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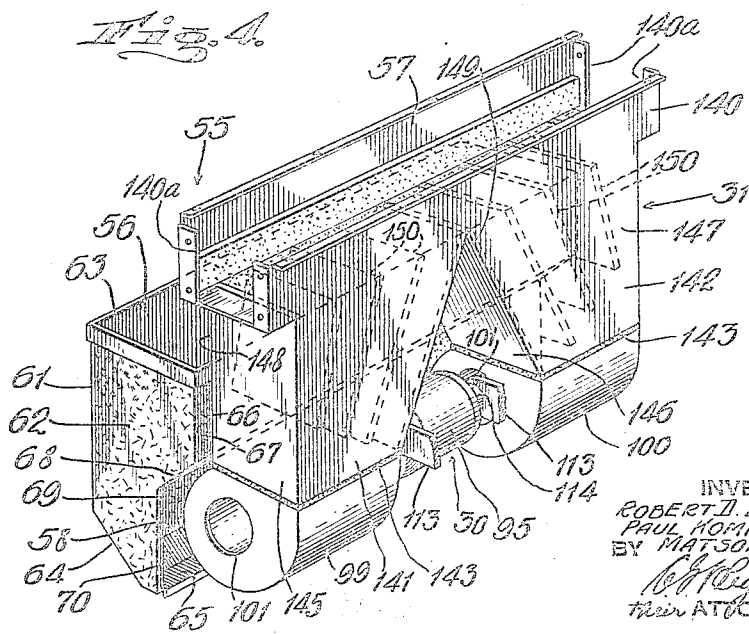
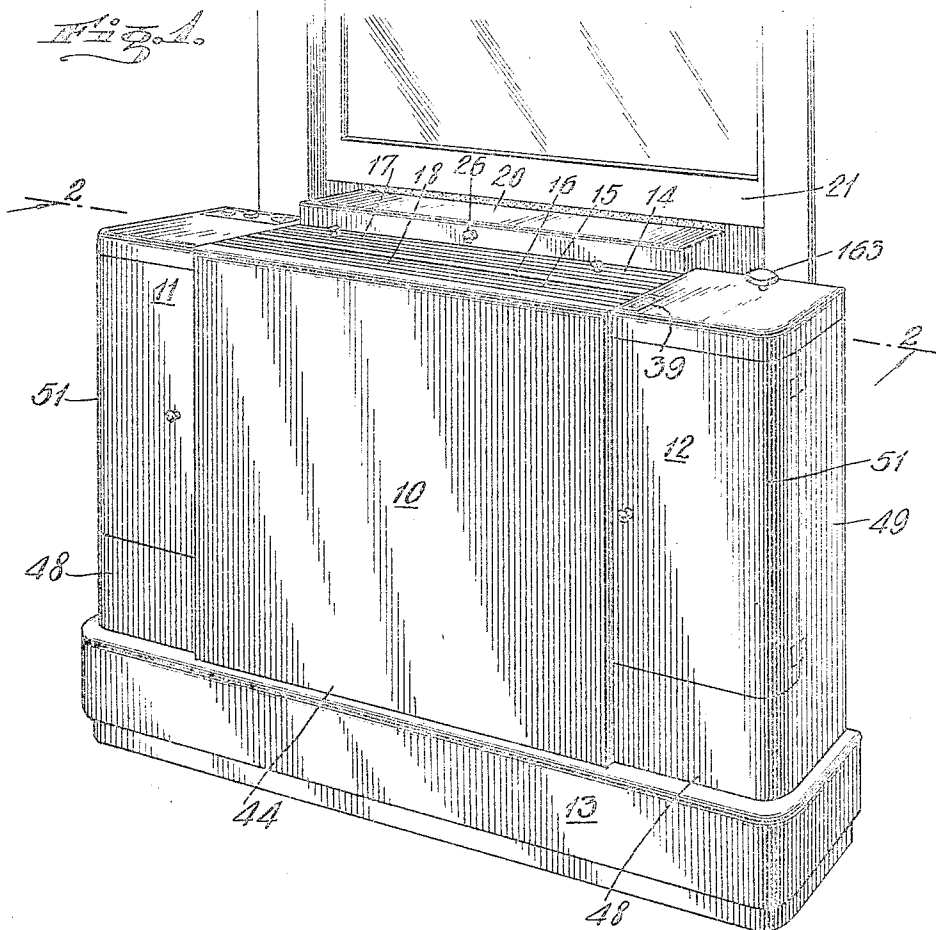
R. D. LAMBERT ET AL

