United States Patent

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[72] Inventor Norman E. Waag
3110 Broadview Road, Cleveland, Ohio 44109

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[54] SAND BLASTING EQUIPMENT
1 Claim, 2 Drawing Figs.

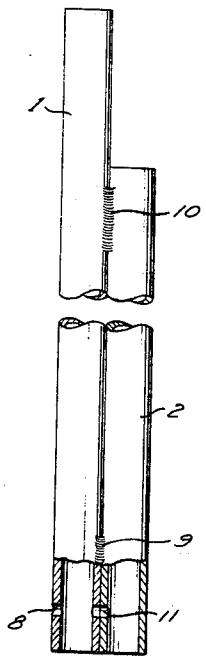
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[50] Field of Search 51/8, 12; 239/355, 434; 103/266, 267; 230/103, 104

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ABSTRACT: A sand aspirator probe for a portable sandblasting apparatus having two parallel tubes of unequal length and welded together along their axes and incorporating therein a sand-air mixing aspirator port in the proximity of the bottom ends of said tubes.



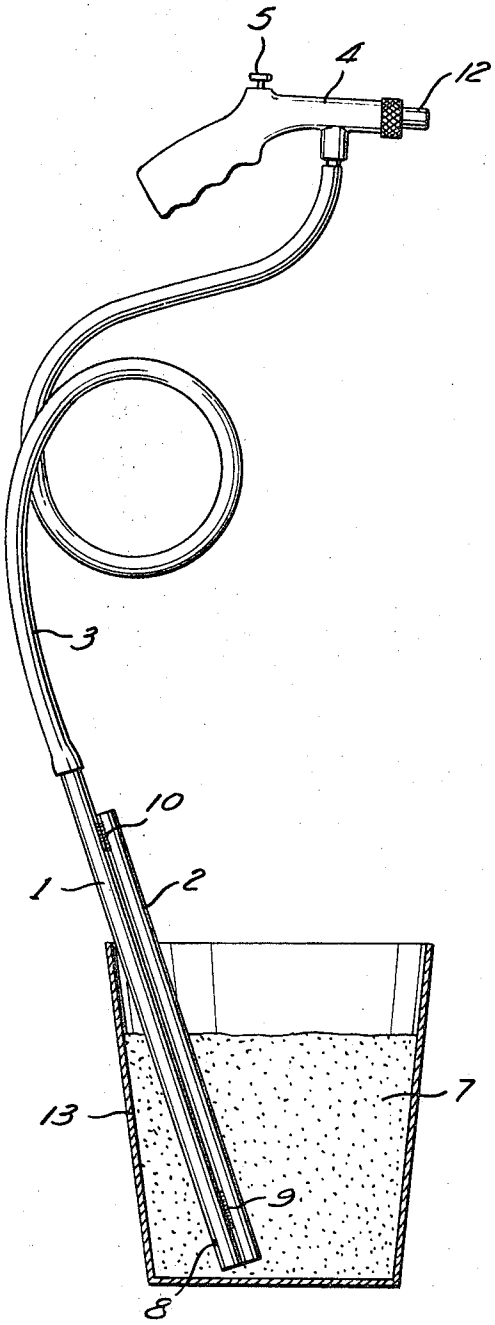


Fig. 1

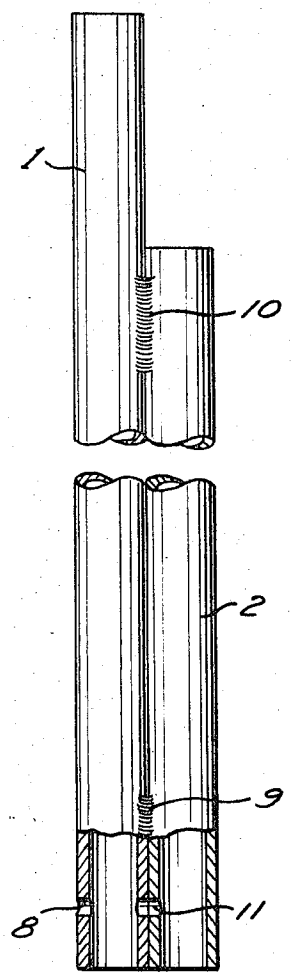


Fig. 2

INVENTOR.
NORMAN E. WAAG

SAND BLASTING EQUIPMENT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to sandblasting equipment and more particularly to an efficient and simple means of drawing a suitable mixture of sand and air for a sand blasting use from any remote open reservoir.

This new device was designed for equipment which raises the sand from a container or reservoir thru tubing to the blasting head.

2. Description of the Prior Art

Heretofore the more or less accepted method of drawing aerated sand from a container was thru a coaxial system of tubes, the inside tube being for sand and the outside tube for air. The air orifice was generally adjustable and always above the sand level.

Regulation of air and sand is difficult because air is introduced around the periphery of the sand tube. Air flows wherever it chooses around said tube causing pulsations and turbulent flow, both conditions being undesirable.

Most systems as have heretofore been devised for this purpose are limited to low velocity air in order to reduce excessive wear of the internal parts caused by turbulent air at high velocity. My device because of the novel design of the metering port produces laminar air at either high or low velocity. Laminar air flow reduces internal wear to a minimum.

To my knowledge there has never been an instantaneous automatic metering of sand and air thru a common port device, whose purpose is to compensate and correct for changes such as sand level in the container or fluctuations of air from the air compressor. Instantaneous automatic metering reduces pulsations to a minimum and permits the sand and air to accelerate more rapidly from the container to the working area.

SUMMARY OF THE INVENTION

My device meters both air and suspended sand particles along a specific path thru a fixed port.

