

(No Model.)

2 Sheets—Sheet 1.

J. E. MATHEWSON.
SAND BLAST APPARATUS.

No. 531,379.

Patented Dec. 25, 1894.

FIG. 1.

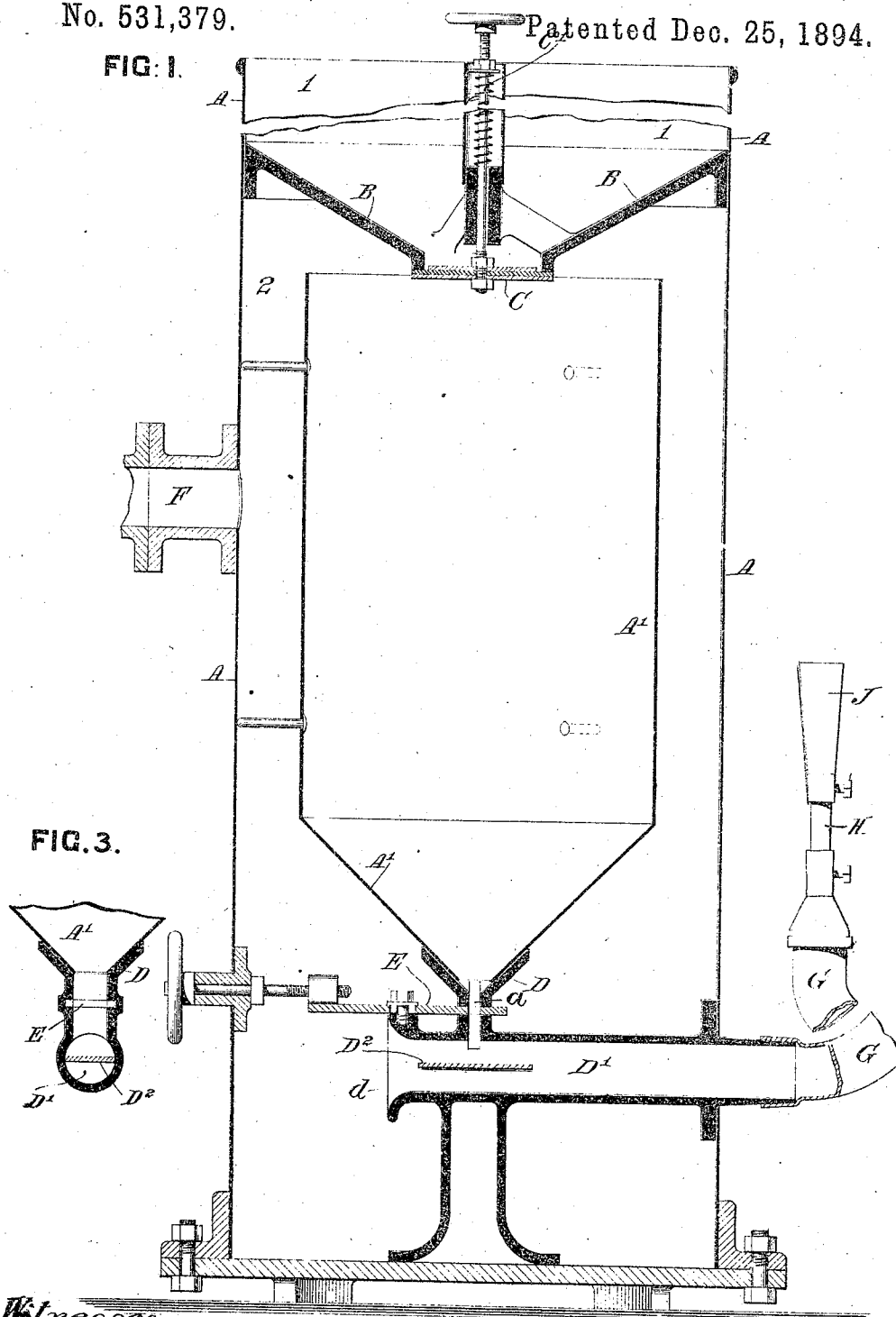
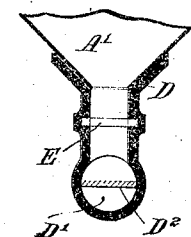


FIG. 3.



