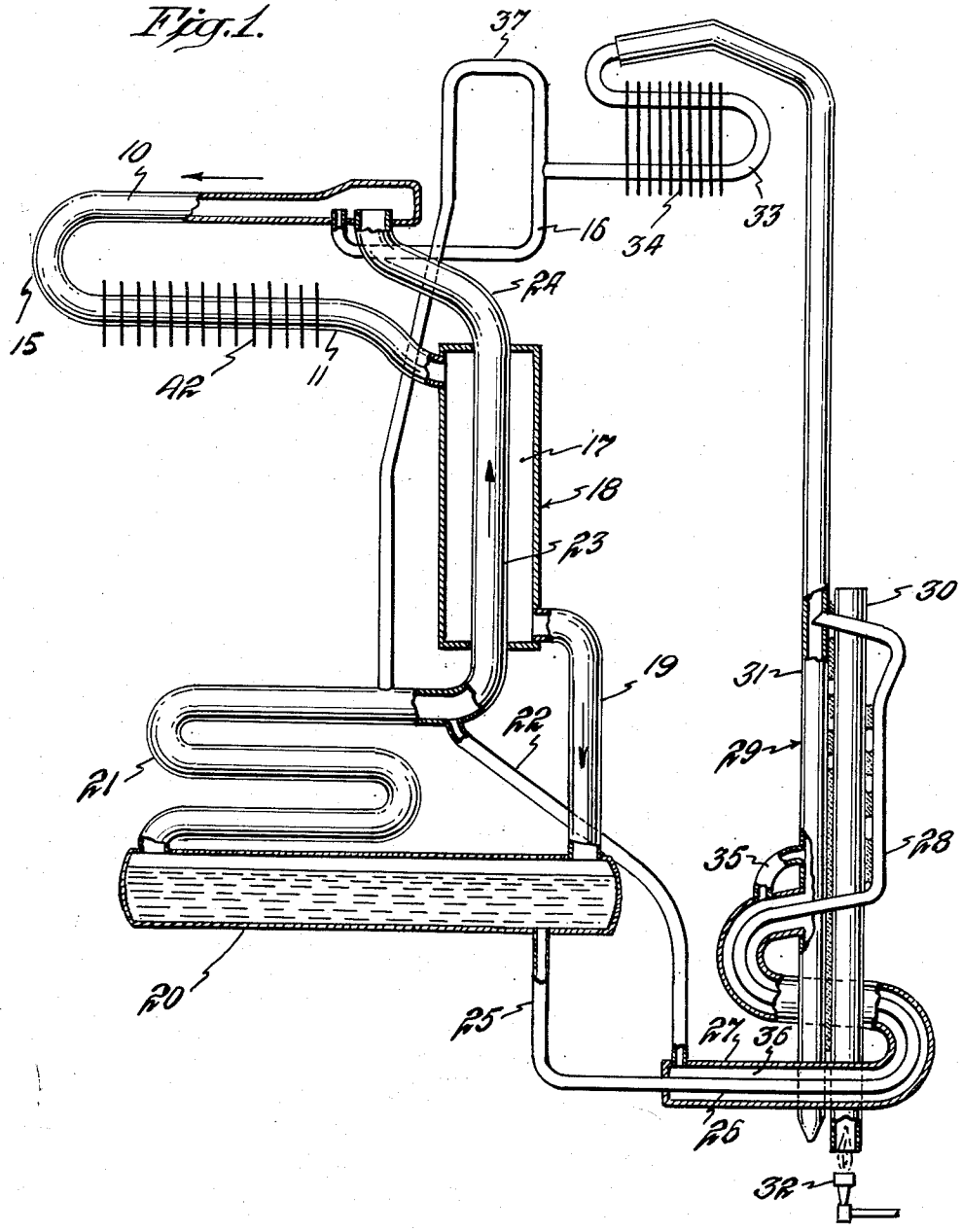
March 1, 1955 W. G. KOGEL ET AL 2,702,990

ABSORPTION REFRIGERATION

Original Filed Feb. 26, 1949 4 Sheets-Sheet 1

Fig. 1.



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ABSORPTION REFRIGERATION

Original Filed Feb. 26, 1949 4 Sheets-Sheet 2

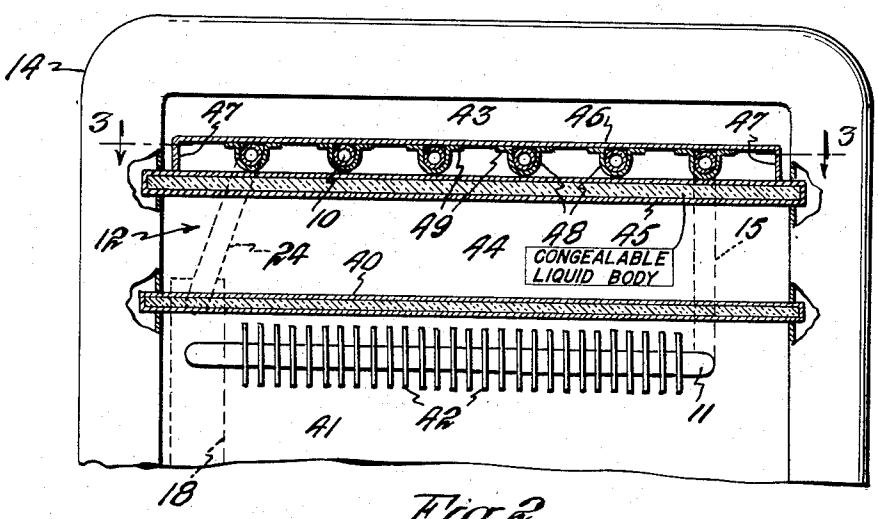


Fig. 2.

