

(19)



(11)

EP 2 580 532 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
21.06.2017 Bulletin 2017/25

(51) Int Cl.:
F24F 7/02 ^(2006.01) **F24F 13/08** ^(2006.01)
E06B 7/082 ^(2006.01)

(21) Application number: **11738771.2**

(86) International application number:
PCT/GB2011/001072

(22) Date of filing: **18.07.2011**

(87) International publication number:
WO 2012/010825 (26.01.2012 Gazette 2012/04)

(54) VENTILATION ARRANGEMENTS

BELÜFTUNGSANORDNUNGEN

AGENCEMENTS DE VENTILATION

(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**

(30) Priority: **19.07.2010 GB 201012114**

(43) Date of publication of application:
17.04.2013 Bulletin 2013/16

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Description

[0001] The present invention relates to a ventilation arrangement for ventilating a building interior.

[0002] The provision of adequate ventilation is an important consideration in building design. The combination of heat gains generated within buildings by occupants and electrical equipment and solar heat gain can cause a significant build up of heat and, therefore over-heating.

[0003] Air conditioning or other mechanical ventilation systems can be used to provide ventilation to buildings to address these difficulties. However, such systems consume electricity and can, therefore, be relatively expensive to operate.

[0004] One prior arrangement is to provide a duct extending from just above roof level into a building, with the upper end of the duct connecting to outwardly facing openings extending around the duct. During use air can enter the windward side of the duct through respective openings, with stale air exiting from the building through respective openings on the leeward side of the duct.

[0005] In such a configuration, the duct is divided by radial dividers, which could for instance divide the duct into four quadrants, with the quadrant nearest the windward side receiving the most air to ventilate the building, whilst the majority of air extracted from the building exits through the opposite quadrant on the leeward side of the arrangement. A ventilation arrangement for ventilating a building interior according to the preamble of claim 1 is known from document US 2 737 876 A. Such arrangements have operated successfully in providing ventilation with little or no power input. However, problems can be encountered in extreme weather with such arrangements, for example with very heavy rain and particularly snow, leading to ingress of precipitation into the apparatus.

[0006] According to the present invention there is provided a ventilation arrangement for ventilating a building interior according to claim 1.

[0007] The passage may extend upwardly, and at an inclination of between 20 and 40°.

[0008] The upper surface of an inner part of the passage may be concavely curved.

[0009] The upper surface of the inner part of the passage may extend inwardly for a distance of between 35 and 60mm, and more particularly between 40 and 50mm.

[0010] The curved upper surface of the inner part of the passage may have a radius of between 55 and 65mm.

[0011] The upper surface of an outer part of the passage may be concavely curved.

[0012] The upper surface of the outer part of the passage may extend inwardly for a distance of between 35 and 60mm, and more particularly between 40 and 50mm.

[0013] The curved upper surface of the outer part of the passage may have a radius of between 30 and 50mm, and more particularly between 35 and 45mm.

[0014] The outermost part of the upper surface of the

outer part of the passage may extend substantially vertically.

[0015] The lower surface of an inner part of the passage may be concavely curved to accelerate air entering through the passage.

[0016] The lower surface of the inner part of the passage may have a radius of between 35 and 45mm.

[0017] The mouth of the ventilation opening may be between 30 and 70mm wide, and more particularly between 40 and 60mm wide, and especially between 45 and 55mm wide.

[0018] The first components may be moveable over a distance of 40 and 70mm, and more particularly 50 and 60mm, between fully open and fully close positions.

[0019] The first components may each extend vertically for between 40 and 70mm, and more particularly 50 and 60mm.

[0020] The second components may define an outer part of the passage when open, with the first components defining an inner part of the passage. The first components may have concave upper and lower surfaces.

[0021] The underside of the second components, at least at an outer part thereof, may be concave.

[0022] The degree of concavity of the second components may be greater than that of the first components.

[0023] A substantially vertical downwardly facing slot may be provided in the first components towards the external side thereof, which slot is slidably locatable over a formation on a respective second component, such that when the slot is fully located over the formation the passage is fully open, and as the first components are moved relative to the second components the slot is moved off the formation causing closing of the respective passage.

[0024] The slots may each extend vertically for between 40 and 70mm, and more particularly 50 and 60mm.

