

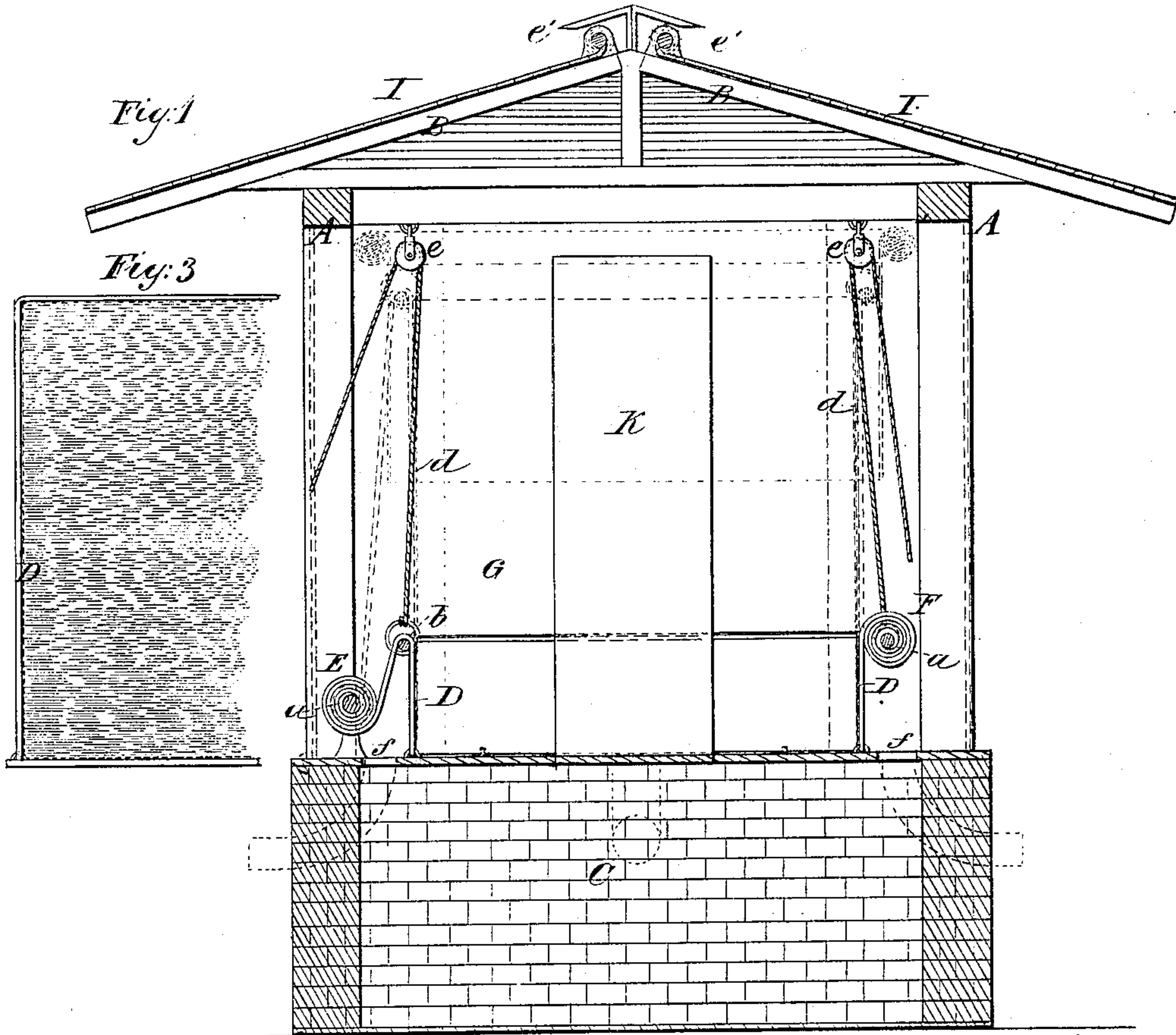
(No Model.)