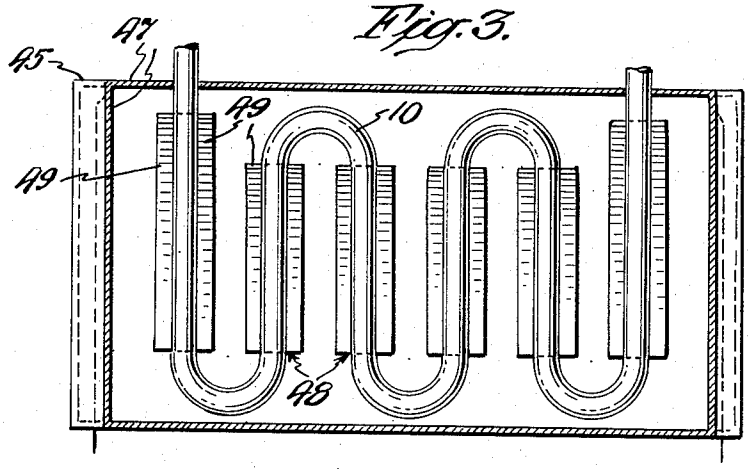


Fig. 3.

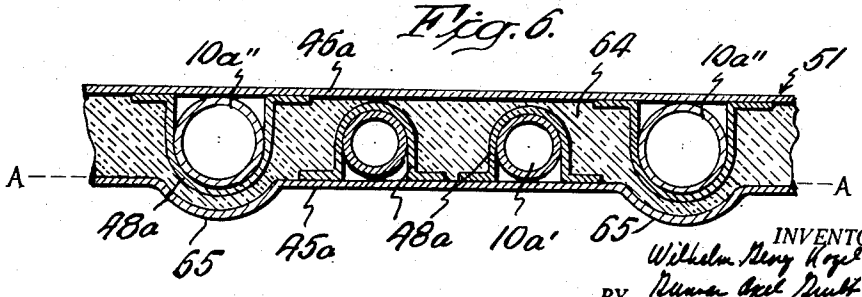


Fig. 6.

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Fig. 5.

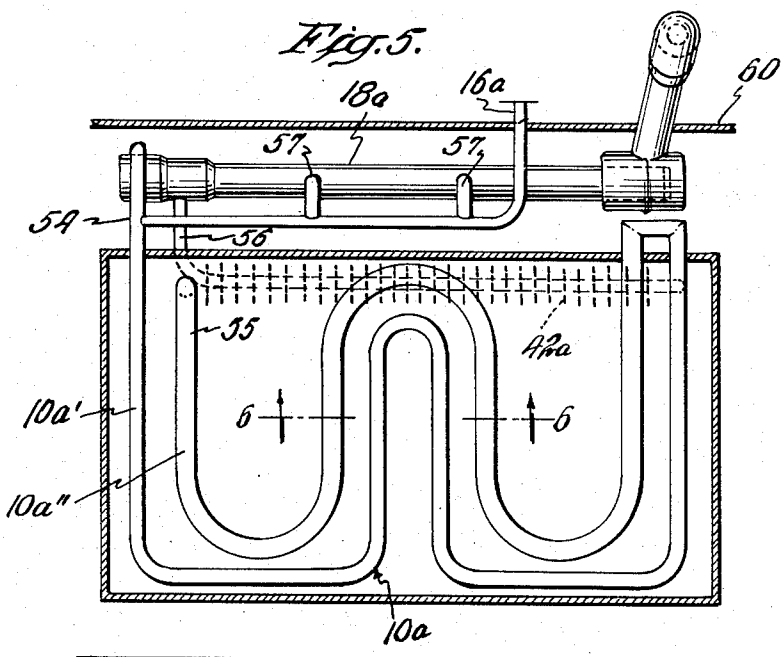
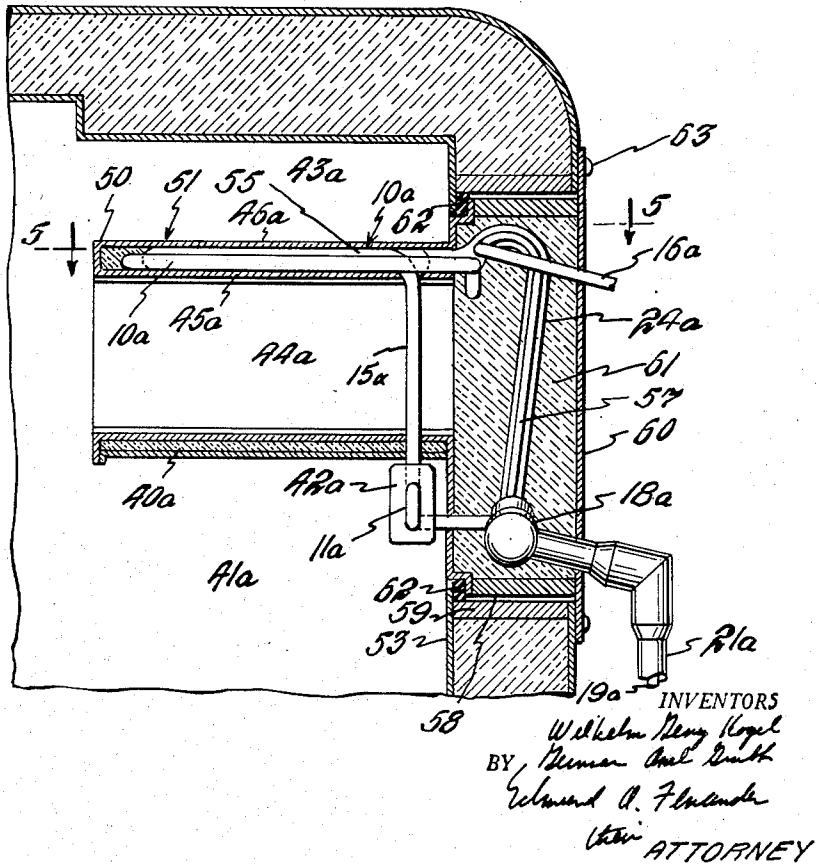


