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

(11) **EP 1 956 315 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
13.08.2008 Bulletin 2008/33

(51) Int Cl.:
F24F 13/14 *(2006.01)*

(21) Application number: **08001167.9**

(22) Date of filing: **23.01.2008**

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

(30) Priority: **06.02.2007 IT MI20070204**

(71) Applicants:
- **Fornasini, Daniela**
  20132 Milano (IT)
- **Marchesi, Paolo Luciano**
  20021 Bollate (MI) (IT)

(72) Inventors:
- **Fornasini, Daniela**
  20132 Milano (IT)
- **Marchesi, Paolo Luciano**
  20021 Bollate (MI) (IT)

(74) Representative: **Lecce, Giovanni**
Dott. Giovanni Lecce & C. S.r.l.
Via Fratelli Ruffini, 9
20123 Milano (IT)

(54) Air vent for air conditioning apparatus

(57) A device (10) for built-in conditioning apparatus, especially suitable to be used in combination with conditioning systems to be installed recessed in the wall, in false ceilings, at doors, walk-in cupboards or spaces obtained in bookcases comprising a front cover (12) placed for closing an open face of a container body (20) suitable for receiving a conditioning apparatus (22), with the front cover (12) of said device that comprises motor means for moving in opening/closing, in an independent manner, at least two top and bottom mobile panels (16, 16').

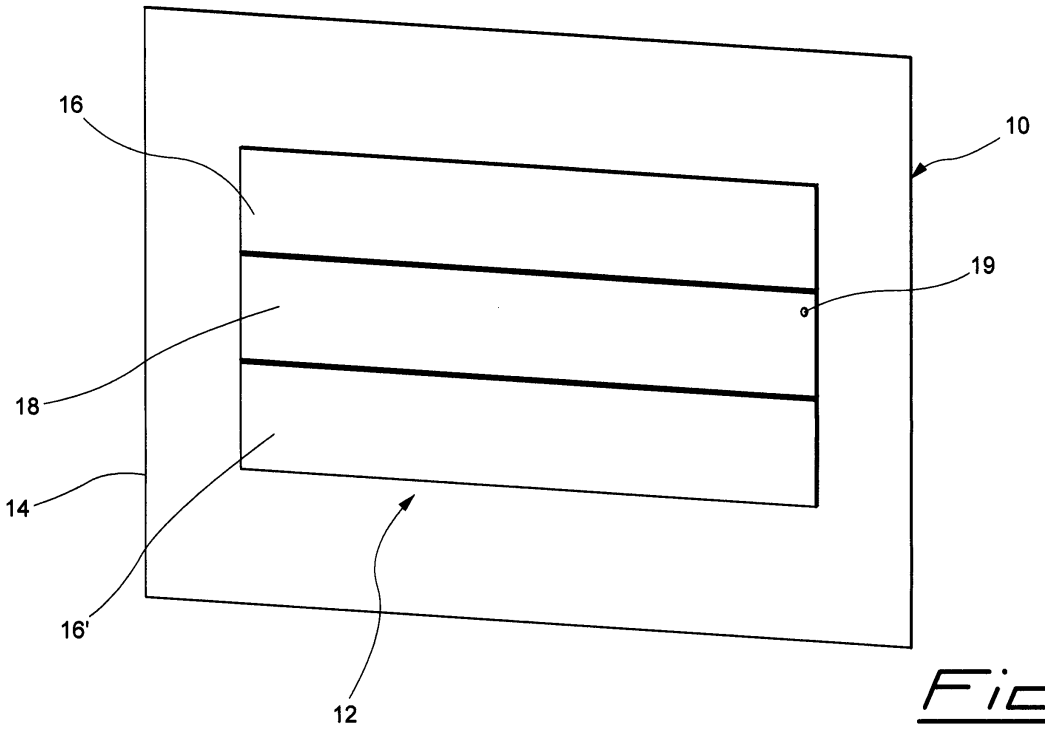


Fig.1

EP 1 956 315 A1

Description

[0001] This invention relates to a device for built-in conditioning apparatus.

[0002] More in particular, this invention relates to a device especially suitable for being used in combination with the conditioning systems to be installed recessed in the wall and belonging to the type commonly known as "split"; the same device finds application for the embedding of conditioning apparatus in false ceilings, at doors, walk-in cupboards or spaces obtained in bookcases, or the like.

