

May 21, 1963

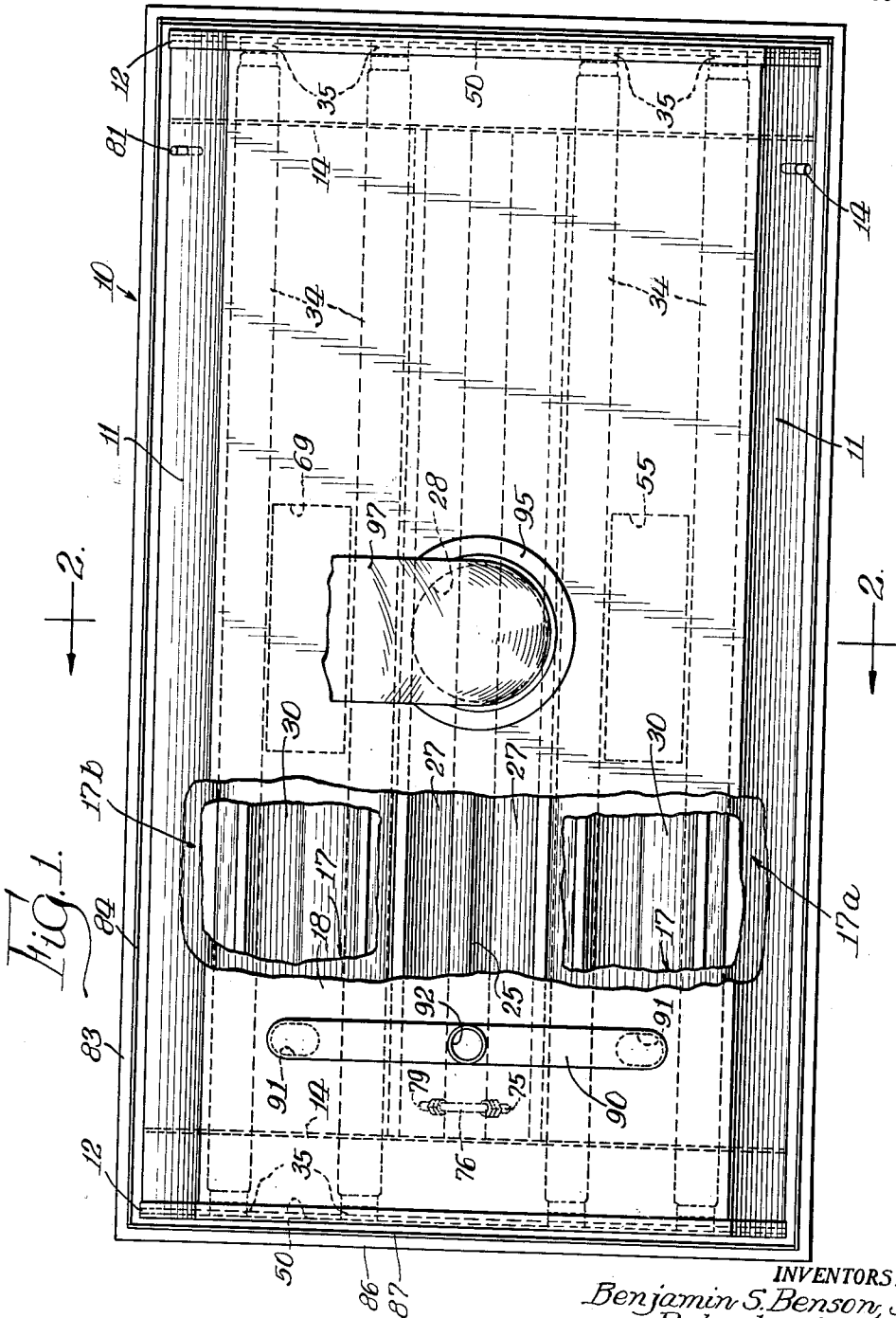
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3,090,434

COMBINATION LIGHTING AND VENTILATING FIXTURE

Filed Feb. 5, 1960

5 Sheets-Sheet 1



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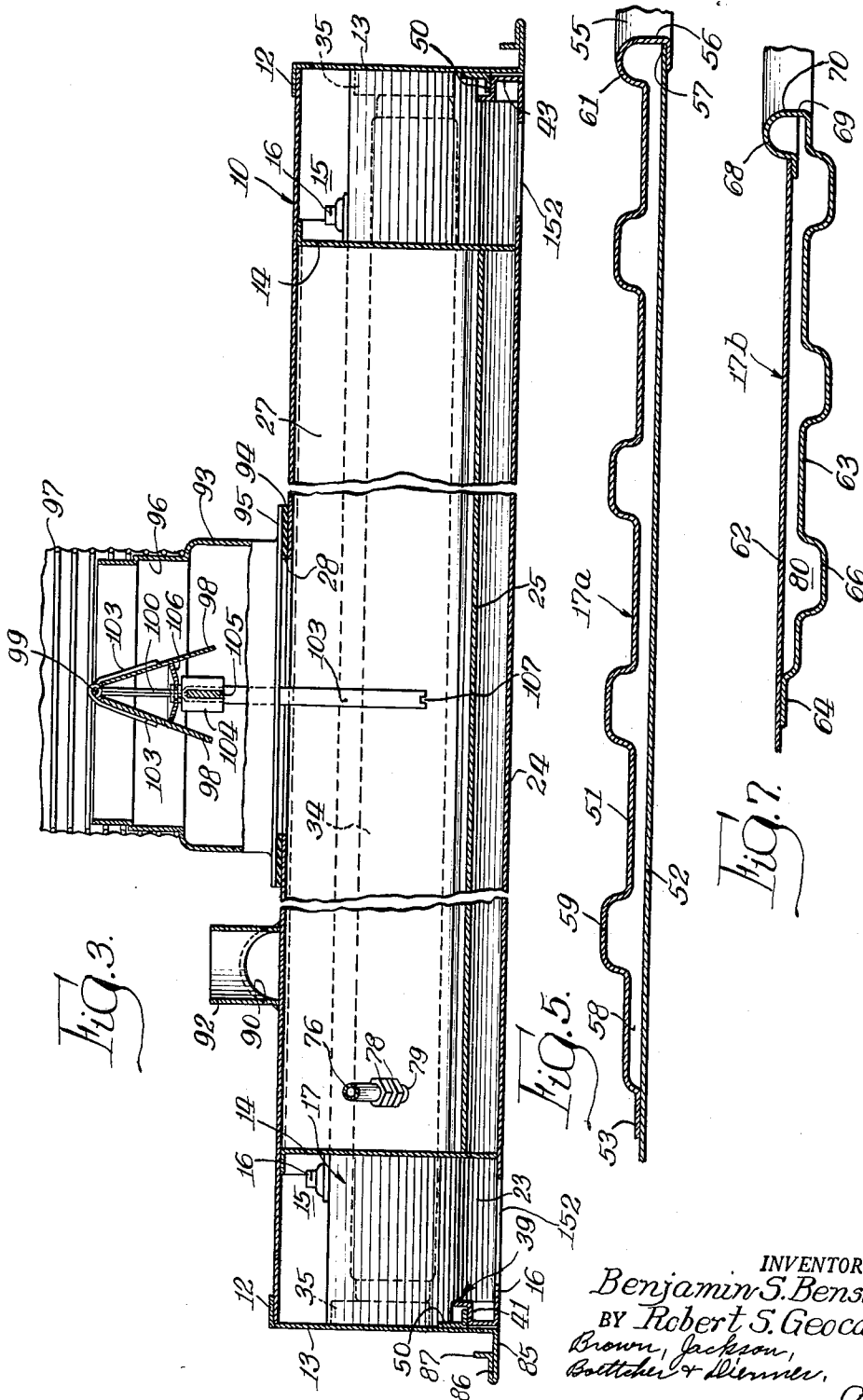
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COMBINATION LIGHTING AND VENTILATING FIXTURE

