

[54] AGITATING APPARATUS

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259/108; 222/136, 137

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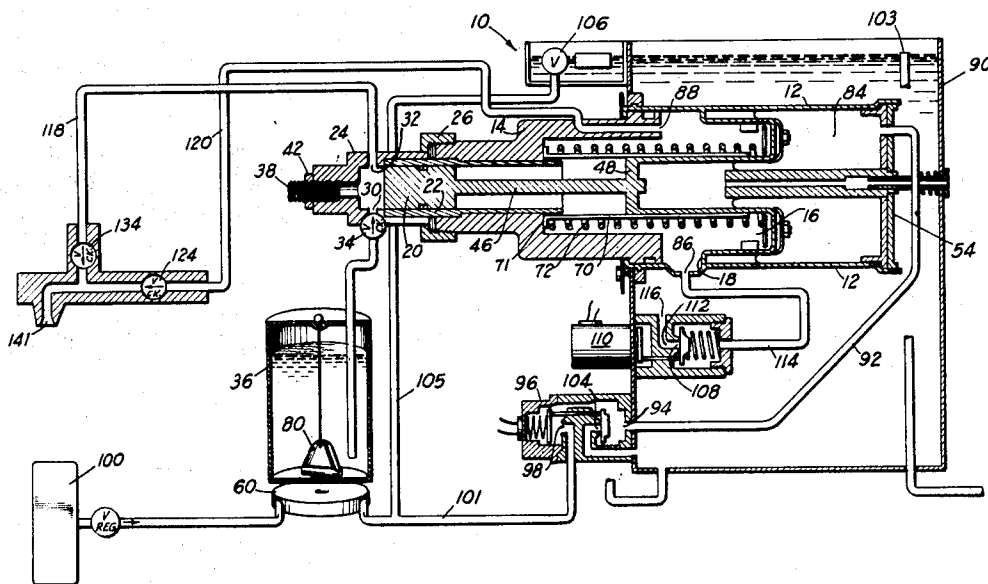
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ABSTRACT

An agitating apparatus is described wherein an improved agitator system is employed in cooperation with a container so as to thoroughly mix a dispensable fluid which is positioned within the container and wherein the container has a removable top or cover portion. The agitator system includes a magnetic coupling arrangement associated therewith which is driven by a fluid motor impeller. The impeller is driven by a fluid which is customarily available at little or no cost and which is further utilized in the system or subsequently dispensed with the concentrate so as to eliminate the requirement of discarding the same. A removable stirring element is suspended from the container top or cover portion in order to prevent the same from being lost or being interfered with during the cleaning or replacement of the container.

