

Jan. 18, 1927.

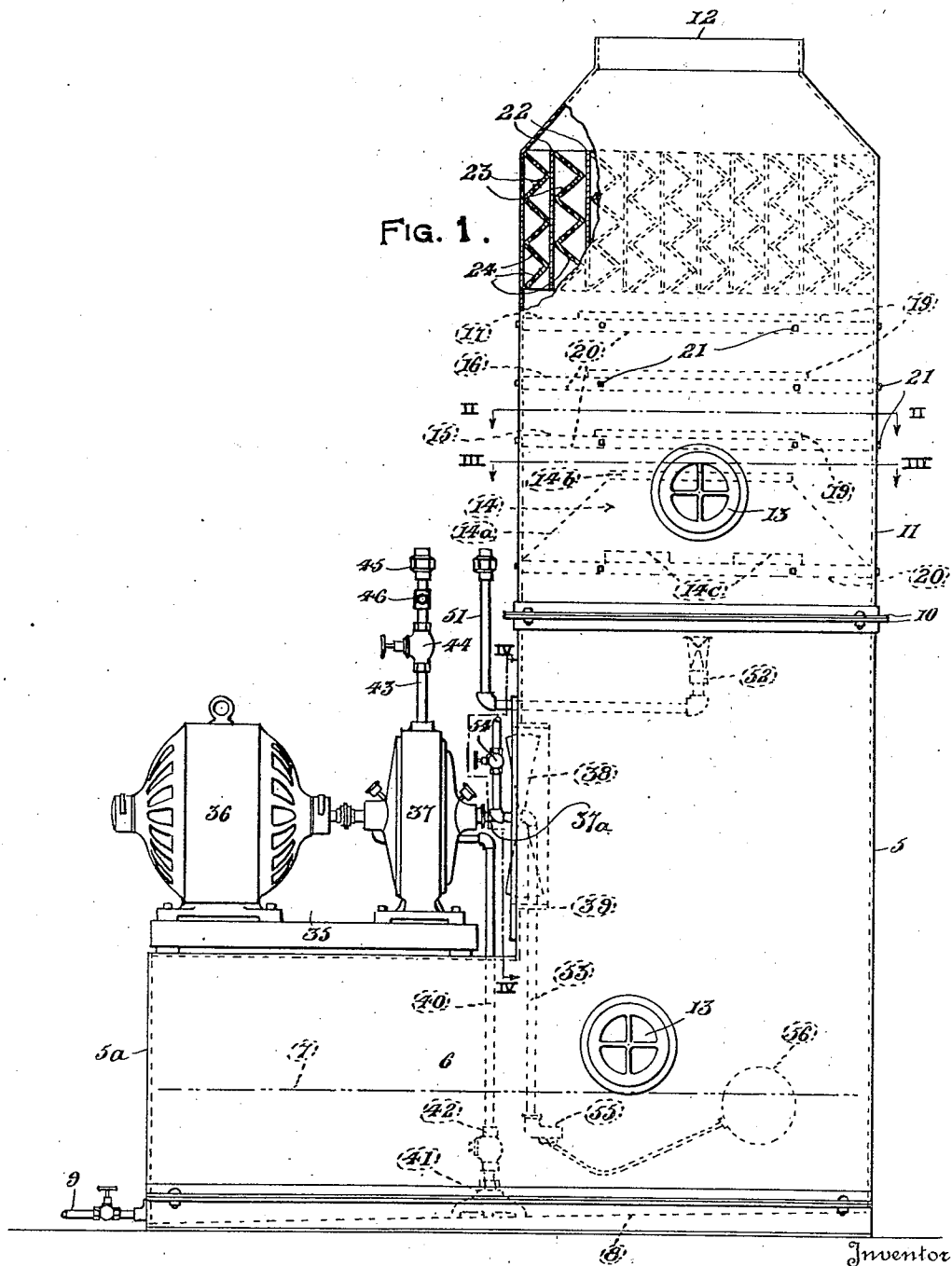
1,614,647

E. A. BROOKS

RECOOLER

Filed Dec. 12, 1924

2 Sheets-Sheet 1



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FIG. 2.