[0025] The formation on the second components may be in the form of an upwardly extending flange provided on the inner edge of the second component.

[0026] The ventilation arrangement may be substantially polygonal in plan view, with first and second components for each side of the polygon. The ventilation arrangement may be substantially rectangular in plan view.

[0027] The movable first components may be interconnected so as to be simultaneously movable, and link members may interconnect the first components. A respective one of a plurality of link members may interconnect respective ends of the first components.

[0028] The link members may be interconnected, and may all be connected to an actuator member.

[0029] An embodiment of the present invention will now be described by way of example only and with reference to the accompanying drawings, in which:-

Fig. 1 is a diagrammatic perspective view of part of a ventilation arrangement according to the invention;

Fig. 2 is a diagrammatic cross sectional view of part of the arrangement of Fig. 1 in an open condition;

Fig. 3 is a similar view to Fig. 2 but in a closed condition; and

Fig. 4 is a diagrammatic cross sectional view of part of the interior of the part of the ventilation arrangement of Fig. 1.

[0030] Fig. 1 shows the exterior of a housing 10 of a ventilation arrangement which housing 10 is mountable on the roof of a building. Within the housing 10 is a duct which extends downwardly to transport air to and from the interior of the building.

[0031] The housing 10 is substantially square in plan view, with a louvre arrangement 12 on each side of the arrangement 10. The louvre arrangement 12 is intended to receive air on a windward side of the housing 10 to enter the duct 18, and to expel air received through the duct 18 on the opposite leeward side. This invention relates to the louvre arrangement 12 which will now be considered in more detail. The size of the arrangement 12 can be determined by a particular situation, but likely dimensional ranges are included below.

[0032] Each louvre arrangement 12 defines a plurality of passages 14 on the respective side of the housing 10, which passages 14 are selectively partially or wholly closable. Each louvre arrangement 12 comprises a plurality of spaced static second louvre components 16 on an external side of the louvre arrangement 12, and a plurality of spaced movable first louvre components 18 on an interior side thereof.

[0033] The second louvre components have on an internal side an upstanding vertical flange 20 extending for between 40 and 70mm. Extending downwardly and outwardly for a horizontal distance of between 35 and 60mm from the flange 20 is a web 22, which interconnects to a further downwardly extending vertical flange 24, which flange 24 extends for between 25 and 50mm. The inner face of the flange 24 and an outer part of the web 22 is profiled to define a concave surface 26 with a radius of between 30 and 50mm, to urge air passing thereby to turn inwardly and downwardly.

[0034] The first movable louvre components 18 are in the form of mouldings with concave upper and lower faces 28, 30, with a slightly greater degree of concavity on the upper faces 28, and respective radii in the ranges 35 to 45mm and 55 to 65mm. A downwardly facing slot 32 is provided adjacent the external edge of the first components 18, and is of a size to slidingly fit over the flange 20 of the second components. The first moveable components 18 have a height of between 40 and 70mm, and a depth of between 35 and 60mm.

[0035] The first movable components 18 are interconnected by linkage bars 34 at their respective ends. Fig. 4 shows two such linkage bars 34 attached to the first components 18, though in Fig. 4 the first and second components 18, 16 have been shown diagrammatically and not with their full profile. The linkage bars 34 are all interconnected by cross bars 36 one of which is shown

in Fig. 4, and the cross bars 36 are attached to an actuator member (not shown) for actuation. The actuation may be provided manually, or by an electric motor or an actuator, and automatic operation thereof may be provided.

[0036] In use in a fully opened condition as shown in Fig. 2, air as shown by the arrows 38 will enter the passages 14 which have an opening of between 30 and 70mm, substantially parallel to the webs 22 but turn upwardly upon encountering the external faces of the first louvre components 18. The air is then guided inwardly and downwardly by the concave surfaces 26. As the air moves further in it is also directed downwardly by the lower faces 30 on the first louvre components 18, whilst also being accelerated by virtue of the decreasing gap caused by the concave upper faces 28.

[0037] The right hand most arrow 38 shows the air entering into the interior of the ventilation arrangement 10 substantially horizontally, as opposed to in the direction of the outer part of the passage defined by the web 22, which would generally be at an upwards inclination of between 20 and 40°.

