T. F. PHARO.

ICE MAKING APPARATUS.

APPLICATION FILED MAY 24, 1913. RENEWED JUNE 9, 1914.

1,127,275. Patented Feb. 2, 1915.

2 SHEETS—SHEET 1.

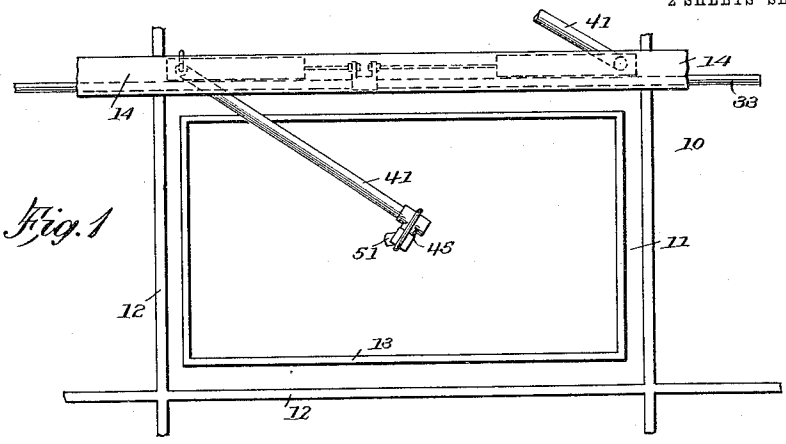


Fig. 1

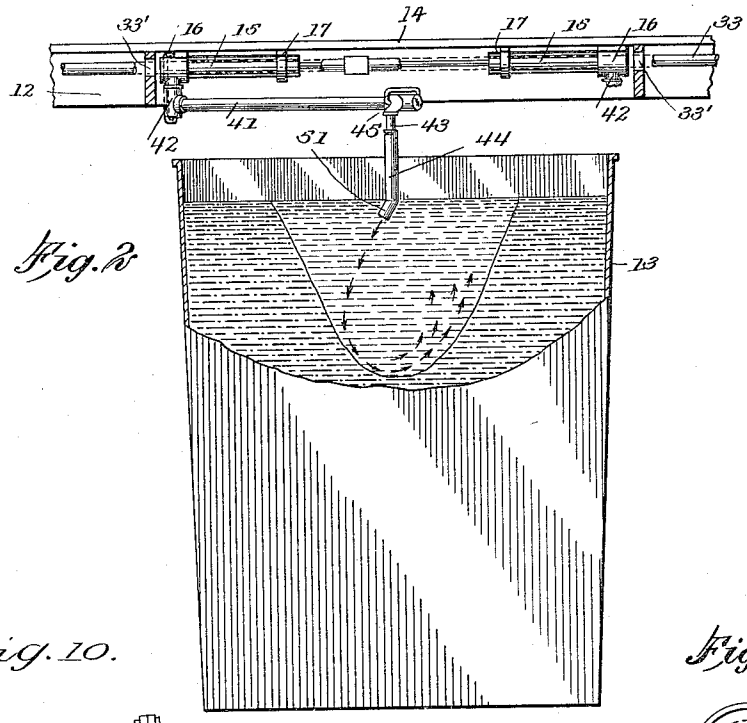
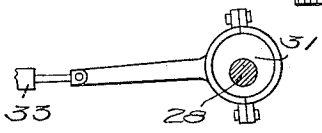


Fig. 2

Fig. 10.



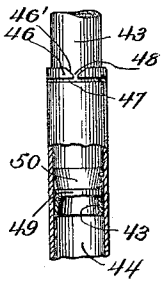
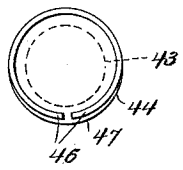


