



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 598 474 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.11.2005 Bulletin 2005/47

(51) Int Cl.7: **D06F 58/02**

(21) Application number: **04425355.7**

(22) Date of filing: **18.05.2004**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
AL HR LT LV MK

(72) Inventor: **Fumagalli, Silvano**
20052 Monza (MI) (IT)

(74) Representative: **Perani, Aurelio et al**
Perani Mezzanotte & Partners
Piazza San Babila 5
20122 Milano (IT)

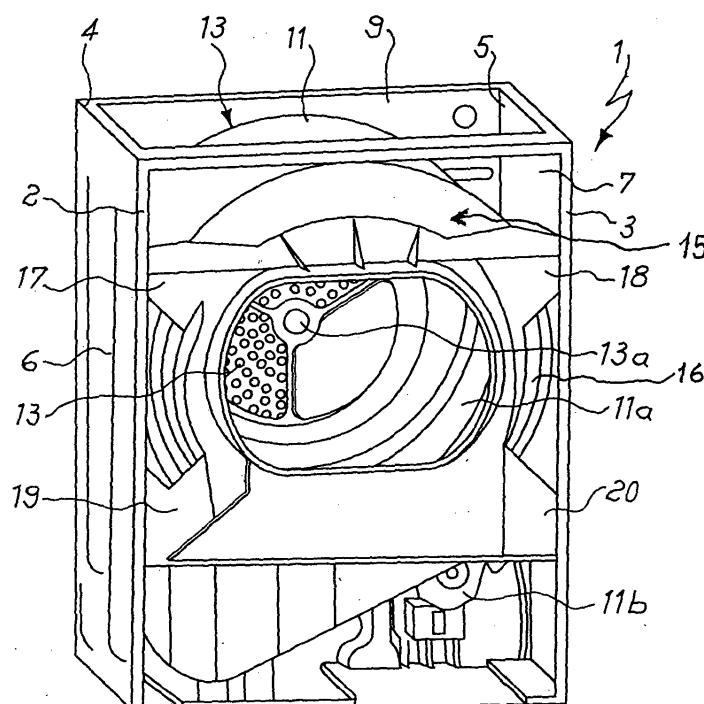
(71) Applicant: **CANDY S.p.A.**
I-20052 Monza (Milano) (IT)

(54) **Improved laundry-drying machine**

(57) A laundry-drying machine comprises a housing cabinet (1) defined by a parallelepipedal frame with at least a pair of vertical front pillars (2,3) and a pair of vertical rear pillars (4,5), a drum (11) for containing the laundry to be dried, in the form of a cylinder with a base closed by a perforated wall (13) and an open opposite end (11a) a first access opening (22) formed in the vertical front wall (10) of the cabinet of the machine, an intermediate bulkhead (15) disposed between the front

wall (10) of the cabinet (1) and the open front end (11a) of the drum (11). The intermediate bulkhead (15) is formed as a unitary block comprising a circular frame (16) defining the outline of a second access (21) opening and a plurality of appendages (17,18,19,20) integral with the frame (16) and projecting outwardly therefrom relative to the access opening, the appendages being provided with means for the anchorage of the intermediate bulkhead on the pair of vertical front pillars (2,3) of the frame of the cabinet (1).

Fig.1



EP 1 598 474 A1

Description

[0001] The present invention relates to a laundry-drying machine with heated-air circulation, of the front-loading, domestic type, comprising a housing cabinet defined by a parallelepipedal frame with at least a pair of vertical front pillars and a pair of vertical rear pillars, as well as by a pair of opposed vertical side walls, by a top wall, by a vertical front wall, and by a vertical rear wall which are connected to the respective pairs of pillars of the frame, a drum for containing the laundry to be dried, in the form of a cylinder with a base closed by a perforated wall and an open opposite end, the open end being arranged transversely relative to the longitudinal axis of the cylinder and having a circular rim facing towards the vertical front wall of the cabinet of the machine, the drum being mounted inside the cabinet so as to be rotatable about its longitudinal axis which is positioned horizontally and perpendicularly relative to the rear and front walls, a first access opening formed in the vertical front wall of the cabinet of the machine, an intermediate bulkhead disposed between the front wall of the cabinet and the open front end of the drum, a second access opening formed in the intermediate bulkhead and aligned with the first opening, both of the first and second openings being aligned with the open end of the drum for the loading and unloading of the laundry, a door for closing and opening the access openings, means for forming an airtight seal between the circular rim of the drum and the intermediate bulkhead, an electric motor for rotating the drum, first support means for the drum, which first support means are disposed in the region of the rear wall of the cabinet of the machine, second support means for the same drum, which second support means are disposed in the region of the intermediate bulkhead, heating means, and means for blowing and filtering the heated air in the drum.

[0002] Laundry-drying machines of the type specified above are known in the art. An example is described in US-A-4,754,556. According to this prior art, the intermediate bulkhead disposed between the rotary drum and the front wall of the cabinet of the machine is constituted by a thin bent metal sheet which is perforated, not only to form the opening for access to the rotary drum but also to produce hook and tab elements for forming the connection with the front wall of the cabinet.

[0003] Although, according to the above-mentioned prior art, the front wall of the cabinet and the intermediate bulkhead can be constructed and finished independently and then mounted and dismantled relative to one another fairly easily, the intermediate bulkhead is structurally weak and does not give the assembled machine sufficient stability and security for transportation, resulting in the need to provide adequate and expensive packaging.

[0004] Moreover, the intermediate bulkhead structure of the prior art is not suitable for being adapted, by simple modifications, to different support systems for the

rotary drum; as is known, these support systems may include rollers or sliding shoes.

[0005] The fundamental object of the present invention is therefore to overcome the problems encountered in the prior art by proposing a laundry-drying machine comprising an intermediate bulkhead between the circular rim of the open end of the rotary drum and the front wall of the cabinet, which can confer a high degree of stability on the machine as a whole.

