

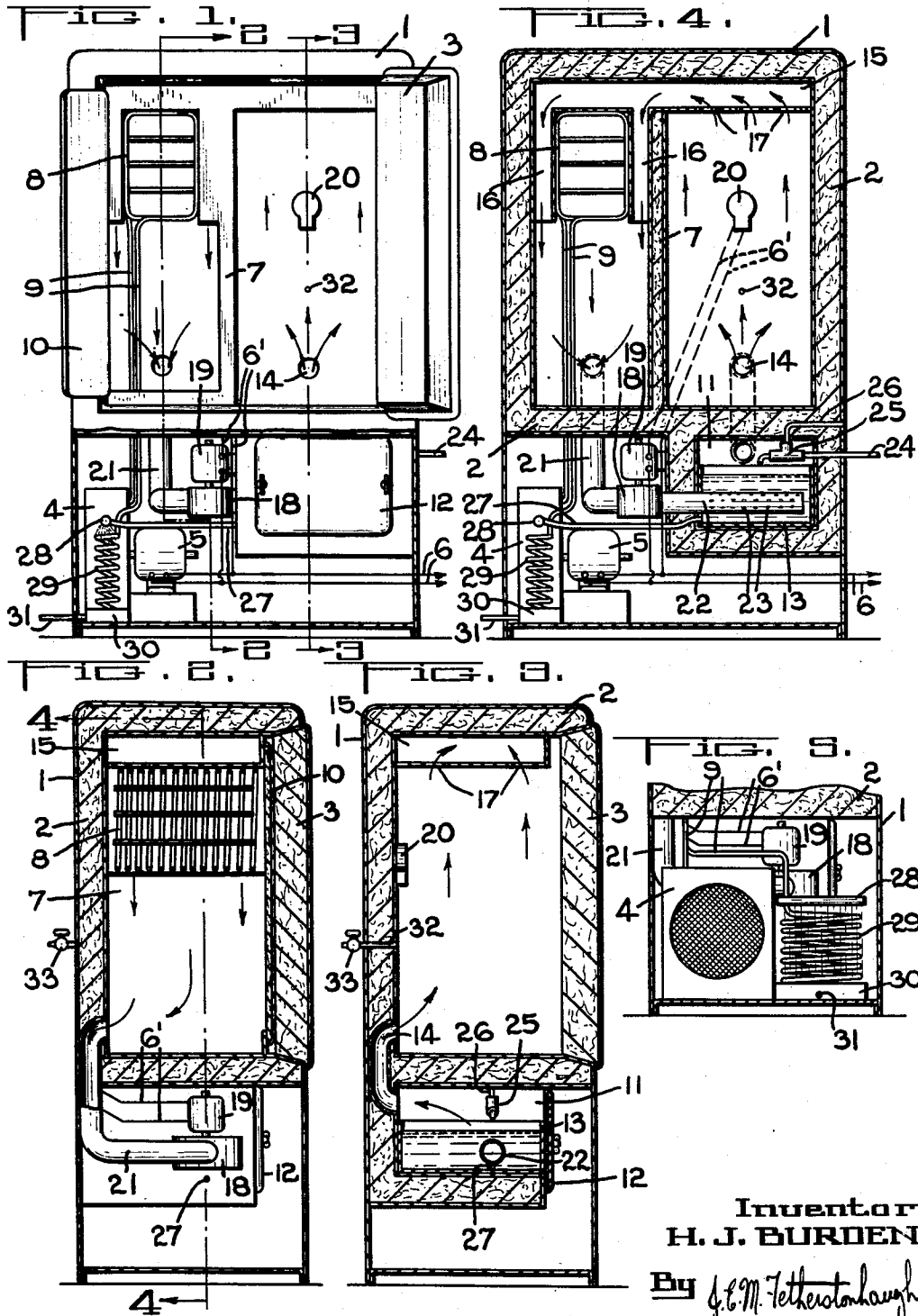
Jan. 30, 1940.

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2,188,526

AUTOMATICALLY HUMIDIFIED AND VENTILATED REFRIGERATOR

Filed Sept. 8, 1936



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UNITED STATES PATENT OFFICE

2,188,526

AUTOMATICALLY HUMIDIFIED AND
VENTILATED REFRIGERATOR

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Application September 8, 1936, Serial No. 99,786

10 Claims. (Cl. 62—102)

My invention relates to improvements in auto-
matically humidified and ventilated refrigerators,
and an object of my invention is to devise a re-
frigerator, particularly adapted for use in homes,
wherein means is provided for circulating the air
in the refrigerator and automatically maintain-
ing it at the optimum moisture content for pre-
serving the food which may be stored in the
refrigerator.

