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[54] **SYSTEM FOR ROOM AIR CONDITIONING**

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[51] **Int. Cl.** **F25b 13/00**

[58] **Field of Search** 62/160, 324; 165/123

[56] **References Cited**

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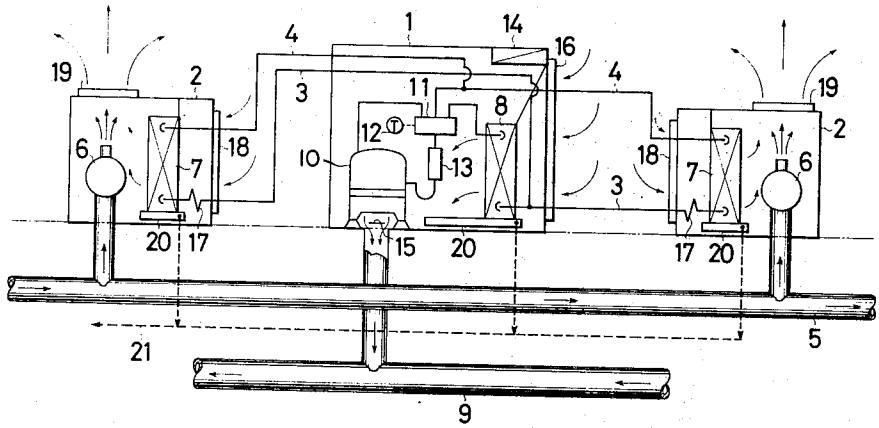
Primary Examiner—William J. Wye

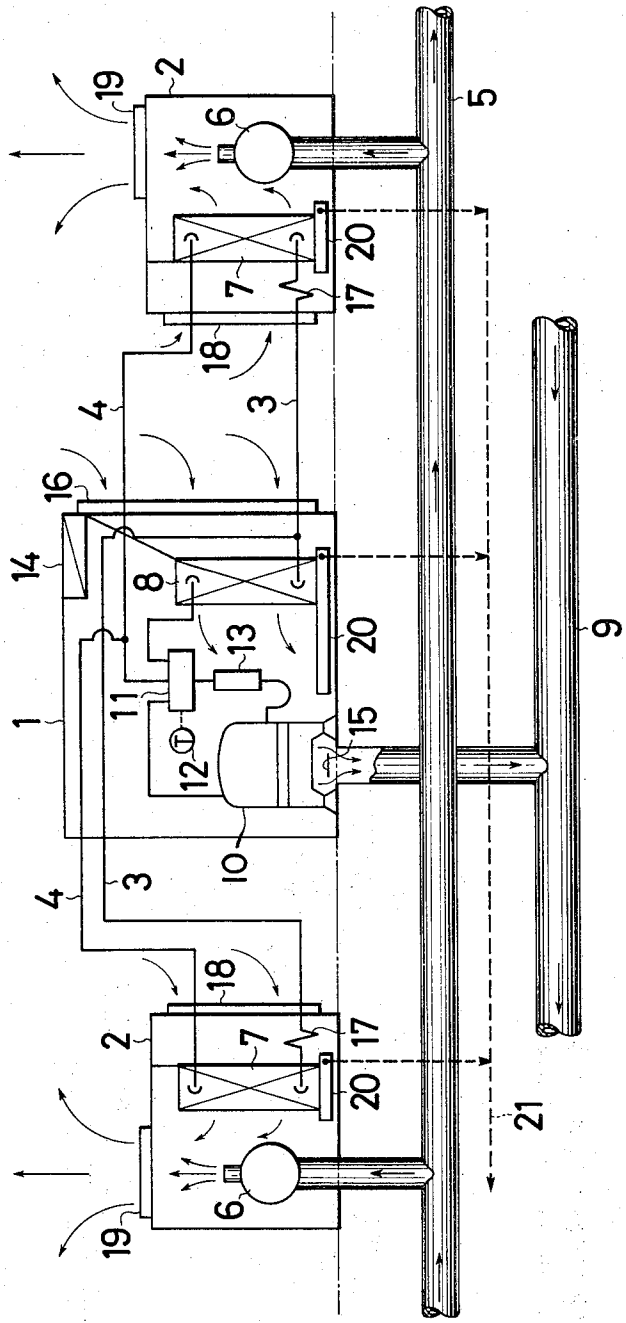
Attorney, Agent, or Firm—Holman & Stern

[57] **ABSTRACT**

An air-conditioning system comprising a compressor unit including a heat exchanger coil, at least one induction coil unit connected to the compressor unit by refrigerant pipes and including a direct expansion type refigerant coil, and an air duct extending into the induction coil unit for introducing a high-velocity primary air flow into the induction coil unit. Room air is induced into the induction coil unit by the primary air flow to effect heat exchange between the room air and the refrigerant coil and is thereafter mixed with the primary air and supplied to the room. Exhaust room air is brought into heat-exchange contact with the heat exchanger coil and then discharged from the compressor unit.

1 Claim, 1 Drawing Figure




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SYSTEM FOR ROOM AIR CONDITIONING

BACKGROUND OF THE INVENTION

This invention relates to a system for room air conditioning and ventilation.

