April 30, 1946. J. W. RASMUSSEN 2,399,385

SANDBLASTING APPARATUS AND THE LIKE

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Fig. 1.

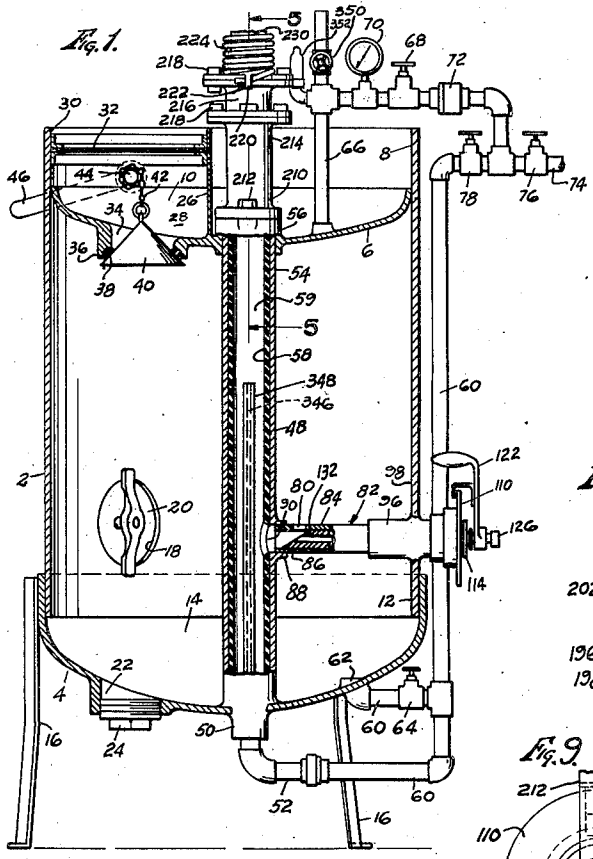


Fig. 5.

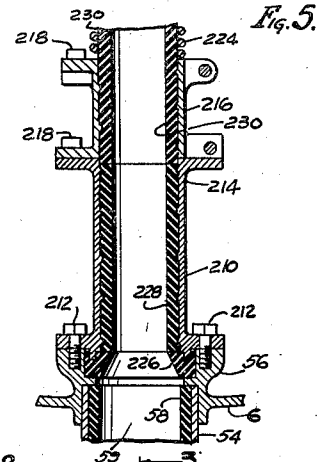


Fig. 2.

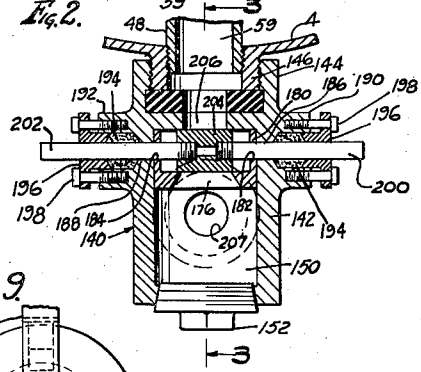


Fig. 9.

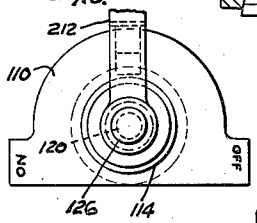


Fig. 7.

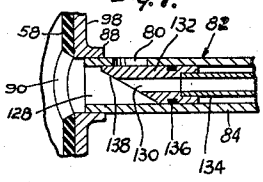


Fig. 8.

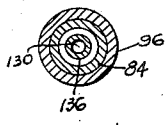


Fig. 6.

