April 22, 1969 P. L. REID 3,439,835

LIQUID METERING DISPENSER WITH RECIPROCABLE PISTON AND ROTATABLE CONTROL VALVE

Filed Sept. 14, 1967 Sheet 1 of 2

Fig. 1

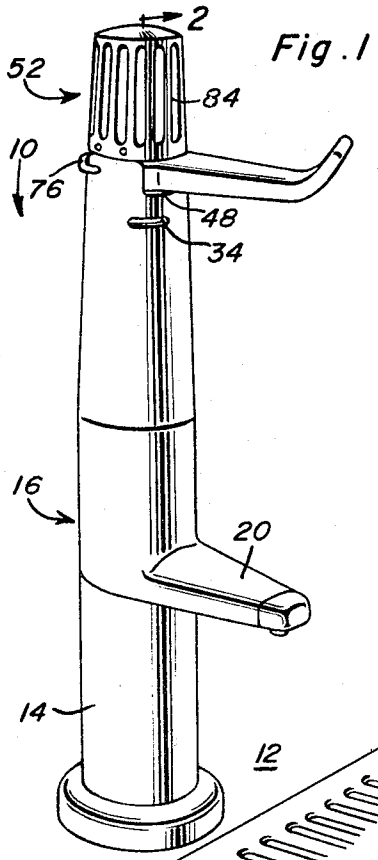


Fig. 7

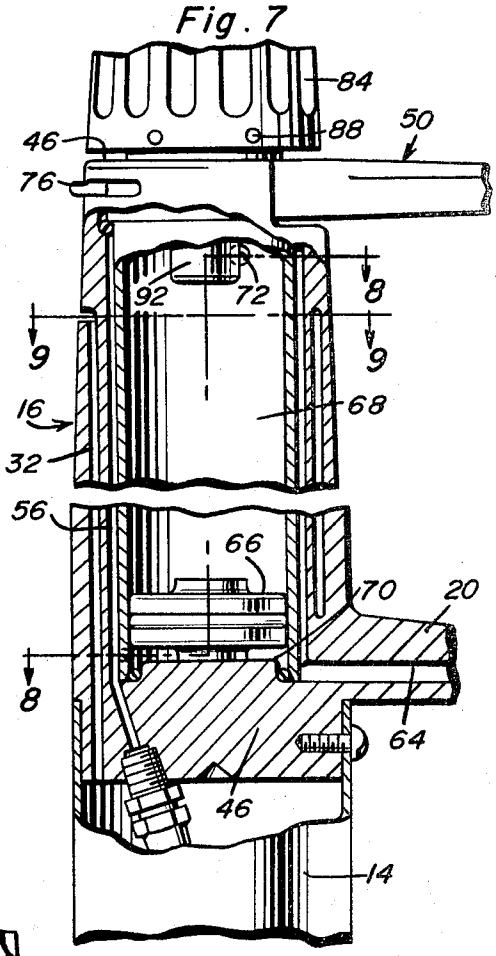


Fig. 10

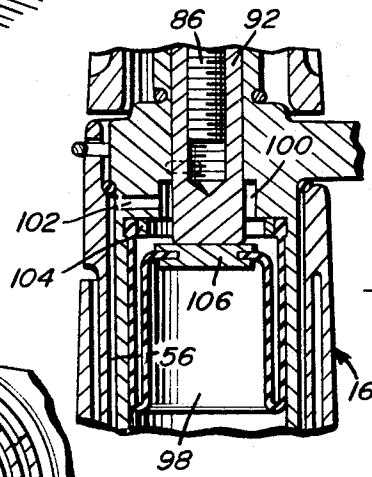


Fig. 8

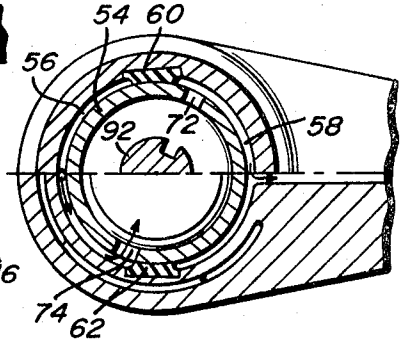
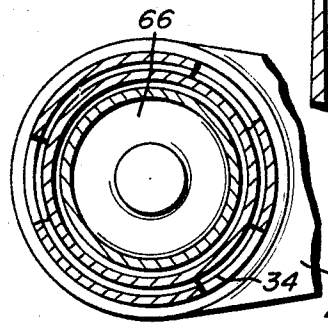