2,214,467

AIR CONDITIONING APPARATUS

Filed Dec. 31, 1936

4 Sheets-Sheet 1



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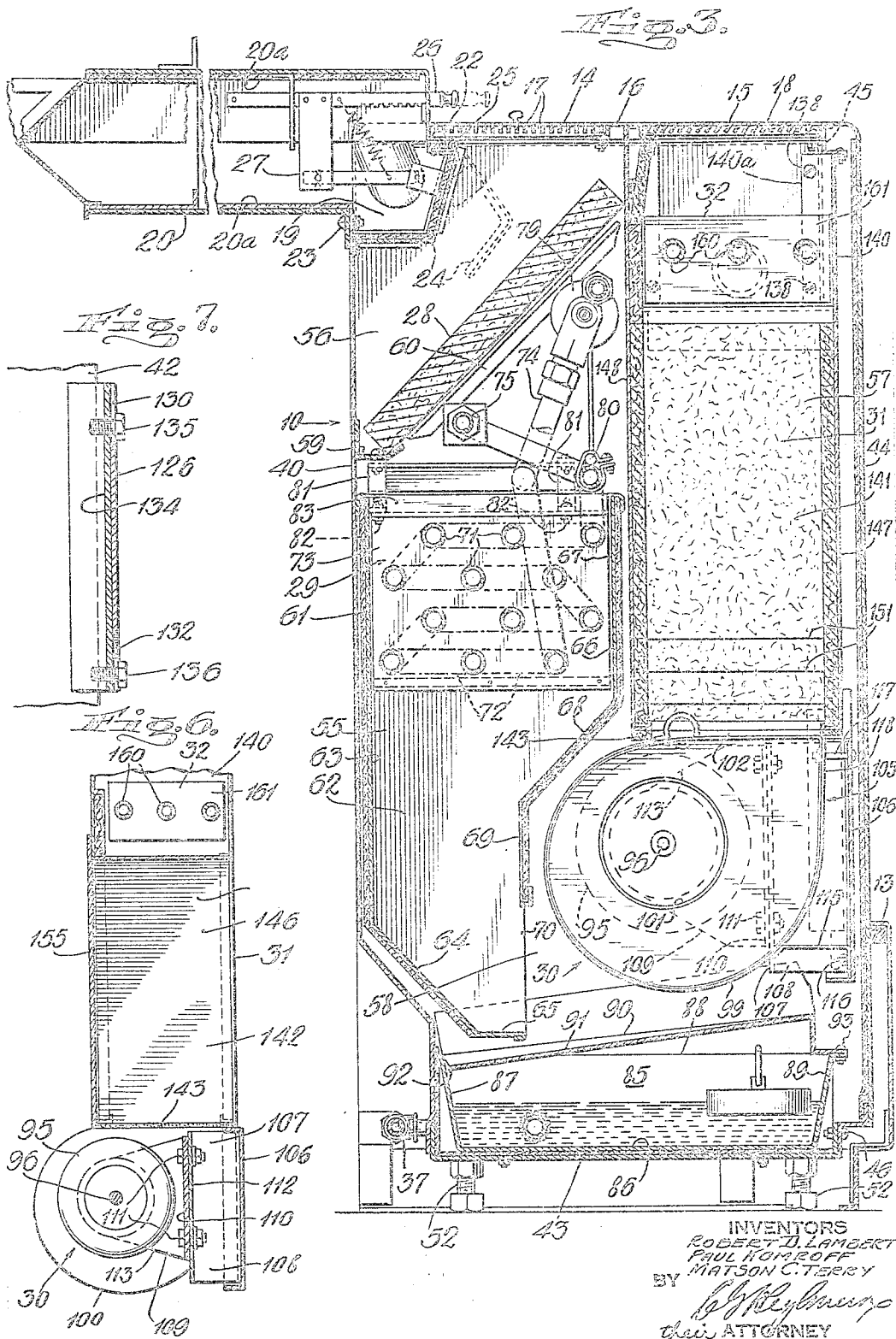
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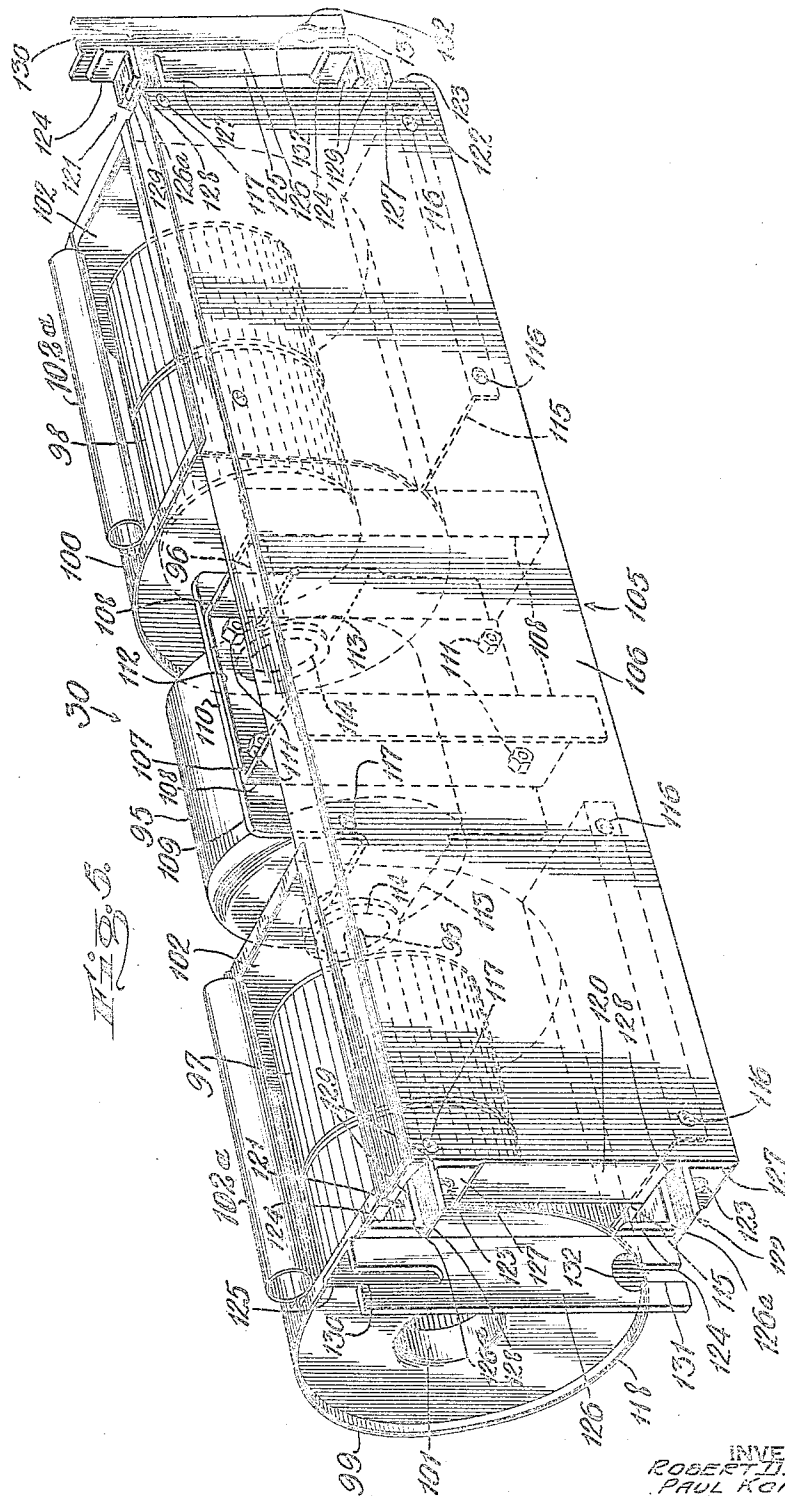
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4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

