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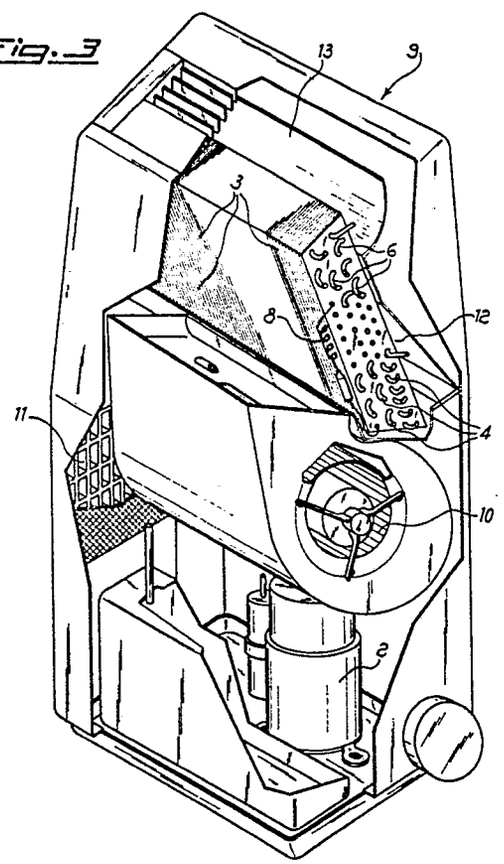
(54) Composite evaporator-condenser battery especially for air conditioners of the removable type and in general for apparatuses operating on the basis of a refrigerating circuit.

(57) Battery (1), especially for air conditioners of the movable type (9) and in general for apparatuses operating on the basis of a refrigerating circuit constitutes of a plurality of fins (3, 3', 3''), constituting as a whole a single package, through which passes a first series (4) of coiled pipes connected to the delivery (5) of a compressor (2) and a second series (6) of coiled pipes connected to the return (7) of said compressor, the two series of pipes being conventionally connected to one another by an expansion device (8) and the second series of pipes, when the battery (1) is in the working position, being disposed above the first series of pipes.

Fig. 3



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Composite evaporator-condenser battery especially for air conditioners of the removable type and in general for apparatuses operating on the basis of a refrigerating circuit

The present patent relates to an evaporator-condenser battery, especially for air conditioners of the removable type and in general for apparatuses operating on the basis of a refrigerating circuit

In the specific case of conventional air conditioners of the movable type, the ambient air is conducted through two exchangers, which constitute, respectively, the evaporator and the condenser of the cooling circuit, the air being cooled and dehumidified in the evaporator and then fed into the room to be conditioned, and the air being, in the condenser, heated by the effect of the condensation, humidified by the re-evaporation of the condensate water coming from the evaporator and then fed out of doors by means of a pipe, with advantage a flexible pipe, inserted, for example, between the half-closed leaves of a window.

In this type of conventional air conditioner, the re-evaporation of the condensate on the condenser is important because, requiring a certain quantity of heat, it allows the quantity of ambient air discharged to the outside to be reduced to a minimum, with a resultant reduced return into the room of untreated air (better overall efficiency) and with a reduction of the dimensions of the pipe leading out of doors to greatly reduce values. The re-evaporation furthermore simplified the use of the apparatus, by eliminating the problem of recovering the condensate.

In said conventional conditioners, the re-evaporation of the condensate being achieved by atomizing the condensate water onto the (hot) condenser by means of a pump, centrifugal impeller or equivalent mechanical means.

The use of two separate exchangers (evaporator and condenser) obviously involves, not only the necessity for providing means, as referred to above, for atomizing the condensate onto the condenser, but also disadvantages of various types, among which may be mentioned the need for constructing two distinct units, the need for providing space for accomodating said two distinct units, the labour costs involved in assembly and other drawbacks well known to the person skilled in the art.

The objective of the present invention consists in providing a composite evaporator-condenser battery which shall make possible the realization of an air conditioning apparatus, or other apparatus operating on the basis of a cooling or refrigerating circuit, which shall have a decidedly more simple and efficient construction than the conventional devices.

