Sept. 22, 1953 C. P. FREER 2,653,013

PRECOOLER FOR REFRIGERATED DRINKING FOUNTAINS

Filed April 27, 1950

Fig. 1

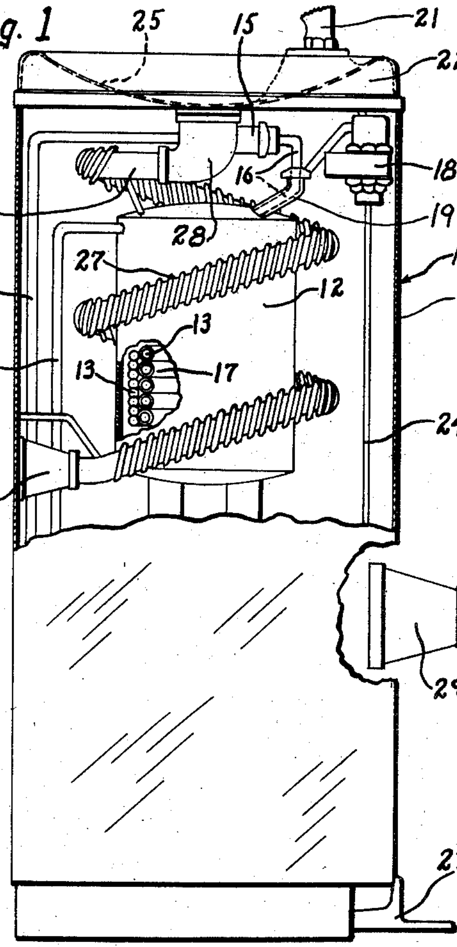


Fig. 2

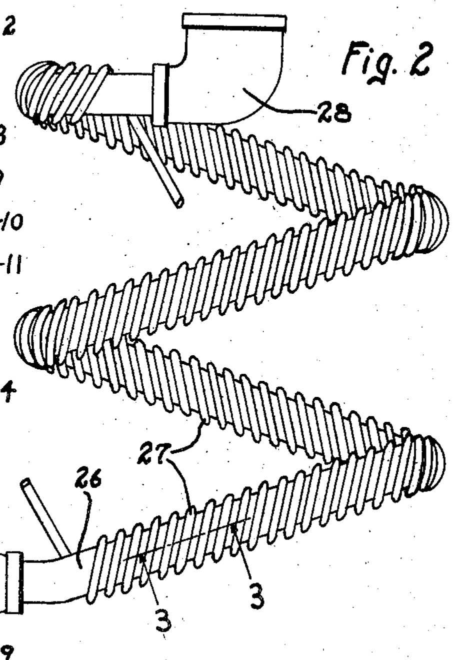


Fig. 3

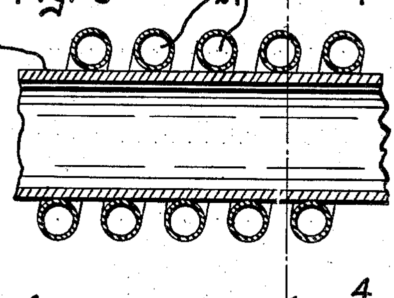


Fig. 4

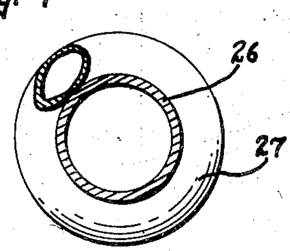
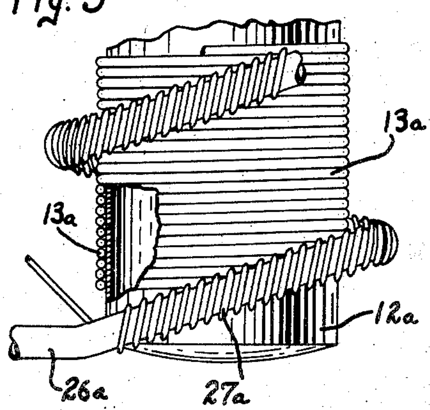


Fig. 5



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PRECOOLER FOR REFRIGERATED DRINKING FOUNTAINS

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2 Claims. (Cl. 257—241)

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My invention relates to water coolers, more particularly to water coolers of the refrigerator type, and the principal object of my invention is to provide new and improved apparatus of this character.

