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M. H. WHITE
WATER COOLING DEVICE
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2,282,276

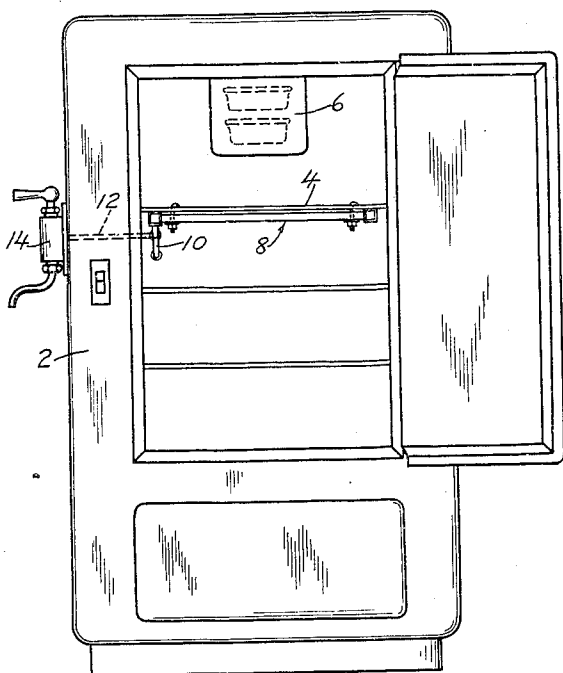


Fig. 1.

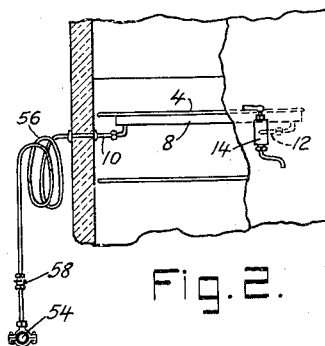


Fig. 2.

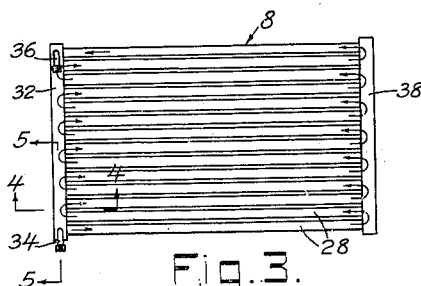


Fig. 3.

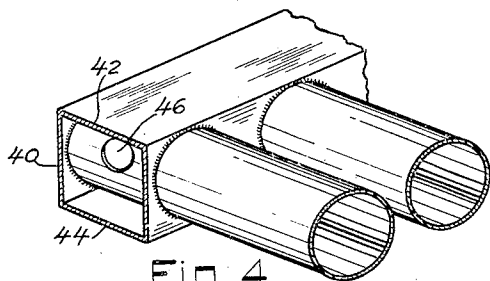


Fig. 4.

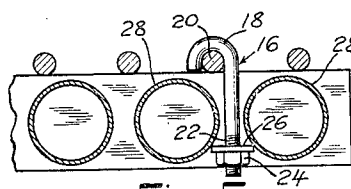


Fig. 6.

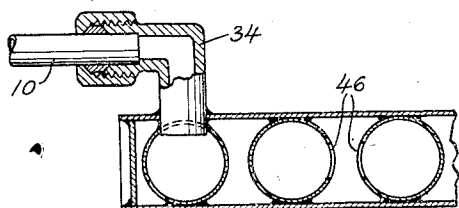


Fig. 5.

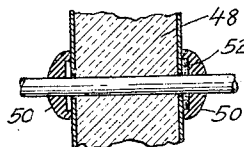


Fig. 7.

INVENTOR
MELBOURNE H. WHITE.
BY *Albert Sperry*
ATTORNEY

UNITED STATES PATENT OFFICE

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WATER COOLING DEVICE

Melbourne H. White, Miami, Fla., assignor to
Koolerkoil Company, a corporation of New
Jersey

Application July 29, 1940, Serial No. 348,201

2 Claims. (Cl. 62-89)

My invention relates to water cooling devices adapted to be applied to household refrigerators and to be connected to the conventional house water system to provide a continuous supply of cold water at all times.

It has been proposed heretofore to provide refrigerators with shelves formed of tubing and adapted to be connected into a water system to supply cold water but such shelves require a different coil size and arrangement for every style and size of refrigerator. Moreover, the shelves are subjected to the impact of heavy objects such as milk bottles or heavy jars whereby they soon become dented and deformed, especially when formed of thin relatively soft material such as copper tubing of high heat conductivity.

