July 23, 1929. H. J. SANDELL 1,721,924

WATER COOLING SYSTEM

Filed Aug. 9, 1926

Fig. 2

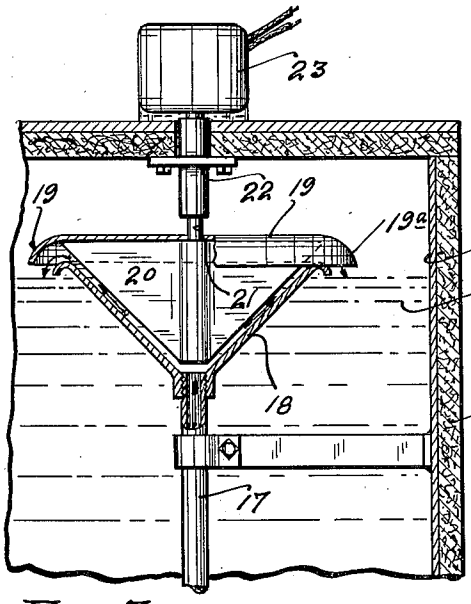


Fig. 3

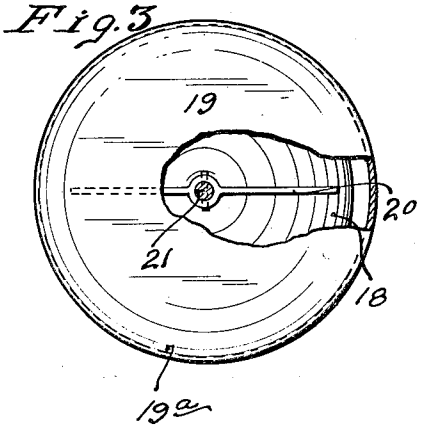
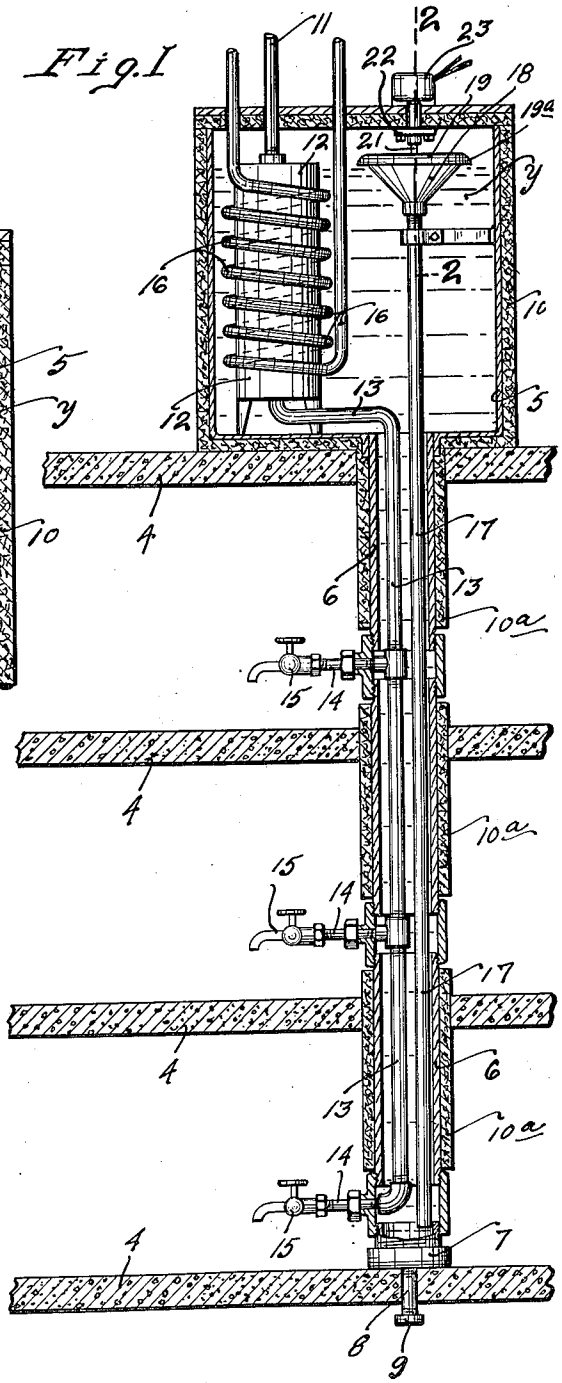


Fig. 1



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UNITED STATES PATENT OFFICE.

