

Jan. 9, 1940.

H. J. DICK ET AL

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REFRIGERATING APPARATUS

Filed June 19, 1936

3 Sheets-Sheet 1

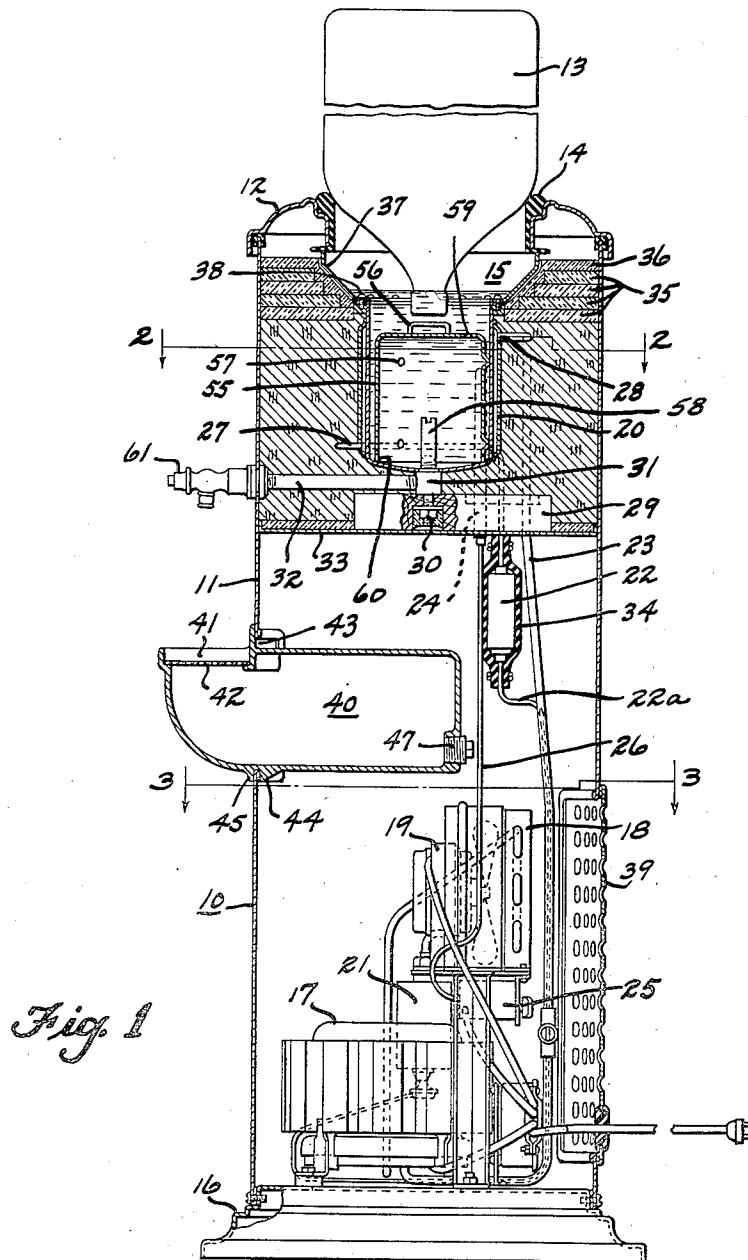