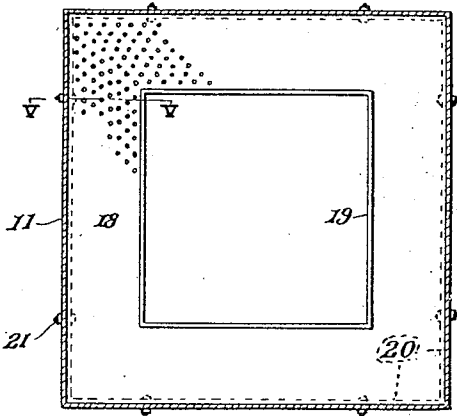


FIG. 3.

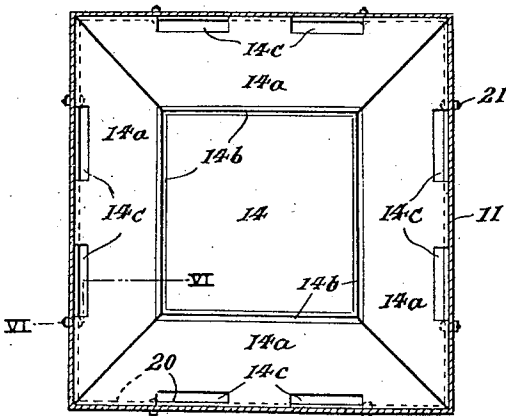


FIG. 7.

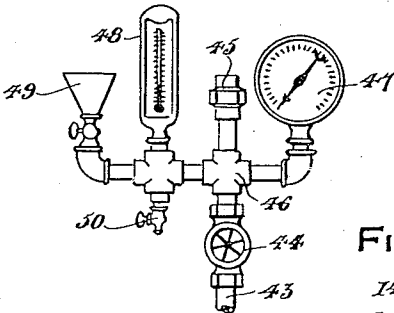


FIG. 4.

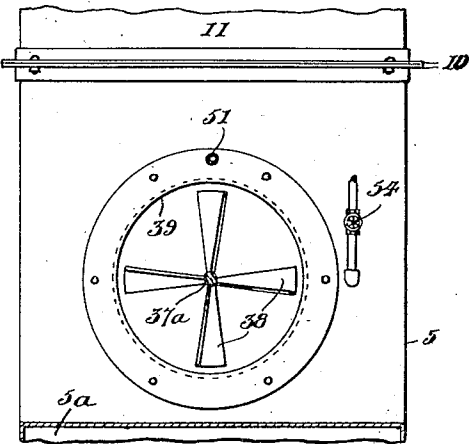


FIG. 5.

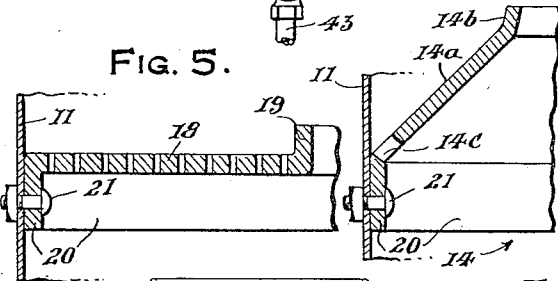


FIG. 8.