It follows from this that another objective of the invention consists of providing an apparatus, a conditioner or the like, equipped with such a battery so as to have relatively limited dimensions and proportionally reduced production costs.

These and other objectives of the invention will become apparent to the person skilled in the art from the following description and from the Claims which follow.

The battery, especially for air conditioners of the movable type and in general for apparatuses operating on the basis of a refrigerating circuit, according to this invention, is characterized by the fact of being constituted of a plurality of fins, constituting as a whole a single package, through which passes a first series of coiled pipes connected to the delivery side of a compressor, and a second series of coiled pipes connected to the return of said compressor, the two series of pipes being conventionally connected to one another by an expansion device and the second series of pipes, when the battery is in a working position, being disposed above the first series of pipes.

The invention is illustrated by way of example but in a non-limiting context, in the Figures of the attached sheet of drawings, in which:

- Figure 1 is an axonometric view of the composite battery of this invention, associated with the relevant compressor,
- Figure 2 is a schematic section through the battery of Figure 1, showing the path of the refrigerating liquid and the state (liquid, liquid/gaseous, gaseous) of this refrigerating liquid;
- Figure 3 is a view, partly cut away, of a movable air conditioner using the battery of this invention;
- Figure 4 is a schematic section of the conditioner of Figure 3, illustrating the flow of air; and
- Figure 5 is similar to Figure 2, but illustrating a possible variant falling within the innovative concept of this invention.

Referring to the aforementioned Figures, the composite evaporator-condenser battery is referenced generally 1 and is conventionally associated with a compressor 2, forming a part of a conventional refrigerating circuit.

The battery 1 is constituted of a plurality of fins 3 side-by-side, constituting as a whole a package, through which passes a first series of coiled pipes 4, connected to the delivery 5 of the compressor 2, and a second series of coiled pipes 6, connected - by means of the return 7 - to said compressor 2.

The last length of the coiled pipe constituting the first series 4 is connected, by means of an

expansion device 8, to the first length of the coiled pipe constituting the second series 6.

In practice, the first series of pipes 4 constitutes the condenser of the refrigerating circuit and the second series of pipes 6 constitutes the evaporator of said refrigerating circuit.

As illustrated in Figures 3 and 4, the battery 1 - in the case of its use in an air conditioner of the removable type and referenced generally 9 - is disposed above a fan unit 10 in a vertical position or near to the vertical. With this vertical, or almost vertical position, the condensate which forms on the cold zone of the evaporator in the uppermost part of the battery 1 flows by gravity along the fins 3, moving gradually and uniformly over the hot surface of said fins 3 of the battery 1, situated in correspondence with the condenser, which consequent re-evaporation.

This, clearly, enables optimum efficiency of the apparatus to be achieved as well as a notable reduction in overall size and simplification by the complete elimination of the conventional means for transfer and atomization of the condensate.

For completeness of the description, and with reference once again to Figures 3 and 4, the fan 10 sucks in the room air through the opening 11, conducts it through the battery 1 and the portion of the room air passing through the condenser zone 4 of said battery is discharged, hot, to the outside through the opening 12. The portion of the room air passing through the evaporator zone 6 of said battery 1 is returned, cooled, into the room through the aperture 13.

Figure 5, as stated above, is similar to Figure 2, the only difference being that the fins 3 of the battery 1 are not continuous between the upper zone (evaporator) and the lower zone (condenser), but are separated by a small space 14, thereby forming an upper group of fins 3′ and a lower group of fins 3″, the two groups - in each case - being so disposed as to permit the desired transfer of the condensate from the evaporator part of the battery to the condenser part in order to achieve the re-evaporation of same.

Claims

1. Battery (1), especially for air conditioners of the movable type (9) and in general for apparatuses operating on the basis of a refrigerating circuit, characterized by the fact of being constituted of a plurality of fins (3, 3′, 3″), constituting as a whole a single package, through which passes a first series (4) of coiled pipes connected to the delivery (5) of a compressor (2) and a second series (6) of coiled pipes connected to the return (7) of said compressor, the two series of pipes being conventionally connected to one another by an expansion device (8) and the second series of pipes, when the battery (1) is in the working position, being disposed above the first series of pipes.