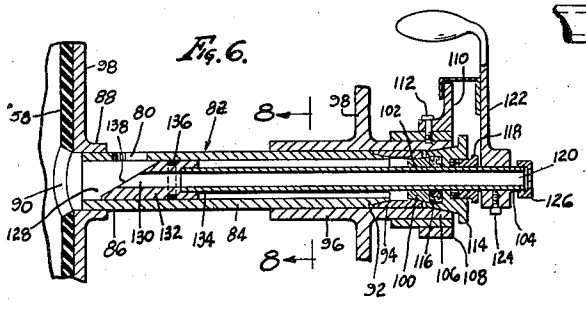
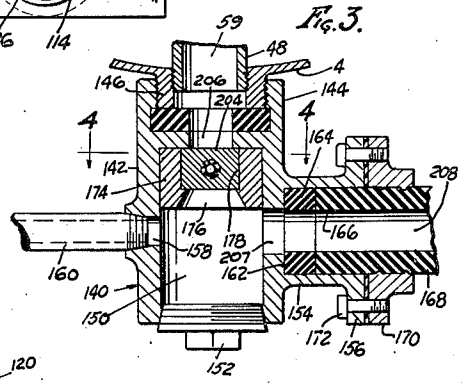


Fig. 3.



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Fig. 1.

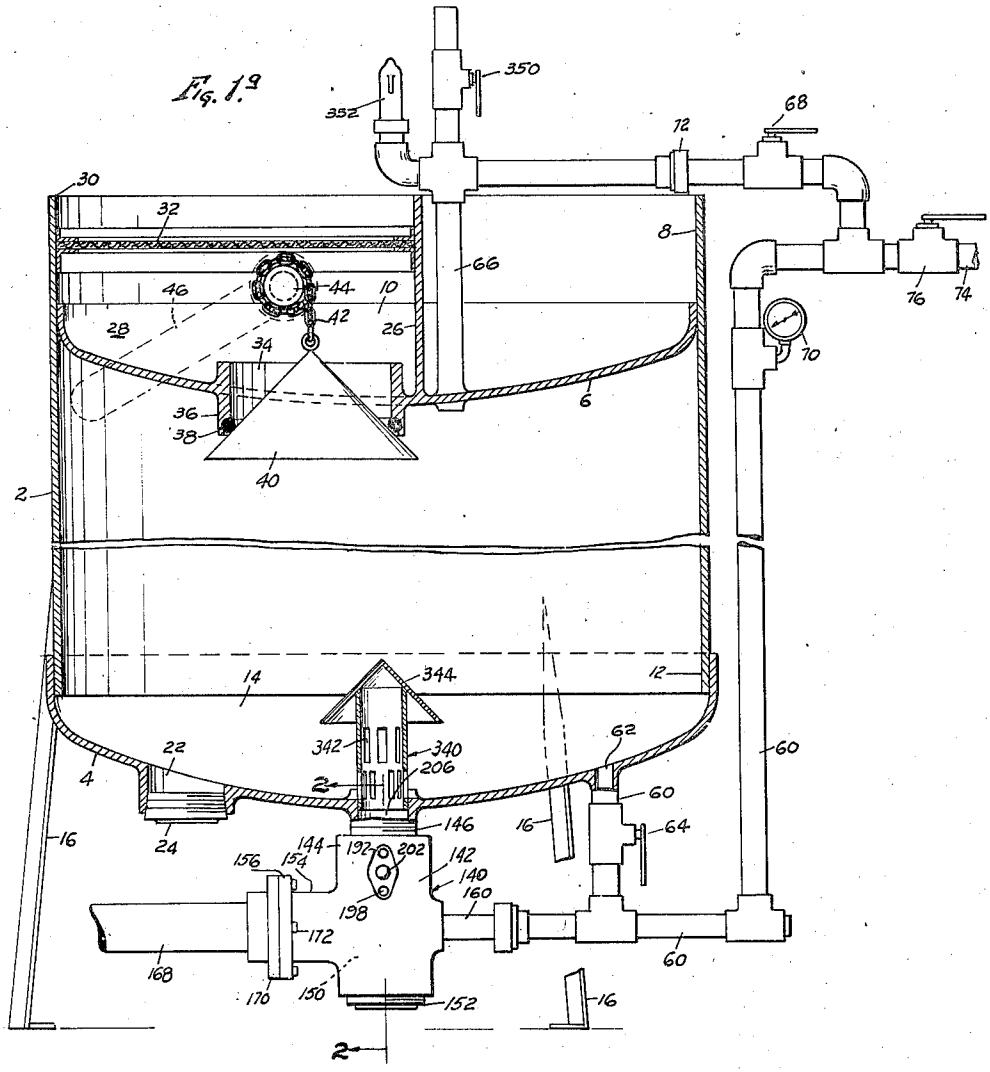
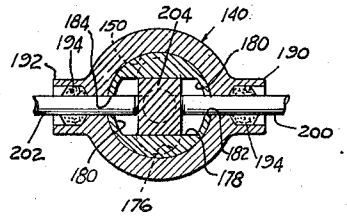


Fig. 4.



