a tubular member omitted.

FIG. 3 is a cross-sectional view of FIG. 1.

FIG. 4 is a partially enlarged view of area A in FIG. 3.

FIG. 5 is a schematic view of a cooling section according to an embodiment of the present application.

FIG. 6 is a schematic view of a cooling section according to another embodiment of the present application.

FIG. 7 is a schematic view of a cooling section according to another embodiment of the present application.

FIG. 8 is a schematic view of a cooling section according to another embodiment of the present application.

FIG. 9 is a schematic view of the cooling section in FIG. 8 from another viewing angle.

List of reference signs

[0020] 10. substrate section; 20. cooling section; 20a. airflow channel; 20b. spacing space; 21. heat conduction member; 211. first heat conduction member; 211a. first

arcuate surface; 211b. second arcuate surface; 2111. first end; 2112. second end; 212. second heat conduction member; 22. body; 30. support section; 40. filter section; 50. tubular member; 50a. air inlet hole.

DETAILED DESCRIPTION

[0021] In the present application, the orientation or position relationship of "an extending direction" is based on the orientation or position relationship shown in FIG. 2. The terms of orientation are only for the purpose of facilitating the description of the present invention and simplifying the description, rather than indicating or implying that a device or element referred to must have a particular orientation or be constructed and operated in a particular orientation, and therefore cannot be understood as limiting the present application.

[0022] An embodiment of the present application provides an aerosol generating article, as shown in FIGS. 2 and 3, including a substrate section 10, a filter section 40, and a cooling section 20.

[0023] The substrate section 10 is a region of the aerosol generating article in which an aerosol-generating substrate is mounted. The aerosol-generating substrate can produce an aerosol when heated in the substrate section 10, and the aerosol can flow with an external airflow as the external airflow passes through the substrate section 10 during an inhalation.

[0024] The filter section 40 is configured to filter the aerosol and control the shape of the aerosol, so as to gather the aerosol, thereby reducing the phenomenon of dispersion of the aerosol. In addition, tiny particles generated during heating of the aerosol-generating substrate can be filtered out, thereby improving user experience.

[0025] The cooling section 20 has an airflow channel 20a. The cooling section 20 is disposed between the substrate section 10 and the filter section 40. A first airflow path passing through at least the airflow channel 20a is formed between the substrate section 10 and the filter section 40.

[0026] During the inhalation, the airflow will pass through the substrate section 10, the airflow channel 20a and the filter section 40 sequentially.

[0027] Referring to FIG. 3 and FIGS. 5 to 9, the cooling section 20 includes heat conduction members 21, and a body 22 having the airflow channel 20a. The body 22 has an outer surface and an inner surface opposite to the outer surface and located within the airflow channel 20a. At least one of the outer surface of the body 22 and the inner surface of the body 22 is provided with the heat conduction member 21.

[0028] Referring to FIGS. 8 and 9, it is possible that only the outer surface of the body 22 is provided with the heat conduction members 21, or only the inner surface of the body 22 is provided with the heat conduction members 21, or both the outer surface and the inner surface of the body 22 are provided with the heat conduction members

21.

[0029] For different actual situations, the body 22 and the heat conduction members 21 may be made in one piece, or they may be separate structures.

[0030] Furthermore, for the actual situation, the aerosol generating article may be provided with another section, such as a support section 30, in addition to the substrate section 10, the cooling section 20 and the filter section 40. The support section 30 is disposed between the cooling section 20 and the filter section 40. The support section may allow the aerosol generating article to have a better support property, thereby making the structure more stable.

[0031] The aerosol generating article according to the embodiment of the present application includes a substrate section 10, a filter section 40, and a cooling section 20 having an airflow channel 20a. The cooling section 20 is disposed between the substrate section 10 and the filter section 40. A first airflow path passing through at least the airflow channel 20a is formed between the substrate section 10 and the filter section 40, and at least one of the outer surface of the body 22 and the inner surface of the body 22 of the cooling section 20 is provided with heat conduction members 21. As a result, by providing the heat conduction members 21, the surface area of the cooling section 20 can be greatly increased. In the case where the outer surface of the body 22 is provided with the heat conduction members 21, the area of the outer surface of the cooling section 20 in contact with the external environment can be significantly increased, so that the energy exchange between the cooling section 20 and the external environment speeds up, thereby increasing the heat dissipation rate of the aerosol within the airflow channel 20a by the cooling section 20. Thus, a better cooling effect can be achieved. On the other hand, in the case where the inner surface of the body 22 is provided with the heat conduction members 21, the contact area between the cooling section 20 and the aerosol within the airflow channel 20a can be increased, so that the energy exchange between the cooling section 20 and the aerosol can speed up, so as to facilitate the cooling section 20 to transfer the heat into the external environment. Thus, a better cooling effect can be achieved as well. It can be understood that, when both the outer surface and the inner surface of the body 22 are provided with the heat conduction members 21, the surface area of the cooling section 20 can be further increased, and thus the cooling effect of the cooling section 20 can be further improved.

[0032] The heat dissipation effect of the cooling section 20 is related to the number, disposing manner and specific shape of the heat conduction members 21. The disposing manner and number of the heat conduction members 21 are not limited. In an example, the heat conduction member 21 is a heat sink fin.

