April 9, 1935. H. D. BETZ 1,997,274

UNIT AIR CONDITIONER

Filed March 24, 1930

Fig. 1.

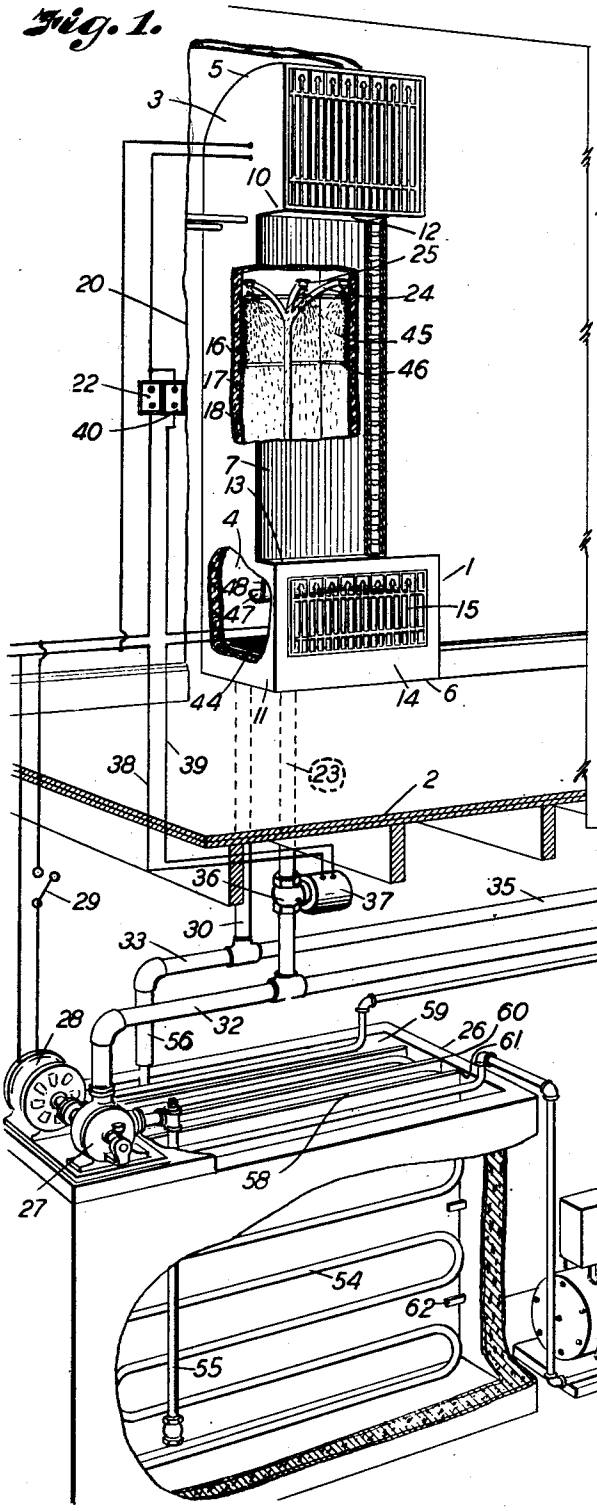


Fig. 2.

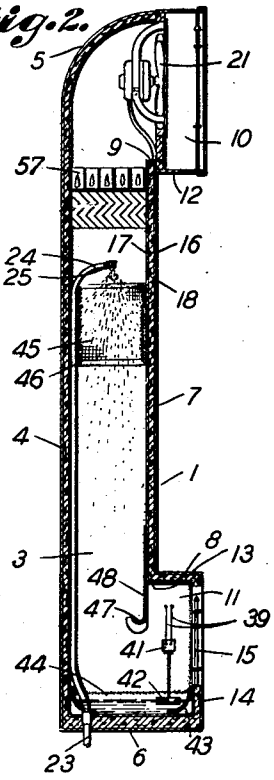
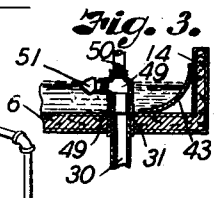


Fig. 3.



