Sept. 27, 1932. A. J. LOEPSINGER 1,879,363

SELF CLEANING ATOMIZER

Filed May 29, 1931

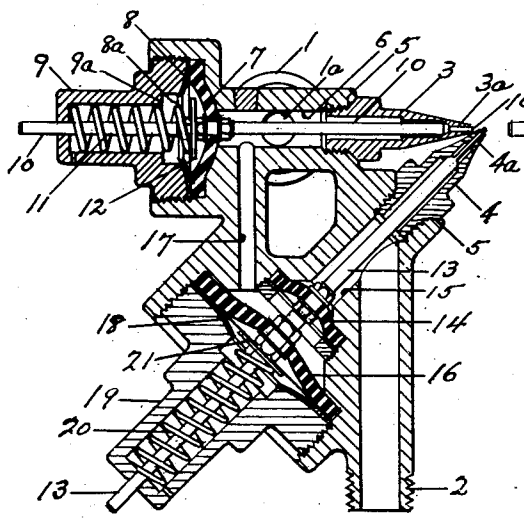


FIG-1

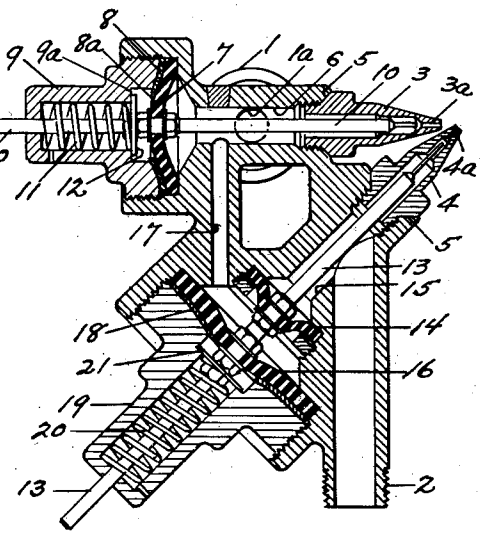


FIG-2

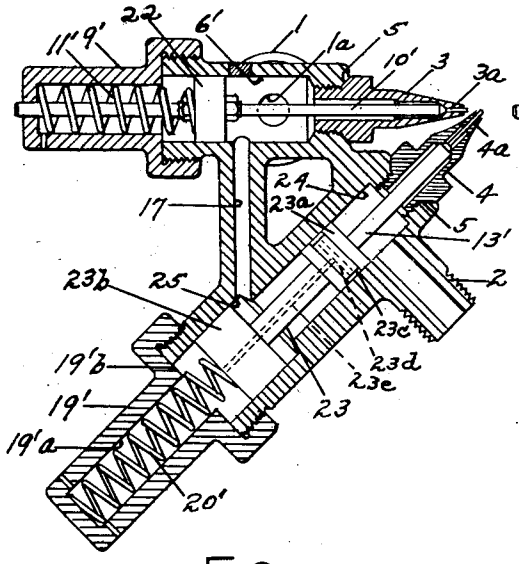


FIG-3

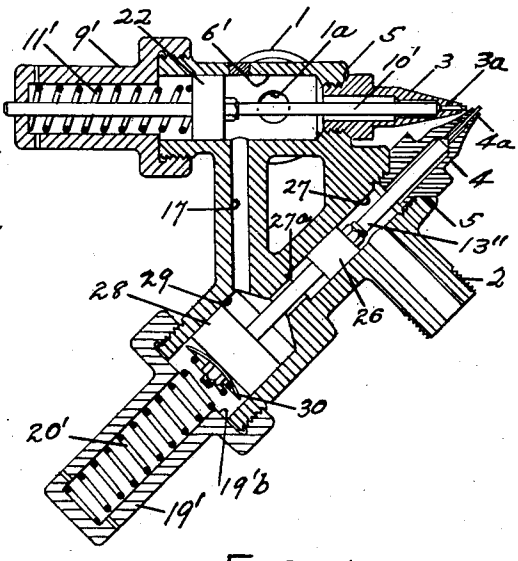


FIG-4

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SELF-CLEANING ATOMIZER

Application filed May 29, 1931. Serial No. 540,905.

