A. E. BOSSÉ.

REFRIGERATOR.

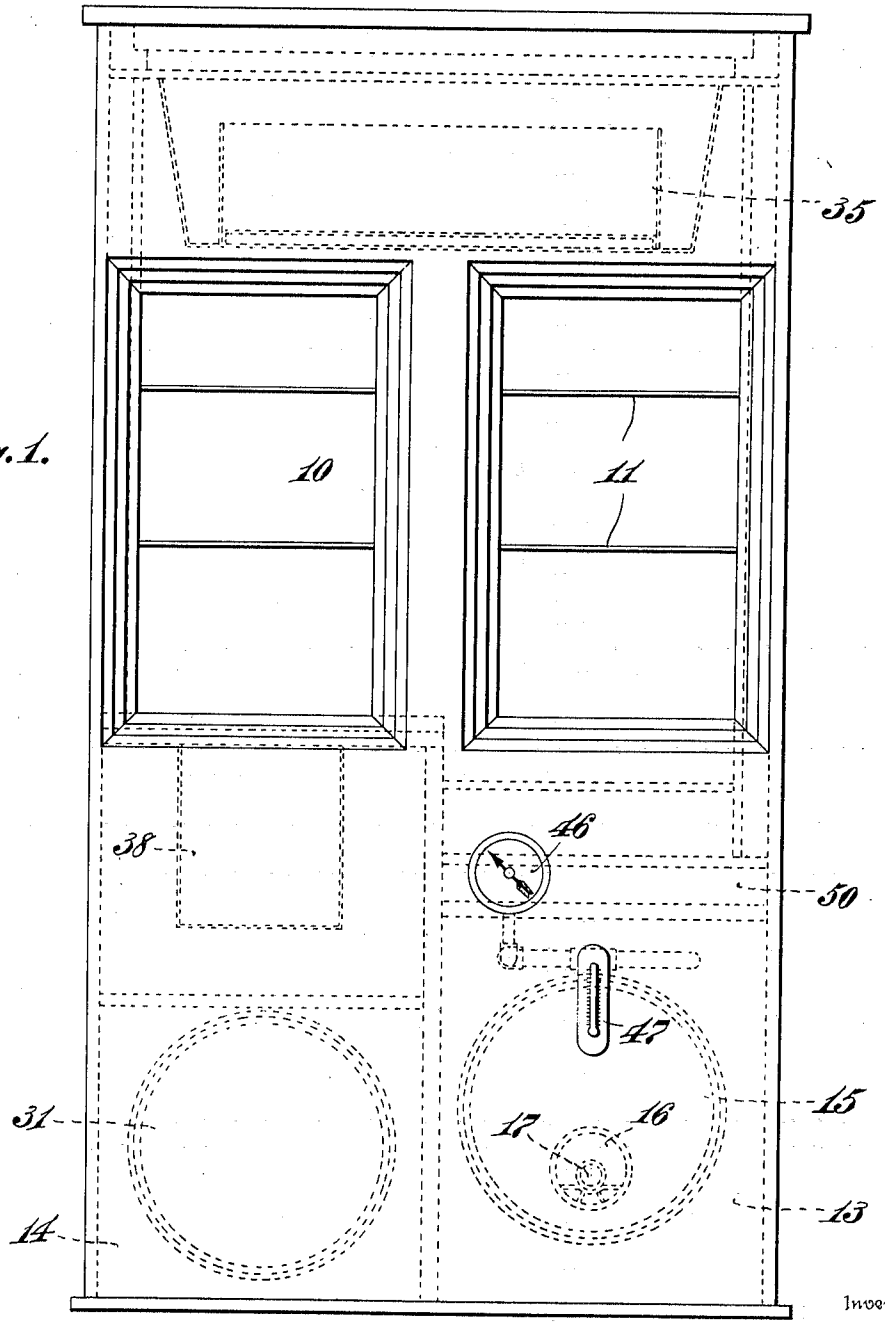
APPLICATION FILED JAN. 10, 1910.

1,048,800.