[0006] A further object is to offer the capability, by means of the intermediate bulkhead, to support the drum by means of sliding shoes or with rollers, by means of simple modifications of only some parts of the intermediate bulkhead.

[0007] The fundamental object of the invention is achieved by a laundry-drying machine of the type indicated in the introduction which is characterized in accordance with appended Claim 1.

[0008] The invention will be described in greater detail with reference to a practical embodiment thereof which is given purely by way of non-limiting example and is illustrated in the appended drawings, in which:

Figure 1 is a perspective view of the laundry-drying machine according to the invention, without the vertical front wall and the top wall of the cabinet,

Figure 2 is a perspective view of the intermediate bulkhead alone of the machine, arranged for supporting the drum by means of sliding shoes, removed from the frame, and viewed from the side facing towards the opening of the drum,

Figure 3 is a front view of the intermediate bulkhead of Figure 2, taken from the inner side facing towards the opening of the drum,

Figure 4 is a view of the intermediate bulkhead of Figure 3 from above,

Figure 5 is a view of the intermediate bulkhead of Figure 3 from below,

Figure 6 is a front view of the intermediate bulkhead of the machine, taken from its outer side,

Figure 7 is a side view of the intermediate bulkhead of Figure 6, taken from the right-hand side towards the lefthand side thereof,

Figure 8 is a section taken on the line VIII-VIII of Figure 3,

Figure 9 is a section taken on the line IX-IX of Figure 6,

Figure 10 is a schematic section through the means for anchoring the intermediate bulkhead on the ver-

tical front pillars of the frame of the cabinet of the machine, in a position in which they are not engaged with one another,

Figure 11 shows the same means as Figure 10 in a position of engagement on the front pillars of the frame,

Figure 12 is a schematic cross-section through the intermediate bulkhead, mounted in the machine, showing its positioning with respect to the front portion of the drum,

Figure 13 shows schematically a portion of the intermediate bulkhead, modified for the support of the drum by means of rollers, and

Figure 14 is a perspective view of a sliding shoe for the support of the rotary drum.

[0009] With reference to the above-mentioned drawings, the cabinet of the laundry-drying machine according to the invention is generally indicated 1. The cabinet is defined by a parallelepipedal frame formed by a pair of vertical front pillars 2 and 3 and by a pair of rear pillars 4 and 5. The side walls 6 and 7, the top wall 8 (Figure 12), as well as the vertical front and rear walls 9 and 10 (Figure 12) are fitted on the frame.

[0010] A drum 11 for holding the laundry to be dried is housed inside the cabinet 1. The drum 11 is in the form of a cylinder with a base 12 closed by a perforated wall 13. The end 11a of the drum remote from the base wall 13 is open, with its opening arranged transversely relative to the longitudinal axis X-X of the cylinder in accordance with which the drum 11 is shaped.

[0011] The open end 11a of the drum has a circular rim 14 (Figure 12) facing towards the front wall 10 of the cabinet. The drum is rotated about its longitudinal axis X-X by conventional means which are driven, for example, by an electric motor 11b housed in the cabinet 1. The drum 11 is supported by first support means, for example, a journal 13a carried by the base wall 13 and supported by the rear wall 9 of the cabinet, and by second support means which are positioned in the vicinity of the open front end 11a and which will be described below.

[0012] The laundry-drying machine further comprises an intermediate bulkhead, generally indicated 15, which is shown in perspective in Figure 2 and is positioned between the front wall 10 of the cabinet and the open end of the drum 11, in the region of the circular rim 14. According to the invention, the intermediate bulkhead 15 is constituted by a unitary element produced by moulding of a suitable plastics material and comprises a frame 16 from which a pair of upper appendages 17 and 18 as well as a pair of lower appendages 19 and 20 extend.

[0013] The above-mentioned appendages are preferably disposed in a cross-like geometrical arrangement

relative to the frame 16.

[0014] The frame 16 defines the outline of an opening 21 for access to the open end of the drum 11, with which it is aligned to permit the loading and unloading of the laundry through a first access opening 22 formed in the front wall 10 of the cabinet 1.

[0015] This first access opening 22 is closed, in conventional manner, by a door 23 which can be opened and closed and is mounted on the wall 10 and operable by the user.

[0016] According to the invention, the frame 16 of the unitary intermediate bulkhead 15 comprises a collar 24 which faces towards the drum 11 and which constitutes the seat for a circular gasket 25. This gasket 25 is intended to form an airtight seal with respect to the rim 14 of the rotary drum 11, with which it engages.

[0017] On the opposite side facing towards the wall 10 of the cabinet, the frame 16 has an annular seat 26, around the opening 21, for a gasket 27 which is intended to form a front seal with respect to the door 23.

[0018] In the region of the lower appendages 19 and 20, the intermediate bulkhead according to the present invention comprises means for constituting the front support for the rotary drum 11. These means comprise a pair of respective curved brackets 28 and 29 supported by respective pluralities of ribs 30 and 31 integral with the appendages 19 and 20.

[0019] Each of the curved brackets, the curvature of which corresponds to that of the external surface of the rotary drum, is provided with means for the snap-engagement of respective sliding shoes 32 such as that shown in Figure 14. These means comprise, in the brackets, a pair of holes 33 and 34 and a pair of slots 35 and 36 whereas, in the sliding shoes, they comprise cylindrical protuberances 37 and 38 which are intended to be inserted in the holes 33 and 34, as well as resilient tabs 39 and 40, provided with respective hooks 39a and 40a, which are intended to be snap-engaged in the slots 35 and 36.

