

(No Model.)

2 Sheets—Sheet 1.

B. C. TILGHMAN, Jr.
SAND BLASTING APPARATUS.

No. 584,021.

Patented June 8, 1897.

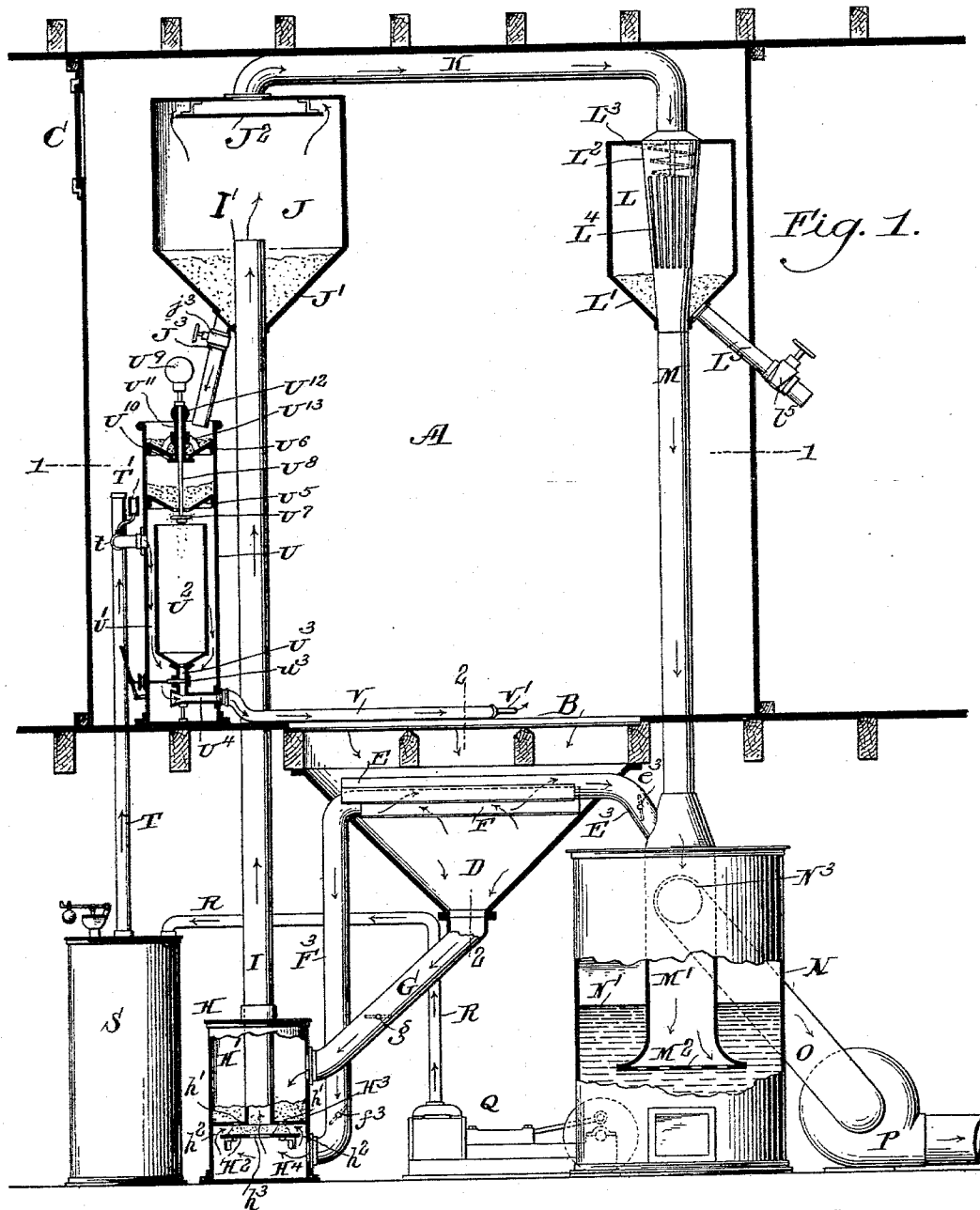


Fig. 1.

Witnesses.

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Francis T. Chambers
his Attorney.

(No Model.)

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Fig. 2.

