May 8, 1962 N. P. GLESENER 3,032,929

PORTABLE SAND BLASTING DEVICE

Filed March 17, 1961

FIG. 1

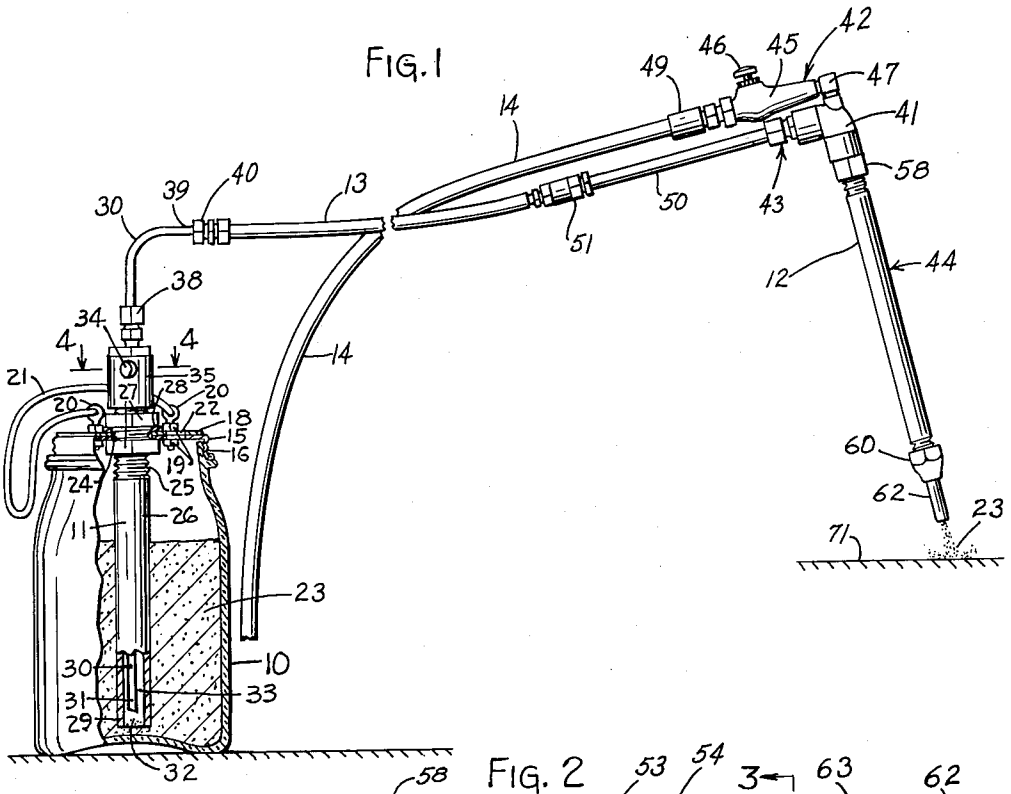


FIG. 2

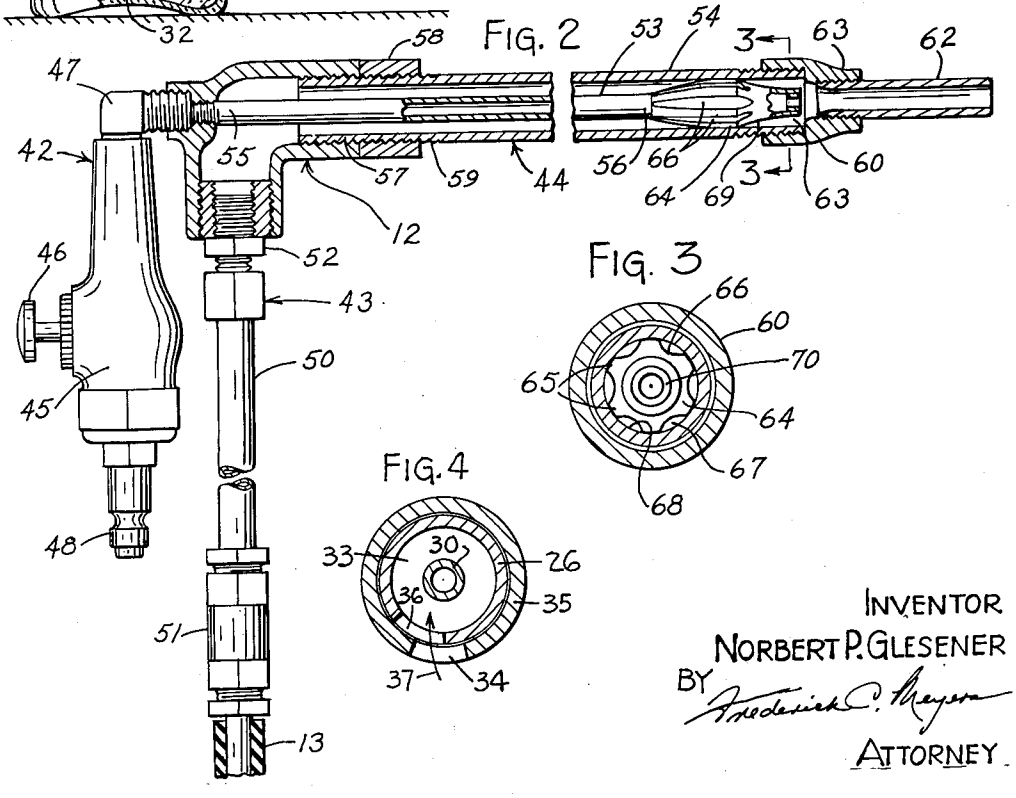


FIG. 3

FIG. 4

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PORTABLE SAND BLASTING DEVICE

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2 Claims. (Cl. 51—8)

This invention relates to sand blasting equipment and more particularly to a portable refinishing sand blasting device.

Heretofore the sand blasters of present design have been of the considerably expensive and cumbersome type. This is true in particular regard to the equipment associated with the sand blasting which contains and transports the sand from its source, or reservoir, to the blasting head. Also, present sand blasting mechanisms rely, for their operation, upon the use of a very large quantity of sand in order to produce the net result upon the working surface being cleaned, roughened or otherwise conditioned. With these disadvantages of existing equipment in mind, I have devised a new and novel portable sand blaster which I now disclose and accordingly:

An object of this invention is to provide a means for blasting sand particles with compressed air wherein the design requires a minimum of sand yet provides a maximum net result upon the working surface.

Another object of this invention is to provide a means for blasting sand particles which allows portability because of the small overall size and light weight.

A further object of this invention is to provide an efficient and simple means for adjusting the rate of sand removal from the sand source.

A still further object is to provide a means for directing an even pattern of sand upon the working surface.

A further object is to provide a means for blasting sand as set forth above which is simple and inexpensive in design and operation.

These and other objects and advantages of my invention will more fully appear from the following description, made in connection with the accompanying drawing, wherein like reference characters refer to the same or similar parts throughout the several views and in which:

FIGURE 1 is a side view of my blasting device having elements not necessary to a full understanding thereof removed, and further having portions of the elements shown in cross section;

