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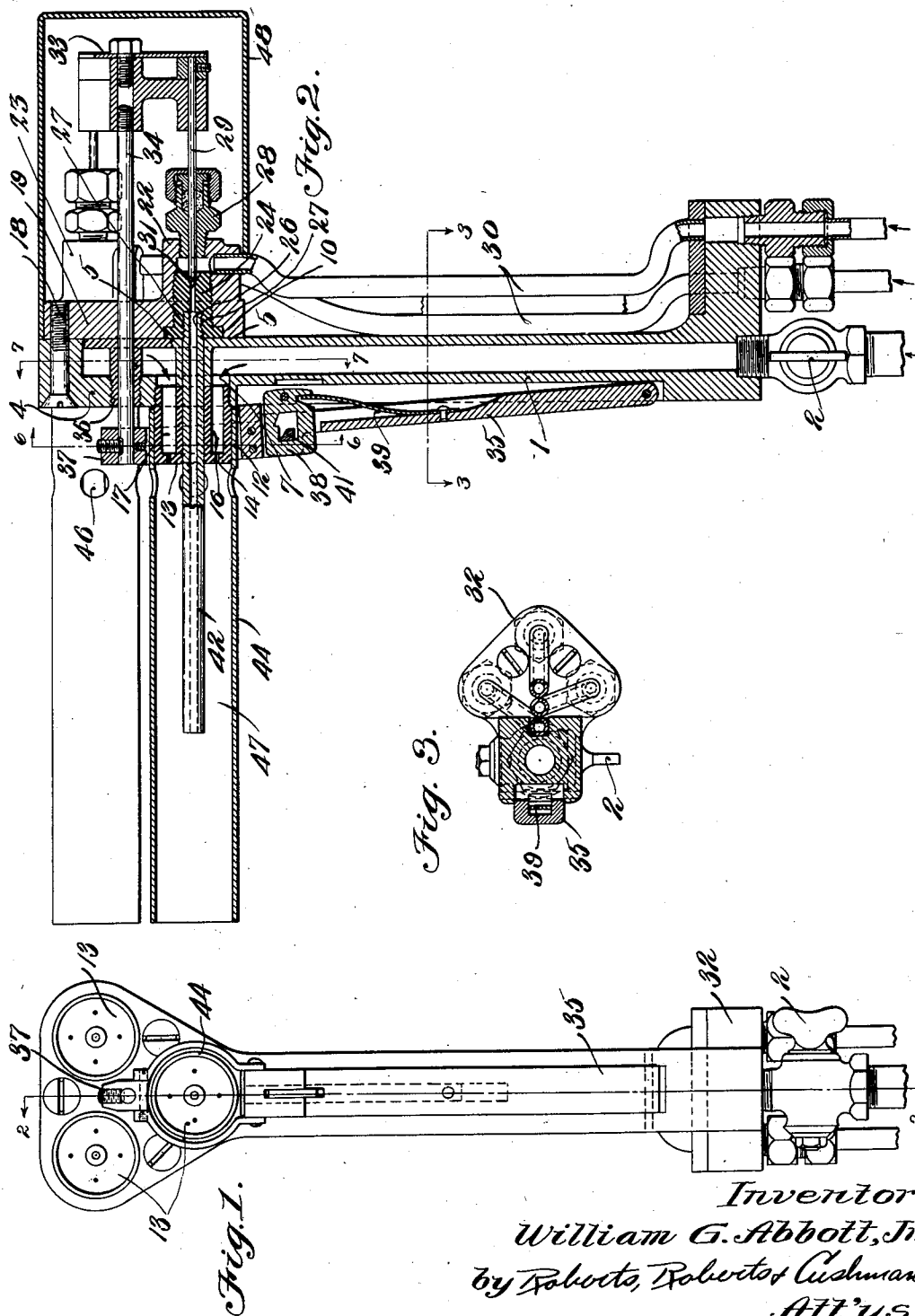
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W. G. ABBOTT, JR

