

May 20, 1958

A. N. GOLDSMITH

2,835,186

AIR CONDITIONING SYSTEM

Filed June 1, 1954

2 Sheets-Sheet 1

Fig. 1.

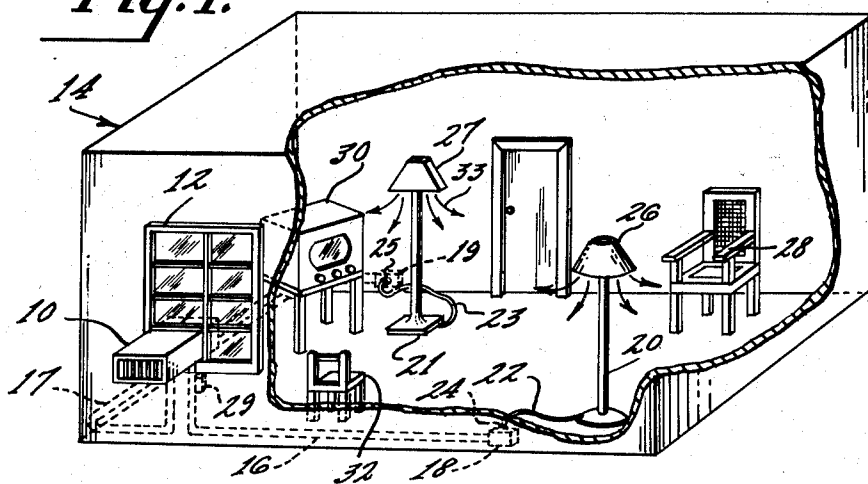


Fig. 2.

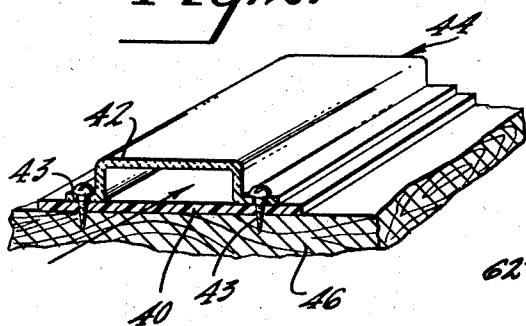


Fig.3.

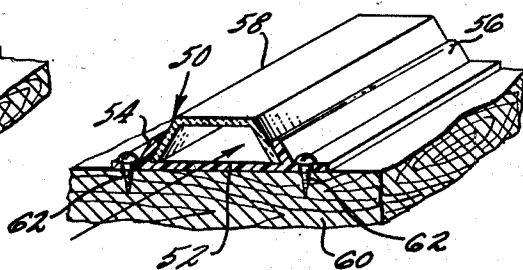
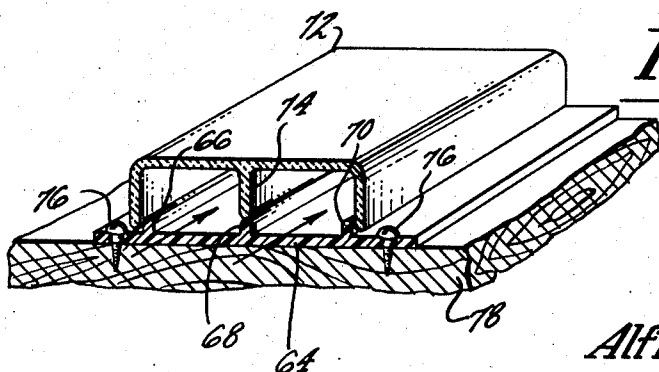


Fig. 4.



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Fig. 5.

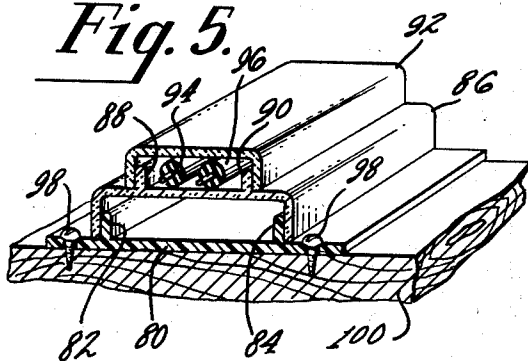


Fig. 6.

