Aug. 15, 1933. M. A. AHERNE 1,922,920

ADJUSTABLE DIFFUSER AND INJECTOR

Filed Sept. 11, 1931 2 Sheets-Sheet 1

Fig. 1.

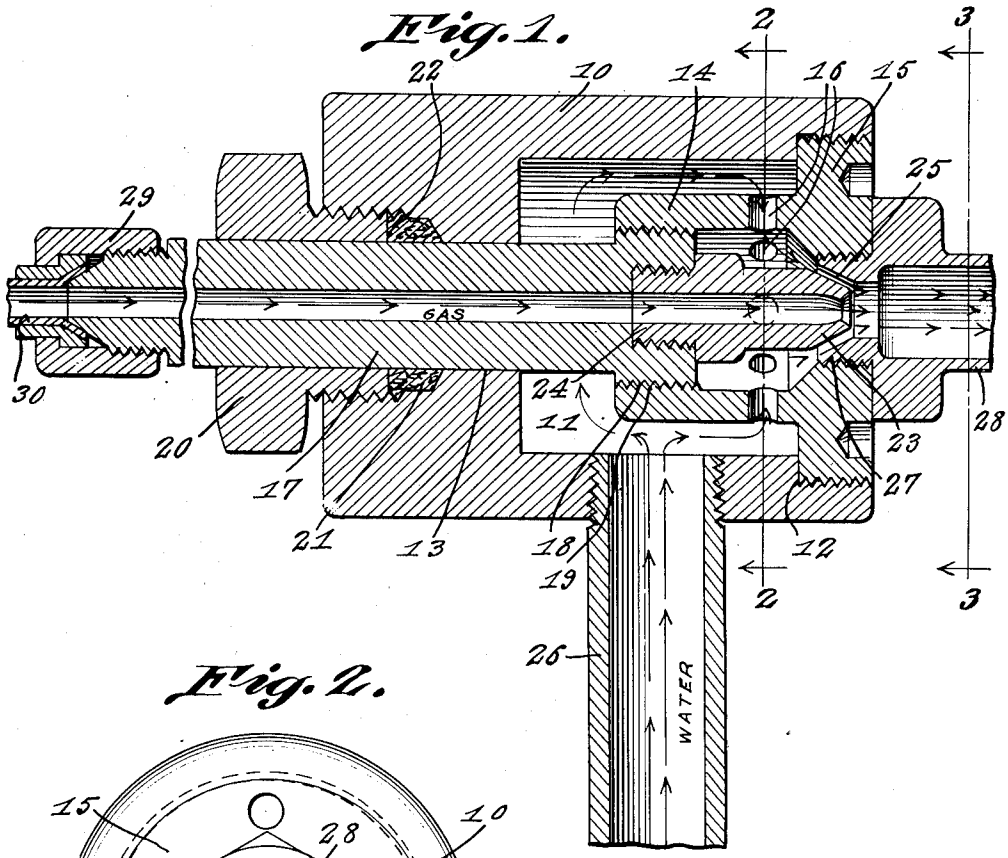


Fig. 2.

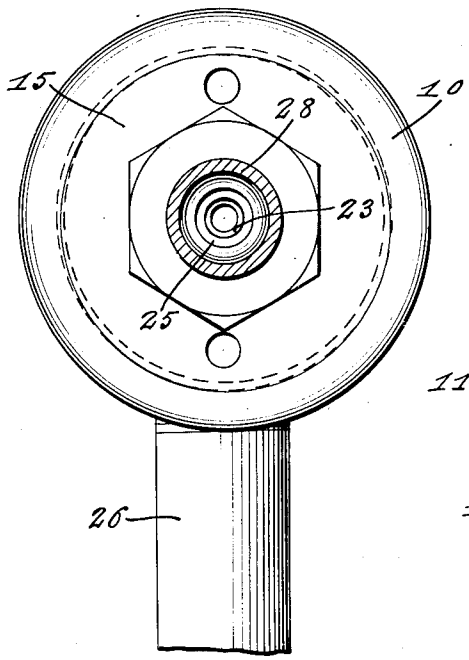
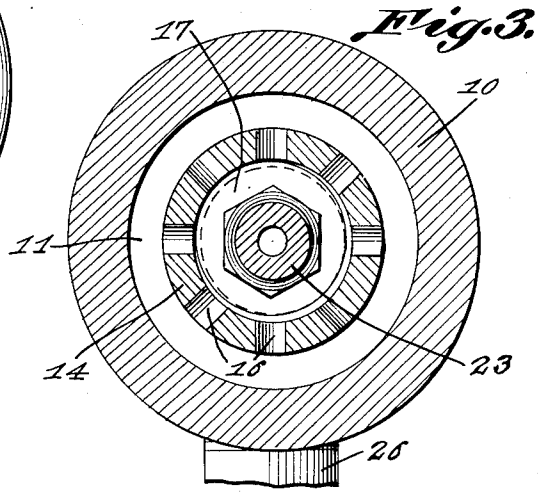


