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(72) Inventor; and
(71) Applicant : **BJØRKLUND, Morten Asger Nilsson** [DK/DK]; Snerlevej 14, DK-4180 Sorø (DK).

(74) Agent: **GUARDIAN IP CONSULTING I/S**; Diplomvej, Building 381, DK-2800 Kgs. Lyngby (DK).

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(54) Title: COMPACT SMOKE OR AIR DILUTER FOR HIGH-TEMPERATURE FLUE GAS AND CONTAMINATED AIR

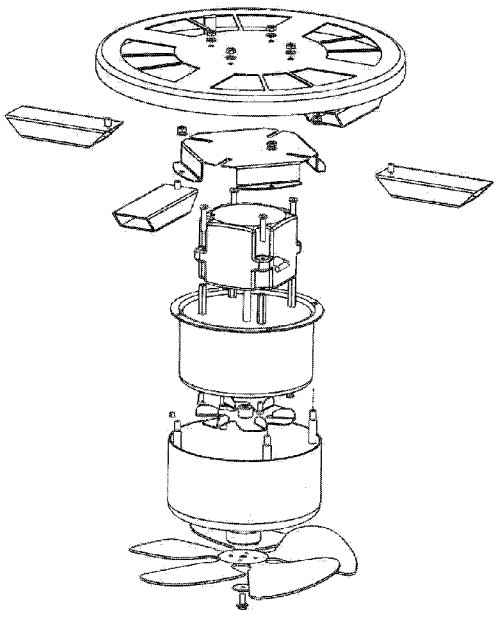

FIG. 1

(57) Abstract: Compact smoke or air diluter for high-temperature flue gas and contaminated air for being mounted at the top of or integrated in a chimney stack or a ventilation system that dilutes and dissipates high-temperature flue gas or contaminated air in the atmosphere, and ensures a normative draw/subatmospheric pressure defined on the basis of preceding requirements to or from connected functional applications consisting of cooling unit/ventilator part: Cooling pipe 9 mounted inserted in cooling top 12. Motor 1 mounted in interior cooling cup 4. The motor shaft is caused to continue out through a circular opening at the bottom of interior cooling cup 4 in a dimension that allows cooling air to pass below the motor 1, past the motor shaft, and out through the opening to exterior cooling cup 5. Between the bottom of interior cooling cup 4 and exterior cooling cup 5, there is, on the motor shaft, securely mounted a cooling medium 8. Through a hole at the bottom of exterior cooling cup 5, the motor shaft is caused to continue, where, at the end, there is mounted a ventilator medium holder 11, on which the ventilator medium 3 is mounted.

COMPACT SMOKE OR AIR DILUTER FOR HIGH-TEMPERATURE FLUE GAS AND CONTAMINATED AIR

The invention relates to a compact, high-temperature-protected smoke or air dilution and diffusion device intended for resisting high-temperature flue gases consisting of heat-protection spaces located in a pipe that uses to advantage the full capacity of the ventilator medium to create a fixed predefined draw or sub-atmospheric pressure at the top of chimney stacks and ventilation systems with simultaneous dilution, ejection and dissipation of high-temperature smoke or contaminated air without ingress of fallen-down atmospheric precipitation in connected functional applications.

The device is of the kind that, mounted at the top of or within chimney stacks and ventilation systems, consists of a pipe of a diameter corresponding approximately to the outer dimension or size of a chimney stack or ventilation system, straight or curved, material, shape and colour and being internally lined with a thin temperature-resistant, dampening material, wherein a double-cooled, heat-protected ventilator part is arranged.

US 4,344,379 Smith et al. teaches a device for roof-mounting, dilution and discharge of contaminated air and gases at high velocity as an alternative to an industrial stack intended for discharging contaminated air, and, by means of adjustable dampers for generating an adjustable draw, adapted to the volume of contaminated air in a ventilation system, and wherein an electric motor is provided on whose shaft is mounted a combination ventilator blade consisting of a primary ventilator blade with fan blades that are interconnected with an auxiliary ventilator blade for cooling of the motor with influent external air, and means for impelling contaminated air in a specified direction, wherein cooling air is used, in addition to providing cooling of the electric motor, for diluting contaminated air. That known device cannot solve

