April 8, 1969 H. K. NYE 3,436,866

AUTOMATIC SANDBLAST MACHINE

Filed Oct. 23, 1967 Sheet 1 of 2

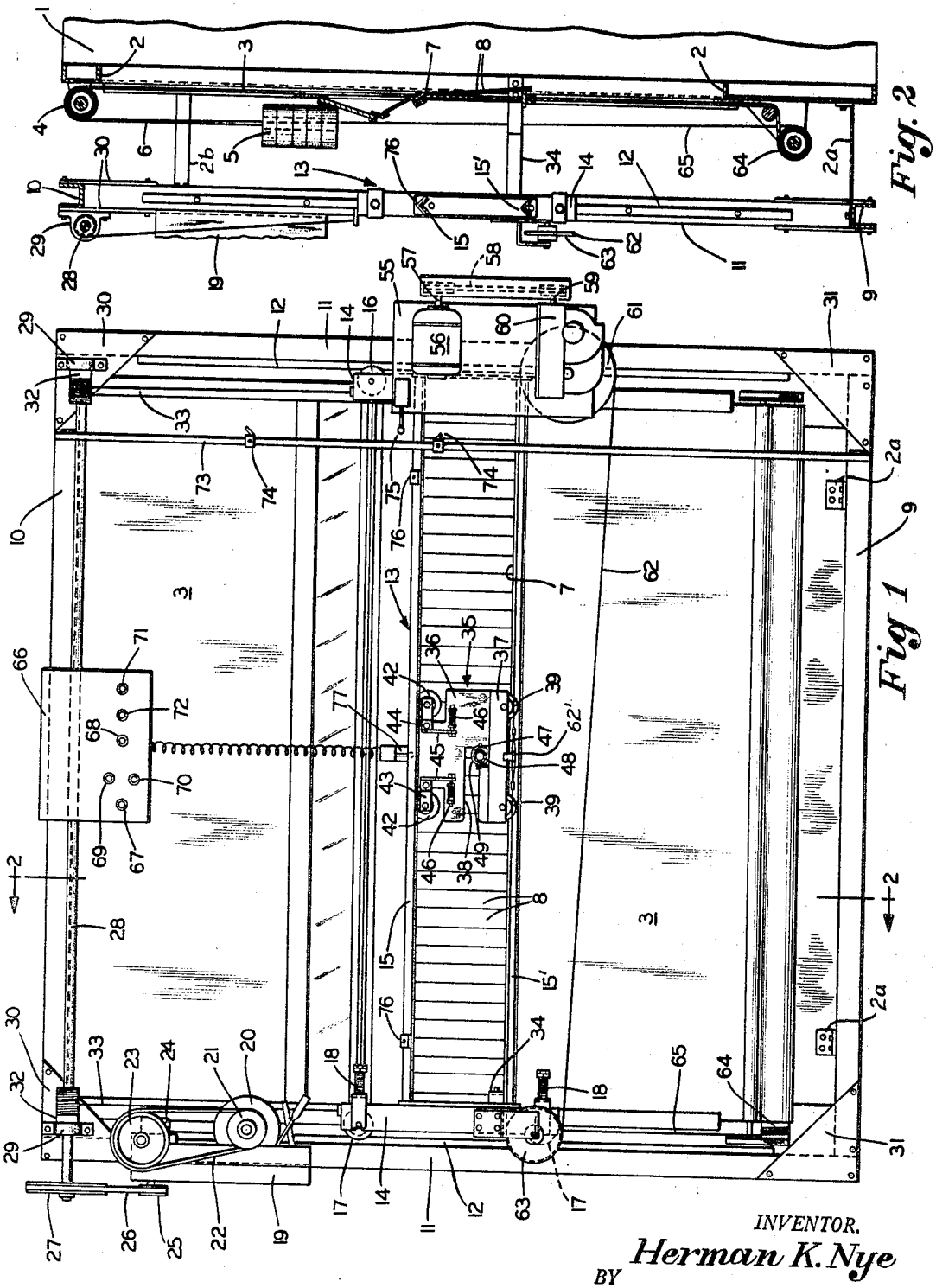


Fig. 2

Fig 1

INVENTOR.
Herman K. Nye
BY
Frease & Bishop
ATTORNEYS

April 8, 1969 H. K. NYE 3,436,866

AUTOMATIC SANDBLAST MACHINE

Filed Oct. 23, 1967 Sheet 2 of 2

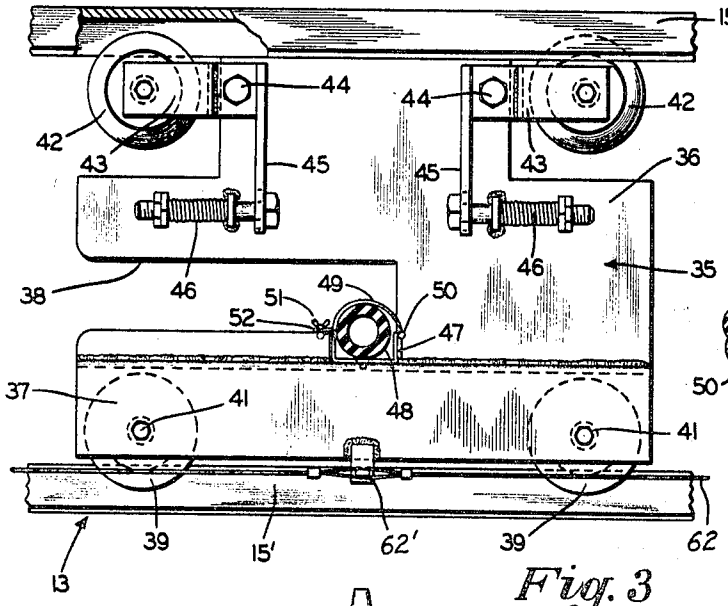


Fig. 3

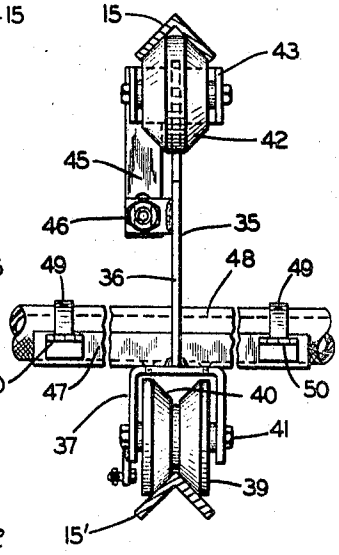


Fig. 4

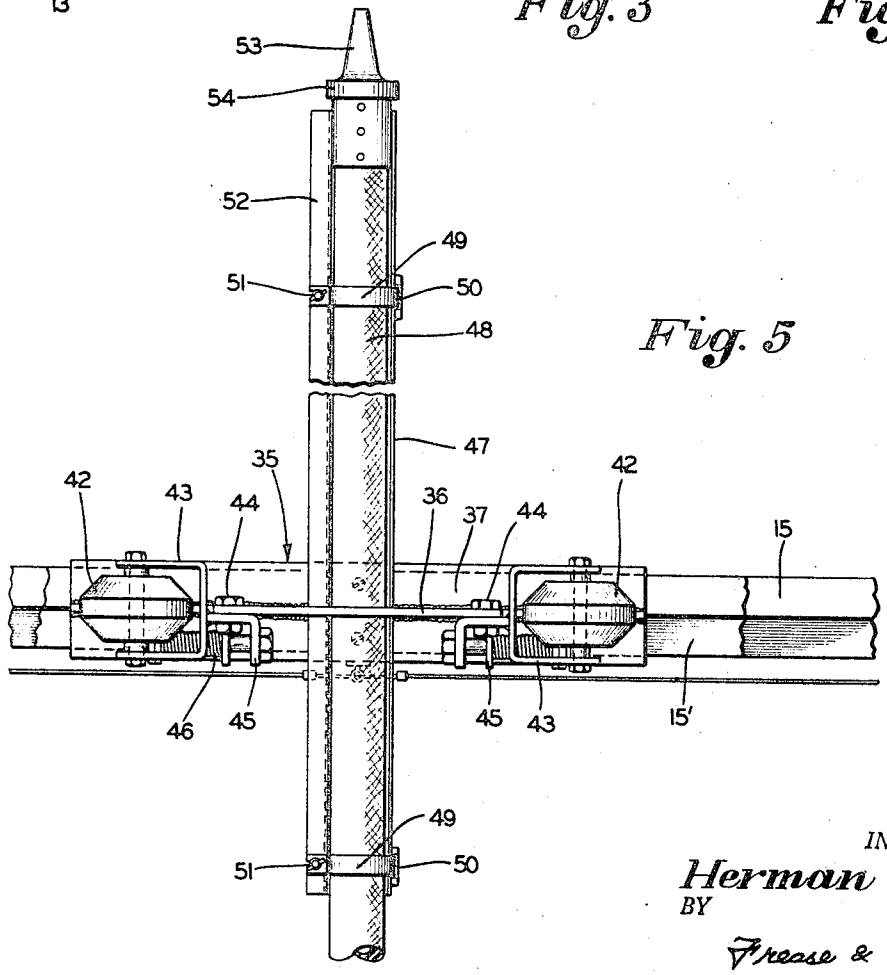


Fig. 5

INVENTOR.
Herman K. Nye
BY
Frease & Bishop
ATTORNEYS

United States Patent Office

3,436,866

Patented Apr. 8, 1969

3,436,866

AUTOMATIC SANDBLAST MACHINE

Herman K. Nye, Hummelstown, Pa., assignor to The Will-Burt Company, Orrville, Ohio, a corporation of Ohio

Filed Oct. 23, 1967, Ser. No. 677,216
Int. Cl. B24c 3/06, 3/12
U.S. Cl. 51—8 11 Claims

ABSTRACT OF THE DISCLOSURE

An automatic sandblast machine for use upon work received within an enclosure having an access opening and a vertically movable curtain having a transverse slot and a sealing surface cooperating with said access opening. A rectangular upright frame is spaced outwardly from the curtain, an elongated, horizontally disposed carriage is vertically movable in the frame, means connects said carriage to the curtain adjacent to said transverse slot, and a generally C-shaped carriage is horizontally movable upon said first named carriage, and provided with means for clamping a sandblast jet projecting through the slot.

