No. 682,579. Patented Sept. 10, 1901.

A. G. WARREN.

MIXER FOR SAND BLAST APPARATUS.

(Application filed Feb. 28, 1901.)

(No Model.)

FIG. 1.

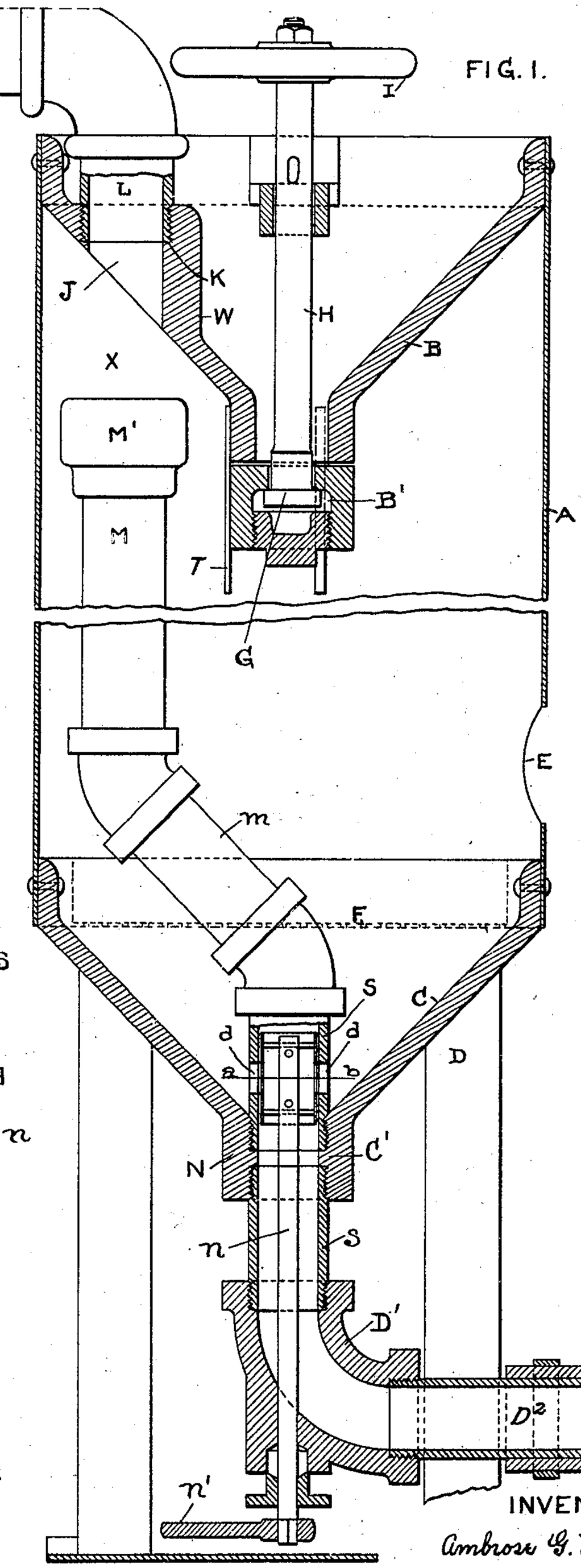

FIG. 2.

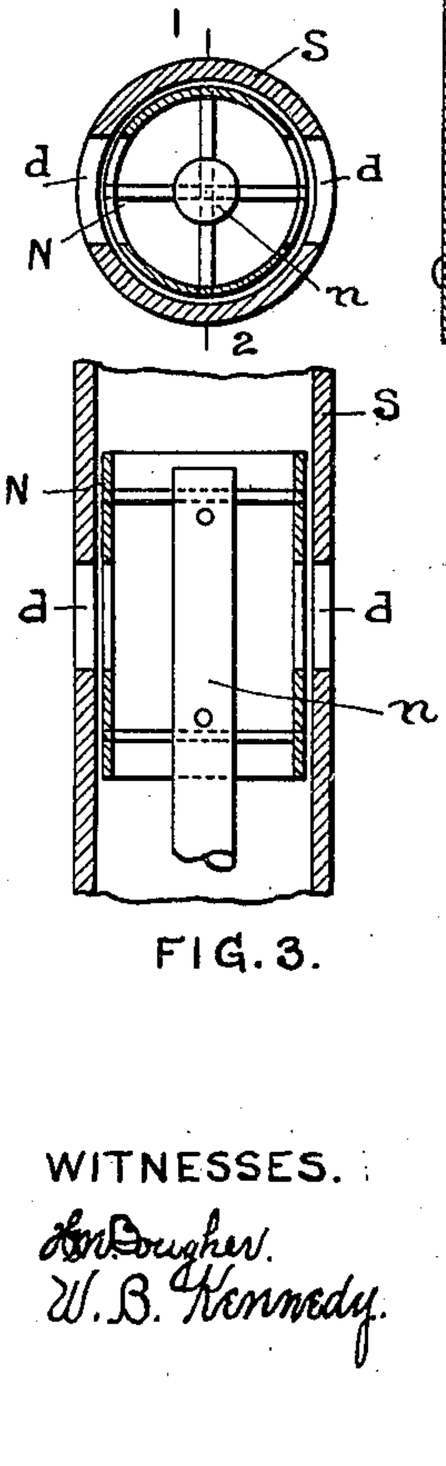

FIG. 3.

