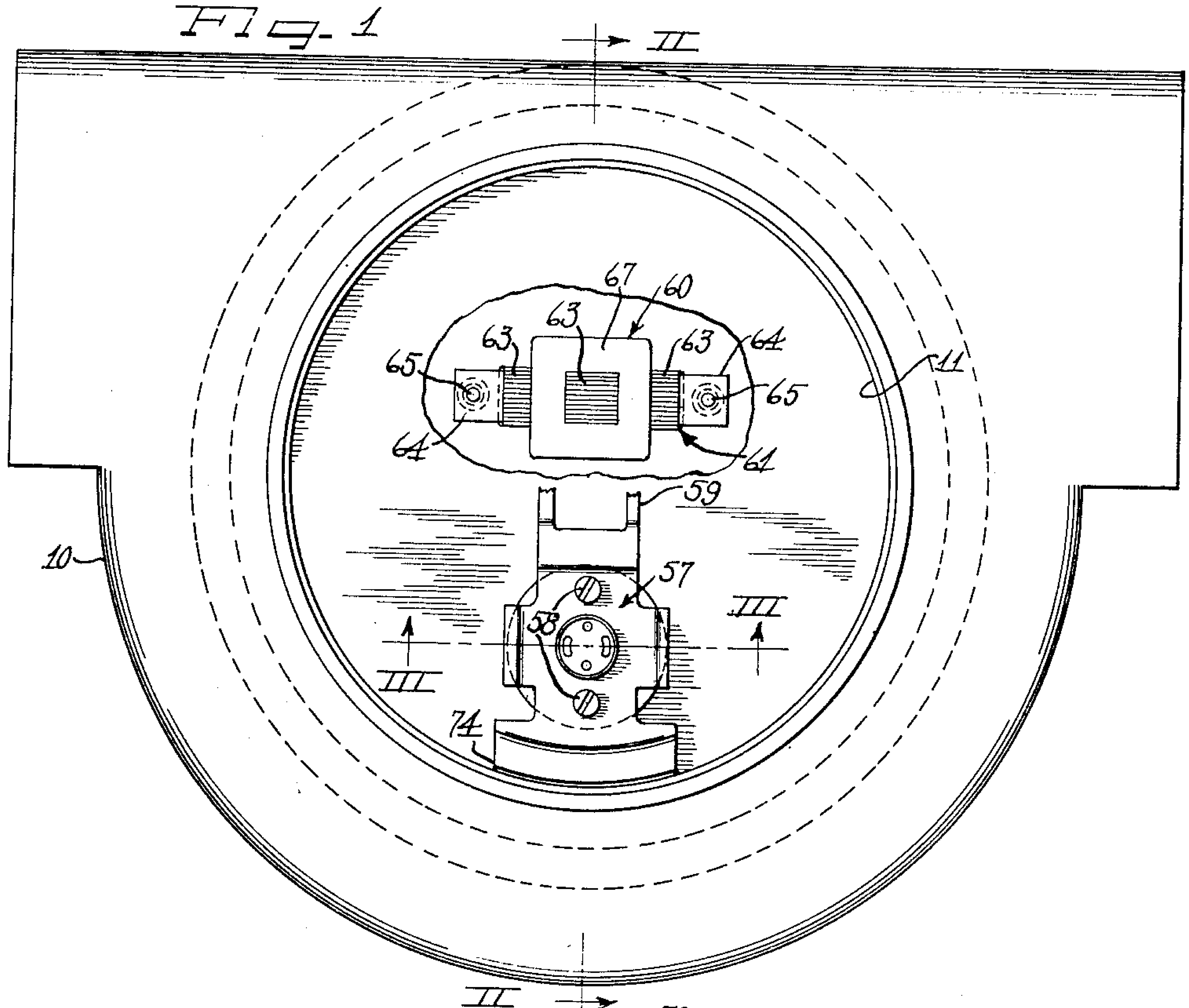
Sept. 29, 1953 C. C. BAUERLEIN 2,653,802

