



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.05.2013 Bulletin 2013/18

(51) Int Cl.:
A47L 15/48 ^(2006.01) **A47L 15/42** ^(2006.01)

(21) Application number: **12190120.1**

(22) Date of filing: **26.10.2012**

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

(72) Inventor: **Brignone, Enzo**
I-12025 FRAZ. MONASTERO DRONERO (Cuneo)
(IT)

(74) Representative: **Gerbino, Angelo et al**
Jacobacci & Partners S.p.A.
Corso Emilia 8
10152 Torino (IT)

(30) Priority: **28.10.2011 IT TO20110985**

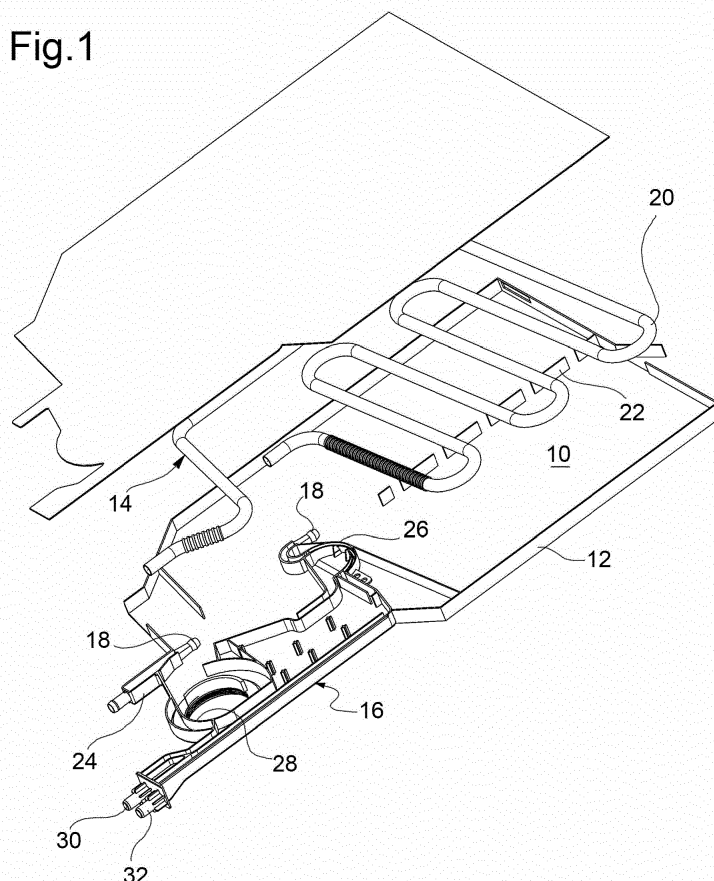
(71) Applicant: **Bitron S.p.A.**
10122 Torino (TO) (IT)

(54) **Drying device for a dishwasher**

(57) The drying device comprises a vapour condensation chamber (10) which is formed within a casing (12) and which contains a corrugated tube (14), inside which

there flows water for causing vapour condensation on its outer surface. The tube (14) advantageously forms a portion of a conduit supplying water to a dishwasher.

Fig.1



Description

[0001] The present invention relates to a drying device for dishwashers.

[0002] A known device of this type comprises a receptacle made of plastic material, typically polypropylene, within which cold water is made to flow so as to cause the vapour formed in the washing chamber to condense on the outer surface of the receptacle.

[0003] The object of the present invention is to provide a drying device which has an increased heat exchange surface while also having a low production cost.

[0004] This object is achieved by means of a drying device for dishwashers, comprising a vapour condensation chamber formed within a casing and containing a corrugated tube within which there flows water for causing the condensation of vapour on its outer surface, wherein the aforesaid corrugated tube has a serpentine-shaped portion.

[0005] An important part of the device according to the invention is the corrugated tube, which is economical to be produced and which has a high surface area per unit of length, enabling the heat exchange to be increased. There is also the advantage that the tube contains a relatively small quantity of water, which, in the preferred case in which the tube forms a portion of the conduit for supplying water to the dishwasher, can easily be renewed by opening the main filling valve.

[0006] Furthermore, the bends of the serpentine-shaped corrugated tube enable the heat exchange surface per unit of volume of the condensation chamber to be increased considerably, thereby significantly increasing the extent of the change from the vapour state to the liquid state.