WITNESSES.

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MIXER FOR SAND-BLAST APPARATUS.

SPECIFICATION forming part of Letters Patent No. 682,579, dated September 10, 1901.

Application filed February 28, 1901. Serial No. 49,257. (No model.)

To all whom it may concern:

Be it known that I, AMBROSE G. WARREN, a citizen of the United States, residing at the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Mixers for Sand-Blast Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates generally to sand-blast apparatus, and specifically to that portion commonly called the "mixer," for receiving and discharging sand and fluid-pressure in an appropriate manner to a connected "combining-tube," so called, from whence the sand is discharged by force of the fluid-pressure there admitted to contact with and propel it.

My present invention is a further carrying forward and another embodiment of the main principle of construction and operation involved in the apparatus described in United States Patent granted to me April 2, 1901, No. 671,410.

The principal features of construction in which my present device, about to be described, differs from the former invention above referred to is the combination and arrangement of the secondary air-inlet with the sand-discharge outlet, so as to form, in effect, a unitary outlet for both, constituting a combining-tube at that point, and in the detail features essential to carry this principle of construction into effect, as hereinafter described and claimed.

In the drawings illustrating my invention, Figure 1 is a vertical section, partly in elevation, of the mixer and its appurtenant parts of a sand-blast apparatus embodying my present improvements. Fig. 2 is a lateral cross-section on line *a b* of Fig. 1 of the secondary air-inlet tube, showing the perforations therein and the sand-valve within the tube; and Fig. 3 is a vertical cross-section of the same and of the stem of the sand-valve on line 1 2 of Fig. 2.

The apparatus consists of a closed body or casing A, which is preferably cylindrical and is shown supported upon brackets or legs D. At its upper end it is provided with a housing or bearing B for maintaining the initial inlet-opening B′ for the sand and the valve-plug G governing the same, with the stem H and hand-wheel I to actuate the said valve G and to control the sand-inlet opening B′. This housing is preferably of funnel shape in order to serve as a sand-hopper. The casing A also supports the supply-inlet L for the compressed air. This housing B is shown substantially funnel-shaped for the purpose stated; but at a point in its periphery above the center of its conical wall it is provided with an interior wall W, in which there is pierced a perpendicularly-arranged cylindrical or tubular opening J, forming the initial air-inlet, which is screw-threaded at K to connect with the air-supply tube L, and said interior wall W is preferably cast or formed integral with the conical housing B. A hand-hole E near the base of the casing A, supplied with a removable cover of any usual construction commonly employed, is provided to give access to the interior, and a sieve F is arranged in the base of the casing A above the lower sand hopper C, as, shown, to screen the sand and separate the larger stones therefrom. These parts are the same as in my former device. The base of the casing or body A is, however, different. It is there supplied with a funnel-shaped housing C at the discharge end, operating first as a discharge sand-hopper and as a means for supporting the combining-tube S of the apparatus, the apex of the inverted cone C being in the form of a screw-threaded tubular mouth C′, into which is fitted in air-tight connection the lower end of the combining-tube S, and also supporting in like manner a connecting and communicating discharge-tube S′. The latter may form part of the combining-tube S—in other words, be integral therewith; but for convenience of construction and insertion into the mouth C′ of hopper C, I prefer to make said tube S′ separate from the combining-tube proper, as shown in the drawings. Said tube S is the combining-tube of the device. The part S′ is merely a means of conveying the sand-blast from the combining-tube S to the blast-discharge pipe D′ D^2 and its usual adjunctive devices. The combining-tube S is radi-

ally perforated at several places in its periphery, as indicated at *d*, at a point slightly above the discharge-mouth C′ of the hopper C and within the interior of said funnel-shaped discharge-hopper C, and in said tube S is supported a sand-valve N, governing said perforations *d*, (which are sand-inlets,) the valve being operated by means of a stem *n*, projecting through an elbow-pipe D′, secured to the tube S′ and provided with an operating-handle *n*′.

Within the body of the casing A is arranged a secondary air-inlet tube M, communicating directly with the mouth of combining-tube S by a suitably-curved pipe *m*. Said secondary air-inlet is preferably provided with a mouth-cap M′, as in the former device, to better catch moisture or oil which might come with the air from the receiver through the initial air-inlet and mixing with the sand clog the sand-entrances to the combining tube or chamber. The said secondary air-inlet tube M is shown arranged in a vertical plane with the initial air-inlet L J, the open mouth-cap M′ of the secondary air-inlet M being slightly below the inner end of initial air-inlet tube J, thus leaving a space between them, (indicated at X;) but said tube M or its mouth-cap M′ must be arranged in a horizontal plane above the discharge end B′ of the sand-inlet hopper B, and I prefer to add a shield-plate T to prevent sand flying up into said mouth-cap M′. This intervening space (indicated at X) between the initial and secondary air-inlet passages J and M permits a deflection and diffusion of some fluid-pressure into the casing above the main body of sand; but the impetus of the moving volume of air under pressure will cause it to discharge with great velocity directly into the said secondary air-inlet.