[0003] As is known, wall or "split" conditioning apparatus is generally composed of an indoor unit and an outdoor unit, that is, the compressor that being a source of noise, is usually located outside the building. The indoor unit, applied to the wall, is in some cases and for purely aesthetic reasons, arranged in a container built in the wall and closed by a grid, so as to hide the indoor unit of the conditioning apparatus to sight; this for the purpose of having an even and straightforward living environment.

[0004] Such grid is applied, by screws or other known types of constraint, to an integrated frame which is in turn constrained to the box for receiving the conditioning apparatus and fixed to the wall.

[0005] The closing grids for wall built-in conditioning apparatus, however, are fixed and have the drawback of preventing the air from flowing easily. The grid closing or covering of the box for embedding the conditioning apparatus tends to create a backflow of the conditioned air in output that returns in circulation, thus actuating the temperature probe of the apparatus, which thus senses a temperature value not matching the real one of the outside environment.

[0006] A further drawback of conventional closing systems for wall built-in conditioning apparatus is represented by the fact that they do not allow easy maintenance of the conditioning apparatus itself; in fact, it is necessary to remove the covering grid at each inspection and/or check of the conditioning apparatus.

[0007] The object of this invention is to obviate the drawbacks mentioned hereinabove.

[0008] More in particular, the object of this invention is to provide a device for built-in conditioning apparatus which is compatible with all the conditioning systems available on the market.

[0009] A further object of this invention is to provide a device that allows a regular flow of the conditioned air preventing a backflow of the same.

[0010] A further object of this invention is to provide a device for built-in conditioning apparatus which allows easy maintenance and/or inspection of the conditioning apparatus itself.

[0011] A further object of this invention is to provide the users with a device for built-in conditioning apparatus suitable for ensuring a high level of resistance and reliability over time, also such as to be easily and inexpensively constructed.

[0012] These and other objects are achieved by the device for built-in conditioning apparatus of this invention which comprises a front cover placed for closing an open face of a container body suitable for receiving a conditioning apparatus, with the front cover of said device that comprises motor means for moving in opening/closing, in an independent manner, at least two respectively top and bottom mobile panels.

[0013] The construction and functional features of the device for built-in conditioning apparatus of this invention shall be better understood from the following detailed description, wherein reference is made to the annexed drawing tables showing a preferred and non-limiting embodiment thereof, and wherein:

figure 1 shows a schematic and axonometric view of the device for conditioning apparatus of this invention, mounted to the wall;

figure 2 shows a schematic axonometric view of the device of the invention;

figures 3 and 4 show a schematic and axonometric view of the device of the invention in open configuration for inspecting and/or maintaining the conditioning apparatus;

figure 5 shows a schematic side view of a portion of the device of the invention;

[0014] With reference to the above figures, the device for built-in conditioning apparatus of this invention, indicated with 10 in the assembly of figure 1, comprises a panelled front cover 12 covering the wall built-in conditioning apparatus, at doors or the like.

[0015] The front cover 12 comprises at least two mobile panels 16 and 16', top and bottom and respectively located at the zone of inlet of the air to be treated and of outlet of the conditioned air; the same front cover 12 in case also comprises a fixed central panel 18. However, in alternative embodiments, also the central panel 18 may be mobile.

[0016] The front cover 12, with specific reference to the preferred embodiment, is fixed in a conventional manner to an optional box or container body 20 by one of the open faces in order to receive the conditioning apparatus 22; said optional container body 20 is suitable for being inserted in the cavity obtained on the wall (not shown in the figure) or in any other element or furnishing component suitable for receiving a built-in conditioning apparatus.

[0017] A lip 24, obtained along the external perimeter of the open face of the optional container body 20, defines a constraint surface for the container body itself relative to the wall or to the optional frame 14 in case provided.

[0018] The front cover 12, which is placed for closing the optional container body 20, may be flush with the wall or the optional frame 14 or detached (in this case, the optional container body 20 protrudes relative to the wall) according to the particular aesthetic and furnishing

needs.

[0019] The front cover 12 is hinged relative to a side of the open face of the optional container body 20, preferably the top side, so as to allow easy opening of the front cover itself for carrying out periodical maintenance and/or inspection operations of the conditioning apparatus 22.

[0020] In alternative embodiments, the front cover 12 is hinged relative to the optional frame 14 or relative to one of the outer edges of the cavity suitable for receiving the conditioning apparatus.

[0021] The opening/closing movement, carried out manually, of the front cover 12 relative to the optional container body 20 and the keeping thereof in open position is obtained through the use of at least one spring element 26, for example a gas spring. The same opening/closing movement of the front cover 12 and the keeping thereof in open position, in an alternative embodiment, may be obtained through a mechanical linkage or an electrical actuator that allows the automatic opening/closing of the front cover itself.

