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Desjardins

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[54] **SANDBLASTER**

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[51] **Int. Cl.**[3] **B24D 11/00**

[52] **U.S. Cl.** **51/438;** 51/427; 51/436

[58] **Field of Search** 51/438, 436, 427

[56] **References Cited**

U.S. PATENT DOCUMENTS

979,897	12/1910	Steedman	51/436
2,063,699	12/1936	Schellin	51/438
2,210,335	8/1940	Mueller	51/438
2,367,647	1/1945	Mott	51/436
2,405,854	8/1946	Ruemelin	51/438
3,102,368	9/1963	Smith	51/438
3,543,444	12/1970	Mehta	51/427
3,553,895	1/1971	Power	51/436
3,557,498	1/1971	Lindsay .	
3,798,841	3/1974	Eppler	51/436
4,080,761	3/1978	Burns	51/438

FOREIGN PATENT DOCUMENTS

8255	7/1933	Australia	51/438
351709	5/1905	France	51/436

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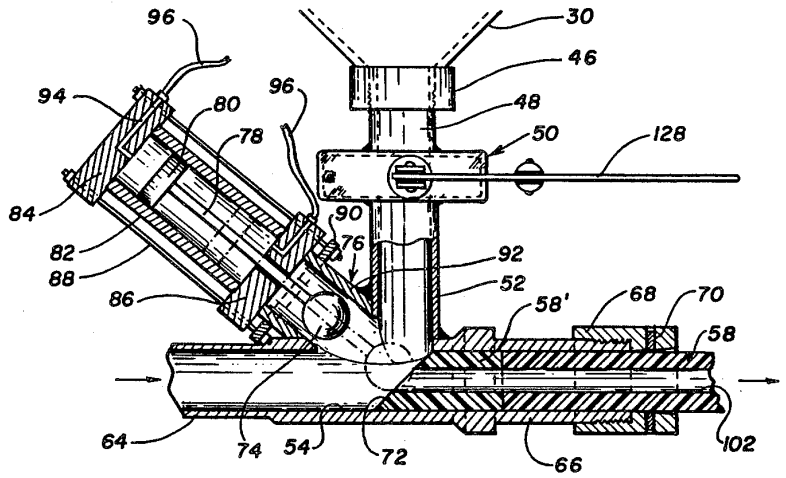
[57] **ABSTRACT**

Sandblasting machine which includes a container for the sand, the bottom end of which is in communication with a sand flow-regulating valve, in turn communicating with a mixing chamber for the compressed air and sand. The outlet of said mixing chamber consists of the inner end of a hose serving to feed the air-sand mixture to the sandblasting nozzle. This inner end of the hose forms a valve seat, which, in conjunction with a ball member, forms a shut-off valve for the sand and air mixture. This shut-off valve is operated by a pneumatic cylinder remotely controlled at the sandblasting nozzle. The inner end of the hose may easily be periodically cut when the abrasive action of the sand wears it out.