When a known blasting head is activated, a suction or vacuum is generated which is transferred from said blasting head via a flexible lift hose to the sand tube of the aspirator probe. Sand will begin to rise in sand tube and uncover aspirator port allowing air from air tube to pass thru aspirator port and mix with sand in sand tube.

When the mass of suspended sand rises in the flexible lift hose toward the blasting head and reaches its final velocity, the rapid flow of air from the air tube to the sand tube thru the aspirator port, generates a high-vacuum area in the air tube at the entrance of the aspirator port, said high-vacuum area then attracts sand from the bottom of the air tube while taking only a small quantity of sand from the bottom of the sand tube. Sand which is drawn at an increasing rate thru the aspirator port occupies space in said port causing a restriction in said port, reducing airflow and as a result a consequent reduction of vacuum at inlet side of aspirator port. When the vacuum at inlet side of aspirator port is reduced, there is a corresponding reduction of sand flow thru said port from bottom of air tube and as a result an increase of the volume of air will flow thru aspirator port. The cycle is then repeated and stabilization of the sand-air mixture takes place.

This means of metering sand and air thru a submerged fixed orifice has been found thru numerous tests to be the ideal method for producing nonturbulent nonpulsating sand-air flow. A nonturbulent mixture will flow faster in the lift tube due to the fact that it generates a minimum of internal friction in said tube during accelerated flow from zero velocity to final or maximum velocity. Tests have proven that nonturbulent sand and air mixtures generated by this invention have reduced wear and nozzle deterioration.

Tests have also proven that nonpulsating sand and air mixtures generate a greater working force at the blast-head nozzle exit. A mass of pulsating sand and air loses considerable energy in stopping and starting.

My device utilizes the kinetic energy of a small quantity of sand flowing at a very rapid rate of acceleration thru a flexible lift hose, gaining energy following the law of mass times acceleration as it travels to the blasting head and imparts an increased working force upon the surface to be cleaned.

An object of this invention is to provide a means for blasting sand particles with compressed air wherein a maximum of convenience is engineered into a simple, reliable and efficient aspirator probe device which draws sand from any open container.

Another object of this invention is to provide a means for blasting sand particles with compressed air wherein a desirable mixture of sand is automatically combined with a quantity of air for any flow rate demanded by the blasting head.

Another object of this invention is to generate kinetic energy within the mass of sand and air flowing in the hose connecting the aspirator probe to the blasting head thereby providing a maximum working force at the blasting head.

Another object of this invention is to provide a simple means of changing blasting sand by removing aspirator probe from one container and inserting it into a container with a different sand without the inconvenience of emptying the first container.

Another object of this invention is the reduction of wear on the nozzle and other internal working parts of the blasting head, said wear reduction being due to the laminar or nonturbulent flow of the sand mixture from the aspirator probe device to the blasting head.

Another object of this invention is to provide a nonpulsating supply of sand and air to the blasting head.

Another object of this invention is to provide an immediate flow of sand and air to the blasting head from a remote sand source.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic view of the sandblasting assembly showing the aspirator probe inserted into a sand or fluid container and connected to a well-known blasting head by a flexible hose.

FIG. 2 shows an enlarged perspective view of the aspirator probe, partly in section showing the aspirator port.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to FIG. 1, I provide an aspirator probe comprising a sand tube 1 and a shorter air tube 2, the sand tube 1 connected to one end of a flexible tube 3, the other end of said tube 3 connected to sand inlet of any well-known sand blast head 4.

The sand blast head 4 has incorporated therein a compressed air control valve 5, thus allowing the compressed air to be fed thru the compressed air valve 5 and then thru sand blast head 4 wherein suction is developed by conventional venturi means.

The sucking action is then transferred from blast head 4 thru flexible tube 3 and finally thru sand tube 1 where sand 7 is picked up by sand tube 1 thru opening 8 in sand tube 1 and thru opening at bottom of sand tube 1.

The said aspirator probe which consists of sand tube 1 and air tube 2 is welded together at positions 9 and 10.

A port 11 the sand-air mixing port is directly in line with said opening 8, said port 11 the sand-air mixing port which will be explained subsequently, receives a vacuum from sand tube 1 thru flexible tube 3 from venturi action of blast gun 4 when air valve 5 is depressed, said vacuum drawing a mixture of sand and air thru aforesaid assembly and finally out thru sand blast nozzle 12.

The said aspirator probe can be inserted in any suitable container 13.

Referring now to FIG. 2 the aspirator port 11 is shown in section, said opening 8 is in coaxial alignment with port 11 which connects the sand tube 1 and air tube 2. Port 11 preferably is smaller in diameter than either the inside diame-

ter of tube 1 or tube 2 this provides a high velocity at port 11. Port 11 is drilled thru said tubes at a distance near the bottom ends of said tubes.

Opening 8 and port 11 are always positioned below the level of the sand in the sand container. Top of tube 2 the air tube which is the shortest tube is always positioned above the sand level and exposed to atmospheric pressure.

Thru my novel arrangement for sandblasting, I have provided an efficient means of automatically controlling the mixture of sand and air thru a common orifice resulting in a more desirable flow pattern to the blasting head.

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 device as set forth in the appended claim.

I claim:

1. A sand aspirator probe for connection to a sand-air input hose and to a container of sand, said sand aspirator probe comprising two parallel tubes of unequal length welded together, the said length being sufficient to probe into the sand and to extend above the surface of the sand, said tubes being open at both ends and flush at their bottom ends, said tubes comprising a sand tube and an air tube, the sand tube being longer than the air tube to provide a means of attachment to a sand-air input hose connected to a sandblast head, said tubes containing a connecting port having a diameter smaller than the inside diameter of said tubes and drilled near the bottom ends of said tubes, and an opening in said sand tube in alignment with said connecting port.