May 26, 1936. S. J. BEST 2,042,087

REFRIGERANT CONDENSING APPARATUS

Filed Aug. 7, 1935

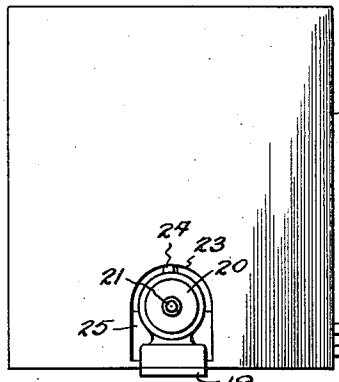


Fig. 1.

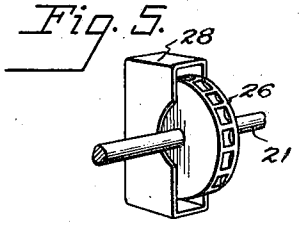


Fig. 5.

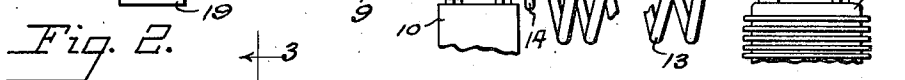


Fig. 2.

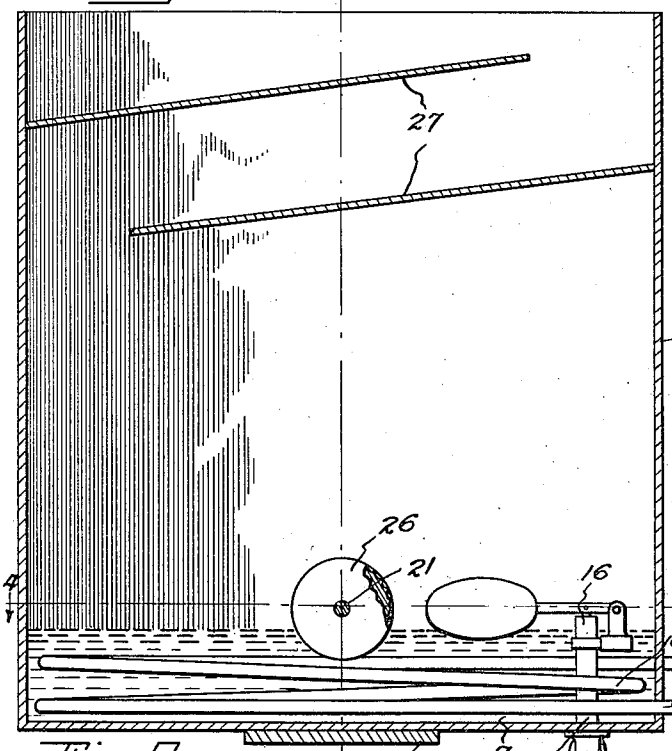


Fig. 4.

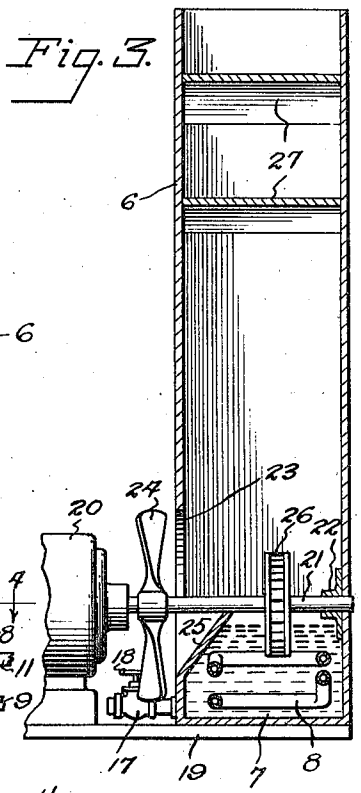
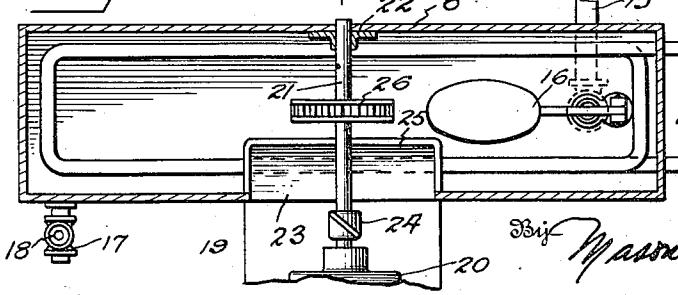


Fig. 3.



