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VALVE ASSEMBLY FOR HOT WATER DISPENSERS OF PRESSURE TYPE

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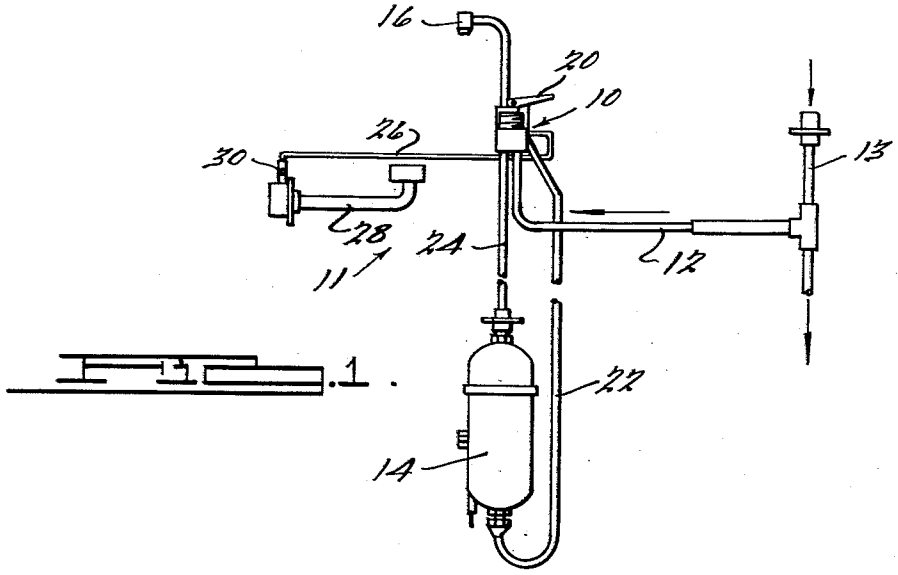


FIG. 1.

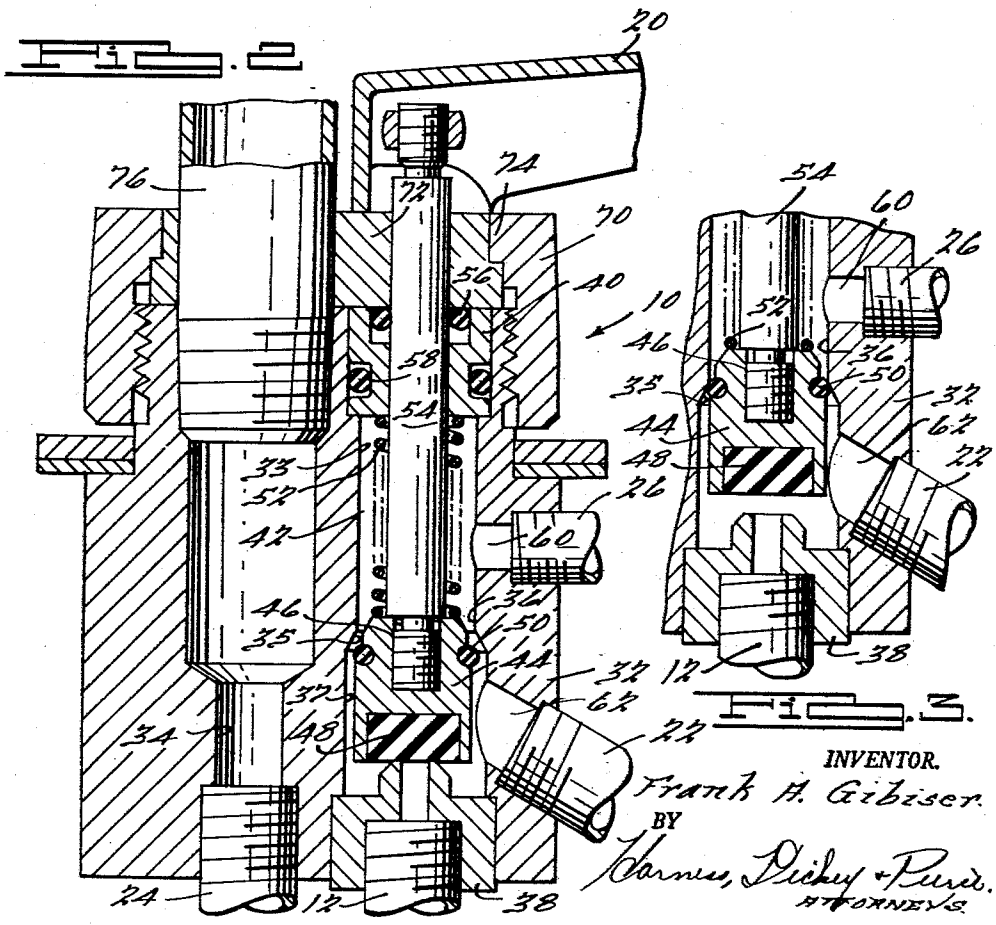


FIG. 2.

FIG. 3.

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VALVE ASSEMBLY FOR HOT WATER DISPENSERS OF PRESSURE TYPE

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This invention relates generally to hot water dispensers of the type which are connected to a supply of water under pressure and more particularly to a valve assembly for hot water dispensers of the pressure type.

