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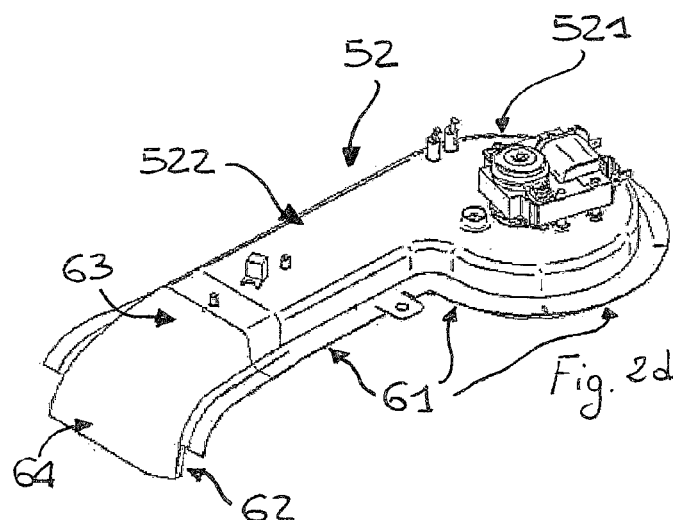
(54) Drying device with a blowing unit

(57) A linen drying device comprising:
i) a drum (2) that can rotate and is intended to house the linen to be dried and/or washed;
ii) a housing compartment (3) of the drum (2);
iii) a condenser (4) that receives a gaseous fluid containing particles of vapour from said compartment (3) and that causes at least partial condensation thereof;
iv) a blowing unit (5) in turn comprising:
-a movement impeller (51) of the gaseous fluid;
-a casing (52) that houses the impeller (51), is placed in fluid communication with the condenser (4) and is down-

stream of the condenser (4) along the outflow direction of the gaseous fluid, said casing (52) comprising a first and a second semi-shell (53, 54).

The condenser (4) and the blowing unit (5) are placed along a line (7) that takes said gaseous fluid out of the compartment (3) and reintroduces it into the compartment (3).

The first and the second semi-shell (53, 54) are made of sheet metal and are connected to each other through a seaming (9).



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Description

[0001] The present invention relates to a linen drying device, for example a dryer. Such a device could also be suitable for washing linen as well as drying it (in which case we typically talk about a washer-dryer).

[0002] A dryer is known comprising a rotating drum in which the items to be dried are placed. The drum is inserted in a housing compartment. To perform the drying through a recirculation line, the air is extracted from the compartment, treated and reintroduced therein. On this point, along the recirculation line there is:

- a condenser that causes the condensation of the moisture contained in the air extracted from the compartment (such moisture is transferred to the air by the linen whilst it is drying);
- a fan that moves the air along the recirculation line;
- an element that heats the air before reintroducing it into the compartment. The fan is inserted in a case (scroll) along which the air is channelled. This case is provided by the combination of two semi-shells that are connected to each other through threaded connection means.

[0003] The semi-shells are created through aluminium die-casting. This solution implies a substantial cost connected with the use of die-casting. Furthermore, die-casting implies the use of a substantial amount of material which tends to reduce the advantages in terms of weight provided by aluminium. Furthermore, the use of aluminium determines substantial heat dispersion. In an alternative embodiment, the two semi-shells are made of plastic, but if so the case is less strong and could break easily following the strain to which it is subject (in fact, this component is very close to the rotating drum).

[0004] In this context, the technical task on which the present invention is based is to propose an electrical household appliance that allows the costs to be reduced.

[0005] The technical task set and the objects specified are substantially attained by an electrical household appliance, comprising the technical characteristics as set out in one or more of the accompanying claims.

[0006] Further characteristics and advantages of the present invention will become more apparent from the following indicative, and hence non-limiting, description of a preferred, but not exclusive, embodiment of an electrical household appliance as illustrated in the appended drawings, in which:

- Figure 1 shows a perspective view of a portion of the device according to the present invention;
- Figures 2a, 2b, 2c, 2d show, from different points of view, a component of the device according to the present invention;
- Figures 3 and 4 show details of a component according to the present invention.

[0007] In the accompanying drawings, number 1 indicates a device for drying linen.

