No. 607,765. Patented July 19, 1898.

T. L. RANKIN.

ICE MAKING APPARATUS.

(Application filed June 1, 1897.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

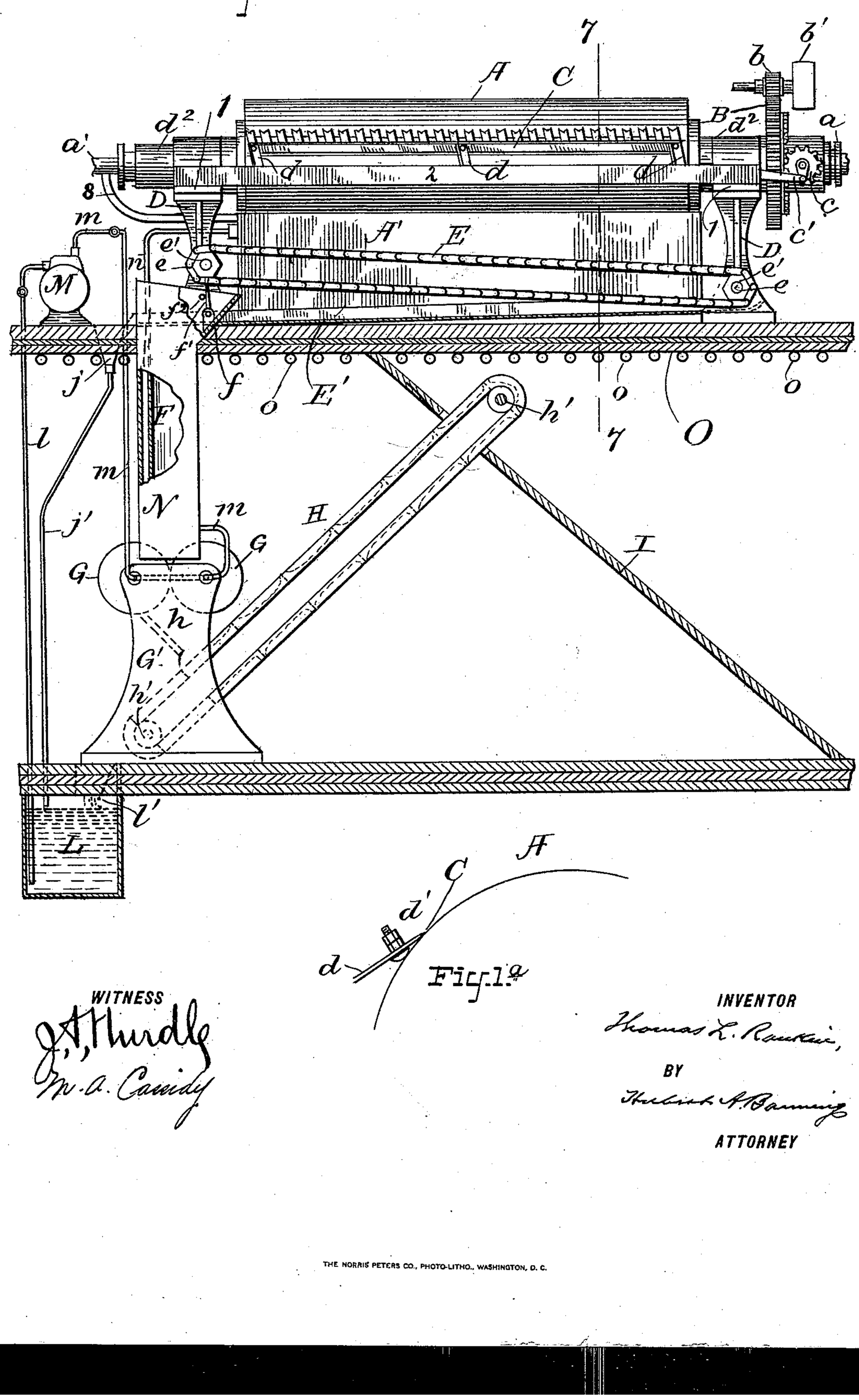

Fig. 1a.

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Fig. 4.

