

Oct. 16, 1945.

A. D. AMES

2,386,883

UNIT COOLER

Filed Oct. 3, 1940

4 Sheets-Sheet 1

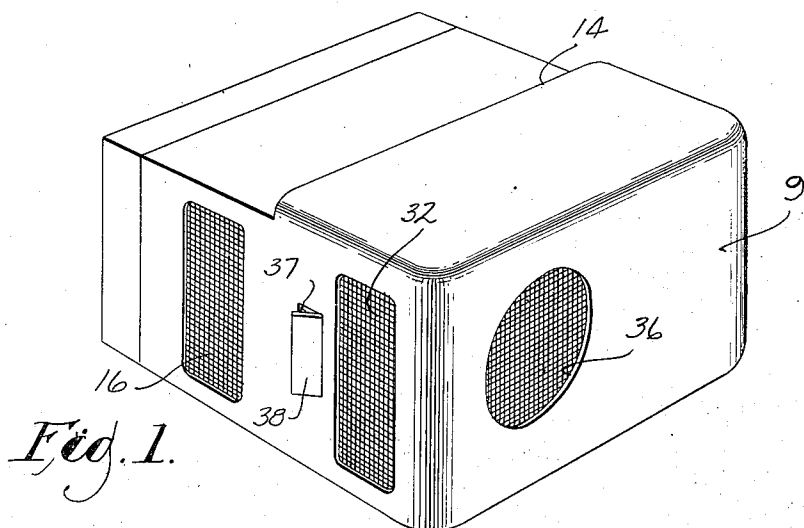


Fig. 1.

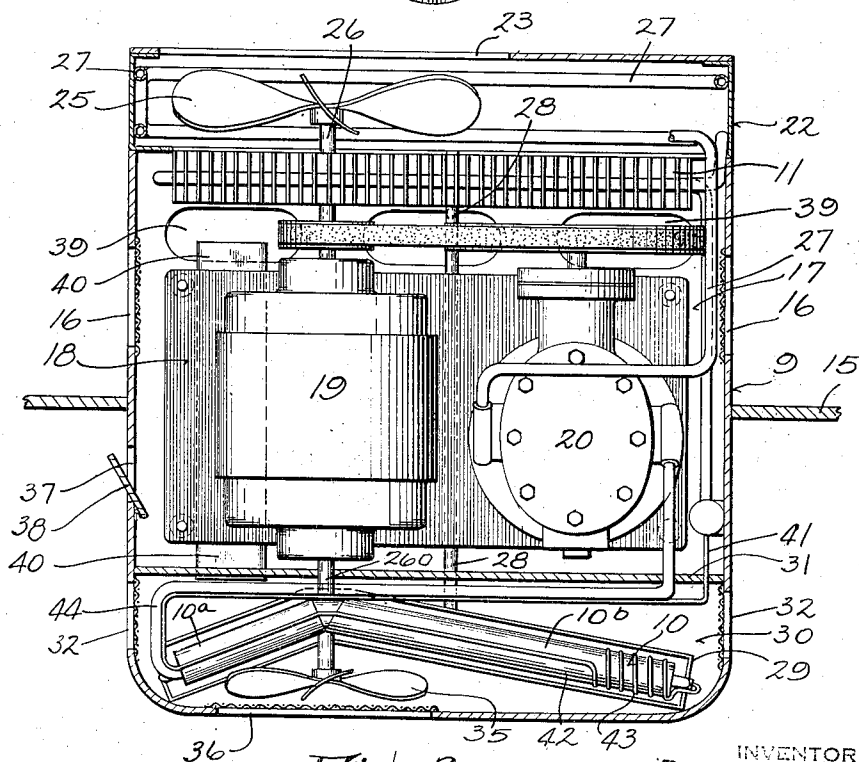


Fig. 2.

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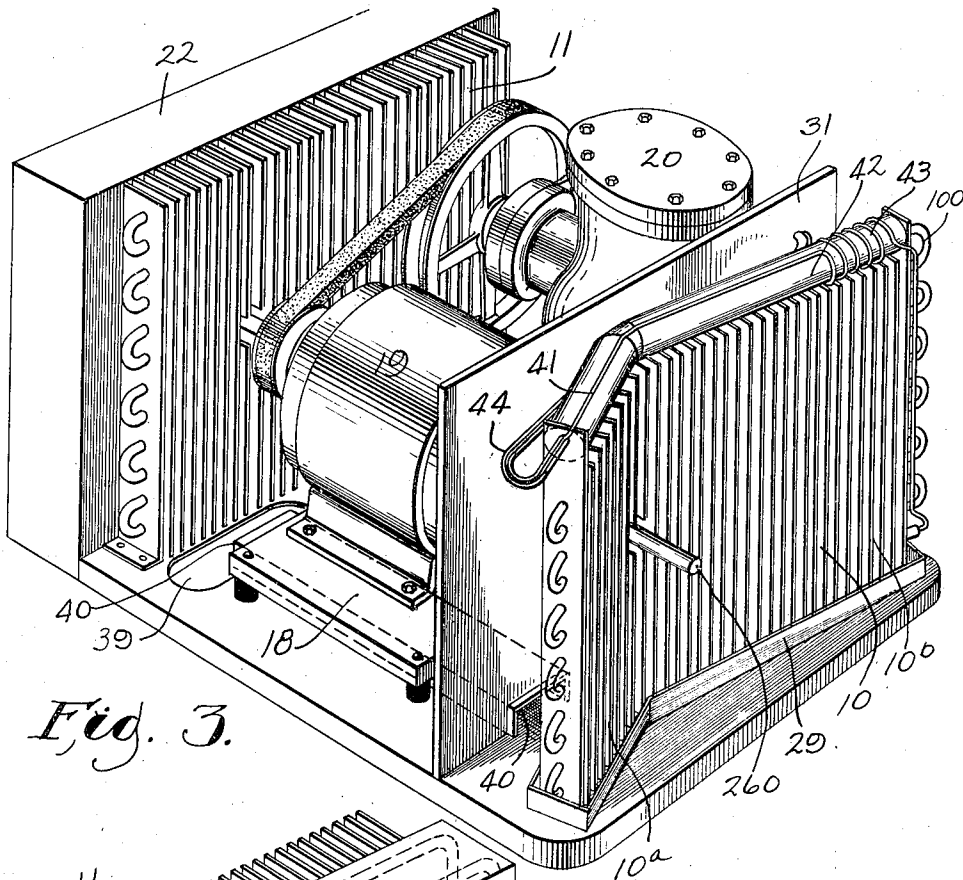


Fig. 3.