[0008] The drying device 1 comprises a drum 2 which can rotate and which is intended to house the linen to be dried. In the case of a washer-dryer this drum 2 also houses the linen to be washed.

[0009] Appropriately the device 1 comprises a housing compartment 3 of the drum 2. In technical jargon this compartment 3 is also known as a tank. In the case of a washer-dryer it houses the water during the running of the washing cycle and on the lower bottom of such a tank, there is a discharge system for the washing water.

[0010] Appropriately the device 1 comprises a line 7 which takes said gaseous fluid out of the compartment 3 and reintroduces it into the compartment 3. This allows the air rich in moisture (following contact with the linen to be dried contained in the drum 2 placed in the compartment 3) to be taken and reintroduced into the compartment 3 after an appropriate treatment. On this point the device 1 comprises a condenser 4 that receives a gaseous fluid containing particles of vapour from said compartment 3 and that causes at least partial condensation thereof.

[0011] The device 1 further comprises a blowing unit 5 in turn comprising:

- a movement impeller 51 of the gaseous fluid;
- a casing 52 that houses the impeller 51. Such casing 52 is placed in fluid communication with the condenser 4. The casing 52 is downstream of the condenser 4 along the outflow direction of the gaseous fluid. The casing 52 comprises a first and a second semi-shell 53, 54. In the preferred embodiment the casing 52 coincides with the joining of the first and the second semi-shell 53, 54.

[0012] Advantageously the casing 52 comprises a scroll 521 which surrounds the impeller 51 and a conduit 522 which projects away from said scroll 521. Appropriately the scroll 521 is interposed between the condenser 4 and the conduit 522. Advantageously the conduit 522 houses an electrical element for heating the air.

[0013] Appropriately the blowing unit 5 is of the centrifugal type.

[0014] The first and the second semi-shell 53, 54 are made of sheet metal. The sheet metal is hence made of metal. The sheet metal of the first semi-shell 53 is preferably steel. In particular it is a type of steel for moulding. By way of non-limiting example the sheet metal can be aluminium- or zinc- coated or electro-galvanised. In a particular embodiment the sheet metal may be aluminium.

[0015] The sheet metal of the first semi-shell 53 has a thickness of less than 1 millimetre, preferably less than 0.8 mm. The reduced thickness of the sheet metal allows a light structure to be created but which can at the same time offer maximum resistance to strain. The description with reference to the first semi-shell 53 may also be re-

peated for the second semi-shell 54.

[0016] The first and the second semi-shell 53, 54 are connected to each other by seaming 9. The seaming 9 allows a fast and cheap connection to be obtained, potentially even without the need to use additional interposed gaskets (which would certainly be necessary if the two semi-shells were connected through threaded connections). As can be seen in Figure 4 in the seaming 9 one of the two edges projects into the other folded edge. At least the part of the first and the second semi-shell 53, 54 afforded at the scroll 521 are seamed (in other words the seaming 9 affects at least the whole scroll 521).

[0017] The first semi-shell 53 defines an upper portion 55 of the casing 52 and the second semi-shell 54 defines a lower portion 56 of the casing 52. The first and the second semi-shell 53, 54 are mutually seamed at a first side part 57 of the casing 52 and at a second side part 58. The first and the second side part 57, 58 are opposite one another.

[0018] The first and the second semi-shell 53, 54 have perimetric edges 59, 60 that overlap along a mutual junction line 8. The seaming of the first and the second semi-shell 53, 54 affects a first stretch 61 which develops along more than 75% of said junction line 8. The first stretch 61 develops with continuity. This guarantees the fluid dynamic seal.

[0019] The perimetric edges 59, 60 of the first and the second semi-shell 53, 54 in a second stretch 62 of said junction line 8 are in contact without being directly constrained by one another; in such second stretch 62 there is simply an overlap as highlighted in Figure 3. The first and the second stretch 61, 62 develop respectively along a first and a second portion 63, 64 of the casing 52, said second portion 64 being downstream of the first portion 63 with respect to an outflow direction of the fluid along the casing 52. Appropriately the device 1 comprises a bellows 91 which surrounds the second stretch 62 (hence improving the fluid dynamic seal) and which leads into the compartment 3. The absence of the seaming 9 on the second stretch 62 allows the second stretch 62 to be inserted into the bellows 91. Otherwise the presence of the seaming 9 on the second stretch 62 would prevent insertion into the bellows 91 or would however reduce the fluid dynamic seal of the bellows 91.