BACKGROUND OF THE INVENTION

Field of the invention

The invention relates to apparatus for automatic sandblasting of tombstones, tiles, tablets of stone, steel, copper, bronze and any other material which has a surface to be acted upon by a comminuted abrasive material blast to provide a satin or frosted surface, a grooved lettering, borderline or similar surface.

Ordinarily, the surface to be acted upon is covered by a protecting stencil made of rubber or the like which is adhesively secured to the tombstones, tablets or the like. The stencil has the configuration desired to be acted upon cutout of the stencil.

Thereafter the comminuted abrasive material blast is produced by a sandblasting jet directed against the exposed portion surrounded by the stencil-covered surface. The cutout portions of the stencil are acted upon by the blast. The protected surfaces underneath the solid part of the stencil are not acted upon by the blast.

Description of the prior art

Such blasting process has previously been performed in an enclosure to receive the work to be acted upon. The enclosure has an access opening on one side. A curtain having a horizontal slot therein is hung over the access opening and is movable vertically with reference to the enclosure.

A sandblast jet is inserted through this slot and moved back and forth horizontally therein as the curtain is moved vertically. Originally the sandblast jet was operated manually and in the majority of cases the jet is still manually operated.

However, even the most skillful of operators manually operating the jet are unable to produce a sandblasting effect of the uniform quality, depth and thoroughness which is desired, since they cannot manipulate the jet with uniform motion and are likely to cut too deeply in some places and not deep enough in others.

Such hand operation is also harmful to the operators as the silica in the sand, or similar harmful substances in other abrasive material, is continuously inhaled by the operators who in time contract lung diseases such as silicosis.

In an effort to overcome these difficulties, an automatic sandblasting machine has been developed which includes a carriage horizontally movable upon the vertically movable curtain adjacent to the slot therein, the sandblast jet being located through said carriage and projected through the horizontal slot in the curtain.

