

No. 671,410.

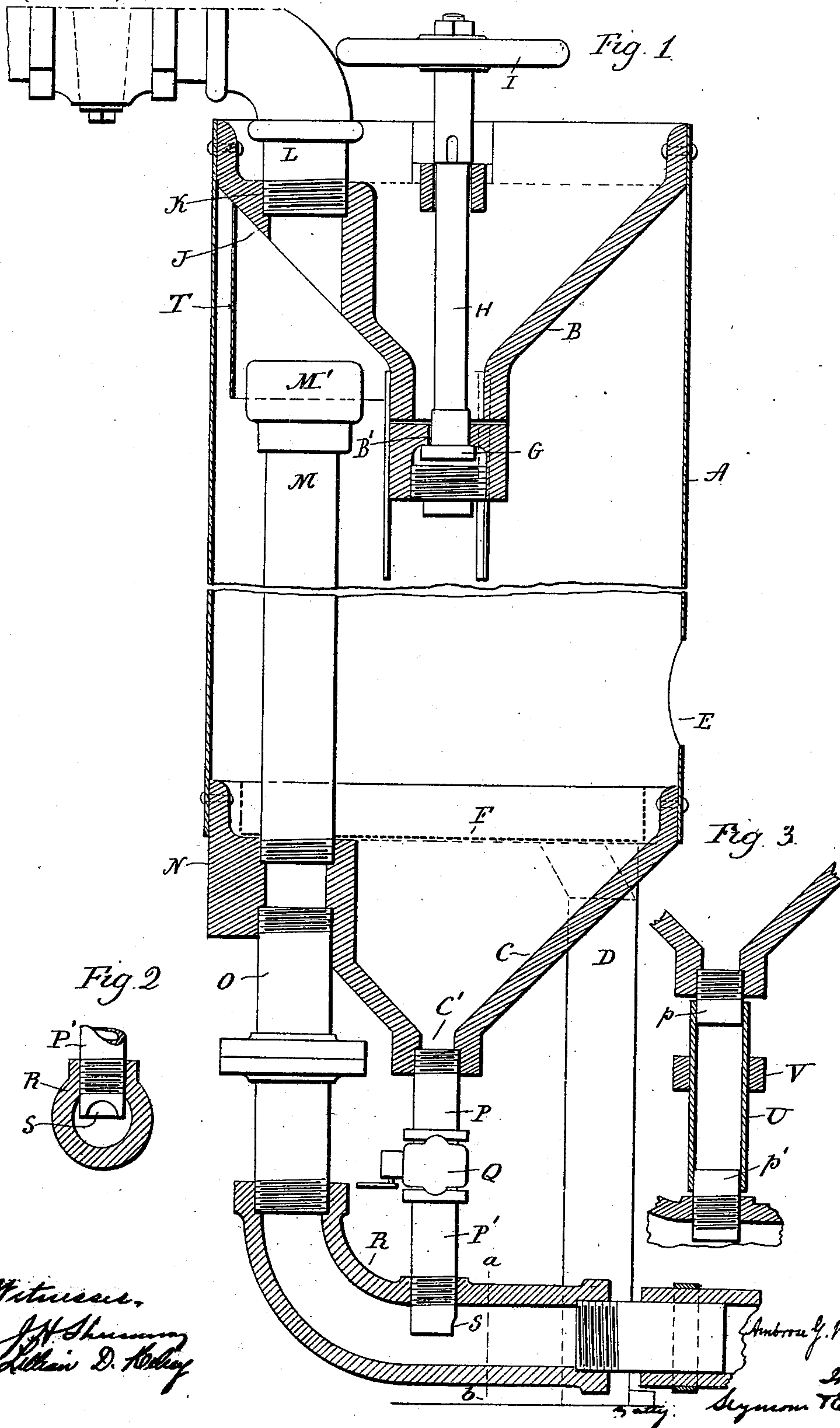
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A. G. WARREN.

MIXER FOR SAND BLAST APPARATUS.

(Application filed Nov. 14, 1900.)

(No Model.)





# UNITED STATES PATENT OFFICE.

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## MIXER FOR SAND-BLAST APPARATUS.