Fig. 4.



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ABSORPTION REFRIGERATION

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Fig. 7.

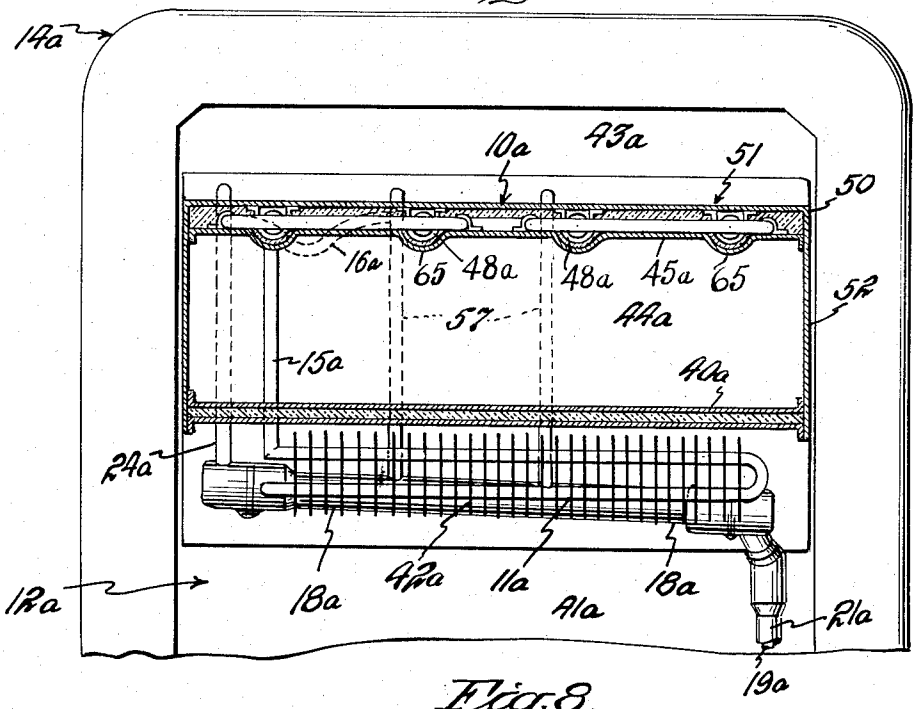
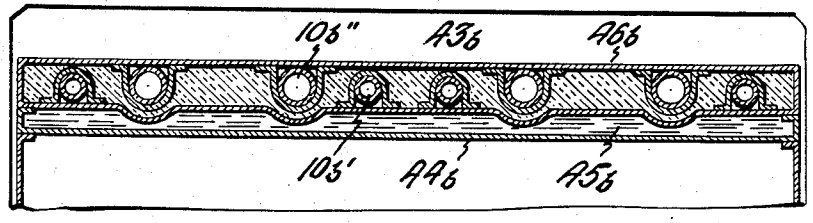


Fig. 8.



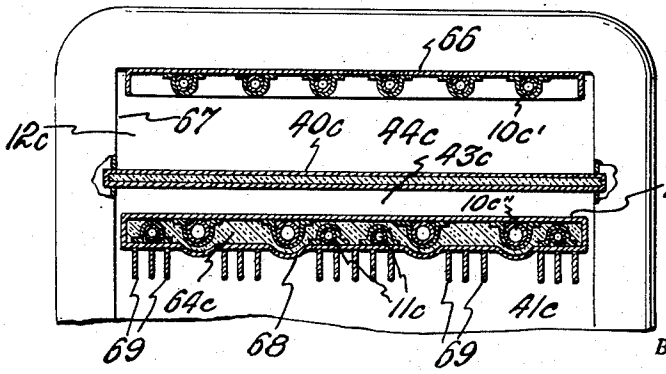


Fig. 9.

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ABSORPTION REFRIGERATION

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Continuation of application Serial No. 78,502, February 26, 1949. This application December 6, 1952, Serial No. 324,530

Claims priority, application Sweden March 2, 1948

7 Claims. (Cl. 62—95)

This invention relates to refrigeration, and more particularly concerns cooling of adjacent spaces or sections of a refrigerator with the aid of a refrigeration system employing evaporation of refrigerant fluid in the presence of an inert gas or auxiliary agent. This application is a continuation of our application, Serial No. 78,502, filed February 26, 1949, now abandoned.

It is an object of the invention to provide improvements for cooling adjacent spaces or sections of a refrigerator by a substantially horizontally disposed evaporator or cooling element of a refrigeration system of the above type, particularly to limit or restrict an increase in temperature in one of the sections upon increase in load on the other section.

