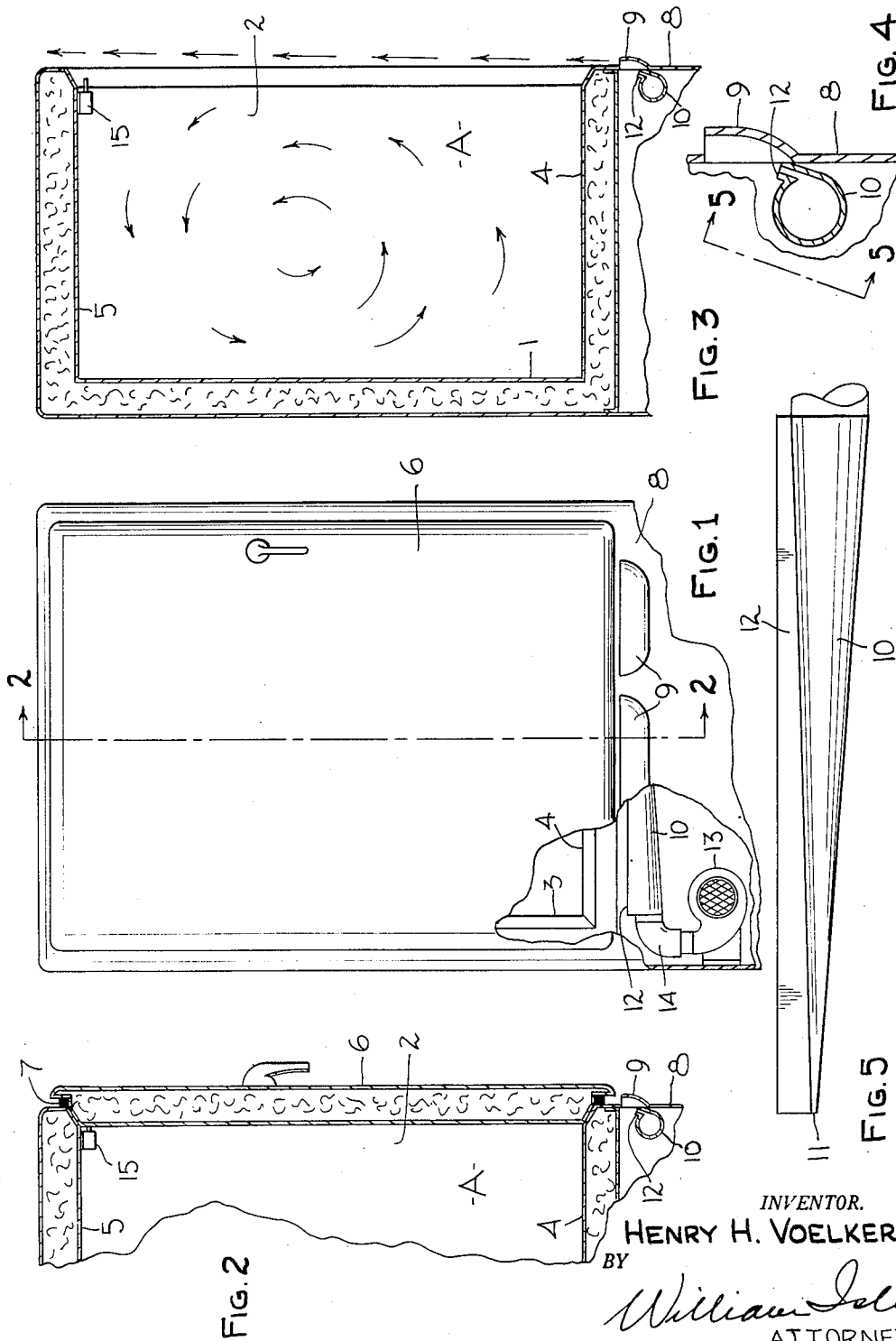


July 3, 1951

H. H. VOELKER
MEANS FOR PREVENTING LOSS OF COLD
AIR FROM REFRIGERATED SPACES
Filed Aug. 9, 1949

2,558,997



UNITED STATES PATENT OFFICE

2,558,997

MEANS FOR PREVENTING LOSS OF COLD
AIR FROM REFRIGERATED SPACES

Henry H. Voelker, Cleveland, Ohio, assignor to
Automatic Screw Products Company, Cleve-
land, Ohio, a partnership

Application August 9, 1949, Serial No. 109,290

9 Claims. (Cl. 62-89)

1

This invention relates, as indicated, to methods of and means for preventing loss of cold air from a refrigerated space.