[0033] For example, referring to FIGS. 5 to 9, at least one of the outer surface of the body 22 and the inner surface of the body 22 is provided with a plurality of heat

conduction members 21 arranged at intervals in a circumferential direction. Each of the heat conduction members 21 extends in an extending direction of the cooling section 20.

[0034] It is possible that the outer surface of the body 22 is provided with a plurality of heat conduction members 21 arranged at intervals in the circumferential direction, or the inner surface of the body 22 is provided with a plurality of heat conduction members 21 arranged at intervals in the circumferential direction, or both of the outer surface and the inner surface of the body 22 are provided with a plurality of heat conduction members 21 arranged at intervals in the circumferential direction. The heat conduction members 21 is spaced apart from each other, which further increases the surface area of the cooling section 20, thereby further improving the heat dissipation effect of the cooling section 20.

[0035] The heat conduction members 21 provided on the outer surface of the body 22 and the inner surface of the body 22 may be same or different in shape and structure.

[0036] For example, referring to FIG. 6, each of the heat conduction members 21 includes a first heat conduction member 211 disposed on the inner surface of the body 22, and the first heat conduction member 211 is a cuboid.

[0037] In another example, referring to FIG. 5, each first heat conduction member 211 has a first arcuate surface 211a and a second arcuate surface 211b which are curved toward each other on both sides of the first heat conduction member. One side of each of the first arcuate surface 211a and the second arcuate surface 211b is located on the inner surface of the body 22, and the other sides of the first arcuate surface 211a and the second arcuate surface 211b have a communal edge which is away from the body 22.

[0038] Each first heat conduction member 211 is an arcuate heat conduction member. By means of a convex surface in the middle of the first heat conduction member 211, the surface area of the first heat conduction member 211 may be increased, so as to further improve the heat-conducting effect. In addition, the first arcuate surface 211a and the second arcuate surface 211b are curved toward each other on two sides, and the side edges of the first arcuate surface 211a and the second arcuate surface 211b on the side away from the body 22 overlap with each other, that is, a communal edge is formed. Therefore, the energy exchange between the first heat conduction members 211 and the aerosol can be facilitated.

[0039] In another example, referring to FIG. 7, each first heat conduction member 211 has a first end 2111 disposed on the inner surface of the body 22, and a second end 2112 opposite to the first end 2111. The width of the second end 2112 gradually decreases in a direction away from the first end 2111.

[0040] The end of each first heat conduction member 211 that is connected to the inner surface of the body 22 is the first end 2111, and the end of each first heat conduc-

tion member 211 that is away from the body 22 is the second end 2112. The first end 2111 is not limited in shape, and it may be a structure having constant width, for example, a cuboid. The width of the cross section of the second end 2112 gradually decreases in the direction away from the first end 2111. For example, the second end 2112 is a triangular prism structure. The second end 2112 in the form of the structure having a gradually decreasing width may facilitate the flowing of the aerosol within the airflow channel 20a.

[0041] In one embodiment, referring to FIGS. 8 and 9, each of the heat conduction members 21 includes a second heat conduction member 212 disposed on the outer surface of the body 22, and the width of the second heat conduction member 212 gradually decreases in a direction away from the body 22. Therefore, the energy exchange between the second heat conduction member 212 and the external environment may be facilitated.

[0042] In one embodiment, referring to FIGS. 1, 3, and 4, the aerosol generating article includes a tubular member 50 having a cavity and air inlet holes 50a. The substrate section 10, the cooling section 20, and the filter section 40 are sequentially disposed within the cavity. At least a part of the body 22 is spaced apart from the tubular member 50 to form a spacing space 20b. The spacing space 20b is in communication with the air inlet holes 50a and the airflow channel 20a, to form a second airflow path passing through the spacing space 20b and the airflow channel 20a, between the air inlet holes 50a and the filter section 40.

[0043] The air inlet holes 50a are in communication with the cavity. The aerosol generating article includes two airflow paths. By the arrangement of the two airflow paths, the air intake of the aerosol generating article may be increased, which may facilitate the user's inhalation.

[0044] The air inlet holes 50a are airflow inlets for an external airflow flowing along the second airflow path. The specific position and number thereof are not limited. For example, a plurality of air inlet holes 50a are arranged at intervals in a sidewall of the tubular member 50.

[0045] The entire body 22 may be spaced apart from the tubular member 50, or only a part of the body 22 is spaced apart from the tubular member 50.

[0046] Indeed, a bottom end of the aerosol generating article also has airflow inlets for the external airflow flowing along the first airflow path.

[0047] In an alternative embodiment, the outer surface of the body 22 is provided with the heat conduction members 21 located within the spacing space 20b.

[0048] That is, at least some of the heat conduction members 21 are disposed within the spacing space 20b. During the inhalation, after the energy exchange between the cooling section 20 and the aerosol, at least a part of the heat may be transferred into the spacing space 20b through the heat conduction members 21 disposed within the spacing space 20b. Therefore, the external airflow flowing into the second airflow path may be preheated, and thus a seepage phenomenon caused

by the occurrence of condensation at the substrate section 10 and the cooling section 20 can be alleviated.

[0049] In an embodiment, the cooling section 20 is integrally formed by injection molding of an organic polymer material and at least one of graphite and a metal material.

[0050] The material of the cooling section 20 may include graphite, a metal material, and an organic polymer material, or may include only graphite and the organic polymer material, or may include only the metal material and the organic polymer material.