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5 Sheets-Sheet 3



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5 Sheets-Sheet 4

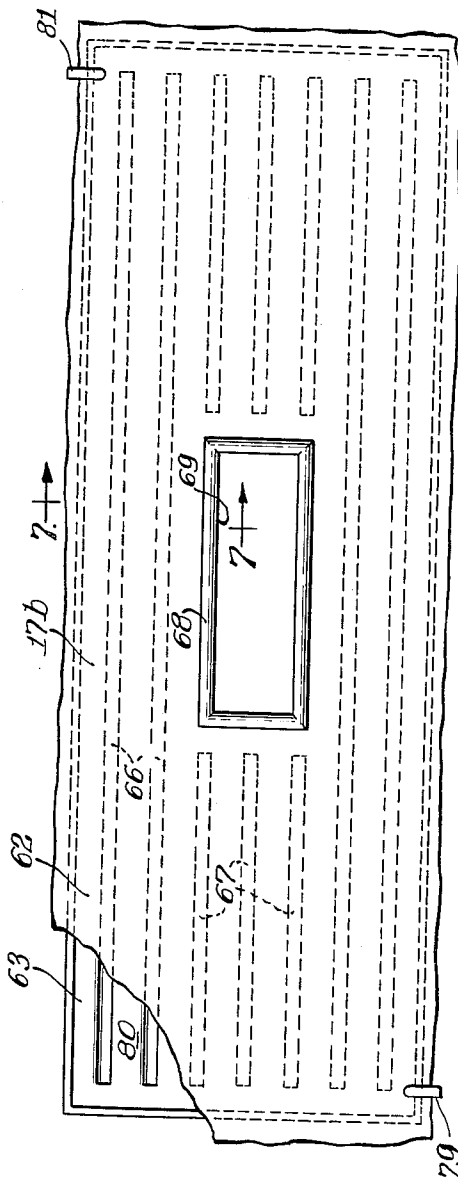


Fig. 6.

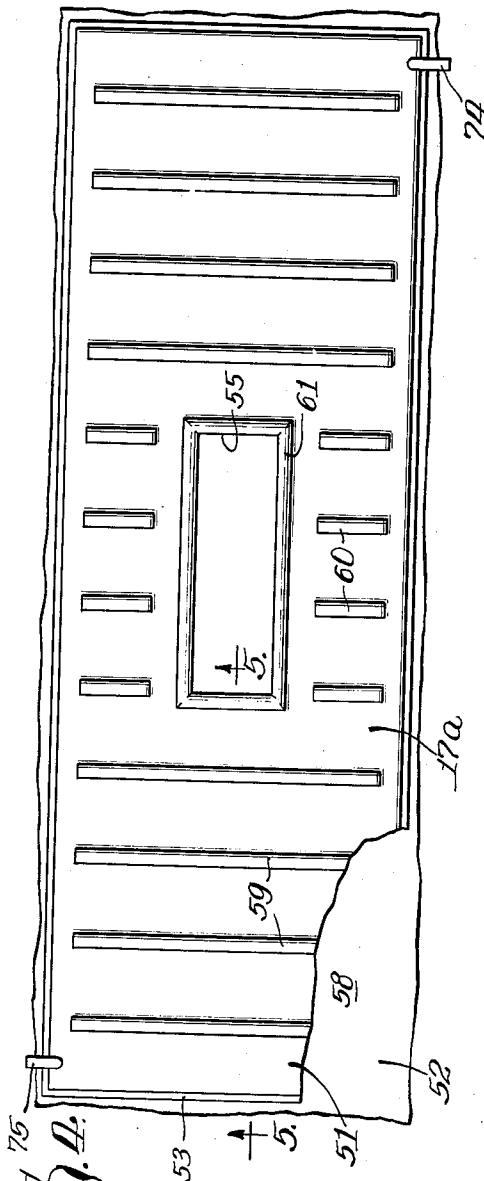


Fig. 7.