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UNIT AIR CONDITIONER

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Application March 24, 1930, Serial No. 438,435

16 Claims. (Cl. 261—117)

My invention relates to a unit air conditioning apparatus in which the temperature of a current of air is modified for delivery to a room, and the current of air washed and its humidity modified while it is being passed to the room, and more particularly to apparatus of this character by which the air of a room is recirculated and tempered, washed and reconditioned as to moisture content while being recirculated.

In a common type of apparatus of this character the air is withdrawn from the room and conducted through relatively long ducts to a distant chamber or chambers where it is tempered and washed for return to the room, thus necessitating excessive expense for installing and operating equipment, requiring a large amount of wall space in the building for the ducts, involving treatment of a much greater amount of air than necessary for use in the room, and incurring refrigeration or heat losses due to radiation through the walls of the ducts. The ordinary type of apparatus provides for treating the air of all the rooms alike and at a point remote from the rooms, the occupants of the rooms having no individual control over the treating means, and the air of the several rooms being mixed so that air from one room may be delivered to another room.

In view of the conditions above cited, and others to be mentioned later, the principal objects of my invention are to condition and recirculate the air within a room, and especially that portion of such air as the occupants of the room normally come into immediate and actual contact with, to provide a unit for treating the air of a room, to recirculate and treat the air of any room in a building independently of the air of another room, to reduce the expense of installing and operating air conditioning apparatus and avoid undue use of wall space for the installations, and to provide common means serving a group of rooms for modifying the temperature and humidity of the air of the roms and cleansing the air, and to enable the occupant of any room to set up or suspend the operation of the unit in his room, whereby the air of each room may be treated according to the liking of the occupant, and the occupant will not have to breathe air coming from any other room.

Further objects of my invention are to accomplish the work indicated by an air conditioning unit supplied with refrigerated water from a remotely connected water cooling unit and without the aid of air ducts, to pump water through conduits to the air cooling unit and dissipate the same within such unit for cooling the air being circulated through the inner housing, the present invention being an improvement over my co-pending application, Serial No. 225,972 which has matured into Patent No. 1,884,534, Oct. 21, 1932. Further objects of my invention are to obviate undesirable noises incident to the delivery of water to the air conditioning unit and return of water to the water treating unit, and to assure maximum efficiency for the air circulating and air conditioning elements.

In accomplishing these and other objects of the invention, I have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawing, wherein:

Fig. 1 is a perspective view of a portion of a room provided with my improved individual air conditioning unit and water treating units located in a basement for delivering water to the air conditioning unit, parts being broken away for better illustration.

Fig. 2 is a central vertical section from front to back of the air conditioning unit.

Fig. 3 is a vertical section through a lower portion of the unit including a water outlet pipe.

Referring in detail to the drawing:

1 designates my improved individual air conditioning unit including a vertically elongated housing or upright casing positioned on the floor 2 of a room and comprising side walls 3, a rear wall 4 having an upper end 5 curved forwardly to form the top of the housing, a bottom 6 and a front wall 7 having a lower edge 8 spaced from the bottom to form a lateral air intake or inlet opening adjacent the floor for receiving air from the lower portion of the room, and an upper edge 9 spaced from the top to define a laterally directed air outlet.

Forwardly projecting wings 10 and 11 on the side walls and plates 12 and 13 comprising horizontal outbent portions of the front wall cooperate with extended portions of the bottom and top to form inlet and outlet noses or mouths, the front end of the inlet being partly closed by a grille frame including an upturned portion 14 of the bottom forming the front wall of a catch basin in the bottom portion of the housing, the opening in the frame being provided with a grille 15 forming the effective inlet opening to the housing, and a similar grille being installed on the outlet.

The walls of the housing and inlet and outlet mouths are preferably formed of metal sheets 16 and 17 spaced to receive insulating material 18 for preventing exchange of heat between the

housing and the air in the room, and for deadening noises produced by water sprayed into the housing as later described.