Another object of the invention is to provide an improved evaporator structure of this type for producing refrigeration at different temperatures at opposite sides of a substantially horizontally disposed evaporator.

A further object of the invention is to provide such an evaporator which makes use of a cold accumulator to maintain a safe refrigerating temperature at one side of the horizontally disposed evaporator when the opposite side thereof is subjected to an increase in load.

A still further object of the invention is to provide an improvement for cooling adjacent ice freezing and frozen food sections of a freezing unit with the aid of absorption refrigeration apparatus of the inert gas type having a substantially horizontally disposed evaporator in the form of a looped coil, particularly to insure an adequately low refrigerating temperature for the frozen food section when the load on the ice freezing section is increased, as by placing several ice trays therein containing water to be frozen.

The above and other objects and advantages of the invention will be more fully understood from the following description taken in conjunction with the accompanying drawings forming a part of this specification, and of which:

Fig. 1 illustrates more or less diagrammatically an absorption refrigeration system of the inert gas type to which the invention is applied;

Fig. 2 is a fragmentary front elevation looking toward the rear of a storage space of a refrigerator embodying the invention, partly broken away and in section, the cooling unit being adapted to be connected in an absorption refrigeration system like that diagrammatically shown in Fig. 1;

Fig. 3 is a horizontal section taken at line 3—3 of Fig. 2 to illustrate the construction more clearly;

Fig. 4 is a fragmentary side sectional view of a refrigerator illustrating another embodiment of the invention;

Fig. 5 is a sectional view, taken at line 5—5 of Fig. 4, to illustrate the cooling unit and connections thereto more clearly;

Fig. 6 is a fragmentary sectional view taken at line 6—6 of Fig. 5;

Fig. 7 is a front elevation, partly broken away and in section, of the refrigerator shown in Figs. 4 and 5; and

Figs. 8 and 9 are fragmentary front elevations of refrigerators, partly broken away and in section, illustrating further embodiments of the invention.

In absorption refrigeration systems of the inert gas type having evaporators adapted to operate at different temperatures, such evaporators or cooling elements are usually formed of piping which are shaped as coils and connected by conduits to other parts of the system. In a household refrigerator of the kind in which the interior is subdivided into a plurality of compartments one above another, the individual compartments are arranged to be cooled to different temperatures by the evaporators. In such case the evaporator coils are horizontally disposed and constructed to provide a maximum amount of usable storage space in the interior of the refrigerator.

One manner of employing a plurality of such horizontally disposed evaporator coils **10** and **11** in accord with the invention is shown in Figs. 2 and 3. The evaporator coils **10** and **11** are disposed in an insulated interior **12** of a refrigerator cabinet **14** adapted to be closed by a door or closure member (not shown) which is hinged to the front of the cabinet. The evaporator sections **10** and **11** form part of an absorption refrigeration system of the inert gas type which is more or less diagrammatically illustrated in Fig. 1. In order to simplify the drawings, the horizontally disposed evaporator coils **10** and **11** of Figs. 2 and 3 have simply been shown as straight conduit sections in Fig. 1 which are connected by a vertical bend **15**.

In a system of the type illustrated in Fig. 1 a refrigerant fluid, such as liquid ammonia, for example, is introduced through a conduit **16** into the evaporator sections **10** and **11**. In the evaporator sections **10** and **11** refrigerant fluid evaporates and diffuses into an inert gas, such as hydrogen, for example, to produce refrigeration and abstract heat from the surroundings. The resulting gas mixture of refrigerant and inert gas flows from the evaporator sections **10** and **11** through an outer passage **17** of a gas heat exchanger **18** and vertical conduit **19** into an absorber comprising a vessel **20** and a looped coil **21**. In the absorber vessel **20** and coil **21** refrigerant vapor is absorbed by a suitable absorbent, such as water, for example, which is introduced into coil **21** through a conduit **22**. The hydrogen or inert gas, which is practically insoluble and weak in refrigerant, returns to the evaporator sections **10** and **11** through an inner passage **23** of the gas heat exchanger **18** and a conduit **24**.

The circulation of gas in the gas circuit just described is due to the difference in specific weight of the columns of gas rich and weak, respectively, in refrigerant vapor. Since the column of gas rich in refrigerant vapor and flowing from the evaporator sections **10** and **11** to the absorber coil **21** is heavier than the gas weak in refrigerant and flowing from the absorber coil **21** to the evaporator sections, a force is produced or developed within the system for causing circulation of inert gas in the manner described.

From the vessel **20** enriched absorption liquid flows through a conduit **25** and an innner passage **26** of a liquid heat exchanger **27** into the lower end of a vapor lift tube **28** of a generator or vapor expulsion unit **29**. The generator unit **29** comprises a heating flue **30** having the vapor lift tube **28** and a boiler pipe **31** in thermal exchange relation therewith, as by welding, for example. By heating generator unit **29**, as by a gas burner **32**, for example, liquid from the inner passage **26** of the liquid heat exchanger is raised by vapor lift action through tube **28** into the upper part of the boiler pipe **31**. The liberated refrigerant vapor entering boiler pipe **31** from the tube **28**, and also vapor expelled from solution in the boiler pipe, flows upwardly into an air cooled condenser **33** provided with a plurality of heat dissipating members or fins **34**. Refrigerant vapor is liquefied in the condenser **33** and returns to the evaporator sections **10** and **11** through the conduit **16** to complete the refrigerating cycle.