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Fig. 10.

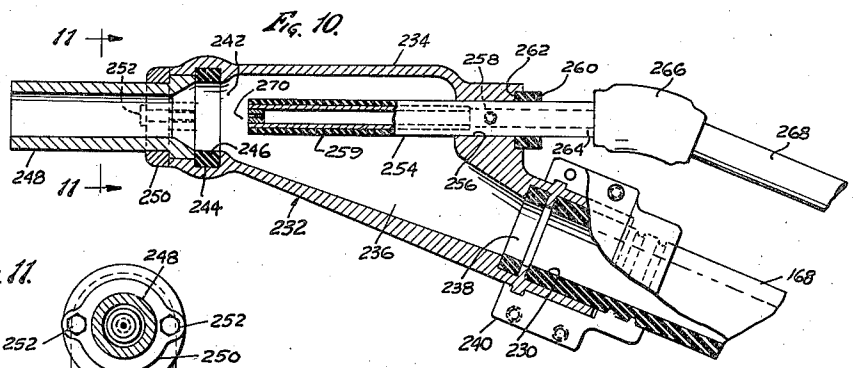


Fig. 11.

Fig. 12.

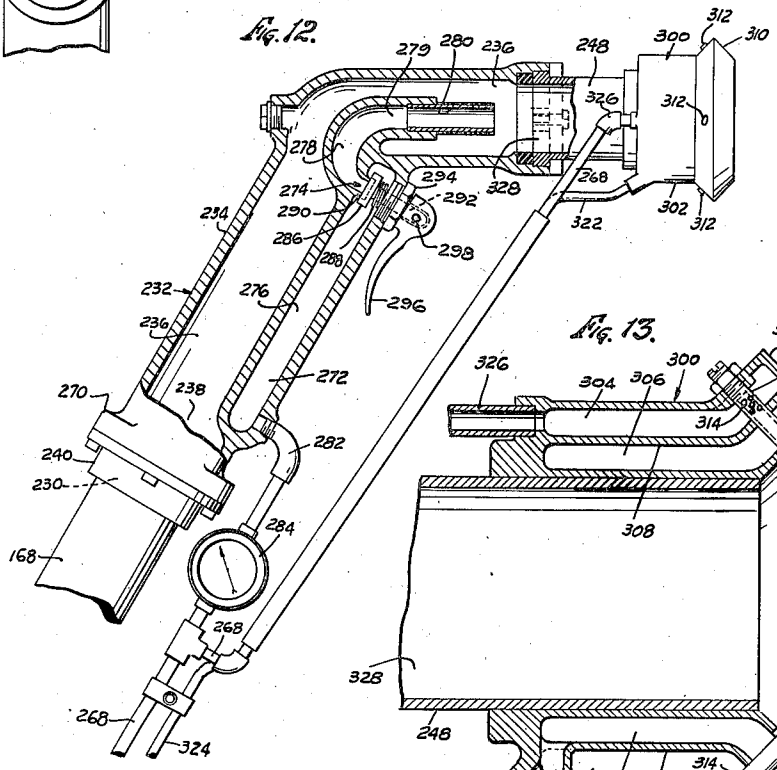


Fig. 13.

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Patented Apr. 30, 1946 2,399,385

UNITED STATES PATENT OFFICE

2,399,385

SANDBLASTING APPARATUS AND THE LIKE

James William Rasmussen, Los Angeles, Calif.

Application May 2, 1944, Serial No. 533,671

4 Claims. (Cl. 51—12)

My invention relates to sand blasting machines and apparatus and more particularly to the construction and operation of the sand blasting equipment, including its controls and regulators, which are especially adapted for controlling and for directing the flow of fluids, of sand and air, in a suitably combined form when passing through said apparatus and for directing the fluid blasting force, in a volume, velocity and the intensity of force, during the sand blasting operation.