Although this machine performed satisfactory work it was expensive to produce. The curtain had to be remodeled, horizontal tracks being built thereon upon which the carriage was movable. It was also found that although there are several types of curtains in use, made by different manufacturers, only one type of curtain, made by one manufacturer, could be used. This required scrapping of the expensive curtains in use upon many sandblasting enclosures.

Another drawback to this machine was the fact that the sandblast hose carrying the jet or nozzle was located through a round aperture in the carriage within which the hose fitted snugly. Since the nozzle has an enlargement thereon, in the form of a nut, it was necessary that the nozzle be removed from the hose in order that the hose be placed in this opening in the carriage, after which the nozzle was again replaced upon the hose.

As many operators of such equipment wish to discontinue the automatic operation at times and revert to hand-operated blasting, this required considerable additional work on the part of the operator.

SUMMARY OF THE INVENTION

The present invention is adapted for application to any conventional sandblast unit having an enclosure now in use regardless of the type of vertically movable slotted curtain covering the access opening therein.

An upright rectangular frame is mounted parallel to and spaced from the front of the curtain. A horizontally disposed elongated carriage is vertically movably mounted in said frame and means is provided attaching this carriage to the curtain. Means is provided for automatically moving this carriage up or down as desired in the frame and correspondingly moving the curtain therewith.

A second carriage is horizontally movable upon rails on the first carriage. The second carriage carries the sandblast hose and has an elongated horizontal slot through one side edge thereof through which the hose may be easily inserted without removing the nozzle therefrom.

A transversely disposed channel is located at the inner end of this slot in the carriage and projects through the slot in the curtain. The hose is laid in this channel with the nozzle at the inner end of the channel, and two hinged clamps are provided for holding the hose stationary in the channel.

It is therefore an object of the invention to generally improve the construction of automatic sandblast machines and to provide a sandblast machine which may be easily and readily applied to any existing sandblast enclosure regardless of the type of vertically movable curtain covering the access opening thereof.

Another object of the invention is to provide an automatic sandblast machine including a frame space from the front of the curtain of a sandblast enclosure, an elongated, horizontally disposed carriage in said frame, means for automatically moving the carriage up and down in the frame as desired, means connecting the carriage to the curtain for moving the curtain with the carriage, a second carriage horizontally movable upon rails on the first carriage, means for connecting a sandblast hose to the second carriage and means for automatically moving the second carriage horizontally upon the rails of the first carriage.

A further object of the invention is to provide such a sandblast machine in which the carriage carrying the sandblast hose has an elongated horizontal slot in one side with a transversely disposed channel member located in the inner end of the slot and hinged clamping means thereon.

A still further object of the invention is to provide a sandblast machine of the character referred to in which there are spring-mounted wheels upon each of said carriages.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation of a sandblast machine constructed in accordance with the invention;

FIG. 2 is a vertical sectional view taken on the line 2—2, FIG. 1;

FIG. 3 is an enlarged front elevation of the horizontally movable carriage;

FIG. 4 is an end view of the same; and

FIG. 5 is a top plan view of the same.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A conventional sandblast unit with an enclosure is indicated at **1** and has an access opening in one side, indicated at **2**. As in usual practice, a flexible curtain **3** is located in front of the access opening **2** and has a sealing surface cooperating with the access opening in sufficient sealing relationship with the enclosure to prevent any substantial outward escape of air and abrasive material past such sealing surface, as disclosed in Zieber et al. Patent No. 2,953,876, issued Sept. 27, 1960.

The upper end of the curtain is supported upon the curtain roller **4** upon which the curtain may wind and unwind. Counterweights **5**, attached to the roller **4** by cables **6**, maintain the curtain **3** under upward tension.

The usual horizontal slot **7** is provided in the curtain, said slot being normally covered as in usual practice by multiple layers of flexible curtain material, slit as indicated at **8**. So much of the structure is of usual and well known design, as is commonly provided for handblasting.

The invention comprehends mounting an upright frame on any typical sandblast unit spaced in front of the curtain by lower brackets **2***a* and upper brackets **2***b* (FIGS. 1 and 2). The frame comprises the horizontal bottom and top members **9** and **10**, respectively, and the vertical side members **11**, upon the inner surfaces of which are located the vertical rails **12**.

