

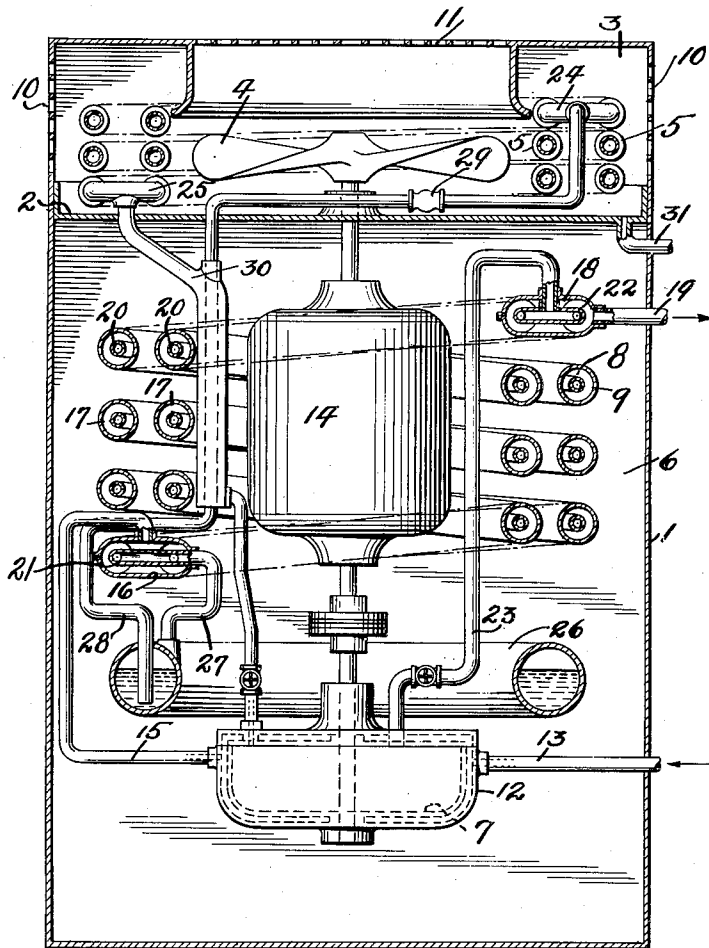
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AIR CONDITIONING APPARATUS

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AIR CONDITIONING APPARATUS

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This invention is directed to air conditioning equipment, and has for one of its objects the provision of a very compact and relatively inexpensive unit but of relatively large capacity, and adapted for use where connection to a water supply and drain are available.

Although my device or apparatus is adapted for other installations, I might mention that it is peculiarly adapted for use on shipboard for conditioning the air of the staterooms. At present it is usual to employ a central refrigerating plant which is a massive and very expensive affair, the same being connected by ducts to the rooms to be conditioned. Such equipment is not satisfactory owing to the space necessarily required for installation and operation, and is not adapted for installation in existing ships, where all available space is already taken up.

My equipment is a small compact self-contained affair adapted for installation in each room to be conditioned. The equipment is water cooled so it is merely necessary to connect it up to a water supply and a drain. The motor, compressor and air circulating fan of my improved unit are mounted in line vertically, while the condenser coils and the cooling coils surround the motor and fan. This, as will be appreciated, enables the unit to be built very compactly so as to require only the minimum of space. It will be appreciated also that by providing a water cooled unit my equipment is well adapted for use on shipboard for conditioning the staterooms.

The accompanying drawing shows an embodiment of my invention in sectional elevation.

Referring to the drawing in detail, 1 designates the cabinet of my unit, the cabinet being divided by a partition 2 into an upper conditioning compartment or chamber 3, containing the air circulating fan 4 and cooling coils 5, and a lower closed chamber 6 containing the compressor 7, condenser 8, water coils 9, etc.

The conditioning chamber 3 is provided with air intake grilles 10 in the sides of the cabinet, and air discharge grilles 11 in the top of the cabinet. The fan 4, as will be understood, draws air into the chamber 3 through the grilles 10, over the conditioning coils 5 and discharges the cooled air to the room in which the unit is mounted through the air discharge grilles 11.

The compressor 7, as above pointed out, is disposed in the lower chamber 6 of the cabinet. This compressor is disposed adjacent the lower end of the chamber, and is water jacketed. The water jacket is designated 12, and water is supplied thereto from any suitable source of supply

through a water pipe 13 which passes through one wall of the enclosing cabinet 1.

