Jan. 31, 1939. A. WEILAND 2,145,380

CONDENSATE DISPOSAL MEANS FOR AIR CONDITIONING UNITS

Filed Sept. 19, 1935 2 Sheets-Sheet 1

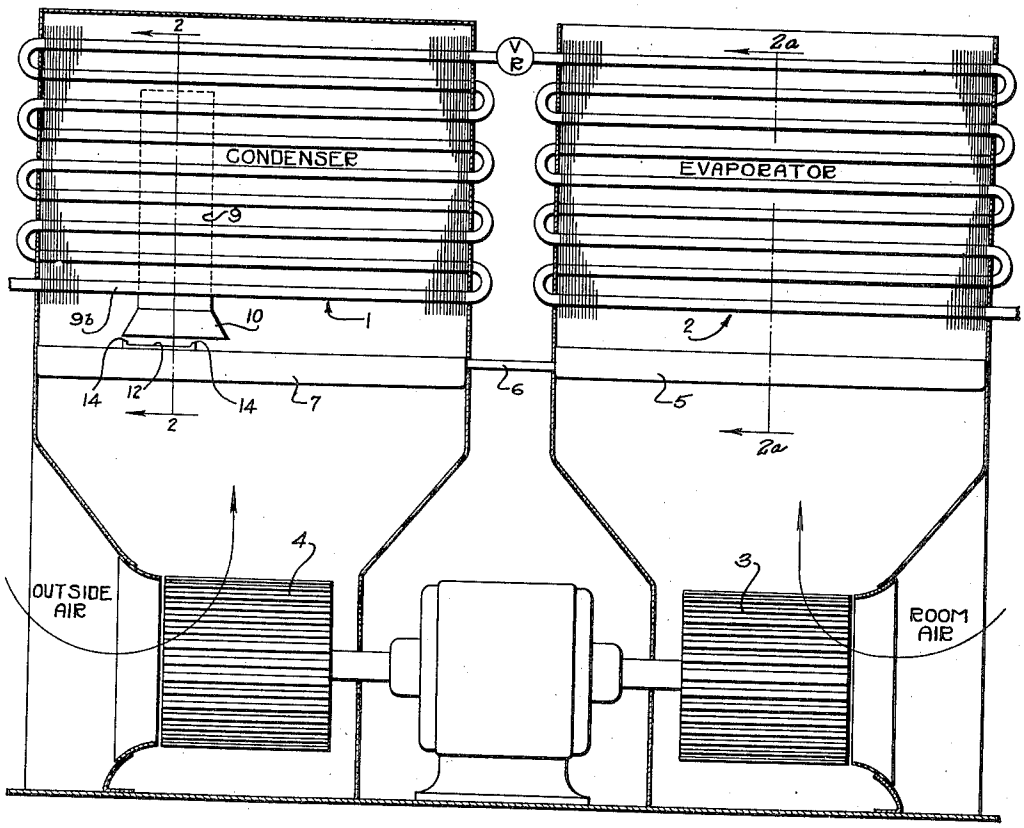


Fig. 1

INVENTOR
A. WEILAND
BY
ATTORNEY

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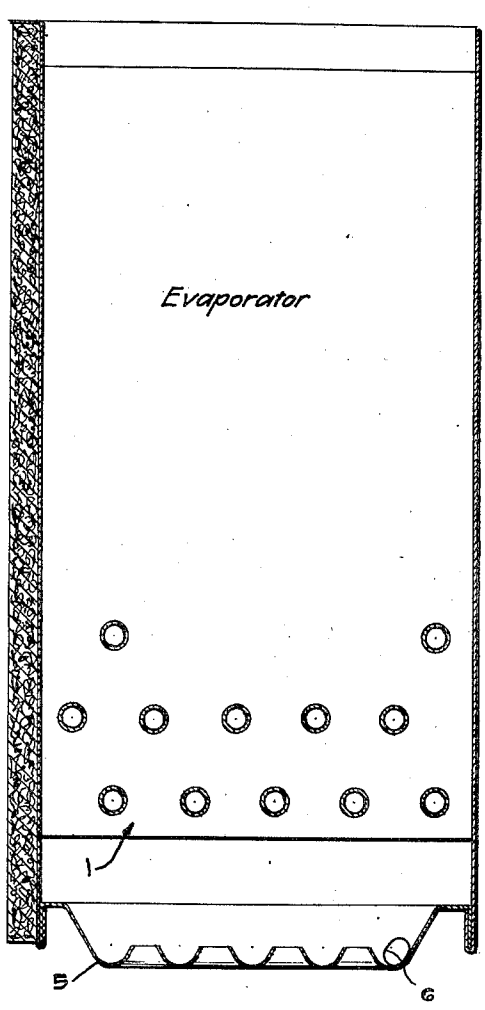


