

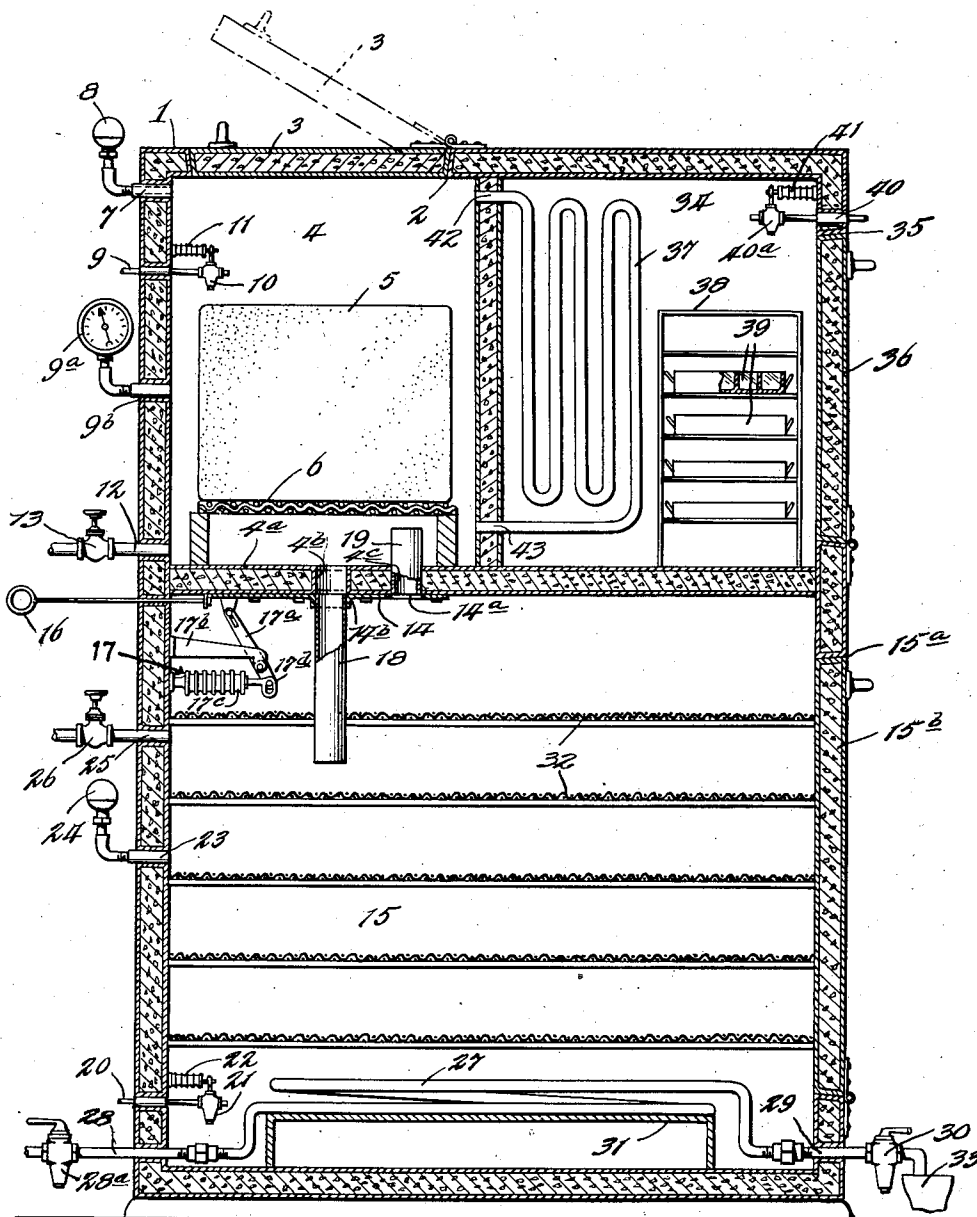
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G. T. PEARSONS

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REFRIGERATING DEVICE

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Geo. T. Pearsons.
INVENTOR

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REFRIGERATING DEVICE

George T. Pearsons, New York, N. Y., assignor of
five-sevenths to George W. Shields, Flushing,
N. Y.