[0022] A plate or shoulder 28 arranged perpendicular to the front cover itself and facing inwards of the optional container body 20 is fixed in a known manner along the inner front of the front cover 12 and at at least one of the two opposite side edges. The spring element 26, mentioned above, is fixed by an end to the optional container body 20 and by the other one to the shoulder 28 or to the inner front of the front cover 12.

[0023] The shoulder 28 defines the seat for receiving the means suitable for moving the mobile panels 16 and 16' of the front cover 12. The movement of said mobile panels is actuated through electrical motors 30; in the preferred embodiments of the figures, such motors are in a number corresponding to the panels to be moved.

[0024] The top 16 and bottom 16' mobile panels are turnably arranged relative to a fulcrum or pivot 32 whereto a plate or guide 34 is also fixed, preferably shaped as a circular sector and made of metal, plastic material or other known type.

[0025] The curvilinear edge of the guides 34 of the top mobile panel 16 and of the bottom mobile panel 16' is in contact with a pinion 36 of the motor 30; in the preferred embodiment, the contact between the guide 34 and the pinion 36 of the motor 30 takes place by friction so as to carry out the opening/closing operation of the mobile panels 16 and 16'. However, in alternative embodiments said guides 34 may be defined by portions of gears that engage with corresponding toothed wheels keyed on the motors 30.

[0026] At least one elastic element, for example a helical spring 38, is fixed to each motor 30 with the function of keeping the motor itself tensioned and keeping the pinion 36 in contact with the guide 34; the same helical spring 38 allows the mobility of the motor 30 relative to the guide 34 so as to prevent any damages to the motor itself or to the guide in the event of a manual opening of the mobile panels 16 and 16'.

[0027] The use of a motor for moving every single mobile panel allows moving the panels themselves in a totally independent manner from one another.

[0028] In an alternative embodiment, the movement of the top mobile panel 16 and of the bottom mobile panel 16' can be obtained using a single motor and a belt or rack motion drive.

[0029] In a further alternative embodiment, the opening and closing movement of the mobile panels may be obtained by means of electrical actuators.

[0030] Moreover, the box 40 containing the control electronics for moving the mobile panels 16 and 16' and the relevant wirings 42, is fixed on the shoulder 28.

[0031] The means suitable for moving the mobile panels 16 and 16' of the grid 12 are protected by a covering case 44 fixed to the shoulder 28 in a conventional manner.

[0032] A seal 33 (indicated with a dashed line at figure 5) extended longitudinally and suitable for defining a barrier against the recirculation or backflow of the conditioned air towards the inlet of the ambient air to be treated, is seated at the inner front of the optional central panel 18.

[0033] The device of the invention, moreover, inside the optional container body 20, in the cavity suitable for receiving the conditioning apparatus, comprises a shaped guide or profile 35 extended by the entire longitudinal dimension of the conditioning apparatus and suitable for conveying the conditioned air in output; said shaped guide 35 is advantageously made of a plastic or otherwise suitable material.

[0034] The movement of the top 16 and bottom 16' mobile panels is obtained in an automatic manner by means of a signal sent, through a remote control or the like, to the control device by the user of the conditioning apparatus; said signal received by a receiver device 19 preferably positioned at the optional central panel 18.

[0035] As can be noticed from the above, the results achieved by the invention are clear.

[0036] The device for built-in conditioning apparatus of this invention has the advantage of being compatible with all the conditioning systems available on the market.

[0037] A further advantage of the device of the invention is represented by the fact that it allows a regular flow of the conditioned air preventing a backflow of the same.

[0038] Further advantageous is the fact that the device of the invention is supplied and operates totally autonomously from the conditioning apparatus.

[0039] Further advantageous is the fact that the device of the invention allows easy maintenance and/or inspection of the conditioning apparatus.

[0040] A further advantage is represented by the fact that the device of the invention is customisable as regards the coating and/or colour of the panels composing the front cover, so as to be adapted to the aesthetic needs of the application environments.

[0041] Even if the invention has been described hereinbefore with particular reference to an embodiment thereof made by way of a non-limiting example only, sev-

eral changes and variations will appear clear to a man skilled in the art in the light of the above description. This invention therefore is intended to include any changes and variations thereof falling within the spirit and the scope of the following claims.

