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ABRASIVE BLASTING EQUIPMENT

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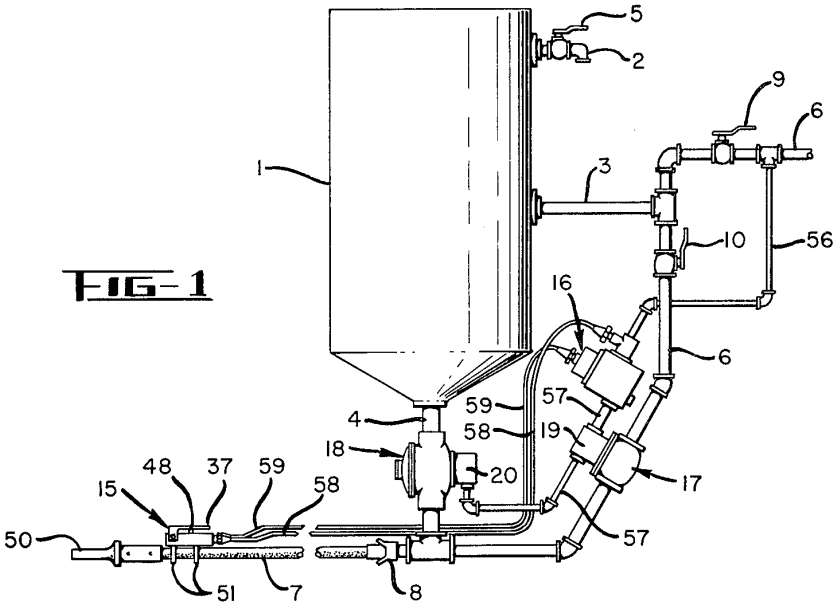

FIG-1

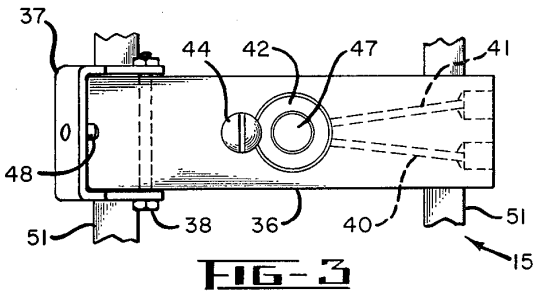

FIG-3

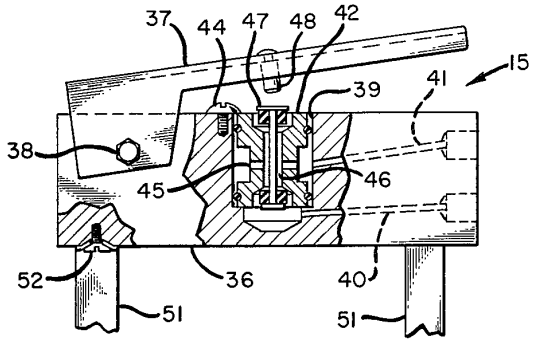

FIG-4

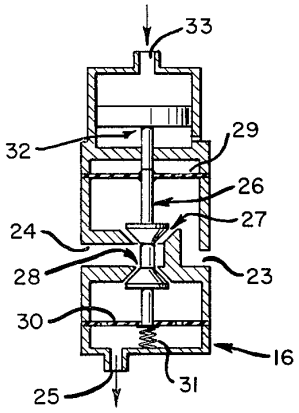

FIG-2

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ABRASIVE BLASTING EQUIPMENT

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This invention relates to abrasive blasting equipment and more particularly to control means for such equipment.

Abrasive blasting is a very helpful tool having many uses. However, as is often the case with power tools, the forces involved in abrasive blasting equipment can cause injury and damage when the equipment gets out of control.

Accordingly, an object of this invention is to provide abrasive blasting equipment having improved safety features. More specifically, an object of the invention is to provide abrasive blasting equipment having an improved control system for automatically discontinuing the blasting operation if the operator becomes disabled.

Another object of the invention is to provide abrasive blasting equipment having a safety control system which is so convenient and simple to use that it is welcomed by the operators, rather than circumvented.

A further object of the invention is to provide an improved control valve for use with abrasive blasting equipment.

These and other objects and features of advantage will be apparent to those skilled in the art from a reading of the following detailed description wherein reference is made to the accompanying drawings, in which:

FIGURE 1 is an elevational view of abrasive blasting equipment embodying the invention;

FIGURE 2 is a schematic sectional view on enlarged scale of the pilot valve employed in the control system of FIGURE 1;

FIGURE 3 is an enlarged top view of the control valve of FIGURE 1 with the handle raised; and

FIGURE 4 is an enlarged side view of the control valve with portions shown in section.