PAINT SPRAYER

Filed Nov. 23, 1923

2 Sheets-Sheet 1



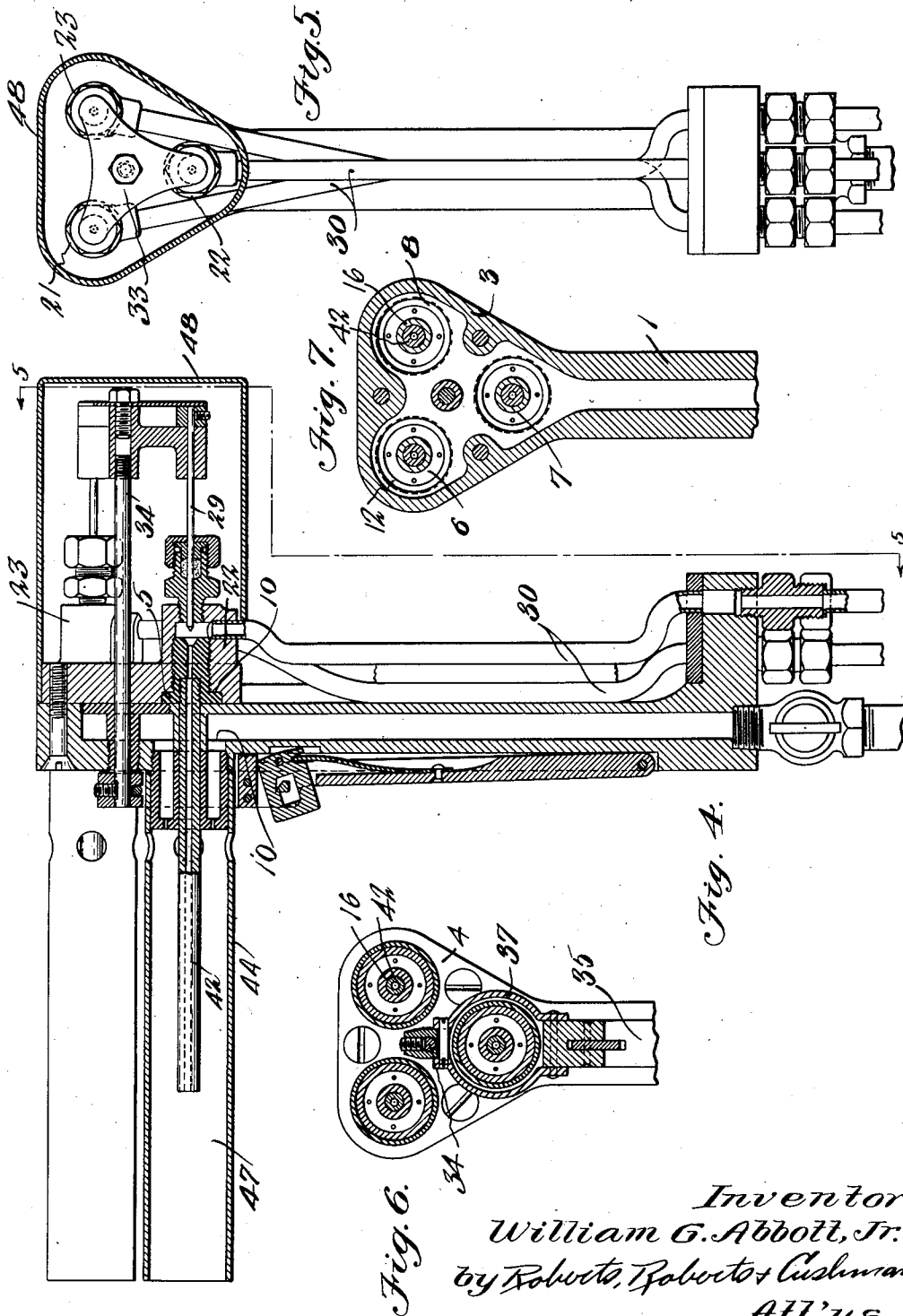
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UNITED STATES PATENT OFFICE.

