Jan. 1, 1952 R. RUEMELIN 2,580,842

CONTROL VALVE FOR SANDBLAST GENERATORS

Filed Sept. 11, 1947

Fig. 1.

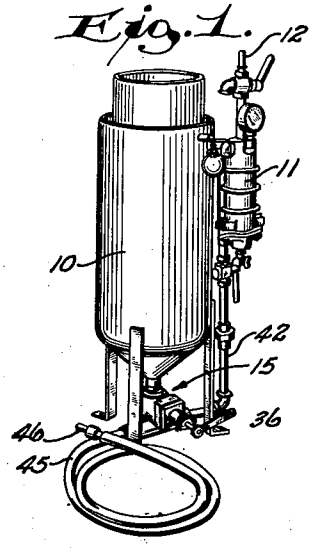


Fig. 2.

Fig. 3.

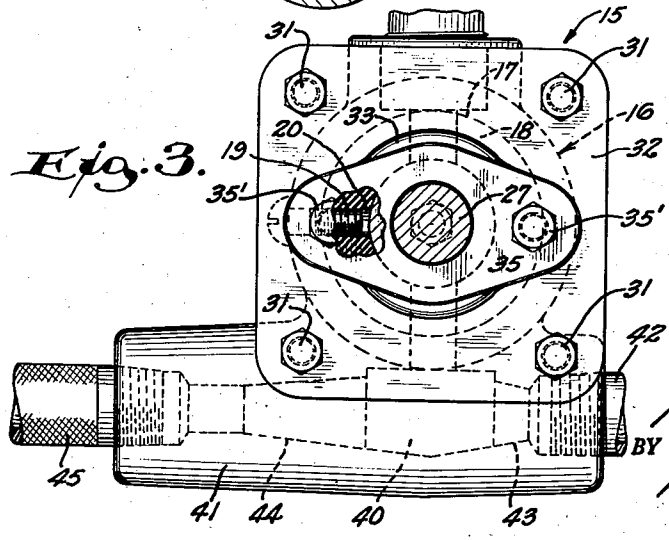


Fig. 4.

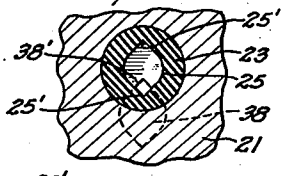
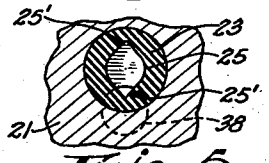


Fig. 5.



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CONTROL VALVE FOR SANDBLAST GENERATORS

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8 Claims. (Cl. 51—12)

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This invention relates to improvements in sand control valves for sand blast generators.

Sand blast generators which are commonly used in lettering of memorials, carving of glass, stripping of paint from auto bodies or the like, cleaning of metal surfaces, and removal of rust and scale or the like, are subject to a substantial amount of wear, particularly in the control valve due to the abrasive action of the sand.

It is a general object of the present invention to provide an improved sand control valve for a sand blast generator which will prolong the life of the valve, increase the efficiency, and simplify the construction and facilitate the operation.

A more specific object of the invention is to provide a device as above described wherein the valve member is rotatable, and wherein novel means is provided for minimizing wear on the parts and for maintaining a tight joint between the relatively movable portions.

A further object of the invention is to provide in combination, a rotatable sand control valve and mixing chamber, wherein said mixing chamber has air bypassing portions.

A further object of the invention is to provide a sand control valve having a rotatable valve member, and having a manually operable stem projecting from the valve member, said stem having its inner end connected in a novel manner to the valve to permit the valve and spindle to be out of alignment without affecting the efficiency of the device.

A further object of the invention is to provide a sand control valve having a valve member which is rotatable within a sleeve of rubber or other wear resistant material, there also being a wear resistant sleeve in the discharge end of the valve member's sand port.

A further object of the invention is to provide novel means for maintaining the parts of the sand control valve in a proper condition of adjustment.

Other objects of the invention are to provide a sand control valve for sand blast generators which is particularly suitable for use on a light weight portable generator, which operates satisfactorily with small nozzles, which reduces the compressed air requirements to a minimum, which aids in creating an intense blasting action, and which provides rapid cleaning or carving at a minimum of cost.

With the above and other objects in view, the invention consists of the improved sand control valve for sand blast generators, and all its parts

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and combinations, as set forth in the claims, and all the equivalents thereof.

In the accompanying drawing, illustrating one complete embodiment of the preferred form of the invention, in which the same reference numerals designate the same parts in all the views;

Fig. 1 is a perspective view of a sand blast generator embodying the improved valve;

Fig. 2 is a vertical sectional view through the sand control valve showing it connected to a portion of the lower end of a generator, part of the handle being broken away;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary sectional view taken on the line 4—4 of Fig. 2; and

Fig. 5 is a similar view showing a slight modification.

Referring more particularly to the drawing, the numeral 10 designates a sand tank, and the numeral 11 designates a tank for compressed air into which compressed air is directed by an inlet conduit 12 leading from any suitable source such as a compressor.