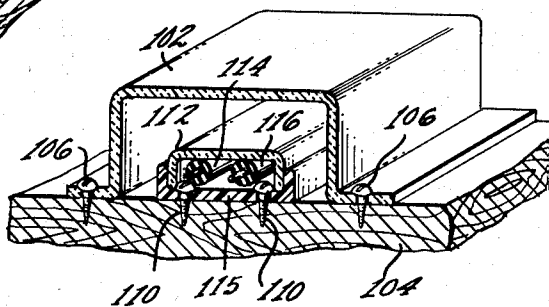


Fig. 7.

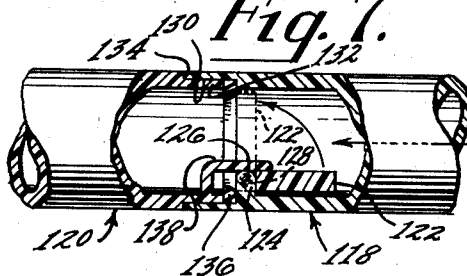


Fig. 8.

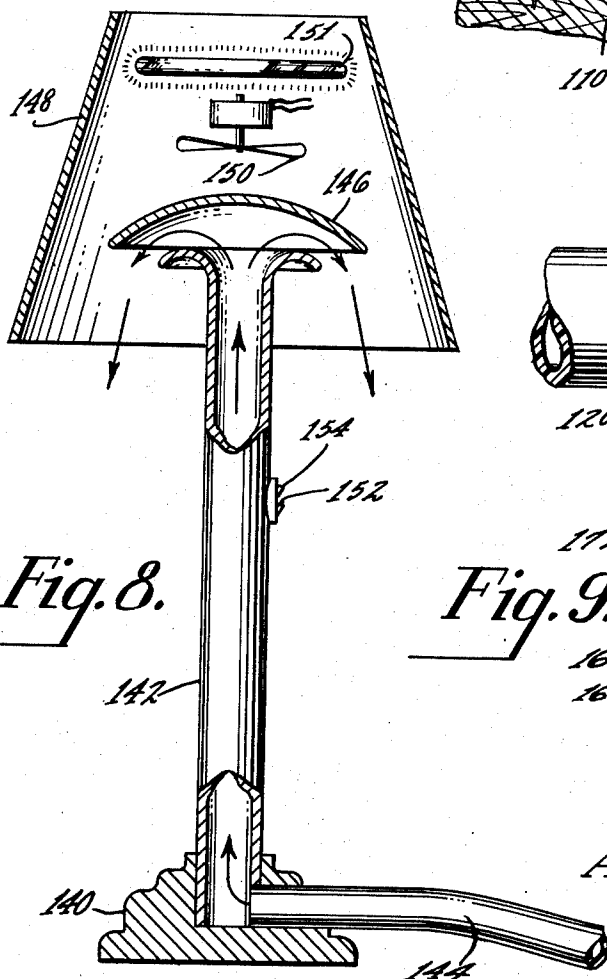
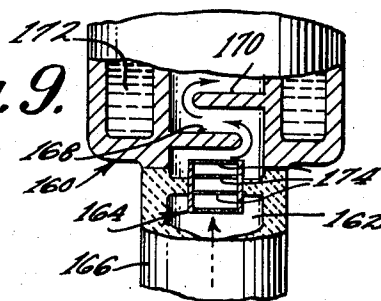


Fig. 9.



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2,835,186

AIR CONDITIONING SYSTEM

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Application June 1, 1954, Serial No. 433,615

5 Claims. (Cl. 98—33)

This invention relates to a novel air conditioning system and more particularly to a novel local or "spot" air conditioning system.

