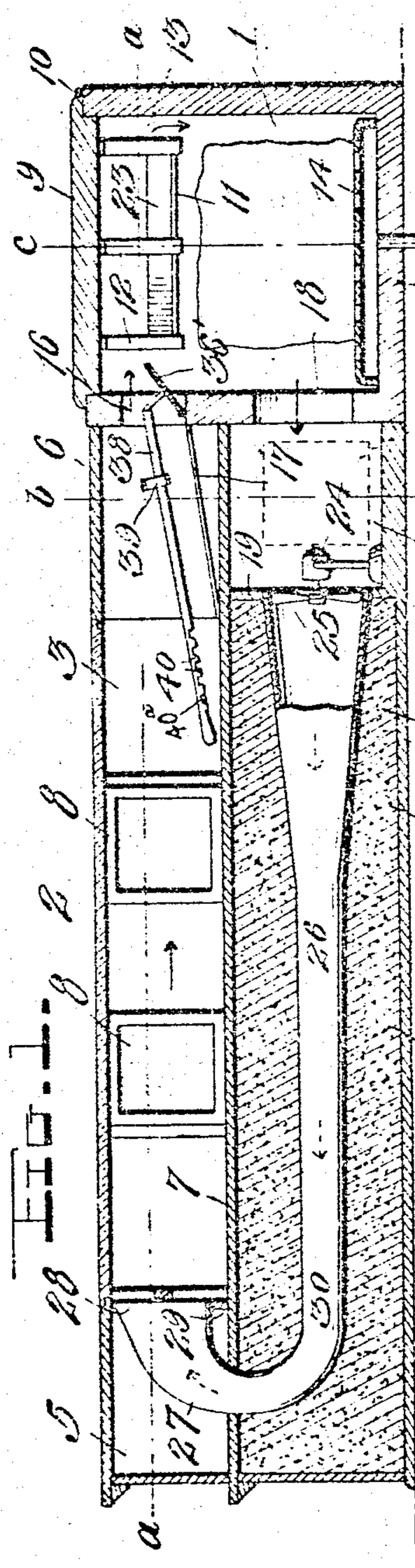
A. W. DE NEEN.

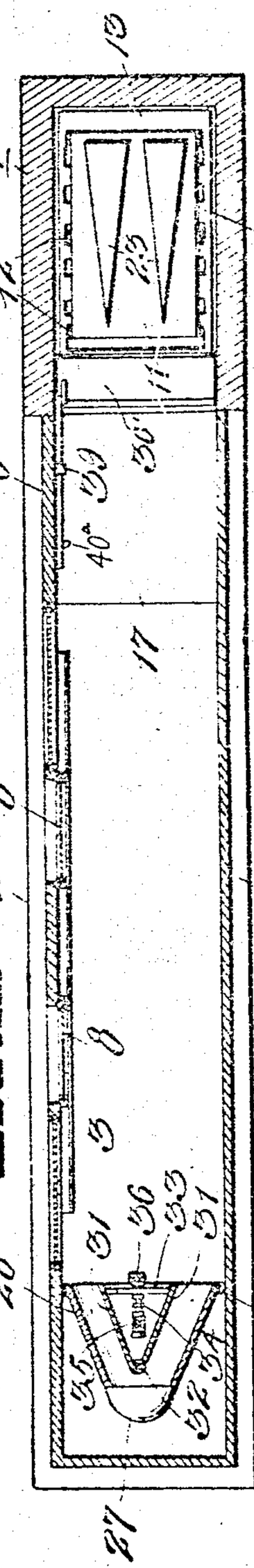
SHOW CASE REFRIGERATOR.