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5 Sheets-Sheet 5

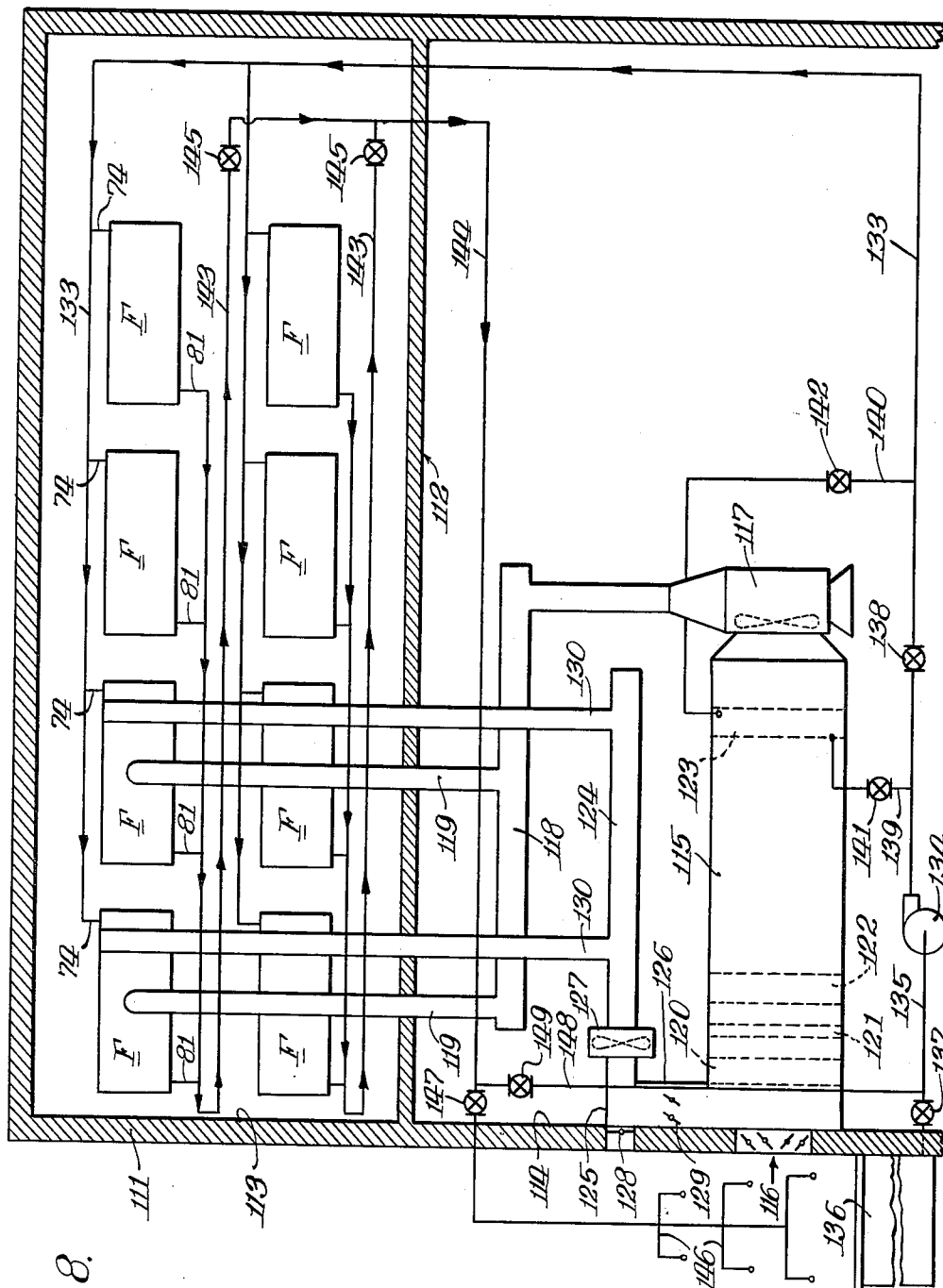


Fig. 8.

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3,090,434

COMBINATION LIGHTING AND VENTILATING FIXTURE

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Filed Feb. 5, 1960, Ser. No. 6,948
9 Claims. (Cl. 165—50)

This invention relates to combination lighting and ventilating fixtures particularly suitable for use with ceiling structures and which may be either surface mounted, recessed mounted or semi-recessed mounted, such fixtures being suitable also, in the broader aspects of our invention, for other purposes.

Fixtures of the general type above referred to are known and extensively used. Such fixtures usually employ fluorescent tubes as the light source. In the known figures with which we are familiar difficulty frequently is experienced due to objectionable cooling of the fluorescent tubes by air flowing through the fixture in contact with the lamps or tubes, resulting in reduced lighting efficiency, and the heat derived from the tubes and the ballast is not handled to best advantage for assuring optimum performance of the fluorescent tubes and high efficiency in heating and in cooling the room or space being lighted and air conditioned.

Our invention is directed to a fixture of the character above referred to which avoids the above noted objections to the known fixtures. To that end we provide a fixture in which the air flowing therethrough is so controlled and distributed that objectionable cooling of the fluorescent tubes is guarded against. More particularly, we provide means for circulating a coolant in proximity to the fluorescent tubes, effective for absorbing heat emitted therefrom before this heat can be transmitted to the air conditioned space below thereby reducing the amount of cooling required and thus reducing the amount of refrigeration equipment that otherwise would be required. The fitting of our invention further provides for dissipating the heat emitted by the tubes, withdrawing of the warm air from the air conditioned room or space, and supplying to such space cool air, during the summer or warm season, while further providing for the utilization of the heat emitted by the tubes and the heat of the air withdrawn from the room for heating such room or space during the winter or heating season. Further objects and advantages of our invention will appear from the detail description.

In the drawings:

FIGURE 1 is a top plan view, partly broken away, of a fixture embodying our invention;

FIGURE 2 is a cross sectional view of the fixture of FIGURE 1, on an enlarged scale, taken substantially on line 2—2 of FIGURE 1;

FIGURE 2A is a sectional view on the order of FIGURE 2, but of the mid-portion only of a modified form of fixture embodying our invention;

FIGURE 3 is a sectional view taken substantially on line 3—3 of FIGURE 2, certain parts being shown in elevation and certain parts being broken away;

FIGURE 4 is a top plan view of a panel, partly broken away, from which one of the reflector shell members is formed, the panel being shown in its flat condition before being shaped to shell form;

FIGURE 5 is a sectional view, on an enlarged scale, taken substantially on line 5—5 of FIGURE 4;

FIGURE 6 is a view similar to FIGURE 4 but of a panel intended for the other reflector shell member of the fixture;

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FIGURE 7 is a sectional view, on an enlarged scale, taken substantially on line 7—7 of FIGURE 6; and

FIGURE 8 is a schematic view of an air conditioning or heating and cooling system including combination lighting and ventilating fixtures embodying our invention.

