Sept. 18, 1934. W. C. COULBOURN 1,973,797

REFRIGERATOR ATTACHMENT

Filed Jan. 6, 1933 2 Sheets-Sheet 1

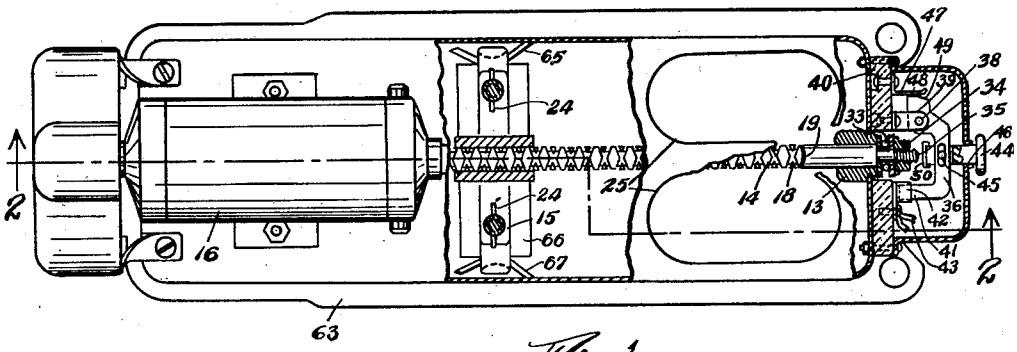


Fig. 1.

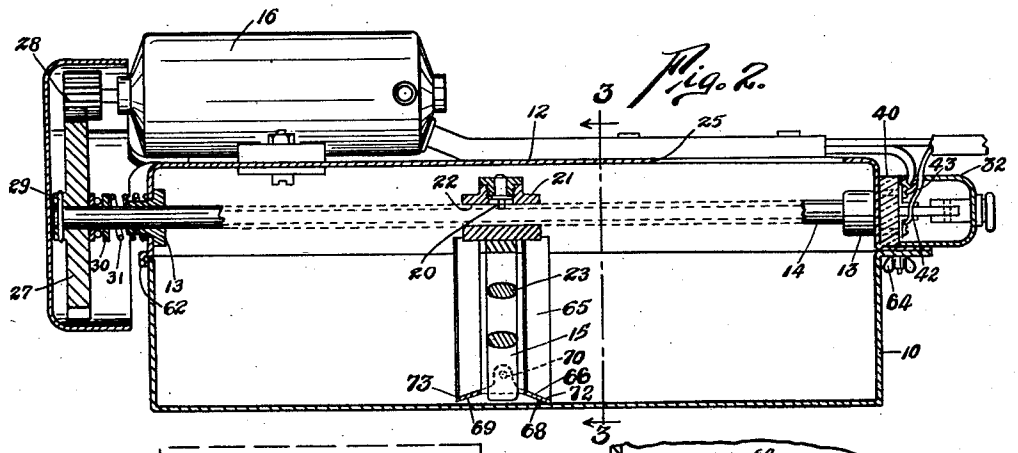


Fig. 2.

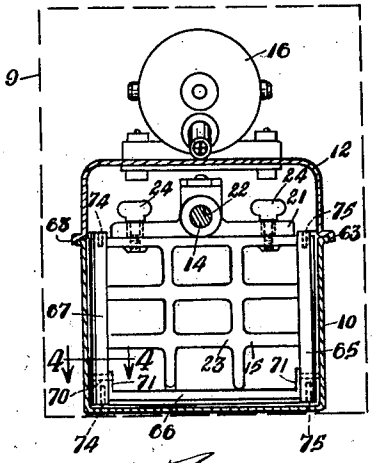


Fig. 3.

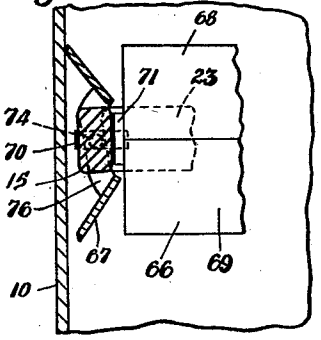


Fig. 4.