[0051] The expression "integrally formed by injection molding" means that the organic polymer material is mixed with graphite and/or the metal material and then integrally molded by injection molding, extrusion and pressing. Therefore, the cooling section 20 may have a higher thermal conductivity, thereby allowing a better heat dissipation effect.

[0052] The metal material may be determined according to the actual situation. For example, the metal material includes at least one of iron, aluminum, and copper. That is, the metal material may include one or more of iron, aluminum, and copper.

[0053] Furthermore, the organic polymer material includes at least one of fiber paper, silicone, a polylactic acid material (PLA), and a polyadipic acid material (PBAT). That is, the organic polymer material may be one or more of the above materials.

[0054] The structure of the cooling section 20 itself has micro-pores. During the inhalation, a "liquid film" may be formed on the inner surface of the body 22, which can adsorb macromolecules of the aerosol within the airflow channel 20a, so that the "graininess" felt by the user during the inhalation can be reduced, and thus the user's experience can be improved.

[0055] The ratio of the surface area of the heat conduction members 21 to the surface area of the cooling section 20 should be within an appropriate range, and should not be too small, so as to avoid the poor heat dissipation effect of the cooling section 20. The ratio also should not be too large, so as to avoid the efficiency of the energy exchange between the cooling section 20 and the aerosol or the external environment from being affected by the crowded heat conduction members 21.

[0056] For example, the surface area of the heat conduction members 21 is greater than or equal to 40% of the surface area of the cooling section 20 and less than or equal to 80% of the surface area of the cooling section 20. For example, the ratio may be 40%, 60%, 70% or 80%.

[0057] In an embodiment, the thermal conductivity of the cooling section 20 is greater than or equal to 2700 W/(m·K) and less than or equal to 5300 W/(m·K). The cooling section 20 has a high thermal conductivity, and thus the heat of the aerosol can be rapidly transferred into the external environment. For example, the thermal conductivity of the cooling section 20 may be 2700 W/(m·K) or 5300 W/(m·K).

[0058] In an alternative embodiment where only the

inner surface of the body 22 of the cooling section 20 is provided with a plurality of heat conduction members 21, the surface area of the heat conduction members 21 is greater than or equal to 40% of the surface area of the cooling section 20 and less than or equal to 70% of the surface area of the cooling section 20. The thermal conductivity of the cooling section 20 is greater than or equal to 3200 W/(m·K) and less than or equal to 4500 W/(m·K). For example, the thermal conductivity of the cooling section may be 3200 W/(m·K), 4000 W/(m·K) or 4500 W/(m·K).

[0059] In an alternative embodiment where both the inner surface and the outer surface of the body 22 are provided with a plurality of heat conduction members 21, the surface area of the heat conduction members 21 is greater than or equal to 60% of the surface area of the cooling section 20 and less than or equal to 80% of the surface area of the cooling section 20. The thermal conductivity of the cooling section 20 is greater than or equal to 3700W/(m·K) and less than or equal to 4700W/(m·K). For example, the thermal conductivity of the cooling section may be 3700 W/(m·K), 4200 W/(m·K) or 4700 W/(m·K).

[0060] In the description of the present application, the description with reference to the terms "in an embodiment," "in some embodiments," "in a specific embodiment," "exemplary," etc., means that the specific features, structures, materials, or characteristics described in connection with the embodiment or example are included in at least one embodiment or example of the embodiments of the present application. In the present application, schematic representations of the above terms do not have to be directed to the same embodiment or example. Moreover, the specific features, structures, materials, or characteristics described may be combined in any one or more embodiments or examples in a suitable manner. Furthermore, different embodiments or examples, and features of different embodiments or examples described in the present application may be combined by those skilled in the art without mutual contradiction.

[0061] The above are only preferred embodiments of the present application and are not intended to limit the present application, and various modifications and variations can be made to the present application for those skilled in the art. Any modifications, equivalent substitutions, improvements, etc. made within the spirit and principles of the present application shall be encompassed within the scope of protection of the present application.

Claims

1. An aerosol generating article, **characterized in that** the aerosol generating article comprises:

a substrate section (10);

a filter section (40); and

a cooling section (20) having an airflow channel (20a), wherein the cooling section (20) is disposed between the substrate section (10) and the filter section (40), a first airflow path passing through at least the airflow channel (20a) is formed between the substrate section (10) and the filter section (40), the cooling section (20) comprises heat conduction members (21) and a body (22) having the airflow channel (20a), the body (22) has an outer surface and an inner surface located within the airflow channel (20a), and at least one of the outer surface of the body (22) and the inner surface of the body (22) is provided with the heat conduction members (21).

