June 8, 1954 D. D. WILE 2,680,599

EVAPORATIVE CONDENSER

Filed June 10, 1949 2 Sheets-Sheet 1

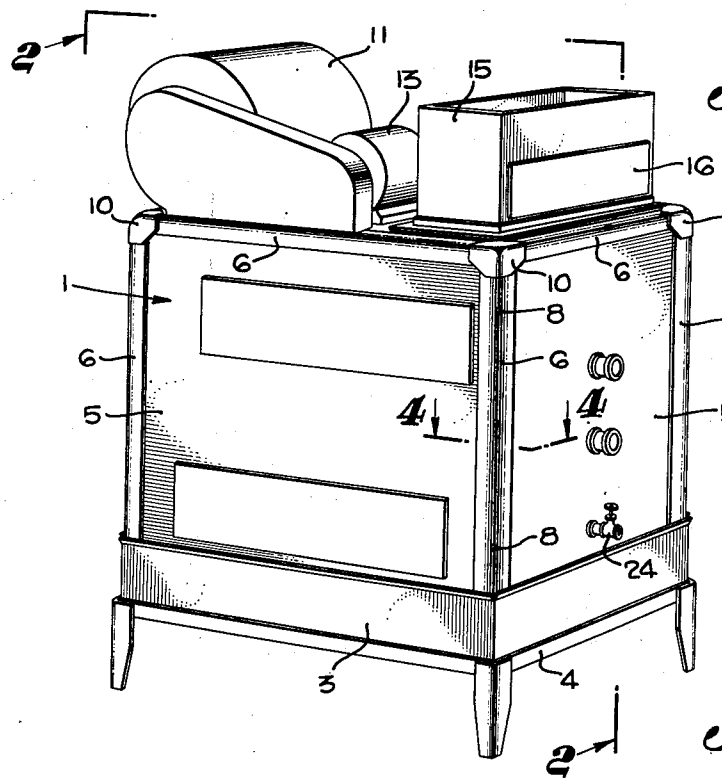


Fig. 1.

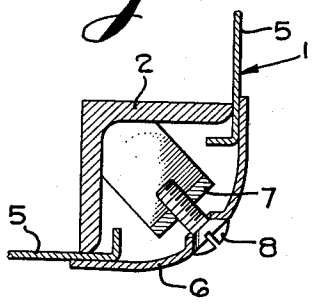


Fig. 4.

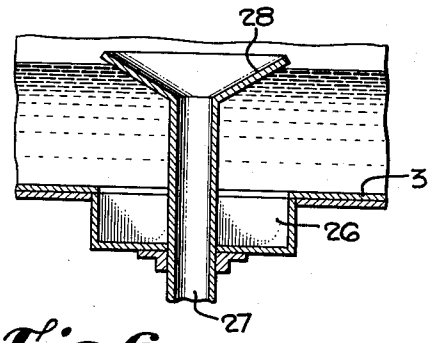


Fig. 6.

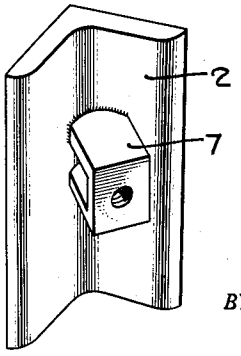


Fig. 5.

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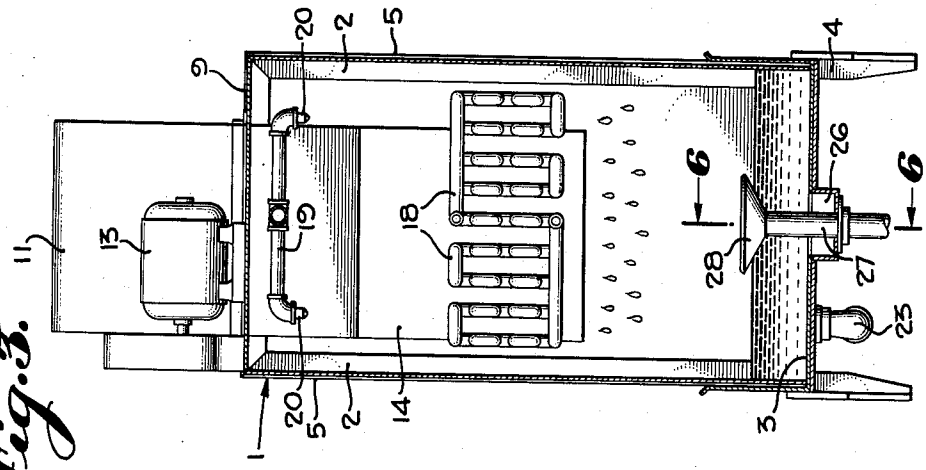


Fig. 1.