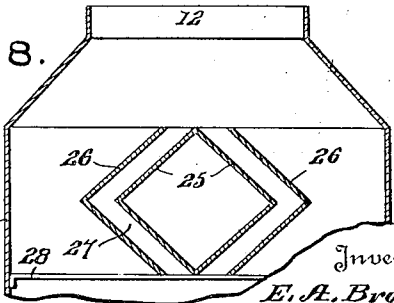
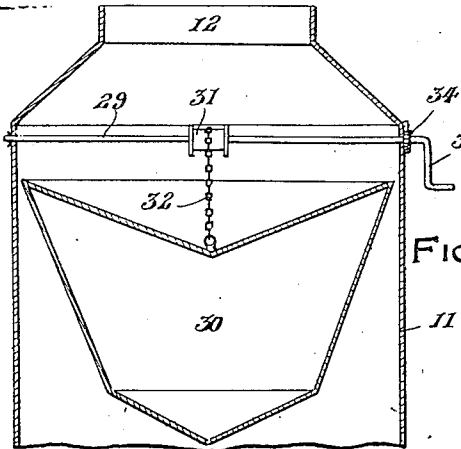


FIG. 9.



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RECOOLER.

Application filed December 12, 1924. Serial No. 755,589.

This invention relates to new and useful improvements in coolers.

The primary object of this invention is to provide an apparatus which may be employed, without material alterations, for cooling water or air, and for washing air.

A further object of the invention is to provide a cooler for the water in small tonnage refrigerating plants, such as those used in meat shops, hotels, etc., or on railroad cars or vessels, for minimizing the consumption of water.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is an elevational view, partly broken away, of the entire apparatus in operative assembly,

Figure 2 is a transverse sectional view taken upon line II—II of Fig. 1,

Figure 3 is a similar view taken upon line III—III of Fig. 1,

Figure 4 is a fragmentary vertical sectional view taken upon lines IV—IV of Fig. 1,

Figure 5 is a fragmentary transverse sectional view taken upon line V—V of Fig. 2,

Figure 6 is a fragmentary transverse sectional view taken upon lines VI—VI of Fig. 3,

Figure 7 is a detail elevational view of a primer, a thermometer, and a pressure gauge employed in connection with the apparatus illustrated in Fig. 1,

Figure 8 is a fragmentary vertical sectional view showing a modified form of baffle plate to be used in connection with the apparatus illustrated in Fig. 1, and

Figure 9 is a fragmentary vertical sectional view of a type of damper adapted to be employed in connection with the apparatus shown in Fig. 1.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of this invention, the numeral 5 designates the lower part of a casing, preferably formed of sheet metal or the like which has projecting laterally of the bottom portion of the same an extension 5^a which forms with the lower part 5 what will be termed a reserve reservoir 6 adapted for having water

maintained therein which is to be retained at the water level line 7. The lower part 5 and extension 5^a are provided with a common bottom 8 which slopes from the outer end wall of the part 5 toward the end wall of the extension 5^a. This said end wall of the extension 5^a is provided with a controlled drain 9 by means of which the water and sediment may be withdrawn from the reserve reservoir 6.

Suitably connected to the upper open end of the lower part 5 of the casing, as by the flanges 10, is the upper part 11 of the casing having the reduced opening 12 in its upper end.

The reserve reservoir 6 and upper part 11 of the casing are each provided with a removable man-hole cover 13 by means of which a person may gain ready access to the interior of these elements.

The upper part 11 of the casing has suitably bolted to its lower portion the substantially pyramid-shaped plate 14 which is shown in detail in Figs. 3 and 6 as comprising the four flat sides 14^a having the flanged upper edges 14^b and the elongated openings 14^c formed in the edge portions which are bolted to the wall of the casing part 11. The function of this pyramid-shaped plate 14 will be disclosed at a later point.

Suitably housed within and bolted to the upper part 11 of this casing are the perforated centrally apertured plates 15, 16 and 17 which are of substantially identical construction, the only variation consisting of the diameter of the openings formed in the centers thereof, the said openings increasing in diameter gradually from the plate 15 to the plate 17. These plates are depicted in detail in Figs. 2 and 5 and are formed with the perforated flat wall 18 having an upwardly turned flange 19 bordering the central opening and a downwardly turned flange 20 at the outer edge by means of which they are secured to the walls of the upper part of the casing by the bolts 21. The specific function performed by these plates will be disclosed in detail at a later point.

