Sept. 9, 1958 J. W. JACOBS 2,850,884

REFRIGERATING APPARATUS

Filed Aug. 9, 1955 2 Sheets-Sheet 1

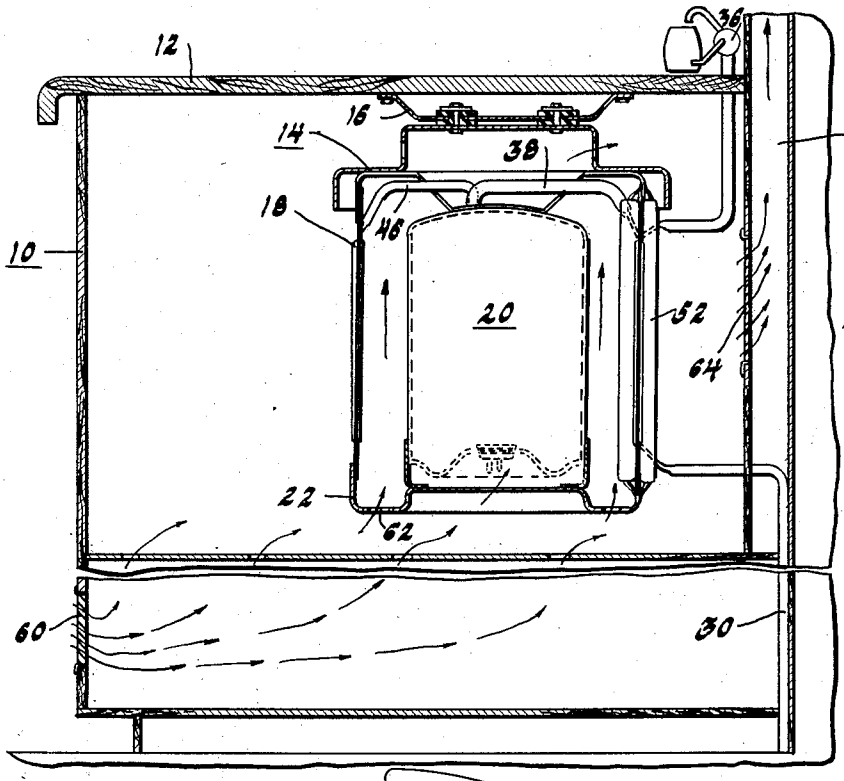


Fig. 1

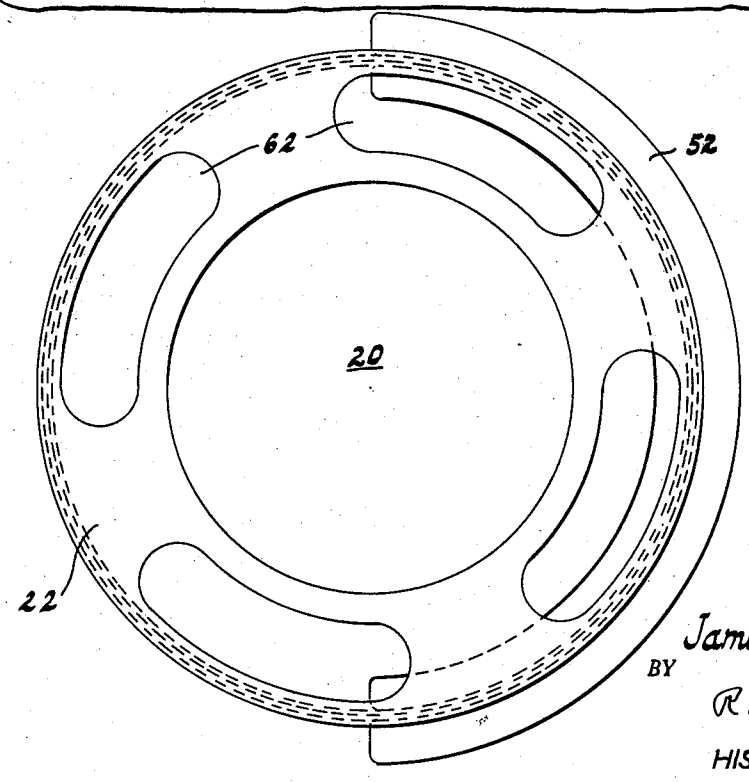


Fig. 2

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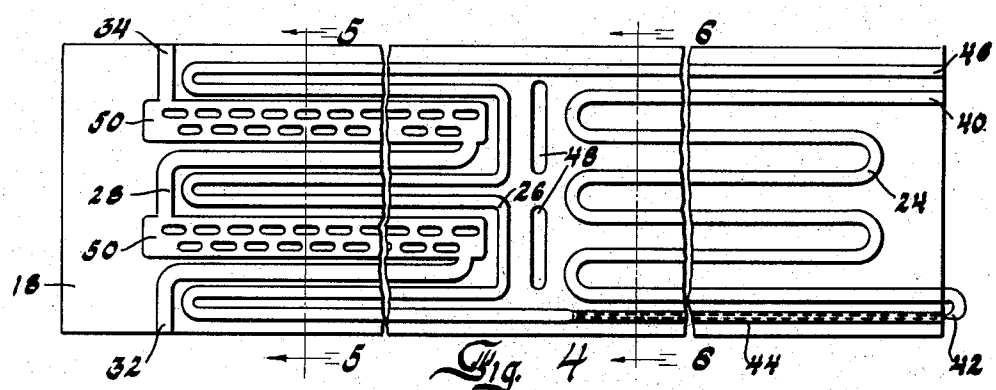