2 Claims, 7 Drawing Figures



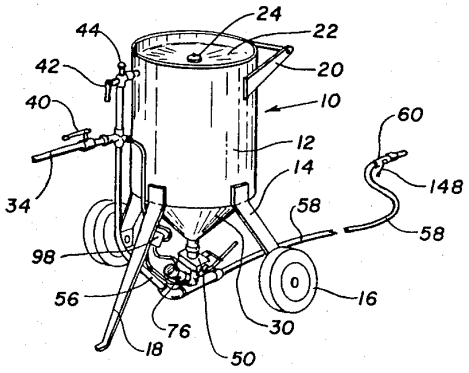


Fig. 1

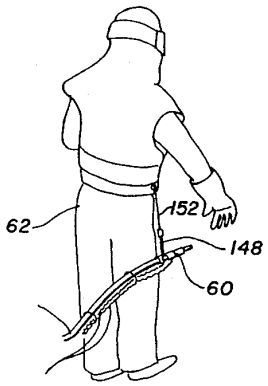


Fig. 3

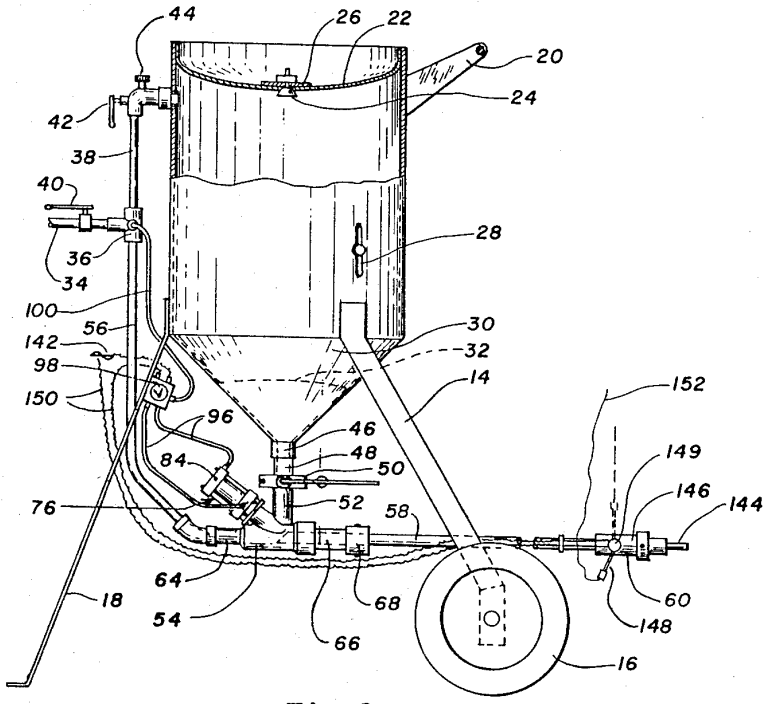


Fig. 2

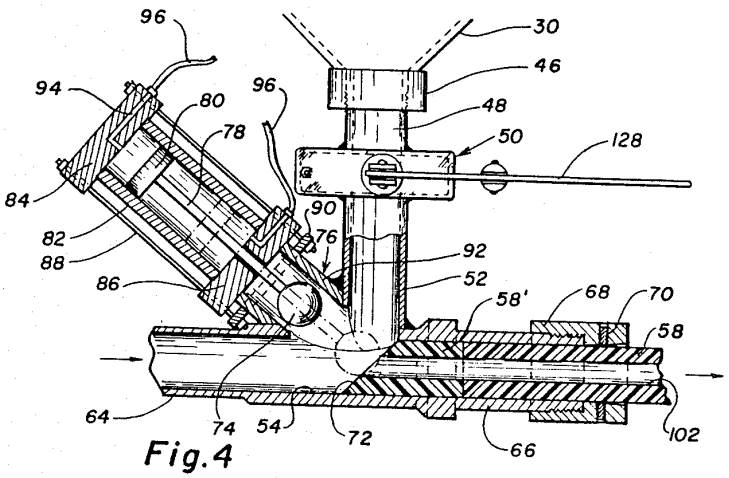


Fig.4

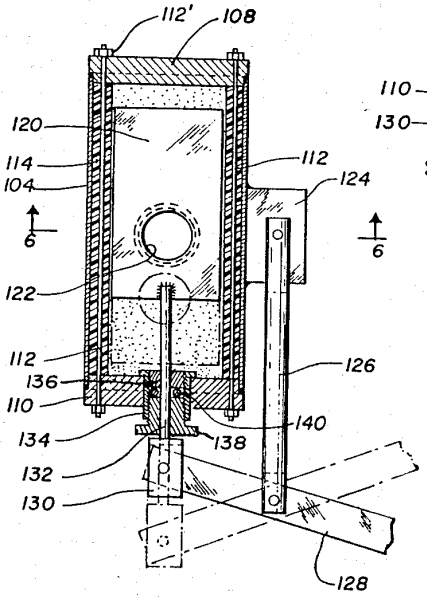


Fig.7

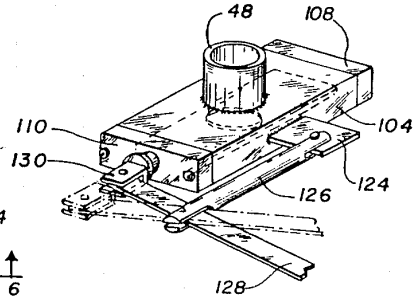


Fig.5

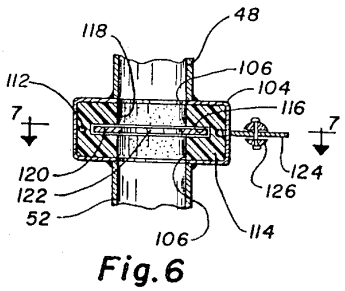


Fig.6

SANDBLASTER

FIELD OF THE INVENTION

This invention relates to sandblasting machines, more particularly to an improved air-sand mixture flow control device for such machines.

