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(71) Applicant: **Daikin Isitma Ve Sogutma Sistemleri Sanayi Ticaret Anonim Sirketi**
**34848 Maltepe Istanbul (TR)**

(72) Inventor: **ECE, Yilmaz Mert**
**54300 Sakarya (TR)**

## (54) AIR CONDITIONING DEVICE COMPRISING ANTI-SWEATING BYPASS STRUCTURE

(57) The present invention relates to air conditioning that prevents condensation (sweating) that may occur on the shell plate surface due to temperature difference by keeping the temperature of the device main body (60) at a level close to the ambient air temperature by bypassing the airflow from the hot side to the cold side or vice versa.

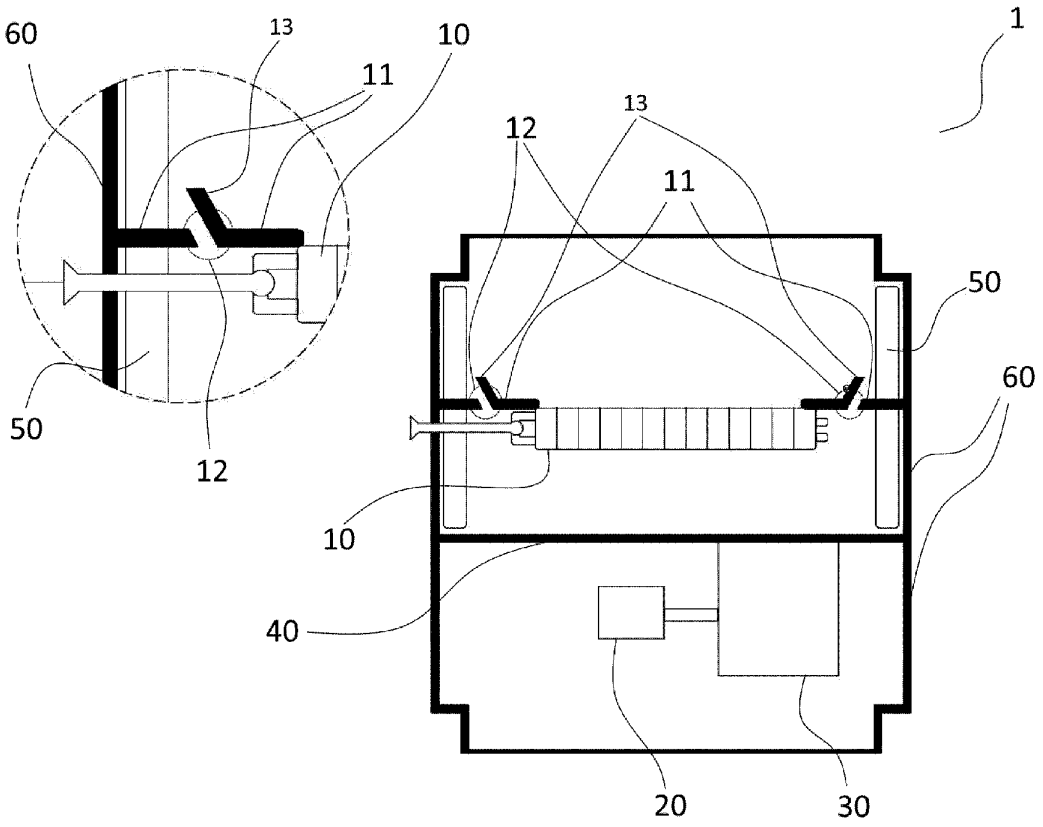


Figure 1

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## Description

### Technical Field

**[0001]** The invention relates to an air conditioning device that prevents the condensation (sweating) that will occur on the shell surface due to the temperature difference by keeping the temperature of main body of the device at a level close to the ambient temperature by bypassing the airflow from the hot side to the cold side or vice versa.

### Prior Art

**[0002]** Ambient temperature can be decreased or increased to a healthy and comfortable level by using technological devices with the developments in technology. Climatic air beyond our control such as heating, cooling, humidifying, dehumidifying, filtering, etc. is possible to keep within the desired values indoors with air-conditioning devices.