Witnesses:-
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Richard

Inventor Jeremiah Eugene Mathewson
by attorneys Brown & Leonard

(No Model.)

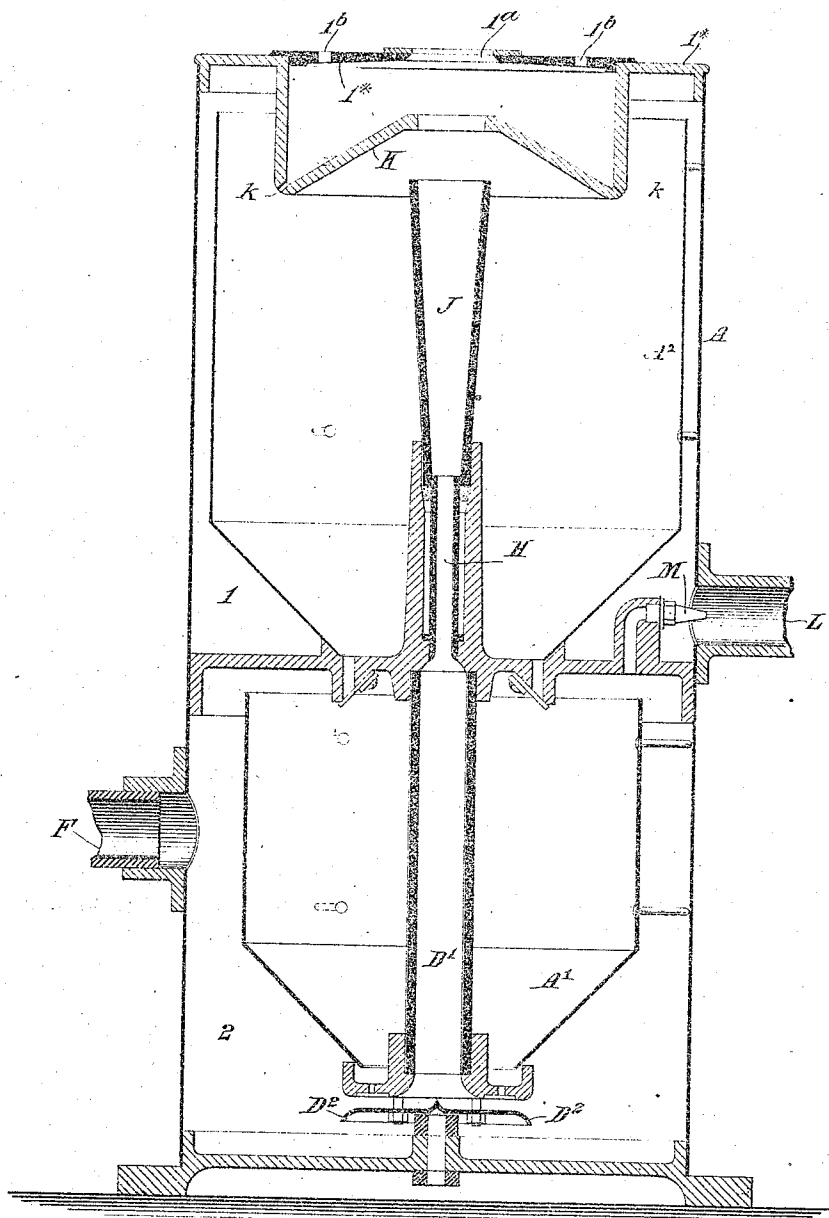
J. E. MATHEWSON.
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FIG. 2.



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UNITED STATES PATENT OFFICE.