Hot water dispensers of the type to which this invention relates are usually, but not necessarily, incorporated in a combination hot and cold water dispenser and are connected to a source of water under pressure such as a city water main. In a dispenser of this type, it is desirable to have the tank in which the water is heated open to atmosphere at all times, provide a vent passage for the excess water caused by thermal expansion of the water in the tank, position the vent line so that it will not become clogged with minerals in the water, and prevent unnecessary loss of hot water through the vent line. It is an object of this invention, therefore, to provide a valve assembly for a hot water dispenser which accomplishes the above desirable objectives and which is readily disassembled for cleaning of internal parts, has large clearances on the internal parts to prevent malfunctioning due to any mineral deposits, and provides for a positive engagement of the movable valve member with the seats therefor.

A further object of this invention is to provide a valve assembly for hot water dispenser apparatus of the pressure type which is simple in construction, economical to manufacture, and efficient in operation in providing for a supply of hot water when desired over a prolonged service life.

Further objects, features and advantages of this invention will become apparent from a consideration of the following description, the appended claims and the accompanying drawing in which:

FIGURE 1 is a diagrammatic view of hot water dispenser apparatus which includes the valve assembly of this invention;

FIGURE 2 is a vertical sectional view of the valve assembly of this invention in a closed position; and

FIGURE 3 is a fragmentary sectional view of the valve assembly illustrated in FIGURE 2 showing an open position.

With reference to the drawing, the valve assembly of this invention, indicated generally at **10**, is illustrated in FIG. 1 in hot water dispenser apparatus **11** which includes a water inlet pipe **12** connected to a source of water under pressure such as a city water pipe **13**, a tank **14** in which water is heated by suitable heating means (not shown), and a nozzle **16** through which hot water from the tank **14** is discharged. The valve assembly **10** has a handle **20** which is actuated to provide for a supply of hot water to the nozzle **16**. A line **22** extends from the valve assembly **10** to the tank **14** for supplying water to be heated, hereinafter referred to as "cold water," to the lower end of the tank **14**, and a line **24** extends between the top end of the tank **14** and the valve assembly **10** for supplying hot water to the nozzle **16**. A vent line **26** extends from the valve assembly **10** to a drain line **28**, and a vacuum break **30** is incorporated in the line **26** to prevent the withdrawal of material from the drain line **28** through the vent line **26**.

As shown in FIG. 2, the valve assembly **10** consists of a body **32** having a pair of vertically extending bores **34** and **36** extending therethrough. The bore **36** has an upper reduced portion **33**, a lower enlarged portion **37** and an

inclined shoulder **35** at the juncture of the portions **33** and **37**. A nozzle or water inlet member **38** is mounted on the body **32** so that it projects into the lower end of the bore **36**, and a seal plug **40** is mounted in the bore **36** adjacent the upper end thereof. The portion of the bore **36** between the nozzle **38** and the seal plug **40** constitutes a valve chamber **42** and a valve member **44**, having a downwardly extending threaded cavity **46** and a lower insert **48** formed of a resilient material such as rubber, is mounted in the bore portion **37** for movement between a position seated on the nozzle **38**, as shown in FIG. 2, and an upper position in which an O ring **50** on the valve member **44** resiliently engages the shoulder **35**. A spring **52** in the bore portion **33** extends between the seal plug **40** and the valve member **44** for urging the valve member **44** to the closed position shown in FIG. 2. A rod **54** threaded at its lower end into the cavity **46** extends upwardly through the seal plug **40** and is connected at its upper end to the handle **20** which is operable on downward pivoted movement to move the rod **54** upwardly to a position in which the O ring **50** engages the inclined shoulder **35**. The seal plug **40** carries an inner annular seal **56** which contacts the rod **54** and an outer annular seal **58** which engages the inner surface of the bore **36**.

The valve body **32** is formed with a transverse passage **60** in which the vent line **26** is positioned and which communicates with the chamber **42** at a position above the inclined shoulder **35** and intermediate the ends of the chamber. A second transverse passage **62**, which is inclined with respect to the passage **60**, communicates with the valve chamber **42** at a position below the inclined shoulder **35** and the line **22** extends into the passage **62**. The upper end of the line **24** projects into the lower end of the bore **34**.

As shown in FIG. 2, when the valve member **44** is in its lower position, seated on the nozzle **38**, the line **22** communicates through the passage **62**, the chamber **42** and the passage **60** with the vent line **26**. As shown in FIG. 3, when the valve member **44** is in its upper position, the O ring **50** seats on the shoulder **35** so as to positively block communication of the line **22** with the line **26**, and open the nozzle **38** to the line **22**.

A sleeve **70** threaded on the upper end of the body **32** has a radially inwardly extending flange **74** which engages a cap **72** and holds it in a position retaining plug **40** in the bore **36**. When the sleeve **70** and cap **72** are removed, the rod **54** can be grasped to withdraw the valve member **44**, spring **52** and plug **40** from the bore **36**. The outer diameter of the O ring **50** is slightly greater than the diameter of the bore portion **33** but the O ring **50** compresses enough to move through the bore portion **33** during withdrawal from the bore **36** and during insertion into the bore **36**.

