The principal object of my invention is to provide a refrigerator that produces a relatively low temperature to the amount of ice used.

A further object of this invention is to provide a refrigerator that is so constructed that the air inside the refrigerator is continuously kept in a fresh condition.

A still further object of my invention is to provide a refrigerator that when once installed requires little attention from the owner and one that is easily kept in a sanitary condition.

A still further object of this invention is to provide a liquid and air circulating refrigerator that is economical in manufacture and economical and durable in use.

These and other objects will be apparent to those skilled in the art.

My invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawing, in which:

Fig. 1 is a side sectional view of my complete invention in use.

Fig. 2 is a top plan sectional view of the device and is taken on line 2-2 of Fig. 1, to more fully illustrate its interior construction.

Fig. 3 is an enlarged view of the water outlet pipes.

The chief objections to large refrigerators now on the market are that they are lacking in efficiency relative to the amount of ice used and harbor excessive impurities in the atmosphere inside the refrigerator. I have overcome these objections by providing a refrigerator that not only utilizes the cold liquid from the melted ice to additionally cool the inside of the refrigerator, but promotes continuous circulation of the air inside the refrigerator.

I have designated the housing of my invention by the numeral 10. This housing, which forms the ice box of the invention, is preferably of rectangular elongated construction with its left end portion extending to a height above the height of the balance of the housing, as shown in Fig. 1. The housing 10 may be made of any suitable material and is completely lined with nonconductive material 11 such as cork or the like. The numeral 12 designates a lid enclosing an opening in the top of the ice box. This lid 12 is positioned above the greatest depth of the refrigerator. Inside the housing 10 and below the lid 12 is a comparatively large vertical tank 13. This tank is spaced apart from the lid 12, the floor of the housing 10, and the left inner side of the housing 10. The tank 13 is also spaced apart at its upper end portion from the downwardly extending top portion 14 of the housing which exists by virtue of the fact that the left end portion of the housing is higher in altitude than the balance of the housing.

However, the width of the tank 13 extends completely from the back side of the housing 10 to the front side of the housing 10, as shown in Fig. 2. The numeral 15 designates a small drain cock having one end communicating with the inside of the housing 10 and its other end communicating with the inside bottom of the tank 13. The tank 13 has its inside top insulated with suitable material such as cork and also its upper side portion furthest from the left inner side of the housing 10, as shown in Fig. 1 and the purpose for which will hereinafter be understood. Inside the tank 13 is a compartment 17. This compartment 17, which will hereinafter be known as the freezing compartment, is spaced apart from the top, bottom, and left and right sides of the tank 13. Access may be had to this compartment 17 through the door 18. The numeral 19 designates a flared tray on the top of the freezing compartment.

The numeral 20 designates a comparatively shallow horizontal tank suitably supported inside the housing 10. This tank 20 extends from the tank 13 to a position near the right inner side of the housing 10 and is of such dimensions that a considerable space exists between it and the inside top of the housing 10 and the inside bottom of the housing 10. It will also be noted that the greater portion of
the length of this second tank resides inside the portion of the housing that is comparatively low and that the tank 13 resides in the portion of the housing 10 that is of the greater height. As this tank 20 is of much less width than the inside width of the housing 10, a space will exist between the two inner back and front sides of the housing 10 and the tank 20, as shown in Fig. 2. The numeral 21 designates a strip of insulating material such as cork or the like on the rear side wall and the right end of the tank 20.

The numeral 22 designates a hood on the left end portion of the tank 20, which extends to the left and upwardly where it is soldered or otherwise secured to the outer side of the tank 13. The numeral 23 designates a pipe having one end communicating with the inside of the tank 13 just below the tray 19 and the inside of the hood portion 22. As the hood portion 22 has its lower end communicating with the inside top of the tank 20, liquid passing from the tank 13 through the pipe 23 will fall into the tank 20, which has its main portion below the pipe 23.

The numeral 24 designates a plurality of doors in the rear side of the housing 10, which permit access to the stop of the tank 20. This space above the tank 20 is the cooling compartment of the refrigerator. The numeral 25 designates a downwardly extending baffle member of non-conductive material such as cork or the like. This baffle member 25 extends downwardly directly below the portion 14 and terminates a distance above the tank 20 and hood 22. The numeral 26 designates a small receptacle at the right end of the tank 20. This receptacle 26 has the same height and elevation of the tank 20. The numeral 27 designates a pipe having one end communicating with the inside top of the tank 20 and its other end communicating with the inside of the receptacle 26.