2,214,467

AIR CONDITIONING APPARATUS

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5 Claims. (Cl. 32—140)

Our invention relates to air conditioning apparatus, and more particularly to apparatus of this type which is adapted to be installed in room spaces and which is operable to condition the air in the room spaces.

An object of our invention is to provide an air conditioning apparatus of the unit type which is of improved construction and arrangement of parts, and which operates in an efficient and effective manner.

A further object is to provide apparatus of the above-mentioned type which reduces, in an efficient manner, the dry bulb temperature and moisture content of the air in the room space with a minimum of re-evaporation of condensed moisture during off-cycles of the cooling and dehumidifying elements.

A further object is to provide highly compact apparatus of the above type which is unusually quiet in operation, and which is capable of handling a relatively large amount of air.

The invention consists in the novel construction and combination of parts, to be more fully described hereinafter, and the novelty of which will be particularly pointed out and distinctly claimed.

In the accompanying drawings, to be taken as a part of this specification, we have fully and clearly illustrated a preferred embodiment of our invention, in which drawings—

Fig. 1 is a perspective view showing one preferred embodiment of our invention as installed in a room space;

Fig. 2 is a longitudinal vertical sectional view taken on the line 2—2 of Fig. 1, certain parts being broken away to illustrate more clearly the structural details;

Fig. 3 is a transverse vertical sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a detail view showing certain of the elements of the preferred embodiment as removed from the enclosing casing and showing the relative position these elements occupy when installed in the casing;

Fig. 5 is a detail assembly view illustrating the motor-blower unit and its mounting;

Fig. 6 is a fragmentary vertical sectional view showing a slightly modified arrangement, the plane of the section being indicated by the line 6—6 of Fig. 2; and

Fig. 7 is a fragmentary vertical sectional view showing the detailed manner in which the motor-blower unit is secured to the enclosing casing structure, the section being taken on the line 7—7 of Fig. 2.

Referring now in detail to the construction illustrated, it will be observed that we have shown an air conditioning unit which is suitable for installation in a room space used either for living quarters, an office, or the like, and which serves to provide a proper and comfortable condition of air within the room space in which it is installed.

The unit comprises an enclosing casing structure including a central or base section 10, wing sections 11 and 12 located, respectively, at each end of the central section, and a skirt member 13 resting on the floor of the room and abutting the lower part of the front and sides of the enclosing casing structure.

In the top and at the rear of the central or base section 10, is provided a longitudinally extending air inlet opening 14 communicating with the room space; and in the top and at the front of the section 10, is provided a longitudinally extending air outlet opening 15 also communicating with the room space and spaced from the inlet opening by means of a longitudinally extending removable strip 16. The inlet and outlet openings 14 and 15 are provided, respectively, with removable grille members 17 and 18. The upper and rear part of the central or base section 10 is provided with a second inlet opening 19 which communicates with one end of a horizontal duct 20. The duct 20 extends rearwardly from the upper part of the section 10 and through an opening defined by a partially raised window sash 21 and thereby provides communication between the interior of the section 10 and the outside atmosphere. The duct 20 may be lined with a suitable sound-absorbing material indicated at 20a, which serves to prevent street noises from entering the room through the duct. The inner end of the duct section 20 is removably secured to the central or base section 10 by screws 22 and 23.