When opening the door of a refrigerator, the cold air, due to its relatively high specific gravity will fall or drop out of the refrigerator in a manner similar to that in which water would flow out of the refrigerator if the refrigerator were filled with water and the door were opened.

This cold air is replaced by lighter warm air which flows in through the open door, and which must be cooled in order to reestablish the desired temperature in the refrigerator. In order to cool this warm air which has replaced the lost cold air, the compressor unit of the refrigerator is required to operate at frequent intervals, the length of which depends, of course, on the frequency with which the refrigerator door is opened. Expressed in another way, the more frequently the door is opened, the more frequently the refrigerator compressor unit is actuated.

I have discovered, as the result of considerable experimentation a novel, unique and efficient method of preventing loss of cold air from a refrigerated space when the space is opened, as for example, when a refrigerator door is opened.

The method may be illustrated by reference to the accompanying drawings, in which

Fig. 1 is a front elevational view of a refrigerator cabinet embodying my invention.

Fig. 2 is a longitudinal cross-sectional view taken on line 2-2 of Fig. 1.

Fig. 3 is a view similar to Fig. 2 but with the door in open position.

Fig. 4 is an enlarged cross-sectional view of one of the details shown in Fig. 3.

Fig. 5 is a view of the cove taken as indicated by line 5-5 of Fig. 4.

Referring more particularly to the drawings, there is illustrated a conventional household refrigerator having a refrigerated compartment or space A, which is defined by a rear wall 1, side walls 2 and 3, a bottom 4 and a top 5. The rectangular opening at the front of the space A is normally closed by means of a door 6, which is hingedly secured to the refrigerator and is provided with the usual rubber seal or tubing 7 which bears against the front edges or surfaces of the walls 2 and 3, bottom 4 and top 5 to effectively seal the space against loss of cold air, when the door is closed.

In accordance with the illustrated or exemplary form of the invention, I preferably stamp the metal constituting the front edge 8 of the bot-

2

tom 4 in such a manner as to provide a line or series of louvers substantially parallel with the lower edge of the door 6, when the latter is in closed position. The louvers 9 extend forwardly from the edge or face 8, and in such a manner that air blown into the lower edges of these louvers will blow upwardly out of the louvers and in a plane substantially parallel with the rear wall 1 of the refrigerator. It will also be noted that the outlet openings or upper edges of the louvers are disposed below the rubber seal 7, when the door is in closed position. The reason for this will be presently explained.

Disposed within the bottom 4, rearwardly of the face 8 of the bottom is a duct or conduit 10, preferably in the form of a cone, closed at its apex 11, and having a throat 12 extending tangentially therefrom along its entire length, the upper or open edge of this throat being in registry with the inlet or lower edges of the louvers 9.

Air is supplied to the duct or conduit 10 by means of a small blower 13, preferably of the Sirocco or centrifugal type, located within a compartment of the refrigerator externally of the space A, and operated by a small motor, of say 50 watt rating, for supplying air at low velocity. Air from the blower 13 is supplied to the base of the cone conduit 10 by means of an elbow duct 14.

Reference numeral 15 designates a conventional push button switch which automatically causes the light bulb within the refrigerator to become energized each time that the door 6 is opened. This button, as illustrated may also be placed in circuit with the motor of the blower 13, so as to cause the blower to operate each time that the door 6 is opened, and remain in operation until the door is closed.

When the door 6 is opened, the blower 13 is energized, causing air to be blown into the duct 10, the air passing through the throat 12 of the duct and into the louvers 9, emerging from these louvers as a substantially vertical wall or curtain of air which extends across the entire width of the opening of the space A. This wall or curtain of air need not be cold air, but may be air of ordinary atmospheric temperature. This wall or curtain of air acts or serves as a barrier to prevent the cold air within the refrigerated space A from "falling out" through the opening at the front or entrance to the space A. This barrier is maintained as long as the door is open, and when the door is closed, the operation of the blower is automatically stopped.

