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(54) **REFRIGERATOR**

KÜHLVORRICHTUNG

REFRIGERATEUR

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- **PATENT ABSTRACTS OF JAPAN vol. 007, no. 124 (M-218), 28 May 1983 (1983-05-28) & JP 58 041280 A (MATSUSHITA DENKI SANGYO KK), 10 March 1983 (1983-03-10)**

EP 1 557 623 B1

Description

Field of the Invention

[0001] This invention relates to a refrigerator and particularly to a piping construction in a machine room for a refrigeration circuit using a hydrocarbon refrigerant.

Background of the Invention

[0002] In recent years, recycling of household electric appliances has been increasingly underway, with a momentum of environmental problems. Thus, the household electric appliances have been subjected to disassembling, crushing or fragmentation, or sorting to raw materials. As for the refrigerator as illustrated in Fig. 5, parts or elements easily detachable are removed from outside; a refrigerant compressor is detached after cutting out piping; and then, whole of the cabinet is crushed to fragmentation as to sort out to each group of the raw materials such as urethane foamed resin and metal. When the refrigerant compressor bas been detached, refrigerating machine oil is drained out from an oil drainage on bottom face of the casing of the refrigerant compressor; and then the compressor is crushed to fragments that are then sorted to steel, cupper or other materials. Evaporators or coolers and piping in the cabinet are crushed along with the cabinet and then sorted to raw materials.

[0003] In order for coping with global warming and ozone layer depletion due to chlorofluorocarbon gases, the refrigerant of the refrigerator has been progressively switched from hydro fluorocarbons (HFC) that had been widely used, to hydrocarbons (to be referred as "hydrocarbon (HC) refrigerant") such as isobutane (R600a), which cause no ozone depletion and are low in global warming coefficients.

[0004] The hydrocarbon refrigerant such as isobutane has high extent of solubility in the refrigerating machine oil and such solubility tends to become remarkably high in low-temperature range, as clear from curve chart of Fig. 6 that shows curves representing solubility of isobutane in the refrigerating machine oil. Moreover, the hydrocarbon refrigerant is flammable and may cause fire disaster when leaked out and then ignited by a spark.

[0005] Hence, when using the hydrocarbon refrigerant, a safety has to be ensured as to prevent the fire disaster even when the refrigerant leaks away due to impacts inflicted during transportation, or defects derived from production process. In view of this, there have been proposed constructions such as follows. Temperature or pressure sensors are arranged in inlet and outlet of the cooler or evaporator so that measured drop in temperature or pressure is compared with a predetermined and stored value as to determine presence or absence of refrigerant leakage. Please see JP-09(1997)-14811A for example. In otherwise, detectors for refrigerant leakage are arranged in vicinity of the cooler(s), and leaked refrigerant is forcedly evacuated via through holes that also serve for drainage for water brought about by defrost procedure. Please see JP-09(1997)-329386A for example.

[0006] At disposal of the refrigerators for recycling, contrary to a manner of transportation during time on sale or usage, the refrigerators are in many occasions piled up in postures of lying on their side other than a normal upright posture. Hence, the refrigerating machine oil held at bottom of the compressor (69), which is usually a reciprocating compressor, may flow out to piping in the cabinet (1) through a suction pipe (75) comprising the refrigerant circuit.

[0007] As in Fig. 7 showing a conventional construction of the machine room, an end of a suction pipe (75) that is taken out from a not-shown cooler is connected with the compressor (69). When the refrigerator is laid on its side, if the left-hand side on the illustration, which is near to a portion the suction pipe (75) is taken out, becomes upside, no flow out of the refrigerating machine oil occurs. When the portion from which the suction pipe (75) is taken out becomes downside in a contrary manner, the refrigerating machine oil in the compressor (69) flows down with gravity, goes through the suction pipe (75) and then flows into piping in the cabinet (1) such as the cooler.

[0008] The refrigerators before disposal processing are stored in the open air, in many occasions. Especially in winter season, temperature of the cabinet drops and the amount of the hydrocarbon refrigerant dissolved in the refrigerating machine oil becomes extremely high as mentioned before. Such hydrocarbon refrigerant along with the refrigerating machine oil flows into the cabinet proper in a large amount. When crushing of the cabinet proper is made in such state, the refrigerating machine oil flows out from various pipes in the refrigerant circuit having been crushed, and the flammable hydrocarbon refrigerant gushes out from the refrigerating machine oil, as to cause a problem of high risk of catching fire.

[0009] The features of the preamble of the independent claims is known from EP-A-949 465.

[0010] Present invention is made in view of the above in respect of the refrigerator using the flammable hydrocarbon refrigerant, and is aimed to prevent flowing of the refrigerating machine oil into the cabinet even when stored or transported in a state laid on its side as to prevent the risk of catching fire.

Disclosure of the Invention

[0011] A refrigerator of claim 1 of the invention comprises: a refrigerant circuit using a flammable refrigerant, which is comprised of a reciprocating compressor, a condenser, a throttling device and a cooler; a machine room that is formed on beneath of a heat-insulator box and is provided with the compressor and with a suction pipe extended from elements of the refrigerant circuit within a cabinet proper as to be connected to a lower-pressure space at the inside of a casing of the compressor; and a

go-and-return portion extending in a right-left-wise span of the compressor in its upright posture and a U-shaped portion extending then forward out of rear side of the compressor, which portions are extended from the suction pipe that runs from a lead taken out from the cabinet proper into the machine room, to a juncture on a face of the compressor.

[0012] Even when the refrigerator is transported or stored in non-upright postures such as lying-on-its-side or tilted posture that are for a recycling processing, the refrigerating machine oil in the compressor is prevented from flowing into piping in the cabinet. Thus, decreased is a chance of ignition of the hydrocarbon refrigerant dissolved in the refrigerating machine oil.