Claims

1. A device (10) for built-in conditioning apparatus, especially suitable to be used in combination with conditioning systems to be installed recessed in the wall, in false ceilings, at doors, walk-in cupboards or spaces obtained in bookcases comprising a front cover (12) placed for closing an open face of an optional container body (20) suitable for receiving a conditioning apparatus (22), with said device **characterised in that** the front cover (12) comprises motor means for moving in opening/closing, in an independent manner, at least two top and bottom mobile panels (16, 16').

2. The device according to claim 1, **characterised in that** the motor means for moving in opening/closing the mobile panels (16, 16') are defined by at least one electrical motor (30).

3. The device according to the previous claims, **characterised in that** the motor means are positioned on at least one plate or shoulder (28) arranged perpendicular to the front cover (12) and facing inwards of the optional container body (20).

4. The device according to any one of the previous claims, **characterised in that** the top mobile panel (16) and the bottom mobile panel (16') are turnably arranged relative to a fulcrum or pivot (32) whereto a plate or guide (34) shaped as a circular sector is fixed.

5. The device according to any one of the previous claims, **characterised in that** the guides (34) of the top mobile panel (16) and of the bottom mobile panel (16') define a contact by friction with a pinion (36) of the motor (30).

6. The device according to any one of the previous claims, **characterised in that** the guides (34) of the top mobile panel (16) and of the bottom mobile panel (16') are defined by portions of gears that engage with toothed wheels keyed on the motors (30).

7. The device according to any one of the previous claims, **characterised in that** it comprises an elastic element fixed to each motor (30) and suitable for tensioning the motor itself and keeping the pinion (36) in contact with the guide (34).

8. The device according to any one of the previous claims, **characterised in that** the elastic element is defined by a helical spring (38).

9. The device according to any one of the previous claims, **characterised in that** it comprises a case (44) for closing and protecting the motor means for the opening/closing movement of the mobile panels (16, 16') of the front cover (12).

10. The device according to any one of the previous claims, **characterised in that** said motor means comprise a belt drive.

11. The device according to any one of the previous claims, **characterised in that** said motor means comprise a rack drive.

12. The device according to any one of the previous claims, **characterised in that** the motor means are defined by electrical actuators.

13. The device according to any one of the previous claims, **characterised in that** the front cover (12) is hinged relative to a side of the open face of the optional container body (20).

14. The device according to any one of the previous claims, **characterised in that** the front cover (12) is hinged relative to the optional frame (14).

15. The device according to any one of the previous claims, **characterised in that** the front cover (12) is hinged relative to the cavity receiving the conditioning apparatus.

16. The device according to any one of the previous claims, **characterised in that** the front cover (12) comprises an optional fixed central panel (18).

17. The device according to any one of the previous claims, **characterised in that** a shaped guide or profile (35) extended by the entire longitudinal dimension of the conditioning apparatus is provided inside the optional container body (20) or the cavity suitable for receiving the conditioning apparatus.

18. The device according to any one of the previous claims, **characterised in that** at the inner front of the optional central panel (18) it comprises a longitudinally extended seal (33).

19. The device according to any one of the previous claims, **characterised in that** it is actuated by means of a remote control.