The fixture of our invention comprises a downwardly opening box-like housing 10 of rectangular shape in plan having downwardly extending side walls 11 preferably, but not necessarily inclined outwardly, and closed at its ends by flanged end caps 12 providing end walls 13. The caps 12 are removably secured to housing 10 in a suitable known manner, conveniently by bolts and nuts (not shown). Cross partition members 14 are secured in housing 10 and are spaced inward a short distance from the end walls 13 providing end compartments 15 which may receive wiring for the fitting as well as accessories which may be desired or necessary, which accessories and the wiring may generate some heat, as will be understood. Two downwardly opening reflector shells 17 are mounted within the housing 10 and extend through the cross partitions 14 with their ends abutting end walls 13. The shells 17 are removably secured in housing 10 in any suitable manner, conveniently by being secured, by nut and bolt means 16, to flanges of cross partitions 14 and are spaced a substantial distance below the top wall 18 of housing 10. Shells 17 have downwardly extending side walls 19 and 20, preferably, but not necessarily, inclined downwardly and outwardly, the outer side walls 19 of the respective shells 17 converging downwardly toward the side walls 11 of housing 10 defining therewith a downwardly converging return air passage 21. The outer side wall 19 of each of the reflector shell members 17 is provided, at its lower edge, with a comparatively narrow inwardly extending flange 22 spaced an appreciable distance above the lower edge of the corresponding side wall 11 of the housing 10. The inner side wall 20 of each of the reflector shells 17 is provided with a lower substantially V-shaped portion 23, the portions 23 of the reflector shell members 17 being spaced apart transversely of housing 10, as shown in FIGURE 2. A finishing strip 24, to be referred to more fully presently, extends midway between the V-shaped portions 23 of the inner side walls 20 of the reflector shells 17. A deflector member 25 of substantially inverted V-shape in cross section is mounted on the finishing strip 24, the deflector strip 25 defining with the portions 23 of side walls 20 of the reflector shell members 17 downwardly and outwardly inclined air discharge passages 26 opening at the underface of the fixture into the underlying room or space to be illuminated and air conditioned. Lengthwise partition members 27 seat at their lower portions on the inner side walls 20 of the shell members 17 and extend to top wall 18 of housing 10 to which they are secured at opposite sides of a central circular opening 28 in wall 18. The partitions 27 extend between the cross partitions 14 and define therewith a central lengthwise air inlet chamber 29 from which the air outlet passages 26 open downward at the underface of the fitting, as above noted. The partitions 27 seat at their lower portions on, but are free from, the lower portions of the inner side walls 20 of shells 17. A reflector 30 of substantially V-shape in cross section is secured to the top wall 31 of each shell 17 centrally thereof by means of brackets 36 (FIGURE 2) welded to wall 31 and attached by nut and bolt means 37 to the upwardly off-set flattened end portions 30a of reflector 30. The reflector 30 extends to and abuts the cross partitions 14. The top wall 31 of each shell 17 is provided with an opening overlying the reflector 30 and closed from above by a flanged cup or cap 32 seating on and suitably secured to the upper face of wall 31, the opening and the cap 32 receiving ballast 39 for two fluorescent light tubes

34 disposed at opposite sides of the reflector 30 and mounted in suitable sockets 35 secured to and depending from top wall 31 of shell 17.

It may be assumed, for purposes of description, that the housing 10 and the reflector shells 17 and associated parts are formed of sheet metal, though it is to be understood that they may be formed of any suitable material fabricated in any suitable manner and may be of any suitable shape. It will be understood that the undersurfaces of the shells 17 and the light reflectors 30 are appropriately finished to provide light reflecting surfaces.

The shells 17 are closed at their undersides by a closure member 38 comprising a frame 39 having side rails 40 of approximately channel cross section providing shoulders 41, which abut flanges 22 of the outer side walls 19 of shells 17, rails 40 having upwardly extending elements 42 projecting from shoulders 41 and in cooperation with flanges 22 restraining the door or closure member 38 against movement toward the side walls 11 of housing 10. The frame 39 of the closure member or door 38 has end rails 43 similar to and connecting side rails 40. The end rails 43 cooperate with angle strips 50, secured on the inner faces of the end walls 13, to limit upward movement of frame 39 and restrain it against endwise movement. The frame 39 supports sheets 44 of glass, plastic or other suitable transparent or translucent material suitably formed or treated to assure substantially uniform diffusion of the light from the lamps or fluorescent tubes 34 and respectively underlying the shells 17. The door or closure member 38 is provided at one side with suitably spaced hinge brackets 60 secured thereto, extending through openings in side wall 11 of housing 10 and seating on flange 82. It normally is held in its closed position by spring clips 45 secured to the other side wall 11 of housing 10 and suitably spaced along and engaging beneath the corresponding side rail 40. The frame 39 is further provided with lengthwise rails 46 having extensions 47 engaging the undersides of the lower portions of extensions 23 of inner walls 20 of shells 17. The finishing strip 24 extends between and is secured to the end rails 43 of frame 39 and carries the deflector 25 the ends of which abut rails 43. It will be understood that the closure members or doors 38 may be of any suitable type and may be held in closed position in any suitable manner. Likewise the sheets or panels 44 of the closure member or door 38 may be of any suitable material and treated in any suitable manner to provide the desired lighting effect.

Referring to FIGURES 4 and 5, the left hand shell member 17 shown in FIGURE 2 may be formed from a panel such as that shown in FIGURE 4. The panel 17a is in general of rectangular shape and is formed of two sheets 51 and 52 of material, preferably aluminum, though any suitable material may be used. The edge portion of sheet 51 is slightly offset away from sheet 52 to provide a relatively narrow rim 53 which is secured to sheet 52 in any suitable manner, conveniently by welding if the sheets 51 and 52 are formed of aluminum, or by soldering if the sheets 51 and 52 are of sheet metal which lends itself to soldering. The upper sheet 51 is provided with an opening 55 for reception of the ballast 33, such opening 55 being defined by a rim or flange 56 integral with sheet 51 and extending through a corresponding opening 57 in the lower sheet 52, to which it is secured by soldering so as to provide a fluid tight seal. Due to the offsetting of the rim 53 of sheet 51, the area of the sheet 51 within the offset rim thereof is spaced from sheet 52 to provide a water-passage 58 therebetween, as shown more clearly in FIGURE 5. Preferably, the sheet 51 is provided with transverse outwardly pressed ribs 59 extending substantially the full width thereof and with shorter transverse outwardly pressed ribs 60 disposed at opposite sides of an outwardly pressed rib 61 defining, with flange 56, the opening 55.

