Jan. 12, 1960 A. TRASK 2,920,464

AIR COOLED CONDENSING UNIT

Filed Feb. 28, 1957

FIG. 1

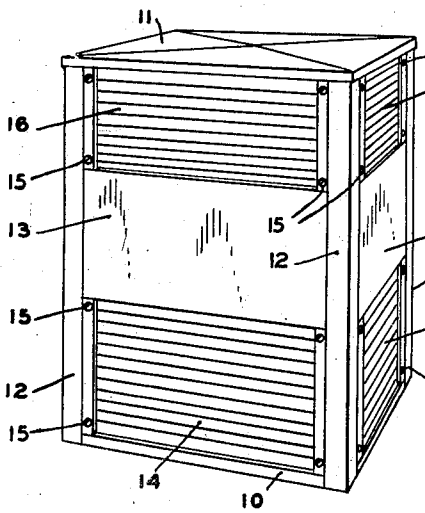


FIG. 3

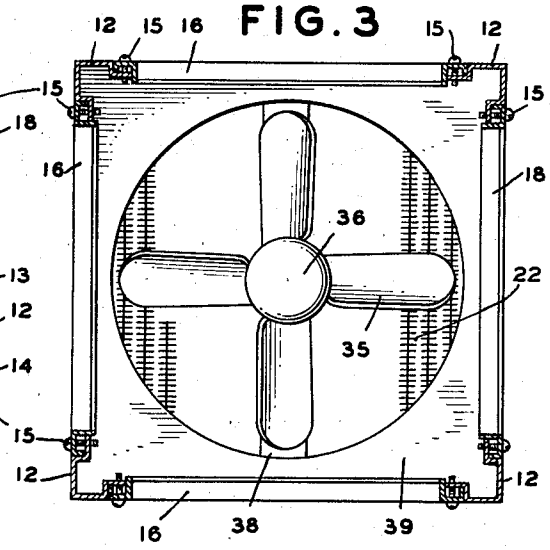


FIG. 4

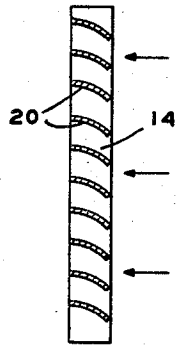


FIG. 5

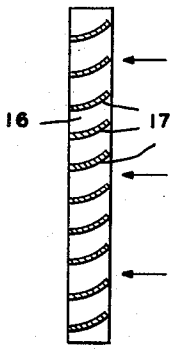


FIG. 2

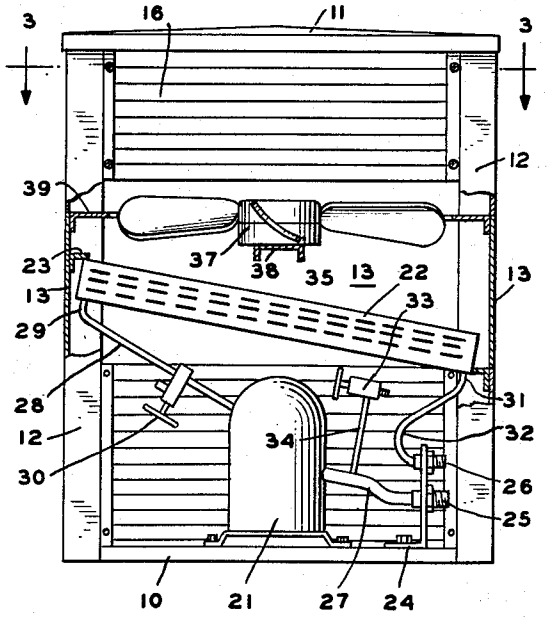
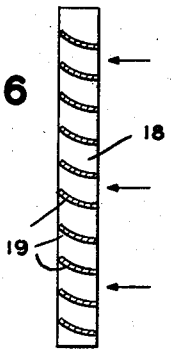


FIG. 6



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AIR COOLED CONDENSING UNIT

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2 Claims. (Cl. 62—428)

This invention relates to refrigeration condensing units and more particularly to air cooled, compression type, condensing units for installation outdoors.

In integral horsepower sizes of air cooled refrigeration systems used for air conditioning and other purposes it is often desirable to have the air cooled condensing unit installed outdoors and connected to an indoor installed evaporator by suitable refrigerant conduits. While there is an unrestricted air supply outdoors directly available to the condensing unit for heat dissipating purposes, there are several attendant disadvantages to be overcome to attain full advantage of the outdoor location. Protection against the elements in the form of rain, snow, and ice is desirable with a minimum restriction of air flow through the condensing unit. It is necessary to direct the heated discharge air from the condensing unit in such manner that it will leave the vicinity of the condensing unit and not be recirculated through it. It is also necessary to air cooling efficiency to construct means for air intake and discharge in such manner that a wind blowing in any direction will not by its velocity pressure appreciably reduce the volume of cooling air flowing through the condensing unit.