The weakened absorption liquid, from which refrigerant vapor has been expelled, is conducted from boiler pipe **31** through a conduit **35**, outer passage **36** of the liquid heat exchanger **27** and conduit **22** into the upper part of the absorber coil **21**. The lower end of the condenser **33** is connected by conduit **37** to the gas circuit, as to the upper part of the absorber coil **21**, for example, so that any non-condensable gas which may pass into the condenser can flow to the gas circuit and not be trapped in the condenser.

In adapting the refrigeration system of Fig. 1 for use in the refrigerator cabinet **14** of Fig. 2, the evaporator sections **10** and **11** are disposed in the thermally insulated interior **12** thereof, and the gas heat exchanger **18**, which is indicated in dotted lines in Fig. 2, and other parts may be disposed at the rear of the cabinet. The horizontally disposed evaporator sections **10** and **11** are connected in series relation with inert gas from conduit **24** flowing through the upper evaporator section **10** in the presence of and in parallel flow with liquid refrigerant which is introduced through conduit **16**. From evaporator section **10** inert gas then passes through the vertical connection **15** for flow through the lower evaporator section **11**. Unevaporated refrigerant is also conducted from evaporator section **10** through the connection **15** into the lower evaporator section **11** and flows therein in the presence of and in parallel flow with the inert gas. It is to be understood, however, that inert gas and liquid refrigerant may pass each other in counterflow relation in the lower evaporator section **11**, and liquid refrigerant may be conducted thereto directly from a separate condenser section, if desired.

Since the inert gas flows successively through the evaporator sections **10** and **11**, the gas in the upper evaporator section contains a lesser amount of refrigerant vapor than the gas in the lower evaporator section **11**. The partial vapor pressure of the refrigerant is a gradient, so that the temperature of liquid refrigerant in the evaporator sections **10** and **11** also is a gradient, the evaporating temperature of liquid being lower in the upper evaporator section **10** which constitutes the freezing portion of the cooling unit.

In the refrigerator cabinet **14** of Fig. 2, the interior **12** thereof is subdivided into a plurality of compartments one above the other by a horizontal partition **40** which is constructed to thermally insulate the compartments from one another. The heat insulating partition **40** desirably extends over the entire width of the interior of the cabinet, and from the rear wall toward the open front of the cabinet so that circulation of air between the spaces above and below the partition is substantially prevented when the door or closure member of the cabinet is in its closed position. The lower evaporator section **11** may be positioned immediately beneath the insulating partition **40**, and, since this evaporator section is the higher temperature section or portion of the cooling unit, it may be effectively utilized to cool air in the lower compartment **41**. To provide adequate heat transfer surface, the coils of the lower evaporator section **11** may have a plurality of fins **42** secured thereto. The compartment above the insulating partition **40** is adapted to serve as a freezing section of the refrigerator cabinet **14** in which the lower temperature evaporator section **10** is positioned.

In accordance with the invention the freezing unit of the refrigerator is subdivided into an upper section **43** and a lower section **44** by a horizontally disposed heat conductive member **45** with which the upper evaporator coil **10** is thermally associated. As shown, this is accomplished by arranging the looped coil forming the evaporator section **10** in thermal exchange relation with the upper side of the member **45**. In addition, a horizontal plate **46** having downwardly depending flanges **47** is positioned over the evaporator section **10** in good thermal contact therewith. This may be accomplished by providing clamping members **48** along the straight portions of the evaporator coil or section **10** that envelop the piping and have flanges **49** which are secured, as by brazing, for example, to the underside of the plate **46**.

The upper section **43** of the freezing unit may be referred to as an ice freezing section adapted to receive ice trays for freezing water and the like, the plate **46** being substantially flat and serving as a supporting shelf for such ice trays. The lower section **44** of the freezing unit desirably is of greater depth than the upper portion **43** and may be referred to as a frozen food section adapted to receive frozen food packages and other matter to be frozen. Since the low temperature evaporator coil **10** in the direction of its length is in good heat conductive relation with the heat conducting member **45** and also the plate **46**, heat is effectively abstracted from ice trays positioned on the plate **46** and also from matter stored in the frozen food section **44**. Although not shown, a suitable closure member or members desirably may be provided at the front opening of the freezing unit to close both the upper and lower portions **43** and **44**, respectively.

In order to insure a low refrigerating temperature in the frozen food section **44** under all operating conditions, the heat conducting member **45** desirably is constructed as a cold accumulator having a hollow interior which is filled with a congealable liquid body, that is, a solution that freezes at a low temperature. Such a cold accumulator may comprise a pair of spaced apart plates which are relatively close to one another and sealed at the peripheral edges thereof to provide a hollow interior for holding a substance, such as a eutectic solution, for example, which freezes at a temperature of about —10° to —15° C.

During the periods when the ice freezing section **43** is under a small load, the low temperature evaporator section **10** is effectively employed to abstract heat from the body of eutectic solution in the member **45**, thereby lowering the eutectic solution to a very low temperature adequate to maintain frozen food in the frozen food section **44** well below the freezing temperature. When ice trays containing water to be frozen are placed on the supporting shelf or plate **46**, the load on the ice freezing section **43** is increased. With a substantial increase in ice freezing load, the temperature of the low temperature evaporator section **10** may increase to a value which is not far below the freezing temperature of water.

