(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 211 339 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.08.2017 Bulletin 2017/35

(51) Int Cl.:
F24F 7/02 *(2006.01)* ***F24F 13/08*** *(2006.01)*

(21) Application number: **17156582.3**

(22) Date of filing: **17.02.2017**

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

(30) Priority: **24.02.2016 FI 20164042 U**

(71) Applicant: **SK Tuote Oy**
65610 Mustasaari (FI)

(72) Inventors:
- **SAIKKONEN, Eero**
  65370 Vaasa (FI)
- **PUIKKONEN, Pasi**
  65610 Mustasaari (FI)

(74) Representative: **Seppo Laine Oy**
Itämerenkatu 3 B
00180 Helsinki (FI)

(54) AIR INTAKE DEVICE

(57) According to the proposed solution an air-intake device includes a casing, which has a jacket element that encases an air-intake pipe to protect it from weather conditions. The wall of the jacket element a ventilation duct, which extends from an outer opening formed in the outer surface of the wall to an inner opening formed in the inner surface of the wall to permit the entry of air from outside the casing to the air-intake pipe inside the casing. The ventilation duct is formed at an inclined angle to the normal of the jacket element such that the outer opening of the ventilation duct is lower than the inner opening.

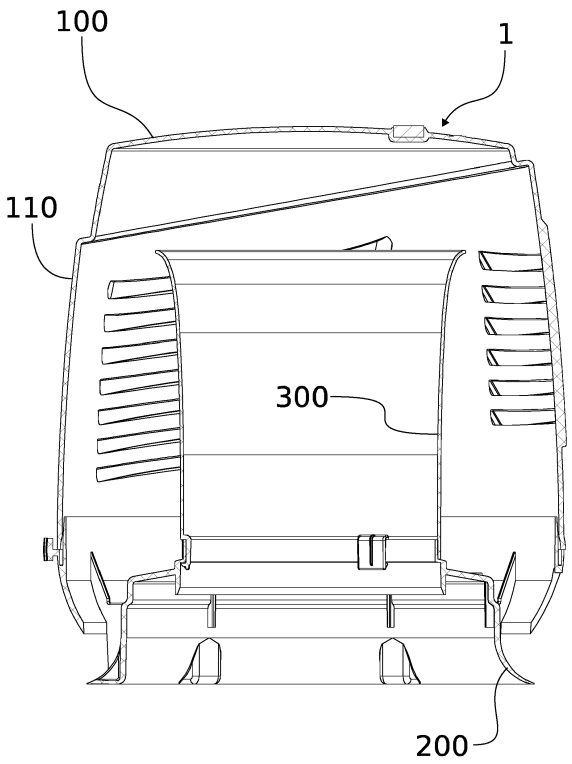


FIG. 3

EP 3 211 339 A1

Description

FIELD OF TECHNOLOGY

[0001] The present invention relates to ventilation technology. In particular, the invention relates to air-intake devices for a replacement-air system. More specifically, the invention relates to an air-intake device according to the preamble of claim 1.

BACKGROUND ART

[0002] Air-intake devices are widely used in building technology for feeding replacement air to a ventilation system. An air-intake device is a guard at the end of the replacement-air pipe, which connects the replacement-air pipe to the environment and prevents rain, snow, loose dirt, animals, and other external factors from entering the ventilation system. When designing air-intake devices, it is of central importance to protect the replacement-air pipe from these external factors, without endangering the operation of the ventilation system by limiting the air flow. For this reason, the ventilation openings of air-intake devices are usually short through-holes, which are made at right angles to the side of the air-intake devices' casing. The number of holes is usually kept large, so that air can flow as unrestrictedly as possible. A conventional example of ventilation openings is a grid. However, it has been observed that an insufficient separation capacity is achieved by using the grid solution, because in windy weather rain can pass through the grid into the replacement-air pipe and from there to the ventilation system.

[0003] The present invention is intended to create an air-intake device, which protects the replacement-air pipe as well as possible, without, however, increasing flow resistance.