the tasks that the present application has taken on to solve. The device known from US 4,344,370 is, according to the description, constructed to process contaminated air generated during industrial processing operations and is not intended for processing of high-temperature flue gas and contaminated air originating from combustion processes. The concept "chimney" covers, in the US 4,344,370 terminology, a ventilation system from industrial processing operations, but terminologically it does not cover a conventional chimney which, based on choice of materials and requirements, is constructed to receive ventilation from high-temperature flue gases and contaminated air generated in combustion-generating or the like high-temperature generating applications. The device known from US 4,344,370 is, according to the description, intended for being mounted directly on a roof surface and is dimensionally too big for being mounted on a conventional chimney or ventilation system. It will not be able to draw out high-temperature flue gases since the motor is provided only with conventional cooling for motors in closed spaces. The cooling blade is not protected against accumulation of soot and tar particles which, during brief use, sticks to the blades with ensuing considerably reduced cooling function.

The construction provides a cheaper and more attractive discharge or ventilation system than a conventional ventilation system of a corresponding height. It is not allowed in the Scandinavian countries, EU, USA, Canada, and Australia to couple solid-fuel-fired fireplaces to that kind of device in replacement of a chimney, the construction being a direct fire and poisoning hazard. US 4,344,370 focuses on discharge rate of contaminated air to compensate for the height from a ventilation system as opposed to the present application that focuses on heat protection of the device and dilution of high-temperature flue gas or contaminated air.

From Exodraft RSV, a velocity-regulating device is known which is, however, associated with the drawback that a fixed, pre-determined draw, utilisation of

the full capacity of the device for diluting or diffusing smoke or contaminated air are not obtained when the device is configured for random regulation of the velocity according to the user's needs. It is also a distinct drawback that the device known from Exodraft RSV is mounted on a mineral wool batt arranged between the device and the top of the ventilation system which prevents air from penetrating below the device for diluting high-temperature flue gases. It is also a distinct drawback that the device known from Exodraft RSV is, on its own, not configured for creating a fixed pre-determined draw without coupling of external equipment in the form of a measurement and control unit for regulating the draw. It is a distinct drawback that dilution cannot take place without accessory equipment being mounted in the form of a subsequently fitted flange at the top of the ventilation system and mounting of spacer bolts to the effect that false air is introduced below the device. It is also a distinct drawback that, when the velocity and hence the draw in the ventilation system are regulated downwards, Exodraft RSV cannot use to advantage the full capacity of the axial blade to create the most comprehensive cooling, dilution and diffusion possible.

On the device known from Exodraft RSV, axial blade and motor part are separated by a plate whose purpose it is to prevent superheating of the motor from the rising hot flue gas, and to shield the motor in a motor housing which is cooled directly by external air through small openings in the sides. The size of the plate covers an area larger than the area of the axial blades just above the flow of smoke or air. The location of the plate above the axial blades brings about a comparatively large capacity loss. The axial blades are made as a heavy construction, weight-wise, which entails comparatively high demands to motor power. If it is taken into consideration that, to provide a requisite capacity to obtain both draw, dilution and diffusion, and that, for the sake of driving a weight-wise heavy axial blade, it is necessary to use a device with a motor larger than foreseen, it is distinct drawback that it entails a multiplication of the energy consumption.

By the identical devices known from Kützer und Weber, Injekt and Termatech that apply the ejector principle to eject smoke up into the air, it is a distinct drawback that the construction is, by virtue of the open top, not configured for being mounted on chimneys or ventilation systems where fallen-down precipitation is not allowed to penetrate into connected functional applications. Taking into consideration that a large number of users of the connected functional applications are precisely connected directly to the bottom of a ventilation system, it is a distinct drawback that fallen-down precipitation may cause damage to parts of the functional application. However, retro-fittable accessories are available in the form of a rain cover that is arranged over the top of the device to the effect that down-fallen precipitation does not penetrate into the connected functional application, but it is a distinct drawback that thus the device cannot at the same time use the ejector principle of vertical ejection since the rain cover, by being placed over the top, prevents the intended ejector effect of the device. By the velocity-regulating device known from Kützner und Weber, Injekt and Termatech it is a distinct drawback that a fixed, predetermined draw and utilisation of the full capacity of the device for dilution or dissipation cannot be obtained when the speed of the motor is regulated arbitrarily subject to user's needs.

