

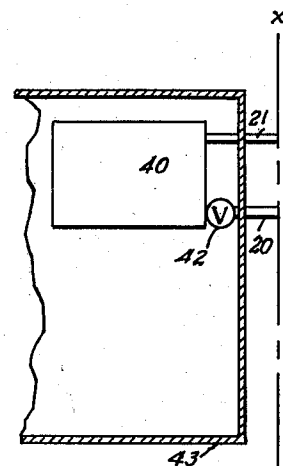
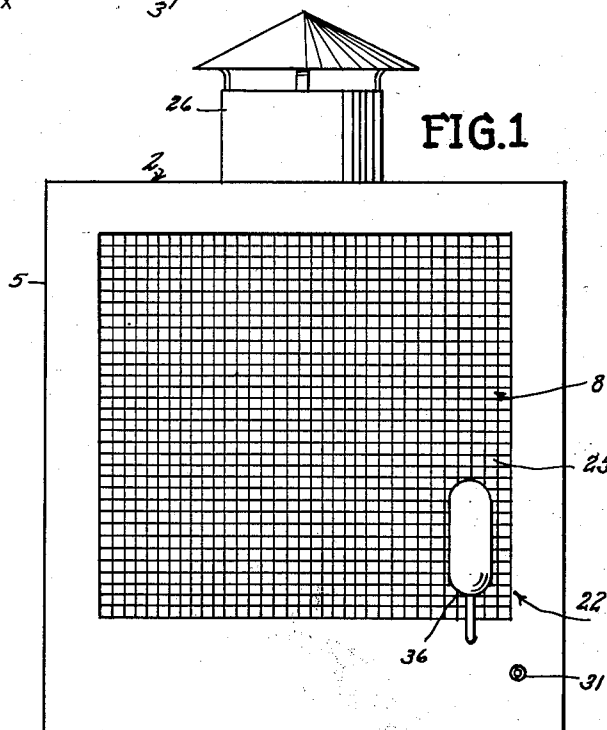
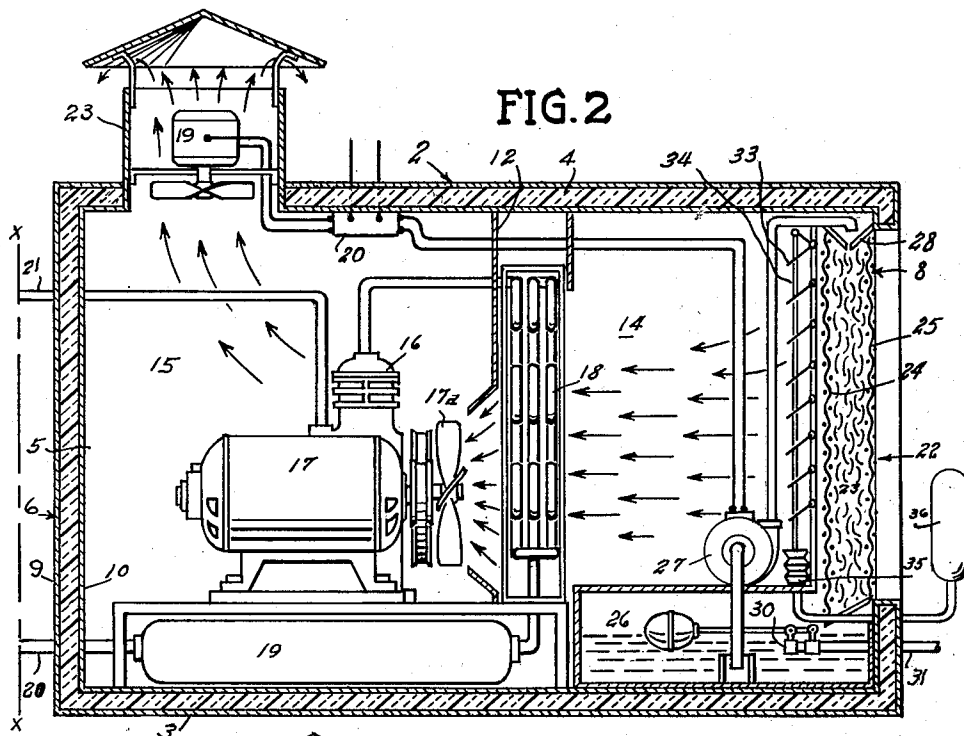
Oct. 20, 1953

J. DYER

2,655,795

REFRIGERATOR CONDENSING UNIT COOLER

Filed Jan. 2, 1952



Inventor
John Dyer,
By Scott L. Towel
att.