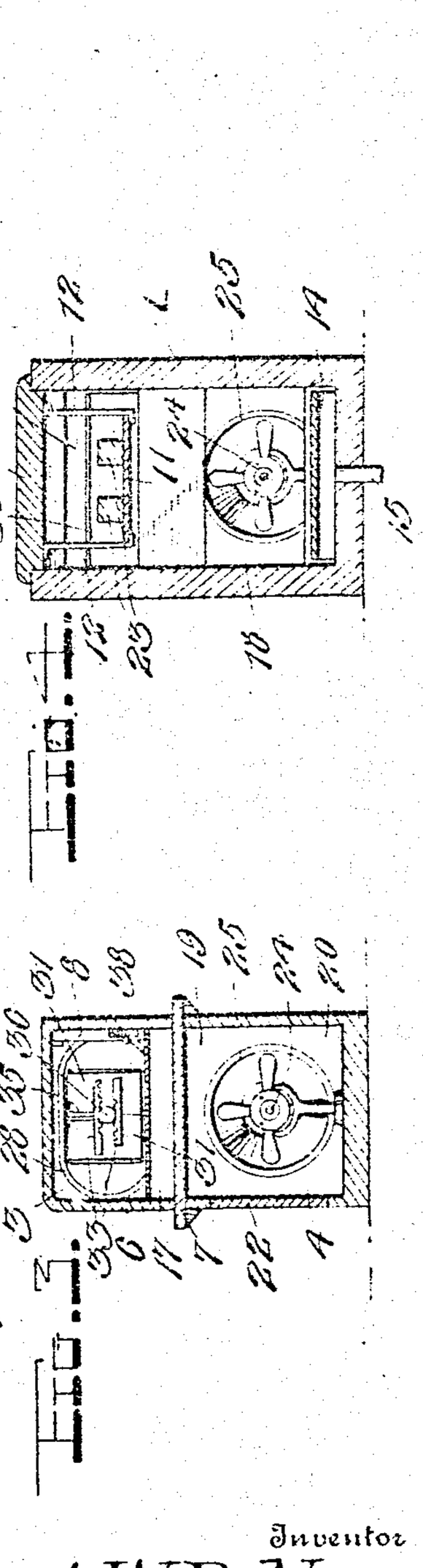
APPLICATION FILED OCT. 8, 1910.

999,704.

Patented Aug. 1, 1911.







Witnesses

Chas. L. Griebauer.

M. F. Peeler.

Inventor

A. W. DeNeen,

By Watson E. Coleman.

Attorney

UNITED STATES PATENT OFFICE.

ALBERT W. DE NEEN, OF ST. JOSEPH, MISSOURI.

SHOW-CASE REFRIGERATOR.

999,704. Specification of Letters Patent. Patented Aug. 1, 1911.

Application filed October 8, 1910. Serial No. 586,032.

To all whom it may concern:

Be it known that I, ALBERT W. DE NEEN, a citizen of the United States, residing at St. Joseph, in the county of Buchanan and State of Missouri, have invented certain new and useful Improvements in Show-Case Refrigerators, of which the following is a specification, reference being had to the accompanying drawings.

This invention is an improved display refrigerator for use in displaying meats and other provisions, and also refrigerating the same so as to keep the same in fresh, attractive and wholesome condition.

One object of my invention is to provide an improved refrigerator of this class which is exceedingly efficient, in which all parts are accessible, so that the refrigerator may be readily kept in a clean and sanitary condition, and which is extremely simple, may be manufactured at minimum cost, and consumes but a minimum quantity of ice.

Another object of my invention is to effect improvements in the construction of the conduit through which the refrigerated air from the ice box is blown to the case or compartment in which the provisions are kept.

Another object is to provide improved means for deflecting the blast of air from the refrigerating chamber to the ice box, and through and around the ice in the ice box so as to cause the ice to effect the refrigerating or cooling of the air while the same is passing through the ice box, and before it reaches the blowing fan.

A further object of my invention is to effect improvements in the construction of the regulating valves.

With the above and other objects in view, the invention consists in the construction, combination and arrangement of devices hereinafter described and claimed.

In the accompanying drawings—Figure 1 is a vertical longitudinal central sectional view of a display refrigerator constructed in accordance with my invention. Fig. 2 is a horizontal sectional view of the same on the plane indicated by the line *a—a* of Fig. 1. Fig. 3 is a transverse sectional view of the same on the plane indicated by the line *b—b* of Fig. 1. Fig. 4 is a detail sectional view on the plane indicated by the line *c—c* of Fig. 1.

In the embodiment of my invention here shown, I provide an ice box 1, on one side of which is a case 2, providing an upper refrigerating chamber 3, and a lower chamber 4, the upper chamber 3 being preferably, and as here indicated, a glass case having end portions 5, 6, of cabinet work, and the lower compartment 4 forming a counter, the top of the counter indicated at 7, being preferably a marble slab which also forms the horizontal partition.