Fig. 8

Fig. 9



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 3

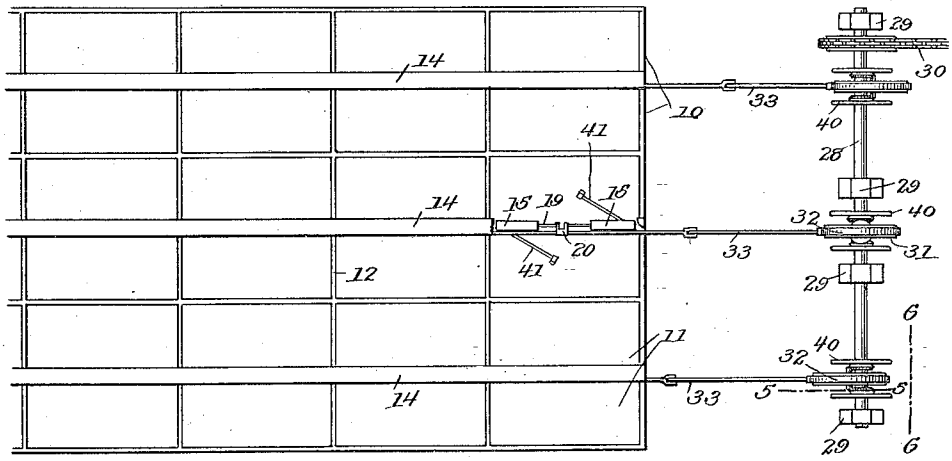


Fig. 4

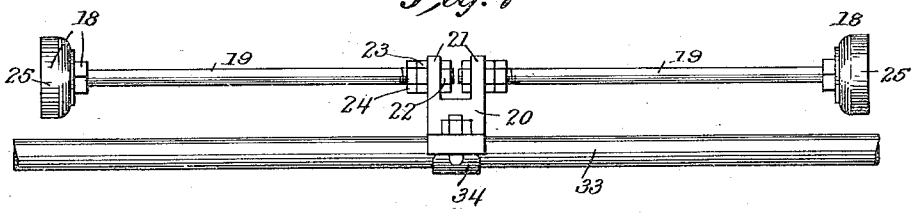


Fig. 5

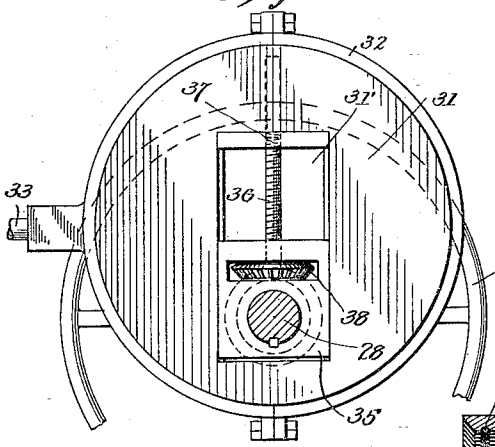


Fig. 6

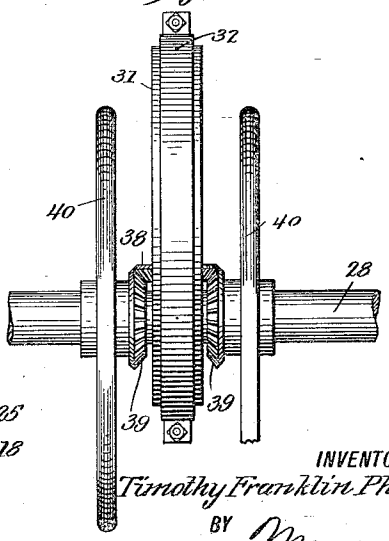
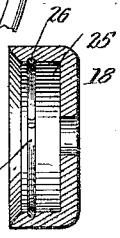


Fig. 7



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UNITED STATES PATENT OFFICE.

TIMOTHY FRANKLIN PHARO, OF TUCKERTON, NEW JERSEY.

ICE-MAKING APPARATUS.

1,127,275. Specification of Letters Patent. Patented Feb. 2, 1915.

Application filed May 24, 1913, Serial No. 769,582. Renewed June 9, 1914. Serial No. 844,082.

To all whom it may concern:

Be it known that I, TIMOTHY FRANKLIN PHARO, a citizen of the United States, and a resident of Tuckerton, in the county of Ocean and State of New Jersey, have invented a new and Improved Ice-Making Apparatus, of which the following is a full, clear, and exact description.

This invention relates to ice making machinery and has particular reference to apparatus employed in connection with the manufacture of ice by freezing the same in cans plunged into a tank of brine, the type of devices to which this invention relates being set forth in my previous Patent, No. 1,055,980, issued to me on the 11th of March, 1913.

Among the special objects of this invention is to provide an apparatus involving the use of a pump or an analogous means in connection with each can of water for the purpose of agitating the water in the can during the process of freezing so as to prevent the incarceration of air bubbles which cause the ice to have a snowy appearance and hence render the ice less salable. I have discovered and have proved in practice that the cloudy or snowy appearance of the ice due to the inclosed air bubbles may be obviated by keeping the surface of the water in the can open and causing the water to be circulated more or less while the freezing is taking place at the bottom of the can upwardly toward the top.

A further object of the invention is to so arrange the several agitating pumps with respect to the brine tank as to simplify the manipulation of the pump connections and nozzles with reference to the introduction and withdrawal of the cans into and from said tank without the necessity of making any disconnections of the devices.