[0020] The frame 16 is also provided with a radial opening 41 and a space 42 which are in communication with one another. The space 42 is intended to house a filter 43 for filtering the heated air which circulates in the machine in conventional manner and which passes through the laundry disposed in the drum and is collected through the radial opening 41 which, for this purpose, is in communication with the access opening 21.

[0021] Both of the upper appendages 17 and 18 are provided with respective hook members 44, 44a, which have free ends facing upwards and are integral with the appendages 17 and 18 and both of the lower appendages 19 and 20 are provided with corresponding hook members 45, 45a with free ends facing downwards. As shown schematically in Figures 10 and 11, the hook members 44 and 45 are used to fix the intermediate bulkhead 15 to the vertical front pillars 2 and 3 of the frame of the cabinet 1 which are provided with respective slots 46, 47 and 46a, 47a for this purpose.

[0022] Anchorage takes place in conventional manner by first of all inserting the hook members 44, 44a in the slots 46, 46a by pushing the bulkhead 15 upwards and then inserting the lower hook members 45, 45a in the slots 47, 47a and, after fitting the bulkhead 15 tightly against the pillars, imparting a vertical downward movement to the bulkhead so that the hook portions of the members 44, 45a are inserted through the thickness of the pillars, as shown in Figure 11.

[0023] Fixing can be completed by the fitting of screws such as those indicated 48 in Figure 11.

[0024] It will be appreciated from the foregoing description that the bulkhead 15, which is produced by an operation for the moulding of a plastics material, reproduces the entire geometry of the various seats that are necessary for the gaskets, the geometry of the supports that are necessary for the front support of the rotatable drum, the geometry of the ducts for the heated air and for holding the filter, as well as the geometry of the members for the fixing of the bulkhead to the pillars of the frame, which can be performed by quick and easy methods.

[0025] As well as reproducing all of the seats that are necessary for its functional capability in a single block, when the bulkhead with the crossed arrangement of the appendages 17, 18, 19 and 20 relative to the frame 16 is mounted and fixed to the pillars 2 and 3 of the frame, it confers on the cabinet of the machine considerable stiffness which permits safe transportation without the need to use special and expensive packaging.

[0026] The invention has been described with reference to a front support system for the rotary drum 11, of the type with sliding shoes such as that shown in Figure 14.

[0027] However, with limited modification of the part of the die which is intended for the formation of the lower appendages 19 and 20 in the regions facing towards the interior of the cabinet 1, it is possible, with the unitary bulkhead 15, to change from the provision of the supports 28 and 29 to the provision of brackets 49 for supporting the axles 50 of rollers 51.

[0028] With regard to the heating of the air for drying the laundry in the drum, this takes place by means of electrical resistors, not shown, which are fitted in the machine in conventional manner.

[0029] The system for the circulation of the heated air, which may be of the suction type or of the blown type, is also conventional and therefore not shown.

Claims

1. A laundry-drying machine with heated-air circulation, of the front-loading, domestic type, comprising a housing cabinet (1) defined by a parallelepipedal frame with at least a pair of vertical front pillars (2, 3) and a pair of vertical rear pillars (4, 5), as well as by a pair of opposed vertical side walls (6, 7), by a

top wall (8), by a vertical front wall (10), and by a vertical rear wall (9) which are connected to the respective pairs of pillars of the frame, a drum (11) for containing the laundry to be dried, in the form of a cylinder with a base closed by a perforated wall (13) and an open opposite end (11a), the open end (11a) being arranged transversely relative to the longitudinal axis (X-X) of the cylinder and having a circular rim (14) facing towards the vertical front wall (10) of the cabinet (1) of the machine, the drum (11) being mounted inside the cabinet (1) so as to be rotatable about its longitudinal axis (X-X) which is positioned horizontally and perpendicularly relative to the rear and front walls (9, 10), a first access opening (22) formed in the vertical front wall (10) of the cabinet of the machine, an intermediate bulkhead (15) disposed between the front wall (10) of the cabinet (1) and the open front end (11a) of the drum (11), a second access opening (21) formed in the intermediate bulkhead (15) and aligned with the first opening (22), both of the first and second openings being aligned with the open end (11a) of the drum (11) for the loading and unloading of the laundry, a door (23) for closing and opening the access openings, means (25) for forming an airtight seal between the circular rim (14) of the drum (11) and the intermediate bulkhead (15), an electric motor (11b) for rotating the drum (11), first support means (13a) for the drum (11), which first support means (13a) are disposed in the region of the rear wall (9) of the cabinet of the machine, second support means (28, 29, 32, 49, 51) for the same drum (11), which second support means (28, 29, 32, 49, 51) are disposed in the region of the intermediate bulkhead (15), heating means, and means for blowing and filtering the heated air in the drum, **characterized in that** the intermediate bulkhead (15) is formed as a unitary block comprising a circular frame (16) defining the outline of the second access opening (21) and a plurality of appendages (17, 18, 19, 20) integral with the frame (16) and projecting outwardly therefrom relative to the access opening (21), the appendages being provided with means (44, 44a, 45, 45a) for the anchorage of the intermediate bulkhead (15) on the pair of vertical front pillars (2, 3) of the frame of the cabinet (1).

2. A laundry-drying machine according to Claim 1, **characterized in that** the frame (16) includes a first seat (24) for the means (25) for forming the airtight seal between the circular rim (14) of the drum (11) and the intermediate bulkhead (15).

3. A laundry-drying machine according to any one of Claims 1 and 2, **characterized in that** the frame (16) includes at least one radial opening (41) for the passage of the flow of heated air and a cavity (42) for housing a filter (43) for filtering that air.

