May 30, 1950 J. D. FRUEN 2,509,294

WATER COOLER

Filed July 21, 1947

FIG. 1

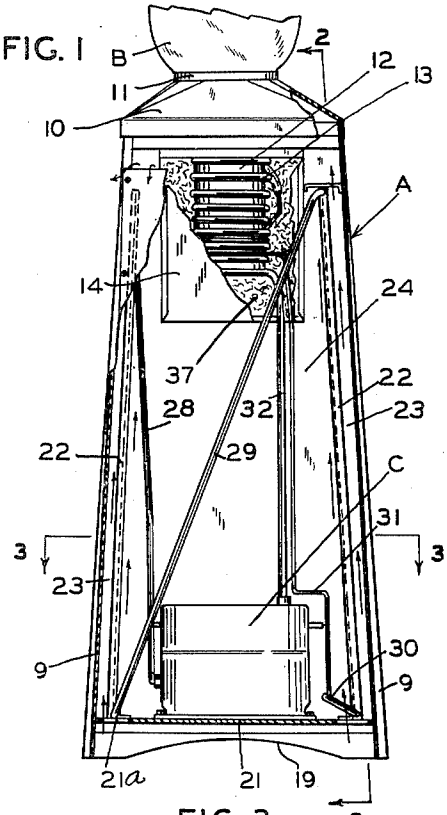


FIG. 2

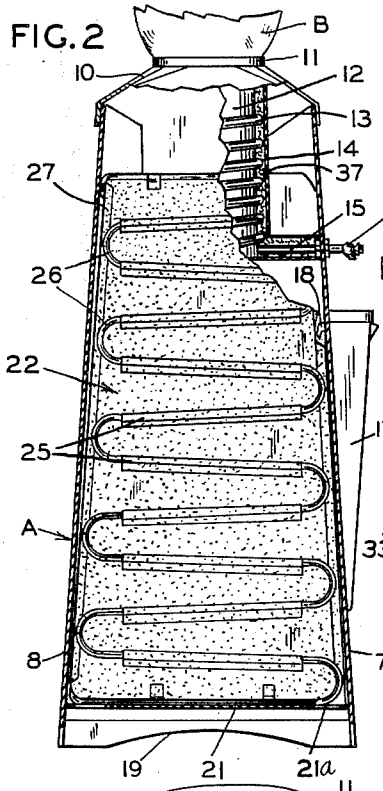


FIG. 6

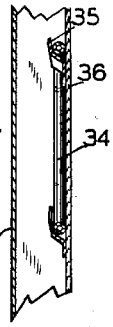


FIG. 3

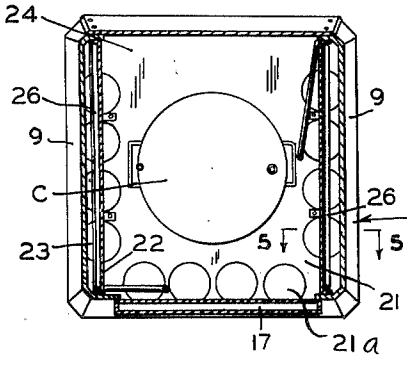


FIG. 4

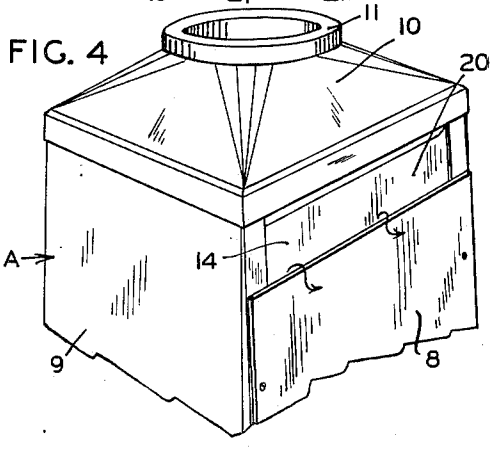
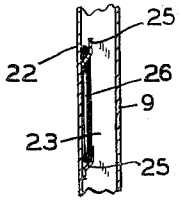


FIG. 5



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WATER COOLER

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3 Claims. (Cl. 62—141)

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This invention relates to water coolers.

It is one of the objects of the invention to provide a novel and improved water cooler incorporating a mechanical refrigeration unit employing a volatile refrigerant as the cooling medium, the cooler being so constructed that the heat from the condensing coil of the refrigeration unit may be very readily dissipated.

A more specific object is to provide in a water cooler stand a flue construction through which air can readily circulate and means for supporting a refrigeration condensing coil in the flue so that the heat from the coil can be very rapidly carried off.