Fig. 1

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3 Sheets-Sheet 2

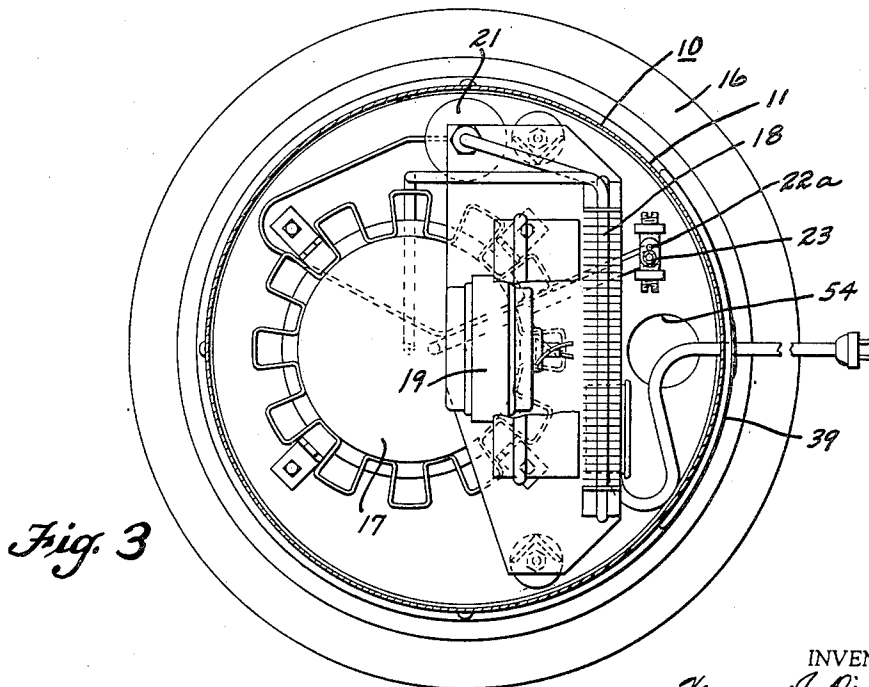
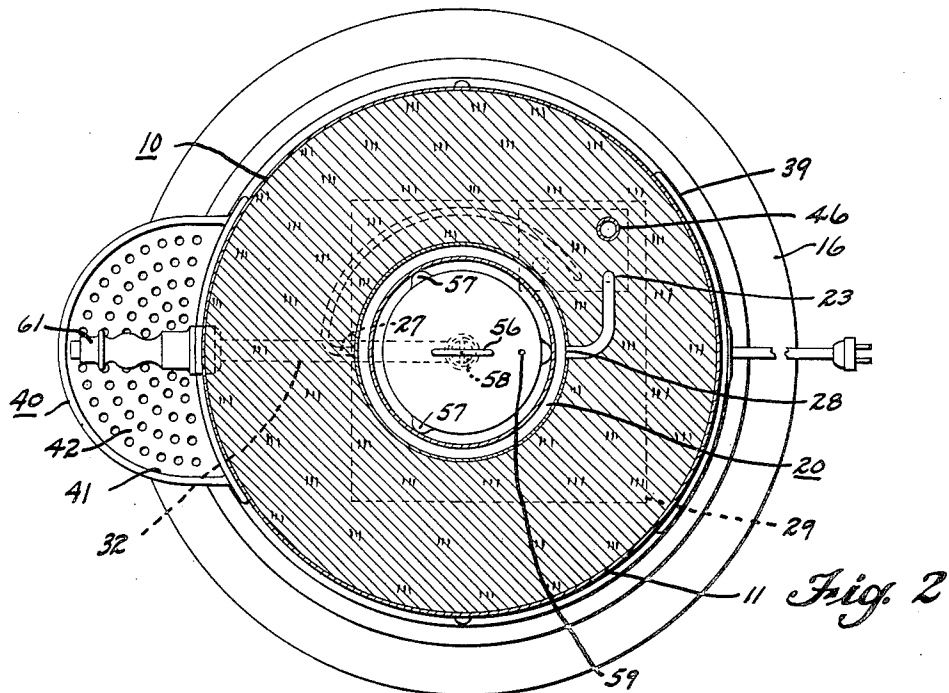