A damper 24 suitably pivoted as indicated at 25 from the forward end of the duct 20, extends longitudinally of the upper rear interior of the central section 10 and may be moved manually about its pivotal axis to any desired position by means of a hand-operated slidable rod 26 connected to the damper by link means 27. The damper 24 serves to close off either the inlet opening 14 or the inlet opening 19; or, when in a mid position, serves to proportion the amounts of room air and fresh air entering the unit. In the full-line position of the damper shown in Fig. 3, the inlet opening 19 communicating with the fresh air duct 20 is shown as being closed, and the air entering the central section 10 of

the unit flows through the inlet opening 14 from the room space. With the damper in the dotted-line position shown in Fig. 3, approximately equal amounts of room air and fresh air will be drawn into the central section 10 through the inlet openings 14 and 19.

In the central section 10, there is arranged a removable filter 28, a cooling coil 29, a motor-driven blower 30, a sound-deadening discharge duct 31, and a heating coil 32. In the wing section 11 there is located a water supply means 33, here shown to be in the form of a water bottle supported in inverted position by a cup 34. In the wing section 12 there is arranged a humidifying mechanism 35 of the motor-driven atomizing type. The mechanism includes a water-receiving receptacle 36 connected to the cup member 34 by means of a pipe 37. The discharge from the humidifying mechanism 35 is connected to an upwardly extending duct 38 which is in turn connected at its upper end to a nozzle member 39 extending through the top wall of the wing section 12 and arranged to direct a stream of air with atomized water or mist in suspension therein, over the outlet opening 15 of the central section 10.

In the construction shown in the drawings, the central or base section comprises a rear wall 40, end walls 41 and 42, and a bottom wall 43, all rigidly secured together by any suitable means, such, for example, as spot-welding. The front of the central section is closed by means of a wall section 44 detachably secured to the bottom and end walls, respectively, by means of suitable screws 45 and 46. The wing sections 11 and 12 each comprise a bottom wall 47, a front wall 48, an outer end wall 49 and a rear wall 50; the end walls 41 and 42 of the central section 10 serving, respectively, also as the inner end walls for the wing sections 11 and 12. Doors 51 are provided in the front of the wing sections to permit ready access to the water supply bottle 33 and humidifying mechanism 35. Vertically adjustable jack screws 52 extending through the bottom walls 47 of the wing sections 11 and 12, serve as a means for adjustably leveling the unit with respect to the window sill and for supporting the entire unit from the floor. The skirt member 13 surrounds the lower part of the unit and conceals the jack screws 52 and other unsightly parts of the unit. The skirt member merely rests on the floor and abuts the front and ends of the unit so that it can be readily removed when desired.

It will be observed from an examination of Fig. 3, that we have provided in the central or main section 10, an upright U-shaped passage 55 which comprises a downcoming or incoming leg 56, an upgoing or outgoing leg 57, and a lateral portion 60 or return-bend leg 58. The upper end of the downcoming leg 56 communicates with the inlet openings 14 and 19, as shown. The upper end of the upgoing leg 57 communicates with the outlet opening 15, and the lower ends of the downcoming and upgoing legs are connected by means of the lateral portion 58.

Arranged across the upper part of the downcoming leg 56 and beneath the removable grille 17, is the removable filter 28 supported at its lower and rear edge by a horizontally extending angle member 59 which may be removably secured to the end walls 41 and 42 of the central section by any suitable means (not shown). The filter is supported at its ends in its inclined position by means of inclined brackets 60 suitably

spot-welded to the end walls 41 and 42 of the casing. Thus, by removing the grille 17, the filter 28 may be readily removed and replaced.

Arranged below the filter 28 is a duct section 61 formed of any suitable corrosive-resisting metal, such, for example, as copper. The duct section 61 is open at its upper end and forms the lower part of the downcoming leg 56 and the beginning of the lateral portion 58 of the U-shaped passage. The duct section may be formed in any suitable manner. In the drawings we have shown the duct as being unitary in construction and as including a pair of spaced end walls 62, a rear wall 63 joining the end walls and having a lower extension 64 inclined forwardly and downwardly, and a horizontal bottom wall portion 65 joining the lower edge of the inclined extension 64. The duct section also comprises a front wall 66 joining the end walls 62 and including a vertical portion 67, a downwardly and rearwardly extending diagonal portion 68 at the lower end of the vertical portion, and a second vertical portion 69 at the lower end of the diagonal portion and terminating above the forward edge of the bottom wall 65 to provide a laterally and forwardly directed discharge opening 70. The diagonal portion 68 overlies the motor-driven blower 30; and, in conjunction with the diagonal portion 64 and the remaining defining wall portions, provides for a complete change in direction of flow of the air before leaving the outlet 70.

