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NOZZLE

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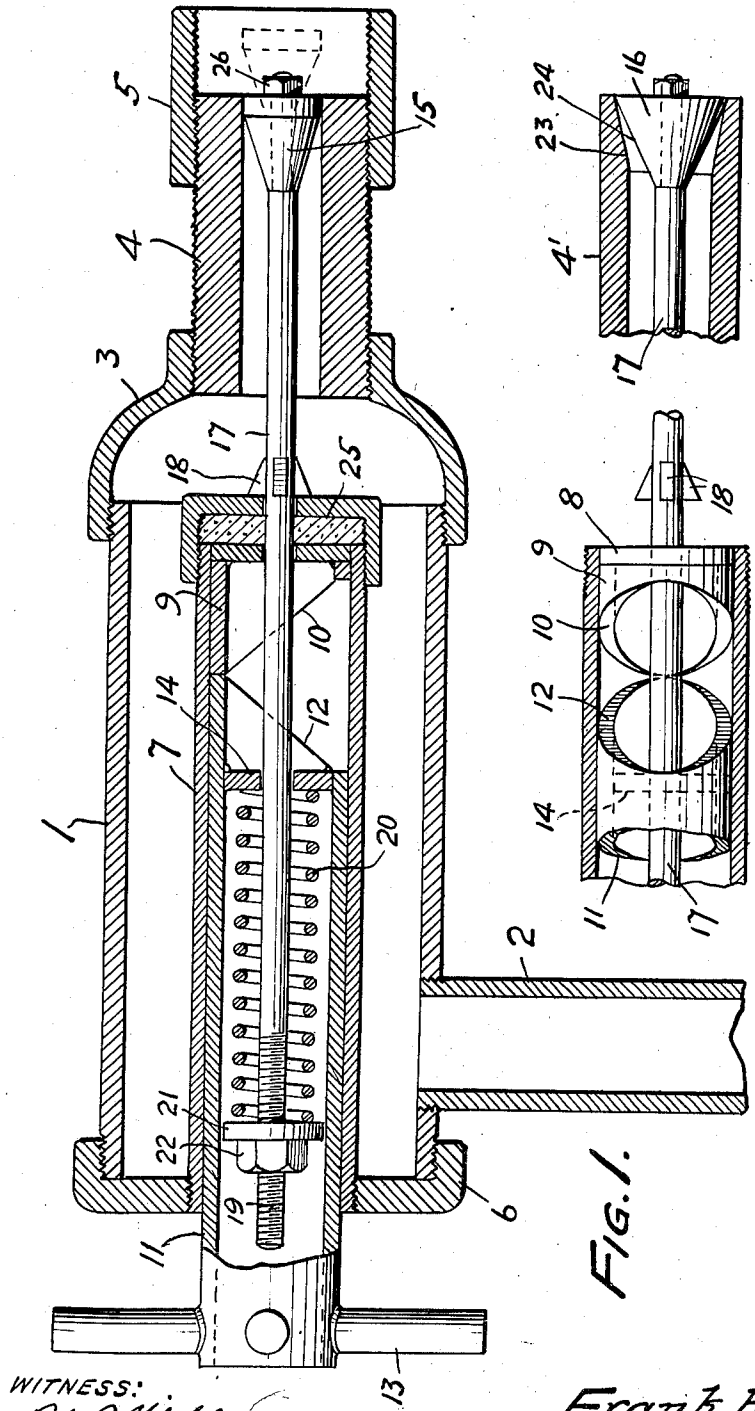


FIG. 1.

FIG. 3.

FIG. 2.

WITNESS:
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NOZZLE

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This invention relates to an improvement in nozzle and, more particularly, to a nozzle adapted for the directional discharge under pressure of liquid carrying more or less solid matter in suspension.

The nozzle in accordance with this invention is, due to its novel construction, adapted normally for the discharge of liquid carrying solid matter without clogging, even when the concentration of solid matter is relatively high and when the solid matter is of a fibrous nature or from its characteristics tends to mat or ball up. Again, due to the novel structure of the nozzle, when clogging or partial clogging occurs, such may be readily and expeditiously relieved and the nozzle returned to normal, without shutting off the nozzle or removal of any of its parts.

