

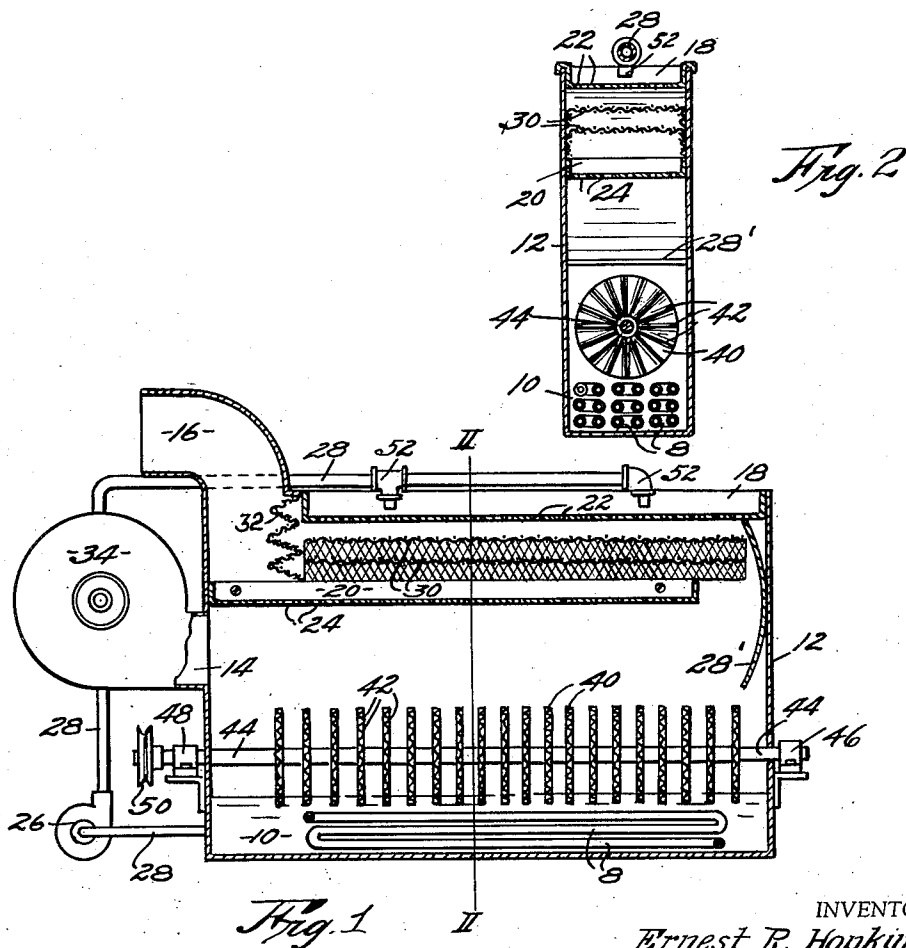
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COOLING UNIT FOR REFRIGERATING SYSTEMS

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COOLING UNIT FOR REFRIGERATING
SYSTEMS

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This invention relates to refrigerating systems and particularly the cooling unit forming a part thereof, wherein the refrigerant is passed through suitable coils and there cooled by the water in which the coils are submerged.

The primary object of this invention is the provision of a cooling unit having means for effectively cooling the water of the cooling unit so that it may be re-used in establishing an economical method of cooling the refrigerant coils.

Another important object of this invention is to provide a cooling unit wherein a serpentine path of travel is established for air under pressure, the major portion of said path being disposed horizontally and having therein a plurality of horizontal screens, all to the end that the water dropping by gravity across said path is broken up for more effective and quicker heat-exchanging action.

Other objects of the present invention include the provision of a cooling unit having horizontally disposed, perforated trays which co-operate to establish a serpentine path of travel for air under pressure; a reservoir for the reception of the refrigerant coil; means for pumping water from the reservoir to the uppermost tray whereby the water is broken up and dropped by gravity back to the said reservoir across the path of travel of the air in the serpentine path; and means for automatically maintaining a predetermined water level in the said reservoir.