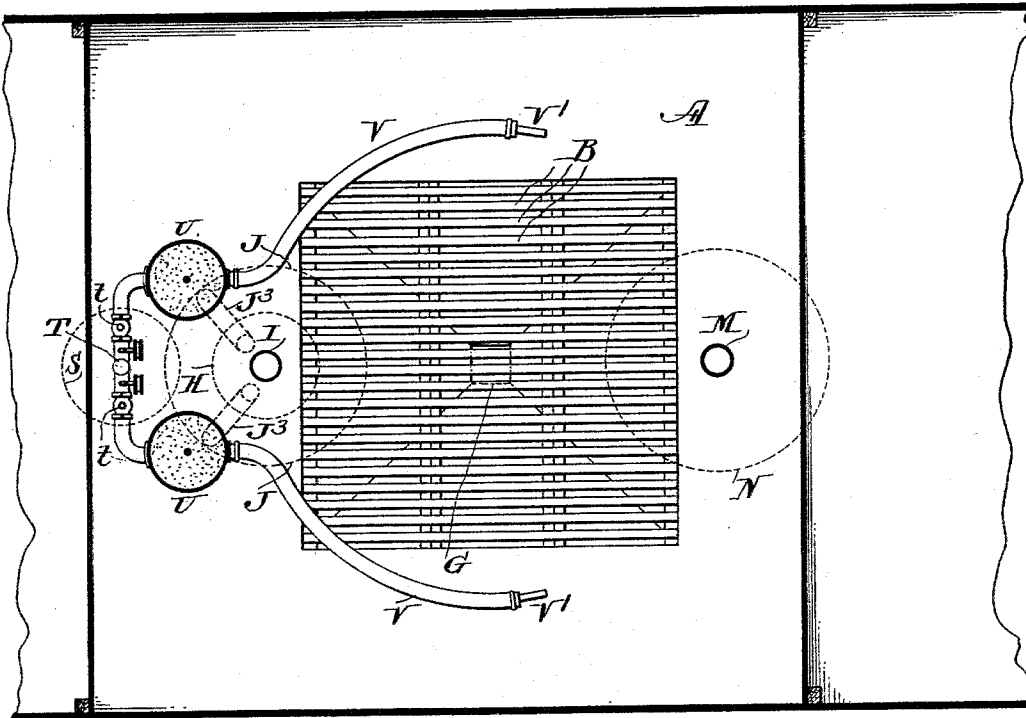
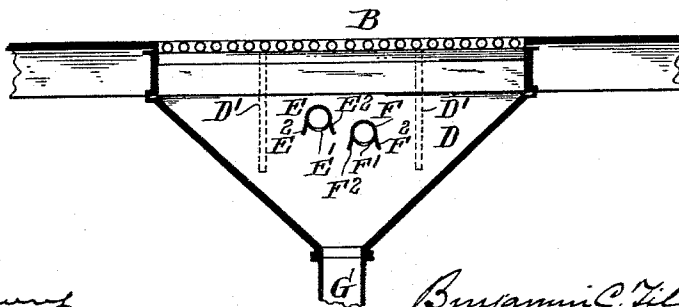


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

BENJAMIN C. TILGHMAN, JR., OF PHILADELPHIA, PENNSYLVANIA.

SAND-BLASTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 584,021, dated June 8, 1897.

Application filed January 8, 1897. Serial No. 618,446. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN C. TILGHMAN, Jr., a citizen of the United States of America, residing in Philadelphia, in the county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Sand-Blasting Apparatus, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to apparatus to be used in connection with the sand-blast, and having for its object to collect and remove the dust, sand, &c., resulting from the operation of the sand-blast and the separation for reuse of such sand as is of proper weight and size for this purpose.

Particularly my invention is designed for such work as cleaning castings, though its usefulness is by no means limited to such employment.

The nature of my improvements will be best understood as described in connection with the drawings, in which they are illustrated, and in which—

Figure 1 is a side elevation, partly in section, illustrating the apparatus as a whole and in the form in which I prefer to use it. Fig. 2 is a cross-sectional view taken as on the section-line 1 1 of Fig. 1, and Fig. 3 is a vertical section taken as on the section-line 2 2 of Fig. 1.

A indicates the room or chamber in which is situated the sand-blasting apparatus and in which the article to be sand-blasted is introduced. This chamber should be substantially air-tight, but provided with one or more regulable openings, such as are indicated at C, (where a sliding shutter is shown for this purpose,) whereby any desired amount of draft can be admitted to the chamber.

B is a grating or grated platform upon which the article to be treated with the sand-blast is to be placed, and below the grating B is situated a hopper D, adapted to receive the sand and dirt resulting from the operation of the sand-blast upon the article under treatment, G being a conduit leading from the bottom of the hopper D, through which the sand is permitted to run, a damper *g* regulating its freedom of motion.

E and F are dust and air collecting pipes situated in the hopper and connected directly or indirectly with some air-sucking apparatus. It is through these pipes, which for certain purposes may be consolidated into a single pipe, that the air is drawn from the hopper and through the grating from the chamber A, a constant and energetic downdraft being thus secured through the grating and obviously through the chamber A also.