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My invention relates generally to stationary or portable refrigerating devices and more particularly to a type of refrigerating device simple in construction of few parts, economically manufactured and economically operated comprising an insulated casing having an opening and a closure therefor. In said casing is a gas carrying chamber for the refrigerant, solidified gas or gases, such as solidified carbon dioxide or similar gas. Connected to the gas carrying chamber and separated therefrom by a manually or automatically operated valve or shutter mechanism is another chamber called a cooling chamber with thermostatic valve means therein to maintain a predetermined temperature in said cooling chamber, both the gas carrying chamber and the cooling chamber having manually and automatically operated valved inlets and outlets to maintain a predetermined temperature and pressure in the gas chamber and the cooling chamber. The cooling chamber, having an opening and closure therefor, is arranged and adapted to house a fluid containing means such as a tank, coiled pipe or some other such fluid carrying means, said carrying means being arranged and adapted to be connected with a fluid supply and to have a valve controlled outlet therefrom to the exterior of the chamber.

In the gas carrying chamber in the casing is another chamber or compartment having a passage to the exterior of the casing with no communication with the chamber, communication through said passage being controlled by a thermostatic valve to maintain a predetermined temperature in the compartment. Cooling means such as a coil of pipe is located in said compartment with both ends in communication with the gas carrying chamber and so arranged as to permit the flow of fluid from said gas carrying chamber therethrough and thereby create, by refrigerating the condensation on the pipes, a frost thereon to cool the compartment and to cool or congelate its contents such as a fluid contained in a series of trays. In the art of refrigerating it is desirable to provide a device which will eliminate the use of natural or water ice and eliminate the labor and annoyance therefrom and also the cause for ill health due to the use of impure ice. It has also been found desirable to provide a device which will eliminate the necessity for using electricity which is not always available and which type presents many hazards due not only to the ill effects of the fluid used but also from fire due to the short circuiting of the electric current.

Furthermore there are many locations, houses and industrial plants, where solidified gas can be had and where natural or water ice and electricity are not available or are too expensive and where the provision of a device such as I have invented will be essential and extremely useful.

Therefore it is an object of my invention of the type described to provide a device to overcome the objections heretofore enumerated and to provide a refrigerating device wherein the use of solidified gas or gases is utilized as the refrigerant.

It has been found in the use of solidified gas, which has a temperature of minus 109 degrees Fahrenheit, that it evaporates when exposed to a higher degree of heat than its own. Therefore it is an object of my invention of the type described to provide means to secure the slow evaporation of the solidified gas when used in a refrigerating device to prolong the solidified state of the gas.

It has been found that when the solidified gas is placed in a chamber in communication with a cooling chamber with nothing to separate the two or regulate the temperature in either, that the temperature of the two chambers will be approximately the same and that each will have a temperature such as to render them useless for refrigerating purposes for either the temperature will be below the freezing point, too low for general refrigerating purposes, or the solidified gas will be quickly evaporated and the temperature will rise to a degree too high for refrigerating purposes. Therefore the main object of my invention is to provide a refrigerating device of the type described wherein there is a gas carrying chamber to hold the solidified gas or gases in communication with a cooling chamber with means comprising an automatically operated valve or shutter to shut off communication between the gas carrying chamber and the cooling chamber to provide a different degree of temperature in each.

Another object of my invention is to provide manual and automatic valve controlled inlets and outlets in the gas carrying chamber and in the cooling chamber so arranged as to permit the retention or release of fluid or air from said tank and chamber to maintain a predetermined degree of temperature or pressure in each of the two said chambers.

A further object of my invention of the type described is to provide in the cooling chamber means such as a tank, pipe or receptacle to contain a fluid, operable to subject the fluid therein to a predetermined degree of temperature.

Another object of my invention of the type described is to provide a portable refrigerating unit wherein solidified gas is utilized as the refrigerant in a casing and means arranged to retain it in its solidified state and provide for the release of the gas from evaporation therefrom.

Another object of my invention of the type described is to provide a cooling chamber cooled to a predetermined degree of temperature by solidified gas contained in another chamber in communication with the cooling chamber and to provide means to shut off and open up communication between the two chambers.

Another object of my invention of the type described is to provide a chamber in a casing for carrying solidified gas, said casing having a compartment not in communication therewith with means therein in communication with said chamber to create a cool temperature in said compartment by means of the fluid produced by the evaporation of the solidified gas in said chamber.

Another object of my invention of the type described is to provide means to connect the fluid containing means in the cooling chamber to the source of fluid supply.

