

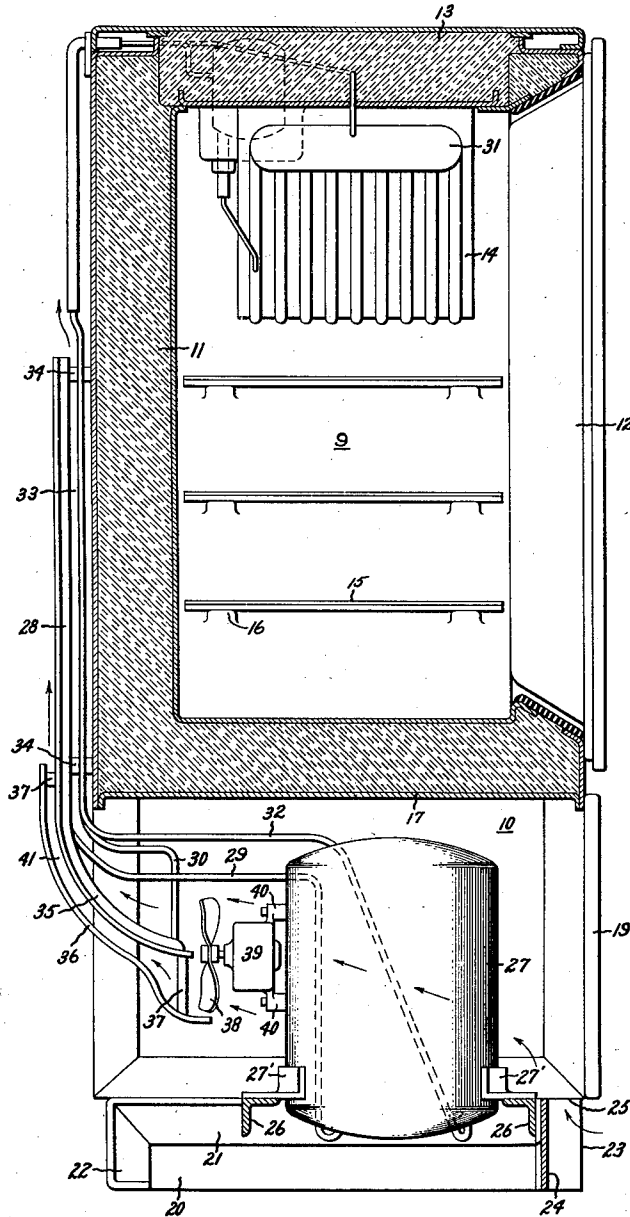
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REFRIGERATOR

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2,169,115

REFRIGERATOR

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5 Claims. (Cl. 62—116)

My invention relates to refrigerators.

It is an object of my invention to provide an improved refrigerating machine condenser and arrangement of apparatus in a refrigerator for effectively utilizing air for cooling adequately the heat-emitting portions of the machine.

Further objects and advantages of my invention will become apparent as the following description proceeds, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of my invention, reference may be had to the accompanying drawing, which is a vertical sectional view, partly in elevation, of a refrigerator embodying my invention.

In the drawing, I have shown a refrigerator cabinet of the household type having an upper insulated food storage compartment 9 and a lower machinery compartment 10 disposed therebeneath. The food storage compartment 9 is enclosed on three sides and the bottom by insulated walls 11 and has a heat-insulated door 12 adapted to close the opening at the front of the compartment 9. The top of the compartment 9 is closed by a removably mounted, insulated wall 13 having suspended therefrom into the upper portion of the compartment 9 a cooling unit 14, such as an evaporator of the flooded type for freezing purposes and for cooling the compartment 9. The compartment 9 is also provided with the removably mounted shelves 15 which are carried on the supporting brackets 16.

Below the storage compartment 9 and separated therefrom by a partition 17 is the apparatus or machinery compartment 10 having sides formed by extensions of the cabinet walls, the front portion being closed by a removable panel 19, and the rear of the compartment 10 being left open. The cabinet thus formed is supported upon and reinforced by a base 20. The base 20 is made of a rectangular frame formed by horizontal angle irons 21 supported on the legs 22, the base being surrounded on the front and sides by a metal mopboard 23 secured thereto. The rear of the base is open. The mopboard 23 has an inset portion 24 in the front thereof, which permits cooling air to enter the machinery compartment 10 at 25. At the top of the base 20, are a pair of angle irons 26 extended transversely across the base and suitably secured thereto, spaced apart, to support within the machinery compartment 10 a motor-compressor casing 27

which is mounted on the brackets 27' carried by and secured to angle irons 26.