In Fig. 1, the upper end of the part 11 of the casing is illustrated as having a baffle structure including the vertically extending parallel plates 22 having arranged in the spaces between the same the zigzag plates 23 having the perforations 24 formed therein. The function performed by this baffle struc-

ture will be clearly disclosed at a later point. In Fig. 8 there is shown a modified form of baffle structure which includes the transversely extending hollow element 25 having its longitudinal edges arranged on horizontal and vertical planes at right angles to each other. Surrounding the hollow structure 25 are the V-shaped baffle plates 26 which are arranged to form V-shaped passages 27 between the walls of the plate 26 and the hollow member 25. This structure is supported by a transversely extending bar 28 bolted to the sides of the upper part 11.

If desired, for particular uses to which the apparatus may be put and which will be described at a later point, the baffle structures may be dispensed with and a transversely extending rod 29, journaled in the walls of the upper part 11 of the casing, may be provided for supporting the hollow damper structure 30 and for raising and lowering the same in respect to the central openings formed in the perforated plates 15 to 17 inclusive for varying the amount of air which may pass through the upper part 11 of the casing and out through its reduced upper end 12. This rod 29 has mounted thereon a roller 31 having the section of chain 32 connected thereto and to the hollow damper 30. A crank handle 33 is formed on one end of this rod 29 and provides means by which the rod 29 may be rotated for winding or unwinding the section of chain 32 in respect to the roller 31. A pawl and ratchet structure 34 is also associated with this rod and operates to retain the damper 30 in any desired adjusted position.

Suitably mounted upon the top wall of the extension 5^a is a base plate 35 which has the electric motor 36 bolted thereto and the pump 37 directly connected with the armature shaft of the said motor. The free end of the pump shaft 37^a has mounted thereon the fan 38 which is arranged in an opening formed in the wall of the lower part 5 of the casing and has surrounding it an annular water shield 39 which projects into the said part 5 of the casing. It will now be seen that when the motor 36 is operated, the fan will be driven for forcing air into the casing which will pass upwardly through the central openings in the plates 14 to 17 inclusive and will escape through the reduced opening 12 of the upper part 11.

The pump 37 is provided with a feed pipe 40 which extends into the reserve reservoir 6 and has connected to its lower end a suction nozzle 41, the said pipe 40 being further provided with a check valve 42 which operates to prevent the flow of liquid from the pump 37 back into the reservoir 6. It will now be seen that when this pump is operated by the motor 36, water will be sucked through the nozzle 41, by the check valve 42, and through the feed pipe 40 into

the said pump. The said pump is provided with a pipe line 43 having a control valve 44 interposed therein. This pipe line is provided with a union 45 by means of which it may be connected to a pipe extending to a condenser of a refrigerating plant, not shown. This pipe 43 is further provided with a coupling 46 by means of which the pressure gauge 47, the thermometer 48, the primer cup 49, and the drain valve 50 may be connected thereto. These various instrumentalities may be used in any desired manner for permitting the proper control and functioning of the pump 37 in connection with the refrigerator condenser.

The return for the water fed to the refrigerator condenser includes the pipe 51 which passes horizontally into the lower part 5 of the casing and terminates in a spraying nozzle 52 which functions to break the stream of water up into a mist or spray.

For the purpose of taking care of any evaporation in the amount of water in the recooler and the condenser portion of the refrigerator system, a supply line 53 is provided which leads from the city water supply and passes into the reservoir 6 beyond the control valve 54. The lower end of this supply line 53 is provided with a valve housing 55 having a valve therein which is controlled by the float 56. It is to be understood that this valve and valve housing may be of any suitable construction whereby the same may be controlled by the float 56 for maintaining the water in the reserve reservoir at the level 7.