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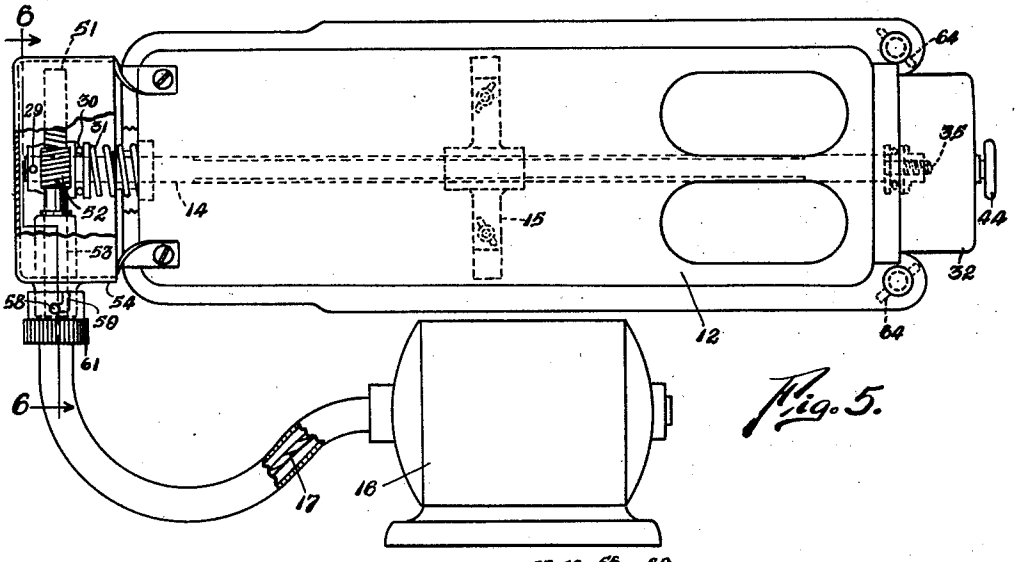


Fig. 5.

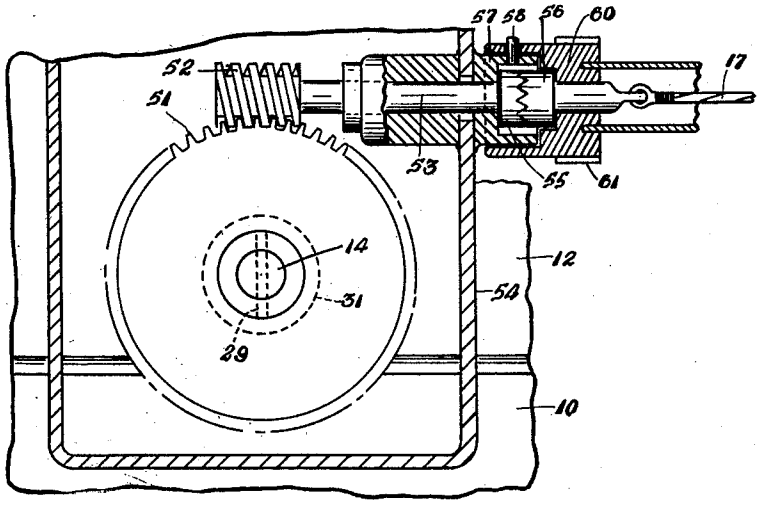


Fig. 6.

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Patented Sept. 18, 1934 1,973,797

UNITED STATES PATENT OFFICE

1,973,797

REFRIGERATOR ATTACHMENT

William C. Coulbourn, Suffolk, Va.

Application January 6, 1933, Serial No. 650,492

7 Claims. (Cl. 259—113)

This invention relates to domestic refrigerator equipment for agitating or stirring normally fluidal solidifiable substances, such as the ingredients of ice cream, ices, and other confections to be subjected to refrigeration.

An object of the invention is to provide an agitating or stirring device that readily and conveniently may be located within the ice cube compartment of a refrigerator, and removed therefrom without inconvenience and the displacement of other articles in the refrigerator.

Another object of the invention is to provide a device of the character stated, which includes a novel means for terminating the agitating action when the contents of the device reaches a predetermined degree of stiffness or solidification.

A further object is to provide a confection stirring device of the above stated character, wherein is employed a novel form of agitator-scraper element and driving means therefor so designed as to require a minimum of space in the refrigerator.

The foregoing and other objects are attained by the means described herein and disclosed in the accompanying drawings, in which:

Fig. 1 is a top view of the device, parts being broken away to show the interior.

Fig. 2 is a cross-sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a cross-sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is an enlarged cross-sectional view taken on line 4—4 of Fig. 3.