Patented Dec. 31, 1912.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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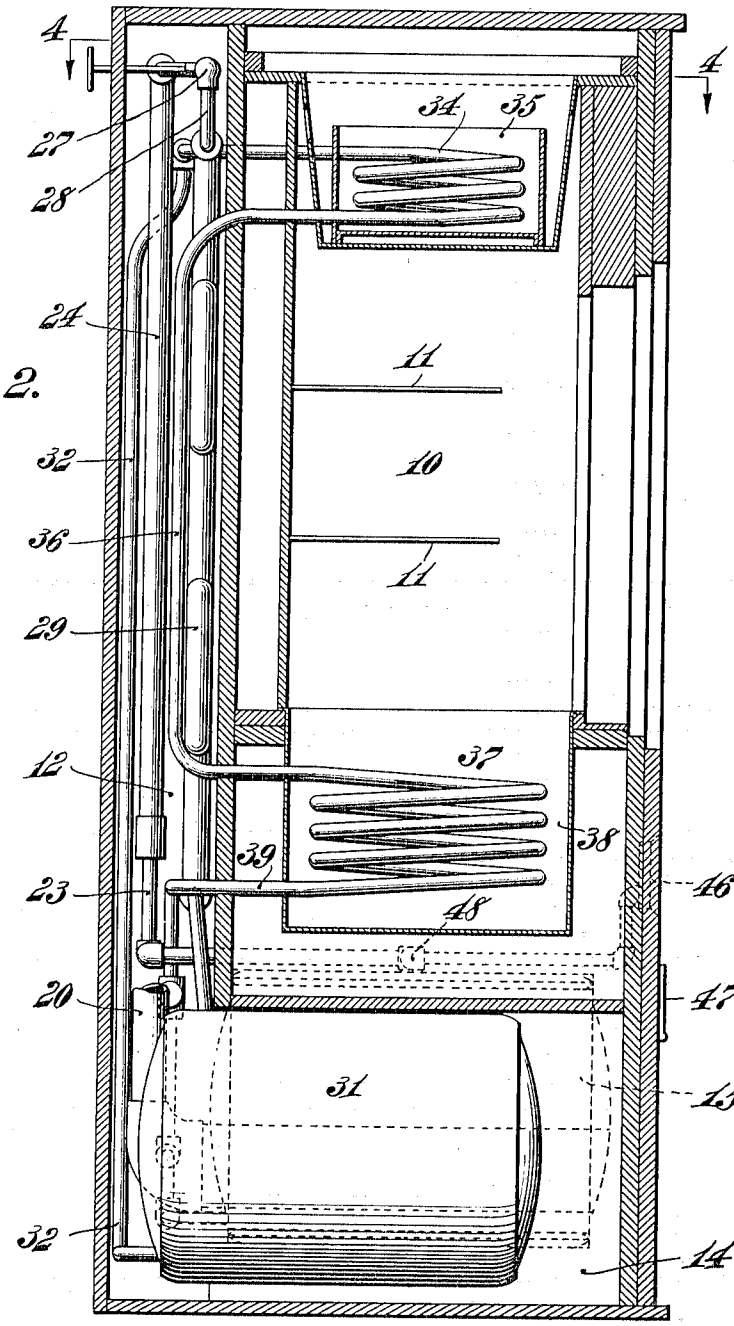
4 SHEETS—SHEET 2.

Fig. 2.