2. The aerosol generating article according to claim 1, wherein at least one of the outer surface of the body (22) and the inner surface of the body (22) is provided with a plurality of the heat conduction members (21) arranged at intervals in a circumferential direction, and each of the heat conduction members (21) extends in an extending direction of the cooling section (20).
3. The aerosol generating article according to claim 1 or 2, wherein the aerosol generating article comprises a tubular member (50) having a cavity and air inlet holes (50a), the substrate section (10), the cooling section (20) and the filter section (40) are sequentially disposed within the cavity, at least a part of the body (22) is spaced apart from the tubular member (50) to form a spacing space (20b), the spacing space (20b) is in communication with the air inlet holes (50a) and the airflow channel (20a), to form a second airflow path passing through the spacing space (20b) and the airflow channel (20a) between the air inlet holes (50a) and the filter section (40).
4. The aerosol generating article according to claim 3, wherein the outer surface of the body (22) is provided with the heat conduction members (21) located within the spacing space (20b).
5. The aerosol generating article according to any of claims 1 to 3, wherein each of the heat conduction members (21) comprises a first heat conduction member (211) disposed on the inner surface of the body (22), the first heat conduction member (211) has a first arcuate surface (211a) and a second arcuate surface (211b) which are curved toward each other on both sides of the first heat conduction member (211), and one side of each of the first arcuate surface (211a) and the second arcuate surface (211b) is located on the inner surface of the body (22), and the other sides of the first arcuate surface (211a) and the second arcuate surface (211b) have a

communal edge away from the body (22).

6. The aerosol generating article according to any of claims 1 to 3, wherein each of the heat conduction members (21) comprises a first heat conduction member (211) disposed on the inner surface of the body (22);

the first heat conduction member (211) is a cuboid; or,
the first heat conduction member (211) has a first end (2111) disposed on the inner surface of the body (22) and a second end (2112) opposite to the first end (2111), the width of the second end (2112) gradually decreasing in a direction away from the first end (2111).
7. The aerosol generating article according to any of claims 1 to 6, wherein each of the heat conduction members (21) comprises a second heat conduction member (212) disposed on the outer surface of the body (22), the width of the second heat conduction member (212) gradually decreasing in a direction away from the body (22).
8. The aerosol generating article according to any of claims 1 to 7, wherein the cooling section (20) is integrally formed by injection molding of an organic polymer material and at least one of graphite and a metal material.
9. The aerosol generating article according to claim 8, wherein the metal material comprises at least one of iron, aluminum and copper; and/or, the organic polymer material comprises at least one of fiber paper, silicone, a polylactic acid material, and a polyadipic acid material.
10. The aerosol generating article according to any of claims 1 to 9, wherein a surface area of the heat conduction members (21) is greater than or equal to 40% of a surface area of the cooling section (20) and less than or equal to 80% of the surface area of the cooling section (20); and/or, a thermal conductivity of the cooling section (20) is greater than or equal to 2700 W/(m·K) and less than or equal to 5300 W/(m·K).