Another object of the invention is to devise
such a refrigerator in which two food compart-
ments are provided, one of which may be kept at
or below freezing temperature for storing mate-
rials that are best preserved at such a tempera-
ture, and the other of which is maintained at a
temperature somewhat above freezing wherein
materials the quality of which may be impaired
by freezing temperatures may be stored.

Yet another object is to devise a refrigerator in
which means are provided for washing the air
contained therein in order to remove odors, car-
bon dioxide or products of decomposition of the
stored material from such air, thereby eliminat-
ing contamination of any of the stored material
by odors, and also extending the length of time
goods may be refrigerated without impairing
their freshness.

A still further object of the invention is to pro-
vide means whereby sufficient fresh air from out-
side the refrigerator may be circulated there-
through to assist in keeping the contents fresh
without passing enough through the device to
necessitate an excessively large cooling unit
therefor.

An additional object is to provide a refrigerator
in which the water which has been used for
humidifying and washing the air therein may be
used to cool the condenser of the cooling unit,
such increased cooling serving to counterbalance
the additional freezing capacity required from
the cooling unit due to the fact that the air in
the refrigerator is being constantly replaced and
humidified.

With the above and other objects in view
which will hereinafter appear as the specification
proceeds, my invention consists, in a preferred
embodiment, of the construction and arrange-
ment all as hereinafter more particularly de-
scribed and illustrated with reference to the ac-
companying drawing, in which:

Fig. 1 is a front elevational view of my im-
proved refrigerator, showing the two doors of the
cooled compartments open and the cover of the
compartment containing the refrigerating, hu-
midifying and air circulating equipment removed;

Fig. 2 is a vertical transverse sectional view
through the refrigerator taken along the line 2—2
of Fig. 1;

Fig. 3 is a similar view taken along the line 3—3
of Fig. 1;

Fig. 4 is a vertical longitudinal sectional view
taken along the line 4—4 of Fig. 2; and

Fig. 5 is a fragmentary elevational view show-
ing the cooling unit of the refrigerator as seen
from the left side of Fig. 1.

Like characters of reference designate corre-
sponding parts in the different views.

Referring to the drawing, my refrigerator may
be of conventional external form, having an ex-
ternal casing 1, the cooled compartment of which
is lined with insulation 2 and closed by an air-
tight insulated door 3, and having a refrigerant
compressor 4 disposed below the casing and
driven by an electric motor 5 supplied with cur-
rent from the mains (not shown) through the
leads 6.

The cooled compartment of my refrigerator is
divided by an insulated wall 7 into two portions
which I shall hereinafter refer to as the "cold
compartment" and the "cool compartment" re-
spectively. In the upper part of the former is
disposed an orthodox cooling coil 8 supplied with
refrigerant by the compressor 4 through the pipes
9 and such cold compartment is provided with
an insulated door 10 so that when the main door
3 of the refrigerator is opened to provide access
to the cool compartment the cold compartment
will still be closed against access of the outside air
thereto.

Below the cool compartment I provide an in-
sulated compartment 11 closed by an air-tight
door 12 in which is located a tank 13 to hold
water for humidification, and an air duct 14 leads
from the top of such compartment into the lower
part of the cool compartment. Across the top of
both the cool and the cold compartments is lo-
cated an air duct 15 connecting with ducts 16
disposed on either side of the cooling coil 8 and
opening into the cold compartment; air from the
cool compartment has access to the duct 15
through orifices 17 therein.

The air in the refrigerator may be circulated
by means of a fan or pump 18 driven by an elec-
tric motor 19, current for which is supplied from
the leads 6 through leads 6' connected in series
with a conventional combined humidostat and
thermostat 20 located in the cool compartment.
The intake of the fan or pump 18 is connected
through an air duct 21 to the lower part of the
cold compartment, and the outlet of such fan is

connected to a pipe 22 which extends through the wall of the compartment 11 and into the bottom of the tank 13. Preferably the part of such pipe 22 within the tank is provided with a closed end and a number of small orifices 23 for breaking up the air passing through the pipe into small bubbles.