SUMMARY

[0004] In the solution presented, the air-intake device includes a casing, in which there is a jacket element, which encases the air-intake pipe to protect it from weather conditions. The wall of the jacket element comprises one or several ventilation duct(s), which extend(s) from the outer opening formed in the outer surface of the wall to an inner opening formed in the inner surface of the wall, to permit the entry of air from the outside of the casing to in air-intake pipe inside the casing. The ventilation duct is formed to be inclined in respect to the normal of the jacket element such that the outer opening of the ventilation duct is lower that the inner opening.

[0005] More specifically, the invention is characterized by what is stated in the characterizing portion of claim 1.

[0006] Significant advantages are gained with the aid of the invention. By means of the slanting ventilation duct an improved water-separation property is achieved, because the air flow in the ventilation duct includes a vertical component, making it difficult for water to flow into the casing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] In the following, some embodiments are described in greater detail with reference to the accompanying drawings, in which:

Figure 1 shows a perspective upper view of an air-intake device according to one embodiment,

Figure 2 shows a side view of the air-intake device according to Figure 1,

Figure 3 shows a cross-sectional view along line A-A of Figure 2, and

Figure 4 shows a perspective lower view of the air-intake device according to figure 1.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0008] As can be seen from Figures 1 - 4, the air-intake device 1 according to one embodiment comprises mainly a closed structure, in which a casing 100 installed on top of a frame 200 covers an air-intake pipe 300 to protect it from weather conditions and other external factors, such as rubbish and small animals. In the embodiment shown, the casing 100 is generally cylindrical, the upper part being circular and the jacket element 100 widening downwards. In the lower part of the casing 100 is a shape-joint to permit a connection with the frame 200. Alternatively, in the lower part of the casing 100 there could be attachment shapes for attaching the air-intake device 1 to a receiving structure, such as a ventilation pipe in the basement of a building. In the example shown, the frame 200 is arranged to act as a boundary surface between the air-intake device 1 and the receiving structure.

[0009] A number of ventilation ducts 121 are arranged in the jacket element 110 of the casing 100 to permit the entry of air from outside the casing 100 to the air-intake pipe 300 inside the casing 100. Though this function could be implemented by using only one largish ventilation duct (not shown), which would run around an annular casing 100, it is preferable to equip the air-intake device 1 with many smaller ventilation ducts, so that the jacket element 110 of the casing 100 can be made sturdy. The ventilation ducts are particularly arranged in the jacket element 110 by equipping the wall of the jacket element 110 with deflectors 120.

[0010] In the embodiment shown, the deflectors 120 comprise a group of ventilation ducts 121, which are delimited by outer and inner openings 122, 123 made in the jacket element 110 of the casing 100 and deviating in the vertical direction, as well as the duct surfaces 124 joining them at an inclined angle. In practice, the edges of the outer and inner openings 122, 123 are formed into a de-

flector 120, which protrudes from the wall of the jacket element 110 outwards and inwards to increase the length of the ventilation ducts, so that the air-intake pipe 300 is especially well protected from weather conditions. It would also be possible for the length of the ventilation ducts to be the same as the wall thickness of the casing. The deflector 120 increasing the wall thickness can be integrated in the wall, for example, by injection moulding or moulding the casing to form a single piece, or the deflector 120 can be a valve separately attached to the wall (not shown).

[0011] As stated, the ventilation ducts 121 are formed at an inclined angle to the jacket element 110. More specifically, the ventilation ducts 121 are at an inclined angle to the normal of the jacket element 110, in such a way that the outer opening 122 of the ventilation duct 121 is lower than the inner opening 123, when the air-intake device 1 is examined in its vertical installed position. An improved water-separation property is achieved by means of the slanting ventilation duct 121, because the air flow in the ventilation duct 121 contains a vertical component, making it difficult for water to flow inside the casing 100 along the duct surfaces 124 that are oriented to slant upwards. As can further be seen from Figures 1 - 4, the deflector 120 comprises a group of ventilation ducts 121 arranged on top of each other. The ventilation ducts 121 on top of each other are arranged in such a way that the upper opening 122 of each upper ventilation duct 121 is closer to the centre of the air-intake device that the outer opening 122 of each lower ventilation duct 121, so that the deflector 120 widens downwards, when the air-intake device 1 is examined in its vertical installed position.