JEREMIAH EUGENE MATHEWSON, OF SHEFFIELD, ENGLAND.

SAND-BLAST APPARATUS.

SPECIFICATION forming part of Letters Patent No. 531,379, dated December 25, 1894.

Application filed February 8, 1894. Serial No. 499,482. (No model.)

to all whom it may concern:

Be it known that I, JEREMIAH EUGENE MATHEWSON, engineer, of Bellefield Works, Sheffield, in the county of York, England, have invented certain new and useful Improvements Relating to Sand-Blast Apparatus, of which the following is a specification.

My invention relates to a sand blast apparatus, which is employed in ornamenting, cutting, or otherwise operating on various hard surfaces, and has for its object to improve the general construction of the apparatus.

My invention consists first in arranging the sand hopper within an inclosing casing which is filled with the fluid under pressure which serves as the propelling medium, so that the sand will flow freely.

My invention further consists in providing a suitable plate or bracket in the chamber into which the sand flows from the sand hopper, and which I call the contact or combining chamber, and from which the propelling medium carries the sand to the blast pipe through which it is thrown against the surface to be ornamented, the object of the plate being to insure that the sand supply will be driven by the air blast from near the center of the chamber and also to form a sand valve in a manner to be explained.

My further improvements will be pointed out in connection with the description of my invention, which is best explained by reference to the accompanying drawings, in which—

Figure 1 shows in sectional elevation a machine for delivering a horizontal blast, which is most suitable for metal, stone, and heavy work generally. Fig. 2 shows a similar view of a machine for delivering a blast upward, this being the form most suitable for glass and light work, and Fig. 3 is a view taken on a section line at right angles to that taken in Fig. 1, showing the lower part of the sand hopper and the combining chamber below it.

Referring first to the construction shown in Figs. 1 and 3, which relates to what I term the horizontal blast apparatus, A is a casing, preferably cylindrical, which is divided into two compartments or chambers 1, 2, by the partition B. This partition B, as shown, has an opening or openings closed by a suitable valve or valves, as C, to permit from time to

time of the discharge of sand from compartment 1 to compartment 2. In Fig. 1 I have shown a disk valve carried by a spring actuated rod C' for controlling this opening. In compartment 2, which is made airtight, except for the inlet and outlet openings, is placed a sand hopper A', which is conveniently supported on a casting D resting on or supported from the bottom of the casing A. With this casting D is formed what I term the combining or contact chamber D', since it is here that the sand and the propelling medium first combine or come in contact. The sand passes from the hopper A' to the chamber D' by a passage a in the casting D, which can be opened or closed, as required, from the outside by a suitable valve E.

F is the inlet for the propelling medium, which is some fluid, as air, steam, &c., under pressure, and, as will be noted, this fluid fills the compartment 2 so that there will be the same pressure on the top of the sand in the hopper A' as at the discharge passage leading into the chamber D' so that the sand can flow freely from the hopper by gravity, entirely uninfluenced by the pressure of the propelling medium. I prefer, as shown, to provide an opening, as indicated at d, from the compartment 2 into the combining chamber D', though of course the fluid under pressure could be introduced therein through any suitable conduit desired.

D² is a plate onto which the sand falls from the sand hopper, and the object of this plate, which is arranged about the middle of the tube, which serves as the contact chamber in Fig. 1, is to keep the sand supply in the center of the contact chamber D' so as to insure its being properly carried forward by the propelling fluid. The plate D² further serves to form a sand valve when the apparatus is not being used. The sand falls on this plate and forms a little cone of sand whose apex finally closes the sand passage which leads from the hopper. If the plate were not employed the sand would still form a cone of sufficient size to prevent the further flow of sand, but when the air was again turned on the pipe the large quantity of sand accumulated would choke the pipe.