Another object of my invention of the type described is to provide valve means to control the withdrawal of fluid from the fluid containing means exterior of the chamber.

Another object of my invention of the type described is to provide suitable means in a refrigerating device for the utilization of solidified gas as the refrigerant.

Another object of my invention of the type described is to provide manual and automatic means to regulate temperature and maintain it at a predetermined degree in the cooling chamber.

It has been found that where solidified gas or gases are contained in a closed receptacle and are in the state of evaporation, there is a pressure created thereby. Therefore another object of my invention is to provide a manual and automatic means such as a hand valve and an automatic safety valve for the release of the pressure of the vapor of the gas of evaporation from the gas chamber and for the inlet of warm air thereto.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, my invention consists in the elements and their relation one to the other, as hereinafter particularly described and then sought to be defined in the claims, reference being had to the accompanying drawing showing an embodiment of my invention said drawing being a cross sectional side elevation of a refrigerating device.

In the accompanying drawing 1 is a cork insulated casing having an opening 2 therein with a closure 3 therefor; in the upper end of said casing 1 is a vaporizing or gas carrying chamber 4 with an insulated bottom 4a arranged to contain a refrigerating means such as solidified gas or gases 5, such a gas being carbon dioxide or any other similar gas. To raise this solidified gas from the floor in the vaporizing chamber to permit easy access for fluid, such as air, to all sides of the solidified gas, and to hasten evaporation, a grill 6 is provided on which the solidified gas or gases may rest. Exterior of the casing 1 and connected to said gas carrying chamber 4 by passage 9b is a pressure gauge 9a operable to determine gas pressure in chamber 4. Leading from said gas carrying chamber 4 to the exterior

thereof is passage 7 to the outlet end of which is connected a safety valve 8 comprising a ball or spring attachment to provide for the release of fluid pressure created by the evaporation of the solidified gas or gases 5 when a predetermined pressure is created in the gas carrying chamber 4. Leading from chamber 4 is another passage 9 leading to the exterior thereof, communication through which is controlled by a valve 10 in chamber 4, said valve being operated by thermostat 11 which automatically operates by change of temperature in chamber 4 to open or close valve 10 to allow the outlet of cold air or the inlet of warm air from or to the chamber 4 and thus provides means to maintain a predetermined temperature within the gas carrying chamber 4.

Leading from the gas carrying chamber 4 is another passage 12 communication through which is controlled by hand valve 13 which provides means for the withdrawal of a cooling fluid from the gas carrying chamber 4. Leading from gas carrying chamber 4 are openings 4b and 4c providing means of communication between gas carrying chamber 4 and cooling chamber 15. A manual and thermostatically operated valve or shutter 14 with openings 14a and 14b is arranged to control communication through openings 4b and 4c between the chambers 4 and 15. Attached to valve 14 is a rod 16 extending to the exterior of casing 1 providing means for manual operation of valve 14. A thermostat 17 is positioned in chamber 15 and attached to valve 14 and is so arranged as to be operable to open or close valve 14 at the change of temperature in chamber 15, the manual and thermostatically operated valve 14 being operable by thermostat 17 which is operable by the change of temperature in chamber 15 provides means to automatically open or close openings 4b and 4c and thereby provides means to maintain a predetermined temperature in the cooling chamber 15 and to automatically open and close communication between chambers 4 and 15 and by closing said openings 4b and 4c to provide means for the slow evaporation of the solidified gas or gases in the gas carrying chamber 4 when the temperature in the cooling chamber 15 has reached a predetermined degree. Cooling chamber 15 has an opening 15a therein and a closure 15b therefor to permit access to the cooling chamber and its contents. Thermostat 17 comprises a lever 17a, a bracket 17b for maintaining lever 17a which is attached to valve 14 and to a metal bar 17c which has a high coefficient of heat expansion and thus provides for the automatic operation, by the expansion or contraction of 17c, of valve 14, due to the changing degrees of heat in chamber 15. Attaching the metal bar 17c to the lever 17a is a releasable link 17d to provide for the release of bar 17c and thereby permit the manual operation of valve 14 by the operation of member 16. Attached to valve 14 and extending therethrough in opening 14b is a tubular member 18 coinciding with opening 14b at certain positions of valve 14 said member 18 extending from valve 14 toward the bottom of the cooling chamber 15 provides means to conduct the cold fluid from the vaporizing chamber 4 to a point below the top of the cooling chamber 15. Extending into chamber 4 from division wall 4a is a tubular member 19 to provide means for the passage of warm fluid from the cooling chamber 15 to a point above the base of the gas carrying chamber 4 when the opening 14a in valve 14 coincides with opening 4c. Said openings and passages providing means for a circuit.

of air travel or circulation between the gas carrying chamber 4 and the cooling chamber 15 when communication between chambers 4 and 15 is established through the openings in valve 14.

