

(No Model.)

4 Sheets—Sheet 1.

J. G. MALCOLM.
REFRIGERATOR.

No. 505,114.

Patented Sept. 19, 1893.

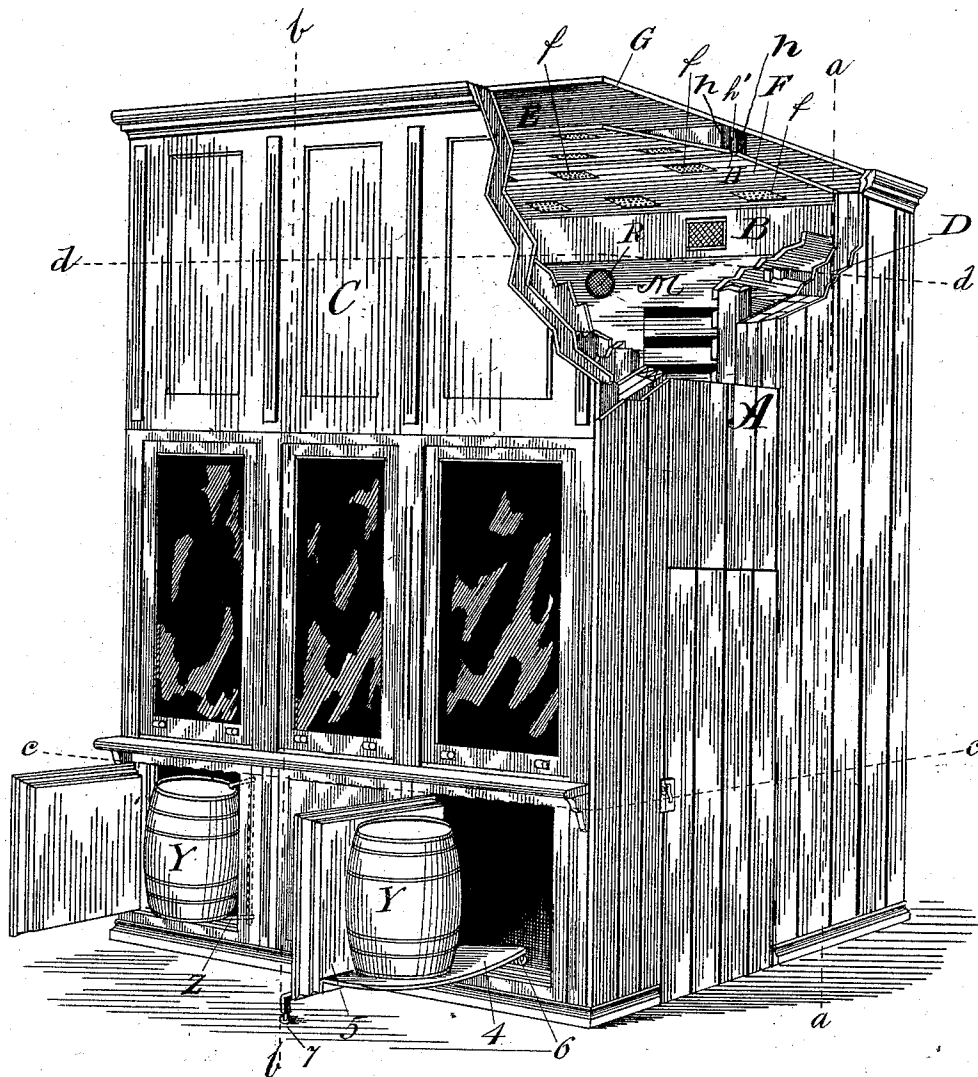
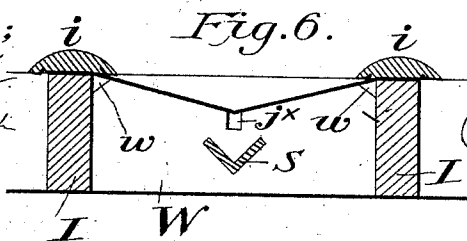


Fig. 1.