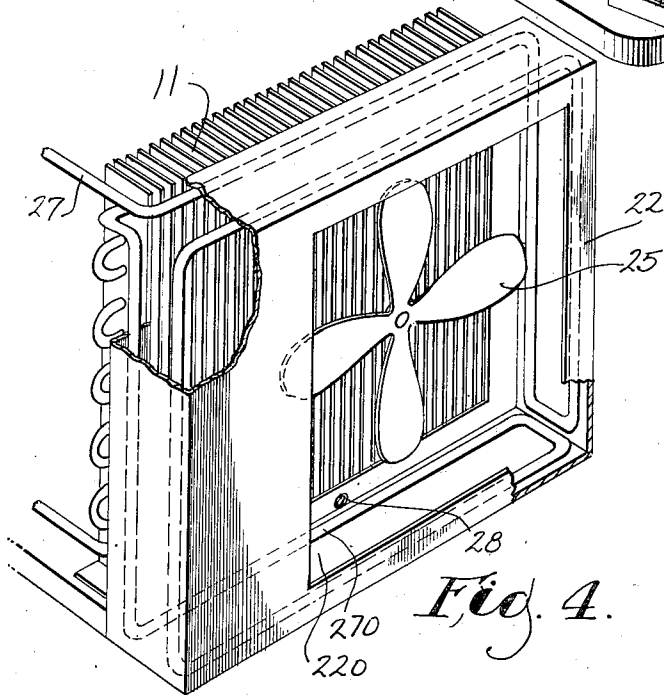


Fig. 4.

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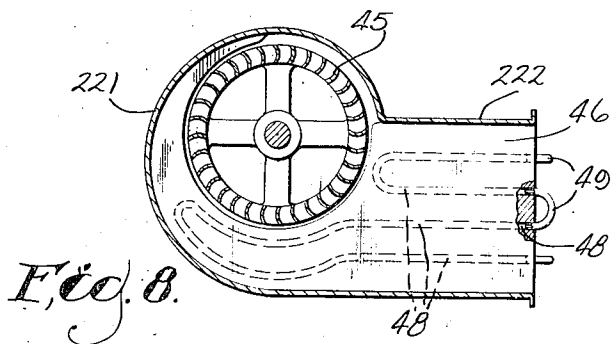
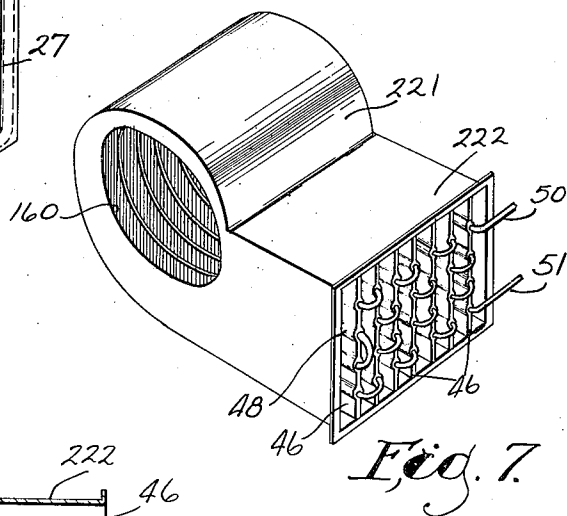
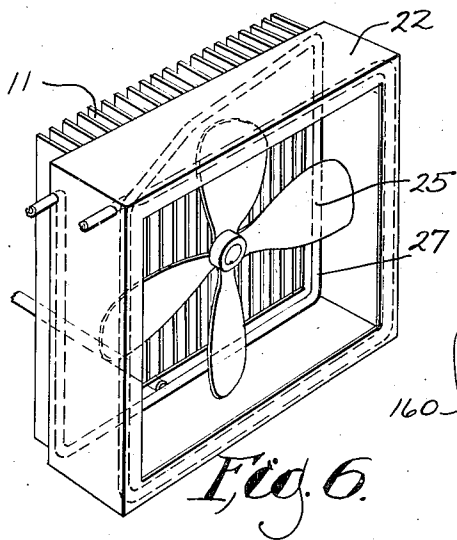
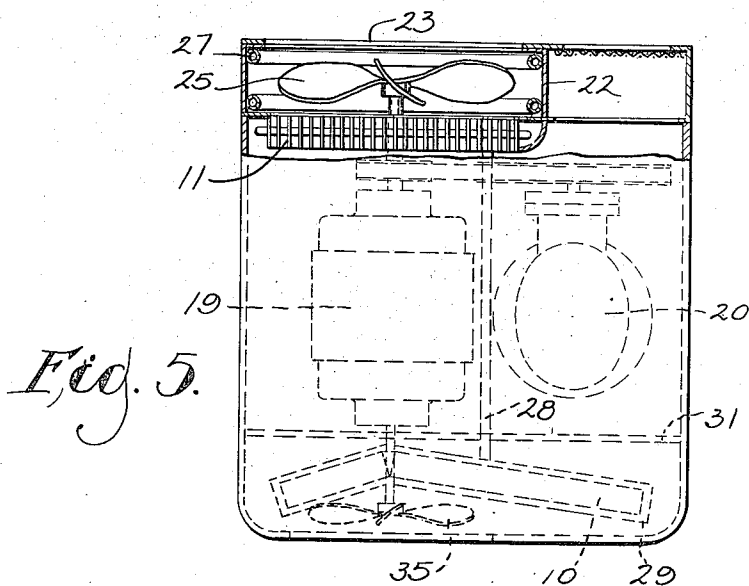
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4 Sheets-Sheet 4