[0038] If it is required to partially or wholly close the passages 14, for instance in the event of inclement weather, the first louvre components 18 can be moved upwardly such that the slot 32 moves off the vertical flange 20, and the components 18 can be moved to a fully closed position as shown in Fig. 3.

[0039] There is thus described a ventilation arrangement which provides for an improved passage of air thereinto, with turning of the air downwardly as it enters the arrangement to provide increased efficiency. There is also described a louvre arrangement permitting partial or complete closing as required.

Claims

1. A ventilation arrangement (10) for ventilating a building interior, the ventilation arrangement comprising: an air duct which extends in use from roof level into an interior of the building to be ventilated to convey air between the exterior and interior of the building; ventilation openings (12) which extend around an upper part of the air duct to direct moving air caused by wind movement into or out of the air duct; the ventilation openings having a louvre configuration defining a plurality of discrete passages, one above each other; the louvre configuration being configured such that each passage (14) extends from the exterior into the ventilation arrangement; the passage (14) extending generally upwardly inwards to avoid the ingress of liquids and other precipitation; **characterised by** the louvre configuration comprising a plurality of movable first components (18) and static second components, with the first components being simultaneously movable with each other, with each passage being defined between a respective pair of first components and a respective pair of sec-

- ond components; the second components (16) defining an outer part of the passage when open, with the first components defining an inner part of the passage; with an upper surface (30) of the inner part of the passage (14) being concavely curved to urge downwardly air entering through the passage from outside, and a lower surface (28) of the inner part of the passage being concavely curved to urge upwardly air entering through the passage from outside to accelerate air entering through the passage.
2. A ventilation arrangement according to claim 1, in which the passage (14) extends upwardly, and at an inclination of between 20 and 40°.
 3. A ventilation arrangement according to claims 1 or 2, in which surface of the inner part of the passage (14) extends inwardly for a distance of between 35 and 60mm, and may extend inwardly for a distance of between 40 and 50mm, and the curved upper surface of the inner part of the passage may have a radius of between 55 and 65mm.
 4. A ventilation arrangement according to any of the preceding claims, in which the upper surface (26) of an outer part of the passage is concavely curved, which upper surface of the outer part of the passage may extend inwardly for a distance of between 35 and 60mm, and may extend inwardly for a distance of between 40 and 50mm.
 5. A ventilation arrangement according to claim 4, in which the curved upper surface (26) of the outer part of the passage has a radius of between 30 and 50mm, and may have a radius of between 35 and 45mm.
 6. A ventilation arrangement according to claims 4 or 5, in which the outermost part of the upper surface (26) of the outer part of the passage extends substantially vertically.
 7. A ventilation arrangement according to claim 6, in which the lower surface (28) of the inner part of the passage has a radius of between 35 and 45mm.
 8. A ventilation arrangement according to any of the preceding claims, in which the mouth of the ventilation opening (12) is between 30 and 70mm wide, and may be between 40 and 60mm wide, and may be between 45 and 55mm wide.
 9. A ventilation arrangement according to any of the preceding claims, in which the first components (18) are moveable over a distance of 40 and 70mm between fully open and fully close positions, and may be moveable over a distance of 50 and 60mm between fully open and fully close positions.
 10. A ventilation arrangement according to any of the preceding claims, in which the first components (18) each extend vertically for between 40 and 70mm, and may extend vertically for between 50 and 60mm.
 11. A ventilation arrangement according to any of the preceding claims, in which the underside of the second components (16), at least at an outer part thereof, are be concave, and the degree of concavity of the second components may be greater than that of the first components.
 12. A ventilation arrangement according to any of the preceding claims, in which a substantially vertical downwardly facing slot (32) is provided in the first components towards the external side thereof, which slot is slidably locatable over a formation on a respective second component, such that when the slot is fully located over the formation the passage is fully open, and as the first components are moved relative to the second components the slot is moved off the formation causing closing of the respective passage, and the slots may each extend vertically for between 40 and 70mm, and may extend vertically for between 50 and 60mm.
 13. A ventilation arrangement according to claim 12, in which the formation on the second components (16) is in the form of an upwardly extending flange (20) provided on the inner edge of the second component.
 14. A ventilation arrangement according to any of the preceding claims, in which the ventilation arrangement is substantially polygonal in plan view, with first and second components (18, 16) for each side of the polygon, and the ventilation arrangement may be substantially rectangular in plan view.
 15. A ventilation arrangement according to any of the preceding claims, in which the movable first components are interconnected so as to be simultaneously movable, and link members (34) may interconnect the first components, and a respective one of a plurality of link members may interconnect respective ends of the first components, which link members may be interconnected, and the link members may all be connected to an actuator member.