WILLIAM G. ABBOTT, JR., OF WILTON, NEW HAMPSHIRE.

PAINT SPRAYER.

Application filed November 23, 1923. Serial No. 676,539.

To all whom it may concern:

Be it known that I, WILLIAM G. ABBOTT, Jr., a citizen of the United States of America, and resident of Wilton, in the county of Hillsborough and State of New Hampshire, have invented new and useful Improvements in Paint Sprayers, of which the following is a specification.

This invention relates to liquid spraying devices, such as paint sprayers and the like.

In the reduction of liquids to a finely divided spray, or so-called atomized condition, by means of the various spraying devices at present employed for this purpose, numerous difficulties and limitations are encountered. Among others may be mentioned as of outstanding importance, the clogging of the tubes through which the liquid is supplied, the incomplete formation of a spray and the lack of control of the liquid if it is too finely divided and forms a mist. Present devices also involve the use of high pressures and are controlled solely by varying the degrees of pressure used in supplying the liquid and air to the atomizer, and such control is not reliable.

It is accordingly an object of this invention to provide a device which will overcome such difficulties and which will control the rate and manner in which the liquid is subdivided and the direction of the spray produced. It is a further object to avoid repeated adjustments during operation and to standardize the apparatus and its requirements for liquid and air supply. Other objects of the invention will appear from the following disclosure.

The invention comprises a device in which a relatively rapid but low-pressure stream of gas such as compressed air is provided, into which a second stream of gas at lower pressure, such as atmospheric air, is allowed to enter upon the well-known Bunsen burner principle and a jet of the fluid to be divided or atomized is introduced into the combined stream of gas, in the same direction and preferably concentrically thereof.

The invention also includes the independent control of the air streams, and a continued regulation of the liquid jet corresponding to its particular characteristics and the type of spray desired.

Other important features of the inven-

tion will be apparent from the following description and from the appended claims.

A preferred embodiment of the invention will be described as adapted to a paint spraying device, which is typical of its practical application, and is illustrated by the accompanying drawings:

Fig. 1 is an end view of a multiple tube sprayer:

Fig. 2 is a vertical longitudinal section on the line 2—2 of Fig. 1:

Fig. 3 is a section on the line 3—3 of Fig. 2:

Fig. 4 is the same as Fig. 2 with the paint supply valves in open position:

Fig. 5 is a vertical section and rear end view of the sprayer:

Fig. 6 is a section on the line 6—6 of Fig. 2: and

Fig. 7 is a section on the line 7—7 of Fig. 2.

Referring to Fig. 2, the device shown consists of a pipe 1, connected at one end to a source of compressed air through the stop cock 2, pipes 30 connected to a supply of paint under pressure, and discharge tubes 42 through which the spray of paint may be directed. Pipes 1 and 30 serve as a handle for the sprayer.

At its upper end tube 1 expands into a triangular chamber 3 (see Fig. 7) having parallel walls 4 and 5. Passing through the wall 4 are three openings 6, 7, 8, evenly spaced apart. Each of said openings is adapted to receive one end of a threaded tube or nipple 12, its opposite end being closed by an annular disc 13 having orifices 14 therein and a central opening in which is fixed a smaller tube 16 concentric with tube 12. Between tube 12 and tube 16 there is thus formed an annular passage 17 having the apertures 14 leading from it at one end and connecting with chamber 3 at the other.

Opposite the openings 6, 7 and 8 apertures are provided in the wall 5 concentric respectively with openings in bosses 21, 22 and 23 formed in the plate 19 which is fastened to the outer side of the wall 5 by screws 18 passing through the wall 4. Into each opening there is tapped a hollow bushing 24 having a passageway 26 there-through, threaded at one end 27 and formed into a valve seat 31 at the other. Rear-

wardly of said bushing is a second hollow bushing 28 tapped therein and serving as a sleeve for a needle valve 29, extending therethrough. A fluid supply pipe or duct 5 30 leads into each of the openings at a point intermediate said bushings and lies parallel to the compressed air pipe or duct 1, being secured thereto by a collar 32.