Fig. 5 is a plan view of a modified form of the device of invention, parts being broken away to show the agitator driving means.

Fig. 6 is an enlarged cross-sectional view taken on line 6—6 of Fig. 5, showing a separable coupling associated with the agitator drive means.

Devices of the character disclosed herein are adapted for use with domestic refrigerators in the making of ice cream, ices and various other confections that require stirring and freezing, or solidification. The device of this invention is adapted to occupy that space, in a refrigerator, which normally is occupied by the ice cube trays. The location of the device may best be appreciated by referring to Fig. 3, wherein the ice cube compartment is indicated conventionally by the broken lines 9. The size of the compartment may vary to some extent in different makes of refrigerators.

The device of the invention comprises a pan-like receptacle 10 for ingredients, which receptacle preferably is rectangular of shape and having dimensions permitting insertion thereof into the usual ice cube tray compartment. The walls of the receptacle are adapted to support a suitable upper member 12, which may be in the form of a cover or lid, and which carries bearings 13 for the rotatable agitator drive shaft 14. The agitator 15 depends from the shaft and into the receptacle 10, as shown.

The agitator shaft may be driven by means of an electrical motor 16 that may be mounted atop the cover member as illustrated in Fig. 2; or the motor may rest upon a shelf in the refrigerator and have its power transmitted to the agitator shaft by means of a suitable flexible shaft 17, as shown in Fig. 5.

In accordance with the disclosure of Fig. 2, means are provided for effecting reciprocatory movement of the agitator longitudinally of the receptacle, and the preferred form of such means comprises cross-threads 18 cut into the shaft 14 so as to provide a right and a left hand thread connected at each extremity by a connecting channel 19 to permit the follower 20 of the agitator to leave the right hand thread and enter the left hand thread, or vice versa, and thereby reverse the direction of movement of the agitator. The general type of threaded shaft disclosed herein may be found in certain well known makes of speed screw drivers and similar tools, and reference thereto is made for the purpose of aiding in properly understanding the action of the screw and its follower 20.

The follower 20 rests in the threads of the shaft and is mounted upon the body member or carriage 21 of the agitator. The transverse opening 22 of the carriage receives the agitator drive shaft. The grille or ribbed member 23 of the agitator is removably secured to the carriage 21, as shown in Fig. 3, by means of any suitable securing devices, there being shown removable screws 24 for the purpose. Access to the screws 24 may be had through the openings 25 of the cover member, so that the cover member and all parts supported thereby may be lifted bodily from the receptacle 10, after detachment of the grille from the carriage 21 by manipulation of the securing means 24. Thus, when the cover is removed to expose the receptacle contents, the grille will remain in the receptacle and need not be removed until it is desired to remove the confection. This construction avoids the possibility of bending the drive shaft in the event that the grille becomes tightly frozen in the tray.

Continuous rotational movement may be imparted to the agitator drive shaft by the use of

any suitable form of power transmission elements. One form of power transmission is exemplified in Figs. 1 and 2, and a second form is shown in Figs. 5 and 6. Referring first to Figs. 1 and 2, it will be noted that the agitator drive shaft has fixed to one of its ends a suitable gear 27 which meshes with the motor pinion 28. Although the gear is shown fixed to the shaft by means of a pin 29, it is to be understood that any accepted type of fastening means may be employed for the purpose.

Behind the gear 27 is a suitable thrust bearing 30 associated with a yielding means 31 that functions to constantly urge the shaft longitudinally in one direction. The shaft bearings permit slight longitudinal shifting of the shaft, and this movement is utilized to actuate an electrical switch 32 which controls operation of the motor. As is most clearly illustrated in Fig. 1, that end of the agitator drive shaft which is opposite to the geared end, carries a thrust bearing 33 which may be held in place by means of a suitable nut or the like 34, and the extreme end of the shaft is provided with a switch actuating abutment 35. When the contents of the receptacle acquire a stiffness of sufficient value, the resistance offered to movement of the agitator causes a slight longitudinal shifting of the shaft to the right, in opposition to the force of the spring 31. The abutment 35 thereupon strikes a part of the switch blade 36, and throws the switch to the opened or inoperative position so as to open the motor circuit and terminate the agitating action. Thus, the mechanism just described functions not only as a means for automatically terminating agitation when the confection is solidified to a predetermined extent, but it functions also as a safety device to preclude breakage of parts and injury to the motor in the event of the agitator's becoming solidly frozen into the contents of the receptacle.