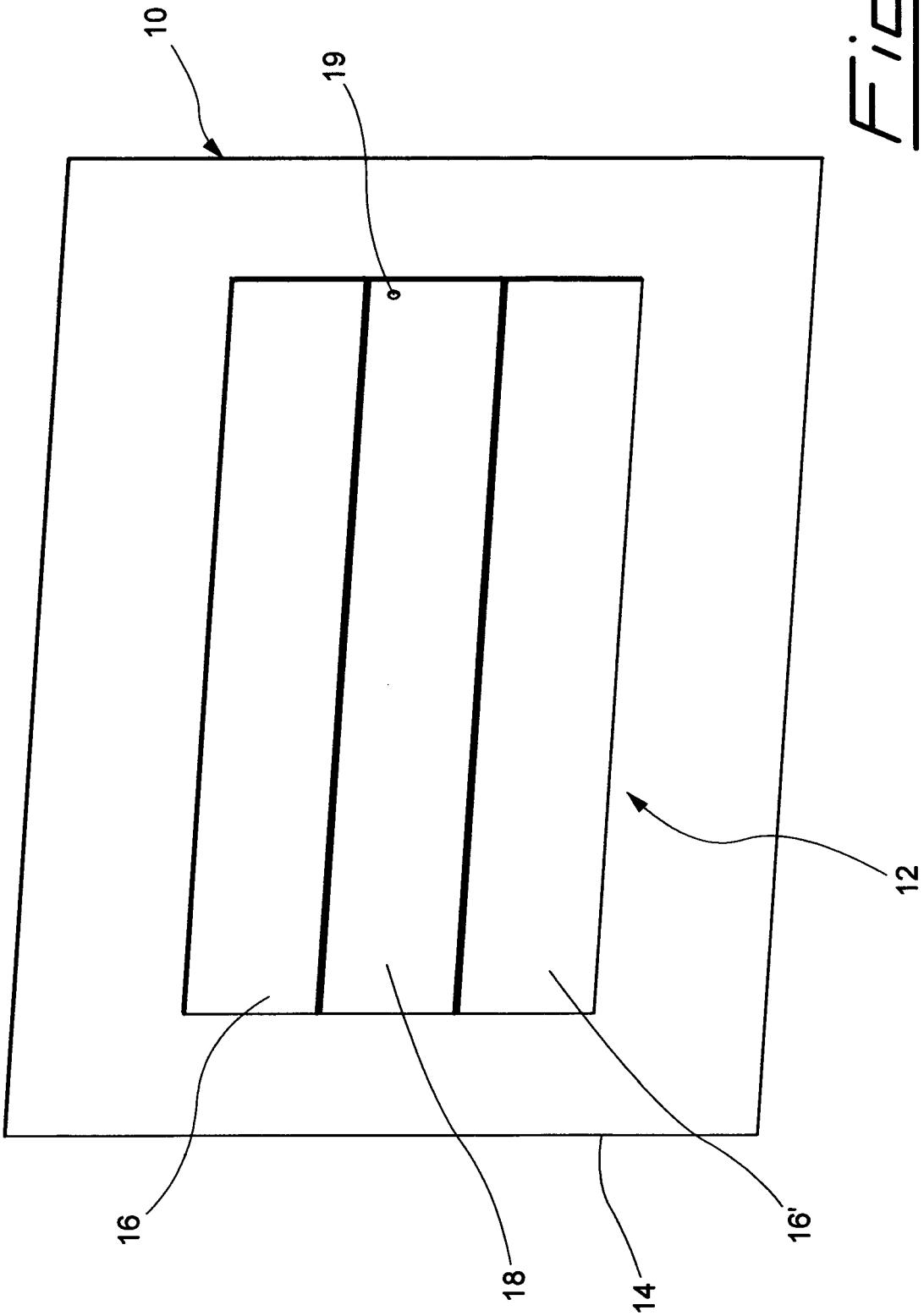