The lower end of the sand tank 10 is hopper-shaped and formed with a discharge spout 13 which is threaded into a threaded opening 14 in the upper end of the sand control valve 15.

The latter includes a main valve casing 16 having a cylindrical chamber 17. In the chamber 17 is a sleeve 18 formed of wear resistant material such as rubber, or a suitable synthetic substitute for rubber. The sleeve is engaged by a set screw 19 which maintains the sleeve against rotation. Preferably the screw extends into a transverse opening 20 in the sleeve 18.

Rotatable within the sleeve 18 is a valve member 21 formed of steel or other wear resistant metal capable of withstanding the abrasive action of sand. The valve member has a transverse port 22 which is enlarged at its lower end as at 23. Fitted in the enlarged portion is a wear resistant sleeve 24 of rubber or other suitable synthetic material. The sleeve 24 has a bore 25 which is of less diameter than the port 22.

One end of the valve member is bored as at 26 to loosely receive the inner end of a valve stem 27. A pin 28 which extends transversely through the valve member 21 and across the bore 26 passes through a transverse hole 29 in the inner end of the valve stem 27. The hole 29 is of a larger diameter than the pin 28 to provide substantial clearance therebetween. In addition, the diameter of the bore 26 of the valve member is larger

than the diameter of the inner end of the valve stem to provide substantial clearance around said inner end. There is also a clearance space 30 at the inner end of the bore 26.

With the above construction,the valve member will always remain tight against its seat in the sleeve 18, particularly after wear occurs, without regard to the alignment of the valve member with its stem 27. In other words, the flexible connection between the inner end of the valve stem and the valve permits disalignment when this is required by operating conditions or after prolonged use.

Removably secured by bolts 31 to the open end of the main housing 16 is a plate 32 having a tubular boss 33 projecting therefrom. The boss forms a stuffing box and contains a suitable packing 34. Cooperable with the packing is a stuffing gland 35 which may be taken up by means of screws 35'. The valve stem 27 extends rotatably through the plate 32 and through the stuffing box and gland. On the outer end of the stem is an operating handle 36.

The sleeve 18 within which the valve is positioned has a transverse duct 37 which is adapted to be placed in registration with the lower end of the discharge nozzle 13 of the sand tank. Opposite the duct 37 the sleeve 18 is provided with another duct 38, which is in registration with a duct 39 leading into a mixing chamber 40, which is located in an extension 41 of the valve casing.

Compressed air from an inlet line 42 is directed by a flared duct 43 into the mixing chamber 40. The mixture of sand and air which is discharged from the device is adapted to pass out of a tapered outlet passageway 44 into a discharge hose 45 and ultimately out of a sand blast nozzle 46.

Any suitable packing 7 may be employed between the plate 32 and the adjacent end of the valve casing 16. At the opposite end of the valve casing 16 there may be an adjustment screw 48 threaded through an opening 49. The inner end of the screw is engageable with the end of the valve member 21 and due to the loose connection around the pin 28, manipulation of the screw 48 will result in an axial adjustment of the valve member 21 to bring about a desired degree of alignment with the ports 37 and 38.

In use of the device, the handle 36 may be rotated to rotate the valve 21 and bring about a desired amount of registration between ends of the port 22 and the ducts 37 and 38 in the sleeve. If complete registration is obtained, then a maximum amount of sand 51 will be directed from the tank 10 through the duct 37, port 22, and ducts 38 and 39 into the mixing chamber. By regulation of the handle 36, the amount of sand discharged into the mixing chamber may be accurately controlled according to requirements. If a very small amount of sand is required, then the valve may be rotated to bring about the type of registration shown in Fig. 4. By referring to this figure, it is apparent that the bore 25 of the sleeve 24 has oppositely disposed peripheral enlargements 25', which are V-shaped in cross section. It is also apparent that the duct 38 has similar peripheral enlargements 38'. With this construction the valve may be rotated so that only portions 25' and 38' are overlapped. Thus the effective opening for discharge of sand is diamond-shaped as is clear from Fig. 4, to permit the passage of only a small quantity of particles. At the same time the shape is such that occasional larger particles will not get caught. If a

corresponding minor overlapping of perfectly round bores were to be employed, the effective opening would be of such shape as to catch large particles. Nor could this condition be remedied by enlarging the effective opening without permitting too large a flow of sand for certain requirements. In the modification disclosed in Fig. 5, the construction is the same as in Fig. 4 except that the bore 38 is round and the bore 25 only is formed with the peripheral enlargements. Thus when the bores are overlapped for a fine adjustment as in Fig. 5, an effective opening, which is trianuglar in shape, is created. This is also very satisfactory.

With the source of compressed air in operation, air from the line 22 will pass into and through the mixing chamber. Due to the triangular cross sectional shape of the mixing chamber, part of this air will bypass through the upper corners 52 and the remainder of the air will pick up the sand at 51 and cause its discharge in the form of a sand blast from the nozzle 46.