[0007] The device according to the invention can be produced in the form of an independent module, which can be mounted on a water supply device of the dishwasher, commonly called an air break, or in the form of an integral part of the air break.

[0008] A further object of the present invention is a dishwasher comprising a drying device of the aforementioned type.

[0009] Other advantages and characteristics of the present invention will become clear from the following detailed description which is given by way of non-limiting example with reference to the attached drawings, in which:

Figure 1 is an exploded perspective view of a device according to the invention integrated into an air break,

Figure 2 is a plan view of the device of Figure 1,

Figure 3 is a plan view of a device of the modular type according to the invention,

Figure 4 is a perspective view of the device of Figure 3, showing its possible association with an air break,

Figure 5 is a plan view of the device of Figure 3 associated with an air break, and

Figures 6 and 7 show two respective embodiments of the device of Figure 3.

[0010] A drying device for a dishwasher, comprising a vapour condensation chamber 10, which is formed within a casing of flattened shape 12 and which contains a corrugated tube 14, is integrated into a water supply device commonly called an "air break" 16.

[0011] In particular, the casing of flattened shape 12 forms a prolongation of the casing of the casing of the air break 16, while the corrugated tube 14 forms a portion of a water supply conduit. The ends of the tube 14 are fitted on to sleeves 18 which protrude into the casing of the air break 16, in such a way that the tube 14, which includes a serpentine-shaped portion 20 having a plurality of bends and held up by a support 22 within the chamber 10, acts as a connecting link between a first and a second section 24, 26 of the supply conduit, which form part of the air break 16.

[0012] The air break itself has an entirely conventional structure and has an opening 28 which, when mounted at the side of a side wall of the washing chamber of the dishwasher, acts as a passage for the discharge of vapours which are formed during operation; the air break also has further sleeves 30, 32 for conveying water to be softened to a softener (not shown in the figures) and for sending the water required for the formation of a regeneration brine to the softener.

[0013] In use, the vapour entering the chamber 10 comes into contact with the outer surface of the tube 14, which is cold because of the presence of water within it, and the vapour is therefore able to condense. It should be noted that the corrugation of the surface of the tube 14 and its serpentine shape provide a large heat exchange surface, thus increasing the amount of condensation.

[0014] Another embodiment of the device according to the invention is shown in Figures 3 to 7, in which numbers identical to those used in the preceding figures denote identical or equivalent parts.

[0015] In this case, the drying device forms an independent module, which can be associated with a water supply device 16. In particular (Figures 3 - 5), the casing 12 is flat and is substantially rectangular in plan view, with a protuberance 34 at one end of one of the short sides. Along this short side, the casing 12 also has a plurality of resilient teeth 36 which are spaced apart, for fastening to the water supply device 16. In this case also, the corrugated tube 14 forms a portion of a water supply conduit, located upstream of an air gap portion 27 formed in the device 16. For its part, the support 22 of the serpentine portion 20 of the tube 14 is formed by a series of strips offset from each other in two orthogonal directions, with recesses into which corresponding sections of the tube 14 can be fitted.

[0016] The casing 12 (Figure 6) can be made by blow moulding in one piece, into which the tube 14 with its support 22 is subsequently inserted.

[0017] Alternatively (see Figure 7), the casing 12 can be made by injection moulding in two pieces which are welded together subsequently.

[0018] Naturally, the principle of the invention remaining the same, the details of construction and the forms of embodiment may be varied widely with respect to those described, which have been given purely by way of example, without thereby departing from the scope of the invention as defined in the attached claims.

5

10

Claims

1. Drying device for a dishwasher, comprising a vapour condensation chamber (10) which is formed within a casing (12) and which contains a corrugated tube (14), inside which there flows water for causing vapour condensation on its outer surface, wherein said tube (14) has a serpentine-shaped portion (20). 15
20
2. Device according to Claim 1, wherein said corrugated tube (14) forms a portion of a conduit supplying water to the dishwasher.
3. Device according to Claim 1 or 2, wherein a support (22) of the serpentine-shaped portion (20) of said tube (14) is arranged within said chamber (10). 25
4. Device according to any of the preceding claims, wherein said casing (12) is an integral part of a water supply device (16). 30
5. Device according to any of the preceding Claims 1 to 3, forming a module which can be selectively associated with a water supply device (16). 35
6. Device according to Claim 5, wherein said casing (12) is flat and is substantially rectangular in plan view with a protuberance (34) at one end of one of the short sides. 40
7. Device according to Claim 5 or 6, wherein said casing (12) has along one of its edges a plurality of resilient teeth (36) for fastening to said water supply device (16). 45
8. Device according to any one of the preceding Claims 5 to 7, wherein said casing (12) is produced by blow moulding. 50
9. Device according to any one of the preceding Claims 5 to 7, wherein said casing (12) is produced by injection moulding.
10. Dishwasher comprising a drying device according to any one of the preceding claims. 55