12 Claims, 3 Drawing Figures



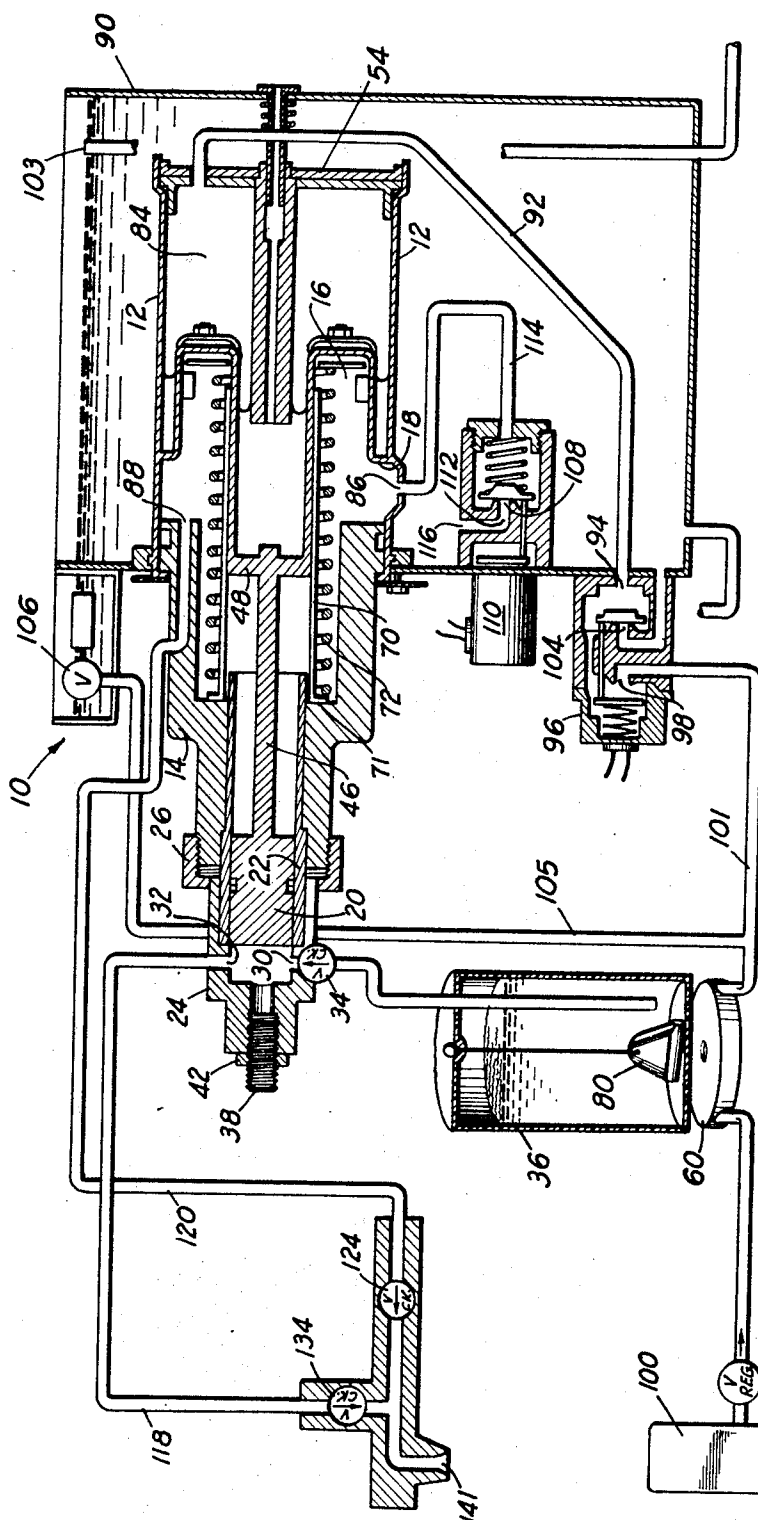


FIG 1

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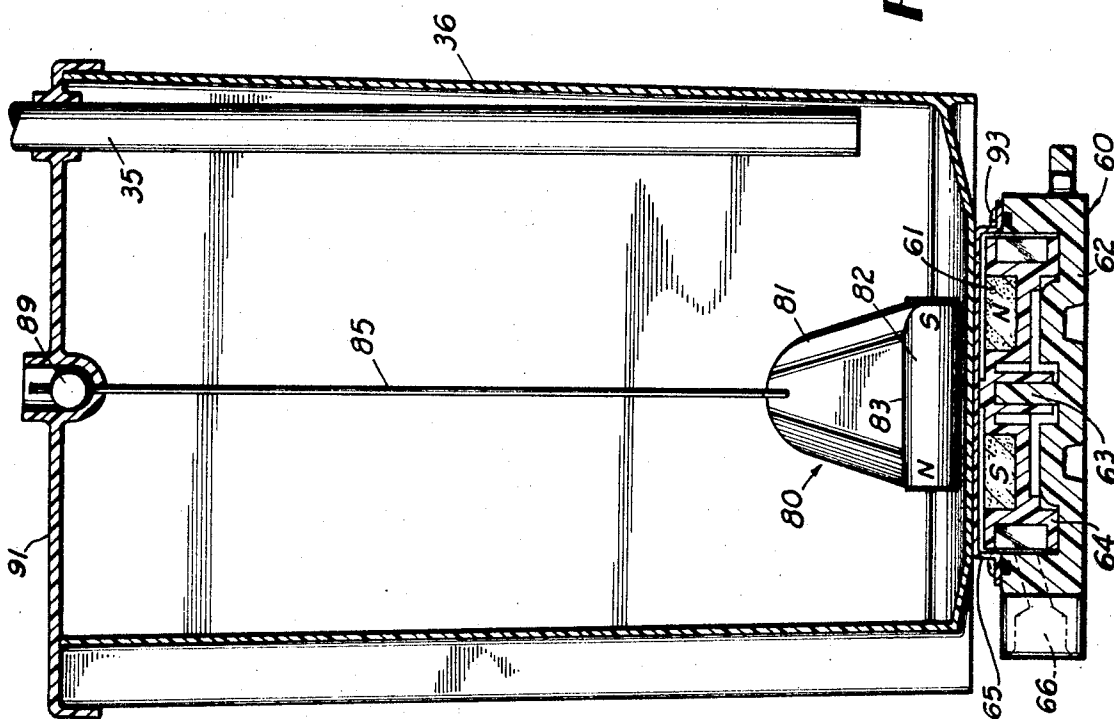


