(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 629 276 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
01.12.1999 Bulletin 1999/48

(21) Application number: **93906903.5**

(22) Date of filing: **10.03.1993**

(51) Int Cl.[6]: **F24F 1/02**, F24F 12/00

(86) International application number:
PCT/NO93/00039

(87) International publication number:
WO 93/18351 (16.09.1993 Gazette 1993/22)

(54) **APPARATUS FOR THE HEATING OR COOLING OF A GASEOUS OR LIQUID MEDIUM**

GERÄT ZUM ERHITZEN ODER KÜHLEN EINES GASFÖRMIGEN ODER FLÜSSIGEN MEDIUMS

APPAREIL POUR CHAUFFER OU REFROIDIR DES MILIEUX GAZEUX OU LIQUIDES

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE IT LI NL PT SE

(30) Priority: **13.03.1992 NO 921006**
11.09.1992 NO 923527

(43) Date of publication of application:
21.12.1994 Bulletin 1994/51

(73) Proprietor: **ACO Klimatteknik Aktiebolag**
S-411 36 Gothenburg (SE)

(72) Inventor: **SAKKI, Arnfinn c/o Liv Sakki**
N-2008 Fjerdingby (NO)

(74) Representative: **Rackham, Stephen Neil**
GILL JENNINGS & EVERY,
Broadgate House,
7 Eldon Street
London EC2M 7LH (GB)

(56) References cited:
US-A- 2 466 383
US-A- 2 920 459
US-A- 3 995 446
US-A- 4 280 443

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 0 629 276 B1

Description

[0001] This invention relates to an apparatus for the heating or cooling of a gaseous or liquid medium, comprising a heat pump circuit having a structure as known per se, with a compressor or the like, a condenser, throttle means and an evaporator and further comprising at least one driving device for the flow of the medium.

[0002] Heat pumps are well known in connection with air conditioning and heating of both gases, such as room air and liquids. As an example reference is made to GB Patent Publication 2.203.830. US-A-2466383 describes an apparatus for heating or cooling a fluid, the apparatus comprising a heat pump circuit including a compressor, a throttle means, a condenser and an evaporator, the condenser and evaporator defining generally parallel main confining surfaces of a distribution chamber, a driving device located outside the distribution chamber and arranged to cause the fluid to be driven into or drawn from the distribution chamber, and a single unitary separating damper blade pivotally mounted within the distribution chamber, and movable to any position between and including two extreme positions in which the ends of the damper blade engage the main confining surfaces of the distribution chamber.

[0003] According to this invention an apparatus comprises a heat pump circuit including a compressor, a throttle means, a condenser and an evaporator, the condenser and evaporator defining generally parallel main confining surfaces of a distribution chamber, the distribution chamber including two fluid inlets each directed substantially in parallel to the main confining surfaces of the distribution chamber, a driving device located outside the distribution chamber and arranged to cause the fluid to be driven into or drawn from the distribution chamber, and a single, unitary, separating damper blade pivotally mounted within the distribution chamber, and movable to any position between and including two extreme positions in which the ends of the damper blade engage the main confining surfaces of the distribution chamber, arranged such that the driving device drives fluid into the distribution chamber through the fluid inlets, generally in parallel to the main confining surfaces of the distribution chamber, the fluid being mixed in the distribution chamber and being discharged from the distribution chamber through the condenser and evaporator depending upon the angular position of the damper blade.

[0004] The present invention is the result of development work based on the heat pump principle and is primarily directed to room heating. In this connection it has been found that the particular arrangement of components and air-flow paths results in significant improvements and a quite unexpected broadening of the functional possibilities and the flexibility in the practical utilisation of the apparatus. In principle this apparatus should also have correspondingly advantageous properties in the case of the medium to be heated or cooled, is a liquid, for example water.

[0005] It is also possible with the invention to make designs which are to a high degree compact and easy to handle, in particular when portable apparatuses are concerned. Whereas previously known room heating apparatus based on the heat pump principle have been subject to certain rather serious deficiencies in practice, in particular with respect to the formation of frost and ice, the apparatus according to this invention is free from such problems. In this connection it is a great advantage that heating apparatus based on the invention can be operated at a high efficiency being comparable to that of good heat pumps, also during periods when the outdoor temperature and the air moisture make it difficult or impossible to operate common heat pumps of the air-to-air type.

[0006] In the following description with reference to the drawings the invention and various embodiments thereof shall be explained more closely, whereby in the drawings:

Figure 1 in a quite schematically cross section illustrates the principle of and the basic solution according to the invention,

fig. 2 also schematically shows an arrangement corresponding to the one in fig. 1, mounted inside an outer wall and with various associated re-setable members shown in the form of plates or baffles for the utilization of the apparatus under varying conditions and time periods,

figs. 3-6 show different operational positions of the apparatus in fig. 2, made possible inter alia by means of the adjustable damper blade in the distribution chamber of the apparatus,

fig. 7 in a cross-sectional view analogous to the preceeding figures, somewhat more in detail shows a practical example of the apparatus,

fig. 8 in a sectional elevation shows main components in the apparatus of fig. 7,

fig. 9 in a corresponding elevation as fig. 8 shows another exemplary embodiment somewhat related to the one in figs. 7 and 8,

fig. 10 shows the embodiment of fig. 9 in a partial horizontal section,

fig. 11 shows a vertical section through the embodiment of figs. 9 and 10, somewhat in analogy to the cross sectional view of fig. 7,

fig. 12 shows a particular design of a damper blade which can be incorporated in the apparatus of fig. 11,

[0007] In the highly schematic illustration of fig. 1 a

conventional heat pump circuit is represented by a condenser 1 and an evaporator 2 only. Between these there is formed a distribution chamber 4 having more or less opposed inlets 5 and 6 for the medium concerned, which can be in the gaseous or liquid phase. In fig. 1 the medium is considered to be a gas, for example air, wherby driving devices 7 and 8 associated with the inlets 5 and 6 respectively, are illustrated in the form of fans.

