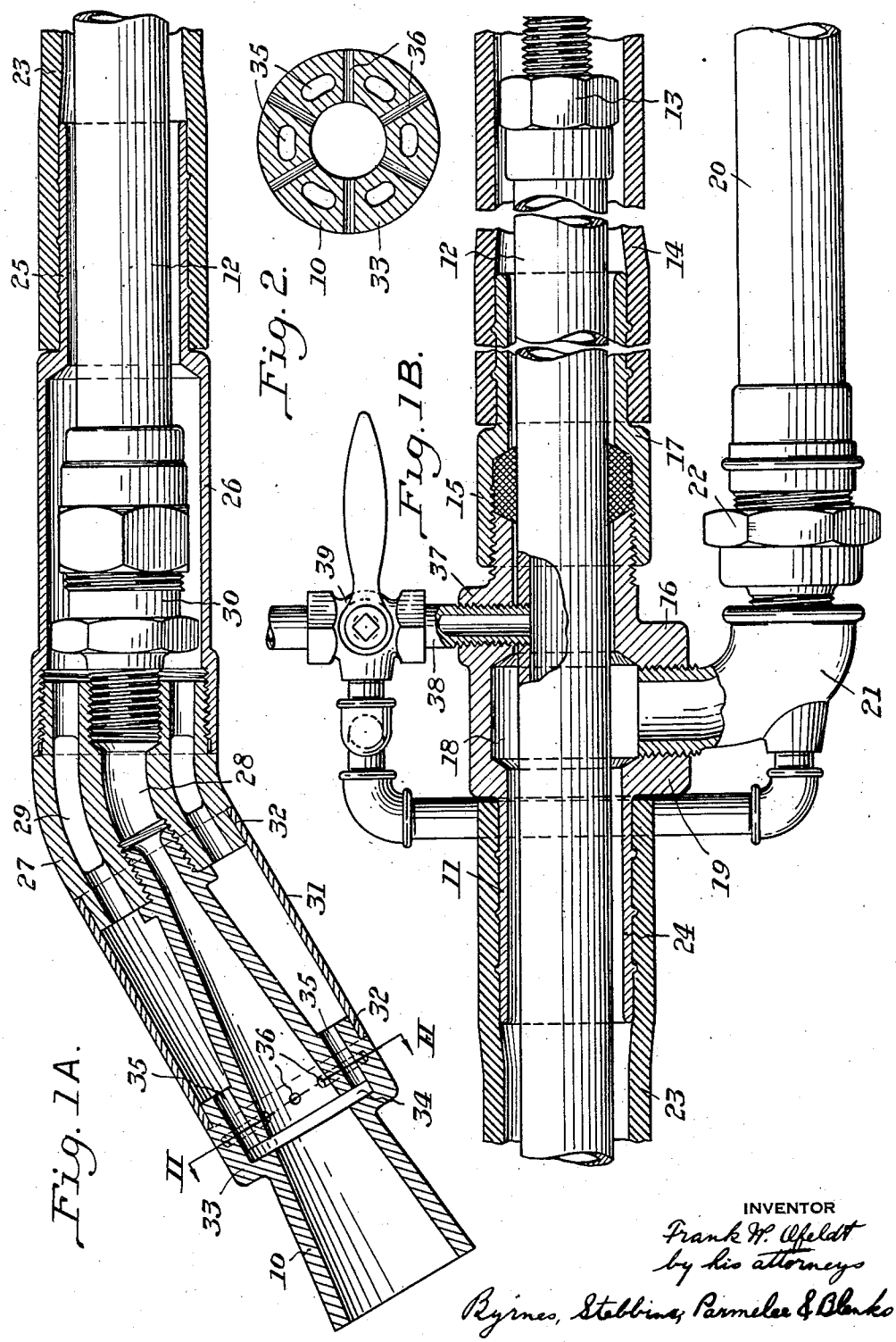
May 8, 1934. F. W. OFELDT 1,958,094

HYDRAULIC SYSTEM AND NOZZLE THEREFOR

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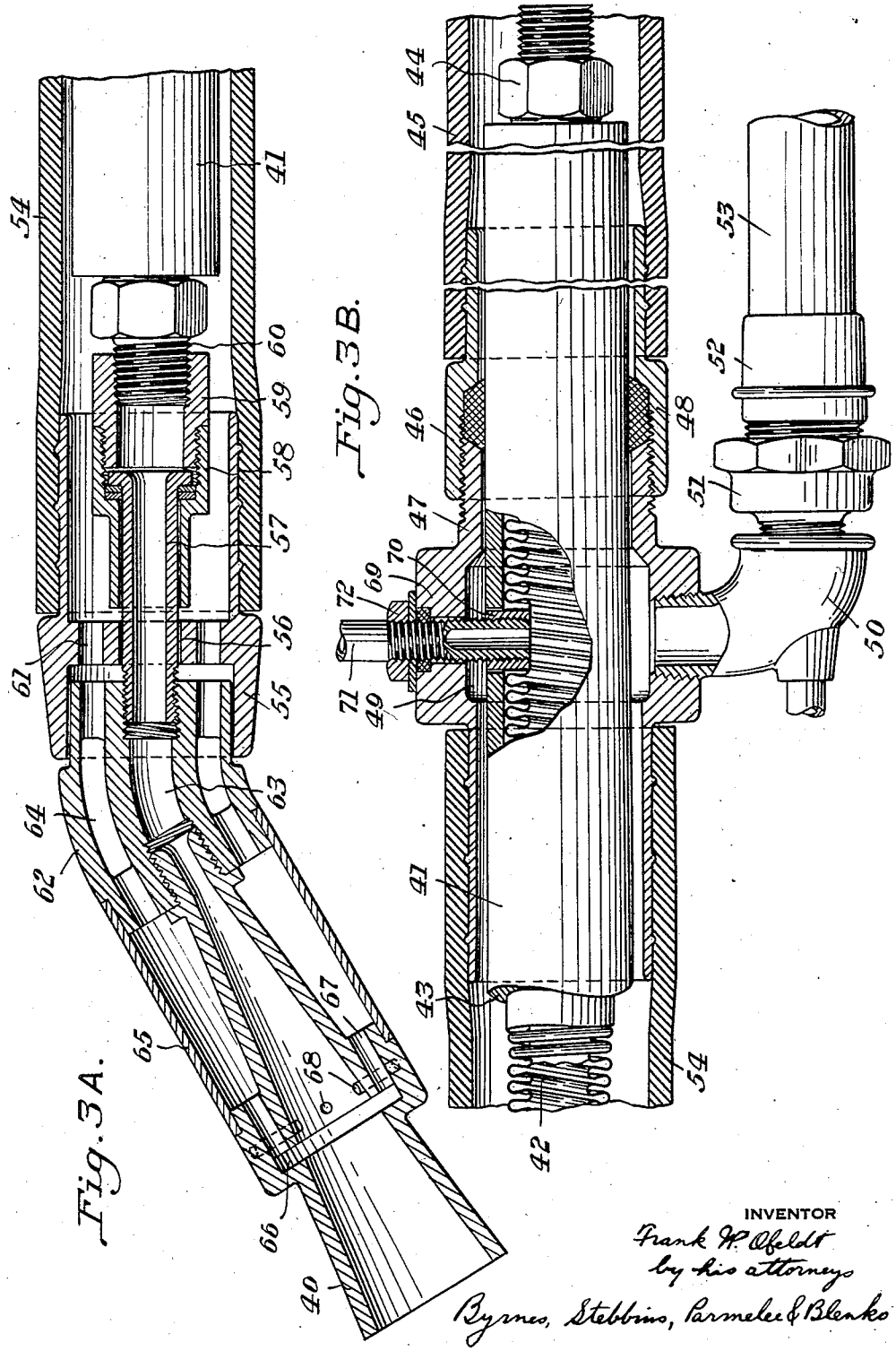


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Frank W. Ofeldt
by his attorneys
Byrnes, Stebbins, Parmelee & Blanke

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UNITED STATES PATENT OFFICE

1,958,094

HYDRAULIC SYSTEM AND NOZZLE THEREFOR

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3 Claims. (Cl. 299—140)

My invention relates to a system for distributing fluid and, in particular, to a nozzle for obtaining proper atomization and velocity of a fluid stream, as well as facility in directing it.

In my copending application, Serial No. 215,557, filed August 26, 1927; Serial No. 221,455, filed September 23, 1927 and Serial No. 461,078, filed June 14, 1930, I have disclosed several forms of apparatus for providing an easily portable supply of hot water under pressure. Such sources of hot water, in combination with a suitable nozzle and connecting conduit, have been found highly useful for many operations, such as the cleaning of automobiles, trucks, buses, streetcars and railway coaches and locomotives.

It is the purpose of the present invention to provide an improved form of nozzle for use in connection with the apparatus of the copending applications, although the invention herein described is not, of course, limited to such use. Specifically, the objects of the present invention are to provide a nozzle which shall effect a more thorough atomization of a fluid stream, preferably a mixture of water and steam, and to increase the velocity thereof. It is also an object of this invention to provide means for cooling a nozzle traversed by heated fluids so that the nozzle may be handled freely without discomfort. Another object is to provide a nozzle having a mouth which can be readily turned without the necessity of shifting the body of the nozzle. The invention also contemplates means for introducing a cleaning compound or an emulsifying agent into a stream of fluid under pressure.