Fig.1

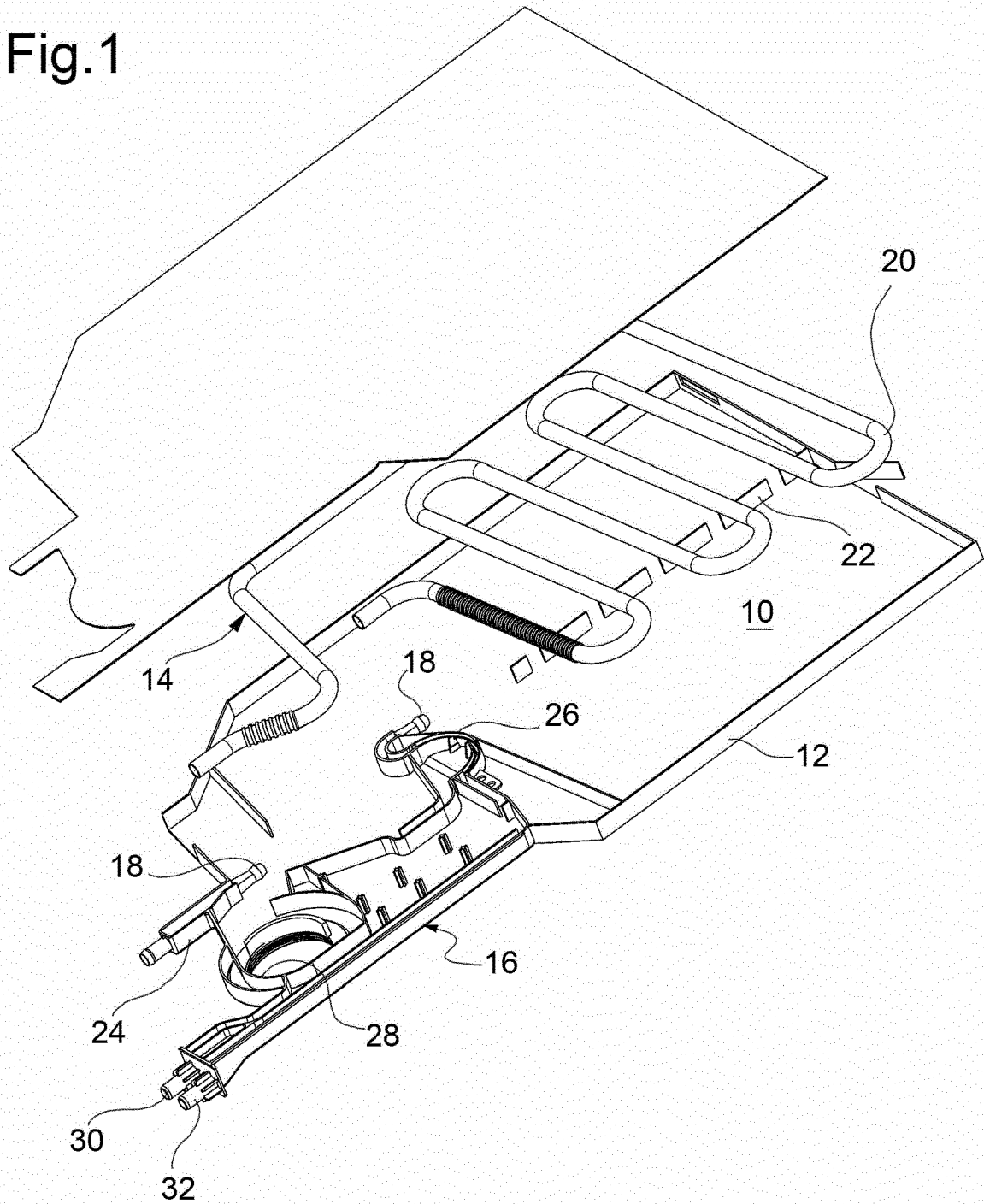


Fig.2