[0008] What is essential in the basic apparatus as illustrated in fig. 1, is the main features of the geometrical relationships in and around the distribution chamber 4. In the first place the condenser 1 and the evaporator 2 constitute two main confining surfaces 1A and 2A for the chamber 4, these confining surfaces being mutually substantially opposed, whereas the inlets 5 and 6 are directed essentially in parallel to the main confining surfaces 1A and 2A. In other words the flow direction through the condenser 1 and the evaporator 2 respectively will be generally at right angles to the flow direction through the inlets 5 and 6. In addition to the main confining surfaces 1A and 2A and the openings 5 and 6, the chamber 4 normally has walls (not shown) that in a more or less fluid-tight manner enclose the rest of the chamber.

[0009] Further it is essential to the basic arrangement being illustrated in fig. 1, that a pivotable separating damper blade 10 has two oppositely located edge portions being adapted to engage marginal portions of the respective main confining surfaces 1A and 2A substantially directly in two extreme positions of the damper blade. In fig. 1 damper blade 10 is shown in an intermediate position, wherein for example air flowing in through inlets 5 and 6 to a certain degree will be mixed in chamber 4. The degree of such mixing will depend on the angular position of the damper blade, and different configurations in this respect will be explained more closely below. Finally with reference to fig. 1 it is remarked that advantageously damper blade 10 is pivotable, i.e. can be angularly adjusted about a central axis 10A, and the whole arrangement of distribution chamber 4 with main confining surfaces 1A and 2A, inlet openings 5 and 6 as well as damper blade 10 in principle is symmetrical. This makes possible the many use options, depending inter alia on the angular position of damper blade 10, as will appear from the following description.

[0010] Fig. 2 shows an apparatus according to the invention in an embodiment adapted for wall mouting and based on the arrangement as illustrated in principle in fig. 1. Thus in fig. 2 there is also a condenser 11, an evaporator 12, a distribution or mixing chamber 14A - 14B, a first inlet 15 and a second inlet 16 with associated fans 17 and 18 respectively.

[0011] In the embodiment of fig. 2 and in association with a wall 29, for example in a building, there are shown various plates and baffle-like members 21-23 for reconfiguring or adjusting the apparatus for obtaining varying operational positions or relationships. These variants shall be explained more closely with reference to the following figs. 3-6.

[0012] An essential structural part in fig. 2 as in the embodiment of fig. 1, is the adjustable damper blade 10 that in its position as illustrated in fig. 2, subdivides the distribution chamber into two chamber portions 14A and 14B that very well can be approximately equally large. With generally planar main confining surfaces of condenser 11 and evaporator 12 respectively, facing the chamber 14A/14B, it can be desirable to put damper blade 10 in a normal position centrally between and in parallel to these main confining surfaces. In this position air flowing in from both sides is mixed in an optimal manner and approximately as if damper blade 10 were not present at all. The air mixture in both chamber portions 14A and 14B will enter into condensor 11 and evaporator 12 respectively. The air flow arrows shown in fig. 2 indicate this.

[0013] In fig. 2 there is also shown three baffles 21, 22, 23 which in the positions shown form a closed re-circulation duct 19 for air re-circulation, without having any communication with the outdoor air at the righthand side of wall 29 as shown in fig. 2. This particular manner of operation is also discussed below with reference to fig. 3

[0014] Fig. 3 shows a position of damper blade 10 in which incoming air from the room through inlet 16 is lead in its entirety through condenser 11, whereas baffles 21, 22, 23 are set for circulation of outdoor air through evaporator 12. Thus a quite conventional heat pump effect is established, utilizing the outdoor air as a heat source, for the purpose of heating the room. In this connection it is a substantial advantage according to the invention that the apparatus being provided with an adjustable damper blade 10, can be adjusted for a very efficient heat pump function as in fig. 3, when the conditions are suitable for such a manner of operation, but with simple manual intervention can be moved for example to the particular manner of operation being shown in fig. 2.

[0015] In many installations it will be advantageous to use the operational position in fig. 3 when the outdoor temperature is above a certain magnitude, but at lower outdoor temperatures the efficiency in operation as a pure heat pump will be so low that it becomes advantageous to change to the manner of operation in fig. 2. A criterion for changing from operation according to fig. 3 to the one in fig. 2, can be that the outdoor temperature is higher or lower than the desired average temperature in the distribution chamber. In the example of magnitudes given above, the chamber temperature is approximately 14°C. It is obvious that the magnitudes mentioned here are pure examples, and that the temperature relationships in practical installations can vary considerably, depending inter alia upon the general room temperature, the desired output temperature from the apparatus and the corresponding air flow volume as well as the flow pattern or distribution into and from the chamber.

[0016] In connection with the above it is also important

to remark that the employment of two fans 17, 18 as driving devices each for its inlet to chamber 14A/14B represents a favourable possibility of regulation, since the fans can be driven with different or equal power, being chosen by taking into account the desired operational parameters.

[0017] As indicated above the manner of operation according to fig. 2 has particular interest in connection with the one in fig. 3, namely during an initial or starting phase being introductory to the operational mode of fig. 3, when the outdoor temperature is low. When a heat pump apparatus as in fig. 1 is not in operation the three baffles 21, 22, 23, are closed as shown in fig. 2. Therefore during this starting phase only indoor air is introduced into the chamber which means that the pressure in the heat pump circuit will be more quickly raised to the desired level, which is of much interst when the outdoor temperature for example is down towards 0°C. This initial or start position is very advantageous and as a rule is more or less necessary in order to bring heat into the room when the outdoor fan 17 is put into operation.

[0018] Fig. 4 shows a mode of operation being almost similar to the one in fig. 3, but is distinguished from the latter in that damper blade 10 is placed in a normal or central position, i.e. as in fig. 2. Thus a combined function of heat pump effect and air exchange is obtained, since an optional or adjustable proportion of outdoor air can be introduced into the room through condenser 11.

[0019] Fig. 5 shows a configuration which is directed to exclusive ventilation or exchange of indoor air with outdoor air at the same time as the heat pump circuit provides for a certain heat recovery from the air being discharged outdoors.

