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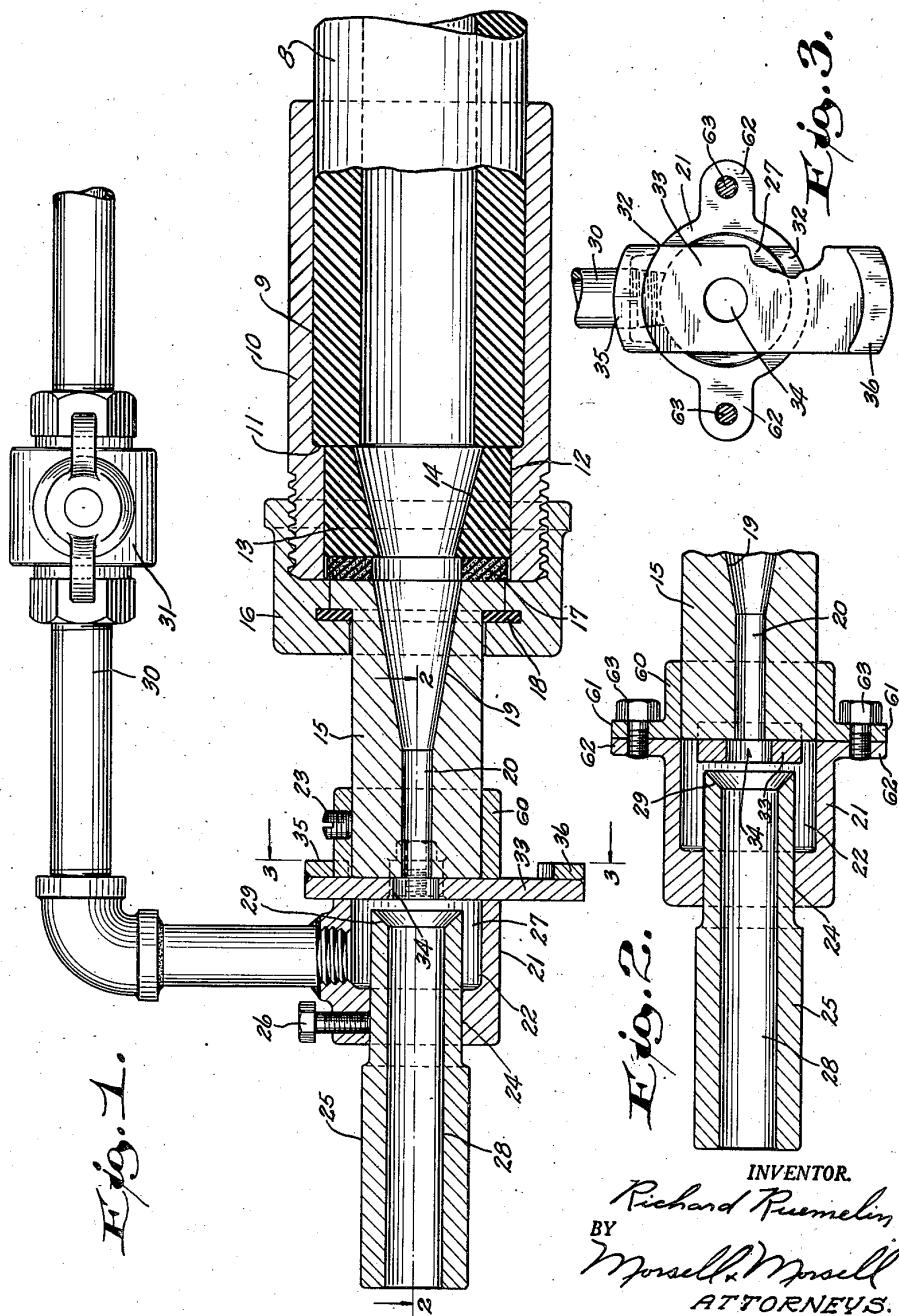
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GUN FOR BLASTING AND SPRAYING