At the present time the rising cost of labor, material, sales, and steadily rising taxes have forced manufacturers to deliver to the consumer goods tending to have a decreased product and service value in comparison to their total cost. To compensate for these increased production costs in a competitive market, it is desirable that the efficiency of the product shall be increased and its cost reduced for a given and desired result. One way of increasing the efficiency of the product is to have it perform its specific job only where required and only to the extent to which it is required. Any product which does more than is needed or does it on a broader scale than is required is particularly undesirable under present conditions.

Room or living-compartment air conditioning as presently practiced is of the volume type. In order to cool an occupant in a segregated portion of the room, a system is provided to cool substantially the entire room. The units are sized, therefore, to cool the entire room rather than cool the immediate zone in which the occupant is seated or active. The present self-contained window type room air conditioner, therefore, may do more than is needed and may do it on a broader scale than is required. This increases the cost to the consumer to a sometimes prohibitive level. The present invention teaches how an individual within a room may be supplied with a zone of conditioned air by much more economical means than the present volume type air conditioning system provides.

An object of this invention is to provide a novel local or "spot" method of economically air conditioning a room or portions thereof and a system therefor.

Another object is to provide novel, convenient and decorative conditioned air outlets for a "spot" air conditioning system.

Still another object is to provide a novel distribution system for a "spot" air conditioning system.

In accordance with the present invention, a room or living compartment is provided with an economical local or "spot" air conditioning system. A primary source of conditioned air is disposed within or closely adjacent to the compartment. This primary source may be a self-contained window type room air conditioner of the well known type. Fixed sockets are disposed at predetermined remote points within the room. Conduits are connected from the primary source to the sockets to conduct or distribute air to these sockets. The sockets therefore may be considered secondary sources of conditioned air. Portable outlets are disposed at selected points within the room. Flexible conduits, which may be supplied hoses, are provided for connecting or plugging these outlets to the sockets. The outlets may be ornamental and may also serve other functions. For example, they may be equipped with low heat-emitting fluorescent light fixtures and be made to resemble floor

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lamps. These portable outlets may be placed in convenient positions to cool the occupants of the room at selected locations within a radius surrounding a fixed socket. They provide concentrated zones of conditioned air within the room.

The primary source may also be disposed at a central location within a house. The conditioned air distributing conduits may be led to various rooms within the house. The portable outlets may be carried from room to room within the house and plugged into a socket in the room in which the occupant is to remain.

Other objects and advantages of the present invention will become apparent to one skilled in the art from a reading of the following specification in conjunction with the drawings of illustrative examples constructed according to the teachings of the present invention in which:

Fig. 1 is a schematic diagram of a local or spot air conditioning system illustrative of the present invention installed in a living compartment of a home;

Fig. 2 is a perspective view partially in cross section of one form of illustrative air distributing conduit;

Fig. 3 is a perspective view partially in cross section of another illustrative conditioned air distributing conduit;

Fig. 4 is a perspective view of still another illustrative air distributing conduit;

Figs. 5 and 6 are perspective views partially in cross section of illustrative combination conditioned air distributing conduits and electrical supply conduits;

Fig. 7 is a view in elevation partially in cross section of an illustrative plug and socket for conditioned air;

Fig. 8 is a view in elevation partially in cross section of an illustrative combination conditioned air outlet and floor lamp; and

Fig. 9 is a schematic diagram of an air purifier and heat exchanger portion of an illustrative air conditioning unit which may be used in or with a primary source of conditioned air.

In Fig. 1 is shown how a local or "spot" air conditioning system may be arranged within a living compartment or room. A self-contained window type room air conditioner 10 is spaced within a window 12 of the room 14. The conditioner 10 may be considered as a primary source of conditioned air. The primary source of conditioned air also may be a centrally located air conditioning unit which supplies each of the rooms with conditioned air through a series of fixed conduits. The cooled and dehumidified air is pumped under pressure from the unit 10 through fixed conduits 16 and 17 to sockets 18 and 19 respectively disposed at predetermined points within the room. The air circulating fan of the conditioner 10 is of sufficient capacity to pressurize the supply of conditioned air. Portable conditioned air outlets 20 and 21 are placed at convenient points within the room. These outlets are connected by flexible or supply conduits 22 and 23 respectively to the outlets. The flexible cables, which may be made of heat-insulating material such as an asbestos or crumpled metal-foil composition, are provided with plugs 24 and 25 respectively for insertion into the sockets 18 and 19.

