

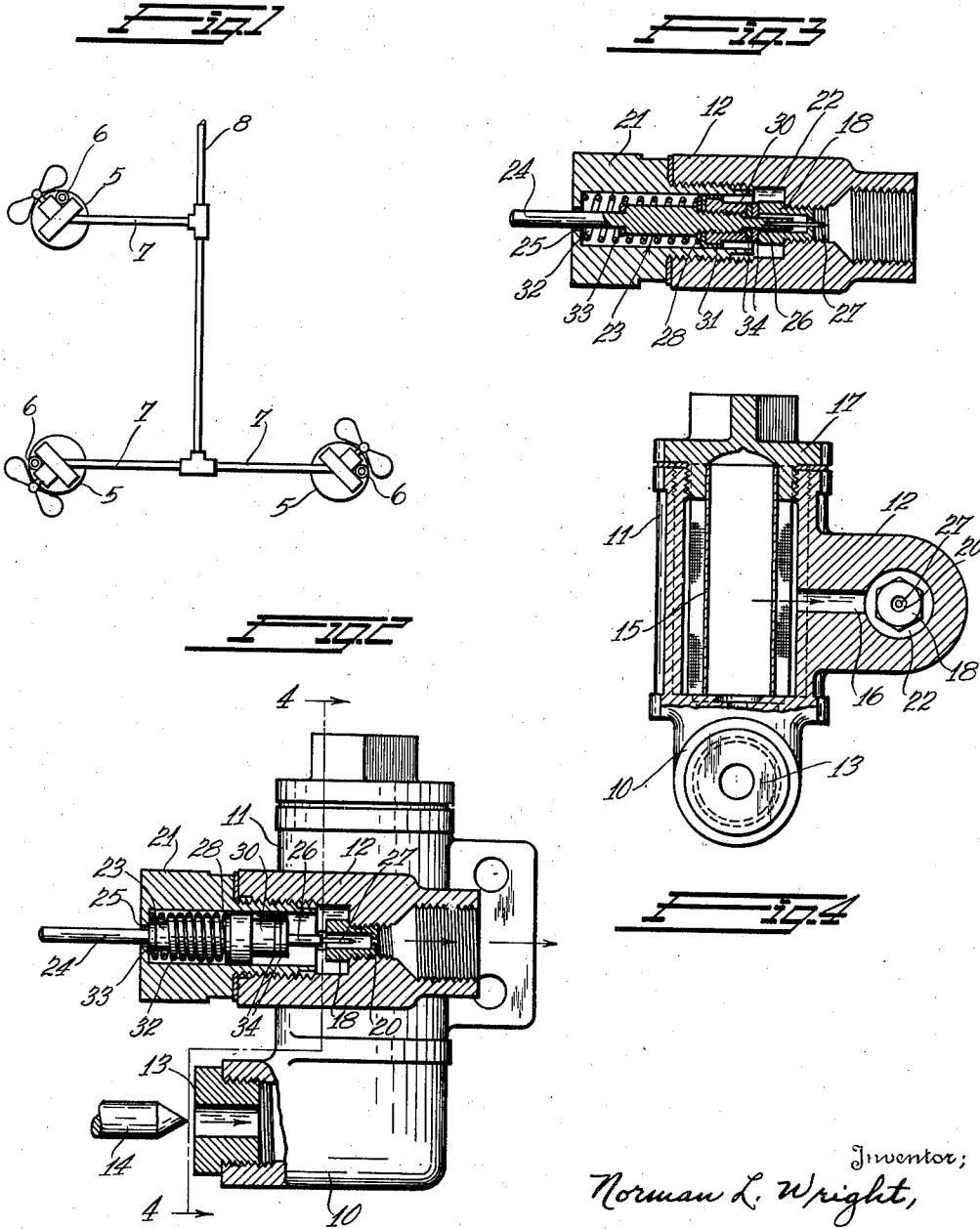
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AUTOMATIC FLUID PORT CLEANER

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AUTOMATIC FLUID PORT CLEANER

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This invention relates to unit control devices for humidifying apparatus and the like and particularly to a novel device for regulating and controlling the supply of water to a humidifier or spraying unit that forms part of a multiple-unit system.

In such multiple-unit systems, and particularly in those where each unit comprises a humidifier of the type designed to spray a limited quantity of water into a stream of air, each unit may embody a measuring element having a constricted port or orifice for limiting the maximum discharge of liquid from that unit. The measuring orifices may be of the same size in all of the units when their only purpose is to throttle the rate of flow when the liquid is supplied at relatively high pressure; or they may vary in size either to obtain different preselected volumetric rates of discharge at various points in the system or to obtain equal rates of flow in a system where the pressure losses in the unit branch lines might otherwise produce unequal rates of flow.

