

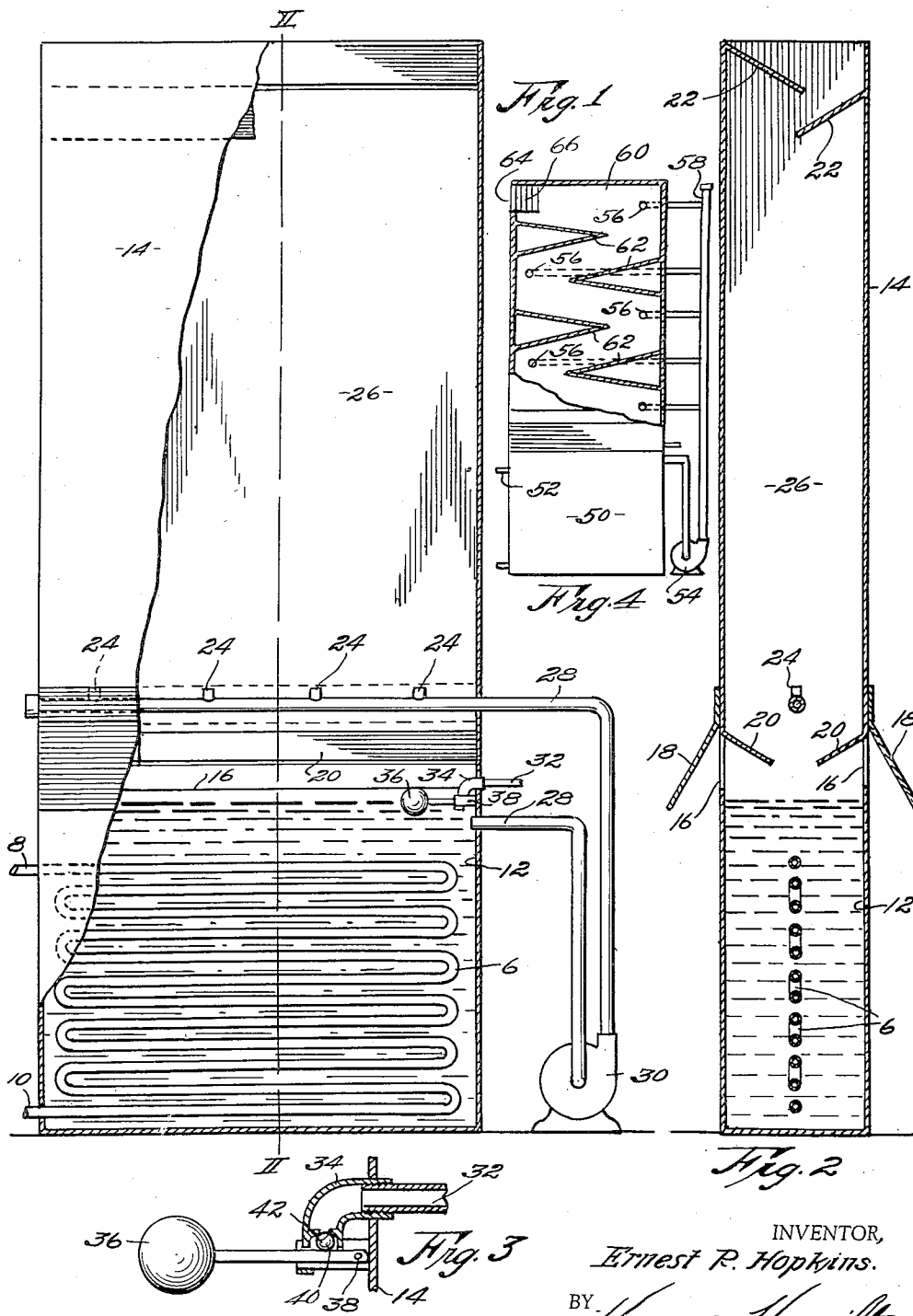
Oct. 9, 1934.

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1,975,945

COOLING UNIT FOR REFRIGERATING SYSTEMS

Filed Aug. 22, 1932



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UNITED STATES PATENT OFFICE

1,975,945

COOLING UNIT FOR REFRIGERATING
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Application August 22, 1932, Serial No. 629,859

9 Claims. (Cl. 257-71)

This invention relates to a cooling unit for a refrigerating system and has for a primary object, provision of a cooling unit for such apparatus, wherein is used a liquid refrigerant that must be lowered in temperature after it has passed through the system, and especially the compressor thereof.

One of the objects of the instant invention is to provide a cooling unit for refrigerating systems of the smaller type that are used in cooling domestic and commercial food storage cabinets, and it is one of the objects of the invention to provide a cooling unit for such refrigerants that employs water as a cooling medium, which water is handled and caused to act upon a refrigerant coil in a unique and novel manner.