The right hand reflector shell member 17 of FIGURE 2 may be formed from a panel 17b such as shown in FIGURES 6 and 7. The panel 17b is formed from upper and lower sheets 62 and 63, respectively, the lower sheet 63 having a relatively narrow offset rim 64 secured to sheet 62 so as to provide a fluid-tight closure therebetween. The lower sheet 63 has pressed therefrom relatively long lengthwise ribs 66 and relatively short lengthwise ribs 67 as well as a rectangular rib 68 surrounding opening 69 for the ballast 33. A flange 70 extends from sheet 63 to the upper sheet 62 defining with rib 68 the opening 69, flange 70 being secured to the upper sheet 62 so as to provide a fluid-tight closure therewith.

A water or coolant inlet nipple 74 extends through one side wall 11 of housing 10, the left side wall as shown in FIGURE 2, and is secured to the corresponding reflector shell member 17, nipple 74 opening into water passage 58 of shell member 17 at one lower corner thereof. An outlet nipple 75 is secured to the left hand shell member (FIGURE 2) at the lower corner thereof diagonally opposite to the nipple 74. The nipple 75 is connected, by an elbow 76 and coupling 77 and 78 to a nipple 79 secured to the corresponding corner of the right hand shell member 17 and opening into water passage 80 thereof. An outlet nipple 81 is secured to the right hand reflector shell member 17 of FIGURE 2 at the diagonally opposite corner thereof from nipple 79, it being understood that nipple 74 is connected to a suitable supply of water or other coolant and nipple 81 is connected to a conduit for conveying the water from the shell members 17 to a suitable point, as will be explained more fully presently. The specific construction of the water jacket panels 17a and 17b from which the reflector shells 17 are formed is not of the essence of our invention. They may be formed of any suitable material and constructed in any suitable known manner. Within the broader aspects of our invention the reflector shells 17 may be water jacketed or cooled in any suitable known manner.

Each side wall 11 of housing 10 is provided at its lower end with an outwardly extending flange 82 bent back upon itself and then upward to provide a narrow horizontal flange 83 and a vertical flange 84. Similarly each of the end closure caps 12 is provided at its lower edge with an outwardly extending flange 85 bent back upon itself and upward to provide a narrower flange 86 and a vertical flange 87. As will be understood, the flanges at the lower edges of the side walls and the end caps of the housing 10 are for support panels of acoustic material, or other suitable material, disposed between a plurality of fixtures F of a ceiling structure supported in a suitable known manner, to provide a finished appearance.

Each of the reflector shell members 17 defines, in conjunction with the housing 10 and associated partitions, a space or chamber 29a which receives room air from the room or return air passage 21. The air receiving chambers 29a are connected by a bridge member 90 seating on top wall 18 of housing 10 and overlying openings 91 therethrough to the respective air receiving chambers. The bridge member 90 is provided with an upwardly opening collar 92 for connection to a return air conduit. A flanged collar 93 overlies opening 28 in top wall 18 of housing 10 and is suitably secured to wall 18, conveniently by bolt and nut means, there being a sealing gasket 94 between wall 18 and base flange 95 of collar 93 effective for providing an air tight closure about opening 28. The collar 93 is provided with a reduced upward extension 96 about which is secured one end of a flexible conduit 97 of suitable known type. Air under appropriate pressure is supplied through conduit 97 and collar 93 to the air inlet or supply chamber 29 from which the air is discharged through passages 26 into the space or room underlying the fixture, as will be explained more fully presently.

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The air supply is controlled by a damper comprising two approximately semi-circular leaves 98 pivoted on a rod 99 at the upper ends of brackets 100 secured in and extending upward above extension 96 of collar 93. The leaves 98 of the damper are urged downward by a torsion spring 101 mounted on pintle rod 99 between the inner ends of sleeves 102 at the upper or inner edges of leaves 98 engaging about the rod 99. The spring 101 is provided with end extensions or fingers 103 bearing upon the leaves 98 and urging them in downward or opening direction. An adjusting rod 103 is threaded through the arms of a U-shaped bracket 104 mounted centrally of collar 93 by a mounting bracket 105 secured thereto. A suitably formed head or spreader 106 is mounted on the upper end of rod 103 for vertical adjustment thereby and is attached to rod 103 in a known manner to permit of relative rotation of the latter. The spreader 106 is disposed between the damper leaves 98 which are yieldingly held in contact with the ends of spreader 106 by torsion spring 101. Rod 103 extends downward through the air inlet or supply chamber 29 with its lower end spaced a short distance above the air deflector 25 and provided with a transverse slot 107 for reception of the blade of a screw driver or other suitable tool inserted through one of the air discharge or inlet passages 26. By turning the rod 103 in appropriate direction the damper leaves 98 may be opened or closed to desired extent for controlling the volume of air flowing into the air supply chamber 29, as will be understood from the above. The air control means comprising the damper leaves 98 and associated parts is shown by way of example only, and any suitable means may be provided for controlling flow of air to the chamber 29.

The modified form of fixture shown in FIGURE 2A is the same as that shown in FIGURE 2, except as to the lengthwise partitions 27a corresponding to partitions 27 of FIGURE 2. As shown in FIGURE 2A, the lower portions of partitions 27a are spaced away from the lower portions of the inner side walls 20 of the reflector shells 17 and are provided, at their lower edge portions with flanges 27b which, with the lower V-shaped portions of walls 20, define downwardly converging passages 26a opening into the air discharge passages 26. A portion of the warm room return air is bled from the spaces or chambers 29a above the shells 17 into the air delivered through the passages 26. The blending with the air from the air inlet chamber 29 of the air from the spaces 29a above the reflector shells 17 permits the introduction of colder air through chamber 29, by mixing or blending therewith some of the warm return or exhaust air picked up from the room through passages 21. That is conducive to using a lesser quantity of supply air, smaller sized circulating fans, lesser horsepower fan motors, and smaller distribution air-ducts. It also provides means effective for tempering cold air discharged through the passages 26 into the room so as to maintain the room at a comfortable temperature.

In the above, it has been assumed that the chamber 29 receives cold air and discharges it through passages 26 into the underlying room or space, and that air is withdrawn from the room or space through the passages 21 into the return air spaces or chambers 29a. It may be desirable, under certain conditions, to reverse that procedure, supplying cold air to chambers 29a and drawing off room air through passages 26 and chamber 29. Accordingly, the passages 21 may be utilized as either return air passages or air discharge passages, as may the passages 26, within the broader aspects of our invention.