**[0003]** In the traditional air conditioner, basically, there are heat exchanger where heat transfer processes, the fan where the airflow is provided, and the fan motor components that give the movement to the fan. The climatization (conditioning) of the ambient is provided by directing the ambient air towards the inside of the unit through the fan and performing heat transfer on the exchanger surface. The conditioned air is sent to the ambient from the exit nozzle of the device and the desired comfort temperature is obtained.

**[0004]** Sweating occurs as a result of the condensation of the moisture in the ambient on the surface of the device through the cold inside section of the air conditioning device and the hot ambient. Especially in summer, when the air conditioner is operated under high temperature and high humidity conditions, the cold fluid passing over the exchanger causes to cool the plate parts of the device. Condensation occurs locally on the main body plates which are in contact with the external ambient due to ambient conditions, and the amount of condensation increases as time passes. In the traditional method, especially the side plate, top plate, and the bottom and top of the heat exchanger are covered with insulation to prevent heat loss and condensation on the main body. Prevention of sweating directly depends on the heat permeability coefficient and thickness of the insulation material. As a result of the sweating tests, the correct material and thickness are determined, the necessary insulation is provided and sweating is prevented. Briefly in current applications, condensation formation on the main body is prevented by using methods of increasing insulation thickness or adding insulation. However, increasing the insulation thickness or using materials with a higher heat permeability coefficient significantly increases labor and production costs during production.

**[0005]** This situation, especially in summer conditions, revealed the need for a solution that prevents the main body parts such as the side plate and top plate around the heat exchanger from falling below the ambient temperature, thus eliminating the formation of sweating.

**[0006]** In the patent No. DE10044433A1, a solution to prevent sweating is disclosed. However, in the solution mentioned here, the bypass process is mechanically controlled.

**[0007]** In the patent No. US4107939A, a solution to prevent sweating is disclosed. However, condensation is prevented by manipulating the movement of cold water due to the pressure difference of the bypass opening made here. In other words, a bypass system due to pressure difference is characterized.

**[0008]** In the patent No. US2521866A, a solution to prevent sweating is disclosed. However, in the solution mentioned here, the bypass process is mechanically controlled. By taking fresh air in by using a movable damper, the condensation on the inner surface is prevented and corrosion is prevented.

**[0009]** In the patent No. US3385350A, a method in which condensation is prevented by controlling the operation of the fan is mentioned.

**[0010]** As a result, bypassing the airflow from the hot side to the cold side or vice versa, the main body temperature of the device is kept at a level close to the ambient temperature. Thus, the solution of the present invention is needed to prevent condensation (sweating) that will occur on the shell surface due to the temperature difference.

### Objectives and Brief Description of the Invention

**[0011]** The aim of the present invention is to introduce an air conditioning device that prevents the condensation (sweating) that will occur on the shell surface due to the temperature difference by keeping the temperature of the main body of the device at a level close to the ambient temperature by bypassing the air flow from the hot side to the cold side or vice versa.

**[0012]** Another aim of the present invention is to reduce the thickness of the insulation jacket or to eliminate its use altogether, thus improving or eliminating the costs arising from the insulation jacket.

**[0013]** An air conditioning device comprising heat exchanger, exchanger side plate, fan, fan motor, and main body wherein the mentioned heat exchanger side plate comprising at least one bypass channel.

**[0014]** In the preferred embodiment of the air conditioning device of the present invention, the mentioned heat exchanger side plate comprises a bypass router.

**[0015]** In the preferred embodiment of the air conditioning device of the present invention, the mentioned bypass router has an angled form that directs the air taken from the fan motor towards the inner surface of the main body.

**[0016]** In the preferred embodiment of the air conditioning device of the present invention, the angle between the mentioned bypass router and bypass channel is 10

to 80 degrees.

