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G. M. PRO
DISCHARGE NOZZLE FOR HYDRATING CEMENTITIOUS
SUBSTANCES UNDER PRESSURE

2,577,664

Filed March 20, 1950

2 SHEETS—SHEET 1

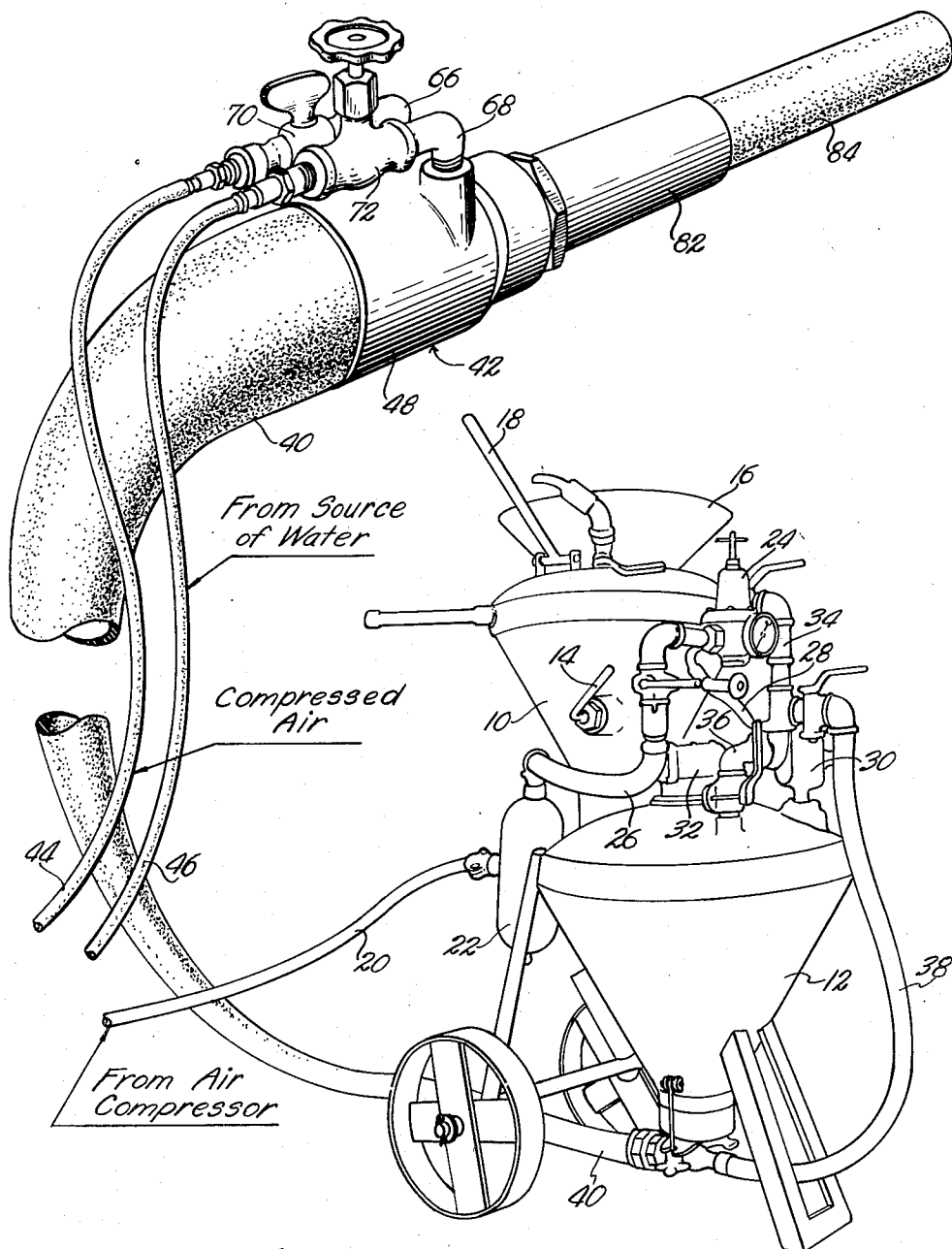


Fig. 1.