The nozzle in accordance with this invention will lend itself to use for the directional discharge of liquids generally carrying solids generally in the form of a stream or spray and, due to its novel construction, will lend itself advantageously to use in a high heated atmosphere.

Among the various uses for which the nozzle in accordance with this invention is adapted, it has been found highly advantageous for use for discharging sewage sludge into a furnace or incinerator, since it normally will not become clogged by the fibres and other solids present in suspension in sewage sludge, and may be readily and expeditiously relieved if it does become clogged. It will compensate for the effects of wear caused by sand and grit present in sludge, and it may be placed in a furnace or incinerator without damage or loss of efficiency.

Having now indicated, in a general way, the nature and purpose of this invention, I will proceed to a detailed description of a preferred embodiment thereof with reference to the accompanying drawing in which:

Figure 1 is a cross-sectional view of a nozzle in accordance with this invention.

Figure 2 is a sectional view showing a detail of the structure of the nozzle shown in Figure 1.

Figure 3 is a sectional view showing a modification in detail of the structure of the nozzle shown in Figure 1.

Referring more particularly to Figures 1 and 2, the reference character 1 indicates a casing, desirably of cylindrical form, provided adjacent its rear end with a threaded aperture for its connection with a conduit 2 adapted to conduct material, as sewage sludge, to be discharged. The forward end of the casing is closed by a centrally apertured head 3, which is desirably threaded on the end of the casing. A nipple 4 is threaded into the central aperture in the head 3 and its outer end is threaded on extension 5 which serves to direct the stream or spray issuing from the nipple.

The rear end of the casing is closed by a centrally apertured head 6, which is desirably threaded on the casing. Threaded in the aperture in the head 6 is an inner casing or tube 7 closed at its forward end by a centrally apertured head 8. Within the casing or tube 7, at its forward end, and secured to the inner side of the head 8, as by welding, is a fixed tubular member 9, the rear end of which is cut off at an angle, as shown at 10. A rotatable tubular member 11 extends within the casing 7 and its forward end, which is cut off at an angle 12 similar to that of the rear end of member 9, abuts against the rear end of member 9. The rear end of member 11 extends without the casing 7 and is provided with handle members 13 whereby it may be revolved within the casing 7.

The tubular member 11 is closed adjacent its forward end by means of a centrally apertured partition 14, secured within the member, as by welding.

A valve or plug 15 is arranged to control discharge from the casing 7 through nipple 4. The valve 15 is secured by a nut 26 to a stem 17, which extends through the nipple 4, the head 8 of casing 7 and the partition 14 into the revoluble member 11. A suitably packed stuffing box 25 is provided to prevent leakage into the casing 7 along the valve stem 17. The valve stem 17 is provided with stop members 18, adapted to engage with the stuffing box 16 to limit the closing movement of the valve and is threaded from its free end as at 19. Within the revoluble member 11 and surrounding the valve stem 17 is a spiral spring 20, one end of which abuts against the partition 14 and the other end of which abuts against an abutment 21, adjustable by means of a nut 22 threaded on the end of the stem 17.

Referring now more particularly to Figure 3, the nipple 4' is internally beveled adjacent its discharge end, as shown at 23, and the valve 16, which is beveled on a less steep bevel, as shown at 24, seats on the beveled surface 23 of the nipple on a line.

In operation of the nozzle shown in Figures 1 and 2, the casing 1 is connected to conduit 2, which leads from any pressure source of liquid carrying solid matter in suspension, as for example, sewage sludge. Thus, the conduit 2 may

be connected to the discharge side of a pump drawing sewage sludge from a supply thereof.

The forward end of member 11 is adjusted with respect to the rear end of member 9, as shown in Figure 1, and the tension of spring 20 is adjusted, by adjustment of nut 22, to permit desired opening of valve 15 for discharge through the nipple 4 under the pressure obtaining in casing 1 and with consideration for the concentration and type of solids in the liquid to be discharged. The shield 5 serves to guide the stem or spring from nipple 4 and prevent its spreading laterally.