4. A laundry-drying machine according to any one of Claims 1 to 3, **characterized in that** the frame (16) also includes a second seat (26) for the means (27) for forming the airtight seal between the door (23) and the second access opening (21) formed in the intermediate bulkhead (15). 5
5. A laundry-drying machine according to any one of Claims 1 to 4, **characterized in that** the appendages (17, 18, 19, 20) which are integral with the frame (16) and project therefrom are disposed in a crossed geometrical arrangement relative to the outline of the frame (16) and are constituted by an upper pair (17, 18) and by a lower pair (19, 20). 10 15
6. A laundry-drying machine according to any one of Claims 1 to 5, **characterized in that** the pair of lower appendages (19, 20) which are integral with the frame (16) comprise respective bracket-like elements (28, 29) facing towards the interior of the cabinet (1) for the mounting of the second support means (32, 49, 51) of the drum (11). 20
7. A laundry-drying machine according to Claim 6, **characterized in that** the bracket-like elements (28, 29) comprise engagement means (33, 34, 35, 36, 37, 38, 39, 40) for the snap-mounting of sliding shoes (32). 25
8. A laundry-drying machine according to any one of Claims 1 to 7, **characterized in that** the means for anchoring the intermediate bulkhead (15) to the vertical front pillars (2, 3) of the cabinet (1) are constituted by male joint elements (44, 44a, 45, 45a) and female joint elements (46, 46a, 47, 47a) carried by the unitary intermediate bulkhead (15) and by the vertical front pillars (2, 3) of the cabinet (1) of the machine, respectively. 30 35
9. A laundry-drying machine according to any one of Claims 1 to 8, **characterized in that** the unitary intermediate bulkhead (15) is constructed by the moulding of plastics material. 40

