Sept. 24, 1940. W. B. ANDERSON ET AL 2,215,991

REFRIGERATION APPARATUS

Filed April 8, 1939 2 Sheets-Sheet 1

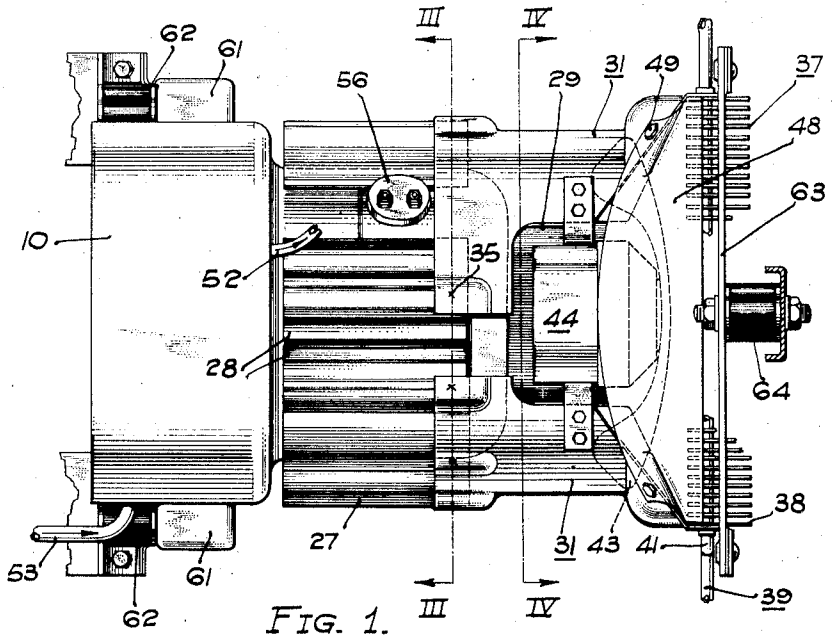


FIG. 1.

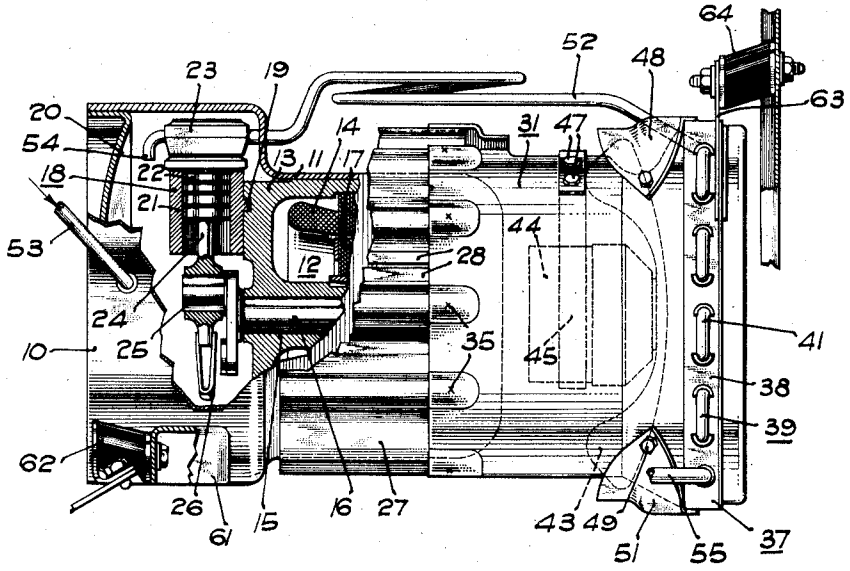


FIG. 2.