[0013] A refrigerator of claim 2 of the invention comprises: a refrigerant circuit using a flammable refrigerant, which is comprised of a reciprocating compressor, a condenser, a throttling device and a cooler; a machine room that is formed on beneath of a heat-insulator box and is provided with the compressor and with a suction pipe extended from elements of the refrigerant circuit within a cabinet proper as to be connected to a lower-pressure space at the inside of a casing of the compressor; and a first trap extending go-and-return wise in a right-left-wise span of the compressor and a second trap extending then forward out of rear side of the compressor and being disposed on an end of the first trap, which first and second traps are extended from the suction pipe that runs from a lead taken out.from the cabinet proper into the machine room, to a juncture on a face of the compressor. Meanwhile, a refrigerator of claim 3 of the invention comprises: a refrigerant circuit using a flammable refrigerant, which is comprised of a reciprocating compressor, a condenser, a throttling device and an evaporator or cooler; a machine room that is formed on beneath of a heat-insulator box and is provided with the compressor and with a suction pipe extended from elements of the refrigerant circuit within a cabinet proper as to be connected to a lower-pressure space at the inside of a casing of the compressor; and a trap extending forward from rear side of the compressor, which trap is extended from the suction pipe that runs from a lead taken out from the cabinet proper into the machine room, to a juncture on a face of the compressor at a side opposite to the lead.

[0014] According to claim 4 of the invention, the pipe that runs from the lead runs by way of a place substantially at center of the right-left-wise span of the compressor. Thereby, the flowing out of the refrigerating machine oil into the cabinet proper is averted by a simpler and standardized construction of piping.

[0015] A refrigerator of claim 5 of the invention comprises: a refrigerant circuit using a flammable refrigerant, which is comprised of a reciprocating compressor, a condenser, a throttling device and an evaporator or cooler; a machine room that is formed on beneath of a heat-insulator box and is provided with the compressor and a suction pipe extended from elements of the refrigerant circuit within a cabinet proper as to be connected to a lower-pressure space at the inside of a casing of the compressor; and a one-way valve provided on a suction pipe connected to the compressor, specific gravity of a valve plug or disc of the one-way valve being larger than that of refrigerating machine oil. Thus, the flowing out of the refrigerating machine oil into the cabinet proper is averted by a simpler manner as a result of taking account the specific gravity of the valve plug or disc of the one-way valve on the suction pipe.

BRIEF DESCRIPTION OF THE DRAWING

[0016]

Fig. 1 is a perspective view showing a machine room and its vicinity in the refrigerator of one embodiment of the invention;

Fig. 2 is a sectional view schematically showing a rough construction of the compressor;

Fig. 3 is a perspective view showing same part as in the Fig. 1, of another example of the invention;

Fig. 4 is a perspective view showing a machine room and its vicinity in the refrigerator of another embodiment of the invention;

Fig. 5 is a chart of crushing and sorting processes for recycling the refrigerators;

Fig. 6 is a graph showing a variation in amount of hydrocarbon refrigerant dissolved in refrigerating machine oil;

Fig. 7 is a perspective view showing a machine room as in the Fig. 1, of a refrigerator in the prior art.

Best Mode for Carrying out the Invention

[0017] An embodiment of the invention will be explained by use of the drawings. Fig. 1 is a perspective view of a machine room of the refrigerator seen from its rear side. The machine room (2) is disposed on a rear-beneath side of the cabinet proper (1) and is defined by; a tilted bottom board (4) at below of a rear board (3) of outer casing, right-hand and left-hand sideboards (5) (6) and a compressor base plate (7) that forms bottom of the machine room.

[0018] On the compressor base plate (7), a compressor (9) is installed with a cushion stuff (8) therebetween. The compressor (9) forming a part of a refrigerant circuit sends out the refrigerant through a delivery pipe (10) into a condenser (11) formed of a heat radiating pipe, which is disposed on the rear board (3) of the outer casing and rear faces of the sideboards (5) (6) and bottom face of the casing of the refrigerator, and into a throttling device (12) and the like. Then, thus sent refrigerant is introduced in a not-shown coolers disposed in the cabinet as to achieve cooling action. Currently, reciprocating compressors formed of low-pressure casings are mostly adopted, while rotary compressors are also adopted.

[0019] A suction pipe (15) for returning gasified refrigerant into the compressor (9) is led out into the machine

room through a bottom of the rear board (3) at its right-hand or left-hand side, and is directly connected to a suction port (9a) on the compressor (9) at its side facing the lead (15a). The suction pipe (15) runs downward from a lead (15a) jutting into the machine room (2), then runs to and reaches a place substantially at center of right-left-wise span of the compressor (9), and subsequently makes a U-turn as to make a trap (15b) in a go-and-return wise. From the end of the trap (15b), the suction pipe (15) runs frontward in a space between the lead (15a) and the compressor (9) out of a rear side in respect of the compressor (9), then reaches a place substantially at center of front-rear-wise span of the compressor (9), and subsequently also makes a U-turn as to make a second trap (15c). The end of the second trap (15c) is connected to the suction port (9a) of the compressor (9). It is noted that the suction port (9a) is not necessarily disposed on a rightward- or leftward-facing side of the casing (9e) of the compressor (9) as shown in Fig. 1, and may be disposed on a rear side of the casing (9e) that has circular contour.

[0020] Fig. 2 schematically shows a sectional construction of a reciprocating compressor. As far as the refrigerator is in a normal upright posture, the refrigerating machine oil (16) is enclosed in the casing (9e) of the compressor (9) in an illustrated position in respect of the delivery pipe (10), the suction pipe (15), a motor (9b) and a compressor cylinder (9c).