BACKGROUND OF THE INVENTION

Normally use of a sandblaster requires that the flow of abrasive material, such as sand, and compressed air be shut off during operation at times, for example to allow the nozzle operator to change position. Therefore, such machines are provided with air-sand mixture control or shut-off valve means which may be summarized as being relatively complex.

Another equally-important disadvantageous characteristic of sandblasters is that certain internal parts become damaged relatively quickly under the abrasive action of high velocity air-sand mixtures. For example, U.S. Pat. No. 3,557,498, issued to Lindsay, has a sand inlet orifice 51, washer 58 and cushion 57 which can be expected to sustain high wear in a relatively short time, thereby needing frequent replacement and resulting in a loss of work efficiency.

OBJECTS OF THE INVENTION

In view of the above, it is a prime object of the invention to provide a sandblaster having an abrasive-air flow control means which can instantly shut off or open the flow of the abrasive-air mixture and which is of simple construction.

It is another important object of the invention to provide a sandblaster wherein most of the internal elements of the control means are not exposed to the abrasive flow.

It is yet another object of the present invention to provide a sanblaster wherein the control means can be remotely actuated by the blasting nozzle operator.

It is still another object of the invention to provide a sandblaster having a sand-regulating valve and a shut-off valve which can be easily and quickly repaired when they become too worn from abrasion.

SUMMARY OF THE INVENTION

The above and other objects and advantages of the invention are realized according to a preferred embodiment comprising an upright tank or container designed to contain an abrasive grit (usually sand) under pressure, as is known. The lower portion of the tank is preferably funnel-shaped, opening into a sand-feed inlet, the latter being vertically oriented and communicating with an air-sand mixing chamber at its lower end.

Intermediate this lower end and the bottom of the sand tank, the sand-feed inlet has sand-feed regulating valve means. The means determines the air-sand ratio to be used and is usually adjusted to one setting for an entire operation of sandblasting.

The mixing chamber is defined by the lower end of the sand-feed inlet and its intersection with a compressed air inlet. The outlet of the mixing chamber is formed by the inner end of a sandblasting hose inner portion. This inner end of the hose forms a valve seat for a ball member which together define the shut-off valve.

Preferably, a pneumatic cylinder and piston connected to the air source of the sandblaster are provided

to move the associated ball member, and this cylinder is remotely actuated at the sandblasting nozzle.

The inner end of the sandblasting hose is preferably bevelled and forms a valve seat for the ball member, which then moves in an inclined path.

Attachment means are provided to removably attach the inner portion of the hose to the mixing chamber.

It will be readily understood that the only parts of the invention subject to abrasive wear are the sand-feed regulating valve and the valve seat-forming end of the inner hose portion. The former is specifically designed for easy replacement of worn parts, as will be described below, while the levelled end can be simply cut when it becomes worn. The sand-air flow control means is not exposed to the sand at all.

BRIEF DESCRIPTION OF THE DRAWINGS

The above will be fully understood by referring to the preferred embodiment of the invention, illustrated by way of the accompanying drawings, in which:

FIG. **1** is a perspective view of a sand-blasting apparatus embodying the invention;

FIG. **2** is a side elevational view of the apparatus, partly sectioned;

FIG. **3** is a rear perspective view of an apparatus operator, showing the sandblasting hose nozzle tied to the operator's waist by a strap;

FIG. **4** is an enlarged, cross-sectional view of the bottom portion of the apparatus shown in FIG. **2**, showing the air-sand control assembly;

FIG. **5** is a cross-sectional view, taken along line **5—5** of FIG. **6**, of the outlet control and a sectional view taken longitudinally of a part of the sand inlet on each said thereof, taken along line **5—5** of FIG. **6**;

FIG. **6** is another cross-sectional view, taken along line **6—6** of FIG. **5**; and

FIG. **7** is a perspective view of the sand-feed regulating means.

Like numerals refer to like elements throughout the drawings.

DETAILED DESCRIPTION OF THE INVENTION

The sandblasting apparatus **10** includes a cylindrical sand container or tank **12** mounted in upright position on legs **14** provided with wheels **16** and on a leg **18** adapted to directly engage the ground. The apparatus can therefore be wheeled about by means of handle **20** fixed to the upper portion of the tank **12**. Leg **18** maintains the tank upright when stationary.