W. W. DUSENBURY.

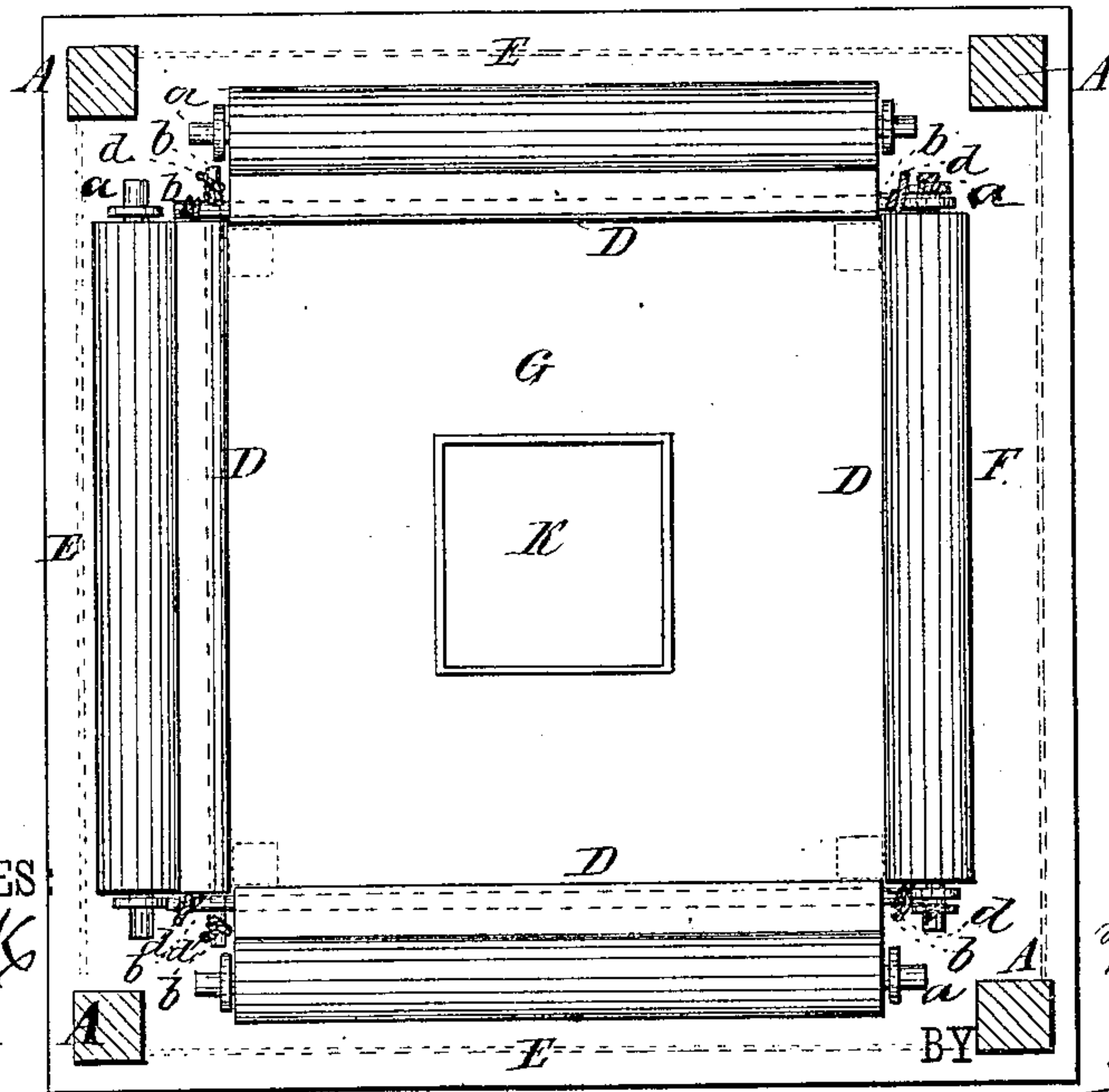
MANUFACTURE OF ICE.

No. 258,566.

Patented May 30, 1882.



*Fig. 2.*



WITNESSES

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# UNITED STATES PATENT OFFICE.

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## MANUFACTURE OF ICE.

SPECIFICATION forming part of Letters Patent No. 258,566, dated May 30, 1882.

Application filed October 13, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM W. DUSENBURY, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in the Manufacture of Ice, of which the following is a specification.