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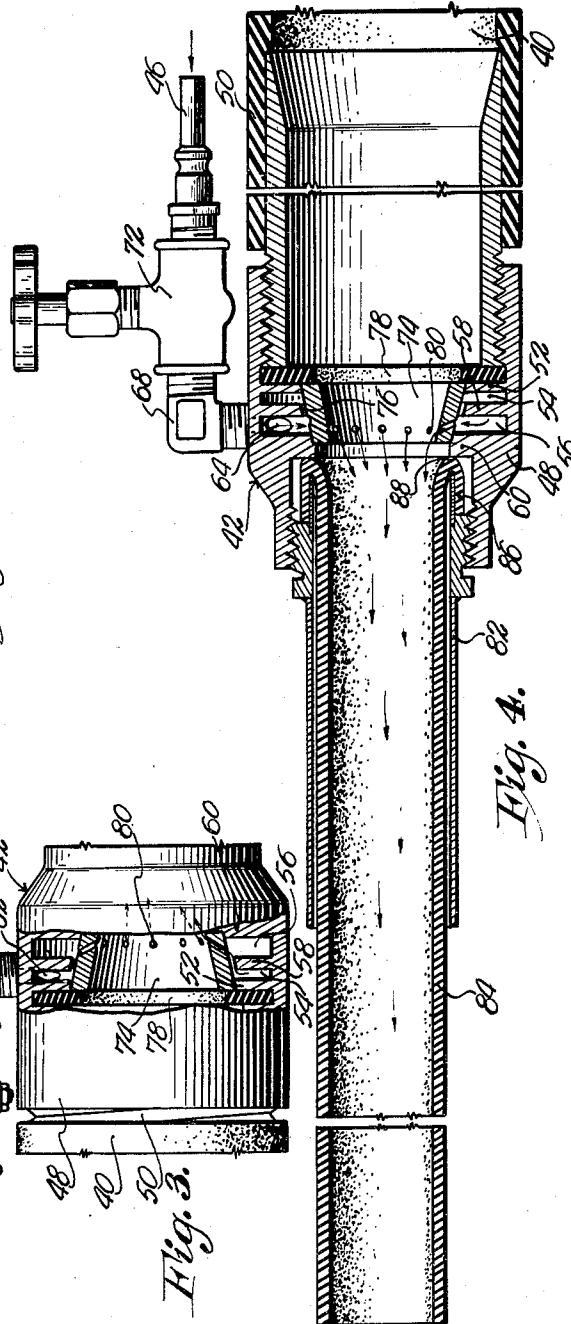
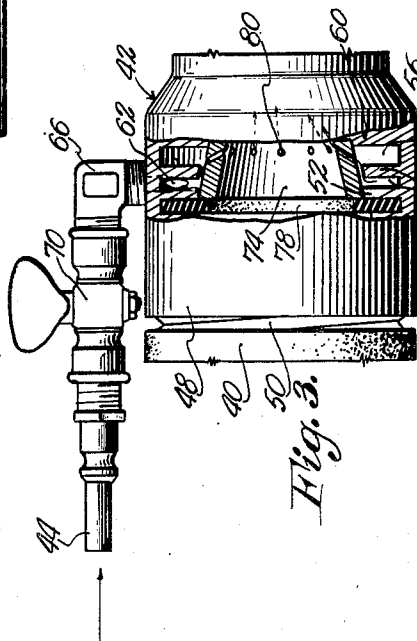
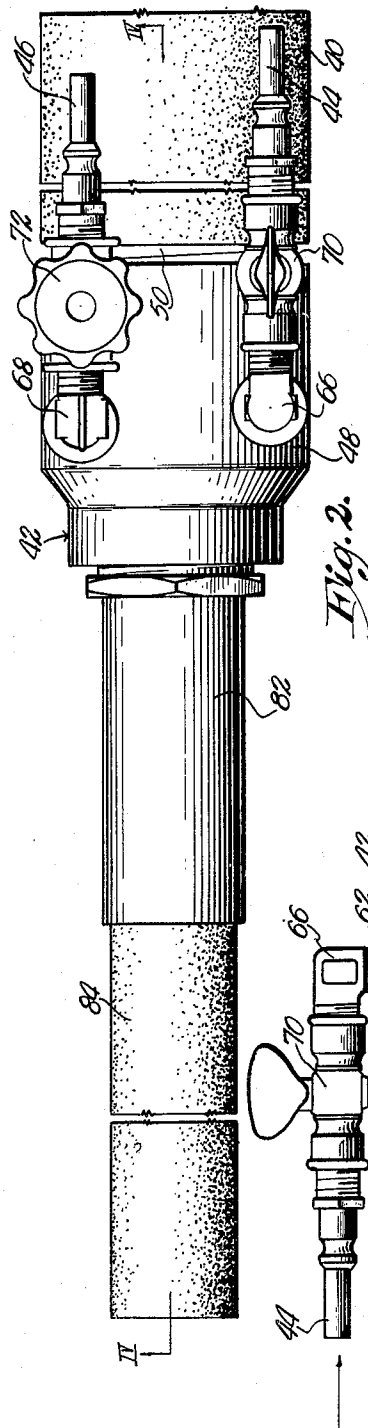
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2 SHEETS—SHEET 2