The objects and advantages of the invention will more fully appear from the description made in connection with the accompanying drawings wherein like reference characters refer to the same or similar parts throughout the various views and in which:

Fig. 1 is a view in front elevation of a water cooler embodying the invention, certain of the parts being broken away and these and other parts being shown in section;

Fig. 2 is a vertical section taken substantially on the line 2—2 of Fig. 1 as indicated by the arrows;

Fig. 3 is a horizontal section taken substantially on the line 3—3 of Fig. 1 as indicated by the arrows;

Fig. 4 is a perspective view showing the upper rear portion of the cooler with the water bottle removed;

Fig. 5 is a partial vertical section taken on the line 5—5 of Fig. 3 as indicated by the arrows, Fig. 5 being in enlarged scale; and

Fig. 6 is a view similar to Fig. 5 but illustrating a slightly modified form of the device.

Referring first to Figs. 1 to 5 of the drawings, there is provided a water cooler stand designated as an entirety by the letter A and adapted to rest as on a floor or the like. This stand includes a front panel 7, rear panel 8, side panels 9, and a cover 10. The four panels and cover form an enclosure and a support for a water bottle B, which is adapted to rest on a circular rubber gasket 11 fitting around the upper edge of a cup 12 supported from the cover 10 in the upper portion of the cooling stand. A cooling coil 13 surrounds the cup 12, the cup and coil being cased in a casing 14 supported from the cover 10 and having a branch running over and connected to the front panel 7. An outlet pipe 15 communicates with the interior of the cup 12 and runs outwardly through the branch of

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the casing 14 and extends through front panel 7 beyond which it is equipped with a valved spigot 16. An opening is cut in the front panel 7 below the spigot 16 for access to the interior of the stand A, this opening being normally closed by an open-topped reservoir 17 adapted to catch overflow water from the spigot 16. The reservoir 17 may be connected by one or more hooks 18 to the front panel 7.

The lower edges of the various panels 7, 8, and 9 are cut away or notched to form air inlets 19 permitting the passage of air into the interior of the enclosure formed by the stand. An opening is formed in one of the panels, such as the rear panel 8, near its upper end to provide an air outlet 20 from the enclosure produced by the stand. In the illustrated form the various panels forming the stand taper from their lower ends upwardly, producing a stand generally of square truncated pyramid shape, although it will be appreciated that stands of different shapes may be provided. The various panels forming the stand may be fabricated from several different pieces of sheet metal or fabricated from a single piece if desired.

A transverse supporting shelf 21 runs across the lower portion of the stand, this shelf being provided with a number of openings 21*a* therethrough to permit the passage of air upwardly from the air inlets 19 to points above the shelf. Supported on the shelf 21 is an electrically operated refrigeration unit C including a compressor, none of the details of which are shown inasmuch as any standard type of refrigeration unit can be employed.

Secured to the inner sides of the front and rear panels 7 and 8 and disposed in parallel rather closely spaced relation respectively relative to the side panels 9 are a pair of upwardly extending panels 22 which run from immediately above the shelf 21 to points adjacent but spaced from the top of the stand. These two panels divide the interior of the stand into a pair of flues 23 and a central chamber 24. The flues 23 as well as the chamber 24 are in free communication with the air inlets 19 through the openings 21*a* in the shelf 21 and they are also in free communication with the air outlet 20 formed at the upper part of the stand. The outer sides of the two panels 22 carry a number of cleat-like brackets 25 which support various convolutions of condensing coils 26 so that these coils are located in the flues 23 and have contact bearing against the upwardly extending panels 22. After the coils 26 have been mounted on the brackets 25, the

brackets, coils, and panels are sprayed with a metal spray of an aluminum, zinc, or other metal alloy indicated by the numeral 27, thereby giving the surfaces of these parts a roughened exterior and in fact welding the coils 26 to the panels 22 while materially increasing the air contact surface area of these parts. The sprayed metal also assists materially in promoting better conductivity of heat from coils 26 to panels 22.

From the refrigeration unit C a highly volatile refrigerant, after being compressed, is supplied to the upper end of one of the coils 26, the left-hand coil as illustrated, as by a conduit 28. Another conduit 29 runs from the lower end of the left-hand coil 26 to the upper end of the right-hand coil 26. The lower end of the right-hand coil within which the refrigerant will be condensed in liquid form is connected by a short pipe 30 with a small capillary conduit 31 which runs upwardly and connects with the upper end of the refrigeration coil 13 surrounding the cup 12 first having one or more turns partly encircling a turn or two of the refrigeration coil 13. Another larger conduit 32 runs from the lower end of the refrigeration coil 13 back to the refrigeration unit C, returning the refrigerant in gaseous form to the compressor of the unit.