Patentansprüche

1. Belüftungsanordnung (10) zum Belüften eines Gebäude-Innenbereichs, wobei die Belüftungsanordnung umfasst:

einen Luftschacht, der sich in Verwendung von einer Dachebene in einen Innenbereich des zu

belüftenden Gebäudes erstreckt, um Luft zwischen dem Außenbereich und dem Innenbereich des Gebäudes zu befördern;

Belüftungsöffnungen (12), die sich um einen oberen Teil des Luftschachts erstrecken, um bewegte Luft, verursacht durch Windbewegungen, in den oder aus dem Luftschacht zu leiten; wobei die Belüftungsöffnungen eine Schlitzkonfiguration aufweisen, die eine Mehrzahl an diskreten Passagen definiert, eine über der anderen; wobei die Schlitzkonfiguration konfiguriert ist, so dass jede Passage (14) sich von dem Außenbereich in die Belüftungsanordnung erstreckt; wobei sich die Passage (14) generell nach oben innen erstreckt, um das Eindringen von Flüssigkeiten und anderem Niederschlag zu verhindern;

dadurch gekennzeichnet, dass die Schlitzanordnung eine Mehrzahl an bewegbaren ersten Komponenten (18) und statischen zweiten Komponenten umfasst, wobei die ersten Komponenten gleichzeitig miteinander bewegt werden können, wobei jede Passage zwischen einem jeweiligen Paar aus ersten Komponenten und einem jeweiligen Paar aus zweiten Komponenten definiert ist; wobei die zweiten Komponenten (16) einen äußeren Teil der Passage definieren, wenn diese geöffnet ist, wobei die ersten Komponenten einen inneren Teil der Passage definieren; wobei eine obere Oberfläche (30) des inneren Teils der Passage (14) konkav gekrümmt ist, um Luft, die durch die Passage von außen eintritt, nach unten zu drängen, und eine untere Oberfläche (28) des inneren Teils der Passage konkav gekrümmt ist, um Luft, die durch die Passage von außen eintritt, nach oben zu drängen, um den Lufteintritt durch die Passage zu beschleunigen.

2. Belüftungsanordnung nach Anspruch 1, wobei sich die Passage (14) nach oben erstreckt, und unter einer Neigung zwischen 20 und 40°
3. Belüftungsanordnung nach Anspruch 1 oder 2, wobei sich ein obere Oberfläche des inneren Teils der Passage (14) nach innen über eine Distanz zwischen 35 und 60 mm erstreckt, und sich nach innen über eine Distanz zwischen 40 und 50 mm erstrecken kann, und die gekrümmte obere Oberfläche des inneren Teils der Passage einen Radius zwischen 55 und 65 mm haben kann.
4. Belüftungsanordnung nach einem der voranstehenden Ansprüche, wobei die obere Oberfläche (26) eines äußeren Teils der Passage konkav gekrümmt ist, welche obere Oberfläche des äußeren Teils der Passage sich nach innen über eine Distanz zwischen 35 und 60 mm erstrecken kann, und sich nach

innen über eine Distanz zwischen 40 und 50 mm erstrecken kann.