The character of switch utilized for opening the motor circuit may vary considerably, but for purposes of proper disclosure there is shown a switch comprising a knife element or blade 36 of electricity conducting material, which blade is pivotally mounted as at 38 upon a bracket 39 secured to an insulating switch base 40. The base is carried by the cover member 12, exteriorly thereof. The terminal end 41 of the switch blade is adapted for reception by a yielding or spring contact means 42 which is electrically connected to one of the electrical line wires 43 in an obvious and well known manner. The switch may be manually operated, if desired, by means of a suitable knob or handle member 44 which has a pivotal mounting upon the blade as at 45. The manual actuating means preferably extends through an opening 46 in the switch housing.

It is considered preferable to provide a snap action for the switch 36, and one form of means for the purpose is illustrated in Fig. 1, which shows a spring metal arm 47 fixed to the base 40 and engaging one of a pair of angularly disposed edges 48—49 formed on the blade member at a distance from the pivotal point 38 thereof. When the agitator shaft shifts to the right, as above explained, the abutment 35 strikes the part 50 of member 44 and moves it until the angular surface 49 of the snap means comes into position substantially beneath the spring 47, whereupon the force of the spring snaps the switch blade to the open position and thereby preclude excessive arcing and burning of the switch contacts.

As was stated before, the invention is not to be limited to the particular type of switch described herein, for there are procurable on the market various types of standard switches that are applicable to the device of the invention.

The modification shown in Figs. 5 and 6 differs from the device just described, in that the motor is not secured to the receptacle cover but may be placed in a convenient location on one of the refrigerator shelves. In this form of the device, the gear 51 of the agitator shaft may be meshed with a worm 52 whose shaft 53 terminates in a coupling element or clutch part 55 that may be connected or disconnected, at will, with the complementary clutch element 56 of the flexible driving means 17. The connection between the clutch elements may be effected by means of any suitable type of coupling, such as is clearly illustrated in Figs. 5 and 6. As shown, the coupling is of the bayonet slot 59 formed in the coupling part 60 of the flexible drive means. The part 60 may be knurled as at 61 to facilitate gripping of the part during manipulation. In the modified form just described the agitator and its drive shaft, and the automatic switch cut-off, may be identical with the corresponding elements of Figs. 1 to 4, inclusive.

The cover member is maintained in proper position upon the receptacle 10 by the use of any suitable guide means, such as the turned flanges 62 and 63, (Figs. 2 and 3), and in the region of the switch casing 32 there may be provided any suitable fasteners (here shown as wing nuts and bolts 64) for securely clamping the cover to the receptacle. The manner of clamping together the members 10 and 12 may be modified so far as the scope of the claims may permit modification.

It is considered desirable and conducive to proper solidification of the confection, to scrape the sides and bottom of the receptacle 10 during movement of the agitator. For this purpose, the grille portion of the agitator is arranged to carry a series of rockable scrapers 65, 66 and 67 that depend, for their movement, upon the resistive force of the substance contained within the receptacle. The bottom scraper 66 is constituted of a pair of flat angularly disposed sheet parts 68 and 69, (Figs. 2 and 4) connected together or made integrally for movement in unison about the pivots 70 which are supported by the grille. The pivots may engage perforated ears 71, located at opposite ends of the scraper element. Thus, when the scraper 66 of Fig. 2 moves to the right, the substance in the receptacle will bear down upon the surface 72 and cause its forward edge to scrape the receptacle bottom ahead of the agitator; and when the agitator moves in the opposite direction, the force of the contents tilts the scraper element to cause scraping by the opposite edge 73, ahead of the agitator. The side scrapers tilt about their pivots 74 and 75 in like manner. The character 76 (Fig. 4) indicates a connecting portion for the scraping planes of scraper 67, and the other side scraper 65 is similarly constructed.

It is to be understood that various modifications and changes in structural details of the device may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim is:

1. Refrigerator equipment for agitating normally fluidal solidifiable substances, and comprising in combination a longitudinal receptacle, a cover removably fitted upon the receptacle, a

shiftable rotatable screw shaft supported by the cover longitudinally thereof, a power means including an electrical switch and an electrical motor arranged to rotate the screw shaft, an agitating element supported upon the screw shaft and depending therefrom into the receptacle, said agitating element including a follower for the threads of the screw shaft whereby rotational movement of the shaft is translated into longitudinal bodily movement of the agitating element, and means to actuate the electrical switch upon longitudinal shifting movement of the screw shaft occasioned by the increased resistance offered to movement of the agitating element when the solidification of the substance being agitated reaches a predetermined value.

