W. F. KEYES.

ICE REST AND WATER COOLER.

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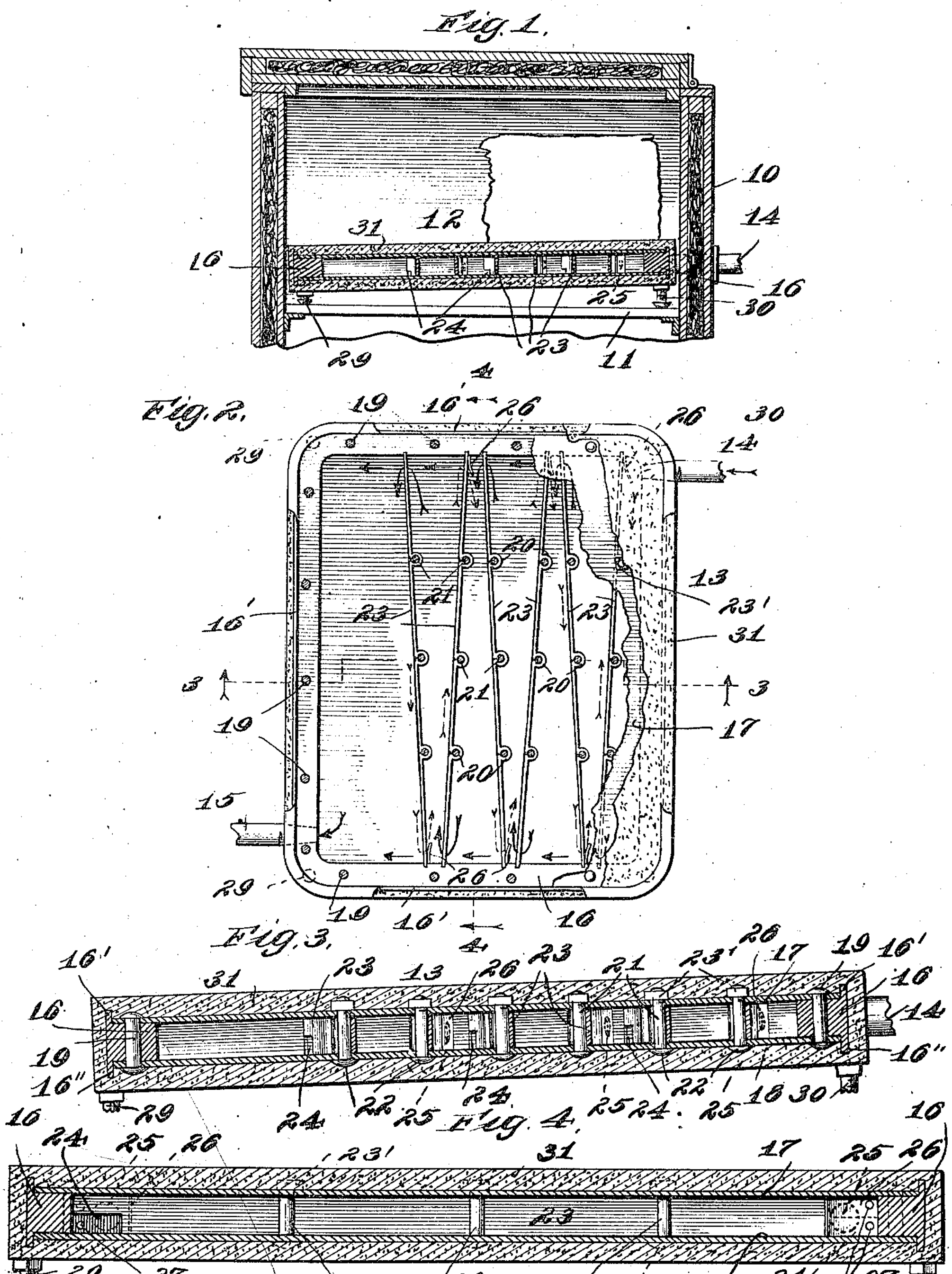
995,791 Patented June 20, 1911.



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UNITED STATES PATENT OFFICE.

WALTER F. KEYES, OF LA GRANGE, ILLINOIS.

ICE-REST AND WATER-COOLER.

995,791. Specification of Letters Patent. Patented June 20, 1911.