In use, when no water is being withdrawn from the tank **14**, the valve member **44** is in the position shown in FIG. 2 closing the inlet line **12**. Consequently, no cold water is being supplied to the tank **14** which is heated and provided with a suitable thermostatic control (not shown) to maintain the water therein at a desired temperature. Any excess water, due to thermal expansion of the heated water in the tank **14** rises in the line **22** and forces the water in line **22** into the chamber **42** for flow through the vent line **26** and into the drain **28**. The vent line **26** is at a lower elevation than the nozzle **16** so that all the excess water will flow out the line **26** and there will not be any drip at the nozzle **16**. Since the vent line **26** is exposed to only the water which results from thermal expansion, the danger of closing of the line **26** from mineral deposits, is substantially reduced. There is sufficient clearance between the bore portion **37** and the valve member **44** to prevent clogging of the path for water between line **22** and vent line **26** with mineral deposits. Furthermore, if

any excess hot water backs up in the line **22** far enough to reach the chamber **42**, it has cooled off sufficiently to minimize the amount of mineral deposits in the valve assembly **10**. When hot water is desired at the nozzle **16**, the lever **20** is actuated to move the valve member **44** to the position shown in FIG. 3 in which it blocks communication of the vent line **26** with both the nozzle **38** and the line **22**. Cold water entering the chamber **42** from the nozzle **38** flows into the line **22** and travels into the lower end of the tank **14** so as to force hot water in the tank **14** upwardly through the line **24** into the bore **34** in the valve body **32** and out the pipe **76** to the nozzle **16**. Since the vent line **26** is completely separated from the hot water from the tank **14** during withdrawal of hot water through the nozzle **16**, there is no danger that any of the hot water will be lost through the vent line **26**.

It will be understood that the specific construction of the improved hot water dispenser which is herein disclosed and described is presented for purposes of explanation and illustration and is not intended to indicate limits of the invention, the scope of which is defined by the following claims.

What is claimed is:

1. In a hot water dispenser which is connected to a source of cold water under pressure and includes a tank in which water is heated, and a drain line, the improvement comprising: a valve assembly including a valve body having a pair of upright side by side bores extending therethrough, one of said bores communicating at the lower end thereof with said source, said one bore having an upper end section and a lower end section which is enlarged relative to said upper end section and having an inclined shoulder at the juncture of said sections, a cold water supply line for said tank connected at one end to said tank and at the opposite end to said body and communicating with said one bore at a position adjacent the lower end thereof, the other one of said bores communicating at the lower end thereof with said hot water tank at a position above the connection thereof with said cold water supply line, a vent line connected at one end to said drain line and at the opposite end to said valve body and communicating with said one bore at a position between the upper end thereof and the point at which said one bore communicates with said cold water supply line to said tank, a valve member insertable through the upper end of said one bore and movable to a position in said lower end portion thereof, an O ring formed of a resilient material and extended about said valve member, said O ring having an outer diameter greater than the diameter of said upper bore section and being movable to a seated position on said shoulder in one position of said valve member, said valve member being movable to a second position blocking flow of water from said source through said chamber and positioning said O ring in a spaced relation with said shoulder, whereby in said first position of the valve member cold water will travel thorugh said one bore to said cold water supply line and thence to said tank so as to force hot water out of the tank for flow to said other bore and said valve member blocks communication of said cold water supply line and said vent line, and in the second position of said valve member fluid flowing in said cold water supply line toward said valve member due to thermal expansion of water in the hot water tank flows through said one bore to said vent line.

2. A hot water dispenser comprising: a tank having means therein for heating cold water; a valve including a valve body having a valve chamber therein, said valve chamber being of circular cross-section and defined by two adjoining bore portions, one of said portions being of larger diameter than the other; means defining a valve seat in said valve chamber between said large and small diameter portions; means defining an inlet passageway communicating said large diameter portion of said valve chamber with a source of cold water under pressure; means defining an outlet passageway communicating said large diameter portion of said valve chamber with said tank; discharge means connected to said tank through which heated water may be discharged from said tank when cold water is supplied thereto through said outlet passageway; means defining a vent passageway communicating said small diameter portion of said valve chamber with a drain; a movable valve member in said valve chamber, said valve member being of circular cross-section and having a maximum diameter less than the diameter of said small diameter portion of said valve chamber; sealing means on said valve member adapted to engage said valve seat; means normally urging said valve member to a first position wherein the inlet flow of cold water through said inlet passageway into said valve chamber is blocked and said vent passageway is in communication with said outlet passageway; and means for moving said valve member to a second position wherein said sealing member engages said valve seat to block communication between said vent passageway and said large diameter portion of said valve chamber and to place said cold water inlet passageway in communication with said outlet passageway, whereby cold water will be supplied to said tank and heated water forced therefrom through said discharge means.

3. Apparatus as claimed in claim 1, wherein said sealing means comprises a resilient annular member mounted on said movable valve member, said annular member being of a diameter slightly greater than the diameter of said small diameter portion of said valve chamber.

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