Fig. 3

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3 Sheets-Sheet 3

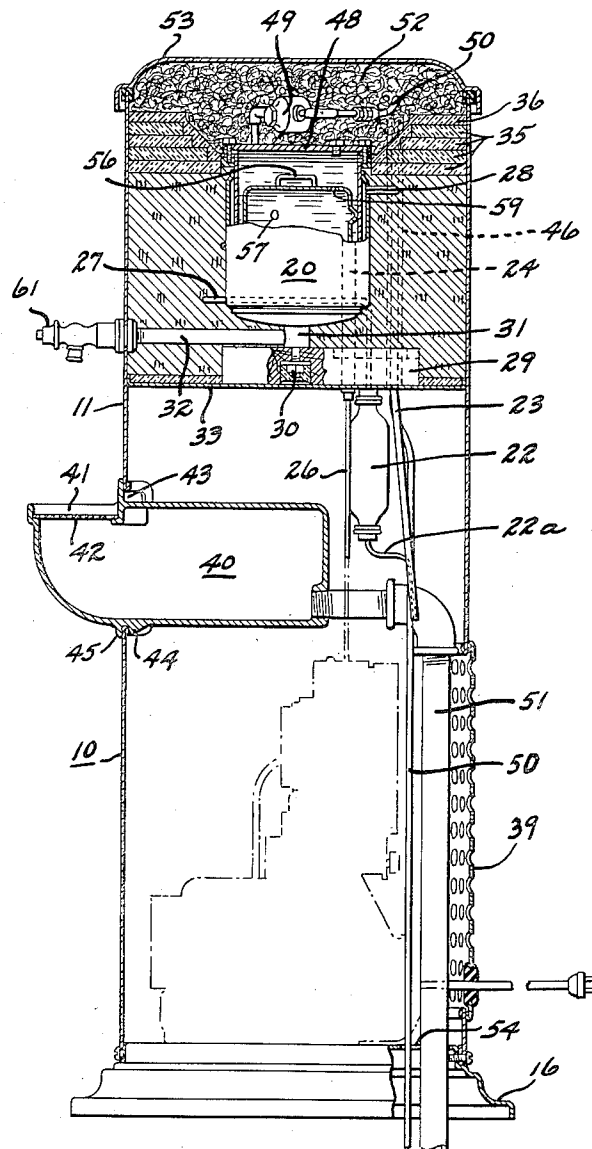


Fig. 4

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UNITED STATES PATENT OFFICE

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REFRIGERATING APPARATUS

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Application June 19, 1936, Serial No. 86,148

12 Claims. (Cl. 62—141)

This invention relates to refrigerating apparatus and more particularly to liquid coolers.

An object of this invention is to provide a small, inexpensive, light weight liquid cooler which is economical and efficient in operation.

Another object is to provide a liquid cooler which is sanitary and easy to clean.

It is a further object to provide a liquid cooler which may be converted very quickly from the bottle type to one for cooling liquid from a main.

Another object of this invention is to simplify the arrangement of the parts whereby the assembly is facilitated.

Still another object of this invention is to provide improved means for directing the liquid within the cooling chamber, and to provide an improved drain pan for the waste liquid.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a vertical sectional view of a bottle type of liquid cooler;

Fig. 2 is a cross-sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 1; and

Fig. 4 is a vertical sectional view of a cooler provided with means for connection to a main.

In the form of the invention shown in Fig. 1, the liquid cooler generally designated by the reference character 10 is of the bottle type in which a cylindrical casing 11 is provided with a top 12 which supports the usual bottle 13. A gasket 14 on which the bottle rests very effectively excludes all dust, etc., from the water compartment 15. The cylindrical casing or shell member 11 is mounted on a pressed steel base 16. Mounted on the base 16 is a compressor unit 17 of the rotary type and a condenser 18 which is provided with the usual motor driven fan 19. In the upper portion of the shell 11 is mounted the combined cooling chamber and evaporator 20 which is of the double wall type in which refrigerant is circulated between the inner and the outer walls. The liquid refrigerant is fed from the storage tank 21 into the usual restrictor 22 via the pipe line 22a and from there goes to the evaporator where it enters at 27. The vaporized refrigerant leaves at 28 and returns to the compressor unit through the line 23.