The housing may be installed at any suitable position in a room, preferably at one side thereof, and is illustrated as located behind a side wall 20 with the inlet and outlet mouths mounted in suitable openings in the wall. Thus the unit is concealed from view within the room wall except for the ornamental grilles.

The height of the housing is limited to locate the outlet substantially below the ceiling of the room, and at a desired elevation above the floor for delivering treated air slightly above the position of the heads of persons standing or walking in the room, and recirculating the air through the portion of the room normally occupied by the persons.

Mounted near the upper end of the housing and preferably supported by the laterally projecting outlet, is a fan 21 actuated by a motor supplied by a circuit under the control of a switch 22 and adapted to draw air through the intake and body of the housing and deliver the same through the outlet.

A water conduit 23 extending upwardly into the housing at one side thereof has a plurality of branches 24 contacting the adjacent housing wall and formed to locate their discharge ends in spaced relation with the upper end of the housing and below the outlet and fan, and provided with downwardly presented nozzles 25 for delivering water in spray form downwardly into the housing, to provide a bath or curtain of moisture through which the air may move from the inlet to the outlet, for washing and modifying the relative humidity of the air.

Sufficient number of branches 24 and nozzles 25 are provided to effect delivery of the required amount of water from the nozzles at relatively low pressure in order to decrease noise produced incident to spraying water. The branches 24 are preferably inclined downwardly from the nozzles toward the conduit 23 and walls of the housing in order that the drops of water formed on such branches from sweating or accumulation of sprayed water will adhere to such branches and follow same by action of gravity to contact with the side walls of such housing, thus minimizing noise that would otherwise be produced by drops of water falling to and splashing in the catch basin.

The water conduit 23 preferably contacts the housing wall and extends through the bottom of the housing and downwardly through the floor of the room toward a source of water supply such as a tank 26 from which water is delivered through the conduit to the housing by a pump 27 actuated by an electrical motor 28 supplied with current through a circuit controlled by a switch 29.

A return or drain pipe 30 connected with a threaded coupling or nipple 31 here shown fixed in the bottom of the housing or catch basin receives water delivered to the housing by the spraying means and conducts the same to the tank so that the water may be recirculated.

The conduit 23 and drain pipe 30 are connected to a supply main 32 and a return 33 respectively, having extensions 34 and 35 to which a plurality of air-conditioning units may be connected by pipes similar to the conduit 23 and pipe 30, whereby water under pressure may be constantly available to the several units, and all water will drain back to the tank.

The supply of water to the air conditioning unit is preferably under control of the occupant of the room, and this result is effected by inserting in the conduit 23 a valve 36 operated by an electrically operated device 37 of conventional type energized through a circuit including wires 38 and 39, and locating a switch 40 in said circuit preferably on the wall of the room adjacent the housing.

Should the return pipe for any reason fail to carry away the water dissipated in the housing, overflow of water from the catch basin is prevented by operation of a float switch 41 in the circuit 38—39 operable by a float 42 responsive to changes of water level in the basin, whereby the valve-operating circuit will be broken when water rises to a predetermined level in the basin.

It may be desirable to operate the fan independently of the delivery of water to the housing, and it is desirable to limit delivery of water to periods when the fan is operating, therefore the circuit to the valve 36 is placed in series with the switch 22 that controls operation of the fan, as illustrated in Fig. 1, whereby the valve circuit cannot be closed unless the fan switch is closed.

The sprayed water is delivered towards the side walls of the inner housing, hence most of such dissipated water will contact with the walls and thus trickle down the same to the catch basin. It was found that water trickling down the side walls of a housing, wherein it was permitted to contact with the water in the catch basin, a slight splashing noise was produced; hence, in order to eliminate such noise, I have provided fillets or curved surfaces 43 for the bottom corners of the inner housing walls, such curves to start above the normal water level in the catch basin. It is found that this arrangement retards the gravity action of the water trickling down the side walls of the housing and further that noise is greatly reduced by decreasing the angle at which the sheets of water contact with the water in the catch basin.