FIGURE 2 is an enlarged view of the blasting head with portions thereof in cross section to expose the interior construction;

FIGURE 3 is a cross section of FIGURE 2 taken at line 3—3, portions thereof being in full line drawing; and

FIGURE 4 is a cross sectional view of FIGURE 1 taken at line 4—4.

Referring now more particularly to FIGURE 1, I provide a sand container or jar **10** which has mounted thereon a feeding structure **11** which connects with the blasting head **12** by way of sand hose **13**. Also connected to the blasting head **12** is a compressed-air hose **14** which is fed by a conventional air compressor, not shown.

The jar **10** which I provide may be of the conventional glass type having a capacity of approximately one gallon. The jar **10** has mounted on the top a conventional cover **15** which secures to the upper threaded portion **16** of the neck **17**.

As may be seen from FIGURE 1, I have also provided a cover plate **18** which is circular in shape and secured to the cover **15** by means of a pair of eye bolt nuts **19**. Eye bolt nuts **19** serve the dual purpose of maintaining

the cover plate **18** in place as well as securing eye bolts **20** thereto. Secured to eye bolts **20** is a flexible handle means **21**.

The cover plate **18** and cover **15** each have an air opening **22** which allows the admittance of atmospheric air into the jar and to the granulated solids such as sand **23** for reasons to become apparent subsequently. The cover plate **18** also serves the purpose of reinforcement to the cover **15**, which is usually of the thin flexible type of material.

Also located centrally in the cover **15** and cover plate **18** is an opening **24** for receiving the threaded portion **25** of the air tube **26**. In order to firmly attach, as well as vertically position the air tube **26** with respect to the bottom of the jar, I provide the two air tube nuts **27**. As may be seen in FIGURE 1, I also provide a resilient washer **28** positioned between the upper nut **27** and cover plate **18** for the purpose of providing a tight and positive securement of the feeding structure to the cover **15**.

