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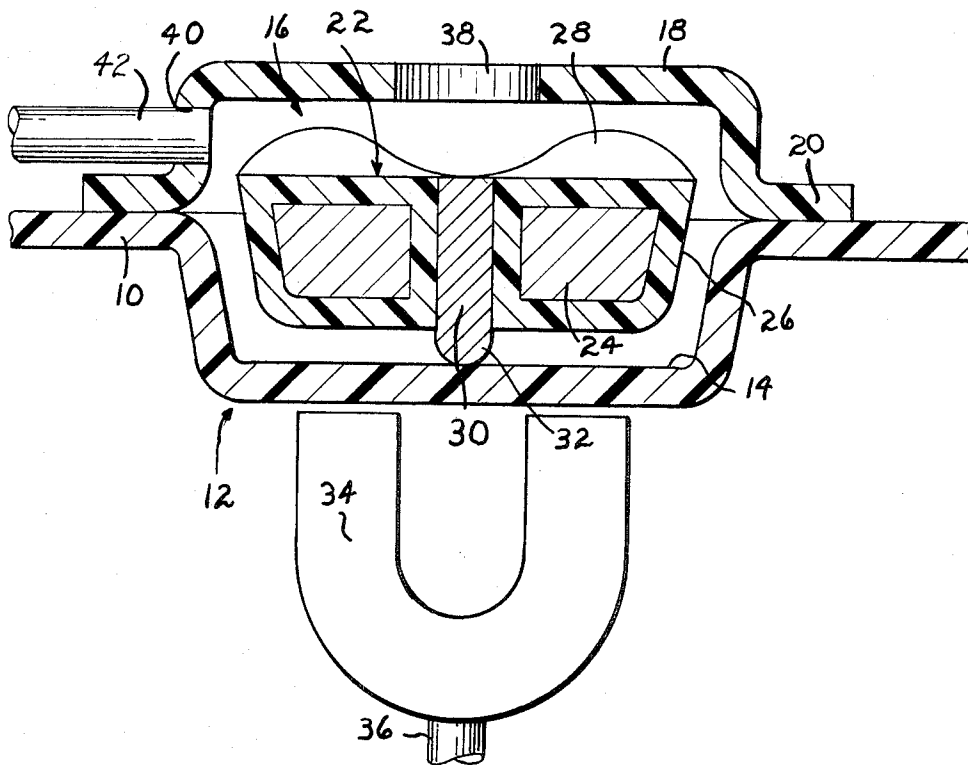
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[54] PUMP FOR BEVERAGE DISPENSER
9 Claims, 3 Drawing Figs.

[52] U.S. Cl. 417/420,
310/104
[51] Int. Cl. F04d 13/02,
H02k 5/10
[50] Field of Search 103/87;
308/(N), 159; 417/420; 310/104

ABSTRACT: A pump assembly for beverage dispensers having a pump chamber within which an impeller is disposed free of any shaft and bushing connections. A magnet embedded in the impeller cooperates with the driving magnet outside the chamber to align the impeller and support it on its bearing for rotation.