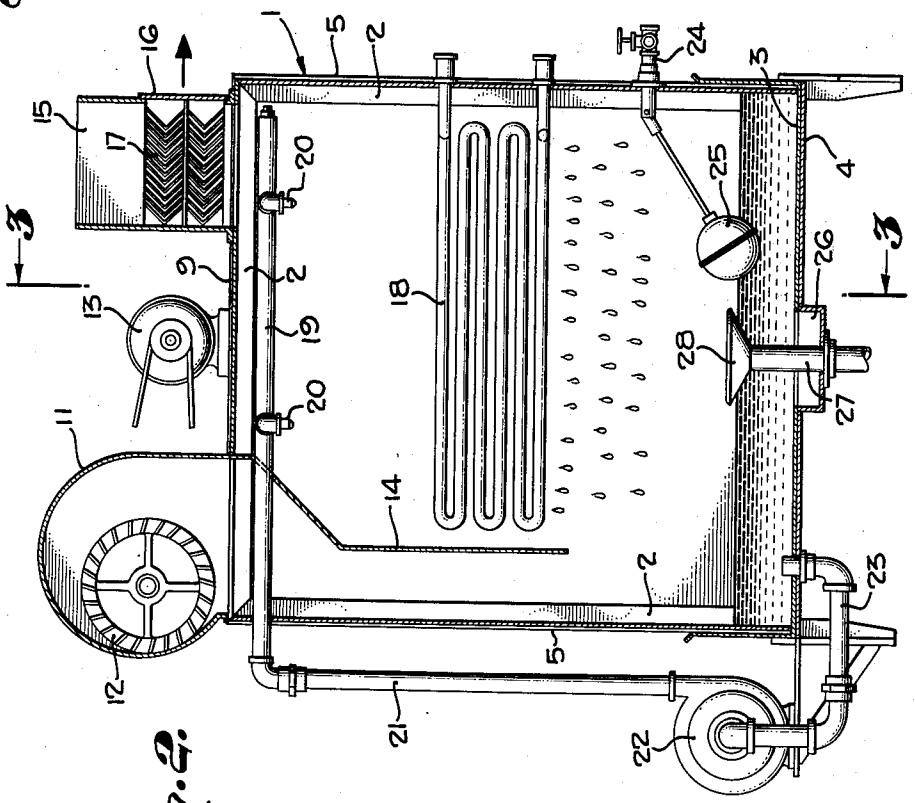


Fig. 2.

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Patented June 8, 1954

2,680,599

UNITED STATES PATENT OFFICE

2,680,599

EVAPORATIVE CONDENSER

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Application June 10, 1949, Serial No. 98,295

5 Claims. (Cl. 257—37)

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My invention relates to evaporative condensers and included in the objects of my invention are:

First, to provide an evaporative condenser wherein air is blown rather than drawn through the heat exchanging elements of the condenser, thus placing the blower or other air supplying device in a region of relatively dry air rather than in a region of moisture laden air whereby corrosion or the accumulation of mineral deposits on the blades and other parts of the blower is avoided.

Second, to provide an evaporative condenser which incorporates a novel yet simple means without moving parts for continuously bleeding a predetermined proportion of the water from the condenser, whereby the mineral concentration in the water is maintained at a predetermined minimum.

Third, to provide an evaporative condenser which employs a novel water tight enclosure incorporating readily removable panels so that all parts of the apparatus are accessible for cleaning or servicing.

Fourth, to provide an evaporative condenser wherein an "eliminator" employed to remove excess moisture from the discharging air is disposed so as to be readily removable for cleaning and servicing.

Fifth, to provide on the whole an evaporative condenser which is particularly effective in its operation, easily serviced, and economical of manufacture.

