

No. 830,342.

PATENTED SEPT. 4, 1906.

J. W. MACDONALD.
REFRIGERATOR.

APPLICATION FILED APR. 27, 1905.

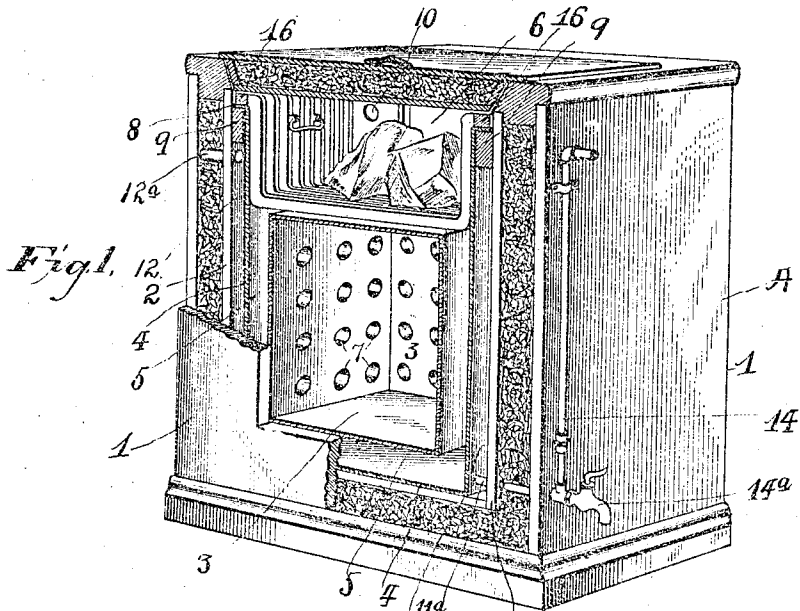


Fig. 1.

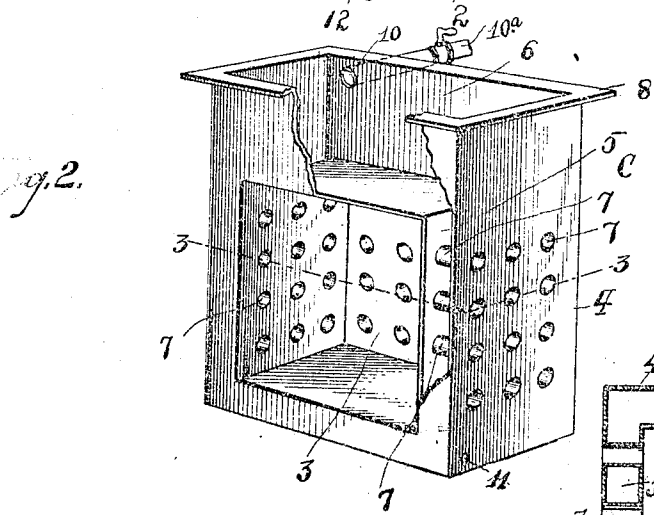


Fig. 2.

Fig. 3.

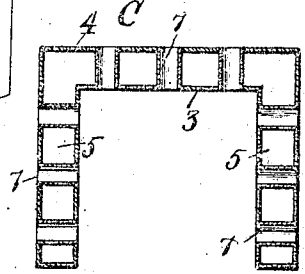
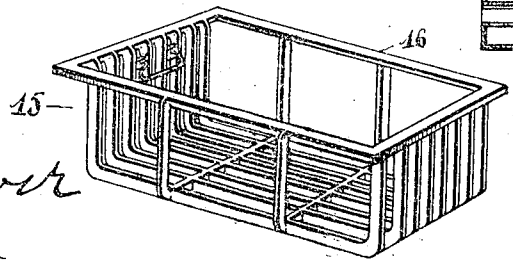


Fig. 4.



WITNESSES:

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REFRIGERATOR.

No. 830,342.

Specification of Letters Patent.

Patented Sept. 4, 1906.

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To all whom it may concern:

Be it known that I, JOHN W. MACDONALD, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Refrigerators, of which the following is a specification.

The object of the invention is to provide a simple, practical, and highly-efficient device for preserving articles by means of a body or running stream of cold or cool water; and the invention consists in certain peculiarities in the construction and arrangement of parts and in certain novel combinations of elements, substantially as hereinafter described, and particularly pointed out in the subjoined claims.