Accordingly, an object of my invention is to provide a simple and an inexpensive sand blasting apparatus, which is so constructed and arranged, whereby a required volume of sand, or other suitable material, such as abrasive or steel shots, or a combination of suitable insulating material, such as a granulated cork or the like, may be suitably mixed and then be applied with sufficient force upon the surface or surfaces, requiring such treatment.

Another object of my invention is to provide a suitable tank means which is adapted for receiving and for holding therein a quantity of sand or of other suitable material which may be most adaptable for application by means of blast, said tank means having a suitably arranged sand loading means, and also having means for cleaning same, further, said tank means having a central passage means, which is at its bottom section, said central passage means is connected with an air inlet pipe means and in close proximity thereabove a suitable sand in-flow controlling valve means is connected, which is controllable from the outside of said valve means for regulating the volume of sand passing therethrough and into said central passage means, and in addition said central passage means, at its side section, is connected with a flexible tube, the end of which is provided with a nozzle means, which is adapted for directing and for controlling the sand blast operation.

A further object of my invention is to provide said tank means with a set of inlet air controlling means, which provide the air, at a required pressure, into said tank means and also to provide means for blowing said sand from the reservoir thereof into the central tubular means and while the amount of said sand passing into said central passage means is controlled and regulated by means of the in-flow controlling valve, in volume as may be required.

Another object of my invention is to provide said nozzle means with a suitable fluid mixing chamber means which is provided with a passage and terminates with a discharge nozzle tube, also, internally, said chamber means, in close proximity to said passage has an air delivery tube means which is adjustably positioned therein and which supplies a volume of air therein, at a pressure which may be suitable for mixing said incoming sand and fluid within said mixing chamber means, and thereby providing a blast of a sand and fluid mixture which is directed into and for passing out of said discharge nozzle of the apparatus.

A further object of my invention is to provide said device with a suitable shell member having a fluid mixing chamber therein, also, having a nozzle connected to its discharge end and terminating with a fluid mixing and spraying means, and in addition having said shell member and said fluid mixing and spraying means connected with a set of fluid directing pipes, each of which is provided with a suitable regulating valve for regulating the flow of the fluid and mixture during their passage therethrough and for regulating the force and the impact of said fluid combination while emerging out of the nozzle.

Other and further objects and advantages of my invention as will hereinafter more fully appear, I attain by the construction herein described in the specification and illustrated in the drawings, forming a part of my application.

Reference is had to the accompanying drawings, in which the similar reference characters denote the similar parts.

In the drawings:

Fig. 1 is the vertical cross sectional view of the sand blasting tank, showing its internal construction.

Fig. 1ª is a fragmentary, vertical sectional view of the sand blasting apparatus, showing same in a modified form.

Fig. 2 is the vertical sectional view of the air inlet valve taken on the line 2—2 of the Fig. 1ª.

Fig. 3 is another sectional view of the air inlet valve, taken on the line 3—3 of the Fig. 2.

Fig. 4 is the fragmentary horizontal and sectional view of the valve, taken on the line 4—4 of the Fig. 3.

Fig. 5 is the vertical cross-sectional view of the discharge passage coupling, taken on the line 5—5 of the Fig. 1.

Fig. 6 is the longitudinally vertical and sectional view of the sand flow control valve, shown in similar position as illustrated in Fig. 1, showing the valve in its operating position.

Fig. 7 is the fragmentary sectional view of the

sand flow control valve, showing said valve closed and in its inoperative position.

Fig. 8 shows the sectional view of the valve, taken on the line 8—8 of the Fig. 6.

Fig. 9 shows the fragmentary front elevational view of the hand lever and the indicating plate, of the sand flow control valve.

Fig. 10 is the longitudinal sectional view of the sand blasting nozzle.

Fig. 11 is the vertical sectional view of the nozzle, taken on the line 11—11 of the Fig. 10.

Fig. 12 is the fragmentary elevational and sectional view of a nozzle, showing same in a modified form.

Fig. 13 shows the enlarged sectional view of the nozzle discharge end, taken from Fig. 12 and disclosing its construction.