A still further object of the invention is to simplify and improve the various details of mechanical devices.

The foregoing and other objects of the invention will hereinafter be more fully described and claimed and illustrated in the drawings forming a part of this specification in which like characters of reference indicate corresponding parts in all the views, and in which—

Figure 1 is a plan view showing the relation of the pump mechanism to the ice cans and framework at the top of the brine tank; Fig. 2 is a side elevation of the same, parts being in section; Fig. 3 is a plan view of a larger portion of the brine tank and indicating the relation thereto of the agitating mechanism; Fig. 4 is a plan view of a section of a pump rod, a clamp secured thereto, and a pair of pistons connected to said clamp; Fig. 5 is a vertical sectional detail on the line 5—5 of Fig. 3, indicating the means for varying the stroke of the pump pistons; Fig. 6 is a view at right angles to Fig. 5 from the plane indicated by the line 6—6 of Fig. 3; Fig. 7 is a detail of the pump piston packing; Fig. 8 is a detail of the agitator nozzle; Fig. 9 is a plan view of the upper end of the nozzle connection described below, and Fig. 10 is a detail of the connection between a driving eccentric and a pump rod.

The several parts of the device may be made of any suitable materials and the relative sizes and proportions as well as the general layout of the device may be varied to a considerable extent without departing from the spirit of the invention hereinafter more fully set forth and specifically claimed.

I show at 10 a brine tank having any suitable number or size of compartments 11 formed therein by means of the rectangular framework 12, each of said compartments being designed to accommodate a well known form of freezing can 13. The cans 13 are intended to be inserted into the brine through the rectangular spaces of the framework and there held in place during the freezing operation according to the well known process.

Extending longitudinally of the brine tank framework 12 are rails 14. Each of these rails extends along the longitudinal rib separating one longitudinal row of compartments 11 from the next. In other words, the number of rails 14 is preferably just one half of the number of longitudinal rows of compartments. These rails 14 are fixed in position with respect to the frame 12 in any suitable manner and are strong and rigid enough to withstand not only the traffic above the brine tank due to the manipulation of the cans of water and ice, but also are intended to carry on their under surface the pump portions of the agitator mechanism. As shown in Figs. 1, 2 and 3, that portion of the rail 14 between each two adjacent compartments 11 is fitted with a pair of pump cylinders 15 extending longitudinally of the rail in aline-

ment with each other and having their open ends directed toward each other with a space between the same. These pump cylinders are secured permanently and rigidly in position by means of clamps 16 and 17 secured to the under surface of said rail. Each cylinder is provided with a piston 18 connected to and operated by a piston rod 19. The piston rods 19 of each pair of pumps terminate adjacent each other and are connected detachably to a clamp 20 in the space, above referred to, between the cylinders. Said clamp is shown provided with a pair of spaced jaws 21, each having an open side. Each piston rod is fitted at its end with a fixed head 22 which may be in the form of a nut upset or riveted in place and adapted to lie upon the inner face of one of said jaws 21, the rod being adapted to slip in or out of said open side of the jaw. When the piston rod is put in place as just described, it will be set and locked by means of nuts 23 and 24. The piston is so made as to include a flexible bucket 25 adapted to be connected to the end of the piston rod 19 and provided on its inner surface with an annular seat or groove 26 into which is adapted to be sprung a split ring 27 which serves to keep the outer edge of the bucket spread outwardly into close fitting engagement with the inner surface of the cylinder.

Located at any convenient place in proximity to the brine tank is a power shaft 28 supported in bearings 29 substantially parallel to one side of the tank. This shaft is adapted to be driven by a power belt or chain indicated at 30. This shaft has mounted thereon any suitable number of adjustable eccentrics 31, such number preferably coinciding with the number of rails 14 above described. Each eccentric 31 is provided with a strap 32 to which is connected a pump rod 33 which extends along preferably beneath the corresponding rail 14, and the pump clamps 20 are secured rigidly to said rod by means of clamps 34. The several eccentrics connected to the power shaft 28 are preferably staggered so that the power required for operating all of the pumps at the same time will be distributed or equalized as much as possible throughout the system. In order to accommodate the apparatus to tanks or systems of varying sizes and also to vary the operation of some of the pumps without disturbing others and for other reasons, I provide means for readily varying the throw of the eccentrics, and hence the stroke of the pumps without stopping the engine or interfering with the ordinary or regular speed of the power shaft. As a simple and effective means for accomplishing this result, I connect each eccentric 31 to the power shaft 28 through a block 35 keyed to the shaft and having slidable connection with the eccentric disk 31, as shown in Fig. 5. In other words, the center of the disk or eccentric is adjustable radially toward or from the axis of the shaft and block 35. To this end I provide a screw 36 having threaded engagement in a stationary nut 37 in the end of the slot 31′ opposite the block 35. Said screw 36 has connected to it at its inner end a miter gear 38 extending laterally from said block, as shown in Fig. 6, and meshing with a pair of similar gears 39. Each of said gears 39 is sleeved upon the power shaft and has connected to it a hand wheel 40 concentric with said shaft. In normal operation said hand wheel and eccentric, and the devices connected between the same, all rotate with the shaft, and the stroke of the pumps corresponds to the eccentricity or throw of the eccentric in any adjustment. In order, therefore, to vary the eccentricity of the eccentric at any station, it is but necessary for the operator to grasp one of the hand wheels 40, and either hold it from rotation while the power shaft is operating, or otherwise manipulate it for the purpose of operating the screw 36 to cause the radial shifting of the eccentric while the shaft is running. The pump rods 33 are preferably guided and supported in bearings 33′ formed in the cross pieces of the frame 12.