With the above and other objects in view as may appear hereinafter, reference is made to the accompanying drawings, in which:

Fig. 1 is a perspective view of my evaporative condenser.

Fig. 2 is a sectional view thereof, taken substantially in the plan 2—2 of Figure 1.

Fig. 3 is a transverse sectional view through 3—3 of Figure 2.

Fig. 4 is an enlarged fragmentary detailed view taken in the plan 4—4 of Figure 1.

Fig. 5 is a perspective view of one of the frame elements employed in my apparatus.

Fig. 6 is an enlarged fragmentary sectional view taken through 6—6 of Figure 3.

My evaporative condenser is encased in a housing 1 of generally rectangular form. The housing includes frame members 2 which delineate the corner of the housing. The lower ends of the upright frame members fit in the corners of a reservoir pan 3. The pan is in turn supported in a base frame 4 including corner legs.

The upright members of the frame structure 2 are preferably formed of angle iron with the

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legs of the angle iron facing outwardly as shown best in Figures 4 and 5. Removable side panels 5 overlie the legs of the angle irons and are provided with flanged edges. Marginal strips 6 of curved cross-section overlie the adjacent margins of the side panels and confront the angle members. The angle members are provided with lugs 7, which are threaded to receive screws 8 extending inwardly through the marginal strips. The marginal strips are formed of metal having spring qualities so that when the screws are tightened, bearing pressure is exerted by the edges of the marginal strip against the panels 5, so as to maintain them in contact with the edges of the angle members thereby to provide a fluid tight enclosure.

The housing includes a top panel or member 9 which may be secured to the horizontal members of the frame structure in the manner of the side panels. Formed corner members 10 cover the adjacent ends of the marginal strips 6.

Mounted on the top member 9 is a fan or blower housing 11 in which is mounted a blower 12, the discharge end of which is directed into the housing 1. The blower is driven by a motor 13 also mounted on the top member 9. The discharge end of the blower is located adjacent one end of the housing, and within the housing a partition or baffle member 14 extends downwardly to a point near the reservoir pan so that incoming air is forced to the bottom portion of the housing.

The top member 9 is provided at its end opposite from the blower 12, with an outlet stack 15. Within the stack 15 there is mounted a moisture eliminator 16, which comprises nesting sets of zigzag baffles 17. These are preferably mounted in a frame in the form of a drawer so that they can be removed as a unit through a lateral opening provided in the outlet stack, as indicated by the arrow in Figure 2.

Within the housing 1, above the lower end of the baffle 14, are heat exchanger coils 18. Above the heat exchanger coils are disposed a series of nozzles 20 supplied from a common supply pipe 21, which extends from the housing 21 and downwardly to a pump 22 located at one side of the housing. The pump 22 is connected by an intake line 23 to the interior of the reservoir pan 3. Water is supplied to the reservoir pan through a valve 24 controlled by a float 25.

Heat exchanger coils 18 are connected to a fluid circulating system not shown. In the construction illustrated, the coils 18 are primarily intended to circulate a heated fluid so that its heat

may be transferred to the water spray and air stream utilizing to a large degree the heat of the evaporation of the water. However, the coils if desired, may circulate a cooling fluid for the purpose of absorbing heat from the water spray and air, so that for example, a cooled air may be delivered to the ducts of an air conditioning system.

The reservoir pan 3 is provided with a sump 26 located under the heat exchanger coils 18. Mounted in the sump 26 is an overflow pipe 27. The upper end of the overflow pipe 27 is provided with a bleeder cone 28. The cone or basin 28 has a predetermined area, for example, ten percent (10%) or other selected proportion of the spray water escapes into the bleeder cone and overflow pipe. By this arrangement the mineral content of the water as it is circulated is prevented from rising above a predetermined value.

It will be observed that the blower forces the air upwardly through the heat exchanger coils and the downwardly flowing water spray. The blower does not come in contact with the moisture laden air discharging from the evaporative condenser and therefore is well protected against excessive corrosion or accumulation of mineral deposits.

The eliminator 16 tends to condense out of the air, excess moisture which drains back into the reservoir pan. The baffles or plates of the eliminator are, of course, subject to corrosion and accumulation of mineral deposits, however, by reason of the fact that the eliminator is arranged in the form of a drawer and can be readily withdrawn for service or repiacement, the problem of maintaining the eliminator in good condition is reduced to a minimum.