2. Battery, according to Claim 1, characterized by the fact that fins (3) constituting as a whole a single package are associated, in a continuous form, with the condenser part (4) and with the evaporator part (6) of said battery.

3. Battery, according to Claim 1, characterized by the fact that the fins constituting as a whole a single package are interrupted by a gap (14) interposed between the condenser part (4) and the evaporator part (6), thus forming two groups (3′, 3″) so arranged as to make possible the transfer of the condensate by gravity from said evaporator part to said condenser part.

4. Battery, according to the preceding Claims, characterized by the fact of being installed in a conditioner interposed in a vertical or almost vertical position between the fan (10) of said conditioner and the openings (12, 13) of the latter, these openings being respectively for the discharge to the outside of the hot air passing through the condenser part (4) of said battery and for the recycling into the room to be conditioned of the cooled air passing through the evaporator part (6) of said battery.

Fig.1

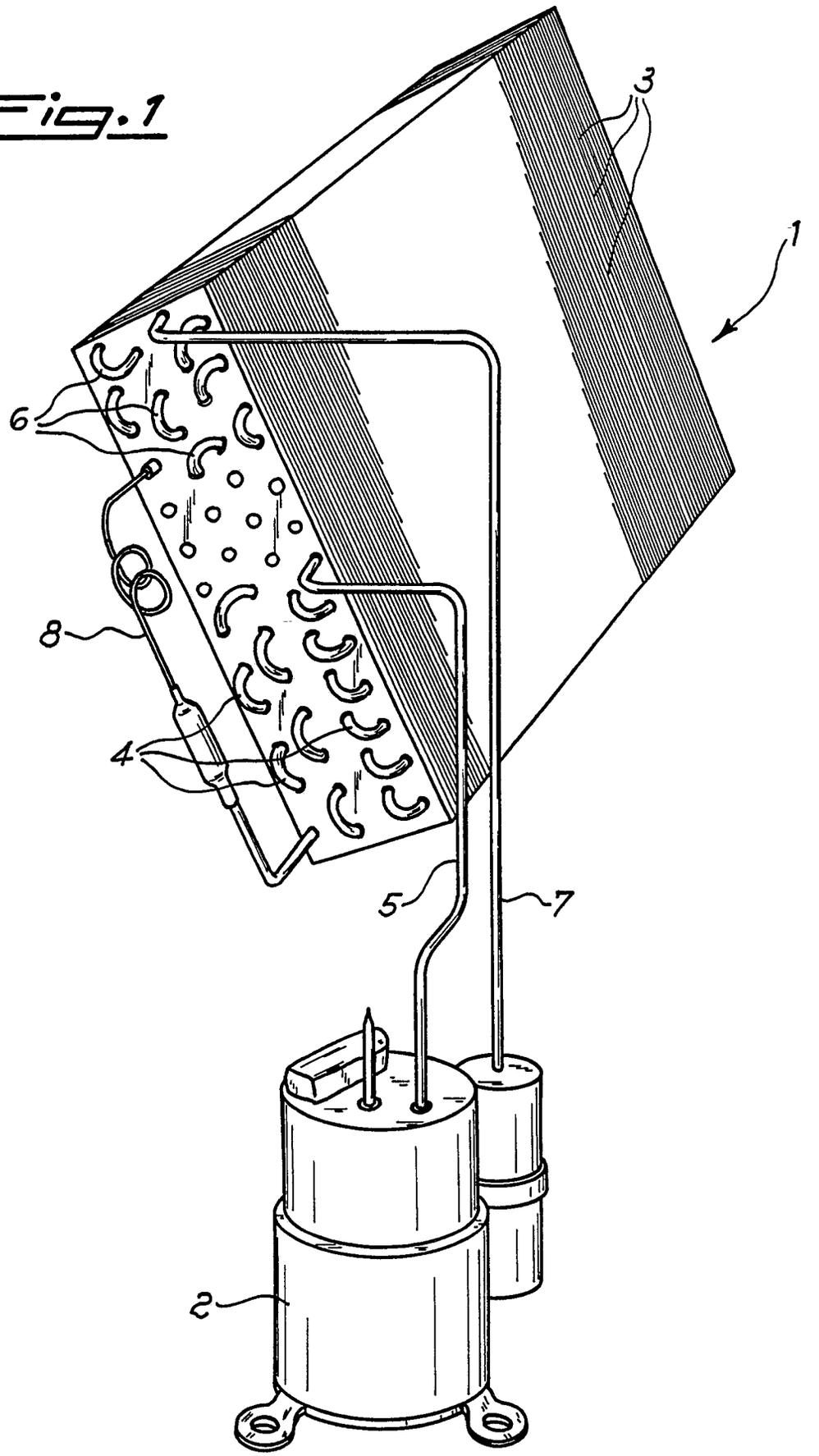

Fig.2

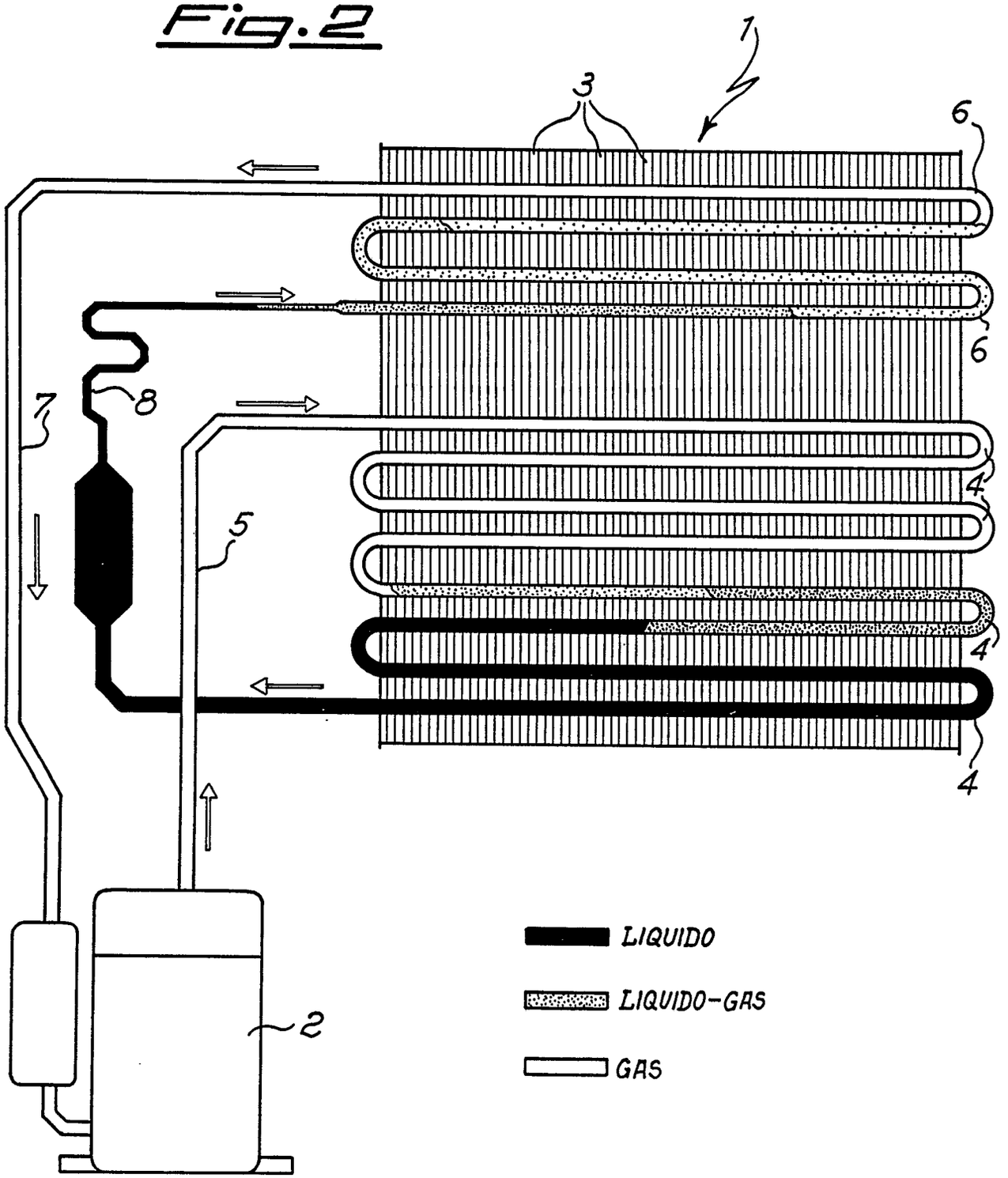

Fig.3

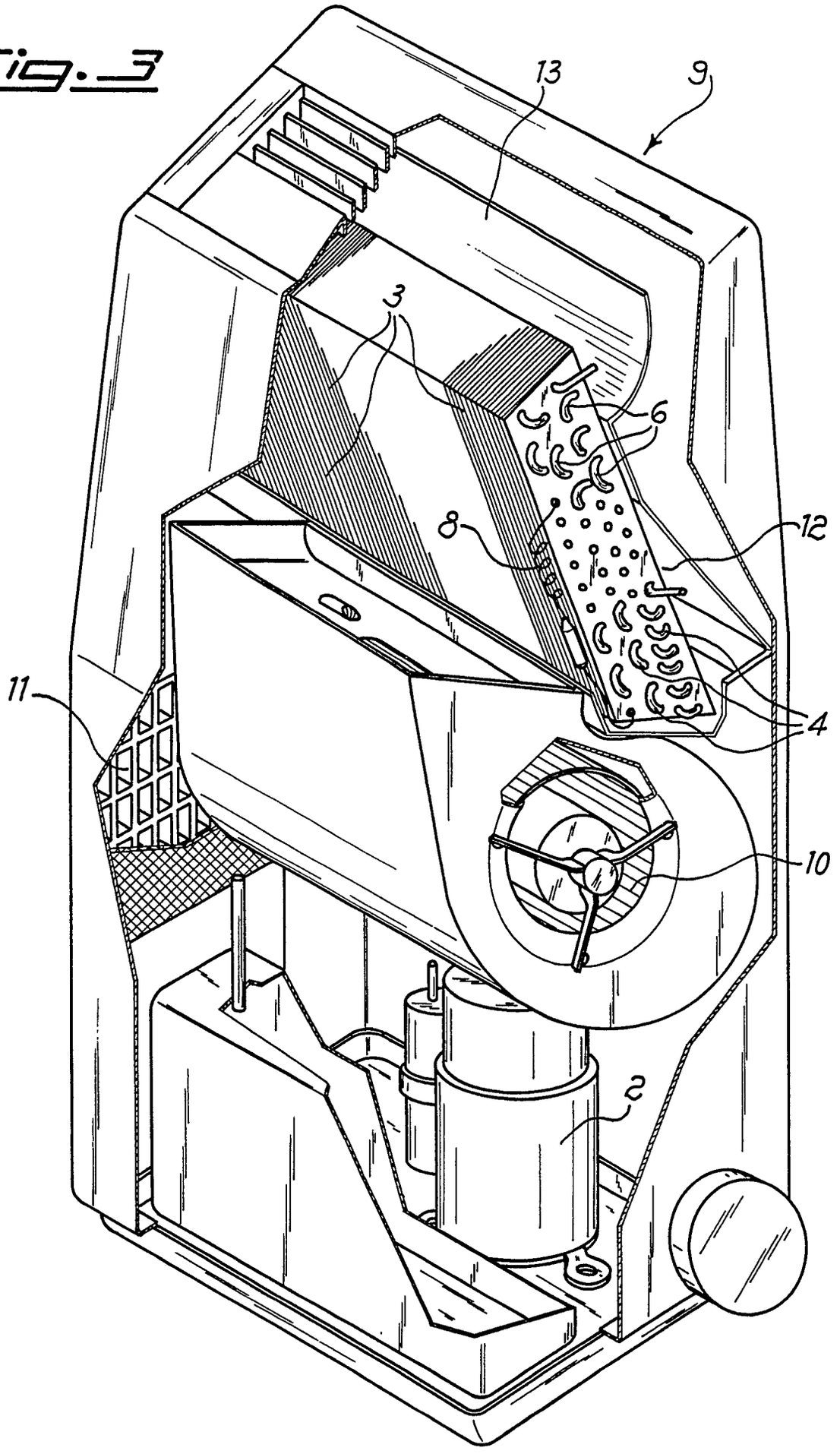

Fig.4

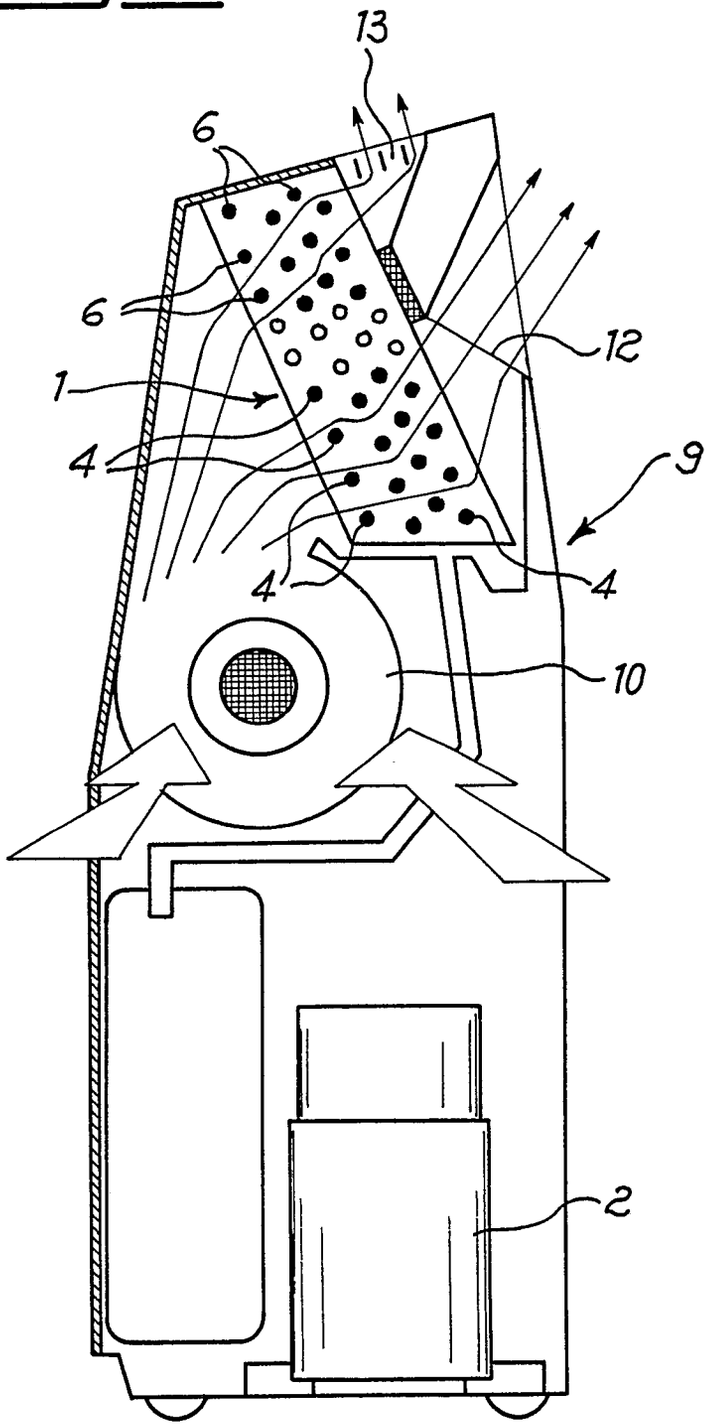

Fig. 5