In carrying the invention into practice the cooling-chamber of the device is immersed in a body of water which, when practicable, is obtained from a source of supply under pressure and is of natural temperature. This water is caused to circulate around the cooling-chamber in a water-space formed by mounting said cooling-chamber in a box or water-receptacle of sufficiently greater size than the cooling-chamber as to leave said space between them. This cooling-chamber and box or receptacle form the cooling portion of the apparatus, the former containing the articles to be preserved and the latter the water which modifies the temperature to a preservative degree. Extending through said water-space and immersed in the water therein are a series of air-passages, the inner ends of which open into the interior of said cooling-chamber while their outer ends open outside the outer surface or wall of the water-space. Means are provided by which said air-passages have communication with the outer air, whereby the air in the apparatus may be changed. Thus the contents of the cooling-chamber may be economically preserved and by proper attention to the air-supply none of the articles in said chamber will be contaminated by the presence of the others. The air in said cooling-chamber may be changed with the frequency necessary to prevent the tainting of such articles as milk and butter, for example, which are very liable to absorb the odors of meats, &c., without increasing to a dangerous extent the temperature of the cooling-chamber, for the reason that the air in its passage to the interior of said cooling-chamber is cooled by the body of water in the water-space. More-

over, the walls of the cooling-chamber and water-receptacle and the air tubes or passages are all made of sheet metal of as light weight as practicable, so that said walls and tubes will receive to a maximum degree the temperature which the body of water is capable of imparting and will similarly in a maximum degree communicate said temperature to the air in contact therewith. Again, the outer wall of the water-receptacle is encircled by an air space or chamber into which the outer ends of said tubes open, and it is through this air space or chamber in the preferred embodiment of the invention that the several tubes have communication with the outer air, which communication is made controllable by valved means. Thus the air is cooled first in the outer air-chamber by the temperature of the outer wall of the sheet-metal box or water-receptacle, then in the air-passages by the walls of the same, and finally in the cooling-chamber by the walls of the latter, each of which walls are in direct contact with the cool liquid. Furthermore, it is practicable by the use of the air-tubes shown in the accompanying drawings to dispense with other means for supporting the cooling-chamber within said water-receptacle and from the walls of the latter.

Although a refrigerator embracing the foregoing features of construction will utilize to a maximum degree the cooling properties of a body or running stream of water of natural temperature conditions may be present to meet which it may prove to be necessary or desirable to reduce by artificial means the temperature of the body of water within the water receptacle or space. Therefore the wall of the water-receptacle, which is continued above the cooling-chamber so as to form, with the top of the latter, a water-space above said chamber, also forms with said top a chamber or space of sufficient dimensions to receive enough ice to lower the temperature of the water in the water-space to the desired degree. To support the ice in said chamber or space free from contact with the walls thereof, which it would be liable to rupture, a grating of basket-like form is provided, which grating will be suspended within said chamber or space and will not impede the access of the water from said space above the top side of the cooling-chamber to the space around the other sides of the same and from the latter to the former spaces. It will be understood that when ice is used it will be undesir-

able to employ a stream of water continuously flowing from a source of supply into and from the water-space of the refrigerator, and for said reason if said water-space is connected with a source of water-supply under pressure the connection should be such that if ice is to be used at any time the supply of water can be cut off when ice is used except to replace that which has been drawn off for drinking or other purposes. It will also be understood that when ice is used it will itself tend to create a circulation of water within the water-space, the cool water descending and replacing the warmer, which is thereby caused to rise and be lowered in temperature when it descends, and so on. When for any reason temporary or otherwise it is not practicable to utilize a running stream of cold water as the cooling medium, a very small quantity of ice will act on the body of water within the water-space to reduce the temperature thereof sufficiently to maintain a preservative temperature within the cooling-chamber.

The ice-retaining basket or grating may be readily lifted out of the refrigerator when its use is not desired.

The water-receptacle and the cooling-chamber in the form hereinbefore described form a single self-contained structure, which in practice is mounted in an outer casing so constructed as to insulate the same from the influences of the outside temperature and is suspended within said casing by flanges which are formed at the upper edge of the water-receptacle and rest upon beads at the upper end of the outer casing, whereby said water-receptacle and cooling-chamber may be lifted from said outer casing when it is desired to clean or repair them.

Having thus in a general way set forth the invention and several of its important structural features, I will next proceed to describe more in detail the best means for carrying the invention into practice, premising, however, with the statement that changes in the details may be made without departing from the spirit of the invention.

In the accompanying drawings, illustrating the invention, and in which like letters and numerals of reference designate like parts throughout the several views, Figure 1 is a perspective view of a refrigerator embodying my improvements with the front of the casing partly broken away and the top of said casing partly in section to show the internal parts of the refrigerator. Fig. 2 is a detail view of the cooling portion of the apparatus, partly broken away to show some of the air passages or tubes. Fig. 3 is a section on the line 3-3 of Fig. 2. Fig. 4 is a view of the metal ice-supporting grating.