This invention contemplates the use of a comparatively small case, wherein are created certain reservoirs, chambers, and ports, all of which combine to lower the temperature of the cooling medium to a degree where it is effective in removing a large number of heat units without the use of complicated parts and mechanical movements which tend to complicate the system and increase its cost of operation.

A yet further object of this invention is to provide a cooling unit of the character specified, wherein a series of spray heads set up a current of air, through which current the water from the spray head passes in a reversed flow direction after the force imparted to the water in the spray head has been spent.

Other objects of the invention include the provision of a cooling unit that is exceptionally compact, may be installed in a refrigerating system requiring the cooling of a refrigerant has no working parts to get out of order and create expense, and is not expensive to maintain.

With these general objects in mind, the invention will be more specifically described by reference to the accompanying drawing, wherein:

Figure 1 is a broken-away side elevation of a cooling unit embodying this invention.

Fig. 2 is a vertical, central section through the same, taken on line II-II of Fig. 1.

Fig. 3 is an enlarged, detailed, sectional view through the valve which automatically maintains the water level within the unit, and,

Fig. 4 is a broken-away side elevation of a cooling unit embodying a modified form of the invention.

As previously set forth, this unit is especially adapted for use in cooling a refrigerant and in this instance the liquid refrigerant is passed through a continuous coil 6 which receives the

refrigerant from the compressor of the system, not here shown, at lead pipe 8 and discharges the cooled refrigerant to the container at pipe 10, which is positioned at the bottom of case 14. This case may be made of suitable material such as sheet metal, and the lowermost portion thereof maintained closed to form reservoir 12 so that water or a similar cooling medium might be contained therein.

An intake port 16 is formed through each side wall of case 14 and above the bottom thereof. These ports, in the preferred form, are opposite each other and above the level of the water within reservoir 12, and to preclude cross drafts or direct circulation, a deflector apron 18 is secured to the outside of case 14 adjacent each port 16 and extends downwardly and outwardly so that air reaching the interior of case 14 is caused to travel through a circuitous path.

A deflector baffle 20 is secured to the inner side of case 14 just above each port 16, as shown in Fig. 2, so that spray water falling downwardly will be deflected toward the center of reservoir 12 and precluded from escaping through ports 16. The upper end of case 14 is opened and adjacent said end there is disposed a plurality of inwardly projecting, downwardly angled, overlapping baffles 22, against which water may be directed from a series of spray heads 24, located near the bottom of a spray chamber 26 that is created between ports and baffles 16 and 20 respectively and baffles 22. Spray heads 24 are connected with reservoir 12 by pipe line 28, in which is interposed pump 30 for the purpose of drawing water from reservoir 12 and forcing the same upwardly through spray chamber 26 from spray heads 24.

As seen in Fig. 1, pipe line 28 terminates within reservoir 12 at a point adjacent the top thereof, which point should be maintained slightly below the level of the water kept therein. As pump 30 functions, water is drawn from reservoir 12 and sent upwardly through spray chamber 26. The force of the jets of water at the series of spray heads 24 will draw air through ports 16 and a circulation will be set up which will cause a continuous draft through spray chamber 26 and out the open upper end of case 14. When the water from spray heads 24 strikes baffles 22 it will fall, by the action of gravity, back toward reservoir 12 against the draft of air and thence to the point of beginning within reservoir 12. Such action has been found to be exceptionally efficient in removing heat from the cooled medium and water within reservoir 12 will be kept cold enough to effectively cool the refrigerant within coil 6.

The level of water within reservoir 12 is preferably maintained constant, and since there is always a small amount of water to be added to the supply, a connection 32 to the water surface line is made and a valve 34 interposed therein for the purpose mentioned. This valve 34 has a float 36 which is pivoted as at 38 for the purpose of bearing against ball 40 when the level of the water is normal. Ball 40 bears against seat 42 and precludes the passage of water into reservoir 12 when float 36 is resting upon the surface of the water which has been previously determined as a proper level.

In practice, pump 30 may be driven by the motor which is used in actuating the compressor of the refrigerating system and since the entire unit is exceptionally small, it may be placed adjacent the other mechanical parts which are usually at a point remote from the cooled compartment.

Many modifications are possible in constructing a unit contemplated by this invention, and one modification has been illustrated in Fig. 4 of the drawing. Case 50 is substantially the same as the one heretofore described, and the lower portion thereof may be made precisely the same, if desired. The two ends of a coil 52 pass from the reservoir and a pump 54 forces water from this reservoir to a number of spray heads 56, all of which are joined to spray pipe line 58. The baffling within spray chamber 60 of this unit is somewhat different than the preferred form in that V-shaped baffles 62 extend inwardly from the sides of case 50 to overlap each other and present a zig-zag path of travel for the air passing into the intake port at the bottom and out exit 64 adjacent the top. Spray heads 56 create jets that are forced in the direction of travel of the air, and there is at least one spray head at the base of each baffle 62.