The object of my invention is to manufacture ice from an artificial supply of water by natural cold, and in an inclosure adapted to expose the surface of the water to the outside atmosphere, and also, in case of a change of temperature, to be arranged to preserve the ice already formed. A further object of my invention is to arrange an apparatus in which ice is formed from natural cold to refrigerate storage-rooms and other receptacles.

The invention consists, first, in an inclosure formed of flexible curtains composed of a suitable material, arranged to be raised from the floor upward, so as to inclose a space for the reception of water in sheets, spray, or in the form of drops, and to retain the same while freezing in successive layers, and also adapted to be used to protect the body of ice so formed, either permanently or temporarily, from changes in the exterior atmosphere.

The invention consists, secondly, in providing said inclosure with suitable devices for conveying cold air to refrigerating-compartments. Lastly, the invention consists in details of construction and arrangement hereinafter specifically described.

In the accompanying drawings, Figure 1 represents a sectional elevation of my improvement in inclosures for manufacturing ice. Fig. 2 represents a sectional plan of the same; and Fig. 3 represents a sectional elevation of the inclosure after being filled, showing how the curtains may be arranged to protect both the top and sides of the ice.

Referring to the drawings, A represents the frame-work of the inclosure; B, the frame of the roof; and C, a refrigerating storage-room, which may be placed under the ice-house, as shown, or at any convenient point. This inclosure being specially designed for manufacturing ice by natural cold in the manner described in Letters Patent No. 240,396, granted to me April 19th, 1881, the frame A is designed to support

the walls of the outer inclosing-house, which may be formed of rolling curtains, shutters, &c., or built up after the ice is stored, as may be convenient. The walls of the inner inclosure, where the ice is formed from water fed into it in sheets or sprayed or sprinkled, I purpose to make of a flexible material adapted to exclude heat and air, be conveniently raised and lowered, and to retain the water while freezing. D represents these walls. They may be made of felt, or of a woven fabric, or of wood slats strung together like the slats of a shutter, so as to roll up compactly. If made of wood, they may be covered on one or both sides with a lining of felt or other suitable material for excluding heat and air. The walls D should be made of continuous pieces of the material employed sufficiently long to extend from the floor of the inclosure or the floor of the compartment (if compartments are employed) to the ceiling, so that the whole space where the ice is formed or stored can be inclosed, from floor to ceiling, by the same piece. The curtains forming the said walls are preferably attached to the floor and arranged to roll upward, and the rollers for raising them may be arranged in various ways, of which two are shown in the drawings. At E the rolled end of the curtain is attached to a roller, *a*, pivoted in suitable supports a short distance from the end of the curtain attached to the floor. In the slack between, a rod, *b*, is inserted, the ends of which are suspended from a rope or ropes, *d*, running over suitable pulleys, *e*, attached to the ceiling at a point about in line with the attached end of the curtain. At F the roller is suspended directly from the cords or ropes, so as to be raised as the curtains are unrolled. In both cases, it will be observed, the curtains are raised by means of the ropes, which unroll them in position to form perpendicular walls, as indicated by the dotted lines in Fig. 1.

The curtains are disposed so as to inclose a space, G, in which the ice is formed and stored. At the corners, where the curtains of the several sides join each other, an air and water tight joint should be formed. This may be done by pressing the sides of the curtains against the corner-posts (indicated by dotted lines) by means of springs or weather-strips, or by nail-



ing the curtains to the said posts, or by joining the adjacent edges of the curtains together by weather-strips or other suitable devices. This may be done as the curtains are  
 5 unrolled and the walls raised. The walls thus formed are specially adapted for an inclosure where the ice is formed by natural cold from water previously let in. As the walls start  
 10 from the floor, they allow a perfect exposure of the surface of the water to the freezing atmosphere and permit the air to circulate over the surface, and thereby greatly assist the freezing process; and as the ice accumulates the walls are gradually raised, inclosing the body of  
 15 ice and protecting it against currents of air. If the temperature should rise so as to interfere with the freezing or injure the ice already formed, the curtains can be instantaneously raised to shut in the ice and prevent its injury.  
 20 I do not confine the use of the curtain-walls D to ice-houses where the ice is formed in the manner just described, as they may be used with advantage in the ordinary storage ice-houses in place of hollow walls and sawdust  
 25 and other packing material. They are so quickly applied and so easily removed that they will be found very convenient for such purposes.