Water is supplied to the tank 13 by means of a pipe 24 passing through the wall of the compartment 11 and connected to the mains (not shown). At a point inside the compartment 11 an orthodox air injector 25 is connected in the pipe 24, its air intake 26 passing through the insulation 2 and casing 1 and terminating outside of the casing 1 so that air from outside the refrigerator may be drawn into the compartment 11 by the injector as water runs through the pipe 24 into the tank 13. The latter is drained by a pipe 27 leading from the bottom of the tank through the wall of the compartment 11 and preferably adapted to deliver the drainage water to the condenser of the refrigerator cooling unit to provide increased cooling of the latter over that obtained with air cooling. As shown this may be effected by providing a spray tube 28 on the free end of the pipe 27 so positioned that the spray therefrom trickles over the condenser coil 29 of the cooling unit and into a pan 30 positioned below the coil 29 whence it runs off through a pipe 31 connected to the house drain (not shown).

An outlet for the air injected into the refrigerator by the injector 24 may be provided, as shown by a pipe 32 passing from the rear inner wall of the cool compartment through the insulation 2 and casing 1 and terminating exteriorly of the refrigerator in a valve 33.

The operation of my refrigerator is as follows:

When power is supplied to the compressor motor 5 and the fan motor 19, through the leads 6, and water is supplied to the tank 13 through the pipe 24, the door 10 of the cold compartment is closed after which the door 3 is closed. The refrigerant flowing through the coil 8 then abstracts heat from the air circulated through the cold compartment by the fan 18. Such air is drawn from the cold compartment through the duct 21 by the fan, then forced through the pipe 22 out through the orifices 23 in the pipe whence it bubbles up through the water in the tank 13 into the compartment 11 being substantially completely washed and humidified thereby. From the compartment 11 the air passes through the duct 14 into the cool compartment, thence through the orifices 17 into the duct 15, over the cooling coil 8 and down through the ducts 16 on either side of the coil 8 and into the cold compartment again.

When the temperature of the cool compartment has dropped to a predetermined temperature, which will be above the freezing point and preferably between 35° F. and 42° F., and the humidity of the circulated air has reached a predetermined value, the combined humidostat and thermostat 20 will open the circuit of the fan motor 19, thereby arresting circulation of the air through the cooled chambers, and preventing further lowering of the temperature in the cool compartment. It is to be understood that the rate of cooling provided by the coil 8 is such that by the time the cool compartment has been cooled to the predetermined temperature the temperature of the cold compartment will have been lowered to the freezing point or below. As soon as the temperature of the cool compart-

ment commences to rise, due to lack of circulation of cooled air with the fan 18 inoperative, and/or the humidity commences to drop below the predetermined level, the combined humidostat and thermostat will close the circuit of the fan motor 19 to circulate and humidify the air again through the cool and cold compartments until the desired conditions of temperature and humidity are obtained.

It will be obvious that the water running continuously through the injector will continuously draw fresh air from outside the refrigerator through the pipe 26 and discharge it into the compartment 11 which is in communication with the cooled compartments, the stale air displaced by the fresh air being ejected through the pipe 32 and valve 33, which may be adjusted to allow an amount of air to escape which will just balance that injected.

It is to be understood that while the cooling coil 8 has been described and illustrated as having refrigerant continuously circulated therethrough by the compressor 4 driven by the motor 5, the latter may well be controlled by an additional thermostat in the cold compartment which will cause the motor 5 to operate only as often as is necessary in order to maintain the freezing compartment at freezing or lower temperatures.

An advantage of my improved refrigerator is that it enables food stored therein to be preserved for longer periods without losing its original freshness than in the orthodox refrigerator, as the humidity of the air surrounding the food is maintained at the optimum value to prevent drying of the food, and in addition the fact that such air is being frequently washed prevents one type of food from being contaminated with the exhalations of another type of food.

A further advantage is that the air in the refrigerator is frequently changed, regardless of how infrequently the door of the food compartment is opened, and yet the change of air is effected without materially increasing the power consumption of the cooling unit.

A still further advantage of a refrigerator constructed according to my invention is that access may be had to part of the contents of the food storage space without exposing the remaining contents to the warm air surrounding the refrigerator, so that a further economy of power consumption is effected.

While I have described and illustrated a preferred embodiment of my invention, I realize that there are many other ways of incorporating the principles of the invention in a refrigerator, and I therefore intend my disclosure to impose no limitations on the scope of my invention other than those set forth in the appended claims.