50

55

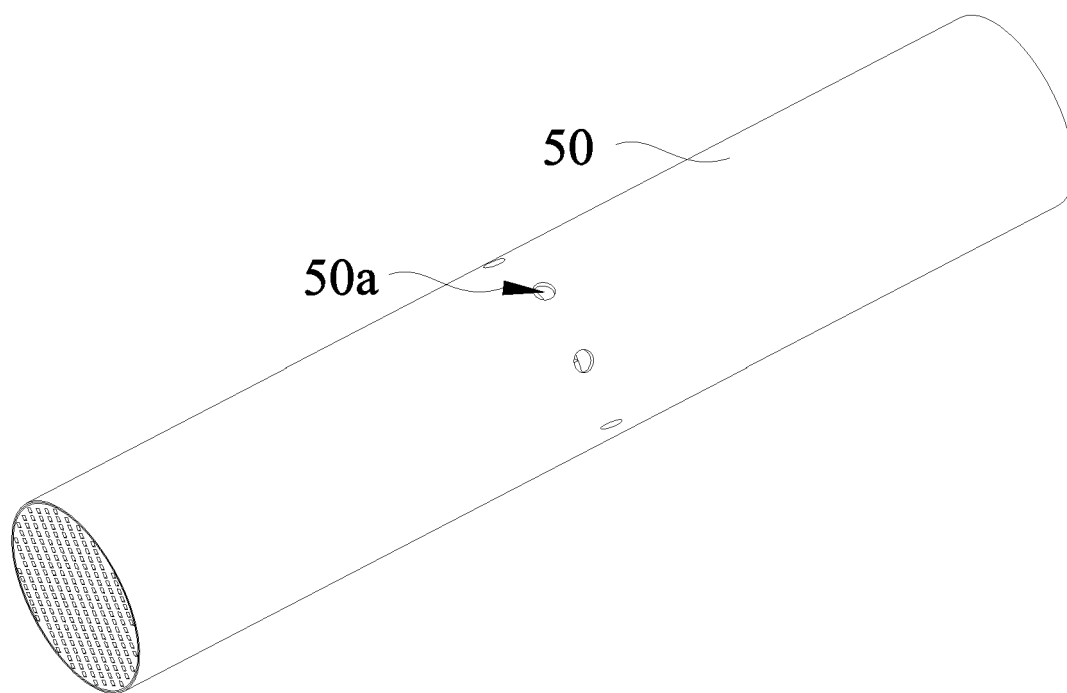


FIG. 1

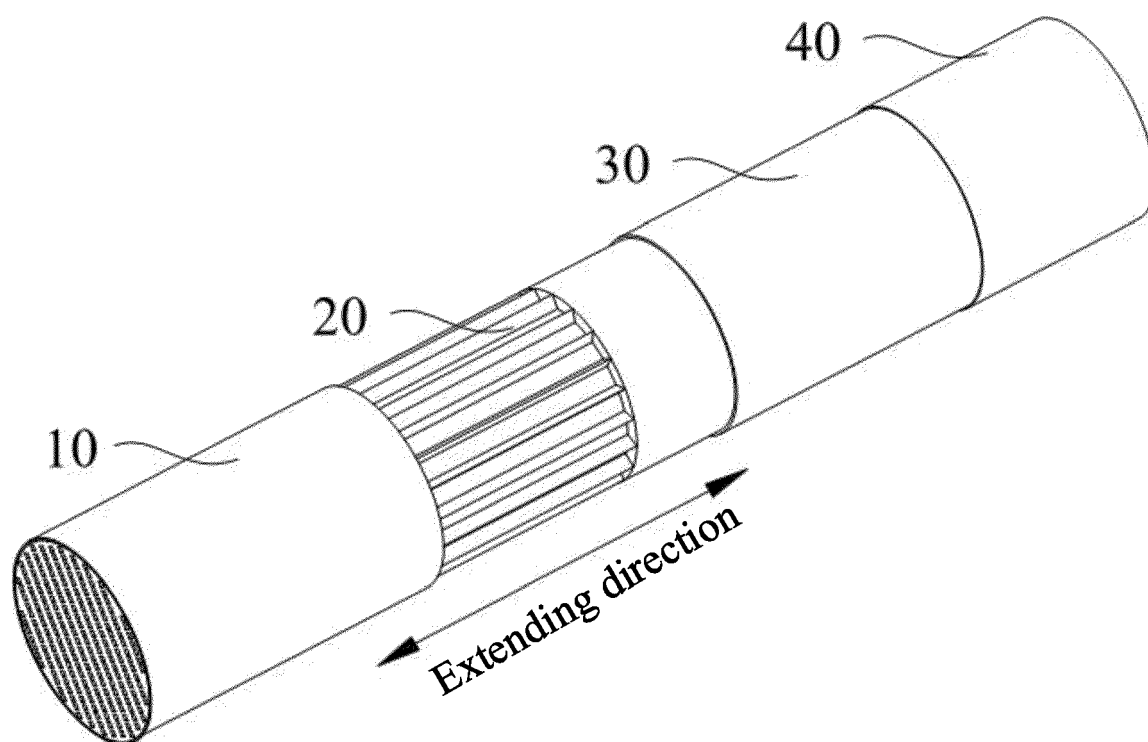


FIG. 2

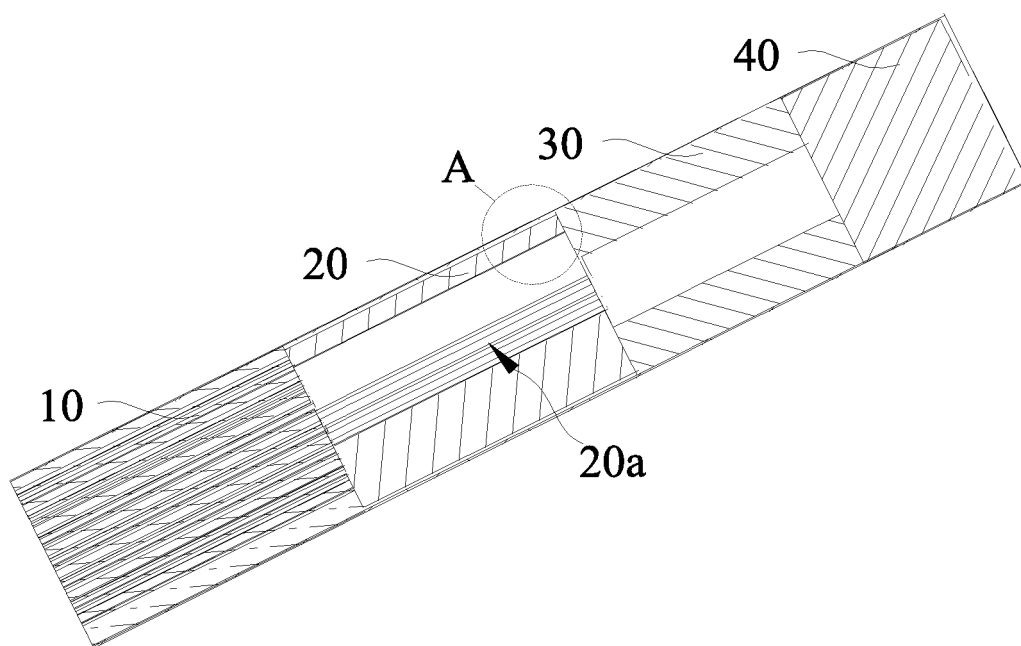


FIG. 3

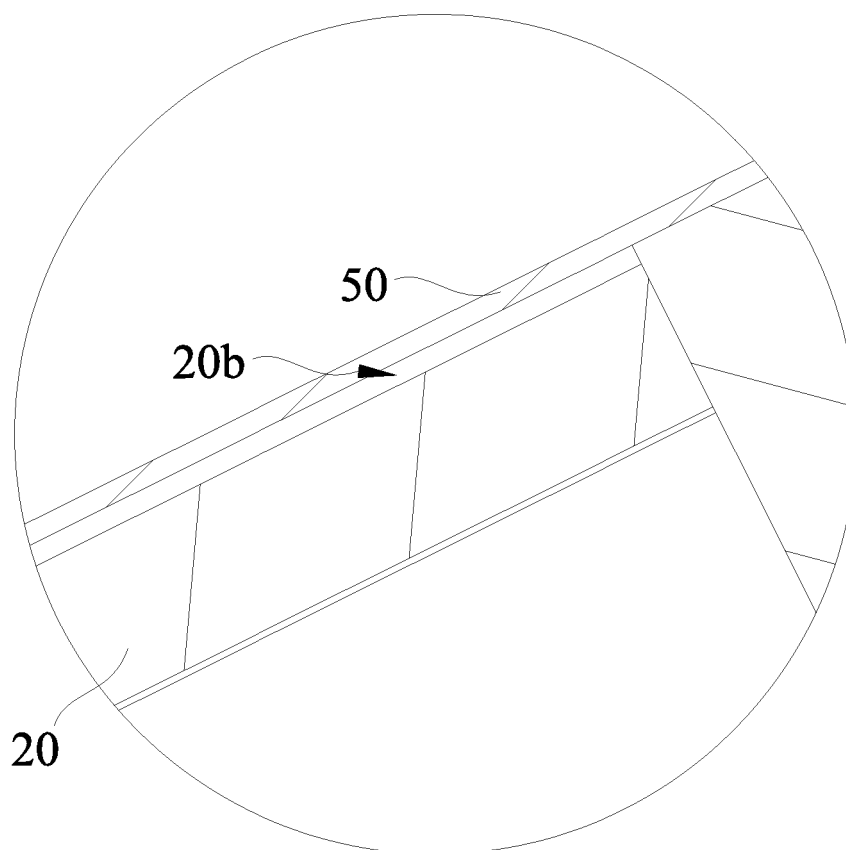


FIG. 4

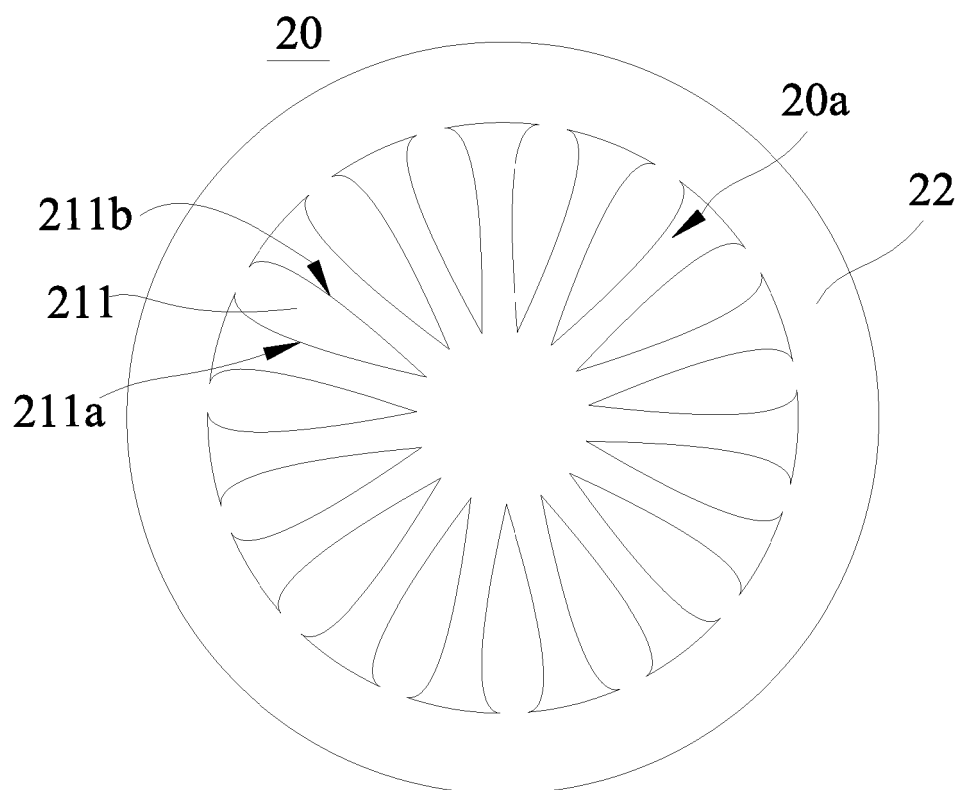


FIG. 5

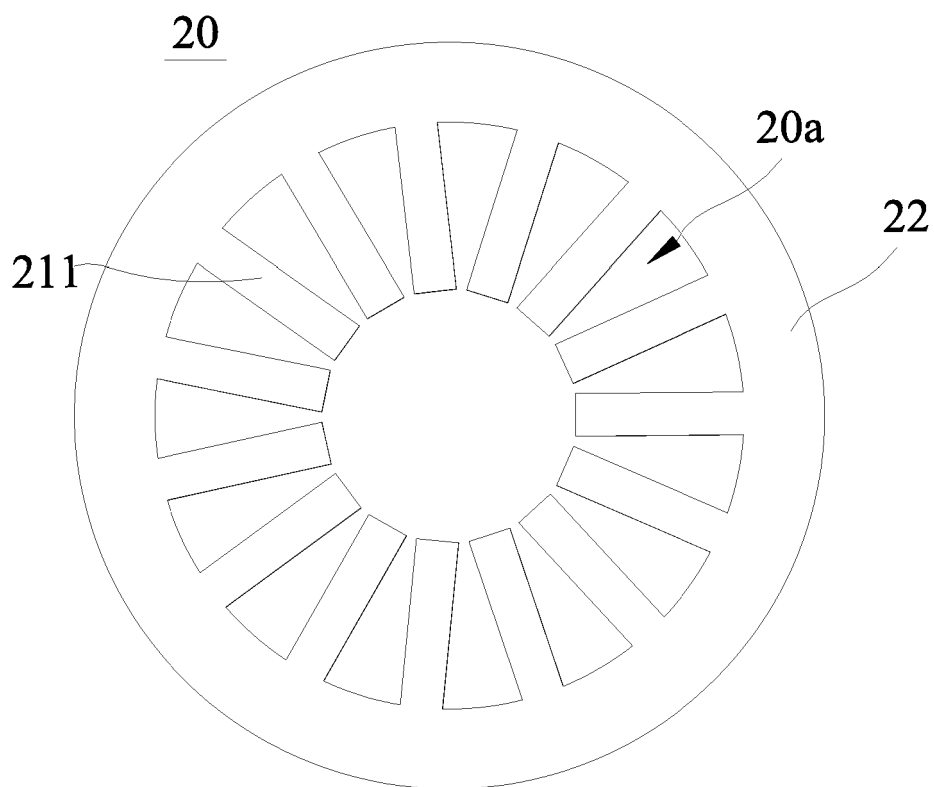


FIG. 6

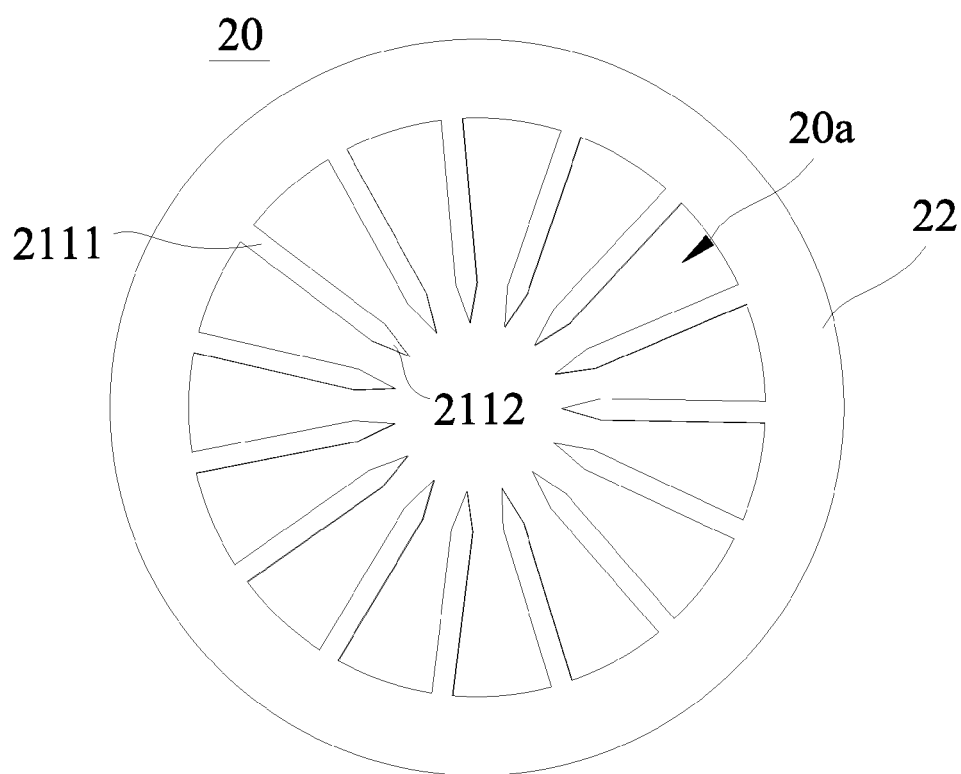


FIG. 7

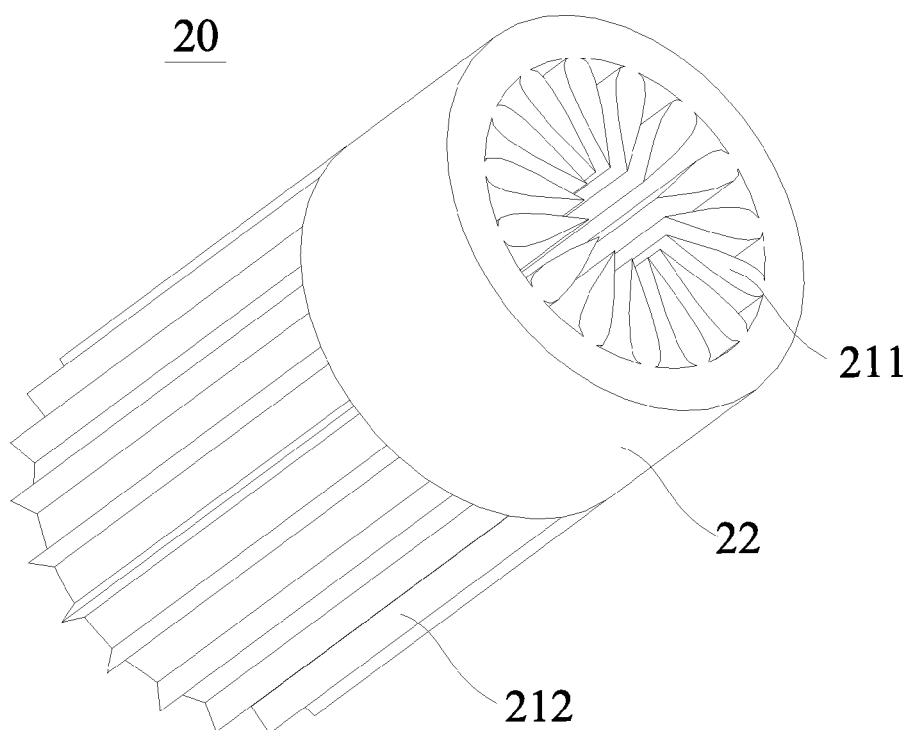


FIG. 8

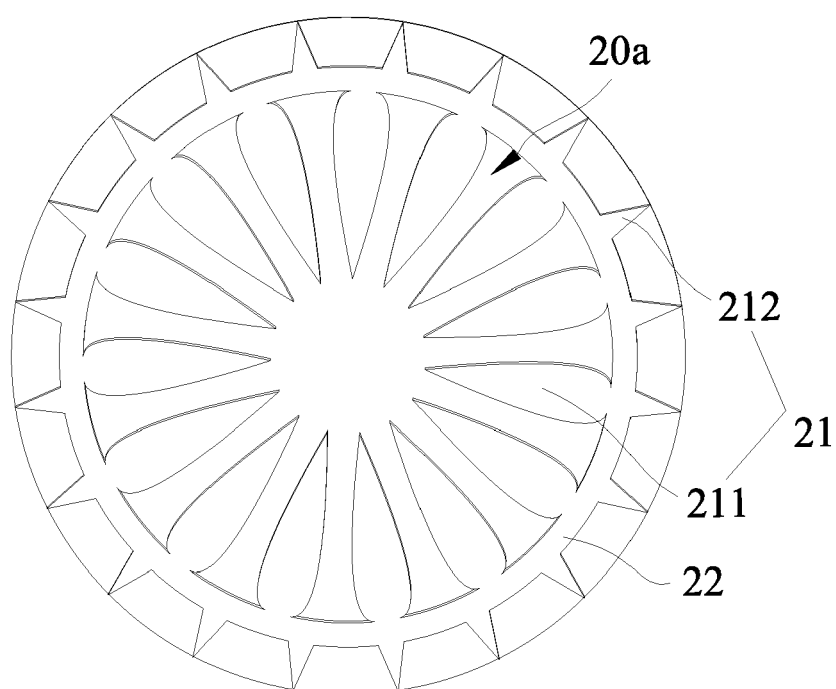


FIG. 9



EUROPEAN SEARCH REPORT

Application Number

EP 24 20 8015

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	CN 217 564 923 U (LEZHI CO LTD) 14 October 2022 (2022-10-14)	1,2,5,6, 8,9	INV. A24D1/20
Y	* paragraph [0066] - paragraph [0107];	10	