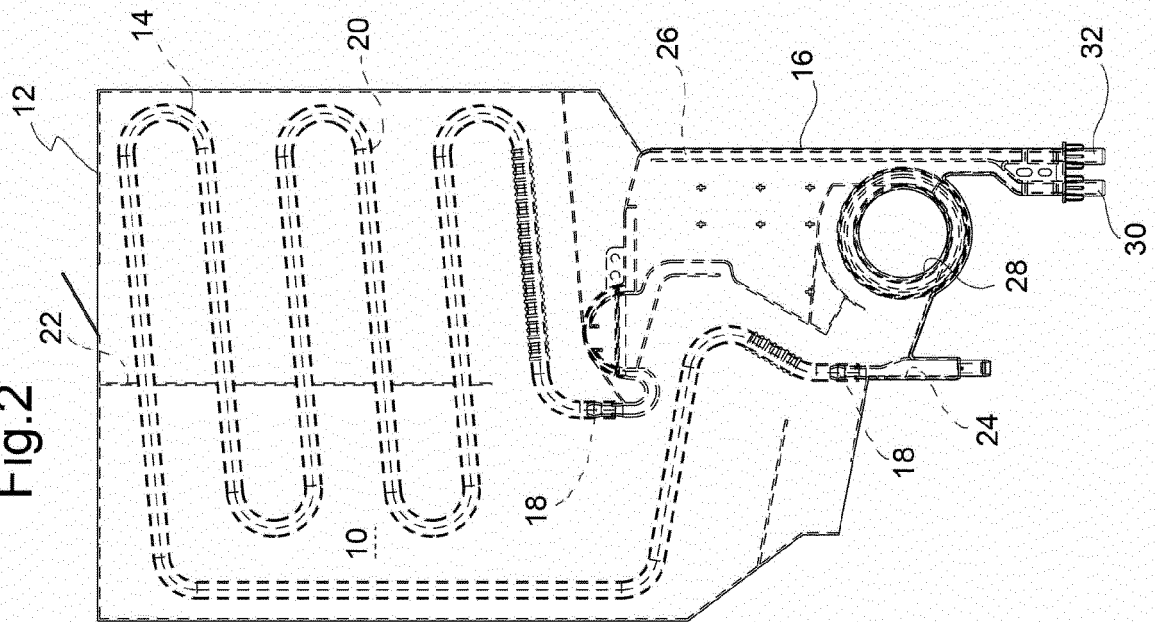
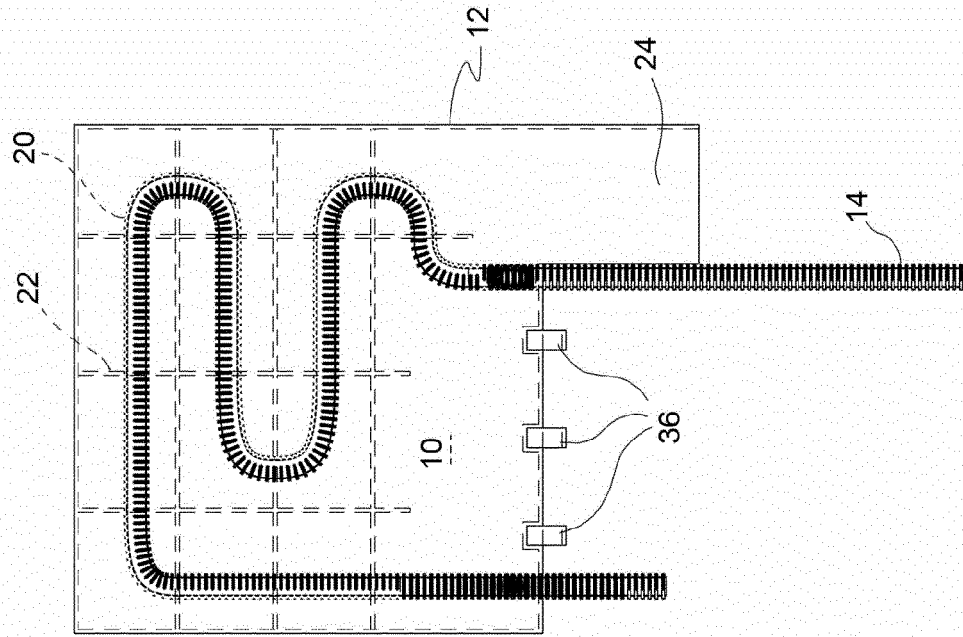