What I claim as my invention is:

1. In a refrigerator, in combination, a compartment adapted to be maintained at or below freezing temperature, a compartment adapted to be maintained at a temperature above freezing, cooling means disposed in the first mentioned compartment, means for circulating air from the first mentioned compartment through the second mentioned compartment and back to the first mentioned compartment, means for humidifying the circulated air, and means for controlling the operation of the air circulating and humidifying means for maintaining the temperature of the second mentioned compartment and the humidity of the circulated air within predetermined limits.

2. In a refrigerator as claimed in claim 1, means for continuously injecting air from with-

out the refrigerator into the circulated air prior to the latter entering the compartment adapted to be maintained at a temperature above freezing, and means for exhausting the air displaced by the injected air from within the refrigerator.

3. A refrigerator comprising an insulated chamber, a partition dividing the chamber into two compartments one of which is adapted to be maintained at or below freezing temperature and the other of which is adapted to be maintained at a temperature above freezing, cooling means in the first mentioned compartment, humidifying means, means for circulating air from the first mentioned compartment through the humidifying means and into the second mentioned compartment, an air duct for returning the circulated air from the second mentioned compartment to the first mentioned compartment and over the cooling means, means for controlling the operation of the air circulating means for maintaining the second mentioned compartment within predetermined limits of temperature and humidity, means for injecting air from without the insulated chamber into the circulated air prior to the latter entering the second mentioned compartment and means for exhausting the air displaced by the injected air from within the insulated chamber.

4. A refrigerator as claimed in claim 3 wherein the air circulating means comprises a fan, an air duct connecting the intake of the fan with the first mentioned compartment, an air duct connecting the output of the fan with the humidifying means, an air duct connecting the humidifying means with the second mentioned compartment, a fan operating motor, and a source of current therefor, the means for controlling the operation of the air circulating means for maintaining the second mentioned chamber within predetermined limits of temperature and humidity comprising a combined humidostat and thermostat positioned in the second mentioned compartment and connected between the fan operating motor and the source of current.

5. A refrigerator as claimed in claim 3 wherein the humidifying means comprises a water tank and a means for bubbling the circulated air therethrough.

6. A refrigerator as claimed in claim 3 wherein the humidifying means comprises a water tank, means for bubbling the circulated air therethrough and a pipe for supplying water to the tank, and the means for injecting air comprising an injector connected in the pipe and having its air intake disposed externally of the insulated chamber.

7. A refrigerator comprising an insulated chamber, an insulated door therefor, a vertical partition dividing the chamber into two compartments one of which is adapted to be main-

tained at or below freezing temperature and the other of which is adapted to be maintained at a temperature above freezing, a subsidiary insulated door for the first mentioned compartment, a cooling coil disposed in the upper part of the first mentioned compartment, a refrigerant compressor, and condenser disposed exteriorly of the insulated chamber and connected to the cooling coil, a fan, an air duct connecting the intake of the fan with the lower part of the first mentioned compartment, a humidifying chamber, an air duct connecting the humidifying chamber with the output of the fan, an air duct connecting the humidifying chamber with the lower part of the second mentioned compartment, an air duct connecting the upper part of the second mentioned compartment with the upper part of the first mentioned compartment and partially surrounding the cooling coil therein, a fan operating motor, a source of current therefor, and a combined humidostat and thermostat positioned in the second mentioned compartment and connected between the fan motor and the source of current for maintaining the humidity and temperature of the second mentioned compartment within predetermined limits.

8. In a refrigerator as claimed in claim 7, a water tank in the humidifier compartment, a water supply pipe therefor and means for bubbling the air circulated by the fan through water in the tank.

9. In a refrigerator as claimed in claim 7, a water tank in the humidifier compartment, a water supply pipe therefor, means for bubbling the air circulated by the fan through water in the tank, an air injector connected in the water supply pipe and having its air intake disposed exteriorly of the insulated chamber, an adjustable air vent in the wall of the insulated chamber, a drain for the water tank, and means for supplying water from the drain pipe to the refrigerant condenser.

10. In a refrigerator, the combination with a food compartment and a cooling element therein adapted to maintain the food compartment temperature at below freezing, of a second food compartment, means for intermittently circulating air from the first mentioned food compartment to the second food compartment and back to the former for maintaining the temperature of the second compartment at above freezing, means for humidifying the circulated air immediately prior to its entering the second food chamber, a combined humidostat and thermostat in the second food chamber for automatically controlling the operation of the air circulating means, and means operatively connecting the humidostat and thermostat with the air circulating means.

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