H and I are parts of a pneumatic elevator, as shown. H is a vessel divided into two chambers H' and H⁴ by means of a partition H³, the uptake-pipe I leading through the chamber H' and through the partition H³ into the chamber H⁴. Slots or perforations *h'* are also formed through the partition H³, and below them an annular ring H² is situated in the chamber H⁴, said plate being of such size as to leave an annular opening around its outer edge as well as the circular opening in its center, which should register substantially with the lower end of the uptake-pipe I. The pipe G, leading from the bottom of the hopper D, leads into the chamber H' and, as shown and as I prefer to construct it, a dust-collecting pipe, as F, situated in the hopper D, connects, as by conduit F³, with the chamber H⁴ of the pneumatic elevator, *f*³ indicating a damper in pipe F³.

It will be seen that the sand, &c., passing through pipe G into the chamber H' will issue through the opening *h'* into the chamber H⁴, but the sand will run out of the opening *h'* onto the annular plate H², and in case the apparatus is not in operation will soon form little conical heaps upon the plate H², which will seal the opening *h'* and prevent the chamber H⁴ from filling up with sand.

When in operation, a blast of air enters the chamber H⁴ preferably, as shown, through the pipe F³, and this air-blast passing through the center opening in the plate H², as well as through the annular space indicated at *h*² around the outer edges of the plate H², will sweep the sand into the opening in the uptake-pipe I and upward through said uptake-pipe, the upper end of which I' enters a sand-separating device, preferably a settling-chamber, such as indicated at J. This settling-chamber is virtually a considerable enlargement of the uptake-pipe, in which the velocity of the

air and sand is checked, so that the heavier particles will fall by gravity into the hopper-shaped bottom J' of the separator, and I have found it advantageous to construct this device, as shown, with a baffle-plate J², situated between the top of the pipe I and the outtake-pipe K, leading from the separator, as by means of this baffle-plate the separator not only insures the checking of the velocity of the air-current, but also necessitates a change in its direction, which of course will facilitate the separation of the heavier particles of sand, and not only so, but avoids the sand-blast-like action which would take place if the sand was permitted, on issuing from the pipe I, to strike freely on the top of the separator.

J³ indicates a spout leading from the lower part of the hopper-bottom of the separator J, by which the sand can be withdrawn from time to time, J³ indicating a valve in this pipe.

K is a pipe leading from the top of the separator J, as shown, to a centrifugal separator L, having a hopper-shaped bottom L', the pipe K opening first into an enlarged, preferably cone-shaped conduit L², situated in the shell of the separator L, and having in its upper part a screw-like deflector L³, by which the air coming from the pipe L is given a rapid rotary movement. The lower part of the conduit L² is formed with a number of openings L⁴, leading from it into the shell of the separator and through which the heavier particles carried by the air are forced out to the space within the shell. The air itself, carrying of course a certain amount of dust, passes downward through the pipe M into the water-tank N, which is a closed chamber partially filled with water to a level indicated at N', and the pipe M, preferably increasing in diameter, as indicated at M', passes through below the water-level in the tank, so that the air is forced to bubble up through the water and is thereby washed.

A grating, as indicated at M², may be used to insure the breaking up of the air as it issues from the pipe-extension M'. As shown, the dust-pipe E connects through a pipe E³, having a damper e³ with the enlarged portion M' of the pipe M, and the air-space of the water-tank N is connected through a conduit O, leading from an opening N³ to a suction-blower, as indicated at P.

To prevent the entry of large particles of sand into the dust-pipes E or F, I form these pipes with openings E' and F', leading through their walls at the bottom, and provide them with deflecting-plates E² E² F² F², (best shown in Fig. 3,) so that only such thin stuff as would be carried upward in the hopper can enter the dust-pipes with the air-currents.

Q indicates an air-compressor connecting through pipe R with a reservoir for compressed air, as indicated at S, said reservoir connecting by a pipe T with the air-space U' of a sand-blast apparatus U, t indicating a valve for regulating the admission of air to the sand-

blast apparatus and T' indicating a pressure-gage. The sand-blast apparatus U, as shown, comprises the air-chamber U', a sand-chamber U², connecting by a vertical passage U³, having a regulating-valve u³ with a horizontal air-passage U⁴, opening freely into the air-chamber U', the sand and air passing from air-passage U⁴ through flexible pipes V to the nozzles V'.

As shown, the sand-blast apparatus is provided with hoppers U⁵ and U⁶, U⁷ being a valve by which the opening in the hopper U⁷ can be closed, this valve being attached to the valve-rod U⁸, having the handle U⁹.

U¹⁰ is the sand-valve of the hopper U⁶, and is attached to a sliding valve-stem U¹¹, having the handle U¹², U¹³ indicating a spider resting on the hopper U⁶ and adapted to engage the handle U¹² and prevent the valve U¹⁰ from opening beyond a determined distance.

