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(71) Applicant: **SIGNAL LUX MDS S.r.l.**
20122 Milano (IT)

(72) Inventor: **BOZZETTI, Elio Tito**
20152 Milano (IT)

(74) Representative: **Brasca, Marco**
Bugnion S.p.A.
Viale Lancetti, 17
20158 Milano (IT)

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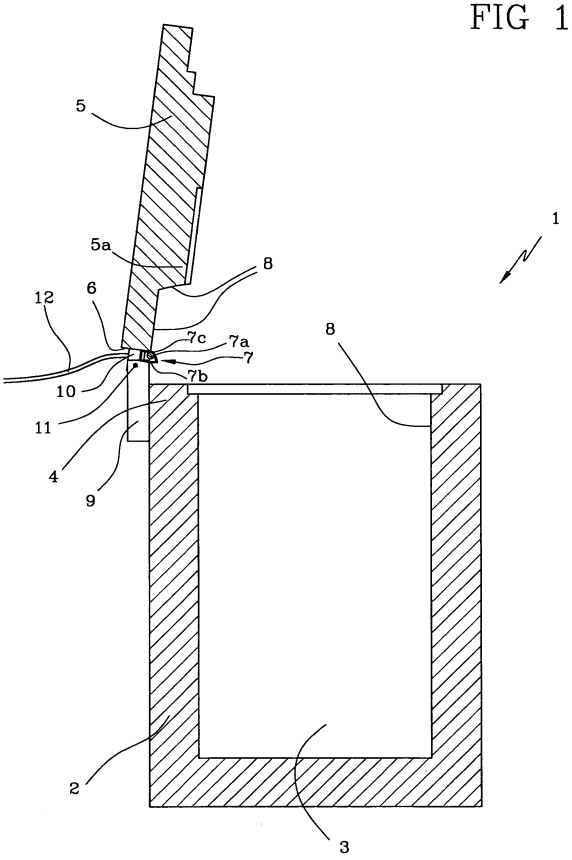
Amended claims in accordance with Rule 86 (2) EPC.

(54) Chest freezer

(57) A chest freezer comprises a box-shaped body (2) having a hollow holding space (3) for the goods to be frozen that is open at the top and a door (5) that is movable between an open position and a closed position. The freezer (1) further has a lighting device (7) to illuminate the interior of the box-shaped body (2); this lighting device (7) is positioned completely at the outside of the holding space (3), both when the door (5) is in the closed position and when said door (5) is in the open position, and is placed to such a location that it illuminates the interior of the holding space (3) at least partly when the door (5) is in the open position.

FIG 1



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Description

[0001] The present invention relates to a chest freezer, i.e. a freezer having access from the top.

[0002] In particular, the present invention relates to an inner lighting device for a chest freezer having an upper closing door hinged along one side thereof.

[0003] It is known that these lighting devices aim at facilitating inspection and search of the goods stored inside the freezer.

[0004] Traditional chest freezers are internally lit from a light source, generally an incandescent lamp, positioned on the closing door at an internal location. In particular, these lamps are applied to the lower surface of the door so that they take up room in the hollow space of the freezer when the latter is closed.

[0005] In alternative embodiments said incandescent lamp is inserted into a cavity formed on said lower surface of the door, in such a manner that it does not project from said surface and does not take up part of the room otherwise occupied by the goods stored in the freezer.

[0006] Manufacture of a lighting device as the one previously described is complicated and expensive because it is necessary to form a housing in the upper closing door to receive the lamp and enable passage of the power cable of said lamp.

[0007] In addition, such a solution at least partly impairs the thermal insulation of the holding space in which the goods to be frozen are stored. The power cable in fact is buried into the insulating material internally of the door itself; therefore, this configuration brings about a reduction in the insulating material thickness and involves a non optimal insulation from the external environment. Also the way the lamp is secured to the door contributes against a weak insulation, due to the fact that the metal screws for connection can dissipate the cold present in the freezer. Said cold dissipation brings about an increase in power consumption although of slight extent.

[0008] In addition, not to be underestimated is the fact that the power cable of the lamp passes internally of the door close to the outer metal wall of the door, which is not very safe for a user.

[0009] A further drawback resulting from the particular position of the lamp is the weak inner lighting in the freezer's holding space. In fact, as previously described, the lamp is located on the lower surface of the door that is parallel to the bottom wall of the holding space when the freezer is closed; therefore, when the door is rotated through almost 90 degrees around the hinge line to open the freezer, the lamp rotates as well and consequently the light beam is directed in a bothersome manner to the user's eyes rather than to the freezer inside.