As may be seen from the cut-away portion of the lower end **29** of the air tube **26**, I provide a second or sand tube **30**, the lower end **31** of which terminates slightly above and adjacent to the lower end **29** of air tube **26**. The sand tube **30**, in operation, receives a vacuum from the blasting head **12**, as will be explained subsequently, which thus creates a sucking action to the sand **23** which is adjacent the lower end **31**. With regard to the flow characteristics of sand, it is readily understood that the sand **23** will not seek its own level within the air tube **26** but rather will maintain itself at a height in the air tube only slightly higher than that of the lower end **29**. Because of this feature, the sucking action of the sand tube **30** will not draw pure sand but rather a mixture of sand grains and air and thus a pre-mixing operation of air and sand is accomplished. The air is received by way of the chamber **33** which separates the air tube **26** from the sand tube **30** and which receives its air supply from the arrangement of collar side opening **34** in collar **35** with respect to the circular side opening **36** in the upper portion of air tube **26** (see FIGURE 4).

It may also be explained at this time that the sucking action of the sand tube will cause a slight amount of atmospheric air to be drawn through the air openings **22** and down through the quantity of sand contained in the container **10**. This action serves the dual purpose of increasing the amount of air which is drawn up into the sand tube **30** with the sand **23** as well as creating a means for drawing the sand evenly down into the jar as it is used. In addition, it induces the sand particles toward the lower end **29** of air tube **26**.

Referring now to FIGURE 1 and more specifically to FIGURE 4, the upper end of the air tube **26** is provided with a circular side opening **36**. Threadably engaged on the air tube **26** is a collar **35** which has a collar side opening **34** of substantially the same diameter as the opening **36**. It may readily be seen by those experienced in this type of metering device, that the amount of air admitted to the chamber area **33** will be dependent upon the alignment of the openings **34** and **36**, i.e. the less alignment, as seen in FIGURE 4, the less the amount of air admitted into chamber **33** as indicated by the arrow **37**. Also seen in FIGURE 4 is the sand tube **30**, shown centrally positioned within the air tube **26**.

Secured to the upper end of the air tube **26** is a coupling element **38** for securing the sand tube **30** to the upper end of air tube **26** as well as providing a means for vertically adjusting the sand tube **30** and lower end **31** with respect to the lower end **29** of air tube **26**. Secured to the sand tube at **39** is a sand tube coupling **40** for connecting to the sand hose **13**.

Referring now to the blasting head **12** and FIGURE

2 generally, I provide a mixer joint 41 which has threadably engaged therein, at one end, the air input referred to generally as 42 (see FIGURE 2) and the sand input referred to generally as 43. Threadably secured to the other end of the mixer joint 41 are the sand and air output tubes referred to as the output co-axial nozzle tubing 44.

The air input mechanisms are comprised generally of an air valve 45, which has the conventional control button 46, and is joined to the mixer joint 41 by means of an elbow joint 47. As seen in FIGURE 2, the air valve is supplied with an air nipple 48 to which the air hose coupling 49 (see FIGURE 1) secures the compressed-air hose 14.

The sand input mechanism consists simply of a connecting tube 50 which interconnects the mixer joint 41 and the sand hose 13 by way of said hose coupler 51 and connecting tube coupler 52.

As indicated above, the output of the mixer joint consists of a co-axial nozzle tubing 44. This tubing in turn consists of an inner air tube 53 and an outer sand tube 54, which is co-axial with air tube 53. As seen in FIGURE 2, the air tube 53 connects directly to the elbow joint 47 (at end 55) which supplies the compressed air. The other end 56 terminates in a special configuration shown more clearly in FIGURE 3, which will be explained shortly. The outer sand tube 54, as seen in FIGURE 2, is threadably engaged at end 57 into the mixer joint 41 and has a head nut 58 secured thereto which, when unscrewed from the threads 59 of the outer sand tube 54, will force against the mixer joint 41 thereby more rigidly securing the elements to each other. The other end of the outer sand tube 54 has a nozzle reducer-coupling 60 threadably engaged thereto which has also engaged therein, but at the outer end 61, a blasting nozzle 62.

Referring now to FIGURE 2 and FIGURE 3, the special arrangement of the inner air tube 53 will be explained. Since an important feature of most sand blasting devices is the uniform and symmetrical pattern of the sand spray, it is necessary that, as in this case, the ends of the inner air tube 53 and outer sand tube 54 be co-axially positioned with respect to each other. It is also necessary that the blasting nozzle 62 be likewise co-axially positioned with respect to the outer sand tube 54 and the inner air tube 53. There is no problem, of course, in co-axially positioning the blasting nozzle 62 because of the arrangement of the conventional nozzle coupling 60; however, there is a slight problem of positioning the inner air tube 53 in the outer sand tube 54 so that an even mixture of air and sand, drawn from the feeding structure 11, may be drawn to the nozzle chamber 63. To provide this air-sand arrangement as well as a central position of the inner air tube 53, I provide the adapter 64 which has a maximum diameter at points 65 substantially equal to the inside diameter of the outer sand tube 54, and which has a plurality of longitudinal grooves or flutes 66 formed around the circumference. Grooves 66 are all formed of substantially the same depth and configuration so that there is a symmetrical flow of air-sand mixture through all of the passageways 67 defined by the grooves 66 and inner bore surface 68 of the outer sand tube 54. The air tube terminates forwardly of the groove portion of the adapter in a diametrically reduced portion 69.