[0020] Then fig. 6 shows an important mode of operation in connection with possible long term service according to fig. 2. During certain circumstances the manner of operation illustrated in fig. 2 may involve some formation of frost or ice in evaporator 12. With damper blade 10 positioned as in fig. 6 a full re-circulation of indoor air will take place first through evaporator 12 and then into and through condenser 11, so that a desired de-icing is performed. This manner of de-icing is very advantageous since it takes place without any loss of heat, which is a drawback in more conventional methods. It is easy to realize that a manner of operation as shown in fig. 6 can only be of interest during short periods, i.e. for a sufficiently long time for de-icing or defrosting to take place.

[0021] When setting damper blade 10 at an angle being the opposite of what is shown in fig. 6 but preferrably not quite in the opposite extreme position, there will be obtained a very good de-humidifying effect on the room air passing through the apparatus.

[0022] The adjustable damper blade 10 has a particularly great practical significance for the purpose of de-icing. In principle, however, such an adjustable damper blade can also be of much interest in installations or with manners of operation wherein the specific variant according to fig. 2 is not utilized, for example in situations as illustrated in fig. 3, 4, and 5. In all circumstances it is obvious that a stepless adjustability of damper blade 10 between extreme positions as represented by for example figs. 3 and 5, will be of high value. The positioning of damper blade 10 in freely chosen intermediate positions will give a very advantageous flexibility in operation of the installation under varying conditions.

[0023] Fig. 7 and 8 together illustrate somewhat more in detail a practical embodiment of an apparatus as schematically shown in the preceeding figures or drawings. Fig. 7 is a cross section corresponding in principle to fig. 2 - 6, and shows a condenser 41, an evaporator 42, and between these a distribution chamber 44A/44B. In the chamber there is mounted a pivotable damper blade 40 which can be angularly adjusted by means of an axle 40A provided for example with a handle or the like outside the actual enclosure around the apparatus. Moreover there are shown two fans 47 and 48 (see fig. 8) directing input air flows somewhat at an inclination upwards into chamber 44A/44B between condenser 41 and evaporator 42, as indicated with arrows 47P and 48P respectively in fig. 8. Thus in this case the two inlets to the chamber can be considered to be located in the region at the two lower corner portions of the mixing chamber, as seen from fig. 8. Also here the two inlets are directed generally in parallel to the main confining surfaces of the chamber formed by the condenser and the evaporator. With these mutually and inclined air flows into the chamber these will be subjected to a very favourable and thorough mixing effect as indicated by arrows 60, in particular in the central region of chamber 44A/44B, with subsequent outflow of mixed air through condenser 41 and evaporator 42 respectively.

[0024] The air flow pattern and distribution within the chamber will of course be influenced by the setting of damper blade 40. With the mutual arrangements of outlets from fans 47 and 48, the chamber and the damper blade 40 as shown, it will be realized that rotation of the damper blade about axle 40A will have a quite corresponding effect on the air distribution, as damper blade 10 in figs. 2 - 6.

[0025] For fan 47 there is shown an inlet 47A and for fan 48 an inlet 48A. Inlet 47A communicates with a duct unit 50 that with an appropriate setting of baffles 51 and 53 will be able to form a re-circulation duct 49 from an output side 54 of evaporator 42. With full lines in fig. 7, however, the two baffles 51 and 53 are shown in positions for operation of the installation as a heat pump. Openings being associated with the baffles are shown at 51A, 51B, and 53A.

[0026] For the sake of completeness figs. 7 and 8 also show a compressor 43 with associated motor and conduits for the heat pump circuit that incorporates condenser 41 and evaporator 42.

[0027] The design of duct unit 50 can be varied quite a lot depending upon the conditions and requirements

at the installation site concerned, for example whether or not a wall mounting is aimed at. There is shown a shape of an internal part 55 for the purpose of obtaining good flow relationships when the re-circulation duct 49 shall be established.

[0028] The embodiment of figs. 9 - 11 has a basic geometry having a high degree of symmetry as in the fundamental arrangement of fig. 1 and in all the preceding figures of drawings. Figs. 10 and 11 show a condenser 71 and an evaporator 72 lateraly confining a distribution chamber 74 having an angularly adjustable damper blade 70 the pivot axis of which is shown at 70A. With full lines damper blade 70 is shown in a central position, whereas two opposite extreme positions respectively are shown with dashed lines. As will appear from fig. 10 opposite edge portions of damper blade 10 in the respective extreme positions are brought to a substantially direct engagement against marginal portions of the main confining surfaces 71A and 72A respectively of condenser 71 and evaporator 72. The damper blade 10 as such is shown separately and in perspective view in fig. 12, wherein the just mentioned two opposite edge portions of the damper blade are denoted 75A and 75B respectively. These edge portions therefore extend parallel to the pivot axis 70A for the damper blade.

[0029] Further figs. 9 and 10 in particular show the location of two fans 77 and 78 for supplying air to the distribution chamber 74. As in the embodiment of fig. 8 the air fans are located with inlets adjacent corner regions in the distribution chamber, but also here the inflow of air from these fans through associated inlets to chamber 74 is directed generally in parallel to the main confining surfaces 71A and 72A. The air inlets from the pair of fans 77 and 78 besides are directed substantially opposite to each other, as in the preceding embodiments. Figs. 9 and 11 also show the location of a compressor 73 in the apparatus. The conduits for the whole heat pump circuit are only partially indicated in these figures. A number of arrows in fig. 10 show how the air flow is directed at various places in the apparatus as well as into and out of the apparatus. With a damper blade 70 being continuously adjustable to different angular positions, it is obvious that the air flow pattern and distribution in chamber 74 and out through condensor 71 and evaporator 72 respectively, can be varied to a very significant degree. The description above with reference to figs. 1 - 6 has explained these possibilities.