[0010] In addition, use of an incandescent lamp involves high power consumption due both to the lamp's energy absorption and to the greater amount of work the compressor must do to compensate for an undesirable temperature increase caused by the heat of the incandescent lamp. In fact, when the door is closed, the lamp still hot is completely disposed at the inside of the freezer and therefore it heats the freezer contents: this temporary temperature increase must be compensated for by a respective increase in the cooling level internally of the freezer's holding space. Furthermore, the low temperatures reached inside the freezer hinder use of a fluorescent lamp in order to at least partly eliminate the above mentioned drawbacks.

[0011] In fact, a fluorescent lamp absorbs a lower energy amount as compared with an incandescent lamp and emits less heat when working, but use of same internally of a freezer is hampered by the fact that the gas contained therein is unable to offer a sufficient illumination if it is too cold.

[0012] The Applicant has found that the chest freezer and the related lighting device of the above described type can be improved under different points of view, particularly in terms of a reduction in the energy consumption, a simpler construction and reduced production costs.

[0013] Accordingly, it is an aim of the present invention to propose a chest freezer with an inner lighting device capable of overcoming the drawbacks found in the known art.

[0014] The above aim and others that will become more apparent in the course of the following description are achieved by a chest freezer comprising the features set out in claim 1 and in the claims depending thereon.

[0015] Further features and advantages will be best understood from the detailed description of a preferred but not exclusive embodiment of a chest freezer in accordance with the present invention. This description will be taken hereinafter with reference to the accompanying drawings given by way of non-limiting example, in which:

- Fig. 1 is a section side view of a chest freezer in accordance with the invention, in an open configuration;
- Fig. 2 shows an enlarged portion of the freezer seen in Fig. 1;
- Fig. 3 shows the portion seen in Fig. 2 in a closed configuration.

[0016] With reference to the drawings, a chest freezer in accordance with the invention has been generally identified by reference numeral 1.

[0017] The chest freezer 1 comprises a box-shaped body 2 internally provided with a hollow holding space 3 and having an opening at the top 4 for access to the holding space 3.

[0018] The freezer 1 has a door 5 at the top 4 which is movable between a closed position and an open position of the freezer itself. Preferably, this door 5 is hinged along one side 6 on the upper part 4 of the box-shaped body 2.

[0019] Also present is a lighting device 7 to illuminate the inside of the holding space 3, which device 7 in a

preferred configuration is operated automatically by the opening movement of the door 5. In an alternative embodiment, a turning-on button not shown is provided.

[0020] Advantageously, in the chest freezer 1 in accordance with the present invention the lighting device 7 is provided to be completely positioned externally of the holding space 3. In particular, this device 7 is external to the box-shaped body 2 of freezer 1, both when the door 5 is open and when it is closed. Therefore, positioning of the lighting device 7 at the outside of freezer 1 enables use of a lighting device 7 comprising a fluorescent lamp 7a, which will bring about energy savings.

[0021] The outer position of the lighting device 7 in accordance with the present invention is able to ensure lighting to the interior of the holding space 3 when the door 5 is opened.

[0022] The door further comprises at least one reflecting surface 8 facilitating inner lighting of the holding space 3 as a consequence of the reflection of the light beam emitted by the lamp 7a of the lighting device 7. This reflecting surface 8 in fact is positioned on a door portion 5a that, in the open position, faces downwards and towards the interior of the holding space 3. In this way the light beam emitted by the lighting device 7 impinges on such a reflecting surface 8 and is directed to the interior of the holding space 3.

[0023] Preferably, this reflecting surface 8 is shaped like a parabola, as shown in Fig. 2.

[0024] In alternative configurations this reflecting surface 8 can have a flat or curved course.

[0025] Advantageously, the inner walls too of freezer 1, i.e. the walls of the holding space 3, comprise at least one reflecting surface 8, to direct the light of the lighting device 7 to the interior of said space 3, and illuminate each region of same. This is particularly advantageous when the freezer 1 is partly filled and the light emitted from the lighting device 7 does not directly impinge on the lowest region of said holding space 3.

[0026] In the accompanying drawings a preferred configuration of the lighting device 7 has been shown. According to this preferred configuration, the lighting device 7 is fastened to the door 5, at the side 6 thereof hinged on the upper part of the box-shaped body 2. In particular, the lighting device 7 is located externally along said side 6 and is movable together with the door 5.

