June 28, 1927. 1,633,712

M. RIBI

ICE MAKING MACHINE

Filed Sept. 14, 1925 3 Sheets-Sheet 1

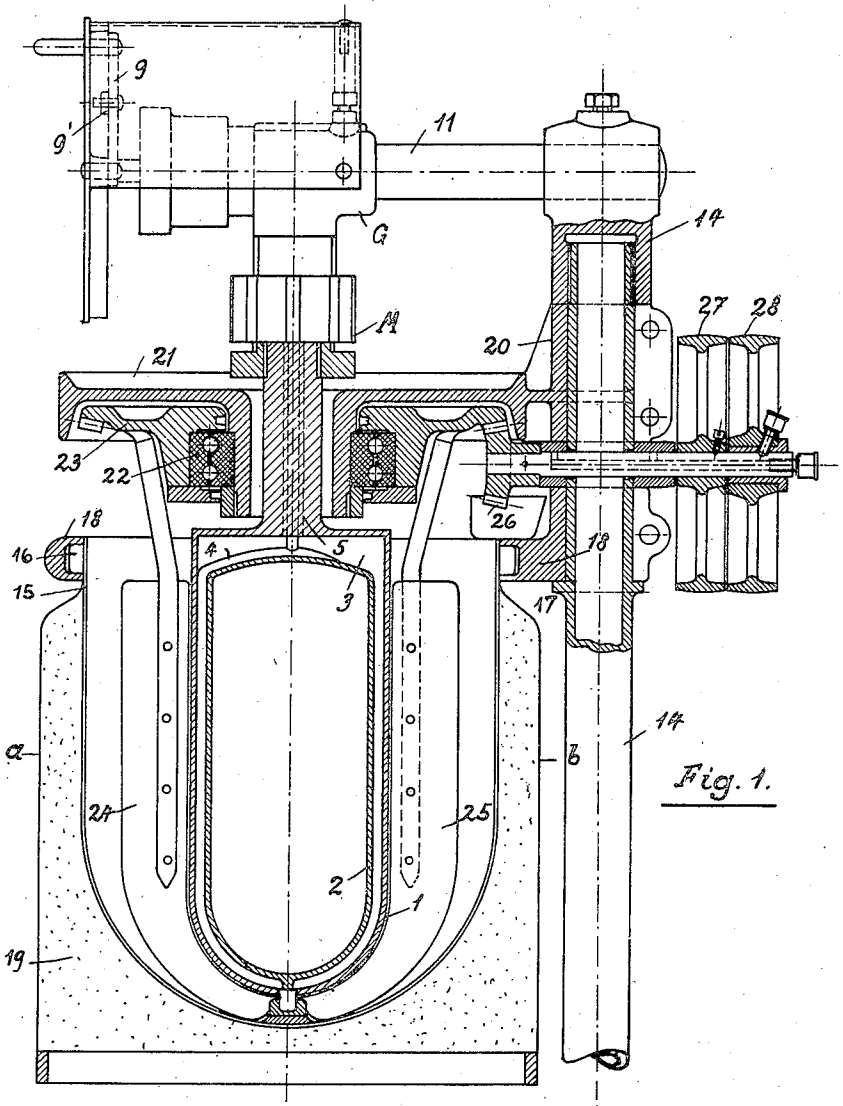


Fig. 1.

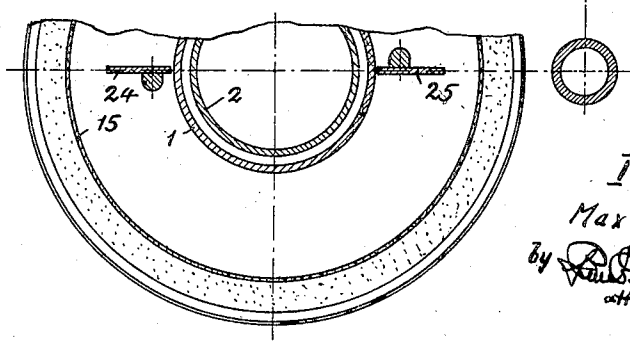


Fig. 2.