Fig. 9



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LIQUID METERING DISPENSER WITH RECIPROCABLE PISTON AND ROTATABLE CONTROL VALVE

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Fig. 2

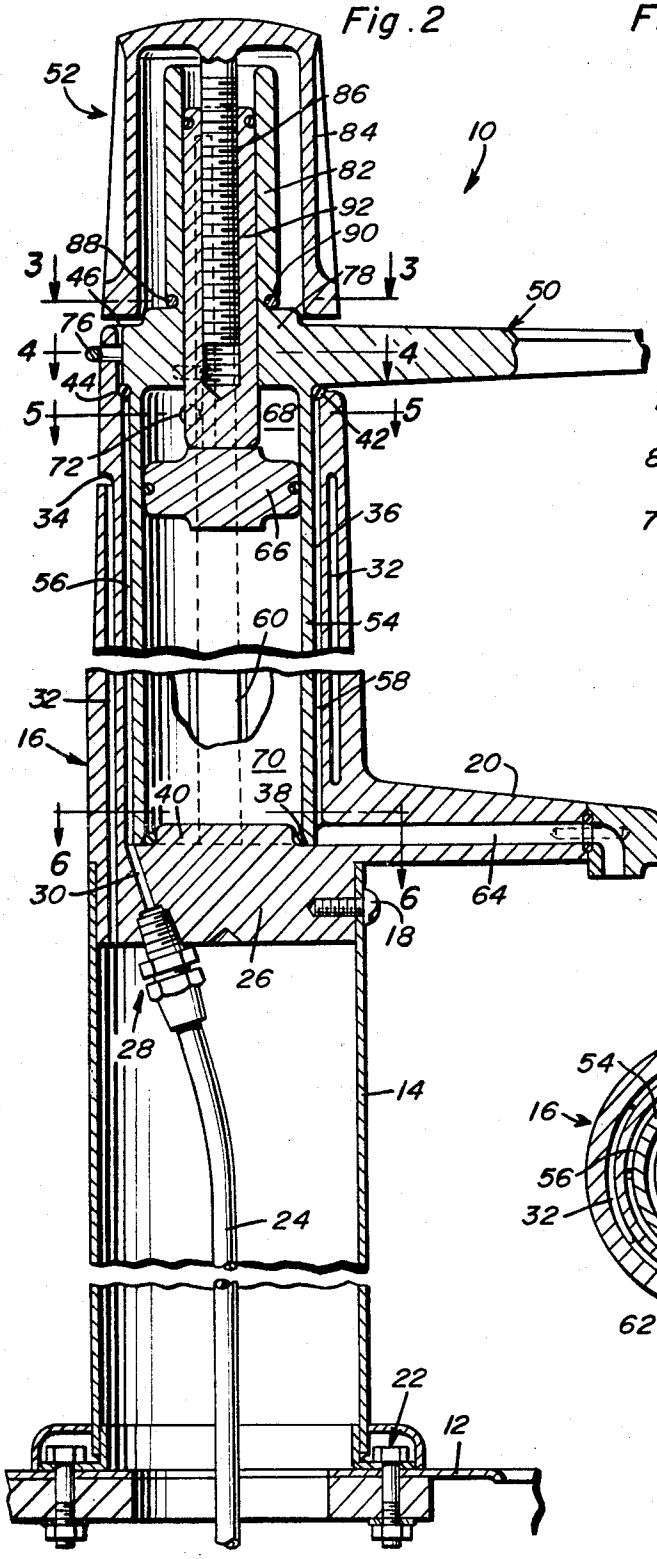


Fig. 3

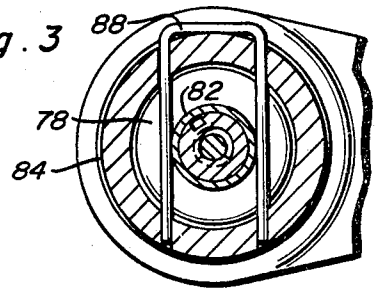


Fig. 4

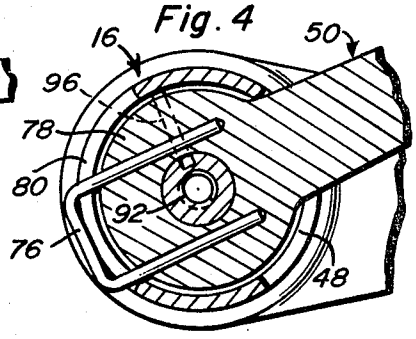


Fig. 5

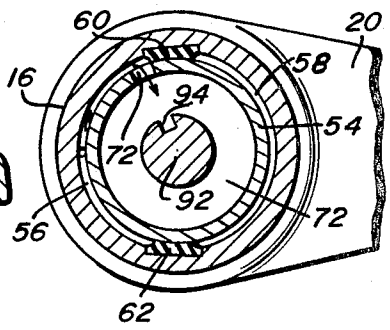
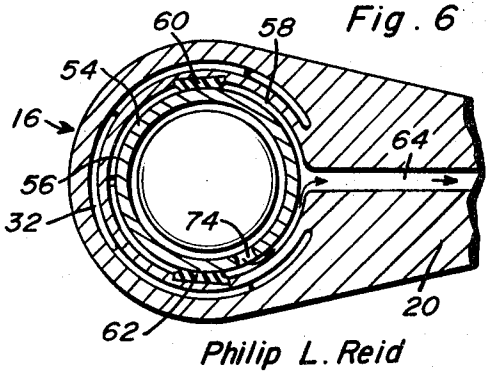


Fig. 6



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3,439,835

LIQUID METERING DISPENSER WITH RECIPROCABLE PISTON AND ROTATABLE CONTROL VALVE

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Int. Cl. B67d 5/30; G01f 11/06
U.S. Cl. 222—21 13 Claims

ABSTRACT OF THE DISCLOSURE

A beverage dispenser of the rotary valve type having a vertically movable piston displaceable through an adjustable stroke by pressurized fluid to dispense a fixed quantity of said fluid each time the valve actuator is angularly moved from one operative position to the other. Inlet and outlet passages separated by axially elongated seals are formed between the valve body and the rotatable valve member for communication with fluid chambers on opposite sides of the piston through axially spaced ports in the valve member.

This invention relates to the dispensing of an adjustably fixed quantity of fluid such as liquid beverages from a pressurized source. More particularly, the present invention relates to a rotatable valve mechanism having means for dispensing a measured quantity of fluid each time the valve actuator is displaced between two limit positions.