UNITED STATES PATENT OFFICE

2,655,795

REFRIGERATOR CONDENSING UNIT
COOLER

John Dyer, Tucson, Ariz.

Application January 2, 1952, Serial No. 264,562

2 Claims. (Cl. 62—4)

1

This invention pertains to improved refrigerator condensing units.

One of the objects is to provide a condensing unit consisting of a motor, compressor, a condenser and a liquid receiver all contained within an insulated case together with control thermostats, and arranged so that if the temperature drops below a certain point the heat developed by the compressor will be confined and retained within the case so that the temperature of the condenser will not drop below that of the area to be cooled and the pressure drop across the metering valve will remain within an efficient operating range;

Another object is to provide evaporative cooling mechanism within said case so that when the temperature rises above a predetermined level the air passing over the condenser will be cooled by evaporation of water so that its actual temperature as it contacts the condenser coils will be lower than the outside air which would otherwise be forced over the condenser coils;

Another object is to provide an insulated case for an air cooled refrigeration unit which has an air inlet provided with an evaporative cooler pad over which water may be flowed and through which air may be drawn into the case, and an exhaust stack having a fan adapted to force air therefrom; the case being arranged generally to maintain a temperature suitable for the efficient operation of the refrigeration unit.

Other objects will appear hereinafter.

I attain the foregoing objects by means of the devices and construction shown in the accompanying drawing in which—

Figure 1 is an end view of the refrigeration unit case;

Figure 2, a longitudinal sectional view thereof taken substantially on line 2—2 of Figure 1; and

Figure 3, a diagrammatic representation of a compartment to be cooled.

Similar numerals refer to similar parts in the different views.

The case 2 is rectangular and has bottom 3, top 4, side walls 5, as well as one end wall 6, composed of insulating material 7, such as cork or glass wool, confined between outer and inner metal sheets 9 and 10 respectively. The cut lines X—X in Figures 2 and 3 represent an indeterminate distance from case 2 to compartment 43.

The case is divided interiorly by a partition 12 into an outer compartment 14 and an inner compartment 15.

Refrigeration apparatus is disposed within compartment 15 and includes compressor 16

2

driven by motor 17, condenser 18, receiver 19, and thermostat control switch 20. The condenser is positioned in an opening in partition 12. Motor 17 has a fan 18 adapted to draw air through the condenser from outer compartment 14 to inner compartment 15. This air then exhausts through ventilator 23. When desired this is accelerated by electrically driven fan 19. Fluid refrigerant leaves the receiver through pipe 20 and goes to the evaporator 40 in the compartment 43 which is to be cooled through expansion or metering valve 42. Thereafter expanded refrigerant is drawn through pipe 21 to the compressor.

The open end 8 of case 2 is provided with an evaporative pad 22 composed of fibrous material 23, such as excelsior or the like, which is confined between screens 24 and 25. A sump 26 is in the bottom of the case part 14 and water is pumped from this by an electric motor-driven pump 27 and delivered into perforated trough 28 at the top of pad 22. This water trickles down through the pad and returns to the sump. Fresh water may be added when the water in the sump falls below a predetermined level by operation of float valve 30 which is in water supply line 31. Air is drawn through pad 22 so long as hinged louver slats 33 are open, as shown in Figure 2. These slats are operated in unison by rod 34 and this, in turn, by bellows 35 which is expanded or contracted by gas in bulb 36, which may be either within or outside of case 2. When the temperature within the box exceeds a predetermined temperature, say 66° F., the bellows 35 opens the slats. So long as the temperature within the box stays below 85° the pump 27, controlled by electrical thermostat 20, does not operate, and fan 18 merely draws outside air through the case and over the condenser. When the temperature rises above 85° pump 27 starts and pumps water over pad 22 and exhaust fan 19 starts. Evaporation of water in this pad effectively reduces the temperature of the air circulating over the condenser and thus increases the efficiency of the condensing unit.

Bulb 36 and bellows 35 may be supplanted by a bi-metal strip or any other heat sensitive control mechanism desired.

I have determined by test that with outside air temperatures as high as 110° F., the effective temperature within the case 2 will not run over 88° F. The temperature differential between the receiver and the evaporator is thus kept within an efficient range, and there is less power consumed by motor 17. The small amount of power consumed by fan motor 19, and motor driven pump 27 is more than offset by the saving in power

consumed by compressor motor 17. With the more effective pressure differential between the interior of case 2 and the compartment to be cooled less running time per unit of time (hour or day) is required to keep the required amount of refrigerant condensed in receiver 19.