A horizontally disposed carriage, indicated generally at **13**, is vertically movable upon the vertical members **11** and comprises generally the vertical end members **14**, the horizontal, inverted spaced V-shape rails **15** and **15'** mounted on the vertical end members **14** and the double flanged wheels **16** and **17** journalled upon the vertical end members **14**, and riding on the vertical rails **12**. The wheels are preferably mounted in oil-sealed ball bearings.

As shown in FIG. 1 the wheels **17** may be spring-mounted, as indicated at **18**, so that the proper tension is maintained thereon at all times regardless of wear, and so that they are flexible enough to roll over any material adhering to the rails which might interfere with their free movement.

Mounted on one of the vertical members **11** is a bracket **19**, upon which is mounted a reversing electric motor **20** for controlling the vertical movement of the carriage **13**. A pulley **21** upon the shaft of the motor **20** is connected by belt **22** to a pulley **23** connected to a gear reduction **24**. A pulley **25**, connected to the gear reduction, is connected by belt **26** with a pulley **27** upon the shaft **28**. This shaft is journalled in bearings **29** mounted upon upper gusset plates **30** at the upper corners of the upright frame. Similar gusset plates **31** are provided at the lower corners of the frame for reinforcing the same.

Drums **32** are fixed upon opposite ends of the shaft **28** and cables **33** are attached to the drums and to the vertical end members **14** of the carriage **13**. Straps **34** connect the vertical end members **14** of the carriage **13** to opposite edge portions of the curtain **3** adjacent to the slot **7** therein so that the curtain will be raised and lowered in unison with the carriage **13**.

A second carriage, indicated generally at **35**, is mounted for back and forth horizontal movement upon the vertically movable carriage **13**. This carriage is shown in detail in FIGS. 3, 4 and 5 and comprises one of the principal features of the invention. This carriage comprises essentially the vertically disposed steel plate **36** with an inverted channel **37** welded or otherwise secured to its lower edge. The plate **36** has a horizontal slot **38** extending through one side edge thereof.

A pair of wheels **39**, having V-grooves **40** therein, are journalled in the inverted channel member **37** as indicated at **41** and ride upon the lower horizontal rail **15'**. The peripheries of the upper wheels **42** of the carriage **35** are of substantially wedge-shape and ride within the inverted V-shaped upper rail **15**. All of the wheels are preferably mounted on oil-sealed ball bearings. The upper wheels **42** are spring-mounted, each being journalled within the bifurcated arm **43** of an angle member pivoted at **44** upon opposite side edge portions of the steel plate **36**, the other arm **45** thereof being spring-mounted as indicated at **46**.

Thus the carriage **35** rolls in a horizontal direction on the two inverted V-shaped tracks **15** and **15'** so that the wheels are protected from accumulation of abrasive material. The two top wheels **42** being spring-mounted, a proper tension is maintained thereon at all times. The wheels are thus flexible enough to roll over any material that might interfere with their free movement. The top wheels rolling underneath the inverted V have the maximum protection from abrasive material.

A transversely disposed channel member **47** is mounted in the bottom of the inner end of the slot **38** in the steel plate **36** of the carriage **35** and is adapted to extend through the slitted portion **8** at the slot **7** of the curtain **3**. This channel member is adapted to receive the sandblast hose **48**. Clamping members **49** are pivoted as at **50** near opposite ends of the channel member **47** and provided with wing screws **51** for engagement with the lip **52** upon the channel member **47**. The nozzle is indicated at **53** with enlarged portion **54** thereon.

For the purpose of automatically moving the carriage **35** back and forth horizontally upon the rails **15** and **15'**, transmission mechanism is mounted upon a bracket plate **55** which is mounted upon one of the vertical members **14** of the carriage **13**. A reversing motor **56** is mounted upon the bracket plate **55** and a pulley upon the shaft **57** thereof is connected by belt **58** with a pulley upon the shaft **59** of a gear reduction **60**.