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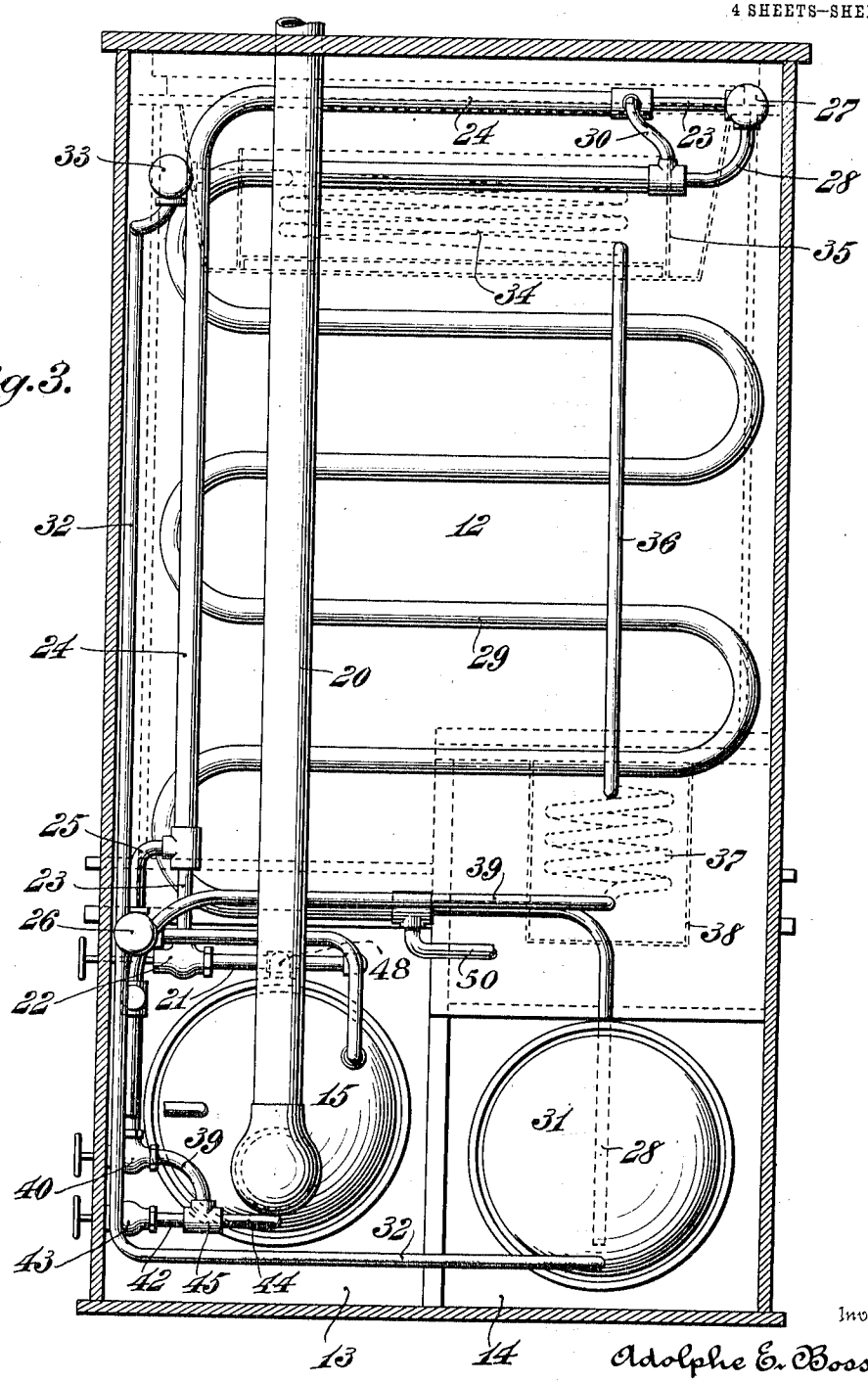
4 SHEETS—SHEET 3.

Fig. 3.



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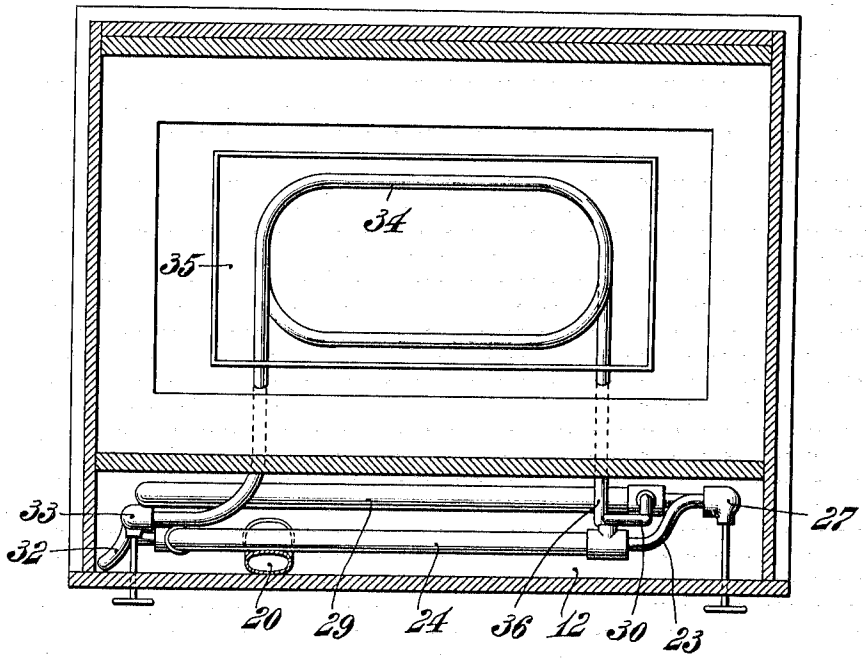
4 SHEETS—SHEET 4.