A still further object of the instant invention is to provide a cooling unit of the aforementioned character and having therein means for converting the water in the reservoir into a spray and projecting said spray upwardly across the path of travel of the air under pressure and against the water falling through the perforated trays and horizontally disposed screens.

Minor objects of the invention will present themselves during the course of the following specification, which refers to the invention as illustrated in the accompanying drawing, wherein:

Fig. 1 is a vertical, longitudinal section through a cooling unit wherein is employed the auxiliary means for creating an upwardly directed spray, and,

Fig. 2 is a vertical, cross section taken along line II—II of Fig. 1.

A cooling unit for the character contemplated by this invention may be employed with high degree of efficiency wherever a liquid refrigerant is to be lowered in temperature after passing through the well known parts of the refrigerating system. The refrigerant usually is circulated through a refrigerant coil 8 which, in this instance, is positioned within a reservoir 10 formed in the bottom of a case 12 that is provided with an intake port 14 and an exhaust port 16.

It has been found essential in units of this character to establish a serpentine path of travel for the air within case 12 and this path is best created through the use of a number of trays 18 and 20, the bottoms of which are perforated as at 22 and 24 respectively. In the exemplification of the invention illustrated, there are two trays and the upper one 18 forms the top of case 12. This tray 18 is opened to the atmosphere, and it is into this uppermost tray 18 that water from reservoir 10 is pumped through the medium of a pump 26 and the suitable connecting pipes 28.

Trays 18 and 20 are disposed in offset relation so that a continuous path of travel is formed from inlet port 14 to exhaust port 16. An arcuate plate 28' should be secured to the inner side of case 12 to assist the smooth passing of air from one horizontal portion of the path of travel around to the other. A plurality of horizontal, spaced-apart screens 30 is secured in the serpentine path of travel of the air, but only along the horizontal portion thereof. These screens 30 are below trays 18 and 20 and between the same in some instances, and tend to further break up the dropping water after it has been passed through perforations 22 and 24. Obviously, water from upper tray 18 drops by gravity downwardly through screens 30, tray 20 and thence to reservoir 10. In order to preclude an appreciable amount of water or moisture from passing out through exhaust port 16, a transverse retarding screen 32 is positioned in the path of travel of the air adjacent said exhaust port. This screen is arranged in a zig-zag path so that a greater baffling area will be established. A conventional type of blower 34 should be joined to intake port 14 in any suitable fashion and water may be supplied to reservoir 10 in any suitable manner.

Another desirable feature of the cooling unit is the series of spray plates 40 that may be employed for converting some of the water in reservoir 10 into a spray and projecting the spray upwardly into the path of travel of air entering port 14. As illustrated in Figs. 1 and 2, these plates 40 are preferably disc-shaped and each is formed with a series of radial corrugations 42 to the end that an exceptionally large amount of water is thrown when the plates are rotated about their axes. These plates 40 should be mounted upon a horizontal shaft 44 that is journaled in bearings 46 and 48 mounted upon the outside of case 12.

The shaft 44 extends along above reservoir 10 and may be driven by connection to pulley 50 in any well known manner. As a matter of fact, pump 26, blower 34 and shaft 44 may all be driven from a common source, if desired. As indicated in the drawing, the lower portion of all of these plates 40 is below the normal water level in reservoir 10 and valve 38 insures that this level be 60

maintained. Where plates 40 are employed, the path therealong may be free of the aforementioned screens.

The operation of this cooling unit is clear after an understanding of the structure, but it is important to point out that pump 26 draws water from reservoir 10 and places it in tray 18 through a number of connections 52 located so that an even amount of water is introduced to the tray. Openings 22 and 24 must be small enough to maintain trays 18 and 20 substantially filled with water so that as the trays filled with water cause the dwell in the flow thereof, a cooling action takes place. The open tray 18 which forms the top of case 12 receives the hottest water and before it is introduced into the serpentine path, it is cooled by direct contact with the atmosphere.

It has been found by actual installation that these cooling units may be installed close to the ceiling and in other inconspicuous places to the end that refrigerating systems normally requiring a large and bulky cooling unit might be installed without taking up a large amount of space. The employment of the action of gravity to drop the water across the horizontal path of travel eliminates the necessity of equipment for creating a force at a spray head and a blower of small capacity might be effectively used where the water body is broken up by the perforated trays and screens.

