Dec. 21, 1937. C. T. WALTER 2,102,866

CHILLING DEVICE

Filed Aug. 15, 1935 3 Sheets-Sheet 1

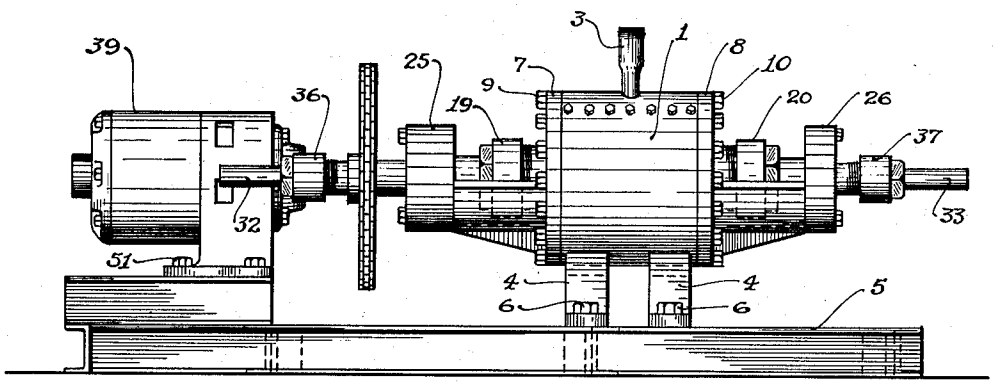


Fig. 1

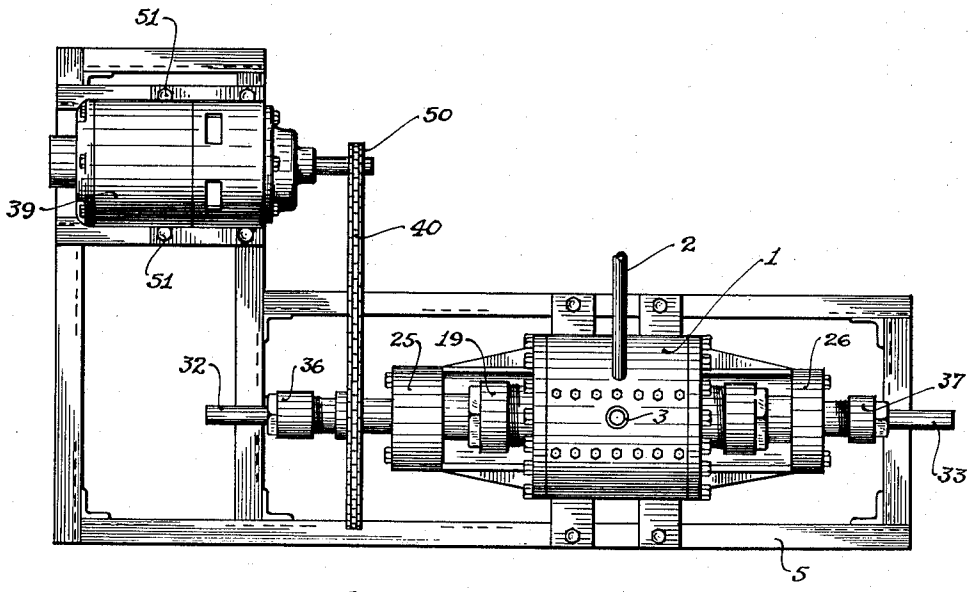


Fig. 2

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WITNESS -