Fig. 3.



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Fig. 4.

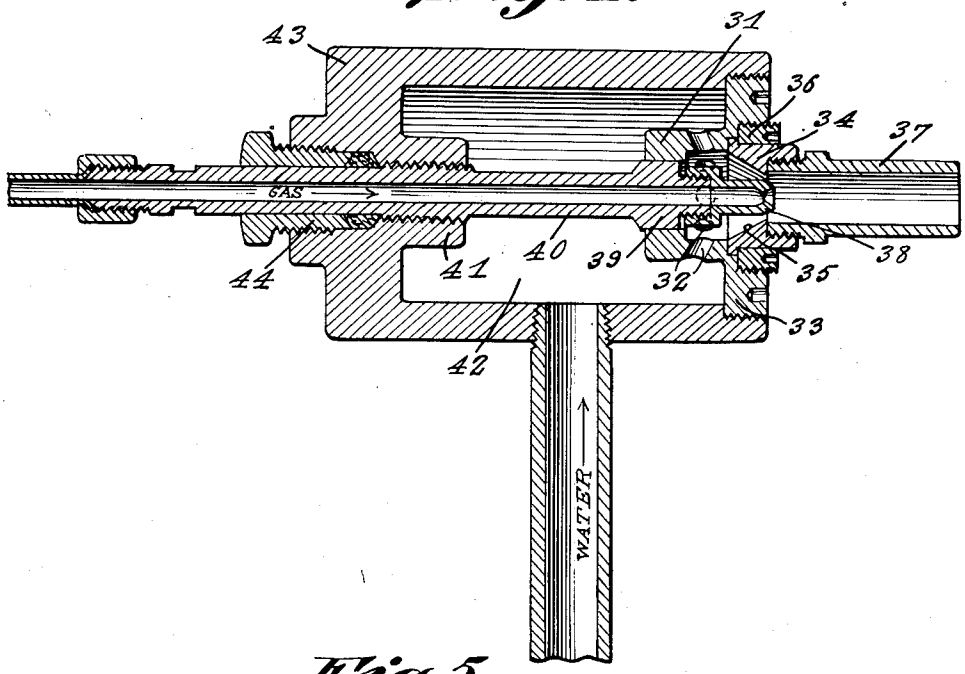


Fig. 5.

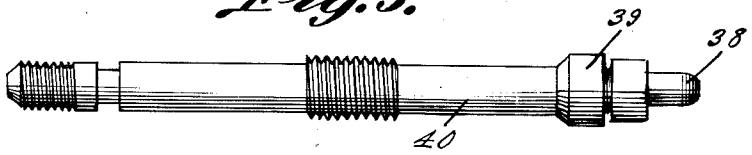
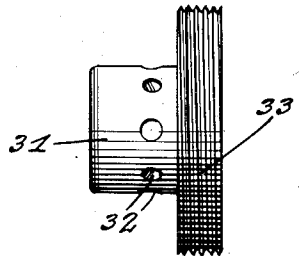


Fig. 6.



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UNITED STATES PATENT OFFICE

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ADJUSTABLE DIFFUSER AND INJECTOR

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Application September 11, 1931
Serial No. 562,348

3 Claims. (Cl. 210—40)

The invention relates to a pressure mixing device and more especially to pressure fluid and gas diffusing and injecting devices.