The industry is constantly striving to achieve the utmost in efficiency in water coolers. One means to increase efficiency is to pre-cool the water coming from a source by passing it in thermal-conducting relationship with waste fluids passing to a drain.

It is a well known fact that a portion of the refrigerated water issuing from a dispensing device of a water cooler is wasted because of various reasons. Such waste may be caused by a consumer who turns on the water control valve and permits a quantity of refrigerated water to flow from the dispensing device before taking a drink. Also, waste is created because not all the water issuing from the dispensing device is consumed during drinking operations. Thus the relatively cold water passes to drain and normally represents a loss in over-all efficiency.

The prior art has employed thermal-transfer devices whereby the incoming water is precooled by the water passing to the drain, but such devices have met with many objections for the reason that they were either subject to clogging by debris accumulating in the drain, or represented only a negligible amount of efficiency as compared to the increase in cost of manufacture.

My invention provides a high degree of thermal transfer between incoming water and outgoing drain water without entailing the disadvantages of prior art constructions.

In the drawing accompanying this specification and forming a part of this application, there is shown, for purposes of illustration, an embodiment which my invention may assume, and in this drawing:

Figure 1 is an elevational view of a water drinking fountain, portions being broken away to disclose detail,

Figure 2 is an enlarged elevational view of the pre-cooler unit shown in Figure 1,

Figure 3 is an enlarged, fragmentary sectional view corresponding generally to the line 3—3 of Figure 2,

Figure 4 is a transverse sectional view corresponding generally to the line 4—4 of Figure 3, and

Figure 5 is a broken, fragmentary view illustrating the invention in a slightly different combination.

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Referring to the drawing, the embodiment of my invention is herein disclosed for use with a refrigerator-type water cooler 10 comprising a casing 11, the lower end of which encloses a motor-compressor-condenser unit which may be of any suitable type and therefore is not shown or described. A water storage tank 12 is supported in the upper portion of the casing 11.

Referring particularly to Figure 1, a refrigerant-carrying coil 13 is disposed within the storage tank 12. A conduit 14 provides for upward flow of liquid refrigerant from the condenser, to and through an automatic expansion valve 15 above the tank 12, where the refrigerant is converted to a liquid-vapor mixture, the temperature of which drops due to partial evaporation of the refrigerant. The mixture of liquid refrigerant and vapor enters into the upper end of tank 12 by means of a conduit 16 and is connected to coil 13. At least a part of the coil 13 is disposed within a coil 17 which receives water from the interior of the tank 12 and delivers such water to a control valve 18 by means of a conduit 19. A suction line 20 carries gas back from the coil 13 to the compressor-condensing unit, where it is compressed, condensed and converted into liquid so that the cycle may be repeated. The foregoing is substantially in accordance with the disclosure in Letters Patent No. 2,278,226 issued to Halsey W. Taylor on March 31, 1942, and detailed description is believed to be unnecessary. It will be appreciated that the upper portion of the interior of the casing 11 will be provided with suitable insulating material surrounding the water tank 12 and cooperating parts to prevent cooling losses. Such insulation is omitted from the drawings for purposes of clarity.

The valve 18 controls flow of refrigerated water to a bubbler 21, or any other suitable dispensing device, which may be carried by a top cover 22 for the casing 11. In the construction herein shown, the valve 18 is operated by means of a foot pedal 23 operatively connected to the valve by means of a rod 24. When the foot pedal 23 is depressed, the valve 18 opens to provide for flow of water to and outwardly of the bubbler 21.

The top cover 22 is formed with a depressed portion 25 forming a catch basin for the unconsumed water which has issued from the bubbler 21. The lowermost portion of the catch basin is connected to a drain conduit 26 which leads the unconsumed water to a suitable drain (not shown).

Means are provided to pre-cool water as it travels from a source to the storage tank 12, and my invention provides efficient thermal-transfer relationship between the drain conduit 26 and the incoming water line, which in this case is in the form of a tube 27.