These portable outlets may be ornamental and serve other functions as well as providing an outlet for conditioned air. For example, they may be made in the form of floor lamps as illustrated. The conditioned air outlets are provided under the air and light deflecting shades 26 and 27 of the lamps. Low heat-emitting lighting fixtures such as the fluorescent type may be installed in the lamp to cut down the heat emitted by the lamp. The lamps may be moved into convenient positions to condition concentrated zones within the room which the occupant desires to remain. For example, if he desires to remain in the chair 28 for an extended period of time, he may easily move the lamp 20 to a position adjacent

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the chair. The lamp, therefore, provides light for reading or for other work, and also provides a stream of conditioned air to cool the immediate zone which the individual occupies.

Should the individual desire to remain in the vicinity of the television set 30 for any extended period of time, the combination lamp and air conditioning outlet 21 supplies a stream of conditioned or cool air in the vicinity of the television set to cool an occupant in this zone. A child, therefore, who may desire to sit in the chair 32 immediately in front of the television set is cooled by the streams of air shown by arrows 33 flowing from the outlet 21.

No attempt as such is made to cool every corner or nook and cranny of the room 14. Air conditioning is deliberately supplied only where needed and only to the extent that it is needed. According to this mode of operation, reduced capacity and size with consequent easier installation of the primary air conditioning source 10 are provided. It is believed that it is possible to substantially reduce the needed cooling capacity of the primary air conditioning source with a corresponding reduction in annoying noise and troublesome drafts.

The primary air conditioner or primary source of cooled air shown in Fig. 1 may be any of the well known types of air conditioners. For example, it may be the compression type self-contained room air conditioner of the window type. Any of the well known refrigeration cycles may be used for cooling the air such as the compression type or the absorption type. The unit may be installed in a window, as shown, to condition a single room or a large central unit may be installed at a central location such as the basement of a building. When this is done, the conduits and the sockets may be permanently installed to supply any of the rooms of the building. The portable outlets may be then moved from room to room as desired. They may be, therefore, used in the living quarters during the day and moved to the bedrooms during the evening. This would, therefore, be an unusually economical way to air condition an entire house.

In a system of the central type, some means, for example a high capacity blower, should be provided to supply the conditioned air to the sockets under adequate pressure. Either a central or window type air conditioning unit may also include means for heating or humidifying the air as well as cooling and dehumidifying. The system including the heat supply feature may be used for supplying small or larger quantities of heat during the periods of the year during which the temperature does not drop too far.

A heat pump type of conditioned air source would be particularly applicable for use in a "spot" or local conditioning system. This unit may be employed as a heat pump on cool days to draw heat from the outside air and supply it to the preselected zones within the room. On hot days, the unit would operate as a cooling device to cool the air in these concentrated zones. Since only a small concentrated portion of air within the room is heated or cooled, the thermal inertia of the objects of large mass making up the room would have little effect on the conditioning system. It is not necessary with the "spot" system to cool the walls of the building themselves in order to cool an individual in a restricted zone within a room of the building.

Another advantage of distributing conditioned air through the conduits rather than some other refrigerant fluid is the freedom from damage if the fluid should escape from the conduit. Air is the least expensive refrigerant fluid known. The only effect of a loss of air from the conduit is, therefore, a reduction in efficiency. Larger leaks would, however, have to be sealed to have the system operate close to its rated efficiency.

In Fig. 1 on the portion of the conduit 16 leading from the conditioning unit 10, a relief valve 29 is provided. This valve may be provided on the primary source

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itself or upon each of the distributing conduits so that the unused conditioned air in excess of that being used is released within the room to generally condition the air within. If no air is being drawn from the sockets, air will escape through the relief valve or valves into the room.