[0030] For the purpose of providing for a more favourable air flow and distribution in chamber 74 in figs. 9, 10, and 11, it can be an advantage to provide a particular guide plate 79A and 79B as shown in fig. 12. This particular guide plate is also shown in fig. 11. Guide plate 79A-79B extends obliquely from one side edge to another on damper blade 70 and is comparatively narrow, which inter alia is related to the dimensions of the distribution chamber 74, in particular the distance between two main confining surfaces 71A and 72A. Guide plate 79A-79B must be so dimensioned and located that it does not interfere with the surrounding surfaces, in the two extreme positions of damper blade 10 as referred to above. This is obtained with a design as illustrated and explained above, at the same time as a desired control or guide effect with respect to the air flow in the chamber is obtained. It is obvious that such a guide plate may have other shapes than what is seen in Fig. 12, where the guide plate is straight and is arranged approximately at a right angle to the major surfaces of damper blade 70.

[0031] Among several other possible modifications in relation to what is illustrated in the drawings, the possibility of using various geometrical shapes in connection with the distribution chamber described, is mentioned here, since for example the condenser and the evaporator forming the main confining surfaces of the chamber, do not necessarily require a geometry based on generally planar surfaces, including the main confining surfaces. Moreover, it is obvious that the multitude of possibilities of variations or re-structuring represented by the baffles shown in Figs. 2 - 6, can be provided for also with other forms of duct changing members. Finally to be mentioned is the possibility of a heat pump circuit working without a compressor, but according to the absorption principle, which is well known within the field of refrigeration techniques.

Claims

1. An apparatus for heating or cooling a fluid, the apparatus comprising a heat pump circuit including a compressor, a throttle means, a condenser (1, 11, 41, 71) and an evaporator (2, 12, 42, 72), the condenser (1, 11, 41, 71) and evaporator (2, 12, 42, 72) defining generally parallel main confining surfaces of a distribution chamber, the distribution chamber including two fluid inlets (5, 6; 15, 16; 75, 76) each directed substantially in parallel to the main confining surfaces of the distribution chamber, a driving device (7, 8; 17, 18; 47, 48; 77, 78) located outside the distribution chamber and arranged to cause the fluid to be driven into or drawn from the distribution chamber, and a single, unitary, separating damper blade (10, 40, 70) pivotally mounted within the distribution chamber, and movable to any position between and including two extreme positions in which the ends of the damper blade (10, 40, 70) engage the main confining surfaces of the distribution chamber, arranged such that the driving device (7, 8;17, 18; 47, 48; 77, 78) drives fluid into the distribution chamber through the fluid inlets (5, 6; 15, 16; 75, 76), generally in parallel to the main confining surfaces of the distribution chamber, the fluid being mixed in the distribution chamber and being discharged from the distribution chamber through the condenser (1, 11, 41, 71) and evaporator (2, 12, 42, 72) depending upon the angular position of the

damper blade (10, 40, 70) .

2. An apparatus for heating a room apparatus for heating or cooling a fluid in accordance with claim 1, the condenser (1, 11, 41, 71) of which is in communication with the room to be heated and the evaporator (2, 12, 42, 72) of which communicates with air outside the room to be heated, the fluid inlets (5, 6; 15, 16; 75, 76) in the distribution chamber being air inlets, and the driving device (7, 8; 17, 18; 47, 48; 77, 78) is arranged to cause air from inside and outside the room to flow through their respective air inlets (5, 6; 15, 16; 75, 76) into the distribution chamber.

Patentansprüche

1. Gerät zum Erhitzen oder Kühlen eines Fluids, wobei das Gerät einen Wärmepumpen-Kreislauf, beinhaltend einen Kompressor, eine Drosseleinrichtung, einen Kondensator (1, 11, 41, 71) und einen Verdampfer (2, 12, 42, 72), wobei der Kondensator (1, 11, 41, 71) und der Verdampfer (2, 12, 42, 72) im allgemeinen parallele Hauptbegrenzungsoberflächen einer Verteilerkammer definieren, wobei die Verteilerkammer zwei Fluideinlässe (5, 6; 15, 16; 75, 76) beinhaltet, welche jeweils im wesentlichen parallel zu den Hauptbegrenzungsoberflächen der Verteilerkammer gerichtet sind, eine Antriebsvorrichtung (7, 8; 17, 18; 47, 48; 77, 78), welche außerhalb der Verteilerkammer angeordnet ist und so positioniert ist, daß das Fluid in die und aus der Verteilerkammer geleitet und abgezogen wird, und eine einzelne, einheitliche Trenn-Dämpferlamelle bzw. -Drosselklappe (10, 40, 70) umfaßt, welche innerhalb der Verteilerkammer schwenkbar angeordnet ist und zu einer beliebigen Position zwischen und beinhaltend zwei Extrempositionen bewegbar ist, in welchen die Enden der Drosselklappe (10, 40, 70) mit den Hauptbegrenzungsoberflächen der Verteilerkammer zusammenwirken, welche derart angeordnet sind, daß die Antriebseinrichtung (7, 8; 17, 18; 47, 48; 77, 78) das Fluid in die Verteilerkammer durch die Fluideinlässe (5, 6; 15, 16; 75, 76) im allgemeinen parallel zu den Hauptbegrenzungsoberflächen der Verteilerkammer führt, wobei das Fluid in der Verteilerkammer gemischt wird und aus der Verteilerkammer durch den Kondensator (1, 11, 41, 71) und Verdampfer (2, 12, 42, 72) in Abhängigkeit von der Winkelposition der Drosselklappe (10, 40, 70) ausgebracht wird.

2. Gerät zum Erwärmen bzw. Erhitzen eines Raum- bzw. Zimmergerätes zum Erwärmen oder Kühlen eines Fluids gemäß Anspruch 1, dessen Kondensator (1, 11, 41, 71) in Verbindung mit dem zu beheizenden Raum steht und dessen Verdampfer (2, 12, 42, 72) mit der Außenluft des zu beheizenden Raums in Verbindung steht, wobei die Fluideinlässe (5, 6; 15, 16; 75, 76) in der Verteilerkammer Lufteinlässe sind und wobei die Antriebseinrichtung (7, 8; 17, 18; 47, 48; 77, 78) angeordnet ist, um zu bewirken, daß Luft von innerhalb nach außerhalb des Raums durch ihre entsprechenden Lufteinlässe (5, 6; 15, 16; 75, 76) in die Verteilerkammer strömt.