[0021] When the refrigerator is lying on its side or in a tilted posture in a manner that a side nearer to the lead of the suction pipe (15) jutting into the machine room (2) comes to down side, that is, the left-hand board (5) comes to bottom, the refrigerating machine oil (16) in the compressor (9) flows out. Nevertheless, because of the above construction of the piping in which the suction pipe (15) reaches a place substantially at center of right-left-wise span of the compressor (9) and then makes a U-turn, the uppermost end of the suction pipe (15) at the lying-on-its-side posture comes to a position higher than surface level of the refrigerating machine oil. In this way, the portion having the U-turn makes a trap (15b) for preventing the refrigerating machine oil from flowing into the cabinet proper (1).

[0022] Meanwhile, even when the refrigerator lies on its back with the rear board (3) coming to bottom, an uppermost end of the suction pipe (15) comes to a position higher than the surface level of the refrigerating machine oil because of the second trap (15c) in which the suction pipe (15) reaches a place substantially at center of front-rear-wise span of the compressor (9) and then makes a U-turn. Thus, the refrigerating machine oil is prevented from flowing into the cabinet proper (1) in a reverse flow.

[0023] When the refrigerator (1) lies on its side opposite to the side near the lead (15a) jutting into the machine room (2) in a manner that the right-hand board (6) comes to bottom, the lead (15a) comes above the compressor, thus, the refrigerating machine oil never flows into the cabinet proper (1). When the refrigerator (1) lies on its front face, or in otherwise when top face of the cabinet proper comes to bottom as the refrigerator is inverted, a juncture of the suction pipe (15) and the compressor (9) comes above center level of a span of the compressor in each of vertical directions at such postures. Thus, the juncture comes above surface level of the refrigerating machine oil, and thereby, the refrigerating machine oil never flows out from inside of the compressor (9).

[0024] Meanwhile, the delivery pipe (10) is connected with the cylinder (9c) and the piston (9d) at inside of the compressor (9) if the compressor is of reciprocating ones as in this embodiment. Thus, the refrigerating machine oil never flows out through the delivery pipe even when the refrigerator lies on its side.

[0025] Fig. 3, in which same reference numerals are respectively given to same parts or elements as in Fig. 1, shows an example where the suction pipe (35) is led out into the machine room through a bottom of the rear board (3) at near its corner; and the suction pipe (35) is connected to a suction port (29a) on the compressor (29) at a side opposite and remote to the suction pipe. The suction pipe (35) runs downward from the lead (35a) jutting out into the machine room (2) and then frontward into a space between the lead (35a) and the compressor (29) from a side rear than the compressor (29), then reaches a place substantially at center of front-rear-wise span of the compressor (29), and subsequently makes a U-turn as to make a trap (35c). The end of the trap (35c) is extended to run along a rear side of the compressor (29) as to enter a space opposite to the lead and then connected to the suction port (29a) of the compressor (29).

[0026] When the refrigerator lies on its side in a manner that the left-hand board (5) on Fig. 3 comes to bottom for example, the juncture of the suction pipe (35) and the compressor (29) comes atop the compressor (29), thus the refrigerating machine oil never flows through the juncture out from the compressor (9) . Meanwhile, when the refrigerator lies on its right-hand side in a manner that the right-hand board (6) comes to bottom; the suction port (29a) comes beneath the compressor (29), and thus the refrigerating machine oil flows into the suction pipe (35). Nevertheless, the refrigerating machine oil never reaches a level above the compressor (29), and thus never flows into the cabinet proper (1). When the refrigerator lies on its back with the rear board (3) coming to bottom, an uppermost end of the suction pipe (35) comes to a position higher than the surface level of the refrigerating machine oil, as in the previous example, because of the second trap (35c) in which the suction pipe (35) reaches a place substantially at center of front-rear-wise span of the compressor (9) and then makes a U-turn. Thus, the refrigerating machine oil is prevented from flowing into the cabinet proper (1) in a reverse flow. Even when the refrigerator lies on its front face or is inverted in a way top face of the cabinet proper comes to bottom, the refrigerating machine oil never flows out for the rea-

sons as explained for the previous example.

[0027] Explanations hereto made are for examples on the reciprocating compressors. As for the rotary compressors, each of which is formed of a high-pressure casing, and thus amount of the hydrocarbons refrigerant dissolved in the refrigerating machine oil tends to increase. Though not shown, a suction pipe is connected with a cylinder of the compressor; and refrigerant sent out from the cylinder is discharged to inside of the casing and flows out through the delivery pipe. These constructions are same for other compressors of high-pressure casings as well. When the rotary compressor is lying on its side, the refrigerating machine oil may flow out through the delivery pipe. It is enough for coping with this occasion to construct the delivery pipe of the rotary compressor as in the suction pipe of the reciprocating compressor in the preceding examples.

[0028] In following, another embodiment of the present invention will be explained. As shown in Fig. 4 having same reference numerals for same parts or elements and showing a machine room of a refrigerator as in preceding examples, a one-way valve (55a) is disposed on a suction pipe (55) on the reciprocating compressor (49) . Moreover, a valve plug or disc of the one-way valve (55a) is designed to be larger in specific gravity than the refrigerating machine oil. The one-way valve (55a) is originally disposed for averting reverse flow of the refrigerant from the compressor (49) to the suction pipe (55) . When the refrigerator is lying on its side at a time of storage or transportation for the crushing processing mentioned before, the juncture of the suction pipe (55) and the compressor may come to bottom of the compressor. In such occasion, if the specific gravity of the valve plug or disc in the one-way valve (55a) is smaller than that of the refrigerating machine oil, the valve plug or disc would float up due to its buoyancy, and thus, the one-way valve becomes not closable. For averting this, the specific gravity of the valve plug or disc is designed to be larger than that of the refrigerating machine oil. In this way, flowing out of the refrigerating machine oil through the suction pipe is averted even when the cabinet proper is lying on its side or toppled sideways in any direction.