The floor of the inclosure, instead of being  
 30 built or laid as indicated in the drawings, may be formed of stones laid on the ground so as to give free drainage, and covered with sawdust or other suitable material. When the making of ice is commenced water should be  
 35 sprinkled or sprayed over the sawdust, so as to freeze and form a crust on which the water can be run in a sheet or layer and frozen.

The curtains may be of light material, if desired, and another curtain of a heavier material or structure may be placed outside, so  
 40 as to form a double wall around the ice and an inclosed air-space. This second or outside set of curtains may be hung from the ceiling and arranged to drop to the floor, if desired.  
 45

The curtains D adhere to the sides of the ice very firmly, and thus afford the amplest protection to it. As it may be necessary to remove the curtains, they may be separated from  
 50 the ice by directing a jet of steam against them. The roof of the structure may be formed of a flexible fabric or of rolling shutters made of wood or metal lined with felt or other fabric, or without such lining, if preferred.

I represents the roofs, which are supported on the frames B and attached at their upper ends to rollers *e'*, so that they can be rolled up, as indicated by the dotted lines, so as to leave  
 55 the top of the ice-house open, and lowered so as to close it up. By this arrangement a freer exposure of the water in the space G can be obtained, and at the same time, owing to the facility with which the shutters or curtains can be closed, the ice may be secured and protected  
 60 against sudden changes of temperature.

K represents the cold-air shaft for conveying cold air into the refrigerating-chambers. It should be built within the space G, so as to be surrounded with ice when formed or stored,  
 70 and it should be arranged to communicate directly with the refrigerator-chamber; or, if the said chamber is not below the ice-house, it may be connected with the air-shaft by suitable pipes or air-ducts.

In the space between the curtained walls  
 75 and the outer inclosing-walls openings *f* may be made in the floor of the structure for the passage of cold air to the refrigerating-chamber below; or pipes may be connected with said openings to convey the cold air to the re-  
 80 frigerating-chamber when placed in another situation. This arrangement may be used in connection with the central air-shaft, K; but the shaft may be used alone, and as a body of cold air will be formed therein it will sink or  
 85 be carried by the pipes into the refrigerating-chamber and maintain its temperature at about that of the air in the inclosure.

When a sufficient quantity of ice has been formed and accumulated the curtains D may  
 90 be laid over the top of the ice to protect it in the manner shown in Fig. 3. By making the curtains sufficiently long, and laying first one and then the other across, it will be seen that  
 95 several thicknesses of the material will cover the ice, and these will afford perfect protection and be much more convenient than the covering heretofore employed. If the curtains are not long enough to be extended over the  
 100 ice, separate pieces of the felting may be employed in place of the curtains.

The curtained inclosure may be set up independent of an outer inclosing-house, which may be added after the manufacture of the ice is  
 105 concluded; or the ice may be protected in any suitable manner.

Either one or more of the curtains may be provided with a suitable door to give admission to the ice within the inclosure.

I claim—

1. As an improvement in manufacturing ice by natural cold, an inclosure formed by walls composed of continuous pieces or sections arranged to be extended from the floor upward,  
 110 and to be lowered for the purpose of exposing the interior to the air, and to shut in and to protect the ice when formed, substantially as described.

2. Walls for an inclosure in which to manufacture and store ice, made of a flexible material or structure, and adapted to be raised to  
 115 inclose the ice-space for the purpose of preserving the ice and lowered to expose the same and admit cold exterior air, substantially as described.

3. The walls D, having their lower edges attached to the floor of the structure, in combination with suitable devices for raising and lowering the same, substantially as described.

4. The combination of the cold-air shaft K,  
 125 130

arranged to be surrounded by the ice, the openings *f* in the floor of the structure, between the inner and outer walls, and a refrigerating-chamber communicating with the shaft K and openings *f*, substantially as described.

5 The walls D, adapted to be raised to in-

close the sides of the ice and to be laid over the top of the same to protect and preserve it, substantially as described.

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Witnesses:

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