In FIGURE 8 we have shown schematically a lighting and ventilating system embodying the fixtures of our invention and comprising a ceiling structure formed of the fixtures or units F supported in a known manner with acoustic, plaster, or other ceiling material between the fixtures. The system is indicated as installed in a building having an exterior wall 111 and an interior partition

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112 providing a room or space 113 to be illuminated or air conditioned, or both, and an equipment room or space 114 for accommodation of heating equipment including furnaces, boilers and the usual accessories, and cooling or refrigerating apparatus and the usual accessories, all of which may be of standard type and need not be shown nor described in detail. A plenum or trunk conduit 115 is mounted in the equipment space or room 114 and opens at one end to atmosphere through the building wall 111 at one side thereof, the extent of such opening to atmosphere being controlled by a damper 116 of suitable known type. The trunk conduit 115 opens at its inner end into the housing of a suitable fan or blower, of any suitable known type, including a housing 117 the outlet of which is connected to a branch conduit 118 connected by subsidiary conduits 119 to the flexible air supply conduits or ducts 97 of the fixtures F aligned transversely of the room 113. The trunk conduit 115 is provided, in advance of the fan or blower 117 with a preheater 120, an air filter 121, a cooling coil 122 and a reheater 123 successively mounted therein in the order stated with the preheater 120 nearest to the air intake opening in wall 111. The preheater 120 may be of any suitable type and preferably utilizes steam as the heating medium, though electrical coils or any suitable heating means may be employed within the broader concept of our invention. The cooling coil 122 may be of any suitable known type and receives a suitable coolant circulated therethrough in a known manner. Likewise, the air filter 121 may be of any suitable type. The reheater 123 is in the form of a radiator similar to automobile radiators of known type and receives heated water or other coolant from the fixtures F, as will be explained more fully presently. The return air conduit 124 opens into the main or trunk conduit 115 in advance of the preheater 120. Conduit 124 is also provided with an extension 125, beyond arm 126 thereof opening into trunk conduit 115, which extension 125 opens through the wall 111 a short distance from the opening to the trunk conduit 115. The return air conduit 124 is further provided with a blower or fan 127, branch 125 having therein a damper 128 of suitable known type for controlling flow of air therethrough and arm 126 also having a damper 129 for controlling flow of air from conduit 124 into the trunk conduit 115. The return air conduit 124 is connected by subsidiary conduits 130 to the collars 92 of the bridge members 90 of the aligned fixtures F. During warm weather the damper 128 is opened and the damper 129 is closed so that, with the fan 127 in operation, warmer air withdrawn from the room and increased in temperature by heat abstracted from the fixtures F is discharged to the atmosphere. Also, during warm weather, the preheater 120 is shut off and flow of heated water through the reheater 123 is replaced by flow of cooled water therethrough, as will appear more fully presently, and coolant is circulated through the cooling coil 122. Under such conditions, the damper 116 being open, the blower or fan 117 delivers cooled air to the fixtures F from which it is discharged into the underlying space or room through the passages 26 of the fixtures, as previously described. It will be understood, of course, that by proper adjustment of the dampers 116, 128 and 129, with resultant mixing of warm air withdrawn from the fixtures with air entering the trunk conduit 115, the air discharged into the room may be tempered so as to regulate its temperature as desired.

The coolant or water inlet nipples 74 of the fixtures F are connected to a pipe or conduit 133 extending from the discharge of a pump 134 of suitable known type. The inlet of pump 134 is connected by a pipe or conduit 135 extending from a water tank 136 which, in practice, is mounted in an elevated position, conveniently on the roof of the building. The conduit 135 is provided with a valve 137 of suitable known type for controlling flow of water therethrough from tank 136 and the conduit or

pipe 133 is provided with a similar valve 138. The valve 138 is disposed between two conduits 139 and 140 connecting conduit 133 to the reheater 123 adjacent the bottom and the top, respectively, thereof. The conduit or pipe 139 is provided with a valve 141 of suitable known type for controlling flow of water therethrough and the pipe or conduit 140 is provided with a similar valve 142 for a like purpose. The outlet nipples 81 of each lengthwise row of fixtures F are connected to one end of a pipe or conduit 143 formed to provide two parallel arms one of which is connected to the nipples 81, the other arm being connected to a common conduit or pipe 144 and provided with a balancing valve or cock 145, of suitable known type, for regulating flow of water or coolant through the conduit 143. The conduit 144 is connected to spray means comprising one or more spray heads 146, the spray means, in practice, being disposed within a cooling or spray tower, conveniently mounted on the roof of the building, and the water from the spray means, cooled by spraying, is delivered to the tank 136, as is known. The conduit or pipe 144 is provided with a valve 147 of suitable known type for controlling flow of water therethrough to the spray means and is connected, at the side of valve 147 away from the spray means, by a branch conduit 148 to the pipe or conduit 135 between valve 137 and pump 134. The branch conduit 148 is also provided with a valve 149 of suitable known type for controlling flow of water therethrough.

During summer or warm weather operation the valves 141, 142 and 149 are closed and valves 137, 138 and 147 are open, the valves 145 remaining open to proper extent to assure flow of water or other coolant through the system. As will be understood from what has been said, the reflector shell members 17 are water jacketed and, during operation of the system in summer or warm weather, water flows from pump 134 through the water jackets of the reflector shell members 17 and thence through the conduits or pipes 143 and 144 to the spray cooling means, the cooled water being returned from tank 136 to pump 134 through the pipe or conduit 135. The heat absorbed by the coolant during its flow through the water jackets of the reflector shell members 17 is released or discharged to atmosphere in the spray tower and the water is cooled during the spraying operation, the cooled water being then returned to the tank 136 and recirculated through the water jackets of the reflector shell members 17. Further, as previously explained, during warm weather or summer operation the dampers 116, 128 and 129 are so adjusted that warm air withdrawn from the room or space being air conditioned, and further heated by heat abstracted from the fixtures during flow of such air therethrough, is discharged to atmosphere and cool air is delivered to the room or space being air conditioned. By dissipating to atmosphere the heat of the room air and the heat derived from the fixtures air conditioning or cooling of the air of the room or space may be accomplished at substantially lower cost than would be possible if the heat contained in the air withdrawn from the room and from the fixtures was retained in the system and not dissipated to atmosphere. The system of our invention effects a material saving in the cost of cooling or air conditioning a room or space during the summer or warm season. During cold weather or winter operation of the system, the valves 141, 142 and 149 are opened and the valves 137, 138 and 147 are closed, dampers 116, 128 and 129 being then appropriately adjusted for delivering to trunk conduit 115 warm air withdrawn from the room or space being air conditioned and heated by flow through the fixtures F. The warm coolant from the water jackets of the fixtures then flows through pipe or conduit 148 to the pump 134 and thence through the reheater 123 and back to the water jackets of the fixtures F. The air warmed by the preheater 120 then flows through the reheater 123, it being understood that the cooler 122 is then cut off, and extracts from re-

heater 123 a substantial portion of the heat of the warmed water flowing therethrough, the warmed air being then delivered into the space or room being air conditioned from the air inlet or supply chamber 29 and the air discharge passages 26 leading therefrom. In that manner, the heat of the air withdrawn from the room, supplemented by heat extracted by such air from the fixtures F, and the heat absorbed by the coolant in the water jackets of the fixtures F, are both utilized for heating the air delivered to the room, effective for conserving heat which would otherwise be wasted and thus effecting a substantial saving in cost of heating of the room or space underlying the ceiling including the fixtures of our invention.