5 Leading from the cooling chamber to the exterior thereof is a passage 20 communication through which is controlled by a valve 21 said valve being controlled by thermostat 22 said thermostat 22 being operable by the change in temperature in

10 chamber 15 to provide means to automatically maintain a predetermined temperature in chamber 15. Passage 23 leads from the cooling chamber 15 to the exterior of casing 1 the outlet of said passage is controlled by safety valve 24 operable to provide means for the release of fluid

15 pressure from chamber 15 when said fluid pressure therein exceeds a predetermined degree. 25 is another passage leading from cooling chamber 15 to the exterior of the casing 1. The outlet of said passage is controlled by valve 26 for manually releasing the fluid from chamber 15. In said

20 cooling chamber 15 is a fluid containing means 27 comprising coiled pipe or any other fluid holding means such as a crock having an inlet 28 thereto and an outlet 29 therefrom both inlet and outlet being in communication with the exterior of the casing 1. Inlet 28 is arranged and adaptable to be connected to a source of fluid supply. Said supply being controlled by a shut-off means

25 28a. Controlling outlet 29 is a valve 30 to provide control means for the withdrawal of fluid from the fluid containing means 27. The liquid container 27 is so arranged as to be adaptable to provide means to cool the fluid contained therein by the cold atmosphere in cooling chamber 15.

30 To maintain the fluid containing means 27 above the bottom of the cooling chamber 15 a rack or shelf 31 is provided to permit access on all sides by the cooling fluid. In chamber 15 there are provided shelves 32 for sustaining and containing purposes. Exterior of the casing and located below valve 30 is a waste water tray 33 adaptable to be connected to a waste water drain pipe. In

35 chamber 4 is a compartment 34 with no communication with the gas carrying chamber 4 having an opening 35 to the exterior of the casing 1 with a closure 36 therefor to provide access to compartment 34 and not permit the escape of fluid from the gas carrying chamber 4. A fluid containing

40 means comprising a chamber or hollow element 37 such as a coil of pipe is arranged in said chamber 34 with both ends 42 and 43 thereof in communication with chamber 4 and so arranged and positioned as to be operable to create a frost in

45 compartment 34 on the exterior of pipe 37 the frost being created by the freezing of the condensed moisture on the pipe 37 in the compartment 34 to provide a cooling element in compartment 34.

50 In chamber 34 is a rack 38 to hold liquid containers 39. The cold produced by the frost on pipe 37 is operable to cool or congeal the liquids in the containers 39. Leading from compartment 34 to the exterior of casing 1 is a passage 40, communication through which is controlled by

55 valve 40a. Valve 40a is controlled by thermostat 41 which is operable by the change of temperature in compartment 34 to open or close valve 40a and thereby to provide automatic means for

60 maintaining a predetermined temperature in compartment 34.

In operation solidified gas is placed in chamber 4 of casing 1, where it evaporates and creates a cold atmosphere which passes from chamber 4

75 through passage 18 into cooling chamber 15

where it cools that atmosphere and forces the warmer air upwards through passage 19 back into chamber 4 there to be cooled again and to again pass through passages 18 and 19 thereby creating a circulation of air as described.

When the atmosphere reaches a predetermined degree of cold in chamber 15 the thermostat 17 operates to close the valve 14 and shut off the passage of cool air from chamber 4 to chamber 15. When the temperature becomes warmer in

80 chamber 15 the thermostat operates to open valve 14 to allow cold air from chamber 4 to permeate chamber 15 thus always maintaining a predetermined degree of temperature in chamber 15.