This same function is performed for the valve U⁷ by the head or handle U¹³, upon which the head or handle U⁹ rests when the valve U⁷ is open.

I have shown this sand-blast apparatus as so placed that the pipe or pipes J³, leading from the separator J, will conduct the sand into the upper hopper U⁶, from which, by opening the valve U¹⁰, it will pass into the hopper U⁵, from which in turn, by opening the valve U⁷, it will pass into the sand-chamber U².

The operation of the device as a whole will be readily followed. The suction apparatus has the double function of elevating the sand coming from the hopper D and of maintaining an energetic and sufficient suction in the hopper D to insure that all dust will be drawn down through the grating, and as this latter function is apt to require greater energy than is required for the elevation of the sand I prefer to use the two dust-pipes E and F, one connecting with the elevator and the other connecting with the air-sucking apparatus without communication with the elevator, the dampers e³ and f³ permitting the nice regulation of the amount of air passing to the elevator and depended upon for the transportation of the sand. It is obviously possible to provide for the elevation of the sand coming from the hopper D by an air-current entirely distinct from that drawn from the hopper, though it is just as obvious that it is decidedly advantageous to use at least a portion of the air drawn from the hopper for the elevation of the sand also drawn from the hopper. The air and sand elevated by means of the pneumatic elevator H and I passing then to the separator J, the heavier and reusable portions of the sand are there separated from the air and lighter and unusable particles of sand and dust, which pass from the separator J to the centrifugal separator L, where a large portion of the fine sand is tossed, is separated from the air, and the air carrying only the very fine dust is then passed down into the water-tank N, where it is thor-

oroughly washed and from which the air issues practically clean.

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

1. In an apparatus for sand-blasting the combination of a grating as B adapted to support the article to be treated, a hopper for sand below said grating, one or more dust-pipes as E, F, opening into said hopper and connected to an air-sucking apparatus, a conduit as G leading from the bottom of the hopper a pneumatic sand-elevator as H, I, arranged to receive sand from conduit G, and a sand-separator as J, arranged to remove the sand and air from the elevator and separate the heavy from the light particles.

2. In an apparatus for sand-blasting the combination of a grating as B adapted to support the article to be treated, a hopper for sand below said grating, a dust-pipe as F opening into the hopper, a conduit G leading from the bottom of the hopper, a pneumatic sand-elevator H, I, having a sand-chamber H' into which conduit G leads and an air-chamber H⁴ connected as by pipe F³ with dust-pipe F, a sand-separator J arranged to receive the sand and air from the elevator and an air-suction apparatus arranged to draw air from the separator and through it from the hopper and elevator.

3. In an apparatus for sand-blasting the combination of a grating as B adapted to support the article to be treated, a hopper for sand below said grating, a dust-pipe as F opening into the hopper, a conduit G leading from the bottom of the hopper, a pneumatic sand-elevator H, I, having a sand-chamber H' into which conduit G leads and an air-chamber H⁴ connected as by pipe F³ with dust-pipe F, a sand-separator J arranged to receive the sand and air from the elevator, a water-tank N, a conduit as K M leading from the separator to said tank and below the water-level

thereof, and an air-suction apparatus connected with said tank above its water-level.

4. In an apparatus for sand-blasting the combination of a grating as B adapted to support the article to be treated, a hopper for sand below said grating, a dust-pipe as F opening into the hopper, a conduit G leading from the bottom of the hopper, a pneumatic sand-elevator H, I, having a sand-chamber H' into which conduit G leads and an air-chamber H⁴ connected as by pipe F³ with dust-pipe F, a sand-separator J arranged to receive the sand and air from the elevator, a water-tank N, a conduit as K, M leading from the separator to said tank and below the water-level thereof, a dust-pipe as E opening like pipe F into the hopper D, a conduit as E³ connecting dust-pipe E with conduit M, dampers as f³ and e³ situated in pipes F³ and E³ and an air-suction apparatus connected with tank N above the water-level.

5. In an apparatus for sand-blasting the combination of a grating as B adapted to support the article to be treated, a hopper for sand below said grating, a dust-pipe as F opening into the hopper, a conduit G leading from the bottom of the hopper, a pneumatic sand-elevator H, I, having a sand-chamber H' into which conduit G leads and an air-chamber H⁴ connected as by pipe F³ with dust-pipe F, a sand-separator J arranged to receive the sand and air from the elevator, a conduit K leading from the settling-chamber, a centrifugal separator L arranged to separate sand coming from conduit K, a water-tank N, a conduit M leading from separator L below the water-level of tank N and an air-suction apparatus connected with the air-space of the tank.

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Witnesses:

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