Connected with the outlet end of the combining or contact chamber D', when neces-

sary, is a flexible tube G of suitable length, and of the same cross-section as the chamber. Preferably both the chamber D' and the tube G are circular in cross-section as shown, the flexible tube G practically forming a prolongation of the contact chamber. At the outer end of the tube G, or at the end of the chamber D', if no flexible tube be employed, is the blast pipe H, of a much smaller diameter than the tube G, and to the end of the blast pipe H, I preferably attach a flaring pipe J. The object of this arrangement is to enable me to carry the sand for some distance through the chamber D' and tube G, if this be employed, at a comparatively slow rate of speed so that the sand will not destroy by abrasion the walls of the chamber D' or of the flexible tube. The blast pipe H is, however, of reduced diameter, and in passing through this pipe the sand attains its maximum velocity.

It is not necessary, nor desirable, that the propelling medium should follow the sand to the surface of the article operated upon, and the outwardly flaring pipe J serves as an expanding chamber in which the propelling fluid can lose its velocity while the sand goes forward in a path whose cross section is about that of the blast pipe H and with undiminished velocity to the surface of the object which is being ornamented or cut.

The main part of the apparatus shown in Fig. 2 is substantially like that shown in Fig. 1 except that the chamber D' is vertical to throw the sand upward. The plate D² is arranged below the end of the chamber D' and the sand falls on it in a number of little streams, and is carried up the contact chamber D' by the propelling medium which passes in around the edge of the plate.

The compartment 1 I preferably provide with a cover 1^a in which is an opening 1^b above which the article to be operated upon is placed, and with air inlets 1^c. Opening from this compartment is a pipe L, and to prevent sand passing out by this pipe L, I provide a sand hopper in the upper compartment.

K is a conical shield having an opening at its apex for the blast to pass through, and small openings k at its base for the sand to pass through and return to the hopper. Near the bottom of the chamber is arranged, as has been said, the pipe L, and I provide a suitable apparatus for creating a suction through the pipe L. As shown, an ejector nozzle M projects into the pipe L. Fluid under pressure, preferably the propelling medium, is blown through the nozzle M, and serves to create a current of air which enters through the inlets 1^c, flows through the compartment 1 and flows out through the pipe L. I preferably arrange the nozzle as shown so as to open from compartment 2 and take its supply of compressed fluid therefrom.

The impact of the sand upon the work not only cuts away the surface operated upon, but also disintegrates considerable of the sand thus creating a fine dust, which, being of no

use for the sand blast, it is desirable to separate from the sand which still remains in good condition for further use. It is also desirable not only to permit the propelling medium to expand in the manner which has been explained, but also to get rid of it.

The apparatus which has been described, and which is shown in Fig. 2, effects the ends above noted, and operates as follows: The compressed air or other propelling medium drives the sand through the chamber D', then through the blast pipe H, where the maximum speed is attained, and finally expands in the conical tube J while the sand strikes the object held over the hole 1^a. The dust and the unbroken sand grains fall back into the conical shield K, and coming to the base of this shield drop through the holes k there provided. The light dust is now carried by the air current created by the nozzle M over the edge of the hopper A² and down and out through the pipe L along with the propelling medium which will take the same avenue of escape. The larger sand grains however, which can be of further use will fall into the hopper A² from whence they, with a fresh sand supply, can be dropped at intervals into the hopper A¹.

I may here remark that it has been discovered in practical operation that an important advantage is gained by permitting the fluid under pressure to have free access to the top of the sand hopper from all sides, so that the compressed air, or other fluid, will, as it were, pour into the hopper over all its upper rim, which of course is possible when the hopper is placed bodily in a casing into which the fluid under pressure enters freely, as shown in Figs. 1 and 2.