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To all whom it may concern:

Be it known that I, WALTER F. KEYES, a citizen of the United States, residing at La Grange, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Ice-Rests and Water-Coolers, of which the following is a specification.

My invention relates to improvements in ice rests and water coolers, for refrigerators, ice boxes, and the like.

One of the objects of my invention is to provide a water cooler for refrigerators by constructing the ice rest, or ice supporting table, hollow, so that additional valuable space for cooling, within the refrigerator, will not be required.

Another specific object of my invention is to provide in the device a tortuous path for the water, as it is being drawn therefrom, and a normal, shorter, independent path for the downward movement of the water superinduced by circulation due to difference of temperature of the water.

Another object of my invention is to cover the metallic structure, containing the water conduit, with cement or like substance.

Another object of my invention is to generally improve the construction of such devices.

Other and further objects of the invention will readily become apparent to persons skilled in the art from the following description taken in conjunction with the accompanying drawings, wherein—

Figure 1 is a central sectional view of my cooling device and a refrigerator in which it is contained; Fig. 2 is a broken-away plan view of the same with parts of the top plate removed to show the interior of the water space; Fig. 3 is a cross sectional view on line 3—3 of Fig. 2; and Fig. 4 is a longitudinal sectional view on line 4—4 of Fig. 2.

In all of the views, the same reference characters indicate similar parts.

10 indicates an ice chest or refrigerator of the usual construction.

11 shows a slatted floor of the ice chamber, 12.

13 indicates generally my water cooler with an inlet pipe 14 communicating with the interior space, for water, within the device.

An outlet pipe, 15, communicates with the water space at a diagonally opposite corner, as shown in Fig. 2.

A rectilinear border frame, 16, may be composed of wrought, cast, or malleable iron, having preferably flanges, 16′ and 16″, projecting laterally therefrom, to provide the outer walls or boundary of the water-containing space or chamber. Flat side plates, 17 and 18, are secured to opposite sides of the frame 16 by means of rivets 19 or other similar fastening.

In order that the water shall be cooled in transit through the device, I provide a relatively long tortuous path for the water as it is being drawn through the device that it may remain sufficiently long therein to be cooled or chilled. To this end, I place a number of separating plates or baffles extending to opposite sides of the rectangular frame and of width substantially equal to that of the frame so that the side plates will make contact with the edge surfaces of these baffle plates.

As the device is to be connected to a water system, and therefore subjected to considerable pressure, it becomes necessary to provide stay bolts placed at intervals sufficiently frequent and secured to the side plates to withstand the pressure. For this purpose, I form in each baffle plate an eye 20 by bending the plate back upon itself, thereby providing an opening for the reception of the stay bolts, 21, as clearly shown in Fig. 2. The stay bolts are preferably headed as at 22, and are provided with nuts. The baffle walls, 23, act as separators against which the side plates, 17 and 18, are tightly drawn by means of the bolts, thereby making a water tight joint between the inner surfaces of the plates, and the edge of the separating baffles, and forming positive shoulders against which the baffles may be fixedly secured.

Thus, it will be seen that the device so far described provides a relatively long narrow path from the inlet 14 to the outlet 15, so that the water in passing through the device may become more effectively cooled before discharge from the device. Such ordinary provision of a tortuous path, however, is obviously not conducive of good ice-impelled circulation in the device when the water is not being drained therefrom. To the end, therefore, of avoiding this disadvantage, I provide a novel arrangement of perforations and valves which, when the water is flowing freely through the device from inlet 14 to outlet 15, operate to form the tortuous

path as above described, but which, when the water is not in such rapid flow, automatically open to provide a path which does not materially impede a constant directly-downward flow of cooled water from the upper to the lower end of the device along its bottom surface, but which directs the upwardly trending, relatively warmer, water in a longer path along the upper surface of the device until it reaches the portion directly ice-cooled at the top of the incline, whence it may again descend in the process of circulation Specifically, each of the baffle plates 23 is provided with a notch, 24, at one end of its body, and a perforation 25 at the other end. Each perforation is provided with a flap valve, as at 26, riveted to the end of the plate 23 by means of rivets 27. This flap valve is preferably made of a piece of very thin metal, such as brass, bronze, or copper, or other material of suitable qualities, bent away from the perforation 25 adapted to be pressed against the side of the separator sufficiently to close the perforation upon the slight pressure applied against the surface thereof when water flows against it, but to open said perforation when the flow has ceased by closure of outlet 15. Further to facilitate circulation, I provide a longer path for the upwardly traveling warmer water than for the descending cooled water, so that as much heat as possible may be absorbed from said water as it passes up toward the cooled area directly under the ice. To this end, instead of running the baffle plates 23 directly across the device from side to side, I prefer to incline them slightly as shown in Fig. 2, so as to provide wedge-shaped channels therebetween, the larger ends of said channels being at alternate sides of the structure for operation as hereinafter described.