Connected to the outer end of each pump cylinder is a tubular arm 41, the connection being through a hinge joint 42 providing for the swinging of the arm in a horizontal plane beneath the pump and rail thereover. To the opposite end of the arm 41 is connected a nozzle arm 43 having a telescopic section 44 fitted thereon. Said nozzle arm 43 is connected also by a hinge joint 45, as shown in Figs. 1 and 2, adapting it to swing in vertical planes whereby it may not only be adjusted vertically with respect to the depth of the water in the can being treated, but it may be swung upwardly to clear the upper edge of the can and then swung in the horizontal plane with the arm 41 out of the vertical range of the can, enabling the can to be inserted or withdrawn without any danger of interference with the pump arm connections. As one convenient and satisfactory means for connecting the telescopic nozzle 44 to the other portion of the nozzle arm I provide the upper end of said nozzle with a pair of spring fingers 46 formed integral with said nozzle by means of a transverse slit 47 adjacent said upper end and then severing or forming said fingers at their free ends by means of a longitudinal slit 48. The free ends of the fingers may then be bent inwardly, as shown in Fig. 9, for automatic coöperation with a shoulder 49 formed adjacent the lower end of the stationary member of the arm 43, formed by a circumferential groove 50. By beveling

the free ends of the fingers, as shown at 46′, the nozzle may be easily slipped upon the other member, and after being applied thereon, may be slipped along to any desired distance, but the form and arrangement of the fingers 46 will prevent the accidental removal of the nozzle from the other member by engagement with said shoulder 49. The lower end of the member 43 is preferably flared or spread slightly, as indicated at 43′, for the purpose of making a substantially close fit with the inner surface of the nozzle 44 whereby special packing is avoided. The lower end of the nozzle is provided with an elbow 51 for the purpose of directing the currents of water as may be required.

The operation of the device may be briefly described as follows: With the power shaft in rotation in either direction and the several pump rods 33 being reciprocated thereby through the eccentrics 31, the pump pistons will all be reciprocated according to the eccentricity or throw of the eccentrics as above described. A can of water may be introduced into any vacant compartment 11 after the arm 41 and its nozzle connection 43 have been swung in a horizontal plane beneath the rail 14. After the can has been set in the brine and secured in any well known manner, said arm 43 is swung outwardly to or toward the position indicated in Fig. 1, and the nozzle arm 43 swung downwardly into or in the position shown in Fig. 2 with the nozzle 44 extended so as to reach beneath the surface of the water which, in practice, must be far enough below the upper edge of the can to provide for the necessary expansion during the freezing. By operating the pumps at a comparatively slow speed, the water at the center of the top of the can will be kept open, preventing the freezing over at this point while the ice is forming at the sides and bottom thereof. Any sediment which may be in the water will collect in the pocket or cap resulting adjacent the top when the freezing is nearly completed, and such dirty water, if desired, may be removed therefrom by any suitable or convenient means (not shown) and the cavity, upon being filled with clear water, will insure a perfectly clean clear block of ice when finished.

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

1. In ice making apparatus, the combination with a brine tank having a plurality of compartments for individual cans, of a plurality of rails extending longitudinally and horizontally of said tank in parallel relation to one another, a pump rod supported for reciprocation below each of said rails, a power shaft, means to operate all of said pump rods simultaneously from said shaft, a pair of pump cylinders connected to the under surface of each of said rails, arms pivotally connected to said pump cylinders and adapted to swing in a horizontal plane outwardly therefrom into coöperation with two adjacent compartments on opposite sides of said rail, an adjustable nozzle arm hinged to the outer end of each of said arms, and a pair of pistons in said cylinders connected adjacent their outer ends to the adjacent pump rod.