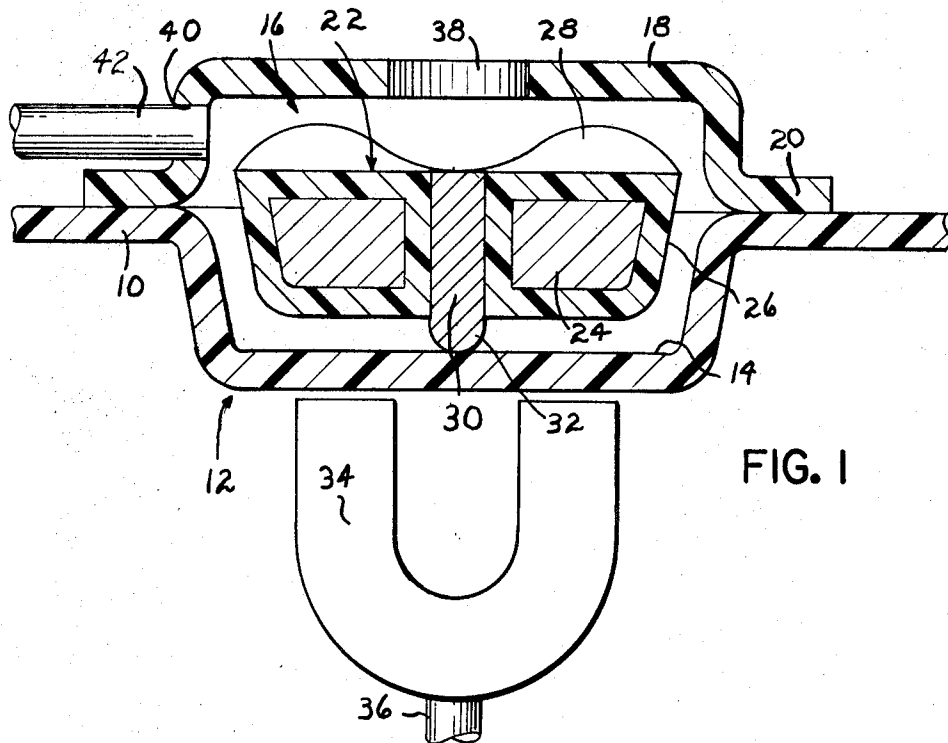


FIG. 1

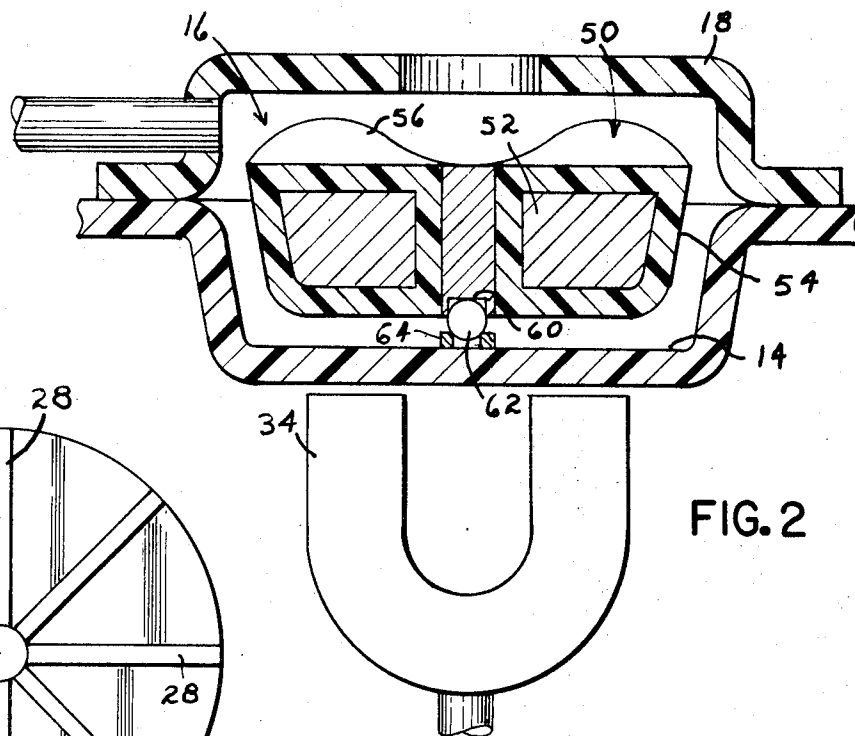


FIG. 2

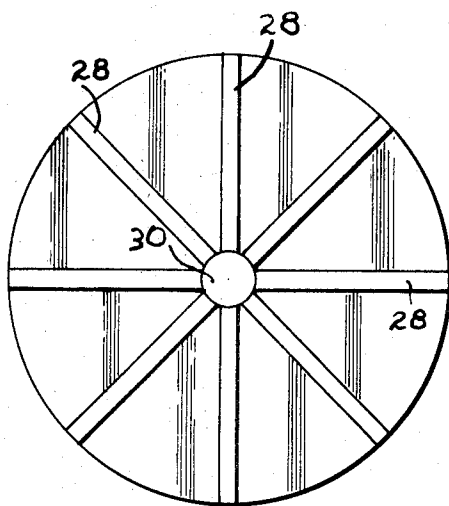


FIG. 3

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PUMP FOR BEVERAGE DISPENSER

This invention relates to beverage dispensers and more particularly comprises an improved pump assembly for beverage dispensers.