FIG 2

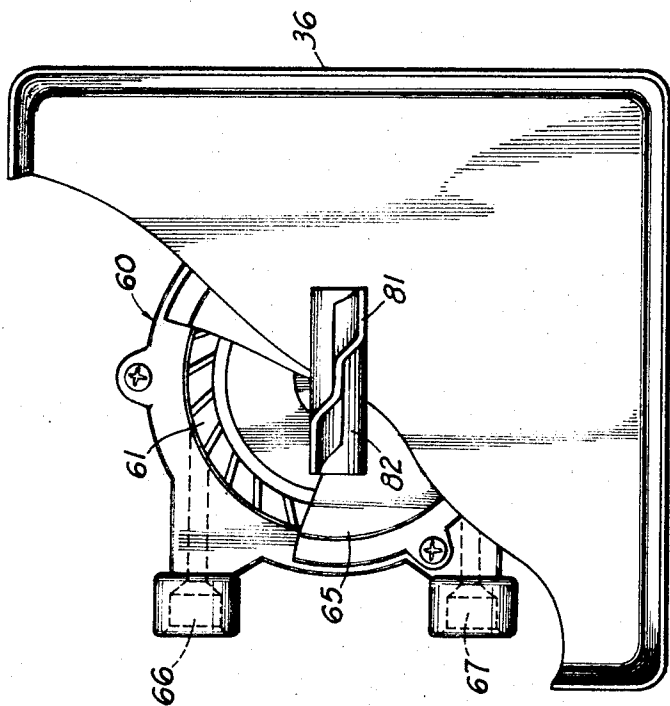


FIG 3

## AGITATING APPARATUS

## FIELD OF THE INVENTION

This invention relates to an improved agitator system that is employed in cooperation with a container so as to thoroughly mix a dispensable fluid held in the container. More specifically, this invention relates to an improved agitator system including a magnetic coupling associated therewith which is driven by a fluid motor impeller. The dispensable fluid is used to drive the impeller prior to being subsequently conditioned and discharged from the container with a concentrate or extract.

## DESCRIPTION OF PRIOR ART

There are presently available a wide variety of dispensing devices that include an agitator assembly for mixing a dispensable liquid; however, many of these agitator assemblies have not been found totally acceptable because of various reasons.

For example, one problem in conventional dispensers which employ a beverage or frozen concentrates to be dispensed, such as fresh fruit juices, coffee, tea, or syrup, is the necessity of keeping the concentrate cold to a certain extent to be palatable. This normally has been done by the use of a refrigerating element which is placed in close proximity to the dispenser in order to maintain or provide a cold environment for the concentrate. Further, in order to prevent the constituents of the concentrate from settling on the bottom of the dispenser container, or stratifying therein, revolving paddles or circulating pumps have been employed in the container for agitating the concentrate. This form of agitation has been used in the beverage industry but frequently not found acceptable since "dead spots" will occur in the region of the dispensing tap and on the bottom of the container. The liquid trapped in these "dead spots" not only becomes unpalatable, but tends to spoil more quickly than the cooler mixed liquid and causes deposits of scum or sediment to form within the container. Also, the circulation is inadequate next to the wall of the container, giving rise to a ring of scum thereon which is unsightly, hard to remove and difficult to sterilize. Because of and to try to overcome these problems, the agitator assemblies normally have been operated continuously.