[0027] Said door 5 is secured to the box-shaped body 2 by means of at least two vertical supporting brackets 9, only one of which is shown in the accompanying drawings, which are positioned externally of the upper part 4 of the box-shaped body 2. The door 5 is hinged to said brackets 9 through at least two connecting elements 10 projecting externally of the side 6 of the door 5 itself. The hinge axis 11 is substantially horizontal and parallel to the side 6 of door 5.

[0028] The lighting device 7 comprises a lamp 7a and a lamp-holder 7b connected to a portion 6a of the side 6 of door 5. In particular, considering the door 5 in a closed position, said portion 6a is the lower part of side 6.

[0029] The lighting device 7 in the preferred configuration is movable relative to the box-shaped body 2, between a backward position at which the device 7 is turned off and contained between the two supporting brackets 9, as shown in Fig. 3, and a position at which the device 7 is turned on and stretched out towards the interior of the holding space 3, as shown in Figs. 1 and 2.

[0030] The above movement of the device 7 is produced by rotation of the door 5 around the hinge axis 11 during opening or closing of freezer 1. The lamp-holder 7b projects from the door 5 on the side thereof facing the interior of the holding space 3. Such a position is necessary to cause the lamp 7a contained in the lamp-holder 7b to be stretched out towards the holding space 3 to better illuminate such a space 3.

[0031] The lamp-holder 7b further has a curved surface 7c the concavity of which faces the hinge axis 11. This curved surface 7c is turned downwards when the door 5 is closed and towards the inside of the holding space 3 when the door 5 is open. Preferably said surface 7c is concentric with the hinge axis 11.

[0032] The described outline of the lamp-holder 7b is required to avoid interferences between the lamp-holder 7b and the upper part 4 of the box-shaped body 2 during opening and closing of the door 5.

[0033] In an alternative configuration, not shown, the lighting device 7 is provided to be positioned in a fixed manner between said brackets 9. In accordance with such a configuration, the device 7 is also fixed relative to the box-shaped body 2. In this construction solution, the lamp 7a faces the holding space 3 to illuminate the inside of same.

[0034] A third configuration, envisaged but not shown, has the lighting device 7 connected to the box-shaped body 2, preferably through the brackets 9 and movable relative to said body by means of a mechanical connection driven by the opening and closing movement of the door 5. In fact, when the door 5 is closed the lighting device 7 is turned off and in a backward position, being included between the connecting brackets 9, whereas when the door 5 is opened the device 7 moves partly forward towards the inside of the holding space 3 to illuminate the goods contained therein.

[0035] In the absence of particular energy-saving requirements, the lighting device 7 alternatively comprises an incandescent lamp 7a instead of a fluorescent lamp.

[0036] Supply of the lighting device 7 takes place by means of a power cable 12 that is constantly at the outside both of the door 5 and of the box-shaped body 2, irrespective of the adopted solution as regards positioning of the lamp 7a.

[0037] The present invention achieves the intended purposes and obtains important advantages.

[0038] First of all, the freezer in accordance with the present invention has a lighting device enabling bulkiness at the inside of the door to be reduced. This allows improvement of the thermal insulation with respect to the external environment, thereby ensuring an optimal stor-

age of the goods and reducing energy consumption.

[0039] By positioning the lighting device externally of the closing door, a simpler structure and construction of the door is obtained. In addition, the particular construction solution contemplating external positioning of the lighting device offers the possibility of using a fluorescent lamp instead of an incandescent lamp so that energy consumption is further reduced.

[0040] Finally, the lamp is powered through an electric cable that is not contained in any structural element and is constantly external, and this involves important construction and servicing simplifications, while at the same time improving safety of the lighting device.

Claims

1. A chest freezer, comprising:

- a box-shaped body (2) having a hollow holding space (3) for the goods to be frozen and being open at the top;
- a door (5) that is movable between an open position and a closed position relative to the box-shaped body (2);
- a lighting device (7) to illuminate the interior of the box-shaped body (2),

characterised in that said lighting device (7) is positioned completely at the outside of the holding space (2) both when the door (5) is in the closed position and when said door (5) is in the open position, and is placed to such a location that it illuminates the interior of the holding space (3) at least partly, when the door (5) is in the open position.

2. A chest freezer as claimed in claim 1, **characterised in that** said lighting device (7) is fastened to the door (5) and is movable therewith.

