Dec. 12, 1961 H. O. KLARER 3,012,759

AIR CONDITIONING UNITS

Filed Oct. 18, 1956

FIG. 2

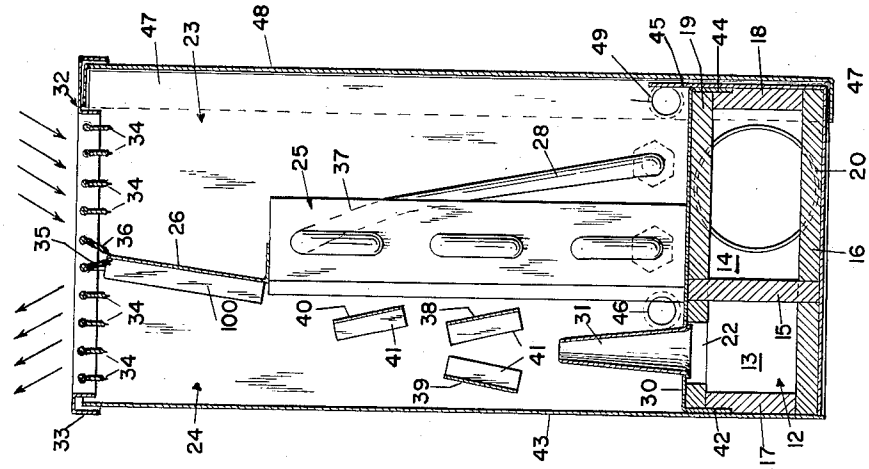
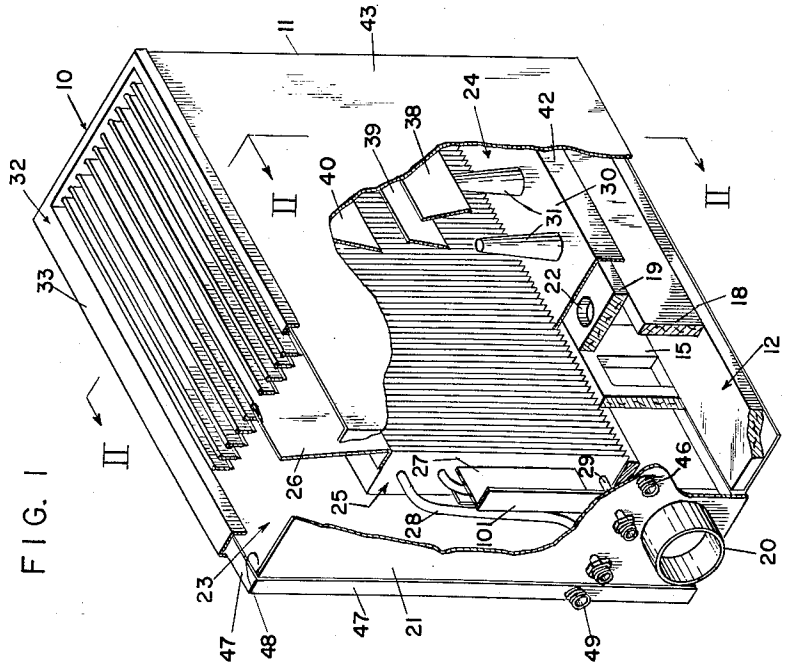


FIG. 1



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3,012,759

AIR CONDITIONING UNITS

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1 Claim. (Cl. 257—137)

This invention relates to a room unit which is used in an air conditioning system wherein a supply of primary conditioned air is supplied to said unit by a conduit from a central source and wherein secondary air which is in the area to be conditioned is induced into said room unit by flow of said primary air through said unit, conditioned therein, mixed with said primary air, and said mixture of primary and secondary air is discharged from said room unit to condition the area served by said unit.

The room unit of the present invention is adapted to be used in an air conditioning system such as disclosed in United States Patent No. 2,363,294, issued to Willis H. Carrier on November 21, 1944.

It is the main object of this invention to provide a room unit having its elements so arranged as to make said unit as small as possible so that it can be used in places where space is at a premium, such as ships.

It is another object of the present invention to provide a room unit, which in addition to being compact, can be oriented in one of a plurality of different positions upon installation so that it can be utilized in applications where space is at a premium.

A further object of this invention is to provide a room unit having air deflecting members mounted relative to its heat exchange unit so that maximum heat exchange is obtained from a relatively small heat exchange unit, thus allowing the entire unit to be sufficiently small to be used where space is at a premium.

Other objects and advantages will become readily apparent from the following description.