Describing my invention more in detail, in its broader aspects, said invention comprises a tank 2 having a bottom end 4 and an inverted top end 6, of which, said top end 6 is set slightly below the tank rim section 8 for providing a reservoir 10, while said bottom end 4 is disposed outwardly from the tank edge 12 and thus forming a reservoir 14 within said tank structure.

In order to hold said tank 2 in its preferred upright position, suitable leg members 16 are provided at the tank bottom section, as shown.

Also, said tank 2 is provided with a man-hole 18 at its side and close to the bottom end 4, which is inclosed by means of a man-hole cover 20, and in addition, said tank 2 is provided with a comparatively large passage 22 which is enclosed by means of a suitable plug member 24, so that said tank 2 may be readily inspected and cleaned, when need be.

The top end 6 of said tank 2 is provided with a divisional plate 26 which divides said reservoir 10, of which, the sub-section 28 at its topmost edge 30 is provided with a perforated plate or screen 32, thus providing suitable means for screening the sand or any other material before it is poured in and through the passage 34 for depositing same within the tank reservoir 14, then, in order to hold the pressure within said tank 2, the edge section 36 of said passage 34 is provided with a suitable gasket member 38 against which a cone shaped cover member 40 is placed and which is held in position by means of a chain member 42 having its end connected and fastened to a cross-shaft member 44 to which an operating lever member 46 is attached as shown.

Said tank 2, at its nearly central position, is provided with an upright pipe 48, the lower end of which is attached to the pipe housing 50 and the bottom air inlet pipe member 52, while the upper end 54 of said pipe 48 is disposed within a pipe housing member 56 which is, substantially, a part of said inverted top end 6 of said tank 2.

In order to eliminate and to prevent the dragging of the passing sand or abrasives and to prevent the wear of said pipe 48, its entire internal surface is provided with a suitable internal liner 58, which in its preferred form is made out of suitable resilient or elastic material, and thus providing a passage 59 the purpose of which will be presently described.

In order to keep said sand element, within said tank reservoir 14 at a constant motion, said tank 2 is provided with an air inlet pipe 60, which has an air inlet member 62 connected to the tank bottom end 4 and also having a suitable valve 64 adapted for controlling an air volume passing therethrough, while the top end 6 of said tank 2 is provided with a pipe connection 66 including an air pressure valve 68 and a gauge 70 which connect through a coupling 72 leading to the main air line 74.

The volume and the velocity of air, at a given pressure and passing into said tank 2, is controlled by means of a main valve 76 which connects with said air pipe line 74 and also an auxiliary valve 78 which controls the volume of air passing into said inlet pipe 60, and thereby supplying sufficient air pressure into said tank 2, so that the sand element may pass through the passage 80 carrying with it and therethrough a volume of sand with air into the passage 59, the amount of which is controlled by means of the sand control valve member 82.

Said sand control valve member 82 comprises an extension tube 84, which is provided with said passage 80 and one end of which, as at 86 is disposed within a collar 88 provided at the side section of said upright pipe 48, at which point, said liner 58 is provided with an opening or passage 90 for allowing the sand to pass therethrough and into the passage 59, hereinbefore named.

The other end 92 of said tube 84 is provided with a suitable union member 94 which is fitted into the inside diameter of the valve guide member or tubing 96 which is disposed within the wall 98 of said tank 2 while the end of said union member 94 is enclosed by means of a suitable plug member 100, the purpose of which will be presently described.

The outer end of said plug member 100 is provided with a hole 102 adapted for receiving and holding therein a section of the valve control tubing member 104.

The end section 106 of said valve guide tube 96 is provided with a casing member 108 to which the valve indicating plate 110 is attached and which also provide means for connecting said casing member 108 to said guide tube 96 by means of screws 112.

Said outer end 106 of said guide tube 96 is also provided with an end plug 114 which is provided with a packing recess and a suitable packing 116, and, if so desired, another packing gland 118 may be provided in said unit for insuring the safety and positiveness of performance of the apparatus.

The extended end 120 of said control tube member 104 is provided with a control valve lever 122 which is held in place by means of screws 124, while said tube member 104, at its end, is provided with a suitable pipe cap 126, so that said tube member 104 may be cleaned at the passage 120 including at the opening 130, which is positioned within the rotary in-flow valve member 132, and which is attached to the end 134 of said tube member 104.