5. Belüftungsanordnung nach Anspruch 4, wobei die gekrümmte obere Oberfläche (26) des äußeren Teils der Passage einen Radius zwischen 30 und 50 mm hat, und einen Radius zwischen 35 und 45 mm haben kann.
6. Belüftungsanordnung nach Anspruch 4 oder 5, wobei sich der äußerste Teil der oberen Oberfläche (26) des äußeren Teils der Passage im Wesentlichen vertikal erstreckt.
7. Belüftungsanordnung nach Anspruch 6, wobei die untere Oberfläche (28) des inneren Teils der Passage einen Radius zwischen 35 und 45 mm hat.
8. Belüftungsanordnung nach einem der voranstehenden Ansprüche, wobei der Mund der Belüftungsöffnung (12) zwischen 30 und 70 mm breit ist, und zwischen 40 und 60 mm breit sein kann, und zwischen 45 und 55 mm breit sein kann.
9. Belüftungsanordnung nach einem der voranstehenden Ansprüche, wobei die ersten Komponenten (18) über eine Distanz von 40 und 70 mm bewegbar sind, zwischen vollständig geöffneten und vollständig geschlossenen Positionen, und über eine Distanz von 50 und 60 mm bewegbar sein können, zwischen vollständig geöffneten und vollständig geschlossenen Positionen.
10. Belüftungsanordnung nach einem der voranstehenden Ansprüche, wobei sich die ersten Komponenten (18) jeweils vertikal zwischen 40 und 70 mm erstrecken, und sich vertikal zwischen 50 und 60 mm erstrecken können.
11. Belüftungsanordnung nach einem der voranstehenden Ansprüche, wobei die Unterseite der zweiten Komponenten (16), wenigstens an einem äußeren Teil davon, konkav sind, und der Grad an Konkavität der zweiten Komponenten größer sein kann als der der ersten Komponenten.
12. Belüftungsanordnung nach einem der voranstehenden Ansprüche, wobei ein im Wesentlichen vertikal nach unten gerichteter Schlitz (32) in den ersten Komponenten bereitgestellt ist, hin zu der externen Seite davon, welcher Schlitz verschiebbar über eine Formation auf einer jeweiligen zweiten Komponente positionierbar ist, so dass, wenn der Schlitz vollständig über der Formation angeordnet ist, die Passage vollständig geöffnet ist, und, wenn die ersten Komponenten relativ zu den zweiten Komponenten bewegt werden, der Schlitz von der Formation herunter bewegt wird, wodurch bewirkt wird, dass sich die je-

weilige Passage schließt, und sich die Schlitze jeweils vertikal zwischen 40 und 70 mm erstrecken können und sich vertikal zwischen 50 und 60 mm erstrecken können.

13. Belüftungsanordnung nach Anspruch 12, wobei die Formation auf den zweiten Komponenten (16) die Form eines sich nach oben erstreckenden Bundes (20) hat, bereitgestellt auf der inneren Kante der zweiten Komponente.

14. Belüftungsanordnung nach einem der voranstehenden Ansprüche, wobei die Belüftungsanordnung in Draufsicht im Wesentlichen polygonal ist, mit ersten und zweiten Komponenten (18, 16) für jede Seite des Polygons, und die Belüftungsanordnung im Wesentlichen rechteckig in Draufsicht sein kann.

15. Belüftungsanordnung nach einem der voranstehenden Ansprüche, wobei die bewegbaren ersten Komponenten miteinander verbunden sind, so dass sie gleichzeitig bewegt werden können, und Verbindungselemente (34) die ersten Komponenten miteinander verbinden können, und ein jeweiliges aus einer Mehrzahl von Verbindungselementen jeweilige Enden der ersten Komponenten miteinander verbinden kann, welche Verbindungselemente miteinander verbunden sein können, und die Verbindungselemente alle mit einem Aktorelement verbunden sein können.

Revendications

1. Dispositif de ventilation (10) pour ventiler l'intérieur d'un bâtiment, le dispositif de ventilation comprenant : un conduit d'air qui s'étend en utilisation depuis le niveau du toit jusqu'à un intérieur du bâtiment à ventiler pour transporter de l'air entre l'extérieur et l'intérieur du bâtiment ; des ouvertures de ventilation (12) qui s'étendent autour d'une partie supérieure du conduit d'air pour diriger l'air en mouvement provoqué par le mouvement du vent dans ou hors du conduit d'air ; les ouvertures de ventilation ayant une configuration de ventelle définissant une pluralité de passages discrets, l'un au-dessus de l'autre ; la configuration de ventelle étant configurée de sorte que chaque passage (14) s'étend depuis l'extérieur jusque dans le dispositif de ventilation ; le passage (14) s'étendant de manière générale vers le haut vers l'intérieur pour éviter l'entrée de liquides et d'autres précipitations ;
caractérisé par la configuration de ventelle comprenant une pluralité de premiers composants mobiles (18) et de seconds composants statiques, les premiers composants étant mobiles simultanément l'un avec l'autre, chaque passage étant défini entre une