In Figs. 2 and 3 are shown illustrative distributing conduits through which a stream of air passes within one direction as shown by the arrows. In Fig. 2, the conduit is shown to consist of a flat base 40 and a U-shaped cover plate 42. The cover plate is held to the base by screws 43 passing through the flanged ends of the cover plate. The entire conduit 44 may be screwed to a portion of the room which may, for example, to a wooden baseboard 46 by means of the screws 43 extending through and beyond the assembled cover plate and base. The conduit may be made up of a number of sections which may be made to telescope into each other in air tight fashion. The telescoping feature is not shown herein.

In Fig. 3, the conduit 50 similarly provides a passage for the conditioned air stream. The conduit is made up of a base plate 52 which includes parallel sloping projections 54 and 56. A U-shaped cover portion 58 having outwardly sloping legs is provided. These outwardly sloping legs or walls are sprung in position within the parallel sloping projections which extend from the base 52. A conduit for conducting the air is, therefore, provided between the U-shaped cover and the flat base portion of the structure. The base may be fastened to a wooden baseboard 60 or any other part of the structure of the room by means of screws 62. The conduit is, therefore, attached as a unit to the room structure.

Both of the conduits shown in Figs. 2 and 3 may be made of a material which is heat insulated, for example, an asbestos composition. This may be also made of material which is not insulating itself but is covered with a heat insulating material either inside, or outside, or both. An illustrative example of this coated material may be a sheet steel structure with an asbestos base coating, or metal foil between two structural sheets.

In Fig. 4 is shown conduit which may be used where it is desired to return a stream of air to the condenser from the vicinity of the outlet. This would enable the conditioner to be supplied with a supply of air which is pre-conditioned to some extent. In a cooling arrangement the conditioner could in this manner supply air to the outlets at a lower temperature. The structure of this return conduit arrangement is similar to that shown in Fig. 3. A base plate 64 is provided having three projections 66, 68 and 70 extending therefrom and running parallel down the entire length of the base. The two outer projections 66 and 70 provide means for securing a U-shaped cover portion 72 in contact with the base portion. The projections 66 and 70 in this case are arranged to be set inside the legs of the U-shaped cover portion rather than outside as shown in Fig. 3. The legs of the cover are, therefore, sprung in place outside the projections. The central projection 66 lines up with a corresponding central projection or septum 74 extending downward from the center of the cover. These central projections cooperate to divide the conduit into two separate flow channels. One provides flow of air from the conditioner and the other provides a flow back to the conditioner. Screws 76 are provided to fasten the base plate and attached cover to a baseboard 78 or any other part of the room structure. The return air flowing back to the conditioner may be drawn from a portion of the cooled zone at a suitable separation from the outlet from which cooled air from the conditioner passes to the conditioned zone. The same arrangement may be used with heated air from the conditioner when a heated rather than a cooled zone is desired.

For convenience and appearance it may be advantageous to combine the conditioned air distributing conduits with electric power distributing conduits. The electric

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power may be used, for example, for lighting the lamps which may be combined as part of the conditioned air outlets, or to operate air distributing fan motors located on these outlets. In Figs. 5 and 6 are shown two illustrative examples of combined air and electric power distribution conduits.

In Fig. 5 is shown a base plate 80 which is similar in function to the base plates shown in Figs. 3 and 4. Parallel projections 82 and 84 are provided running the length of the plate to provide means for securing the cover of the air distributing portion 86 of the conduit. This cover which may be termed an intermediate cover is U-shaped and has legs which are sprung over the projections 82 and 84 on the base. Additional extended projections 88 and 90 are provided on the upper surface of the intermediate cover 86. The outside U-shaped cover 92 may be sprung in place over these projections 88 and 90 to form a conduit for carrying the electrical cables 94 and 96. The air is, therefore, carried through the inside passageway between the base 80 and the intermediate cover 86 while the electric cables or wires are carried through the outer passageway formed between the intermediate cover 86 and the outer cover 92.

Screws 98 are provided to attach the base and associated conduits with the baseboard 100 or any other suitable part of the room structure.