It is important to have outdoor installed condensing units constructed for easy access by installers who must connect the refrigeration tubing, charge the system with refrigerant, and start the system and check its operation in the field.

An object of this invention is improved protection against rain, snow, ice, and accidental damage of internal parts for air cooled condensing units installed outdoors.

Another object is minimum restriction to cooling air flow into and out of the enclosing cabinet.

Another object is the reduction of wind interference with the normal air flow volume through the condensing unit cabinet and its condenser coil.

Still another object is the restriction to a minimum of recirculation of cooling air flow through the condensing unit.

A further object is a cabinet structure providing for removable access panels permitting internal connecting, adjusting, and inspection of a condensing unit during starting and normal running while the access panels remain off the cabinet.

The above and further objects and advantages of this invention will be readily understood by reference to the following description and the accompanying drawings, in which:

Fig. 1 is a perspective elevation view of an air cooled condensing unit structure embodying this invention;

Fig. 2 is an elevational view of the condensing unit with a part of the cabinet broken away in order to show the internal arrangement of the components;

Fig. 3 is a horizontal sectional view taken substantially on line 3—3 of Fig. 2;

Fig. 4 is a vertical sectional view of a louver panel

for the sides of the lower compartment of the condensing unit cabinet;

Fig. 5 is a vertical sectional view of one type of louver panel for the upper compartment sides; and

Fig. 6 is a vertical sectional view of a second type of louver panel for the upper compartment of the cabinet sides.

In the drawings an enclosing cabinet for the air cooled condensing unit includes a base 10 and top cover 11. Corner posts 12 attached to the corners of base 10 support top cover 11 at its corners. A side panel 13 is suitably attached to each of the four sides of the cabinet at its respective corner posts, enclosing a middle portion of each cabinet side to form an enclosing band around the middle of the cabinet.

A fin tube condenser coil 22 suspended from opposite side panels 13 is located at the lower portion of said side panels 13 to form a sloping, transverse partition in said cabinet. A fan shroud 39 aligned with propeller fan blades 35 and a fan motor 36 is located at the upper portion of side panels 13 to form a second transverse partition in said cabinet. Fan motor 36 has a stationary housing 37 attached to supporting channel 38 secured at its ends to opposite side panels 13.

A middle compartment in the cabinet is formed by condenser coil 22 as its base, four side panels 13 enclosing its sides, and said fan motor assembly and fan shroud 39 providing its top.

A lower compartment underneath the middle compartment is formed by cabinet base 10 as its base, condenser coil 22 as its top, and four louver panels 14 attached to corner posts 12 by panel mounting screws 15 provide its side enclosures. Louver panels 14 have horizontal louvers 20 sloped downwardly toward the outside of the cabinet, as shown in Fig. 4, for shedding rain and snow.

An upper compartment above the middle compartment is formed by said fan motor assembly and fan shroud 39 as its base, cabinet top cover 12 as its top, and enclosed at its sides with four interchangeable louver panels attached to corner posts 12 with panel mounting screws 15, including three louver panels 16 having horizontal louvers 17 concave from an outside point of view and sloping downward toward the outside of the cabinet with their outward edges substantially tangent to horizontal planes, as shown in Fig. 5, and a fourth louver panel 18 having horizontal louvers 19 which are convex from an outside upward point of view sloping upward toward the outside of the cabinet, as shown in Fig. 6.

Centrally located on base panel 10 a refrigeration compressor 21 is mounted within the lower compartment of the cabinet. A fitting mounting angle 24 attached to base 10 holds refrigerant vapor intake flare fitting 25 and refrigerant liquid outlet flare fitting 26. Suction conduit 27 connects flare fitting 25 to the suction connection of compressor 21 and discharge conduit 28 connects the discharge outlet of compressor 21 to the inlet tube connection 29 to the condenser coil 22 at its uppermost side. Purge valve 30 is connected to discharge conduit 28. Liquid outlet tube 32 connects condenser outlet tube 31 with liquid outlet fitting 26. A charging valve 33 for introducing refrigerant into the system is in communication with the low pressure side of the system through conduit 34 connected to suction conduit 27.

When installing an air cooled condensing unit similar to the one here specified, all of the lower louver panels 14 may be removed to permit unrestricted access to the lower compartment of the cabinet underneath the transverse condenser coil 22 to facilitate making electric connections to the compressor 21, connecting refrigerant conduits to fittings 25 and 26, charging the system through charging valve 33, purging the system by means of purge

valve 30, and for performing the other usual operations of installation and inspection required of installers.

