Feb. 23, 1965 L. E. KOCH 3,170,676

DISPENSING FREEZER BEATER AND MOUNTING THEREFOR

Filed Dec. 21, 1962

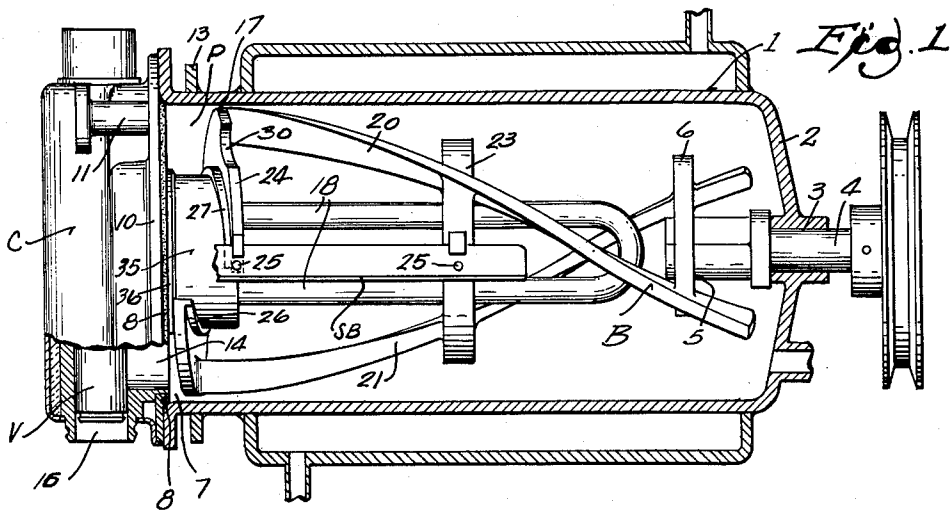


Fig. 1

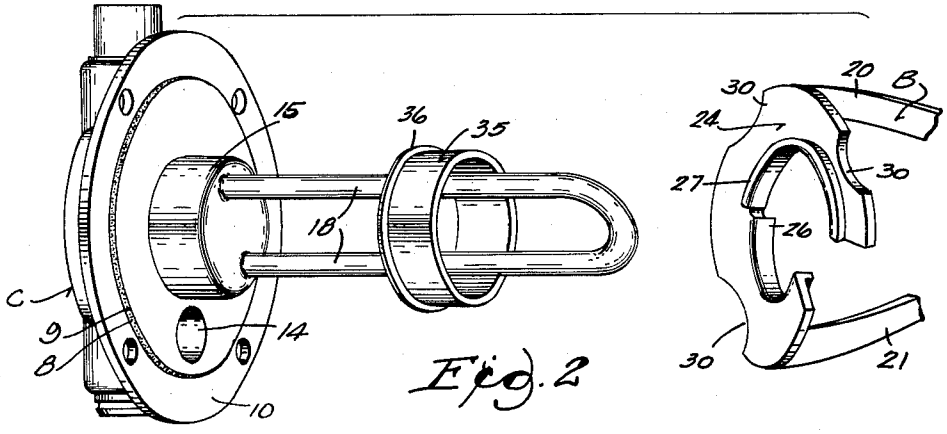


Fig. 2

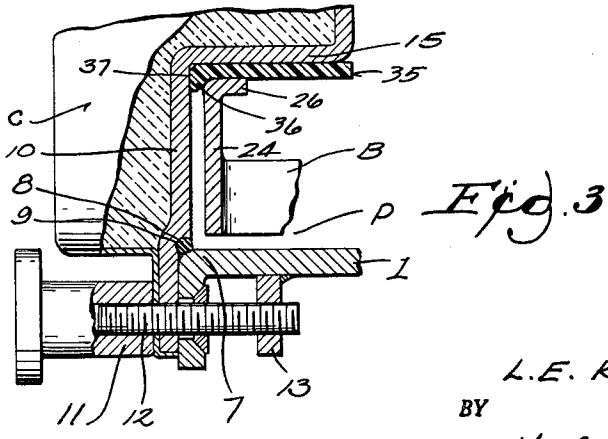


Fig. 3

INVENTOR.
L. E. KOCH
BY
Lieber & Miller
ATTORNEYS

United States Patent Office 3,170,676 Patented Feb. 23, 1965

3,170,676

DISPENSING FREEZER BEATER AND MOUNTING THEREFOR

Lawrence E. Koch, Rockton, Ill., assignor to Louis A. M. Phelan

Filed Dec. 21, 1962, Ser. No. 246,405
5 Claims. (Cl. 259—45)

The present invention relates generally to continuous freezers for soft ice cream, custards, malteds or the like, in which the fresh mix is fed into one end of a refrigerated freezing cylinder, thoroughly and simultaneously aerated and fed to the other end of the cylinder where it is then drawn off through a serving valve.

