W. B. KIRKPATRICK.

APPARATUS FOR MANUFACTURING ICE.

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1,162,075. Patented Nov. 30, 1915.

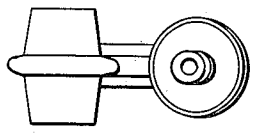


Fig. 2.

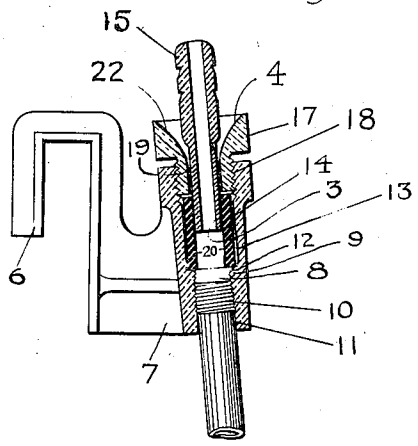


Fig. 1.

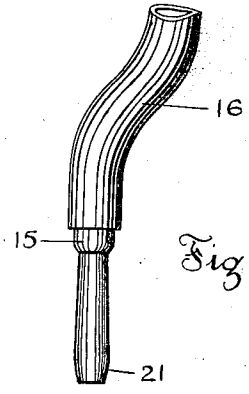


Fig 4.

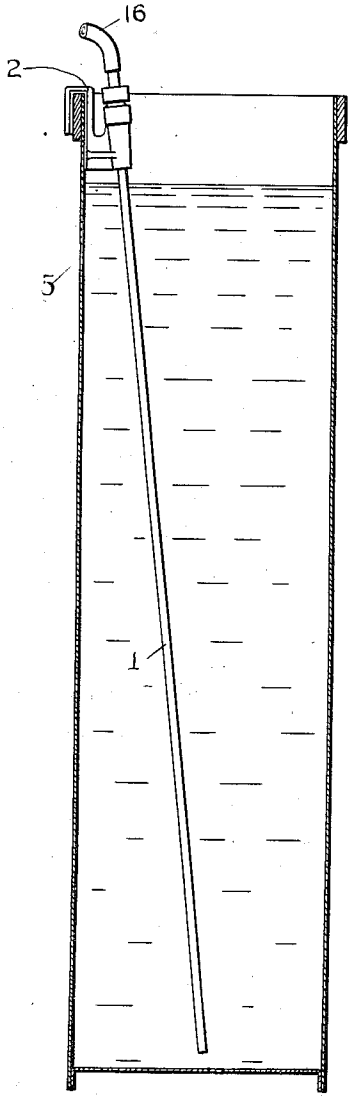


Fig. 3.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MANUFACTURING ICE.

1,162,075. Specification of Letters Patent. Patented Nov. 30, 1915.

Application filed March 29, 1915. Serial No. 17,617.

To all whom it may concern:

Be it known that I, WILLIS B. KIRKPATRICK, a citizen of the United States of America, residing in the city of Baltimore, State of Maryland, have invented certain new and useful Improvements in Apparatus for Manufacturing Ice, of which the following is a specification.

This invention relates to an improvement in apparatus for manufacturing raw water ice of the general type described in my copending application No. 6987, the device herein described being adapted for use as a substitute for the corresponding parts of the apparatus described in the previous application. That application relates to the manufacture of raw water ice and particularly to means for supplying air in such a manner as to cause the agitation of the water to be continuous and thus to prevent impounding of the suspended matter in the body of the ice. The air by which the water was agitated was supplied by means of a central vertical drop pipe which was frozen into the cake of ice and later removed by steaming.

The present invention relates to an improved means for delivering air and particularly to the use of a pipe which is straight like the central drop pipe of the previous application but which, instead of being vertical, is placed at an angle to the vertical, preferably extending from a point near the side of the can at the top to a point near the center slightly above the bottom. When the pipe is in this position, the air, being delivered at an angle to the vertical, as it loses its downward velocity, turns upward on one side of the outlet of the pipe, causing a swirl which is more effective in keeping the suspended matter in motion, and preventing it from becoming impounded in the ice, than is the agiation produced by the more generally diffused air delivered from the vertical tube. In the latter instance, the air is first projected directly downward from the end of the tube and rises upward on all sides with a greater tendency to diffusion than when delivered from the inclined pipe. Also, as the freezing progresses, the flow from the inclined pipe passes upward by a single direct channel and is more effective in keeping open the path by means of which the air escapes to the surface than is the flow from the vertical pipe.

The invention relates to the use of a straight pipe which can be easily withdrawn from the frozen cake when heated, the pipe being placed at an angle to give the result stated and also to means for supporting the pipe in this position.