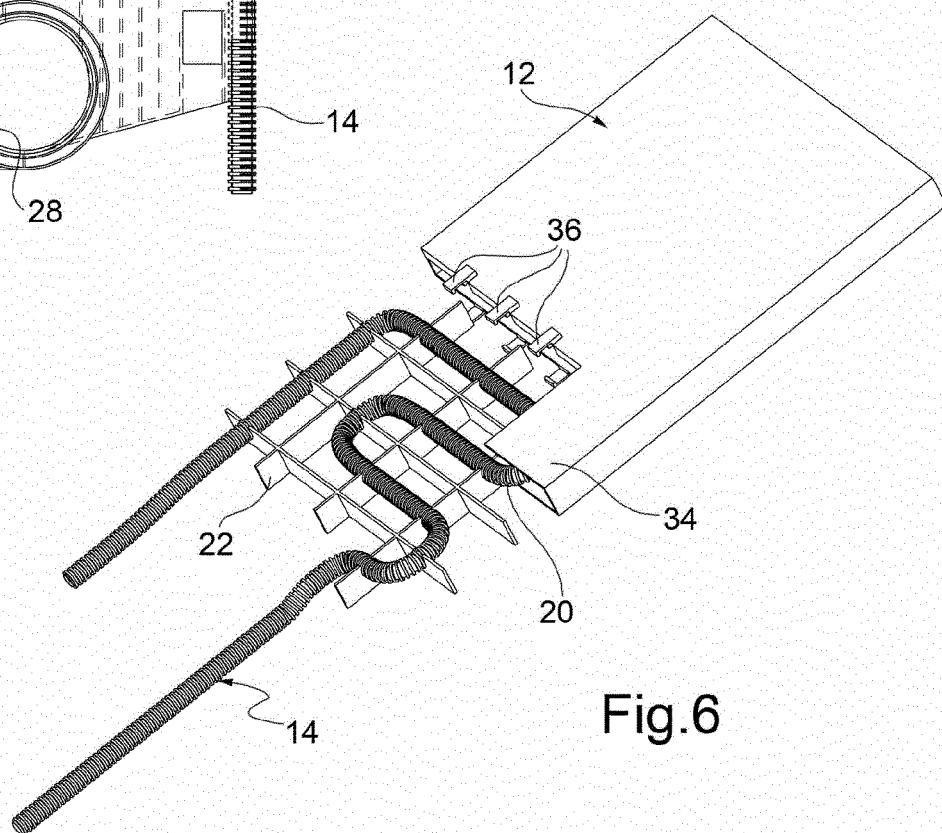