The particular construction facilitates operation and permits accurate control over the mixture. Due to the novel valve construction, including the wear resistant sleeves 18 and 24, the life of the parts is prolonged materially and the efficiency of the device is maintained. By use of the flexible connection between the valve member 21 and the inner end of the valve stem 27, the valve may always be maintained in its seat in the sleeve 18 regardless of its exact axial alignment with the stem. This is particularly advantageous after the wear has occurred.

Various other 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.

As the invention I claim:

1. In a sand control valve for sand blast generators, a valve casing having a cylindrical bore, a sleeve of wear resistant material in said bore, a cylindrical valve member rotatable in said sleeve, a transverse port in said valve member, a sand inlet duct in said sleeve communicating with one end of said port and a sand outlet duct in said sleeve communicating with the other end of said port, and a sleeve of wear resistant material at the end of the port which is adapted to communicate with said sleeve outlet duct, said last mentioned sleeve having a bore of less diameter than the diameter of said port of the valve member and of less diameter than said outlet duct of the first mentioned sleeve.

2. In a sand control valve for sand blast generators, a valve casing having a cylindrical bore, a cylindrical valve member rotatable in said bore and having a transverse port therein and having an end bore, a valve stem having an end of less diameter than said end bore projecting therein, and a transverse pin extending through said end of the end bore and stem, the fit between said stem and pin providing for a relatively slidable movement between said pin and stem, and there being substantial clearance around said pin to provide for axial movement of said valve member, and an adjustment screw threaded into said valve casing and engageable with the opposite end of said valve member.

3. In a sand control valve for sand blast generators, a valve casing having a cylindrical bore, a cylindrical valve member rotatable in said bore and having a transverse port therein and having

an end bore, a valve stem having an end projecting into said end bore, a transverse pin extending through said end bore and stem, there being substantial clearance around said pin to provide for axial movement of said valve member independently of said stem, and an adjustment screw threaded into said valve casing and engageable with the opposite end of said valve member.

4. In a sand control valve for sand blast generators, a valve casing having a cylindrical bore, a sleeve of wear resistant material in said bore, a cylindrical valve member rotatable in said sleeve, a transverse port in said valve member, a sand inlet duct in said sleeve communicating with one end of said port, and a sand outlet duct in said sleeve communicating with the other end of said port, said casing having a mixing chamber therein with which said outlet duct of the sleeve communicates, means for directing compressed fluid through said mixing chamber, and a means for discharging a mixture of sand and said compressed fluid, said mixing chamber being substantially triangular in cross section with the base of the triangle adjacent the discharge end of said outlet duct and projecting beyond each side thereof whereby air may bypass through the upper corners of said mixing chamber.

5. In a sand control valve for sand blast generators, a valve casing having a cylindrical bore, a non-rotatable sleeve of wear resistant material in said bore, a cylindrical valve member rotatable in said sleeve, a transverse port in said valve member, a sand inlet duct in said sleeve communicating with one end of said port, a sand outlet duct in said sleeve communicating with the other end of said port, said other end of said port being enlarged, a sleeve of wear resistant material positioned in the enlarged end of said port, the bore of said last-mentioned sleeve having at least one peripheral enlargement.

6. In a sand control valve for sand blast generators, a valve casing having a cylindrical bore, a non-rotatable sleeve of wear resistant material in said bore, a cylindrical valve member rotatable in said sleeve, a transverse port in said valve member, a sand inlet duct in said sleeve communicating with one end of said port, a sand outlet duct in said sleeve communicating with the other end of said port, the other end of said port being enlarged, a sleeve of wear resistant material positioned in the enlarged end

of said port, said sand outlet duct in the sleeve and the sleeve in said port having peripheral enlargements which are adapted to overlap in a certain position of rotation of said valve member.

7. In a sand control valve for sand blast generators, a valve casing having a cylindrical bore, a cylindrical valve member rotatable in said bore, a transverse port in said valve member, a sand inlet duct in said casing communicating with one end of said port, and a sand outlet duct in said casing communicating with the other end of said port, said casing having a mixing chamber therein with which said outlet duct communicates, means for directing compressed fluid through said mixing chamber, and a means for discharging a mixture of sand and said compressed fluid, said mixing chamber being substantially triangular in cross section with the base of the triangle adjacent the discharge end of said outlet duct and projecting beyond each side thereof whereby air may bypass through the upper corners of said mixing chamber.

8. In a sand control valve for sand blast generators, a valve casing having a cylindrical bore, a sleeve of wear resistant material in said bore, a cylindrical valve member rotatable in said sleeve, a transverse port in said valve member, a sand inlet duct in said sleeve of less diameter than and communicating with one end of said port, and a sand outlet duct in said sleeve communicating with the other end of said port, and a sleeve of wear resistant material at the end of the port which is adapted to communicate with the outlet of said first sleeve, said second mentioned sleeve having a bore of less diameter than the diameter of said port of the valve member and of less diameter than the outlet duct of the first mentioned sleeve.

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