In cold weather gas in bulb 36 contracts and bellows 35 contracts so as to close louver slats 33. Pump 27 and motor 19 are shut off by thermostat 20. The heat generated by compressor 16 and motor 17 is sufficient when conserved by the insulated case 2 to keep the temperature within the case above that of the compartment to be cooled. Thus there is a temperature drop between the condenser 18 and the evaporator 40 sufficient to keep the expansion valve 42 open. Otherwise, I have found, that when the temperature of the compressor unit drops to or below the temperature where the evaporator is positioned the pressure in the condenser becomes so low relative to that in the evaporator that the expansion valve does not operate and requires servicing.

In commercial installations the capacity of the device is determined by the expansion or metering valve. This is set or selected to provide the results required, under average conditions, with a certain pressure drop across the valve. The pressure drop is maintained by the difference between the suction or intake pressure of the compressor and the output or head pressure. Assuming the temperature to be maintained by the evaporator to be 40° F., then when outside air temperatures are high, say 85° F., there could be a head pressure of 135 pounds per square inch, and a suction pressure of 25 pounds per square inch, resulting in a pressure drop of 110 pounds per square inch which would operate through the expansion valve with good efficiency. However, with outside air at 40° F., the head pressure might well be 72 pounds per square inch while the suction pressure would be only 23 pounds per square inch, resulting in a pressure drop of only 49 pounds per square inch. This would be inefficient with the same metering valve. Since commercial refrigeration units, as here concerned, are for the most part, installed outside of heated habitations they are subjected to fluctuations of the weather including the temperature changes above mentioned. The device here disclosed provides a means for overcoming the inefficiencies caused by these weather changes and automatically compensates for them and minimizes the effects of temperature extremes.

Thus, I have provided a structure and arrangement of parts which greatly adds to the efficiency of refrigerator compressor unit installations, particularly in climates such as encountered in southwestern portions of the United States where the higher summer temperatures range from 100° F. to 120° F., and lower winter temperatures range from 20° F. to 40° F.

I claim:

1. A refrigerator condensing unit comprising an insulated case, an intermediate partition dividing the interior into an outer compartment and an inner compartment; a condenser posi-

tioned in an opening in said partition, the said outer compartment being provided with an inlet opening enclosing a refrigerating evaporating pad, a water sump and a motor driven pump for pumping water on to said pad and a shutter for closing said inlet opening; said inner compartment being provided with an outlet opening, a compressor, a receiver and fans for drawing air from said outer compartment and circulating it therethrough and forcing it out of said outlet opening, and a thermostat mechanism for controlling the operation of said circulating fans, said pump motor for moistening said evaporative pad, and said shutter, whereby when the temperature within the case rises above a predetermined degree, said fans will operate, said pump will pump water to moisten said evaporative pad and said shutters will open admitting air into said outer compartment through said evaporating pad and forcing it over the surface of said condenser; said fans operating to circulate air within said insulated case when the temperature within it falls below a predetermined degree.

2. In a refrigeration mechanism including a compressor, a condenser, a receiver, an expansion valve and an evaporator in a compartment to be cooled, the combination therewith of an insulated case having a partition, including said condenser, dividing the interior into an outer compartment and an inner compartment, said outer compartment having an inlet opening including an evaporating refrigerating pad, a water sump in the bottom, a motor driven pump for circulating water from said sump over said pad, and a normally closed shutter operative by heat sensitive mechanism to open when the temperature outside said case exceeds a predetermined degree; said inner compartment enclosing said compressor and receiver, having an outlet vent provided with a fan driven by a motor and a thermostat connected to said evaporating pad, pump motor and said outlet vent fan motor so that when the temperature within said case exceeds a predetermined degree said motors operate to produce refrigeration by evaporation and force air cooled by said evaporating pad over said condenser; said compressor having a fan adapted to draw air from said outer compartment into said inner compartment and force it out of said outlet vent, and to circulate air within said case when said shutter is closed.

JOHN DYER.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,627,713	Seymour	May 10, 1927
1,874,803	Reed	Aug. 30, 1932
2,009,882	Fourness	July 30, 1935
2,059,839	Ashley	Nov. 3, 1936
2,120,767	Raver	June 14, 1938
2,187,398	Goggins	Jan. 16, 1940
2,236,111	Philipp	Mar. 25, 1941
2,238,808	Dube	Apr. 15, 1941
2,526,874	Jones	Oct. 24, 1950