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REFRIGERATION APPARATUS

Filed April 8, 1939 2 Sheets-Sheet 2

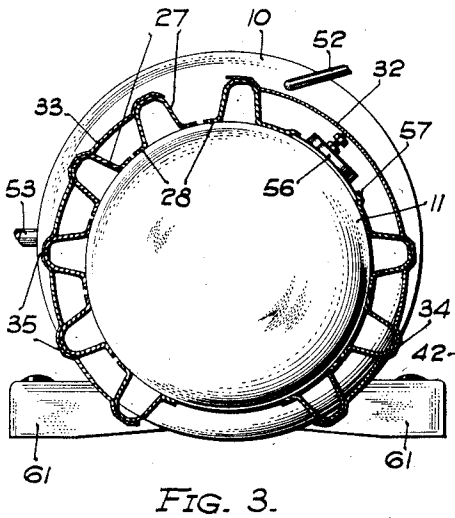


FIG. 3.

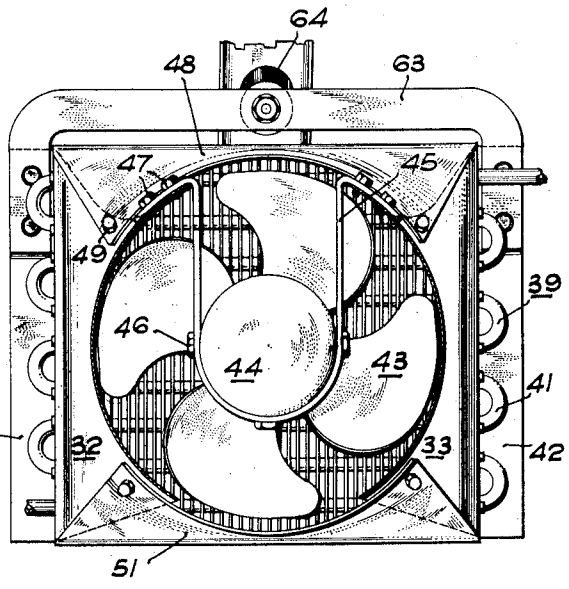


FIG. 4.

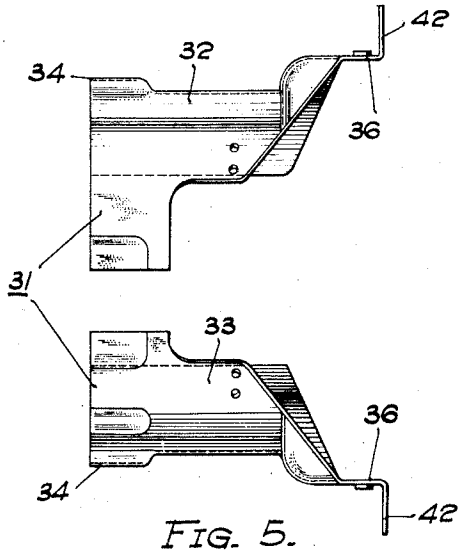


FIG. 5.

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Patented Sept. 24, 1940

2,215,991

UNITED STATES PATENT OFFICE

2,215,991

REFRIGERATION APPARATUS

William B. Anderson, West Springfield, and George E. Hanner, Springfield, Mass., assignors to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application April 8, 1939, Serial No. 266,768

3 Claims. (Cl. 62—115)

This invention relates to refrigerating apparatus and more especially to a refrigerant compressing and condensing apparatus arranged in a unitary structure.

One object of the invention is to provide a refrigerant compressing and condensing unit which is economical to construct and assemble.

Another object is to provide a unitary assembly of a motor-compressor housing, a condenser, and a fan, which assembly provides superior cooling facilities for the condenser and the housing.

These and other objects are effected by our invention as will be apparent from the following description and claims taken in connection with the accompanying drawings forming a part of this application, in which:

Fig. 1 is a plan view of the refrigerant compressing and condensing unit of this invention;

Fig. 2 is an elevation of the unit with parts broken away;

Fig. 3 is a section on the line III—III of Fig. 1 with a motor casing in elevation;

Fig. 4 is a section on the line IV—IV of Fig. 1; and,

Fig. 5 is a plan view of the shroud members in the same relative position as shown in Fig. 1.