The numeral 28 designates a second pipe having one end terminating inside the tank 20, but at a point much lower in elevation than the pipe 27 and its other end terminating inside the receptacle 26. The numeral 29 designates a manually operated valve interposed in the pipe 28. The numeral 30 designates a continuous trough in the bottom of the housing 10 and which follows adjacent the four inner sides of the invention. The numeral 31 designates a pipe communicating with the inside bottom of the receptacle 26 and its other end terminating inside the trough 30.

The numeral 32 designates a drain or water outlet pipe having its intake end terminating in the trough 30, but some distance above the bottom of the trough 30, as shown in Fig. 3. The numeral 33 designates a second drain or water outlet pipe also extending into the housing 10 and into the trough 30, but terminating at the bottom of the trough 30, as shown in Fig. 3. The numeral 34 designates a threaded plug or means for enclosing the pipe 33 in order that the same will not be in communication at times with the inside of the trough 30. The complete housing 10 may be held above a supporting surface 36 by blocks or legs 35.

To operate the device it is merely necessary to remove the lids 12 and 16, fill the tank 13 with broken ice 37 and salt and replace the lids 12 and 16. This ice as it melts, will fill the bottom portion of the tank 18 and provide the cold salt water, which I have designated by the numeral 38. The member 19 will aid in holding most of the broken or cracked ice above the compartment 17. As the compartment 17 will be completely surrounded by ice or extremely cold salt water, all food materials, which require a very low temperature to prevent them from spoiling, should be placed in this freezing compartment through the door 18.

As the ice melts and the liquid therefrom raises in the tank 13, which may be tapered toward its bottom, it will eventually pass through the pipe 23 into the tank 20. If the manually operated valve 29 is in a closed condition this tank 20 will become completely filled with the cold salt water, thereby providing a very desirable cooling compartment above the tank 20. It is into this last mentioned compartment that most food materials should be kept and which do not require an extremely low temperature such as low temperatures required for fish or like. If desired, the top of the tank 20 may act as the bottom of this compartment, or an auxiliary bottom may be supplied to rest on top of the tank 20.

Glass windows may also be in the front of the refrigerator, but which are not shown, due to the sectional showings of the drawing. From the tank 20 the cool liquid will pass through the pipe 27 into the receptacle 26, from which it will pass through the pipe 31 to the trough 30. This trough 30 will fill with the cooling fluid until it reaches a height to pass out from the refrigerator through the pipe 32. Naturally, by the time the liquid 38 passes out of the pipe 32, which is at the right end of the refrigerator, it will have lost the major portion of its coldness. If it is desired, the tank 20 may be maintained only partially filled with cool water and this is accomplished by opening the valve 29. To clean the device, all of the water should be drained from the trough 30 and this is accomplished by removing the plug 34.

As the right upper side and top of the tank 13 are insulated, they will be warmer than the left end side and bottom of the tank 13. This will cause the air between the inner right end of the housing 10 and the tank 13 to circulate downwardly and to the right under the bottom of the tank 13, as shown by the arrows.
in Fig. 1. From below the bottom of the tank 13 the air will circulate upwardly and to the right under the tank 20. As the right end wall and back side of the tank 20 are insulated and warmer than the other sides of the tank, the air inside the refrigerator will tend to circulate upwardly between the rear wall of the refrigerator and the tank 20 and between the right end wall of the refrigerator and the tank 200. Some of this air, after it passes to the compartment above the tank 20, will pass downwardly between the tank 20 and the front wall of the refrigerator, thereby providing a transverse circulation of the air around the tank 20.

Most of the air, however, that reaches the compartment above the tank 20 will pass below the baffle member 25 and upwardly between the right side of the tank 13 and the portion 14 of the housing, as shown in Fig. 1. From this position, the circulating air will pass above the tank 13 and then downwardly, as we have herebefore seen. The upward movement of the air between the tank 13 and the baffle member 25 and portion 14 is encouraged to do so by the upper right side portion of the tank 13 being properly insulated and of a warmer nature than the other side and bottom of the tank 13.