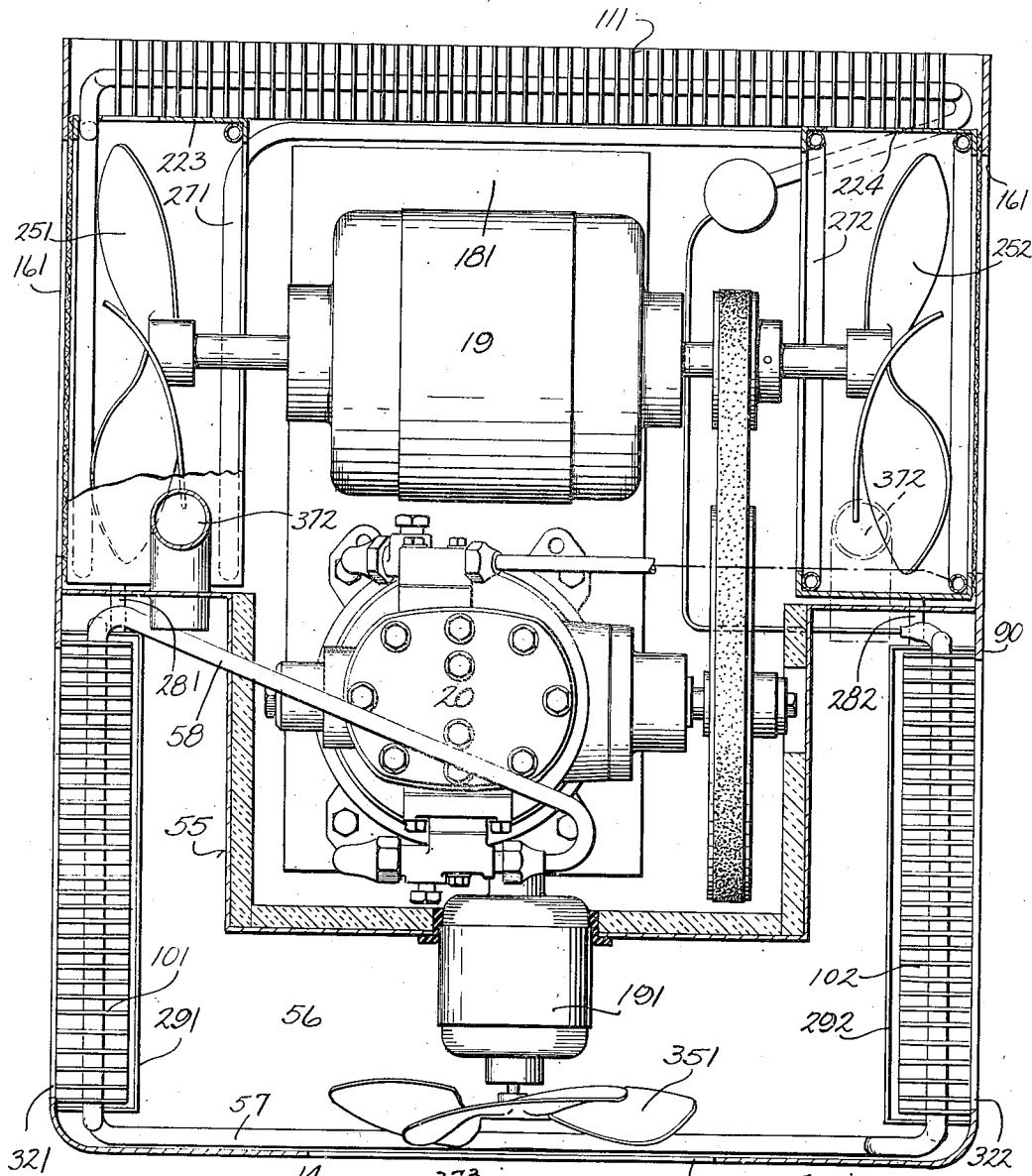


Fig. 9.

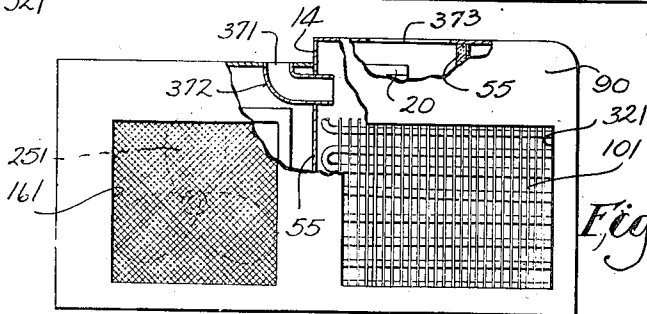


Fig. 10.

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UNITED STATES PATENT OFFICE

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UNIT COOLER

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Application October 3, 1940, Serial No. 359,523

29 Claims. (Cl. 62—140)

This invention relates to improvements in unit coolers of the type adapted to be mounted in a window or other opening to absorb heat from the air of a room and to dissipate such heat to the outside air.

One of the primary objects of the present invention is to greatly increase the heat exchange capacity of a device of this character by utilizing for heat exchange purposes the shroud of a circulating fan. More particularly stated, it is proposed by the present invention to greatly increase the efficacy of the condenser portion of the apparatus by passing about the shroud in intimate heat conductive relation thereto the pipe leading from the compressor whereby the hottest refrigerant delivered from the compressor is subjected to a scouring action involved in the circulation of air by the fan into intimate heat absorbing relation to the fan shroud, whereby much of the heat of the refrigerant is delivered to the shroud and thence to the circulated air before the refrigerant ever reaches the condenser proper. In this connection, it is my further purpose to so devise the shroud and the circulating pipes for the refrigerant as to provide within the shroud a pan into which condensate from the evaporator portion of the apparatus is delivered to be heated by the hot refrigerant just emerging from the compressor, whereby not only to cool such refrigerant but to facilitate the evaporation of the condensate and its dissipation by the fan.

A further major objective of the invention is the reduction of noise in the operation of a unit cooler of the character described. In this connection, it is a purpose of the invention to provide a novel and improved disposition of the evaporating or cooling radiator with reference to the fan which propels room air thereover, the arrangement being simple, inexpensive and yet of greatly increased efficiency and greatly reduced noise.

Other objects of the invention will be apparent from the following disclosure.

In the drawings:

Fig. 1 is a view in perspective showing the external appearance of a unit cooler embodying the invention.

Fig. 2 is a detail view of a mechanism as it appears in plan with the case shown in horizontal section to expose the interior construction and certain portions of the mechanism also shown in section.