SPECIFICATION forming part of Letters Patent No. 671,410, dated April 2, 1901.

Application filed November 14, 1900. Serial No. 36,483. (No model.)

*To all whom it may concern:*

Be it known that I, AMBROSE G. WARREN, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new Improvement in Mixers for Sand-Blast Apparatus; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same.

My invention relates generally to sand-blast apparatus, and specifically to that portion of the apparatus commonly called the "mixer" and its appurtenant mechanism for feeding the sand to the mixing-chamber and supplying fluid-pressure to said chamber to propel the sand.

The objects of my invention are to provide in a single and compact device and in which all the parts commonly liable to disarrangement in use from wet sand are easily accessible means for supplying a volume of sand and compressed air to an inclosed casing or reservoir, means therein to convey the main volume of fluid-pressure to a secondary air-inlet within the casing and to deliver it through the same to a combining or mixing tube, means to deliver the sand from the closed casing to the combining or mixing tube, means to govern the sand-feed into the latter, and means to govern the pressure and velocity of the compressed air in the combining-tube relatively to the pressure on and feed-supply of sand delivered thereto.

To these ends my invention consists of a combined device having primarily a closed casing or body in which the initial sand-inlet and initial fluid-pressure inlet are combined in a single housing forming the top of said closed body or casing and in which the basal portion also of the said casing or body is provided with a like single housing or frame containing the respective discharge-outlets for sand and fluid-pressure, said closed casing and said parts being so constructed and arranged relatively to each other that access may be had at all times to the casing and to the said initial inlet and outlet discharges for sand and fluid-pressure by a hand-hole device directly in the periphery of the casing.

My invention also consists in a novel construction of the initial sand-inlet, the relative

arrangement of the same with the fluid-pressure inlet within the body of the casing, in a novel construction of the initial discharge-outlet for the sand, a valved connection leading from the same, and in a novel construction and arrangement of the same relatively to the combining or mixing tube, and finally in the construction and relative arrangement of the parts supplying and governing the fluid-pressure in its passage from the initial air-inlet and in its delivery to the combining and mixing tube.

I will proceed to describe my new device, referring to its essentials as aforesaid and also in detail by reference to the drawings, in which—

Figure 1 is a vertical section, partly in elevation, of the mixer and its appurtenant parts of a sand-blast apparatus constructed according to my invention. Fig. 2 is a vertical cross-section on line *a b* of Fig. 1 of the tubular mixing-chamber and part of the sand-supply pipe leading thereto, and Fig. 3 is a modification of the last-mentioned sand-supply pipe leading to the mixing-chamber.

In so-called "mixing" devices for sand-blast apparatus the basic principle is the delivery to the chamber in which a propelling current of fluid-pressure is moving with great velocity of a continuously-supplied volume of sand under such a head of pressure only as will enable such delivery to be effected against the counteracting force of the propelling-current of fluid-pressure. The essential means to embody that principle—namely, mechanism to supply such head of pressure to the sand delivered to the combining and mixing tube in the path of the propelling-current—have been various in form and character in previous machines, those of the class to which my device belongs consisting of a casing inclosing a subchamber or inner casing containing a body of normally-delivered sand, into which outer chamber both the whole body of sand and the whole volume of fluid-pressure are delivered and the latter left unguided and free to exert its pressure throughout the whole casing and its contained parts and to pass as it may into the inner sand-chamber to exert pressure on the contained sand and also to pass at like pressure to the open end of a combining or mix-



ing tube, into which the sand is sought to be delivered from the aforesaid inner sand-chamber. My device is constructed and operates on an essentially different principle.

5 It is entirely devoid of any inner sand-chamber or casing, the combining or mixing tube is wholly outside of the same, and the initial fluid-pressure, while it is delivered directly into the open body of the casing or sand-reservoir, creates a less pressure therein than

10 in the secondary air-inlet leading to the combining-tube, because it is delivered into the casing in a line of movement directly in the plane of the open end of a secondary air-inlet

15 or receiving tube contained in said casing and leading to the combining or mixing tube outside the casing, and hence the pressure in the casing above the body of contained sand is always relatively much less than in the

20 secondary air-inlet. In order to further increase the pressure therein relatively to the pressure in the casing on the sand and at same time increase the velocity of the same body of fluid-pressure at the point (in the

25 combining or mixing tube) where it meets the volume of delivered sand, I arrange the relative sizes of initial air-inlet tube and combining or mixing tube accordingly, as herein-after stated.