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by C. H. Riches
his atty

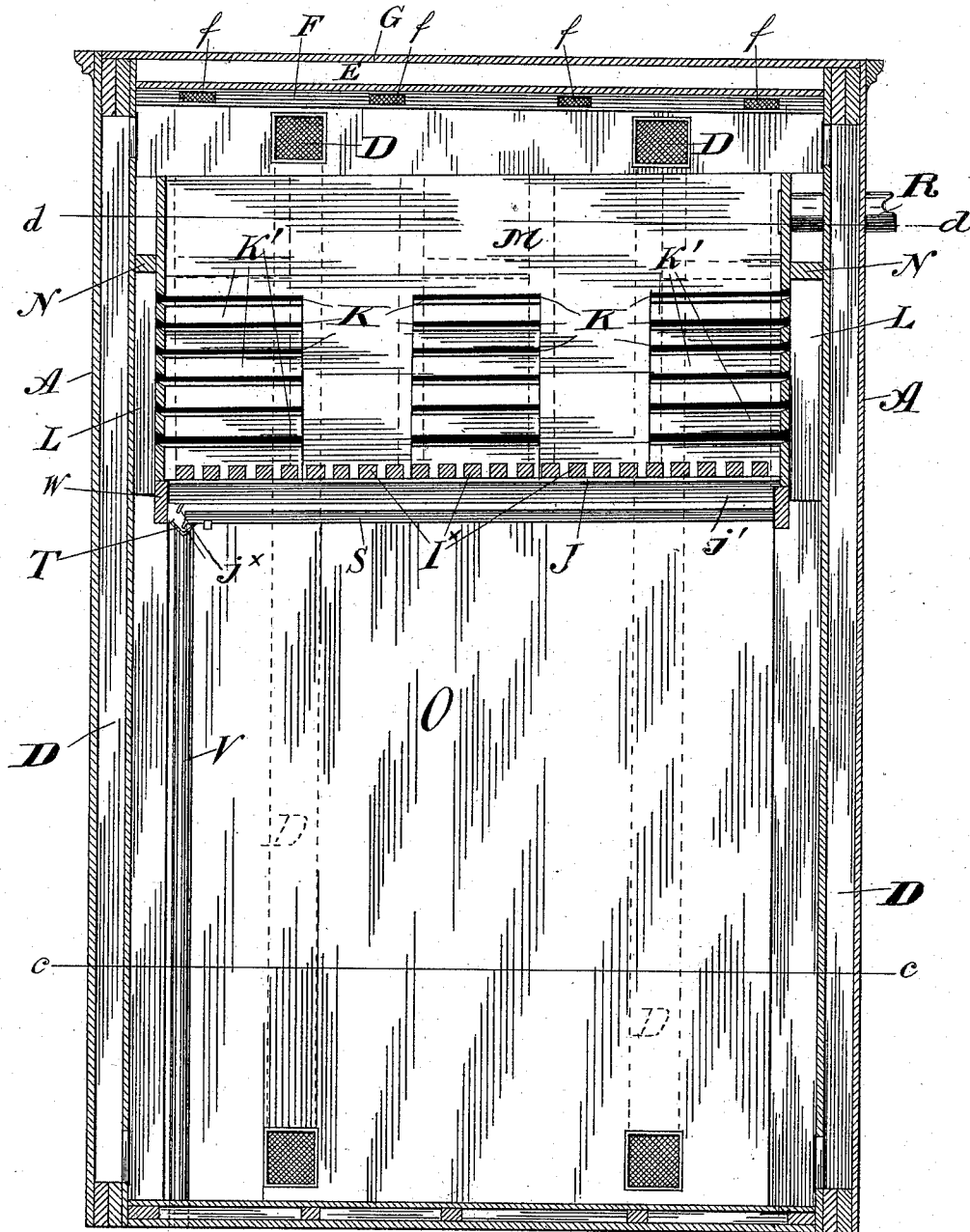
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Fig. 2.