Fig. 3 is an enlarged view in perspective of the

operating portions of the mechanism with its housing completely removed.

Fig. 4 is a fragmentary detail view in perspective of the condenser section of the mechanism with portions of the shroud broken away to expose the construction.

Fig. 5 is a view partially in plan and partially broken away to horizontal section showing a modified disposition of the parts.

Fig. 6 is a fragmentary detail view similar to Fig. 5 showing in perspective the condenser portion of the modified opening.

Fig. 7 is a view in perspective diagrammatically illustrating, partially separated, the component parts of a modified embodiment of the invention using a blower as distinguished from a propeller type of fan in a shroud serving as the heat exchange function.

Fig. 8 is a horizontal cross section of the fan illustrated in Fig. 7.

Fig. 9 is a detail view of the mechanism of a modified and preferred embodiment of the invention as it appears in plan with the case shown in horizontal section, as in Fig. 2.

Fig. 10 is a view partially in side elevation and partially in vertical section showing on a reduced scale the preferred device illustrated in Fig. 9.

Like parts are identified by the same reference characters throughout the several views.

The casing or cabinet 9 illustrated in Figs. 1 and 2 is of a type which is normally placed on a window sill and provided interiorly with an evaporator 10 over which room air is circulated and a condensing radiator 11 over which exterior air is circulated.

As shown, both the evaporator radiator 10 and the condenser radiator 11 are of the type having closely adjacent fins which would occasion considerable noise if fans operated in proximity to them to drive, rather than suck, the air through the radiators.

The top of the casing 9 is shouldered at 14 to provide an abutment for the lower rail of a window sash. Ordinarily, a partition 15 in which the casing 9 is set fills the remainder of the window opening. Outside of the partition 15 exterior air is admitted to the interior of casing 9 through the side openings 16, which are previously described. This air reaches an interior compartment 17 in which a suitable base 18 supports motor 19 and the compressor 20 driven thereby.

The outside air admitted to the casing through the side openings 16 can escape therefrom only

through the radiating condenser 11 through which such air is admitted to the fan shroud 22 having a rearwardly directed opening 23 before which fan 25 operates on the extended end of the motor shaft 26.

I have found that a fan, drawing or sucking air through a radiator such as that used for the condenser 11, makes far less noise than would be made by the same fan rotating in like proximity to a radiator and driving air therethrough. Thus, despite the fact that the air moved is substantially the same in either instance, the noise level is greatly reduced by placing the fan on the outside of the radiator.

At the same time, the disposition of both heat and condensate water is greatly enhanced by this position of the fan and the arrangement of the shroud 22 as hereinafter described.

It will be noted from Fig. 4 that the shroud 22 is rectangular in elevation. No effort is made to round the corners. As a result, the rotation of the fan 25 tends to create eddy currents at the corners of the shroud and these eddy currents bring into intimate contact with the metal of the shroud a scouring current of air set in motion by the fan. Such air rapidly removes from the shroud the heat delivered thereto by a refrigerant pipe 27 which passes in one or more coils about the shroud in thermally conductive, bonded relation thereto from compressor 20 to the condensing radiator 11.

One coil or portion 270 of the pipe 27 which brings hot refrigerant from the compressor lies in the lowermost portion 220 of the shroud 22. Such portion 220 of the shroud is closed to constitute a water retaining trough into which condensate is delivered through a pipe 28 from a pan 29 beneath the evaporator 10. Thus, heat from the hot refrigerant is not only given to the shroud and thence delivered to the air stream, but is also delivered to condensate in the trough portion 220 of the shroud, thus raising the temperature of the condensate to a point where the aforesaid eddy currents created by the rotation of the fan blades in a circular path within a rectangular shroud will readily carry off water in the form of vapor. The fan blades rotate in a path which is below the level of the top margin of the trough portion 220 of the shroud 22 and, consequently, if the water should reach an excessive depth in the trough portion of the shroud without being evaporated in the aforesaid manner, the water would be struck by the tips of the blades of fan 25 and in this manner atomized by impact and thrown from the apparatus.

The evaporator 10 and pan 29 are located in a chamber 30 which is separated from chamber 17 of the apparatus by a partition within the case 9. Room air, that is to say air from within the wall or partition 15, is admitted to chamber 30 through lateral means 32 which are preferably described as shown. The space in compartment 30 is extremely limited and in order to make effective use thereof and still to have the circulating fan 35 outside of the evaporating radiator 10, the motor shaft is extended at 260 on through the partition 31 and through the radiator 10 and the radiator 10 is formed to provide two angularly related portions 10a and 10b joined at an apex at or near the vertical plane of the motor shaft extension 260 upon which fan 35 is mounted. As a result, the fan is mounted in the angle between the obliquely disposed radiator sections 10a and 10b. The air from one of the lateral inlets 32 is drawn through the evaporator radiator section 10a and the air

from the other of the lateral inlets 32 is drawn through section 10b. The air from both sections is returned to the room through the opening 36 in the casing, such opening preferably being screened.

Some exchange of air from the room to the out of doors is provided for, if desired, by means of an opening 37 in the side of the casing leading from the interior side of partition 15 to the casing 17 from which air normally admitted from the outside of partition 15 is withdrawn by fan 25. The suction of fan 25 keeps compartment 17 under partial vacuum so that some room air will be drawn out through opening 37 subject to the control of a hinged door or valve 38.

Both of the radiators used for the condenser and the evaporator sections of the device are preferably of the continuous tube type and provided with fins for assisting in heat exchange. In both instances, the fact that the fan is located on the delivery side of the radiator toward which air circulation occurs is of great assistance in reducing the amount of noise occasioned by movement of the fan.

Additional air for cooling purposes is admitted to compartment 17 from a point outside of the partition 15 through the bottom openings provided at 39 in the casing 9. From the immediate proximity of one of these bottom openings, a passage 40 leads beneath the motor base 18 through partition 31 into compartment 30 to deliver outside fresh air to fan 35 for the replenishment of the room air which may be withdrawn through the opening 37 as above described.