Wm C. Meiser

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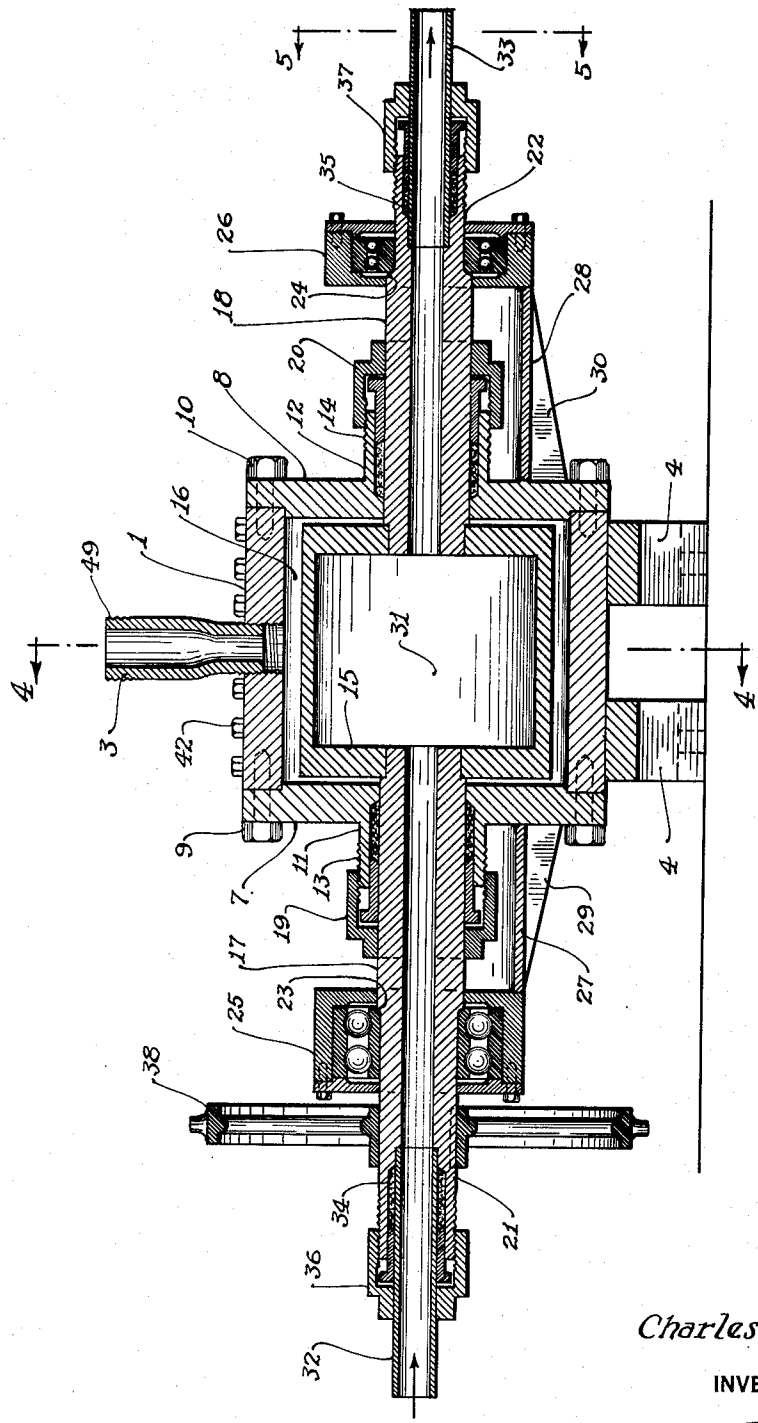


Fig. 3

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Filed Aug. 15, 1935 3 Sheets-Sheet 3

