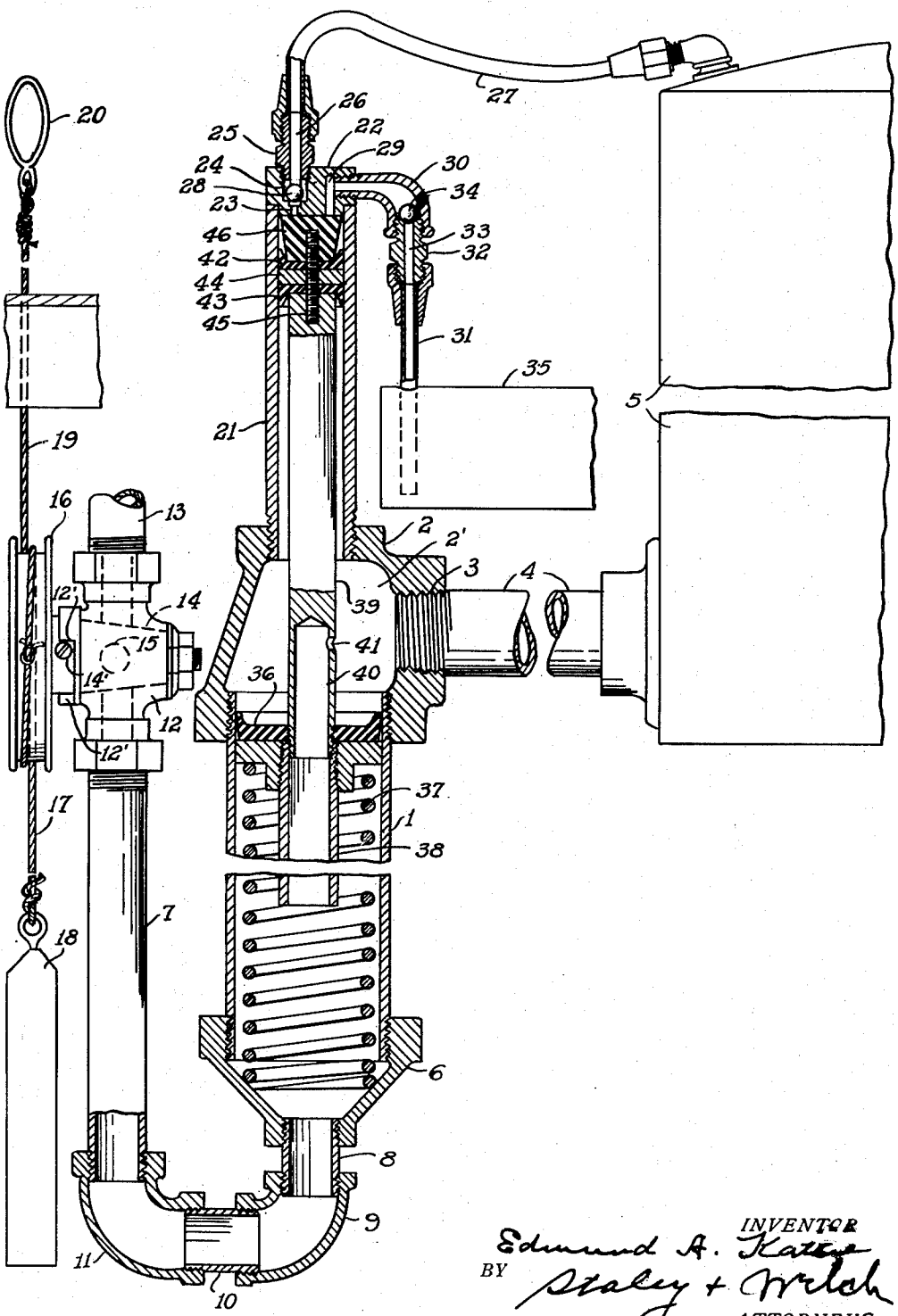
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WATER SOFTENER

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WATER SOFTENER

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2 Claims. (Cl. 210—40)

This invention relates to water softeners, it particularly relating to a water softener which can be readily attached to a supply source for water under pressure such as a domestic water heater, or to a water storage tank, or other source of water supply.