3. A chest freezer as claimed in claim 2, **characterised in that** said door (5) is hinged along one side (6) thereof to the upper part (4) of said box-shaped body (2).

4. A chest freezer as claimed in claim 3, **characterised in that** said lighting device (7) is positioned to the outside along the side (6) of the door (5) hinged on the upper part (4) of the box-shaped body (2).

5. A chest freezer as claimed in claim 3 or 4, **characterised in that** said lighting device (7) is movable relative to said box-shaped body (2) between a backward position at which the device (7) is contained between at least two supporting brackets (9) connecting the door (5) to the box-shaped body (2) and a position at which the device (7) is partly stretched out towards the interior of the holding space (3).

6. A chest freezer as claimed in claim 1, **characterised in that** said lighting device (7) is mounted on the box-shaped body (2) and partly faces the interior of the holding space (3).

7. A chest freezer as claimed in claim 6, **characterised in that** said lighting device (7) is fixed relative to said box-shaped body (2).

8. A chest freezer as claimed in claim 6, **characterised in that** said lighting device (7) is movable relative to said box-shaped body (2) between a backward position at which the device (7) is contained between at least two supporting brackets (9) connecting the door (5) to the box-shaped body (2) and a forward position at which the device (7) is partly stretched out towards the interior of the holding space (3).

9. A chest freezer as claimed in anyone of the preceding claims, **characterised in that** said lighting device (7) is operated by the opening movement of the door (5).

10. A chest freezer as claimed in one or more of the preceding claims, **characterised in that** said lighting device (7) is at least one fluorescent lamp (7a).

11. A chest freezer as claimed in one or more of claims 1 to 9, **characterised in that** said lighting device (7) is at least one incandescent lamp (7a).

12. A chest freezer as claimed in one or more of the preceding claims, **characterised in that** said door (5) has at least one reflecting surface (8) to direct light from the lighting device (7) to the inside of the holding space (3).

13. A chest freezer as claimed in claim 12, **characterised in that** said reflecting surface (8) is shaped like a parabola.

14. A chest freezer as claimed in claim 12 or 13, **characterised in that** said reflecting surface (8) is positioned on at least one portion (5a) of the door (5) facing the interior of the holding space (3) when the door (5) is in the open position.

15. A chest freezer as claimed in one or more of the preceding claims, **characterised in that** said holding space (3) has at least one inner reflecting wall (8) to direct the light from the lighting device (7) to the interior of the holding space (3).

Amended claims in accordance with Rule 86(2) EPC.

1. A chest freezer, comprising:

- a box-shaped body (2) having a hollow holding space (3) for the goods to be frozen and being open at the top;
- a door (5) that is hinged along one side (6) thereof to the upper part (4) of said box-shaped body (2) and is movable between an open position and a closed position relative to the box-shaped body (2);
- a lighting device (7) to illuminate the interior of the box-shaped body (2),

wherein said lighting device (7) is positioned completely at the outside of the holding space (2) both when the door (5) is in the closed position and when said door (5) is in the open position, and is placed to such a location that it illuminates the interior of the holding space (3) at least partly, when the door (5) is in the open position;
characterized in that the door (5) is secured to the box-shaped body (2) by means of at least two vertical supporting brackets (9) and the lighting device (7) is positioned between said brackets (9).

2. A chest freezer as claimed in claim 1, **characterised in that** said lighting device (7) is fastened to the door (5) and is movable therewith.

3. A chest freezer as claimed in claim 1, **characterised in that** said lighting device (7) is positioned to the outside along the side (6) of the door (5) hinged on the upper part (4) of the box-shaped body (2).

4. A chest freezer as claimed in claim 1, **characterised in that** said lighting device (7) is movable relative to said box-shaped body (2) between a backward position at which the device (7) is contained between the two supporting brackets (9) connecting the door (5) to the box-shaped body (2) and a position at which the device (7) is partly stretched out towards the interior of the holding space (3).

5. A chest freezer as claimed in claim 1, **characterised in that** said lighting device (7) is mounted on the box-shaped body (2) and partly faces the interior of the holding space (3).

6. A chest freezer as claimed in claim 5, **characterised in that** said lighting device (7) is fixed relative to said box-shaped body (2).

7. A chest freezer as claimed in claim 5, **characterised in that** said lighting device (7) is movable relative to said box-shaped body (2) between a backward position at which the device (7) is contained between the two supporting brackets (9) connecting the door (5) to the box-shaped body (2) and a forward position at which the device (7) is partly stretched out towards the interior of the holding space (3).