Revendications

1. Appareil destiné à chauffer ou refroidir un fluide, l'appareil comportant un circuit de pompe à chaleur comprenant un compresseur, des moyens d'étranglement, un condenseur (1, 11, 41, 71) et un évaporateur (2, 12, 42, 72), le condenseur (1, 11, 41, 71) et l'évaporateur (2, 12, 42, 72) définissant des surfaces de confinement principales globalement parallèles d'une chambre de distribution, la chambre de distribution comprenant deux entrées de fluide (5, 6; 15, 16; 75, 76) dirigées chacune sensiblement parallèlement aux surfaces de confinement principales de la chambre de distribution, un dispositif d'entraînement (7, 8; 17, 18; 47, 48; 77, 78) disposé à l'extérieur de la chambre de distribution et prévu pour amener le fluide à être entraîné dans ou aspiré depuis la chambre de distribution, et un unique volet de séparation unitaire (10, 40, 70) monté de façon pivotante dans la chambre de distribution, et mobile vers une position quelconque entre et comprenant deux positions extrêmes dans lesquelles les extrémités du volet (10, 40, 70) engagent les surfaces de confinement principales de la chambre de distribution, agencé de telle sorte que le dispositif d'entraînement (7, 8; 17, 18; 47, 48; 77, 78) entraîne du fluide dans la chambre de distribution en passant par les entrées de fluide (5, 6; 15, 16; 75, 76), globalement parallèlement aux surfaces de confinement principales de la chambre de distribution, le fluide étant mélangé dans la chambre de distribution et étant évacué de la chambre de distribution en passant par le condenseur (1, 11, 41, 71) et l'évaporateur (2, 12, 42, 72) en fonction de la position angulaire du volet (10, 40, 70).

2. Appareil destiné à chauffer une pièce afin de chauffer ou refroidir un fluide selon la revendication 1, dont le condenseur (1, 11, 41, 71) est en communication avec la pièce devant être chauffée et dont l'évaporateur (2, 12, 42, 72) est en communication avec l'air à l'extérieur de la pièce devant être chauffée, les entrées de fluide (5, 6; 15, 16; 75, 76) dans la chambre de distribution étant des entrées d'air, et le dispositif d'entraînement (7, 8; 17, 18; 47, 48; 77, 78) est prévu pour amener l'air de l'intérieur et de l'extérieur de la pièce à s'écouler à travers les entrées d'air respectives (5, 6; 15, 16; 75, 76) dans

la chambre de distribution.