In the above description of the heating and ventilating system, it is assumed that the fittings F are the same as that of FIGURE 2. If fittings the same as that shown in FIGURE 2A are used in the system of FIGURE 8, increased cooling efficiency is obtained. By appropriate adjustment of the dampers, a portion of the air from the chambers 29a above the reflector shells 17 may be returned directly to the room, thereby permitting colder air to be supplied through chamber 29 with cost savings resulting in smaller fans, fan motors, and air duct sizes.

The end compartments 15 of the fixture F may contain wiring associated with the fixture and accessories, which would emit a certain amount of heat. In such cases the finishing strips 16 at the lower ends of the compartments 15 may be provided with suitable slots or openings 152, and the cross partitions 14 may also be provided with suitable openings or slots 153, opening into the return air passages 21 and the return air spaces or passages between the top wall 18 of housing 10 and the top walls 31 of the shell members 17. With such an arrangement, air will be drawn through the compartments 15 and mixed with the air flowing to the conduit 124, to be discharged therefrom to atmosphere or delivered to trunk conduit 115, as required, whereby additional cooling of the fixtures in warm weather, and utilization of the heat emitted from the wiring and accessories in the compartments 15 may be effected in cold weather for heating purposes, thereby effecting a further saving in air conditioning of the room both in summer and in winter.

The air inlet or discharge passages 26 are closed at their ends by the cross partitions 14, as will be clear from FIGURES 2 and 3. Accordingly, the ends of passages 26 are spaced away from the end walls or caps 12 of the fixture so that if the fixtures are disposed in endwise abutting relation, as is sometimes desirable, the sheets or streams of air being discharged downward through the passages 26 will not merge at the end portions thereof so as to cause objectionable down drafts. While that is preferable it is not essential to our invention. If desired the cross partitions 14 may be omitted, in which case the reflector shell members 17 will extend the full interior length of the housing 10, as will be understood. If the partitions 14 are omitted, the end portions of the passages 26 may then be closed by short finishing strips of appropriate width extending from the end walls or caps 12 of housing 10, as will be understood, though such finishing strips may be omitted if desired, under appropriate conditions, in which case the air passages 26 would extend the full length of housing 10. In FIGURES 2 to 7, inclusive, we have shown the water jacketing of one of the reflector shell members 17 arranged differently from that of the other thereof. It will be understood that the water jacketing may be the same for both of the shells 17 or may be different, as desired. We have also shown each of the shells 17 as provided with a sprayed-on coating 154 of a known heat insulating material. That is desirable as assuring that heat radiated by the lamps or fluorescent tubes 34 will be, to large extent, absorbed by the coolant or water flowing through the water jackets rather than being radiated into the space between the housing and the shell members 17. While the insulating

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coating 154 is preferred, it is not essential to our invention and may be omitted if desired.

As above indicated, and as will be understood, changes in detail may be resorted to without departing from the field and scope of our invention, and we intend to include all such variations, as fall within the scope of the appended claims, in this application in which the preferred forms only of our invention have been disclosed.

We claim:

1. In a lighting and ventilating system, a plurality of fixtures having lamps mounted therein and overlying a space to be air conditioned, said fixtures respectively comprising a housing and water jacketed light reflecting shell means therein in spaced relation thereto, and partition members extending between said housing and shell means providing therewith a return air chamber overlying said shell means, a downwardly opening return air passage leading from said return air chamber and a downwardly opening air supply chamber closed to said return air chamber; a trunk conduit having an atmospheric air intake opening, a blower having its intake connected to said conduit, the latter having therein a preheater and a cooling coil and a reheater disposed in the order stated between said opening and said blower, means for delivering air from said blower to said air supply chambers of said fixtures, means for drawing air through said air return passages and chambers of said fixtures and delivering it to said trunk conduit and to atmosphere optionally, and means for optionally circulating water through said shell means and reheater and shunting the water from said shell means around said reheater.

2. In a lighting and ventilating system, a plurality of fixtures having lamps mounted therein and overlying a space to be air conditioned, said fixtures respectively comprising a housing and water jacketed light reflecting shell means therein in spaced relation thereto, and partition members extending between said housing and shell means providing therewith a return air chamber overlying said shell means, a downwardly opening return air passage leading from said return air chamber and a downwardly opening air supply chamber, closed to said return air chamber; a trunk conduit having an atmospheric air intake opening, a blower having its intake connected to said conduit, the latter having therein a preheater and a cooling coil and a reheater disposed in the order stated between said opening and said blower, means for delivering air from said blower to said air supply chambers of said fixtures, means for drawing air through said return air passages and chambers of said fixtures and delivering it to said trunk conduit and to atmosphere optionally, water cooling means, and means for optionally circulating water through said shell means and reheater and around said reheater and through said cooling means.

3. In a lighting and ventilating system, a plurality of fixtures having lamps mounted therein and overlying a space to be air conditioned, said fixtures respectively comprising a housing and water jacketed light reflecting shell means therein in spaced relation thereto, and partition members extending between said housing and shell means providing therewith a return air chamber overlying said shell means, a downwardly opening return air passage leading from said return air chamber and a downwardly opening air supply chamber closed to said return air chamber; a trunk conduit having an atmospheric air intake opening, a blower having its intake connected to said conduit, the latter having therein a preheater and a cooling coil and a reheater disposed in the order stated between said opening and said blower, means for delivering air from said blower to said air supply chambers of said fixtures, means for drawing air through said air return passages and chambers of said fixtures and delivering it to said trunk conduit and to atmosphere optionally, water cooling means including spray means and a tank receiving water from said spray means, and means for

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optionally circulating water through said shell means and reheater and around said reheater to said spray means and from said tank through said shell means.