re respective de seconds composants ; les seconds composants (16) définissant une partie extérieure du passage lorsqu'ils sont ouverts, les premiers composants définissant une partie intérieure du passage ; une surface supérieure (30) de la partie intérieure du passage (14) étant courbée de manière concave pour pousser vers le bas l'air entrant à travers le passage depuis l'extérieur, et une surface inférieure (28) de la partie intérieure du passage étant courbée de manière concave pour pousser vers le haut l'air entrant à travers le passage depuis l'extérieur pour accélérer l'air entrant à travers le passage.

2. Dispositif de ventilation selon la revendication 1, dans lequel le passage (14) s'étend vers le haut, et avec une inclinaison comprise entre 20 et 40 °.

3. Dispositif de ventilation selon la revendication 1 ou 2, dans lequel la surface supérieure de la partie intérieure du passage (14) s'étend vers l'intérieur sur une distance comprise entre 35 et 60 mm et peut s'étendre vers l'intérieur sur une distance comprise entre 40 et 50 mm, et la surface supérieure incurvée de la partie interne du passage peut avoir un rayon compris entre 55 et 65 mm.

4. Dispositif de ventilation selon l'une quelconque des revendications précédentes, dans lequel la surface supérieure (26) d'une partie extérieure du passage est courbée de manière concave, laquelle surface supérieure de la partie extérieure du passage peut s'étendre vers l'intérieur sur une distance comprise entre 35 et 60 mm, et peut s'étendre vers l'intérieur sur une distance comprise entre 40 et 50 mm.

5. Dispositif de ventilation selon la revendication 4, dans lequel la surface supérieure incurvée (26) de la partie extérieure du passage a un rayon compris entre 30 et 50 mm et peut avoir un rayon compris entre 35 et 45 mm.

6. Dispositif de ventilation selon la revendication 4 ou 5, dans lequel la partie la plus extérieure de la surface supérieure (26) de la partie extérieure du passage s'étend sensiblement verticalement.

7. Dispositif de ventilation selon la revendication 6, dans lequel la surface inférieure (28) de la partie intérieure du passage a un rayon compris entre 35 et 45 mm.

8. Dispositif de ventilation selon l'une quelconque des revendications précédentes, dans lequel l'embouchure de l'ouverture de ventilation (12) a une largeur comprise entre 30 et 70 mm et peut être comprise entre 40 et 60 mm de large, et peut être comprise entre 45 et 55 mm de large.

9. Dispositif de ventilation selon l'une quelconque des revendications précédentes, dans lequel les premiers composants (18) sont mobiles sur une distance de 40 et 70 mm entre des positions complètement ouvertes et complètement fermées, et peuvent être mobiles sur une distance de 50 et 60 mm entre des positions complètement ouvertes et complètement fermées. 5
10. Dispositif de ventilation selon l'une quelconque des revendications précédentes, dans lequel les premiers composants (18) s'étendent chacun verticalement sur une distance comprise entre 40 et 70 mm et peuvent s'étendre verticalement sur une distance comprise entre 50 et 60 mm. 10
15
11. Dispositif de ventilation selon l'une quelconque des revendications précédentes, dans lequel la face inférieure des seconds composants (16), au moins au niveau d'une partie extérieure de celle-ci, est concave et le degré de concavité des seconds composants peut être supérieur à celui des premiers composants. 20
12. Dispositif de ventilation selon l'une quelconque des revendications précédentes, dans lequel une fente (32) sensiblement verticale dirigée vers le bas est prévue dans les premiers composants vers le côté externe de ceux-ci, laquelle fente peut être positionnée de manière coulissante sur une formation sur un second composant respectif, de sorte que lorsque la fente est entièrement située au-dessus de la formation, le passage est complètement ouvert, et lorsque les premiers composants sont déplacés par rapport aux seconds composants, la fente est déplacée hors de la formation provoquant la fermeture du passage respectif, et les fentes peuvent chacune s'étendre verticalement sur une distance comprise entre 40 et 70 mm, et peuvent s'étendre verticalement sur une distance comprise entre 50 et 60 mm. 25
30
35
40
13. Dispositif de ventilation selon la revendication 12, dans lequel la formation sur les seconds composants (16) se présente sous la forme d'une bride (20) s'étendant vers le haut, prévue sur le bord intérieur du second composant. 45
14. Dispositif de ventilation selon l'une quelconque des revendications précédentes, dans lequel le dispositif de ventilation est sensiblement polygonal en vue de dessus, avec des premier et second composants (18, 16) pour chaque côté du polygone, et le dispositif de ventilation peut être sensiblement rectangulaire en vue de dessus. 50
55
15. Dispositif de ventilation selon l'une quelconque des revendications précédentes, dans lequel les premiers composants mobiles sont interconnectés de