An object of the invention is to provide a water softening attachment for water tanks which can be readily applied to the tank with but little alteration in the tank.

An object of the invention is to provide a water softening device of the character referred to whereby by a single manipulation of certain operating devices the precipitation from the water tank may be discharged and the softening material fed to the tank; a further and more specific object being to provide for restoring the parts automatically to normal position.

Further objects of the invention will appear from the accompanying description and claims.

In the accompanying drawing the figure is a view partly in elevation and partly in vertical section of the tank of a water heater and the improved water softener attachment.

Referring to the drawing, 1 is a cylinder which has threaded on the upper end thereof a head 2, having a chamber 2'. The head has a threaded inlet opening 3 in which is screwed one end of a pipe 4 which leads to the lower end of the tank 5 of the hot water heater; this heater being in the present case any well known type of domestic water heater, with pipes (not shown) for supplying water under pressure to the tank and drawing it therefrom. Threaded on the lower end of the cylinder 1 is a head 6 the lower end of which communicates with a discharge pipe 7 through the coupling members 8, 9, 10 and 11. The pipe 7 has a threaded connection with a valve body 12 from which leads a pipe 13 to any suitable point of discharge. The valve in the present case is of the type having a tapered plug indicated by dotted lines at 14, 15 indicating the passage therethrough, although any other suitable type of valve may be used. The valve has a pin 14' to cooperate with stop shoulders 12' on the body 12 to limit the movement of the valve. This valve is connected with a drum 16 to which is attached a cable, one portion 17 of the cable having secured thereto a weight 18. Another portion 19 of the cable is extended to any suitable accessible point and provided with a hand-grasping ring 20.

A cylinder 21 has a threaded connection with the head 2 and communicates therewith, the cylinder being smaller than the cylinder 1. The upper end of the cylinder 21 is closed by a head 22 which has a port 23 leading from a small chamber 24 in the head to the cylinder 21. Threaded into the head is an adapter 25 having a passage 26 which communicates with the small chamber 24 and connected with this adapter is a tube 27 which communicates with the upper end of the hot water tank 5. A check valve in the form of a ball 28 normally closes the port 23.

The head 22 also has an inlet port 29 and screwed into the head and communicating with this port is a hollow fitting 30 which is connected to a pipe 31 through an adapter 32 which has a passageway 33 which is normally closed by a ball check valve 34; the lower end of the pipe 31 leading to a receptacle 35 which contains the water softening material in liquid form, this material being any well known chemical suitable for the purpose, the receptacle being open to atmosphere.

Slidably mounted in the cylinder 1 is a piston 36 and interposed between the piston and the cap 6 is a coil spring 37, this coil spring surrounding a tube 38 which has a threaded connection with the piston and also with a hollow stem 39 which extends through the piston and is formed with a chamber 40 which communicates with the tube 38; the chamber 40 also communicating with the interior of the head 2 through a port 41; the lower end of the hollow tube 38 being open so as to communicate with the interior of the cylinder 1. The stem 39 carries at its upper end a piston 44 having on each side thereof cup-shaped rings 42 and 43 formed of rubber or other flexible material, the three parts, piston 44 and cup shaped rings 42 and 43, being connected together and also to the end of the stem 39 by a screw 45. The upper side of this piston has also secured thereto by the screw 45 a plug 46 formed of yieldable vulcanized rubber or similar material.