As best seen in Figure 2, the drain conduit 26 is provided with connections 28 and 29 for respective connection with the catch basin and the drain. The drain conduit is non-rectilinear and is preferably of a tortuous character so that water flowing therethrough is caused to follow a tortuous path. As herein disclosed, that portion of the drain conduit intermediate the connections 28, 29 is formed in the shape of a helix. In order that the pre-cooler unit combines with other structure to form a compact unit, the diameter of the helix is large enough so that the storage tank may be disposed within the confines of the helical coil, as seen in Figure 1.

The water tube 27 has its lower end connectable to a source of supply (not shown) and has its upper end leading into the upper portion of the storage tank 12. The tube 27 is held in good thermal-transfer relationship with the drain conduit 26 and is also preferably of a tortuous character so that water flowing upwardly therethrough will be cooled by waste water flowing downwardly through the drain conduit 26. To provide for adequate length of the tube 27 and for optimum thermal-transfer engagement with the drain conduit 26, the tube 27 is spirally wound around the drain tube.

The convolutions of the drain conduit 26 are spaced-apart to provide sufficient inclination so that water will freely flow through the drain conduit 26. As seen in Figure 3, the interior of the drain conduit is entirely unobstructed and therefore any foreign matter will be constantly washed out of the drain conduit by flow of waste water. Accordingly, the drain conduit will be free of the danger of clogging. Further, because of the spiralled character of the drain conduit 26, waste water flowing therethrough will be urged to engagement with its defining wall by inertia and centrifugal force.

The water supply tube 27 is wound about the drain tube 26 with a spiral lead sufficient to accommodate the required overall length of the tube. In the embodiment herein disclosed, the lead is such as to provide space between adjoining convolutions of the spiral tube.

A method of forming the pre-cooler unit herein disclosed is to first wind the tube 27 in spiral fashion on the drain conduit 26 when the latter is in rectilinear condition. Thereafter the drain conduit, with the tube 27 wound thereon, is formed to spiral shape. It will be appreciated that such method will cause the tube 27 to be drawn into efficient thermal-transfer contact with the exterior wall of the drain conduit 26. To further increase thermal-conducting relation, the entire assembly may be dipped in a hot tin bath so as to metallically bond the tube 27 to the drain conduit 26.

The pre-cooler unit shown in Figure 5 may be in all respects similar to the unit hereinbefore described. In this instance the refrigerant coil 13*a* is wound about the exterior of the storage tank 12*a* in order to meet requirements of certain localities.

In view of the foregoing, it will be apparent to those skilled in the art that I have accomplished at least the principal object of my invention and it will also be apparent to those

skilled in the art that the embodiment herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the herein disclosed embodiment is illustrative only, and that my invention is not limited thereto.

I claim:

1. A drinking fountain, comprising a housing for the drinking fountain structure, a water storage tank for storing chilled water, said tank being disposed within said housing in spaced relation with respect to the inner wall surface thereof and having an outlet connected to a service outlet for dispensing chilled water for consumption, a waste pipe for conducting unconsumed chilled water from said service outlet, said waste pipe being disposed within the space between said housing and said storage tank in surrounding relation with respect to said storage tank, thereby providing for compactness in manufacture, and a coiled water supply pipe connected to said storage tank for admitting water thereto from a source of supply, said supply pipe being mounted on said waste pipe with convolutions thereof extending transversely about said waste pipe in close heat transfer contact with the outer surface thereof, whereby water to be admitted to said storage tank is pre-cooled by waste chilled water flowing through said waste pipe.

2. A drinking fountain, comprising a housing for the drinking fountain structure, a water storage tank for storing chilled water, said tank being disposed within said housing in spaced relation with respect to the inner wall surface thereof and having an outlet connected to a service outlet for dispensing chilled water for consumption, a helically coiled waste pipe for conducting unconsumed chilled water from said service outlet, said waste pipe being disposed within the space between said housing and said storage tank in coiled relation around said storage tank, thereby providing for compactness in manufacture, and a coiled supply pipe connected to said storage tank for admitting water thereto from a source of supply, said supply pipe being mounted on said waste pipe with convolutions thereof extending transversely about the convolutions of said waste pipe in close heat transfer contact with the outer surface thereof, whereby water to be admitted to said storage tank is pre-cooled by waste chilled water flowing through said waste pipe.

CLYDE P. FREER.

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