Having fully described my invention, it is to be understood that I not wish to be limited to the detail herein set forth, but by invention is of the full scope of the appended claims.

I claim:

1. An evaporative condenser, involving: a relatively fluid tight housing including a water reservoir at its lower portion and dry air intake and wet air discharge ducts at its upper portion; a blower mounted in said air intake duct to force air downwardly through said air intake duct and upwardly through said housing to said discharge duct said blower being isolated from the wet air in said discharge duct; heat exchanger coils disposed in said housing in the path of air flowing upwardly therethrough; means including spray nozzles and a pump for circulating water from said water reservoir downwardly over said heat exchanger coils; an overflow pipe in said reservoir; a deflector of predetermined area with respect to the spray area of said nozzles for catching a corresponding proportion of spray and discharging the same through said overflow pipe, thereby to prevent excessive rise in the mineral content of said circulated water; and means for replenishing the water to maintain a predetermined volume thereof.

2. An evaporative condenser, involving: a relatively fluid tight housing including a water reservoir pan at its lower portion, removable side panels, and dry air intake and moist air discharge ducts in its upper portion, said intake duct continuing into said housing to deliver air at its lower portion for upward flow to said discharge duct; a blower mounted in said dry air duct and isolated from the wet air in said discharge duct, said blower adapted to deliver dry air downwardly through said intake duct for subsequent upper flow through said discharge duct; heat exchanger coils disposed in said housing in the path of said upwardly flowing air; means including spray nozzles above said coils and a pump for circulating water from said water reservoir pan downwardly over said heat exchanger coils and return thereto; an overflow pipe in said reservoir; a deflector of predetermined area with respect to the spray area of said nozzles for catching a corresponding proportion of spray and discharging the same through said overflow pipe, thereby to prevent excessive rise in the mineral content of said circulated water; and means for replenishing the water to maintain a predetermined volume thereof.

3. An evaporative condenser, involving: a relatively fluid tight housing including a water reservoir pan at its lower portion, removable side panels, and dry air intake and wet air discharge ducts in its upper portion, said intake duct continuing into said housing to deliver air at its lower portion for upward flow to said discharge duct; a blower mounted above said housing in said dry air inlet duct for delivery of air downwardly through said intake duct and upwardly through said discharge duct; heat exchanger coils disposed in said housing in the path of said upwardly flowing air; means including spray nozzles above said coils and a pump for circulating water from said water reservoir pan downwardly over said heat exchanger coils and return thereto; a moisture eliminator in said discharge duct including nested baffles; said eliminator being mounted in said duct for removal as a unit; an overflow pipe in said reservoir; a deflector of predetermined area with respect to the spray area of said nozzles for catching a corresponding proportion of spray and discharging the same through said overflow pipe, thereby to prevent excessive rise in the mineral content of said circulated water; and means for replenishing the water to maintain a predetermined volume thereof.

4. In an evaporative condenser wherein a housing defines an inlet and an outlet at its upper side and a reservoir at its lower side, heat exchanger coils are disposed above said reservoir, spray means discharges water downwardly over said heat exchanger coils, means is provided to circulate air over said heat exchanger coils, and a pump recirculates the water from the reservoir to said spray means, the combination of: an overflow pipe disposed under said coils in the path of said spray; and a spray catching basin communicating with said overflow pipe and having a preselected area in proportion to the effective spray area of said spray means whereby a proportionate quantity of water is removed through said overflow pipe.

5. In an evaporative condenser wherein a housing defines an inlet and an outlet at its upper side and a reservoir at its lower side, heat exchanger coils are disposed above said reservoir, spray means discharges water downwardly over said heat exchanger coils, means is provided to circulate air over said heat exchanger coils, water is recurrently circulated from a reservoir over heat exchanger coils and caused to drain from said coils into said reservoir, a combined collector and overflow funnel disposed above the normal water level of said reservoir and arranged to collect a portion of the water draining from said coils; a discharge pipe to conduct away from said reservoir and remove from recirculation the water received in said collector; and means for

replenishing the water so removed, thereby to prevent excessive rise of the mineral content of said water.

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