Nov. 27, 1928.

1,693,200

P. W. FLINT

REFRIGERATOR

Filed June 11, 1926

2 Sheets-Sheet 1

FIG. 1.

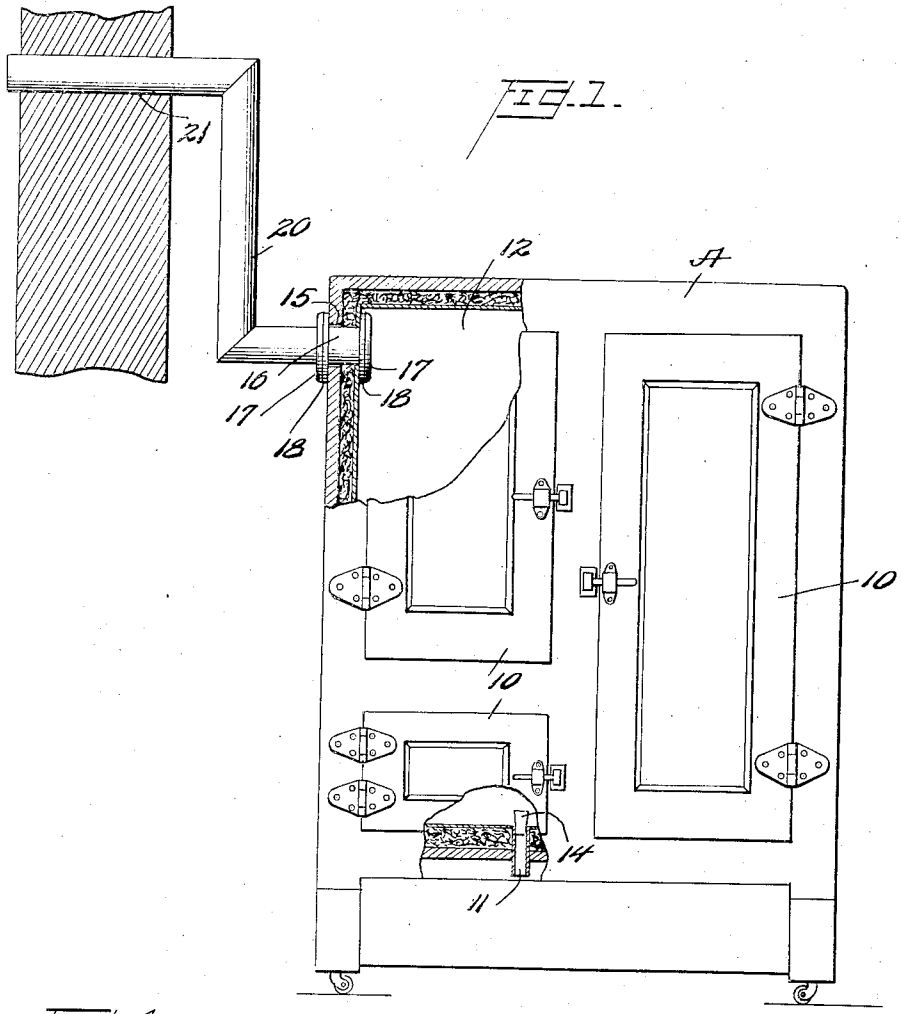


FIG. 4.

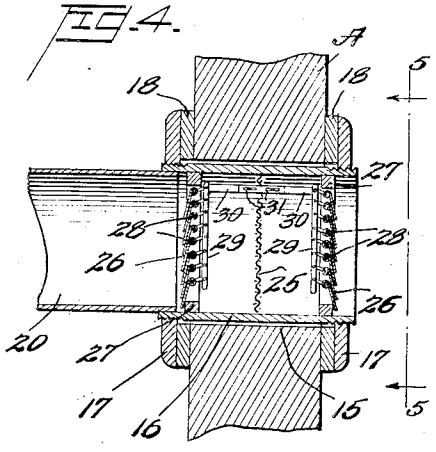
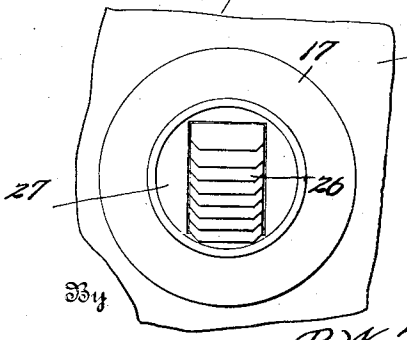


FIG. 5.