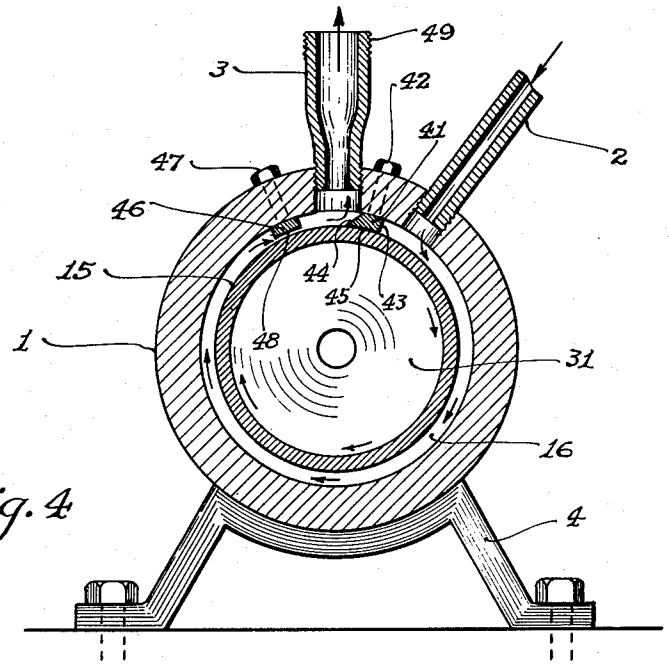


Fig. 4

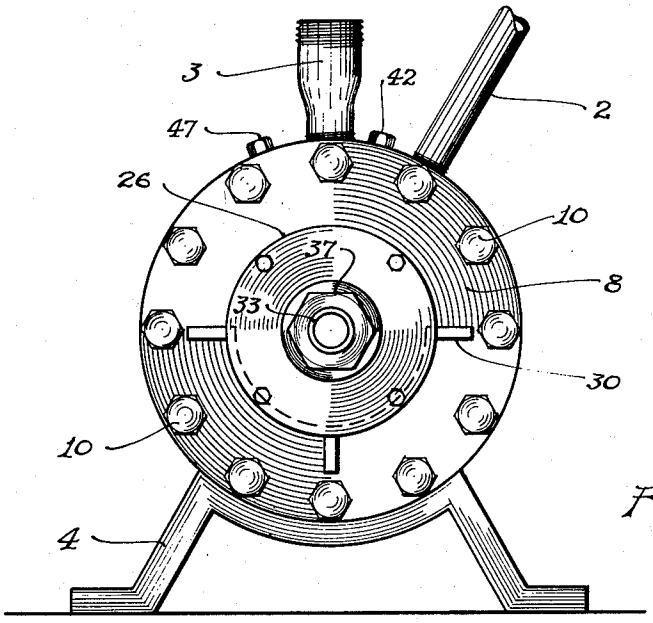


Fig. 5

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Patented Dec. 21, 1937 2,102,866

UNITED STATES PATENT OFFICE

2,102,866

CHILLING DEVICE

Charles T. Walter, Chicago, Ill., assignor to Industrial Patents Corporation, Chicago, Ill., a corporation of Delaware

Application August 15, 1935, Serial No. 36,415

16 Claims. (Cl. 257—96)

This invention relates to a chilling device.

One of the objects of this invention is to provide a simple, practical and comparatively inexpensive chilling device of strong durable construction, designed for chilling fluid products, such as hot soap and the like, to a stiff pasty mass.

Another object of this invention is to provide an internal chilling device having means near the place of discharge for separating the solidified portion of the chilled product from the unsolidified portion, permitting only the solidified portion to pass from the chilling chamber.

Another object of this invention is to provide means in an internal chilling device for removing the solidified portion of the product from the surface of the chilling means, thereby maintaining maximum efficiency of the refrigerating surface.

Another object of this invention is to provide means in an internal chilling device for positively directing the inflowing liquid over a rotatable chilling element in the direction of rotation thereof.

Another object of this invention is to provide a device in which hot fluid which is congealable by temperature reduction, upon being passed between a fixed casing and a rotatable chilling element in heat exchange relationship therewith, will be chilled to a stiff pasty mass, a solidified portion of which will be separated therefrom, removed from contact with the surface of the chilling element and discharged from the machine.

Other objects of the invention will be apparent from the description and claims which follow.

For a full understanding of the several aspects of this invention, reference may be had to the drawings in which similar reference characters in the several figures indicate similar elements.

Figure 1 is a side elevation illustrating a preferred embodiment of the present invention.

Figure 2 is a plan view of the device shown in Figure 1.

Figure 3 is an enlarged vertical sectional view of the device shown in Figure 1, the motor and framework being omitted.

Figure 4 is a vertical sectional view taken on line 4—4 of Figure 3.

Figure 5 is an end elevation taken on line 5—5 of Figure 3.

In the accompanying drawings in which is illustrated one embodiment of the invention, 1 designates an outer cylindrical shell provided with inlet and outlet pipes 2 and 3, respectively. Shell 1 is mounted upon standards or uprights 4 secured to suitable framework 5 by bolts 6. Heads 7 and 8 are secured at the ends of shell 1 by annular series of bolts 9 and 10 studded in the ends of shell 1. Heads 9 and 10 are provided with central hub extensions 11 and 12 having exteriorly threaded ends 13 and 14, respectively.

Shell 1 and heads 7 and 8 form a casing for rotary cooling drum 15 arranged therein. Rotary cooling drum 15 is concentric with shell 1 and spaced therefrom a sufficient distance to provide space 16 for passage of the product between pipe 2 and outlet pipe 3.

Drum 15 terminates slightly short of heads 7 and 8 to prevent frictional engagement thereagainst as it is rotated therebetween. Drum 15 is supported by tubular shafts 17 and 18 rotatably mounted in heads 7 and 8. Gland couplings 19 and 20 are secured on threaded portions 13 and 14 about shafts 17 and 18 to prevent leakage of product from the chilling chamber.