Thus, there is a need for a device which is state-of-the-art in respect of fixed draw, dilution, vertical dissipation, fallen-down precipitation and utilisation of energy for using to advantage the full effect of the motor and in particular for resisting high-temperature flue gases and contaminated air which complies with environmental requirements, service value and requirements to safety and design.

Thus, the invention relates to a mechanical double-cooled device for high-temperature flue gas and contaminated air intended for generating a determined normative or variable draw in chimney stacks and ventilation

systems, wherein draw or sub-atmospheric pressure is instable/poor, and, in operation, for generating an admixture of air/high-temperature smoke or contaminated air, and dissipating them upwardly into the atmosphere, axially in the longitudinal direction of the pipe, for a chimney or a ventilation system, which unit comprises a pipe in which there is mounted a double-acting cooling unit with a ventilator part, in the following designated cooling unit/ventilator part, and which is protected against high temperatures and particles.

The device according to the invention can be mounted on the top of, or be built integrally with, chimney stacks or ventilation systems, and consists of a double-cooled ventilator part arranged interiorly of a pipe of a size approximately corresponding to the outer dimension, the material, curved or straight, shape and colour of a chimney or a ventilation system, and which is lined interiorly with a thin resonance-dampening, high-temperature-resistant material.

The ventilator medium/the cooling unit may, as a separate part, be built into existing or other chimney/ventilation systems and functional applications.

The pipe is made of metal or other suitable material. The pipe may have a shape that is approximately round or edged, curved or straight to the effect that the unit can be adapted to all chimneys and ventilation systems.

At the top of the pipe, a cooling unit/ventilator part is arranged wherein a motor is mounted in independently cooled heat-protection cups. In the cooling unit/the ventilator medium outlying cooling pipes are arranged that, in the outwardly facing end, protrude outside or are flush with the pipe, and, in the inwardly facing end, in the cooling unit/ventilator part, end in an air intake above, below, or at the motor. The motor is secured in an interior cooling cup through which the shaft from the motor is caused to extend out through a

cooling hole at the bottom of the interior cooling cup. Below the interior cooling cup, the shaft is provided with a ventilator medium of a dimension corresponding approximately to the diameter of the bottom of the interior cooling cup, and a height corresponding approximately to the ventilator medium plus requisite work clearance between top and bottom of interior and exterior cooling cup. The interior cooling cup containing motor, and blade arranged exteriorly, is arranged down in an exterior cooling cup of a size that allows optimal amount of cooling air to pass between bottom and sides of interior and exterior cooling cup, and out through the top of the exterior cooling cup via a space below the top flange of the interior cooling cup and the exterior cooling cup. Below the exterior cooling cup, through a hole at the bottom for the shaft, there is, at the end of the shaft, on an adaptor, mounted a ventilator medium.

Below the cooling unit/the ventilator medium a safety grid is arranged or one or more baffle plates, eg in the form of a set of round, inwardly upwardly oriented rings having an internal diameter corresponding to the internal dimension of a chimney or ventilation system, and an external diameter corresponding to the outer dimension of the pipe on the device. The rings are upwardly oriented with varying inclinations relative to the performance, but will preferably be about 45°.

Below the ventilator medium, a heat-protection shield is mounted, arranged in braces that rest in adjustable or fixed holders on the inside of the pipe, on the flange or on the rings. The pipe is mounted on a fixed or exchangeable precipitation-deflecting flange on which a downwardly oriented pipe is mounted of a dimension which, by means of adaptor rings or adaptor holders, can be conveyed down into all of the current chimney interiors or ventilation systems. The hole in the flange can be adjusted to the effect that the draw in the chimney or the ventilation system can be adjusted as needed. The heat protection shield serves the purpose of forming first heat protection

barrier to protect the motor unit and to divert particles from the hot flue gas or contaminated air, and to deflect fallen-down precipitation to prevent it from penetrating further down into the chimney or the ventilation system.