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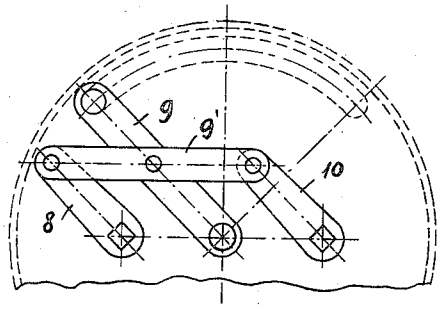


Fig. 5

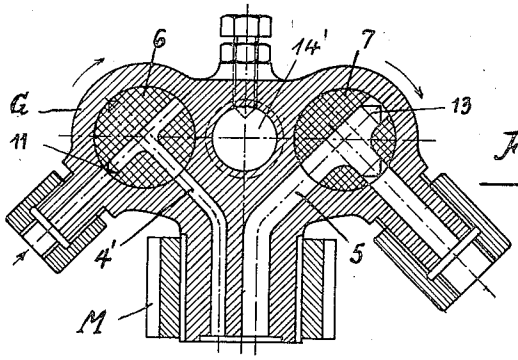


Fig. 4.

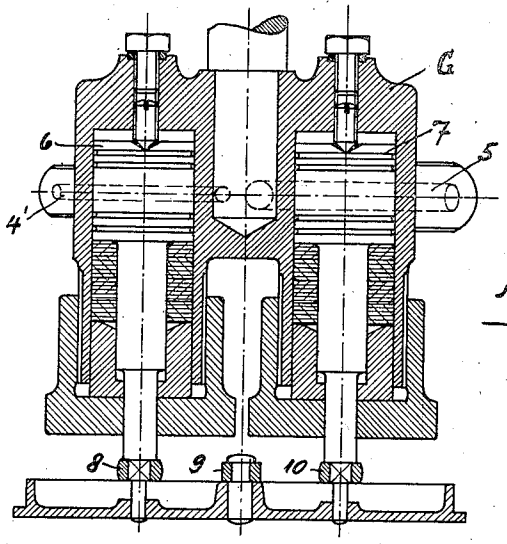


Fig. 3.

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ICE MAKING MACHINE

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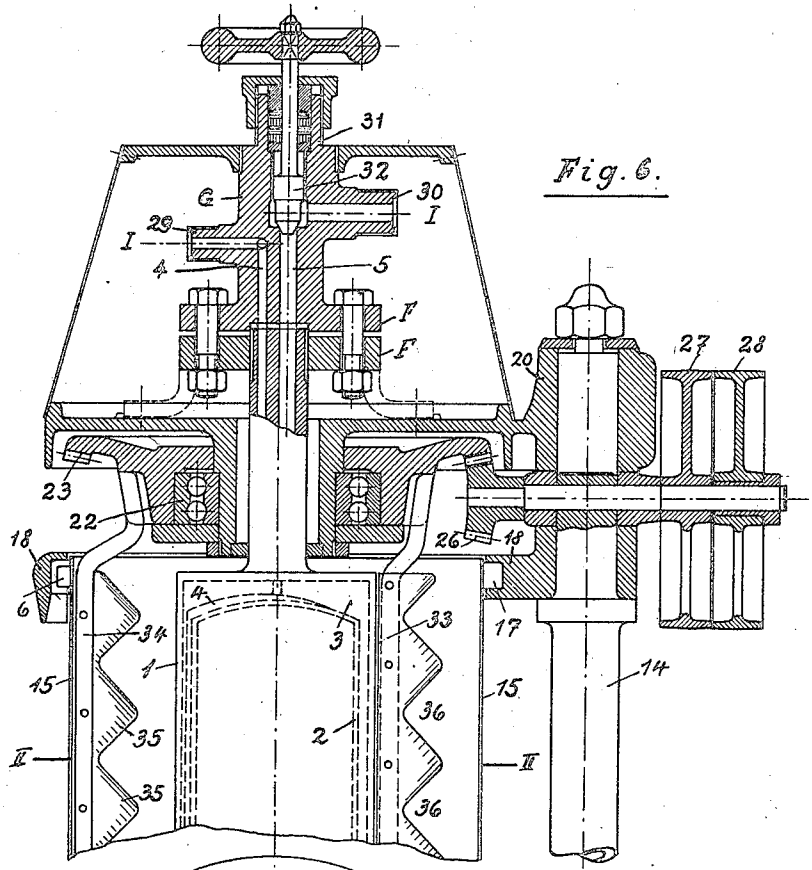