In order to prevent splashing noises, due to impact of drops of water that may fall without contact with the side walls of the housing, a horizontal screen 44 may be mounted above the normal level of the water in the catch basin and this screen supported by any suitable means, such as footing members, brackets projecting from the side walls or the like.

Some parts of the sprays will impinge on the walls of the housing, and while the insulated character of the walls will tend to muffle the noise of water impacting the inner surfaces of the inner wall sheets 17, I preferably install vertically extending screens 45 on the walls to receive the laterally driven particles of spray water, for breaking up the sprays, retarding their velocity, and substantially preventing water from being driven against the walls. The screens are spaced sufficiently from the walls to provide channels wherein water may pass freely downwardly either over the inner surfaces of the screens or over the surfaces of the walls. The lower edges of the screens are outbent and engaged with the walls as indicated at 46, for supporting the screens, and to enable water trickling over the surfaces of the screens to run onto the walls and flow thereover toward the catch basin, thus avoiding both the noise of impact of water against the walls, and preventing the water captured by the screens from falling vertically from the lower edges of the screens to the catch basin and splashing therein.

Water running on the inner surface of the

front wall will tend to fall from the lower edge thereof across the inlet opening to the catch basin and splash therein. I therefore provide a transverse trough **47** located at or adjacent the lower edge of the front wall to receive water flowing over said wall, and inclining downwardly from its center toward the side walls **3**, the ends of the trough being spaced slightly from the side walls to permit water to flow from the trough toward the catch basin, but being located sufficiently close to the side walls to cause water to pass thereto from the trough and be conducted over the side walls to the catch basin, the water thus being prevented from splashing in the basin.

The front wall is further provided with an extension **48** for purposes independent of the function or presence of the trough, projecting downwardly to a sufficient distance to afford an inner inlet opening having substantially the same area as the free or effective area of the inlet grille, the normal level of water substantially defining the bottom edge of said inner inlet opening. The extension serves to conduct water from the front wall a maximum distance toward the catch basin and across the mouth without unduly interfering with the movements of air into the housing, provides a maximum length of air washer space in the housing for the current of air passing therethrough and subjected to treatment therein, and assists in preventing dissipation of moisture outwardly through the inlet.

The trough may be located at any desired position on the front wall or the extension, but is preferably mounted at the lower edge of the extension, the inner inlet opening being defined either by the lower edge of the trough or by the lower edge of the wall extension, but in any event the area of the inner inlet opening above the normal water line being approximately equal to the free air passage through the grilled opening.

In order to eliminate the usual noises incident to water draining through a hole, I have terminated the pipe **30** in a fitting **49** so designed as to permit water to enter same below the surface of such water, in addition to providing such fitting with an air intake conduit **50**, preferably connected to the highest point of such fitting and extending upward within the housing to a point wherein the suction of air into such pipe will not be noticeable from the exterior of the unit.

The above described fitting is here shown in the form of a pipe T fastened to the top of the return pipe or nipple **31**, which is here illustrated as projecting through the bottom of the inner housing, it being obvious that the entrance of the nipple **31** could just as well be through the lower part of the side wall of the housing. The T is so mounted as to provide one side inlet, to which is fastened an L **51** with its open end facing downwardly. This arrangement provides a practically constant water level within the catch basin, with the intake opening of the L **51** submerged, thus preventing entrance of air therethrough.

In order to eliminate siphoning action at the water intake, which would obviously be followed by a noise, as well as a variation in water level, the upper end of the T **49** is left open to the atmosphere; however, owing to the running water and air suction noise produced at this point, I have connected the open end conduit **50** above referred to, to the upper end of the T and extended it upwardly into the neck of the inner housing to a point wherein such noise will not be noticeable from the exterior of the unit.