The refrigerant cooled in the pipe 27 of shroud 22 and condensed in the condenser radiator 11 is delivered through a capillary tube or other controlling means 41 to an accumulator 42 which may lie upon the top of the evaporator radiator 10 to receive refrigerant from the top coil 100 thereof. A portion of the capillary tube 41 may be wound or coiled at 43 about the accumulator 42 en route to its point of entry into the evaporator at the bottom thereof as shown in Fig. 3. From the accumulator 42 a return pipe 44 leads back to the compressor 20 to complete the closed refrigeration circuit.

In the construction shown in Figs. 2 and 4, it will be noted that due to the location of the two fans 25 and 35 on the extended motor shaft and the disposition of the motor at one side of the casing, each of the fans is located off center with respect to its associated radiator. It is frequently advantageous, particularly in the case of the fan 25, to have the fan off center with respect to the shroud 22 in which it operates inasmuch as the eddy currents above referred to and their operation above described are increased by this arrangement. However, in certain designs it may be advantageous to have the fan symmetrically located with respect to its shroud 220 and such an arrangement is shown in Figs. 5 and 6.

For other purposes it may be desired to substitute a fan of the blower type for the propeller type of fan here shown and previously described. In Figs. 7 and 8, I have shown an arrangement in which the blower type impeller or fan 45 is used to circulate the condensing air through a housing or shroud 221. The impeller may be of the Sirocco type, as indicated in Fig. 8, supplied with air through axially arranged admission ports 160. The housing 221 is preferably of volute form having a wall progressively increasing in radius and delivering the air to a tangential outlet portion 222.

A feature of the device consists of the use of partition vanes at 46 which are preferably parallel and substantially uniformly spaced in the delivery portion 222 and extended about the volute wall of the fan housing 221 in the manner shown in Fig. 8. Within the several partition vanes are pipes which are cast or molded as indicated at 48 and these are connected in series by external fittings 49 to provide for the circulation of refrigerant through the passages in a continuous series supplied by pipe 50 and leading outwardly through pipe 51. In a device of this character, the heat exchange surfaces of the circulation passages are so extended by the vanes 46 that this device need not be supplemented by a radiator as in the case of the devices shown in Figs. 1 to 6 inclusive.

The embodiment shown in Figs. 9 and 10 is preferred for many purposes because of its simplicity, efficiency, and low level of noise. It achieves these advantages by reason of construction which is quite distinct from that usually followed.

The casing 90 has a radiating condenser 111 extending completely across the back of the casing and providing an inlet for cooling air.

The air drawn into the casing through the condensing radiator 111 is expelled laterally through side openings 161 by means of two fans 251 and 252 mounted on the ends of the armature shaft of the motor 19. It will be noted that the motor 19, instead of being arranged with its armature shaft disposed longitudinally, in accordance with conventional practice, is set with its armature shaft transverse so that the oppositely pitched fans 251 and 252 will expel air in opposite directions laterally from the housing. Since the fans are completely removed from the vicinity of the radiator 111, it will be obvious that there will be no noise resulting from interaction of the blades with the fins of the radiator. The fans 251 and 252 are provided with shrouds 223 and 224 about which extend the coils 271 and 272 as above described. While the coils may be connected either in series or in parallel, the series connection, as disclosed, is preferred, coil 272 of shroud 224 being connected directly with the output of the compressor 20 and coil 271 of shroud 223 being connected into the condensing radiator 111.

As previously described, the bottom portion of each of the shrouds constitutes a trough into which condensate is delivered for expulsion by the fans 251, 252 either in the form of vapor or in the form of an atomized liquid.

In this preferred embodiment of the invention, there are two separate evaporators 101 and 102 located along opposite sides of the housing 90 in close proximity to respective shrouds 223, 224, but separated therefrom by the partition 55. The evaporators 101, 102 span the lateral inlets 321 and 322 through which room air is drawn into the chamber 56 wherein a separate motor 191 operates the circulating fan 351 to discharge the cooled room air from the housing 90 through the return opening 361. Beneath the evaporators 101 and 102 are pans 291 and 292, respectively, such pans being connected by pipes 281, 282 into the respective shrouds 223, 224 which, as above noted, lie directly at the other side of the partition 55. Any desired arrangement such as the capillary tube, like that shown at 41 in Fig. 2, may be employed to restrict the flow from the condenser 111 to the evaporators. The evaporators may be connected to the capillary either

in parallel or series, the series connection being illustrated. From the capillary the refrigerant flows into the evaporator coil 102 and thence through the series connecting pipe 57 into the evaporator coil 101, from which the return pipe 58 carries the refrigerant back to the compressor to complete the closed circuit.

The bed 181 carries the motor 19, the compressor 20 and the motor 191 in an extremely compact arrangement which makes a maximum amount of space available in the rest of the cabinet 90 for air circulation along the lines above described.

Where exchange of air between the room and the exterior atmosphere is desired, it can also be provided for very conveniently due to the novel organization and design of the parts. The exterior dimensions and form of the cabinet 90 are preferably similar to those of the cabinet 9 as shown in Fig. 1. Immediately outside of the shoulder 14 engaged by the window sash is a pair of openings 371 from which elbowed pipes 372 lead into the chamber 56 so that under the suction produced in said chamber by the operation of the fan 251 outside air will be drawn into the chamber and there mixed with the recirculated and chilled room air for delivery to the room.

The offset in partition 55 which accommodates the compressor 20, as shown in Fig. 9, makes it possible to withdraw air from the room by means of fans 251, 252. The chamber in which the motor 19 and compressor 20 are located may have an opening 373 leading downwardly directly over the compressor 20 whereby room air may be withdrawn by the fans 251, 252 and expelled out of doors.

In each of the several devices herein disclosed, the shroud or housing about the fan would be desirable in any event as a means of controlling the air set in motion by the fan. In each of the constructions herein disclosed, the utility of these shrouds or housings is increased by the additional function of heat exchange. In the construction shown in Figs. 2 and 5, I have shown the heat exchanging fan shroud or housing used only for heat dissipation, but it will be understood that the same principles might be applied for heat absorption if desired. In the unit coolers, there is a greater advantage in the use of the construction for heat dissipation and for heat absorption. In the blower fan arrangement disclosed in Figs. 7 and 8, however, it is contemplated that the shroud or housing may be used for heat exchange either for the purpose of dissipation or absorption of heat. In any event, the scouring action of the air currents set in motion by the fan contributes materially to the heat exchange.