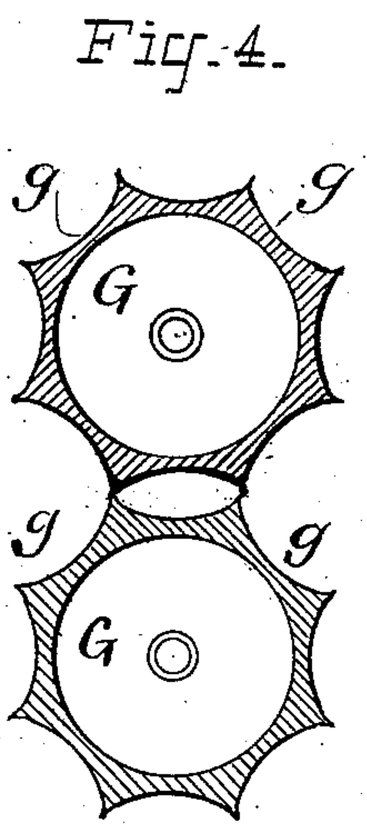


Fig. 5.

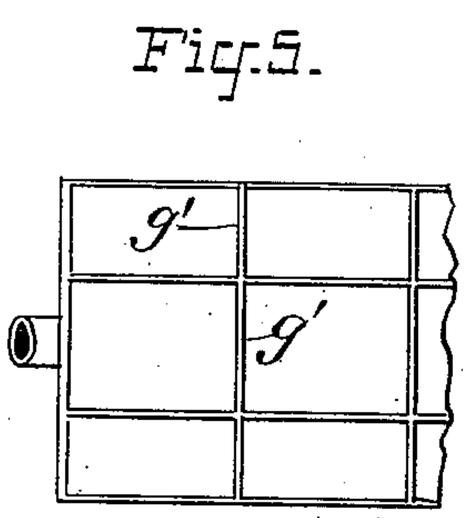


Fig. 2.

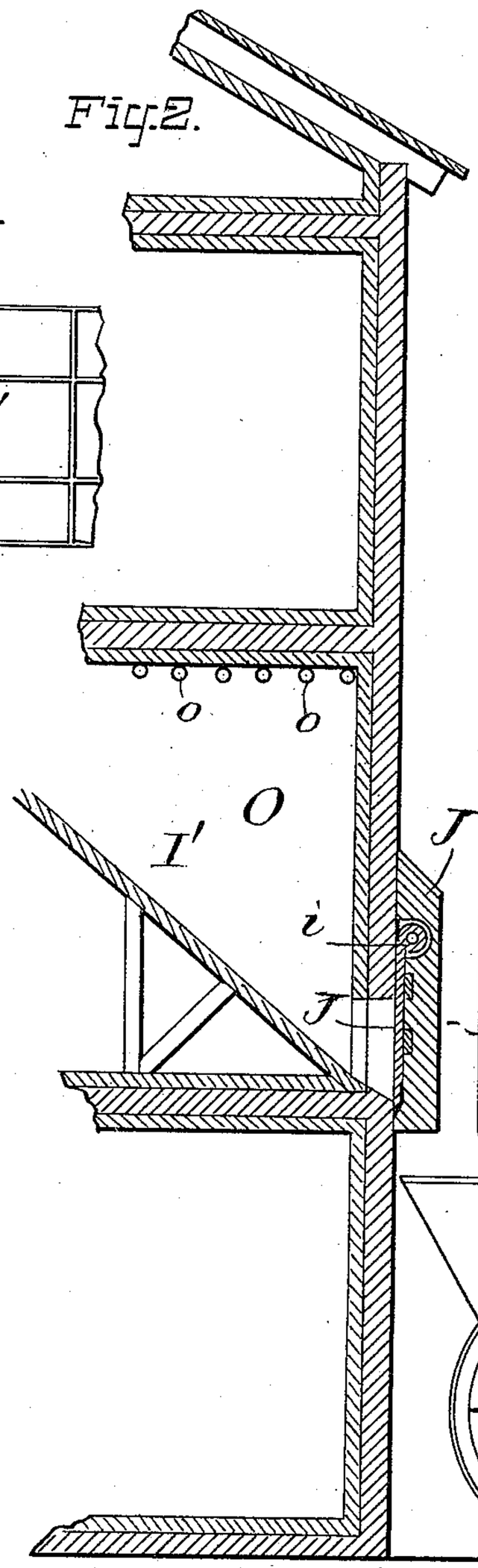
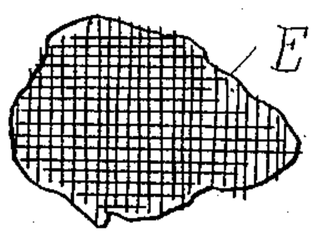


Fig. 3.

Fig. 6.



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(No Model.) 3 Sheets—Sheet 3.