Shafts 17 and 18 are provided with reduced portions 21 and 22 to provide shoulders 23 and 24. The reduced portions 21 and 22 are journaled within bearings 25 and 26 of the anti-friction type, the bearings 25 and 26 being arranged to abut shoulders 23 and 24 to prevent thrust movement of drum 15 between heads 7 and 8.

Anti-friction bearings 25 and 26 are secured to brackets 27 and 28 extending from heads 7 and 8, respectively. Brackets 27 and 28 are supported against bending by a number of webs as 29 and 30 extending from the outer ends of brackets 27 and 28 to heads 7 and 8.

Rotary cooling drum 15 consists of a hollow cylinder forming an interior refrigerant chamber 31. The hollow portions of tube 17 and 18 communicate with chamber 31, providing a passage for continuous circulation of a cooling medium through chamber 31.

Stationary inlet and outlet pipes 32 and 33 extend within annular recesses 34 and 35 at the outer ends of tubular shafts 17 and 18 and serve to carry the cooling medium to and from shafts 17 and 18. Gland couplings 36 and 37 are secured to shafts 17 and 18 about inlet and outlet pipes 32 and 33 to prevent leakage of the cooling medium between the inlet and outlet pipes and their respective shafts.

Drum 15 is rotated in a clockwise direction by sprocket 38 secured to shaft 17. Sprocket 38 is driven by motor 39 through chain 40 and sprocket 50. Motor 39 may be affixed to framework 5 by suitable bolts 51.

As shown in Figure 4, scraping element 41, consisting of an elongated bar, extends the full inner length of shell 1 and is secured by bolts 42 to the inner face of shell 1 in the space between inlet and outlet pipes 2 and 3. Scraping element 41 is provided with a square edge 43 adjacent inlet pipe 2 and a beveled edge 44 adjacent outlet pipe 3, the squared edge facing in the direction of rotation of drum 15 and the beveled edge counter thereto. Lower face 45 of scraping element 41 is fitted closely to drum 15 but without frictional engagement therewith.

If desired, scraper blade 41 may be spring loaded to insure close contact with the surface of the drum 15. I prefer, however, to employ a scraper blade rigidly affixed to the outer shell, the edge 44 of the scraper blade being placed in very close proximity to the rotating cylinder. This construction gives positive scraping.

However, this condition presupposes very good machine work in which the rotor is a perfectly circular cylinder, truly concentric with the supporting elements which rest in the bearings, and requires a rigid construction with bearings which will maintain accuracy over a long period of time. I have found that anti-friction bearings are best suited for this purpose.

It will be noted by reference to the drawings that the anti-friction bearings utilized in the machine are mounted in outboard fashion in order to protect the bearings from contact with the material to be chilled. This arrangement of parts wherein the scraper does not actually touch the rotor but is mounted extremely close to it gives very satisfactory results in practice and brings about a minimum amount of wear and stress on the machine. The scraper blade when rigidly mounted is subjected only to the wear of the product and not to frictional wear against the surface of the rotor nor is it forced outwardly by very stiff product on the surface of the rotor.

As fluid enters the chilling device through inlet pipe 2, squared edge 43 of scraping element 41 positively directs the fluid in the direction of rotation of drum 15. The chilled product adhering to the surface of drum 15 is removed by beveled edge 44 of scraping element 41 and directed through outlet pipe 3.

Gate member 46 consisting of an elongated bar extends the full inner length of shell 1 and is secured to the inner face thereof by bolts 47. Face 48 of gate 46 is spaced from drum 15 and serves to separate a solidified portion of the chilled product from the mass as the drum is rotated thereunder. Gate 46 is positioned in relation to the rotation of drum 15 such that the product will be separated prior to engagement with scraper 41. The solidified portion passing beneath gate 46 is engaged by scraping element 41 and removed thereby.

A liquid congealable by chilling is introduced under pressure to the chilling device through inlet pipe 2. The fluid upon entering space 16 flows in the direction of rotation of drum 15 by reason of the barrier formed by edge 43 of scraping element 41. The chilling medium circulating through drum 15 causes a portion of the fluid to solidify and adhere to the surface of the drum. Rotating drum 15 carries the solidified portion of the product beneath gate 46 to scraping element 41, by which it is removed and directed through outlet pipe 3.

I have found in chilling soap that by rotating drum 15 from ten to thirty R. P. M., a portion of the heated soap will become solidified, it being apparent, of course, that the slower drum 15 is rotated, the longer the fluid will be subjected to the chilling surface and consequently the more firmly chilled it will be at the point of extrusion.