As shown in FIG. **2**, the top end of the tank is closed by a circular and concave sealing plate **22**, which has a central aperture sealingly closable by a check valve **24** carried by washer **26**. Check valve **24** permits sand filling of the tank **12** but closes when the latter is air-pressurized. The tank **12** has the usual clean-out **28**. The bottom portion of the tank **12** forms a funnel **30** provided with a grating **32** to screen undesirably large sand agglomeration. The tank is adapted to be put under air pressure by means of air supply line **34**, T fitting **36** and upper air-line **38**, which communicates with the top portion of the tank. Air-lines, or piping **34** and **38**, are provided with manually-operated shut-off valves **40**, **42**, respectively. Top line **38** is also provided with an air-bleeding valve **44**, also manually operable to bleed the pressurized tank. The bottom of the funnel **30** is connected by means of a threaded collar **46** to the upper nipple **48** of a sand flow-regulating valve **50**, the lower

nipple **52** of which forms part of an air and sand mixing chamber **54** through the sand flow-regulating valve **50**, while air under pressure is fed to the mixing chamber by air pipe **56** connected to the T fitting **36**. A flexible hose **58** is connected to the outlet of the mixing chamber **54** and is terminated by a sandblasting nozzle **60** adapted to be manipulated by the operator, indicated at **62** in FIG. **3**.

As shown in FIG. **4**, the mixing chamber **54** is formed by the intersection of the upright lower nipple **52** with a horizontal nipple **64**, to the outer end of which is connected the air pipe **56**. Nipple **64** forms a co-axial extension **66** protruding from the opposite side of lower nipple **52**; said extension receives inner end of the hose **58** which is fixed in position by means of a threaded collar **68** screwed on the extension **66** and also by means of setscrews **70** threaded at angularly-spaced positions around collar **68** and engaging the hose **58**. The hose **58** has a separate inner part **58'** which has a bevelled inner end **72** making a 45-degree angle with the long axis of the hose and exposed within the mixing chamber **54**. This bevelled end **72** forms a valve seat for a ball-shape valve member **74** of a shut-off valve, generally indicated at **76**, for the sand and air mixture. The ball member **74** is secured to the outer end of a piston rod **78**, the other end of which is fitted with a piston **80**, which is movable within a cylinder **82** closed at both ends by end caps **84**, **86**, the end cap **86** having a central hole for the passage of piston rod **78**. The assembly of the cylinder **82** and end caps **84** and **86** is secured together in fluid-tight relation by tie-rods **88**, also securing the cylinder assembly to a flange **90** surrounding and fixed to the outer end of a nipple **92** in communication with a mixing chamber **54** and welded, or otherwise fixed, to the lower nipple **52** and the horizontal nipple **64**, being in the plane of said two nipples and making a 45-degree angle with respect to each nipple. The end caps **84**, **86**, are provided with air passages **94** in communication with the interior of the cylinder **82** on both sides of the piston **80** and connected to pressurized air-lines **96**, in turn connected to a three-way valve **98** fixed to the apparatus, for instance to leg **18**. The three-way valve **98** is fed with air under pressure by a branch air-line **100** connected to the T fitting **36**.

As shown in FIG. **4**, the ball member **74** moves in a path perpendicular to the bevelled end face **72** of hose **58** and makes sealing contact with the edge of the center bore **102** of the hose **58**.

In the open retracted position of the ball member **74**, the latter is wholly confined within the nipple **92** and out of the path of the sand and air streams flowing into the mixing chamber at the intersection of nipples **52** and **64**.

Therefore, there is very little abrasive action on the ball member **74** in the operation of the sandblasting machine. Only the exposed inner end **72** of the hose is subjected to abrasion. When worn out, hose part **58'** is simply replaced. If parts **58**, **58'** are made of one piece, the inner end of the hose may be very easily detached from the tubular extension **66** and cut again at a 45-degree angle and replaced within the mixing chamber.

Referring now to FIGS. **4** to **7** inclusively, there is shown the sand feed-regulating valve means **50**. Valve means **50** includes a rectangular elongated box-shaped casing **104**, made of rigid material and provided with central and registering top and bottom openings communicating with the respective sand nipples **48** and **52**. Each end of casing **104** is closed by end cap members **108,110** which are detachably secured to casing **104** by a pair of laterally-spaced longitudinal tie-rods **112** and nuts **112'**.