More specifically, the present invention relates to the dasher or beater and the means for mounting it, which beater is rotatably driven within the refrigerated cylinder and serves to perform the functions of beating and aerating the product and feeding it towards the serving valve where it forcibly ejects the finished product when the valve is open.

In certain of the prior art, such as that shown in United States Patent No. 2,810,557 issued October 22, 1957 to L. A. M. Phelan, who is the assignee of the present invention, the beater at its discharge end is mounted by its periphery against the inside wall of the refrigerated cylinder, and that beater is therefore unsupported centrally and can be easily removed from the cylinder along with the cover and then easily reassembled.

In another example of the prior art, and over which the present invention is an improvement, the United States Patent No. 3,061,281, issued October 30, 1962, of which I am a co-inventor, also shows a beater that has its front end peripherally supported on the inner wall of the cylinder and which cooperates with a large hub on the cover to positively force the material in a confined path for forcible ejection out of the serving valve.

The above prior art devices have proved to be commercially successful and are still in considerable use today. They did have certain shortcomings, however, such as for example, the necessity for holding very close concentricity limits between the inner wall of the cylinder and the effective outside diameter formed by the front end of the cylinder, and also the expense of manufacturing and plating the beater bearing surfaces with appropriate wear resistant metal. Furthermore, and importantly, these prior art devices would eventually necessitate the replacement of the freezing cylinder due to wear caused by beater rotation, and these cylinders are extremely costly to replace.

One aspect of the invention, therefore, relates to the improved manner in which the front end of the beater is centrally supported for rotation, while obtaining and/or retaining the benefits and advantages of (1) being able to quickly and easily remove and replace the beater for frequent cleaning (2) providing efficient pumping pressure for the forcible discharge of the finished product and (3) insuring economy in manufacture and maintenance.

A more specific aspect of the invention relates to the provision of an economically replaceable wear sleeve insertable between the beater and the supporting large control hub of the cover.

It is not new, per se, to centrally support the front end of a driven beater, for example, on a stub shaft extending inwardly from the front cover. However, the improved structure provided by the present invention results in the above and other definite advantages, as will appear from further reference to the drawings in which:

FIGURE 1 is a longitudinal view taken through a continuous freezer embodying the present invention, the view being partially in section and with certain parts broken away for clarity;

FIGURE 2 is an exploded, perspective view of certain of the parts shown in FIGURE 1; and

FIGURE 3 is an enlarged, fragmentary sectional view of a portion of the assembly as shown in FIGURE 1.

Referring in greater detail to the drawings, the horizontally disposed refrigerated cylinder **1** includes a rear end **2** having a central opening **3** through which the stub drive shaft **4** extends for detachable engagement with the irregular and complementary shaped opening **5** in the rear drive member **6** of the beater B. By means of this shaft, the beater is rotatably driven and is centrally supported at its rear end.

The cylinder **1** also has a front or discharge end **7** which abuts in sealing engagement with the rubber O-ring **8** which is carried in a groove **9** on the inside wall **10** of the front cover C. This front cover is detachably secured to the cylinder by large thumb nuts **11** threadly engaged in the bolt means **12** secured to the ring **13** welded to the outside of the cylinder. This cover can be easily removed by unscrewing the thumb nuts **11** and thereby fully exposing the inside of the cylinder.

The cover is an insulated one and has a horizontal draw-off opening **14** located in its lower side and which communicates with a vertical bore **16** in the cover for discharge of the finished product, when the shiftable valve element V is raised to the open position. If a more complete description of the structure and operation of this type of valve is deemed to be either necessary or desirable, reference may be had to my co-pending application Serial No. 246,406 filed December 21, 1962. It is believed sufficient to say for purposes of this disclosure, that the beater B acts, in cooperation with the large central hub **15** formed on the inside of the cover, to pump the finished product into the opening **14** with sufficient pressure to be able to quickly eject the product from the freezer when the valve is open. This cooperative effect is also shown and described in the United States Patent No. 3,061,281, previously referred to. The hub **15** is formed as an integral part of the cover and extends from the vertical inner wall **10** of the cover and rearwardly into the cylinder when assembled therewith. It will be noted that the hub forms an annular flow path P with the inner wall **17** of the cylinder and the front wall **10** of the cover, and the discharge opening **14** is located in this flow path and extends forwardly therefrom.

The retarder **18** is secured to the hub **15** and extends therefrom for the purpose of promoting turbulence as disclosed in said United States Patent No. 2,810,557. When the cover is removed from the cylinder, this retarder and the hub are pulled axially from the beater B, which is now to be described.

The beater includes a pair of diametrically disposed helical screws **20** and **21** which are rigidly secured together by the rear drive member **6**, an intermediate ring **23** and a front, steeply-pitched auger-ring **24**, all of which are welded to the screws. The beater also includes axially spaced and aligned mounting means **25** which serve to swingably hold the scraper blades SB for yielding engagement with the inner wall of the cylinder, as fully described in United States Patent No. 2,836,401, issued May 27, 1950, to L. A. M. Phelan.

