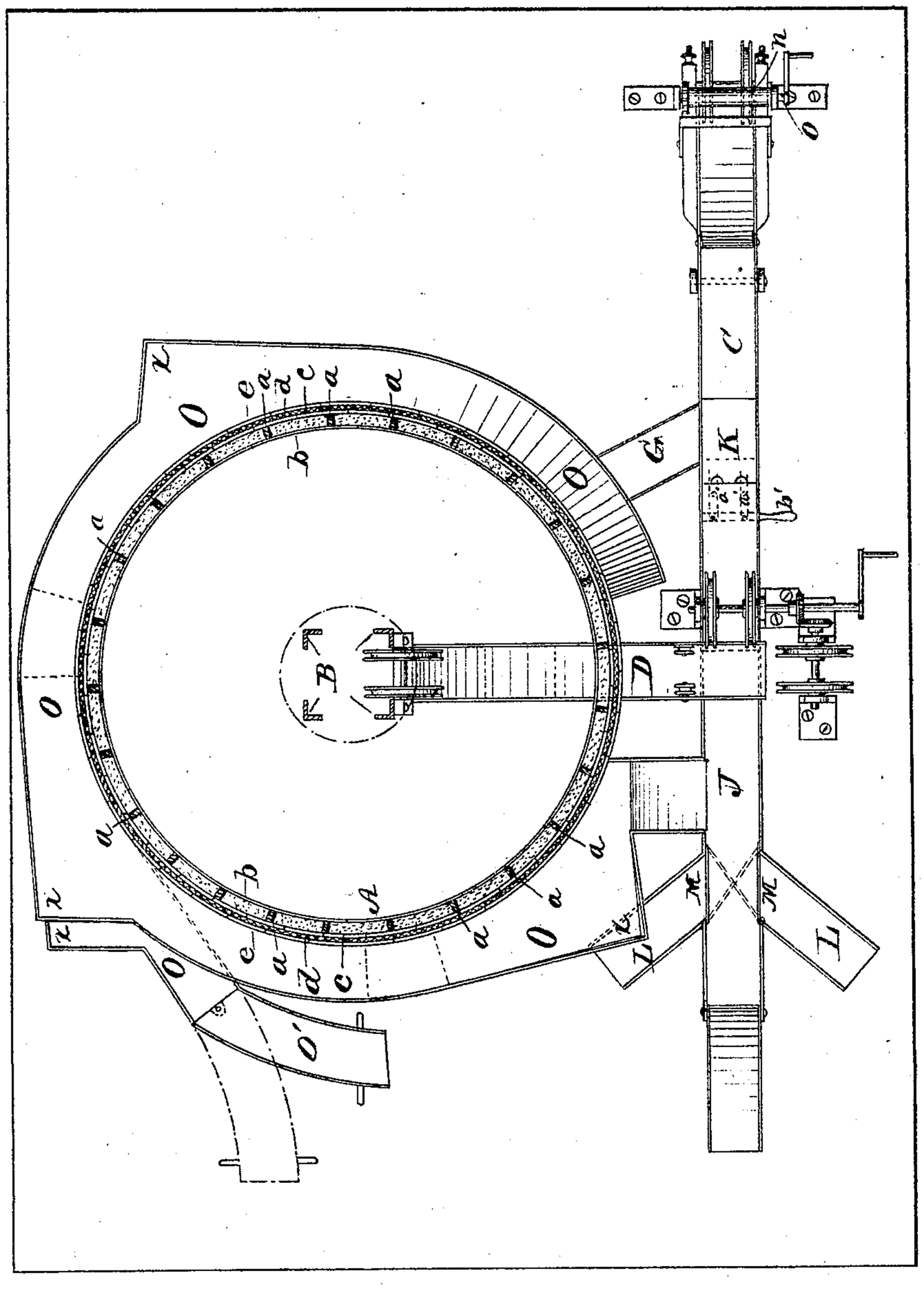
2 Sheets--Sheet 1.

R. W. SANBORN.

Ice-Houses.

No. 152,521. Patented June 30, 1874.

Fig. 1.



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2 Sheets--Sheet 2.