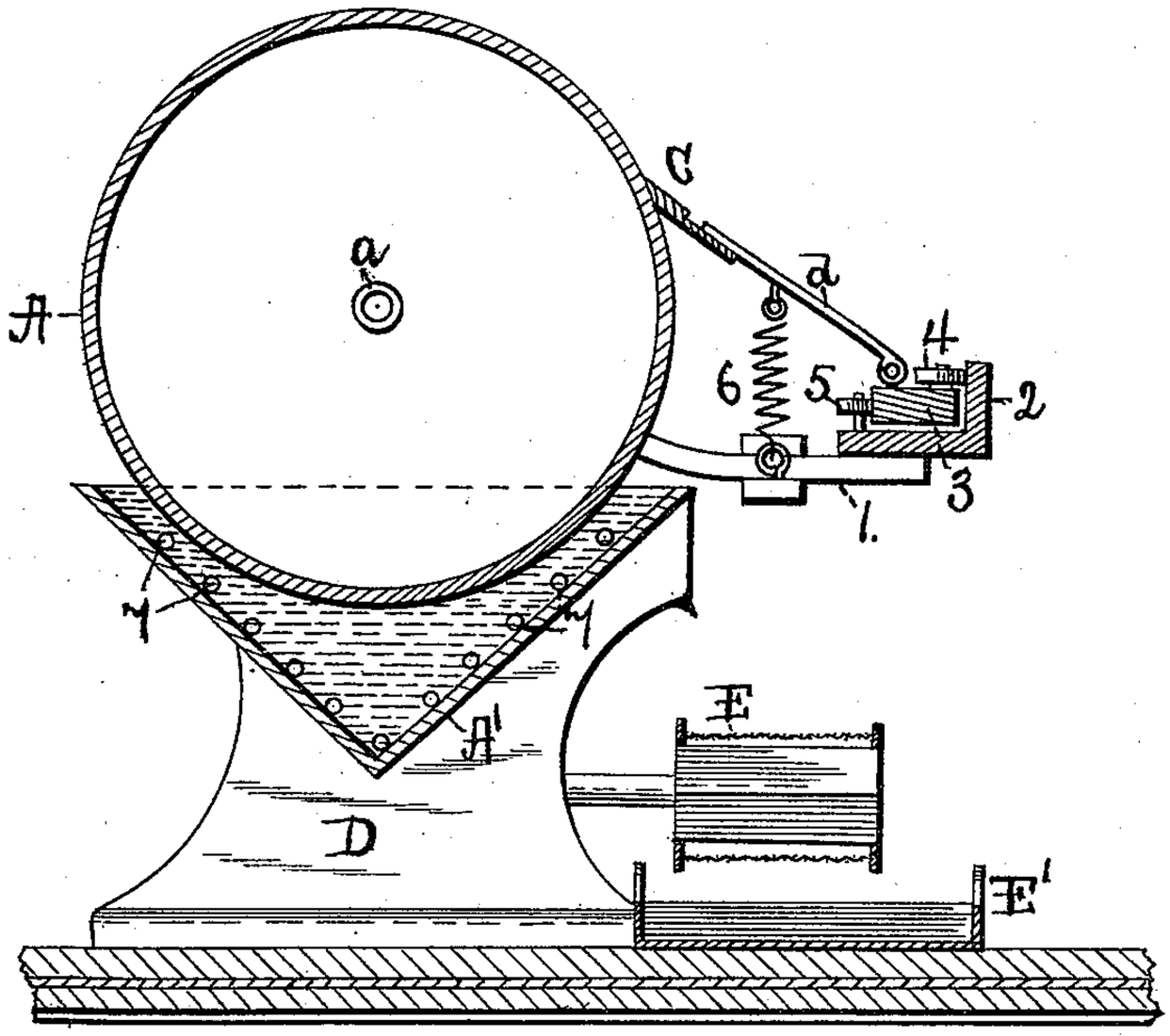

Fig 7.

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UNITED STATES PATENT OFFICE.

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ICE-MAKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 607,765, dated July 19, 1898.

Application filed June 1, 1897. Serial No. 639,031. (No model.)

To all whom it may concern:

Be it known that I, THOMAS L. RANKIN, a citizen of the United States, and a resident of Sackett's Harbor, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Ice-Making Apparatus, of which the following is such a full, clear, concise, and exact description as will enable others skilled in the art to which my invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

The object of my invention is to construct an ice-making apparatus in which the ice as frozen is removed from the freezer and carried to a molding device and from thence to a storage-room or delivery-outlet by continuous operation; and the invention consists in the combinations of devices or parts hereinafter described and as pointed out in the claims.