In order to properly regulate the amount of cooling which is to take place, a thermostatic

bulb 24 is placed adjacent the wall of the evaporator and is connected to a conventional adjustable relay 25 located in the lower portion of the shell by means of line 26. The arrangement is such that the bulb may be slipped into place from below. In mounting the cooling chamber, the chamber is first secured to the connection 31 which in turn is secured to the block 29 by means of bolt 30. The liquid pipe line 32 is fastened in place to the fitting 31 and thereafter the block 29 is fastened to the partition 33 by means of screws or any other suitable attaching means. In order to prevent sweating due to the low temperatures, a rubber casing 34 is placed around the restrictor 22 and some suitable insulation such as rock wool, ground cork, or the like is packed in around the cooling chamber and the pipe 32. Thereafter, sheets of insulation 35 are placed on top of the insulation which is packed around the cooling chamber and in order to have the cooling chamber completely sealed in, suitable insulation 36 is poured over the blocks 35. It has been found that hydrolene or hot asphalt is suitable for this purpose. Inasmuch as the funnel member 37 is not used when the cooler is adapted for connection to a liquid main, care is taken to prevent the insulation from adhering to the funnel. For this purpose, it has been found very satisfactory to place Cellophane on the outside of the funnel 37 while the liquid insulation is being poured. The funnel 37 is removably secured to the chamber 20 by any suitable means such as screws 38 shown in Fig. 1. In order to provide proper ventilation for the compressor compartment, a perforated closure member 39 has been provided which is readily removable in case anyone wishes to adjust the thermostatic control 26.

Besides relying on the cooling effect produced by the air circulated over the condenser for dissipating heat from the compressor compartment, I have provided a novel drain pan 40 which assists in dissipating heat from the compressor compartment. As shown in Fig. 1, this drain pan rests on the lower edge of opening 43 and is located partly without the shell and partly within the shell. With such a construction, waste liquid may be poured in through the opening 41 which is protected by means of a perforated plate 42 and by virtue of the shape of the drain pan, the larger portion of the water will be disposed within the shell, thereby absorbing heat from the compressor compartment. The drain pan 40 is an aluminum casting and is provided with a plug 47 which may be removed in the event that one

wishes to connect the drain to a drain pipe, as will be described hereinafter.

In order to facilitate removal of the drain pan, the lower edge of the opening 43 in the shell 11 is used as a pivot for the pan. In order to properly position the pan, the underside thereof is provided with a projection 44 located within the shell which serves to limit outward movement and a flange 45 which encircles the whole drain pan serves to limit the inward movement of the pan. By virtue of the larger portion of the pan being located to the right of the point of suspension, the pan will remain in the position shown in Fig. 1. Removal thereof merely requires tilting the pan slightly in a counter-clockwise direction, or lifting it upwardly and thereafter pulling it out.

Each cooler unit, whether of the type shown in Fig. 1, or the type shown in Fig. 4, is provided with an aperture 46, best shown in Fig. 2, through which liquid may be piped to the cooling chamber whenever one wishes to cool liquid from a main.

Referring to Fig. 4, it will be seen that the essential structure is all the same as that shown in Fig. 1, except that the head 48 has been substituted for the funnel 37 so as to make it possible to cool liquid coming directly from a main in lieu of liquid coming from a bottle. A pressure regulating valve 49 is adapted to reduce the main pressure from approximately sixty pounds to a pressure around five pounds which has been found to be most satisfactory in units of this type. A pipe line 50 passing through the base 16 supplies liquid to the cooling chamber. Waste liquid may be removed through a pipe such as 51, although if it is not convenient to dispose of the waste liquid in this manner, the pipe line 51 may be dispensed with and a plug such as 47 shown in Fig. 1 may be used, in which case, the drain pan must be removed and emptied from time to time.

In the modification shown in Fig. 4, some suitable insulation such as Kapok is packed into the space 52 above the cooling chamber and in place of using a cover such as 12 shown in Fig. 1, a special cover 53 is substituted. It will be apparent, therefore, that it is a very simple matter to convert the unit shown in Fig. 1 into a unit of the type shown in Fig. 4, the only thing necessary being the removal of the funnel 37 and the substitution of the head 48. The plumbing connections necessary may all be made by merely removing the cover and the perforated plate 39. Each base member used is provided with an aperture 54 through which pipes, if any are used, may pass.