Indoor air conditioning has heretofore been effected by a system in which conditioned air is supplied to rooms through ducts, or by a system comprising fancoil units or induction-type units installed in individual rooms to which cold water or hot water is supplied by way of pipes. Another system is also known which comprises compressor-incorporating units installed in respective rooms and to be supplied with cold water or hot water. These conventional systems have advantages and disadvantages peculiar thereto. For instance, the first-mentioned system does not permit local control, while the piping system has the drawback of being susceptible to corrosion caused by pollution of water and being incapable of providing ventilation. Accordingly, many systems presently available employ these conventional systems in combination, but they are still less than satisfactory in respect of equipment cost and air conditioning during intermediate seasons, i.e., during spring and fall.

Further with the conventional induction-type unit, room air induced therein is cooled or heated by a water coil supplied with cold or hot water from a central large capacity refrigerator or water boiler and the conditioned air is mixed with primary air and then forced back to the room. On the other hand, outside air supplied is forced out by an exhaust fan. Thus, the conventional system is complex and involves difficulties in respect of piping for the supply of cold or hot water, heat insulation, local control and installation work.

SUMMARY OF THE INVENTION

An object of this invention is to provide a room air-conditioning system free of the drawbacks heretofore experienced.

Another object of this invention is to provide a room air-conditioning system of a simple construction which requires only a drain pipe for discharging water during cooling, an outside air intake duct for ventilation and an exhaust duct for discharging room air in an amount corresponding to the air intake.

Another object of this invention is to provide a room air-conditioning system which assures air conditioning all the year round to achieve cooling or heating effect as desired, with local control ensured through the instructions of thermostats positioned in individual rooms.

The room air-conditioning system of this invention comprises a heat pump compressor unit of the air type including a heat exchanger coil, at least one induction coil unit connected to the compressor unit by refrigerant pipes and including a direct expansion type refrigerant coil, and an air duct extending into the induction coil unit for introducing a high-velocity primary air flow into the induction coil unit. Room air is induced into the induction coil unit by the primary air flow to effect heat exchange between the room air and the refrigerant coil and is thereafter mixed with the primary air and supplied to the room. Exhaust room air is brought into heat-exchange contact with the heat exchanger coil and then discharged from the compressor unit through an exhaust duct.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be described in greater detail with reference to the accompanying drawing which is a diagram showing an embodiment of this invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the drawing, a compressor unit **1** is connected to at least one induction coil unit **2** by refigerant pipes **3** and **4** so as to provide an air type heat pump cycle which utilizes exhaust room air to effect cooling or heating as desired. A required amount of outside air is supplied, after primary treatment or dust removal, to an induction coil unit **2** from a duct **5** in the form of a high-velocity air flow. Thus the primary air forced into the induction coil unit **2** from a primary air chamber **6** causes induction of ambient air, which in turn induces a flow of room air into the induction coil unit **2**, where the room air is cooled or heated by a direct expansion type refrigerant coil **7**, mixed with the primary air and forced out into the room. On the other hand, exhaust room air in an amount equal to that of the outside air supplied into the room is introduced into the compressor unit **1** and passed through a heat exchanger coil **8** which serves as condenser for cooling and evaporator for heating. The exhaust air is then discharged from the room through an exhaust duct **9**. Thus heat exchange is effected between the exhaust room air and the heat exchanger coil **8**. The drawing shows compressor **10**, four-way changeover valve **11** for the refrigerant, indoor thermostat **12**, muffler **13**, operation panel **14**, air-controlling orifice **15**, exhaust air inlet **16** of the compressor unit **1**, capillary tube **17**, air intake **18** of the induction coil unit **2**, air outlet **19** of the same, drain pan **20** and drain water tube **21**.

Depending upon the amount of primary air and desired capacity, the compressor unit **1** is provided for every one or every two induction coil units **2**.

The instructions given by the thermostat **12** operate the four-way changeover valve **11** to automatically drive the units individually to effect cooling or heating as desired. Thus a large capacity cooling or heating source as well as associated piping for distributing cooling or heating medium can be dispensed with. Moreover, instead of directly discharging exhaust room air, the present system causes the exhaust air to pass through the heat exchanger coil **8** before it is forced out of the room. This assures effective utilization of waste heat and an increased capacity for the compressor.

What is claimed is:

1. A system for room air conditioning of air heat pump type for use in a room to which air conditioned by a central device or only made dust-proof is supplied, said system comprising:

a heat pump compressor unit of the air type including a first heat-exchanger coil which is heat-exchanged with exhaust room air in an amount corresponding to air centrally supplied from said central device and which serves as a condenser for cooling and as an evaporator for heating, said unit discharging exhaust room air into a discharge duct after contact with said first coil;

a plurality of induction coil units, each induction coil unit including a high-speed duct for discharging indoors said centrally supplied air in the form of a

high-velocity primary air flow, a passage for inducting room air by said primary air flow, and a second heat-exchanger coil for effecting heat exchange with said induced air and mixing it with the primary air for supplying the room, said second heat-exchanger coil serving as an evaporator for cooling and as a condenser for heating; and

said first heat-exchanger coil of said heat pump compressor unit of the air type and each second heat-exchanger coil of at least one of said induction coil units being connected to each other with refrigerant pipes, thus effecting an air type heat pump cycle for air-conditioning a room.

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