In the rear wall of the case forming the refrigerating compartment, 3, are openings provided with doors 8 which enable access to the articles in the said refrigerating compartment and on the counter to be had. I would have it understood that my improved display refrigerator may be made of any suitable material and finished in any suitable manner, and that the same may be of any suitable size, and the various parts thereof, of any suitable proportion.

The ice box 1 is provided with a lid 9 which is hinged at one side as at 10. A plate 11 is spaced from the lower side of the said lid and is carried thereby, the said plate is preferably made of sheet metal and is here shown as suspended from the lid 9 and supported at a suitable distance below the same by metal straps 12, the upper ends of which are outturned and secured to the underside of the said lid, their lower ends being inturned and secured to the plate at the side edges thereof. The said plate forms a spreading chamber between its upper side, and the lower side of the lid. The rear side of the said plate terminates short of the outer end wall of the ice box, a space 13 being thereby formed between the said plate, and the said wall. In the lower portion of the ice box, is an ice supporting rack 14 which is spaced a suitable distance from the bottom of the ice box, and may be of any suitable construction. A branch pipe 15 for the water resulting from the melting of the ice leads from the bottom of the ice box.

The inner end wall of the ice box is provided with an opening 16 which establishes communication between the refrigerating chamber 3 and the upper portion of the ice box, the said opening extending entirely across the said refrigerating chamber, that is to say, the width of the said opening being coextensive with the space between the front and rear walls of the refrigerating chamber. The lower side of the said opening is above the counter 7 which forms the bottom of the refrigerating chamber, and a deflecting plate 17 which is inclined, is at-

tached to the inner end wall of the ice box at a point coincident with the lower side of the said opening 16, one end of the said inclined plate resting on the counter 7 or bottom of the refrigerating chamber. An opening 18 in the said inner end wall of the ice box establishes communication between the lower portion thereof and the lower compartment 4 of the case 2. The said compartment is divided by a vertical partition 19, into an air intake chamber 20, and a duct chamber 21. In the rear wall of the air intake chamber is an opening provided with a door 22. V-shaped spreaders 23 are secured on the upper side of the plate 11, and disposed with their pointed ends opposite the opening 16, their bases or broadened ends extending to the outer edge of the said plate. One or more of these spreaders may be used, and where a plurality of them are employed, as in the form of the invention shown herewith, their broadened ends are spaced somewhat apart, and are also spaced from the sides of the plate 11, which form the side walls of the spreading chamber.

A suitable blower 24 which is here shown as an electric fan, operates in the intake end 25 of a duct 26 which is preferably made of suitable sheet metal. The said duct is provided with an upturned portion 27 which extends through the partition 7 and terminates in a reversely bent nozzle 28 which is located in the outer end portion of the refrigerating chamber, is contracted in width vertically, is broadened horizontally, as shown in Fig. 2, so that the discharge end of the said nozzle extends practically across the refrigerating chamber from the front to the rear wall thereof. The under side of the discharge end of the said nozzle bears on a cleat or partition 29 which lies on the horizontal partition 7 and serves to prevent any article in the refrigerating chamber from getting into the nozzle or into the duct 26. The main portion of the duct 26 tapers from its intake end to its joint with the upturned bend 27, the intake portion 25 of the duct being tapered to a greater extent than the intermediate portion 30 of the said duct. The throat of the nozzle, formed by the bend 27 is contracted. A pair of deflecting valves 31 are disposed in the nozzle 28. Each of these deflecting valves is preferably a substantially oblong rectangular sheet metal plate. Their front ends are pivotally connected together as at 32, their pivotal axis being vertical. The said deflecting valves converge toward the throat or narrow end of the nozzle, and they are movable toward and from each other so that they may be disposed at any desired distance apart. Any suitable means may be employed to adjust the said deflecting valves. They are here shown as each provided with a rack bar 33, between which is mounted a pinion 34 which engages both of said rack bars, and has its bearings as at 35, and is provided with a head or other suitable device 36 on its shaft, whereby the pinion may be turned and caused by coaction with the rack bars to adjust the said deflecting valves as may be required.