85 When a pressure is created in chamber 4 it registers in gauge 9a and when the pressure reaches a predetermined degree it operates safety valve 8 and the pressure is released from chamber 4 thereby. The thermostatic valve 10 operates at a predetermined degree to automatically release

90 cold air from chamber 4 when the temperature reaches a predetermined degree. Hand valve 13 is operable to release the cold fluid from the chamber 4. When the temperature in chamber 15 reaches a predetermined degree it is maintained at that degree by the automatic operation of the thermostatically operated valve 21 which

95 operates to open or close as the temperature in chamber 15 varies. If it is desired to release the cool air from chamber 15 or to allow warm air to permeate said chamber, hand operated valve 26 is used for that purpose. When the pressure in

100 chamber 15 reaches a predetermined degree the automatic valve 24 operates to release it and thereby maintains a predetermined degree of pressure in chamber 15. The fluid container in chamber 15 being connected to a fluid supply operates to subject the fluid contained therein to the cooling atmosphere of cooling chamber 15

105 and to provide a cooled fluid for any desired purpose which can be maintained therein or withdrawn therefrom at will by means of valve 30. In compartment 34 which is not in communication with chamber 4 is a coil of pipe 37 in communication with chamber 4. The cold fluid from

110 chamber 4 passes in circulation through this fluid chamber comprising coil 37 and creates a frost on the exterior of the pipe 37 in compartment 34. This frost created by the freezing of the moisture of condensation in compartment 34 provides a cooling element which operates to cool or congeal any material or fluid such as water, contained in the containers 39.

The temperature in compartment 34 is controlled by a thermostatically operated valve 40a which operates under change of temperature to open or close the passage 40 to the exterior thereof and thereby maintains in the compartment 34 a predetermined degree of temperature. Access is had to the compartment 34 by an opening 35 and a closure 36 therefor.

Although I have herein shown and described what I now consider the preferred embodiment of my invention the same is merely illustrative and I claim the right to all changes, modifications and uses that come within the scope of the claims herein and the right to all uses to which the subject matter embodied in the several claims appended hereto may be put.

I claim:

1. In a refrigerating device a casing having an opening therein and a closure therefor; a chamber in said casing containing solidified gas; a compartment in said casing with no means of communication with said chamber; an opening and a

closure for said compartment, means in said compartment in communication with said chamber to create a cooling atmosphere in said compartment, and means comprising a thermostatically operated valve in said gas containing chamber operable to maintain the temperature in said chamber at a predetermined degree.

2. In a refrigerating device a casing having an opening therein and a closure therefor; a chamber in said casing containing solidified gas; a second chamber in communication with the first chamber and separated therefrom by a valve mechanism; thermostatic means connected to said valve mechanism operable by the change in temperature to open up or shut off communication between the two chambers; fluid containing means in said second chamber arranged with an inlet exterior of said casing to be connected to a source of fluid supply and means exterior of the second chamber operable to withdraw the fluid from the fluid containing means after it has been subjected to the temperature in the second chamber.

3. In a refrigerating device a casing having a chamber therein containing solidified gas; a compartment in said casing with no communication with the first chamber containing a liquid carrying device therein, fluid carrying means in said compartment in communication with the gas carrying chamber operable by the sublimation of solidified gas to create a reduced temperature in the compartment.

4. In a refrigerating device a casing containing a plurality of chambers in communication with each other; a compartment in said casing not in communication with any of the chambers; solidified gas in one of said chambers; fluid carrying means in another of the chambers which chamber is in communication with the gas carrying chamber; thermostatically operated valve means in the line of communication between the gas carrying chamber and the chamber having the fluid carrying means therein, a liquid carrying device in said compartment; means in said compartment in communication with the gas carrying chamber to congeal the liquid in the liquid carrying means; thermostatic means in the gas carrying chamber to maintain a predetermined temperature in the gas carrying chamber; and an auxiliary thermostat in the chamber having said fluid carrying means operable to maintain a predetermined temperature therein.

5. In a refrigerating device a casing having an opening therein and a closure therefor, a chamber in said casing containing solidified gas; a compartment in said casing having no communication with said chamber having fluid containing means therein in communicable association with said chamber arranged to contain a fluid refrigerating means and operable to reduce the temperature in said compartment and means in said chamber and said compartment operable to maintain the temperature in the said chamber and in the said compartment at a predetermined degree.

6. In a gas carrying device a multiplicity of chambers one of said chambers adapted to carry a fluid, another chamber in communicable association with said first chamber and a plurality of conduits establishing communicable association between said chambers, alternate conduits extending into alternate chambers and in opposite directions, whereby a circulation in a predetermined direction is established.