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UNITED STATES PATENT OFFICE

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DISCHARGE NOZZLE FOR HYDRATING
CEMENTITIOUS SUBSTANCES UNDER
PRESSUREGeorge Marcus Pro, Kansas City, Mo., assignor
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6 Claims. (Cl. 259—151)

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This invention has to do with the field of building and construction and relates more specifically to apparatus for applying cementitious substances such as concrete that includes an admixture of cement, water and an aggregate, the primary object being to provide a nozzle construction particularly adapted for use with apparatus having means for forcibly directing the material to be applied to the nozzle, together with a source of air and water under pressure.

It is the most important object of the present invention to provide nozzle structure adapted to receive and apply cementitious materials and having a body of a tubular nature provided with a removable insert adapted to span the distance across a pair of equalizing chambers in the body for water and air respectively and having a plurality of perforations for receiving the admixed air and water and directing the same into the interior of the body.

Another important object of the present invention is to provide a nozzle structure having a hollow body provided with a pair of continuous annular equalizing chambers therein adapted to receive air and water under pressure respectively, there being a frusto-conical, ring-like insert in the body spanning the distance across the chambers, but presenting a space between the latter and having outlet perforations formed therein whereby air is directed from its chamber to the water chamber and the admixed air and water pass into the interior of the body through the perforations of the insert.

Another object of the present invention is to provide a nozzle having a hollow body provided with an outlet spout that includes an elongated sleeve and a rubber tube within the sleeve and projecting beyond the outermost end of the sleeve, the tube being rebent on the sleeve and held tightly in place within the body, all to the end that a long-lasting, efficiently operating nozzle construction is presented.

Other objects of the invention include the way in which the frusto-conical insert is seated within the body; the way in which the insert is releasably held in place through the medium of washer means and sectional body construction; the manner of arranging the outlet passages of the insert to direct the water and air mixture properly into the nozzle; and the way in which the component parts of the nozzle construction are held together for quick and easy disassembling for repair, cleaning or replacement of parts as desired.

In the drawing:

Figure 1 is a perspective view of apparatus for applying cementitious substances under pressure made in accordance with the present invention and illustrating the nozzle thereof on an enlarged scale.

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Fig. 2 is a top plan view of the nozzle per se.

Fig. 3 is a fragmentary, side elevational view of the nozzle parts, including the water valve thereof, being broken away and in section to reveal details of construction; and

Fig. 4 is a longitudinal, cross-sectional view taken on line IV—IV of Fig. 2, looking in the direction of the arrows.

While the mobile apparatus illustrated in Fig. 1 of the drawings forms no part of this invention, a brief description thereof will teach the nature and purposes of producing the novel nozzle construction hereinafter described. Such apparatus includes a pair of interconnected, superimposed hoppers 10 and 12 having a gate therebetween that is manually controlled by a lever 14. A funnel 16 communicates with the hopper 10 at the top thereof for receiving cement and aggregate and a gate between funnel 16 and hopper 10 is manually controlled through the medium of a lever 18.

A hose 20 interconnects a source of compressed air not shown, with a moisture removing tank 22 that in turn joins with a pressure regulator 24 by means of a valved line 26. Compressed air is also directed from line 26 through valved tube 28 to an air motor 30. Motor 30 is operably connected through gear box 32 with an agitator and metering mechanism disposed in hopper 12.