DISPENSER CIRCULATORY DEVICE

Filed Sept. 15, 1951 2 Sheets-Sheet 1

Fig. 1



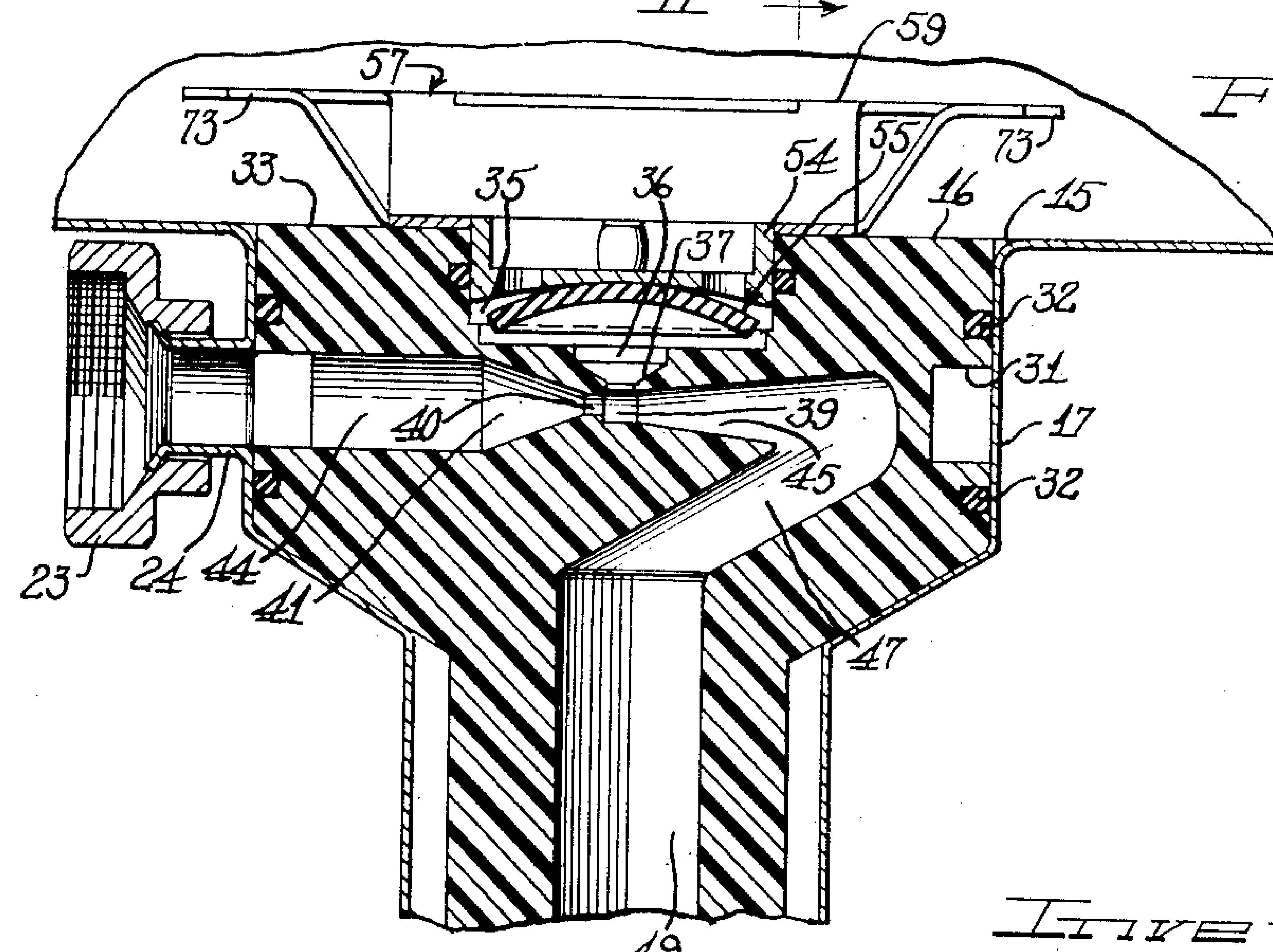


Fig. 3

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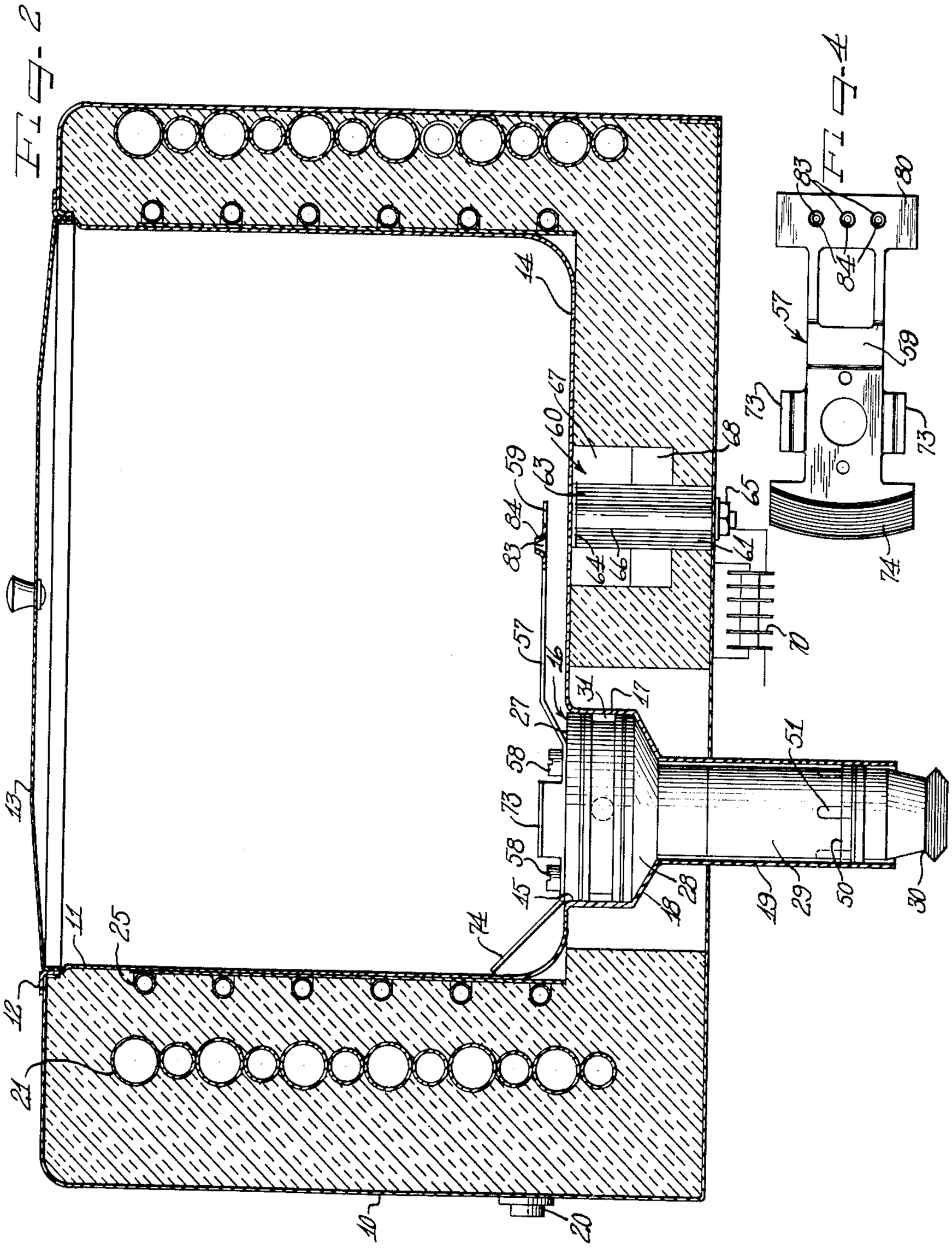
2 Sheets-Sheet 2



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2,653,802

UNITED STATES PATENT OFFICE

2,653,802

DISPENSER CIRCULATORY DEVICE

Carl C. Bauerlein, Mukwonago, Wis., assignor to The Dole Valve Company, Chicago, Ill., a corporation of Illinois

Application September 15, 1951, Serial No. 246,844

10 Claims. (Cl. 259—39)

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This invention relates to dispensers for diluting or carbonating and dispensing fluids or concentrates, such as concentrated juices, malts, liquors, colas, flavors and the like.