The primary object of the invention is the provision of a device of this character wherein a vacuum is created by which gas or liquid is supplied to the center of a stream and such device is adaptable for use with water or sewerage sterilization apparatus.

Another object of the invention is the provision of a device of this character, wherein the construction thereof is novel in form so as to diffuse or inject sterilizing liquid or gas into a body of liquid or water under pressure or otherwise and the discharge of water or other liquid will operate to draw in sterilizing gas or liquid into the center of a converging stream of liquid under pressure and either diffuse or inject the same into any liquid either under pressure or otherwise.

A further object of the invention is the provision of a device of this character wherein vacuum is created at the apex of a nozzle through the center of which is supplied a stream of gas or other liquid, the latter being sucked into or diffused by a stream of water or other liquid passing through an orifice in the center of which is located such nozzle, the nozzle and orifice being so designed and mounted for adjustment whereby the amount of water or other liquid flowing through the orifice may be minutely controlled.

A still further object of the invention is the provision of a device of this character wherein the vacuum is created by the velocity of variable converging streams of liquid and the sterilizing gas or liquid is supplied to the center of such stream, thereby rendering the device efficient and positively operable, the device being usable either as a diffuser or injector.

A still further object of the invention is the provision of a device of this character which is extremely simple in construction, thoroughly reliable and efficient in its operation, readily and easily adjusted as well as assembled or disassembled, and inexpensive to manufacture.

With these and other objects in view, the invention consists in the features of construction, combination and arrangement of parts as will be hereinafter more fully described in detail, illustrated in the accompanying drawings, which disclose the preferred embodiment of the invention, and pointed out in the claims hereunto appended.

In the accompanying drawings:—

Figure 1 is a vertical longitudinal sectional view through the device constructed in accordance with the invention.

Figure 2 is a sectional view on the line 2—2 of Figure 1 looking in the direction of the arrows.

Figure 3 is a sectional view on the line 3—3 of Figure 1 looking in the direction of the arrows.

Figure 4 is a vertical longitudinal sectional view through a slightly modified form of the device and adaptable as an injector.

Figure 5 is a side elevation of the gas tube.

Figure 6 is a side elevation of the orifice container.

Similar reference characters indicate corresponding parts throughout the several views in the drawings.

Referring to the drawings in detail, particularly Figures 1 to 3 inclusive, 10 designates the body of the device which is in the form of a cylindrical casing having therein a circular chamber 11, the latter being extended a considerable distance of the length thereof and merges into a socket 12, the latter being slightly larger than the chamber 11 and opens through one end of said body or casing, while opening through the other end of this body or casing centrally thereof is a bore 13, the same opening into the chamber 11.

Located within the chamber 11 is an orifice container 14 having at its outer end an annular rim or flange 15, the latter being threaded into the socket 12 for the mounting of the container 14 centrally within the chamber 11. This container is formed with radial openings 16 disposed an equi-distance apart circumferentially thereof, or at irregular distances from each other as may be desired, while connected with said container is a gas supply tube or pipe 17, the forward end thereof having the external threads 18 for engaging companion threads 19 internally of said container 14. This tube or pipe 17 is longitudinally adjustable in the bore 13 and is surrounded by a packing nut 20 to act upon packing 21 which also surrounds said tube or pipe and is confined within the gland 22 circumferentially of said tube or pipe, the gland being formed in the end of the body or casing 10 remote from the socket 12 therein.

The tube or pipe 17 carries at its inner end a nozzle 23 which is detachably connected therewith by a connector nipple 24, the outer end of the nozzle being outwardly tapered and confronts an orifice 25 formed in said container and shaped substantially correspondingly to the tip of the nozzle 23.

Tapped into one side of the body or casing 10 is a water feed pipe 26 which delivers this liquid

into the chamber 11 whence the same will flow through the holes 16 into the container 14 about the nozzle 23 and thence through the orifice 25, the gas in the tube or pipe 17 being delivered through the nozzle 23 at the orifice 25 where it meets the water admitted from the pipe 26.

Detachably connected with the container 14 in alignment with the orifice 25 and through the medium of a connector nipple 27 is a throat member 28.