Filed Sept. 7, 1944

2 Sheets-Sheet 1





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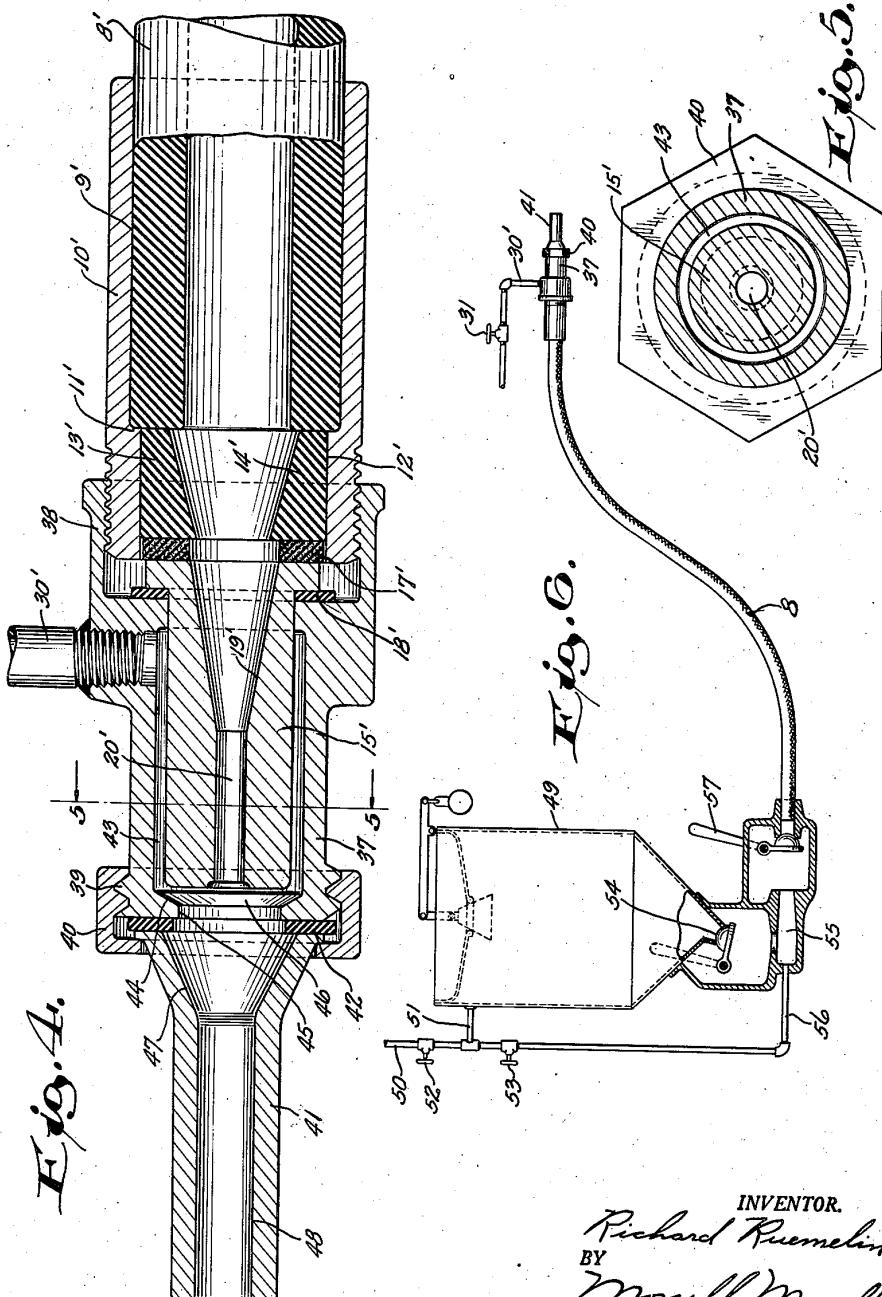
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GUN FOR BLASTING AND SPRAYING

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2 Sheets-Sheet 2



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Patented Aug. 13, 1946

2,405,854

UNITED STATES PATENT OFFICE

2,405,854

GUN FOR BLASTING AND SPRAYING

Richard Ruemelin, Milwaukee, Wis.

Application September 7, 1944, Serial No. 552,989

5 Claims. (Cl. 51—11)

1

This invention relates to improvements in guns for blasting and spraying.

It is a general object of the present invention to provide a gun which may be used for a variety of purposes such as wet or dry sand blasting operations, water washing operations, spraying with rust-proofing chemicals, or the spraying of cement mixtures.

A further object of the invention is to provide a device of the class described in which there are tandem nozzles, together with means for delivering dry material, such as sand propelled by compressed air to the inner nozzle, and means for delivering a mixture of said dry material and a liquid to the outer nozzle.

A further object of the invention is to provide a gun of the type described wherein the outer nozzle, together with the liquid admitting conduit, may be readily detached from the inner nozzle so that the latter may be used for the discharge of dry material only.

A further object of the invention is to provide a wet blast gun wherein there is means for quickly effecting a longitudinal adjustment of the outer nozzle to thereby vary the effective size of the mixing chamber.

A still further object of the invention is to provide a device of the class described wherein the dry material discharge orifice of the inner nozzle is of less diameter than the inlet opening of the outer nozzle, there being a mixing chamber adjacent said discharge orifice of the inner nozzle which is so arranged that a vacuum is created in the mixing chamber to more effectively entrain liquid into the stream of dry material emerging from said inner nozzle.