Immediately below the filter 28 and in the upper part of the duct section 61, is arranged a cooling and dehumidifying means, here shown to be in the form of the refrigerant evaporator coil 29, which consists of a plurality of horizontally extending pipes 71 connected at their ends by return bends 72 to provide a continuous flow of refrigerant through the coil, and provided on their exterior surfaces with vertically arranged fins 73 serving to promote the rate of heat absorption by the coil. Any suitable type of refrigerant may be supplied to the interior of the coil; for example, dichlorodifluoromethane or "Freon."

The coil 29 is connected at one end to an inlet pipe 74 and at the other end to a discharge pipe 75. It will be appreciated that, in operation, the inlet pipe 74 will be connected to the discharge side of a conventional type of motor-compressor-condenser unit (not shown) which operates to supply liquid refrigerant to the pipe 74, and that the discharge pipe 75 will be connected to the suction side of such a motor-compressor-condenser unit. It is believed unnecessary for an understanding of the present invention to illustrate in this application a motor-compressor-condenser unit, for the construction and operation of this type of unit is well known to those skilled in the art. The motor-compressor-condenser unit may be located at any suitable place; for example, in a separate cabinet in the room space in which the air conditioning unit is located; or it may be located at some desirable point outside of the room space. In either case, pipes of sufficient length will be provided to connect the inlet and discharge pipes 74 and 75 of the evaporator coil 29 with the discharge and suction side, respectively, of the compressor unit.

If desired, a solenoid valve 78 may be provided in the inlet pipe 74 for controlling the flow of refrigerant to the cooling coil in response to room temperature conditions. Also, an expansion valve 79 may be located in the inlet pipe 74 and

its operation may be controlled by a suitable thermostatic bulb 80 on the coil 29, so as to regulate the flow of refrigerant to the coil, and consequently the refrigerating effect of the coil.

The cooling coil may be removably supported from the end walls 41 and 42 of the central or base section 10 by brackets 61 connected by bolts 62 to supporting sheets 83 arranged at the ends of the coil and having openings through which the horizontal tubes 71 extend. It may be observed that the duct section 61 is also here shown to be removably supported from the end walls 41 and 42 of the central section by means of the brackets 81 which support the cooling coil.

Arranged beneath the lateral or return-bend portion 50 of the U-shaped passage, is a condensate-collecting pan or receptacle 85, comprising a bottom wall 86 supported by the bottom wall 43 of the central section, a rear wall 97, and walls 98, and a front wall 99. The pan 95 also comprises a removable top wall 90 which has an upper inclined surface 91 extending downwardly and rearwardly towards the rear wall 97 and terminating short of the latter wall to provide therewith an opening 92 through which moisture collected on the top surface 91 may gravitate. The cover 90 may be suitably secured to the remaining parts of the receptacle by means of screw bolts 93.

The motor-driven blower 30 is suitably arranged at the lower end of the upgoing leg 50 and comprises a motor 95 having a shaft 96 extending out both ends thereof, a pair of blower wheels 97 and 98 fixed respectively to the ends of the shaft 96, and a pair of scroll-shaped blower housings 99 and 100 encircling, respectively, the blower wheels 97 and 98. Each of the blower housings 99 and 100 is provided with axial inlets 101 and with a radial discharge or outlet opening 102. At one side of the outlet opening 102, the metal is rolled to provide a rounded cut-off edge 102a which functions to prevent eddying and turbulence in the air stream having the outlet.

In the construction shown in the accompanying drawings, the motor and blower are in the form of a separate unit 105 removably supported from the end walls 41 and 42 of the central section 10. The unit 105 includes a supporting plate 106 to which the motor 95 and blower housings 99 and 100 are rigidly secured, and the supporting plate is detachably secured to the end walls 41 and 42. The motor is secured to the plate 106 by a U-shaped bracket 107 having its legs 108 suitably spot-welded to the plate 106, and a second U-shaped bracket 109 having its base 110 secured by bolts 111 to the base 112 of the bracket 107 and having the outer ends of its legs 113 provided with openings receiving the outer periphery of the end bearings 114 of the motor 95. (See Fig. 5.) The blower housings 99 and 100 are fixed to the supporting plate 106 by means of plates 115 suitably spot-welded at one side to the housings 99 and 100 and secured at the other side to the plate 106 by screw bolts 116. Screw bolts 117 passing through the plate 106 and through flanges 118 on the outside of the housings 99 and 100, also serve to aid in securing the housings to the plate 106 (see also Fig. 3).

The plate 106 is provided at each end with vertical flanges 120 and spaced Z-shaped brackets 121 and 122 are secured to the upper and lower parts of the flanges 120 by any suitable means, such, for example, as bolts 123. The brackets 121 and 122 are each provided with vertical flanges 124 arranged parallel to the flanges 120.

A flange 125 of a vertical angle bracket 126 is fixed to each pair of flanges 124 by any suitable means, such, for example, as by spot-welding. As shown, each of the Z-shaped brackets 121 and 122 is a composite unit and comprises two angle brackets 126a and 127 with an intermediate resilient member 128, such, for example, as rubber, firmly secured to flanges 129 of the brackets 126 and 127. Each of the vertical angle brackets 126 is provided at its upper end with a straight longitudinal slot 130 and at its lower end with a keyhole slot 131 having an enlarged hole 132 at its inner end, both slots extending through the ends of the brackets.