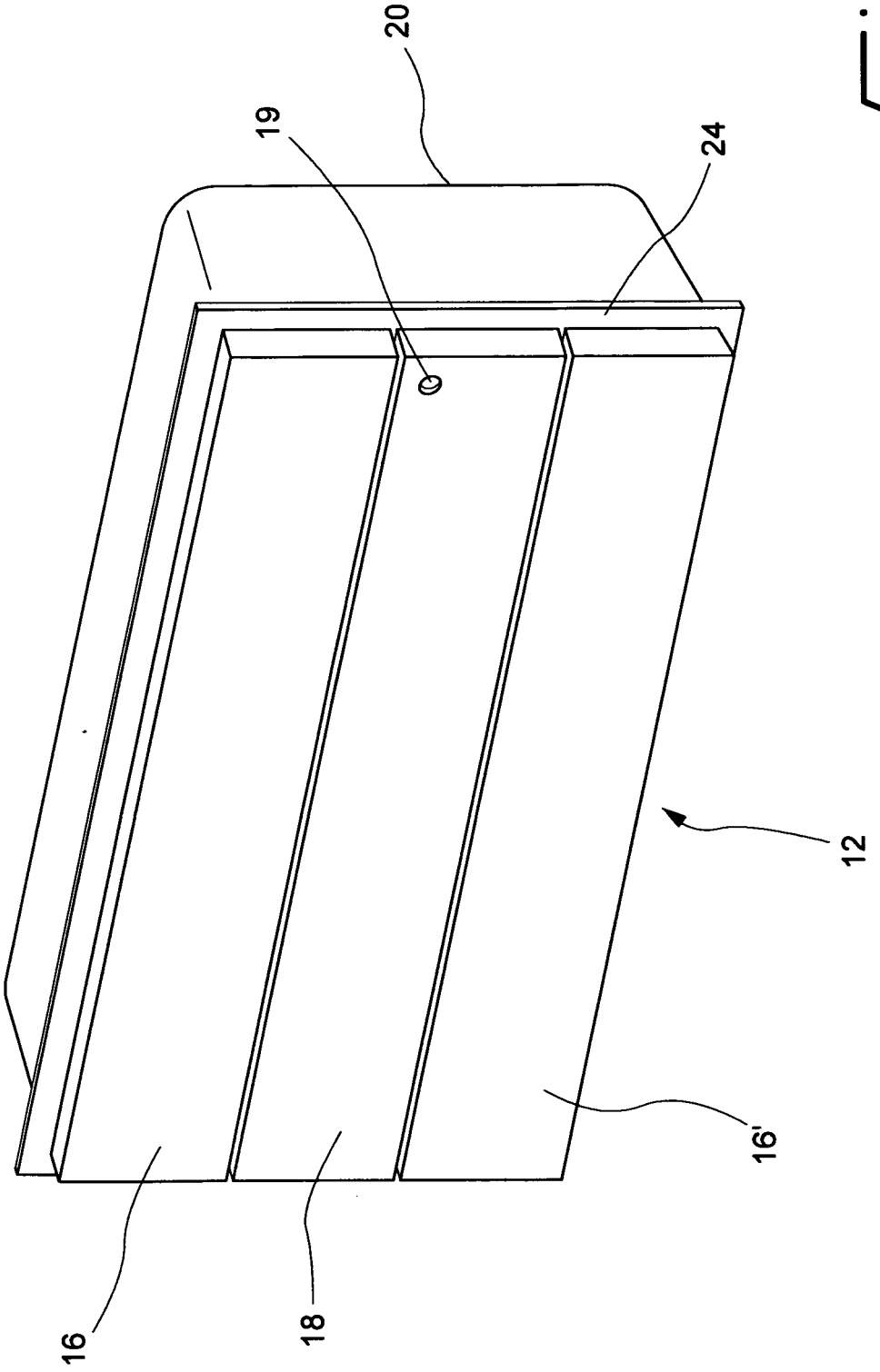