In Fig. 6 is shown a combined electricity and air distributing conduit in which the conduit for the electric cables or wires is enclosed within the air stream conduit. This arrangement presents the appearance of a single conduit to the observer and may, therefore, be more appealing esthetically. A large flanged U-shaped cover 102 is screwed to the baseboard structure 104 or any other part of the room structure by means of screws 106. Within the center of the conduit formed by the baseboard and the cover 102, a smaller U-shaped cover section 112 is disposed with its legs sprung inside the cooperating U-shaped base section 115. A passageway is, therefore, provided for electric cables 114 and 116 running between these opposed U-shaped sections. The air supply is carried through the interior of the larger flanged cover 102 around the outer periphery of the inner electricity conducting sections. This arrangement has a disadvantage over that shown in Fig. 5 in that the electrical system is less accessible for maintenance and repair. Also the heat generated by passing current through the wires leaks into the cold air stream passing around it. In both Figs. 5 and 6, therefore, a provision should be made for insulating the electricity conducting conduit from the air distributing conduit. This may be easily done by means of the aforementioned asbestos base spray compound or its thermally-insulating equivalent.

The sockets 18 and 19 shown in Fig. 1 provide means for connecting the portable local outlets to the conditioned air supply. They, therefore, may be termed secondary sources of conditioned air. In Fig. 7 is shown an example of one type of socket which efficiently provides a secondary source of conditioned air. The socket is shown as a tubular section 118. A plug 120 for connecting a flexible conduit to a local outlet is shown inserted within the socket 118. The socket 118 has a rotating closure member or lid 122. This member is pivoted on a lug 124 which is secured to an inner portion of the socket. The closure member rotates on a bearing pin 126. A torque spring 128 is provided to urge the member 122 to rotate to a closed position shown as 122₁ (in phantom) when the plug 120 is disconnected from the socket 118. The entrance to the tubular socket 118 is counterbored at 130 to provide a means for insertion of the snout 132 of the plug 120. The snout 132, or entering portion of the plug, is reduced in cross section from the major portion thereof to provide a shoulder 134 which contacts the outer edge of the socket. A gasket 136 which may be a resilient material, for example rubber,

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is provided to form a tight seal between the entering edge of the plug and the shoulder portion of the socket. The gasket also provides a tight seal around the rotating member 122 which is spring urged in the closed position. The plug carries a bayonet-like member 138 which strikes the rotating cover member 122 when the plug is inserted in the socket. This bayonet member, therefore, rotates member 122 into the open position so that air may flow in the direction shown by the arrow from the socket out through the plug.

In Fig. 8, is shown a local conditioned-air outlet which also acts as a decorative floor lamp. The electrical connections are not shown since any system of connection well known in the art may be utilized. Other forms of decorative and functional outlets may be utilized such as table lamps, plant holders, magazine holders, book cases, or the like.

The outlet is constructed of a pedestal base 140 within which is mounted a supporting standard or pole 142. This support pole is hollow to provide a passage for the air stream. A flexible or supple conduit 144 which may be an insulated hose is provided leading into the base of the hollow standard through the pedestal 140. Air passes from the socket through the inserted plug into the flexible conduit. The standard is constructed with a flared upper portion to distribute the conditioned air radially in all directions. A dome shaped cover 146 is placed over the flared outlet to help to direct the streams in an outward and generally downward direction. A lamp shade 148 of standard structure covers the air outlet portions of the apparatus, and also helps direct the air stream in a generally downward direction. A low power air distributing fan 150 may be arranged over the dome shaped portion to direct and help circulate the air in the direction shown. A "Circline" (circular) fluorescent lamp 151 is installed in the upper portion of the outlet to provide light. The fluorescent lamp is used because of its low heat emitting properties for a given light output. Switches 152 and 154 are provided in a normal manner on the outer portion of the standard 142. These switches may be respectively used to control the fan motor and the light. Since the fan is not an essential feature of apparatus, the switch to control it is provided only if a fan is installed.