Vertical angle brackets 133 and 134 are fixed respectively to the end walls 41 and 42 of the section 10, and are provided with spaced openings which are adapted to register with the slots 130 and 131, respectively, of the brackets 126, and through which screw bolts 135 and 136 extend for securing the motor-blower unit 105 to the end walls 41 and 42. By reason of this construction, the motor-blower unit may be quickly removed from the casing by loosening the bolts 135 and 136 and permitting the unit 105 to drop down so that the bolts 136 carry the weight of the unit and are in the large part 132 of the keyhole slots 131. The lower part of the unit may then be pulled forward so that the heads of the bolts 136 pass through the large part 132 of the keyhole slots 131 and then the unit 105 may be further lowered to disengage the bolts 135 from the upper slots 130. In assembling, the reverse of this procedure will be carried out, as will be readily understood.

The discharge outlets 102 of the blower casings 99 and 100 are so arranged that the air is discharged vertically upward into the lower end of the sound-deadening duct section 31, and the latter is rigidly and removably secured to the end walls 41 and 42 of the casing by means of suitable screw bolts 138. The sound-deadening duct section 31 comprises almost the entire upgoing leg 57 and includes an upper main section 140 extending from end wall 41 to end wall 42, and a lower section comprising a pair of legs 141 and 142. The ends of the main section 140 are cut out, as indicated at 140a, so as to receive the pipe connections for the heating coil 32. The lower open ends of these legs 141 and 142 are of approximately the same size as and are adapted to register with the discharge openings 102 of the blower casings 99 and 100. A compressible gasket 143 made of any suitable material, such, for example, as rubber, surrounds the discharge opening of each of the blower housings and is interposed between the housing and the lower end of the connecting leg of the duct 31.

In assembling the motor-blower unit 105 in the air conditioning unit, and before the bolts 135 and 136 are drawn tight, the unit 105 is preferably pushed upwardly so that it is pressed firmly against the gasket 143 and compresses the latter. The bolts 135 and 136 are then drawn tight; and, as a result, there will be no air leaks at the joints between the discharge outlets 102 of the blower and the legs 141 and 142. Furthermore, as the plate 106 is supported by brackets with rubber elements 128 from the central section 10, and as the rubber gasket 143 is between the blower housings and the duct section 31, a minimum of vibration will be transmitted to the central section 10 from the blower unit.

Referring to Figs. 2 and 4, it will be observed that the legs 141 and 142 of the duct section 31 comprise vertical end walls 145 at the outside, 75

and inwardly and upwardly inclined end walls 146 at the inside. Front and rear walls 147 and 148 of the legs 141 and 142 are arranged vertical and parallel to one another and are notched-out to provide an inverted V-shaped opening 149 at their point of juncture with the inside end walls 148. The outside end walls 145 are set inwardly from the ends of the section 140 and from the end walls 41 and 42 to provide openings or passages 150. Transverse splitter vanes 151 are arranged within each of the legs 141 and 142. The width of the legs 141 and 142 progressively increases from the blower to their point of juncture with the main section 140; and, as the splitter vanes 151 are arranged across the legs 141 and 142, the air flowing through the outlets 102 of the blower casings 99 and 100 is caused to flow in straight lines and is distributed evenly across the bottom of the heater coil 32. The interior surface of the legs 141 and 142 and the splitter vanes 151 are preferably formed by slabs made of suitable sound absorbing material, as indicated at 152.

The point of juncture of the inside end walls 146 and the main section 140 is above the upper horizontal edge of the front wall 67 of the cooling duct section 61. Also, the end walls 62 of the duct 61 are spaced from the end walls 41 and 42. The openings 149 and 150 provide restricted communication between the downcoming leg 56 and the inlets 101 of the blower. These openings 149 and 150 therefore provide a bypass around the cooling coil 29, and a part of the air entering the central section 10 through the openings 14 and 19 flows directly to the inlets 101 of the blower without passing through the cooling coil. This construction is advantageous where the principal object is to reduce the moisture content of the air in the room rather than to attain such a low dry bulb temperature. In other words, for a given design of cooling coil and a given total amount of air flowing through a unit, the rate of latent heat removal can be increased by bypassing a part of the air around the coil. The reason for this is that the velocity of the air flowing through the coil will be lowered and the temperature of such air passing through the coil will be correspondingly lowered and more moisture extracted. If desired, the ratio of latent heat removal to sensible heat removal may be reduced by restricting or entirely closing the by-pass opening so that more or all of the air will pass through the cooling coil. To this end, I have shown in Fig. 6 of the drawings an alternative arrangement, wherein a vertical plate 155 extends longitudinally of the central section 10 and at the rear of the legs 141 and 142 and serves to close entirely the openings 149 and 150. Obviously, if desired, the plate 155 may be so constructed as to only partially close the openings 149 and 150.