Fig. 4.



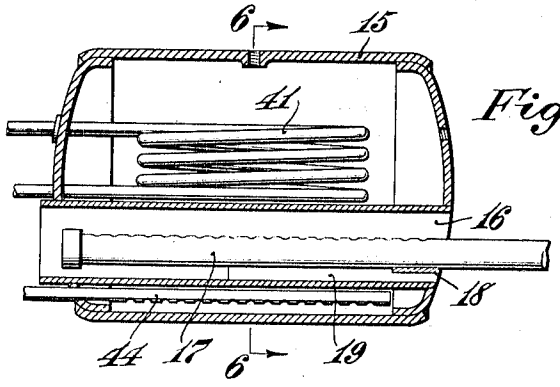
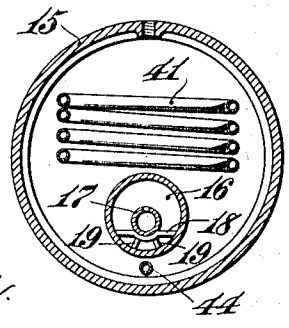


Fig. 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

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REFRIGERATOR.

1,048,800. Specification of Letters Patent. Patented Dec. 31, 1912.

Application filed January 10, 1910. Serial No. 537,110.

To all whom it may concern:

Be it known that I, ADOLPHE E. BOSSÉ, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Refrigerators, of which the following is a specification.

My invention relates to refrigerators, and in such connection it has particular relation to a household refrigerator having refrigerating apparatus contained therein which may be readily operated by persons of ordinary intelligence not possessing special knowledge.

The objects of my invention are to provide a refrigerator having the refrigerating apparatus contained entirely within the walls of the same whereby the various parts of the apparatus will be protected from injury, thereby securing the maximum of efficiency, and further to so construct and arrange the refrigerating apparatus to obviate the necessity of skilled attendance.

My invention also contemplates certain details of construction as will later appear.

The nature and characteristic features of my invention will be more readily understood from the following description taken in connection with the accompanying drawings forming part hereof, in which,

Figure 1 is a front elevation of a refrigerator embodying the main features of my invention, certain of the interior parts being shown in dotted lines; Fig. 2 is a transverse vertical section thereof; Fig. 3 is a vertical section thereof, looking from the rear and showing the construction and arrangement of the refrigerator apparatus; Fig. 4 is a horizontal section of the upper portion of the refrigerator; Fig. 5 is a vertical longitudinal central section of the preferred form of ammonia generator, constituting a portion of the apparatus; and Fig. 6 is a transverse section thereof taken on the line 6—6 of Fig. 5.

In the particular embodiment of my invention shown in the drawings, 10 is the provision chamber within which the articles to be preserved are adapted to be contained, which chamber may be provided with suitable shelves 11 of any desired arrangement. To the rear of the provision chamber 10 is provided a chamber 12 containing a portion of the refrigerating apparatus.

13 and 14 are chambers arranged beneath the provision chamber for the reception also of a portion of the refrigerating apparatus.