R. W. SANBORN.

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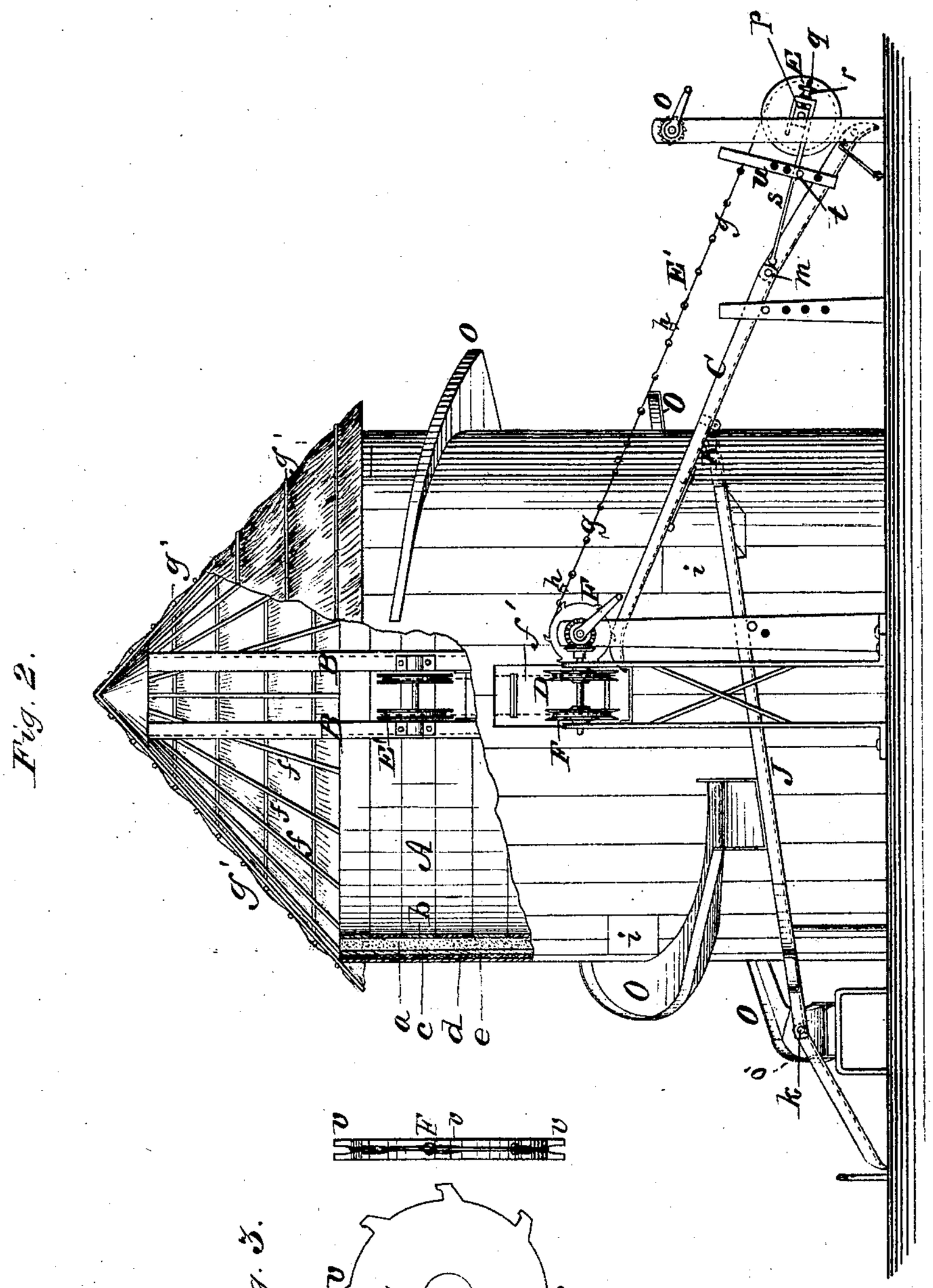

Fig. 2.

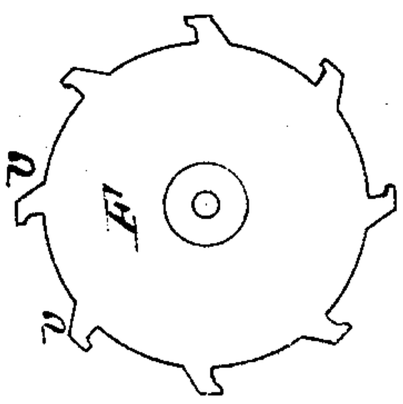

Fig. 3.

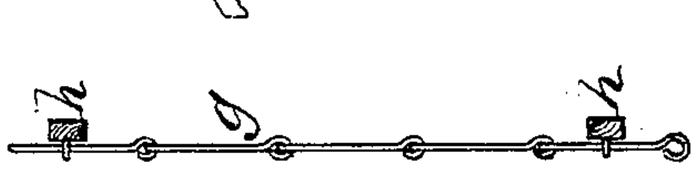

Fig. 4.

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UNITED STATES PATENT OFFICE.

RODMAN W. SANBORN, OF ROCHESTER, NEW YORK.

IMPROVEMENT IN ICE-HOUSES.

Specification forming part of Letters Patent No. **152,521**, dated June 30, 1874; application filed January 15, 1874.