Leveling screws, 29 and 30, are provided for varying the elevation of the structure with respect to its opposite sides. In Fig. 1 it will be observed that the rear side of the device is elevated above that of the front side, and that the ice is placed upon the high side of the device, this, therefore, being the coolest portion of the device, the melted ice water covering and cooling the inclined unoccupied part of the ice rest or cooler.

I preferably cover the entire structure with plastic material, such as cement, 31, to provide a straight, relatively smooth, and durable surface upon which to rest the ice, which can be readily and easily cleansed, and which tends to preserve the iron surfaces of the device from corrosion. The cement surface I have found to be effective in holding the ice in its elevated position, and in view of the relatively slight inclination of the device, the consequently slight tendency of the ice to slide downwardly, and the tendency of melting ice to cling to a surface upon which it presses through perfect correspondence of the meeting surfaces, I have found that very fine-grained cement may be used, if desired, or even materials with still smoother surfaces than cement, which retain the ice in any given position on the slight incline with equal facility. It further acts as a body for preserving a more uniform temperature of the water contained within the water receptacle, absorbing and giving up heat slowly and practically unaffected by sudden drafts of air, as when the refrigerator is opened. Thus, it will be noted that the cooling effect of the ice resting upon the upper edge of said cement surface will cause cooling of the coating body in that locality while in other localities the body is relatively warmer, so securing more uniformity of temperature differences than would result if the casing were not provided with such a slowly heated and cooled surrounding coating. The large mass being more efficient than mere coils of pipes.

The full-line tailed arrows show the direction of the water flow as it is being drawn through the device. When it strikes the flaps 26 in its passage through the channels, it closes them and is thereby forced to take a path through the channels provided, by means of which the water is retained in the device longer than if it were to pass directly from the pipe 14 to the pipe 15, diagonally across the water space.

When the flow of water through the device is stopped, and there is no difference of water pressure therein from the inlet 14 to the outlet 15, the flap valves 26 automatically open, thereby providing an opening at each end of the separating plates, 23. The water that is contained at the highest point of the device immediately under the ice being colder, will naturally fall to the bottom of the device, nearer which the outlet pipe 15 is connected. The tailless arrows show the direction of the water in falling from the highest to the lowest altitude, and the dotted arrows show the direction of the water as it rises from the lower to the higher altitude along the upper surface of the device adjacent the strips 23 as a result of difference of temperature in the process of circulation. The warmer water being in contact with the lower separating strip, and the strip being inclined slightly, the water will follow the incline and gradually creep along under its lower surface until it comes to its valved opening through which it will pass, and it will then strike the lower surface of the next baffle wall, which is also provided with an inclined surface, and will follow the under surface of it to the next valved opening, and so on the water will gradually reach the top of the device. The water that is immediately under the ice, or the part of

the highest altitude, will, for the same reason pass downward to the bottom surface, its path being shown by the tailless arrows. It will pass down through the normal openings, and the valved openings to the lower surface, and thus a positive circulation of the water is automatically produced.

While I have herein described in some detail a particular embodiment of my invention, it will be readily apparent to persons skilled in the art that numerous changes in the details of construction and arrangement of the parts thereof might be made without departure from the spirit of my invention and within the scope of the appended claims.

What I claim is:

1. In an ice rest for cooling water, a flat hollow casing having a flat upper surface adapted to support ice, and being provided with an inlet and an outlet for water, baffles in said casing extending between the sides thereof, said baffles being each inclined to form between adjacent baffles a series of gradually widening paths for water, and means for supporting said casing at an inclination whereby water may flow downwardly from the inlet through said series of paths from the narrower to the wider ends thereof.