8. A chest freezer as claimed in anyone of the preceding claims, **characterised in that** said lighting device (7) is operated by the opening movement of the door (5).

9. A chest freezer as claimed in one or more of the preceding claims, **characterised in that** said lighting device (7) is at least one fluorescent lamp (7a).

10. A chest freezer as claimed in one or more of claims 1 to 8, **characterised in that** said lighting device (7) is at least one incandescent lamp (7a).

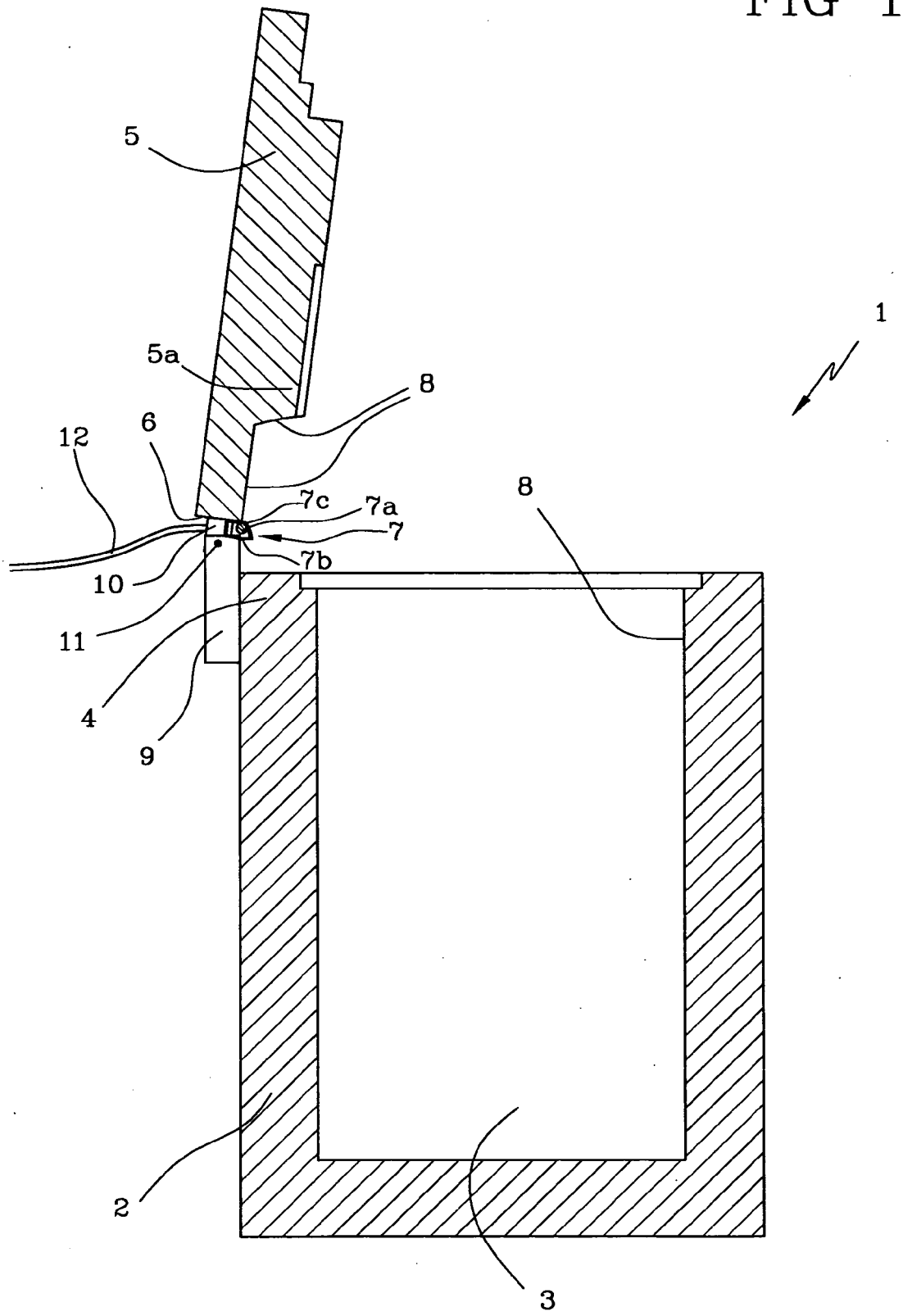
11. A chest freezer as claimed in one or more of the preceding claims, **characterised in that** said door (5) has at least one reflecting surface (8) to direct light from the lighting device (7) to the inside of the holding space (3).