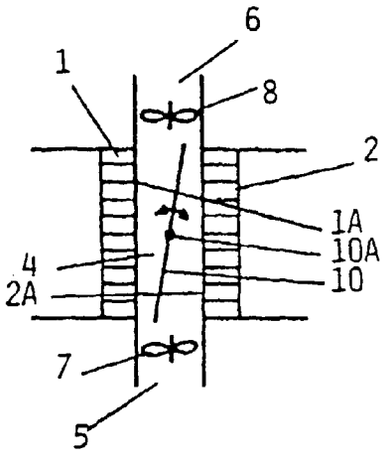


FIG. 1

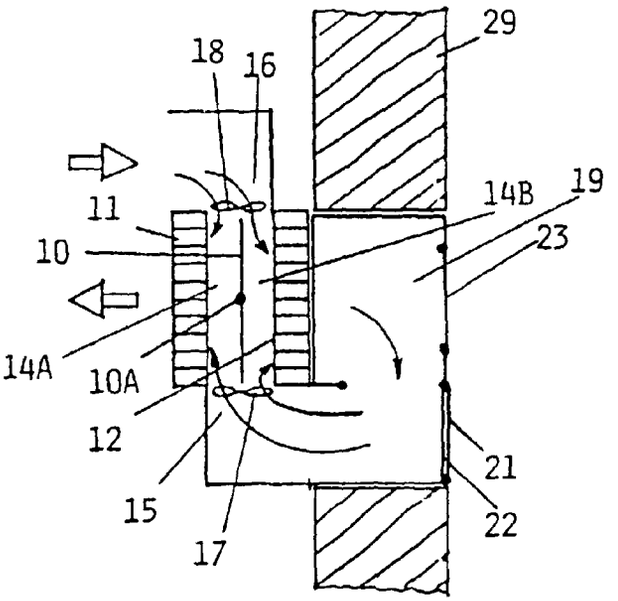


FIG. 2

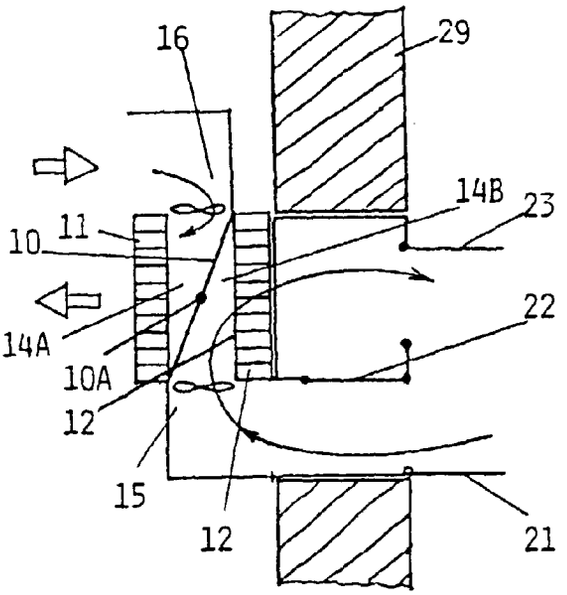


FIG. 3

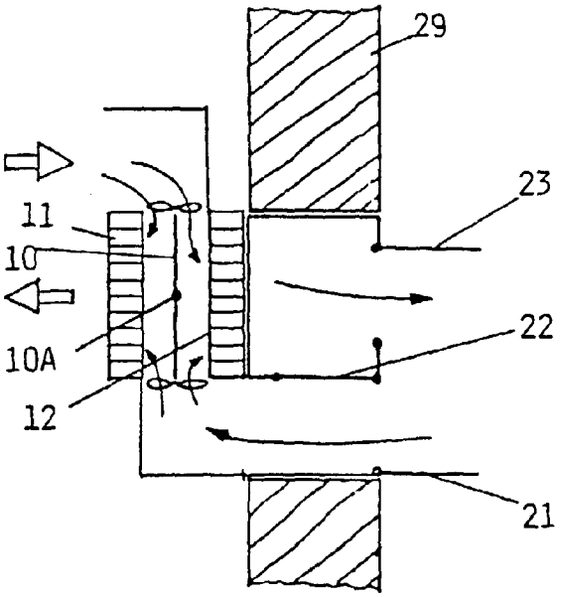


FIG. 4