The operation of the device is as follows: The body of sand in the casing will discharge by gravity aided by the pressure upon it in the open body of the casing A and the suction created in the combining-tube S into and through the perforations or inlets *d d* in the combining-tube S in the path of a volume of fluid-pressure therein moving with sufficiently-increased velocity to equalize or overcome any differences in pressure between its pressure at that point and the pressure above the body of discharged sand in the casing. The sand-valve devices N *n* described operate to govern the flow of sand to the combining-tube S and to regulate or shut off completety the sand-discharge when desired.

The device is simple and effective and is designed to receive both sand and fluid-pressure directly into the body of the casing and discharge it therefrom without the intervention of contained hoppers, partitions, or chambers for separately receiving, containing, and discharging the sand to the combining-tube. The sand and fluid-pressure are both admitted freely into the body of the casing, and so received the sand is always under pressure in the casing in my apparatus. The contained sand and fluid-pressure are then separated directly within the casing and in volume, as desired, the sand being delivered by gravity and pressure directly from the open body of the closed casing to the combining-tube in the path of a volume of fluid-pressure therein, moving with great velocity, the means for so doing being a secondary air-inlet extending above the sand-line, and a combining-tube so constructed, arranged, and combined therewith and with the discharge-outlets of the casing that the sand and fluid-pressure within the casing are separated and guided and delivered separately to the contained combining-tube and therein mixed, and thence discharged through the discharge-outlet of the casing.

Having thus described my invention, I claim as new—

1. In a sand-blast apparatus, the combination with a closed casing adapted to receive and contain a body of sand and discharge it directly therefrom under pressure, to a contained combining-tube, of means within the casing to separate therein the sand and fluid-pressure delivered into the casing, and discharge the sand in the path of a separated and rapidly-moving volume of the fluid-pressure, said means consisting of a secondary air-inlet within the casing, and a combining-tube communicating directly therewith, and having peripheral openings into which the sand in the casing is directly delivered by gravity and pressure in the path of said moving volume of fluid-pressure discharged thereinto from the secondary air-inlet.

2. In a sand-blast apparatus the combination with a casing adapted to receive and contain sand and fluid-pressure, a discharge-outlet therein, a combining-tube supported by and opening into said discharge-outlet and extending upward into the interior of the casing, radially-arranged ports or passages in said upper portion of the combining-tube into which sand is adapted to be forced by gravity and pressure directly from the casing, and a secondary air-inlet within the casing communicating by a closed passage directly with the mouth of the combining-tube and adapted to deflect a portion of the fluid-pressure within the casing, above the sand-line, into said combining-tube above the radial sand ports or passages therein.

3. In sand-blast apparatus, the combination with a closed casing having sand and air inlets respectively, admitting sand and compressed air directly into the body of the same, a conical discharge-hopper at the base thereof, having a central screw-threaded mouth, a combining-tube within the casing and extending into said screw-threaded mouth of the hopper, means extending above the discharge end of the initial inlet for sand, within the casing, conveying fluid-pressure to the upper end or mouth of the combining-tube, and ports or passages in that portion of the

combining-tube within the closed casing, said ports or passages establishing communication directly between the combining-tube and the body of sand under pressure, within the casing, substantially as described.

4. In sand-blast apparatus, the combination with a closed casing having sand and air inlets respectively, through which sand and air are received directly into the body of the casing; a secondary air-inlet supported within the casing and adapted to receive and convey the main volume of compressed air to a combining-tube extending partly within and partly without the interior of the closed casing; a sand-hopper at the base of the casing, having a tubular mouth, a combining-tube supported air-tight in said tubular mouth, and perforated at points in its periphery within the casing at or near the base of the sand-discharge hopper; substantially as described.

5. In sand-blast apparatus, the combination with a closed casing having sand and air inlets respectively, admitting sand and air under pressure directly into the body of the same, a combining-tube within the casing and extending without it, means extending above the discharge end of the inlet for sand, within the casing, conveying fluid-pressure to the combining-tube, and ports or passages in that portion of the combining-tube within the closed casing, said ports or passages establishing communication directly between the combining-tube and the body of sand under pressure, within the closed casing, and a sand-valve governing said ports or passages, operated by a stem projecting through the combining-tube; substantially as described.

In testimony whereof I have hereunto affixed my signature this 25th day of February, A. D. 1901.

AMBROSE G. WARREN.

Witnesses:
GEO. W. REED,
H. T. FENTON.