In many installations, it is desirable to provide a dispensing valve mechanism which incorporates therewithin facilities for measuring a predetermined quantity of fluid to be dispensed as well as means for adjusting or changing the quantity as desired. The dispensing valve mechanism of this type must also be compact and versatile in installation. In particular, it is desirable to have such a dispensing valve mechanism for the serving of draft beer as a counter top dispenser, in an under bar installation or as a direct draw-type of beer dispenser.

In accordance with the present invention, a dispensing valve mechanism fulfilling the foregoing requirements is provided which features a tubular valve member rotatably mounted within an elongated valve body so as to enclose fluid chambers on opposite sides of a vertically movable piston communicating through axially spaced ports in the valve member with inlet and outlet passages formed between the valve member and the valve body. The inlet and outlet passages are separated by axially elongated seal elements mounted by the valve body in wiping engagement with the external surface of the tubular valve member, the inlet passage being connected through tubing to the bulk container within which the pressurized fluid is stored while the outlet passage communicates with a dispensing spout. The valve member is angularly displaced between two limit positions in order to dispense a predetermined quantity of fluid by means of a handle actuator which mounts thereon, facilities for changing the stroke of the piston to thereby change the quantity of fluid dispensed each time the valve member is angularly displaced from one position to the other.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view showing the dispensing valve mechanism of the present invention in one typical installation.

FIGURE 2 is a longitudinal sectional view through the valve mechanism taken substantially through a plane indicated by section line 2—2 in FIGURE 1.

FIGURE 3 is a transverse sectional view taken substantially through a plane indicated by section line 3—3 in FIGURE 2.