Another problem encountered in paddle-type stirring mechanisms and conventional circulation pumps is the leakage of oil through the packing of the drive shafts. As is obviously known, the leakage of a very minute quantity of such oil in the beverage itself makes it unfit for consumption.

A further disadvantage in conventional dispensers is that they normally employ an electric motor for driving the agitator assembly. This arrangement has not been found acceptable and should not be used because of the hazards attendant the generation of sparks which may occur upon deterioration of elastomers and insulating material used in the sealing of the electrical components. Aside from the sparking aspect, a further disadvantage is their large size and bulkiness which greatly restricts their use. For example, the use of the electrical motor for driving the agitator assembly greatly hinders the production of portable beverage dispensers due to its space requirements. Additionally, it is well recognized that electrical motors by their very nature de-

velop and produce heat which may be deleterious to the dispensable liquids or constituents.

Accordingly, there has arisen a need in the industry for the production of a suitable agitator dispenser apparatus, preferably of simple construction, whereby the rate of agitation may be controlled and the concentrate will be subjected to a uniform, complete and thorough agitation regardless of the container's configuration or the particular constituents of the liquid contained therein.

## SUMMARY OF INVENTION

The agitator apparatus of the present invention satisfies these needs by providing an improved magnetic coupling between the agitator element and the fluid motor impeller. In addition, the fluid motor impeller itself is an improved impeller arrangement which utilizes the hydraulic pressure of the dispensable fluid itself as the driving force or source of power therefor. After the dispensable fluid leaves the impeller, the same may be subsequently conditioned by either being heated or cooled prior to being dispensed with or as a liquid such as frozen orange juice, coffee, tea, syrup, hot cocoa, pre-mixed beverage, carbonated beverage or preparations for making the same. Thus, a more compact, efficient, simply constructed and unique dispenser apparatus is provided incorporating an improved agitator assembly whereby the product components are utilized in the system and nothing must be discarded.

## OBJECTS OF INVENTION

It is, accordingly, an object of this invention to provide an improved agitator apparatus.

Another object of the invention is to provide an improved agitator apparatus incorporating a magnetic coupling generally of the type described which is low in cost and of simple, reliable construction.

Another object of the invention is to provide an agitator dispenser which may be easily disassembled and cleaned in order to meet sanitation requirements or purposes.

Another object of the invention is to provide an agitator within a liquid or beverage container which may be driven by magnetic means that do not require passage of a shaft through a wall of the container, thus eliminating the need to seal the shaft against leakage.

Another object of the invention is to provide an improved fluid motor impeller arrangement for driving the magnetic coupling and wherein the driving force therefor is customarily available for use at little or no cost.

Another object of the present invention is to provide a more compact agitated dispensing system by employing the dispensable liquid as the driving fluid for the fluid motor impeller and related magnetic coupling arrangement of the agitator apparatus to ensure that all product components are utilized in the system and nothing is required to be discarded. This alleviates the requirement for a separate driving force for actuating the agitator which normally has to be discarded after the impeller driving operation.

Another object of the present invention is to provide an agitator dispenser which mixes the liquid uniformly, which maintains circulation in desired parts of the storage and dispensing system during intermittent opera-

tion thereof, and which eliminates the formation of scum or sediment on the walls of the container.

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 an embodiment thereof, selected for purposes of illustration only and shown in the accompanying drawings, in which:

#### BRIEF DESCRIPTION OF DRAWING

FIG. 1 is a schematic view, partly in section and partly broken away, showing a beverage dispenser system including an improved agitator assembly for the beverage dispenser in accordance with this invention;

FIG. 2 is an enlarged side view in section showing details of a concentrate tank housing an agitator assembly embodied in this invention;

FIG. 3 is an enlarged top section view, partly broken away, showing details of a concentrate tank housing, with the tank cover removed, embodied in this invention.