By the invention is provided a device that, from a design point of view, in size, shape, and colour, partakes as a natural part of, or is within, a steel chimney, or, as a less visible part, partakes in size, shape, and colour as a natural part on or in a brick-built chimney or a ventilation system, which device creates a determined draw or sub-atmospheric pressure from the requirements made by a manufacturer or authority to chimneys and ventilation systems connected to the functional application. High-temperature flue gas or contaminated air is diluted and are aired out at the top for higher degree of dissipation in the atmosphere. Owing to construction and choice of intelligent motor control, the energy consumption is very low. Down-fallen rainwater cannot penetrate down into the chimney or the ventilation system and cause damage to connected functional applications. By the high-temperature flue gas or contaminated air admixed with air, the temperature around the cooling unit/ventilator unit is decreased, and, due to the construction of the cooling unit/ventilator medium with heat protection spaces, the temperature of the motor is further reduced to an operation level which is, in respect of the motor, acceptable. To avoid excessive heating of the motor in case of non-occurrence of manual start-up, one or more sensors is/are arranged as motor protection in the cooling unit/ventilator medium that starts/start the motor when the temperature exceeds a given temperature. The same sensor(s) start(s) the motor when the smoke or air diluter is, in case of powerful impact by the sun, heated to a given temperature to the effect that critical motor parts outside normal operation are cooled to acceptable temperature level, which prolongs the longevity of the motor.

According to the invention, this is obtained by using, from a design perspective and from a construction perspective, materials, size, shape and

colour that are approximately adapted to the chimney or the ventilation system to or in which the device is to be mounted. From a functional point of view, the invention is characterised, on the one hand, in that there is arranged, at the top of the pipe, mounted in a top ring, a shield device that prevents birds from falling down into the pipe and prevents contact with rotating parts. The top ring with shield may be provided with a short chain or wire that is secured to the outside of the pipe in which the top ring with grid can be suspended during servicing.

Below the top ring, cooling unit/ventilator part can be secured on the pipe with heat-resistant, vibration-dampening absorbers secured to the pipe, or cooling unit/ventilator part is secured to the shield which is arranged suspended at the top of the pipe. The electric cable from the motor part is provided with a multiple outlet enabling connection of one or more control, measurement or sensor units in the cooling unit/ventilator medium. The control, measurement or sensor units are arranged on one or more critical or strategic places in the cooling unit/ventilator medium. The electric cable is conveyed out through a cooling pipe and down along the pipe to a safety switch that switches off the motor when the device needs cleaning or maintenance or is conveyed to connectors at the end of one or more cooling pipes whose purpose it is to disconnect power when cooling unit/ventilator part is lifted clear of the connectors in the context of servicing or has been conveyed directly to a control box. Below the cooling unit in the ventilation openings, a safety grid is secured, or baffle plates, in the form of adapted, inwardly upwardly oriented rings having an internal diameter approximately corresponding to the inner dimension of the ventilation pipe, and an external diameter corresponding approximately to the outer dimension of the pipe, larger than or equal to. The rings transport the dilution air into the column of smoke or contaminated air that comes from the top of the chimney or the ventilation system and upwards to the ventilator medium, and conduct down-fallen rainwater away. The device is secured on a fixed or exchangeable

flange with outward inclination to deflect precipitation and provided with a downwardly oriented pipe of a dimension which, by means of adaptor rings, can be conveyed down into all current sizes of chimneys or ventilation systems. Below the device that abuts on the top of the chimney or ventilation system, a vibration dampening material/sealing ring is provided that reduces resonance, vibrations and ingress of precipitation.

Functionally, the invention is characterised, on the one hand, in that the cooling air of the cooling unit is drawn in through one or more outlying cooling pipes and into an air intake mounted on the interior cooling cup in which the upper part of the motor housing is located. The cooling air cools the motor housing, is then forced downwards between the external sides of the motor housing and the wall of the interior cooling cup. The cooling air is conveyed onwards down below the motor housing, out through an opening at the bottom of interior cooling cup, and out into exterior cooling cup where the cooling air ventilator medium mounted to the motor shaft forces the cooling air out into the space underneath the bottom of interior cooling cup and the bottom of exterior cooling cup, and up the sides between the external walls of interior and exterior cooling cups. The cooling air then debouches horizontally into the space between interior and exterior cooling cups' top flange at the top below the air intake and out into the admixed atmospheric air/high-temperature smoke or contaminated air that comes from the ventilator medium below the cooling unit/ventilator medium. The particular construction of the cooling unit/ventilator medium and choice of intelligent motor type enables adaptation of the cooling unit/ventilator medium to different sizes of pipes and hence modification of the capacity and energy consumption of the overall unit merely by elongation of cooling pipe and modification of the dimension of the ventilator medium in response to the requirements to size/function for chimneys and ventilation and/or requirements to connected functional applications.