Said rotary in-flow valve member 132 is provided with a suitable packing 136 and an angularly disposed feed surface 138, the angle of which extends partially the length of said valve, and which is used for restricting the opening of said passage 80 by turning the valve lever 122 in the direction desired, so that a variable flow of sand and air may pass into the passage 120 and through the opening 90, said flow thereafter passing into and through the pipe member 48, as shown in Fig. 6, or causing it to close the passage entirely, as shown in Fig. 7.

Also, in order to stir the passing sand upwardly from the bottom of said reservoir 14, a suitable air inlet member 62 is provided, to the end that said sand may be very readily picked up and carried by the air current and directed through the

passage 80, thus passing by the control valve 82 and into said passage 59.

As shown in Fig. 1a, said tank 2 is provided with a sand flow control valve 140, which comprises a housing 142 and of which, its top section 144 is attached to a pipe member 146 which is made substantially a part of said tank 2 at the tank bottom end 4.

Said housing 142 extends downwardly for forming a chamber 150 of which, its bottom section is provided with a plug 152 and at one of its sides it is provided with an air outlet section 154 which terminates with a flange 156, while its opposite side section is provided with a suitable hole 158 wherein an air inlet pipe 160 is positioned.

Said hole 158 is also used for lining up said housing 142 when boring the recess 162 adapted for receiving therein a suitable resilient pad member 164. Said pad member 164 in its preferred form is made out of suitable resilient material, such as rubber or the like, and is also adapted for providing an abutment for the end section 166 of the discharge hose member 168, the end of which is held in place by means of a suitable flange 170 having a set of screws or other suitable fastenings 172 provided therein for holding it against the housing flange 156.

Within said chamber 150 a suitable shoe member 174 is positioned, which is provided with an air passage 176 and a groove 178, thus providing a pair of side flanges 180, see Fig. 2, which extend upwardly and through which the holes 182 and 184 are drilled.

Said holes 182 and 184 being in line with holes 186 and 188 which are disposed within the side bosses 190 and 192 respectively, each of which is provided with a packing recess wherein a suitable packing 194 is placed and which are held in place by means of a suitable packing gland 196 and by means of screws 198, as shown.

Within said holes of said packing glands 196 including said holes 186 and 188 disposed in said housing 142 and the holes 182 and 184 of said shoe member 174, suitable rod members 200 and 202 are slidably positioned, of which, one end thereof is screwed in place and within the respective sides of the valve block 204, which is slidably disposed within said groove 178, while said rods 200 and 202 extend outwardly from said housing 142, so that when said valve block 204 is in its central position it will close the passage 206 which leads into the passage 207 and thereby controlling the flow of sand which is picked up by means of the air passing from said air inlet pipe 160 and through the passage 208 of the discharge hose member 168, during the operation of the apparatus, and it may be noted, that in operation, the position of said valve block 204 may be so arranged and adjusted, whereby the bridging of the sand may be prevented and entirely eliminated.

Within said tank 2 said pipe member 146 is provided with a nipple 340 having a plurality of holes or slots 342 provided therein and having its top section provided with a conical hood member 344, which is for preventing the sand from accumulating in and around said pipe member 146, and in addition, its purpose is for causing the sand particles to be segregated into light and easy flow of sand at all times and while passing into the opening or passage 206 of the control valve 140.

The discharge end of said pipe housing 56, see Fig. 1, is provided with an extension 210, one end of which is connected to the pipe housing 56 and is held in place by means of screws 212 while its upper end 214 is provided with a connection 216 having a set of bolts 218 adapted for holding it in place, as shown, and also having a suitable loop member 220 adapted for receiving and for holding in place the end section 222 of the spring housing member 224.

Internally within said discharge connection 210 is placed a cushioning member 226 which lies against the internal liner 228 as shown in Fig. 5, while the connection 216 holds the end of the discharge hose 230, the length of which may be to suit any desired purpose as in practice may be most desirable and the end of which terminates with a nozzle or a gun spray member 232.