Fig. 4



Fig. 5



Fig. 6

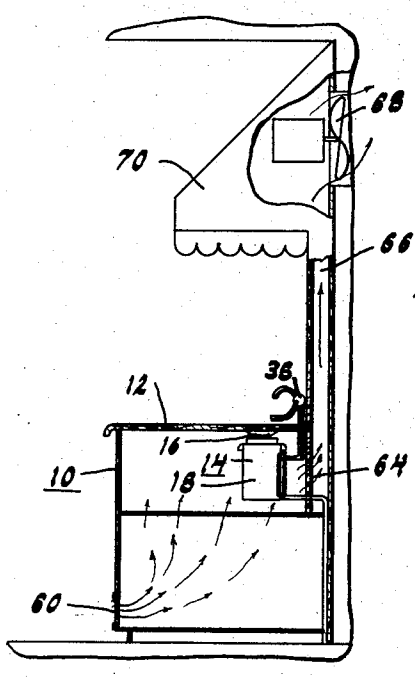


Fig. 3

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REFRIGERATING APPARATUS

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Application August 9, 1955, Serial No. 527,217

5 Claims. (Cl. 62—258)

This invention relates to refrigerating apparatus and more particularly to apparatus for cooling water.

It is an object of this invention to provide a small compact water cooler which may be manufactured at a low cost.

Another object of this invention is to provide a water cooler having a minimum number of parts. More particularly, it is an object of this invention to provide a refrigerating system for use in a water cooler in which the refrigerant condenser, the evaporator, and the water chilling passages are all formed in a single roll bonded heat exchange unit.

Another object of this invention is to provide an improved arrangement for mounting and cooling the refrigeration equipment.

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:

Figure 1 is a vertical sectional view through a kitchen cabinet showing a water cooler unit constructed in accordance with my invention;

Figure 2 is a bottom view of the water cooler unit;

Figure 3 is a side elevational view with parts broken away showing the arrangement for circulating condenser cooling air over the unit;

Figure 4 is a developed view showing the arrangement of the refrigerant and water passages in the roll bonded heat exchange element forming part of the water cooler unit;

Figure 5 is a sectional view taken substantially on line 5—5 of Figure 4; and

Figure 6 is a sectional view taken substantially on line 6—6 of Figure 4.

Referring now to the drawings wherein a preferred embodiment of the invention has been shown, reference numeral **10** generally designates a kitchen cabinet having a top **12** which provides work surface and also serves as a support for a water cooler assembly **14**. The water cooler is suspended from the bottom surface of the work top by means of the supporting means **16** which is constructed and arranged as shown.

The water cooler assembly includes a one-piece roll bonded plate type heat exchange unit **18** which has been bent into circular shape so as to form the outer shell of the water cooler assembly. A conventional sealed motor-compressor unit **20** is carried by an apertured bottom plate **22** secured to the lower edge of the heat exchange unit **18**. The upper edge of the circular heat exchange unit **18** is secured to the mounting means **16** which serves to suspend the water cooler beneath the work surface **12**.

As best shown in Figure 4 of the drawing, the heat exchanger **18** consists of a one-piece roll bonded plate which has incorporated therein a condenser passage **24**, an evaporator passage **26**, and a water passage **28**. The plate element **18** is manufactured by the roll bonding

process disclosed in Long Patent No. 2,662,273. The water to be cooled is supplied from a city water main or any other suitable source and enters the passage **28** through a line **30** which connects to the inlet **32** for the water cooling passage **28**. The chilled water leaves through the outlet **34** which connects to a water dispensing faucet **36** provided above the table top **12** as best shown in Figures 1 and 3.

The compressor discharge line **38** is connected to the condenser passage **24** of the roll forged plate **18** at **40** whereby the compressed refrigerant is required to pass through the condenser portion **24** of the plate before entering the fixed restrictor **42** which then directs the liquid refrigerant leaving the condenser **24** into the evaporator passage **26**. As shown in Figure 4 of the drawing the fixed restrictor **42** is in the form of a small capillary tube inserted into the inlet end **44** of the evaporator passage. The liquid refrigerant entering the evaporator passage **26** vaporizes therein prior to returning to the motor-compressor unit through the usual suction line **46**.