The invention further relates to a convenient means for connecting and disconnecting the air pipe and to a guide for the steam nozzle used in thawing out the delivery pipe prior to withdrawing it.

The drawings which form a part of this application show a can of the kind used in the manufacture of can ice and in connection with this. there is illustrated an air delivery pipe mounted in accordance with my invention. I also show details relating to the air connection and steam nozzle guide.

Figure 1 is a view showing partly in section and partly in elevation a clamp adapted to hold the air delivery pipe in the inclined position described; the figure also shows the air connection and nozzle guide; Fig. 2 is a plan of the same; Fig. 3 is a vertical central section through a can of the type used in the manufacture of can ice showing in elevation within the can an air delivery tube mounted in accordance with the principles of my invention, a bracket for supporting the tube, and, in a general way, the air connection and steam nozzle guide; and Fig. 4 shows a portion of the external air supply pipe with the removable portion of the air connection attached.

Referring to the drawings by numerals; the preferred form of the invention illustrated includes a straight delivery pipe 1 set at an angle to the vertical, means in the form of a bracket 2 for supporting the pipe, a removable air pipe connection 3 carried by the supporting bracket at the top of the delivery pipe, and a steam nozzle guide 4, also carried by the bracket.

As the air is preferably delivered at the bottom of the can near the center, and the delivery pipe is inclined in order to direct the current of air in the manner most favorable to continuous and uniform agitation of the freezing liquid which prevents the suspended foreign matter from becoming impounded in the ice, the pipe is prefer-

ably extended from the top of the can at one side of the center to the center near the bottom and is conveniently supported on the top edge of the can by means of the bracket 2 which is a feature of this invention. This bracket is strengthened by webs as shown to give it the necessary rigidity. In the form shown, it includes a hook 6 which takes over the edge of the can and an arm 7 which projects into the can. This arm is apertured at 8 in a direction inclined to the vertical, the aperture being preferably directed toward the center of the can near the bottom. This aperture has a threaded portion 9 near the bottom to engage a correspondingly threaded end 10 of the delivery pipe, and below the thread at 11, the aperture is preferably smooth and of a diameter to fit the outside of the pipe and serve as a guide and support for the pipe. Above the threaded portion, the aperture is enlarged forming a shoulder 12 and a chamber 13 in which is a rubber sleeve or tube section 14 which should be of pure rubber gum to resist the action of heat and steam used in removing the delivery tube from the cake of ice. This rubber sleeve or ring 14 forms an adjustable gripping member to engage the metal tip 15 which is secured to the flexible air supply pipe 16, of which there is one to each can, the supply pipes being connected to the compressed air mains in accordance with the description of the previous application referred to herein. To vary the intensity of the grip, a nut or screw plug 17 is provided which engages an internal thread 18 in the apertured portion of the bracket. This plug has a central hole or opening 19 to admit the tip 15 of the supply pipe. To increase the intensity of the grip, the plug 17 is screwed down against the rubber ring compressing it and reducing the size of the central opening 20 in the ring or sleeve. For the purpose of making the engagement effective, the tip 15 is crowned or enlarged at its lower end at 21 so as to offer increased resistance to the withdrawal from the socket or gripping member 14, and the butt is made to fit the tube having circumferential grooves or barbs to improve the engagement.

Another important feature of the device is found in the positioning or guiding surface 22 which serves as a means for locating the steam nozzle or needle. When freezing is completed and it becomes desirable to remove the delivery pipe from the cake of ice, steam is injected into it to raise the temperature of the pipe and thaw the immediately surrounding ice and release the pipe. This cannot be done conveniently by admitting steam to the top end of the air pipe. In order to accomplish the desired result, the steam must be delivered to the bottom of the air pipe and to this end, a steam needle or elongated nozzle is used which is substantially the length of the air pipe from the bracket to the bottom end. This steam nozzle is thrust into the delivery pipe after the air supply pipe 16 has been disconnected, and on account of the length of the nozzle, considerable difficulty is experienced in inserting it. To form a suitable guide for this nozzle, the nut 17 has been cupped as described, at 22, forming an external guide surface or conical concavity, the axis of the cone being concentric with that of the air pipe.