The heating coil 32 comprises a plurality of parallel straight pipes 160 connected at their ends and having vertically disposed heat-radiating fins 161 on their exterior surface. Any suitable heating fluid, for example steam or hot water, may be supplied to the coil by a pipe 162, a valve 163 serving to connect and disconnect the coil and the supply of heating fluid.

From the above, it will be apparent that we have provided a highly compact air conditioning unit which is of improved construction and arrangement of parts, and one in which the parts are so arranged that any and all of the various air conditioning functions are effectively and efficiently performed. The unit provides for the

recirculation of room air, the introduction into the room space of fresh air, or for the introduction into the room of any desired proportion of recirculated and fresh air. All air passing through the unit is cleaned by the removable filter 28. The unit is so designed as to properly condition the air of room spaces during all seasons of the year.

During the hot months of the year, a suitable refrigerant is supplied to the cooling coil 29 and the air flowing thereover is cooled and dehumidified. As the air flows downwardly over the coil 29, condensed particles of moisture are readily disengaged from the surfaces of the coil by gravity aided by the downward direction of flow of the air stream, and these particles are separated out of the air stream at the bottom of the U-shaped passage by gravity and by centrifugal action as the direction of flow of the stream is changed from downward to upward, due to the construction of the lower end of the duct section 61 and the location of the inlets 101 of the blower casings with respect to the opening 70. The moisture separated out of the air stream is deposited on the upper inclined surface 91 and flows down the surface and through the opening 92 into the receptacle, where it is out of contact with the main air stream.

This arrangement of the cooling coil in the downcoming leg of the air passage, the construction of the lower end of the duct section 61, the arrangement of the blower inlets 101 with respect to the duct 61 and the opening 70, and the construction and arrangement of the condensate collection receptacle 85, all contribute to the beneficial result of quickly ridding the air stream of the condensed particles of moisture before the stream enters the blower, thereby reducing to a minimum the re-evaporation in the air stream of the condensed moisture during off-cycles of the cooling coil.

The inlets 101 of the blower are shown in the accompanying drawings as being arranged above the outlet 70, and as a result all of the air entering the blower flows upwardly into the inlets. This arrangement serves admirably in preventing condensate from being carried into the blower. It is to be noted, however, that our invention is not to be considered as limited in all of its aspects to this specific construction and arrangement, for other arrangements may be used without departing from the spirit thereof; for example, the wall 59 could terminate at a higher level, or it may even be omitted, and the outside of the air stream, which carries most of the moisture due to centrifugal action, would still flow upwardly into the inlets 101. Or, if desired, the same construction of duct 61 could be used as is shown, and the blower lowered where the inlets would be partially below the top of the opening 70, and the condensate would still be effectively eliminated from the air stream before the air enters the inlets 101.

During the wintertime, the refrigerant is, of course, not supplied to the cooling coil 29, and any suitable heating medium may be supplied to the heating coil 32. The air flowing through the air conditioning unit will then be efficiently and effectively heated and introduced into the room. Humidification is effected by the humidifier 35; and, as the nozzle 39 is arranged so that it directs the stream of air with moisture entrained therein over the outlet 15, the warm air flowing through the latter quickly evaporates such moisture.

During the months of the year when the outside

atmosphere is comfortable, both the heating and the cooling coil may be turned off and the unit used to admit into the room space large quantities of clean, fresh air from the outside.

5 During all seasons of the year, large volumes of air flow through the unit with a minimum of friction loss due to eddy currents. This is made possible by the location of the blower on the downstream side of the cooling coil so that the
10 air will be drawn in straight lines through the coil 22, and by the spacing of the outlets 102 of the blower housing from the heating coil by the relatively long legs 141 and 142 of the duct section 31, which legs merge gradually into the main
15 section 140 before the air engages the heating coil and which legs are provided with splitter vanes 151 which effect a straight-line flow of the air and distribute the air evenly across the lower part of the coil 32 so that the air may pass
20 through such coil with a minimum of friction loss due to eddying.

During all seasons of the year, air at the proper temperature and humidity is supplied to the room space by a unit which is unusually quiet in operation. The sound-deadening lining 152 of the duct
25 section 31 practically eliminates noise due to motor operation and flow of air. As fresh air is supplied with the window sash closed through a sound deadened duct 20, only the outside noises
30 which would normally be transmitted through a closed window are heard in the room. The improved form of mounting for the motor-blower unit and the rubber gasket connection between
35 the unit and the duct section, eliminate transmission of motor and fan vibrations to the enclosing casing structure.

It is also to be noted that a further feature of our invention is that, due to our improved construction and arrangement of parts, it is not necessary for a customer to buy all of the several
40 features of air conditioning at first; for, if he desires, he may select the features which he feels he needs at the moment, and may purchase the remaining features and have them readily installed at some later date, without affecting the
45 enclosing casing structure or its installation in the room space. This is made possible by the fact that the inlet and outlet openings 14 and 15 extend for the full length of the central section,
50 the grilles 17 and 18 are removable, and the duct section 61 can be readily removed. The supporting angle 59 of the filter is also removable. Thus, by simply removing the grille 17, filter 28 and
55 supporting angle 59, the cooling coil 29 and the duct section 61 can be readily inserted and removed through the top and quickly connected. Also, by removing the grille 18 and strip 16, the heating coil can be readily inserted through the top and connected.