When the condensing unit has been put into operation it may be left running with the lower louver panels 14 removed as long as may be required by the installer for inspection and to assure himself that the unit is operating properly and normally. The attachment of the louver panels in their normal position on the cabinet for purposes of protection is not required for the normal functioning of the condensing unit and therefore may be left off for inspection and confirmation of normal operation.

In operation the propeller fan blades 35 rotated by fan motor 36 draw air into the compressor compartment underneath condenser coil 22 and through condenser coil 22. The fan then discharges the air upward toward the cabinet top cover 11 which deflects the air flow outward through the three upper louver panels 16, and one upper louver panel 18. The lower louver panels 14 offer no appreciable resistance to the flow of air into the compressor compartment, and have no effect in the functioning of the condensing unit except for protecting it as a guard against the elements and accidents. The downward and outward slope of louvers 20 in these panels enables them to shed rain or snow. These louvers may be constructed in any shape that will not unduly restrict air flow or the shedding of rain and snow.

Air flow discharged from the condensing unit cabinet through louver panels 16, shown in section in Fig. 5, will be discharged substantially in a horizontal flow because the downstream edges of the louvers 17 are tangent to horizontal planes. The curvature of these louvers acts as an airfoil to change the direction of discharge air flow as it enters the louver panels, and to cause it to leave louver panels 16 in a flow that is substantially horizontal. The horizontal flow of discharge air is important for preventing it from reentering the lower louver panels 14 and being recirculated through the condensing unit. The discharge air in an air cooled condensing unit is normally heated from 15 to 20 degrees F. in its passage through the condenser coil. When the heated discharge air is expelled from a condensing unit embodying this invention, its lighter weight due to its increased temperature will cause it to rise as its velocity decreases from its horizontal discharge flow. Therefore this heated air will not enter the lower louver panels 14 where it would be caused to recirculate through the condensing unit. The downward slope of louvers 17 causes them to shed rain and restrict the entrance of snow into the unit.

When a condensing unit embodying this invention is located outdoors where there are no obstructions near the unit, such as on a roof of a building, all four of the upper louvers are of the type shown in Fig. 5, for discharging the air in horizontal direction. When a condensing unit is located close to a wall, eighteen inches from the side of a house, for instance, the upper louver panel facing the wall is the type shown in Fig. 6. The louvers 19 in this panel direct the discharge air flow upward along the wall. Thus the wall will not induce recirculation of the air discharged against it as it would if the air flow was not directed upward.

Upper louver panels 16 for directing horizontal discharge air flow, and panels 18 for directing upward air flow are constructed to be interchangeable and the cabinet is constructed to receive either type interchangeably on each of its four sides. By virtue of this construction the condensing unit may be installed facing the direction offering the maximum in installation convenience relative to connecting tubing, electric wiring, etc., without regard for effect of adjacent obstructions to discharge air flow. Then when the unit is connected in an installation, the upper discharge louver panels may be interchanged so that discharge air flow will be directed upward against nearby walls, and directed horizontally from the sides which have no obstructions to discharge air flow in front of them.

In the event it is required that a condensing unit of this invention be set in a corner close to an intersection of two vertical walls, then two upper louver panels 18 of the type shown in Fig. 6 should be used, one facing each wall to direct the discharge air flow upward against them to prevent recirculation. The other two upper louver panels should then be of the type shown in Fig. 5 to direct the discharge air flow outward horizontally.

When condensing units are located close to building walls, as above described, the walls prevent wind from blowing rain or snow into the louver panels 18 opening upward. Thus louver panels opening upward next to a vertical wall do not admit rain or snow as they would if they were on the other sides of the cabinet not so protected.

The structure of this invention provides for louver panels of exceptionally large open area so that during normal operation when no wind is blowing the air flow velocity into the lower panels and out of the upper panels will be relatively slow. When a wind blows against one side of the cabinet it will induce an air flow into both the lower and upper louvers on that side, and this air flow will join the normal air flow induced by the fan to leave the cabinet through the remaining three louver panels. The wind air flow entering one of the lower louver panels will accelerate the normal inward air flow.

The wind air flow into an upper louver panel will be directed upward as it passes through the upwardly curved louvers, to blend with the discharge air flow from the fan blades. The combined air flow, at a higher than normal velocity assisted by the velocity pressure of the wind, will flow unrestricted out the opposite side of the cabinet. If the condensing unit is located in an unrestricted area, a wind blowing in any direction will pass through the unit in the manner described without obstructing, or detracting from, the normal volume of air flow through the condenser coil. If the condensing unit is located near a vertical wall, a wind may blow toward the unit at any angle within 180 degrees without obstructing, or detracting from, the normal volume of air flow through the condenser coil. Therefore the condensing efficiency of an air cooled condensing unit embodying this invention and installed outdoors will not be adversely affected by a wind blowing in any direction. A strong wind blowing dust, fallen leaves, etc. into the compressor compartment will blow most of them out the opposite side of the cabinet. Because of the transverse position of the condenser coil in the cabinet, gravity will tend to prevent foreign matter from reaching the underside of the condenser coil where its presence would obstruct air flow through the condenser.