Referring now to the drawings for a detailed description of the invention, the reference numeral 10 represents a generally cup-shaped sheet metal casing having a portion 11 of reduced diameter into which a motor 12 is pressed. The motor 12 comprises a motor frame 13, a field winding 14 on the frame 13, a shaft bearing 15 in the frame 13, a crankshaft 16 journaled therein, and a rotor 17 secured on the crankshaft 16. A reciprocating compressor 18 is secured to the frame 13 by means of a tongue and groove connection 19 and by further means not shown in the drawings. The compressor 18 comprises a cylinder 21, a piston 22 therein, a valve chamber 23, a connecting rod 24 secured to a pin 25 on the crankshaft 16 for reciprocating the piston 22, and an oil scoop 26 at the base of the connecting rod 24. The cup-shaped casing 10 is closed by a cover 20, so that the casing comprises a hermetically-sealed container for the motor 12 and the compressor 18. The reduced portion 11 of the casing 10 which houses the motor 12 is provided with U-shaped sheet metal cooling fins 27 comprising legs, the extremities 28 of which are bent outwardly to lie flatly against the casing 10 and are welded thereto.

A shroud 31 comprising two formed sheet metal members 32 and 33 (best shown in Fig. 5) is secured at one end to the central bent portion of the U-shaped cooling fins 27. The portions 34 of the shroud members 32 and 33 which contact the fins 27 are bulged outwardly to fit closely over the central bent portion of the cooling fins 27. The shroud members 32 and 33 are secured to the cooling fins 27 preferably by spot welding shown at 35. The other ends of the two shroud members 32 and 33 are formed into two parallel and spaced apart surfaces 36 between which a condenser 37 is secured. The condenser 37 comprises parallel and spaced apart strips of metal 38 through which a refrigerant conduit 39 is passed back and forth. The parallel surface portions 36 of the shroud 31 are slotted to fit over the projecting loops 41 of the refrigerating conduit 39. Each of the parallel surface portions 36 is also provided with an outwardly turned flange 42.

The two shroud members 32 and 33 are formed to provide an opening 29 at the top of the unit through which a fan 43, a motor 44, and a portion of a hanger 45 which supports the motor 44 may be inserted. The motor 44 is secured to the hanger 45 by tap screws 46 and the hanger 45 is secured at the edges of the opening 29 by tap screws 47 after the fan 43, motor 44, and a portion of the hanger 45 are inserted through the opening 29. The portion of the opening 29 adjacent the condenser 37 is closed by a cover plate 48 which is secured to the shroud members by means of tap screws 49. A similar plate 51 is secured between the shroud members 32 and 33 at the bottom of the shroud 31. The plates insure that all of the air circulated by the fan is drawn through the condenser 37.

The refrigerant conduit 39 of the condenser 37 is connected with the valve chamber 23 of the compressor 18 through a tube 52 which passes through the wall of the casing 10 and is brazed therein to form a leakproof joint. A further tube 53 is brazed into the walls of the casing 10 and communicates with the interior thereof. The valve chamber 23 of the compressor 18 is also provided with a short downwardly turned tube 54 which communicates with the interior of the valve chamber 23 and the interior of the casing 10.

In the operation of the unit, the refrigerant vapor enters the container 10 through the tube 53 and passes from there through the tube 54 into the valve chamber 23, is compressed in the cylinder 21 and forced through the tube 52 to the condenser 37 wherein it is liquefied and thereafter passes through an outlet tube 55 to the refrigerating apparatus (not shown).

A protective device 56 is secured on the outside of the casing 10 adjacent to the motor 12

by forcing its edges beneath the specially formed extremities 57 of two adjacent fins 27. This protective device 56 is provided with a thermostatic element (not shown), which interrupts the electric current conducting path to the motor 12 when the casing 10 exceeds a predetermined temperature in a manner well understood in the art. This protective device 56 is inserted in the electrical circuit of the motor 12 to interrupt the current supply thereof, when the temperature of the motor 12 becomes dangerously high such as may occur through a break-down in the apparatus.