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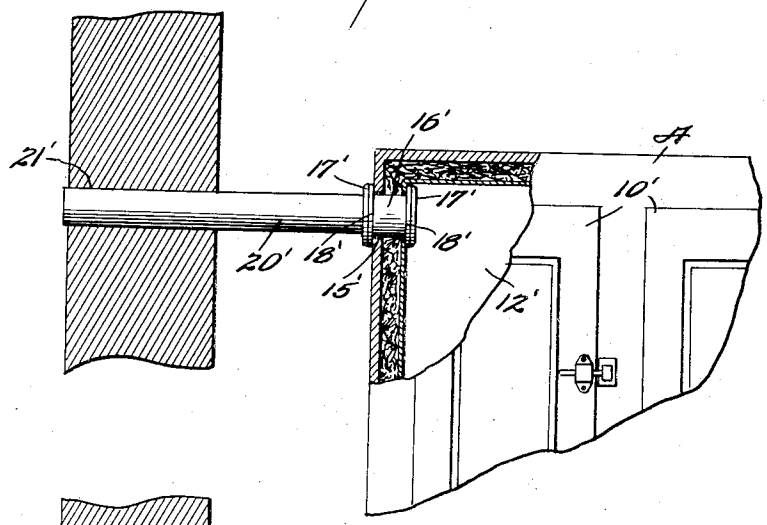
P. W. FLINT

REFRIGERATOR

Filed June 11, 1926

2 Sheets-Sheet 2

FIG. 2.



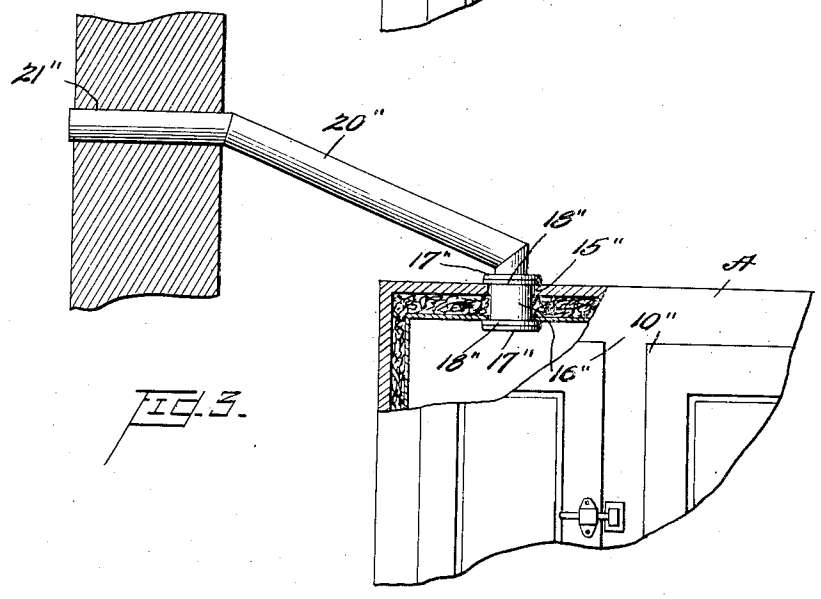


FIG. 3.

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UNITED STATES PATENT OFFICE.

PERCY WIGHTMAN FLINT, OF NORTH CHARLESTON, SOUTH CAROLINA.

REFRIGERATOR.

Application filed June 11, 1926. Serial No. 115,370.

This invention relates to a method of and apparatus for refrigerating.

The principal object of this invention is the utilization of the refrigerating effect of the free atmosphere when it is chilled sufficiently to serve as a refrigerating medium for the purposes desired. Another object of this invention is the utilization of the cooling effect of a chilled atmosphere in such a manner that the heat exchange takes place principally or entirely by convection through a single conduit, as distinguished from those systems relying upon a unidirectional forced draft.

An important feature of this invention resides in the extremely simple apparatus which is provided for effecting the refrigerating.

Other objects and features will be apparent from the following description taken in connection with the drawings, in which:

Figure 1 is a front elevation partly in section of a refrigerator embodying this invention;

Figure 2 is a fragmentary front elevation of a refrigerator embodying a modified form of apparatus;

Figure 3 shows a further modification;

Figure 4 is a detail of the section shown in Figs. 1 and 2; and

Figure 5 is an elevation taken inside the refrigerator on the line 5—5 looking in the direction of the arrow.

Free atmosphere at various times and places becomes sufficiently chilled to serve as a refrigerating medium. Many attempts have been made to utilize this available refrigerating effect in order to dispense with artificial refrigeration, but so far as applicant is aware none of them has proven entirely satisfactory in practice. In most attempts a draft of outside air has been forced to circulate through the refrigerator. This entails many undesirable features, the principal ones being the complexity of apparatus required and the great amount of dirt, dust and odor brought into the refrigerator by the flowing body of air. The present invention aims particularly to eliminate these undesirable features by providing an interchange of heat between the cold outside air and the air within the refrigerator without the forced unidirectional flowage of air through the refrigerator.

Referring to the drawings, A designates an ice box of the well-known type adapted to be located within the walls of a closed building and having doors 10, a drain pipe 11, and an ice chamber 12. The doors of the refrigerator are normally closed and will be understood to be closed for the proper functioning of the apparatus according to this invention. The drain pipe 11 is also closed as by a stopper 14, so that when the doors are closed there will be only one opening from the refrigerator, as will be presently explained, to the end that there is no forced draft of air through the refrigerator.