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2,042,087

REFRIGERANT CONDENSING APPARATUS

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Application August 7, 1935, Serial No. 35,211

9 Claims. (Cl. 257—37)

This invention relates to apparatus for condensing refrigerant material; and more particularly, to that type of cooling tower wherein water is used as the cooling medium.

Heretofore, sprays, fountains, and the like, have been used with air forced through the same in air conditioning and for cooling purposes. My invention, however, presents a compact, simple structure for condensing the refrigerant in the coils which eliminates the circulating pump commonly used, and the sprays which clog, and permits the compressor to deliver more refrigeration capacity with less current consumption.

One of the objects of my invention is to provide the condensing coil with uniform condensing conditions, providing a minimum head pressure in the compressor.

Another object is to provide a simple, compact structure, wherein a water tower is provided with the condensing coils submerged in water at the bottom of the tower, and with a fan and water wheel mounted on a power driven shaft so that as the fan is revolved the water wheel will lift and throw the water into the tower where the air is in position to contact the same.

Another object of the invention is to provide automatic feeding and control apparatus to maintain the water in the tower at a constant level.

Still another object is to provide baffles in the tower which force the water distributed by the water wheel to spread out in thin layers so that the air can more completely cool the same, and thus eliminate the necessity for extremely high towers now commonly used.

Other objects of my invention will become apparent as the detailed description thereof proceeds.

In the drawing:

Figure 1 is a diagrammatic view of the system;

Figure 2 is a vertical section of the tower;

Figure 3 is a vertical section taken on the line 3—3 of Figure 2;

Figure 4 is a horizontal section taken on the line 4—4 of Figure 2; and

Figure 5 is a perspective detail of a modified water wheel.

Referring to the drawing, in which similar parts are designated by like numerals:

Numeral 6 designates a tank or water tower in the bottom 7 of which is positioned a condenser coil 8, having an entrance pipe 11 leading from the compressor 12 and an exit pipe 9 connecting with the receiving tank 10. A freezing coil 13 is positioned between the compressor 12 and the receiving tank 10 connecting the two. An expansion valve 14 is between the freezing coil 13 and the receiving tank 10.

A water entrance pipe 15 extends into the side of the tank 6 and has a float control valve 16 in connection therewith so as to maintain a constant water level. A discharge water port 17 controlled by a manually operated valve 18 is located at one corner of the tower 6. A shelf 19 extends from the bottom of the tower 6 to support a motor 20 having a shaft 21 extending through the tower immediately above the water level and supported at the opposite side of the tower in a bearing 22, altho this is not essential. An opening 23 is formed in the tower opposite the motor 20 substantially the diameter of a fan 24 mounted on the shaft 21 and positioned between the motor 20 and the opening 23. The side wall 25 immediately opposite the lower portion of the fan 24 is inclined inwardly so as to form a directing baffle for the air forced into the tower by the fan 24, and at the same time, provide a restraining wall for the water in the bottom of the tower. One or more water wheels 26 are mounted on the shaft 21 and are rotated by the motor 20 in conjunction with the fan 24. A series of overlapping baffles 27 are arranged in the top of the tower so that the water thrown into the air by the water wheels 26 will strike the baffles and be thinly spread over the baffle surfaces so that the air forced into the tower by the fan 24 will more completely cool the same. The baffles 27 extend substantially over the entire upper surface of the tower 6. The water wheel shown in Figure 5 with the casing 28 may be used where it is desired to more definitely control the direction of sprayed water, it being only necessary to adjust the casing 28 in the desired direction.

As actually used, the tower 6 will receive water through the water entrance pipe 15 until the predetermined level is reached at which time the float 16 will shut off the water supply through its valve mechanism. The refrigerant in the liquid state will pass from the receiving tank 10 through the expansion valve 14, thence to the refrigerant coil 13 and pass to the compressor 12 in a gaseous state, and from compressor 12 in a gaseous state to entrance pipe 11, through coil 8 in Figure 2, where it is changed to a liquid, passing out through exit pipe 9 and into receiver 10. During the operation of the system, the motor 20 will rotate the shaft 21 on which are mounted the fan 24 and the water wheels 26. The water wheels 26

lift the water from immediately above the coil 8 against the baffles 27 and at the same time the fan 24 will force air into the tower through the lifted water and against the baffles 27, thus cooling the water, which in turn falls to the bottom of the tower, condensing the refrigerant passing through the coil 8.