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WATER-COOLING SYSTEM.

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My invention relates to water-cooling systems and has for its object to simplify and improve the efficiency thereof especially in view of the delivery of cold water or other liquid to various different floors of or other places in a building that is supplied with drinking water from a common cooling source. Generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims. A preferred form of the invention is illustrated in the accompanying drawing, wherein like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a view chiefly in vertical section, but with some parts in full, showing the preferred form of the improved water-cooling system installed in a building of several stories, the latter being diagrammatically indicated;

Fig. 2 is a fragmentary view, some parts being sectioned on the line 2—2 of Fig. 1 and some parts being shown in full; and

Fig. 3 is a plan view of the centrifugal pump shown in Fig. 2, some parts being broken away.

The numerals 4 indicate the several floors of a building. The cooling liquid is herein designed broadly as the "brine" and this is contained in a tank or container 5 which, for important reasons and in the preferred embodiment of the invention, is placed on the upper floor or at a high altitude. This elevated container 5 is provided with a depending stack 6 that extends preferably to or nearly to the bottom of the lower floor and is closed by a head 7 in which, as shown, depends a drain pipe 8 normally closed by a cap 9. The container 5 is preferably covered with heavy insulating material 10 and the stack 6 with heavy insulating material 10^a.

The drinking water is supplied from a suitable source, such as a city water main, through a pipe 11 connected to a water container shown as in the form of a small tank 12 located within the brine container 5. From the bottom of this tank 12, a drinking water delivery pipe 13 extends downward and through the stack 6 nearly to the bottom thereof. Above the different floors, the drinking water delivery pipe 13 is provided with laterally extended branch pipes 14 which, as shown, extend to faucets 15, but might be connected to any suitable normally closed water-dispensing devices.

As a means for maintaining low temperature of the brine within the container 5, ice may be used but, preferably, mechanical refrigeration will be employed and, hence, I have shown a refrigerating coil 16 placed around the drinking water container 12 and submerged within the brine y of the container.

To produce a rapid forced circulation of the cold brine through the stack 6, I provide a brine-circulating device including a vertical return pipe 17. This pipe extends from a point close to the bottom of the stack upward into the brine container and at its upper end is provided with a funnel-shaped head 18. This funnel-shaped head extends from a point above to a point below the level of the brine y, so that normally it will be about one-half filled with brine. Working in the funnel-shaped head 18 is a motor-driven centrifugally acting propeller which, as preferably constructed, comprises a disc-like top plate 19, and an approximately triangular propeller blade 20. The blade 20 is secured to and depends from the disc 19 and both are secured to the lower end of the shaft 21 journaled in a suitable bearing 22 shown as supported from the top of the container 5. The shaft 21 is preferably connected to the rotor shaft of a very small electric motor 23, also shown as mounted on the top of the tank 6. This disc 19 is provided with a downturned ring 19^a that deflects the brine downward.

As is evident, when the propeller blade 20 is rotated by the motor, it will, under the action of centrifugal force, throw the brine from within the funnel-shaped head 18 upward, outward and over the top of said head, and the discharged brine will be deflected downward and not splashed against the top of the container. When the brine is displaced from the head 18, it, of course, seeks its level and, hence, will flow rapidly upward through the return pipe 17, thereby producing a forced downward circulation through the stack 6 and upward through the return pipe 17. This produces equal temperature of the drinking water at all of the several points of discharge and makes it unnecessary to waste any of the drinking water in order to obtain cold water: otherwise stated, there is no place where the drinking water can

accumulate and get warm, even when the system is not in use.