A valve 36′ is located in the opening 16, and extends across the said opening, the said valve being horizontal so that the valve may be moved angularly in a vertical plane, to open or close the opening 16 to any desired extent. Any suitable means may be employed for operating this valve. I herein show for this purpose a rod 38, which leads to a point near one of the doors 8, operates in a guide 39, and is provided with rack teeth 40 any one of which may be engaged with a pin 40ª so as to secure the rod, and hence also the said valve 36, in any desired adjusted position.

The operation of my improved display refrigerator is as follows: A suitable quantity of ice, either with or without salt, is placed in the ice box and on the rack 14. The blower 24 is set in operation and the valves 31 and 36 are moved to open position. The blower draws air from the ice box and forces the same through the duct 26 into the refrigerating chamber, and the exhaust or suction in the ice box, caused by the operation of the blower, causes the air from the refrigerating chamber to pass down through the ice box, and back into the duct 26, so that a constant circulation of air in the direction of the arrows, is caused through the ice box, the duct and the refrigerating chamber, the air passing through the refrigerating chamber in a blast. As the air is passed through the ice box and in contact with the surfaces of the ice, it is rendered extremely cold. The cold air is sucked by the blower from the ice box through the suction chamber 20, and blown through the duct 26. Owing to the fact that the said duct tapers from its intake end to the contracted throat of the nozzle, its velocity is greatly increased, and hence it issues from the nozzle in a strong blast which sweeps through the refrigerating chamber 3 from end to end, takes up and condenses the moisture on the meat, or other articles in the refrigerating chamber, and also by reason of its low temperature, chills the meat and other articles. In one of my display refrigerators, which I have in practical use, I am enabled to keep meat so cooled that its surfaces are frosted even in very hot weather. Owing to the strength of the blast of cold air maintained through the refrigerating chamber and the exhaust or suction action of the blower, in and through the ice box, the cold air of the refrigerating chamber does not escape therefrom when the doors 8 are opened. In practical tests which I have made, thermometers

in the refrigerating chamber have indicated no increase of temperature in the refrigerating chamber when the doors are opened.

The duct chamber 21 is filled with a suitable heat-non-conducting packing 38 around the duct 26. The valves 31 may be spread apart or adjusted as may be required to deflect the air to opposite sides of the refrigerating chamber and prevent it from passing through the center of the chamber.

The spreader or spreaders 23 in the spreading chamber operate in connection with the plate 11 as baffles to deflect the air current to opposite sides of the refrigerating chamber and prevent it from passing by the shortest course through the center thereof, and this secures an equal distribution of the air to all parts of the ice-box so that it acts upon all of the exposed surfaces of the ice in the ice-box and hence is cooled by the ice to the maximum extent.

I claim:—

1. In apparatus of the class described, a chamber having a refrigerant, a refrigerating chamber communicating therewith, a duct disposed with its intake in communication with the refrigerant containing chamber, and terminating in a nozzle directed into the refrigerating chamber, said duct tapering and diminishing in diameter from its intake to the throat of the said nozzle, and said nozzle widening from its throat to its discharge end and a blower to force a blast of air from the refrigerant containing chamber through the said duct and through the refrigerating chamber, back to the first named chamber.

2. The herein described refrigerator comprising an ice box, a duct compartment leading from the lower portion of the ice box, a refrigerating compartment communicating with the upper portion of the ice box, the said duct compartment being provided with a suction chamber immediately coinmunicating with the lower portion of the ice box, a duct leading from said suction chamber, and having a nozzle discharging into the refrigerating chamber, and back therethrough into the upper portion of the ice box, and a blower to exhaust air from the suction chamber and force the same through the said duct, deflecting valves in the nozzle of the blast duct, and a valve regulating the communication between the refrigerating chamber and the upper portion of the ice box.

3. The herein described refrigerator comprising an ice box, a duct compartment leading from the lower portion of the ice box, a refrigerating compartment communicating with the upper portion of the ice box, the said duct compartment being provided with a suction chamber immediately communicating with the lower portion of the ice box, a duct leading from said suction chamber, and having a nozzle discharging into the refrigerating chamber, and back therethrough into the upper portion of the ice box, and a blower to exhaust air from the suction chamber and force the same through the said duct, a spreading chamber in the upper portion of the ice box, and with which the refrigerating chamber immediately communicates, the said spreading chamber communicating with the interior of the ice box, and a spreader in the said spreading chamber.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ALBERT W. DE NEEN.

Witnesses:

J. W. GARNER,

M. K. REEDER.