In operation the compressed gaseous refrigerant is supplied immediately after compression thereof through the conduit 28 to the left-hand condensing coil 26 and thence through the coil and thence through the conduit 29 to the right-hand condensing coil 26, whereupon the refrigerant, having given up its heat, liquifies and flows through the small conduit 31 to the refrigeration coil 13. In this coil the liquid refrigerant is reconverted to gaseous state, absorbing the heat from the water contents of the cup 12 and cooling the water therein, whereupon the refrigerant in gaseous form is returned through the conduit 32 to the refrigeration unit C for further compression and recycling. Naturally the refrigerant, after compression and while it is circulating through the two radiation condensing coils 26, is quite hot, thereby causing the air in the upper portions of the flues 23 to be heated, causing this air to rise rapidly. Heat from the coils 26 is carried by conduction as well as radiation to the upwardly extending panels 22 and is also carried by radiation to the side panels 9 of the stand. The air movement up through the flues 23 has a scrubbing effect on the coils 26, brackets 25, and panels 22 and 9 to rapidly carry off the heat from these parts and consequently from the condensing coils 26, causing the coils to rapidly cool and condense the gaseous refrigerant therein. Of course fresh cool air enters through the air inlets 19 and exhausts through the outlet 20. The rapid movement of the air through the flues 23 also induces an upward draft in the main chamber 24 of the stand, which produces a scrubbing effect on the inner surfaces of the upwardly extending panels 22 to also assist in carrying off the heat. The tapered shape of the flues 23 has somewhat of a Venturi effect in inducing flow of air upwardly through the main chamber 24 and between the panels 22 and the casing 14 surrounding the cooling coil 13. The flues 23 are wider at their lower portions than at their upper portions. The air enters the flues at the lower ends of the same and is heated as it passes upwardly through successively narrowing passages. It eventually issues from the upper ends of the flues at accelerated velocity and hence a Venturi action is produced which induces a flow of air upwardly through main chamber 24 to speed up the natural flow through the main chamber produced by the heating of the air therein. It should be stated that the casing 14 is normally filled with insulation 37 to secure the utmost efficiency from the cooling coil 13.

It will be seen that a highly efficient water cooler construction has been provided. In place of mounting the coils 26 on brackets 25 carried on the outer surfaces of the upwardly extending panels 22 as illustrated in Figs. 1 to 5 of the drawings, it is possible to employ the structure shown in Fig. 6 wherein plane-faced upwardly extending panels 33 are illustrated taking the place of the panels 22, and a coil 34 is shown as being mounted on brackets 35 carried by a side panel 36. With the construction shown in Fig. 6 the action is very similar to that previously described. The construction shown in Figs. 1 to 5, however, has some advantage over the construction shown in Fig. 6 inasmuch as the side panels 9 in the first described construction will not heat up to the same extent as do the side panels 36 of the construction shown in Fig. 6.

In place of the construction shown in Fig. 6, the panel 33 may be eliminated, whereupon the entire chamber formed by the stand acts as a flue to carry off the heat from the coils 34 mounted on panels 36.

In some instances it may be desirable to spray both or either of the inner and outer surfaces of the panels 7 and 36, as the case may be, with a metal alloy such as a zinc or aluminum alloy to increase surface contact area and permit the more rapid dissemination of heat. It may be desirable in some instances to employ a crackled paint finish on the exterior surfaces of the panels of the stand to increase surface contact area for the same purpose.

It will be understood that various changes may be made in the form, details, arrangement, and proportions of the parts without departure from the scope of the present invention, which generally stated consists in the matter shown and described and set forth in the appended claims.

I claim:

1. In a water cooling stand a casing forming an enclosure having an air inlet at its lower portion and an air outlet at its upper portion, an upwardly extending panel spaced from one wall of said casing to divide the interior of the casing into a main chamber and a flue, said main chamber and flue having communication at their lower ends with said air inlet and having communication at their upper ends with said air outlet, a refrigerant condensing coil mounted in said flue, said upwardly extending panel and the wall of the casing from which it is spaced tapering upwardly from their lower ends to give said flue a truncated wedge-shaped form for increasing the rapidity of flow of air at the upper portion of the flue and assisting in producing a flow of air through said main chamber.

2. In a water cooling stand a casing forming an enclosure of substantially truncated pyramid shape, said casing having an air inlet at its lower portion and an air outlet at its upper portion, an upwardly tapering, upwardly extending panel spaced inwardly from one wall of said casing to divide the interior of the casing into a main chamber and an upwardly tapering flue, said main chamber and flue communicating with each other above said panel and both having communication at their lower ends with said air inlet and having communication at their upper

ends with said air outlet, and a refrigeration condensing coil mounted in said flue and through which a volatile refrigerant after compression is adapted to run to be condensed into liquid form through loss of heat.

3. In a water cooling stand a casing having a number of panels forming an enclosure of substantially truncated pyramid shape, said enclosure having an air inlet at its lower portion and an air outlet at its upper portion, a pair of upwardly extending panels respectively spaced from the casing panels to divide the interior of the casing into a main chamber and a pair of upwardly extending, upwardly tapering flues, the main chamber and said flues being in communication above said upwardly extending panels and having communication at their lower ends with said air inlet and having communication at their upper ends with said air outlet, a refrigeration unit mounted in the lower part of said main chamber, refrigerant condensing coils mounted in said flues and through which a volatile refrigerant after compression by said refrigeration unit is adapted to run to be condensed into liquid form through loss of heat, the heat given off by the condensing coils causing a flow of air upwardly through said flues, and the draft of air through said flues producing a flow of air upwardly through said main chamber.

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