While I have described my device as being provided with a pressed steel base 16, a cast iron base may equally well be used. While pressed steel is cheaper, cast iron bases are desirable inasmuch as they assist in holding the unit in place and assist in preventing the unit from being pushed over. By referring to Fig. 1, it will be apparent that all of the heavy mechanism is mounted in the very lower portion of the housing 11 and all of the mechanism located in the upper portion of the housing is of very light construction, with the result that the unit may be tilted considerably without being toppled over. This unit in actual practice takes up a minimum amount of space by virtue of its design, but at the same time is sturdy, efficient, and very neat in appearance.

Referring again to Fig. 1, I wish to call attention to the novel mechanism within the cooling chamber. In units of this type, it is desirable to frequently empty out the liquid and thoroughly

clean the cooling chamber. In order to facilitate cleaning, I have devised novel means for directing the flow of liquid within the cooling chamber which is readily removable. In either modification, I employ an inverted cup member 55 which is provided with a handle 56. This handle serves the double purpose of preventing the cup member from closing the bottle opening and also facilitates removal thereof for cleaning purposes. In the upper wall of the cup 55 is provided a small vent hole 59 which permits air to escape from the cup as water fills in from the bottom. The cup member is also provided with integral protuberances 57 which space the cup from the walls of the chamber. Removably secured to the attachment 31 is a drain pipe 58 which extends up into the cooling chamber. At spaced points around the bottom edge of the cup are provided notches 60 which permit water to freely enter the cup 55. It will be seen, therefore, that the relatively warm water entering the cooling chamber from the bottle will be required to flow through the narrow passage between the cup and the cold wall of the cooling chamber and will thereafter pass through the notches 60 into the storage chamber where it will mix with the cold water stored therein before leaving via the pipe 58, pipe 32 and the usual faucet 61. The entrance to the outlet or drain pipe 58 is such that the water dispensed will come from the central part of the storage chamber.

My arrangement of parts greatly facilitates the assembly of the device and inasmuch as the labor cost in assembling any device constitutes a substantial portion of the cost, this is an important feature of my device. In assembling the unit, the compressor and condenser mechanism are first secured to the base 16. Thereafter, the cooling chamber is installed within the upper portion of the shell 11. The shell 11 is then slipped over the compressor and condenser mechanism onto the base and is secured in place. The electrical connections and the connections between the cooling chamber and the compressor mechanism are all made immediately within the plate 39 and are made before the apertured plate 39 is slipped into place. It is apparent, therefore, that the men on the assembly line have no difficulty in attaining access to the particular elements with which they work.

After the cooling chamber has been installed in the upper portion of the shell and the shell has been secured to the base, but prior to the introduction of insulation around the cooling chamber and prior to installing the thermostat relay mechanism and condenser fan motor, the entire unit is placed in a 250° F. oven in order to remove all moisture from the system. After removal from the oven, the insulation, thermostat, etc. are assembled.

It will be apparent from a study of Fig. 1 that in operation, the relatively cool air will enter through the lower portion of the perforated plate 39 and will pass over the compressor unit and will circulate up past the condenser and thereafter leave through the apertures in the upper portion of plate 39.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the 70 claims which follow.

What is claimed is as follows:

1. In a liquid cooling apparatus, a cabinet, a cooling chamber within the cabinet positioned to receive liquid to be cooled, and an inverted cup 75

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member within the cooling chamber for directing the liquid into contact with the walls of the cooling chamber.

2. In a liquid cooling apparatus, a cabinet, a cooling chamber within the cabinet positioned to receive liquid to be cooled, an inverted cup member within the cooling chamber for directing the liquid into contact with the walls of the cooling chamber, and handle means on the cup to facilitate the removal of the cup.