A principal object of my invention is to provide a new and improved form of dispenser operable to maintain the consistency of the fluid to be dispensed of a uniform consistency throughout the tank.

Another object of my invention is to provide a novel and improved form of dispenser for refrigerated concentrates and the like having circulatory means for maintaining the temperature of the fluid within the tank uniform throughout the tank.

A further object of my invention is to provide an improved form of dispenser wherein the consistency of the fluid to be dispensed is maintained uniform throughout the tank by creating a circulation of the fluid by an agitating vibrator.

Another object of my invention is to provide a novel and improved form of agitator for circulating the contents of a dispensing tank including a vibrating blade in the form of a flat armature extending along a wall of the tank in parallel spaced relation with respect thereto and an oscillating field on the outside of the tank in alignment with said armature.

Still another object of my invention is to provide a novel and improved form of dispenser for concentrates and the like including a dispensing valve recessed in the bottom of a concentrate tank and a vibrating circulating member secured thereto and movable with respect to the wall of the tank, for creating a circulation of liquid therein.

Still another object of my invention is to provide a simple form of circulating means for concentrate dispensers including a diluting and dispensing valve detachably mounted in the bottom of a tank and recessed therein, a vibrator in the form of a flat armature secured to said valve and extending in parallel relation with respect to the bottom of said tank, and an oscillating field beneath the bottom of said tank, for setting said armature into vibratory motion.

A further and more detailed object of my invention is to provide a novel and improved form of dispenser comprising a tank constructed from a non-magnetic material and having a dispensing and mixing valve recessed in the bottom thereof, and forming a detachable mounting for a vibratory armature in the bottom of said tank

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and also including an oscillating field on the outside of said tank setting said armature into vibratory motion and creating a circulatory movement of the fluid in said tank.

These and other objects of my invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings wherein:

Figure 1 is a top plan view of a dispenser constructed in accordance with my invention with the top cover removed and certain parts thereof broken away in order to show the oscillating field for setting the armature into vibratory motion;

Figure 2 is a sectional view taken substantially along line II—II of Figure 1;

Figure 3 is a sectional view taken substantially along line III—III of Figure 1; and

Figure 4 is a top plan view of the vibrating circulatory armature of my invention.

In Figures 1 and 2 of the drawings, I have shown a part of a dispenser for diluting or carbonating and dispensing various types of fluids or concentrates, such as concentrated fruit and vegetable juices, malts, liquors, colas, flavors and the like, and particularly adapted to dilute fruit or vegetable concentrates to the normal consistency of the juice of the fresh natural fruits or vegetables and to deliver a cool uniformly mixed juice for drinking purposes. The dispenser may include a casing 10 having a container or tank 11 therein, and spaced from and insulated from the wall thereof. The tank 11 may be of a generally cylindrical form and may be secured at its upper end to the top of the container 10, as by a flange 12 herein shown as being formed integrally with said tank and extending outwardly therefrom. Said tank may be closed by a cover 13 and may have a bottom 14 leading to an opening 15 therein and forming a receptacle for recessing a diluting and mixing valve 16 within the bottom of said tank with its top substantially flush, or a slight distance beneath the bottom thereof.

As herein shown, the receptacle 15 has an enlarged diameter cylindrical wall 17 terminating into an inverted frustoconical wall 18 forming a seat for the valve 16. The wall 18 terminates at its end of reduced diameter into a depending cylindrical wall 19 encircling the lower end portion and spout of the valve 16.

The supply pipe for diluting water may enter the casing 10 through a wall thereof and may be coiled around the outside of the wall of the tank 12 in radially spaced relation with respect thereto as indicated by reference character 21. Said