The water for conditioning and washing the air moved through the housing may be cooled by a refrigerating unit **52** of ordinary construction, actuated by a motor **53** for producing heat absorbing means within coils **54** mounted in the tank **26**. A pump suction pipe **55** connected with the water main **32** preferably extends downwardly into the tank to a point adjacent the bottom thereof, and the return pipe **33** has an outlet portion **56** extending into the tank preferably at the opposite end of the water channel.

I mount a heating or tempering coil **57** in the housing above the sprays and ahead of the fan which may be energized from either a remote steam producing source or electric supply for producing heat therein, the primary object of the so-called coil being to decrease the relative humidity of the air after same leaves the air washer and before it is discharged from the housing by means of the fan.

In order to assure substantially equal cooling of all water that moves through the tank, and to assure employment of every portion of the coils for effective cooling of the water, I arrange each coil in a vertical plane, and provide baffles **58** extending between the coils to form coil-containing chambers **59** and having vertical end edges alternately engaged with the end walls of the tank as indicated at **60** and slightly spaced from the end walls as indicated at **61**. The lower edges and engaged vertical edges of the baffle plates may be welded to the bottom and end walls of the tank, and the spaced ends may be attached to the tank end walls by clips **62**.

Each coil thus lies between a pair of baffles or between a side wall of the tank and a baffle whereby water may move in a vertical sheet substantially the depth of the tank through the coil chamber and into or out of a chamber through the vertically elongated passages formed by spacing the end of a chamber-forming baffle from an end wall of the tank.

I particularly provide for restricting the flow of water past the end of a baffle to a volume substantially equal to the amount of water that will pass through the inlet or suction pipe **55** and proportionately thereto, and accomplish this object by reducing the spacing between the end of the baffle and the end wall of the tank so that the effective passage therebetween has substantially the same area as the cross section of the pump suction pipe, and preferably not more than 250 per cent of the transverse internal area of the suction pipe, whereby water will be uniformly circulated through the tank and all portions of the sheet of water will move substantially at the same velocity.

Improved apparatus of the character described may be provided in three distinct units, including the air-conditioning unit proper, the water cooling tank, and the refrigeration plant, which may be shipped to the job and set up, and the refrigerating plant being then connected to the coils in water cooling tank by piping, the pump connected to the water conduit for delivering water to the air cooling unit, a return conduit arranged to discharge water into the tank, and the motors for actuating the several power-using elements connected to suitable sources of power.

The air conditioning unit may be installed in a closet, hollow pilaster or similar walled space, for example in a wall opening as illustrated, with only the grilled openings visible from within the room to be cooled.

In operating my apparatus constructed and

installed as described, the fan draws air from the room into the lower opening of the housing, conveys it upwardly through the housing and discharges the cooled washed air through a horizontal opening at an elevation considerably above that of the lower opening. The discharged air may thus be controlled so as to move across the room slightly above the space normally occupied by persons therein, and to return to the housing over paths below the outwardly moving air stream from the discharge opening, whereby the air in the portion of the room normally occupied by persons is recirculated and reconditioned.

Such arrangement places the reconditioned air where wanted, produces comparatively uniform temperature in such space and saves refrigeration by not cooling the strata of air near the ceiling. The burden of circulating and reconditioning the entire volume of air in the room is, therefore, not put upon the apparatus, and the cost of apparatus and the expense of operating same with reference to serving a room having a relatively high ceiling is reduced.

The air is conditioned by coming into contact with the tempered water while passing through the housing, wherein the one conditioning element is the refrigerated water spray delivered into the path of the air, one function of the spray being to wash the air, one to cool it and the third to modify the humidity of such air. With reference to falling water which might accidentally drop into the water at the bottom of the unit and thus create objectionable noise, my apparatus provides for muffling and eliminating such noises by installing a screen at a sufficient distance above the water which may accumulate in the bottom of the inner housing of the unit to break up the falling liquid.