Other types of cooling coils applied to refrigerators have in general been so constructed and arranged as to occupy a substantial part of the food storage space or have been of such limited water cooling capacity that the water is not properly cooled when drawn frequently from the coil.

In accordance with my invention these objections and disadvantages of prior constructions are overcome and a water cooling device provided which is economical to produce and install and is adapted to be applied to refrigerators of any style or size. Constructions embodying my invention have a large water cooling capacity and yet are constructed and installed so as to take up a minimum of the storage space of the refrigerator.

These and other advantages are attained by arranging the coil directly beneath one of the shelves of the refrigerator and preferably in heat conducting contact therewith whereby the entire surface of the shelf is added to the heat conducting and radiating surface of the coil. Moreover, the coil itself is so spaced from the shelf below that it does not interfere with the storage of articles thereon or reduce the useful capacity of the refrigerator.

My invention further embodies numerous structural features whereby the construction of the coil and its installation are simplified and all danger of leakage or injury to the refrigerator or water system are eliminated even though the refrigerator may vibrate severely when in operation or may be moved some distance away from a wall to permit cleaning behind the refrigerator.

These and other features, objects and advantages of my invention will appear from the following description thereof in which reference is made to the figures of the accompanying drawing illustrating one typical embodiment of my invention.

In the drawing:

Fig. 1 is a front elevation of a refrigerator having a water cooling device embodying my invention installed therein.

Fig. 2 is a fragmentary side elevation of the refrigerator of Fig. 1 with parts thereof broken away to show the cooling device and its related elements more clearly.

Fig. 3 is a view looking upward from beneath a typical cooling coil forming a part of my invention.

Figs. 4 and 5 are vertical sectional views of portions of the coil illustrated in Fig. 3 taken on the lines 4-4 and 5-5 thereof respectively.

Fig. 6 is a vertical sectional view of a portion of a typical coil and shelf illustrating preferred means for securing these elements together, and

Fig. 7 is a vertical sectional view of a portion of a refrigerator illustrating preferred means for installing devices embodying my invention in a refrigerator.

In that form of my invention illustrated in the figures of the drawing conventional household refrigerator 2 is provided with a shelf 4 which may be in the form of a wire grid or otherwise constructed and refrigerating element 6 is located in the upper portion of the storage space above the shelf 4. Beneath the shelf 4 is located a cooling coil 8 which preferably is in the form illustrated in detail in Figs. 4 and 5. Water is supplied to the coil 8 through the inlet pipe 10 and passes from the coil through an outlet pipe 12 to a suitable faucet or tap 14.

The coil may be connected to the shelf in any suitable manner but preferably is attached thereto so as to be in heat conducting contact therewith, whereby the entire surface of the grid of the shelf is added to the effective heating radiating and conducting service of the coil. By attaching the coil to the shelf 4 directly adjacent the lower surface thereof the coil merely adds to the thickness of the shelf by one half or three quarters of an inch and does not appreciably reduce the storage capacity of the refrigerator. Substantially the full space between the shelves is left clear and unobstructed and the coil is not even noticeable in most installations.

A preferred means for securing the coil 8 to the shelf 4 is illustrated in Fig. 6 wherein a bolt 16 is provided with a hooked upper end 18 which extends over one of the wire rods 20 of the shelf while the lower end of the bolt 16 extends downward between adjacent tubes of the coil and is threaded at 22 to receive a nut 24 which bears against a washer or suitable plate 26 adapted to engage the adjacent tubes 28.

The preferred type of coil illustrated is characterized by the fact that its capacity is relatively great whereas its thickness and the space which it occupies within the refrigerator is very

limited. The coil embodies a header 32 to which is connected an inlet elbow 34 and an outlet elbow 36. Water tubes 28 extend from the header 32 to a second header 38 and are formed of material having high heat conductivity. The headers themselves are rectangular in cross section whereas the water tubes are circular in cross section and equal in their outside diameter to the inner height of the header. The ends of the water tubes lie in planes at right angles to the longitudinal axis thereof and when inserted into the openings in the header and secured in place with the ends in engagement with the flat inner vertical wall 40 of the header the ends of the tubes are effectively sealed. The portions of the tubes 28 which are in engagement with the upper and lower walls 42 and 44 of the headers similarly divide the header longitudinally and serve to limit flow of water lengthwise of the header.