4. In a combination lighting and ventilating fixture, a downwardly opening housing substantially rectangular in plan and having a top wall and two side and end walls, two downwardly opening light reflecting shell members substantially rectangular in plan mounted in said housing in spaced relation thereto and to each other, said shell members respectively having a top wall and side walls extending to the end walls of said housing with said shell top and side walls respectively spaced from said housing top and side walls, cross partitions spaced from the end walls of said housing and extending between the side walls of said housing and between and about said shell members, said partitions extending from the top wall of said shell members to the top wall of said housing and defining with the latter and said shell members and compartments within said housing, and spaced lengthwise partitions extending between said cross partitions and between said top wall of said housing and the inner side walls of said shell members, said partitions further providing with said housing and shell members two air chambers respectively overlying said shell members and a third air chamber between said shell members, and air take-off and supply conduits connected to said two chambers and to said third chamber respectively, the lower edge portions of said lengthwise partitions being spaced apart and spaced a slight distance from the corresponding side walls of said shell members providing with the inner side walls of said shell members an air flow opening at the under side of said fixture and air flow openings having restricted communication with said air chambers overlying said shell members, the outer side wall of the respective shell members being spaced from the corresponding side wall of said housing defining therewith an air flow opening at the under side of said fixture.

5. In a combination lighting and ventilating fixture, a downwardly opening housing substantially rectangular in plan and having a top wall and two side and end walls, two downwardly opening light reflecting shell members substantially rectangular in plan mounted in said housing in spaced relation thereto and to each other, said shell members respectively having a top wall and side walls extending to the end walls of said housing with said shell top and side walls respectively spaced from said housing top and side walls, cross partitions spaced from the end walls of said housing and extending between the side walls of said housing and between and about said shell members, said partitions extending from the top wall of said shell members to the top wall of said housing and defining with the latter and said shell members end compartments within said housing spaced lengthwise partitions extending between said cross partitions and between said top wall of said housing and the inner side walls of said shell members, said partitions further providing with said housing and shell members two air chambers respectively overlying said shell members and a third air chamber between said shell members, an air supply conduit connected to said third chamber the lower edge portions of said lengthwise partitions being spaced apart and spaced a slight distance from the corresponding side walls of said shell members providing with the inner side walls of said shell members an air flow opening at the under side of said fixture and air flow openings having restricted communication with said air chambers overlying said shell members, the outer side wall of the respective shell members being spaced from the corresponding wall of said housing defining therewith an air flow opening at the under side of said fixture, each of said air chambers having a further air flow opening through the top wall of said housing, an air flow member overlying said housing bridging said third air chamber and connecting said further air flow openings of said air chambers overlying said shell

members, and an air take-off conduit connected to said bridging member.

6. In a lighting fixture, a downwardly opening housing substantially rectangular in plan having a top and end and side walls, two downwardly opening light reflecting shell members substantially rectangular in plan mounted in said housing in spaced relation thereto and to each other, said shell members respectively defining a lamp chamber and having top and side walls spaced from the top and side walls of said housing, spaced partition members extending downwardly from the top wall of said housing between said shell members defining therewith and with said housing two air flow chambers respectively of greater height and width than the respective shell members and overlying the tops and the sides of the latter and opening downwardly at the sides of said housing, said partition members also defining therebetween and with said housing a third downwardly opening air flow chamber, said shell members being of metal having comparatively high heat conductivity and formed with interior coolant passages overlying the tops and sides of said lamp chambers, air take-off conduit means connected to said two air flow chambers, an air supply conduit connected to said third chamber, and means for delivering coolant to and from said coolant passages.

7. In a combination lighting and ventilating fixture, a downwardly opening housing having a top and side walls, two downwardly opening light reflecting shell members mounted in said housing in spaced relation to each other and respectively having a top and side walls spaced from the top and side walls of said housing defining therewith two air chambers overlying the tops and the sides of said shell members and opening downwardly at the sides of said housing, air take-off conduit means connected to said chambers, spaced partitions in said housing extending downwardly from the top wall thereof between said shell members defining therewith and with said housing a third air chamber between said partitions closed to said two air chambers and opening downwardly therebetween, and an air supply conduit connected to said third chamber.

8. In a combination lighting and ventilating fixture, a downwardly opening housing substantially rectangular in plan having a top and end and side walls, two downwardly opening light reflecting shell members substantially rectangular in plan mounted in said housing in spaced relation thereto and to each other, said shell members respectively having top and side walls spaced from the top and side walls of said housing and defining therewith two air chambers respectively of greater height and width than the respective shell members overlying the tops and the sides of the latter and opening downwardly between the side walls of said housing and the adjacent side walls of said shell members, spaced partition members extending downwardly from the top wall of said housing between said shell members defining therewith a third air chamber between said shell members closed to said two

air chambers and opening downwardly between said shell members, an air supply conduit connected to said third chamber, said two air chambers respectively having an air flow opening through the top wall of said housing, an air flow member overlying said housing bridging said third air chamber and connecting said air flow openings of said two air chambers, and an air take-off conduit connected to said bridging member.

9. In a combination lighting and ventilating fixture, a downwardly opening housing substantially rectangular in plan having a top and end and side walls, two downwardly opening light reflecting shell members substantially rectangular in plan mounted in said housing in spaced relation thereto and to each other, said shell members respectively having top and side walls extending to the end walls of said housing with said shell top and outer side walls respectively spaced from said housing top and side walls and defining therewith two air chambers respectively of greater height and width than the respective shell members overlying the tops and the sides of the latter and opening downwardly between the side walls of said housing and the adjacent side walls of said shell members, air take-off conduit means connected to said chambers, cross partitions spaced from the end walls of said housing and extending between the side walls of said housing and between and about said shell members, said partitions extending from the top walls of said shell members to the top wall of said housing and defining with the latter and said shell members end compartments within said housing, spaced lengthwise partitions extending between said cross partitions and downwardly from the top wall of said housing to the inner side walls of said shell members, said lengthwise partitions providing with the housing top wall and said shell members a third air chamber between said shell members, and an air supply conduit connected to said third chamber, the outer side wall of the respective shell members defining with the adjacent side wall of said housing an air passage opening at the underside of said fixture, the lower edges of said lengthwise partition being spaced apart and providing between them an opening at the under side of said fixture, said cross partitions having therein openings into said two air chambers.

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