2. Refrigerator equipment for agitating normally fluidal solidifiable substances, and comprising in combination a longitudinal receptacle, a cover removably fitted upon the receptacle, a shiftable rotatable screw shaft supported by the cover longitudinally thereof, a power means including an electrical switch and an electrical motor arranged to rotate the screw shaft, an agitating element supported upon the screw shaft and depending therefrom into the receptacle, said agitating element including a follower for the threads of the screw shaft whereby rotational movement of the shaft is translated into longitudinal bodily movement of the agitating element, and means to actuate the electrical switch upon longitudinal shifting movement of the screw shaft occasioned by the increased resistance offered to movement of the agitating element when the solidification of the substance being agitated reaches a predetermined value, and means for effecting movement of the agitating element along the screw shaft in opposite directions to traverse substantially the length of the receptacle.

3. Refrigerator equipment for agitating normally fluidal solidifiable substances, and comprising in combination a longitudinal pan-like receptacle, a member removably superposed upon the receptacle, an agitating element supported by the superposed member and mounted for horizontal movement longitudinally of the pan-like receptacle, and angularly disposed movable scrapers mounted upon the agitating element to respond to pressure applied thereon by the solidifiable substance during movement of the agitating element, for scraping the receptacle interior in advance of the moving agitating element.

4. Refrigerator equipment for agitating normally fluidal solidifiable substances, and comprising in combination a longitudinal pan-like receptacle, an agitating element located within the receptacle and means for reciprocating said element therein from one end of the receptacle to the other, the agitating element being of an apertured plate-like formation and extending transversely of the receptacle, and a scraper blade hingedly mounted upon the agitating element at an angle to the plane thereof so as to be influenced in its hinge movement by the resistive force of the solidifiable substance as the agitating element and scraper blade are moved lengthwise of the receptacle.

5. In a device of the class described the combination of a longitudinal pan-like receptacle, an agitating element for movement longitudinally within the receptacle, a shaft supporting the agitating element and means associated with the shaft and the agitating element for effecting reciprocatory movement of the agitating element upon continuous unidirectional rotation of the shaft, a shaft supporting member removably mounted upon the receptacle, bearings on the shaft supporting member in which the shaft may rotate and simultaneously shift longitudinally to a limited extent, electrical motor means for rotating the shaft, a normally closed electrical switch and an electrical circuit including the switch and the motor, and means operating to open the switch when the shaft is shifted longitudinally due to excessive resistive force of the receptacle contents upon the agitating element as said element is moved through said contents.

6. Refrigerator equipment for agitating normally fluidal solidifiable substance, and comprising in combination a longitudinal receptacle, a cover removably fitted upon the receptacle, a shiftable rotatable screw shaft having crossed connected threads, said shaft being supported by the cover longitudinal thereof, a power means including an electrical switch and an electrical motor arranged to rotate the screw shaft, an agitator carriage supported upon the screw shaft, an agitating element removably supported upon the carriage and depending therefrom into the receptacle, said carriage including a follower for the threads of the screw shaft whereby rotational movement of the shaft is translated into longitudinal bodily movement of the agitating element, and means to actuate the electrical switch upon longitudinal shifting movement of the screw shaft occasioned by the increased resistance offered to movement of the agitating element when solidification of the substance being agitated reaches a predetermined value.

7. Refrigerator equipment for agitating normally fluidal solidifiable substances, and comprising in combination a longitudinal receptacle, a cover removably fitted upon the receptacle, a shiftable rotational shaft having connected cross screws, said shaft being supported by the cover longitudinally thereof, a power means including an electrical switch and an electrical motor disposed remotely from the receptacle, a flexible drive shaft connecting the motor with the screw shaft so as to rotate the screw shaft, an agitator carriage supported upon the screw shaft, an agitating element removably mounted upon the carriage to depend therefrom into the receptacle, said carriage including a follower for the threads of the screw shaft whereby rotational movement of the shaft is translated into longitudinal bodily movement of the agitating element, and means to actuate the electrical switch upon longitudinal shifting movement of the screw shaft occasioned by the increased resistance offered to movement of the agitating element when solidification of the substance being agitated reaches a predetermined value.

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