It should be noted that the beater itself does not contact the inner cylindrical wall of the cylinder and is not rotatably supported thereby. Neither does the front end of the beater, more particularly the ring **24**, touch the inner front wall **10** of the cover.

Instead, the front end of the beater is centrally supported for rotation on and around the large hub **15**. For this purpose, axially disposed flanges **26** and **27** are formed around and define the central opening **28** of the ring. It

will be noted that the flange 26 extends rearwardly while flange 27 extends forwardly, in respect to the ring proper, thus providing a bearing surface of considerable axial length without requiring an exceptionally long hub 15. The flanges are formed as an integral part of the ring as by a stamping operation.

The ring 24 has relief portions 30 cut from its periphery at circumferentially spaced locations to prevent excessive compression and thereby de-aeration of the product, and to permit axial recirculation of the product.

A replaceable bearing sleeve 35 is located between the ring 24 and the hub and is formed preferably of nylon, which can be cleaned by boiling when the beater is removed. This sleeve is of an internal diameter which permits it to fit on the hub and form a freely sliding fit therewith but without any appreciable play therebetween. During operation, it is not necessary for this sleeve to rotate, but it may be permitted to do so.

The sleeve is of such an external diameter that the internal, central opening of the ring fits thereon to permit the beater to turn freely on the sleeve, yet without any appreciable play or wobble thereon. In other words, the sleeve forms a nice running fit between the beater and the hub.

The sleeve has a radial flange 36 extending outwardly from its front end which bears against the cover wall 10 and against which the front edge 37 of the ring abuts. Thus the beater is prevented from scraping against the front wall 10 of the cover but passes closely adjacent thereto, to thereby prevent escape of the product therebetween.

With the present arrangement, any wear that occurs, takes place on the sleeve 35 which can be readily replaced at a minimum cost. No wear occurs on the expensive parts of the apparatus, particularly on the expensive refrigerated cylinder, and there is no need to provide and refinish bearing surfaces of the beater.

The cover, sleeve and beater can all be easily removed for frequent cleaning and reassembled without special tools.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. In combination with a freezing cylinder having a removable front cover including a large hub extending centrally into said cylinder to define therewith an annular flow path, and a discharge opening in said cover and located in said flow path, a removable sleeve mounted on said hub, a rotary beater in said cylinder for feeding material toward said cover, material pumping means at the front end of said beater for rotation in said flow path and forcing material into said discharge opening, said pumping means being mounted on said removable sleeve for rotationally supporting the front end of said beater.

2. In combination with a freezing cylinder having a removable front cover including a large hub extending centrally into said cylinder to define therewith an annular flow path, and a discharge opening in said cover and located in said flow path, a removable sleeve mounted on

said hub, a rotary beater in said cylinder for feeding material toward said cover, material pumping means at the front end of said beater for rotation in said flow path and forcing material into said discharge opening, said pumping means being mounted on said removable sleeve for rotationally supporting the front end of said beater, said sleeve having a radial flange adjacent one end, said pumping means being abuttable against said flange and held thereby in spaced relationship from said cover.

3. In combination with a freezing cylinder having a removable front cover including a large hub extending centrally into said cylinder to define therewith an annular flow path, and a discharge opening in said cover and located in said flow path, a rotary beater in said cylinder and comprising, means for feeding material toward said cover, a steeply pitched auger-ring at the front end of said beater for rotation in said flow path and forcing material into said discharge opening, said auger-ring having a central opening and axially extending flange means substantially completely around and defining said opening, said flange means being mounted on said hub for rotationally supporting the front end of said beater.

4. In combination with a freezing cylinder having a removable front cover including a large hub extending centrally into said cylinder to define therewith an annular flow path, and a discharge opening in said cover and located in said flow path, a removable sleeve mounted on said hub, a rotary beater in said cylinder and comprising, means for feeding material toward said cover, a steeply pitched auger-ring at the front end of said beater for rotation in said flow path and forcing material into said discharge opening, said auger-ring having a central opening by means of which it is mounted on said removable sleeve for rotationally supporting the front end of said beater on said hub.

5. In combination with a freezing cylinder having a removable front cover including a large hub extending centrally into said cylinder to define therewith an annular flow path, and a discharge opening in said cover and located in said flow path, a removable sleeve mounted on said hub, a rotary beater in said cylinder and comprising, means for feeding material toward said cover, a steeply pitched auger-ring at the front end of said beater for rotation in said flow path and forcing material into said discharge opening, said auger-ring having a central opening by means of which it is mounted on said removable sleeve for rotationally supporting the front end of said beater on said hub, said sleeve having a radial flange at one end abuttable against said cover, said ring being abuttable against said flange and held thereby in spaced relationship from said cover.

References Cited by the Examiner

UNITED STATES PATENTS

2,847,197	8/58	Thompson	259—109
3,061,281	10/62	Phelan	259—109

CHARLES A. WILLMUTH, *Primary Examiner.*

GEORGE J. NORTH, *Examiner.*