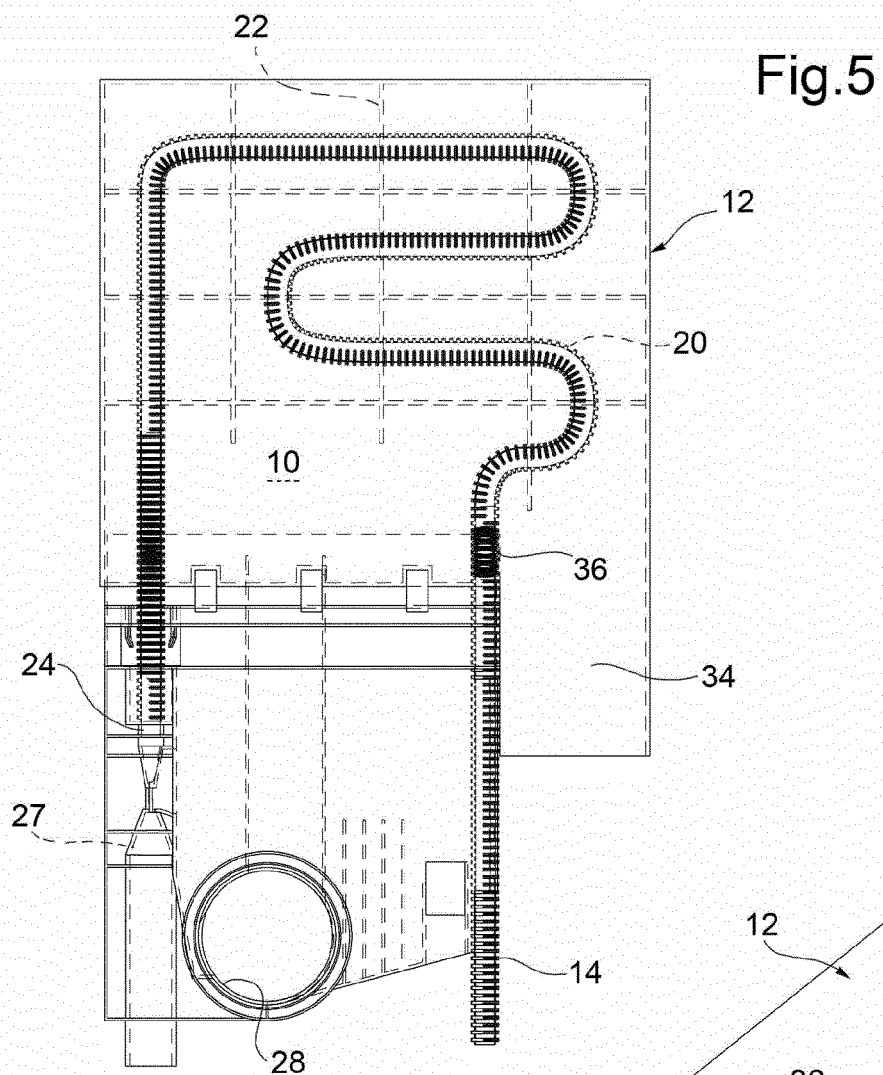
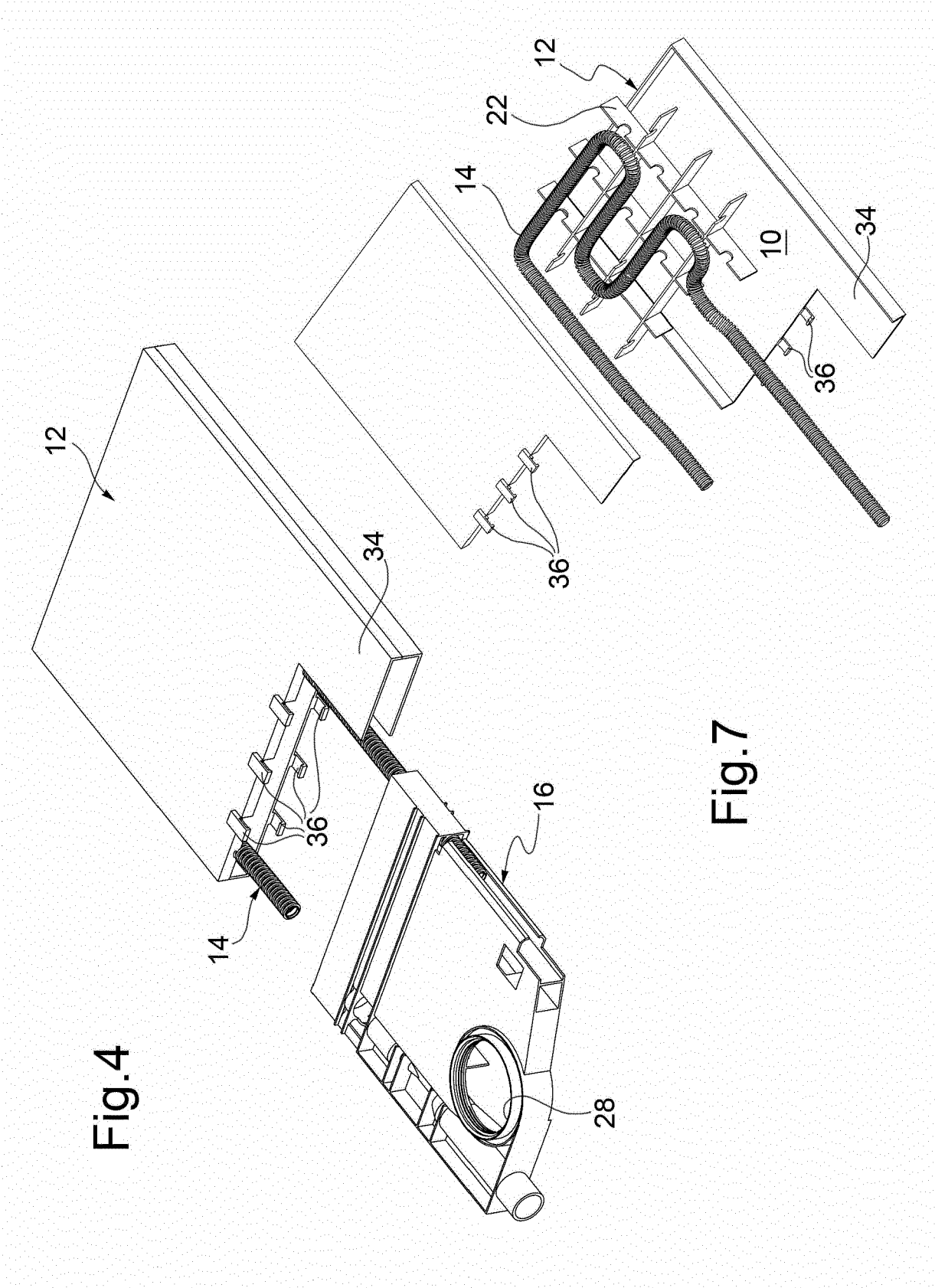