supply pipe may be connected at its delivery end with a constant volume solenoid operated delivery valve (not shown) like the valve shown and described in my application Serial No. 229,121, filed May 31, 1951, and no part of my present invention so not herein shown or described. The delivery valve (not shown) may be connected with a fitting 23 (Figure 3) connected with a conduit 24 extending outwardly from the enlarged diameter wall portion 17 of the receptacle for the valve 16, and communicating with the inside of said receptacle, for supplying a constant volume of diluting fluid thereto and to the dispensing valve 16, as in my prior application Serial No. 229,121. Where the concentrate or fluid to be dispensed must be maintained cool to prevent the breeding of bacteria, the tank 11 may be cooled by a refrigerating coil 25 encircling the outer periphery thereof which may be connected with a compressor, motor and condenser of a refrigerating unit (not shown), to maintain the concentrate at the proper temperature, a desirable temperature for juice concentrates being in the neighborhood of 28° F., although the concentrate may be maintained at higher or lower temperatures as long as it will flow relatively freely and is sufficiently cold to prevent the breeding of bacteria. It is, of course, obvious that where the fluid in the tank 11 is to be heated that a heating coil may be substituted for the refrigerating coil.

The tank 11 is shown as being formed so as to be free from all shoulders or recesses where bacteria may breed and may be made from a corrosion-resistant material, such as a non-magnetic stainless steel, which besides resisting corrosion of highly acid fruit juices, also acts as a conductor of cold, to aid in maintaining the juice cool, when the refrigerating unit may be shut off. Where hot beverages may be dispensed, said tank may also act as a conductor of heat to retain the heat in the concentrate.

The dispensing valve 16 is herein shown as comprising a valve body 27 of a generally cylindrical form fitting within the wall 17 of the receptacle 15 for said valve and having a frusto-conical bottom wall 28 seated on the wall 18 of the receptacle. A conduit 29 leads from the bottom of the frusto-conical wall 28 and is herein shown as being formed integrally therewith and spaced inwardly from the inner periphery of the wall 19. The conduit 29 is seated on a nozzle or spout 30 mounted in the bottom of the reduced diameter cylindrical wall 19 of the valve receptacle, and suitably sealed with respect thereto. The valve body 27 is preferably transparent and may be molded or formed from one of the well known thermoplastic materials, or from glass. One such thermoplastic material may be "Lucite," which not only exposes the passageways in the valve to view, but also acts as an insulator and inhibits freezing of the diluting water passing into and through the valve. It is obvious, however, that the valve body need not be transparent and may be made from metal if desired.

The valve body 27 is shown as having an annular passageway 31 extending therearound and opening to the periphery thereof and to the inside of the wall 17 and communicating with the conduit 24, for conducting water or any other diluting or carbonating fluid under pressure into and through the valve body. Sealing rings 32, 32 may be provided on opposite sides of the annular passageway 31, to retain water in said

passageway and prevent leakage of water along the side wall of the valve body 27 and also to prevent the leakage of concentrate from the tank into said annular passageway. Said sealing rings may be of any well known form of flexible sealing ring, such as an O ring, made from rubber or an elastomer. The rings and recesses in the wall of the valve body for said rings, however, should be so constructed that they may readily be cleaned and will not harbor the breeding of bacteria.

The valve body 27 is shown as having a top face 33, herein shown as being flush with the bottom 14 of the tank 11 and as having a concentrate chamber 35 recessed therein and opening to the top thereof. The concentrate chamber 35 is shown as communicating with a generally cylindrical outlet 36, at the bottom thereof having a generally frusto-conical bottom terminating in a knife edge orifice 37, communicating with a vacuum chamber 39 on the downstream side of a throat 40 of a venturi 41.

A passageway 44 having an inverted truncated core-like inner end communicating with the throat 40 at its reduced diameter end, leads from the annular passageway 31. An inverted truncated cone-like passageway 45 is shown as leading from the vacuum chamber 39 and as communicating with a downwardly extending inclined passageway 47, opening to a vertically extending passageway 49 extending downwardly along the conduit 29 into communication with the spout 30.

The conduit 29 fits within and may be slidably removed from an upper annular recessed portion 50 of the nozzle 30. Said conduit has a plurality of vertically extending notches or grooves 51, 51 formed therein and opening to the bottom thereof. The grooves 51, 51 are normally closed by engagement with the annular recessed portion 50 of the nozzle 30 but open to afford a passageway through the nozzle when the valve 16 is moved upwardly to disengage the bottom surface of the conduit 29 from the annular portion 50. When it is desired to dump concentrate from the tank 29, the valve is moved upwardly until the lower sealing ring 32 is raised above the top of the valve receptacle 15.