The sprayed water may be delivered in such a manner as to impinge against the side walls of the housing and tend to cause noise. The noise normally produced by the impact of water against sheet metal walls is in my construction reduced by the presence of insulation between the walls of the inner and outer housings, and in order to more completely eliminate the noise resulting from the impinging action of the water, I have interposed screens located in the path of the laterally moving portions of such spray.

Attention is called to the relation of the screens to the side walls, and particularly the engagement of the lower edges of the screens with the walls, whereby water stopped or retarded by the screens will flow downwardly over the walls toward the catch basin.

The normal air intake opening in the housing forms a break in the front wall, and water flowing downwardly over the inner face of the front wall would tend to fall across the opening to the catch basin. The transverse trough formed at the lower edge of the front wall receives such water, and being oppositely inclined, conducts the same to the side walls 3 so that it will flow downwardly over the surface thereof to the catch basin, rather than fall and splash in the water below. The suspension of the trough in the inlet opening is so arranged as to provide a space below the trough substantially equal to the free opening in the grilled air intake.

Among additional purposes accomplished by the extension of the lower end of the front wall with or without the trough are, first, a longer and more effective air washer housing, and second, assistance in preventing the dissipation of moisture through the lower or intake air opening, such purposes being accomplished without affecting the capacity of the air passage or offering undue resistance to flow of the air.

Water will accumulate in the catch basin until it flows through the outlet pipe. The normal tendency of a liquid flowing into an opening by gravity is to produce a whirlpool effect, which in turn gives off a gurgling and other noises.

I have, therefore, installed a fitting of such design that the water entrance to same will remain below the water level in the catch basin and such fitting will further be provided with a conduit for permitting air to enter same above the movement of water and thereby break the otherwise siphoning action that would occur at the water intake. Further benefits are derived by keeping the water intake below the water level in the catch basin such as the elimination of the running water noise and noise produced incident to water and air both entering the same aperture.

Should the outlet become clogged the float switch will operate automatically to suspend delivery of water to the housing.

Obviously, when the air washer is used for cooling, the water supplied to same must be cooled to a temperature below the dew point of the space to be cooled in order to accomplish effective cooling and at the same time reduce the relative humidity of the air in the space to be cooled to a point wherein the effective temperature of such space will be within the summer comfort zone.

The cooling water is therefore circulated in vertical sheet form over the vertically arranged coils in the tank, the sheet entering one end of a coil chamber, passing over every portion of the coil therein to effect equal exchange of heat between all portions of the coil and all portions of the water sheet, and passing from the opposite end of the chamber toward the pump, thus the relatively rapid movement of water over the maximum amount of refrigerated coil will permit delivery of water at its minimum temperature and the lower the temperature of water used for washing the air the greater the reduction of moisture with reference to the air of a room so cooled. Further it is obvious that the colder the water is, the less is the quantity required to perform a given amount of cooling.

Should ice form on the coils, the water sheet will pass uniformly over the ice to tend to reduce the accumulation of ice.

Restriction of the vertical passages at the end of the baffles to effective areas proportionate to the capacity of the suction pipe further controls flow so that all water will be uniformly cooled to a minimum temperature.

Attention is called to the fact that the return pipe discharges water into one end of the first coil chamber, the water moves through the passage at the opposite end of the first chamber into the adjacent coil chamber, and through said adjacent chamber toward the suction pipe, which has its intake near the bottom of the last coil chamber of the tank.

When the invention is employed for conditioning the air of a plurality of rooms occupied by the several tenants of an office building or the like, cooled water and electrical current will be available at all times and the occupant of a room may set the fan and spraying means in operation when desired to recirculate and condition the air of the room. The refrigerating unit will be controlled by a thermostat responsive to change of temperature in the tank as in ordinary practice,

and will operate only when required to maintain water at a desired temperature in the tank.

The demand for electric current and cooled water, and cost of operating the common source of supply for water, will be materially reduced, since considerable periods may elapse during which some of the air conditioning units are not being operated.