manière à être mobiles simultanément, et des éléments de liaison (34) peuvent interconnecter les premiers composants, et un élément respectif parmi une pluralité d'éléments de liaison peut interconnecter les extrémités respectives des premiers composants, lesquels éléments de liaison peuvent être interconnectés, et les éléments de liaison peuvent tous être connectés à un élément d'actionnement.

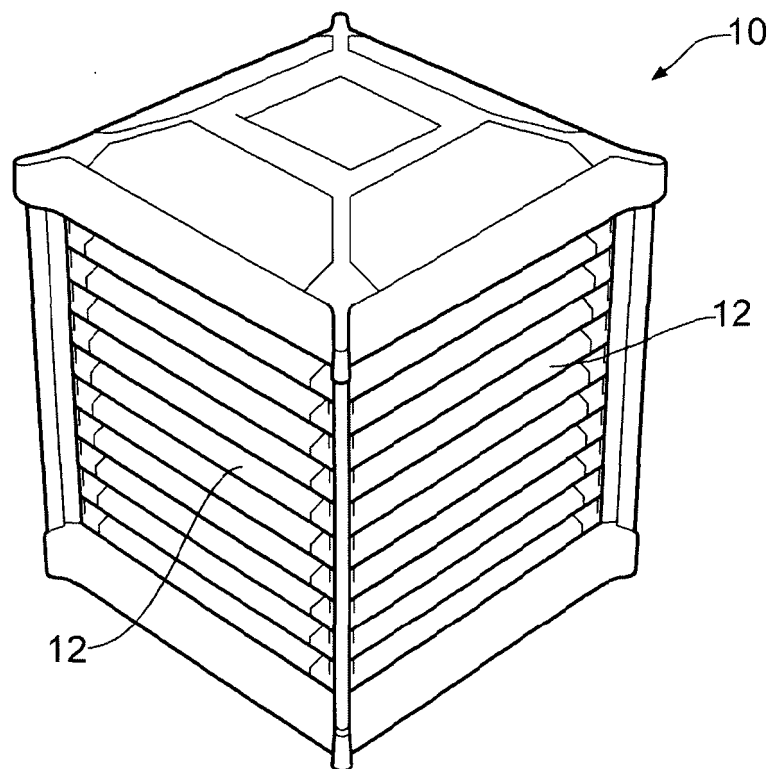


FIG. 1

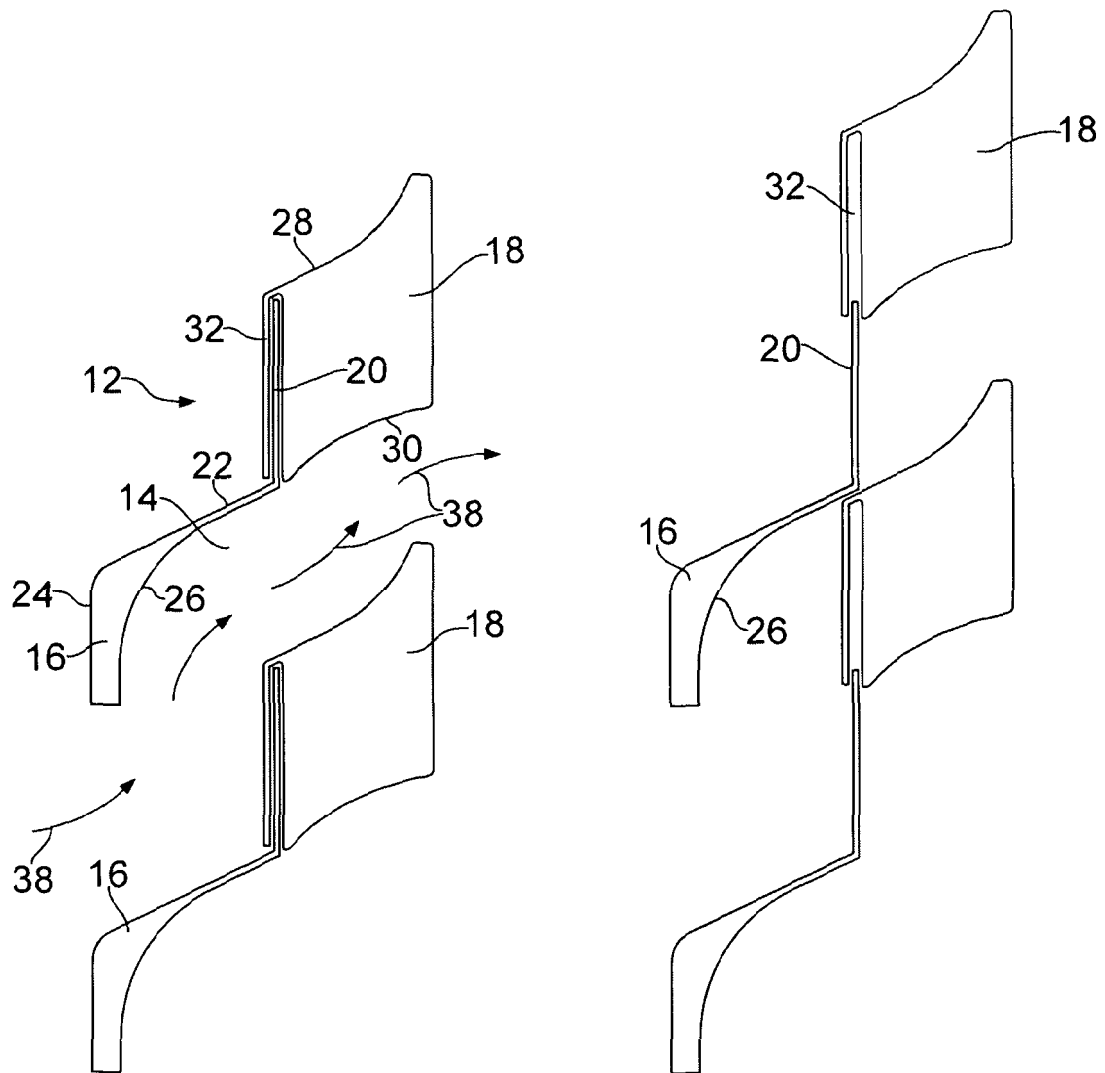


FIG. 2

FIG. 3

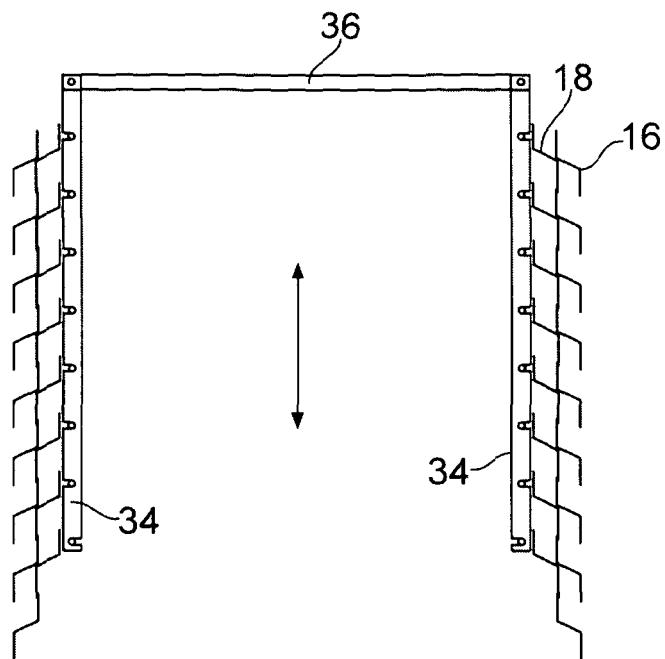


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2737876 A [0005]