According to the invention, I provide an expanding nozzle mouth having suitable lateral openings therein. A water jacket surrounding the nozzle mouth and the body of the nozzle communicates with certain of these openings, whereas the others are open to atmosphere. A connection is made from the water jacket to a source of cooling water. The nozzle also includes a side connection for the introduction of a cleaning compound or an emulsifying agent into the fluid stream ejected by the nozzle.

The results obtained by the invention are that the fluid stream is much more thoroughly atomized than has heretofore been possible and has a greater velocity. At the same time, the body and mouth of the nozzle are maintained at low temperature by the cooling jacket. The introduction of the cleaning or emulsifying agent is simplified by the side connection. In order to facilitate proper direction of the fluid stream in one form of the invention, I provide a swiveled connection between the mouth of the nozzle and the body thereof.

For a complete understanding of the invention, reference is made to the accompanying drawings, in which

Figures 1*a* and 1*b* together constitute a longitudinal sectional view of one form of the invention showing parts in elevation;

Figure 2 is a transverse sectional view along the line II—II of Figure 1*a*; and

Figures 3*a* and 3*b* together represent a longitudinal section through another form of the invention.

Referring in detail to the drawings and, for the present, to Figures 1*a*, 1*b* and 2, a present preferred embodiment of the invention comprises an expanding nozzle mouth 10 and a body portion 11 connected thereto. The nozzle mouth is a unitary casting while the body of the nozzle is built up of several members. An inner metallic conduit 12 extends through the body of the nozzle and is provided with a suitable terminal 13 for making connection with a flexible hose leading to a source of hot water under pressure, such, for example, as those shown in the copending applications above referred to. A length of hose 14 may be disposed about the conduit 12 for providing a thermal insulation therefor.

The hose 14 is seated on one end of a packing gland 15 composed of two castings 16 and 17 provided with a threaded connection. The casting 16 has an internal annular channel 18 and an integral boss 19. The latter permits a connection to be made to the interior of the body of the nozzle from a suitable source of water through a hose 20. An elbow 21 and union 22 complete the connection from the water source to the nozzle body.

A length of hose 23 extends from a sleeve 24 integral with the casting 16 to a similar sleeve 25 on a tubular member 26 disposed about the other end of the conduit 12. A connector 27 is threaded into the member 26 and is provided with a central opening 28 and annular passages 29. The opening 28 is enlarged at both ends and threaded. At one end it receives a portion of a union 30 connecting it to the end of the conduit 12. At the other end, the connector receives the reduced threaded end of the expanded or tapered nozzle mouth 10. A tube 31 is seated in annular recesses 32 in the end of the connector 27 and in a flange 33 formed integral with the nozzle mouth.

Within the flange 33, an annular groove 34 is formed and longitudinal passages 35 connect-

ing therewith afford communication with the space between the nozzle mouth and the tube 31. Radial holes 36 are bored in the flange 33 through the solid metal intervening between the passages 35 and are open to the atmosphere on the outside, and thus permit air to be drawn into the nozzle mouth.

It will be understood from the foregoing, that when the union 13 at the end of the conduit 12 is coupled to a source of hot water under pressure, the heated fluid will flow through the conduit 12, the union 30, the central opening 28 in the connector 27 and thence through the nozzle mouth 10. If the hose 20 is connected to a source of water, the water will flow through the hose, the coupling 22, the elbow 21 and into the annular channel 18. Thence, the water will flow through the water jacket constituted by the hose 23 connecting the sleeves 24 and 25, into the tubular member 26. The latter is connected to the tube 31 through the passages 29 in the connector 27 and the water passing through the cooling jacket therefore flows forward into the tube 31 and thence through the passages 35 and the channel 34 into the stream of hot water issuing from the nozzle mouth 10. The movement of the fluid stream through the nozzle mouth 10 draws air through the radial holes 36, and the result is a high velocity stream of hot water mixed with bubbles of air and steam and atomized thoroughly. Practical tests demonstrate that the water entering the nozzle stream from the cooling jacket, with the air drawn through the openings in the nozzle, are influential factors in increasing the velocity of the stream leaving the nozzle, as well as a degree of atomization thereof.

Since it may frequently be desirable to introduce a cleaning compound, such as a detergent, or an emulsifying agent, such as kerosene oil, into the stream of hot water, I provide a connection to the conduit 12 for this purpose. A boss 37 is formed in the casting 16 and is tapped to receive a pipe 38 connected to a suitable source of cleaning compound or oil and having therein a cock 39 for controlling the flow of oil or compound into the stream of hot water passing through the conduit 12. The oil may be introduced into the cold water stream, if desired, through a connection between the cock 39 and the elbow 21.