It will be noted that the evaporator passage **26** is arranged in close proximity to the water passage **28** and that the condenser portion of the roll bonded plate **18** is largely separated from the evaporator portion thereof by means of slots **48** which minimize the transfer of heat from the condenser portion of the plate **18** to the evaporator and water cooling portion of the plate. It will also be noted that the water passage includes a pair of enlargements **50** of the waffle plate type which serve as storage chambers for the water to be refrigerated. Suitable insulation **52** serves to enclose the evaporator and water chilling passages in the roll bonded plate **18** as best shown in Figure 1 of the drawing.

The condenser portion of the roll bonded plate **18** is fully exposed to the air flowing through the kitchen cabinet so as to dissipate the heat removed from the water by the refrigerating system. As best shown in Figures 1 and 3 the condenser cooling air enters the kitchen cabinet through an air inlet grille **60** provided adjacent the floor of the cabinet **10** and some of this air flows around the outside of the water cooler assembly and some of it flows through air inlet passages **62** provided in the member **22** so as to cool the inner surface of the condenser portion **18** and so as to cool the motor-compressor unit **20**. The rear wall of the cabinet construction is provided with an air outlet **64** which communicates with an air flue **66** leading to an exhaust fan **68** which exhausts the air into the outside atmosphere.

The exhaust fan **68** may be provided solely for the water cooler assembly or it may also serve to exhaust air from the entire kitchen as well as from the water cooling unit. As shown in Figure 3 of the drawing a canopy **70** of the type used over ranges has been provided for withdrawing odors emanating from the food preparation center as well as for withdrawing the condenser cooling air.

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, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. In a water cooling unit; a one-piece metal plate having formed therein a condenser passage, an evaporator passage, and a water passage; a refrigerant compressor; means for connecting said compressor, condenser passage, and evaporator passage in series refrigerant flow relationship; means for supplying water to be refrigerated to said water passage; means for dispensing water from the outlet of said water passage; said water passage being arranged in close relationship with said refrigerant passage whereby the water flowing through

said water passage is cooled by the refrigerant vaporized in said evaporator passage, said one piece plate type heat exchanger forming an outer shell surrounding said compressor.

2. In a water cooling unit; a one-piece metal plate having formed therein a condenser passage, an evaporator passage, and a water passage; a refrigerant compressor; means for connecting said compressor, condenser passage, and evaporator passage in series refrigerant flow relationship; means for supplying water to be refrigerated to said water passage; means for dispensing water from the outlet of said water passage; said water passage being arranged in close relationship with said refrigerant passage whereby the water flowing through said water passage is cooled by the refrigerant vaporized in said evaporator passage; insulating means surrounding said evaporator and water passages, and means for circulating air in thermal exchange relationship with said condenser passage.

3. In a water cooling unit; a circular outer housing element comprising a one-piece plate type heat exchanger having formed therein a condenser passage, an evaporator passage, and a water passage; a refrigerant compressor; means for connecting said compressor, condenser passage, and evaporator passage in series refrigerant flow relationship; means for supplying water to be refrigerated to said water passage; means for dispensing water from the outlet of said water passage; said water passage being arranged in close relationship with said refrigerant passage whereby the water flowing through said water passage is cooled by the refrigerant vaporized in said evaporator passage; insulating means surrounding said evaporator and water passages, and means for circulating air in thermal exchange relationship with said condenser passage.

4. In combination, a one-piece plate type heat exchanger having formed therein a condenser passage, an evaporator passage, and a water passage; a refrigerant compressor; means for connecting said compressor, condenser passage, and evaporator passage in series refrigerant flow relationship; means for supplying water to be refrigerated to said water passage; means for dispensing water from the outlet of said water passage; said water passage being arranged in close relationship with said refrigerant passage whereby the water flowing through said water passage is cooled by the refrigerant vaporized in said evaporator passage; a kitchen cabinet; means for supporting said plate type heat exchanger and said compressor within said cabinet; air inlet means for introducing condenser cooling air into one portion of said cabinet; and means for forcefully exhausting air from another portion of said cabinet; said heat exchanger being arranged in the path of said air.

5. In combination; a one-piece plate type heat exchanger having formed therein a condenser passage, an evaporator passage, and a water passage; a refrigerant compressor; means for connecting said compressor, condenser passage, and evaporator passage in series refrigerant flow relationship, means for supplying water to be refrigerated to said water passage; means for dispensing water from the outlet of said water passage; said water passage being arranged in close relationship with said refrigerant passage whereby the water flowing through said water passage is cooled by the refrigerant vaporized in said evaporator passage; means forming an enclosure having therein a cabinet; means for supporting said plate type heat exchanger and said compressor within said cabinet; means for introducing condenser cooling air into one portion of said cabinet; means for forcefully exhausting air from another portion of said cabinet; said last named means comprising an exhaust fan arranged to exhaust air from said enclosure and from said cabinet into the outside atmosphere.

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