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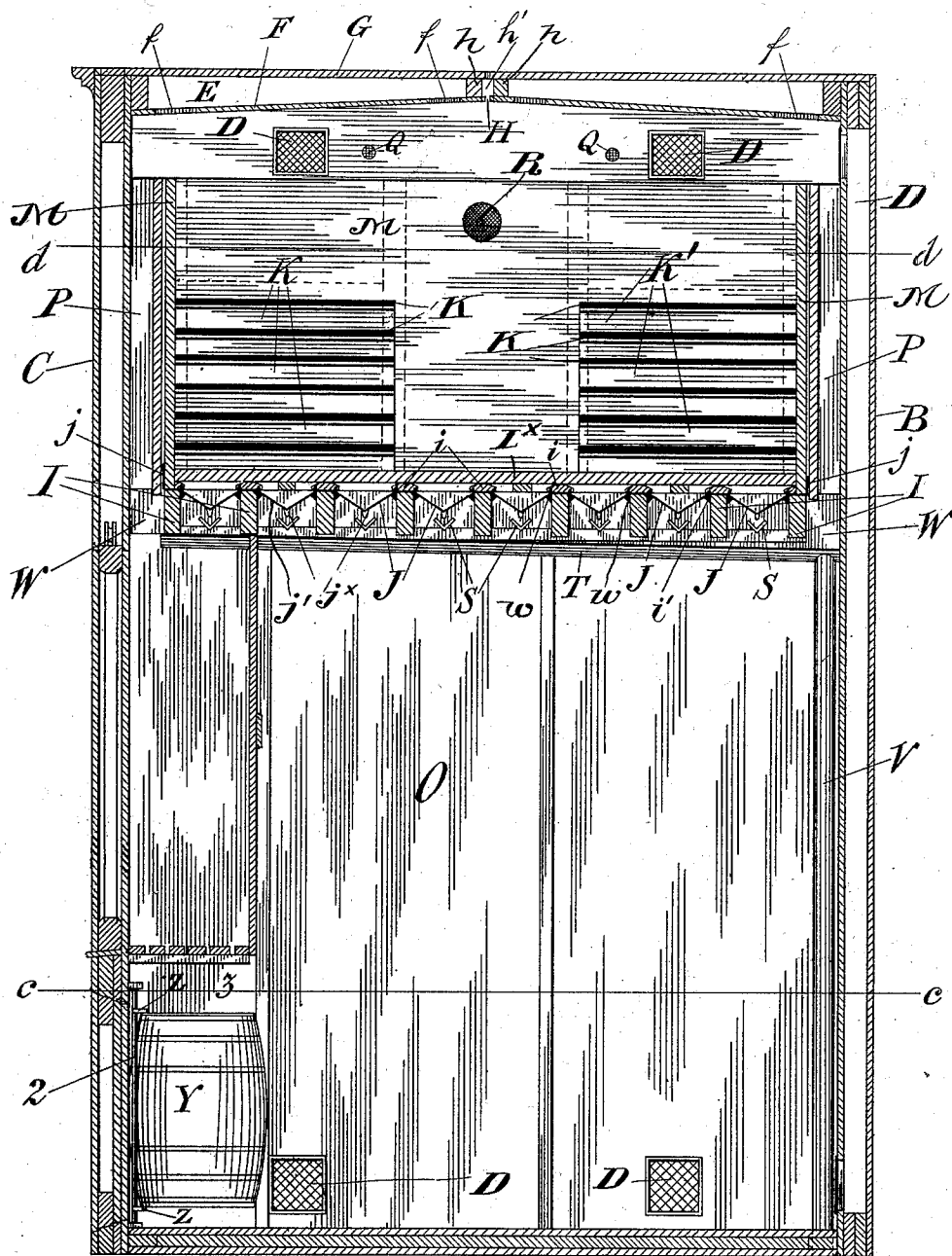
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J. G. MALCOLM.
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Fig. 3.