[0012] From Figure 3 it can be particularly seen how the air-intake pipe 300 is oriented outwards from the hollow frame 200 and opens like a horn. More specifically, the said air-intake pipe 300 is shaped to open out in such a way that the inner diameter of the air-intake pipe 300 diminishes in the direction of flow, to permit a laminar air flow. The casing 100 is also attached to the frame 200, so that the air-intake pipe 300 is surrounded by the casing 100. It would also be possible to manufacture the frame 300 and the air-intake pipe 300 as a single piece, in which case the casing 100 would be connected directly to the air-intake pipe 300 to encase its mouth opening.

LIST OF REFERENCE NUMBERS

1	air-intake device
100	casing
110	jacket element
120	deflector
121	ventilation duct
122	outer opening
123	inner opening
124	duct surface
200	frame
300	air-intake pipe

Claims

1. Air-intake device (1) for feeding replacement air to the ventilation system of a building, which air-intake device (1) comprises:

   - an air-intake pipe (300) and
   - a casing (100), which comprises a jacket element (110), which is arranged to encase the air-intake pipe (300) to protect it from weather conditions and the wall of which jacket element (110) comprises one or several ventilation duct(s) (121), which extend(s) from an outer opening (122) formed in the outer surface of the wall to an inner opening (123) formed in the inner surface of the wall, to permit the entry of air from outside the casing (100) to the air-intake pipe (300) inside the casing (100),

   characterized in that the ventilation duct (121) is formed at an inclined angle to the normal of the jacket element (110) such that the outer opening (122) of the ventilation duct (121) is lower than the inner opening (123).

2. Air-intake device (1) according to claim 1, which is further **characterized in that** it comprises a plurality of the said ventilation ducts (121).

3. Air-intake device (1) according to claim 1 or 2, which is further **characterized in that** the wall of the jacket element (110) comprises a deflector (120), which contains a ventilation duct or ducts (121) and which deflector (120) is configured to protrude outwards or inwards or both from the wall compared to the wall portion surrounding the deflector (120), to increase the length of the ventilation duct or ducts (121).

4. Air-intake device (1) according to claim 3, which is further **characterized in that** it comprises a plurality of ventilation ducts (121) on top of each other, which superposed ventilation ducts are arranged in such a way that the outer opening (122) of each upper ventilation duct (121) is closer to the centre of the air-intake device (1) than the outer opening of each lower ventilation duct, wherein the deflector (120) widens downwards.

5. Air-intake device (1) according to any of the above claims, which is further **characterized in that** the

outer opening (122) of the ventilation duct (121) is lower than the inner opening (123), when the air-intake device (1) is in the vertical installed position.

6. Air-intake device (1) according to any of the above claims, which is further **characterized in that** the air-intake pipe (300) is shaped to open out in such a way that the inner diameter of the air-intake pipe (300) decreases in the flow direction, to permit a laminar air flow.