In operation, when it is desired to re-charge the water in the tank 5 with the softening chemical the valve 14, which is normally closed, is rotated to open position to form a communication between the pipes 7 and 13 by rotating the drum through the medium of the cable 19 and hand ring 20, this being a manual operation in the present case, the valve 14 being held open for a predetermined length of time. Pressure is thereby relieved in the cylinder 1 below the piston 36 and permits water to flow from the cylinder 1 through pipe 7 and its connections with the cylinder and pipe 13 to a suitable point of discharge, thus permitting the discharge from the

lower end of the hot water tank of the matter which has been precipitated by the action of the softening chemical. At the same time the piston 36 is forced downwardly by the water pressure against the tension of the spring 37 and also against the pressure on the under side of the piston 44, pulling with it through the stem 39 the piston 44 and the plug 46, thus uncovering the ports 23 and 29. As this creates a partial vacuum above the plug the chemical solution is drawn up into the space between the head 22 and the plug, the parts being so designed and the valve 14 being held open a predetermined length of time, that a predetermined charge of chemical solution will be deposited in this space. After a predetermined length of time the cable 19 is released by the operator and the drum 16 is rotated back to its normal position by the weight 18 and cable 17, closing the valve 14. The spring 37 and pressure on the under side of the piston 44 then act to force the pistons 36 and 44 upwardly in their respective cylinders to the position shown in the drawings, the pressure on each side of the piston 36 being now substantially equalized, this movement displacing the water in the chamber of the head 2, causing it to flow into the cylinder 1 through the port 41, chamber 40 and tube 48. As the piston 44 moves upwardly it creates a pressure greater than that in the hot water tank so as to open the valve 28 and close the valve 34 and thereby force the chemical solution through the connections described into the upper end of the tank 5, the plug 46 finally closing the ports 23 and 29, thereby permitting the valve 28 to close.

While there is shown a manual operation of the valve 14, the valve may be if desired operated automatically.

Having thus described my invention, I claim:

1. In a water softening apparatus, a cylinder, a piston therein, a water inlet connection for said cylinder on one side of said piston adapted to be connected to a source of water under pressure, a water discharge connection for said cylinder on the opposite side of said piston, a hollow tube associated with said piston and extending into the spaces on opposite sides of said piston, a restricted passage in said tube within the inlet end of said cylinder, a spring surrounding said tube and interposed between the piston and a fixed abutment in said cylinder, a valve for controlling flow of water between said inlet and discharge connections, a second smaller cylinder communicating with said first mentioned cylinder, a piston therein, means connecting the two pistons, means connecting said smaller cylinder to a source of water softening material and including a check valve, means including a check valve connecting said smaller cylinder to the water supply source, whereby when said valve is opened the larger piston, will be moved by water pressure from the water supply source against the tension of the spring and said smaller piston moved therewith to draw in a supply of water softening material into the smaller cylinder, and when said valve is closed said larger piston will be returned to its normal position by said spring to inject the water softening material into said water supply source, and a valve associated with the smaller piston to close said connections to the water softening material source and to the water source after ejection of material from said cylinder.

2. In a water softening apparatus, a cylinder, a piston therein, a water inlet connection for said cylinder on one side of said piston adapted to be connected to a source of water under pressure, a water discharge connection for said cylinder on the opposite side of said piston, a hollow tube associated with said piston and extending into the spaces on opposite sides of said piston, a restricted passage in said tube within the inlet end of said cylinder, a spring surrounding said tube and interposed between the piston and a fixed abutment in said cylinder, a valve for controlling flow of water between said inlet and discharge connections, a second smaller cylinder communicating with said first mentioned cylinder, a piston therein, means connecting the two pistons, means connecting said smaller cylinder to a source of water softening material and including a check valve, means including a check valve connecting said smaller cylinder to the water supply source, whereby when said valve is opened the larger piston will be moved by water pressure from the water supply source against the tension of the spring and said smaller piston moved therewith to draw in a supply of water softening material into the smaller cylinder, and when said valve is closed said larger piston will be returned to its normal position by said spring to inject the water softening material into said water supply source.

EDMUND A. KATHE.