If the cold accumulator **45** were not provided the evaporator coil **10** alone would have to be relied upon to keep frozen food in the frozen food section at a safe refrigerating temperature. However, a substantial increase in ice freezing load may cause the evaporator coil **10** to rise to a temperature which is not far below the freezing temperature and which will remain substantially constant for a considerable length of time during the entire ice freezing period. Under such conditions the ability of the evaporator coil **10** alone to maintain frozen food at a safe refrigerating temperature is decreased, and under severe operating conditions the evaporator section **10** may be ineffective to keep frozen food at a sufficiently low temperature.

By providing the cold accumulator **45**, undesirable increase in temperature of the frozen food section **44** is avoided, particularly frozen food stored in the uppermost part of such freezing section. In accord with the invention the total melting heat of the cold accumulator **45** desirably is balanced so that the eutectic solution will remain frozen during the interval of time that water stays in a liquid state in the ice trays. The cold accumulator desirably may be oversize and larger than actually necessary to insure that it will take care of the most severe load on the ice freezing section **43**. However, the cold accumulator should not needlessly be made unduly large because this reduces the maximum amount of storage space made available for ice trays, frozen food and other matter adapted to be placed in the freezing sections **43** and **44**. When the eutectic solution in the cold accumulator is frozen or charged at the time ice trays containing water are positioned in the ice freezing section **43**, the decrease in temperature of the supporting shelf or plate **46** that would otherwise occur is substantially reduced, thereby accelerating the rate at which ice is formed to a relatively high extent.

Figs. 4 to 7 inclusive illustrate another embodiment of the invention in which there is provision for maintaining a frozen food section **44*a*** at a safe refrigerating temperature even when the load on the ice freezing section **43*a*** is increased at times. The embodiment of Figs. 4 to 7 differs from the embodiment of Figs. 2 and 3 and just described in that no cold accumulator is employed.

As best shown in Figs. 4 and 7, the cooling unit comprises a shell or casing **50** having a top wall **51**, bottom wall **40*a*** and side walls **52**. The shell extends across the entire width of the interior **12*a*** of the cabinet **14*a***, and from the rear wall **53** toward the open front of the cabinet so that circulation of air between the space **41*a*** and freezer sections **43*a*** and **44*a*** is substantially prevented when the door of the cabinet, not shown, is in its closed position. As in the embodiment first described, one or more closure members desirably may be provided at the front openings of the freezer portions **43*a*** and **44*a***.

The low temperature evaporator **10*a*** is disposed in the upper part of the shell **50**, as will be described more fully hereinafter, while the higher temperature evaporator **11*a*** is positioned in the upper part of the lower compartment or space **41*a***. The evaporator sections **10*a*** and **11*a***

are adapted to be connected to other parts of an absorption refrigeration system of the inert gas type and like that diagrammatically shown in Fig. 1. However, the parts of the refrigeration system which are shown in Figs. 4, 5 and 7 differ from those illustrated in Fig. 1 in that a horizontal gas heat exchanger **18***a* is provided to which the evaporator sections **10***a* and **11***a* are connected.

In Figs. 4 and 5 inert gas weak in refrigerant flows from the upper end of the absorber coil through a conduit **21***a*, an inner passage of the horizontal gas heat exchanger **18***a* and conduit **24***a* to which is connected one end of the evaporator section **10***a*, as indicated at **54** in Fig. 5. Liquid refrigerant from the condenser is also conducted to the same end of the evaporator section **10***a* through a conduit **16***a*, so that liquid refrigerant passes through the upper evaporator section **10***a* in parallel flow with inert gas. Both liquid refrigerant and inert gas pass from the upper evaporator section **10***a* at **55** through the vertical connection **15***a* for parallel flow in the lower evaporator section **11***a* which is provided with heat transfer members or fins **42***a*.

Inert gas rich in refrigerant flows from the higher temperature evaporator section **11***a* at **56** into an outer passage of the gas heat exchanger **18***a* and thence through a conduit **19***a* which is connected at its lower end to the absorber vessel in a manner similar to the conduit **19** in Fig. 1. As best shown in Fig. 4, the conduit **21***a* for inert gas weak in refrigerant envelops and surrounds the conduit **19***a* through which inert gas rich in refrigerant returns to the absorber. In order to precool liquid refrigerant conducted to the upper evaporator section **10***a* through the conduit **16***a*, the latter is connected at spaced apart regions to the outer passage of the gas heat exchanger **18***a* by conduits **57**, as shown in Fig. 5. In this way natural circulation of inert gas from the outer passage of the gas heat exchanger **18** takes place through a part of conduit **16***a* and evaporation and diffusion of refrigerant into inert gas takes place, thereby taking up heat from liquid refrigerant before being introduced into the evaporator section **10***a*.

In order to position the evaporator sections **10***a* and **11***a* and shell **50** in the thermally insulated interior **12***a* of the cabinet **14***a*, the rear wall **53** is formed with an opening **58** defined by a rectangular frame **59** which may be formed of wood, for example. A cover or closure member **60** for the opening, which contains insulating material **61** and in which the gas heat exchanger **18***a* is embedded, is arranged to bear against a gasket **62** of suitable insulating material and is removably secured at **63** to the rear wall **53**.

In accordance with the invention the top wall **51** of the shell **50** comprises spaced apart plates **46***a* and **45***a*, and the low temperature evaporator section **10***a* is formed to provide two looped coils **10***a'* and **10***a''*, each of which in the direction of its length is in thermal exchange relation with one of the plates **45***a* and **46***a*. As best shown in Fig. 5, each looped coil **10***a'* and **10***a''* includes spaced apart straight portions which are more or less parallel to one another and connecting bends, thereby forming a number of U-shaped pipe portions which are serially connected to one another. Further, the legs of certain U-shaped elements or pipe portions are disposed between the legs of other U-shaped elements to provide a compact arrangement of the looped coils **10***a'* and **10***a''*.