**[0017]** It is a method of preventing condensation on the outer surface of the main body wherein it comprising the steps of

- by the fan operation, directing the ambient air to the heat exchanger and to the bypass channel on the exchanger side plate,
- directing the air which directed to the bypass channel, to the inner surface of the main body via bypass router,
- preventing condensation by reducing the temperature difference between the inner and outer surface of the main body.

**Brief Description of the Figures**

**[0018]**

In Figure 1; a top section view of the air conditioner is shown.

In Figure 2; a front view of the heat exchanger side plate containing bypass router and bypass channel structures is shown.

In Figure 3, close perspective views of the bypass router and bypass channel structures on the mentioned heat exchanger side plate are shown.

In Figure 4, a top section view of the air conditioner in the prior art is shown.

In Figure 5, a front view of the heat exchanger side plate in the prior art is shown.

**Reference Numbers**

**[0019]**

1. Air conditioner
10. Heat exchanger
11. Exchanger side plate
12. Bypass channel
13. Bypass router
20. Fan motor
30. Fan
40. Separation plate
50. Insulation jacket
60. Main body

**Detailed Description of the Invention**

**[0020]** The present invention relates to the air conditioning device (1) which prevents the condensation (sweating) that will occur on the shell plate surface due to the temperature difference. The air condition device ensures that the temperature of the main body (60) of the device is kept at a level close to the ambient temperature by bypassing the airflow from the hot side to the cold side or vice versa.

**[0021]** Especially in the summer months, when the air conditioner is operated under high temperature and high humidity conditions, the cold fluid passing over the exchanger causes to cool of the plate parts of the device. In air conditioning devices the humidity in the ambient condenses on the device surface and becomes liquid as the interior of the device is cold and the ambient is hot. As a result, corrosion occurs on the main body surface of the device. In the prior art, the problem of condensation was solved by increasing the thickness of the insulation or using insulation materials with a high heat permeability coefficient. The problem of condensation can be easily solved by the bypass channels (12) formed in the heat exchanger side plate (11) and by the associated bypass router (13) without the need for extra costs with the present invention.

**[0022]** Figure 1 shows a top section view of the air conditioning device (1) of the invention. As shown in the figure, the air conditioning device (1) of the invention comprises;

- a fan (30) through which airflow is provided,
- a fan motor (20) giving the movement of said fan (30),
- a heat exchanger (10) where heat transfer takes place,
- a heat exchanger side sheet (11) associated with the said heat exchanger (10), comprising at least one bypass channel (12) and a bypass diverter (13) structure associated therewith,
- a separation plate (40) separating the parts where the fan (30) and the heat exchanger (10) are located,
- the main body (60) part that surrounds the outside of the device so as to include the fan (30) and the heat exchanger (10) parts,
- the insulation jacket (50) placed on the inner surface of said main body (60).

**[0023]** With the air conditioning device (1) of the present invention, a part of the ambient air that is suctioned by the fan (30) and sent onto the heat exchanger (10) is bypassed via the bypass channel (12) and bypass router (13) structures on the heat exchanger side plates (11). The ambient air passing through the mentioned bypass channel (12) is directed through the bypass router (13) structure in order to be close to the plates forming the outer shell (60) and the sweating surfaces condensed

on the main body plates (60) as a result of the sweating tests. For this, the angle of the bypass router (13) structure to the bypass channel (12) must be between 0 and 90 degrees. Thus, considering the summer conditions, via bypassing the airflow from the hot side (ambient) to the cold side (device interior) towards the main body (60) surface via bypass channel (12) and bypass router (13) structures in certain regions, the temperature of the main body (60) of the device is kept at a level close to the ambient temperature, and condensation is prevented. Therefore, insulation thickness and costs are reduced. Corrosion (paint corrosion) that will occur on the outer surface due to condensation is prevented.

**[0024]** At the preferred embodiment of the present invention shown in Figures 1, 2, and 3, there are bypass channels (12) on both the left and right sides of the exchanger side plate (11) to provide bypass towards the left side and the right side of the main body (60) surface, and the associated bypass router (13) structures. In other embodiments of the invention, the number of pair including bypass channels (12) on the exchanger side plate (11) and the associated bypass router (13) structure can be increased according to requirement. In Figure 3, a close perspective view of the bypass channel (12) configured on both left and right sides and the associated bypass router (13) structure is shown.