In the normal continued operation of the nozzle as the concentration of solids may momentarily increase, or as the type of solids may result in agglomeration and a tendency to clog the discharge opening occurs, the pressure in casing 1 will necessarily rise, force the valve 15 outwardly against the spring 20, thus increasing the size of the discharge opening and permitting the passage of solid matter tending to clog the discharge.

In the event that the discharge becomes clogged and relief is not afforded by the normal operation of valve 15, relief may be expeditiously given by the mere rotation of member 11 through a half turn, which will bring the angular adjacent ends of members 9 and 11 together, permit the member 11 to move forward under the influence of spring 20 and largely release the tension on the spring, thus permitting the valve 15 to move out, for example, to the position shown in dotted lines, Figure 1, entirely clear of the nipple, and permit any solid matter which may be clogging the discharge to be expelled under the increased pressure in casing 1.

As will now be observed, the angular ends of the members 9 and 11 act as cams permitting member 11 to be positioned to afford a fixed abutment for spring 20 under desired or normal operation of valve 15, as shown in Figures 1 and 2, and to be positioned, by merely turning it through the medium of handles 13, to release the tension on the spring.

When the modification shown in Figure 3 is used, the internal bevel 23 on the nipple 4 and the less steep bevel 24 on the valve 16 will insure that the valve may be properly adjusted to give required opening despite inevitable wear from sand and grit in the liquid, as sewage sludge, discharged. The modification shown in Figure 3 may be provided with a shield such as the shield 5 shown in Figure 1.

The nozzle, when used for the burning of sewage sludge, or the like, may be placed under high temperature conditions, as in a furnace, without injury especially to the spring 20, since the space between the casing 1 and the inner casing or tube 7 within which the spring is contained forms a water jacket and protects the spring from the effects of high temperature outside the casing 1.

It will be understood that the above detailed description of a preferred embodiment of this invention is for illustrative purposes and that it is not intended that this invention shall be limited thereby, since various modification in detail may be made without departing from the scope of the invention.

What I claim and desire to protect by Letters Patent is:

1. A nozzle comprising, in combination, a casing having a discharge opening in its forward end and an inlet opening, a valve arranged to control the said discharge opening, a stem on said valve extending rearwardly within said casing, a spring embracing said valve stem and adapted to control said valve, a fixed cam member embracing said valve stem, a rotatable longitudinally movable cam member embracing said valve stem and adapted to cooperate with said fixed cam member, an abutment for one end of said spring carried by said rotatable cam member, an adjustable abutment for the other end of said spring carried by said valve stem and means to rotate said rotatable cam member relative to said fixed cam member to vary the tension on said spring.

2. A nozzle comprising, in combination, a casing having a discharge opening in its forward end and an inlet opening, a valve arranged to control the said discharge opening, a stem on said valve extending rearwardly within said casing, a spring embracing said valve stem and adapted to control said valve, an inner casing within said first mentioned casing arranged to cover said spring, a fixed cam member positioned within said inner casing, a rotatable cam member extending within said casing and adapted to cooperate with said fixed cam member, an abutment for one end of said spring carried by said rotatable cam member and an adjustable abutment for the other end of said spring carried by said valve stem.

3. A nozzle comprising, in combination, a casing having a discharge opening in its forward end and an inlet opening, a valve arranged to control the said discharge opening, a stem on said valve extending rearwardly within said casing, a spring embracing said valve stem, an abutment for said spring carried by the valve stem, and a second abutment for said spring movable relative to the abutment on the valve stem, a pair of cooperating members adjacent to and engaging each other at their surfaces, said members each having a cut-away portion at the engaging surface, one of said members being carried on said second abutment for said spring, and said members being relatively movable toward and away from each other and adapted in one relative position to maintain tension on said spring, whereby it will control said valve and in another relative position to release tension on said spring, and means for moving one of said members relative to the other.

FRANK R. MAXWELL.