As best shown in Fig. 6, the looped coil **10***a'* is arranged in thermal relation with the upper side of the plate **45***a*, and the looped coil **10***a''* is arranged in thermal relation with the underside of the plate **46***a*. It will be seen that the diameter of the piping forming the looped coil **10***a'* is smaller than that of the piping forming the looped coil **10***a''*, and that the horizontal planes tangential to the top and bottom portions of the looped coil **10***a'* are at levels between the horizontal planes tangential to the top and bottom portions of the looped coil **10***a''*. The looped coils **10***a'* and **10***a''* may be arranged in good heat conducting relation with the plates **45***a* and **46***a* in any suitable manner, as by clamping members **48***a* which envelop the straight portions of the coils and are secured to the spaced apart plates forming the top wall **51** of the shell **50**.

Essentially, the spaced apart plates **45***a* and **46***a* form a container or vessel which desirably is filled with a suitable insulating material **64** for thermally shielding the two portions **10***a'* and **10***a''* of the evaporator section **10***a* from one another. In order to obtain the compact arrangement of the looped coils **10***a'* and **10***a''* in the manner just described, it will be seen that the bottom plate **45***a* is formed with a depressed region **65** immediately beneath looped coil **10***a''* along the length thereof, as seen in Fig. 6, so that each looped coil is out of physical contact and removed from the plate to which it is not thermally connected.

In the operation of the embodiment being described, liquid refrigerant and inert gas weak in refrigerant first flow through the looped coil **10***a'* which is in thermal contact with the bottom plate **45***a* of the top wall **51** of the cooling unit. With such arrangement strong cooling of the plate **45***a* is effected which serves as the ceiling or roof of the frozen food section **44***a*, the bottom wall **40***a* of which is constructed to insulate such frozen food section from the lower food compartment **41***a*.

From the looped coil **10***a'* liquid refrigerant and inert gas then flow in the presence of each other into the looped coil **10***a''* which is in thermal contact with the upper plate **46***a* of the top wall of the freezing unit. In this manner strong cooling of the plate **46***a* is also effected which serves as a supporting shelf of the ice freezing section **43***a* of the freezing unit. When the load on the ice freezing section **43***a* is increased by placing ice trays containing water to be frozen on the plate **46***a*, the temperature of the looped coil or evaporator portion **10***a''* increases. However, such rise in temperature of the evaporator portion **10***a''* does not adversely affect or cause any rise in temperature of the looped coil or evaporator portion **10***a'*, because liquid refrigerant and inert gas weak in refrigerant are continuously introduced into the latter. Hence, the plate **45***a* will always be strongly cooled by the looped coil **10***a'* to keep frozen food in the frozen food section **44***a* at a safe refrigerating temperature of about −15° to −18° C., irrespective of sudden increase in load on the ice freezing section **43***a*.

Since the frozen food section **44***a* will be primarily employed for storing frozen food packages, the load on the looped coil or evaporator portion **10***a'* will be relatively small. Consequently, liquid refrigerant will practically always be supplied to the looped coil or evaporator portion **10***a''*, and the inert gas which is introduced therein will not be too rich in refrigerant vapor, so that the evaporator portion **10***a''* will be quite effective to effect cooling of the ice freezing section **43***a* for the purpose of producing ice.

Another embodiment of the invention is shown in Fig. 8 which is generally like the embodiment of Figs. 4 to 7 and differs therefrom in that a cold accumulator is provided for the frozen food section **44***b*. It will be understood that the provision of the cold accumulator **45***b* in Fig. 8 will act to restrict changes or variations in temperature of the frozen food section **44***b*, and this is particularly true when the operation of the refrigeration system is thermostatically controlled responsive to a temperature condition of the air being cooled or temperature of an evaporator section. In such case the supply of heat to the generator unit is reduced from time to time to regulate the refrigerating effect produced by the evaporator sections. During the periods when the heat input to the generator unit is reduced, the cold accumulator **45***b* exerts a stabilizing influence and acts to maintain the frozen food section **44***b* at a safe refrigerating temperature at all times.

Since the plate **46***b* and evaporator portion **10***b''* of the ice freezing section **43***b* are thermally shielded from the evaporator portion **10***b'* of frozen food section **44***b*, the cold accumulator **45***b* does not influence ice freezing in the ice freezing section **43***b* to any significant extent.

If it is desired to utilize the cold accumulator **45***b* to accelerate freezing of ice in the ice freezing section **43***b*, heat conductive members may be provided which provide a thermal connection between the top plate of the cold accumulator and plate **46***b*. Such an arrangement is preferable to that of providing direct thermal contact between the plate **46***b* and top wall of the cold accumulator, or between the looped coils **10***b'* and **10***b''*. In certain instances it may be advantageous to provide the cold accumulator on the plate **46***b*, so that ice trays containing water to be frozen can be placed thereon, or a second cold accumulator may be provided on top of the plate **46***b* in addition to that shown in Fig. 8 which is in thermal relation with the looped coil **10***b'*.