The vacuum chamber 39 on the downstream side of the throat 40 of venturi 41 is of a larger diameter than the throat of the venturi and is so proportioned that a vacuum will be built up in said chamber by the increased velocity of the water flowing therethrough as it leaves the throat of the venturi. When the tank 11 has concentrate therein, and water enters the valve body 27 through the annular passageway 31, at a predetermined generally constant pressure governed by the water delivery valve (not shown), the velocity of the water flowing through the throat 40 of the venturi 41 will increase, with a resultant drop in pressure at the downstream side of said throat. This will create a vacuum in the vacuum chamber 39. This vacuum will thus aspirate the concentrate from the tank 11, mixing it with the water and discharging it through the spout 30, diluted to the desired consistency. The proportioning of the water and concentrate is thus governed by the vacuum in the vacuum chamber 39 as in my application Serial No. 229,121 and the opening into said vacuum chamber may be varied without affecting the proportions.

The concentrate chamber 35 is herein shown as having a cage 54 of a check valve 55 recessed therein. The check valve 55 is herein shown as

being of the flexible wafer type, like that shown and described in my aforementioned application Serial No. 229,121 so not herein shown or described further. The purpose of said check valve is to prevent the leakage of concentrate into the vacuum chamber **39** when the aspirating liquid, such as water, is shut off, but to allow the passage of concentrate into said vacuum chamber upon the reduction in pressure therein by the passage of water through the reduced throat of the venturi **41**.

It should here be understood that while I herein refer to water as the diluting liquid, that any other diluting liquid may be used in place of water and that where it may be desired to carbonate the fluid in the tank **11** that carbonated water or a carbonating gas may be used to aspirate the fluid or liquid from said tank in place of water under pressure.

Referring now in particular to the means for creating a circulation of the concentrate or other fluid within the tank **11** and attaining a uniformly mixed fluid or concentrate and also maintaining the temperature thereof uniform throughout said tank, a circulator in the form of a flat vibratory armature **57** is herein shown as being secured to the top face **33** of the valve body **27** of the mixing and dispensing valve **16** as by machine screws **58**, **58**. The armature **57** is shown as having a flat blade **59** extending in parallel relation with respect to the bottom **14** of the tank **11** and spaced thereabove. A field or electromagnet **60** beneath the bottom of the tank **12** and energized with a pulsating current is shown as being provided to set said armature into vibration.

The field **60** is herein shown as comprising a laminated core **61** secured to the inside of the bottom plate of the casing **10**. Said core may be of a well known form and is shown as being in the form of a three tined fork having three upwardly extending poles **63**, **63**. Said core may be secured to the bottom plate of the casing **10** by clips **64**, **64** engaging the outer edges of the outer pole pieces **63** and by bolts **65** secured thereto. The bolts **65** may pass through insulating sleeves **66**, **66** and may also form the terminals for the conductors for coils **67** and **68** of the magnet. Said coils are shown as being wound about the central pole piece **63** inside of the outer pole pieces.

As herein shown the coils **67** and **68** with the core **61** form a two stage electromagnet for setting the blade **59** into vibration with varying intensity. The purpose is that when the concentrate is warm, less power is required to thoroughly circulate the concentrate, but as said concentrate is refrigerated, the power required to circulate the concentrate, which may be viscous, increases and it is desirable to increase the intensity of vibration of the armature **57** in order to maintain the required circulation of the concentrate.

Thus, during operation of the dispenser, when dispensing a warm or hot liquid or concentrate, or when dispensing a concentrate when the refrigerating unit is not in operation, the coil **67** only will be energized. As, however, the temperature of the concentrate is reduced, as where the refrigerating unit comes into operation, the coil **68** is cut into the circuit and both coils **67** and **68** will be effective to vibrate the armature **57** and thus increase the intensity of vibration of said armature and maintain the same relative circulation as when the concentrate is warm.

A separate thermostat (not shown) or the thermostat controlling operation of the refrigerating element and connected in the circuit to the coils **67** and **68**, may be used to cut the coil **68** into the circuit when the refrigerating unit comes into operation, and to cut out said coil when the refrigerating unit is not in operation, in a manner well known to those skilled in the art so not herein shown or described. A rectifier **70**, which may be a half wave selenium rectifier is shown as being mounted on the bottom of the casing **10**. Said rectifier is connected to the coils **67** and **68** to energize said coils with a pulsating current and reduce the number of pulsations.