A further object of the invention is to provide a construction in which the flow of liquid may be controlled or shut off adjacent the nozzle, and in which there may be a valve for controlling the flow of dry material from the inner nozzle.

With the above, and other objects in view, the invention consists of the improved gun for blasting and spraying, and all its parts and combinations, as set forth in the claims, and all equivalents thereof.

In the accompanying drawings, illustrating complete embodiments of preferred forms of the invention, in which the same reference numerals designate the same parts in all of the views:

Fig. 1 is a longitudinal sectional view through the gun showing the liquid conduit connected thereto;

Fig. 2 is a fragmentary sectional view taken on line 2—2 of Fig. 1;

2

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1, part of the valve being broken away;

Fig. 4 is a longitudinal sectional view through a modified form of gun;

Fig. 5 is a sectional view taken on line 5—5 of Fig. 4; and

Fig. 6 is an elevational view illustrating the gun connected to a source of supply for compressed air and dry material, part of the mechanism being broken away, and shown in vertical section.

Referring first to Figs. 1 to 3 inclusive, the numeral 8 designates the outer end of a hose, preferably formed of rubber, and this hose may lead from a source of dry material propelled by compressed air. This dry material may be sand or other abrasives, powdered cement, or the like. The hose end 8 is connected within the bore 9 of a sleeve 10; and the inner end of the hose may abut against a shoulder 11. Outwardly of the shoulder 11 is a bore 12 of smaller diameter. Within the bore 12 is a rubber ring 13 having a tapered bore 14.

An inner nozzle member 15 is connected by a nut 16 with the outer end of the sleeve 10, there being a rubber gasket 17 between the inner end of the nozzle 15 and the outer end of the rubber ring, and there being another gasket 18 within the nut member 16. The nozzle 15 is formed with a duct which includes a tapered section 19 and an outer straight section 20 of restricted diameter communicating with the discharge end of the inner nozzle 15.

A tubular injector housing 21 has a bore 22 which is preferably of the same diameter as the external diameter of the outer end of the inner nozzle 15. A ferrule 20, fitted on the end of the nozzle 15, has ears 21 which are connected to ears 22 of the injector housing by bolts 23 to hold the housing in position. The ferrule may be removably held in place by a set screw 24.

The main bore 22 of the housing 21 communicates with a bore 24 of smaller diameter at the outer end of the housing, and this latter bore receives the inner end of an outer nozzle member 25. The outer nozzle member is adjustably held in position by a bolt 26.

The main bore 22 of the injector housing is of substantially larger diameter than the inner end of the outer nozzle member 25 so that a mixing chamber 27 is formed therearound. The inner end of the outer nozzle is spaced outwardly from the orifice of the inner nozzle so that dry material discharged from the inner nozzle can entrain liquid from the mixing chamber as it



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3

passes into the bore 28 of the outer nozzle member. The bore 28 is of substantially larger diameter than the outer orifice 20 of the inner nozzle so that a vacuum condition is created in the mixing chamber as the dry material passes therethrough. The inner end of the bore 28 is preferably flared as at 29.

A conduit 30 for water or for a chemical solution under pressure communicates with the periphery of the mixing chamber 22, there being a liquid control valve 31 in said conduit. Slidable transversely of the injector housing through slots 32 is a slide valve 33 having an opening 34. The slide valve is movable against the outer end of the inner nozzle 15, and serves to control the discharge of dry material therefrom. The ends of the slide valve may be equipped with suitable stops 35 and 36. When the stop 35 is in engagement with the top of the injector housing, then the valve opening 34 is in registration with the orifice 20, and permits the discharge of dry material. When the stop 36 is in engagement with the lower side of the injector housing, then the discharge of material is shut off.

In the modified form of the invention illustrated in Fig. 4, the parts 8', 9', 10', 11', 12', 13', 14', 15', 17', 18', 19', and 20', correspond in construction and function to the unprimed parts having corresponding numerals in the form of the invention in Fig. 1 and will not be again described in detail.

In this modification, however, the injector housing, designated by the numeral 37, is of increased length and surrounds the entire inner nozzle portion. The inner end of the injector housing 37 is in the form of a nut, as at 38, to hold the parts in assembled position on the sleeve 10'. The outer end of the injector housing is threaded as at 39 to receive a coupling nut 40. The latter serves to removably connect the outer nozzle 41 to the outer end of the injector housing 37, there being a rubber gasket 42 at the joint.

A pipe 30', corresponding to the pipe 30 of the form of the invention of Fig. 1, which is similarly equipped with a valve, such as the valve 31 of Fig. 1, is adapted to discharge liquid into a chamber 43 surrounding the exterior of the nozzle 15'. This chamber is of larger diameter than the external diameter of the inner nozzle. The outer end of the chamber 43 is connected by a tapered offset 44 with a discharge orifice 45 of smaller diameter, there being a mixing chamber portion 46 in front of the outer end of the inner nozzle 15'.