This invention relates to self-cleaning atomizers. More especially it relates to that type of atomizer in which air under pressure is discharged through a nozzle in close proximity to another nozzle through which water is discharged.

It is an object of this invention to provide means whereby the air pressure available may be utilized to effect cleaning of both nozzles of the atomizer automatically. It is a further object of the invention to provide means whereby this air pressure is prevented from affecting the desired discharge of the water.

The best mode in which I have contemplated applying the principles of my invention are disclosed in the accompanying drawing but it is intended that the patent shall cover by suitable expression in the appended claims whatever features of patentable novelty exist in the invention disclosed.

In the drawing:

Figure 1 is a vertical medial section showing an atomizer embodying the invention, the movable parts being in the so-called closed positions;

Figure 2 is a similar section with the moveable parts in open position;

Figure 3 is a similar section showing an atomizer having pistons as the pressure responsive means; and

Figure 4 is a similar section showing a modified form of the piston type of atomizer.

Referring more particularly to the drawing, the body of the atomizer has a threaded inlet 1 for connection to an air supply pipe and another such inlet 2 for connection with a water supply. The air is supplied under pressure while the water is preferably lifted from a nearby well by the aspirating effect of the discharging air. It is to be understood, however, that the water may also be supplied under pressure and the atomizer used when this arrangement pertains.

In either case it is important that the water be discharged with uniformity for if the water supply is varied, as would be the case if air were to be admitted to the water supply, then the desired effectiveness of the atomizer can not be realized and moreover such variation in the water supply might cause undesired precipitation. Accordingly, it is essential to maintain a predetermined relation of the air and water nozzles and to insure an unvaried water supply while the nozzles are in action.

The said predetermined relation is attained in the atomizer of this invention by arranging the air nozzle 3 and water nozzle 4 at an angle to each other with the opening of the latter substantially on the axial line of the air stream. The accurate positioning of these nozzles is assured by the cone seats 5 against which the respective nozzles tightly make up.

In the preferred form of atomizer shown in Figures 1 and 2, the air nozzle is at one end of a passage 6 whose other end is closed by a diaphragm 7 here depicted as a disk of rubber or flexible composition. This is clamped at its periphery between a suitable seat formed in an enlargement of the passage and a metal disk 8 which is of dished shape with an opening 8*a* through its central portion. The edge of this metal disk is pressed against the diaphragm by a cylindrical nut 9 that screws into the enlarged end of the passage 6.

At its center the diaphragm is attached to a rod 10 which extends through the passage and into the nozzle, its end making a nice sliding fit with the nozzle opening 3*a*. When the air supply is cut off this rod is pushed forward by a spring 11 housed in the nut 9 so as to exert pressure on a plate 12 secured to the rod 10 by suitable clamping nuts. In this position the end of the rod extends through the nozzle opening 3*a*.

When the air supply is turned on it enters the passage 6 through the inlet opening 1*a* and acts directly on the diaphragm 7 to overcome the force of spring 11. The diaphragm is accordingly flexed and pushed back against the reinforcing plate 8, the plate 12 at the same time bottoming on the shoulder 9*a* of the nut 9. During this movement of the diaphragm the rod 10 is withdrawn from the opening 3*a* thus allowing the air to discharge through the nozzle past the opening 4*a* of the water nozzle 4.

This water nozzle is likewise provided with a cleaning rod 13 which is secured to two

diaphragms. One diaphragm 14 is smaller than the other and serves primarily to prevent leakage of air into the water passage 15. This is important because, whether the water is lifted from a well by aspirating effect or is itself supplied under pressure, it should be a solid unified stream of water in order that the maximum effectiveness of discharge may take place. If the air were permitted to leak into the water passage it is evident that the full effect of the aspirating effect would be jeopardized and in any event the discharge from the water nozzle would be adversely disturbed by the air bubbles caused by the leaking air.

The other diaphragm 16 is acted upon by the air pressure which is admitted to its chamber by a passage 17 connecting with the air passage 6. This diaphragm 16 is held at its edge by a reinforcing plate 18 and a cylindrical nut 19. The latter houses a spring 20 which acts against a plate 21 secured to the rod 13.