Another member which may be included in the local outlet is an adjustable means for controlling the angular direction of the outgoing air stream to apply it most effectively. Other features may be adjustable means to control the width of an air stream and a means for controlling the direction and velocity of the air stream. This control may be accomplished either by means of the fan motor or by means of a throttle valve in the conduit within the lamp standard.

In Fig. 9 is shown a schematic diagram of a portion of an illustrative air conditioning unit that may be used as a primary source of conditioned air. A portion of the generator 160 of the well known absorption type refrigerating system is shown surrounding an air flow channel 166. A catalytic air purifier 164, of the type described in U. S. Letters Patent No. 2,664,340 entitled Catalytic Apparatus and Method for Treating Exhaust Gases granted to Eugene V. Houdry on December 29, 1953, is mounted in the center of the inlet flow channel. The inlet section of the flow channel 166 is made of heat insulating material, for example refractory brick, and the generating portion including baffles 168 and 170 are made of a heat conducting material, for example a copper compound. The refrigerant in the liquid form, for example ammonia, is contained in the outer cavity 172 of the generator 160.

As described in the aforementioned Letters Patent, heat is applied to heat the series of plates 174 of the catalytic purifier 164. These plates are covered by substances capable of oxidizing odors and chemical impurities in the air. Means are provided (not shown) to heat these sub-

stances which also gain additional heat during the oxidation process. Air is withdrawn from the room into the inlet flow channel 162 of the primary conditioned air source. It passes through the plates 174 of the catalytic air purifier 164. The heated and purified air then flows into the flow passage passing through the absorption system generator 160. The heat is conducted through the heat conducting walls and baffles 168 and 170 of the generator to aid in operating the absorption refrigerating system. The heat thus made available by the catalyst may be only a portion of the heat supplied to the absorption type refrigerating system but will nevertheless add to the efficiency or output thereof. This system (not shown) cools the air before it is returned to the room through the secondary source sockets and portable outlets. The waste heat from the purifier is, therefore, applied to assist in operating the refrigerating system. An alternative arrangement also may be constructed where the waste heat from the heater unit of an absorption cooling unit is applied to raise the temperature of a catalytic air purifier.

Illustrative embodiments have been shown and described of the overall system for local or "spot" conditioning a room or an entire house. Specific details of portions of the system which play a vital part in making this "spot" conditioning system workable have also been shown and described.

What is claimed is:

1. A spot air conditioning system comprising an air conditioning unit for cooling a room or the like and having means for cooling and dehumidifying the air and means for propelling the air from a housing for said unit, said housing having an air outlet and an air inlet, a plurality of air conduits extending from the outlet of said housing, the said conduits extending to predetermined connection outlets in said room, each of said outlets having an outlet fixture provided with a tubular body having an air closure therein, said tubular body having a bore and a counterbore containing a sealing ring projecting into said bore to form an air sealing seat for said closure, and resilient means for urging said closure to the closed position, and an air discharging outlet member for use in attachment to any one of said outlet fixtures to effect a local spot air conditioning at a point near the user without cooling substantially the balance of the room, said outlet member having a complementary connection fixture carried by the end of a flexible air hose, and said complementary fixture having a reduced portion fitting in said counterbore and engaging the other side of said sealing ring, the said complementary connection fixture having a closure engaging member projecting from its end to engage said closure and open it as the fixtures are joined.

2. A spot air conditioning system comprising an air conditioning unit for cooling a room or the like and having means for cooling and dehumidifying the air and means for propelling the air from a housing for said unit, said housing having an air outlet and an air inlet, a plurality of air conduits extending from the outlet of said housing, the said conduits extending to predetermined connection outlets in said room, each of said outlets having an outlet fixture provided with a tubular body having an air closure therein, said tubular body having a bore and a counterbore containing a sealing ring projecting into said bore to form an air sealing seat for said closure, and resilient means for urging said closure to the closed position, and an air discharging outlet member for use in attachment to any one of said outlet fixtures to effect a local spot air conditioning at a point near the user without cooling substantially the balance of the room, said outlet member having a complementary connection fixture carried by the end of a flexible air hose, and said complementary fixture having a reduced portion fitting in said counterbore and engaging the other side of said sealing ring, and an air dis-

tributing terminal fixture connected to said flexible hose and having a further conduit carrying the air upwardly to head level of a user where air is discharged from the terminal fixture, said terminal fixture having a base and a hollow column forming a conduit upwardly open, and a concave deflector centrally located above the terminal outlet to direct air downwardly from the deflector on the user, and an auxiliary upwardly tapered shield surrounding and spaced from the deflector for confining the air stream for downward motion and permitting additional air to be drawn from above the deflector to be mixed with the conditioned air.