To all whom it may concern:

Be it known that I, RODMAN WILCOX SANBORN, of Rochester, in the county of Monroe and State of New York, have invented certain Improvements in Ice-Houses and apparatus connected therewith, of which the following is a specification:

My invention consists in a circular building, having walls of peculiar construction, and provided with a novel arrangement of chutes, endless belts, &c., for carrying the ice into the building, and with an inclined gallery around its exterior, upon which the ice is allowed to slide down when removing it from the building.

Figure 1 is a top plan view of my building and the apparatus connected therewith; Fig. 2, a side elevation of the same, with the upper portion of the building broken away, in order to show more clearly its construction; and Figs. 3 and 4 are views showing the construction of the endless chains, and the wheels by which they are carried and driven.

In carrying out my invention I first erect a circular or cylindrical building, A, of any suitable dimensions, by first erecting a frame-work of vertical studs or timbers *a*, and then sheathing the same on the inner and outer sides with horizontal boards *c* and *b*, as shown in Figs. 1 and 2. I then cover the outside of the building with coarse woolen cloth, or paper, or other good non-conducting material *d*, and then cover the same with a sheathing of boards, *e*, arranged vertically. The inside of the building may also be lined with cloth, or other like material, and a covering of wood. The alternate layers of wood and cloth, either on the inside or outside of the frame, may be multiplied to any extent rendered necessary by the climate. In one climate the single layers on the outside will be sufficient, while in another climate several layers will be necessary. In the center of the building I erect a square frame, B, extending above the level of the outside walls, and from the top of said frame to the top of the walls I stretch strong wires *f*, and then interlace therewith transverse wires *g'*, as shown in Fig. 2. In this way I produce a very cheap, light, and strong frame-work for a conical roof. The frame may be thatched with straw, or like material, or covered with canvass.

By the above plan of construction I am enabled to roof a very large building without the use of a heavy frame-work, and at a very small expense. The body of the house, not having a heavy roof to support, may be made lighter than would otherwise answer.

In order to provide for conveying the ice into the building I erect by the side of the latter an inclined chute, C, and at a right angle to said chute mount a second chute, D, which extends from the upper end of the first one upward into the building A, passing through a door, *f'*, in the side, and being attached at its upper end to the central frame B, as shown in Figs. 1 and 2. Above each chute, and parallel therewith, I arrange an endless belt or apron, E', consisting of two chains, *g*, connected by cross-bars or cleats *h*. The chains are supported by wheels or pulleys E and F, mounted in suitable supports on the ends of the chutes, motion being communicated from any suitable source or motor to the wheels F, so as to keep the belts or aprons constantly in motion. The space between the belts or aprons and the face of the chutes is such that the cakes of ice fed onto the latter are caught by the bars or slats on the former and carried upward. The ice is delivered from the upper end of the chute C upon the lower end of the chute D, up which it is carried into the building. The inner upper end of the chute D will be provided with a hinged movable extension, down which the ice may be allowed to slide in any direction, or to any side of the building. The chute D, and its conveying belt or apron E', are only employed, however, when the ice is to be stowed or packed at a point as high or higher than the upper end of the chute C. During the early stages of filling the building, when the level of the ice is low, the ice is carried up on the chute C to a point a little higher than that at which it is to be stowed, and is then allowed to slide down lateral chutes G through doors or opening *i* into the building. There will be in practice a number of the chutes G, one for each two or three feet in rise of the building. One is used until the ice rises to its level, and then the next one above is employed, and so on, successively, from one to the next as the building is filled up. In order to allow the

passage of ice from the chute C to the lateral chutes G the former is provided with hinged doors or drops K, which may be turned down so as to permit the ice to drop through upon the lateral chutes. When raised up or closed the doors or drops form a portion of the chutes so the ice passes over them. In order to provide for loading ice into wagons by means of the belt E′ and chute C, instead of conducting it into the building, I erect a chute, J, which commences at a point near the top of the chute C, and inclines downward in the opposite direction, and provide the chute C with a hinged door or drop, K, which may be turned down, as shown by dotted lines in Fig. 2, so as to permit the ice which is brought up the chute C to slide down on the incline or chute J. The lower end of the chute J is arranged at such height that the wagons to be filled may be placed under it. The extreme end is hinged at *k*, so that it may be raised and lowered to rest upon wagons of different heights. In order that several wagons may be loaded at once I provide the lower end of the delivery-chute J with lateral branches L, and with hinged side pieces M, by which the ice may be switched off into either of said branches at will. When the building is erected, as is generally the case, by the side of the ice-field, the lower end of the elevating-chute C will be extended down into the water, so that the blocks of ice may be floated directly upon its end, and under the elevating belt or chain E′. The lower end of this chute is hinged at *m*, so that its nose may be raised and lowered to correspond with the rise and fall of the water. This hinged end is suspended and operated by chains *n*, attached to a windlass, *o*, which is provided with hand-cranks, and with a ratchet-wheel, by which it is locked fast, in order to hold the end of the chute up to the required point.