With the apparatus in operation for cooling the heated water discharged from the condenser of a refrigerating plant, the motor 36 is started for the purpose of driving the pump 37. This pump will draw water from the reserve reservoir 6 and will feed the same to the condenser of the refrigerating plant. This water will absorb heat while passing through the refrigerator plant and when it is returned to the apparatus through the pipe 51 and sprayed into the casing by the sprayer 52, the said water is at a rather high temperature. The operating of the electric motor 36 and pump 37 will cause the fan 38 to be rapidly rotated for driving air into the lower part 5 of the casing. This air can only escape by passing upwardly through the central openings of the plates 14 to 17 inclusive and by the baffle structures to the reduced opening 12 of the upper part 11 of the casing. This upward draft will blow the spray of water thrown out by the sprayer 52 upwardly through the central openings of the plates 14 to 17 after which it will impinge against the baffle structure in the upper portion of the casing part 11 and will be caused to drop downwardly. This downward fall of the water will be substantially completely

checked by the perforated plates 15 to 17 which will split the water up into drops resembling rain. These rain drops will pass through the plates 17, 16 and 15 and will drop upon the sloping flat walls 14^a of the pyramid-shaped plate 14. The said drops will then collect or unite and will be permitted to drain from the plate 14 through its elongated openings 14^c. This water draining through the openings 14^c will be deposited in the reserve reservoir 6.

It will readily be understood that the air forced into the casing by the fan 38 will be thoroughly mixed with the water sprayed from the sprayer 52 and the rain drops falling into the plates 15 to 17 inclusive and will absorb all of the heat carried by the said water during its upward and return travel so that when the water is deposited in the reserve reservoir 6, it has been greatly reduced in temperature and is in readiness for again being sucked into the pump 37 and fed to the condenser of a refrigerating system.

If this apparatus is to be used for cooling and washing air, it is operated in the same manner as described and the air driven into the casing by the fan 38 is collected as it leaves the upper reduced end 12 and conducted to any point desired. It is, of course, to be understood that the water used in the system, when employed for cooling air, will be the cooling medium and that the pipes 43 and 51 will be directly connected so that the water discharged from the pump 37 will be fed directly to the sprayer 52.

The damper shown in Fig. 9 may be employed when the device is used for cooling or washing air for the purpose of controlling the amount of air permitted to be discharged through the central portions of the plates 15 to 17 inclusive.

It is to be understood that the forms of this invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the sub-joined claims.

Having thus described the invention, I claim:—

1. In an apparatus of the type described, a casing having in its lower portion a reservoir for the reception of liquid, means

for feeding the liquid from the reservoir to a system wherein the liquid will be heated, means for returning the heated liquid to the casing above the reservoir in the form of a spray, means for creating an up-draft in said casing for contacting with and absorbing heat from the sprayed liquid, said draft operating to carry the liquid upwardly through said casing, means for extracting the liquid from the draft for permitting the liquid to fall into the reservoir, a plurality of plates located below said liquid extracting means for retarding the fall of the said liquid to further extract heat therefrom, and a pyramid-shaped centrally apertured member having a plurality of elongated slots formed in its peripheral edge portion located below said perforated plate for collecting the drops of liquid and discharging them through said slots in the form of streams to be returned to the reservoir out of the path of travel of the draft.

2. In an apparatus of the type described, a casing having in its lower portion a reservoir for the reception of liquid, means for feeding the liquid from the reservoir to a system wherein the liquid will be heated, means for returning the heated liquid to the casing above the reservoir in the form of a spray, means for creating an up-draft in said casing for contacting with and absorbing heat from the sprayed liquid, said draft operating to carry the liquid upwardly through said casing, means for extracting the liquid from the draft for permitting the liquid to fall into the reservoir, said last named means including a plurality of zig-zag baffle plates mounted in the uppermost portion of the casing, a plurality of perforated plates located below said liquid extracting means adapted for forming the liquid into drops for permitting the further contacting of the draft therewith to absorb additional heat therefrom, and a pyramid-shaped centrally apertured member having a plurality of elongated slots formed in its peripheral edge portion located below said perforated plates for collecting the drops of liquid and discharging them through said slots in the form of streams to be returned to the reservoir out of the path of travel of the draft.

In testimony whereof I affix my signature.

EDWARD A. BROOKS.