In the drawings, Figure 1 is a front elevation of the ice-making apparatus, showing a freezer, a saw for removing the ice therefrom, a carrier for transporting the same in a loose or slushy condition to a chute or tube provided with a hopper-mouth, and a scraper for taking the ice from the carrier and conveying the same to a pair of rolls provided on their surfaces with molds for compressing the ice into cakes and delivering the same to a carrier for transporting it to a chute leading to a storage-room or delivery-outlet. This figure also shows various drain connections and a pump for returning the water to a cylindrical jacket surrounding the ice-receiving chute or tube, which also has connections with the trough or tank for supplying water to the freezer. Fig. 2 is a vertical section of a three-story refrigerated house provided with an ice-chute and a door opening outward for loading the ice to a delivery cart or wagon shown in Fig. 3, which also shows an outside view of the door appearing in section in Fig. 2. Fig. 4 is a sectional view across the rolls, showing the contour of the depression or concave spaces forming the molds as the two rolls come together; and Fig. 5 is a surface view of a portion of one of the compression-rolls, showing cross-ribs or partitions by which the molds are separated at the ends. Fig. 6 is a detail plan view of a portion of the conveyer E. Fig. 7 is a transverse vertical section on the line 7 7 of Fig. 1. Fig. 1^a shows a device for regulating the distance of the saw from the surface of the cylinder on which the ice is formed.

In the drawings, A represents a rotary cylinder having a gas-inlet pipe *a* and a gas-outlet pipe *a'*. This cylinder receives motion from a gear-wheel B, connecting with a pinion *b*, operated by a pulley *b'*, and the gear-wheel B is also provided with side cogs for operating the pinion *c*, connecting by a crank-rod *c'* and braces *d d* with a saw C. This saw and its operating mechanism are not claimed specifically in this application, but are fully shown and claimed in my pending application, Serial No. 637,197, filed May 19, 1897. The distance of the saw from the cylinder may be regulated by a screw-bolt *d'*, (shown in Fig. 1^a,) which has a rounded head resting against the surface of the cylinder or the ice remaining thereon. This bolt *d'* is threaded all the way to its head and passes through the brace *d*, having a threaded opening to receive it, so that the distance at which the bolt-head is regulated by the screw-thread determines the distance of the saw from the cylinder. Each of the braces *d* is provided with such a regulating-screw, and the saw is held down to the ice-cylinder by means of springs or other suitable devices.

Upon suitable supports, as 1, projecting from and secured to the frame, is an angular plate or bar 2, arranged parallel with the axis of the freezing-cylinder, and on this plate 2 is carried a bar 3, to which the arms *d*, carrying the saw C, are jointed, substantially as shown in Fig. 7 of the drawings. The saw-bar 3 is guided in its seat on the plate 2 by rollers 4 5, the former of which is mounted on the bar 3 and the latter on the plate 2, and to hold the saw in proper operative contact with the surface of the freezer springs 6 are connected to the braces or arms *d*, as indicated in Fig. 7. The saw is reciprocated by the movements of the bar 3 imparted by the crank connections *c c'*.

The cylinder A is mounted at its ends on suitable supports D D, provided with bear-

ings for the hollow shafts d^2 d^2, through which the inlet and outlet pipes a a' pass for the circulation of ammonia-gas or refrigerating agent on the interior of the rotary freezer. The supports D D are also provided with bearings for shafts e e, one of which may have one of its ends provided with a pulley (not shown) for imparting motion, and these shafts e e carry rollers e' e', preferably of a pentagonal form, as shown. A belt E passes over the rollers e' e' for the purpose of receiving the ice as it drops from the saw, and this belt is made of open-mesh cloth or other suitable material, so as to permit any water that may be in the ice to pass through the same and fall onto a drainer E' below such belt. The ice is transported by the belt E to a vertical chute or open-ended tube F, having a hopper-mouth f at its upper end, into which the ice is dumped. This hopper-mouth is provided with a scraper f', which is either weighted or held in nearly a vertical position by a spring, (not shown,) and it is prevented from being pulled too far back by one or more lugs or pins f^2 on the inside of the hopper, as shown. By means of the belt and scraper all of the ice will be conveyed to the vertical chute or open-ended tube F and pass through the same to the rolls G G, located below the same.