When desired, the tower may be located in an exposed high position such as the roof of a building, and instead of utilizing the fan the natural air current may be received through the opening 23 and in turn cool the water lifted by the water wheel.

Numerous variations may doubtless be devised by persons skilled in the art without departing from the principles of my invention. I, therefore, desire no limitations to be imposed on my invention, except such as are indicated in the appended claims.

What I claim is:

1. A refrigerant condensing apparatus comprising a container, a condensing coil in the bottom of said container, a shaft extending through said container immediately above said coil, water lifting means on said shaft in said container above said coil, air propelling apparatus on said shaft outside of said container, said container having an opening opposite said air propelling apparatus, means for simultaneously operating said air propelling apparatus and water lifting means.

2. A refrigerant condensing apparatus comprising a container, a condensing coil in the bottom of said container, a shaft extending through said container immediately above said coil, water lifting means on said shaft in said container above said coil, air propelling apparatus on said shaft outside of said container, said container having an opening opposite said air propelling apparatus, the side of said container below said opening inclined inwardly and upwardly to direct air from said air propelling apparatus, means for simultaneously operating said air propelling apparatus and water lifting means.

3. A refrigerant condensing apparatus comprising a container, a condensing coil in the bottom of said container, a shaft extending through said container immediately above said coil, water lifting means on said shaft in said container above said coil, air propelling apparatus on said shaft outside of said container, said container having an opening opposite said air propelling apparatus, baffles in the upper portion of said container to receive and reflect water from said water lifting means, and means for simultaneously operating the air propelling apparatus and water lifting means.

4. A refrigerant condensing apparatus comprising a container, a condensing coil in the bottom of said container, a shaft extending through said container immediately above said coil, water lifting means on said shaft in said container above said coil, air propelling apparatus on said shaft outside of said container, said container having an opening opposite said air propelling apparatus, the side of said container below said opening inclined inwardly and upwardly to direct air from said air propelling apparatus, baffles in the upper portion of said container to receive and reflect water from said water lifting means, and means for simultaneously operating said air propelling apparatus and water lifting means.

5. A refrigerant condensing apparatus comprising a container, a condensing coil in the bottom of said container having entrance and exit pipes extending through the sides of said container, float valve controlled water entrance means to maintain a predetermined water level, a shaft extending through said container immediately above said coil, water lifting means on said shaft in said container above said coil, air propelling apparatus on said shaft outside of said container, said container having an opening opposite said air propelling apparatus, means for simultaneously operating said air propelling apparatus and water lifting means.

6. A refrigerant condensing apparatus comprising a container, a condensing coil in the bottom of said container having an entrance pipe above an exit pipe extending through the sides of said container, float valve controlled water entrance means to maintain a predetermined water level above said pipes, a shaft extending through said container immediately above said coil, water lifting means on said shaft in said container above said coil, air propelling apparatus on said shaft outside of said container, said container having an opening opposite said air propelling apparatus, baffles in the upper portion of said container to receive and reflect water from said water lifting means, and means for simultaneously operating the air propelling apparatus and water lifting means.

7. A refrigerant condensing apparatus comprising a container, a condensing coil in the bottom of said container, a shaft extending through said container immediately above said coil, water lifting means on said shaft in said container above said coil, means on said water lifting means to control the direction of water lifted, air propelling apparatus on said shaft outside of said container, said container having an opening opposite said air propelling apparatus, means for simultaneously operating said air propelling apparatus and water lifting means.

8. A refrigerant condensing apparatus comprising a container, a condensing coil in the bottom of said container, means for maintaining liquid in said container at a predetermined level completely covering said coil, a shaft extending through said container immediately above said coil, water lifting and air propelling apparatus mounted on said shaft, said shaft directly connected to said air propelling and water lifting apparatus, power driving means connected to said shaft and forming a part thereof, the power driving means, shaft, air propelling and water lifting apparatus in substantially the same horizontal plane and operating simultaneously.

9. A refrigerant condensing apparatus comprising a container, a condensing coil in the bottom of said container, means for maintaining liquid in said container at a predetermined level completely covering said coil, a shaft extending through said container immediately above said coil, water lifting and air propelling apparatus mounted on said shaft and directly connected thereto, said air propelling and water lifting apparatus in substantially the same horizontal plane, and common means for operating said air propelling and water lifting apparatus.

SHERIDAN JOSEPH BEST.