In constructions, which have been experimented with, where the compressed fluid was simply admitted into the upper part of a closed sand receptacle, by means of a branch pipe from the tube which conveyed the compressed fluid, it was found that the flow of sand would be irregular, even though the branch pipe were of as great area as the main air pipe, so that sometimes it was necessary to throttle the flow of fluid into the combining chamber so as to drive the sand down by the greater pressure above it. All these irregularities are overcome in my improved apparatus when the sand is surrounded on all sides by an atmosphere of the compressed fluid.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a sand blast apparatus the combination of a compartment or chamber 2, a sand hopper situated therein, an inlet into said chamber for a suitable compressed propelling medium, a combining or contact chamber beneath the sand hopper, a passage for the flow of sand from said hopper to the contact chamber and an inlet thereto for the propelling medium and a tube for conveying away the sand driven by the propelling medium.

2. In a sand blast apparatus, the combina-

tion of an air tight compartment or chamber 2, a sand hopper situated therein, an inlet into said chamber for a suitable compressed propelling medium, a combining or contact chamber beneath the sand hopper, a passage for the flow of sand from said hopper to the contact chamber, an inlet for the propelling medium from the chamber 2 to the combining chamber, and an outlet from said combining chamber for the mixed sand and propelling medium.

3. In a sand blast apparatus, the combination of a sand hopper, a combining or contact chamber into which the sand flows from the hopper, an inlet to said chamber for fluid under pressure, a flexible pipe G, of the same cross-section as the combining chamber, leading therefrom, and serving to conduct away the propelling medium mixed with sand, and a blast pipe H of reduced cross section arranged on the end of the flexible pipe G whereby the sand may have a comparatively slow motion in the flexible pipe and attain its maximum velocity only in the blast pipe.

4. In a sand blast apparatus, the combination with a sand hopper, of a combining or contact chamber into which sand flows from the hopper, an inlet thereto for fluid under pressure, a tube or pipe G leading from said chamber, a blast pipe H of reduced size on the end of the tube, and an outwardly flaring tube J on the end of the blast pipe, substantially for the purpose specified.

5. In a sand blast apparatus, the combination of a sand hopper, a combining or contact chamber into which the sand flows from the hopper, an inlet to said chamber for fluid under pressure, a flexible pipe G of the same cross-section as the combining chamber leading therefrom and serving to conduct away the propelling medium mixed with sand, a blast pipe H of reduced cross-section arranged on the end of the flexible pipe G, and a flaring pipe or tube J, into which the blast pipe H opens, whereby the sand may have a comparatively slow motion in the flexible tube and attain its maximum velocity in the blast pipe, and so that the propelling medium may have a chance to expand after leaving the blast pipe.

6. In a sand blast apparatus, the combination of a sand hopper, a combining or contact chamber into which the sand flows from the sand hopper, an inlet for fluid under pressure to said combining or contact chamber and a plate or platform D² in said chamber into which the sand flows from the hopper.

7. In a sand blast apparatus, a box or casing A divided into two compartments 1 and 2 by a suitable partition, a sand hopper in the upper compartment 1, a valved opening in the partition whereby sand can be supplied to the sand hopper, an inlet for fluid under pressure leading into the lowermost compartment, a contact or combining chamber underneath the hopper, an inlet from the compartment 2 to the combining chamber and a blast pipe leading therefrom.

8. In a sand blast apparatus the combination with a suitable casing having an opening 1^a, of a sand hopper as A² in said casing below the opening 1^a, a pipe L leading from the casing outside of the hopper A², means for creating a current of air through the casing and out at the tube L, and a sand blast pipe adapted to throw a stream of sand against an object held over the opening 1^a, all substantially as specified, and so that the fine dust and broken sand will be separated from the unbroken sand and carried out of the casing while the unbroken sand will fall into and be collected in the hopper A².

9. In a sand blast apparatus the combination with an air tight casing or compartment 2 to which fluid under pressure is supplied, of a receptacle for sand situated therein, a combining or contact chamber below the receptacle, a passage for the flow of sand from said hopper to the contact chamber, a second chamber 1 through which the sand blast passes, a pipe opening from the chamber 1 an ejector adapted to create a current of air through said chamber and a passage leading from the compartment 2 to the ejector and adapted to supply operating fluid thereto.

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