I claim:

1. In a unit cooler of the character described, the combination with a compressor and a motor having a shaft operatively connected to the compressor for the actuation thereof, of a fan mounted on said motor shaft, a radiator condenser having an aperture through which said motor shaft extends, said fan having blades so pitched as to draw air through said radiator condenser, a shroud enclosing said fan, said radiator condenser being disposed in the path of air drawn to said fan and said shroud being adapted to constrain the fan to draw air through the radiator condenser, and a conduit leading from said compressor to said radiator condenser and having an intermediate portion extending in a coil about at least a part of the path of rotation of said fan and supported on said shroud in thermally con-

ductive relation thereto, whereby said shroud facilitates heat exchange between said conduit and the air withdrawn by the fan through the condenser, together with an evaporator, a pipe affording communication between the condenser and the evaporator, a trough in the lower portion of said shroud and over which air set in motion by said fan is moved, and means for delivering to said trough condensate accumulating on the evaporator, at least a portion of said conduit being in thermally conductive relation to said trough.

2. In a device of the character described, the combination with a compressor and a motor having its shaft extended in both directions from the motor, of operative driving connections from the motor to the compressor, an evaporating radiator having closely spaced fins and through which one end of the extended motor shaft projects, a condenser radiator having closely spaced fins and through which the other end of the extended motor shaft projects, and fans mounted on the ends of the extended motor shafts wholly beyond the respective radiator fins and provided with blades positioned so as to be rotatable in immediate proximity to the radiators and across the edges of the fins thereof and pitched to draw air through the respective radiators.

3. In a device of the character described, the combination with a compressor and a motor having its shaft extended in both directions from the motor, of operative driving connections from the motor to the compressor, an evaporating radiator through which one end of the extended motor shaft projects, a condenser radiator through which the other end of the extended motor shaft projects, each of said radiators comprising fins, and fans mounted on the ends of the extended motor shafts wholly beyond the respective radiator fins and provided with blades pitched to draw air through the respective radiators, at least one of said fans being provided with a shroud enclosing the fan and contiguous to portions of the adjacent radiator whereby to constrain the air drawn by the fan to pass through the radiator.

4. A unit cooler of the character described comprising the combination with a compressor, of a motor having a motor shaft in operative connection with the compressor, said shaft being extended at both ends from the motor, a condenser radiator having an opening through which the shaft extends, a fan mounted on the shaft and provided with blades pitched to draw air through the condenser radiator, a shroud for said fan having a conduit in heat conducted relation to the shroud, said conduit being connected in series between the compressor and the radiator, an evaporator having an aperture through which the other end of the motor shaft extends, a fan mounted on the motor shaft adjacent the evaporator and having blades pitched to draw air through the evaporator, operative refrigeration connections from the condenser to the evaporator and from the evaporator to the compressor, and a housing enclosing the condenser and evaporator and the motor and compressor, said housing being provided with a partition dividing it transversely into two compartments, one of which contains the evaporator and the other of which contains the motor, the compressor and the condenser, each of said compartments having outlets aligned with the motor shaft, and lateral inlets behind the evaporator and condenser respectively.

5. In a device of the character described, the

combination with a casing having an evaporator compartment provided with an end outlet and lateral inlet means, of a fan shaft directed toward said outlet, a fan mounted on a shaft and adapted to propel air toward said outlet, and an evaporator heat exchanger having obliquely disposed sections forming an apex adjacent said shaft within which apex said fan is disposed, the respective sections extending toward the end of the casing at either side of the fan and between the fan and said inlet means and being provided with means closing them to the casing about the fan, whereby air admitted to the casing through the inlet means is constrained to pass through said sections to the fan.

6. In a device of the character described, the combination with a cabinet having oppositely disposed discharge ports in one of its ends and correspondingly disposed lateral intake ports in the other of its ends, of partition means dividing the cabinet between the end having the discharge ports and the end having the intake ports, a power driven transverse shaft extending between said discharge ports and provided with fans for propelling air from said ports, pans associated with the respective fans, expansion coils placed before the respective intake ports of said cabinets and immediately adjacent the respective pans, and means for delivering condensate from the respective expansion coils directly to the respective pans.

7. In a device of the character described, the combination with a cabinet and partition means subdividing said cabinet into an outer compartment and an inner compartment, a motor driven shaft extending transversely of the outer compartment, said cabinet having ports aligned with said shaft, fans on the ends of said shaft for expelling air through said ports, a condenser radiator across the outer end of said cabinet, the outer end of said cabinet having an opening for receiving air into said outer compartment through said radiator for discharge by said fan, shrouds for said fans, the bottom of each shroud comprising a pan adapted to receive condensate, expansion coils disposed along the sides of said cabinet in the inner compartment, pans beneath said expansion coils respectively communicating with the pan portions of the respective shrouds through said partition, said cabinet having ports with which said expansion coils register to refrigerate air admitted to the inner compartment of said cabinet through said last mentioned ports, a power driven fan disposed at the end of said cabinet in the inner compartment and arranged to deliver from said compartment air admitted thereto through said expansion coils, said cabinet having an aperture in its end with which said last mentioned fan is aligned.

8. A device of the character described comprising a cabinet having opposing side openings adjacent its rear end and also adjacent its front end and also having openings in its rear end and its front end, a motor with a transversely disposed shaft provided with fan means for expelling air laterally from the rear side openings of said cabinet, a condenser radiator in the rear end opening of said cabinet in the path of air admitted to said cabinet to be expelled therefrom by said fan means, an evaporator coil in said cabinet adjacent each front side opening thereof in the path of air admitted to said cabinet through said front side openings, fan means for discharging through the front of said cabinet air admitted through the front side openings and

refrigerated in passing said evaporator coils, and refrigeration mechanism in said cabinet operatively connecting said radiator and evaporator coil in closed refrigeration circuit, said cabinet being partitioned between said fans.