3. A spot air conditioning system comprising an air conditioning unit for cooling a room or the like and having means for cooling and dehumidifying the air and means for propelling the air from a housing for said unit, said housing having an air outlet and an air inlet, a plurality of air conduits extending from the outlet of said housing, the said conduits extending to predetermined connection outlets in said room, each of said outlets having an outlet fixture provided with a tubular body having an air closure therein, said tubular body having a bore and a counterbore containing a sealing ring projecting into said bore to form an air sealing seat for said closure, and resilient means for urging said closure to the closed position, and an air discharging outlet member for use in attachment to any one of said outlet fixtures to effect a local spot air conditioning at a point near the user without cooling substantially the balance of the room, said outlet member having a complementary connection fixture carried by the end of a flexible air hose, and said complementary fixture having a reduced portion fitting in said counterbore and engaging the other side of said sealing ring, and an air distributing terminal fixture connected to said flexible hose and having a further conduit carrying the air upwardly to head level of a user where air is discharged from the terminal fixture, said terminal fixture having a base and a hollow column forming a conduit upwardly open, and a concave deflector centrally located above the terminal outlet to direct air downwardly from the deflector on the user, and an auxiliary upwardly tapered shield surrounding and spaced from the deflector for confining the air stream for downward motion and permitting additional air to be drawn from above the deflector to be mixed with the conditioned air, and said shield forming a lamp shade and partially housing a low heat output electric lamp.

4. A spot air conditioning system comprising an air conditioning unit for cooling a room or the like and having means for cooling and dehumidifying the air and means for propelling the air from a housing for said unit, said housing having an air outlet and an air inlet, a plurality of air conduits extending from the outlet of said housing, the said conduits extending to predetermined connection outlets in said room, each of said outlets having an outlet fixture provided with a tubular body having an air closure therein, said tubular body having a bore and a counterbore containing a sealing ring projecting into said bore to form an air sealing seat for said closure, and resilient means for urging said closure to the closed position, and an air discharging outlet member for use in attachment to any one of said outlet fixtures to effect a local spot air conditioning at a point near the user without cooling substantially the balance of the room, said outlet member having a complementary connection fixture carried by the end of a flexible air hose, and said complementary fixture having a reduced portion fitting in said counterbore and engaging the other side of said sealing ring, and an air distributing terminal fixture connected to said flexible hose and having a further conduit carrying the air upwardly to head level of a user where air is discharged from the terminal fixture, said terminal fixture having a base and a hollow column forming a conduit upwardly open, and a concave deflector

centrally located above the terminal outlet to direct air downwardly from the deflector on the user, and an auxiliary upwardly tapered shield surrounding and spaced from the deflector for confining the air stream for downward motion and permitting additional air to be drawn from above the deflector to be mixed with the conditioned air, said shield forming a lamp shade and partially housing a low heat output electric lamp, and a downwardly directed electric air fan above said deflector for counteracting upward convection air currents and feeding air downwardly.

5. A terminal discharge fixture for use with a spot air conditioning system comprising a base and a hollow column, forming a conduit upwardly open, and a concave deflector centrally located above the terminal outlet to direct air downwardly from the deflector on the user, and an auxiliary upwardly tapered shield surrounding and spaced from the deflector for confining the air stream for downward motion and permitting additional air to be drawn from above the deflector to be mixed with the conditioned air, said shield forming a lamp shade and partially housing a low heat output electric lamp, and a downwardly directed electric air fan above said de-

flector for counteracting upward convection air currents and feeding air downwardly.

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