If desired, extrusion nozzles may be secured to threaded end 49 of outlet pipe 3 through which the solidified product may be forced and formed into any desired shape. It has been found, however, that heated soap should be introduced through inlet pipe 2 at a pressure ranging from 500 to 3000 pounds per square inch depending upon the nature of the soap and the hydraulic system following the chilling device in order to satisfactorily utilize forming nozzles on outlet pipe 3.

In actual practice in the treatment of soap I have found that satisfactory results are secured with chilling drum 15 spaced substantially one-half inch from shell 1 and the face 48 of gate 46 spaced approximately one-sixteenth inch from drum 15.

This invention, while herein described as a device for chilling soap in fluid form, is also adapted for chilling other fluids such as shortenings, margarines, ice cream and other congealable fluids.

I claim:

1. A chilling device of the class described including a cylindrical shell, inlet and outlet means in said shell for the introduction and removal of a fluid product to be chilled therein and a rotatable drum arranged in spaced relation within said shell, said drum being provided with inlet and outlet means for the passage of a chilling medium therethrough, and a scraping element rigidly mounted in fixed spaced relationship to the surface of the drum for removing solidified product from the surface of the drum and directing the same through the outlet in the shell, said scraping element providing a surface relative to the shell inlet for directing fluid as introduced into the shell in the direction of rotation of the drum.

2. A chilling device of the class described including a cylindrical shell, inlet and outlet means in said shell for the introduction and removal of a fluid product to be chilled therein and a rotatable drum arranged in spaced relation within said shell, said drum being provided with inlet and outlet means for the passage of a chilling medium therethrough, and a gate member located on the inner face of said shell and spaced from said drum to separate a solidified portion of the chilled product from the mass.

3. A chilling device of the class described including a cylindrical shell, inlet and outlet means in said shell for the introduction and removal of a fluid product to be chilled therein and a rotatable drum arranged in spaced relation within said shell, said drum being provided with inlet and outlet means for the passage of a chilling medium therethrough, a gate member located on the inner face of said shell and spaced from said drum to separate a solidified portion of the chilled product from the mass and a scraping element located between said shell and said drum to remove the solidified portion from the surface of the drum and direct the same through the outlet means provided therefor.

4. A chilling device of the class described including a cylindrical shell, inlet and outlet means in said shell for the introduction and removal of a fluid product to be chilled therein and a rotatable drum arranged within said shell and spaced therefrom, said drum being provided with inlet and outlet means for the passage of a chilling medium therethrough, and a gate member spaced

from said drum consisting of an elongated bar extending the inner length of said shell and secured to the inner face thereof, said gate member constituting means for separating a solidified portion of the chilled product from the mass.

5. A chilling device of the class described including a cylindrical shell, inlet and outlet means in said shell for the introduction and removal of a fluid product to be chilled therein and a rotatable drum arranged within said shell and spaced therefrom, said drum being provided with inlet and outlet means for the passage of a chilling medium therethrough, and a scraping element located between the shell and the drum, said scraping element consisting of an elongated bar extending the length of the shell and secured to the inner face thereof having a beveled edge extending counter to the direction of rotation of the drum, said scraping element constituting means for removing solidified product from the surface of the drum and directing the same through the outlet provided therefor.

6. A chilling device of the class described including a cylindrical shell, inlet and outlet means in said shell for the introduction and removal of a fluid product to be chilled therein and a rotatable drum arranged within said shell and spaced therefrom, said drum being provided with inlet and outlet means for the passage of a chilling medium therethrough, and a scraping element located between the shell and the drum, said scraping element consisting of an elongated bar extending the length of the shell and secured to the inner face thereof having a squared edge facing in the direction of rotation of the drum and a beveled edge facing in the direction counter to the direction of rotation of the drum, said squared edge constituting means for directing fluid introduced through the fluid inlet in the direction of rotation of the drum and said beveled edge constituting means for removing solidified product from the surface of the drum and directing the same through the outlet provided therefor.

7. A chilling device of the class described having a casing comprising a cylindrical outer shell provided with inlet and outlet means for the introduction and removal of a fluid product and fixed heads at the ends of said shell, a cylindrical drum mounted upon tubular shafts arranged to rotate within said casing in spaced relation with said shell, inlet and outlet means communicating with said tubular shafts for passing a chilling medium through said drum and a gate member secured to the inner face of said shell and spaced from said drum to separate a solidified portion of the chilled product from the mass.