12. A chest freezer as claimed in claim 11, **characterised in that** said reflecting surface (8) is shaped like a parabola.

13. A chest freezer as claimed in claim 11 or 12, **characterised in that** said reflecting surface (8) is positioned on at least one portion (5a) of the door (5) facing the interior of the holding space (3) when the door (5) is in the open position.

14. A chest freezer as claimed in one or more of the preceding claims, **characterised in that** said holding space (3) has at least one inner reflecting wall (8) to direct the light from the lighting device (7) to the interior of the holding space (3).

FIG 1



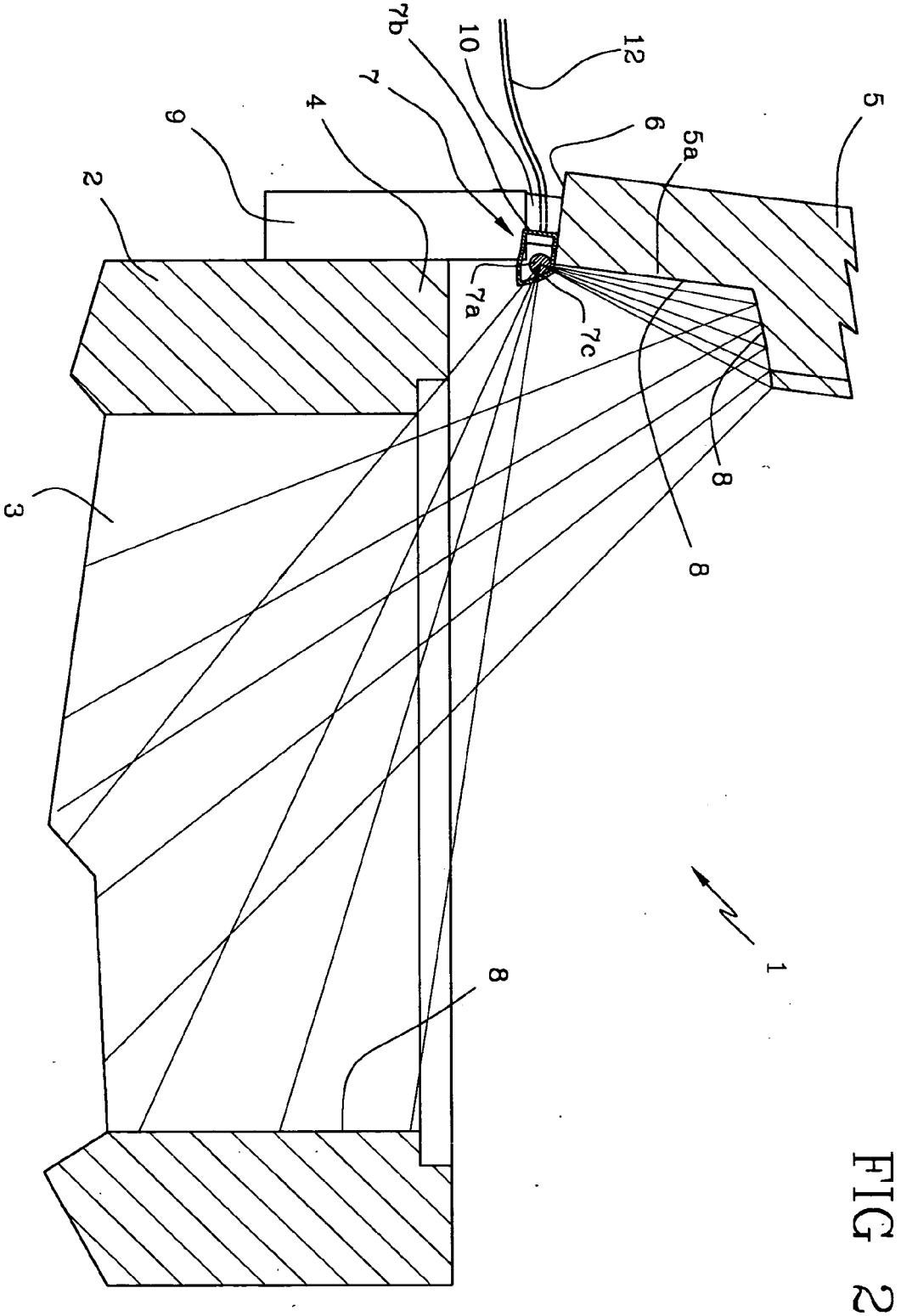


FIG 2

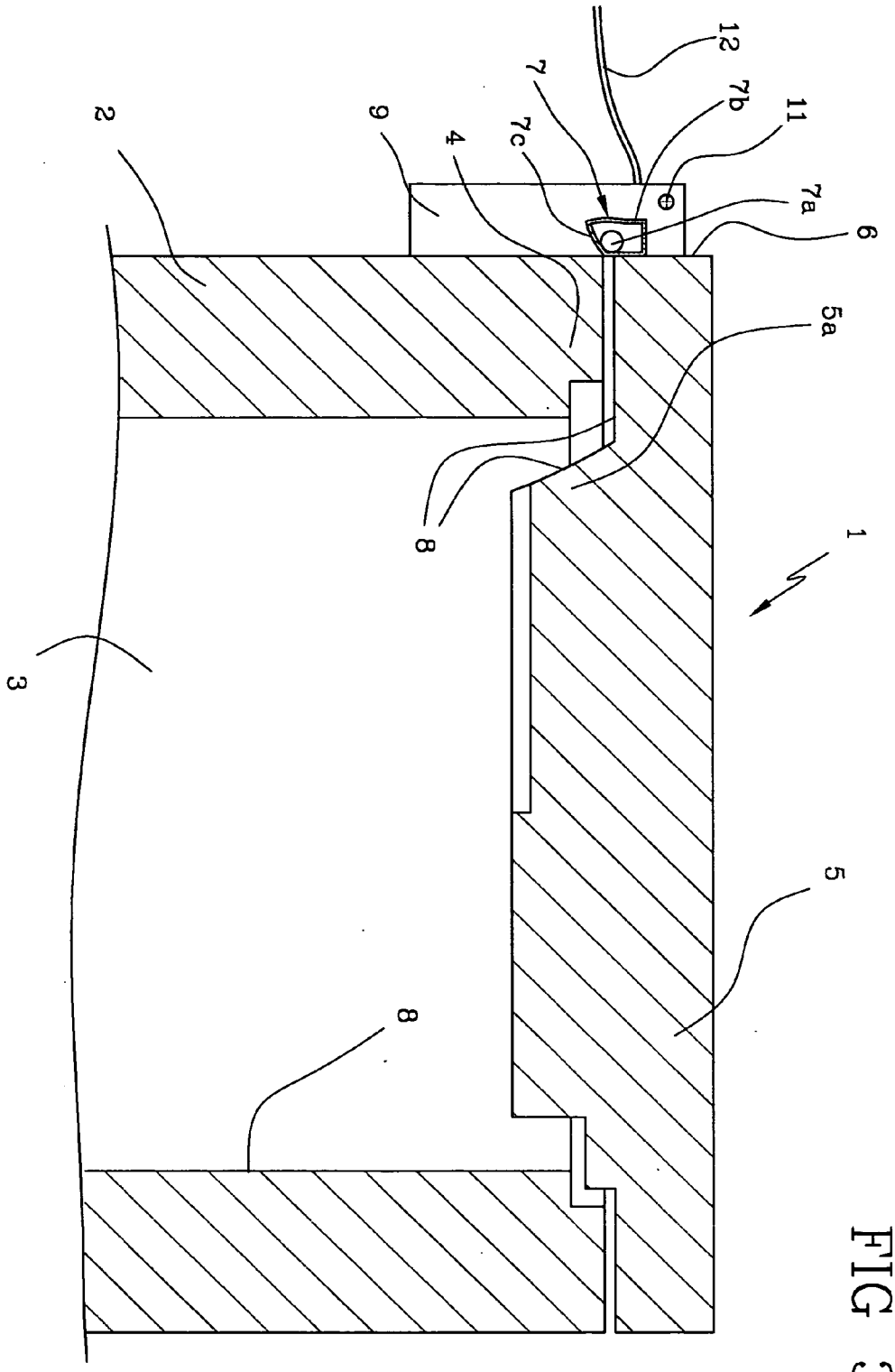


FIG 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 42 5758

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

F25D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	1 March 2006	Jessen, F

CATEGORY OF CITED DOCUMENTS

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01-03-2006

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