With the container 5 located at the highest elevation and with the brine stack depending therefrom, even without the forced circulating device, the cold water would tend to go to the bottom of the stack, but the circulation would be slow and the system would not be nearly as efficient as would be the forced circulation. Obviously, with the brine container located lower down, the means for producing forced circulation would be even more important. In the above described arrangement, it is, of course, obvious that the two columns of brine or cooling liquid, the one in the stack (including the container) and the other in the return pipe, will be counterbalanced and will normally be kept at the same level under the action of gravity. When, however, the rotor or propeller in the funnel-shaped head 18 is rotated, it will cause water to overflow from said head into the container and, immediately, centrifugal force will become active to again bring the two columns of water into balance and at the same level. In this arrangement, regardless of the height of the column, the propeller or rotor of the centrifugally acting circulating device may be operated with very small power, because all that is required to do is to throw a little liquid out of the head and, under the action of gravity, water will flow from the lower end of the stack into the lower end of the return pipe, and in this way, by the exercise of a very small amount of power, a continuous circulation of the brine or liquid will be maintained through the column and return pipe. This, of course, keeps the temperature of the brine or cooling liquid constant at all altitudes or different points. The same action will take place when the so-called column is not truly vertical or where it has long extended horizontal runs.

This water-cooling system is, as is evident, very simple and may be cheaply and quickly installed, and by the use thereof, cold drinking water may be supplied to the different floors or elevations at a minimum of cost.

It will be understood that the device described as the preferred form is capable of modifications within the scope of the invention as herein disclosed and claimed. For example, the so-called "stack" or extended brine tube that leads from the brine container might be horizontally extended therefrom to supply different faucets or water-dispensing devices located on the same floor or level. It, therefore, follows that the term "stack" is herein used in a broad and liberal sense.

What I claim is:

1. In a water cooling system, a brine container having a vertically extended stack, means for maintaining a low temperature of the brine in said container, a drinking water pipe extended through said container and stack and having dispensing devices extended therefrom at different points, and means for producing a forced circulation of the brine from said brine container through said stack and back to said container.

2. In a water cooling system, a brine container located at a high elevation and having a depending stack, means for maintaining a low temperature of the brine within said container, a drinking water pipe extended through said container and stack and having dispensing devices extended laterally therefrom at different elevations.

3. In a water cooling system, a brine container located at a high elevation and having a depending stack, means for maintaining a low temperature of the brine within said container, a drinking water pipe extended through said container and stack and having dispensing devices extended laterally therefrom at different elevations, and means for producing a forced circulation of the brine from said container through said stack and back to said container.

4. In a water cooling system, a brine container located at a high elevation and having a depending stack, means for maintaining a low temperature of the brine within said container, a drinking water pipe extended through said container and stack and having dispensing devices extended laterally therefrom at different elevations, and means for producing a forced circulation of the brine from said container through said stack and back to said container, said means comprising a pipe extended along said stack and at one end thereof a motor-driven centrifugal pump at the upper end of said pipe.

5. In a water cooling system, a brine container having a vertically extended stack, means for maintaining a low temperature of the brine in said container, a drinking water pipe extended through said container and stack and having dispensing devices extended therefrom at different points, and means for producing a forced circulation of the brine from said brine container through said stack and back to said container, said means comprising a pipe extended along said stack, a funnel-shaped head at the upper end of said stack, and a motor-driven propeller arranged to rotate within said head.

6. In a water cooling system, a brine container having an extended stack, means for maintaining a low temperature of the brine in said container, a drinking water pipe extending through said container and stack and having dispensing devices extended therefrom at different points, and means for producing a forced circulation from said brine container through said stack and back to said container.

7. In a liquid-tempering system, a stack and a return pipe, the latter receiving from the lower portion of said stack and deliver-

ing into the upper portion thereof, a power-driven centrifugal liquid-discharging device located at the upper portion of said return pipe and operative to cause the liquid to overflow from said pipe into said stack, and drinking water dispensing means arranged to be cooled by circulation of fluid through said stack and return pipe.

8. In a liquid-tempering system, a stack and a return pipe, the latter receiving from the lower portion of said stack and delivering to the upper portion thereof, a power-driven liquid discharge device at the upper end of said return pipe operative to cause the liquid to overflow from said pipe into said stack, and drinking water dispensing means arranged to be cooled by circulation of fluid through said stack and return pipe, said dispensing means being in heat exchange relation to and parallel with said stack and including a plurality of liquid dispensing devices delivering the tempered liquid therefrom at different points.

In testimony whereof I affix my signature.

HARRY J. SANDELL.