Industrial Applicability

[0029] As explained above, even when the refrigerators are piled up in lying-on-its-side or tilted postures other than upright normal posture as to be subjected to disassembling or crushing for the recycling, the pipe connecting the leads jutting into the machine room to the suction or discharge ports has a portion coming above the surface level of the refrigerating machine oil, according to the invention-wise refrigerator. Thus, averted is leaking out of the refrigerating machine oil through piping in a cabinet proper having been crushed, at a time the refrigerator is processed to be crushed; and thereby, averted are the gushing out of the flammable refrigerant having been dissolved in the refrigerating machine oil and risk of catching fire under some circumstances.

Claims

1. A refrigerator comprising:

a refrigerant circuitusing a flammable refrigerant, which is comprised of a reciprocating compressor, a condenser, a throttling device and a cooler;
a machine room that is formed on beneath of aheat-insulator box and is provided with the compressor and with a suction pipe extended from elements of the refrigerant circuit within a cabinet proper as to be connected to a lower-pressure space at the inside of a casing of the compressor; and **characterised by**
a go-and-return portion extending in a right-left-wise span of the compressor in its upright posture and a U-shaped portion extending then forward out of rear side of the compressor, which portions are extended from the suction pipe that runs from a lead taken out from the cabinet proper into the machine room, to a juncture on a face of the compressor

2. A refrigerator comprising:

a refrigerant circuit using a flammable refrigerant, which is comprised of a reciprocating compressor, a condenser, a throttling device and a cooler;
a machine room that is formed on beneath of a heat-insulator box and is provided with the compressor and with a suction pipe extended from elements of the refrigerant circuit within a cabinet proper as to be connected to a lower-pressure space at the inside of a casing of the compressor; and **characterised by**
a first trap extending go-and-return wise in a right-left-wise span of the compressor and a second trap extending then forward out of rear side of the compressor and being disposed on an end of the first trap, which first and second traps are extended from the suction pipe that runs from a lead taken out from the cabinet proper into the machine room, to a juncture on a face of the compressor.

3. A refrigerator comprising:

a refrigerant circuit using a flammable refrigerant, which is comprised of a reciprocating compressor, a condenser, a throttling device and a cooler;
a machine room that is formed on beneath of a heat-insulator box and is provided with the com-

pressor and with a suction pipe extended from elements of the refrigerant circuit within a cabinet proper as to be connected to a lower-pressure space at the inside of a casing of the compressor; and **characterised by**
a trap extending forward from rear side of the compressor, which trap is extended from the suction pipe that runs from a lead taken out from the cabinet proper into the machine room, to a juncture on a face of the compressor at a side opposite to the lead.

4. A refrigerator according to anyone of claims 1-3, wherein: said pipe that runs from the lead runs by way of a place substantially at center of right-left-wise span of the compressor.

5. A refrigerator comprising:

a refrigerant circuit using a flammable refrigerant, which is comprised of a reciprocating compressor, a condenser, a throttling device and a cooler;
a machine room that is formedonbeneathof aheat-insulator box and is provided with the compressor and with a suction pipe extended from elements of the refrigerant circuit within a cabinet proper as to be connected to a lower-pressure space at the inside of a casing of the compressor; and **characterised by**
a one-way valve provided on a suction pipe connected to the compressor, wherein specific gravity of a valve plug or disc of the one-way valve is larger than that of refrigerating machine oil.

Patentansprüche

1. Kältemaschine umfassend:

einen Kühlmittelkreislauf, der ein brennbares Kühlmittel verwendet, welches einen hin- und hergehenden Kompressor, einen Kondensator, eine Drosseleinrichtung und einen Kühler umfasst;
einen Maschinenraum, der unter einem Hitze-isolierenden Kasten ausgebildet ist und der mit dem Kompressor und mit einem Saugrohr versehen ist, das sich von Elementen des Kühlmittelkreislaufs innerhalb eines Gehäuses erstreckt, so das es mit einem Niedrigdruckraum an der Innenseite eines Gehäuses des Kompressors verbunden ist; und

gekennzeichnet durch
einen Lauf-und-Rückkehr-Abschnitt, der sich in einer Rechts-Links-Messspanne des Kompressors in seiner aufrechten Haltung erstreckt, und einen U-förmigen Abschnitt, der sich dann vorwärts aus der Rückseite des Kompressors erstreckt, wobei die Abschnitte sich vom Saugrohr, das von einer aus dem Gehäuse genommenen Führung in den Maschinenraum läuft, zu einer Verbindungsstelle an einer Fläche des Kompressors erstrecken.

2. Kältemaschine umfassend:

einen Kühlmittelkreislauf, der ein brennbares Kühlmittel verwendet, welches einen hin- und hergehenden Kompressor, einen Kondensator, eine Drosseleinrichtung und einen Kühler umfasst;
einen Maschinenraum, der unter einem Hitze-isolierenden Kasten ausgebildet ist und der mit dem Kompressor und mit einem Saugrohr versehen ist, das sich von Elementen des Kühlmittelkreislaufs innerhalb eines Gehäuses erstreckt, so das es mit einem Niedrigdruckraum an der Innenseite eines Gehäuses des Kompressors verbunden ist; und

gekennzeichnet durch
eine erste Kühlfalle, die sich in einer Lauf-und-Rückkehr-Art in einer Rechts-Links-Messspanne des Kompressors erstreckt, und eine zweite Kühlfalle, die sich dann vorwärts aus der Rückseite des Kompressors erstreckt und an einem Ende der ersten Kühlfalle angeordnet ist, wobei die erste und zweite Kühlfalle sich von dem Saugrohr, das von einer aus dem Gehäuse genommenen Führung in den Maschinenraum läuft, zu einer Verbindungsstelle an einer Fläche des Kompressors erstrecken.