Fig. 2a

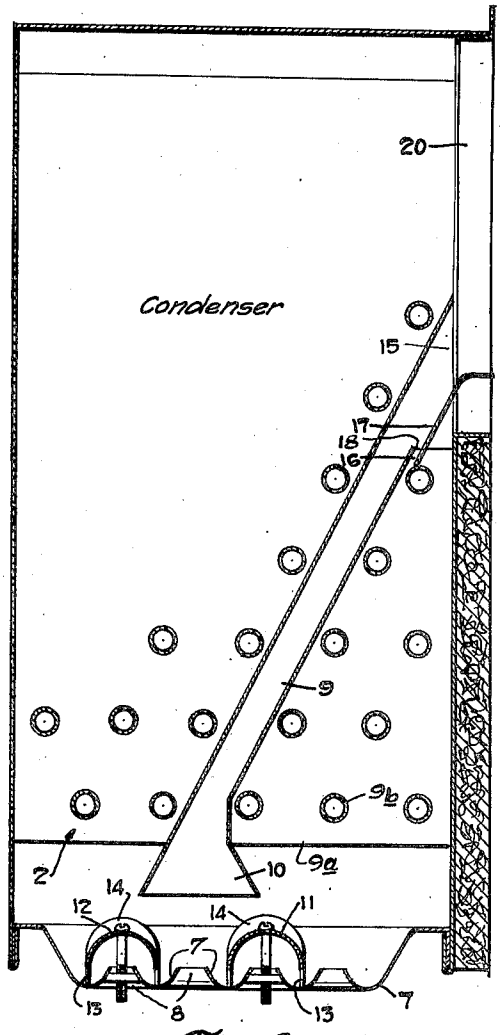


Fig. 2

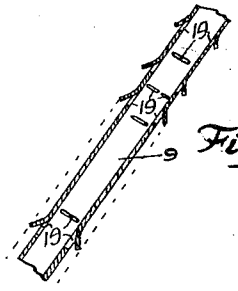


Fig. 3

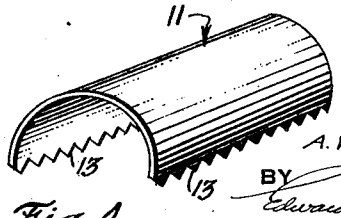


Fig. 4

INVENTOR
A. Weiland
BY
Edward A. Stockbridge
ATTORNEY

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2,145,380

CONDENSATE DISPOSAL MEANS FOR AIR CONDITIONING UNITS

Alfred Weiland, Philadelphia, Pa., assignor to Baldwin-Southwark Corporation, a corporation of Delaware

Application September 19, 1935, Serial No. 41,297

7 Claims. (Cl. 257—39)

This invention relates generally to air conditioning apparatus of the type employing complementary heat exchange elements of a refrigerating system, and the invention relates more particularly to improved condensate disposal means.

In air conditioning apparatus, especially of the self-contained type adapted to be disposed within a room to be conditioned, it is necessary to provide simple and effective means for eliminating varying quantities of condensate formed on the evaporator surface. One of the prior disposal methods is to discharge condensate against the hot surfaces of an air-cooled condenser whereby the condenser air carries away the vapor, but the quantity of condenser heat available in a given period of time is not usually sufficient to evaporate an abnormal excess of condensate in that period of time with the result that means have heretofore been provided for collecting such excess condensate and then manually disposing of the same.