As before stated, the wheels which carry the lower end of the belt or chain E′ of chute C are mounted on the lower end of the chute, and hence when the hinged end of the chute is raised and lowered it tightens or loosens the belt or chain. Trouble from this source is prevented by mounting the shaft of the wheels in sliding journal-boxes *p*, provided with screw-stems *q*, held by nuts *r*, as shown in Fig. 2, so that by turning the nuts the boxes and wheels may be moved, and the belt or chain thereby tightened or loosened, as required. The ice slides on the face of the chute between it and the belt, and is carried forward by the cross-bars on the latter engaging upon its top. As the ice varies greatly in thickness at different times, it is necessary to have the belt run closer to the surface of the chute at one time than at another, and therefore the wheels at the lower end of the belt have their bearings in pivoted arms *s*, the ends of which may rise and fall. The arms are pivoted to the chute and are supported by a rod or pin, *t*, passing through supports *u* under the arms, so that while the arms and pulleys are prevented from falling beyond a certain point, they are left free to rise. In this way the belt is prevented from falling, so as to prevent the entrance of ice, but is permitted to rise in case a block of unusual thickness, or a block on edge, enters the chute. The chains of which the belts are formed have their links made of wire or iron, with eyes or loops which are simply hooked together without being welded or riveted, as shown in Fig. 4. The wheels F, by which the chains are driven, have teeth *v*, which are slotted to receive the links. These teeth draw against the bent eyes or loops of the links, as shown in Fig. 3, so that they tend to close said loops and prevent them from being pulled open by the strain on the chain. The driving-wheels of the lower belt are located at its upper end, while the driving-wheels of the upper belt are at its lower end. The two pairs of driving-wheels, standing in close proximity to each other, are connected by miter-gear, as shown in Fig. 1. The two belts are so adjusted that the instant a block of ice is delivered from the upper end of the chute C it is caught and carried up the chute D, so that there is no loss of time or motion.

In order to provide for removing the ice from the building with little labor and great expedition, I build around the outside of the building one or more inclined or spiral slides or chutes, O, on which the ice is placed and allowed to slide down, the house being provided with doors at short intervals, through which the ice passes onto the slides or chutes.

In the present case, I have shown a building provided with two of the slides or chutes O, one of which delivers the ice upon the delivery-chute J, from which it slides down into the wagons. The other slide, which delivers ice on the other side of the building, is provided with a pivoted reversible end, O′, which may be turned either side up, so that it will deliver at either of two points, as required. This reversibility of the end is clearly shown by the dotted lines in Fig. 1.

In order to prevent the ice from attaining too great a velocity as it descends the spiral chutes or slides O, I provide the latter, at suitable intervals, with an angular extension, *x*, at the outer side. These extensions have their edges curled upward more or less, according to circumstances. As the ice slides down the centrifugal force causes it to slide out into the angle X, by the raised side of which the motion of the ice is checked and the blocks turned up nearly on edge. The ice then swings and slides slowly out of the angle, and continues its course down the chute or slide until checked by the next angle, and so on until it reaches the lower end. In this way the speed of the sliding blocks is controlled without labor or expense, and without chipping or injuring them. The space within the central frame B of the building may be filled with ice or left vacant, to form a

refrigerating-chamber, or a receptacle for the sawdust which is used in packing the ice. The doors or traps K in the bottom of the chute C are locked up by means of two or more parallel pivoted arms, *a'*, which lock at one end under the edge of the door or drop, while at the other end they are all pivoted to a transverse bar or handle, *b'*, by which they are all moved simultaneously.

Having described my invention, what I claim is—

1. The circular ice-house, consisting of the vertical timbers, covered inside and out by the vertical boards *b* and *c*, and sheathed with a layer or layers of paper cloth or like material, *d*, and vertical boards *e*, as shown and described.

2. The roof-frame, consisting of the wires *f* stretched from the walls of the building to a central support, and the transverse wires *g'* interlaced therewith, as shown and described.

3. The spiral incline O for delivering the ice from the building, constructed substantially as described.

4. The spiral incline O, provided with the extensions or angles, as and for the purpose described.

5. The chute O, having the pivoted reversible end O', as and for the purpose set forth.

6. In combination with the door or drop K in the chute C the two pivoted locking-arms *a'*, connected by the transverse bar or handle *b'*, as shown and described.

7. In combination with the chute J, having the lateral branches L, the hinged side pieces or switches M, as shown and described.

8. In combination with the chute C and its belt or chain E' the wheels E, supported in the pivoted arms *s*.

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Witnesses:
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