The refrigerator is provided with a refrigerating machine including as its principal element a refrigerant circulatory unit, such as a compressor, a refrigerant liquefying unit, such as a condenser, and a refrigerant expansion unit, such as an evaporator. The compression type machine shown includes a compressor and a motor for driving the compressor contained in the cylindrical hermetically sealed casing 27 within the machinery compartment 10, an air-cooled sheet metal condenser 28 arranged at the back of the cabinet, and an evaporator 14 located within the upper portion of the cooling compartment 9. The gaseous refrigerant is compressed by a compressor unit in the casing 27 which may be constructed as described and illustrated in United States Letters Patent No. 2,102,403, H. H. Bixler, which issued on December 14, 1937, and is assigned to the present assignee. The compressed refrigerant is carried by a conduit 29 to the air-cooled condenser 28, where it is cooled and liquefied by a transfer of heat therefrom to the cooling air which passes over the surfaces of the condenser 28. The liquefied refrigerant drains by gravity to the lower portion of the condenser 28 and is forced through the conduit 30 to the float valve casing (shown by dotted lines) from which the liquid refrigerant is supplied to the evaporator 14 in sufficient quantity to maintain the header 31 of the evaporator 14 about half full of liquid refrigerant. The refrigerant, which is vaporized by the absorption of heat from the cooling compartment 9, is collected in the header 31 above the level of the liquid refrigerant contained therein, and is drawn off to the compressor contained in the casing 27 through the suction conduit 32 and the cycle is repeated continuously during the operation of the machine.

I have provided an air-cooled condenser 28 including a plurality of complementary sheet metal portions having indentations or corrugations therein to provide a refrigerant condensing chamber and welded together about their edges to seal the condensing chamber. These sheets are also welded together in the indentations or between the corrugations to withstand the high pressure to which the condenser 28 is subjected. This plate condenser may be of the type illustrated in the United States Letters Patent No. 2,071,182, which issued February 16, 1937, and is assigned to the present assignee, but I do not limit myself thereto. The condenser 28 has a flat rectangular portion extending vertically up-

ward along the rear outside wall of the cabinet in a spaced relation thereto, forming flue-like opening 33, and a lower portion deflected from the plane of the upper portion, preferably a lower curved end portion extending arcuately, inward into the machinery compartment 10, spaced away from the ceiling partition 17 and the base 20. A plurality of supporting members 34 maintain the condenser 28 securely in a spaced relation to the rear wall of the refrigerator cabinet, as well as maintaining the curved end portion 35 of the condenser 28 spaced away from the partition 17 and the iron channels 21 of the base 20. Supported beneath the lower portion of the condenser 28 and cooperating therewith is a curved baffle 36 whose curvature may be concentric with the end curve 35 of the condenser 28. The baffle 36 is maintained in a spaced relation with the condenser 28 by a plurality of rigid supporting members 37 secured to the condenser 28 in a suitable manner. The upper end of the baffle 36 extends vertically upward and may substantially parallel the vertical portion of the condenser 28. The lower end of the baffle 36 has an additional downward curvature to provide a skirt for the fan blades 38 of a fan 39 adjacent thereto, the baffle extending slightly beyond the lower end of the condenser 28. The fan 39 is centered with respect to the transverse line of the lower end of the condenser 28 and has its center line in the same horizontal plane therewith for forcing air along both the upper and the lower curved surfaces of the condenser. A portion of the air from the fan blades 38 is directed into the space 41 between the baffle 36 and the condenser 28 upwardly along the rear surface of the condenser, and another portion of the air is directed along the inner curved surface of the condenser upwardly into the space 33 between the condenser 28 and the rear wall of the cabinet. The fan 39 is securely mounted on the compressor casing 27 by any suitable means, such as the feet 40 bolted thereon. The casing 27 together with the fan 39 may form a unitary structure which is removably mounted in the machinery compartment 10 and may be conveniently placed therein or removed therefrom.

In the operation of the refrigerating machine, the gaseous refrigerant is compressed by the motor-compressor unit contained in the casing 27 and is discharged therefrom through the conduit 29 into the condenser 28. The compressed gaseous refrigerant in the condenser 28 is liquefied by a transfer of heat therefrom to the cooling air which passes over the surfaces of the condenser. It will be noted that the condenser 28 is mounted in a spaced relation with respect to the rear wall of the cabinet in order that cooling air may readily pass over both the inner and the outer surfaces of the condenser. The cooling air enters the machinery compartment 10 through the opening 25 formed in the front part of the inset portion 24 of the mopboard 23. This air, taken from the lowest and coolest portion of the room, is drawn across, around, and over the casing 27 containing the motor-compressor unit which emits heat during operation. The casing 27 may be provided with cooling fins if so desired. The passage of cool air over the casing 27 causes it and the machinery therein to be cooled. The cooling air is then drawn through the fan 39 and forcibly blown partly against the inner curve of the condenser 28 and partly against the inner surface of the baffle 36 and outer surface of the condenser 28. The cooling air is then directed by these