30 The closed body or casing A of the device is preferably cylindrical, and it serves not only to support and maintain the operative parts of the structure, but is an air-tight reservoir for containing the sand and into which

35 the compressed fluid is simply and freely admitted above the sand from the main inlet, which supplies compressed fluid to a secondary inlet therefor leading to the combining-chamber, and the said casing is supported by

40 suitable legs D or otherwise. At the upper end this casing A is provided with a housing or bearing B for maintaining the initial inlet-opening B' for the sand and the valve-plug H G, which operates therewith, and also for supporting the initial inlet L for the compressed

45 air. This housing or bearing B is substantially funnel-shaped; but at a point about the center of its conical wall it is pierced by a perpendicularly-arranged cylindrical or tubular

50 portion J, screw-threaded at K to connect the air-inlet tube L, and it is preferably cast or formed integral with the conical housing B. A similarly-constructed housing or bearing C is arranged at the extreme base of

55 the casing A and closes the bottom thereof, the tubular portion N of said lower housing forming a means of communication within and without the closed casing A. Near the bottom of the casing is a hand-hole E, closed by

60 a suitable cover of usual construction. Below the same and resting upon the mouth of the lower housing C is a sieve F of proper mesh to screen the sand employed and preventing stones or other obstructions from getting into the sand-pipe. At the lower end of the top

65 housing B is an opening B', and this opening is closed by a valve G, carried by a stem H,

which projects up above the top of the reservoir, where it is provided with an operating-handle I, the inner mouth of the tubular

70 bearing N within the sand-chamber or casing supporting in line below the tubular bearing J, a pipe N, which extends upward in direct vertical line above the horizontal plane

75 of the discharge-mouth of the housing B, but terminates at a point below the discharge-mouth of the tubular support K of the air-inlet-supply pipe L. From this tubular bear-

80 ing N a pipe O extends downward and across the plane of the discharge-mouth C' of the bottom housing C of the casing or sand-reservoir A to and connecting with the inlet end

85 of a combining-tube or mixing-chamber R. The said mouth C' is connected with the mixing tube or chamber by a tube formed, as shown in Fig. 1, of two parts P P', with an

90 intermediate connecting-valve Q, and the lower member P' of the pipe extends downward for a short distance into the mixing or combining tube, and preferably a notch S

95 will be formed in the extreme lower end of the pipe P', as shown in Fig. 2. The object of thus extending and notching the pipe P' is to form a sand cut-off when the fluid-pressure supply at initial-inlet L is stopped—that

100 is, the sand passing through the pipes P P' will form a pyramid in the chamber R, and hence close the bottom of the same below pipe P' before any material quantity of sand has been discharged from the exit end of the

105 chamber. The discharge end of the combining-tube is supplied with the usual flexible hose or other pipe connection, leading the blast to any point desired for the use to which it may be intended to apply it. In the modification shown in Fig. 3 instead of employ-

110 ing two pipe-sections P P' and a valve between them nipples p p' may be inserted in the opening of the discharge-mouth and in the opening into the mixing-chamber and these connected by a rubber pipe U, in connection with which I employ a clamp V, by which the tube may be readily contracted.

The space between the tubular initial air-inlet K and the secondary air-inlet M within

115 the casing directly below and in vertical line therewith allows of a deflection and diffusion of fluid-pressure freely into the casing above the body of sand and maintains the proper pressure upon the sand within the

120 reservoir-casing A, so as to cause the same to properly feed through the discharge-pipe P', and this space between the initial and secondary air-inlets is partially inclosed by a shield T, which overlaps the upper end of

125 the pipe M and prevents the sand from entering the said pipe M. Preferably the pipe M will be provided with a mouth-cap M' to better catch moisture or oil which might come with the air from the receiver through air-

130 inlet pipe L and entering the chamber A and mixing with the sand therein cause it to clog the apparatus.