What I claim and desire to secure by Letters Patent is:

1. In an air cooling unit adapted for use in connection with a source of refrigerated water supply, a housing comprising inner and outer shells and insulation between the shells and having laterally directed air inlet and air outlet openings at the bottom and top of said housing respectively, downwardly facing nozzles within the housing laterally directed air inlet and air outlet opening, a screen covering said accumulator, a water outlet pipe communicating with the accumulator, a direct motor driven propeller type fan arranged for creating an upwardly moving current of air through the housing and means for preventing flow of water from the housing except by means of the water outlet pipe.

2. In air conditioning apparatus of the character described, an upright housing including a wall having an air inlet opening and a mouth projecting from the wall forming a conduit communicating with the opening, means including a nozzle in the housing for directing a spray of water toward said wall, an extension member on said wall projecting downwardly substantially in the plane thereof and into said opening, and a trough on said extension for directing water gravitating over said wall and said extension onto an adjacent wall of said housing to prevent the water from dripping across said opening.

3. In air conditioning apparatus of the character described, an upright housing including a catch basin and a front wall having a laterally directed upper air outlet and an outwardly projecting lower air inlet member provided with a grille at its outer end, and an extension on the front wall defining a inner inlet opening having substantially the same area as the free air passage through the grille.

4. An air conditioning device including an upright housing having laterally directed outlet and inlet openings at the top and bottom of said housing, a fan in said outlet for inducing flow of air upwardly through the housing, and means including a nozzle in the housing for delivering a spray of water to the housing, means including a trough positioned transversely of the housing for receiving water falling from said nozzle, and having oppositely inclined portions for conducting said water to the side walls of the housing.

5. In air conditioning apparatus of the character described including an upright housing having side walls and a front wall provided with a lateral air inlet adjacent the bottom of said housing, means including a nozzle in the housing for directing a spray of water downwardly, and a transverse trough supported by the front wall to receive water delivered by said means, and having ends located adjacent the side walls and sufficiently close thereto to effect flow of said water from the trough to the side walls.

6. In apparatus of the character described including water delivery means and a fan, an upright housing including side walls and a front wall and having a base portion provided with a laterally directed lower air intake opening and a laterally directed air outlet portion at its upper end, said water delivery means being mounted for spraying water into the housing above the base to pass downwardly over the several walls, and a trough mounted at the bottom of the front wall extending downwardly to a point somewhat below the top of the lower opening in the housing and formed to produce an inwardly facing trough provided with ends spaced from the side walls of the housing for conducting water passing downwardly over the front wall toward the side walls of the housing.

7. An air conditioning unit consisting of a vertical housing having laterally projecting inlet and outlet air openings, means in the housing for spraying water downwardly, means within the housing for circulating air upwardly through the housing, means below the inlet air opening for draining water falling from the spray, and means associated with said draining means and extending upwardly within the housing to a point above said air inlet for preventing detection of noise at said air inlet incident to the draining of the water.

8. In an air conditioner of the character described including an upright elongated housing having an air inlet adjacent the lower end of the housing, means including a supply pipe for liquid under pressure for discharging liquid into the housing, and means including a catch basin below the inlet for collecting and leading off said liquid, a valve in said pipe, a float responsive to changes in level of liquid in the catch basin, an electrical circuit, and means for operating the valve including a pair of switches in series in the circuit, one of said switches being operable by the float, and one of said switches being manually operable.

9. In an air cooling unit adapted for use in connection with a source of refrigerated water supply, a housing comprising inner and outer shells, insulation between the shells, and having laterally directed an air inlet adjacent the bottom of the housing and an air outlet near the top of said housing, spray nozzles within the housing, a water accumulator below the inlet opening, a screen below the inlet opening and covering said accumulator, a water outlet fitting communicating with the accumulator and having an inlet located below the surface of the liquid, a vent pipe fixed to the fitting and extending through the screen to a point above the air inlet, and a fan arranged for creating an upwardly moving current of air through the housing.