The interior of casing **104** is filled with a sealing block **114**, preferably made of rubber and formed with a longitudinal slot **116** defining a slide pathway in casing **104**. Block **114** further has a transverse through bore **118** in register with casing openings **106**.

A flat rectangular slide plate valve **120** is provided, for longitudinal sliding inside casing **104** along the pathway, and formed with a central hole **122**. Operating means are also provided to move plate **120**, consisting of an outwardly-projecting flange **124** secured to one side of casing **104**, a lever **126** pivotally secured to flange **124** and an operating arm **128**. The latter is pivotally secured in its middle to the opposite end of lever **126** and also to a clevis **130** fixed to the outer end of a rod **132**, which extends through end cap **110** and is secured to an end of slide plate **120**. Compressible block makes a sliding and fluid-tight fit with slide plate **120**. An inwardly-threaded bushing **134** is fixed through end cap **110** and surrounds rod **132**. Plug **136** and **138** are screwed in bushing **134** and their bore has a sliding fit with rod **132**. A packing **140** surrounds rod **132** and is compressed by screwing outer plug **138** towards plug **136**.

It will be clear that the flow of sand may be metered precisely as desired by moving plate valve **120** such that its hole **122** is in partial or complete registry with the through bore **118**, or alternately, in total disregistry to shut the flow of sand. Moreover, the rubber sealing block **114** ensures that the only portion of the assembly exposed to high abrasion be the portion of plate valve **120**, immediately adjacent hole **122**. Whenever plate valve **120** is sufficiently worn away, it is very simply replaced by disconnecting operating arm **128** and removing end cap **110**.

Three-way valve **98** is preferably an electro-valve connected to an electrical power source **142**.

Nozzle assembly **60** includes a nozzle **144** and a handle portion **146**, the latter being provided with a pivotally-attached control lever **148** which operates a switch **149** electrically series connected with electro-valve **98** by a pair of wires **150** running along hose **58**. Lever **148** pivots from a downwardly vertical position to an upwardly vertical position, being provided with a small strap or cord **152** which can be attached to the waist of operator **62** (cf. FIG. **3**). It will be clear that in the former position, shut-off valve **76** will be open, permitting the sand-air mixture to reach nozzle **60**, while in the latter position, the valve **76** will close to instantly shut off the flow. Thus, when operator **62** releases nozzle handle portion **146**, lever **148** will be pulled upwardly by cord **152**, thereby constituting a dead-man safety feature.

It is to be noted that, should cleaning of the internal elements of the machine, specifically mixing chamber **54** and the bore of hose **58**, become necessary, it is a simple matter to shut sand-regulating valve **50** while leaving ball member **74** open, so that only compressed air will be blasted therethrough.

What I claim is:

1. A sandblasting apparatus comprising an upright container for containing abrasive grit under pressure and having a discharge opening at its bottom, a manually-operable grit flow-regulating valve communicating with said discharge opening, an air and sand mixing chamber including a compressed air inlet nipple, a grit inlet nipple, an outlet nipple and a fourth nipple forming

a unitary unit and adapted to be mounted under said upright container with said grit inlet nipple disposed upright and communicating with said grit flow-regulating valve, aid air inlet nipple and outlet nipple axially aligned and making a substantially right angle with said grit inlet nipple, said fourth nipple making an acute angle with said air inlet nipple, all of said nipples intersecting and defining a cavity at their intersection, said air inlet nipple provided with means for connection to a supply of air under pressure, a sandblasting hose, of elastomeric material, having one end portion inserted into and detachably secured to said outlet nipple and carrying a nozzle at its other end portion, said hose having a bore, the inner end of said hose exposed within said cavity, a double-acting pressurized air-operated cylinder and piston unit removably mounted on, and carried by, the outer end of said fourth nipple, a piston rod fixed to the piston of said unit and axially extending through said fourth nipple, a ball fixed to the outer end of said piston rod and of larger diameter than that of said bore, said ball movable by said cylinder and piston unit between a retracted position confined within said fourth nipple and shielded from grit flowing through said grit inlet nipple, and an advanced position abutting said hose inner end and sealing said bore, and remote control means operable at said nozzle for operating said cylinder and piston unit.

2. A sandblasting apparatus as defined in claim 1, wherein said inner end of said hose exposed within said cavity is formed by a hose portion wholly confined within said outlet nipple and forming a part separate from the remaining portion of said hose and making a joint with said hose remaining portion located within said outlet nipple.

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