Fig.3









EUROPEAN SEARCH REPORT

Application Number
EP 12 19 0120

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 978 250 A2 (BITRON SPA [IT]) 9 February 2000 (2000-02-09) * paragraph [0014] - paragraph [0031]; figures *	1-6,8-10	INV. A47L15/48 A47L15/42
X	DE 10 2007 007133 A1 (MEIKO MASCHINENBAU GMBH & CO [DE]) 14 August 2008 (2008-08-14) * paragraph [0039] - paragraph [0058]; figures 3-6 *	1-6,8-10	
A	EP 0 753 282 A1 (PREALPINA TECNOPLASTICA [IT] T & P SPA [IT]) 15 January 1997 (1997-01-15) * column 3 - column 4; figures *	1-6,8-10	
X	DE 19 26 049 A1 (KRONWITTER WOLFRAM; KRONWITTER GEB STAIBER) 26 November 1970 (1970-11-26) * page 2 - page 4; figure 2 *	1-6,8-10	
A	EP 1 825 800 A2 (V ZUG AG [CH]) 29 August 2007 (2007-08-29) * paragraph [0011] - paragraph [0012]; figures *	1	TECHNICAL FIELDS SEARCHED (IPC) A47L
A	US 2005/113698 A1 (KRISTOFFERSEN KJELL [NO] ET AL) 26 May 2005 (2005-05-26) * paragraph [0006]; figures *	1	
A	US 4 995 454 A (THOMPSON DONOVAN S [US]) 26 February 1991 (1991-02-26) * column 1, lines 9-32; figures *	1	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 27 February 2013	Examiner Lopez Vega, Javier
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			

 2
EPO FORM 1503 03.82 (P04C01)

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

EP 12 19 0120

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.

27-02-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0978250 A2	09-02-2000	EP 0978250 A2	09-02-2000
		IT T0980686 A1	07-02-2000

DE 102007007133 A1	14-08-2008	AT 495696 T	15-02-2011
		CN 101610707 A	23-12-2009
		DE 102007007133 A1	14-08-2008
		EP 2117414 A2	18-11-2009
		US 2009038661 A1	12-02-2009
		WO 2008098745 A2	21-08-2008

EP 0753282 A1	15-01-1997	DE 69601055 D1	14-01-1999
		DE 69601055 T2	05-08-1999
		EP 0753282 A1	15-01-1997
		IT MI951532 A1	14-01-1997

DE 1926049 A1	26-11-1970	NONE	

EP 1825800 A2	29-08-2007	NONE	

US 2005113698 A1	26-05-2005	EP 1533626 A2	25-05-2005
		JP 4774205 B2	14-09-2011
		JP 2005152630 A	16-06-2005
		US 2005113698 A1	26-05-2005

US 4995454 A	26-02-1991	NONE	