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 refrigerant coil, comprising a case having an intake port and an exhaust port formed therein and a reservoir formed at the bottom thereof having the refrigerant coil therein; a plurality of perforated horizontal trays in said case arranged in offset relation one above the other to form a serpentine path from the said intake port to the exhaust port; means to force air along said serpentine path from the intake port to exhaust port; means for pumping water from the said reservoir to the uppermost tray; and a series of movable spray plates positioned above the reservoir to project water from the reservoir into the said path.

2. A cooling unit for refrigerating systems having a refrigerant coil, comprising a case having an intake port and an exhaust port formed therein and a reservoir formed at the bottom thereof having the refrigerant coil therein; a plurality of perforated horizontal trays in said case arranged in offset relation one above the other to form a serpentine path from the said intake port to the exhaust port; means to force air along said serpentine path from the intake port to exhaust port; means for pumping water from the said reservoir to the uppermost tray; and a series of movable spray plates positioned above the reservoir to project water from the reservoir into the said path, said spray plates being vertically disposed and arranged above the said refrigerant coil.

3. A cooling unit for refrigerating systems having a refrigerant coil, comprising a case having an intake port and an exhaust port formed therein and a reservoir formed at the bottom thereof having the refrigerant coil therein; a plurality of perforated horizontal trays in said case arranged in offset relation one above the other to form a serpentine path from the said intake port to the exhaust port; means to force air along

said serpentine path from the intake port to exhaust port; means for pumping water from the said reservoir to the uppermost tray; and a series of movable spray plates positioned above the reservoir to project water from the reservoir into the said path, said spray plates being vertically disposed in spaced-apart relation along a horizontal rotatable shaft above the said refrigerant coil and adapted to have their lowermost portions below the normal water level of the said reservoir.

4. A cooling unit for refrigerating systems having a refrigerant coil, comprising a case having an intake port and an exhaust port formed therein and a reservoir formed at the bottom thereof having the refrigerant coil therein; a plurality of perforated horizontal trays in said case arranged in offset relation one above the other to form a serpentine path from the said intake port to the exhaust port; means to force air along said serpentine path from the intake port to exhaust port; means for pumping water from the said reservoir to the uppermost tray; and a series of movable spray plates positioned above the reservoir to project water from the reservoir into the said path, said spray plates being vertically disposed in spaced-apart relation along a horizontal rotatable shaft above the said refrigerant coil and adapted to have their lowermost portions below the normal water level of the said reservoir, said reservoir having a water supply pipe and means for maintaining the water level in the reservoir at the said normal water level.

5. In a cooling unit for refrigerating systems, means for directing air along a serpentine path having the major portion thereof disposed horizontally; means for dropping water across said path of travel of the air; a reservoir at the bottom of said unit for receiving said water; and a series of rotatable spray plates having their lower portions below the normal water level of the reservoir for converting some of the water across spray and projecting the spray upwardly into the path of travel of the air and in direct counter-flow to the dropping water as it is crossing the path of travel of the air.

6. In a cooling unit for refrigerating systems having a serpentine path of travel for air under pressure; means for dropping water across said path of travel; an open top reservoir along a portion of the length of said serpentine path to receive said water; and a series of rotatable, spaced-apart, vertical spray plates disposed in said path, above the said reservoir with their lower portions below the normal water level of the reservoir for converting some of the water across spray and projecting the spray upwardly into the path of travel of the air in said serpentine path and against the dropping water in counter-flow thereto.

7. In a cooling unit for refrigerating systems having a serpentine path of travel for air under pressure extending horizontally for the major portion of its length; a reservoir at the bottom of said unit; means for causing water to drop by gravity across the horizontal portion of said path of travel in the form of spray and over an appreciable area of the horizontal portions of the path; and means for projecting the water from said reservoir upwardly into said spray across the air passing therethrough and in opposed relation against the spray dropping across said serpentine path of travel.

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