#### DETAILED DESCRIPTION OF INVENTION

Referring to the drawings in detail, a beverage dispenser incorporating this invention is illustrated in FIGS. 1-3. It will be understood that a housing, not shown, may be provided for supporting and enclosing various operating components (schematically illustrated in FIG. 1) in operative assembled relation. While the dispenser is capable of quickly and positively discharging fluids of various types in different applications, it is particularly suited for dispensing both hot and cold liquid beverages at the same time. The term beverage will be understood to include a variety of consumable liquids such as coffee, soup, beer, fruit juices such as orange juice, vegetable juices, milk, tea, premixed beverages, carbonated beverages, and similar liquid foods and drinks. Separate metered quantities of either hot or cold liquids may be dispensed from each metering compartment of the dispenser, but for the purposes of illustration, the embodiment shown in FIGS. 1-3 will be described in connection with the metering and dispensing of separate slugs of hot water and cold concentrate, or syrup, to provide a blended hot beverage.

To effect precision metering and simultaneous discharge of water and beverage concentrate in precisely proportioned quantities for a single serving, a two stroke cycle metering pump 10 is provided in accordance with this invention as best seen in FIG. 1. The pump 10 has a tubular body 12 and an attached coaxial housing portion 14 jointly defining a longitudinal extending chamber 16 wherein a piston subassembly is received for reciprocating movement.

The piston subassembly includes a water piston 18 of V shaped half section opening toward the housing portion 14 and a concentrate piston 20 which is of reduced size and is reciprocable with a cylindrical liner 22 preferably formed of stainless steel for increased abrasion resistance while minimizing any resistance to piston movement. The liner 22 projects beyond housing portion 14 and into concentrate chamber housing 24 suitably fixed to the housing portion 14 by a nut 26.

Concentrate inlet and outlet fittings 30, 32 are provided in the concentrate chamber housing 24, and the inlet fitting 30 is shown having a check valve 34 exclusively providing one-way flow of concentrate into the

housing 24 through a supply line 35 connected to an insulated concentrate tank 36 (FIGS. 1-3) that maintains the concentrate in a refrigerated condition until discharged in a drink. If desired, the tank 36 could also be adapted to serve as a source of concentrate to be dispensed at room temperature or even at elevated temperatures depending on the uses to which the dispenser is to be applied.

A throw adjustment screw 38 is threadably secured within an end of the housing 24. The screw 38 may be set to project a preselected distance beyond an inner end of the plug 24 and then locked in position by a hex nut 42 to provide a left hand stop for the concentrate piston 20 defining a discharged position for the piston subassembly.

The piston 22 is secured to an axially extending connecting rod 46 integrally fixed to a circular end plate 48 of the water piston 18 that is reciprocable within chamber 16 to an extent limited by a throw adjustment screw and a spacer plug (not shown) coaxially mounted within the water piston 18 to provide a right hand stop defining a loaded position for the piston subassembly.

To assist self-centering reciprocating movement of the pump 10, a perforated guide tube 70 is coaxially received within the chamber 16 and has a flared end 71 abutting housing portion 14 for seating one end of a return compression spring 72 coiled about the guide tube 70 and the water piston 18. It is to be noted that the guide tube 70 additionally serves to maintain the return spring 72 in proper position.

The concentrate piston 20 and water piston 18 thus divide chamber 16 into separate concentrate and water measuring chamber portions and a rear operating chamber portion 84, the pistons 18, 20 and their respective chamber portions or compartments being of predetermined sizes for precisely metering measured quantities of concentrate and water in a fixed preselected ratio which may be controlled in volume by setting the throw adjustment screw 38. The forward concentrate compartment is provided with separate inlet and outlet fittings 30 and 32 as described above, and the back water compartment is also provided with separate inlet and outlet fittings 86 and 88 secured to the body 12 and the housing portion 14 respectively.

While not described in detail, suitable fluid-tight seals and packing rings are provided in the system where needed to ensure against undesired fluid leakage between component body parts as well as between the different compartments of the chamber 16 and their respective fittings in accordance with well known conventional techniques. Each of the seals is preferably formed of a suitable, commercially available, dry bearing plastic material exhibiting low abrasive characteristics and minimal deformation under load while possessing high wear resistance and high compression strength over a wide range of temperature to provide a suitable low friction piston seal.

For illustrative purposes, the tank 90 is described as having a suitable heated liquid therein, although it is to be understood that the dispenser could be easily modified to permit tank 90 to serve in a different capacity, e.g., wherein another cold liquid is desired to be mixed with the refrigerated concentrate to provide a blended, cold beverage.