According to one embodiment, the top of the device is configured to be narrowing like a nozzle for increasing the velocity of the ejection approximately as an ejector effect.

According to a further embodiment, the ventilation openings in the pipe for dilution air below ventilator part/cooling unit are enlarged by a separate part consisting of a network, grid or a set of inwardly facing, upwardly oriented rings having an internal diameter approximately corresponding to the inner dimension of the chimney pipe or the ventilation system, and an external diameter approximately corresponding to the outer dimension of the device, larger than or equal to.

According to a third embodiment, the cooling unit/ventilator medium is arranged underneath the suspension (facing upwards), wherein the motor part is secured in a single- or double-cooled cooling unit/ventilator part with cooling pipes that simultaneously act as legs arranged on/at the flange or suspended from the pipe.

According to a fourth embodiment, the upwardly oriented rings below the ventilator medium is secured on the outer side of the pipe with an internal diameter corresponding to the outer dimension of the pipe and an external diameter corresponding to the outer dimension of the pipe is larger than or equal to.

According to a fifth embodiment there is, before and/or after the ventilator medium, arranged a filter device serving the purpose of purifying the flue gas or the contaminated air of undesired objects. The filter device is made of metal, ceramic material or of polymeric material suitable for the purpose. Likewise, the pore or mesh size of the filter may be varied depending of the purpose, and, likewise, an immersion bath, an electrostatic or ion-exchange application may partake as a filter.

According to a sixth embodiment, there is provided, in the unit, two ventilators between which a filter device is arranged whose purpose it is to purify the flue gas or the contaminated air of objects.

According to a seventh embodiment there are mounted sensor- and metrological applications for control, registration, reporting, safety, logging, and communication.

The invention will be described in further detail in the following with reference to figure 1:

Sectional view of cooling unit/ventilator part: Cooling pipe 9 mounted inserted in cooling top 12 which, on threaded spacer element 13 with welded exterior cooling cup 5, fixates both interior cooling cup 4 and exterior cooling cup 5. Motor 1 is mounted in interior cooling cup 4 by means of spacer thread 7 attached to motor 1 and at bottom of interior cooling cup 4 by means of screws. The motor shaft is conveyed through a larger circular opening at the bottom of interior cooling cup 4 of a dimension that allows cooling air to pass underneath the motor 1 and further out through the opening to exterior cooling cup 5. Between the bottom of interior cooling cup 4, and exterior cooling cup 5, there is, on the motor shaft, securely mounted a cooling medium 8. The cooling medium 8 draws the cooling air through the interior cooling cup 4 in which the motor 1 is arranged, and presses the cooling air on down through the opening at the bottom of the interior cooling cup 4 and out into the space between the internal cooling cup 4 and the external cooling cup 5 to the cooling medium 8 that is arranged on the through-going motor shaft in the space of the interior cooling cup 4 and the exterior cooling cup 5. The cooling air is pressed, via the cooling medium 8, on into the space between interior cooling cup 4 and exterior cooling cup 5, and up along the sides between the walls of interior cooling cup 4 and exterior cooling cup 5.

Then the cooling air debouches into the space between interior cooling cup 4 and exterior cooling cop 5, at the top below cooling top 12, and out into the admixed atmospheric air/smoke or contaminated air. The motor shaft is caused to continue through a hole at the bottom of exterior cooling cup 5, on which shaft there is, at the end, mounted a ventilation medium holder 11 by which the ventilator medium 3 is secured by means of a screw that has been conveyed through the centres of the ventilator medium 3 and the ventilator medium holder 11 and up into an internal thread in the motor shaft.

Figure 2:

Sectional view of the device that consists of: pipe 14 provided with top ring 10 by means of flaps 15 for securing on pipe 14 by means of screws. Cooling pipe slots 16 at the top of the pipe 14 for lowering of cooling pipe 9 from cooling unit/ventilator part. Below cooling unit/ventilator part there is, on a heat shield 19, securely mounted a safety grid 18. The lowermost part of the pipe 14 is perforated by air intake 17 for drawing in dilution air. The pipe 14 is, down below, secured to an exchangeable bottom flange 20 by means of hinge 21 and a hinge bolt 22.