**[0025]** Besides, in the alternative embodiment of the invention, as the bypass channel (12) and the associated bypass router (13) structure are achieved by the shearing method on the exchanger side plate (11) currently used in the prior art, it is not required to use a separate part.

**[0026]** A top section view of the air conditioning device including the exchanger side plate in the prior art is shown in Figure 4. As shown in the figure, there is no bypass channel (12) on the traditional exchanger side plate. As a result, there is a difference between the ambient temperature and the main body temperature, and condensation occurs on the outer surface of the main body. In Figure 5, a front view of the exchanger side plate in the prior art is shown.

## Claims

1. An air conditioner (1) comprising heat exchanger (10), exchanger side plate (11), fan (30), fan motor (20), main body (60), **characterized in that** said exchanger side plate (11) comprises at least one bypass channel (12).

2. An air conditioner (1) according to Claim 1 wherein the exchanger side plate (11) comprising a bypass router (13).

3. An air conditioner (1) according to Claim 2 wherein the bypass router (13) has an angled form that directs the air taken from the fan motor (30) towards the inner surface of the main body (60).

4. An air conditioner (1) according to Claim 3 wherein the angle between the mentioned bypass router (13) and bypass channel (12) is 10 to 80 degrees.

5. A method of preventing condensation on the outer side of main body (60) **characterized in that** it comprising the steps of

    - by the fan (30) operation, directing the ambient air to the heat exchanger (10) and to the bypass channel (12) on the exchanger side plate (11),
    - directing the air, which directed to the bypass channel (12), to the inner surface of the main body (60) via bypass router (13),
    - preventing condensation by reducing the temperature difference between the inner and outer surface of the main body (60).