9. A device of the character described comprising the combination with a cabinet provided with an opening in its rear end, an opening in its front end, openings in its opposite sides adjacent its rear end, and openings in its opposite sides adjacent its front end, of a partition subdividing said cabinet into compartments with which the front and rear side openings respectively communicate, said partition having an offset toward the front end whereby to enlarge the compartment at the rear of the partition, a compressor within the partition offset, a motor behind the compressor in operative connection therewith and provided with transversely extended motor shaft having oppositely pitched fans arranged to propel outwardly through the side openings of the cabinet near its rear end air from the rear compartment of said cabinet, shrouds about said fans directing the air to said openings, a condenser radiator disposed transversely of said cabinet in the rear compartment thereof across the opening in the rear end of said cabinet in the path of air admitted to said rear compartment to replace air expelled by said fans, coils in thermally conductive relation to the respective shrouds and in operative connection between the compressor and the condenser, evaporators disposed longitudinally of the cabinet before the lateral openings which are located near the front of the cabinet in the path of air admitted through the front compartment of said cabinet to said openings, refrigerator circuit means operatively connecting said evaporators between said condenser and said compressor, and a motor driven fan mounted in front of the opening in the front end of said cabinet and arranged to expel therefrom air admitted to said front compartment through the side openings of said cabinet communicating therewith and refrigerated in traversing said evaporator coils.

10. A device of the character described comprising the combination with a cabinet provided with an opening in its rear end, an opening in its front end, openings in its opposite sides adjacent its rear end, and openings in its opposite sides adjacent its front end, of a partition subdividing said cabinet into compartments with which the front and rear side openings respectively communicate, said partition having an offset toward the front end whereby to enlarge the compartment at the rear of the partition, a compressor within the partition offset, a motor behind the compressor in operative connection therewith and provided with transversely extended motor shaft having oppositely pitched fans arranged to propel outwardly through the side openings of the cabinet near its rear end air from the rear compartment of said cabinet, shrouds about said fans directing the air to said openings, a condenser radiator disposed transversely of said cabinet in the rear compartment thereof across the opening in the rear end of said cabinet in the path of air admitted to said rear compartment to replace air expelled by said fans, coils in thermally conductive relation to the respective shrouds and in operative connection between the compressor and the condenser, evaporators disposed longitudinally of the cabinet before the lateral openings which are located near the front of the cabinet in the path of air admitted through

the front compartment of said cabinet to said openings, refrigerator circuit means operatively connecting said evaporators between said condenser and said compressor, and a motor driven fan mounted in front of the opening in the front end of said cabinet and arranged to expel therefrom air admitted to said front compartment through the side openings of said cabinet communicating therewith and refrigerated in traversing said evaporator coils, together with pans disposed beneath the respective evaporator coils and independently communicating respectively with the lower portions of the contiguous shrouds in the rear compartment of said cabinet.

11. In a device of the character described, the combination with a cabinet having a high inner portion, a lower outer portion, and an intervening shoulder adapted to be abutted by a window sash or the like, of a partition extending transversely of the cabinet and joined to the sides thereof in the vicinity of said shoulder, said partition having an intermediate portion offset forwardly toward the front of the cabinet whereby to provide a relatively large compartment rearwardly of the partition and a smaller compartment forwardly thereof, refrigerator mechanism including a motor, a compressor and a condenser in the rear compartment of the cabinet, and motor driven fan means for circulating atmospheric air over said condenser and expelling it from said rear compartment, evaporator means in operative closed circuit connection with said refrigerator mechanism and condenser and disposed in the front compartment of said cabinet, fan means for circulating room air over said evaporator means, air inlets to the front compartment comprising elbowed connections from the top of the lower section of said cabinet through said partition into the forward compartment thereof for the admission of external air into the stream of refrigerated air circulated by said last mentioned fan means, said cabinet having a port in the top surface of its higher section leading into the rear compartment of said cabinet behind the offset portion of said partition through which port room air is adapted to escape through the rear compartment of said cabinet.

12. In a unit cooler of the character described, the combination with a cabinet having inlet and outlet openings, of a motor and compressor means for circulating air comprising a fan positioned directly in front of the outlet opening and operatively connected with said motor and having propeller type blades pitched to blow air directly through said opening, means associated with a cabinet wall adjacent said opening to provide a substantially square cornered shroud about the path of said fan blades, the corners of said shroud being adapted to establish eddies in the course of blade rotation, a condenser radiator contiguous to said shroud, said shroud and said cabinet walls comprising means for directing through said radiator currents established in the operation of said fan, an evaporator, and closed circuit connections between the compressor, the condenser radiator and the evaporator radiator including a conduit from the compressor to the condenser radiator having at least one convolution extending about the path of fan blade movement and in bonded relation to said shroud.

13. The device of claim 12 in which the bottom of the shroud constitutes a pan in which portions of said conduit are immersed, said evaporator being provided with a water collecting pan having a drain connection to the pan at the bottom of

the shroud for delivery of condensate thereto, whereby such condensate receives heat from said conduit and from air which has traversed said condenser radiator and whereby the heated condensate is evaporated and lifted by eddies created by said fan blades in the corners of said shroud.

14. The device of claim 12 in which said shroud comprises a pan at its bottom and said evaporator radiator has a collecting pan at substantially the same level, together with a tube connecting said last mentioned pan with the pan at the bottom of the shroud through said partition for the delivery of condensate from the evaporator radiator to the shroud pan, said conduit having at least two convolutions extending across the bottom of said shroud pan, one of said convolutions being located adjacent the cabinet wall through which air is discharged from the fan and the other being located behind the path of the fan blades from said wall.

15. Air conditioning apparatus comprising an evaporator, a condenser, a compressor, means for passing air to be conditioned thereby across the evaporator, a conduit for delivering the compressed refrigerant gas from the compressor to the condenser, means for collecting moisture condensed on the evaporator, a conduit for conducting the collected condensate from said collecting means, a shroud made of heat conducting material and having a portion formed to receive said condensate from the second mentioned conduit and hold the condensate in the form of a pool, and a fan having blades within the shroud arranged to dip into the pool and throw a spray of condensate against the walls of said shroud; a portion of the first mentioned conduit being arranged to surround the fan blades, said surrounding portion being bonded to the wall structure of the shroud to transfer heat from the compressed refrigerant to the walls of said shroud.