Through a wall of the refrigerator near the top thereof and preferably leading to the ice chamber 12, an opening 15 is provided. A short pipe or bushing 16 extends through this opening and has spaced flanges 17 adapted to be secured thereto for fastening the pipe between the sides of the wall. A packing member or gasket 18 is clamped between the wall and each flange to furnish a tight seal between the pipe 16 and the sides of the wall.

A pipe 20 fits into the outer end of the short pipe 16 and extends to a point outside the building in which the refrigerator is housed. The outer end of the pipe 20 is disposed at an elevation as high as, or higher than, the elevation of the opening 15 in the refrigerator, for the purpose of causing an upward transfer of the heat of the warm air existing near the top of the refrigerator to the colder outside air. Figure 1 shows the opening 15 on the side of the refrigerator near the top with the pipe 20 extending upwardly therefrom to the opening 21 through the building wall. Figure 2 shows the opening 15′ with the pipe 20′ extending horizontally to an opening 21′ in the building wall. Figure 3 shows the opening 15″ in the top of the refrigerator with the pipe 20″ extending upwardly to the opening 21″ in the building wall. The various locations of the opening 15 in the refrigerator and the opening 21 in the building wall are provided as conditions about, and the location of, the refrigerator may require. In case the refrigerator is of the built-in type, the building wall and refrigerator wall will merge into one wall. This wall will usually comprise merely the outer door to the ice chamber 12. In this case the opening 15 and short pipe 16 will be located in this door. A sufficient length of pipe 20 is then used to provide a quiet column of air leading to the pipe 16. Pipe 20 is in all cases secured in pipe 16 in

such a manner as to be readily removable but at the same time to provide a tight joint therebetween. The telescoping joint illustrated, if well made, will prove satisfactory though other means may be employed.

A fine screen 25 is carried within the pipe 16 to keep out dust or other matter which might tend to enter in the temporary draft of air created when the service doors to the refriferator are opened.

Two spaced sets of shutters 26 are also carried in the short pipe 16 in frames 27 fitting closely within the pipe. The shutters are moved on aligned pivots 28 and the shutters of the two sets have oppositely disposed inclinations with a common plane to further preclude the formation of drafts. The shutters of each set are all connected by pivot joints to a rod 29. The two rods 29 carry rigidly thereon bars 30 which have a slide joint 31 therebetween to permit and compel the two sets of shutters to move together. This is desirable on account of the inaccessibility of the outer set of shutters. The inner set can be reached and operated from the inside of the ice chamber and by this arrangement, operation of the inner set operates the outer set as well. The shutters are provided for the purpose of changing the effective size of the column of air within the pipe and also to close off the opening completely for summer service, when pipe 20 may be removed if desired. Thus, by having a pair of spaced shutters a dead air space is formed between them which acts as a heat insulating medium if the shutters are of non-conducting material. Then by removing the stopper from the drain pipe the refrigerator may be iced and used in the usual way.

The operation of the device is believed to be as follows:

The body of air within the refrigerator becomes heated by seepage of heat from the room through the refrigeration walls and by heat given off from objects placed in the refrigerator for cooling. Let it be considered that a cold body of air exists within the pipe 16 at the top of the refrigerator. This is actually the case and the reason therefor will be explained presently. This cold body of air chills the warmer air at the top of the refrigerator with which it is in contact and causes it to descend while warm air ascends. In this way convection currents are set up within the confined body of the air within the refrigerator and all of the air therein is thereby cooled. Heat taken up by the air in pipe 16 is passed to the outside air through the column of air in pipe 20. The heat is transferred by intermittent convection currents within the pipe, created by the tendency of warm air to rise and cold outside air to enter by descending. This movement is not forced, but is such as takes place because of varying temperatures of the air, aided to some extent by the varying air pressures existing at the outer end of pipe 20. The varying pressures are induced by eddy currents and gusts of air about the end of the pipe.

Thus it will be seen that the provision of a single pipe from the refrigerator to the outside air provides a simple but effective means of refrigerating and one that avoids all forced drafts of air, what draft there is being only that which is induced by the process of refrigerating.

From the nature of this apparatus, it will be evident that it is adapted and intended to be used as an attachment to existing refrigerators or alternatively the refrigerators may be built and sold with the attachment installed. It is also evident that various changes may be made in the apparatus so long as these changes fall within the scope of the appended cdaim.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

An apparatus of the character described including in combination, a refrigerator of the usual type, adapted to be located within a closed building and having in addition to the usual doors only a single opening, said opening being located at the extreme upper end of the refrigerating chamber, a pipe extending from said opening to a point outside of the building housing the refrigerator, the outer end opening of said pipe being at an elevation as high as the opening in the upper end of the refrigerating chamber, means in said pipe for regulating the effective size of the opening therethrough at two separate points, said means comprising two sets of axially operated transverse shutters, said shutters having oppositely directed inclination to a horizontal plane and being interconnected for cooperative simultaneous movement.

In testimony whereof I hereunto affix my signature.

PERCY WIGHTMAN FLINT.