The outer end of the tube or pipe 17 through the medium of the coupling 29 is attached to a gas supply lead 30.

It will be apparent that vacuum is created at the tip or apex of the nozzle 23 by the velocity of the converging stream of liquid delivered by the container 14 and the gas in the tube or pipe 17 is introduced at this point so that more thorough mixing takes place as the gas or fluid must pass from the center to outside of stream to escape.

The tube or pipe 17 can be readily adjusted in the body or casing 10 so as to properly position the nozzle 23 or regulate its position with relation to the orifice 25 in the container 14 as will be apparent.

The throat member 28 is readily adaptable to the container 15 by the connector nipple 27 in its engagement therewith.

In Figures 4 to 6 inclusive there is shown a slight modification, wherein the orifice container 31 has the holes or openings 32 therein forwardly converging while in the rim portion 33 of the container is removably fitted a thimble 34 having the orifice 35 and this thimble is held in place by a lock ring 36, while the thimble is connected with an injector throat member 37. The nozzle 38 is detachably engaged upon a circular head 39 on the gas tube or pipe 40 which is threaded with a boss 41 projected internally of the chamber 42 in the body or casing 43 and has fitted therewith a packing gland 44, the tube or pipe 40 being readily adjustable within the body or casing to regulate the position of the nozzle 38 relative to the orifice 35 as will be obvious and in this arrangement hereinbefore described the device is usable as an injector, while in the use of the device as shown in Figures 1 to 3 it serves as a diffuser.

It is apparent that in the use of the device as a diffuser or injector a vacuum is created at the tip or apex of the nozzle of said device by the velocity of the converging stream of liquid which is variable to meet the efficient requirement as delivered by the container of the device, thereby being independent of the throat member 28 or the member 37 or the tail passage for the creation of vacuum thereby making it available for both diffuser or injector, the gas being introduced to the middle of the stream and thus assures a more thorough diffusing.

While there has been shown a device wherein adjustment is made by the pipe 17 carrying the nozzle 23 and the pipe 40 carrying the nozzle 38 it is also contemplated that adjustment can be otherwise had so as to alter the relation of the nozzle to the orifice and in that respect the parts 15 or 33 can be so constructed to permit the adjustment of the orifice with respect to the nozzle and this is contemplated within the scope of the present invention.

What is claimed is:—

1. In a device of the character described, a casing forming a chamber opening through one end thereof, a fluid pipe passed centrally through the casing into the chamber, an orificed container fitted upon the open end of the casing and adjustably joined with the pipe and having an annular flange adjustably threaded in the open end of said casing, a nozzle detachably connected with the pipe and projected into the container, the container having radial openings concentrically with respect to the nozzle, and a throat member connected with the container and having an opening aligned with the nozzle, the first named pipe being adjustable in the casing to vary the relation of the nozzle with respect to the container orifice.

2. In a device of the character described, a casing forming a chamber opening through one end thereof, a fluid pipe passed centrally through the casing into the chamber, an orificed container fitted upon the open end of the casing and adjustably jointed with the pipe and having an annular flange adjustably threaded in the open end of said casing, a nozzle detachably connected with the pipe and projected into the container, the container having radial openings concentrically with respect to the nozzle, a throat member connected with the container and having an opening aligned with the nozzle, the first named pipe being adjustable in the casing to vary the relation of the nozzle with respect to the container orifice, and a fluid pipe opening into the chamber and disposed at substantially right angles to the first named pipe and rearwardly of the container openings.

3. In a device of the character described, a casing forming a chamber opening through one end thereof, a fluid pipe passed centrally through the casing into the chamber, an orificed container fitted upon the open end of the casing and adjustably joined with the pipe and having an annular flange adjustably threaded in the open end of said casing, a nozzle detachably connected with the pipe and projected into the container, the container having radial openings concentrically with respect to the nozzle, a throat member connected with the container and having an opening aligned with the nozzle, the first named pipe being adjustable in the casing to vary the relation of the nozzle with respect to the container orifice, a fluid pipe opening into the chamber and disposed at substantially right angles to the first named pipe and rearwardly of the container openings, and means for sealing the adjustable connection of the first named pipe and casing.

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