It is one object of my invention to provide an improved combination of elements adapted to bodily discharge condensate into a stream of outside air, which preferably, is employed for cooling an air-cooled condenser. Another object is to accomplish the foregoing bodily discharge of condensate together with possible evaporation of some of the condensate, the condensate in either form being carried away by a common current of condenser cooling air.

A further object is to provide a condensate discharge passage embodying improved means for maintaining condensate suspended in a flow of air through said passage, particularly at the discharge end thereof although the principle of operation is equally applicable to suspending the condensate in the air flow throughout the length of the passage. A further object is to provide such a passage in combination with means for causing condensate to be initially thrown into the entrance of said passage.

Other objects and advantages will be more apparent to those skilled in the art from the following description of the accompanying drawings in which:

Fig. 1 is a diagrammatic view of condenser and evaporator heat exchange elements together with blowers for circulating respectively outside air and room air over said elements;

Fig. 2 is a transverse section through the condenser taken substantially on the line 2—2 of Fig. 1;

Fig. 2*a* is a transverse section through the evaporator taken substantially on the line 2*a*—2*a* of Fig. 1;

Fig. 3 is a modified condensate passage showing auxiliary openings throughout its length;

Fig. 4 is a perspective of one member for effecting air agitation of the water in the condensate disposal means.

For the purpose of illustrating the particular improvements constituting my present invention, the same is shown in a diagrammatic condenser and evaporator arrangement for an air conditioning unit although a practical embodiment of such an arrangement is shown in my Patent 2,071,366. Inasmuch as all details of construction of an air conditioning unit do not enter into my present invention it will suffice to state for purposes of the present disclosure that a condenser 1 and evaporator 2 are disposed so that room air is circulated vertically over the evaporator by a blower 3 and outside air is drawn in through a suitable window duct and then discharged upwardly by a blower 4 and over condenser 1 and thence out through the window duct. Moisture condensed from room air drips down from evaporator 2 to be collected in a series of troughs 5 or other suitable sump. The condensate then flows laterally through a pipe 6 to a similar series of troughs 7, it being understood that the troughs 7 are connected at their ends by a suitable header and that air openings 8 are provided between said troughs to permit substantially free flow of air upwardly over the condenser and evaporator.

To bodily discharge condensate from troughs 7, there is provided an upwardly and rearwardly inclined passage 9 which as shown in Fig. 1 is relatively wide as compared to its width shown in Fig. 2. To form this passage, the fins 9*a* for the condenser tubes 9*b* are cut out to receive the walls of passage 9. The fins and the tubes extending therethrough constitute what is herein referred to as a heat exchange element. Refrigerant flows through the tubes and air is circulated over the surface of the fins and tubes constituting the heat exchange element. The lower end of this passage is provided with a funnel shaped inlet 10 which as shown in Fig. 2 directly longitudinally overlies one of the air openings 8. Disposed immediately below said funnel and to one side thereof are water agitating means in the form of inverted U-shape members 11 and 12. The lower ends of these members are provided with suitably serrated edges 13 resting near the bottom of troughs 7 which are adjacent to the particular air opening over which funnel 10 is disposed. However, the U-shaped members may be formed in the manner shown in Neeson Patent 2,111,570, although it is preferable that the ends of such members are provided with upwardly extending flanges 14 to prevent moisture from falling back on to the top of the members and then running longitudinally thereof and beneath the same from which position the water might drip through the air openings. As shown in Fig. 1, the members

11 and 12 are of less length than funnel 10, thus producing a very effective upward discharge of condensate from the troughs 7 into the funnel 10. As shown in Fig. 2, one of the air passages 8 is unobstructed so as to permit free flow of air directly into the funnel and between the agitators 11 and 12.

In the operation of the device as so far described, it will be seen that air flowing upwardly through those passages over which members 11 and 12 lie will be directed downwardly into the water within adjacent troughs 7 and thus cause the water therein to be bodily thrown upwardly into the path of air entering funnel 10, such water at the same time being broken up into small particles by the serrated edges 13 of the members 11 and 12. The stream of upwardly flowing air will then entrain these particles of water and cause the same to be carried upwardly to the discharge end 15 of the passage.