In order that the sand may feed freely



through the discharge-pipes P P', I make the area in cross-section of the initial air-inlet L, communicating through the tubular opening in the housing B with the secondary air-inlet tube M, slightly larger in diameter than the latter, which should be the same diameter as the combining or mixing tube R. Hence the pressure of the compressed air is greater, but the velocity less, in the initial inlet L than in the secondary air-inlet M and combining or mixing tube R, and the converse is true—viz., that the velocity is greater and pressure less in secondary air-inlet M and combining-tube R than in the initial air-inlet L. For the reasons stated, due to the construction described, the whole body of sand will be delivered through the sand-outlet to the combining-tube under a pressure and velocity relatively suitable to the pressure and velocity of the propelling fluid at the point of mixing or contact in the combining-tube to effect the results desired.

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

1. In sand-blast apparatus, a casing or reservoir with means to directly admit to and discharge sand therefrom, an initial air-inlet for fluid-pressure, opening directly into the said casing, a secondary air-inlet tube in said casing, having a free and open end within the casing, directly in line with the initial air-inlet and receiving, through the intervening space, the main body of the compressed air from the initial air-inlet, the lower end of the secondary inlet discharging into a tubular air-opening in the lower end of the casing, a combining or mixing tube communicating with said tubular opening, and means adapted to discharge the sand into the combining-tube directly from the sand-discharge opening in the casing; substantially as described.

2. In a sand-blast apparatus, the combination with a casing having sand and air inlets through which sand and air are received directly into the body of said casing, means within the casing adapted to receive and convey the main volume of compressed air to an air-discharge opening in the casing leading directly to a combining or mixing tube, means to deflect a portion of the fluid-pressure to and upon the body of sand in the casing, and means to create a less pressure and greater velocity of compressed air in the combining and mixing tube than within the initial air-inlet; substantially as described.

3. In a sand-blast apparatus, the combination with a closed casing or reservoir having a top housing providing separated inlet-openings for sand and compressed air, and an opposite housing providing separated discharge-passages for compressed air and sand, of a secondary air-inlet pipe within said closed

casing-reservoir, communicating at its base with the said air-outlet discharge of the casing and with its other end free and arranged in line with the said initial air-inlet of the casing, but with an intervening space between them, said space being part of the free space within the casing above the sand-line; a combining or mixing tube communicating with the air-discharge opening in the lower housing of the casing, and a connecting-passage between the sand-discharge in the lower housing of the casing and the combining or mixing tube; substantially as described.

4. In a sand-blast apparatus the combination with a casing having opposite open ends, top and bottom housings closing said ends, a valved inlet for sand and a separated initial inlet for compressed air, in the top housing, a valved outlet for sand and a separated outlet passage-way for compressed air, in the bottom housing, a screen covering the open mouth of the lower housing, within the casing, and a hand-hole in the periphery of the casing above said screen; a secondary air-inlet arranged within the casing, communicating directly with the discharge-outlet in the lower housing therein, and arranged in line but not directly communicating with, the initial air-inlet aforesaid; a combining or mixing tube communicating with the air-discharge opening in the lower housing of the casing, and a connecting-passage between the sand-discharge in the lower housing of the casing and the combining or mixing tube; substantially as described.

5. In a sand-blast apparatus, the combination with the casing or reservoir A, a housing B closing the upper end thereof and formed with a depending conical-shaped sand-inlet and a separated initial air-inlet, a like housing C closing the lower end of the casing and provided with like separated sand and air outlets respectively, a secondary air-inlet tube M wholly within the casing, communicating at bottom directly with the air-discharge outlet, and arranged with a free and open upper end in line with the initial air-inlet and above the sand-inlet, a flaring cap M' on said tube M; a combining-tube R communicating with the air-discharge passage in the lower housing, and a discharge-pipe between the sand-discharge in the housing C and said combining-tube R, said discharge-pipe P' extending into the interior of the latter; substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

AMBROSE G. WARREN.

Witnesses:

GEO. W. REED,  
AMOS BONSALL.