Referring now to Figures 3*a* and 3*b*, illustrating another embodiment of the invention, a nozzle mouth 40 which is similar in all respects to that shown, is associated with a slightly different form of nozzle body. A flexible conduit 41 having the usual spiral inside 42 and a rubber-fabric covering or sheath 43 is adapted to be connected by means of a union 44 to the water heating unit. An external sheath 45 may be disposed about the end of the conduit 41 for insulating purposes and the end of the sheath is preferably seated on a packing gland 46 comprising the threaded members 47 and 48. The member 47 has an external angular channel 49 tapped to receive an elbow 50 connected through a reducer 51 and a coupling 52 to a hose 53 adapted to supply cooling water for circulating around the outside of the conduit 41.

Another length 54 of hose serves as the outer wall of the water jacket surrounding the conduit 41 and extends from the casting 49 to a ring 55.

A central bore 56 in the ring 55 is adapted to receive a nipple 57 connected to the end of the conduit 41 through a swivel joint composed of sleeves 58 and 59 threaded together and provided with suitable packing and a union 60. The ring 55 is also provided with passages 61 to permit flow of cooling water therethrough.

A connector 62 having a central passage 63 and axial passages 64 is seated in the ring 55 for swiveling movement, with respect thereto. The connector is threaded onto the end of the nipple 57, the passage 63 being enlarged and tapped for that purpose. The passage 63 is also threaded for receiving the end of the nozzle mouth 40 which is surrounded by a tube 65 identical with that shown at 31 in Figure 1*a*. The nozzle mouth 40 has an annular channel 66, axial passages 67 and radial holes 68 therebetween, exactly as in the nozzle mouth 10.

The foregoing description should make it clear that hot water from the heating unit passes therefrom through its connecting hose to its union 44 and thence through the flexible conduit 41, the union 60, the swivelled nipple 57, the central passage 63 and the connector 62 and the nozzle mouth 40. Cooling fluid supplied through the hose 53 flows through the coupling 52, the reducer 51, the elbow 50, the annular channel 49 in the casting 47, through the hose 54 surrounding the conduit 41. The cooling water then passes through the passages 61 in the ring 55 and the cooperating passages 64 in the connector 62. The cooling water thus reaches the interior of the tube 65 and through the axial holes 67 and the annular channel 66 in the nozzle mouth 40, enters the stream of hot water passing therethrough.

The operation and effect of the second form of the invention is exactly the same as in the case of the first form. The body portion of the second form of the invention, however, is flexible and the nozzle mouth is swivelled thereto, so that the utmost facility in directing the stream is obtained.

If it is desired to introduce cleaning compound or an emulsifying oil into the stream of hot water passing through the conduit 41, this may be accomplished by forming a boss 69 on the casting 47 and brazing a hub 70 into the metallic portion of the wall of the conduit 41. A pipe 71 threaded to the hub 70 and clamped to the boss 69 by a nut 72 is connected to a suitable reservoir. Instead of supplying the cleaning compound or emulsifying agent to the body of the nozzle, as described for both forms of the invention, this material may be fed to the hot water stream at any point between the nozzle body and the water heater, or to the cold water stream.

The aforementioned advantages and desirable results flowing from the first form of the invention described also characterize the second form of the invention. Summarizing, the invention provides means in the form of a water jacket for maintaining the nozzle at a low temperature even though the latter conveys heated fluids. The flow of cooling water into the hot water stream, as well as the drawing in of atmospheric air, noticeably increases the velocity of the nozzle stream, as well as its degree of atomization. The swivelled nozzle in the second form of the invention and the flexibility of the nozzle body thereof facilitates the direction of the nozzle stream to the utmost. The side connections for cleaning compound and emulsifying oil make possible the easy introduction of these materials into the hot water stream, or the cold water stream.

Although I have described but two forms of the invention which represent embodiments pre-

ferred at present, the invention is not limited to the specific details herein disclosed. Numerous changes in the construction illustrated may be made without sacrificing the advantages mentioned, or departing from the spirit of the invention, as set forth in the appended claims.

I claim:

1. In a nozzle structure, an outwardly flaring mouth, a jacket surrounding a portion of the mouth, axial holes in the nozzle mouth communicating with the jacket, and radial holes in the nozzle mouth communicating with atmosphere.

2. In a nozzle structure, an outwardly flaring mouth, a jacket surrounding a portion of the mouth, holes in the nozzle mouth communicating with the jacket, and holes in the nozzle mouth communicating with atmosphere.

3. A fluid distributor comprising a supply tube, an angularly disposed nozzle mouth swiveled thereto, a jacket surrounding the tube and mouth and concentric therewith, holes in the nozzle mouth communicating with the jacket, other holes therein communicating with the atmosphere, and a swivel connection between the portion of the jacket surrounding the tube and the portion surrounding the nozzle mouth.

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