3. Kältemaschine umfassend:

einen Kühlmittelkreislauf, der ein brennbares Kühlmittel verwendet, welches einen hin- und hergehenden Kompressor, einen Kondensator, eine Drosseleinrichtung und einen Kühler umfasst;
einen Maschinenraum, der unter einem Hitze-isolierenden Kasten ausgebildet ist und der mit dem Kompressor und mit einem Saugrohr versehen ist, das sich von Elementen des Kühlmittelkreislaufs innerhalb eines Gehäuses erstreckt, so das es mit einem Niedrigdruckraum an der Innenseite eines Gehäuses des Kompressors verbunden ist; und

gekennzeichnet durch
eine Kühlfalle, die sich vorwärts aus der Rückseite des Kompressors erstreckt, wobei die Kühlfalle sich dann von dem Saugrohr, das von einer aus dem Gehäuse genommenen Führung in den Maschinenraum läuft, zu einer Verbindungsstelle an einer Flä-

che des Kompressors an einer Seite gegenüberliegend der Führung erstreckt.

4. Kältemaschine nach einem der Ansprüche 1 - 3, bei dem das Rohr, das von der Führung aus läuft, mittels eines Platzes im Wesentlichen im Zentrum der Rechts-Links-Messpanne des Kompressors läuft.

5. Kältemaschine umfassend:

einen Kühlmittelkreislauf, der ein brennbares Kühlmittel verwendet, welches einen hin- und hergehenden Kompressor, einen Kondensator, eine Drosseleinrichtung und einen Kühler umfasst;
einen Maschinenraum, der unter einem Hitze-isolierenden Kasten ausgebildet ist und der mit dem Kompressor und mit einem Saugrohr versehen ist, das sich von Elementen des Kühlmittelkreislaufs innerhalb eines Gehäuses erstreckt, so das es mit einem Niedrigdruckraum an der Innenseite eines Gehäuses des Kompressors verbunden ist; und

gekennzeichnet durch
ein Ein-Weg-Ventil, das an einem mit dem Kompressor verbundenen Saugrohr vorgesehen ist, bei dem das spezifische Gewicht eines Ventilsteckers oder einer Ventilscheibe des Ein-Weg-Ventils größer ist, als das des kühlenden Maschinenöls.

Revendications

1. Réfrigérateur comprenant :

un circuit de frigorigène utilisant un frigorigène inflammable, qui est composé d'un compresseur alternatif, d'un condenseur, d'un obturateur et d'un refroidisseur ;
un compartiment de machine qui est formé audessous d'un module isolant de la chaleur et qui est pourvu du compresseur, et d'un tuyau d'aspiration s'étendant depuis des éléments du circuit de frigorigène à l'intérieur d'une armoire proprement dite de façon à être connecté à un espace à pression plus basse à l'intérieur d'un carter du compresseur ; et **caractérisé :**

par une partie en aller et retour s'étendant sur une étendue dans le sens droite-gauche du compresseur dans sa posture debout et par une partie en forme de U s'étendant ensuite vers l'avant depuis le côté arrière du compresseur, lesquelles parties s'étendent depuis le tuyau d'aspiration qui va d'un raccord de sortie de l'armoire proprement dite pour entrer dans le compartiment de machine, jusqu'à une jonction sur une face du compresseur.

2. Réfrigérateur comprenant :

un circuit de frigorigène utilisant un frigorigène inflammable, qui est composé d'un compresseur alternatif, d'un condenseur, d'un obturateur et d'un refroidisseur ;
un compartiment de machine qui est formé audessous d'un module isolant de la chaleur et qui est pourvu du compresseur, et d'un tuyau d'aspiration s'étendant depuis des éléments du circuit de frigorigène à l'intérieur d'une armoire proprement dite de façon à être connecté à un espace à pression plus basse à l'intérieur d'un carter du compresseur ; et **caractérisé :**

par un premier siphon s'étendant en aller et retour sur une étendue dans le sens droite-gauche du compresseur et par un second siphon s'étendant ensuite vers l'avant depuis le côté arrière du compresseur et étant disposé à une extrémité du premier siphon, lesquels premier et second siphons s'étendent depuis le tuyau d'aspiration qui va d'un raccord de sortie de l'armoire proprement dite pour entrer dans le compartiment de machine, jusqu'à une jonction sur une face du compresseur.

3. Réfrigérateur comprenant:

un circuit de frigorigène utilisant un frigorigène inflammable, qui est composé d'un compresseur alternatif, d'un condenseur, d'un obturateur et d'un refroidisseur ;
un compartiment de machine qui est formé audessous d'un module isolant de la chaleur et qui est pourvu du compresseur, et d'un tuyau d'aspiration s'étendant depuis des éléments du circuit de frigorigène à l'intérieur d'une armoire proprement dite de façon à être connecté à un espace à pression plus basse à l'intérieur d'un carter du compresseur ; et **caractérisé :**

par un siphon s'étendant vers l'avant depuis le côté arrière du compresseur, lequel siphon s'étend depuis le tuyau d'aspiration qui va d'un raccord de sortie de l'armoire proprement dite pour entrer dans le compartiment de machine, jusqu'à une jonction sur une face du compresseur du côté opposé au raccord de sortie.

4. Réfrigérateur selon l'une quelconque des revendications 1 à 3, dans lequel ledit tuyau qui part du raccord de sortie passe par un emplacement prati-

quement au centre de l'étendue dans le sens droite-gauche du compresseur.