When the air is admitted to the air passage 6 its pressure is imposed on the diaphragm 16 and overcomes the force of spring 20 and the resistance offered by diaphragm 14, thus causing the rod 13 to move so that its end is withdrawn from the nozzle opening 4*a*. Thus upon the turning on of the air supply both rods are retracted from their respective nozzle openings and held so as long as the air pressure continues. Upon the air being cut off the springs 11 and 20 then force the rods through their respective nozzle openings with cleaning effect, since the end of each rod makes a nice sliding fit with the wall of its nozzle opening.

In the atomizers disclosed in Figures 3 and 4 the pressure responsive means associated with the air nozzle cleaning rod 10′ is a piston 22. This is attached to the rod by suitable nuts and slides in the cylinder 6′ which forms the air passage to the nozzle 3. It is acted upon by a spring 11′ housed in a hollow nut 9′. Upon admission of the air through inlet opening 1*a* the piston 22 and rod 10′ are retracted against the force of spring 11′ and the air nozzle outlet 3*a* is opened. When the air pressure is cut off the spring 11′ moves the piston and rod to effect cleaning of the nozzle.

The atomizer of Figure 3 has a cleaning rod 13′ for the water nozzle 4, attached to a double piston 23 the smaller head 23*a* of which slides in the cylinder 24 and the larger head 23*b* of which moves in cylinder 25. The smaller head 23*a* has a peripheral groove 23*c* and a transverse hole 23*d* which is connected by the axial hole 23*e* with a vented spring chamber 19′*a* in the hollow nut 19′. The groove and holes just mentioned take care of any leakage of air which tends to pass by the small head 23*a*, such air being able to pass through the groove and holes in the piston into the vented chamber 19′*a* and thence to the atmosphere. Thus in this modification the invention provides means to prevent leakage of air to the water passage.

When air pressure is admitted to the cylinder 6′ it passes by connection 17 to cylinder 25 and acts upon the head 23*b* to move the piston 23 against the resistance of spring 20′ in the nut 19′ until the head 23*b* bottoms on the shoulder 19′*b* of the nut. Upon reduction of the air pressure the spring 20′ forces the piston and attached rod 13′ to effect cleaning of the water nozzle opening 4*a*.

In the modification shown in Figure 4, the small piston 26 is attached to the cleaning rod 13″ and moves in cylinder 27. A larger piston 28 is likewise secured to rod 13″ and moves in cylinder 29. Upon the introduction of the air to the latter, through connection 17, the two pistons are moved against the spring 20′ housed in the nut 19′ until the smaller piston 26 seats tightly against the shoulder 27*a* of cylinder 27. In order to insure this seating, a flexible disk 30 is attached to the large piston 28 and so arranged that as it engages the shoulder 19′*b* of nut 19′ it yields sufficiently to allow piston 26 to seat tightly. This tight seating of the piston 26 will prevent any leakage of air to the water passage.

Thus in all of the forms shown, the air and water nozzles are automatically cleaned by rods which are retracted or removed from the respective nozzle openings by the air pressure.

If the water is supplied under pressure the action of the atomizer so far as its movable parts is concerned is precisely the same, the water pressure acting on the diaphragm 16, or the pistons 23*a* or 26 to augment the air pressure in the opening movement of the respective water nozzle cleaning rod.

I claim:

1. A self-cleaning atomizer comprising, in combination, a body having a passage adapted to receive air under pressure; a nozzle at one end of the passage for discharge of air; a pressure responsive element at the other end of said passage adapted to be moved in one direction by the air pressure in said passage; a rod attached to said element and adapted to be moved thereby to effect cleaning of said nozzle; a spring arranged to oppose the movement of said rod occasioned by the air pressure and to cause movement of the rod upon the cessation of said air pressure; another passage in said body adapted to receive water; a nozzle at one end of said water passage arranged in proximity to the air nozzle whereby the discharge of air causes the water to be atomized; a second rod adapted to be moved to effect cleaning of the water nozzle; a chamber in

said body having a second pressure responsive element associated therewith and connected to said second rod; a passage connecting said chamber and the air passage first mentioned whereby upon the admission of air under pressure said second pressure responsive element is subjected to pressure to effect movement of said second rod; a second spring opposing movement of said second rod and adapted upon cessation of the air pressure to cause movement of said second rod to effect cleaning of the water nozzle; and means associated with said second rod to prevent leakage of air into the said water passage.