It will be understood that this embodiment of my invention specifies one example that may be modified with various structural changes within the scope of the invention as defined in the appended claims.

What is claimed is:

1. In an air cooled compression type refrigeration condensing unit comprising a rectangular enclosing cabinet for outdoor installation having a base, four corner posts attached to said base, a top cover supported by said corner posts, and side panels for enclosing each of its four sides; said cabinet enclosing a fin tube condenser coil, a motor driven propeller fan, and a shroud for said fan; a lower compartment in said cabinet defined by said cabinet base as its base, said condenser coil arranged as a transverse cabinet partition as its top, and including removable louvers of said side panels at its sides; a middle compartment defined by said condenser coil as its base, said fan and shroud arranged as a transverse cabinet partition as its top, and including four soild panels at its sides; and an upper compartment defined by said fan and shroud as its base, said top cover as its top, and including removable louver panels as its sides, the louvers of said panels being horizontal and having a concave upper surface with the outside edges substantially tangent to horizontal cross-sectional planes; a refrigeration com-

pressor in said lower compartment operatively connected to said condenser coil, connecting means in said lower compartment for connecting refrigerant conduits to said compressor and said condenser coil to complete a refrigerant circuit to a refrigerant evaporator; means for operatively aligning and supporting said propeller fan within said fan shroud so that in operation said fan will draw air through said lower compartment louvers into and through said lower compartment and into said middle compartment through said condenser coil and discharge it into said upper compartment and means including the configuration of the louvers of the side panels of said upper compartment to discharge the air therefrom in a substantially horizontal direction, the configurations of said louvers also hindering the passage of snow and rain therethrough into said upper compartment.

2. In an air cooled compression type refrigeration condensing unit comprising a rectangular enclosing cabinet for outdoor installation having a base, four corner posts attached to said base, a top cover supported by said corner posts, and side panels for enclosing each of its four sides; said cabinet enclosing a fin tube condenser coil, a motor driven propeller fan, and a shroud for said fan; a lower compartment in said cabinet defined by said cabinet base as its base, said condenser coil arranged as a transverse cabinet partition at its top, and including four louver panels in the lower sections of said side panels at its sides, said louver panels having horizontal louvers sloped downward toward the outside; a middle compartment defined by said condenser coil as its base, said fan and shroud arranged as a transverse cabinet partition at its top, and including four solid sections of said side panels at its sides; and an upper compartment defined by said fan and shroud as its base, said top cover as its top, and including four interchangeable louver panels in the upper sections of said side panels at its sides of the class consisting of louver panels having horizontal louvers curved concave from a downward point of view with their

outward edges substantially tangent to horizontal cross-sectional planes and of louver panels having horizontal louvers curved convex from an upward point of view and sloping upward toward the outside; a refrigeration compressor in said lower compartment operatively connected to said condenser coil, connecting means in said lower compartment for connecting refrigerant conduits to said compressor and said condenser coil to complete a refrigerant circuit to a refrigerant evaporator; means for operatively aligning and supporting said propeller fan within said fan shroud so that in operation said fan will draw air into said middle compartment through said condenser coil and discharge it into said upper compartment means including the louvers of the side panels of said upper compartment having outer edges substantially tangent to cross-sectional planes to discharge the air passing therethrough in a substantially horizontal direction, and means including the louver of a side panel curved convex from an upward point of view and sloping upward toward the outside to discharge the air passing therethrough in an upward direction.

References Cited in the file of this patent

UNITED STATES PATENTS

1,589,412	Mitchell	June 23, 1926
1,672,086	Rainsford	June 5, 1928
1,974,317	Steenstrup	Sept. 18, 1934
2,234,753	Frazer	Mar. 11, 1941
2,277,247	Morse	Mar. 24, 1942
2,285,075	Ashley	June 2, 1942
2,293,718	Eberhart	Aug. 25, 1942
2,304,359	Hommel	Dec. 8, 1942
2,342,566	Wolfert	Feb. 22, 1944
2,369,511	Winkler	Feb. 13, 1945
2,475,841	Jones	July 12, 1949
2,513,644	Hagen	July 4, 1950
2,648,202	Otterholm	Aug. 11, 1953