The rolls G G are mounted on a suitable frame or post G' and are driven or rotated by any suitable power connection. These rolls are provided with concave or hollow peripheral receptacles g g, separated one from another by longitudinal and transverse ribs g' g', as shown in Figs. 4 and 5. The receptacles g g on each roll form one-half of what are shown as oval-sided and square-ended molds, which during the rotation of the rolls grasp the ice as it comes from the bottom of the chute or tube F and compress the same as the respective half-molds are brought together during rotation, and, finally, after compressing the ice in this form it is discharged beneath the roll onto a short slide or guide h placed below them, as shown in Fig. 1. This guide permits the ice thus molded to drop onto a carrier or belt H, driven by suitable power over the rollers h' h'. This belt or carrier H is provided with suitable pockets or receptacles for receiving and holding the cakes of ice during their further transportation to a slide or chute I, which leads either directly to a delivery-wagon or to a storage-room, such as shown in Fig. 2, which is also provided with a slide or chute I', leading to an outlet double door J J'. The door J is arranged to slide on a suitable rod i, passing through a space within the outer insulated door J'. As shown in Figs. 2 and 3, the ice by this means may be conveyed from the storage-room to a delivery cart or wagon K.

The water caused by melting as the ice drops from the freezer onto the carrier E is caught in a trough or drainer E', set on an incline and leading to a spout j and pipe j'', which empties into a tank or cistern L. The water is forced from this cistern by a pump M, connecting therewith by a pipe l, and passes from the pump through a pipe m, which leads through the rolls G G and empties into a jacket N, surrounding the ice chute or tube F. The water-jacket N is entirely closed at top and bottom and is provided at its top with a pipe n, leading into a receptacle or trough A', which supplies water to the freezer A. The force of the pump M is sufficient to cause an overflow from the tank N through the pipe n to the water-supply receptacle A'. By passing the water pumped from the cistern through the rolls G G and water-jacket N the temperature will be sufficiently raised to cause the ice to have a watery or slippery condition, which will insure its passing from the chute or tube F to the rolls G G and make it sufficiently weighty and compact to permit an easy solidification in the molds of the rolls as well as its dropping therefrom when compressed.

In the water-tank A' is laid a coil of pipe 7, which is fed or supplied with the refrigerating-gas from a return-pipe 8, leading back from the discharge-pipe a' and connected to the pipes of the coil in the water-tank, the gas thus lending its well-known agencies to the reduction of the temperature of the water in the tank.

Means are also provided for draining off any water which may be sqeezed out of the ice by the rolls or come from the ice on the carrier H and for leading the same into the cistern L through a spout l'. (Indicated by dotted lines.)

It will be observed that the ice chute or tube F and molds are within a room O, which is refrigerated or kept at a sufficiently low temperature by the expansion of a liquefying-gas in pipes o o, which may be connected with and form part of the system for supplying the refrigerating agent to the freezer A. In this way the ice when molded is prevented from melting, and the cakes will by reason of the low temperature in the room become harder, so that they may be conveyed or transported without loss. The low temperature in the room O makes the water circulation through the rolls G G and in the water-jacket N highly important for the purpose of keeping the ice sufficiently soft until after it has passed through the rolls and become molded in the manner already described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An ice plant or apparatus, comprising the freezing-cylinder within a suitable room, means for removing the ice from the surface of the cylinder, a horizontally-disposed conveyer on which the ice is deposited from the cylinder, a vertical chute at the delivery end of the said conveyer and extending down into a lower refrigerating-chamber, ice-compression rollers mounted at the lower end of

the chute, a slide below the said rollers, and an offtake-conveyer inclined upward from below the ice-compression rollers and at its upper end delivering into the upper portion of a storage-compartment.

2. An ice plant or apparatus comprising, the water-tank, the freezing-cylinder therein, means for removing the ice therefrom, an endless horizontal pervious conveyer to receive the ice as removed from the cylinder, a vertical jacketed chute into the upper end of which said conveyer delivers, hollow ice-compression molding-rollers at the lower end of the chute, a slide to receive the ice from the said rollers, an offtake-conveyer leading from the molding-rollers to a storage-chamber, a reservoir at a lower level than the molding-rollers to receive the drip therefrom, a trough under the said horizontal conveyer and also connected with the said reservoir, a pump to raise the water from said reservoir and discharge it down into the interior of the molding-rollers, a pipe connecting the outlet from said molding-rollers with the lower end of the chute-jacket, and a pipe connecting the upper end of the jacket with the main water-tank.

3. The combination with the water-tank, the rotating freezing-cylinder therein, and a vertical jacketed chute into which the ice is discharged from the cylinder, the upper end of the jacket having a pipe discharging into said tank, of hollow ice-molding rollers at the lower end of the vertical chute and having their outlet connected with the lower end of said chute-jacket, a reservoir to receive the water expressed by the said ice-molding rollers, a pump having a supply-pipe connected with the said reservoir, and a discharge-pipe connected with the inlet of the molding-rollers.

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