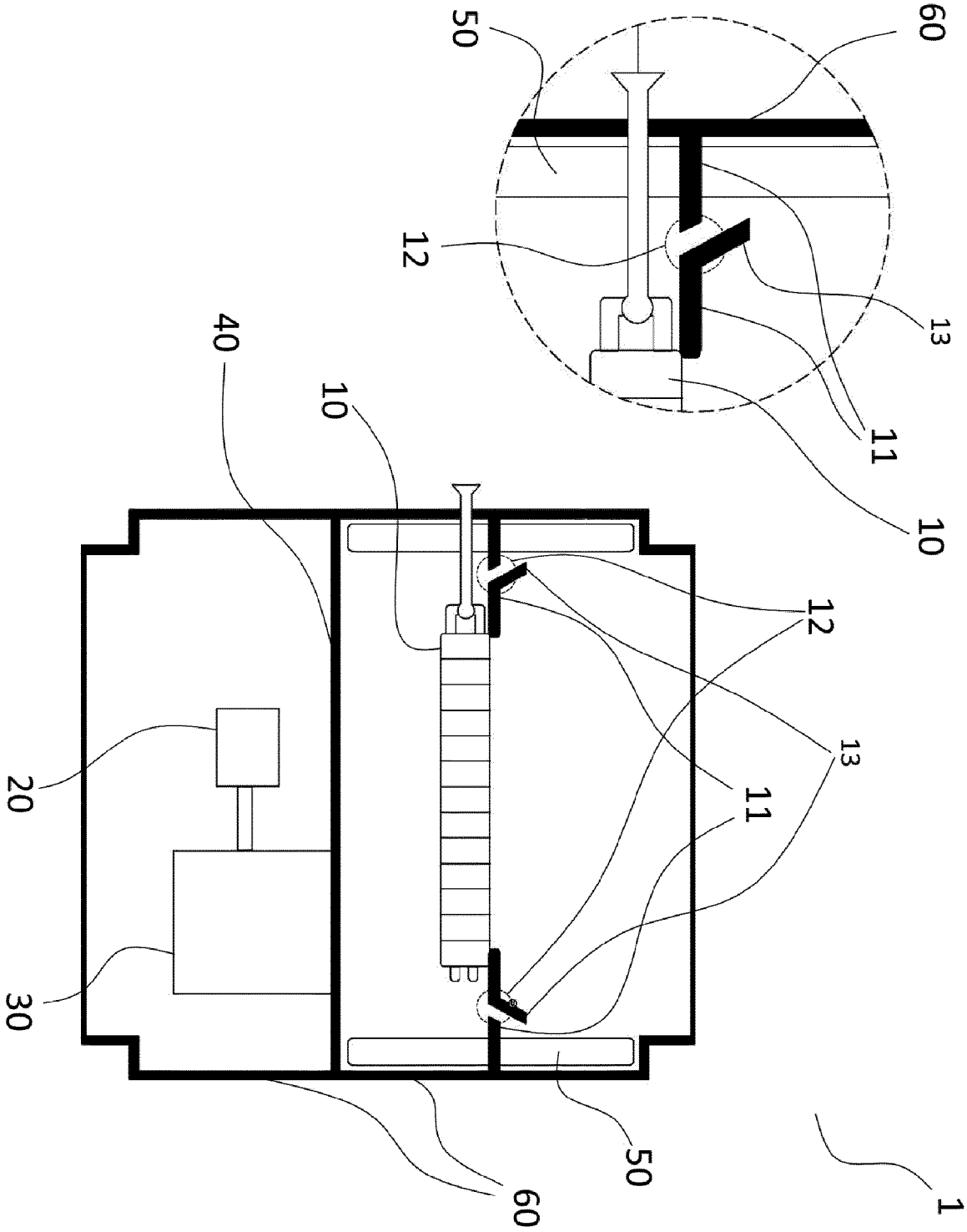


Figure 1

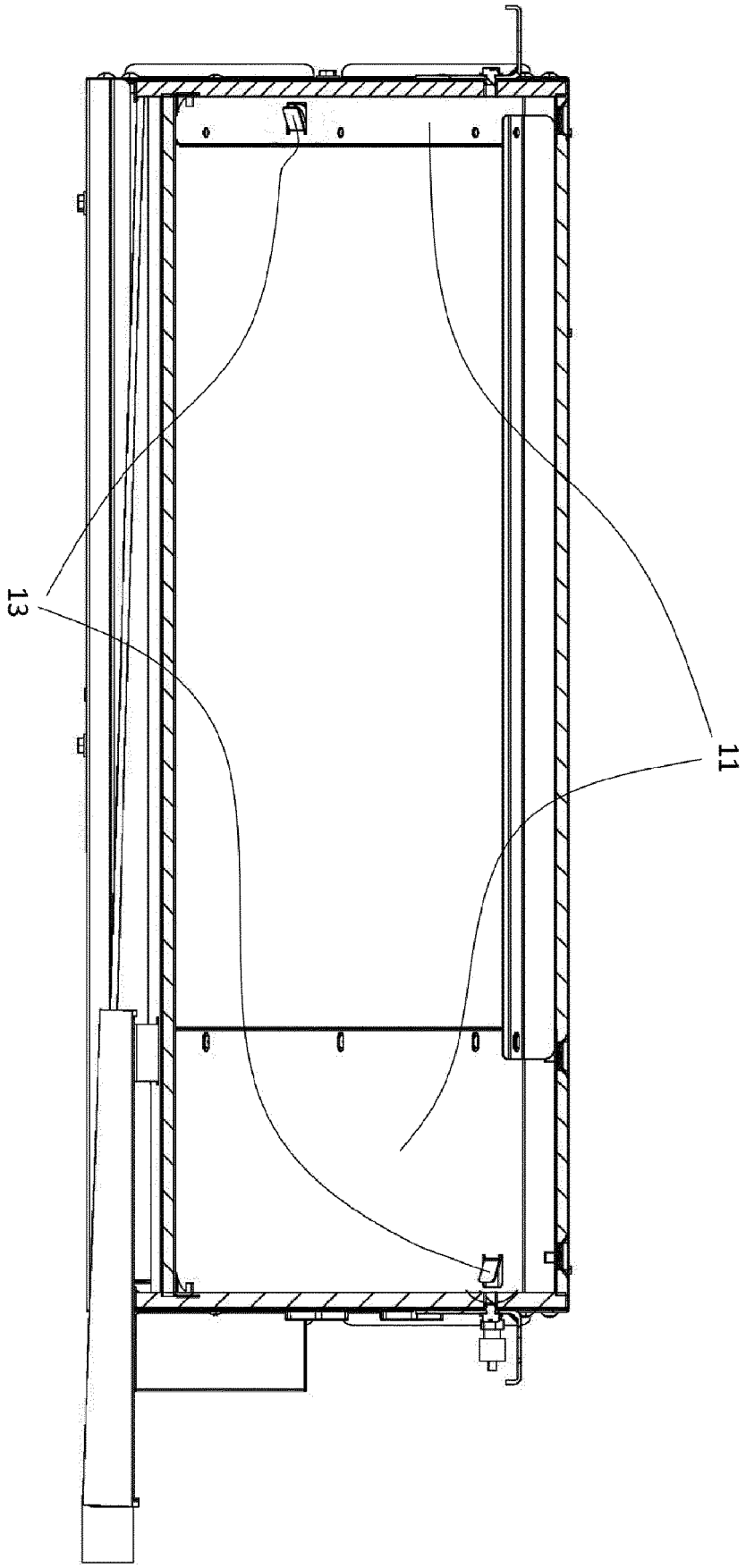


Figure 2

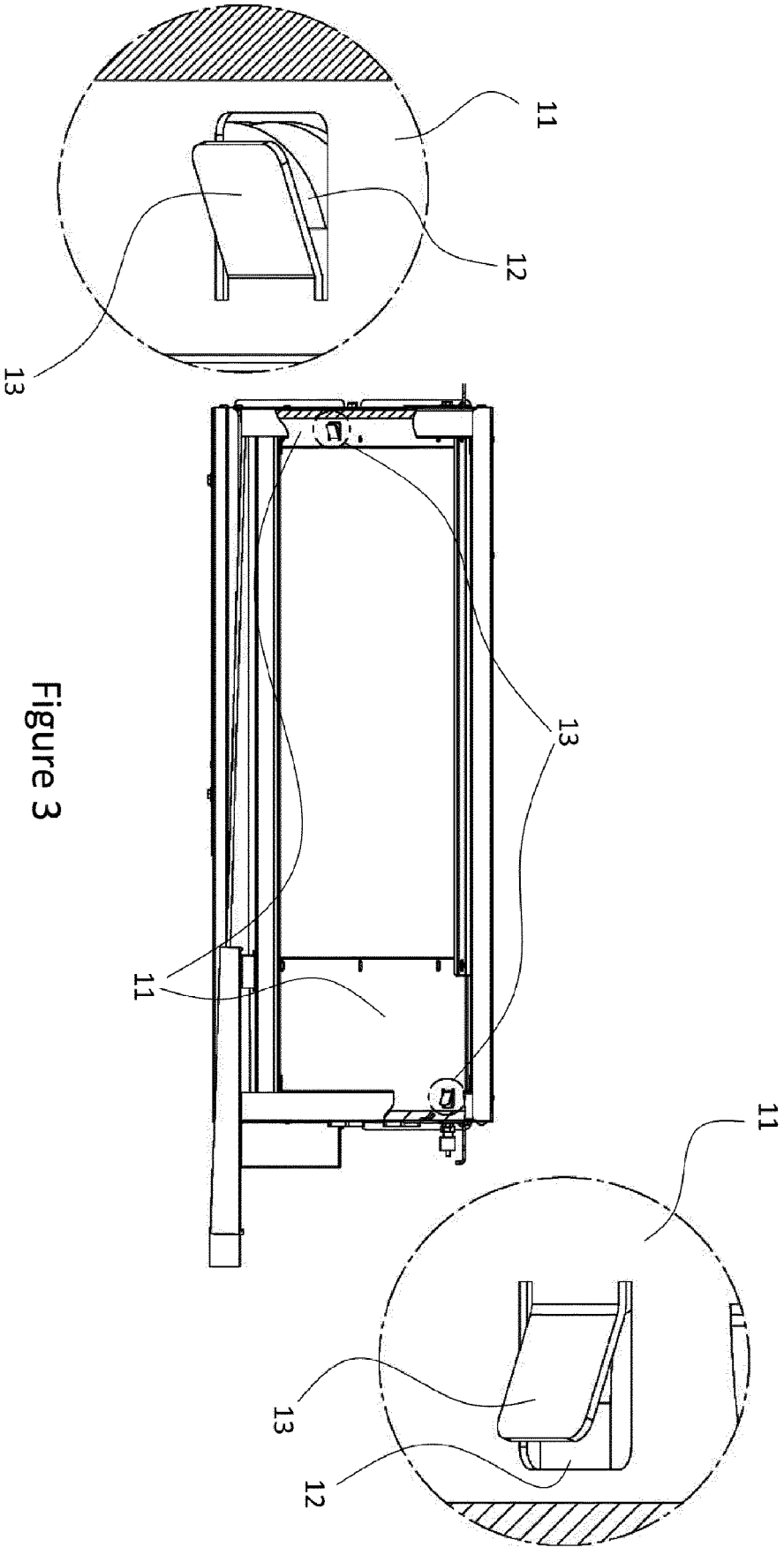