Dry material which is discharged from the orifice 20' entrains liquid from the annular chamber 43 into the mixing chamber, and the mixture is directed into a flared inner end portion 47 of the bore of the outer nozzle. It is to be noted that the end of the flared bore portion 47 is of substantially larger diameter than the adjacent outlet end of the duct 20' of the inner nozzle. The mixture from the flared bore portion 47 is directed outwardly into and through a straight discharge bore 48 of the outer nozzle.

Fig. 6 illustrates a typical hookup of a gun with mechanism for supplying abrasive material and compressed air. Referring to said figure, the numeral 49 designates a hopper for the dry material, and the numeral 50 is a conduit for supplying compressed air. The compressed air conduit has a branch line 51 which communicates with the interior of the hopper, and there are valves 52 and 53 on each side of said branch line. When the valve 54 at the bottom of the hopper is

4

opened, the compressed air and gravity will force dry material from the hopper into a chamber 55. Compressed air from the line 56 will pick up said material and convey it through the hose 8 to one of the guns heretofore described. A manual valve 57 may control the admission of the dry blast into the hose 8.

From the above description it is apparent that, in both forms of the gun, the dry material is discharged from a relatively small orifice of an inner nozzle toward a relatively large opening of an outer nozzle, there being a space between the adjacent ends of the two nozzles where the sand or other dry material effectively entrains liquid into the moving stream in a manner as to produce an excellent mixture. By having the dry material pass through the inner nozzle, the control valve 31 for the liquid may be shut off whenever desired to permit the discharge of dry material only. Furthermore, in the form of the invention of Fig. 1, by loosening the set screw 23, the gun may be quickly converted into a dry blast device. The same object may be accomplished by removing the outer nozzle 41 from the structure of Fig. 4. In the form of the invention of Fig. 1, the slide valve 33 provides for convenient manual control of the dry material at the nozzle.

Various changes and modifications may be made without departing from the spirit of the invention, and all of such changes are contemplated as may come within the scope of the claims.

What I claim is:

1. A gun for blasting and spraying, comprising an inner nozzle having a duct therein, means for supplying dry material under pressure to the duct of said inner nozzle, an outer nozzle having a duct communicating with its inner end, means connecting the inner end of said outer nozzle adjacent the outer end of said inner nozzle with a space between said adjacent nozzle ends, means for admitting liquid to said space, and a valve on said gun positioned to coat with the duct of the inner nozzle for controlling the flow of material from the inner nozzle to said space.

2. A gun for blasting and spraying, comprising an inner nozzle having a duct therein, means for supplying dry material under pressure to the duct of said inner nozzle, an outer nozzle having a duct communicating with its inner end, means connecting the inner end of said outer nozzle adjacent the outer end of said inner nozzle with a space between said adjacent nozzle ends, means for admitting liquid to said space, and a slide valve operable in said space adjacent the outer end of the inner nozzle for controlling the flow of material from said end.

3. A gun for blasting and spraying comprising an inner nozzle having a duct therein, means for supplying a dry material under pressure to the duct of said inner nozzle, an outer nozzle having a duct communicating with its inner end, means connecting the inner end of said outer nozzle adjacent the outer end of said inner nozzle with a space between said adjacent nozzle ends, means for admitting liquid to said space, and a valve on said gun positioned for quick manipulation by the operator while holding the gun for controlling the flow of dry material from the inner nozzle.

4. A gun for blasting and spraying, comprising an inner nozzle having a duct therein, means for supplying dry material under pressure to the duct of said inner nozzle, an outer nozzle having a duct communicating with its inner end, means



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5

connecting the inner end of said outer nozzle adjacent the outer end of said inner nozzle with a space between said adjacent nozzle ends, means for admitting liquid to said space, and a valve operable in said space adjacent the outer end of the inner nozzle for controlling the flow of material from said end.

5. A gun for blasting and spraying comprising an inner nozzle having a duct therein, means for connecting the inner end of said inner nozzle to a source of supply for one blasting material; an outer nozzle assembly including an outer nozzle having a duct communicating with its inner end, a tubular connection member secured to the outer nozzle and having a chamber therein 10 communicating with the inner end of the outer

5

6

nozzle, and said outer nozzle assembly also including a conduit projecting laterally therefrom for supplying a second blasting material to said chamber; and means including laterally projecting cooperating members on the inner end of the connection member and outer end of the inner nozzle providing a quickly detachable connection between said connection member and the outer end of the inner nozzle with a mixing space between said adjacent nozzle ends and communicating with the connection member chamber whereby the outer nozzle assembly may be quickly detached as a unit to permit use of the inner nozzle alone.

RICHARD RUEMELIN.