The room unit fits into the above-mentioned type of air conditioning system in the following manner. A room air conditioning unit comprising the present invention is adapted to be positioned in each of a plurality of areas to be served by the air conditioning systems. As set forth in above-mentioned Patent No. 2,363,294, primary air is conditioned to a desired extent at a central point. This air is then conveyed by suitable conduits to a plurality of room units, each of which may be located in one of several areas to be conditioned. Within each of the room units is a heat exchange element which is supplied from a central source with a heating medium or cooling medium for heating or cooling, respectively, as weather conditions dictate, e.g. in cool weather a heated medium is supplied to the heat exchanger, and in hot weather a cooled medium is supplied to the heat exchanger. The primary air, usually consisting of treated fresh air, is discharged into the room unit. This discharge induces a secondary air already in the area to be conditioned to flow through the heat exchange element in the room unit and to be conditioned thereby. The primary and secondary air are then mixed in the room unit and discharged to the area to be conditioned.

The present invention relates to the room unit which is used in the above-described air conditioning system. It consists of a casing which houses a plenum chamber which receives the primary air from the central unit; an air exhaust chamber into which the primary air is discharged from the plenum chamber through nozzles; and an air intake chamber into which secondary air is induced from the area to be conditioned as a result of air being discharged by said nozzles into said air exhaust chamber. A heat exchange element effectively partitions the air intake and air exhaust chambers. The secondary air which is

induced into the air intake chamber is caused to flow through the heat exchange element to be conditioned thereby, and is then mixed with the primary air in the air exhaust chamber. This mixture is then discharged into the area to be conditioned. Baffles are provided in the plenum chamber to minimize the noise caused by the flowing air. Spaced in the air exhaust chamber relative to the nozzles and the heat exchange element are a plurality of slats which in effect constitute a secondary nozzle for controlling the secondary air flow through the heat exchange element. These slats insure maximum contact between the secondary air and the heat exchange element, thus causing the room unit to operate at maximum efficiency. The unit also possesses a plurality of drain pans. A first drain pan is positioned so that it prevents condensate from entering the plenum chamber from the other chambers. A second drain pan is formed from a side of the casing and lies in a plane normal to the first pan. Because of this construction the room unit can be operated either in an upright position or on its side, as space requirements dictate.

A more thorough understanding of the present invention will be obtained from the following description and accompanying drawings, in which:

FIGURE 1 is an isometric view of the room unit, with certain parts broken away to show the orientation of the various elements of the unit; and

FIGURE 2 is a sectional view taken on the line II—II of FIGURE 1.

Referring now to FIGURE 1, numeral **10** depicts the room unit having a casing **11**, the walls thereof being preferably made of suitable metal. The lower portion of the unit consists of a plenum chamber **12** which is partitioned into two chambers **13** and **14** (FIGURE 2) by a baffle **15** made of suitable sound absorbing material. It is to be noted that the bottom **16**, sides **17** and **18**, and top **19** of plenum chamber **12** are also made of suitable sound absorbing material. A conduit connection **20** is suitably attached to wall **21** of the unit and is adapted to be attached to a conduit (not shown) which conducts air from a central unit (not shown) to the plenum chamber **12** of room unit **10**. The top **19** of the plenum chamber has holes **22** therein for allowing air to be discharged from the plenum chamber.

The remainder of the room unit **10** is divided into an air intake chamber **23** and an air exhaust chamber **24** by a heat exchange element **25** and walls **26** and **27**. These walls are affixed as by screws (not shown) to the sides of the unit, the screws passing through flanges **100** and **101** of walls **26** and **27** which abut the sides of the casing. A heating or cooling medium, as described above, is supplied to heat exchange element **25** by pipes **28** and **29** which have suitable fittings (not numbered) attached thereto for connection to suitable conduits (not shown) leading from a central source (not shown).

A metallic plate **30** of inverted channel shape is positioned on the top **19** of plenum chamber **12**. Nozzles **31** are suitably affixed (as by pressing or welding) to plate **30**. The nozzles **31** are coaxially positioned relative to holes **22** in the top **19** of the plenum chamber and serve the purpose of discharging air from the plenum chamber **12** into air exhaust chamber **24** at the required velocity.

A louvered top **32** fits on the top of the unit. It consists of a channel-shaped frame **33** in which pivotable slats **34** (FIGURE 2) are mounted for directing the air flow. Additional slats **35** and **36** are preferably mounted as shown in FIGURE 2 to minimize the possibility of short-circuiting the air (shown by the arrows) between intake chamber **23** and exhaust chamber **24**.