2. In ice making machinery, the combination with a brine tank and a frame thereover including a longitudinal rail, of a pump rod extending along and beneath said rail, means to reciprocate the rod, a clamp secured to said rod beneath said rail and between two adjacent tank compartments, said clamp having a pair of spaced jaws, a pair of pump cylinders secured in spaced relation in alinement with each other to the under surface of said rail, pistons in said cylinders, piston rods detachably connected at their free ends in said spaced jaws of the clamp, and adjustable tubular connections leading from the rear ends of the cylinders into said compartments on opposite sides of the pump rod.

3. In ice making apparatus, the combination with a brine tank including a plurality of individual ice can compartments arranged in parallel pairs of rows and a rail extending along and between each pair of said rows, of a power shaft arranged transversely of said rows of compartments, pairs of pump devices connected to the under surfaces of said rails and including adjustable arm connections to communicate with the compartments on either side thereof, a plurality of pump rods arranged in parallel relation and each extending beneath one of said rails, connections between the respective pump devices and said rods, and means connecting all of said pump rods with the power shaft, said connecting means including devices for varying the stroke of the pumps while the operation of the power shaft remains undisturbed.

4. In ice making apparatus, the combination with a brine tank and a framework above the same forming a plurality of ice can compartments, of pump cylinders connected in pairs to said framework, the cylinders of each pair being arranged in longitudinal alinement with their open ends adjacent each other, pistons within said cylinders, piston rods extending from said pistons toward each other, a pump rod extending along said cylinders, a single clamp connected to said pump rod in the space between the adjacent cylinders of the same pair, and means to detachably connect said pump piston rods to said clamp.

5. In a water agitator for ice making apparatus, the combination of a pump cylin-

der, means to secure it in fixed position, a tubular arm connected to one end of the cylinder and adjustable therearound in a horizontal plane, and a nozzle arm connected to the outer end of said first mentioned arm and movable around its point of connection in vertical planes independently of said first mentioned arm, said nozzle arm including a telescoping section provided with means to prevent accidental displacement thereof from the other part of the arm.

6. In a water agitator for ice making apparatus, the combination of a pump cylinder, means to secure it in fixed position, a tubular arm connected to one end of the cylinder and adjustable therearound in a horizontal plane, and a nozzle arm connected to the outer end of said first mentioned arm and movable around its point of connection in vertical planes independently of said first mentioned arm, said nozzle arm including two telescopic sections, one of said sections having an annular groove forming a shoulder and the other having a pair of fingers adjacent its end embracing the other section and adapted to coöperate in said groove and against said shoulder, substantially as and for the purposes set forth.

7. The combination of a series of water containers; means for freezing the water therein; and means for agitating the water in the containers, including members extensible over the same while the freezing is in progress, and movable into retracted positions to permit of the unobstructed removal of the containers after the water has been frozen.

8. The combination of a brine tank; a frame work mounted over the same and including a series of parallel members; water containers in said tank; with means for agitating the water in the containers, including members respectively extensible over the same when the freezing is in progress, and movable into the positions adjacent said parallel members to permit of the unobstructed removal of the containers after the water has been frozen.

9. The combination of a series of water containers; means for freezing the water therein; and means for agitating the water in said containers, the same consisting of a jointed conduit mounted adjacent the side of each container and extensible over the same while the freezing is in progress and being retractable to the side of said container to permit of the free removal thereof when the water has been frozen; with means for causing movement of the fluid in each conduit.

10. The combination of a series of water containers; means for freezing the water therein; and means for agitating the water in said containers during the freezing, the same consisting of a conduit mounted adjacent each container and free to swing on a vertical axis extending at one side of the same; a second conduit pivoted to the free end of each of said first conduits so as to swing on a horizontal axis; and means for causing movement of fluid in each of said conduits.

11. The combination of a brine tank; a frame mounted above the same; substantially parallel rails adjacent the frame; a series of water containers in the tank; pumps mounted under the rails respectively adjacent the containers; means for actuating the pumps; conduits respectively connected to the pumps so as to swing on vertical axes; other conduits respectively connected to said first conduits and free to swing on horizontal axes, each pair of conduits being extensible over the containers while the freezing is in progress and being foldable under the rails upon completion of the freezing to permit of the unobstructed removal of the containers.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

TIMOTHY FRANKLIN PHARO.

Witnesses:
WM. C. JONES,
HARVEY E. PHARO.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."