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his attorney

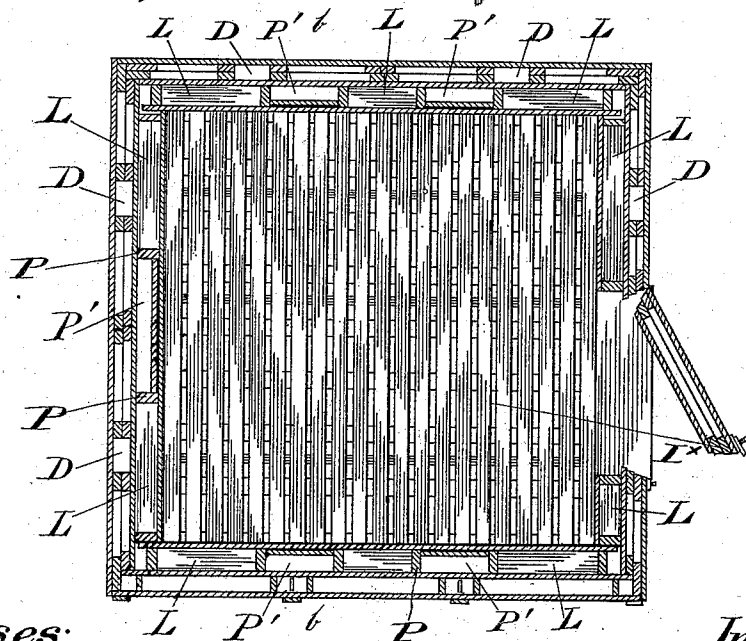
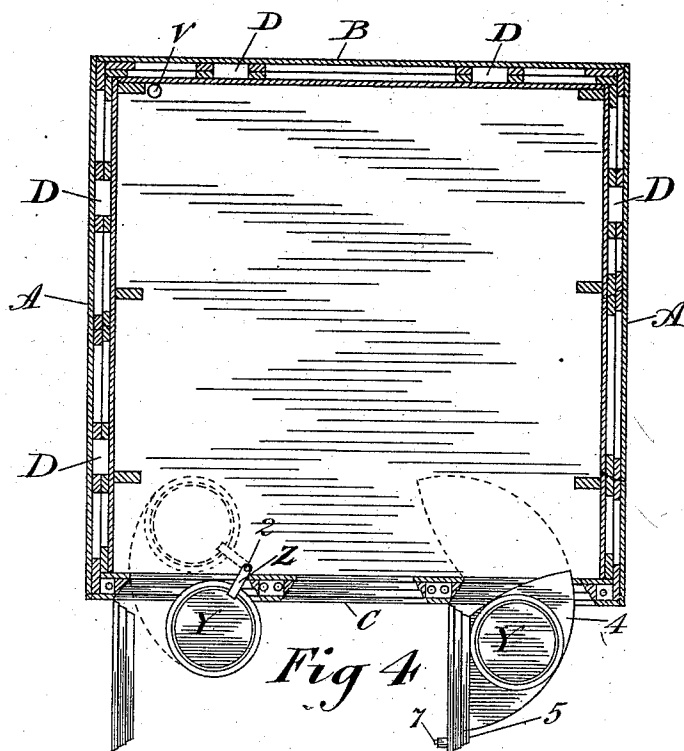
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Fig. 5.

Inventor;
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UNITED STATES PATENT OFFICE.

JAMES GEORGE MALCOLM, OF TORONTO, CANADA.

REFRIGERATOR.

SPECIFICATION forming part of Letters Patent No. 505,114, dated September 19, 1893.

Application filed November 18, 1892. Serial No. 452,461. (No model.)

To all whom it may concern:

Be it known that I, JAMES GEORGE MALCOLM, manufacturer, of the city of Toronto, in the county of York and Province of Ontario, Canada, have invented certain new and useful Improvements in Refrigerators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to certain improvements in refrigerators and has for its object to provide a refrigerator of an improved construction whereby certain important advantages of simplicity, durability and economy of construction and operation are attained, all as will be hereinafter fully set forth.

The novel features of my invention will be carefully defined in the claims.

In the accompanying drawings which serve to illustrate my invention—Figure 1 is a perspective view of the refrigerator, certain portions of the walls thereof being broken away in order to show the construction within. Fig. 2 is a vertical sectional elevation taken along line *a—*a** in Fig. 1, and Fig. 3 is a similar sectional view taken at right angles to Fig. 2 or along line *b—*b** in Fig. 1. Fig. 4 is a sectional plan taken in the plane indicated by line *c—*c** in Fig. 1, and Fig. 5 is a similar view taken along line *d—*d** in Figs. 1, 2 and 3. Fig. 6 is an enlarged detail view to be hereinafter referred to.

In the views A, A, represent the side or end walls of the refrigerator, B the back wall and C the front wall, each of which is composed of an inner and an outer sheathing suitably studded and braced, between which sheathings is comprised inclosed dead air spaces as clearly seen in the drawings. The roof of my improved refrigerator is also composed of an outer or upper sheathing or roof proper G and an inner sheathing or ceiling F, between which is inclosed an air space E, as seen in Figs. 2 and 3.