From FIGURE 2 it can be seen that primary air is discharged from nozzles **31** into exhaust chamber **24** and then through the exhaust louvers **34** into the area to

be conditioned. However, as the primary air is being discharged from the nozzles **31**, secondary air is induced into intake chamber **23** through louvers **34** in the direction of the arrows. The secondary air thus induced into chamber **23** is caused to travel between the heat exchange fins **37** of heat exchanger **25** and into exhaust air chamber **24** by the air which is discharged by nozzles **31**. In order to insure maximum contact between the heat exchanger **25** and the secondary air passing therethrough, slats **38**, **39**, and **40** are positioned in exhaust chamber **24**. These slats are suitably attached to the end wall **21** and the opposing end wall (not numbered) by means of flanges **41** (connections not shown). Slats **38** and **39** essentially form a second nozzle. Slat **40** and wall **43** essentially form a third nozzle. These slats are positioned relative to nozzle **31**, heat exchanger **25**, and each other, so that the secondary air is distributed over the face of the exchanger and caused to pass through substantially all parts of the heat exchanger when traveling from intake chamber **23** to exhaust chamber **24**.

From time to time, especially when the system is first put into operation, there might be condensation within the unit **10**. It is desirable that the condensate be properly disposed of. To this end, plate **30** serves as a drain pan. The flange **42** (FIGURE 2) of plate **30** is welded to wall **43** of casing **11** to form a water tight connection. The flange **44** of plate **30** has a plate **45** welded to it, said plate **45** extending above plate **30**. The other two ends of plate **30** are also treated in a similar manner so that plate **30** serves as a drain pan. A suitable fitting **46** is placed into a hole in wall **21** so that it communicates with the drain pan. Any condensate which forms on plate **30** flows out of the unit through fitting **46** which may be attached to a suitable drain line. It is to be also noted at this point that the tops of nozzles **31** extend well above plate **30** so that the condensate will not be able to seep through said nozzles into the plenum chamber **12**.

The foregoing described structure for handling condensate can only be used when the unit is used in a vertical position, as shown in the drawings. However, because the space where the unit **10** is to be installed is sometimes limited, it often becomes necessary to install unit **10** so that side wall **48** serves as the bottom of the unit. In such a case, wall **48** must serve as a drain pan. To this end, wall **48** has its edges turned up into a flange **47**. A fitting **49** is inserted into a hole (not numbered) in flange **47**. This fitting is adapted to be attached to a drain line for carrying away condensate which may come to rest on wall **48** when the unit **10** is installed on its side.

In operation, primary air is discharged from plenum chamber **12** through nozzles **31** into air exhaust chamber **24**. This discharge of air induces secondary air to flow from the area to be conditioned between slats **34** in louver **32** into air intake chamber **23**. Because of the velocity of the air discharged through nozzles **31**, the secondary air induced into chamber **23** is caused to flow through heat exchange element **25**, where it is conditioned. The secondary air then passes into air exhaust chamber **24** where it is mixed with primary air and discharged between

slats **34** of louver **32**. In order to obtain maximum contact between the secondary air and the heat exchange element **25**, slats **38**, **39**, and **40** are positioned in the air exhaust chamber **24**. The unit also contains two drain pans. These pans, which are formed from plate **30** and side wall **48**, enable the unit to be installed in an upright position or on its side, as space conditions dictate.

I have thus described a preferred embodiment of my invention. However, it is to be understood that the invention is not limited thereto but may otherwise be embodied within the scope of the following claim:

I claim:

A room air conditioning unit for use in an air conditioning system wherein primary conditioned air is supplied by a conduit to said local unit for further conditioning comprising a casing, a plenum chamber located in said casing, a connection in said casing leading to said plenum chamber for conducting said primary air from said conduit to said plenum chamber; partition means dividing said room unit exclusive of said plenum chamber into an air intake chamber and an air exhaust chamber; a heat exchange element forming a part of said partition means; nozzles mounted on said plenum chamber for discharging said primary air into said air exhaust chamber; air intake louver means and air exhaust louver means formed on said casing relative to said air intake and air exhaust chambers, respectively, whereby as primary air is discharged from said nozzles into said air exhaust chamber and through said exhaust louvers, secondary air is induced through said intake louvers and caused to flow through said air intake chamber and through said heat exchange element for mixture with said primary air in said air exhaust chamber; air deflecting means mounted in said air exhaust chamber in spaced relation to said nozzles and heat exchange member for insuring optimum contact between said secondary air and said heat exchange element as it passes therethrough, said casing being of solid rectangular shape; a first drainage pan positioned on one inside surface of said casing; a second drainage pan interposed between said plenum chamber and said other chambers whereby said unit can be mounted for operation in a plurality of positions, said nozzles extending through said second drainage pan for a sufficient distance to prevent drainage from seeping into said plenum chamber; said air deflecting means comprising a row of slats spaced from and extending substantially parallel to said nozzles.

References Cited in the file of this patent

UNITED STATES PATENTS

2,065,873	Ruff	Dec. 29, 1936
2,072,833	Baird et al.	Mar. 2, 1937
2,287,267	Palmer	June 23, 1942
2,363,945	Carrier	Nov. 28, 1944
2,548,665	Grant	Apr. 10, 1951

FOREIGN PATENTS

379,430	Great Britain	Sept. 1, 1932
538,919	Italy	Feb. 1, 1956