[0020] Advantageously the device 1 comprises threaded connection means that allow the assembly of the casing 52 on the external wall of the compartment 3. For that purpose the casing 52 comprises a plurality of holes 92 placed along the seaming 9 and intended to house corresponding stems of threaded elements.

[0021] The subject matter of the present invention is also a method for producing the washing and drying device 1. The method comprises the steps of:

- deep-drawing a first metal sheet to obtain the first semi-shell 53;
- deep-drawing a second metal sheet to obtain the second semi-shell 54;

- overlapping the first and the second semi-shell 53, 54 to define said casing 52;
- mutually coupling the first and the second semi-shell 53, 54 seaming a perimetric edge of the first semi-shell 53 and a perimetric edge of the second semi-shell 54 obtaining said casing 52;
- coupling the casing 52 to an external wall of the compartment 2.

[0022] The invention as it is conceived enables multiple advantages to be attained.

[0023] Above all it allows the assembly costs to be reduced thanks to the connection of the first and the second semi-shell 53, 54 through seaming 9 (avoiding the costs of die-casting and, in fact, thinner metal sheets can be used with weight savings). This connection in an exemplary, but non-limiting, embodiment could also avoid the use of an additional gasket to be interposed between the first and the second semi-shell (which would be required if the edges of the first and the second semi-shell were connected through threaded means; in that case the edges would not in fact be folded onto themselves). The use of sheet steel is also very advantageous allowing the costs and heat dissipation to be reduced with respect to the case in which the semi-shells were made by aluminium die-casting.

[0024] The invention as conceived is susceptible to numerous modifications and variants, all falling within the scope of the inventive concept characterised thereby. Furthermore all the details can be replaced by other technically equivalent elements. In practice, all the materials used, as well as the dimensions, can be any according to requirements.