8. A chilling device of the class described having a casing comprising a cylindrical outer shell provided with inlet and outlet means for the introduction and removal of a fluid product and fixed heads at the ends of said shell, a cylindrical drum mounted upon tubular shafts for passing a chilling medium through said drum and a scraping element rigidly secured in fixed spaced relationship to the surface of said drum for removing solidified product from the surface of said drum and directing the same through the outlet provided in said shell, said scraping element providing a surface relative to said shell inlet for directing fluid as introduced into the shell in the direction of rotation of said drum.

9. A chilling device of the class described having a casing comprising a cylindrical outer shell provided with inlet and outlet means for the introduction and removal of a fluid product and fixed heads at the ends of said shell, a cylindrical drum mounted upon tubular shafts arranged to rotate within said casing in spaced relation with said shell, inlet and outlet means communicating with said tubular shafts for passing a chilling medium through said drum and a scraping element located between said drum and said shell and secured to the inner face of said shell having a squared edge facing in the direction of rotation of said drum and a beveled edge facing in the direction counter to the direction of rotation of said drum, said squared edge constituting means for directing fluid introduced through the fluid inlet in the direction of rotation of the drum and said beveled edge constituting means for removing solidified product from the drum and directing the solidified product through the outlet provided therefor.

10. In a chilling device of the class described having an outer shell provided with inlet and outlet means for the introduction and removal of a congealable material and a rotatable chilling drum therein, scraper means in fixed spaced relationship to the surface of said drum, said scraper means providing a surface relative to said shell inlet for directing fluid as introduced into the shell in the direction of rotation of said drum, said drum being mounted in anti-friction bearings exteriorly of the shell.

11. In a chilling device having an outer shell, a chilling drum rotatably mounted within said shell, inlet means for the introduction of a congealable material into said shell under pressure, and means mounted relative to the inlet means for directing the incoming material in the direction of rotation of the drum, means mounted relative to said drum surface for separating the congealed material from the mass, said separating means being located sufficiently apart from said inlet means to permit congelation of the congealable material adjacent the surface of the drum, and a scraper means mounted in fixed spaced relationship with said drum surface for removing the congealed material therefrom.

12. In a chilling device having a cylindrical shell provided with an inlet and outlet for the introduction and removal of a congealable compound introduced into said shell under pressure and a chilling rotor rotatably mounted within said shell, means mounted relative to said rotor surface for separating the congealed material from the mass and a scraper means mounted between said outlet and said inlet and adapted for removing the congealed material from the surface of said rotor and for directing the same through said outlet, said scraper means being rigidly mounted in fixed spaced relationship with said rotor surface.

13. In a chilling device having a cylindrical shell provided with an inlet and outlet for the introduction and removal of a congealable compound introduced into said shell under pressure and a chilling rotor rotatably mounted within said shell, means mounted relative to said rotor surface for separating the congealed material from the mass and a scraper means mounted between said outlet and said inlet and adapted for removing the congealed material from the surface of said rotor and for directing the same through said outlet, said scraper means being rigidly mounted in fixed spaced relationship with said rotor surface and providing a surface relative to said inlet for directing the material as introduced into the shell in the direction of rotation of said rotor.

14. In a chilling device having an outer shell provided with closely adjacent inlet and outlet means for the introduction and removal of a congealable material and a rotatable chilling drum therein, scraper means in fixed spaced relationship to the surface of said drum, said scraper means being located between said inlet and outlet means and providing a surface relative to said inlet means for directing the congealable material as introduced into the shell in the direction of rotation of said drum.

15. In a chilling device having an outer shell, a rotatable chilling drum mounted therein, inlet and outlet means for the introduction and removal of a congealable material, and means mounted relative to the inlet means for directing the incoming material in the direction of rotation of the drum, a gate member in fixed spaced relationship to the drum to separate the congealed material from the mass, said gate member being located sufficiently apart from the inlet means to permit congelation of the congealable material adjacent the drum surface.

16. In a chilling device having a cylindrical shell, a chilling rotor rotatable within the shell and concentric therewith, inlet and outlet means for the introduction and removal of a congealable material, and means mounted relative to the inlet means for directing the incoming material in the direction of rotation of the rotor, a gate member rigidly mounted within the shell in fixed spaced relationship to the rotor to separate the congealed material from the mass, said gate member being located in close proximity to the outlet means and sufficiently apart from the inlet means to permit congelation of the congealable material adjacent the rotor surface.

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