The system employed for securing the desired low temperature in the provision chamber 10 is of the "absorption" type, the apparatus being constructed and arranged as follows: 15 is a generator adapted to contain aqua ammonia of varying degrees of strength during the operation of the system. The generator at times also acts as an absorber for the restrengthening of the aqua ammonia contained therein. The generator 15 comprises a cylindrical tank with its longitudinal axis arranged horizontally, and is provided with a flue 16 extending through the lower portion thereof, within which flue 16 is provided a longitudinal burner 17 for the heating of the aqua ammonia contained within the generator 15. The burner 17 is supplied with fuel from any suitable source of supply, and is supported within the flue at the forward end by means of a plate 18. Two rearwardly extending plates 19 form a channel beneath the burner for the ingress of air to assist the combustion within the flue 16. The rear end of the flue 16 is connected to the lower end of a vertical pipe 20 which passes upwardly through the chamber 12 arranged in the rear of the provision chamber 10, the pipe 20 serving to conduct away the products of combustion to any desired point outside the refrigerator. Connected with the top of the generator 15 is a pipe 21 which conducts the ammonia gas which is driven off from the aqua ammonia when the burner 17 is in operation. Pipe 21 is connected by a control valve 22 with a pipe 23 which extends vertically upward within the chamber 12 and then horizontally across the top thereof. Pipe 23 is enshrouded by a larger pipe 24 to form an annular space between said pipes whereby water or other cooling mediums may be employed to reduce the temperature of the ammonia gas passing through pipe 23. Pipe 23 being vertically and then horizontally arranged within the chamber 12 serves as a rectifier to permit the return of any water which may be improperly driven off from the generator 15. The water for the cooling of pipe 23 leaves the annular space between pipes 23 and 24 by a pipe 25, controlled by a valve 26. The end of the horizontal extension of pipe 23 is connected through a check valve 27 with a condenser pipe 28 which is ar-

ranged in a sinuous manner within the chamber 12. Condenser pipe 28 is also enshrouded by a pipe 29 of larger diameter to form an annular space for the passage of the cooling water. The cooling water enters enshrouding pipe 24 from enshrouding pipe 29 through a connecting pipe 30, said cooling water being supplied to enshrouding pipe 29 by a pipe 50 leading from any suitable source of supply. After passing through the condenser pipe 28 the ammonia gas will be liquefied and is conducted to a receiver tank 31, which is arranged within a chamber 14 at the base of the refrigerator, and the end of the pipe 28 may if desired extend within the receiver 31 to a point near the bottom thereof. Connected to the rear end of the receiver 31 at a point near the base thereof is a conducting pipe 32 which extends first horizontally and then vertically upward through the chamber 12 to a point near the top thereof, whence it passes through an expansion valve 33 to a coil 34 which is arranged within a brine tank 35. Brine tank 35 is suspended within the top of the provision chamber 10 and serves to maintain the same at the requisite low temperature. After passing through the coil 34, the ammonia gas then passes downward through a pipe 36 to another coil 37 arranged within a brine tank 38, which serves as an additional cooling unit which is accessible from the provision chamber, and within which ice or ice cream making or similar operations may be carried on to a desired limited extent. Brine tank 38 and its expansion coil 37 are interposed between the receiver 31 and the provision chamber 10, thereby serving to prevent the transmission of heat from the receiver 31 to the said provision chamber 10. After passing through the expansion coil 37, the ammonia gas is conducted by means of a pipe 39 back to the generator 15, which as before stated also serves as an absorber, the pipe 39 being controlled by means of a valve 40. It is of course to be understood that during the period when the generator 15 is acting as an absorber that the water contained therein must be reduced in temperature from its previously heated condition to thereby permit it to reabsorb the ammonia gas, and for this purpose there is provided a cooling coil 41 contained therein, which is supplied with cooling water from any suitable source of supply. To permit the generator 15 to be charged or recharged when desired with a supply of aqua ammonia, there is provided a pipe 42, which is controlled by a valve 43, the pipe 42 and the ammonia gas return pipe 39 being joined together to a common inlet pipe 44 by means of a T 45, the inlet pipe extending along the bottom of the generator 15 and being perforated along the part within the generator to thereby distribute the gas through the liquor contained within the receiver.

In the operation of the device, assuming that the generator 15 contains a strong solution of aqua ammonia, the expansion valve 33 and ammonia return valve 40 being closed, valve 22, which controls the outlet of ammonia gas from the generator 15, is opened and the burner 17 is lighted to drive off the ammonia gas from the aqua ammonia solution, which gas then passes, as before stated, through the rectifier pipe 23 and the condenser pipe 28 where the gas will be liquefied and pass in a liquid condition to the receiver 31. When the gas has been driven off from the generator 15 in a sufficient amount, the burner 17 is then extinguished and valve 22 closed, after which the expansion valve 33 may be opened to permit the liquefied anhydrous ammonia contained within the receiver 31 to expand to a gaseous condition and thereby reduce the temperature of the provision chamber through the intermediary of the brine contained in tank 35, which is cooled by the expansion coil 34. At the same time valve 40 in the ammonia gas return line is opened to permit the gas to return to the generator and be reabsorbed by the liquor contained therein, which has been reduced in temperature by means of the cooling coil 41, as hereinbefore described. It will be understood that the operation of driving off the gas from the aqua ammonia solution within the generator 15 will take place only during a relatively short period of time, and that the balance of the operation may be so controlled by means of the expansion valve 33 as to extend over a very much larger period of time whereby the provision chamber 10 may be as uniformly as possible maintained at the requisite low temperature.