curved surfaces upwardly along both the inner and the outer condenser surfaces. The air easily follows the flue-like opening 33 formed between the cabinet wall and the condenser 28. The air will also tend to follow the outer surface of the condenser 28 along which it is directed upon leaving the baffle space 41. When the cabinet is placed in a room so that the condenser 28 is adjacent and parallel to a wall and spaced therefrom, a second flue-like duct will be formed by the rear of the condenser and the wall, further confining the flow of air along the rear surface of the condenser. The forced draft created by the fan 39 is supplemented by the natural connection air current caused by the heat exchange between the air and the compressor casing 27 and the air and the condenser 28. The fan 39 and the motor of the motor-compressor unit may be so interconnected that the fan operates only during the time when the motor is operating. Then, during a period of non-operation, the rising convection current of air will then set up a current of cooling air about the compressor casing 27 and the condenser 28 which will reduce the temperature of this heat dissipating apparatus.

To further facilitate the circulation of the cooling air over the surfaces of the condenser 28, I prefer to leave the sides of the space 33 between the condenser and the rear wall of the cabinet open, so that air may circulate in a lateral direction therethrough. It is readily seen that shielding could be provided to enclose the space 33 and part of the space in the back of the condenser if so desired.

While I have shown a particular embodiment of my invention in connection with a household refrigerating machine of the compression type, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I therefore contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A refrigerator having a food storage compartment and an apparatus compartment, means including a cooling unit associated with said food storage compartment to cool the same, means including a refrigerant circulatory unit and a condenser for supplying a refrigerant to said cooling unit, said condenser being positioned in proximity to a wall of said refrigerator and having an upwardly extending portion in spaced relation with said wall forming a flue-like opening therewith and a lower portion deflected from the plane of said upwardly extending portion and extending into said apparatus compartment, and means including said lower deflected portion of said condenser for direct cooling air currents over the surface of said condenser with a portion of the air passing through said flue-like opening.

2. A refrigerator having a food storage compartment and an apparatus compartment therebeneath, means including a cooling unit associated with said food storage compartment for cooling the same, means including a refrigerant circulatory unit and a condenser for supplying refrigerant to said cooling unit, said condenser having an upwardly extending portion and a lower curved portion, said upwardly extending portion being mounted in proximity to an outer wall of said refrigerator in a spaced relation thereto and forming therewith a flue-like opening along said outer wall, said lower curved por-

tion extending downwardly into said apparatus compartment, and means including said curved portion of said condenser for directing the cooling air over the surface of said condenser with a portion of the air passing upwardly through said flue-like opening.

3. A refrigerator having a food storage compartment and an apparatus compartment therebeneath, means including a cooling unit associated with said food storage compartment for cooling the same, means including a refrigerant circulatory unit and a condenser for supplying refrigerant to said cooling unit, said condenser having an upwardly extending portion and a lower curved portion, said upwardly extending portion being mounted in proximity to an outer wall of said refrigerator in a spaced relation thereto and forming therewith a flue-like opening along said outer wall, said lower curved portion extending downwardly into said apparatus compartment, means for circulating cooling air, and means including said curved portion of said condenser for directing the cooling air over the surface of said condenser with a portion of the air passing upwardly through said flue-like opening.

4. A refrigerator of the compression type having a food storage compartment and an apparatus compartment therebeneath, means including an evaporator associated with said food storage compartment for cooling the same, means including a motor-compressor unit for circulating refrigerant and an air-cooled condenser mounted in proximity to and in a spaced relation with an outer wall of said refrigerator for supplying refrigerant to said evaporator, a casing for said motor-compressor unit mounted in said apparatus compartment, means including a fan for circulating cooling air over said casing and said

condenser, said condenser having an upwardly extending portion forming an air space with said outer wall of said refrigerator and a lower curved portion extending downwardly into said apparatus compartment, and means including a baffle mounted in proximity to and spaced away from the outer surface of said condenser for directing the cooling air along said outer surface, one portion of the cooling air passing upwardly along the outer surface of said condenser and one portion passing upwardly along the wall of said refrigerator through said air space.

5. A refrigerator of the compression type having a food storage compartment and an apparatus compartment therebeneath, means including an evaporator associated with said food storage compartment for cooling the same, means including a motor-compressor unit for circulating refrigerant and an air-cooled condenser mounted in proximity to and in a spaced relation with an outer wall of said refrigerator for supplying refrigerant to said evaporator, a casing for said motor-compressor unit mounted in said apparatus compartment, means including a fan intermediate said casing and said condenser for circulating cooling air over the surfaces of said casing and said condenser, said condenser having an upwardly extending portion forming an air space with said outer wall of said refrigerator and a lower curved portion extending downwardly into said apparatus compartment, and means including a baffle mounted in proximity to and spaced away from the outer surface of said condenser for directing the cooling air along said outer surface, one portion of the cooling air passing upwardly along the outer surface of said condenser and one portion passing upwardly along the wall of said refrigerator through said air space.

CHRISTIAN STEENSTRUP.