Fig.1

Fig.2



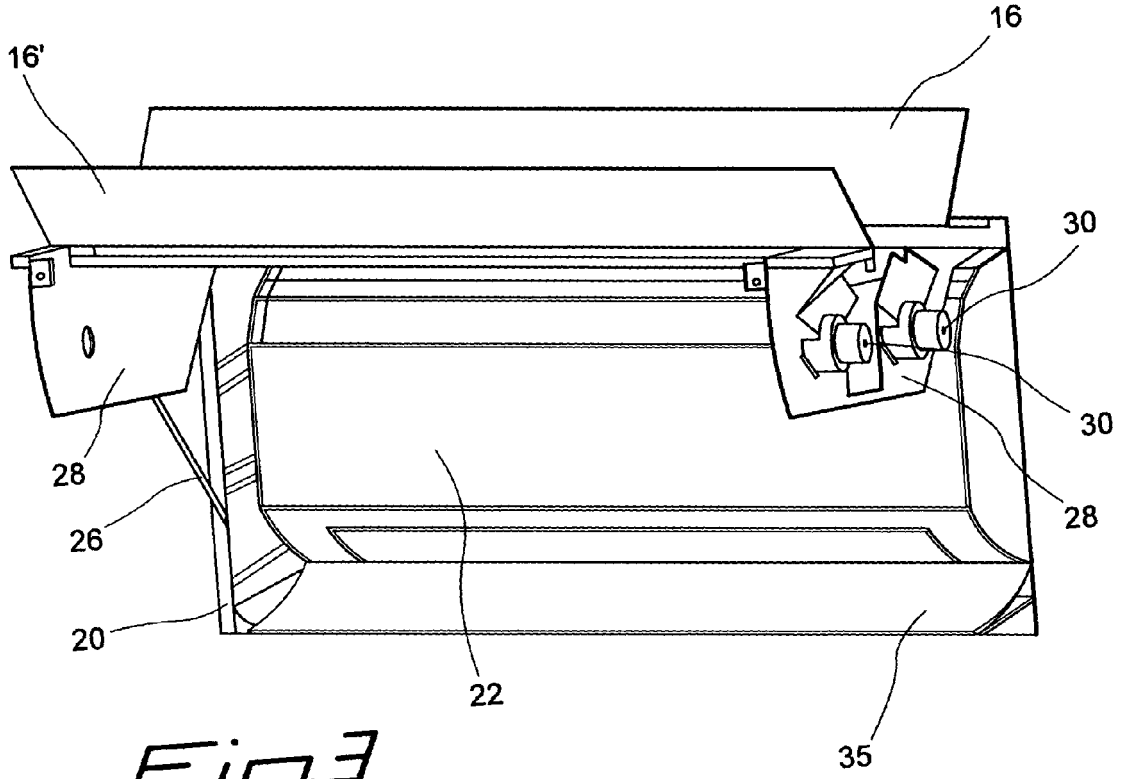


Fig.3

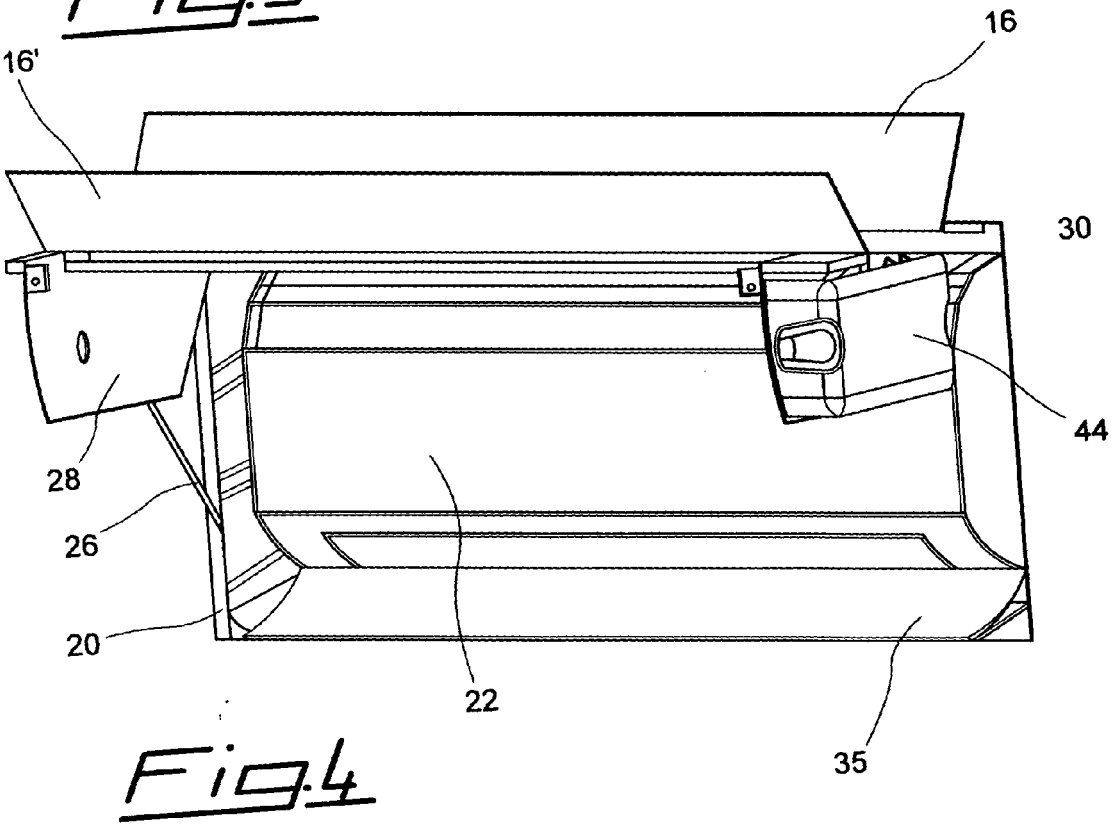


Fig.4

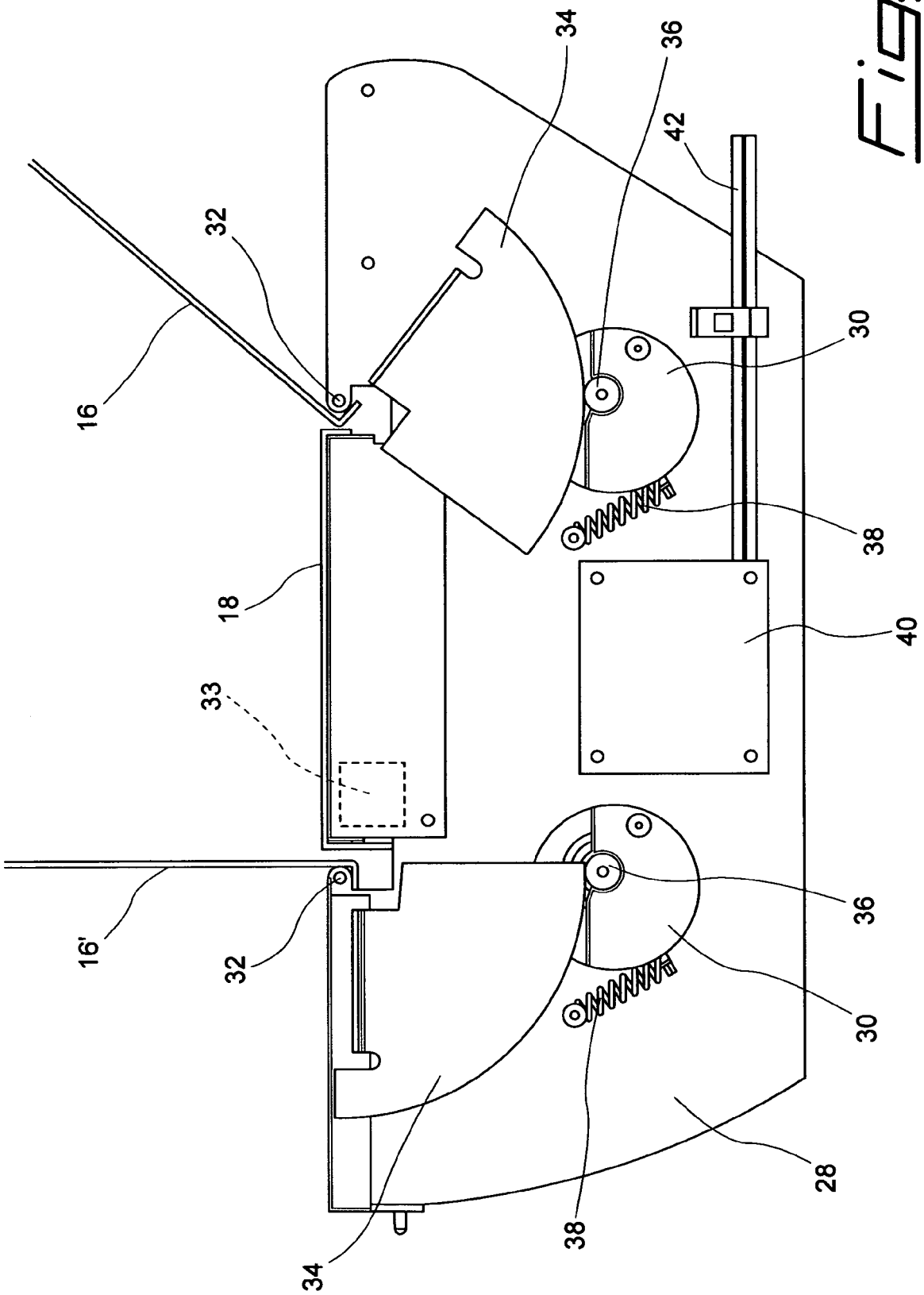


Fig.5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 00 1167

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 Y	US 2005/064811 A1 (MROZEK GREG T [US] ET AL) 24 March 2005 (2005-03-24) * the whole document *	1-19 1-19	INV. F24F13/14
X Y	US 2004/137838 A1 (LINDE KENNETH J [US] ET AL) 15 July 2004 (2004-07-15) * the whole document *	1-19 1-19	
X Y	EP 1 580 493 A (DAIKIN IND LTD [JP]) 28 September 2005 (2005-09-28) * the whole document *	1-19 1-19	
Y	US 2 236 865 A (BAILEY JAMES H ET AL) 1 April 1941 (1941-04-01) * the whole document *	1-19	
Y	JP 2005 016862 A (DAIKIN IND LTD) 20 January 2005 (2005-01-20) * abstract *	1-19	
Y	JP 2006 336925 A (HITACHI LTD) 14 December 2006 (2006-12-14) * abstract *	1-19	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	9 May 2008	Valenza, Davide

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 08 00 1167

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.

09-05-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005064811 A1	24-03-2005	NONE	
US 2004137838 A1	15-07-2004	NONE	
EP 1580493 A	28-09-2005	AU 2003280658 A1 WO 2004040204 A1 JP 4013954 B2 US 2006010901 A1	25-05-2004 13-05-2004 28-11-2007 19-01-2006
US 2236865 A	01-04-1941	NONE	
JP 2005016862 A	20-01-2005	NONE	
JP 2006336925 A	14-12-2006	NONE	

EPO FORM P0459

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