Extending across the interior of the refrigerator from the front wall C to the back wall B thereof are two beams W, W, one near each of the side walls A, said beams being each adapted to receive and support the ends of a series of joists I, I. These beams W and joists I support the ice pan J, and separate the interior of the refrigerator into an upper or ice chamber and a lower or cooling chamber O,

for the reception of the substances to be stored, the walls of the refrigerator being provided with suitable doors to afford access. The ice pan J is of galvanized iron or similar material, and is provided with a series of V-shaped corrugations or channels *j'* extending parallel to and arranged between the joists I, as seen in Figs. 3 and 6, this latter view being a detail of this part. The flattened portions of the ice pan between such corrugations are arranged on and fit neatly over the upper surfaces of the joists I, as seen in the drawings, and to secure said pan in place I provide strips *i, i* of hard wood preferably covered with galvanized iron arranged on the flattened portions of the pan and held in place by nailing through to the joists below. These strips *i* are rounded on their upper sides and are of a width greater than that of the flattened portions of the ice pan, whereby the water running therefrom will fall into the channels *j'* to insure which, the galvanized iron cover, where used, may have a depending lower edge as seen in Fig. 6. Secured to the inner surface of the inner sheathing of the vertical walls of the refrigerator is the inner wall or lining M of the ice chamber, said lining being supported on vertical braces at the angles and forming together with the walls of the refrigerator, an air space communicating between the ice chamber and the cooling chamber below. The lower edges of this lining M rests upon the edge of the ice pan J, as seen in Fig. 3, and said edge of the ice pan is provided with an upturned edge, flange or rim *j* outside said lining, for purposes to be shortly explained. A slatted or perforated floor I^x is arranged in the ice chamber over the pan J, in order that said pan may not be damaged by the falling of the ice thereon, said floor resting on the strips *i*, as seen in Figs. 2 and 3.

As stated, the roof of my improved refrigerator is double being formed with an inclosed air space E, and its inner sheathing F, which forms the ceiling of the ice chamber is formed in two halves or sections, separated by a transverse central slit or aperture H, said sections being inclined slightly from the front and back walls toward the said central aperture H, as seen in Fig. 3 and at their inner or adjacent ends these halves or sections of the

ceiling F are secured to the outer roof G by transverse strips h, h' , arranged on opposite sides of the central aperture H, and forming the vertical walls of a passage-way communicating with the interior of the refrigerator through slit H and with the outer air through a series of openings h', h' , in the outer or upper roof G, as seen in Fig. 3.

As stated, the lining M of the ice chamber and the inner sheathing of the refrigerator walls, form the walls of an air space, communicating between said ice chamber and the cooling chamber, and in the construction of my improved refrigerator I utilize this air space to establish proper circulation of the warm and cooled air between the cooling chamber and the ice chamber, as I will now describe. In said air space I arrange at suitable intervals along the sides of the same, vertical partitions P, extending from the bottom to the top thereof, thus forming a series of vertical flues, L and P. Across the upper portions of each of the flues L I arrange a second horizontal partition N, whereby the same is closed at its upper end and in order to provide inlets to said flues L which I will now call the cold air flues, I provide openings K, K, in the lining M, of the ice chamber, which openings are covered by inwardly inclined slats K', to prevent the escape of water or ice into said flues L. Thus it will be seen that the air in the ice chamber becoming cooled, falls by gravity through the flues L into the cooling chamber O, and becoming warmed by absorption of heat from the substances stored therein, passes up through the open-topped flues P; to the upper part of the ice chamber. As above stated, the edges of the ice pan J are provided with an upturned flange j , which is arranged by preference just outside the lining M of the ice chamber. This rim or flange performs a double function serving not only to retain any water which may drip from the slats K', but also in case of the choking up of the outlets of the ice pan, to hold water to a sufficient depth to permit the water to flow over the parting strips z into the next of the channels j' to the one which has become choked, when such water will pass off through the discharge opening of that channel.

In order to maintain a circulation of air through the air space E in the roof, I have provided the ceiling F with two series of openings f covered with wire gauze or similar perforated material, one series of openings being in the nature of inlets and arranged above the open mouths of flues P' and the other series being arranged along the inner ends of the sections of the ceiling adjacent to the aperture H.