Figure 3

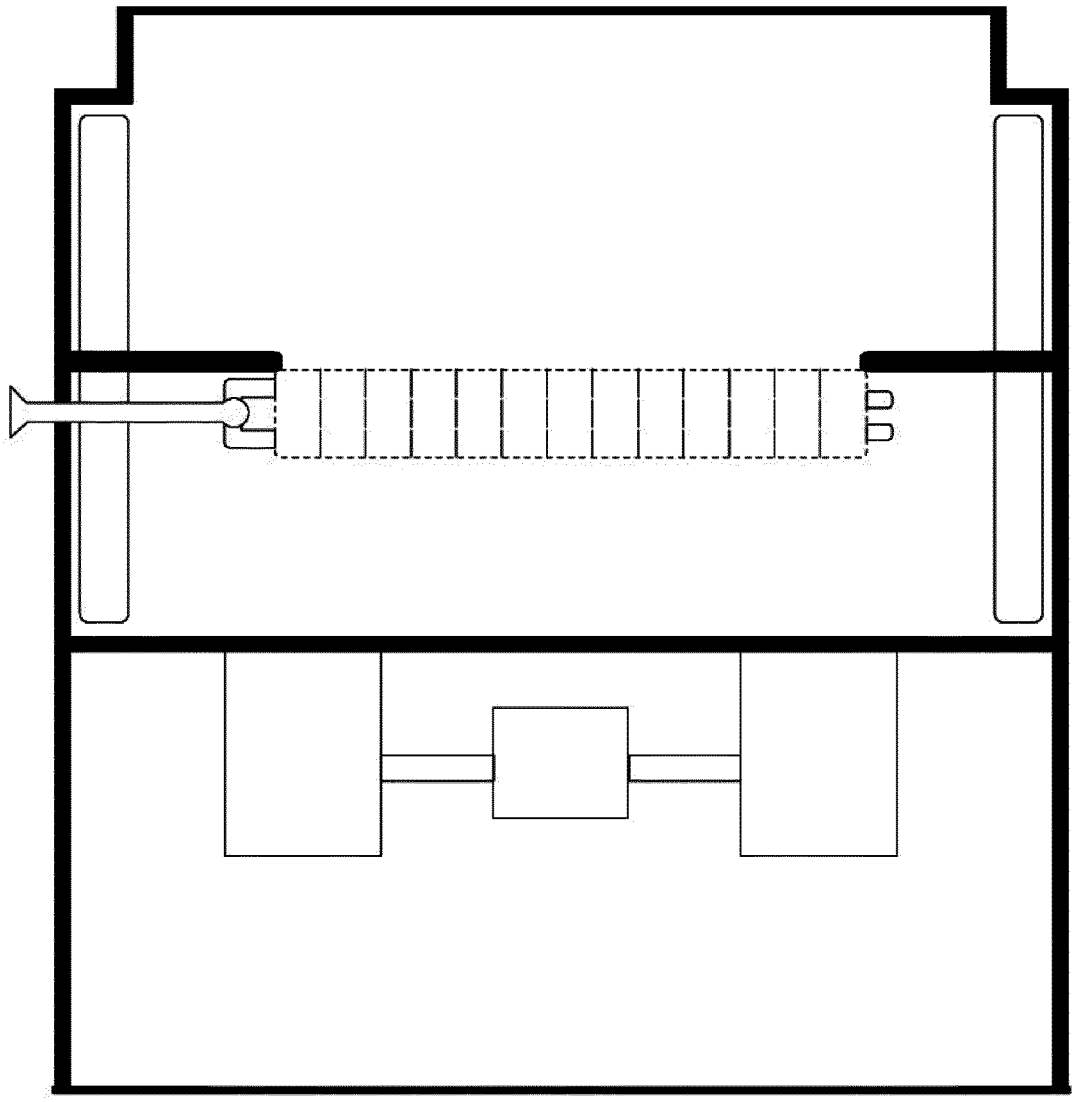

Figure 4

- The Prior Art-

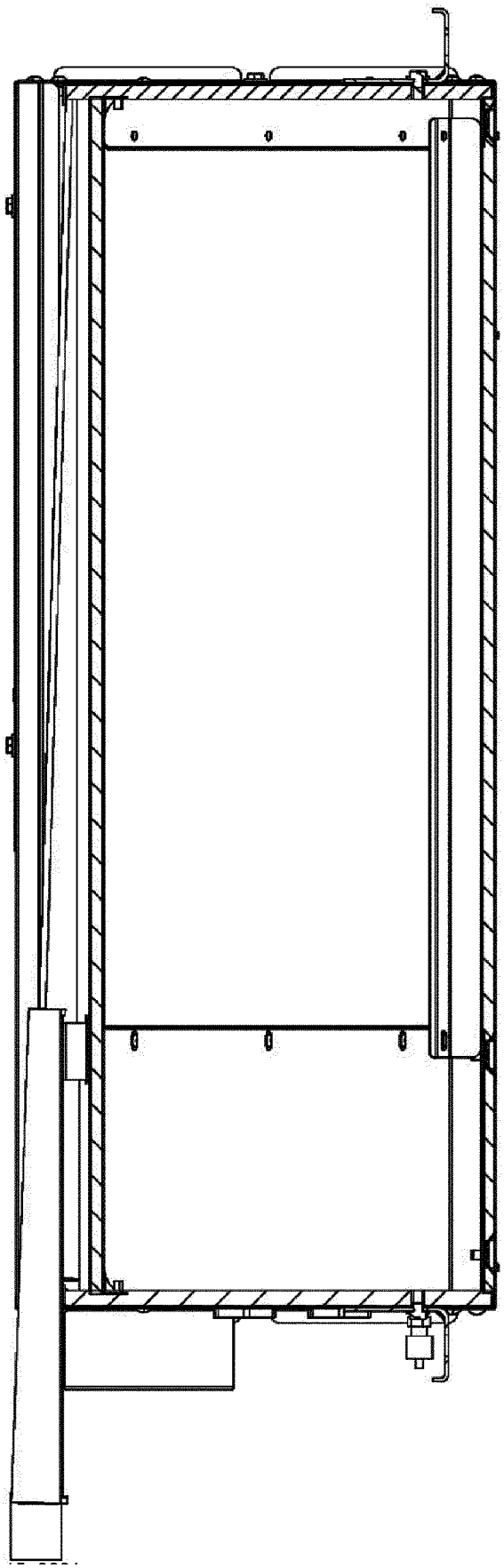

Figure 5

- The Prior Art -

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# EUROPEAN SEARCH REPORT

Application Number
EP 21 02 0259

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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 8 October 2021 | Lienhard, Dominique |

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