A designates the outer insulating-casing, which is preferably formed of wood and comprises the outer wall 1 and inner wall 2,

spaced apart to leave an intermediate chamber packed with mineral wool or other suitable insulating material. This casing has a door (not shown) for access to the cooling-chamber and a lid or door for access to the ice chamber or grating, which doors, forming no part of the invention, need not be further referred to.

C designates the cooling portion of the refrigerator and comprises the inner casing or cooling-chamber 3 and the outer box or water-receptacle 4, both of which are formed of suitable sheet metal. They are of such sizes that when placed one within the other a water-space 5 will be left between the sides and bottom parts thereof and an open space or chamber 6 will be formed above the cooling-chamber. The smaller casing—i. e., the cooling-chamber 3—is held in position by means of a series of sheet-metal tubes 7 passing through the sheet metal forming the sides of said cooling-chamber and water-receptacle and expanded in place to form rigid joints. The whole is then dipped in melted tin or galvanizing material to make all seams and joints water-tight and prevent rusting. The top of the box or water-receptacle 4 is worked out to form the flanges 8, by which said cooling portion of the apparatus is suspended within the casing A upon the beads 9, and is provided with openings 10 and 11 to receive valved water supply and outlet pipes 10^a and 11^a. The wood casing A should be of such interior size as to permit the box or receptacle 4 to be placed inside of it and leave between the outside wall of said box and the inside wall of the outer casing an air-chamber 12, into which the tubes 7 open. This chamber 12 has communication with the air outside the casing through one or more valve-controlled air-passages 12^a. In the form herein shown air is admitted to the chamber 12 from outside the refrigerator by means of a single pipe 12^a, and the supply of said air is regulated by a shutter placed upon the outer end of said pipe. The water-outlet pipe 11^a is passed through said casing A and screwed into the opening 11 near the bottom of the box 4, and said pipe is provided with an upward extension or overflow-pipe 14, which projects to the level it is desired to maintain in the water-space, and is further provided with a spigot 14^a, which may be opened to withdraw water from said space.

It will be seen that if cool water be flowed through the opening 10 it will pass down into the space 5 and rise up in the space 6 until it reaches the height of the outlet of the overflow-pipe 14, and as the water continues to flow into the space 6 it will circulate around the chamber 3 on its course to said outlet and will cool said chamber. Fresh air will flow from the pipe 12^a into the chamber 12 and will be cooled by contact with the cold surface of the sides of the box 4 and flowing

through the tubes 7 will be further cooled by contact with the walls of the same in its passage to said chamber 3.

When ice is to be used, the metal grating 5 15 of basket-like form is dropped into the open space 6 to support said ice, and water is then supplied to fill the space 5 and to nearly fill the space 6. As the water in the space 6 becomes cold it will gravitate toward the bottom of the space 5 and act to cool the air flowing into the cooling-chamber 3 in the same manner as when a stream of cold water flows around said chamber. When the ice supply is to be renewed, as much water may be 5 drawn off through the spigot or cock 14^a as the ice will displace. Said grating 15 is removably supported in place in the space 6 by means of its flanges 16, which rest upon a suitable support provided for. The several walls in the cooling portion of the refrigerator are preferably flat in order to afford a maximum amount of cooling-surface for the space occupied and to permit the use of plain sheets of metal without the expense of shaping the same.

From the above it will be seen that I have provided a refrigerating means of simple and inexpensive construction which is thoroughly sanitary and effectively preserves perishable articles placed in the cooling-chamber at little or no expense for ice.

Having thus described the invention, what I believe to be new, and desire to secure by Letters Patent, and what I therefore claim, is—

1. A refrigerating means comprising a series of walls relatively arranged to form an inner cooling-chamber, a water-space around

said cooling-chamber and an air-chamber around said water-space, tubes extending 40 through said space and opening into said cooling-chamber and air-chamber, and means through which said air-chamber has communication with the outer air.

2. In a refrigerating means, a casing, a receptacle, flanges on said receptacle, said receptacle being arranged within said casing and spaced therefrom by said flanges thereby forming an air-space, an inner receptacle spaced from the first-named receptacle forming a water-space, means establishing communication between the said air-space and interior of said inner receptacle, and an ice-receptacle supported from said flanges and overlying said inner receptacle and water-chamber. 55

3. In a refrigerating means, an outer receptacle, an inner receptacle, and an intermediate receptacle, said inner receptacle being open at its front face and rigidly connected to the intermediate receptacle to form a unitary member, said receptacles forming a central air-chamber, an outer air-chamber, and an intermediate water-chamber, means by which air is introduced into 65 said outer air-chamber, and air-conduits extending from said outer air-chamber through the water-chamber and into the central air-chamber.

In testimony whereof I affix my signature 70 in presence of two subscribing witnesses.

JOHN W. MACDONALD.

Witnesses:

ERNEST W. BEACH,
A. W. SCHIRRING.