Each of the water tubes 28 is provided with a port 46 in that portion thereof which is located within the header and as illustrated the ports 46 are so arranged that water entering the header 32 through the inlet 34 is caused to pass to the right through the first tube as seen in Fig. 3 to the header 38 and then flows through the port 46 in the first tube and into the port 46 in the second tube and back through the second tube to header 32. The water in adjacent tubes therefore flows in opposite direction and back and further from one water tube to the other and from one end of the headers to the other from the inlet 34 to the outlet 36. In this way the water is caused to flow through an extended path which insures adequate cooling thereof even when water is drawn frequently from the system.

In order that the device may be applied to household refrigerators of any desired size, shape or style the dimensions and horizontal area of the coil 8 is made sufficiently small to permit insertion into any usual storage chamber. At the same time, the relatively large diameter of the water tubes and their close arrangement in the coil provides a water cooling capacity of the coil sufficient to take care of the most unusual demands on the system.

In applying the device to a refrigerator a hole is bored through the wall 48, preferably the back wall, of the refrigerator and the water inlet pipe 10 is passed through the opening thus made. Cup washers 50 are applied to the pipe adjacent both to the inner and outer walls of the refrigerator and as shown have a friction fit about the inlet pipe 10. Generally the suction of the effect of the cupped washer is sufficient to insure proper sealing of the opening through the refrigerator walls but I prefer to apply cement 52 to the recess in the cup of the washer so as to insure perfect sealing of the connection.

The inner end of the inlet pipe 10 is connected to the inlet elbow 34 on the coil 8 by a force fit or otherwise whereas the outer end of the inlet pipe is connected to a pipe 54 of the conventional house water system by suitable means. A flexible connection which preferably is in the form of a spiral coil of flexible metal tubing 56 extends between the inlet pipe 10 and the pipe 54 of the water system, whereby to eliminate all danger of injury or leakage at the connections due to vibration of the refrigerator or limited movement thereof to permit cleaning behind the refrigerator. A cut off valve 58 is located adjacent

the water pipe 54 so that the refrigerator may be removed if desired or the system cut off and drained if the refrigerator is not to be used during the winter months or for long periods of time.

The outlet elbow 36 of the coil is connected to the outlet pipe 12 which extends through the side wall or other portion of the refrigerator to the tap 14 which may be secured directly to the outer wall in a convenient location.

With this construction a continuous supply of suitable cooled water is provided, whereas the device itself occupies only a very limited space within the refrigerator and is so located that it does not reduce the useful capacity of the storage space. Moreover the construction is simple and economical to produce and install and it may be connected or disconnected with the water system so that the refrigerator may be removed from one location to another. Furthermore, vibration of the refrigerator does not injure the connections, or cause leakage thereof when the refrigerator is moved to a limited extent for cleaning behind the same.

While I have herein illustrated and described one form of my invention it will be apparent that the shape, size and manner of constructing the coil and the nature of the water connections and supporting means employed therewith may be varied considerably without departing from the spirit and scope of the invention as set forth in the following claims. It should therefore be understood that the form of my invention described above and as shown in the drawing is intended to be illustrative of my invention and is not intended to limit the scope thereof.

What I claim is:

1. A water cooling device adapted to be applied to a household refrigerator having a shelf therein in the form of a metal wire grid, said device comprising a coil having spaced metallic water conducting tubes, attaching means extending over the wires of said shelf and projecting downward between the same and between adjacent water conducting tubes of the coil, elements secured to said attaching means and extending transversely of the water conducting tubes beneath the same and serving to hold said coil closely adjacent the lower surface of the shelf and in heat conducting contact therewith and means for supplying water to and for removing water from said coil.

2. In combination with a household refrigerator having a shelf therein in the form of a metal wire grid and a domestic water supply system, means for cooling water from said system in said refrigerator comprising a metal coil of less area than said shelf, metal members engaging said shelf and coil and serving to secure said coil to said shelf closely adjacent the lower surface thereof and in heat conducting contact therewith, a water inlet pipe connected to said coil and passing through a wall of said refrigerator, flexible water conducting means connected to said water inlet pipe and to a pipe of the water system, a water outlet pipe connected to said coil and passing through another wall of the refrigerator and a faucet mounted on the exterior of said refrigerator and connected to said water outlet pipe to control the flow of water through said coil.

MELBOURNE H. WHITE.