Referring in more detail to the drawings, the equipment comprises a conventional tank 1 which is charged with abrasive prior to blasting. The tank is provided with an exhaust pipe 2, a high pressure air inlet 3 and an abrasive outlet 4. The exhaust pipe 2 is provided with a manual control valve 5. A high pressure feed line 6 is connected to the air inlet 3 and the abrasive outlet 4. A flexible blast hose 7 is connected to line 6 by a conventional quick-connect coupling 8. Line 6 is provided with two conventional manual valves 9 and 10.

The automatic control system comprises a control valve 15, a pilot valve 16, an air valve 17 and an abrasive valve 18. Valve 17 is a conventional valve of the type which normally permits the passage of high pressure air through line 6. Valve 17 is controlled by a conventional fluid pressure actuator 19 so that when air pressure is admitted to actuator 19 it forces valve 17 into closed position.

Similarly, valve 18 is a conventional valve of the type which normally permits the passage of abrasive through line 4. Valve 18 is controlled by a conventional fluid pressure actuator 20 so that when air pressure is admitted to actuator 20 it forces valve 18 into closed position.

Pilot valve 16 is a conventional valve which, as shown in FIGURE 2, has an inlet opening 23, an outlet opening 24 and an exhaust opening 25. The valve assembly contains a double stem unit 26 which controls the two valve ports 27 and 28. The upper end of stem unit 26 is attached to a solid diaphragm 29 and the lower end is attached to an apertured diaphragm 30. The valve assembly is biased by a spring 31 toward the position shown in FIGURE 2 with port 27 open and port 28 closed. The

upper end of the assembly contains an operating plunger and stem unit 32 which abuts stem 26. Unit 32 has an axial bore so that when air is admitted to a control port 33 fluid pressure is exerted against the upper side of both the diaphragm 29 and plunger 32 to depress stem 26, closing port 27 and opening port 28.

Control valve 15 forms an important part of the invention and comprises a body 36 with a handle 37 secured thereto by a pivot pin 38. The valve assembly 15 has a central recess 39 opening to the top of the body 36. An inlet passage 40 extends from the front of the body 36 to the bottom of recess 39, and an outlet passage 41 extends from the front of the body to the mid portion of the recess. Although the left ends of passages 40 and 41 are necessarily spaced vertically, the right ends are spaced horizontally so that the vertical thickness of body 36 can be minimized, such thickness being exaggerated in the drawings to clarify the center part shown in section. A cylindrical unit 42 is sealed in recess 39 by O-rings, and is held in place by a screw 44. Unit 42 has a diametric bore 45 intersecting an axial center bore 46. The ends of bore 46 form two valve seats which are alternatively closed by a double valve stem 47. Handle 37 carries an actuating button 48 which abuts the top of stem 47 when the handle is depressed. In order to secure the control valve 15 on the hose 7 adjacent a conventional nozzle 50, two adjustable hose clamps 51 are secured to body 36 by screws 52.

Piping for the various valves comprises a high pressure pipe 56 which connects line 6 to the inlet 23 for pilot valve 16. A line 57 connects the outlet 24 of valve 16 to the actuator chamber 19 and thence to the actuator chamber 20. A flexible tube 58 connects pipe 56 to the inlet passage 40 of the control valve 15, and a flexible tube 59 connects the outlet passage 41 of valve 15 to the control port 33 of valve 16.

In order to operate the equipment, tank 1 is filled through the top with abrasive. Line 6 is connected to a source of high pressure air. Exhaust valve 5 is closed and valves 9 and 10 are opened. The equipment is then ready for blasting. However, no blasting can occur until handle 37 on control valve 15 is forcibly depressed. The reason no blasting occurs is that valves 17 and 18 are closed. As previously described valves 17 and 18 permit flow unless fluid pressure is admitted to their actuator chambers 19 and 20. Until valve 15 is operated, pressure is admitted to chambers 19 and 20 through pipe 56 and the open port 27 in pilot valve 16. It will be recalled that port 27 is open unless fluid pressure is admitted to port 33 in valve 16. The only path for high pressure air to port 33 is through the flexible tube 58, through valve 15, and back through flexible tube 59. Tube 58 is connected to the passage 40 of valve 15 and thus transmits air pressure to the bottom of the recess 39 in valve 15. However, as soon as air pressure reaches the bottom of recess 39, it forces stem 47 upwardly to close the lower seat in passage 46.