It may be noted that the supply of air into said pipe 52 may be provided through a suitable piping 14, which may come from a suitable accumulator or a compressor, and that the pipe 48 including the discharge extension 210, and the pipe 160 interconnecting the discharge hose member 168 may be of any desired size and area, as in practice may be most desirable for securing the best results.

The discharge nozzle 232 comprises a housing member 234 which is provided with a suitable mixing chamber 236 having an inlet passage 238 which connects with the end of the discharge hose 230, wherein it is held in place by means of clamping member 240, also, having the discharge end 242 provided with a suitable recess 244 wherein a resilient member 246 is placed, against which the nozzle extension 248 is held and fastened in its position by means of a collar 250 and a set of screws 252.

Directly in line and rearwardly within said mixing chamber 236 an extensible tubing member 254 is placed which is fitted snugly within the hole 256 of said housing 234, wherein it is adjustably positioned and held in place by means of a set screw 258, while the outside section of said tubing member 254, so disposed within said mixing chamber 236, is entirely covered with a resilient covering or rubber tube 259 so as to prevent the wear of said tubing member 254 during the operation of the apparatus.

Also, for preventing the air, when under pressure, from escaping out of said mixing chamber 236, said tubing member 254 is provided with a resilient collar 260, one side of which is fitted into the recess 262, as shown, and thereby providing an adequate fitting for said collar and preventing its shifting.

The rearwardly extending end 264 of said tubing member 254 is connected to a pipe elbow 266 which connects with an air pipe 268 and which leads to and is connected with an auxiliary air supply line (not shown).

For increasing the velocity of the fluidal mass passing through the passage 59 a suitable tube member 346 covered with a resilient coating 348 may be provided therein, as shown in Fig. 1, which may be of any suitable length or size as may be required or desirable, also, to relieve the air pressure from said tank 2 said pipe connection 66 is provided with suitable valve 350, which is manually operated, and then to insure the safety of the apparatus, a suitable automatic safety valve 352 is connected to said pipe connection line 66, as shown in Figs. 1 and 1a.

It may be noted, that when said sand blasting apparatus is in operation, and the sand, abrasive or other suitable material is mixed with the air

and when it reaches said mixing chamber **236**, the velocity of the fluidal mass is slightly retarded and the blasting force is diminished in the process unless an additional volume of air, at a greater pressure, is added therein passing from the line of supply and controlled by the controlling valves **76** and **78**.

When, however, it may be required to maintain a comparatively low velocity of said fluidal mass, allowing it to pass through the apparatus, and it is found then to be essential to increase said fluidal velocity for securing the best results, then the passage **270** of said nozzle **248** is employed, thereby increasing the impact of said fluidal mass, allowing the air to pass through the adjustable tubing member **254** and consequently increasing the efficiency.

It may also be noted, that said elbow connection **266** may, if so desired, be provided with or be substituted for a valve, with which the passing volume of air from said auxiliary supply line may be controlled and regulated as required.

In Figs. 12 and 13, the spray discharge nozzle member **232** is shown in a modified form, which comprises said housing member **234** wherein the mixing chamber is positioned, having a base member **270** wherein the end of the hose member **230** is held in place by means of the clamping member **240**.

Said mixing chamber **236** is also provided with a sub-chamber member **272** which is divided, by means of a valve **274** into a lower chamber **276** and the upper chamber **278**, said chamber **278** having its discharge end **279** provided with a tube **280** which is directly in line with the nozzle extension member **248**.

The lower chamber **276** is supplied with air through the pipe supply connection **268** and a pipe connection **282**, which is also provided with a suitable gage member **284** so that the air pressures may be noted and accordingly controlled as required.

Said valve **274** is of a conventional type, it being provided with a valve disc **286** which is supported in place by means of a spring **288**, having its disc seated upon the ridge **290**, also having a stem member **292** which extends upwardly and passes through the valve cap **294**. The lifting of said disc member **286** is accomplished by means of a lever member **296** which is attached to the end of the stem extension **292** by means of a suitable pin **298**.