Fig. 6.

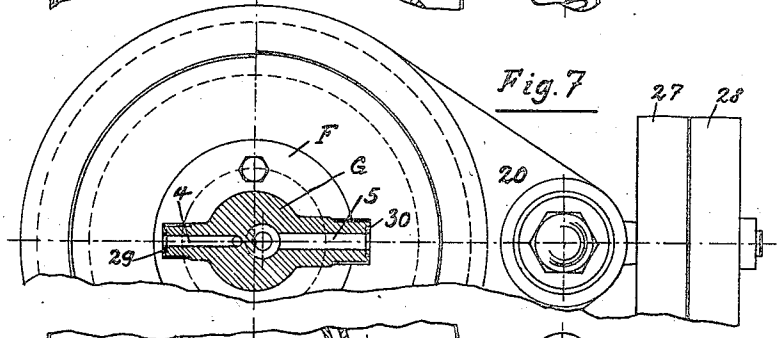


Fig. 7

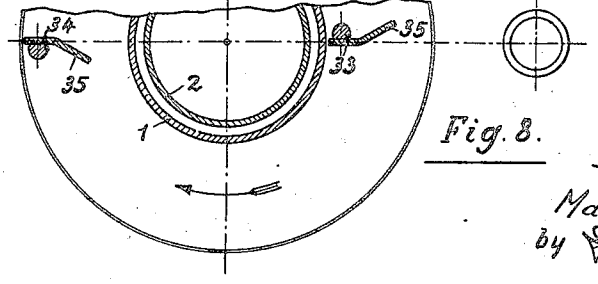


Fig. 8.

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Patented June 28, 1927. 1,633,712

UNITED STATES PATENT OFFICE.

MAX RIBI, OF ZURICH, SWITZERLAND, ASSIGNOR TO CATHARINA RIBI, OF ZURICH, SWITZERLAND.

ICE-MAKING MACHINE.

Application filed September 14, 1925, Serial No. 56,354, and in Switzerland September 29, 1924.

My invention has reference to improvements in ice-making machines and relates more particularly to machines for use in confectioners' shops, hotels, boarding houses, large households and the like.

One object of my invention is to provide a machine producing solid block ice, used for ordinary cooling purposes, as well as broken ice or ice in fine particles such as used for ice-cream packing, etc.

Another object of my invention is to provide a machine producing ice with great rapidity as compared with machines working with brine.

My invention will be best understood when described in connection with the accompanying drawings in which Fig. 1 is a central vertical longitudinal section of the machine, Fig. 2 is a section on line *a—b* of Fig. 1, Fig. 3 is a longitudinal section through the refrigerant distributing device, Fig. 4 a cross section of the same, Fig. 5 is a fragmentary end elevation of the refrigerant distributing device, Fig. 6 is a longitudinal section of a modification, Fig. 7 is a section on line I—I of Fig. 6 and Fig. 8 is a section on line II—II of Fig. 6.