The three needle valves 29 are mounted 10 at their outer ends on triangular spider 33, and a rod 34 which is fixed upon the center of the spider passes through the plate 19, through bushing 36 in walls 5 and 4, and connects at its opposite end with a ring 37 pivoted to the free end of a lever 15 35 which is pivoted at its opposite end to the collar 32 on the handle. A catch 38 engages one end of a spring 39, the other end of which is fastened to lever 35, and is also adapted to engage the lug 41 upon said lever. 20

A small tube or nozzle 42 of such exterior diameter as to just pass through the inner tube 16 is inserted therein and 25 threaded into the end 27 of the corresponding bushing 24 on the opposite side of chamber 3, thus connecting with passageway 26 therein.

Tightly fitting over the projecting ends 30 of each tube 12 there is provided an open tube 44, which has an annular row of holes 46 therein adjacent its connection with said tube 12. The tube 44 projects beyond the outlet end of tube 42, and forms a comparatively wide annular space 47 therebetween. Surrounding triangular plate or head 19 and covering spider 33 is provided a casing 48. 35

In operating the device for spraying 40 paint a current of air is supplied to the apparatus through stop cock 2 in regulated amount and a stream of paint or other liquid is supplied through one or more of the tubes 30, as desired.

The current of air passes up through tube 45 1, through chamber 3, through annular passage 17 and out through the orifices 14. In passing through apertures 14 the air streams tend to continue parallel with the tube, and in passing by the holes 46 create a partial vacuum or suction therethrough, thus drawing in a greatly increased volume of air. The combined currents pass through the annular opening 47, by the end of tube 42, 50 and thence out of tube 44.

The paint or other liquid which is to be sprayed is supplied through tubes 30, and may be under low or high pressure as desired. It is preferably free from lumps, 60 but the fine state of sub-division ordinarily required in such apparatus is not essential to successful operation.

By grasping as a handle the pipes 1 and 65 30 and lever 35, the latter is pressed inwardly forcing back ring 37, rod 34 and

spider 33, thus drawing needle valves 29 from their valve seats 31. This permits the fluid to flow through pipe 30, passage 26, tube 42, and out through the tube 44. Here it encounters the combined currents of gas 70 or air from apertures 14 and through the holes 46 which, on account of their greater speed, flick the liquid stream away from its outlet and divide it into a spray of minute droplets or into a stream of relatively large globules as desired and as determined by the conditions provided. In passing through 75 pipe 44 this spray is confined so that the drops follow more or less parallel paths, and upon leaving the sprayer, the paint does not spread and may be directed accurately upon the article being coated. 80

While painting, lug 38 may engage the catch 41 and hold it in position without requiring the operator to exert extra effort 85 to hold it there. When the flow of paint is to be stopped, catch 41 is lifted and spring 39 throws lever 35 outwardly thus drawing spider 33 forward and forcing needle valves 29 against valve seats 31, as in Fig. 90 2.

In using materials having low viscosity a tube 42 will be selected which has a small passageway or capillary. If the fluid has 95 extremely high capillarity the length of tube 42 may be also be advantageously increased. The decrease of the bore and increase in length of the tube will effectively reduce the rate of flow of such fluids. On the other hand, if the paint is heavy or contains sizable particles of solid pigments 100 a tube 42 having a large bore will be employed. In such cases, tube 42 may also be shortened in length. The resistance to flow is thereby diminished, and the rate at which the paint leaves the tube will be 105 accordingly increased. To provide such variations a series of tubes 42 will be used having equal outside diameters, but of varying internal dimensions and lengths to correspond with the characteristics of the various fluids and other conditions of operation (such as air pressure available, temperature ranges, etc.). 110

It will be apparent that this invention 115 provides a device which is adaptable to the spraying of various kinds of fluids having a wide range of characteristics and may be applied under numerous conditions of use. The fluid need not necessarily be a limpid liquid or solution, nor carefully separated from solid particles, as is essential with other types of such apparatus now in use 120 in order to avoid clogging. Small apertures in the supply means are eliminated, and any tendency to clog, as by thickening or oxidation of the fluid, is overcome by the accumulated effect of the pressure under which it is supplied. Owing to the uniform and relatively large passageways 125 130

employed a low pressure is sufficient to keep them clear. Hence frequent adjustments of the degree of air pressure are avoided, as well as the frequent clearing out of the supply tubes.