In certain instances advantages are realized by providing a construction in which the ice freezing section is

located below the frozen food section of the freezing unit. Such an arrangement is shown in Fig. 9 in which the looped coil 10c' is positioned at the roof or ceiling of the frozen food section 44c. The looped coil 10c' is fixed to a plate 66 which is insulated from the inner lining 67 of the cabinet interior 12c in any suitable manner. The bottom of the frozen food section 44c is formed by a partition 40c constructed to be heat insulating, such partition also serving as the roof or ceiling of the ice freezing section 43c. The looped evaporator coil 10c'' is in thermal relation with the underside of plate 46c which serves as the supporting shelf of the ice freezing section 43c. The plate 46c and plate 68 closely adjacent thereto form a container or vessel in which the looped coil 10c'' and another looped coil 11c are disposed, the latter being in thermal contact with the upper side of the plate 68. The looped coils 10c'' and 11c are thermally shielded from one another by suitable insulation 64c, and a plurality of members 69 are fixed to the underside of plate 68 to provide a relatively extensive heat transfer surface to promote efficient cooling of air in the space 41c by the looped evaporator coil 11c.

In the embodiment of Fig. 9, the looped evaporator coils are connected in series whereby inert gas first flows through the uppermost looped coil 10c', then through the looped coil 10c'' and finally through the looped coil 11c which constitutes the higher temperature evaporator section corresponding to evaporator section 11 in Fig. 1 and evaporator section 11a in Figs. 4 and 7. Hence, inert gas weak in refrigerant initially flows through looped coil 10c' which corresponds to looped coil 10a' in Fig. 6, and the cooling effect produced by this looped coil is utilized to maintain the frozen food section 44c at a safe refrigerating temperature irrespective of changes in load on looped coil 10c'' which is utilized to produce ice in the ice freezing section 43c. The operating temperature of the higher temperature looped coil 11c may be about 0° C. or slightly below this value. A cold accumulator may be provided for one or both of the looped coils 10c' and 10c'', if desired.

The cold accumulators may employ any well known eutectic solution having a sufficiently low freezing temperature, so that heat can be abstracted at a low temperature which is below 0° C., for example. Various substances can be employed to provide the eutectic solution desired depending upon the operating temperatures of the different sections of the cooling unit. It will be understood that homogeneous substances having a melting point below the freezing temperature of water can be employed as well as eutectic solutions.

Modifications of the embodiments of our invention which we have described will occur to those skilled in the art, so that we desire our invention not to be limited to the particular arrangements set forth and intend in the claims to cover all modifications which do not depart from the spirit and scope of the invention. However, the provision of a cold accumulator for a low temperature evaporator section, in a manner generally like that shown, for example, in the embodiment of Fig. 1, which also embodies a higher temperature evaporator section, is being claimed in copending application Serial No. 305,966, filed August 23, 1952.

What is claimed is:

1. In a refrigerator comprising a cabinet having a thermally insulated interior, an absorption refrigeration system of the inert gas type including an evaporator in which refrigerant evaporates in the presence of an inert gas, said evaporator comprising a looped coil providing an elongated path of flow for fluids therethrough and in which practically all effective parts along the length thereof have a region in substantially the same single horizontal plane, said coil including a first portion in such horizontal plane in which refrigerant evaporates at a first average or mean temperature in the presence of the inert gas and a second portion in such horizontal plane in which refrigerant evaporates at a second higher average or mean temperature in the presence of the inert gas, a horizontal partition in the interior of said cabinet, means including one of said coil portions for effecting cooling primarily of matter above said partition, and means including the other of said coil portions for effecting cooling primarily of matter below said partition.

2. Apparatus as set forth in claim 1 in which said partition includes spaced apart upper and lower horizontally extending walls, the first coil portion in said single horizontal plane being in heat conductive connection with the under side of said upper wall and the top surface of which provides a supporting surface for matter to be refrigerated, and the second coil portion in said single horizontal plane being in heat conductive connection with the top side of said lower wall arranged to effect cooling primarily of matter below said partition.

3. In a refrigerator comprising a cabinet having a thermally insulated interior, an absorption refrigeration system of the inert gas type including an evaporator in which refrigerant evaporates in the presence of an inert gas, said evaporator being formed of piping which provides an elongated path of flow for fluids therethrough and includes a first horizontally extending portion in which refrigerant evaporates at a first average or mean temperature in the presence of the inert gas and a second horizontally extending portion in which refrigerant evaporates at a second higher average or mean temperature in the presence of the inert gas, said evaporator portions being disposed with respect to one another so that a horizontally extending plane tangential to one side of the piping forming one of said portions is located between the horizontally extending planes tangential to the opposite sides of the piping forming said other portion, and a horizontal partition in the interior of said cabinet, one of said evaporator portions being arranged to effect cooling primarily of matter above said partition and the other of said evaporator portions being arranged to effect cooling primarily of matter below said partition.

4. Apparatus as set forth in claim 3 in which the diameter of the piping forming one evaporator portion is different from that of the piping forming said other evaporator portion.

5. Apparatus as set forth in claim 3 in which the piping forming each evaporator portion includes U-shaped sections, the sides of a U-shaped section of one evaporator portion being disposed between the sides of a U-shaped section of the other evaporator portion.

6. Apparatus as set forth in claim 3 in which said partition includes a horizontally disposed plate forming the top surface thereof and upon which matter to be refrigerated may be placed, the piping forming said first evaporator portion being heat conductively connected to the under side of said plate.

7. Apparatus as set forth in claim 3 in which said evaporator portions are thermally shielded from one another.

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