7. In a gas carrying device a casing having an opening therein and a closure therefor—a plurality of chambers in said casing one of said

chambers arranged to contain solidified gas, a second chamber in communicable association with said first chamber, outlet means leading from said first and second chambers to the exterior of the casing and thermostatic valve mechanism in the line of said outlet means operable at a predetermined temperature to open or close communicable association between the first and second chambers and the atmosphere exterior of said casing.

8. In a fluid pressure creating device, a multiplicity of chambers, one of said chambers containing solidified gas, a second chamber in communicable association therewith, a third elongated chamber having its opposite ends entering the walls of the first chamber for providing communicable association therebetween, the said third chamber communicating with said second chamber only through said first chamber, and means to open up and shut off said communicable association between two of the chambers while the third chamber is maintained in open communicable association with said first chamber.

9. In a pressure creating device, a multiplicity of chambers, one of said chambers containing solidified gas, a second chamber in communicable association therewith, a third chamber having a plurality of parts in communicable association with the first chamber at spaced points in said first chamber, said third chamber communicating with said second chamber only through said first chamber, and automatic means to open and shut off communicable association between two of the chambers while the third chamber is in open communicable association with said first chamber.

10. In a fluid pressure creating device, a multiplicity of chambers, one of said chambers containing solidified gas, a second chamber in communicable association with the gas containing chamber, a third chamber having spaced areas in communicable association only with the gas containing chamber and through the gas containing chamber with the second chamber, and means to open up and shut off communicable association between the second and third chambers while open communicable association is maintained between the gas containing chamber and the third chamber.

11. In a refrigerating device, a casing having a multiplicity of chambers therein, one of said chambers containing solidified gas, a compartment with no communicable association with the first chamber, said compartment containing a chamber in communicable association with the first chamber, a second chamber in communicable association with the first chamber and through said first chamber with the chamber of the compartment, thermostatic valve means between the first chamber and the second chamber operable to open up and shut off communicable association between the second chamber and the first chamber and the chamber of the compartment at a pre-determined temperature in the second chamber.

12. In a refrigerating device, a multiplicity of chambers, one of said chambers containing solidified gas, a second chamber in communicable association therewith, a third chamber in communicable association with the first chamber, said third chamber being sealed except for its communication with the first chamber said third chamber communicating with said second chamber only through said first chamber and

automatic means to open up and shut off communicable association between two of the chambers while the third chamber is in open communicable association with the first chamber.

5 13. In a gas carrying device, a multiplicity of chambers, one of said chambers enclosing a gas-emitting solid, another chamber in association with said first chamber, a wall member between said chambers having conduits extending into
10 each of the two chambers to control the direction of the gas circulation between the two chambers, and valve means operable to shut off the gas circulation from said control means.

14. In a gas carrying device a multiplicity of
15 chambers, one of said chambers adapted to carry a gas-emitting solid, another chamber in association with said first chamber and means through a wall of one of said chambers including spaced conduits extending into said chambers in
20 opposite directions through said wall member to control the direction of the gas flow between the two chambers, and valve means operable to shut off and open up the gas flow between the two chambers.

25 15. In a gas carrying device a multiplicity of chambers, one of said chambers enclosing a gas-emitting solid, another chamber in association with said first chamber, and a plurality of means through a wall of one of said chambers including spaced conduits of unequal extent for compelling the passage of gas between the said
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chambers in opposite pre-determined directions.

16. A casing having a chamber for solidified gas, a compartment with no communication with said chamber, a second chamber, having a wall exposed to said compartment, in communication
80 with the first chamber, with no communication with the compartment and with no communication with the exterior of the casing except through said first chamber, and means to conduct the gas from the first and second chamber
85 to the exterior of the said casing, and a valve controlling the outlet of said conducting means.

17. A casing having a chamber therein for solidified gas, a compartment with no communication with said chamber, a second chamber exposed to said compartment and communicating only with said first chamber, said chambers having uncontrolled communication whereby the cooling fluid emitted may freely circulate there-
90 through, said second chamber having spaced portions disposed at spaced locations within the interior of said compartment whereby an even distribution of the cooling fluid throughout said second chamber may be effected, and whereby
95 an even distribution of cold may be effected throughout that portion of the compartment containing said second chamber, and valve controlled means establishing communication from the chambers to the exterior of the casing through said first chamber only.
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GEO. T. PEARSONS.

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