The motor for driving the compressor 7 and for driving the fan 4 is designated 14 and is disposed in the chamber 6 intermediate the compressor and fan and in vertical alignment therewith. The armature shaft of the motor is direct coupled to the compressor and fan. This makes for a very compact and reliable unit in that it eliminates belts and the like, and provides a unit for which only the minimum of space is required for installation.

Leading from the water jacket 12 of the compressor is water pipe 15, this pipe extending upwardly in the chamber 6 for some distance where it is tapped into a header 16 connecting the adjacent ends of two concentric coils 17 of water pipes, the opposite ends of these two cooling coils being connected to each other by header 18. Water discharge or drain pipe 19 leads from this header through the wall of the cabinet to any suitable drain.

The water cooling coils 17 surround or enclose two concentric condenser coils 20, so that the condenser is immersed in the stream of water moving through the water cooling coils and which enters the equipment at 13 and discharges to a drain at 19. These condenser coils are connected to each other at one end by header 21 and at the other end by header 22. The condenser coils and water cooling coils surround the driving motor 14 and as the water cooling coils 17 surround the condenser coils the heat generated by the motor 14 will be dissipated.

The discharge side of the condenser 7 is connected by a vertically extending pipe 23 to the upper condenser header 18.

The air conditioning coils 5, located in the conditioning chamber 3, are composed of two sets of coils disposed concentrically, their intake ends being connected to each other by header 24 and their discharge ends by header 25.

Just above the compressor 7 I provide a liquid receiver 26 and a pipe or tube 27 connects the condenser header 21 with this receiver. A discharge pipe or tube 28 extends from this liquid receiver vertically of the chamber 6 and into the air conditioning chamber 3 where it is connected to the header 24 at the upper end of the conditioning coils 5. An expansion valve is provided in this line as indicated at 29.

Connected to the header 25 at the lower end of conditioning coils 5 is a tube 30, connected at its lower end to the suction side of the compressor 7. 31 is a pipe or tube extending from the bottom

of the conditioning chamber to the exterior of the casing 1, where it is connected to a suitable drain, for draining off any condensate accumulating in the conditioning chamber 3.

5 In operation the refrigerant in the form of gas under pressure passes from the discharge side of the compressor by way of pipe or tube 23 to the water cooled coils 20 of the condenser 8, the condensed refrigerant flowing downwardly into the liquid receiver 26 counterflow to the water 10 passing through the water pipes 17, the liquid refrigerant being forced by the compressor from the liquid receiver upwardly through pipe 28, past expansion valve 29, entering the conditioning 15 coils 5 as a vapor; the temperature of the refrigerant as it passes the expansion valve drops immediately to cool the coils 5, with a consequent cooling of the air coming into the chamber 3 and sweeping over these coils. The refrigerant after circulating through the conditioning coils 5 re- 20 turns to the suction side of the compressor by way of tube 30.

It will be seen from all of the foregoing that the present invention provides an extremely simple, compact and efficient water cooled air conditioning unit, well adapted for installation where space 25 is at a premium.

It is to be understood that changes may be made in the details of construction and arrangement of parts within the purview of my invention. 30

What I claim is:

1. Air conditioning apparatus comprising in

combination a compressor for compressing a refrigerant, a vertically disposed motor for driving the compressor said motor and compressor being disposed concentrically in vertical alignment, a condenser surrounding the motor for condensing 5 the compressed refrigerant, said compressor being water jacketed, and cooling means associated with the condenser whereby water flows through the water jacket of the compressor and from thence in contact with the condenser and finally 10 to a drain exterior to the apparatus.

2. Air conditioning apparatus comprising in combination an enclosing cabinet divided into upper and lower chambers, air conditioning coils and a fan for causing air to flow over said coils 15 in said upper chamber, a compressor, a motor for driving the same and said fan and a condenser for refrigerant compressed by said compressor all in said lower chamber, said condenser being in the form of tubes or pipes arranged in a coil, said 20 motor, compressor and fan being disposed in vertical alignment, coiled water pipes enclosing the tubing of the condenser coils, said condenser and water pipes surrounding the motor, a water jacket for the compressor, means for effecting 25 passage of water through the water jacket, through said water pipes and from thence to a drain, said compressor effecting passage of the condensed refrigerant under pressure to the conditioning coils of said upper chamber and return of the refrigerant to the suction side of the 30 compressor.

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