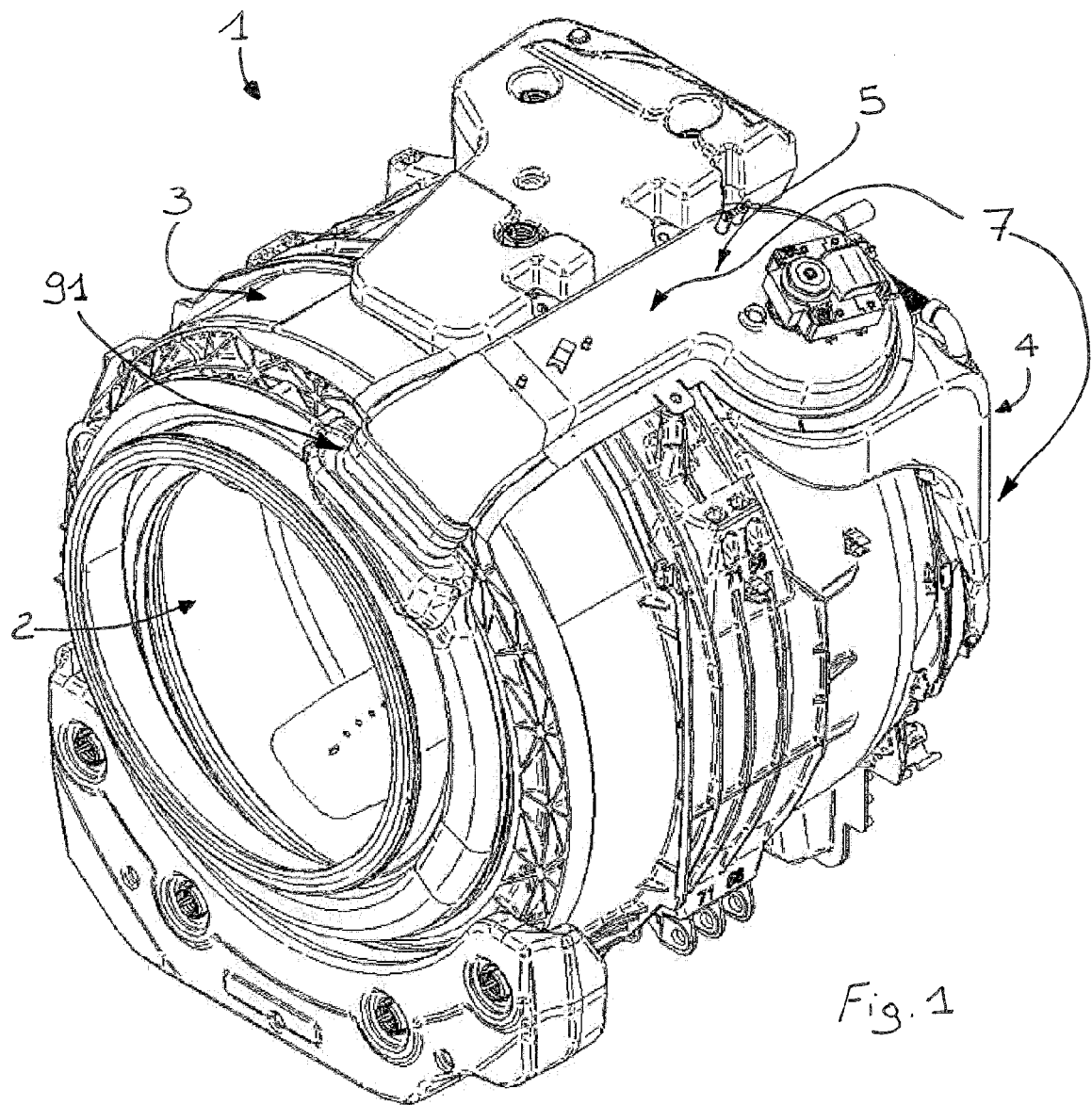
Claims

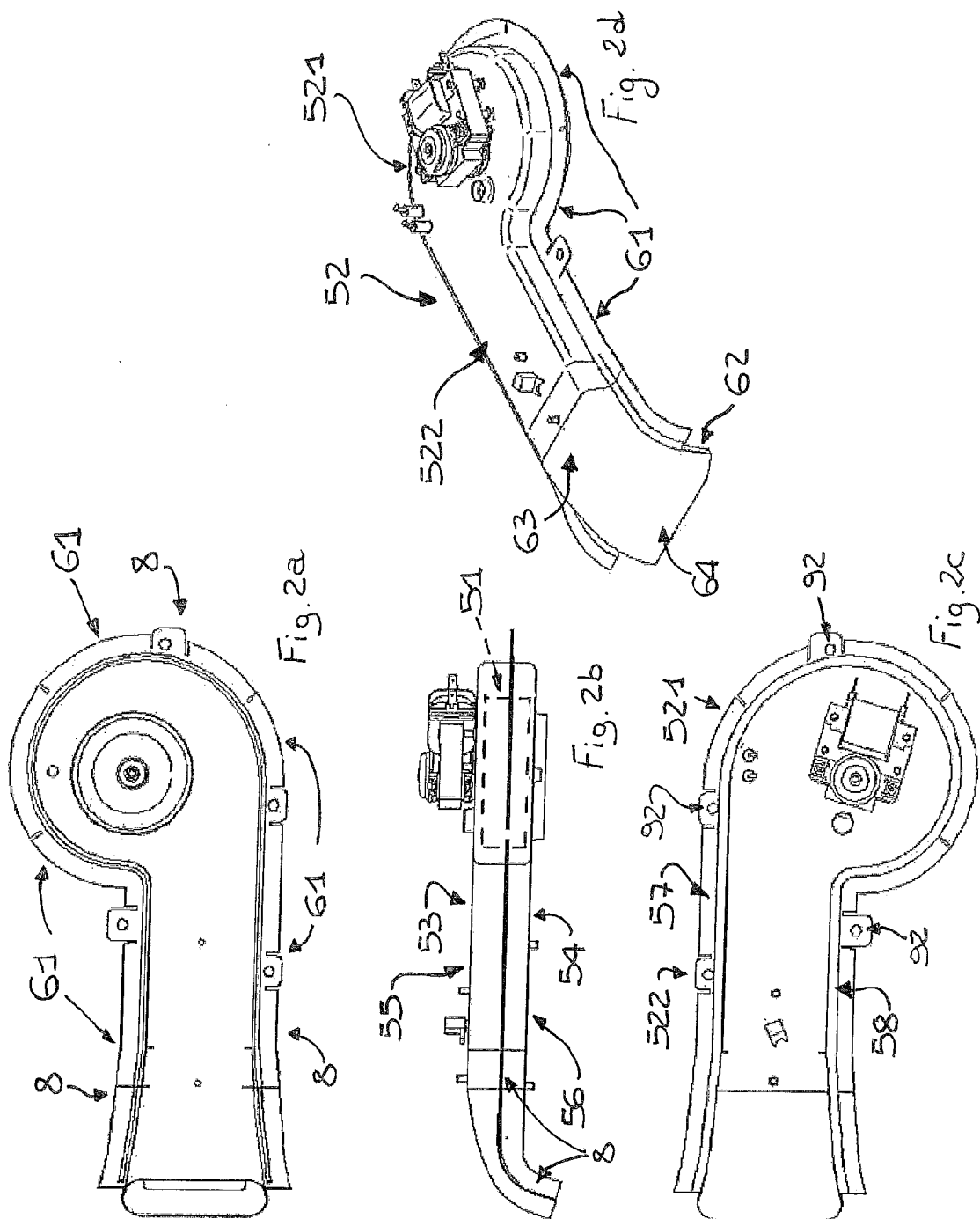
1. A linen drying device comprising:

- i) a drum (2) that can rotate and is suitable for housing the linen to be dried;
- ii) a housing compartment (3) of the drum (2);
- iii) a condenser (4) that receives a gaseous fluid containing particles of vapour from said compartment (3) and that causes at least partial condensation thereof;
- iv) a blowing unit (5) in turn comprising:

- a movement impeller (51) of the gaseous fluid;
- a casing (52) that houses the impeller (51), is placed in fluid communication with the condenser (4) and is downstream of the condenser (4) along the outflow direction of the gaseous fluid, said casing (52) comprising a first and a second semi-shell (53, 54); said condenser (4) and said blowing unit (5) being placed along a line (7) that takes said

- gaseous fluid out of the compartment (3) and reintroduces it into the compartment (3);
characterised in that the first and the second semi-shell (53, 54) are made of sheet metal and are connected to each other through a seaming (9).
2. The device according to claim 1, **characterised in that** the sheet metal of the first semi-shell (53) and the sheet metal of the second semi-shell (54) are made of steel.
3. The device according to claim 1 or 2, **characterised in that** the sheet metal of the first semi-shell (53) and the sheet metal of the second semi-shell (54) have a thickness of less than 1 millimetre.
4. The device according to any one of the preceding claims, **characterised in that** the first semi-shell (53) defines an upper portion (55) of the casing (52) and the second semi-shell (54) defines a lower portion (56) of the casing (52); the seaming (9) joining the first and the second semi-shell (53, 54) at a first side part (57) of the casing (52) and at a second side part (58); the first and the second side part (57, 58) being opposite to each other.
5. The device according to any one of the preceding claims, **characterised in that** the first and the second semi-shell (53, 54) have perimetric edges (59, 60) that overlap with each other along a mutual junction line (8); the seaming (9) of the first and the second semi-shell (53, 54) affecting a first stretch (61) that develops for over 75% of said junction line (8).
6. The device according to claim 5, **characterised in that** the first stretch (61) develops with continuity.
7. The device according to claim 5 or 6, **characterised in that** the perimetric edges (59, 60) of the first and the second semi-shell (53, 54) in a second stretch (62) of said junction line (8) are in contact without being directly constrained by each other; the first and the second stretch (61, 62) developing respectively along a first and a second portion (63, 64) of the casing (52), said second portion (64) being placed downstream of the first portion (63) with respect to an outflow direction of the fluid along the casing (52).
8. The device according to claim 7, **characterised in that** it comprises a bellows (91) that surrounds the second stretch (62) and leads into the compartment (3).
9. The device according to any one of the preceding claims, **characterised in that** the casing (52) comprises a scroll (521) that surrounds the impeller (51) and a conduit (522) that stretches away from said scroll (521).
10. A method of producing the washing and drying device according to any one of claims 1 to 9, **characterised in that** it comprises the steps of:
- deep-drawing a first metal sheet to obtain the first semi-shell (53);
 - deep-drawing a second metal sheet to obtain the second semi-shell (54);
 - overlapping the first and the second semi-shell (53, 54) to define said casing (52);
 - mutually coupling the first and the second semi-shell (53, 54) seaming a perimetric edge of the first semi-shell (53) and a perimetric edge of the second semi-shell (54) obtaining said casing (52);
 - coupling the casing (52) to an external wall of the compartment (2).