FIGURE 4 is a transverse sectional view taken substantially through a plane indicated by section line 4—4 in FIGURE 2.

FIGURE 5 is a transverse sectional view taken substantially through a plane indicated by section line 5—5 in FIGURE 2.

FIGURE 6 is a transverse sectional view taken substantially through a plane indicated by section line 6—6 in FIGURE 2.

FIGURE 7 is a partial side elevational view of the valve mechanism in one of its positions opposite to the position illustrated in FIGURES 1–6, with parts broken away and shown in section.

FIGURE 8 is a partial transverse sectional view taken substantially through a plane indicated by section line 8—8 in FIGURE 7.

FIGURE 9 is a transverse sectional view taken substantially through a plane indicated by section line 9—9 in FIGURE 7.

FIGURE 10 is a partial sectional view showing a modified form of the invention.

Referring now to the drawings in detail, FIGURES 1 and 2 illustrate the dispensing valve mechanism generally denoted by reference numeral **10** mounted for example on a support **12** by means of a tubular support **14** so as to extend above a counter top. The tubular support is therefore connected at its upper end to a tubular valve body **16** by means of fasteners **18** for example thereby positioning a liquid dispensing spout **20** the proper distance above the counter top so as to accommodate a glass or container into which a measured quantity of liquid is to be dispensed. The liquid or beverage is derived from a pressurized container (not shown) disposed below the support **12** to which the tubular support **14** is connected by means of the fastener assemblies **22**. The fluid is conducted from the pressurized source upwardly to the valve body by means of the tubing **24** within the tubular support **14**.

The tubular body **16** is closed at a lower end by means of a base portion **26** which threadedly mounts the fitting **28** by means of which the tubing **24** is coupled to the tubular body conducting fluid into the tubular body through the passage **30** formed in the base portion **26**. A cylindrical cavity is formed within the tubular body **16** with which the passage **30** communicates. An annular flow passage **32** is also formed in the tubular body which opens into the tubular support **14** through the base portion **26** and terminates adjacent the open upper end of the tubular body at a plurality of circumferentially spaced vent slots. The annular flow passage **32** accordingly conducts a flow of cold air upwardly from the source of pressurized fluid which is refrigerated in order to maintain any fluid stored within the valve mechanism at a low temperature suitable for drinking purposes. Fluid is stored within the tubular body **16** by means of a tubular valve member generally referred to by reference numeral **36**. The valve member is rotatably mounted within the tubular body **16** to enclose sealed fluid chambers. Toward this end, an annular seal element **38** is positioned about an upwardly projecting boss **40** formed on the base portion **26** while an annular seal element **42** is seated on an annular shoulder **44** formed in the tubular body adjacent its upper open end **46**. Also formed in the tubular valve body **16** at the upper open end, is a slot **48** through which the valve actuator handle **50** extends. The actuator handle is accordingly connected to

the valve member **36** for angular movement thereof and also mounts thereabove, a stroke adjusting device **52**.

The tubular valve member **36** includes a cylindrical wall portion **54** which is radially spaced from the internal surface of the tubular valve body **16** so as to form inlet and outlet passages **56** and **58** on opposite sides of axially elongated seal elements **60** and **62** that are mounted in the tubular body and are in wiping engagement with the valve member as more clearly seen in FIGURE 5. The inlet passage **56** is in constant communication with the supply passage **30** through which pressurized fluid is conducted to the valve mechanism. The outlet passage **58** on the other hand is in constant communication with the discharge passage **64** formed in the spout **20**.

A piston element **66** is slidably mounted within the tubular valve member so as to separate an upper fluid chamber **68** from a lower fluid chamber **70** formed within the valve member between the base portion **26** of the valve body **16** and the actuator handle **50**. A port **72** is formed in the cylindrical wall **54** of the valve member adjacent its upper end in order to establish fluid communication between the inlet passage **56** and the upper fluid chamber **68** in one angular position of the valve member as more clearly seen in FIGURE 5. In this same angular position, fluid communication is established between the lower fluid chamber **70** and the outlet passage **58** through a second port **74** which is located adjacent the lower end of the valve member as more clearly seen in FIGURE 6. Thus, in the angular position of the valve member illustrated in FIGURES 5 and 6, the axially spaced ports **72** and **74** are disposed on opposite sides of the seal elements **60** and **62**. Therefore, in the position of the valve member illustrated in FIGURES 2, 5 and 6, fluid under pressure will be conducted through the inlet passage **56** to the upper fluid chamber **68** causing downward displacement of the piston element **66** which will thereby displace the fluid within the lower fluid chamber **70** into the output passage through port **74** resulting in the discharge of fluid through the spout **20**. The quantity of fluid so discharged will be determined by the volume of the lower chamber **70** when the piston is at the upper end of its stroke.