The enlarged portion of the container 10 which houses the compressor 18 is provided with two formed brackets 61 at its base which extend in opposite directions. Each of these brackets 61, at its extremity, is provided with a rubber mounting 62 which supports this portion of the apparatus. A yoke 63 is secured to the outwardly turned flanges 42 of the shroud members 32 and 33 and a similar rubber mounting 64 is secured at the center portion of the yoke 63. The rubber mountings 62 and 64 provide a mounting for the unit and are described in greater detail in the application of Elliott E. Grover, Serial No. 250,192, filed January 10, 1939, and assigned to the assignee of the present application.

It will be observed that the heat of the motor 12 is readily conducted through the thin walls of the casing 10 then across the contacting surface 28 of the cooling fins 27 to the fins 27 themselves. A portion of the heat of the fins 27 is also conducted across the contacting surface 34 of the shroud 31 to the remainder of the shroud 31. The fan 43 draws the cooling air through the condenser 37 and then passes it through the shoud 31 to the fins 27, and to the casing 10 thereby cooling the condenser 37 and absorbing the heat of the motor 12 by sweeping across the surfaces of the casing 10, the fins 27 and the interior surface of the shroud 31.

It will be apparent that this invention provides a unit which includes the condenser, the compressor, the motor for driving the compressor, the cooling fan, and a shroud which guides the air of the cooling fan, absorbs heat from the motor and unites the elements in a structure which may be supported at its ends from vibration mountings without the use of intermediate supporting structure. The construction of the unit also facilitates the assembly of the fan and its driving motor in the unit.

While we have shown our invention in but one form, it will be obvious to those skilled in the art that it is not so limited but is susceptible of various changes and modifications without departing from the spirit thereof, and we desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What we claim is:

1. In refrigerant liquefying apparatus, the combination of a compressor, a motor for driving the same, a metal casing enclosing said motor and compressor, a portion of said casing being in intimate heat exchange relationship with said motor, U-shaped metal cooling fins on said casing, the legs of said U-shaped fins being bent outwardly at their extremity to be welded flatly against said casing, a shroud secured to and formed to lie flatly against the fins for an appreciable distance, a condenser spaced from said casing, said means for securing shroud to said condenser to unite the condenser and the casing into an integral structure, an air circulating fan in said shroud between the condenser and the casing, and a motor for driving said fan, said shroud having an opening for insertion of said fan motor and fan, said shroud directing the air of said fan through the condenser and over the cooling fins.

2. In refrigerant liquefying apparatus, the combination of a compressor, a motor for driving the same, a casing enclosing said motor and compressor, cooling fins on said casing, a shroud secured to said fins, a condenser spaced from said casing and secured to said shroud, a motor and fan assembly between said condenser and said casing, said fan circulating air through said condenser and over said fins, said shroud having an opening for inserting said motor and fan assembly, and a hanger secured to the motor of said assembly and detachably secured to said shroud adjacent said opening, said assembly and hanger being removable from said shroud without disconnecting either said casing or said condenser therefrom.

3. In refrigerant liquefying apparatus, the combination of a compressor, a motor for driving the same, a metal casing enclosing said motor and compressor, a portion of said casing being in intimate heat exchange relationship with said motor, U-shaped cooling fins on said casing, the legs of said U-shaped fins being bent outwardly at their extremity and welded flatly against said portion of the casing, a shroud secured to and formed to lie flatly against the fins for an appreciable distance, a condenser spaced from said casing, said means for securing shroud to said condenser to unite the condenser and the casing into an integral structure, an air circulating fan in said shroud between the condenser and the casing, a motor for driving said fan, said shroud having an opening for insertion of said motor and fan, and a cover plate for at least a portion of said opening, said shroud directing the air of said fan through the condenser and over the cooling fins.

WILLIAM B. ANDERSON.
GEORGE E. HANNER.

CERTIFICATE OF CORRECTION.

Patent No. 2,215,991. September 24, 1940.

WILLIAM B. ANDERSON, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, lines 13 and 49, claims 1 and 3 respectively, strike out the word "said" before "means" and insert the same after "securing" in same lines; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of October, A. D. 1940.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)

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Patent No. 2,215,991. September 24, 1940.

WILLIAM B. ANDERSON, ET AL.

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Henry Van Arsdale,
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(Seal)