The baffle member 25 also prevents a change of circulation or for an excessive amount of cool circulating air in the refrigerator to escape through any of the doors 24 when they are opened, as this member extends to a lower elevation than the lowest elevation of any of the doors 24.

If it is desired to drain the tank 13, the drain cock 16 should be opened.

From the foregoing, it will readily be seen that by circulating the air inside the refrigerator and using the cold liquid from the melting ice, a refrigerator is provided that produces an extremely low temperature relative to the amount of ice used, thereby making for efficiency and economy. Also, the circulating of the air inside the refrigerator eliminates impurities and offensive odors inside the same. Much of these impurities in the air, which contact the water in the trough 30, will be carried off by the water through the outlet drain pipe 32.

Although I have described my invention as particularly adapted to use with cracked ice and salt, it may be also used to advantage with electric refrigeration inside the tank 13. A hood 39 may be placed in the compartment 17 to prevent condensed liquid from falling downwardly onto the items in the compartment. Insulation should be placed under this hood. The numeral 40 designates a drain pipe leading from the compartment 17.

Some changes may be made in the construction and arrangement of my improved liquid and air circulating refrigerator without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim:

1. In a device of the class described, a housing, a vertical tank inside said housing having some of its sides spaced from the inner side of said housing, a compartment inside said tank, a door communicating with the inside of said compartment, a second tank inside said housing and having some of its sides spaced apart from the inner sides of said housing, a pipe having one of its ends communicating with the inside of said first mentioned tank and its other end communicating with the inside of the second tank, a compartment above said second tank, a door communicating with the inside of said last mentioned compartment, an outlet pipe communicating with the inside of said tank, and insulating material embracing a portion of each of said tanks for encouraging the circulating of air inside said housing.

2. In a device of the class described, a housing, a vertical tank inside said housing having some of its sides spaced from the inner sides of said housing, a compartment inside said tank, a door communicating with the inside of said compartment, a second tank inside said housing and having some of its sides spaced apart from the inner sides of said housing, a pipe having one end communicating with the inside of said first mentioned tank at a point between the top and bottom of said tank and its other end communicating with the inside of said second tank, an outlet pipe communicating with the inside of said second tank, and insulating material embracing a portion of each of said tanks for encouraging the circulating of air inside said housing.

3. In a device of the class described, a housing, a vertical tank inside said housing having some of its sides spaced from the inner sides of said housing, a compartment inside said tank, a tray inside said tank and above said compartment, a door communicating with the inside of said compartment, a second tank inside said housing and having some of its sides spaced apart from the inner sides of said housing, a pipe having one of its ends communicating with the inside of said first mentioned tank and in its other end communicating with the inside of the second tank, a compartment above said second tank, a door communicating with the inside of said last mentioned compartment, an outlet pipe communicating with the inside of said second tank, and in
insulating material embracing a portion of each of said tanks for encouraging the circulating of air inside said housing.

4. In a device of the class described, a housing, a vertical tank inside and at one end of said housing; said tank having its right and left sides and top and bottom spaced from the inner sides of said housing; a horizontal tank inside said housing and spaced apart from the inner sides of said housing, a compartment inside said first mentioned tank; said second mentioned tank so positioned as to create a compartment between its top and the top of said housing, a pipe having one end communicating with said first mentioned tank and its other end communicating with the inside end of said second tank adjacent said first tank, and an outlet pipe communicating with the inside opposite end of said second tank.

5. In a device of the class described, an elongated housing having one of its end portions higher than its other end portion, a comparatively deep tank inside said housing and positioned where said housing has the highest elevation; said tank having its top, bottom, and right and left sides spaced from the inner sides of said housing, insulating material on the top and right side of said tank, a compartment inside said tank, a comparatively shallow horizontal tank inside said housing and completely spaced from the inner sides of said housing, a pipe having one end communicating with the inside of said first mentioned tank and the inside of said second mentioned tank, a downwardly extending baffle member inside said housing and terminating a distance above said second tank, insulating material on the back side and right side of said second tank, a small receptacle at the right end of said second tank, a pipe having one end communicating with the inside top of said second tank and said receptacle, a second pipe having one end communicating with the inside of said second tank and its other end communicating with the inside of said receptacle and at a lower altitude than said first mentioned pipe, a manually operated valve interposed in said last mentioned pipe, and a drain pipe having one end communicating with the inside of said receptacle.

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