Hoppers 10 and 12 are pressurized by means of valved conduits 34 and 36 respectively and air under pressure is directed to the lowermost outlet end of hopper 12 by means of valved line 38. The dry, admixed material is fed to a hose 40 from hopper 12 by means of the aforesaid metering mechanism and such material is forced into the nozzle construction forming the subject matter hereof and broadly designated by the numeral 42 by means of the air pressure in line 38.

A hose 44 coupled with nozzle 42 may either be connected with the source of compressed air with which hose 20 is joined, or be coupled with line 26 as desired. A second hose 46 is connected with a source of water under pressure, not shown.

Nozzle 42 includes a tubular body having one end thereof internally tapped to threadably receive an externally threaded, relatively short tube 50 that in turn has hose 40 telescoped thereon. An inturned flange 52 in body 48, faces outwardly toward the tube 50 and a continuous annular air equalizing chamber 54 is formed in body 48 adjacent flange 52. A water equalizing chamber 56 formed in body 48 is of substantially the same character as chamber 54 except that the same is slightly wider as shown in Figs. 3 and 4, and an inturned flange 58 serves as a partition between chambers 54 and 56.

A third annular inturned flange 60, forms one

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side of the chamber 56 and faces outwardly in a direction oppositely to tube 50. Inlet openings 62 and 64 are formed in body 48 in communication with chambers 54 and 56 respectively, and L-shaped couplings 66 and 68 are threadably inserted in openings 62 and 64 respectively.

A manually operable valve 70 is interposed between hose 44 and coupling 66 and a second manually operable valve 72 interconnects coupling 68 and hose 46.

The innermost annular edges of flanges 52, 58 and 60 are contoured angularly to conform to the shape of a frusto-conical ring-like insert 74 that is disposed within body 48. It is noted that the insert 74 is seated tightly on the inclined edges of flanges 52 and 60; but that the innermost edge of flange 58 is spaced from the outermost face of insert 74, thereby presenting an annular passageway 76 circumscribing insert 74 and placing chambers 54 and 56 in direct communication. Insert 74 is held wedged tightly in place against the flanges 52 and 60 by means of a gasket 78 that is interposed between the proximal faces of flange 52 and tube 50, and bears against the proximal base edge of insert 74. Removable insert 74 thus closes the chambers 54 and 56 from the interior of body 48 with the exception of an annular row of passages 80 formed in the insert 74 and communicating with the annular chamber 56. As shown in Figs. 3 and 4, these passages 80 are all inclined inwardly toward the longitudinal axis of body 48 in the direction of flow of material through the nozzle 42 as indicated by arrows in Fig. 4 of the drawings.

That end of the body 48 opposite to tube 50 and proximal to turned flange 60, is also internally tapped for threadably receiving an elongated cylindrical, externally threaded sleeve 82. A relatively long, flexible tube 84 made from rubber or like material is telescoped within the sleeve 82 and extends outwardly beyond the outermost free end of the latter. The innermost end of the flexible tube 84 is rebent upon itself in partial circumscribing relationship to the proximal end of sleeve 82 as at 86. As sleeve 82 is forced into the body 48, tube 84 is brought to bear tightly against the outwardly facing side of shoulder 60 at line of bend 88 of hose 84. It is noted that the outside diameter of hose 84 is slightly less than the inside diameter of sleeve 82.

In operation, as the dry material including cement and aggregate, is forced into nozzle 42 through hose 40, selected amounts of air and water are simultaneously directed into body 48 and tube 84 by adjustment of valves 70 and 72 respectively. It is seen that air entering inlet 62 equalizes in chamber 54 and is free to flow through passageway 76 into water equalizing chamber 56. Such air admixes with the water and carries the same in the form of a relatively fine atomized mist through passages 80 into insert 74 and thence into tube 84. The angularity of passages 80 serves to cause the air and water mixture to be directed toward the center of the flowing material through nozzle 42 and to thereby evenly distribute the water through the dry material and effectively hydrate the same.