To insure forceful discharge of the condensate at the upper end of passage 9, there is provided an auxiliary air inlet 16 formed by a wall 17 which is slightly spaced beneath the lower wall of passage 9 at its upper end. Hence air flowing upwardly over the condenser tubes will finally enter opening or slot 16 and thus positively force water off of the upper corner 18 of passage 9. It has been found in practice that water tends to accumulate at this point and that it can be effectively discharged and maintained in the air stream by the provision of the auxiliary openings 16. As shown in Fig. 3, auxiliary openings 19 could be formed at spaced points along and around the full length of the passage, thereby insuring that the condensate would be suspended in the air flow throughout the length of the passage without possibility of such water accumulating on the passage wall.

In addition to effecting bodily discharge of condensate, there is a certain amount of condensate which may be disposed of due to it impinging upon the hot surfaces of the condenser and being evaporated thereby. This evaporated condensate is carried outwardly by the flow of condenser cooling air which is turned laterally at the upper end of the condenser and discharged horizontally through an outlet opening 20, this outlet preferably being connected to a window duct as is described in Galson Patent 2,071,366.

From the foregoing disclosure, it is seen that I have provided a relatively simple means for disposing of condensate by forceful ejection thereof from the unit without employing mechanical moving parts or other structure which might require attention for its efficient operation and maintenance. The arrangement as herein disclosed is continuously operable so long as the air circulating blowers function, thus minimizing the necessity for repair or attention.

It will of course be understood that various changes in details of construction and arrangement of parts may be made by those skilled in the art without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. An air conditioning apparatus comprising, in combination, a heat exchange element over whose surface air flows, means for accumulating liquid beneath said element, means for supplying liquid to said accumulating means, means forming a passageway in said element, and means whereby liquid in said accumulating means is discharged into said passageway and carried away by a portion of the air flow for said element.

2. An air conditioning unit comprising, in combination, a refrigerant condenser having pipes and fins therefor over whose surface cooling air is passed, means forming a passageway extending through the fins of said condenser and terminating with a substantially horizontal inlet, means for accumulating liquid below said inlet, means for supplying liquid to said accumulating means, and means for causing accumulated liquid to be discharged into said inlet by an upward flow of air.

3. An air conditioning unit comprising, in combination, a refrigerant condenser having pipes and fins therefor, means forming an upwardly and rearwardly inclined passage through said fins having at its lower end a substantially horizontal inlet, means for accumulating liquid beneath said inlet, means for supplying liquid to said accumulating means, and means for pneumatically causing said liquid to be broken up and discharged into said inlet.

4. An air conditioning unit comprising, in combination, an air cooled refrigerant condenser having refrigerant pipes and fins therefor, means for circulating cooling air over said condenser and discharging the air to the outside, means for accumulating liquid beneath said condenser, means for supplying liquid to said accumulating means, means forming a liquid passageway through the fins of said condenser, one end of said passageway being adjacent said accumulating means and the other end communicating with the discharge of condenser cooling air to the outside, and means for causing liquid in said accumulating means to be discharged into said passageway and carried to the outside in a stream of air flowing through said passageway.

5. An air conditioning unit comprising, in combination, an air cooled condenser having pipes and fins therefor, means for accumulating liquid beneath said condenser, means forming a combined air and liquid passageway through the fins of said condenser and having at one end an inlet above said accumulating means, and means partially disposed beneath said inlet for agitating liquid in said accumulating means, whereby air flowing upwardly to said condenser carries the agitated liquid into said passageway to be discharged to the outside.

6. An air conditioning apparatus comprising, in combination, means forming a chamber, a heat exchange element disposed within said chamber, means for circulating air through said chamber and over said heat exchange element, means for accumulating liquid within said chamber, means for supplying liquid to said accumulating means, means forming a liquid discharge passageway in said chamber, said passageway receiving a portion of the air flow through said chamber, and means whereby the air flow through said chamber discharges the liquid into said passageway.

7. An air conditioning apparatus comprising, in combination, means forming a chamber, means forming a walled passageway extending through said chamber in spaced relation to the walls thereof and terminating at its inlet end in free open communication with said chamber, means for circulating air through said chamber and passageway, means for accumulating a liquid supply, and means for discharging liquid from said supply into said inlet whereby the liquid is carried away by the air flow through said passageway.

ALFRED WEILAND.