The strength of the upward force of stem 47 is sufficient to overcome the weight of handle 37, so that the described closing of the lower seat in passage 46 occurs automatically unless handle 47 is forcibly depressed. Thus, until the handle is depressed, high pressure air goes no farther than the bottom of recess 39. At the same time, the control port 33 of pilot valve 16 is vented to the atmosphere through tube 59, passage 41, bore 45 and the upper end of bore 46. As a result of these conditions, valves 17 and 18 are closed and no blasting occurs until control valve 15 is operated.

When the operator is ready to blast he depresses handle 37 so that actuating button 48 forces stem 47 downwardly to close the upper seat and open the lower seat in bore 46. The high pressure air from line 58 then passes through

passage **40**, bores **46** and **45**, passage **41**, and line **59** into the actuating port **33** in the pilot valve **16**. The high pressure air forces operating plunger **32** downwardly to cause port **27** in the pilot valve **16** to close and port **28** to open. Thus, high pressure air no longer passes through pipe **57** to the actuators **19** and **20**. Instead, the actuators are vented to the atmosphere through the now open port **28** and the exhaust opening **25**. As soon as the pressure is relieved from actuators **19** and **20**, valve **17** and **18** open and blasting commences. If the operator desires to discontinue blasting he simply releases the pressure on handle **37**. If the operator accidentally, or through sudden illness, loses his grip on the handle **37**, the blasting will obviously be automatically discontinued.

Although a preferred embodiment of the present invention is shown and described herein, it is to be understood that various modifications may be made therein without departing from the spirit and scope of the invention as set forth in the appended claims.

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

1. Abrasive blasting equipment comprising a tank having an air inlet and a separate abrasive outlet line, a high pressure feed line connected to said air inlet and to said abrasive outlet line, a first valve controlling flow through said high pressure line, fluid pressure operated means for controlling said valve, a manually operable valve controlling fluid flow to said fluid pressure operated means, said manually operable valve having first, second and third ports, said first port being connected to said high pressure line, said second port being connected to said fluid pressure operated means, said third port being connected to atmosphere, port controlling means in said valve, a handle having a direct mechanical engagement with said port-controlling means for moving said port-controlling means to close said third port and interconnect said first and second ports, and said port-controlling means being normally biased to cause said second and third ports to be connected to each other and isolated from said first port.

2. In abrasive blasting equipment having a high pressure feed line and a first valve in said line, the improvement comprising a control valve having a body, a recess part way through said body, a cylindrical unit in said recess and having an axial bore intersected by a radial bore intermediate the ends of the axial bore, a valve seat formed adjacent each end of said axial bore, said body having an inlet passage opening to said recess below said cylindrical unit, said body having an outlet passage opening to said recess in communication with said radial bore, a valve stem movably positioned in said axial bore for alternatively engaging one of said seats, and a handle attached to said body and adapted to engage the outer end of said stem.

3. The arrangement as claimed in claim **2** in which said control valve further comprises hose clamps attached to said body.

4. The arrangement as claimed in claim **2** in which said handle is pivotally attached adjacent one end of said body and the middle portion of the handle is engageable with said stem, whereby substantial mechanical advantage is obtained.

5. A control valve for abrasive blasting equipment comprising a body, a recess in said body, a valve in said recess, said valve having first, second and third ports, said body having an inlet passage communicating with said first port and an outlet passage communicating with said second port of said valve, said third port of said valve communicating with the atmosphere, said first port being normally closed by pressure in said inlet passage, and a handle adapted to cause said first port to open and said third port to close.

6. A valve as claimed in claim **5** in which said inlet and outlet passages open at one end of said body, said openings being offset from each other both vertically and horizontally whereby the cross-section dimension of said body can be minimized.

7. Abrasive blasting equipment comprising a tank, an abrasive outlet from said tank, a high pressure air line connected with said abrasive outlet to deliver a high velocity stream of abrasive, an air valve in said high pressure air line, fluid pressure operated means for actuating said air valve, a manually operable control valve, said manually operable valve having first, second and third ports, said first port being connected to said high pressure air line upstream from said air valve, said second port of said control valve being connected to said fluid pressure operated means, said third port of said control valve being vented to atmosphere, said control valve being automatically operated by pressure admitted to said first port to cause said second and third ports to be connected to each other and isolated from said first port, said air valve and said means for operating said air valve being so arranged that said air valve is closed when said second and third ports are connected to each other, and manually operable means for connecting said first and second ports to each other.

8. Abrasive blasting equipment as claimed in claim **7** in which said means for actuating said air valve comprises a fluid pressure actuator and a pilot valve connected to said actuator, and said second port is connected to said pilot valve.

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