3

It has been determined that by the use of the aforesaid wall, or curtain of air, the loss of cold air, when the door is opened, is reduced sufficiently so that the time intervals between operation of the refrigerator compressor or other refrigeration-producing unit, are increased at least 20%, thereby resulting in a saving of electrical energy consumed in the operation of the refrigerator.

By utilizing a tapered or conical tube as the duct 10, the air pressure is equalized along the entire tube, resulting in an equal volume of emerging air at all points throughout the length of the tube. This produces a curtain or wall of air of uniform thickness and height.

It is desirable, also, that the air forming the wall or curtain be filtered, and for this purpose, an ordinary spun glass filter or similar air filtering device may be incorporated in the blower 13, or placed across the entrance to the duct 10.

By having the outlet edges of the louvers 10 disposed below the rubber seal 7, leakage of cold air from the space A downwardly into the louvers when the door 6 is in closed position is precluded.

Although the invention has been described in connection with the conventional type of household refrigerator, it will be readily understood that the invention is not limited in this respect, but is readily adapted for commercial type of refrigerators, for meat lockers, frozen food lockers, refrigerator trucks, coolers, etc.

Moreover, the curtain or barrier of air, while preferably being one formed by blowing air upwardly across the opening or entrance to the refrigerated space, may be produced in other ways, as for example, by blowing curtains or walls of air laterally across said space, as from opposite side walls of the space toward each other. The wall or curtain of air need not extend the full height of the opening, but will be effective if it extends only across the lower portion of the opening, since the cold air, which is normally lost, drops out of the lower portion of the opening.

It is to be understood that various changes in the steps and other details in the method and in the means for carrying out said method may be resorted to without departing from the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a refrigerator having a refrigerated space and an entrance for said space, a closure for said entrance, said closure having sealing means associated therewith, said sealing means adapted to engage the walls defining said entrance, a blower, air slots disposed in the portion of said walls defining the lower edge of said entrance, a conduit communicating said blower with said air slots, and means for automatically actuating said

4

blower when said closure is opened, whereby a wall or curtain of air is blown upwardly across said entrance to prevent loss of cold air from said space.

2. A refrigerator, as defined in claim 1, in which said air slots are defined by louvers.

3. A refrigerator, as defined in claim 1, in which said conduit is of conical shape.

4. A refrigerator, as defined in claim 3, in which said conduit has a throat extending tangentially therefrom, said throat being in registry with said air slots.

5. In a refrigerator having a refrigerated space and an entrance to said space, means for preventing loss of cold air from said space, said means comprising a wall or curtain of air blowing upwardly across said entrance, and means for supplying said curtain of air, said last-named means including a conduit of conical shape.

6. A refrigerator, as defined in claim 5, in which said conduit has a throat extending tangentially therefrom.

7. In a refrigerator having a refrigerated space and an entrance to said space, a closure for said entrance, and means for preventing loss of cold air from said space while said closure is opened, said means comprising means for blowing air upwardly across said entrance, and including a blower, and a conduit of conical shape.

8. A refrigerator, as defined in claim 7, in which said conduit has a throat extending tangentially therefrom.

9. In a refrigerator having a refrigerated space and walls defining an entrance for said space, a closure for said entrance, a blower, air slots disposed in the portion of said walls defining the lower edge of said entrance, a conduit communicating said blower with said air slots, and means for automatically actuating said blower when said closure is opened, whereby a wall or curtain of air is blown upwardly across said entrance to prevent loss of cold air from said space.

HENRY H. VOELKER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
907,609	Kirk	Dec. 22, 1908
935,850	Kirk	Oct. 5, 1909
1,649,290	De Neen	Nov. 15, 1927
2,241,854	Hall	May 13, 1941
2,462,705	Abeling	Feb. 22, 1949
2,494,480	MacMaster	Jan. 10, 1950
2,500,606	Dosmar	Mar. 14, 1950