A pulley **61**, driven by the gear reduction **60**, is connected by a cable **62** with an idler pulley **63**, journalled upon the other side member **14** of the horizontal carriage **13**.

The cable **62** is connected to the carriage **35** as indicated at **62'** in FIGS. 1 and 3.

In the event the curtain is of the type having a bottom roller **64**, as shown in FIGS. 1 and 2, a cable **65** may connect the top roller **4** and the bottom roller **64** so as to cause the curtain to roll upon the bottom roller **64** as it unrolls from the top roller **4**, or vice versa.

A control cabinet **66** is provided upon the front of the frame and has thereon a starting switch button **67** for starting vertical movement of the carriage **13** and a starting button **68** for starting horizontal movement of the carriage **35**. Lighted push buttons **69** and **70** are provided for indicating up and down movement, respectively, of the carriage **13** and for manually controlling the same when desired.

Lighted right and left push buttons **71** and **72**, respectively, are provided for indicating right and left hand horizontal movement, respectively, of the carriage **35**, as well as for manually operating the same.

A vertical bar **73** is connected to and spaced outwardly from the bottom and top members **9** and **10**, respectively, of the frame and has mounted thereon a pair of adjustable stops **74** for alternate engagement by a limit switch **75**,

mounted upon the bracket plate **55**, for automatically reversing up and down movement of the carriage **13**.

In like manner a pair of adjustable stops **76** are mounted upon the top rail **15** of the carriage **13** for alternate engagement with a limit switch **77** for automatic movement of the carriage **35** horizontally back and forth.

THE OPERATION

In the operation of the machine, after the work has been set in place within the enclosure **1**, with the surface to be sandblasted properly covered with a stencil, the machine is adjusted for the desired operation.

The adjustable stops **74** are set at the proper positions on the vertical bar **73** to provide for the desired up and down movement of the carriage **13**, and the adjustable stops **76** are set at the proper positions on the upper horizontal rail **15** of the carriage **13** to provide for the desired back and forth horizontal movement of the carriage **35**.

The hose **48** is clamped in place in the transverse channel member **47** of the carriage **35**, with the nozzle **53** projected through the slot in the curtain, and the hose is connected to a suitable source of sand or other abrasive material propelled by a blast of compressed air on the like.

The starting switches **67** and **68** are closed to start the vertical movement of the carriage **13** and the curtain **1**, and the horizontal movement of the carriage **35**, and the push buttons **69** or **70** and **71** or **72** are pushed to start either up or down vertical movement and either right or left horizontal movement.

The machine will then operate automatically in the general manner as described in the above mentioned Zieber et al. Patent No. 2,953,876, continuously moving the blast jet back and forth horizontally and up and down vertically within any desired limits.

Many operators of such equipment wish at times to discontinue automatic operation and revert to handblasting for certain work. To do this the automatic switches **67** and **68** in the control cabinet **66** are first opened. The opening between the horizontal rails **15** ad **15'** on which the carriage **35** rides corresponds exactly with the slot **7** in the curtain **1**.

The carriage **35** is built in such a manner that by running it to the right, the two clamps **49** which hold the hose **48** and nozzle **53** in position for automatic blasting can be immediately detached by loosening the wing screws **51** and sliding the hose and nozzle out of the slot **38**.

When the handblasting operation is completed, the hose and nozzle may be easily and readily placed back in original position and the automatic buttons in the control cabinet **66** are pushed to put the machine back into automatic operation.

In the foregoing description certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiments of the improved construction illustrated and described herein are by way of example, and the scope of the present invention is not limited to the exact details of construction.

Having now described the invention or discovery, the construction, the operation, and the use of preferred embodiments thereof, and the advantageous new and useful results obtained thereby; the new and useful construction, and reasonable mechanical equivalents thereof obvious to those skilled in the art, are set forth in the appended claims.