2. A self-cleaning atomizer comprising, in combination, a body having a passage adapted to receive air under pressure; a nozzle at one end of the passage for discharge of air; a diaphragm at the other end of said passage adapted to be flexed by the air pressure therein; a rod connected to said diaphragm so as to be moved by the flexing thereof; a spring acting on said rod in opposition to the air pressure, adapted to yield to the flexing of said diaphragm when the air pressure is applied and to move said rod, when the air pressure is reduced, to clean said air nozzle; another passage in said body adapted to receive water; a second nozzle for discharge of the water arranged in proximity to said air nozzle whereby the air effects atomization of the water; a second cleaning rod associated with said water nozzle; a second diaphragm connected to said second rod; a connecting passage from the first said air passage whereby the air pressure is communicated to said second diaphragm to cause it to flex and thereby move said rod; a second spring opposing movement of said second rod, adapted to yield to the flexing of said diaphragm where the air pressure is applied thereto, and upon the reduction of the air pressure to move said second rod to effect cleaning of the water nozzle; and a third diaphragm associated with said second rod and arranged to prevent communication between said air passages and the water passage.

3. A self-cleaning atomizer comprising, in combination, a body having a cylinder adapted to receive air under pressure; a discharge nozzle connected with said cylinder for discharge of said air; a rod arranged to extend through said air nozzle; a spring acting upon said rod to force its end through the discharge opening of said air nozzle; a piston in said cylinder, secured to said rod and adapted to be acted upon by the air pressure to overcome the force of said spring and effect an opening movement of said rod whereby air is discharged from the air nozzle; a second cylinder in said body having a portion adapted to receive water and another portion adapted to receive air; a nozzle connected to one end of said cylinder for discharge of water, the said water nozzle being in proximity to the air nozzle so that the discharge of air under pressure will effect atomization of the water; a connection between the first said cylinder and the portion of the second cylinder adapted to receive air whereby air is introduced to said portion; a piston in said second cylinder having a head slidable in the portion thereof adapted to receive water and having another head slidable in the portion adapted to receive air; a rod connected to said piston and adapted to be moved thereby in direction to open said water nozzle when the air pressure is imposed on said piston; a spring acting upon said water nozzle rod to cause it to move to clean said water nozzle when the air pressure on said piston is reduced; there being a groove around the piston head in the water receiving portion of the cylinder and passages connecting said groove to the atmosphere whereby air tending to leak past said piston into the water passage is vented and thereby prevented from entering the water receiving portion of the cylinder.

4. A self cleaning atomizer comprising, in combination, a body having a cylinder adapted to receive air under pressure; a nozzle associated with said cylinder for discharge of the air; a piston in said cylinder responsive to the pressure therein; a rod for cleaning said air nozzle attached to said piston and adapted to be moved thereby to open said air nozzle when the air pressure is applied to the piston; a spring acting upon said rod and adapted to move it to clean said nozzle when the air pressure is reduced; a second cylinder in said body having a portion adapted to receive water and a portion adapted to receive air; a nozzle connected to said second cylinder for discharge of water; a connection between the air portion of said cylinder and the first mentioned cylinder whereby air is introduced to said air portion; a piston in said second cylinder having a head in the water portion and another head in the air portion, the latter being acted upon by the air to cause the piston to move in one direction; a rod attached to said piston and so arranged with respect to said water nozzle that upon the piston being moved by the air pressure the water nozzle is opened; a spring acting upon said rod to cause it to move and effect cleaning of the water nozzle when the air pressure is reduced; there being yieldable means associated with the piston head in the air portion of cylinder whereby the piston head in the water portion is tightly sealed by the air pressure and leakage of air into the water portion is prevented.

Signed at Providence, Rhode Island, this 28th day of May, 1931.

ALBERT J. LOEPSINGER.