The advantages of the invention are found, first, in the fact that the air thus delivered from the inclined pipe produces more thorough agitation and thus keeps the foreign matter in suspension to better advantage than when the air is more generally diffused as by a vertical pipe; that after freezing has taken place, choking of the air passage is less apt to occur on account of the fact that the current of air, instead of being diffused, is directed into a single channel. Placing the pipe in this way also has the advantage that it leaves the center of the can near the top unobstructed so that when water having a high content of foreign matter is used, the core may be pumped out near the end of the freezing process, removing all the impurities and the inclined pipe offers no obstruction to this operation. The pipe placed in this position has the advantage over an outside pipe or one placed in the corner of the can, that it is not subject to the lowest temperatures until the freezing process is well advanced so that condensation of moisture with consequent choking of the pipe is less apt to occur. Freezing takes place first at the sides well below the top, and more rapidly at the sides than at the bottom where the circulation of brine is not active, so that the pipe is not subject to a temperature below 32° until freezing has been in progress for a considerable period, and even then, the temperature of the ice which comes in contact with the pipe is not as low as that of the brine to which the outside pipes or those placed directly against the walls of the can are subject. Another advantage of this construction is that the connection is near the header and also the length of hose required is shorter and therefore cheaper and easier to handle.

By means of the removable connection which I have described, the intensity of the grip taken by the stationary member upon the removable tips of the supply pipe, may be varied at will as the rubber wears, so that the life of the parts is almost interminable, and, in addition to this, the connections may be made with the shortest possible delay. When freezing is completed, the air pipes are withdrawn instantly and the steam nozzle inserted by way of the guide 22 without appreciable difficulty, and the operation is

accomplished instantaneously in the case of each can.

The improvement relates to the perfection of the product as well as to efficiency and economy of operation.

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

1. Means for agitating water in the manufacture of raw water can ice having in combination, a can, an air supply pipe and an air delivery pipe, the latter being straight placed in a position inclined to the vertical and extending through the body of water near the central portion substantially to the bottom of the can.

2. Means for agitating water in the manufacture of raw water can ice having, in combination, a can, an air supply pipe, an air delivery pipe of a length approaching the depth of the can, the pipe being straight and placed at an angle to the vertical so that it extends nearly to the bottom of the can, the submerged portion of the pipe being well away from the sides of the can, and means for supporting the delivery pipe in such position in which it is inclined to the vertical.

3. Means for agitating water in the manufacture of raw water ice including an air supply pipe, a straight and rigid air delivery pipe which is inclined to the vertical and extends from a point near the top of the can at one side of the center to a point near the bottom of the can and near the center, and means for supporting the delivery pipe in the position described.

4. Means for agitating water in the manufacture of raw water can ice, including a can, a hook engaging the top edge of the can and having an arm extending inward, the arm being apertured at an angle to the axis of the can so that the aperture points toward the center of the can at the bottom, a rigid delivery pipe secured in the aperture and extending toward the center of the can near the bottom, and means for leading air to the upper end of the air delivery pipe.

5. In an apparatus for agitating water in the manufacture of raw water ice, a flexible air supply pipe, an air delivery pipe, a bracket for holding the delivery pipe, the same being apertured to receive the delivery pipe and the supply pipe, a rubber ring in the aperture, a tip on the supply pipe to engage the ring and means for compressing the ring to vary the size of the opening and the gripping force with which the tip is engaged.

6. In an apparatus for agitating water in the manufacture of raw water can ice, a supply pipe and a rigid delivery pipe for delivering air near the bottom of the can and means for supporting the delivery pipe, said means having an aperture to receive the ends of the delivery pipe and the supply pipe respectively, a flexible ring mounted in said aperture, means for compressing the ring to vary the size of the aperture, and means on the supply pipe to be inserted in the aperture to complete the connection.

7. An apparatus for agitating water in the manufacture of raw water can ice including a rigid delivery pipe, means for supporting the delivery pipe, said means having an aperture to receive the delivery pipe, the upper end of said aperture having a conical opening to act as a guide for the steam nozzle in thawing.

8. An apparatus for agitating water in the manufacture of raw water can ice including a rigid air delivery pipe, a flexible supply pipe having a rigid tip, a support for the adjacent ends of both pipes apertured to admit the upper end of the delivery pipe and the tip of the supply pipe, a flexible ring in said aperture adapted to receive the rigid tip of the supply pipe and means for compressing the ring in the form of a threaded plug, adapted to engage a thread in the aperture, the plug being centrally apertured and the upper end of the aperture in the plug being flared to serve as a guide for the steam nozzle when the supply pipe is withdrawn.

9. In an apparatus for manufacturing ice, a can to hold the water to be frozen and means for delivering air at the bottom of the can to agitate the water in freezing, in the form of a straight pipe inclined to the axis of the can having its lower end in the bottom of the can, all submerged portions of the pipe being spaced well away from the sides of the can.

Signed by me at Baltimore, Maryland, this 26th day of March, 1915.

WILLIS B. KIRKPATRICK.

Witnesses:
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H. H. WALDKOENIG.