60 What we claim and desire to secure by Letters Patent of the United States is:

1. In an air conditioning unit, the combination of wall means defining an enclosing casing structure having spaced inlet and outlet openings
65 in the upper part thereof; means defining an upright U-shaped passage in said casing structure including a downcoming leg communicating at its upper end with the inlet opening, an upgoing leg communicating at its upper end with the outlet,
70 and a lateral portion connecting the lower ends of the downcoming and upgoing legs; blower means in the lower part of said upgoing leg and having an inlet communicating with the downcoming leg and an outlet arranged to discharge air upwardly through the upgoing leg; said

passage-defining means including a removable duct section structurally separate from said enclosing casing structure forming a part of the downcoming leg and the beginning of the lateral portion and including a side wall adjacent the blower extending downwardly and at the side thereof, and a second wall arranged in opposed spaced relation with respect to the first-named wall and extending downward below the lower end of the first-named wall and having a lower
10 section inclined downwardly and toward the side of the casing which houses the blower so as to effect a change in direction of flow of the air stream from a downward direction to a lateral direction and then to an upward direction before
15 the air enters the inlet of the blower; a cooling coil within the upper portion of said duct section; and a condensate receptacle below the lateral portion and beneath the blower inlet for catching the condensate as it is separated out of the air stream by gravity and by the change in direction of flow thereof.

2. In an air conditioning unit, the combination of wall means defining an enclosing casing structure having spaced inlet and outlet openings
25 in the upper part thereof; means defining an upright U-shaped passage in said casing structure including a downcoming leg communicating at its upper end with the inlet opening, an upgoing leg communicating at its upper end with the outlet, and a lateral portion connecting the lower ends of the downcoming and upgoing legs; said
30 passage-defining means including a removable duct section structurally separate from said enclosing casing structure and being formed of corrosion-resisting material and providing the lower part of the downcoming leg and the beginning of the lateral portion and having an outlet arranged to direct the flow of air laterally across the lower part of the passage toward the blower;
40 blower means in the lower part of said upgoing leg having an outlet arranged to discharge air upwardly through the upgoing leg and having an inlet so arranged with respect to said duct and the outlet of the duct that at least a major part of the air entering the inlet flows upwardly thereinto; a cooling coil removably supported within the upper part of said removable duct section; and a condensate receptacle below the lateral portion and beneath the blower inlet for catching
45 the condensate as it is separated out of the air stream by gravity and by the change in direction of flow thereof.

3. Air conditioning apparatus comprising means defining an upright U-shaped passage for directing the flow of air therethrough; a cooling coil arranged across the U-shaped passage in the leg thereof first to receive the air, and operable to lower the temperature of the air flowing through the passage and thereby condense moisture out of the air; and condensate-collecting means arranged below the bend in the U-shaped passage and comprising a receptacle including upright opposed side walls, a bottom wall, and a top wall covering said receptacle and fitting
65 tightly against one of the opposed side walls and being inclined downwardly toward the opposite side wall and having at least a part thereof terminating short of the latter wall to define therewith an opening through which moisture may
70 gravitate into the receptacle.

4. In an air conditioning unit, the combination of wall means defining an enclosing casing structure having spaced inlet and outlet openings in the upper part thereof; means defining an up- 75

right U-shaped passage in said casing structure including a downcoming leg communicating at its upper end with the inlet opening, an upgoing leg communicating at its upper end with the outlet opening, and a lateral portion connecting the lower ends of the downcoming and upgoing legs; a cooling coil arranged across the downcoming leg of the passage; blower means providing for the flow of air from said inlet opening through said U-shaped passage and out of said outlet opening; and condensate-collecting means arranged below the lateral portion of the passage for receiving the condensate as it is separated out of the air stream by gravity and by the change in direction of flow of the stream; said condensate-collecting means comprising a receptacle including a bottom wall, upright side walls, and a top wall covering said receptacle and having an upper surface inclined downwardly toward one side wall of the receptacle, and the receptacle having an opening at the lower part of said inclined upper surface through which condensed moisture may gravitate.

5. Air conditioning apparatus comprising wall means defining an enclosing casing structure and having spaced air inlet and outlet openings in the

upper part thereof and being provided with an upright U-shaped air passage including a downcoming leg connected at its upper end with the air inlet opening, an upgoing leg connected at its upper end with the air outlet opening and a lateral portion connecting the lower ends of the downcoming and upgoing legs; a cooling coil extending across said downcoming leg; a blower in said upgoing leg and so arranged that at least a major portion of the air flows upwardly into the inlet thereof; a condensate collecting receptacle arranged below said lateral portion of the passage and directly below said blower; and a cover, extending over the top of said receptacle and having its upper surface exposed to the air flowing through said lateral portion and upwardly into the blower inlet and said cover being inclined downwardly toward one side of said receptacle and having an opening at its lower side through which condensate drains into said receptacle.

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