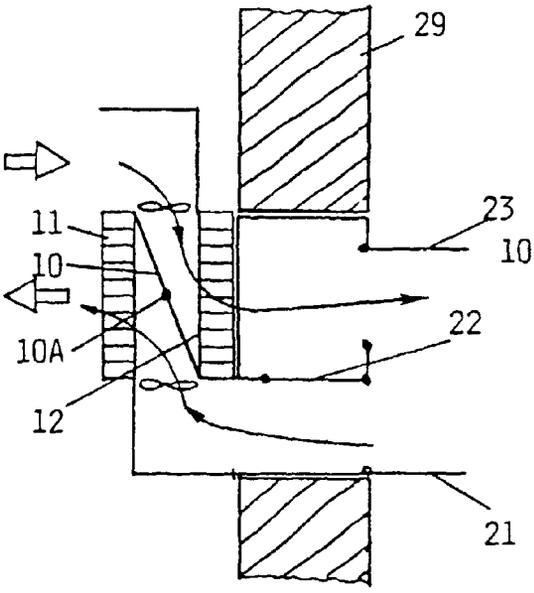


FIG. 5

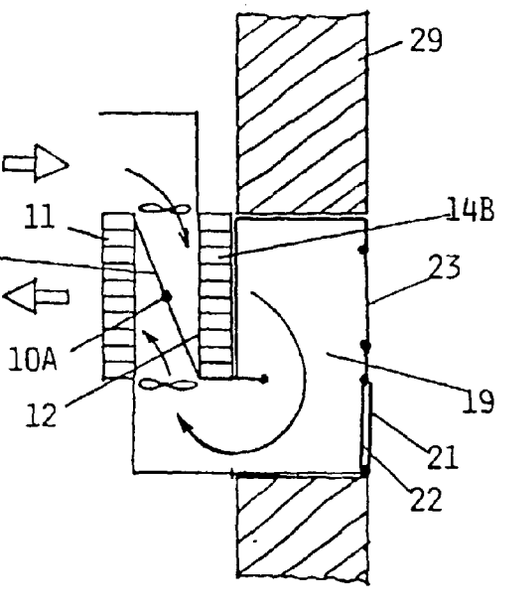


FIG. 6

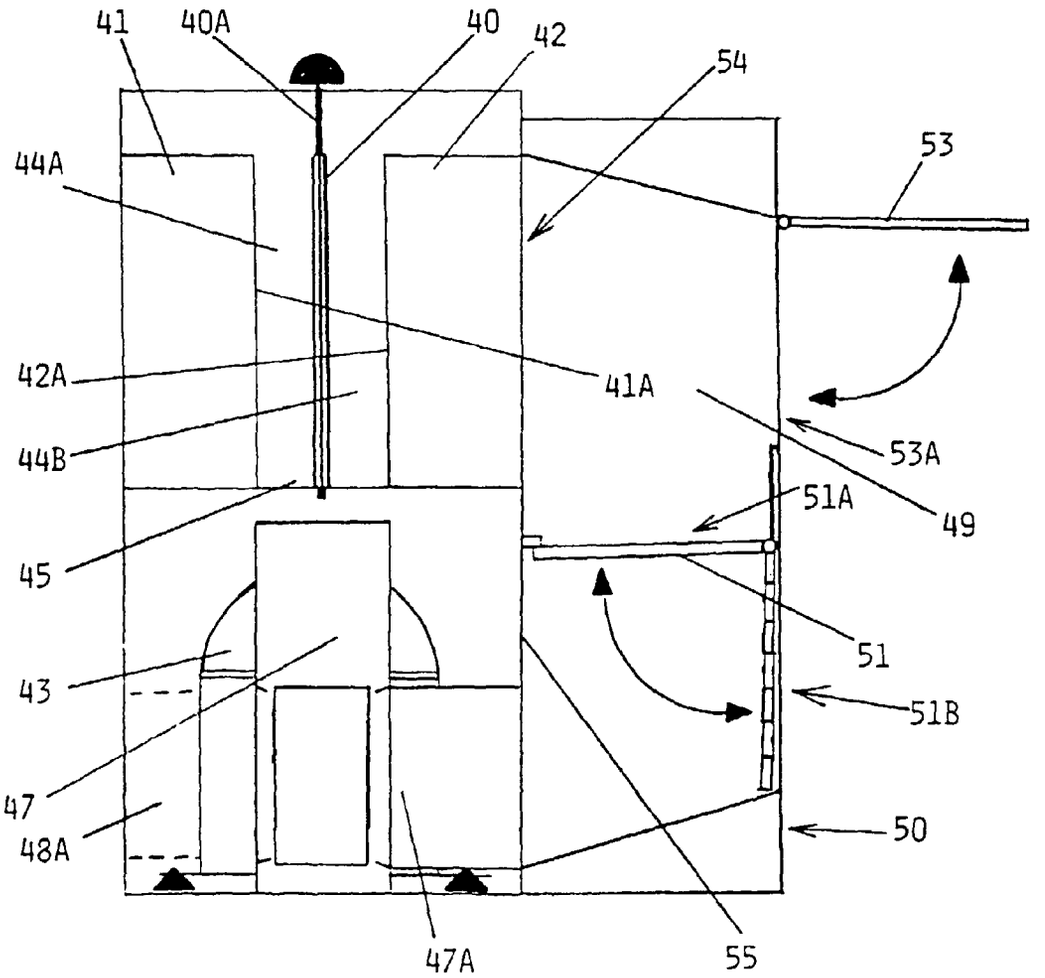


FIG. 7

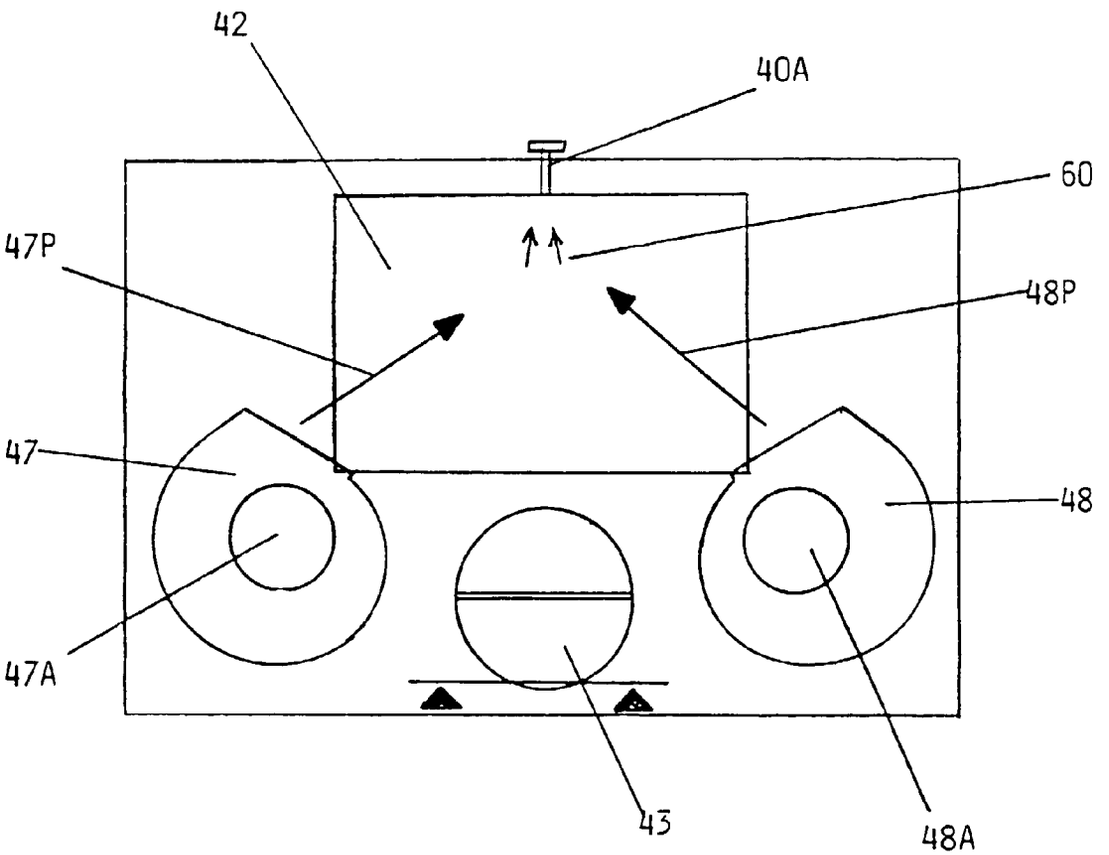


FIG. 8