5. Réfrigérateur comprenant :

un circuit de frigorigène utilisant un frigorigène inflammable, qui est composé d'un compresseur alternatif, d'un condenseur, d'un obturateur et d'un refroidisseur ;
un compartiment de machine qui est formé au-dessous d'un module isolant de la chaleur et qui est pourvu du compresseur, et d'un tuyau d'aspiration s'étendant depuis des éléments du circuit de frigorigène à l'intérieur d'une armoire proprement dite de façon à être connecté à un espace à pression plus basse à l'intérieur d'un carter du compresseur ; et **caractérisé :**

par un clapet de non retour prévu sur un tuyau d'aspiration connecté au compresseur, dans lequel la densité d'un obturateur ou disque de clapet du clapet de non retour est plus grande que celle de l'huile de la machine réfrigérante.

FIG. 1

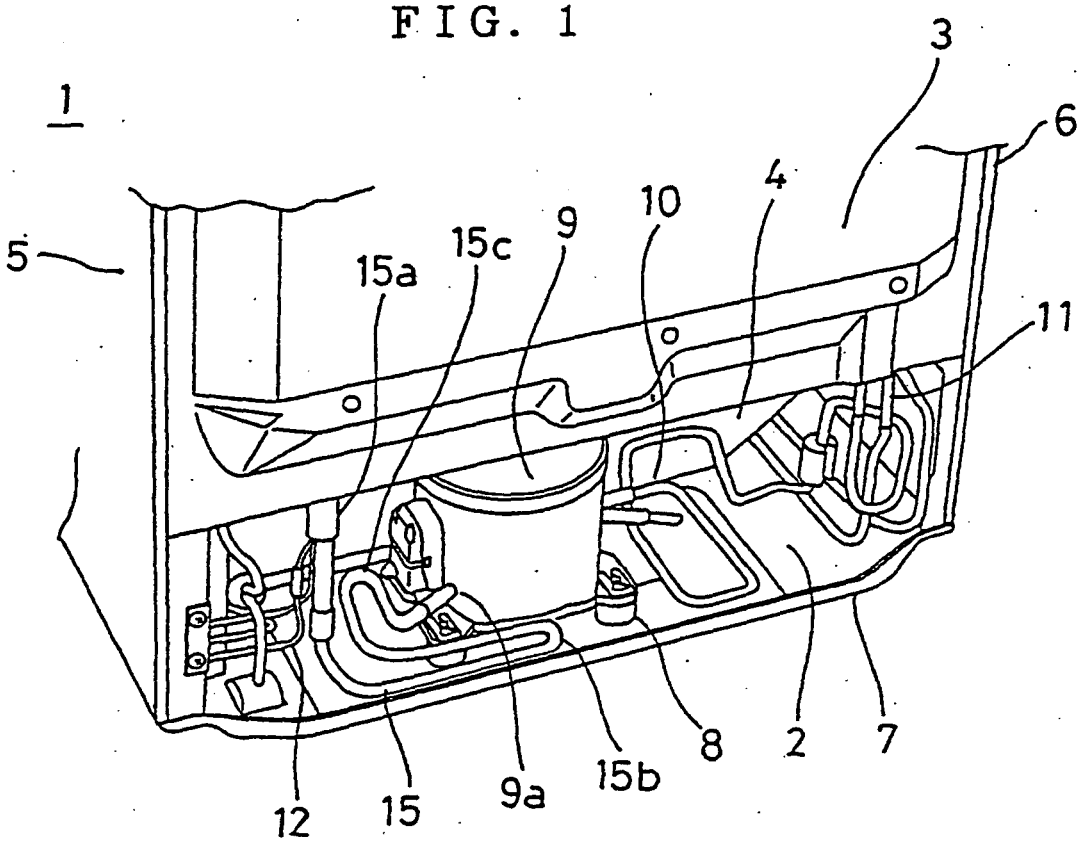


FIG. 2

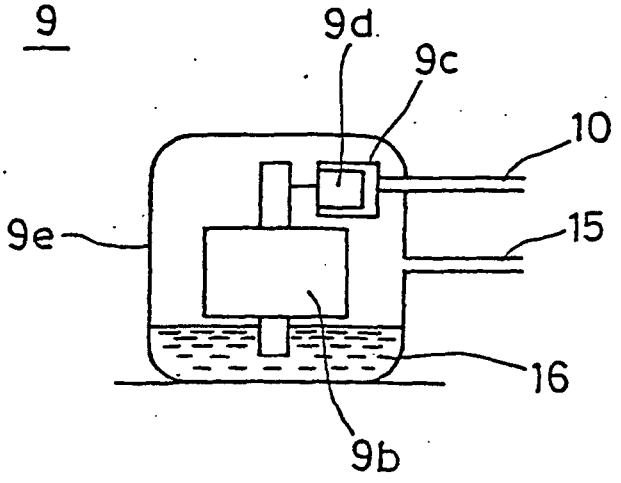


FIG. 3

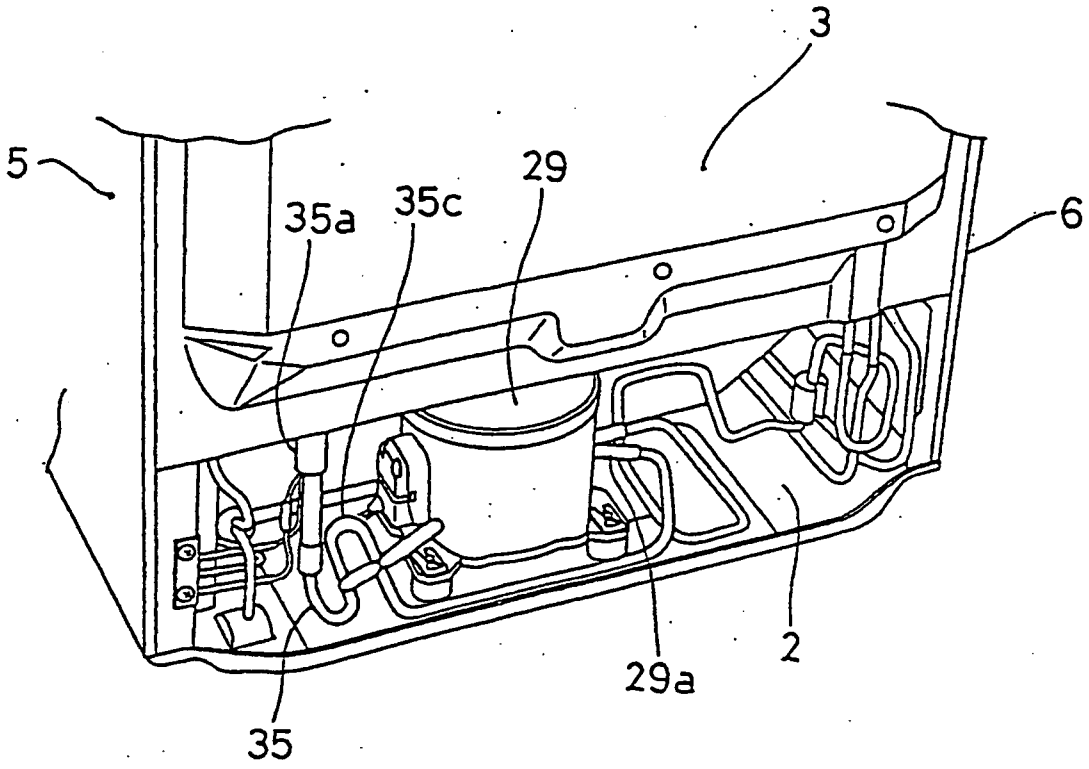


FIG. 4

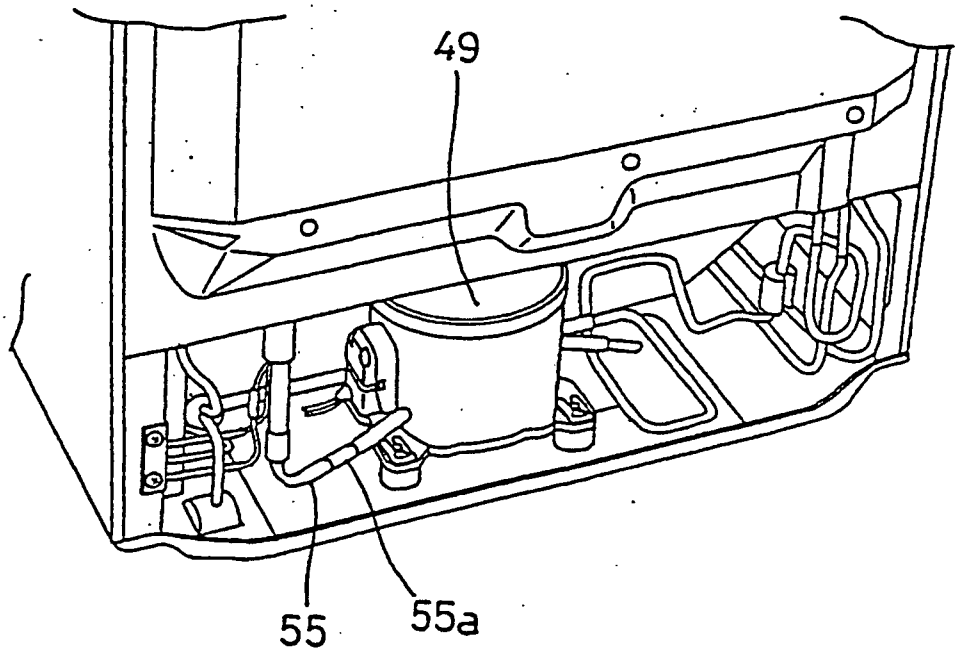


FIG. 5

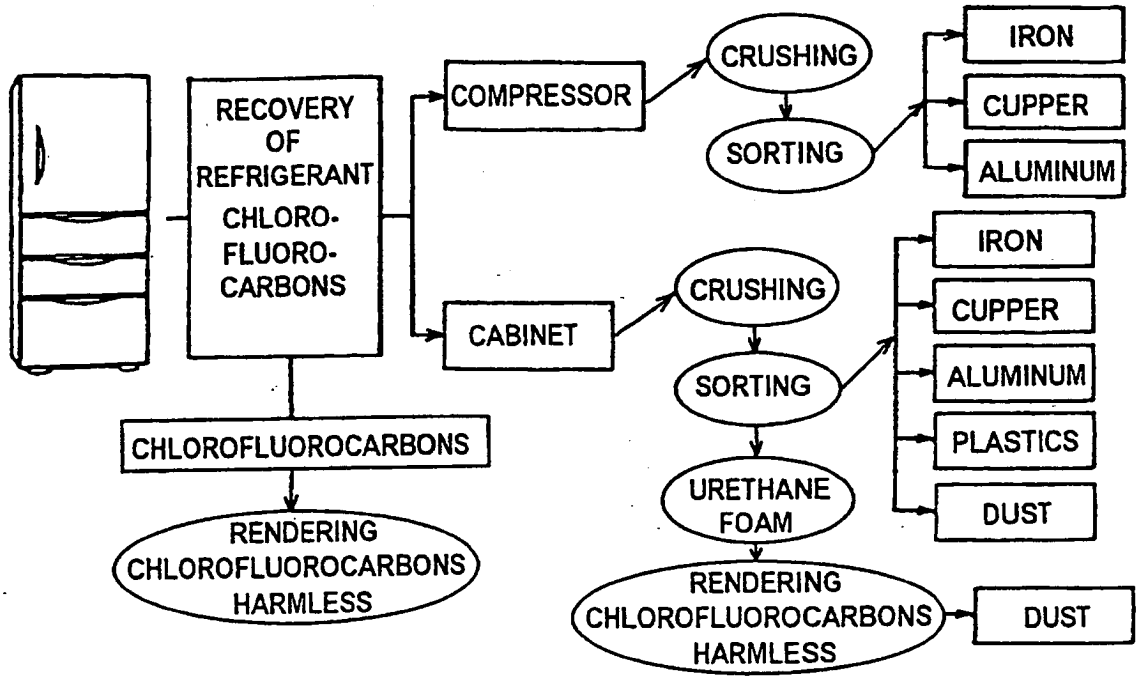

RECOVERY OF REFRIGERANT CHLORO-FLUORO-CARBONS
COMPRESSOR
CRUSHING
SORTING
IRON