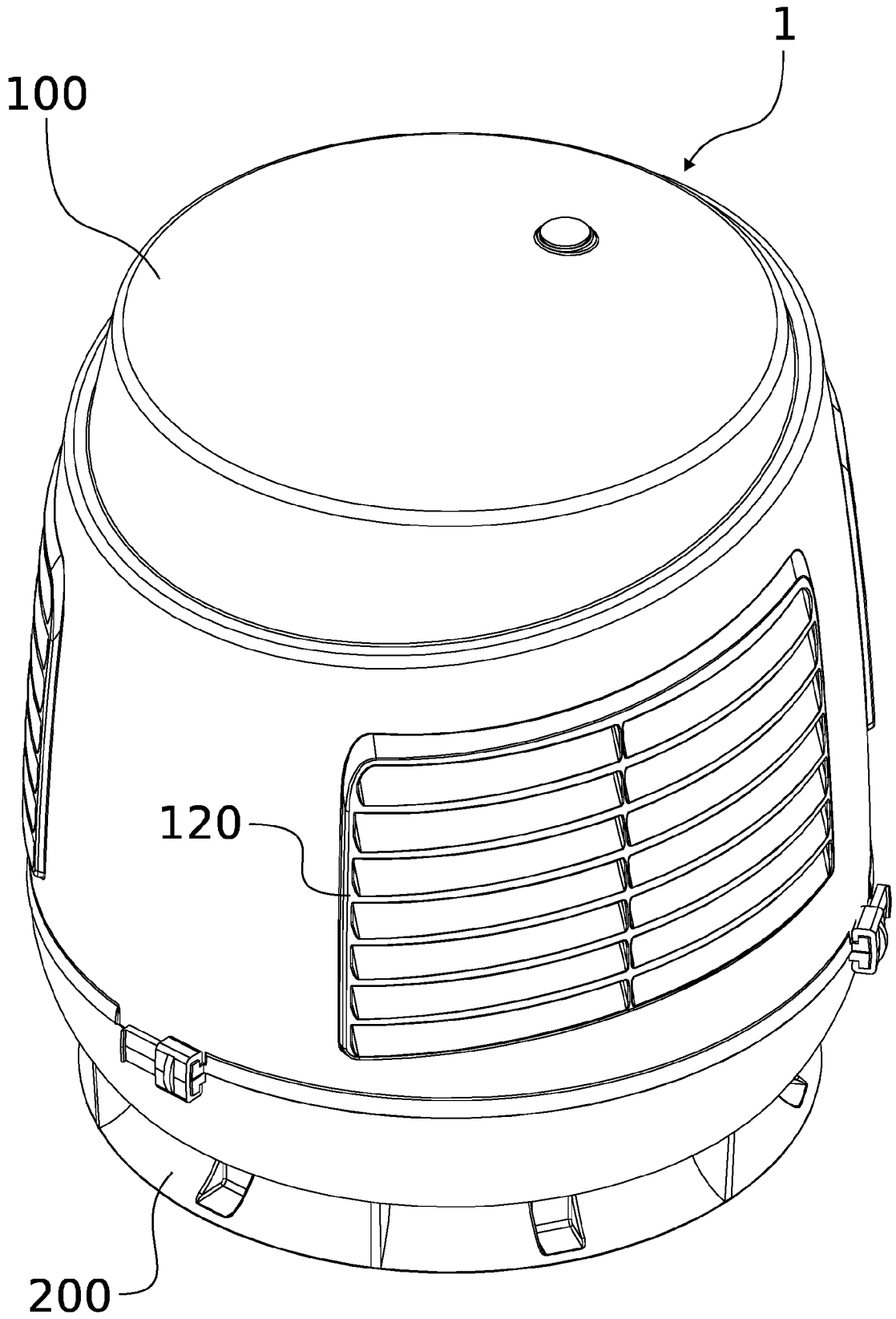


FIG. 1

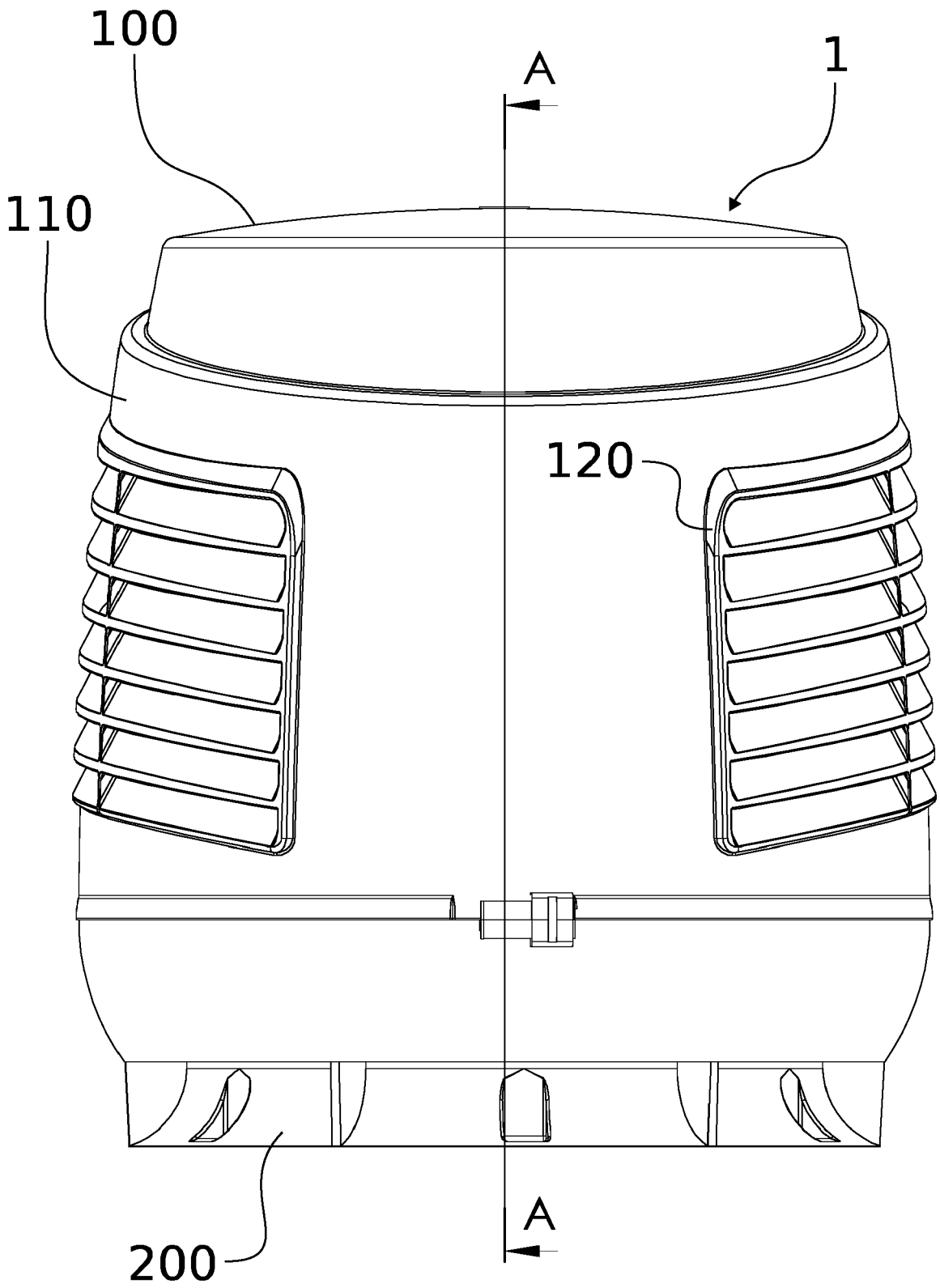


FIG. 2

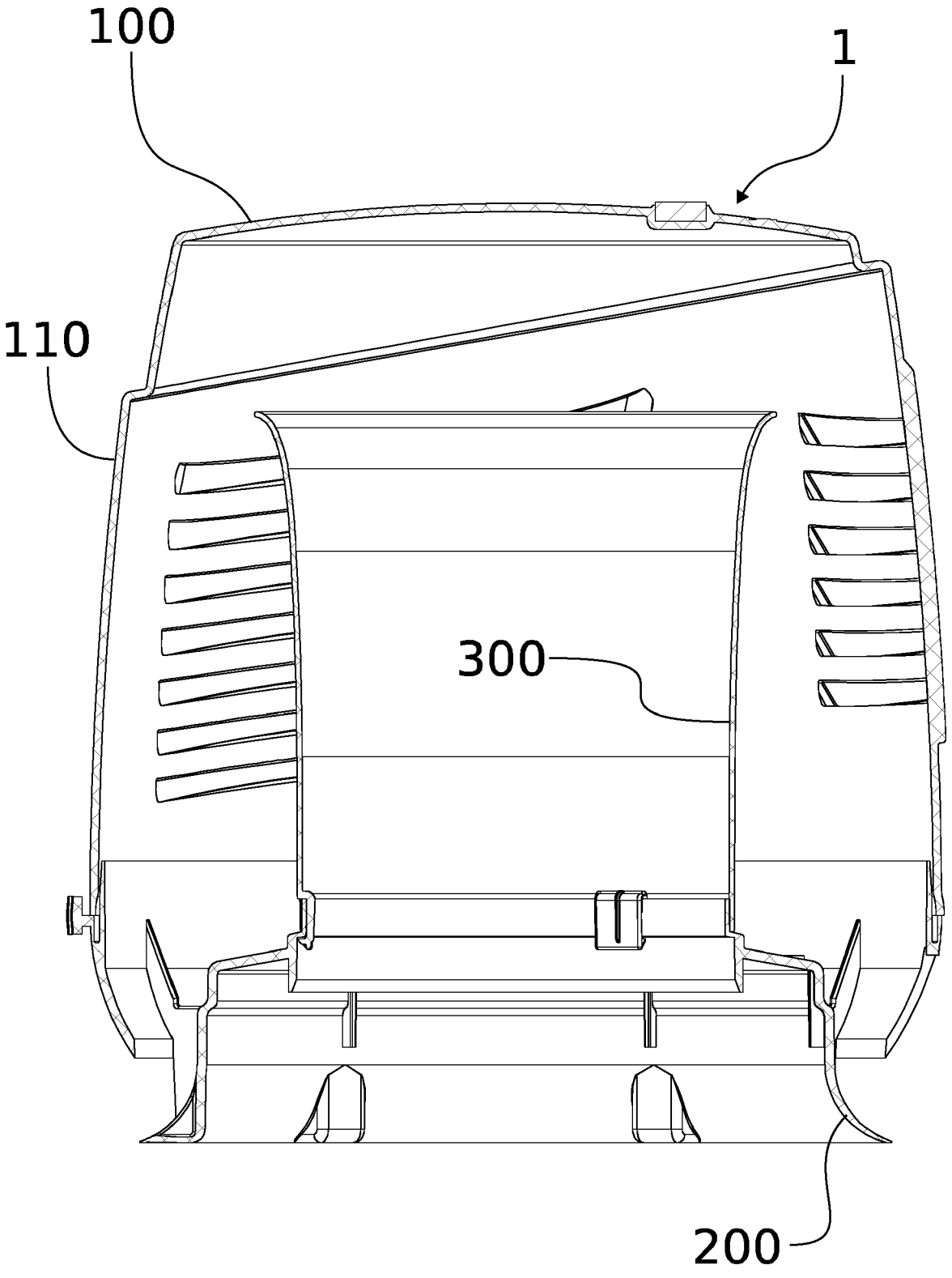


FIG. 3

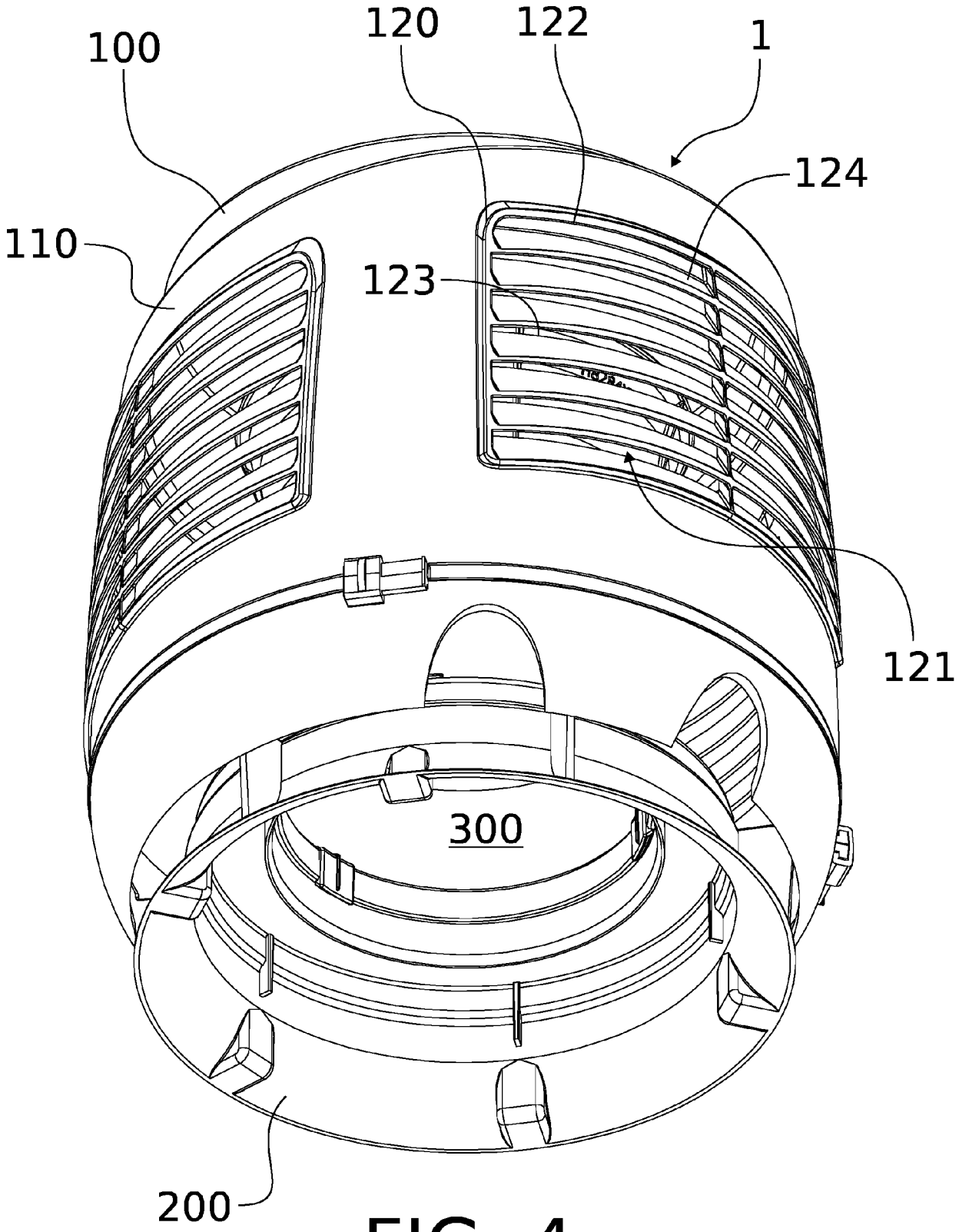


FIG. 4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 17 15 6582

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 2012/184198 A1 (CULL ANTHONY FRANCIS [GB] ET AL) 19 July 2012 (2012-07-19) * abstract; figure 1 * -----	1,2,4-6	INV. F24F7/02 F24F13/08
X	GB 2 150 686 A (GLENDALE ENGINEERING LTD) 3 July 1985 (1985-07-03) * abstract; figures 1-4 * -----	1,3,4,6	

TECHNICAL FIELDS SEARCHED (IPC)

F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	6 July 2017	Decking, Oliver

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 15 6582

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.

06-07-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2012184198 A1	19-07-2012	NONE	
GB 2150686 A	03-07-1985	NONE	

EPO FORM P0459

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