Beverage dispensers that include bowls which visually display the beverage have circulating systems for the beverage to enhance the heat exchange relationship between the beverage and refrigeration system in contact with the bowl and to dramatize the display of the beverage. These circulating systems ordinarily include an impeller within a pump chamber in the bowl, and the impeller is ordinarily suspended on a shaft carried by the pump chamber cover. When such systems are used for beverages containing milk or other dairy products there is some tendency for butter which develops in the bowl to work its way into the impeller about the shaft and within the bushing and impede proper functioning of the impeller. Various schemes have been attempted to reduce the problem but they have not proved to be wholly satisfactory. When for any reason the dispensers are shut down to stop rotation of the impeller, sometimes the impeller does not rotate when the machine is reactivated.

One important object of this invention is to eliminate shafts and bushings in the impeller structure which can capture butterlike substances and impede proper operation of the pump.

Another important object of this invention is to simplify the impeller construction.

Another important object of this invention is to eliminate all mechanical connections between the impeller and the pump chamber so that the various parts may be cleaned more readily and be assembled and disassembled without effort.

To accomplish these and other objects, the pump assembly of this invention includes a chamber which houses the impeller and which does not employ any shaft or other type of fixed bearing on which the impeller rotates. Rather, the impeller is disposed in the chamber free of all mechanical connections with the chamber walls, and the magnet of the impeller serves to align the impeller for rotation when the drive magnet outside the bowl rotates. A simple bearing support is provided on which the impeller stands when the magnet is rotated so to free the impeller bottom from the base of the chamber. The impeller is free to shift laterally in the chamber or it may be lifted from the chamber, and its position is established by the orientation of the drive magnet disposed outside the chamber.

These and other objects and features of this invention along with its incident advantages will be better understood and appreciated from the following detailed description of two embodiments thereof, selected for purposes of illustration and shown in the accompanying drawing, in which:

FIG. 1 is a cross-sectional view of a pump assembly for beverage dispensers constructed in accordance with my invention;

FIG. 2 is a cross-sectional view similar to FIG. 1 but showing another embodiment of my invention;

FIG. 3 is a plan view of the impellers shown in the embodiments of FIGS. 1 and 2.

The pump assembly of this invention is designed typically to be used with beverage dispensers of the type shown in U.S. Pat. Nos. 3,119,531 and 3,225,965 having bowls in which the beverage is circulated. In the present application only a portion of the bowl is shown. It is to be understood that the bowl may take a variety of shapes including those shown in the patents noted.

In the embodiment of FIG. 1 the bottom 10 of a transparent plastic bowl 12 is shown formed with a well 14 that in part defines the pump chamber 16 of the assembly within the bowl. A pump cover 18 is provided to complete the chamber, which cover has an outwardly extending flange 20 in its periphery which rests on the bottom wall 10 of the bowl. An impeller 22 is disposed in the chamber 16 to circulate the beverage in the bowl.

The impeller 22 includes an annular magnet 24 embedded in a plastic casing 26 on the top of which are formed a number

of radial vanes 28 shown clearly in FIGS. 1 and 3. A pin 30 having a lower end 32 semispherical in shape and made of Teflon or some similar material extends below the plane of the bottom of the casing 26 to form a support bearing for the impeller as it rotates in the chamber 16.

Drive magnet 34 located in the base of the dispenser (not shown) is supported on shaft 36 driven by a motor (not shown), and the magnet 34 is magnetically coupled to the magnet 24 in the impeller causing the impeller to rotate when rotation is imparted to the motor. As suggested, the impeller may be used to move the beverage in the bowl for one or more of several purposes. Ordinarily the circulation of the beverage improves the heat exchange relationship between the beverage and the refrigeration system (not shown) associated with the bowl so as to cool the beverage to the desired temperature. In addition, the movement of the beverage may be employed to enhance the visual appeal of the drink to the observer. Further, the circulation may be used to carbonate the beverage. The impeller 22 in the pump chamber 16 imparts movement to the beverage by drawing the beverage in the bowl into the chamber 16 through the central opening 38 in the cover 18 and driving it out through the outlet 40. The outlet 40 may or may not be connected to a nozzle 42 to confine the direction of discharge.