According to the invention, the machine comprisses a hollow cylinder 1, in which a second cylinder 2 is placed in such a way, as to form, together with the cylinder 1 an expansion space or chamber 3, having the section of a ring. To this space 3 a pipe 4 leads, serving for the introduction of the cooling medium or refrigerant, such as ammonia, sulphurous acid etc. for evaporation. A conduit 5 leads out from the space 3 for the discharge of the gases. The two conduits 4 and 5 pass to a distributing device, disposed in a housing G fixed to the cylinder 1 by means of a sleeve M and containing two two-way cocks 6 and 7 (Figs. 3 and 4) of which cock 6 serves for the inlet, and cock 7 for the outlet of the refrigerant. By means of a lever-system, consisting of the levers 8, 9, 10 and the link 9′ (Figs. 4 and 5) the cocks 6 and 7 can be turned through an arc of 90° from the open position shown in Fig. 4 to the closed position shown in Fig. 3. The position shown in Fig. 4 is the inlet position for the refrigerant supplied to cock 6 in liquid form from the condenser (not shown). The cock 6 is provided with a nozzle 11 serving for the atomizing of the refrigerant before its entrance in the expansion chamber 3 through the conduits 4′, 4. The outlet cock 7 is also provided with a nozzle 13 serving to atomize any liquid particles of refrigerant on its passage to the condenser from the chamber 3. The described distributing device is fastened to the column 14 by means of a support 14′.

Surrounding the cylinder 1 is a casing 15 filled with water, and held in place by a ring 18, fastened to the column 14 by means of projecting lugs 16, 17, entering the notches of a (not shown) bayonet-lock. This casing may be enclosed, if desired, by a jacket 15 between which and the casing 15 a filling of insulating material may be placed.

The column 14 carries a bracket 20 to which is fixed a head or cover plate 21 provided with a stationary hub 20′ surrounding the conduit 5. This hub supports a ball bearing 22 for a bevel gear wheel 23 carrying propeller or agitator blades 24, 25. The bevel gear 23 is housed in a cavity in the underside of head 21 and is driven by means of the bevel gear wheel 26 actuated by the pulleys 27 and 28.

According to the modification (Figs. 6–8) the conduits 4 and 5 lead to a housing G connected to the hollow cylinder 1 by flanges F, F′ and provided with inlet and outlet passages 29, 30 connecting respectively with conduits 4 and 5, which housing is provided with a stuffing box for passage of the stem of a shut-off valve 32 whereby the circulation of the refrigerant may be cut off when desired.

The agitator or propeller in this construction consists of two saw-shaped blades carried by arms 33 and 34, each blade having a straight edge and a toothed edge, the latter presenting alternating V-shaped projections 35 and recesses 36. The blades are so disposed that in their rotation the straight edge of one blade contacts with the outer surface of the cylinder 1, while the straight edge of the other blade contacts with the inner surface and the jacket 15. The toothed edges of the two blades thus project radially inward and outward with respect to cylinder 1 and the blades traverse concentric rotary paths on opposite sides of the center of the water containing space or freezing chamber between the cylinder and jacket so as to agitate the body of water throughout its cross-sectional area. The projections 35 and recesses 36 of the two blades are equally spaced

but staggered with relation to each other, the projections of each blade lying in horizontal planes corresponding to the recesses of the other blade, so that in the rotation of the blades all portions of the water in a vertical direction will be agitated by the projections, as a result of which the ice as formed will be kept finely divided into small particles, in which condition it is highly suitable for use in packing ice cream and for other similar purposes.

The working of the described machine for producing solid ice, in which operation the agitator or paddle is not used, is as follows:

After the mantle 15 previously filled with water, is placed over the hollow cylinder 1, the cocks 6 and 7 are set in the position allowing the refrigerant to flow from the condenser through the cock 6. The refrigerant then enters the chamber 3 by way of the pipe 4 in which chamber it evaporates. Through this evaporation heat is withdrawn from the hollow cylinder 1 and therefore from the water surrounding it, which causes an immediate formation of ice. The form of the ice-block is a hollow cylinder which is easily removable upon the disconnection of the cylinder 1 from ring 18.

The production of ice-cream ice, i. e., broken ice or ice in small particles for ice cream packing, etc., is performed in an identical manner with the only difference that the agitator or propeller is employed to keep the water in motion during the freezing action.