To operate the pump 10 at high speed dispensing cycles with minimal energy requirements, as well as to provide for minimum water consumption, a common

supply and tank return conduit 92 is connected in permanently open communication with the operating compartment 84 for supplying tap water under pressure to drive the piston subassembly from its loaded position to its discharged position. Thereafter, the spent tap water returns from the operating compartment 84 via conduit 92 to the water tank 90 to be heated such that it is conditioned to be dispensed in a subsequent cycle. Moreover, the fluid circuit is particularly suited for operation wherein ordinary city water is supplied at approximately 35 psi to 15 psi gage pressure.

More specifically, the supply and tank return conduit 92 is connected to an open service port 94 in a solenoid operated main flow control valve 96. The main control valve 96 has a normally closed inlet port 98 communicating with an ordinarily water supply line 101, and a normally open outlet port 104 of the main control valve 96 is connected with the water tank 90. A branch inlet line 105 is provided for supplying water to the tank 90, excessive flow being accommodated by an overflow line 103 connected to a suitable drain, not shown. The inlet water is controlled by a float operated valve 106 in the line 105 to assist in maintaining a substantially constant volume within the tank 90.

The main control valve 96 is provided with suitable electrical connections to be energized in response to a demand signal in a well known manner. Upon energization of the main valve 96, the pistons 18 and 20 are immediately thrust forward against the spring force into discharge position to simultaneously dispense cold concentrate and hot water from the pump 10 through their respective outlets 32 and 88.

During this power stroke, the fluid circuit inlets to the concentrate and water compartment of the pump 10 are closed. While the check valve 34 effectively prevents reverse flow of concentrate into tank 36, the inlet 86 to the water compartment is closed off to the water tank by a valve member 108 of a solenoid operated auxiliary control valve 110 seating against a normally open working port 112 between a pump inlet line 114 and a hot water conduit 116 extending upwardly in the tank 90 for conducting hot water from the top of the tank 90 into the water compartment of the pump 10. Although the auxiliary control valve 110 is normally open, it is energized in phase with the main control valve 96 to close off the inlet 86 between the pump 10 and the tank 90 during the power stroke of the pump.

The water supply line 101 and branch inlet line 105 are connected to a fluid motor impeller 60 that is fed by a water supply 100. The fluid motor impeller 60 provides an intermittent agitation of the concentrate in the tank 36 immediately preceding withdrawal of the concentrate through supply line 35. The agitator assembly 80 for stirring the concentrate is driven through a magnetic drive provided by the fluid motor impeller 60.

The agitator assembly designated generally 80 has a plurality of vanes 81 which are equally spaced and which extend radially from adjacent to the center of the impeller to the outer periphery thereof. A stirrer rod 85 is suspended within the container 36 from a removable lid portion 91. A pivot ball 89 is secured to the upper end of the stirrer rod 85 and positioned within a cavity of the removable lid 91 so as to rotate therein during the stirring of the concentrate. A bar magnet 82 is completely embedded within a plastic material 83 and attached to the lower end of the stirrer rod 85 by the vane portions 81.

The impeller 60 has a magnetic core 61 which may be of any suitable manufacture. In the present instance the core 61 is a bipolar circular magnet which is suitable sealed or embedded in a plastic ring portion 64 so as to prevent the contamination of the product by the magnet or vice versa. This ring portion 64 is mounted for free rotation on a stud 63 which is fixed centrally on the bottom wall portion 62 of the impeller 60. A non-magnetic top plate 65 is secured to the bottom portion 62 by bolts 93. The impeller 60 is provided with an inlet 66 and outlet 67 (as shown in FIG. 3) for passage of water therethrough.

It will be apparent that as water enters the inlet 66 of the impeller 60 from water supply 100, the impeller will rotate and when opposite poles of the magnets 61 and 83 come into registry there will be a magnetic coupling between the two so that they will revolve together as a unit causing the agitator to stir the contents of the tank 36 to mix the contents of the concentrate and prevent sediment from settling. It will also be apparent that as the agitator rotates, liquid will flow through the grooves of the impeller 60 and provide a lubricant between the ring portion 64 and stud 63 so as to reduce wear of the parts of the impeller in contact therewith. Additionally, because of the large ratio of water to concentrate, it will be apparent that there is sufficient volume of water available to drive the impeller and more compact operation is present.