45

50

55

Fig. 1

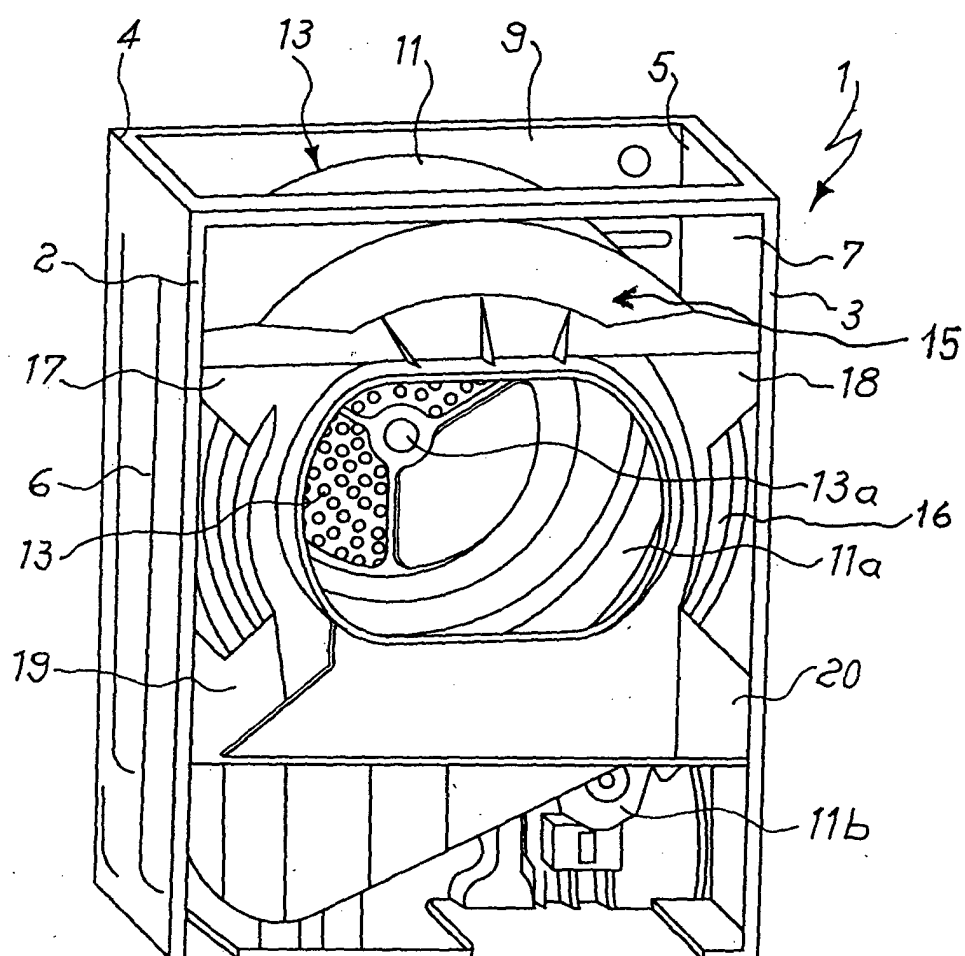


Fig. 2

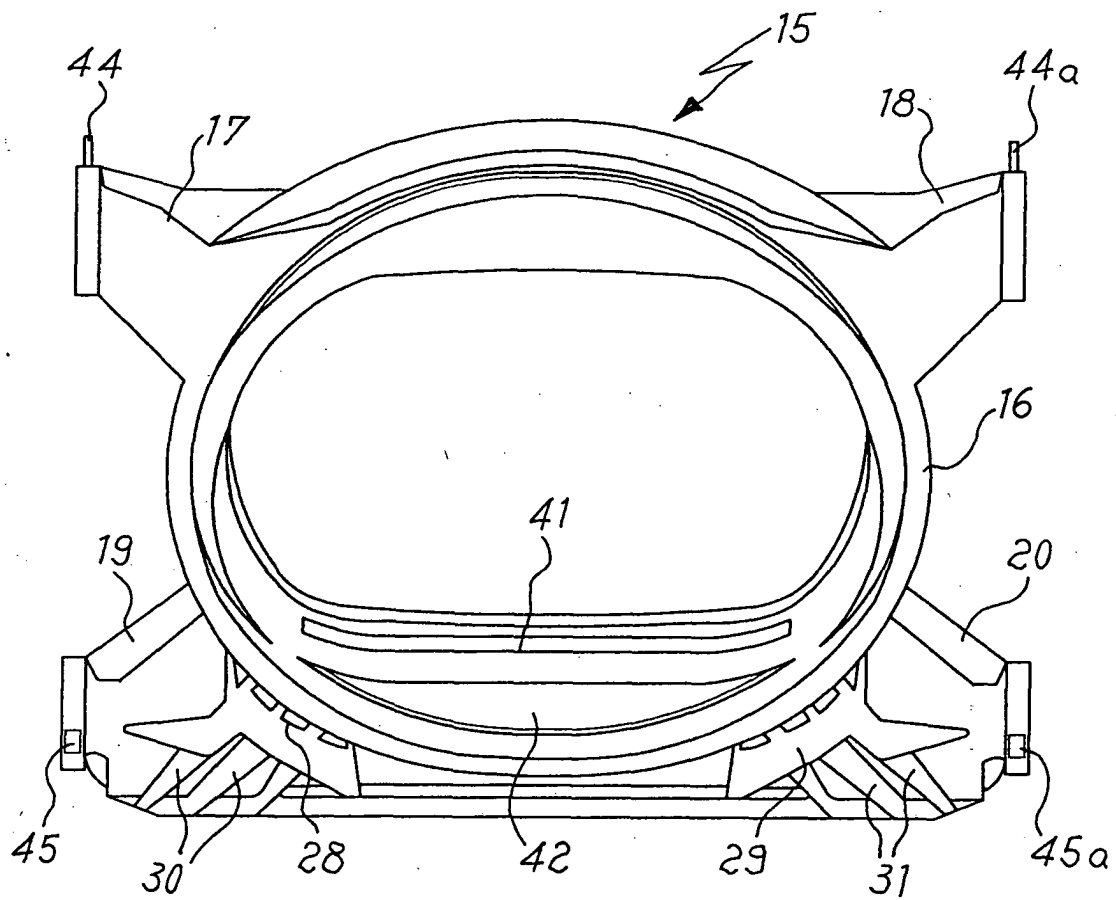


Fig. 5

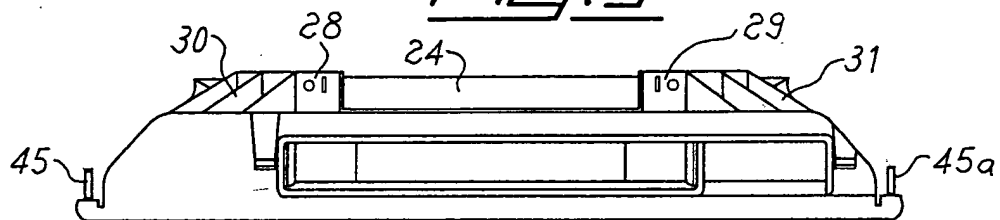


Fig. 3

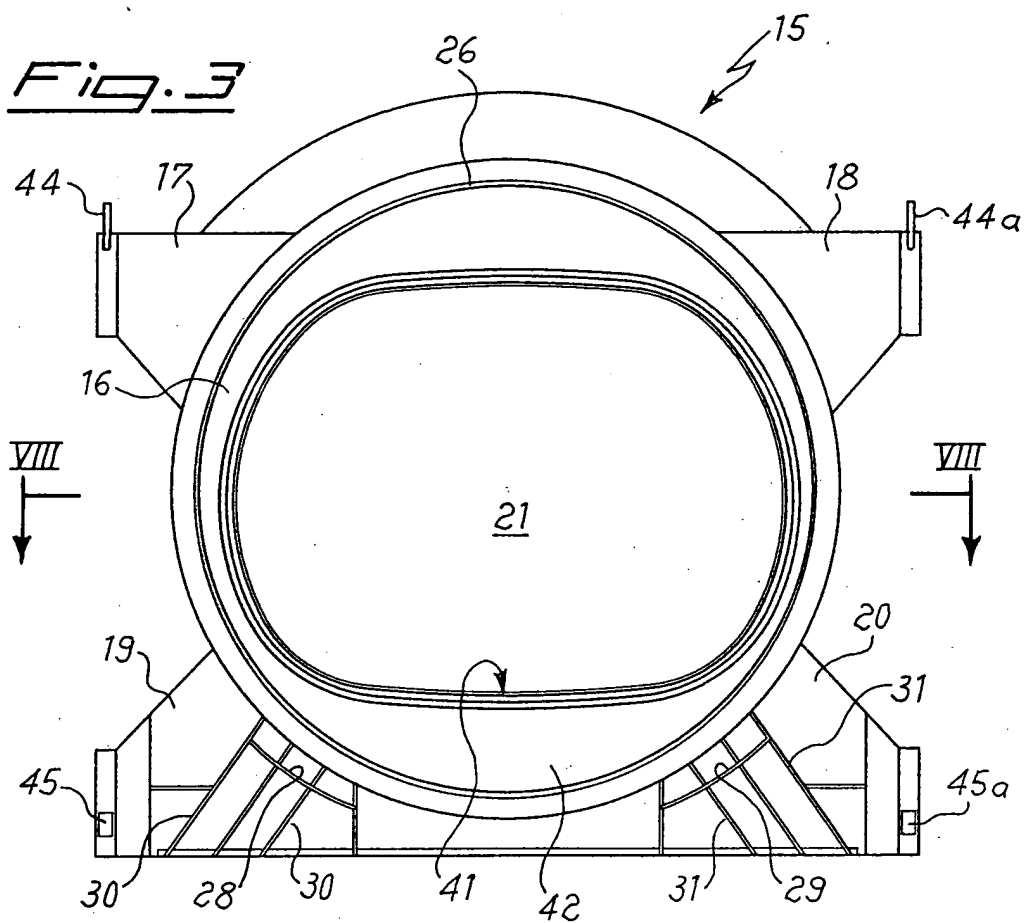
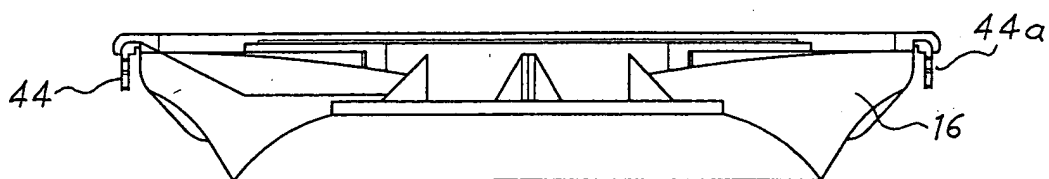