It will be appreciated that the pin 30 and more particularly its lower end serves as a bearing on which the impeller spins as a top when the magnet 34 is rotated. When the motor is turned on and the magnet 34 rotates, rotation is imparted to the impeller 22, and the magnetic coupling of the two magnets serves to align the impeller with the magnet 34 so that the impeller rotates on the bearing 32 about a fixed axis in the manner of a child's spinning top. There is a total absence of bushings, shafts, etc. in which solids or semisolids may collect in the chamber so as to impede rotation of the impeller in its chamber.

The embodiment of the invention shown in FIG. 2 differs from that of FIG. 1 only in the construction of the bearing for the impeller. Thus, the pump assembly of FIG. 2 includes the well 14 and cover 18 that defined the pump chamber 16, and an impeller 50 is provided in the chamber 16, which impeller includes an annular magnet 52 embedded in an inert plastic case 54 having formed as an integral part thereof, radial vanes 56.

A pin 58 is embedded in the casing 54 and is provided with a shallow recess 60 that rests on the top of ball bearing 62. The pin 58 preferably is made of Teflon or other self lubricating and long wearing material. The ball bearing 62 is in turn shown seated on a washer 64 also made of Teflon or other similar material.

Just as in the preferred embodiment of FIG. 1, the impeller assembly is free of all bushings, shafts, etc. which may collect butter or other solid or semisolid material and impede the free rotation of the impeller in the chamber 16. Rather, when the magnet 34 rotates, the impeller 50 by virtue of the magnet coupling between the magnet 52 embedded in the impeller and the drive magnet 34 centers itself automatically on the ball bearing 62 and the impeller rotates freely. Thus, the several parts automatically align themselves with one another and the impeller rotates in the manner of a child's top due to the gyroscopic effect of the centrifugal force applied to it. The impeller is not mechanically attached to the ball bearing and therefore may be lifted off it at will. Similarly, the ball 62 may be lifted from the seat formed by washer 64. When the motor stops, the impeller in each embodiment may tip to one side or the other, but will immediately assume the position shown when the motor is energized.

In each of the embodiments of this invention a bearing is provided with no accompanying bushing or sleeve within which solids or semisolids may be captured to impair rotation of the impeller. The impeller automatically aligns itself with the drive magnet, and when the motor is turned on the centrifugal force creates a gyroscopic effect so that the impeller revolves upright on its bearing.

We claim:

1. A vertically arranged pump assembly for beverage dispensers comprising:

a beverage bowl, a pump cover in the bowl and cooperating with the bowl bottom to form a pump chamber, an impeller disposed in the chamber and supported on the bottom wall of the chamber, and being generally disc-shaped and bearing impeller blades, means supporting said impeller totally free of any mechanical interengaging connections to the surface of said chamber being said impeller positionable freely within said chamber within the dimensional limits defined by said chamber, said impeller having a surface free of any crevices which would entrap quantities of said beverage to be pumped, a magnet imbedded in the impeller and adapted to be magnetically coupled to a drive magnet disposed adjacent to it,

said means supporting said impeller comprising a bearing operatively engaging the center of the impeller at its bottom for supporting the impeller for rotation in the chamber on said bottom wall,

said bearing allowing the impeller to rotate about its center and shift freely within the chamber when at rest.

2. A pump assembly as described in claim 1 further characterized by:

said impeller bearing comprising a ball bearing and a self lubricating seat for the ball being embedded in the impeller.

3. A pump assembly as described in claim 1 further characterized by:

said bearing comprising a pin made of self lubricating

material embedded in the impeller and having a supporting end extending below the plane of the impeller bottom and resting loosely on the bottom wall.

4. A pump assembly as described in claim 2 further characterized by

an annular seat secured to the bottom wall of the chamber for releasably restraining the ball in the center of the chamber.

5. A pump assembly as described in claim 3 further characterized by

said blades lying in the top of the impeller body, and an inlet in the cover providing access to the chamber.

6. A pump assembly as described in claim 4 further characterized by

said blades lying the top of the impeller body, and an inlet in the cover providing access to the chamber.

7. A pump assembly as defined in claim 1 further characterized by

said bearing being a pin having a smooth surface.

8. A pump assembly as described in claim 7 further characterized by:

said being being a pin made of self lubricating material embedded in the impeller and having a supporting end extending below the plane of the impeller bottom and resting on the bottom wall.

9. A pump assembly as described in claim 3 further characterized by

said supporting end being semispherical and facing down on the bowl bottom.

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