As seen in FIGURE 2, the very end of the adapter 64 has a bushing 70 positioned on the inside which effectively reduces the cross sectional opening area for the compressed air and, which in turn, creates the drawing or sucking action (necessary for the operation of this type of device) as the air exits through the blasting nozzle 62. The theory and operation of the air forces will be readily understood and recognized by those skilled in the art of fluid dynamics.

In the use and operation of my invention, the feeding structure 11 would be inserted in the container 10 and secured thereto after the container had been filled with sand. I find that the type of sand is not critical and any beach type sand is suitable and adequate. The compressed-air hose would, of course, be connected to an air compressor, as indicated above, the compressor, for maximum results of the blasting equipment, to have approximately sixty pounds pressure.

With a working surface 71 (see FIGURE 1) properly oriented, the container filled with sand, and the air compressor operating, the operator may begin his sand blasting operation by merely pressing the control button 46 of the air valve 45. This operation admits air through the inner air tube 53 and at a very high velocity through the reduced portion 69 of the adapter 64, thus creating a vacuum upon the nozzle chamber 63. This vacuum in chamber 63 is transmitted through the passageways 67 to the mixer joint 41 and ultimately through the sand hose 13 to the feeding structure 11. With a vacuum applied to the feeding structure 11, a sand and air mixture is thus drawn upwardly through the lower end 31 of sand tube 30 and ultimately through the blasting head 12 and upon the working surface 71.

It was explained earlier that the collar 35 may be rotated whereby to align the collar side opening 34 with the circular air tube opening 36 in order to vary the amount of air admitted to the sand and air mixture drawn to the blasting head 12. During the blasting operation, if the operator desires to impinge a larger quantity of sand upon the working surface, he would merely rotate the collar 35 to close off the air tube opening, thus allowing less air to be premixed with the sand and consequently a greater amount of lifting or sucking action will be imparted upon the sand 32. As a consequence, a larger amount of sand is delivered to the working surface.

Through my novel arrangement for sand blasting, I have provided an efficient means of conditioning a working surface but, as evident from the above, with a much desirable portability feature in addition to the usage of a small quantity of sand which is put to an optimum effective usage.

It will, of course, be understood that various changes may be made in the form, details, arrangements, and proportions of the parts without departing from the scope of my invention as set forth in the appended claims.

What is claimed is:

1. A portable sand blasting apparatus comprising, a container adapted for holding sand, a feeding structure mounted to said container for removing sand therefrom when a vacuum is applied thereto, a blasting head having a compressed air input and a sand input connected to said feeding structure and further having an output co-axial nozzle tubing, said co-axial nozzle tubing having an outer sand tube terminating in a blasting nozzle of reduced cross section for communicating therethrough a sand and air mixture from said sand input, and an inner air tube terminating in an adapter having an axial passage connected to said compressed air input for communicating therethrough compressed air from said compressed air input, said adapter having portions of its outer peripheral surface positioned closely adjacent the inner peripheral diameter of said outer sand tube, the remaining portions of the outer peripheral surface and said inner peripheral diameter of said outer sand tube defining passageways in communication with said sand input adapted for flow of said sand and air mixture, the forward end of said adapter further terminating adjacent and in alignment with said blasting nozzle and at a substantially reduced size opening whereby said inner air tube will remain substantially positioned axially with respect to said blasting nozzle during blasting operations.

2. A portable sand blasting apparatus comprising, a container adapted for holding sand, a cover for said container having an opening therein for controlling the

amount of atmospheric air admitted into said container, a feeding structure mounted to said container cover for removing sand therefrom when a vacuum is applied thereto, said feeding structure having an air tube and sand tube disposed within said air tube, each of which have portions thereof within said container, means interengaging said cover and said air tube for vertically adjusting said air tube and said sand tube with respect to the bottom of said container and with respect to each other, a blasting head, means interconnecting said blasting head and said feeding structure for communication of sand and air mixture therebetween, said blasting head having controllable valving means for intermittently imparting a vacuum to said feeding structure whereby to draw sand and air mixture to said blasting head, and means for blasting said sand and air mixture with compressed air upon a working surface.

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