2. In an ice rest for cooling water, a flat hollow casing having a flat upper surface for receiving ice, and being provided with an inlet and a diagonally opposite outlet for water, baffles in said casing extending between the sides thereof adapted and arranged to provide a tortuous path therein from the inlet to the outlet, said baffles being each inclined to form between adjacent baffles a series of gradually widening transverse paths for water, and screw-threaded supports attached to the bottom of said casing whereby the casing may be held at an adjustable inclination to cause water to flow downwardly from said inlet into the narrow end of a transverse path, and successively through the remaining transverse paths from narrow to wider ends thereof, for discharge from the wider end of the last said transverse path through said outlet.

3. In an ice rest for cooling water, a flat hollow casing comprising a frame, opposite plates held in spaced relation by said frame to provide therebetween an inclosed water space, said frame being provided with an inlet and a diagonally opposite outlet opening for said inclosed space, baffles extending from side to side of said frame, said baffles being inclined in alternately opposite directions to provide a series of gradually widening transverse paths, and each baffle being provided with a perforation for flow of water therethrough from the wider portion of a transverse path into the narrower portion of the next succeeding path, and supporting means for said casing to hold the casing in adjustable inclination, whereby water may pass into said casing from the inlet, and downwardly toward said outlet successively through the transverse paths from narrower to wider ends thereof for discharge from the wider end of the last transverse path.

4. In a device of the character described, a flat hollow structure comprising a frame, parallel plates secured thereto, and baffle walls at intervals between said plates, and extending between opposite sides of the frame to form wedge-shaped channels therebetween, each channel being provided with a free opening at one end and a valved opening at the other, said valves adapted to be closed by the forcible passage of the water through the channels and means for inclining said structure, an inlet connection at the high side thereof for water under pressure, and an outlet connection at the low side for discharge of water.

5. In a device of the character described, a flat hollow structure comprising a frame, parallel plates secured thereto, baffle-wall plates at intervals between said side walls, each plate partially surrounding stay bolts, and stay bolts taking through said side plates and within the openings provided within said baffle plates.

6. In a device of the character described, a flat hollow structure comprising a frame, parallel plates secured thereto, baffle wall plates at intervals between the side walls, stay bolts taking through said side plates, and a cement coating applied to the outside surface of said structure overlying the ends of said bolts to provide an even ice-retaining surface.

7. In an ice rest for cooling water, a receptacle having an inlet and an outlet, means for supporting said receptacle at an inclination to the horizontal, means in said receptacle providing a direct downward path for cooled water and a tortuous path for upwardly traveling warmer water, and a plastic material surrounding said receptacle to provide a substantially uniform integral coating sluggish in its response to temperature variation.

8. In an ice rest for cooling water, a receptacle having an inlet and an outlet, and a plastic material surrounding said receptacle to provide a substantially uniform integral coating relatively slow in response to temperature variation, said coating providing a substantially straight upper surface to receive ice.

9. In an ice rest for cooling water, a water receptacle having an inlet and an outlet, a plastic material surrounding said receptacle to provide an integral homogeneous coating, the upper surface of said coating being substantially straight for receiving thereon a body of ice, and supports for maintaining

said receptacle at an adjustable inclination, and means whereby the cooling effect of said ice body acting through said coating impels a circulation of water throughout said receptacle.

10. In an ice rest for cooling water, a hollow flat receptacle, means for supporting said receptacle at an inclination, and baffles in said receptacle extending from side to side thereof, each baffle having at one end a perforation of slightly less diameter than the distance between the top and bottom of said casing and at its other end a perforation extending from the bottom of said casing to a point midway betwen the bottom and top thereof, whereby the cooling effect of a body of ice upon the upper edge of said receptacle may impel a circulation of water directly toward the lower edge of said casing and upwardly along the baffles, as described.

11. In a device of the character described, a flat hollow structure comprising a frame, parallel plates, secured thereto, baffle walls at intervals between said plates and extending between opposite sides of the frame to form channels, said plates provided with a free opening at one end and a valved opening at the other, said valves adapted to be closed by the forcible passage of water through said channels, and means for inclining said structure, an inlet connection at the high side thereof for water under pressure, and an outlet connection at the low side for discharge of water.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

WALTER F. KEYES.

In the presence of—
W. LINN ALLEN,
MARY F. ALLEN.