In order to provide for the admission of air to the interior of the refrigerator, I have arranged a series of inlets Q covered with gratings or gauze in the upper portions of the side walls above the ice chamber, whereby air may be admitted from the room in which the refrigerator is located, and in order to effect

an economy in the use of ice during cool seasons, I have provided an inlet flue R, which communicates with the air outside the house and preferably on the north and west sides. The inner end of this flue opens into the ice chamber as clearly seen in the drawings, by which arrangement cold exterior air may be admitted to the ice chamber instead of air from the interior of the building, which is usually warmer, and a considerable economy is made in the use of ice.

It has been found by experience in the construction of refrigerators that where a descending and ascending current of air are employed to effect cooling, a bed of heavy air collects at the bottom of the cooling chamber and cannot be dislodged by ordinary means. This heavy air remaining for a considerable time unchanged becomes foul and impure by the absorption of the odors arising from articles placed on storage in the refrigerator. In order to dislodge this air and to cause a free circulation of fresh air through every part of the cooling chamber I have provided a series of narrow flues D, arranged in the dead air space inclosed between the inner and outer sheathings of the walls of the refrigerator. These flues communicate at their lower ends with the bottom of the cooling chamber near the floor thereof, and at their upper ends with the upper portions of the ice chamber near the roof of the refrigerator. The cold air flues L are as seen in the drawings considerably larger in section than the warm air flues P' and consequently the descent of a large volume of cold air will cause the air at the floor of the cooling chamber to enter the flues D, where being in a position less protected from the influence of the heat of the room an upward draft is generated and such heavy air is drawn up said flues into the upper portion of the ice chamber.

In order to convey the water away from the ice pan J as it collects therein I have provided each of the channels j' at one end with a depending lip j^x which lips are arranged over and adapted to empty into an open trough T extending along one side of the cooling compartment and having a discharge spout V leading down through the dead air space to the base of the refrigerator from which point connection may be made with a sewer.

To prevent the dripping of the water which may condense on the under side of the ice pan down into the cooling chamber, which has heretofore been a source of considerable trouble, I have arranged under each of the channels j' a shallow V-shaped wooden trough S, lined with galvanized iron or the like, which troughs S are also open to the trough T, and serve as drains for any water which might otherwise drip from the angle of the channel from condensation or in case said angle should crack or rust.

Great trouble has arisen in other constructions of refrigerators owing to the condensa-

tion of water on the beams and joists which support the ice pan, said beams, &c., becoming mildewed and in time rotting away. To obviate this defect I have provided the beams

5 W with a series of notches *w* one on each side of each of the joists *I*, in the angle formed with said joist by the V-shaped portions of the ice pan *J*. These notches form vents communicating with the air space inclosed 10 between the lining *M* and the inner sheathing of the refrigerator and the warm moist air which may collect under the ice pan in the space inclosed by said beams and joists is thereby withdrawn and kept in circulation.

15 In order to provide means for preventing the fouling of the cooling chamber of the refrigerator by drippings from the articles which are preserved in brine, &c., I have provided means whereby the barrel or tank containing such articles may be readily with- 20 drawn from the cooling chamber without the necessity of opening the main doors and exposing the interior to the warm air of the room. This means comprises, as seen at the 25 left in Fig. 4, two arms *Z*, pivoted at 2 inside the cooling chamber and on the side of the door opposite to the hinge pivot thereof. These arms are connected respectively with the upper and lower ends of a tank or barrel 30 which by this arrangement may be swung completely out of the cooling chamber when the door is open.

At the right hand side of Fig. 4 I have shown a modified form of this device wherein 35 a shelf 4 is secured to the door and is provided on its inner end with a caster 6 rolling on the floor of the cooling chamber. By this arrangement a barrel may be set up on the shelf and withdrawn from the cooling cham- 40 ber by opening the door.

In order to take the strain off the hinges of the door I have provided the same with a second caster 7 adapted to roll on the floor of the room whereby the same is supported when 45 opened.