A comparatively low pressure is sufficient to furnish the air stream required for this device and may be provided by a small motor-driven blower of the fan type attached thereto.

The aspirated air from the atmosphere swells the volume and greatly increases the effectiveness with which the air current contacts with the jet of liquid. A mist may be produced if desired, but it will be surrounded and directed by the annular stream of air, which restrains it from promiscuous scattering and the formation of floating mists.

By proper selection of the length and bore of the supply tubes employed and preliminary adjustment of the pressure upon the air and liquid supply, further regulation is not necessary so long as the same liquid is being used and the same type of spray is desired.

In order to vary the degree of spread of the spray the distance between the outlet ends of tubes 42 and 44 may be varied, the spread increasing as the distance decreases. This variation is preferably effected by varying the length of tube 44 as, for example, interchanging the tube with a tube of different length.

Among the advantages incident to a plurality of nozzles grouped together is the advantage of separately spraying different liquids and then mixing the sprays. For example, in "spotting" terra cotta and other wares different colors may be supplied to the respective nozzles thereby affording unique decorative effects.

I claim:

1. Apparatus for spraying paint comprising an air nozzle having a cylindrical bore, a paint nozzle extending axially through said bore and terminating at a point substantially in rear of the forward end of said air nozzle, and supporting means for said nozzles whereby one nozzle may be removed independently of the other, said air nozzle having an opening remote from the outer end of said paint nozzle to permit atmospheric air to be drawn through the air nozzle by the stream of air flowing there-through.

2. Apparatus for spraying paint or the like comprising an approximately cylindrical

air nozzle, means for flowing a stream of air through the nozzle, and means for introducing paint under pressure into the said stream at a point near the center of the stream and remote from the forward end of the nozzle, said air nozzle having an opening in the rear of said point to admit air under atmospheric pressure.

3. Apparatus for spraying paint or the like comprising an air nozzle, a paint nozzle extending along the axis of the air nozzle in the rearward end thereof, means for flowing a stream of air through said air nozzle, a pressure tank and connections from the tank to the paint nozzle for feeding paint under pressure into said stream, said air nozzle having openings distributed around said paint nozzle to admit air under lower pressure.

4. A paint spraying device or the like, comprising a tube having a closed end, an annular row of air inlets disposed in the closed end, a fluid supply nozzle mounted concentrically in the closed end and projecting into the tube, and apertures in the tube intermediate the air inlets and the outlet of said nozzle.

5. A paint spraying device or the like comprising a tube having a closed end, an annular row of orifices disposed in said closed end and connected with a source of compressed air and a nozzle connected with a supply of fluid under pressure, mounted in the closed end of said tube and projecting concentrically thereinto.

6. A paint sprayer device or the like, comprising a tube having one end closed, an annular row of orifices disposed in said closed end and connected with a source of compressed air, a nozzle mounted in the closed end projecting concentrically into the tube and connected with a supply of paint under pressure, and apertures in said tube intermediate the closed end thereof and the projecting end of said nozzle.

7. Apparatus for spraying paint and the like comprising a tube having a closed end, a plurality of air inlets being disposed in said closed end, a fluid supply nozzle projecting into said tube substantially in rear of the outer end thereof and detachably supported in said closed end so that the nozzle may be removed from the outer end of said tube, and apertures in the tube intermediate the air inlets and the outlet of said nozzles.

Signed by me at Wilton, N. H., this twentieth day of November, 1923.

WILLIAM G. ABBOTT, JR.