The orifices discussed above are necessarily small and hence they tend to clog partially and sometimes close completely even where the liquid is relatively clean and pure. The primary object of the present invention, therefore, is to incorporate in each unit a novel and effective device for automatically maintaining the orifice of that unit clean and fully open.

This object preferably is accomplished by placing a ported thimble in each branch line on the discharge side of the valve that controls the flow through that line, and placing a pressure-responsive member in the line on the supply side of the thimble so that said member will assume one or the other of two positions depending upon the position of the control valve. The pressure-responsive member carries a cleaning needle movable into and out of the thimble port, and the latter of course constitutes the restricted orifice.

It is a major object of the present invention to design the pressure-responsive member so that it has an outwardly projecting and visible extension and yet so that it provides a seal against leakage when the control valve is open. The extension serves as a guide, as an indicator of needle position and as an element for manual operation of the needle in the event the pressure-responsive member should become stuck.

A further object of this invention is to provide the pressure-responsive member with a second seal which in effect constitutes a check valve

for closing the passageway through the thimble when the control valve is closed.

Other objects of my invention reside in improvements in the detail structure of the entire pressure-responsive assembly.

The foregoing and further objects will become apparent from a study of the following detailed description when taken in conjunction with the accompanying drawing in which:

Fig. 1 is a diagrammatic view of a portion of a multiple-unit humidifying system of the type in which the present invention is particularly adapted to be incorporated;

Fig. 2 is a side view, in partial section of a portion of a control mechanism that is embodied in each of the spraying units of Fig. 1;

Fig. 3 is a sectional view of the metering unit of Fig. 2, showing the pressure-responsive member in its position assumed when the control valve is closed; and

Fig. 4 is a sectional view taken substantially along the irregular line 4-4 in Fig. 2.

The assembly shown in Fig. 1 comprises a plurality of humidifying units 5 of the general character of those disclosed in the United States patent to Bahnson, No. 1,891,133, granted Dec. 13, 1932. Each unit comprises a fan for creating an air stream, a rotating disk and atomizer ring for introducing a mist of water into the air stream, and a regulating and control device 6 through which the water passes on its way to the rotating disk. Each device 6 is connected to a branch line 7 that receives water from a main line 8.

The mechanism shown in Figs. 2, 3 and 4 is a part of one of the control devices 6. It comprises a casting that consists essentially of an inlet portion 10, a filtering compartment 11 and an outlet sleeve 12, all preferably formed in one piece. The inlet 10 is designed to receive water from a branch pipe 7 by way of a valve port 13 controlled by a valve 14 that is automatically operable to open and closed positions by any suitable humidity-responsive device (not shown) such, for example, as that disclosed in the aforementioned patent to Bahnson, No. 1,891,133. The inlet 10 opens directly into the interior of the compartment 11, which carries a straining sleeve 15 through which the water must pass before it can enter the outlet sleeve 12 by way of a passage 16. A plug 17 closes the compartment 11 and holds the screen in place.

Between its ends the cast sleeve 12 is constricted and internally threaded, as shown, to receive a

metering thimble 18 that has a flow-limiting orifice 20 of preselected size. Both ends of the sleeve 12 are internally threaded, one of them to receive a detachable fitting 21 and the other for connection to the water spraying or atomizing means. The fitting 21 forms, with the sleeve 12 and the head of the thimble 18, a chamber 22 that receives liquid under pressure from the passage 16. The chamber 22 is thus axially aligned with the outlet branch of the fluid passage through sleeve 12, and is normal to the inlet branch or passage 16.

As previously pointed out, the orifices 20 for the plurality of units may be of the same size or may vary in size as desired for any particular condition. The thimbles 18 are readily replaceable and interchangeable upon removal of the fitting 21. Due to the essential metering and restricting action of the orifices, they are so small they may become clogged frequently unless some provision is made to keep them clean and fully open. The following automatic mechanism is provided for this purpose.

A plunger 23, disposed freely in the chamber 22, has an integral reduced extension 24 at one end slidable through a small aperture 25 in the fitting 21 and an integral reduced extension 26 at its other end slidable into and out of the thimble 18. The extension 26 has a coaxial needle 27, of slightly less diameter than the orifice 20 and aligned therewith. The blunt end of this needle may be pressed into a hole in the extension 26 with a tight fit, or it may be secured thereto in any other suitable manner.

The intermediate portion of the plunger 23 is slightly reduced to form a shoulder against which is disposed a metal washer 28, and is threaded for reception of an internally threaded bushing 30. A leather packing 31 of the cup type is disposed between the washer and the bushing and is held securely in place by the latter. The packing is of substantially the same diameter as the bore of the fitting 21, and its skirt portion faces the fluid pressure supply and hence tends to expand radially against said bore to seal the fluid against escape in the direction of the aperture 25.