When the force of the spray has been spent, water will fall upon the upper surface of baffle 62 and flow by the action of gravity back to the reservoir to the bottom of case 50. Flow of this return water will be opposite to the draft of air passing through case 50, and the same effective heat exchange will be accomplished as heretofore mentioned. Exit 64 is protected by suitable offset eliminators or the like 66, to preclude the escape of water from casing 50.

As indicated by the foregoing, the size of this unit may be altered in accordance with the amount of refrigerant handled and modifications as to structure might be practiced without departing from the spirit of the invention.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A cooling unit for refrigerating systems having a liquid refrigerant, comprising a case; an intake port formed through the side of said case intermediate the top and bottom thereof; an exit formed at the top of said case; baffle plates within the case intermediate the intake port and exit; and a series of spray heads disposed to direct jets of water upwardly toward the said exit and from said intake port whereby to set up an air current through said case toward the exit, said baffle plates being angled downwardly to direct the released water through said air current toward the said intake port the baffle plates being projected toward each other from opposite sides of said case.

2. A cooling unit for refrigerating systems having a liquid refrigerant, comprising a case;

an intake port formed through the side of said case near the bottom thereof; an exit formed at the top of said case; a reservoir at the bottom of the case below the said intake ports; a refrigerant coil within the reservoir; a series of spray heads disposed to direct jets of water toward the said exit and away from said intake within the case; a pipe joining said spray heads and said reservoir; and a pump to force water from a point at the top of said reservoir to the spray heads.

3. A cooling unit for refrigerating systems having a liquid refrigerant, comprising a case; an intake port formed through the side of said case near the bottom thereof; an exit formed at the top of said case; a reservoir at the bottom of the case below the said intake port; a refrigerant coil within the reservoir; a series of spray heads disposed to direct jets of water upwardly toward the said exit and away from said intake within the case; a pipe joining said spray heads and said reservoir; a pump to force water from the reservoir to the spray heads; a water supply pipe in communication with the reservoir; and a float-operated valve to maintain the water within said reservoir at a predetermined level, said pipe joining the spray heads and reservoir being connected to the latter at a point immediately below the said predetermined level.

4. In a cooling unit for refrigerating systems, a case having an open top; a pair of opposed downwardly inclined, overlapping baffles within the case adjacent the top thereof; a series of aligned spray heads to direct jets of water upwardly toward said baffles; a reservoir at the bottom of said case; and means to carry water from the reservoir to the spray heads, the free edge of the lowermost baffle plate being in the same plane as said aligned spray heads whereby the force of the spray is in direct opposition to the returning water running from the said baffle plate.

5. In a cooling unit for refrigerating systems, a case having an open top; a pair of opposed downwardly inclined, overlapping baffles within the case adjacent the top thereof; a series of aligned spray heads to direct jets of water upwardly toward said baffles; a reservoir at the bottom of said case; means to carry water from the reservoir to the spray heads; and air intake ports formed through opposite walls of said case above the reservoir, the free edges of the said baffle plates being in the plane with said aligned spray heads.

6. In a cooling unit for refrigerating systems; a case; a water reservoir formed by the case at the bottom thereof; a refrigerant coil within the reservoir; a series of spray heads within the case; intake ports formed in said case below said spray heads and above the reservoir; means for forcing water from a point adjacent the top of said reservoir through all of said spray heads; means to supply water to said reservoir; and means to maintain the water within the reservoir at a level above the take-off point.

7. In a cooling unit for refrigerating systems; a case; a reservoir formed within the case at the bottom thereof; a coil housed by the reservoir; an intake port formed by the case immediately above the reservoir; an exit formed at the top of said case; a series of overlapping V-shaped baffles between the intake port and exit; a spray head at the base of each baffle and directed toward the outer edge thereof; and means for forcing water from the reservoir to said

spray heads alternate baffles being projected toward each other from opposite sides of said case.

8. A cooling unit for refrigerating systems having a liquid refrigerant, comprising a case; a reservoir formed by the case at the bottom thereof; a spray head within the case; a refrigerant coil within the reservoir having its intake at the top and its outlet at the bottom; and means for forcing water from the reservoir through said spray heads, said means removing water from the reservoir at a point intermediate the top thereof and the said coil therein.

9. A cooling unit for refrigerating systems having a liquid refrigerant, comprising a case;

a reservoir formed by the case at the bottom thereof; a refrigerant coil within the reservoir; spray heads above the reservoir within said case; baffle plates carried by the casing between said spray heads and said reservoir whereby to set off a spray chamber within the case above the said reservoir; an inlet port formed above the reservoir through one wall of that part of the case forming the spray chamber; and an exit formed through the opposed wall of that part of the case forming the spray chamber, said spray chamber inlet and exit ports being disposed in parallel planes.

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75	150