16. A device of the character described comprising the combination with a cabinet having openings at its respective ends and oppositely disposed pairs of openings in its sides adjacent its respective ends, of a condenser radiator extending across one of the end openings of the cabinet, evaporator radiators extending across the side openings of the cabinet adjacent its opposite end, a partition across the cabinet between its respective pairs of lateral openings, fan shaft means disposed transversely of the cabinet adjacent the condenser radiator, fan means on the fan shaft means pitched oppositely to discharge air through the lateral openings adjacent the condenser radiator whereby to draw air through said condenser radiator, fan shaft means disposed longitudinally of the cabinet between the evaporator radiators, and fan means on the last mentioned fan shaft means pitched to discharge air through the cabinet opening at the end opposite the condenser radiator whereby to draw air into the cabinet through the respective evaporator radiators.

17. The device of claim 16 in which each of the fan means on the transverse fan shaft means is provided with an independent shroud, said condenser radiator having a refrigerant supply pipe leading thereto and bonded in sequence to the respective shrouds.

18. The device of claim 16 in which the respective evaporator radiators are provided with independent collecting pans for condensate, such pans lying immediately adjacent the respective shrouds and respectively communicating therewith for the delivery of condensate individually

from the respective evaporator radiator pans to the respective shrouds.

19. A device of the character described comprising a cabinet adapted to rest on a window sill with an inner end within a building structure and an outer end disposed externally thereof, said cabinet having a sash engageable portion and being provided with a large opening at its outer end, and a pair of lateral openings disposed toward its outer end from its sash engageable portion and with another pair of lateral openings disposed toward its inner end from its sash engageable portion, and an air discharge opening at its inner end, in combination with a condenser radiator in the outer end opening of the cabinet disposed transversely of the cabinet, shrouds in front of each of the lateral openings first mentioned, fans disposed in the respective shrouds and pitched to expel air through said first mentioned lateral openings, a motor provided with a common armature shaft mounting said fans whereby the fans expel air from the shrouds and the interior of the cabinet through the first mentioned lateral openings and draw air into the cabinet through the condenser radiator, a partition extending across the cabinet between the shrouds and the second mentioned pair of lateral openings, evaporator radiators before the openings of the second mentioned pair, and a power driven fan disposed between the evaporator radiators and pitched to expel air from the cabinet through the inner end opening of the cabinet and to draw air into the cabinet through the evaporator radiators.

20. In a room cooler, the combination with a cabinet having openings substantially aligned at corresponding sides of its opposite ends, of a motor in the cabinet having an armature shaft projecting oppositely toward the respective openings, a compressor beside the motor and operatively connected to receive motion from the shaft, fans mounted on oppositely projecting end portions of the shaft and before the respective openings and pitched to expel air through the respective openings, a partition extending transversely of the cabinet adjacent the motor and compressor and through which said shaft extends to one of said fans, and condenser and evaporator radiators in operative refrigeration circuit connection with the compressor and disposed behind the respective fans and provided with means defining an air path through the radiators and about said fans, said cabinet having lateral inlet means for admitting air to traverse said radiators to replace that expelled by said fans.

21. The device of claim 20 in which one of said radiators is disposed between said partition and the fan nearest thereto and comprises two sections in the form of a V with its apex toward the partition and the fan being enclosed between said sections and the end of the cabinet.

22. The device of claim 20 in which the means defining an air path through the respective radiators comprises trough elements beneath each, together with means affording condensate communication between said elements through said partition.

23. The device of claim 20 in which the means defining an air path through the respective radiators comprises trough elements beneath each, together with means affording condensate communication between said elements through said partition, said refrigeration circuit including a hot tube connection from the compressor to the

condenser radiator thermally exposed to reject heat to condensate in the trough beneath the condenser radiator.

24. A room cooler comprising a cabinet adapted for use across the sill of a building opening, with exposed inner and outer ends, a motor in one of said ends with a transverse shaft, a compressor in the cabinet disposed toward the other end and operatively connected to be driven from the motor, fans on opposite ends of the motor shaft and oppositely pitched, the cabinet having lateral ports to which the fans are directed, a radiator extending across the end of the cabinet adjacent the motor, said end having an opening for admitting air through the radiator, a second motor at the other end of the cabinet with an outwardly directed shaft, a third fan on said second motor shaft and pitched to expel air at said other cabinet end, said other end being open at said fan, a partition having a transverse portion between the compressor and the third fan and other portions offset toward the center of the cabinet, a pair of radiators disposed at the sides of the cabinet between the offset partition portions and the said other cabinet end, the cabinet having ports for admitting air through the respective radiators comprising said pair, and refrigeration circuit means operatively connecting said compressor and the respective radiators.

25. The device of claim 24 in further combination with shroud means about the fans first mentioned and disposed adjacent the said offset partition portions, condensate collection means beneath the respective radiators comprising the pair, and means affording communication through the said partition portions between the respective condensate collection means and the respective shroud means at each side of the cabinet.

26. The device of claim 24 in further combination with shroud means about the fans first mentioned and disposed adjacent the said offset partition portions, condensate collection means beneath the respective radiators comprising the pair, and means affording communication through the said partition portions between the respective condensate collection means and the respective

shroud means at each side of the cabinet, said refrigeration circuit means including hot line connections from the compressor to the first mentioned radiator in heat rejecting relation to condensate in said shroud means.

27. The device of claim 24 in which the cabinet has a top provided near its center with a transversely extending shoulder.

28. Air conditioning apparatus comprising the unitary combination of a compressor, condenser means, evaporator means, circulating means for air to be cooled, means for guiding such air in operative heat exchange relation to the evaporator means, means for collecting condensate at the evaporator means, circulating means for cooling air for the condenser means, means for guiding the cooling air in operative heat exchange relation to the condenser means, said last means including shroud means extending at least partially about the circulating means for such cooling air and formed to hold condensate for ejection by the circulating means last mentioned, means for delivering condensate from the collecting means to the shroud means, and operative refrigeration circuit connections between the compressor, condenser means and evaporator means and including a conduit for hot refrigerant leading from the compressor to the condenser means and having a portion in operative heat rejecting relation to the condensate in said shroud means.

29. The device of claim 28 in further combination with a cabinet having apertures for air circulation, the shroud means comprising two shrouds having discharge openings adjacent respective apertures of the cabinet and the evaporator means comprising two radiators adjacent respective shrouds and having individual condensate collecting means opening to the respective shrouds, the first air circulating means comprising fans in the respective shrouds and an intervening motor in said cabinet having a drive shaft on opposite ends of which said fans are mounted.

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