I claim:

1. In an automatic sandblast machine comprising an enclosure adapted to receive work to be acted upon by a blast of comminuted abrasive material, said enclosure having an access opening, a movable curtain having a sealing surface cooperating with said access opening to produce a sufficient sealing relationship with said enclosure to prevent any substantial outward escape of air past said sealing surface, said curtain having a transverse slot, a comminuted abrasive material blast hose and nozzle projecting through the slot, a carriage movable back and forth adjacent to the slot and supporting said blast hose and nozzle, said carriage having a slot through one side thereof for receiving said blast hose, a downwardly disposed notch at the inner end of the slot in said carriage for receiving said blast hose and nozzle, and means for holding said blast hose and nozzle in said downwardly disposed notch.

2. In an automatic sandblast machine as defined in claim **1**, the means at the inner end of the slot for receiving and holding said blast hose and nozzle comprising a transversely disposed channel member located in said notch, and hinged clamping members near each end of said channel member.

3. In an automatic sandblast machine as defined in claim **1**, means for supporting said carriage comprising spaced upper and lower rails movable up and down in unison with the curtain, and wheels upon the carriage riding on said rails.

4. In an automatic sandblast machine as defined in claim **3**, said rails being inverted V-shape, the upper wheels having peripheries of substantially wedge-shape cross section riding in the upper rail and the lower wheels having V-shape peripheral grooves riding on the lower rail.

5. In an automatic sandblast machine as defined in claim **3**, certain of said wheels being spring-mounted.

6. In an automatic sandblast machine as defined in claim **3**, each of the wheels riding on said upper rail being mounted upon one arm of an angle member having two arms and pivoted to the carriage, the other arm of the angle member being spring-biased urging the last named wheels against the upper rail.

7. In an automatic sandblast machine comprising an enclosure adapted to receive work to be acted upon by a blast of comminuted abrasive material, said enclosure having an access opening, a movable curtain having a sealing surface cooperating with said access opening to produce sufficient sealing relationship with said enclosure to prevent any substantial outward escape of air past said sealing surface, said curtain having a transverse slot, spaced upper and lower rails located adjacent to said slot, means for moving said rails up and down in unison with the curtain, a carriage movable back and forth relative to said slot in the curtain, upper and lower wheels upon the carriage riding upon the upper and lower rails respectively, one set of said wheels being spring-mounted, and a comminuted abrasive material, blast hose and nozzle connected to said carriage.

8. In an automatic sandblast machine as defined in claim **7**, in which the horizontal rails are both of inverted V-shape, the carriage having upper wheels with peripheries of wedge-shape cross section riding in the upper rail, and the lower wheels having V-shaped peripheral grooves riding on the lower rail.

9. In an automatic sandblast machine as defined in claim **7**, each upper wheel being mounted upon one arm of an angle member having two arms and pivoted upon the carriage, the other arm of said angle member being spring-biased.

10. An automatic sandblast machine attachment for a sandblast unit of the type in which work to be acted upon by a blast of comminuted abrasive material is located in a unit enclosure having an access opening closed by a vertically movable curtain maintained in sealing relation with said enclosure access opening and in which the unit curtain has a transverse slot; the attachment including a rectangular upright frame comprising horizontal bottom and top and vertical side members, means mounting the

frame on a sandblast unit parallel with and spaced outwardly of the unit movable curtain, said frame having a pair of spaced vertically disposed rails; a first horizontally disposed vertically movable carriage formed of vertical end members and a pair of vertically spaced horizontally disposed rails, wheel means mounted on the first carriage and engaged with and movable along the frame rails; a second carriage having wheel means mounted and movable on the first carriage rails; means connecting the first carriage with the unit movable curtain; means mounted on the frame for automatically moving the first carriage up and down upon the frame; means mounted on the first carriage for automatically moving the second carriage horizontally back and forth upon the first carriage; and a comminuted abrasive material blast jet supported upon

the second carriage and adapted to project through the slot in said unit curtain.

11. The construction defined in claim **10** in which certain of the wheel means on each of the first and second carriages are spring mounted.

References Cited

UNITED STATES PATENTS

1,849,384	3/1932	Ruemelin	51—8
1,882,541	10/1932	Billman	51—8
2,063,054	12/1936	Rosenberger	51—8
2,075,369	3/1937	Stetler	51—180
2,495,269	1/1950	Lindmark	51—15
2,953,876	9/1960	Zieber	51—8

LESTER M. SWINGLE, *Primary Examiner.*