10. In an air conditioning unit including a housing having an air inlet adjacent its lower end and an air outlet at its upper end, a catch basin formed in the bottom of the housing to contain liquid at a predetermined level, a liquid outlet fitting having its inlet located below the surface of the liquid in the catch basin, and an air vent connected with the fitting having its intake located above said air inlet whereby noises incident to liquid flowing through said fitting are not perceptible at said inlet.

11. In an apparatus of the character described, a vertically arranged housing having a catch basin formed in the bottom thereof and adapted to contain liquid at a predetermined level, means within the housing arranged to direct a spray of liquid toward the vertical walls of the housing, a fillet member positioned at the juncture of the vertical walls with the bottom of the housing and having its lower edge curving inwardly from the vertical walls of the housing from a point above the level of liquid carried in

the basin whereby the liquid discharged from said spray and flowing down the vertical walls flows over the fillet member into the body of liquid in said basin without splashing and creating a noise.

12. In an air conditioning apparatus, a housing having an air outlet and having an air inlet arranged at an angle to flow of an air stream through the housing so that the air stream changes its direction of travel after passing through said inlet, an air conditioning means in the housing between the outlet and said point of change in the direction of flow of the air stream, means associated with the housing for inducing flow of the air stream, a water basin formed in the housing below said air inlet for containing a body of water, and a baffle member depending from the housing and having a V-shaped notch in its lower portion to provide inclined lower edges diverging downwardly toward side walls of the housing for co-operating with the surface of the water for restricting flow of air passing from said inlet to said conditioning means to increase its velocity at the point of change in the direction of flow of the air stream.

13. In an air conditioning apparatus, a housing having an air outlet and having an air inlet arranged at an angle to flow of an air stream through the housing so that the air stream changes its direction of travel after passing said inlet, means associated with the housing for inducing flow of said air stream, spray nozzles supported in the housing between said outlet and the point of change in the direction of flow of the air stream for discharging water in counter-flow to the direction of flow of the air stream, a water basin formed in the housing below said inlet for collecting the water spray, a baffle member depending within the housing at said point of change in the direction of flow of the air stream for increasing velocity of the air stream at said point of change to prevent eddying of air currents that may tend to carry water spray out of the housing through the inlet, and diverging troughs on the lower edge of the baffle member for draining water toward side walls of the housing.

14. In an air conditioning unit in connection with a source of water supply, a housing comprising inner and outer shells having laterally directed air inlet and air outlet openings at the top and bottom of said housing, a water accumulator below said inlet opening, a water spray nozzle in the housing for discharging a water spray toward the walls of the housing for gravitational flow thereon to the water accumulator, a fan in the housing for creating a current of air for movement through said housing, a water outlet pipe communicating with the accumulator, means for preventing flow of water from the housing except by means of the water outlet pipe, a float in the accumulator, and a switch connected with the float and operable thereby in response to level of water carried in the accumulator to suspend the spray from the nozzles.

15. In an air cooling unit adapted for use in connection with a water supply, a housing having air inlet and air outlet openings, downwardly facing nozzles within the housing arranged to discharge water for gravitational flow down the walls of the housing, a water catch basin below the inlet opening, a water outlet pipe communicating with the basin, means inclined relatively to the upper edge of the inlet opening and extending thereacross to prevent water from dripping thereacross on its downward passage, and curved means provided in said catch basin for guiding the water gravitating down the walls of the housing to said catch basin to prevent splashing thereof.

16. In an air cooling unit adapted for use in connection with a source of refrigerated water supply, a vertical housing having air inlet and air outlet openings, a downwardly facing nozzle within the housing and connected with the source of water supply, a water catch basin below the inlet opening, a screen below the inlet opening, a water outlet pipe communicating with the basin, means for inducing an air flow through the housing, and means including an inclined trough extending across said inlet opening to prevent water from dripping thereacross in its downward passage from the nozzle, the lower end of said trough being slightly spaced from an adjacent side wall of the housing, whereby water flowing in the trough is discharged for gravitational flow down said side wall and through the screen to the catch basin.

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