It should be manifest that while a preferred embodiment of the present invention has been shown and described for illustrative purposes, the present invention is nevertheless capable of wide variation within the purview of the invention. For example, the present invention could be incorporated in a conventional premix carbonated beverage system. Such conventional premix carbonated beverage systems generally employ a tank for holding the premix beverage, a carbon dioxide inlet connection for the tank, and a dip tube suspended within the tank and connected to an outlet connection on the top cover portion of the tank. In normal operation, carbon dioxide is supplied to the tank through the inlet connection of the tank for driving the pre-mix beverage up the dip tube and out of the tank. The pre-mix beverage is then supplied through a serving nozzle to the consumer. The present invention can be incorporated in such a system so that a stirring element suspended within the tank is driven by an agitator apparatus as described above. In such a system, the pre-mix beverage is withdrawn through the dip tube within the tank and supplied as the liquid drive for the fluid motor impeller. After passing through the impeller, the pre-mix beverage is supplied through a serving nozzle to the consumer.

In view of the above-described embodiments it will be seen that a dispenser with an agitator assembly in accordance with this invention can be readily constructed for dispensing metered quantities of a plurality of different fluids each of which can be either hot or cold, depending on the requirements of the beverage desired to be dispensed. As aforesaid, the term beverage is meant to include a variety of consumable liquids such as coffee, soup, beer, fruit juices, vegetable juices, milk, tea, pre-mix beverages, carbonated beverages and similar liquid foods and drinks. The agitator dispenser of this invention will be seen to be of rugged, compact construction which is quick and easy to assemble in addition to being capable of providing de-

pendable operation over extended periods of time with minimal maintenance and service requirements.

It is believed that the present invention, its mode of construction, assembly, and operation, and many of its advantages attendant thereto should be readily understood from the foregoing without further description, and it should also be manifest that while a preferred embodiment of the invention has been shown and described for illustrative purposes, the structural details are nevertheless capable of wide variation within the purview of the invention as defined in the appended claims.

The embodiments of the invention in which an exclusive property right or privilege is claimed are defined as follows:

1. An agitator dispenser having a container for holding an additive fluid to be dispensed wherein:  
agitating means are provided for agitating a dispensable additive fluid and wherein driving means are provided for driving the agitating means, torque being applied to the driving means by another fluid to be dispensed with the additive (the dispensable) fluid.
2. An agitator dispenser as defined in claim 1, wherein the driving means for driving the agitating means comprises a magnetic coupling means.
3. An agitator dispenser as defined in claim 1, wherein the driving means comprises an impeller having an inlet and outlet connection for the dispensable fluid.
4. An agitator dispenser as defined in claim 1, wherein the agitating means comprises a magnetic element immersed within the container holding the additive fluid so as to form a magnetic coupling with said driving means.
5. An agitator dispenser as defined in claim 4,

wherein the magnetic element is suspended within the container holding the additive fluid from a removable top or cover for the container so as to provide an easily removable agitator element and prevent the same from being lost during the cleaning or replacement of the container.

6. An agitator dispenser as defined in claim 1, wherein conduit means are provided for routing the dispensed fluid from the driving means to a conditioning chamber prior to being dispensed with the additive from the container.

7. An agitator dispenser as defined in claim 6, wherein the additive within the container comprises a beverage extract.

8. An agitator dispenser as defined in claim 7 wherein control means are provided for intermittent operation of the agitating means immediately preceding dispensing of the extract.

9. An agitator dispenser as defined in claim 7 wherein conduit means are provided for routing the dispensed fluid to a conditioning chamber prior to being dispensed with the extract.

10. An agitator dispenser as defined in claim 1, wherein control means are provided for intermittent agitation of the additive fluid within the container immediately preceding dispensing of the same.

11. An agitator dispenser as defined in claim 1 wherein the dispensable fluid comprises a pre-mix beverage and wherein a dip tube is provided within the container for withdrawal of the pre-mix beverage.

12. An agitator dispenser as defined in claim 11 wherein a serving nozzle means are provided for dispensing the pre-mix beverage after operation of the agitating means by the pre-mix beverage.

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