Fig. 4



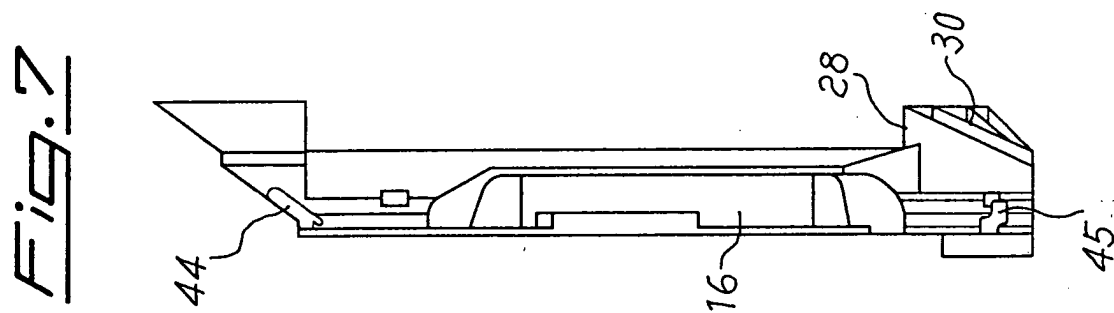
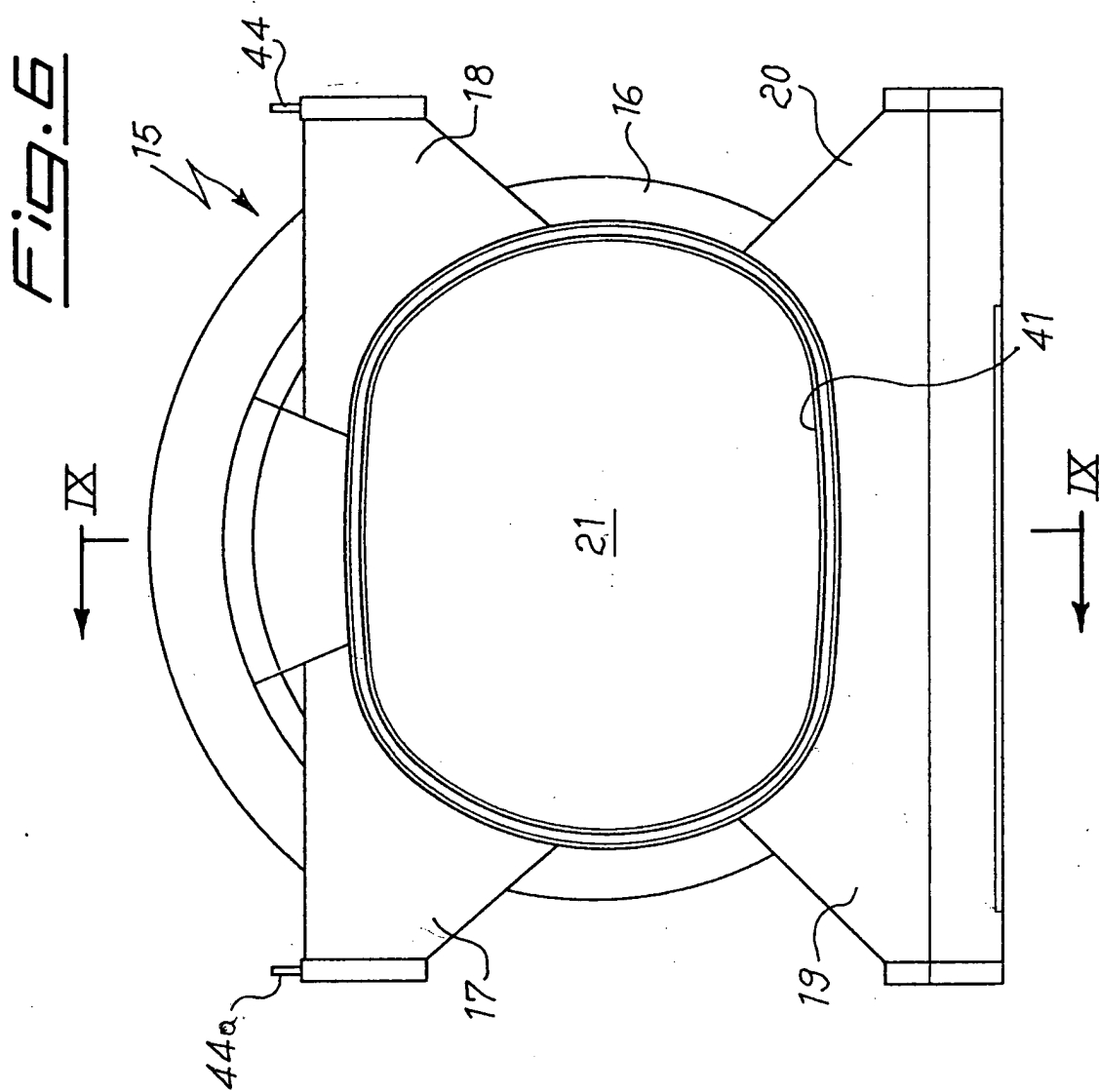