The valve member **36** is held axially assembled within the tubular valve body **16** by means of a U-shaped retainer **76** which projects from the cylindrical hub portion **78** of the actuator handle **50** through an arcuate slot **80** formed in the tubular valve body **16** adjacent the open upper end **46** as more clearly seen in FIGURE 4. The retainer **76** therefore also limits angular movement of the actuator **50** and the valve member **36** to which it is connected. The hub portion **78** of the actuator is also provided with an upwardly extending tubular extension **82** by means of which the piston stroke adjusting device **52** is mounted.

The stroke adjusting device **52** includes an outer adjustment knob **84** to which an externally threaded screw member **86** is connected, the screw member extending downwardly from the top of the knob through the tubular extension **82**. The knob is held axially assembled on the tubular extension by means of a U-shaped retainer **88** which extends transversely through the knob and is received within the annular groove **90** formed in the tubular extension for this purpose as more clearly seen in FIGURE 3. The screw member **86** extending downwardly from the top of the knob **84**, is threadedly received within the threaded bore of an axially elongated stop member **92** slidably mounted in the tubular extension **82**. The stop member is provided with an external keyway **94** as more clearly seen in FIGURES 4, 5 and 8. An axial bore is formed through the hub portion **78** and the extension **82** for slidably receiving the stop member **92** which is keyed within the bore through the pin **96** projecting radially from the hub portion **78** into the keyway **94** formed in the stop member. It will be apparent therefore, that rotation of the knob **84** and the screw member **86** connected thereto will cause axial displacement of the stop member **92** inasmuch as it is prevented from rotation relative to the actuator handle assembly **50** within which it is slidably mounted. The stop member **92** projects from the handle assembly into the fluid chamber **68** so as to limit the upward stroke of the piston element **66**. By rotating the knob **84** in one direction or the other, the extent to which the stop member projects into the fluid chamber may be varied in order to change the piston stroke. A reduction in the piston stroke will accordingly reduce the quantity of fluid dispensed whereas an increase in its stroke will increase the measured quantity of fluid dispensed.

As hereinbefore indicated, when the actuator assembly **50** is in the position illustrated in FIGURES 2–6, downward displacement of the piston element **66** by pressurized fluid supplied to chamber **68** will dispense the fluid stored within the lower fluid chamber **70**. After all of the fluid from chamber **70** has ben discharged by movement of the piston element **66** to the bottom of its stroke as shown in FIGURE 7, the upper fluid chamber **68** will have been charged with fluid. The actuator assembly **50** may then be displaced to its other operative position as illustrated in FIGURE 8 in order to dispense the same quantity of fluid once again. Thus, the axially spaced ports **72** and **74** will have been displaced to the other sides of the seal elements **62** and **64** so that the lower port **74** establishes communication between the inlet passage **56** and the lower chamber **70** while the upper port **72** establishes fluid communication between the upper chamber **68** and the outlet passage **58**.

FIGURE 10 illustrates another form of the invention in which the tubular valve member is modified to replace the piston element with a rolling diaphragm **98**. The hub of the actuator is provided with a cavity **100** communicating with the inlet passage **56** through inlet port **102** on the upper side of the diaphragm anchored to the valve member by the retainer ring **104**. A metal stiffener **106** is centrally connected to the diaphragm in engagement with the stop member **92** at the upper end of its stroke as shown in FIGURE 10. This form of the invention operates in the same manner as hereinbefore described with respect to FIGURES 1–11 with less friction and greater fluid sealing between the upper and lower metering chambers. Thus, accurate metering of pressurized as well as non-pressurized beverages is made possible.