To properly observe the operation of the device, the generator 15 is provided with a pressure gage 46 and a thermometer 47, the pressure gage being connected by means of a T 48 to a pipe 21, and the thermometer 47 being directly connected to the generator 15.

The walls of the refrigerator are suitably constructed to insulate the interior thereof against the escape of heat, and to prevent the transmission of heat from the generator chamber 13 to the provision chamber 10 there is provided a dead air space 50 interposed therebetween.

Having thus described the nature and characteristic features of my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a refrigerator, the combination of a provision chamber, an absorption refrigeration apparatus arranged in chambers in the rear and beneath said provision chamber, a brine tank in the top of said provision cham-

ber, and a second brine tank in the bottom of the provision chamber and accessible therefrom, and means connected with said absorption refrigeration apparatus for lowering the temperature of said brine tanks.

2. In a refrigerator, the combination of a provision chamber, an ammonia generator arranged in a chamber beneath said provision chamber, a rectifier and a condenser arranged in a chamber in the rear of said provision chamber, an anhydrous ammonia receiver, a brine tank in the top of the provision chamber, a second brine tank in the bottom of the provision chamber and accessible therefrom, and expansion coils for lowering the temperature of said brine tanks.

3. In a refrigerator, the combination of a provision chamber, an ammonia generator arranged in a chamber beneath said provision chamber, a receiver arranged in a separate chamber beneath the provision chamber, a pipe from said generator extending vertically upward and then horizontally to constitute a rectifier in a chamber in the rear of said provision chamber, a sinuous pipe communicating with the rectifier constituting a condenser also arranged in the chamber in the rear of the provision chamber, and means for cooling the rectifier and condenser pipes.

4. In a refrigerator, the combination of a provision chamber, an ammonia generator arranged in a chamber beneath said provision chamber, a pipe from said generator extending vertically upward and then horizontally to constitute a rectifier in a chamber in the rear of said provision chamber, a sinuous pipe communicating with the rectifier constituting a condenser also arranged in the chamber in the rear of the provision chamber, means for cooling the rectifier and condenser pipes, an anhydrous ammonia receiver tank arranged in a separate chamber beneath the provision chamber, a brine tank in the top of the provision chamber and an expansion coil for lowering the temperature of said brine tank.

5. In a refrigerator, the combination of a provision chamber, an ammonia generator arranged in a chamber beneath said provision chamber, a pipe from said generator extending vertically upward and then horizontally to constitute a rectifier in a chamber in the rear of said provision chamber, a sinuous pipe communicating with the rectifier constituting a condenser also arranged in the chamber in the rear of the provision chamber, means for cooling the rectifier and condenser pipes, an anhydrous ammonia receiver tank arranged in a chamber beneath the provision chamber, a brine tank in the top of the provision chamber, a second brine tank in the bottom of the provision chamber and accessible therefrom, said second brine tank being interposed between the receiver and the provision chamber, and expansion coils for lowering the temperature of said brine tanks.

6. In a refrigerator, the combination of a provision chamber, an ammonia generator arranged in a chamber beneath said provision chamber, a pipe from said generator extending vertically upward and then horizontally to constitute a rectifier in a chamber in the rear of said provision chamber, a sinuous pipe communicating with the rectifier constituting a condenser also arranged in the chamber in the rear of the provision chamber, means for cooling the rectifier and condenser pipes, an anhydrous ammonia tank arranged in a chamber beneath the provision chamber, a brine tank in the top of the provision chamber, a second brine tank in the bottom of the provision chamber and accessible therefrom, said second brine tank being interposed between the receiver and the provision chamber, expansion coils for lowering the temperature of said brine tanks, and means for preventing the transmission of heat from the generator to the provision chamber.

In testimony whereof, I have hereunto affixed my signature in the presence of two witnesses.

ADOLPHE E. BOSSÉ.

Witnesses:
CHARLES A. BRADLEY,
JAS. C. WOBENSMITH.