The armature **57** may be of a magnetic stainless steel, which will resist the corrosive action of the juices, one form of which steel found satisfactory is a Number 430 magnetic type of stainless steel. The armature **57** is shown as having an intermediate portion abutting the top of the valve body **27** and secured to the cage **54**, and also secured to the top of said valve body. While said armature is shown as being secured to said valve body by the machine screws **58**, **58**, it need not be so secured and may be molded to said valve body if desired. Two oppositely extending wings **73**, **73** extend upwardly from said intermediate portion and afford a means for lifting the valve **16** from its receptacle. The armature **57** also has an upwardly inclined rear end portion **74**, the outer margin of which conforms generally to the cylindrical wall of the tank **11**, and affords a means for aligning the projecting blade **59** of said armature with the electromagnet **60** and making it impossible to insert the valve within its receptacle with the blade **59** out of alignment with the pulsating field of said electromagnet. The blade **59** is herein shown as extending outwardly from the valve body **27** in an upwardly inclined direction and then extending in parallel relation with respect to the bottom **13** of the tank **11**. Said blade is shown as terminating in a transversely extending circulating forward end portion **80**, extending across said blade and beyond opposite sides thereof. The blade **59** is likewise shown as being open for a portion of the length thereof to afford a means for increasing the flexibility of said armature.

The circulation of fluid within the tank **11** upon vibration of the armature **57** is created by vibration of the circulatory portion **80** forcing the concentrate through a plurality of apertures **83**, **83** extending therethrough, with a pumping action. As herein shown, the apertures **83**, **83** extend through collars **84**, extending upwardly from the top of the transverse end portion **80** of the blade **79**. The apertures **83**, **83** may be of a generally frusto-conical form, with the reduced diameter portion thereof opening to the tops of said collars. While separate collars may be secured to the top of the transverse portion **80** of the blade **59**, I have herein shown said collars as being extruded from said blade, to provide the frusto-conical apertures therein, the increased diameter portions being at the bottom of said blade and the reduced diameter portions being at the top thereof. This reduction in diameter of the apertures **83**, **83** in the direction of pumping movement of the blade **59**, restricts the passage of fluid through said apertures with a resultant increase in velocity of fluid passing therethrough and an increased circulating effect of said blade.

It should here be noted that the electromagnet **60** is connected in the circuit to continuously vibrate the armature **57**, as long as the dispenser is connected in the electric circuit. This creates a continuous circulation of fluid therein and as-

sures a uniform consistency of fluid throughout the tank 11, and also assures a uniform temperature thereof.

It will be understood that modifications and variations may be effected without departing from the spirit and scope of the novel concepts of the present invention.

I claim as my invention:

1. In a dispenser, a tank, a dispensing and mixing valve leading from the bottom of said tank, and means circulating the fluid within said tank comprising a vibrating blade extending along a wall of said tank and spaced closely adjacent to said wall and extending in parallel relation with respect thereto and having a laterally extending agitating free end portion, an electromagnet on the outside of the wall of said tank in alignment with the agitating free end portion of said blade, and means energizing said electromagnet with a pulsating current.

2. In a dispenser, a tank of non-magnetic material, a dispensing and mixing valve leading from the bottom of said tank, and means circulating fluid in said tank and maintaining a uniform consistency thereof comprising an electromagnet on the outside of a wall of said tank, means energizing said electromagnet with a pulsating current, and a blade of magnetic material extending along said wall in parallel spaced relation with respect thereto and secured thereto adjacent one of its ends having a widened agitating free end portion in direct alignment with said electromagnet and set into vibration upon energization of said electromagnet.

3. A dispenser comprising a tank, a dispensing and mixing valve leading from the bottom of said tank, and means circulating the fluid in said tank and maintaining the consistency thereof uniform, comprising an armature within said tank and secured to the bottom thereof adjacent one of its ends and having an impelling end portion extending along said bottom in generally parallel spaced relation with respect thereto, an electromagnet beneath said bottom in alignment with the impelling end portion of said armature, and means energizing said electromagnet with a pulsating current to effect vibratory movement of said armature.