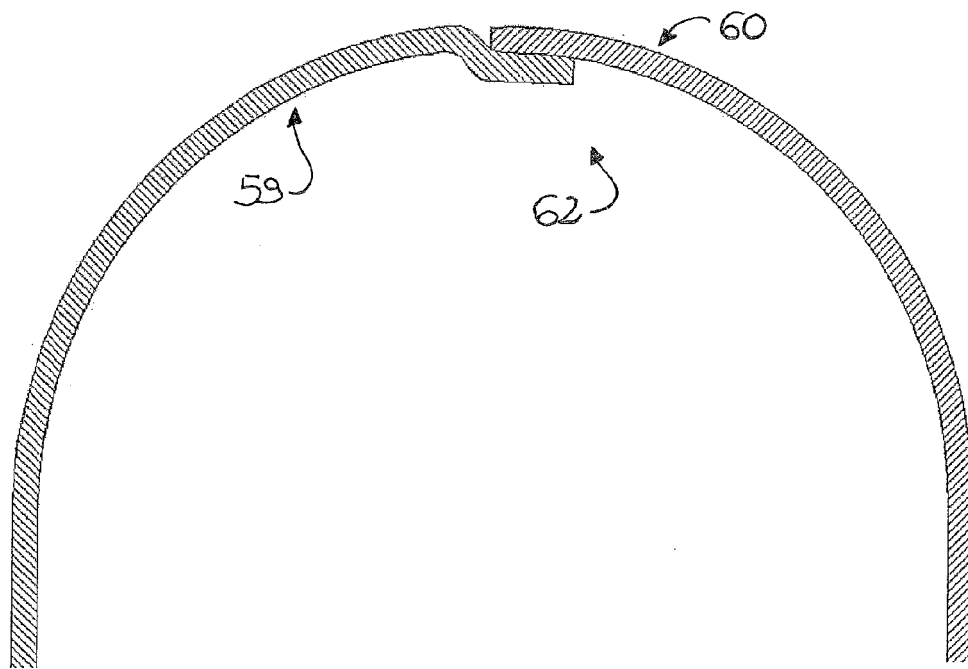


Fig. 3

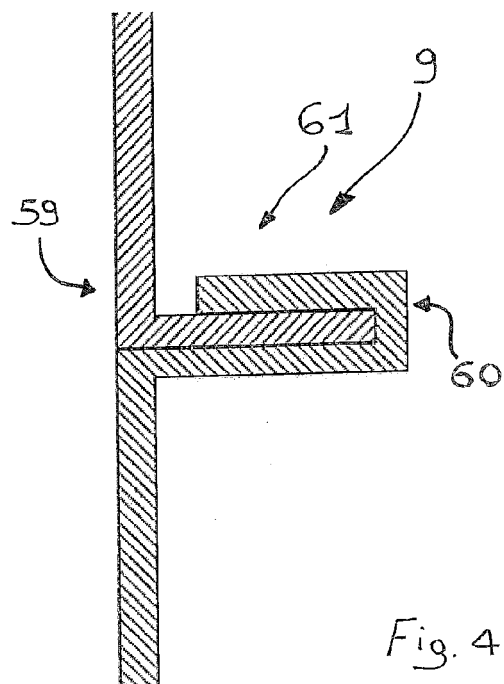


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 13 18 8657

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Place of search Munich		Date of completion of the search 30 October 2013	Examiner Kising, Axel
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	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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