Said extension member **248** is provided with a spray nozzle member **300**, comprising a housing **302** which is divided into air chamber **304** and a fluid supply chamber **306**, having an annular divisional wall **308** positioned therein as shown, and which extends to the flared out end **310**, wherein said air chamber **304** is provided with a plurality or a set of tube members **312**, which are disposed at a suitable converging angle and each of which is provided with a plurality of holes **314** the openings of which are confined within said air chamber **304** while the tube extending end **316** passes through a passage **318** which is larger than the outside diameter of said tube member **312** and disposed within the outer wall **320** of said supply chamber **306**.

In this manner said housing **302** becomes an independent unit which is supplied with a suitable fluid, such as shellac or paint through the pipe connection **322** leading into said fluid supply chamber **306** from the connecting pipe **324**, and also, having the air pipe extension **326** connected to the air chamber **304** which leads from the air supply pipe **268** and which, when so desired, it may be provided with a suitable control valve, not shown.

It may be noted that said mixing chamber **236** of said gun housing member **234** may be used for drawing and for dispensing continually a quantity of grounded cork or other suitable material by allowing it to pass through the passage **328** of said extension member **248**, and also, by allowing a suitable volume of air, under pressure, to pass into said chamber **304**, said air in escaping through the holes **314** and the tube passage **330** will create a siphonic action within the passage **318** of said supply chamber **306**, thus causing the shellac or paint collected therein to be drawn and sprayed at said passages **318**, and thereby, by means of said spray so formed, it will cause said granulated cork or other suitable material passing from said passage **328** to be deposited upon and adhere to the surface upon which it is applied.

In this manner, an effective coating of any suitable material may be applied upon the surface, said material to be in one or more combinations, such as a rust preventing coating upon the hull of the ship, or a mixture of cement with a spray of water, or other powdered material which may be mixed with a suitable fluidal medium and thereupon be applied evenly as a waterproof coating over the wall surfaces of fortifications, buildings or the like, or be used for filling cracks, ruptures in cement walls, cellars and foundations, and which may be accomplished quickly, effectively and inexpensively.

While I have thus described my invention with great particularity, it will be clear that the same may be modified throughout a wide range.

I accordingly do not propose to be limited to the exact details of construction herein shown on the drawings and described in the specification, but reserve the rights in practice to make the necessary changes and modifications therein, which may come within the scope of the appended claims.

I claim as my invention:

1. In a sand blasting apparatus having a valve connection of the class described connected to the sand blasting apparatus and adapted for controlling the air and sand inflow therethrough, comprising, a housing, a sand reservoir in said housing, an air inlet passage in said housing for supplying the air into said sand and passing into said valve at a pressure, a slotted nipple means having a conical hood for controlling the flow of said sand into said valve connection, a control passage means disposed in said housing and in close proximity to the air discharge of said housing, and a sidewardly movable block valve means in said control passage for regulating the volume of sand passing therethrough and out of said sand blasting apparatus and for preventing the bridging of said sand therein.

2. In a sand blasting apparatus of the class described having in combination, a tank, a sand reservoir in said tank, air inlet in said tank for forcing the sand out of said reservoir, and slotted passage means in said tank for directing the passage of sand from said tank and to the tank outlet including means connecting said tank outlet for imparting another element into said mixture of sand and air and for increasing the velocity of the passing fluids when reaching said passage means in said tank, substantially as described.

3. In a sand blasting apparatus of the class described comprising a tank, a sand loading means

in said tank, a slotted sand in-flow controlling means in said tank, an air inlet connection means connecting said last mentioned means for intermixing the air with the passing sand, means connected to and extending out of said tank for directing the fluidal mixture of said sand and air, and air passage means in said last mentioned means for intensifying said blast of said fluidal mixture passing from said sand blasting apparatus.

4. In a fluidal mass blasting apparatus of the class described, comprising, a tank, a reservoir means in said tank, a loading and sealing means in said tank for sealing the sand or other suitable material therein, an air inlet connection means connecting said tank, a slotted nipple in said tank having a hood disposed thereover for restricting the flow of said sand, a mixing valve means connecting said tank and interconnecting said last mentioned means for mixing a portion of said material stored in said tank with a volume of air passing therethrough, and control means in said mixing valve means for controlling and for regulating the volume of said fluidal mass passing through said valve.

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