4. A dispenser comprising a tank constructed of non-magnetic material, a dispensing and mixing valve recessed in the bottom of said tank and removably mounted therein and having a fluid passage therethrough, and means circulating fluid in said tank and maintaining the fluid therein of a uniform consistency comprising an electromagnet beneath the bottom thereof, means energizing said electromagnet with a pulsating current, and an agitating blade secured to said valve and having a flat projecting portion extending therefrom in generally parallel relation with respect to the bottom of said tank and having a circulating end portion in direct alignment with said electromagnet.

5. A dispenser comprising a tank constructed of a non-magnetic material, and means circulating the fluid within said tank comprising an electromagnet on the outside of said tank adjacent the bottom thereof, an armature on the inside of said tank in the form of a relatively wide blade and secured to the bottom of said tank adjacent one of its ends and having a projecting blade extending along said tank in parallel spaced relation with respect thereto, and having a widened circulating free end portion in alignment with said electromagnet and having a plurality of pumping apertures extending vertically therethrough.

6. A dispenser comprising a tank, means establishing a circulation of fluid within said tank comprising an electromagnet on the outside of said tank beneath the bottom thereof, a blade within said tank and secured to the bottom thereof adjacent one of its ends and having a projecting portion extending along the bottom of said tank in generally parallel spaced relation with respect thereto, said blade having an apertured circulating free end portion disposed over and in alignment with said electromagnet, the portions of said blade forming the apertures in said free end portion extending above the top surface of said blade and having inner walls of a frusto-conical form, with the portions of larger diameter opening toward the bottom of said tank and the portions of reduced diameter opening toward the top of said tank.

7. In a dispenser, a dispensing and mixing valve recessed in the bottom of said tank and removably mounted therein, and means circulating fluid in said tank upwardly along the center thereof and down the sides thereof and maintaining the circulation of fluid therein comprising an electromagnet beneath the bottom of said tank, means energizing said electromagnet with a pulsating current, an agitating blade secured to the top of said valve and having a projecting portion extending therefrom in vertically spaced parallel relation with respect to the bottom of said tank into alignment with said electromagnet, said blade having an apertured circulating portion adjacent the end thereof, the portions forming the apertures of which extend vertically above the top of said blade and form elongated passageways and impart a pumping action to the fluid and are of a reducing diameter from the bottom to the top thereof, to increase the velocity of the fluid passing therethrough and the circulation of the fluid within said tank.

8. In a dispenser, a tank having a receptacle in the bottom thereof, a dispensing and mixing valve removably mounted in said receptacle and having a fluid passage therethrough, and means circulating fluid upwardly along the center of said tank and downwardly along the sides thereof and maintaining the fluid therein of a uniform consistency comprising an electromagnet disposed beneath the bottom of said tank, means energizing said electromagnet with a pulsating current, an agitating blade secured to said valve and having a flat projecting portion extending therefrom in parallel spaced relation with respect to the bottom of said tank with a circulating end portion in alignment with said electromagnet, and also having a tail conforming generally to the form of the wall of said tank and locating said blade in aligned relation with respect to said electromagnet upon the insertion of said valve within said receptacle.

9. A dispenser particularly adapted to mix and dispense concentrates comprising a tank, a mixing and dispensing valve in the bottom of said tank, a flat armature carried by said valve and extending along the bottom of said tank and spaced therefrom, and an electromagnet disposed beneath the bottom of said tank and energized with a pulsating current to set said armature into vibration.

10. A dispenser comprising a tank, and means creating a circulation of fluid within said tank comprising a blade of magnetic material secured to the bottom of said tank and extending there-

along in substantially parallel spaced relation with respect thereto, an electromagnet disposed beneath the bottom of said tank, means energizing said magnet with a pulsating current to create vibratory motion of said blade, and said blade having a substantially flat circulating free end portion disposed over and in alignment with said electromagnet and having a plurality of apertured portions therein extruded from said blade to extend above the top thereof and of a uniformly decreasing diameter from the bottom to the top thereof.

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