Because of the metering valve arrangements of the present invention and its simplicity, the most rigid sanitary requirements may be met. Further, any form of counting device may be added economically to obtain accurate accountability for the product sold. By eliminating the adjustment feature **52**, the dispenser can be made self-draining which is particularly useful where carbonated beverages are to be dispensed.

The foregoing is considered as illustrative only of the principles of the invention.

What is claimed as new is as follows:

1. A liquid dispenser adapted to discharge metered quantities of fluid from a pressurized source comprising a tubular body having a closed end and an open end, a tubular valve member rotatably mounted on said ends in radially spaced relation to the tubular body forming an annular cavity therein, spaced seals mounted by the tubular body in wiping engagement with the tubular valve member partitioning the annular cavity into an inlet passage and an outlet passage, conduit means extending through said closed end of the tubular body establishing fluid communication between the inlet passage and the pressurized source, an outlet spout mounted on the tubular body in fluid communication with the outlet passage, said tubular valve member having at least two axially spaced ports respectively communicating with the inlet and outlet passages, fluid operated means movably mounted within the tubular valve member forming fluid pressure chambers on opposite axial sides thereof between said axially spaced

ports, and actuator means connected to the valve member for angular movement thereof between operative positions displacing the ports across the seals to switch the passages communicating with the fluid chambers through said ports.

2. The combination of claim 1 including means mounted by the actuator means for adjusting the stroke of the fluid operated means to vary the quantities of fluid dispensed.

3. The combination of claim 2 wherein said actuator means comprises a handle connected to the valve member at the open end of the tubular body, and means connected to the handle holding the valve member axially assembled in the tubular body and limiting angular movement thereof between the operative positions.

4. The combination of claim 3 wherein said stroke adjusting means comprises a stop member slidably mounted by the actuator means projecting into one of the fluid chambers within the valve member, an adjustment knob threadedly engaged with the stop member and retainer means holding the knob axially fixed on the actuator means for axial displacement of the stop member in response to rotation of the knob.

5. The combination of claim 4 wherein said tubular body is provided with an annular flow passage opening through said closed end and circumferentially spaced vent openings formed in the tubular body adjacent the open end communicating with the annular flow passage.

6. The combination of claim 1 wherein said actuator means comprises a handle connected to the valve member at the open end of the tubular body, and means connected to the handle holding the valve member axially assembled in the tubular body and limiting angular movement thereof between the operative positions.

7. The combination of claim 6 wherein said tubular body is provided with an annular flow passage opening through said closed end and circumferentially spaced vent openings formed in the tubular body adjacent the open end communicating with the annular flow passage.

8. The combination of claim 1 wherein said tubular body is provided with an annular flow passage opening through said closed end and circumferentially spaced vent openings formed in the tubular body adjacent the open end communicating with the annular flow passage.

9. The combination of claim 1 including a piston stop member slidably mounted by the actuator means projecting into one of the fluid chambers within the valve member, an adjustment knob threadedly engaged with the stop member and retainer means holding the knob axially fixed on the actuator means for axial displacement of the stop member in response to rotation of the knob.

10. The combination of claim 1 wherein said fluid operated means is a rolling diaphragm.

11. A liquid dispenser adapted to discharge metered quantities of fluid from a pressurized source comprising a valve body, a tubular valve, means rotatably mounting the valve within the body to form inlet and outlet passages radially spacing the valve from the valve body, a fluid pressure displaceable piston mounted within the valve to form expansible chambers therein, said valve having spaced ports conducting fluid to one of the chambers from the inlet passage and fluid from the other of the chambers to the outlet passage, and actuator means connected to the valve for angular displacement of said ports to operative positions relative to the inlet and outlet passages.

12. A fluid valve assembly comprising a valve body, a tubular valve member enclosing a valve chamber, means rotatably mounting the valve member within the valve body to form an annular passage about the valve member, said valve member having valve ports establishing fluid communication between the valve chamber and the annular passage, said valve body having inlet and outlet ports in fluid communication with said annular passage and seal means mounted in the annular passage for controlling axial flow of fluid to and from the valve chamber in response to angular movement of the tubular valve member between operative positions.

13. The combination of claim 12 including pressure responsive means reciprocably mounted within the valve chamber for displacing fluid from the valve chamber into the annular passage.

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STANLEY H. TOLLBERG, *Primary Examiner.*

U.S. Cl. X.R.

222—250