Fig. 8

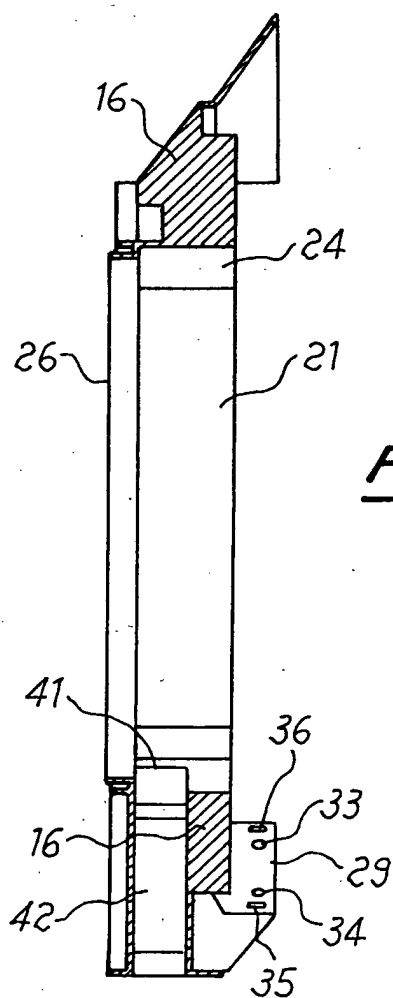
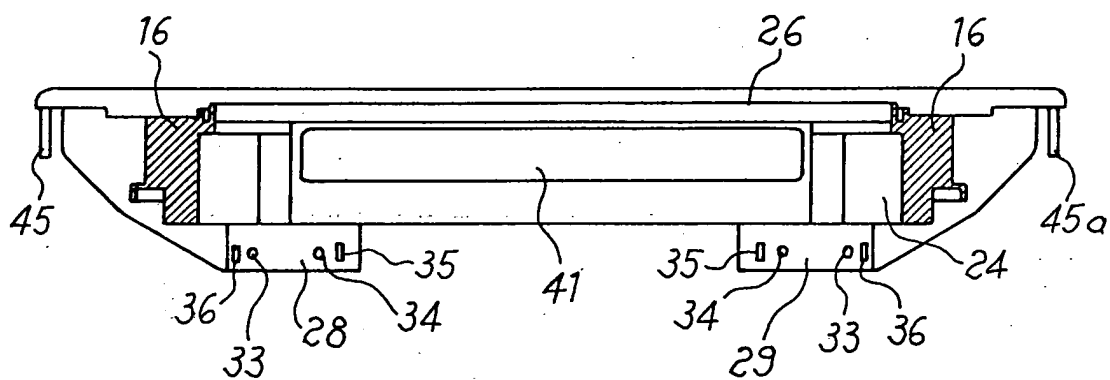