CUPPER
ALUMINUM
CABINET
CRUSHING
SORTING
IRON
CUPPER
ALUMINUM
PLASTICS
DUST
URETHANE FOAM
CHLOROFLUOROCARBONS
RENDERING CHLOROFLUOROCARBONS HARMLESS
RENDERING CHLOROFLUOROCARBONS HARMLESS
DUST

FIG.6

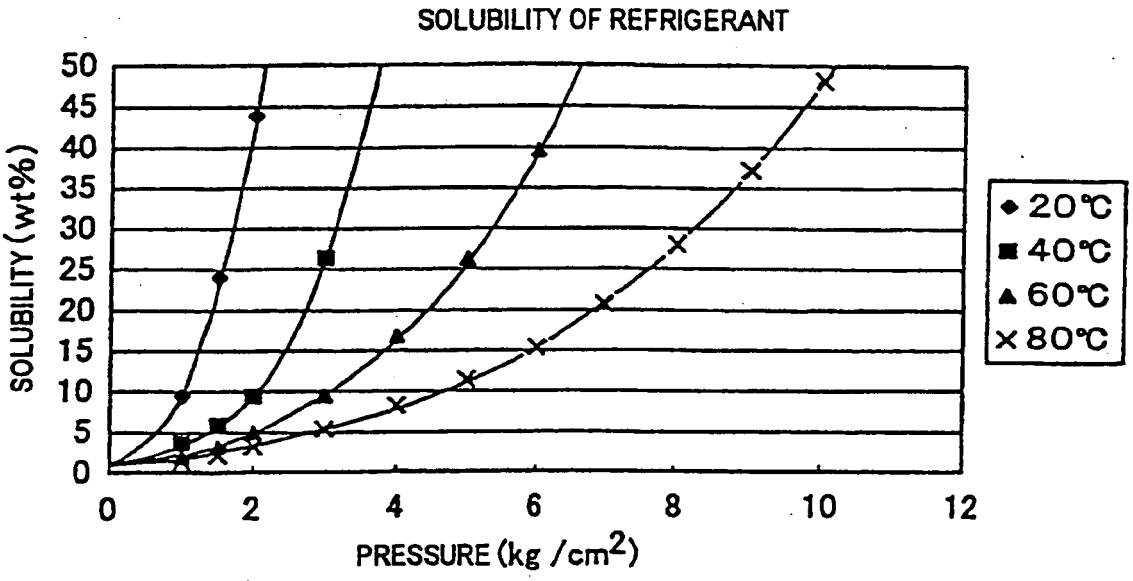
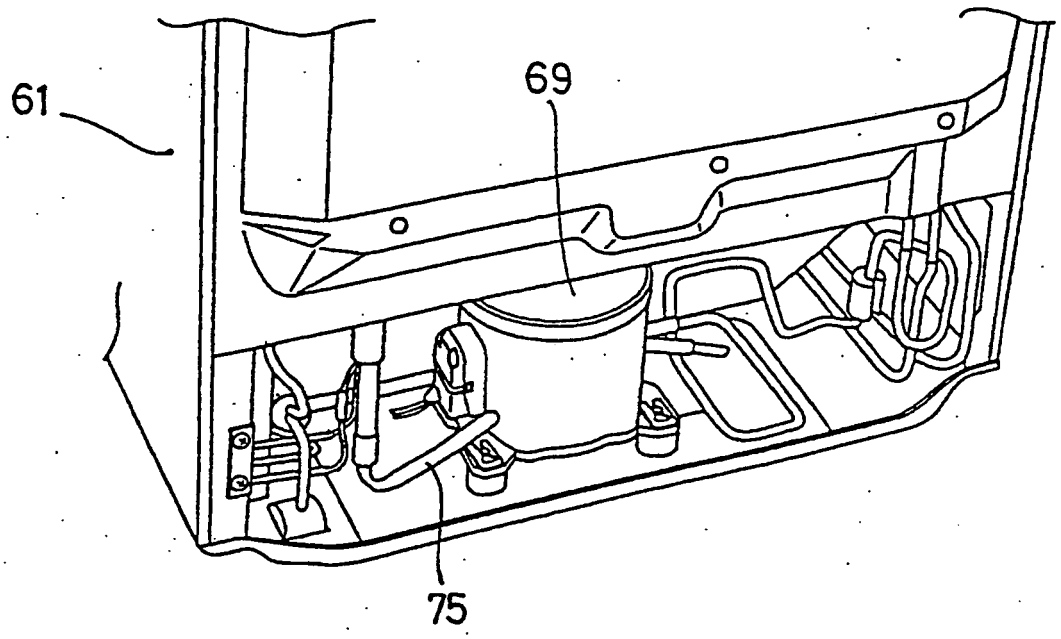

SOLUBILITY OF REFRIGERANT
SOLUBILITY (wt%)
50
45
40
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
PRESSURE (kg /cm2)
20℃
40℃
60℃
80℃

FIG. 7


61
69
75

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 9014811 A **[0005]**
- JP 9329386 A **[0005]**
- EP 949465 A **[0009]**