3. In a liquid cooling apparatus, a cabinet, a cooling chamber within the cabinet positioned to receive liquid to be cooled, and an inverted cup member within the cooling chamber for directing the liquid into contact with the walls of the cooling chamber, said cup member being provided with means for spacing it from the walls of the chamber.

4. In a liquid cooling apparatus, a cabinet, a cooling chamber within the cabinet positioned to receive liquid to be cooled, an inverted cup member within the cooling chamber for directing the liquid into contact with the walls of the cooling chamber, and an outlet pipe for the liquid protruding into said cup.

5. In a liquid cooling apparatus, a cabinet, a cooling chamber within the cabinet, means for supplying a liquid to be cooled to said chamber, means for directing the liquid entering said chamber downwardly into thermal exchange relationship with the walls of said chamber, and removable means protruding into substantially the central portion of the chamber through which liquid thus cooled may be withdrawn.

6. In a liquid cooling apparatus, a cabinet, a cooling chamber within the cabinet, and two interchangeable heads for said chamber, one of said heads being provided with means for supporting an inverted vessel containing a liquid, and the other being provided with means for connection to a water main.

7. In a liquid cooling apparatus, a cabinet, means for supporting on its upper wall an inverted vessel containing a liquid to be cooled, a cooling chamber within the cabinet positioned to receive said liquid, an inverted cup within said cooling chamber, and means precluding closure of said vessel by said cup.

8. In a liquid cooling apparatus, a housing having an upper and a lower compartment, a refrigerated cooling chamber in the upper compartment, refrigerant liquefying mechanism in the lower compartment supplying refrigerant for said cooling chamber, air inlet means and air outlet means on one side of said housing, and a baffle intermediate the air inlet means and the air outlet means, one portion of said liquefying mechanism being mounted on said baffle and another portion being mounted below said baffle.

9. In a liquid cooling apparatus, a housing, a refrigerated cooling chamber within said housing,

a refrigerant liquefying mechanism in said housing for supplying refrigerant for said cooling chamber, an opening in one side of said housing, a closure member for said opening having perforations for the circulation of air into and out of said housing, and a baffle disposed within said housing intermediate the upper and lower perforations, said baffle being so arranged as to permit the circulation of air between it and the wall of said housing which is disposed opposite said closure member.

10. In combination, a compressor, a condenser, a base, means securing said compressor, condenser and base together as a preassembled unit, a housing, a water storage chamber, evaporator means for cooling said water storage chamber, means for securing said evaporator and water storage chamber within the upper portion of said housing so as to form a second preassembled unit adapted to be lowered over said first unit, means for securing said first preassembled unit to said second preassembled unit with the lower portion of said housing enclosing said first unit, an opening in the side wall of said housing, and refrigerant flow connections between said evaporator, compressor and condenser, said connections being accessible through said opening.

11. In a liquid cooling apparatus, a cabinet, a cooling chamber within said cabinet, means for supplying a liquid to be cooled to said chamber, means disposed adjacent the side walls of said chamber for circulating a refrigerant in thermal exchange relationship with said liquid, means for directing the liquid entering said chamber horizontally and then downwardly along said side walls in thermal exchange relationship with said refrigerant, and means for withdrawing liquid thus cooled from said chamber, said liquid directing means having a substantially flat upper surface disposed above the main bulk of liquid in said chamber.

12. In a liquid cooling apparatus, a cabinet, a cooling chamber within said cabinet, means for supplying a liquid to be cooled to said chamber, means disposed adjacent the side walls of said chamber for circulating a refrigerant in thermal exchange relationship with said liquid, means for directing the liquid entering said chamber horizontally and then downwardly along said side walls in thermal exchange relationship with said refrigerant, and means for withdrawing liquid thus cooled from said chamber, said liquid directing means having a liquid directing surface disposed above the main bulk of liquid in said chamber and comprising a substantially upright partition means defining a storage space adjacent the liquid withdrawing means and arranged to receive a substantial volume of the cooled liquid.

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