Fig. 9

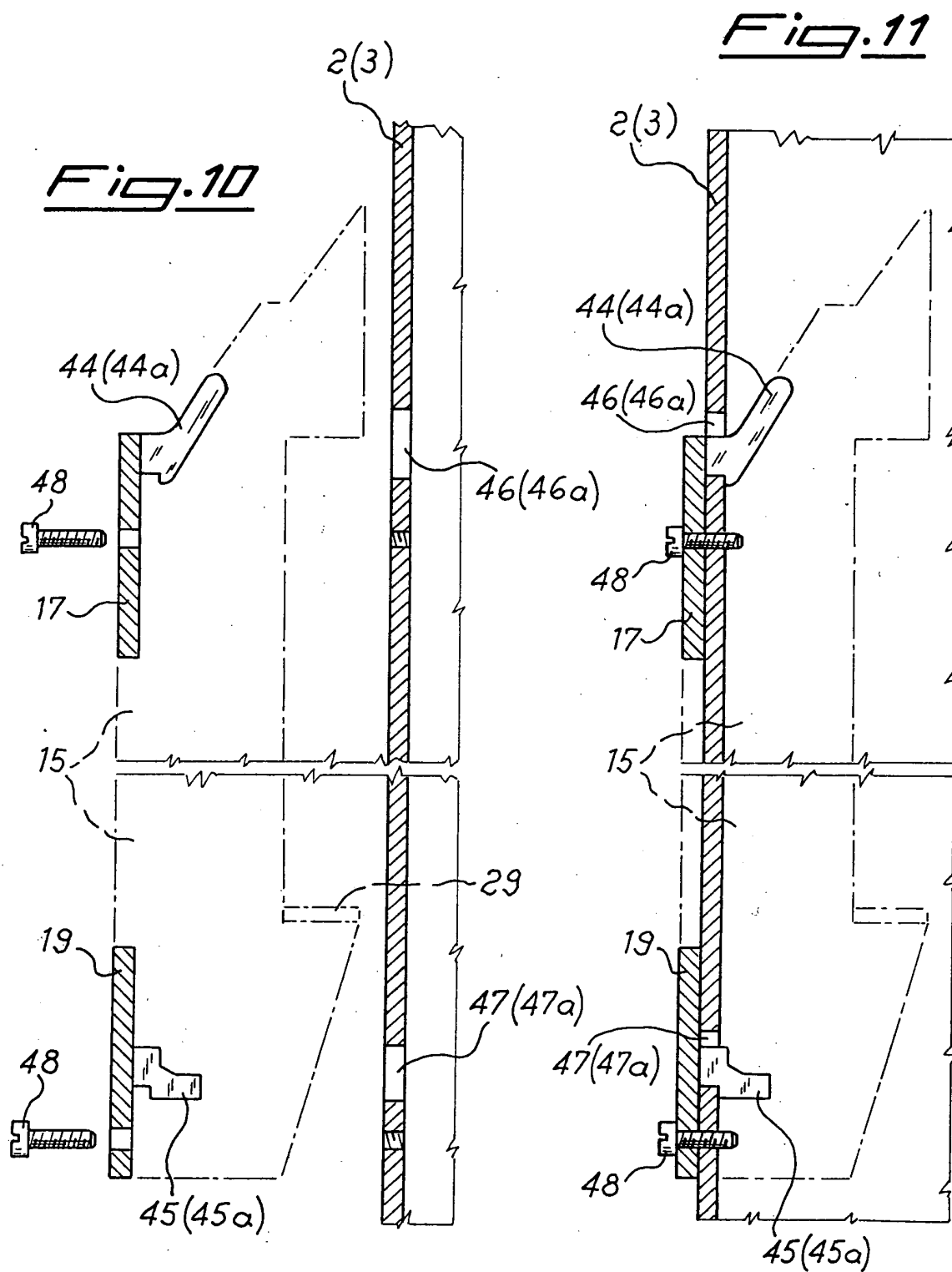


Fig.12

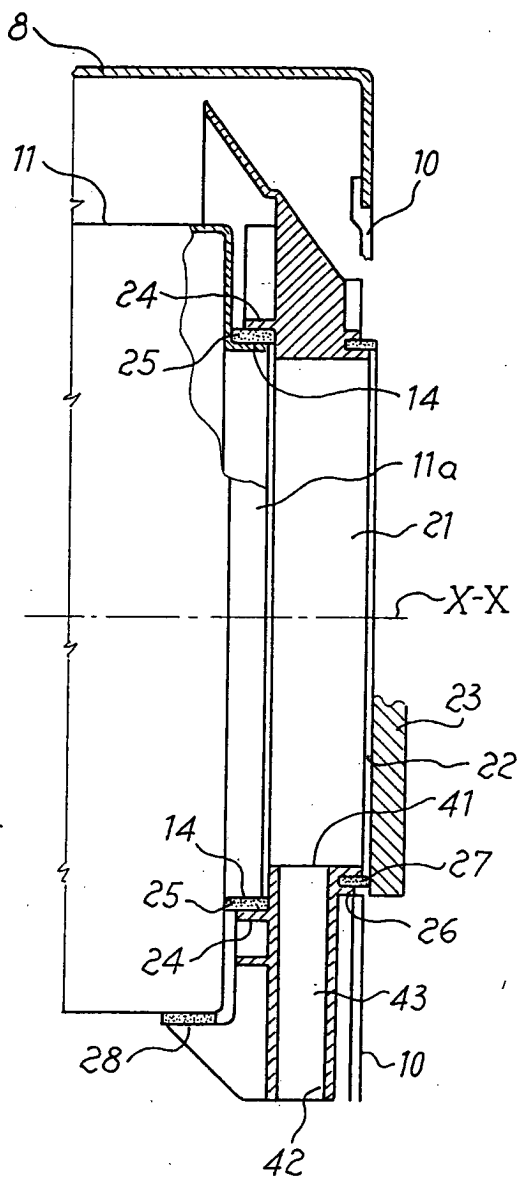


Fig.13

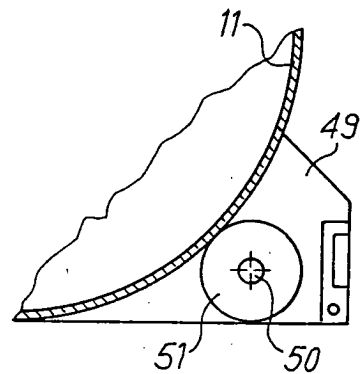
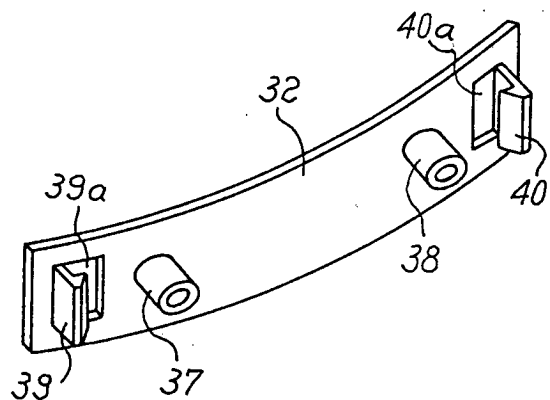


Fig.14





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 42 5355

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 5 257 448 A (PEARCE THOMAS M ET AL) 2 November 1993 (1993-11-02) * column 2, line 11 - line 58 * * column 4, line 46 - column 6, line 24 * -----	1,3,5-8	D06F58/02
X	US 4 817 298 A (TOMA DANIEL N) 4 April 1989 (1989-04-04) * column 2, line 19 - column 4, line 51 * -----	1	
A	US 3 584 393 A (MENK MELVIN A) 15 June 1971 (1971-06-15) * column 2, line 54 - line 58 * -----	1,9	
A	US 5 363 569 A (KADAKIA PRATISH R) 15 November 1994 (1994-11-15) * column 3, line 8 - column 4, line 5 * -----	1,2	
A	US 5 127 169 A (ELLINGSON DAVID I) 7 July 1992 (1992-07-07) * column 3, line 42 - line 45 * -----	1,4	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			D06F
Place of search		Date of completion of the search	Examiner
The Hague		21 October 2004	Norman, P
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			

4
EPO FORM 1503 03/82 (P04C01)

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

EP 04 42 5355

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.

21-10-2004

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5257448	A	02-11-1993	NONE	
US 4817298	A	04-04-1989	CA 1303350 C	16-06-1992
US 3584393	A	15-06-1971	NONE	
US 5363569	A	15-11-1994	NONE	
US 5127169	A	07-07-1992	CA 2042081 C	10-12-1996