To a certain extent also, by virtue of the fact that air and water enters nozzle 42 under pressure, the inwardly directed air and water mixture will aid in forcing the material through the nozzle 42 and out of the discharge end of tube 84 thereof. The pressurized air flowing through passageway 76 aids in forcing the water from chamber 56 into the dry material being directed through the insert

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74 and tube 84. Furthermore, by admixing the air and water prior to introduction thereof to the dry material, an effective vaporization of the water is produced and when the air and water mixture passes into the dry material, the latter will become completely and thoroughly dampened to the extent desired and depending upon the amount of water that is permitted to flow into inlet 64 by adjustment of valve 72. The controls 70 and 72 permit the operator to vary the nature of the material emanating from tube 84 with respect to the extent of water content with extreme accuracy as desired.

It is noted that an effective seal is presented through use of the insert 74 whereby none of the cementitious material can enter the chambers 54 and 56 and thereby clog the same and fill the inlets 62 and 64. The pressure behind the air and water will maintain the relatively small angularly disposed outlet passages 80 open at all times, and the gasket 78 will prevent entrance of the material into the chamber 54 behind or along the outermost surface of insert 74.

Additionally, by virtue of the tight, abutting fit between line of bend 88 of tube 84 and the shoulder 60, none of the material will pass to the outermost surface of sleeve 82. Rebending of the hose 84 upon the sleeve 82 as at 86, constitutes an efficient and inexpensive way of joining hose 84 and sleeve 82 and these two members can be thus interconnected quickly and easily by the operator. Since sleeve 82 is releasably mounted in body 48, hose 84 can be replaced with ease whenever necessary. However, because of the flexibility of hose 84 and the way in which it is permitted to vibrate within sleeve 82 and expand as necessary, replacement of such spout construction 84 will not become necessary except after long continued use. By provision of a removable insert 74, the latter can be manufactured with high precision and readily replaced by merely removing tube 50 from within body 48. Further, by provision of removable insert 74, the annular chambers 54 and 56 can be inexpensively formed in the body 48 and with accuracy as needed.

In substance therefore, the entire nozzle construction 42 is made of a number of separate interconnected parts, any one of which may be replaced with little expense and without loss of valuable time.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a discharge nozzle, a tubular body; a ring-shaped insert in the body; a pair of fluid inlets formed in said body; an annular equalizing chamber for each inlet respectively formed in the body, said chambers being in communication and circumscribing said insert; and a number of passages formed in the insert and constituting the sole means for placing said chambers in communication with the interior of said body.

2. In a discharge nozzle, a tubular body having an inlet end and an outlet end; a ring-shaped insert in the body; a pair of fluid inlets formed in said body; an annular equalizing chamber for each inlet respectively formed in the body, said chambers being in communication and circumscribing said insert; and a number of passages formed in the insert in alignment with one of said chambers for placing said chambers in communication with the interior of said body.

3. In a discharge nozzle, a tubular body having an inlet end and an outlet end; a pair of

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spaced, internal, annular flanges in the body; a ring-shaped insert in the body and engaging said flanges; a pair of fluid inlets formed in said body; an annular equalizing chamber for each inlet respectively formed in the body between said flanges, said chambers being in communication and circumscribing said insert; and a number of passages formed in the insert and placing said chambers in communication with the interior of said body.

4. In a discharge nozzle, a tubular body; a ring-shaped insert in the body; a pair of fluid inlets formed in said body; an annular equalizing chamber for each inlet respectively formed in the body, said chambers being in communication and circumscribing said insert; and a number of passages formed in the insert and placing said chambers in communication with the interior of said body, said insert being spaced from the inner walls of said body between said chambers, presenting a passageway between the latter.

5. In a discharge nozzle, a tubular body; a pair of spaced, internal, annular flanges in the body; a pair of annular equalizing chambers formed in said body between said flanges; a third, annular, intumed flange in the body separating said chambers; and a ring-shaped insert disposed in the body and engaging said pair of flanges, said insert having a number of passages placing the body in communication with the chambers, there being a fluid inlet formed in the body for each chamber respec-

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tively, said third flange being spaced from said insert presenting a passageway between the chambers.

6. In a discharge nozzle, a tubular body, an elongated, ring-shaped insert in the body; a pair of fluid inlets formed in said body; an annular equalizing chamber for each inlet respectively formed in the body, said chambers being in communication and circumscribing said insert; and a number of passages formed in the insert and placing said chambers in communication with the interior of said body, said insert being disposed in transverse, spanning relationship to said chambers, said body being in surrounding engagement with the insert adjacent each end thereof respectively.

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