What I claim is:

1. In an ice making machine, an upright support, a pair of superposed horizontal supporting members carried by said upright support, a valve casing mounted upon the upright support above the upper horizontal supporting member, an outer receptacle detachably suspended from the lower horizontal supporting member, a pair of cylinders disposed one within the other and forming an expansion chamber between them, said cylinder being arranged with the receptacle so as to form a freezing chamber between the receptacle and the inner cylinder, suspending means for said cylinders extending upwardly through the upper horizontal supporting member and fastened to the valve casing, said suspending means being provided with refrigerant flow passages connecting said valve casing and expansion chamber, and valve means in the valve casing for controlling the flow of the refrigerant.

2. In an ice making machine, an upright support, a pair of superposed horizontal supporting members carried by said upright support, a valve casing mounted upon the upright support above the upper horizontal supporting member, an outer receptacle detachably suspended from the lower horizontal supporting member, a pair of cylinders disposed one within the other and forming an expansion chamber between them, said cylinders being arranged with the receptacle so as to form a freezing chamber between the receptacle and the inner cylinder, suspending means for said cylinders extending upwardly through the upper horizontal supporting member and fastened to the valve casing, said suspending means being provided with refrigerant flow passages connecting said valve casing and expansion chamber, valve means in the valve casing for controlling the flow of the refrigerant, a rotary agitator for agitating the liquid to be frozen in the freezing chamber, a rotary gear element mounted on the upper horizontal supporting member for transmitting motion to said agitator, and drive gearing on the upright support for driving said gear element.

3. In an ice making machine, an inner expansion chamber for the expansion of a refrigerant therein, an outer freezing chamber concentric therewith, and a rotary agitator in the freezing chamber comprising blades rotating on opposite sides of the center of said refrigerating chamber, said blades having relatively outer straight edges and relatively inner toothed edges, the straight edges of the blades rotating in contact with the inner and outer walls of the freezing chamber and the toothed edges of the blades having their projections and recesses staggered with relation to each other.

4. In an ice making machine, an upright support, a pair of superposed horizontal supporting members carried by said upright support, a valve casing mounted upon the upright support above the upper horizontal supporting member, an outer receptacle detachably suspended from the lower horizontal supporting member, a pair of cylinders disposed one within the other and forming an expansion chamber between them, said cylinders being arranged with the receptacle so as to form a freezing chamber between the receptacle and the inner cylinder, suspending means for said cylinders extending upwardly through the upper horizontal supporting member and fastened to the valve casing, said suspending means being provided with refrigerant flow passages connecting said valve casing and expansion chamber, valve means in the valve casing for controlling the flow of the refrigerant, and a rotary agitator in the freezing chamber supported from the upper horizontal supporting member and comprising blades rotating on opposite sides of the center of said refrigerating chamber, said blades having relatively outer straight edges and relatively inner toothed edges, the straight edges of the blades rotating in contact with the inner and outer walls of the freezing chamber and

the toothed edges of the blades having their projections and recesses staggered with relation to each other.

5. In an ice making machine, an upright support, a pair of superposed horizontal supporting members carried by said upright support, a valve casing mounted upon the upright support above the upper horizontal supporting member, an outer receptacle detachably suspended from the lower horizontal supporting member, a pair of cylinders disposed one within the other and forming an expansion chamber between them, said cylinders being arranged with the receptacle so as to form a freezing chamber between the receptacle and the inner cylinder, suspending means for said cylinders extending upwardly through the upper horizontal supporting member and fastened to the valve casing, said suspending means being provided with refrigerant flow passages connecting said valve casing and expansion chamber, valve means in the valve casing for controlling the flow of the refrigerant, a rotary gear element on the upper horizontal supporting member, drive mechanism on the upright support for rotating said gear element, and a rotary agitator in the freezing chamber driven by said gear element and comprising blades rotating on opposite sides of the center of said refrigerating chamber, said blades having relatively outer straight edges and relatively inner toothed edges, the straight edges of the blades rotating in contact with the inner and outer walls of the freezing chamber and the toothed edges of the blades having their projections and recesses staggered with relation to each other.

MAX RIBI.