Claims

1. A device for mounting or integration in or on chimney stacks or ventilation systems for dilution, ejection and dissipation of high-temperature flue gas or contaminated air, consisting of a pipe 14 that has an inlet for hot contaminated air, and an inlet for cooling air for a motor 1, and wherein the pipe 14 has an outlet for the mixture of atmospheric air and hot contaminated air, wherein motor 1 is arranged in a motor space 2 delimited by an interior cooling cup 4, within the pipe 14, and having a ventilator medium 3 on the output shaft for movement of said air mixture, and a cooling medium 8 for movement of cooling air from the surroundings to the motor space 2 and on, **characterised in that** the interior cooling cup 4 is further surrounded by an exterior cooling cup 5 for forming an independently cooled heat protection space 6, in which heat protection space 6 cooling air passes out to said air mixture and which, in operation, does not allow ingress of high-temperature smoke, gas or particles, and the cooling medium 8 is arranged.

2. A smoke or air diluter according to claim 1, **characterised in that:** the motor 1 is provided with one or more ventilator media 11 for moving and distributing high-temperature smoke and/or contaminated air, and is protected by a heat shield 19.

3. A smoke or air diluter according to claim 1, **characterised in that:** there is, in air intake 17, below ventilator medium 3, secured one or more baffle plates in the form of inwardly facing, upwardly oriented rings for conveying air into the air column of high-temperature smoke or contaminated air from the chimney or the ventilation system and up to the ventilator medium.

4. A smoke or air diluter according to claims 3 and 4, **characterised in that:** the baffle plates have an inclination relative to the longitudinal direction of the

unit, which inclination is preferably between 20° and 60°, but is preferably 40°-50°.

5. A smoke or air diluter according to any one of the preceding claims, **characterised in that:** either in or to the unit, one or more cabled or wireless electric, electronic or computer-controlled components are provided for control, registration, reporting, safety, logging and communication.

6. A smoke or air diluter according to any one of the preceding claims, **characterised in that:** the unit comprises a heat shield 19 whose outer diameter approximately corresponds to or is larger than the diameter of the stub of the bottom flange for deflecting heat from high-temperature flue gases and contaminated air and for deflecting down-fallen rainwater.

7. A smoke or air diluter according to any one of the preceding claims, **characterised in that:** the top of the unit is provided with a shield device.

8. A smoke or air diluter according to any one of the preceding claims, **characterised in that:** the unit is provided with a shield device at the air intake 17.

9. A smoke or air diluter according to any one of the preceding claims, **characterised in that**: in the unit, before and/or after ventilator medium 3, a filter device may be provided.

10. A smoke or air diluter according to any one of the preceding claims, **characterised in that**: in the unit, one or more ventilator media 3 may be provided, wherein between the ventilator media 3, a filter device is provided.

11. A smoke or air diluter according to any one of the preceding claims, **characterised in that**: the smoke or air diluter has an external cylindrical

shape or an external shape which is adapted to the chimney or the ventilation system on which or in which the smoke or air diluter is mounted.

12. A smoke or air diluter according to any one of the preceding claims, **characterised in that:** at the top of the pipe 14, mounted in a top ring 10, a shield device is provided.

13. A smoke or air diluter according to claim 12, **characterised in that:** the top ring 10, with shield device, is provided with a suspension chain or wire which is secured to the outside of the pipe 14.

14. A smoke or air diluter according to any one of the preceding claims, **characterised in that:** interiorly of the pipe 14, a thin, resonance-dampening material is provided.

15. A smoke or air diluter according to any one of the preceding claims, **characterised in that:** in the cooling unit/the ventilator medium, outlying cooling pipes 9 are arranged that, at their outwardly oriented ends, protrude outside or are flush with the pipe 14.

16. A smoke or air diluter according to any one of the preceding claims, **characterised in that:** the cooling pipes 9 are, on the downwardly facing face, protected by deflector means.

17. A smoke or air diluter according to any one of the preceding claims, **characterised in that**: in the inwardly facing end in the cooling unit/ventilator part, outlaying cooling pipes 9 are arranged that end in an air intake 17 at the motor 1.