Having thus described my invention, I claim—

1. In a refrigerator, the combination with the body having a cooling chamber and an ice chamber and having a series of flues communicating between said ice chamber and cooling chamber, said body being also provided with an air space included between the inner and outer sheathings of its walls, said 50 air space being closed to both said ice chamber and cooling chamber, of a series of flues *D*, arranged in said air space, said flues having their lower ends opening into the lower portion of the cooling chamber and their upper 55 ends opening into the upper portion of said ice chamber, substantially as set forth.

2. In a refrigerator, the combination with a body having an ice chamber and a cooling chamber, of a perforated lining arranged in 60 said ice-chamber and forming the walls thereof, vertical studs arranged between the walls of the refrigerator and of the ice chamber on

opposite sides of the perforation in the walls of the ice chamber whereby a vertical cold air flue is formed communicating between 70 said ice chamber and the cooling chamber, a partition arranged across said flue above the perforation in the wall of the ice chamber, and a series of vertical flues *D*, extending from the upper portion of the ice chamber to 75 the lower portion of the cooling chamber, substantially as set forth.

3. In a refrigerator, the combination with the body, of the joists dividing said body into a cooling chamber and an ice chamber, warm 80 and cold air flues communicating between said ice chamber and cooling chamber, an ice pan mounted on said joists and having channels arranged between the same, a series of strips secured to said joists over said ice pan, 85 said strips having a width greater than the thickness of the joists and means for carrying the water away from said channels, substantially as set forth.

4. In a refrigerator, the combination with 90 the body, of the beams arranged across the same, the joists resting at their ends on said beams, whereby the interior of the body is divided into an ice chamber and a cooling chamber, warm and cold air flues communicating 95 between said ice chamber and cooling chamber, an ice pan mounted on said joists and adapted to receive and discharge the water from the ice in the ice chamber, and a series of vents formed through the upper portions 100 of said beams adjacent to the under-side of the ice pan, substantially as set forth.

5. A refrigerator having a roof composed of inner and outer sheathings separated by an air space said sheathings being provided with 105 coinciding apertures extending transversely of the refrigerator, in combination with two strips arranged in the air space between the sheathings on opposite sides of said coinciding transverse apertures, substantially as set 110 forth.

6. In a refrigerator, the combination with the body having an ice chamber and a cooling chamber, of a perforated lining arranged in said ice chamber and forming the walls 115 thereof, vertical studs arranged between the walls of the refrigerator and of the ice chamber on opposite sides of the perforation in the walls of the ice chamber whereby a vertical cold air flue is formed communicating between 120 said ice chamber and the cooling chamber, and a partition arranged across said flue above the perforation in the wall of the ice chamber, substantially as set forth.

7. In a refrigerator, the combination with 125 the body having an ice chamber and a cooling chamber, of a perforated lining arranged in said ice chamber and forming the walls thereof, a series of vertical studs arranged between the walls of said refrigerator and of 130 said ice chamber, whereby vertical flues are formed which communicate between the upper portions of the ice chamber and of the cooling chamber, the perforations in the walls

of the ice chamber being arranged to open into alternate flues of said series whereby cold air flues are formed, and partitions arranged across said cold air flues above the perforation in the walls of the ice chamber, substantially as set forth.

8. In a refrigerator, the combination with the body, of the joists dividing said body into a cooling chamber and an ice chamber, warm and cold air flues communicating between said chambers, an ice pan mounted on said joists and having channels arranged between the same, a series of strips secured to said joists over said ice pan, a perforated floor arranged in said ice chamber and resting on said strips, and means for carrying away the water from said channels, substantially as set forth.

9. In a refrigerator, the combination with the body having an ice chamber and a cooling chamber, an ice pan arranged in the ice

chamber and adapted to discharge its water outside the refrigerator, a perforated lining arranged in said ice chamber and forming the walls thereof, vertical studs arranged between the walls of the refrigerator and of the ice chamber on opposite sides of the perforation in the wall of the ice chamber whereby a vertical cold air flue is formed communicating between said ice chamber and cooling chamber, a partition arranged across said flue above the perforation in the wall of the ice chamber, a series of inwardly inclined slats arranged across the perforation in the wall of the ice chamber, and an upturned rim or flange formed about the edges of the ice pan outside said walls of the ice chamber, substantially as set forth.

Sharon, October 18, 1892.

JAMES GEORGE MALCOLM.

In presence of—

A. W. WILLIAMS,

W. O. LESLIE.