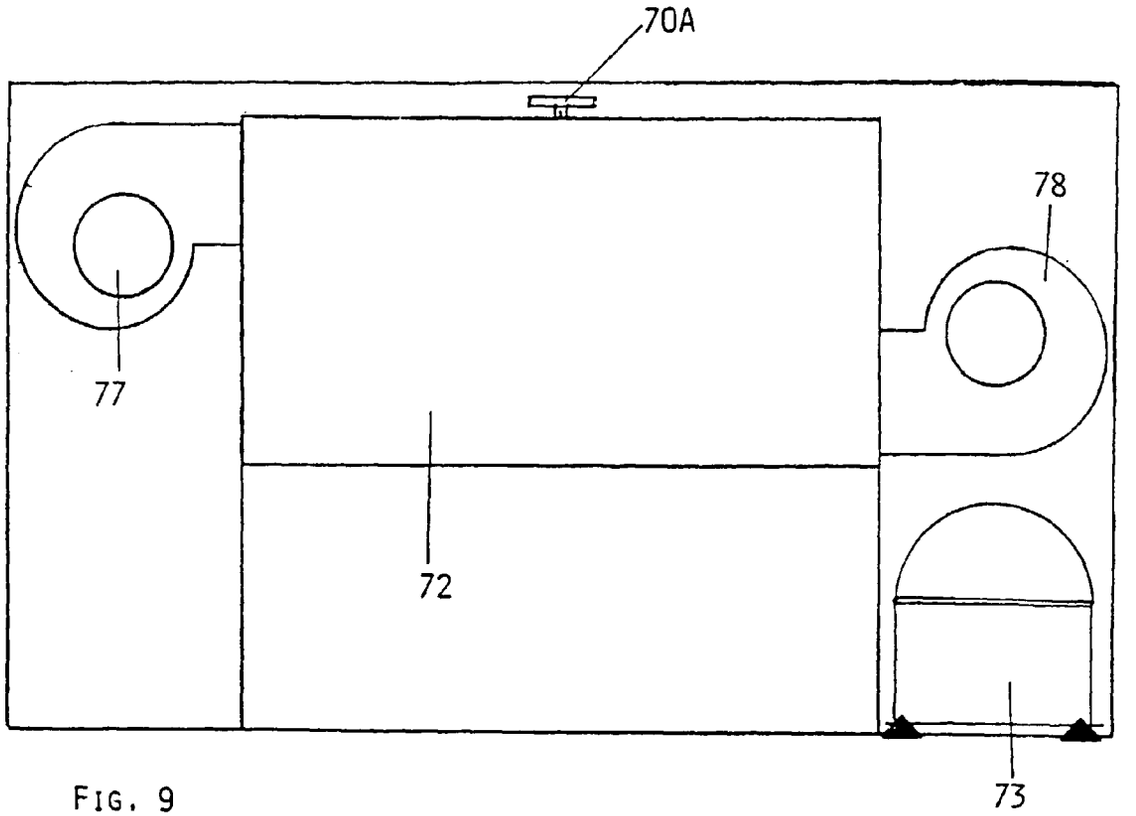


FIG. 9

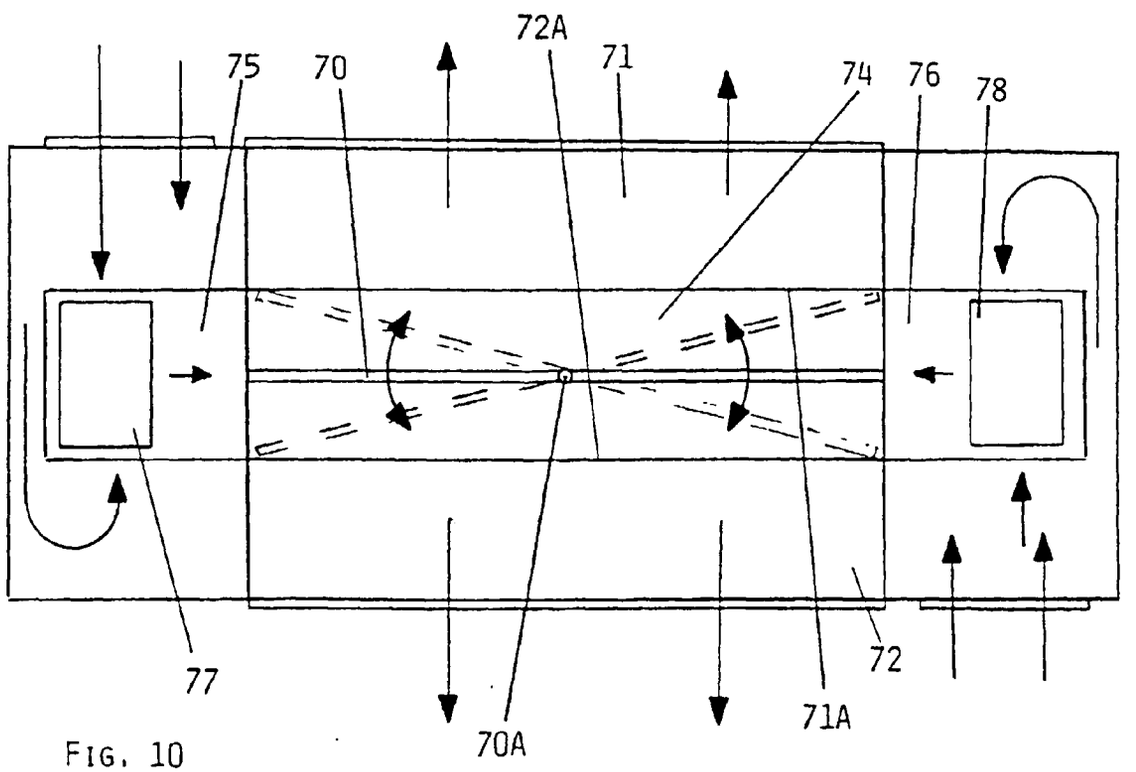


FIG. 10

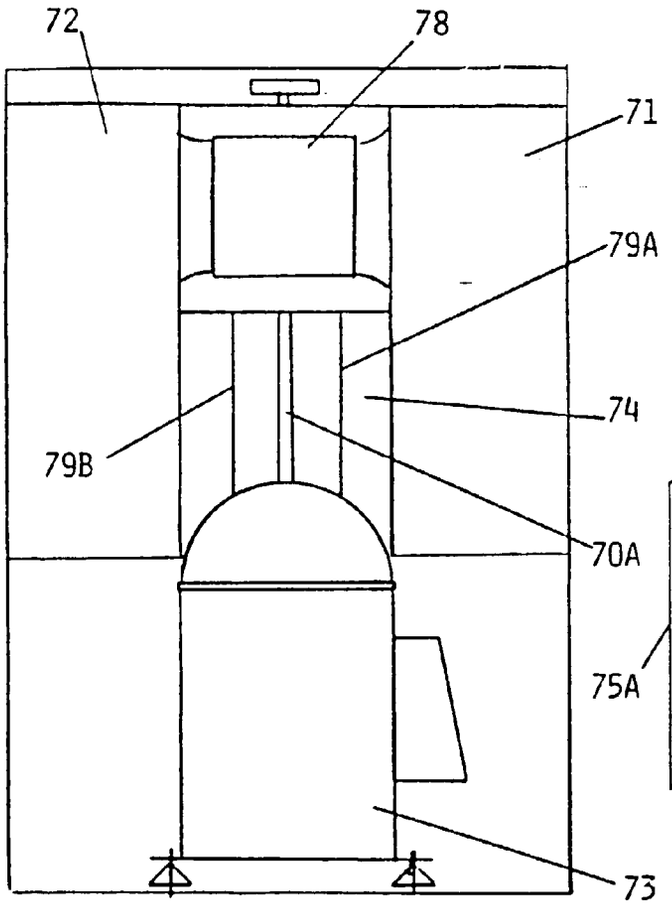


FIG. 11

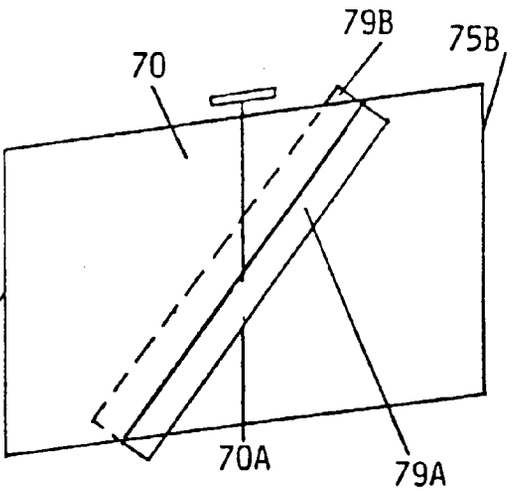


FIG. 12