A coil spring 32, under constant compression, surrounds contiguous portions of the plunger and its extension 24, and reacts between the washer 28 and the apertured end of the fitting with a tendency to urge the packed plunger into the position illustrated in Fig. 3, where the needle 27 has entered the orifice 20. This position can be attained only when the valve 14 is closed to interrupt the supply of water to the chamber 22. When the valve 14 is open, the packed plunger responds to the fluid pressure and overcomes the spring to move to the position illustrated in Fig. 2.

A washer 33 of rubber, composition or the like is fitted tightly around the extension 24 where the latter joins the body 23. When the pressure is on and the spring 32 compressed, this washer seals the aperture 25 against any possible escape of water that may have leaked past the packing cup 31.

In like manner a pair of washers 34 of rubber, composition or the like is snugly fitted to the other extension, 26, so that when the spring is permitted to expand, one of these washers will seat uniformly against the receiving end of the thimble, thus in effect serving as a check valve for augmenting the seal produced by the closed control valve. The auxiliary seal has the further

advantage of preventing the liquid trapped in the filtering chamber and the chamber 22 from gradually escaping through the spraying means after closure of the control valve.

In operation, the cleaning needle makes a complete reciprocation for each successive opening and closure of the control valve. When the latter is opened, said pressure-responsive unit carries the needle rearwardly to open the orifice 20 fully and compresses the spring so that the guiding aperture 25 is sealed by the washer 33. When the valve 14 is closed, the pressures upon opposite sides of the thimble 18 are rapidly equalized and the pressure-responsive unit is shifted quickly by the spring to seal the large end of the thimble and to project the needle into the orifice to substantially fill the latter. The orifice therefore is kept clean and open for a predetermined maximum flow at all times that the control valve is open. The cleaning mechanism may be seated manually, by pressing upon the outer end 24 of the plunger, to clean the orifice 20 during fluid flow and/or to free the mechanism if it sticks in open position.

Although I have shown and described the invention with reference to a specific form thereof, it is obvious that the invention is not limited to this form, and I desire that the appended claims be given the broadest interpretation consistent with their wording and the prior art.

I claim:

1. In a device of the character described, a member having a fluid passageway therethrough and means affording a restricted orifice intermediate the ends of said passageway, a needle projectable into said orifice from the inlet side thereof to keep the orifice clean, and automatic mechanism for actuating said needle; said mechanism comprising a reciprocating plunger disposed internally of said member having one end exposed to any pressure fluid at the inlet side of the orifice, said member having an aperture adjacent the other end of said plunger, an extension on said plunger slidable through said aperture, means carried by said plunger for sealing said aperture when said plunger is exposed to substantial fluid pressure, and yielding means urging said plunger towards said orifice.

2. In a device of the character described, a member having therethrough a fluid passage including inlet and outlet branches substantially normal to each other, a fitting detachably secured to said member to form therewith a chamber intersecting said passage and axially aligned with the outlet branch thereof, a metering thimble disposed in said passage at the junction of said branches and readily detachable when said fitting is removed, a pressure-responsive element disposed in said chamber, a needle carried by said element for movement into and out of said orifice, and a compression spring mounted between said element and a wall of said fitting.

3. In the device set forth in claim 2, said fitting comprising a cup-shaped member having an elongated sleeve extending towards said thimble and providing a cylinder coaxial with said thimble, and said pressure-responsive element comprising a plunger slidable in said cylinder.

4. In a device of the general character described, a member having a fluid passageway therethrough, a measuring orifice seated in said passageway and provided with a valve seat, a pressure-responsive plunger having valve means cooperable with said seat, said member having a

chamber slidably receiving said plunger and an apertured wall for closing said chamber, an extension on said plunger slidable in the aperture of said wall, and a sealing washer snugly surrounding said extension and operable to close said aperture.

5. In combination, a housing providing a cylindrical chamber and means defining a passage for fluid flow at one end of said chamber, said means including an inlet extending radially through the chamber wall and a metering thimble having an orifice coaxial with said chamber, a plunger within said chamber comprising a body

having a reduced threaded portion, a rigid washer slidable over said portion and arranged to abut said body, a cup packing surrounding said threaded portion and an internally threaded sleeve screwed onto said threaded portion and extended into said packing to clamp a part of the latter against said washer, and means carried by said plunger for cleaning said orifice.

6. The combination defined in claim 5, wherein said cleaning means comprises a needle secured to said reduced threaded portion of said plunger.

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