A	figures 1,10 *	3,4	
X	CN 109 645 552 A (CHINA TOBACCO HENAN IND CO LTD) 19 April 2019 (2019-04-19)	1,7	
A	* figures 1,2 *	2-6,8-10	
X	WO 2023/099779 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 8 June 2023 (2023-06-08)	1,3,4	
A	* page 46 - page 50; figures 1b, 5b *	2,5-10	
Y	JP 2022 116098 A (REYNOLDS TOBACCO CO R [US]) 9 August 2022 (2022-08-09)	10	
A	* paragraph [0043] *	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			A24D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		1 April 2025	Sylvestre, Jonathan
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone		T : theory or principle underlying the invention	
Y : particularly relevant if combined with another document of the same category		E : earlier patent document, but published on, or after the filing date	
A : technological background		D : document cited in the application	
O : non-written disclosure		L : document cited for other reasons	
P : intermediate document		& : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)

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

EP 24 20 8015

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

01-04-2025

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 217564923 U	14-10-2022	CN 217564923 U	14-10-2022
		WO 2023216326 A1	16-11-2023
-----		-----	
CN 109645552 A	19-04-2019	NONE	
-----		-----	
WO 2023099779 A1	08-06-2023	CN 118302064 A	05-07-2024
		EP 4440347 A1	09-10-2024
		JP 2024542564 A	15-11-2024
		KR 20240113943 A	23-07-2024
		US 2025000132 A1	02-01-2025
		WO 2023099779 A1	08-06-2023
-----		-----	
JP 2022116098 A	09-08-2022	AU 2016367520 A1	26-07-2018
		BR 112018011749 A2	27-11-2018
		CA 3007957 A1	15-06-2017
		CN 108601403 A	28-09-2018
		EP 3386326 A1	17-10-2018
		HK 1254204 A1	12-07-2019
		JP 7269734 B2	09-05-2023
		JP 7383077 B2	17-11-2023
		JP 2019503669 A	14-02-2019
		JP 2022116098 A	09-08-2022
		KR 20180093030 A	20-08-2018
		MY 190208 A	05-04-2022
		RU 2018124656 A	10-01-2020
		UA 124455 C2	22-09-2021
		US 2017164654 A1	15-06-2017
		US 2019254342 A1	22-08-2019
		WO 2017098464 A1	15-06-2017
		ZA 201804455 B	31-03-2021
-----		-----	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82