18. A smoke or air diluter according to any one of the preceding claims, **characterised in that:** on the device, energy absorbers, energy

accumulation applications, and control or regulation for driving the electric, electronic and data-controlled components of the device are mounted.

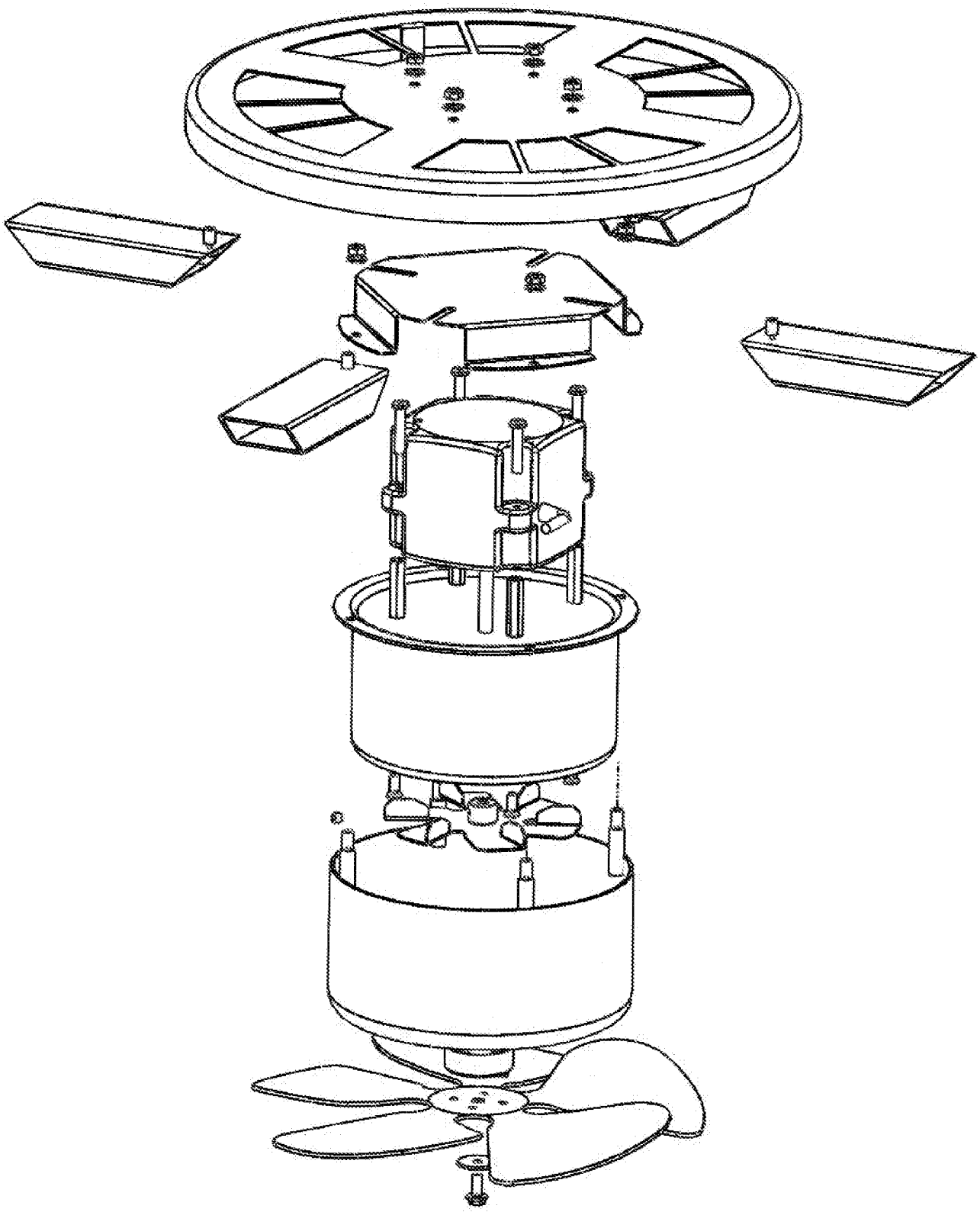

FIG. 1

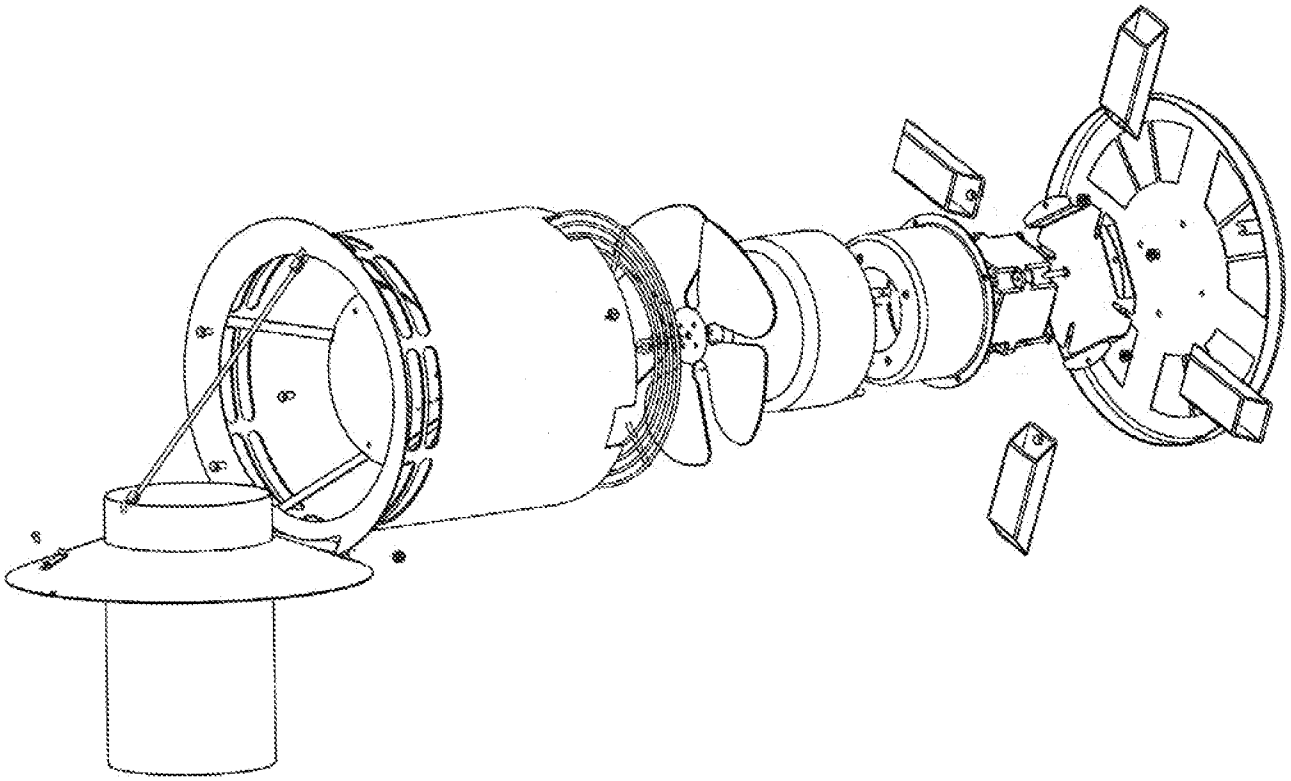

FIG. 2

INTERNATIONAL SEARCH REPORT

International application No
PCT/DK2015/050247

A. CLASSIFICATION OF SUBJECT MATTER
INV. F23L17/02 F23L17/00 F23J13/08
ADD.

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)
F23L F23J

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 199 774 A (LOWELL MAHLON A) 10 August 1965 (1965-08-10) column 1, line 63 - column 3, line 48 figures 1-3	1-18
A	US 4 344 370 A (SMITH W CHRISTEN ET AL) 17 August 1982 (1982-08-17) column 3, line 4 - column 6, line 6 figures 1-3	1-5,7,8, 11,12, 15-17
A	US 4 742 765 A (WEINERT BERND [DE] ET AL) 10 May 1988 (1988-05-10) column 3, line 39 - column 8, line 42 figures 1-3	1,2,5-7, 11-13

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
16 November 2015	23/11/2015

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Rudolf, Andreas

INTERNATIONAL SEARCH REPORT

International application No
PCT/DK2015/050247

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