July 17, 1923. 1,462,296

E. J. MOORE ET AL

SAND BLAST APPARATUS

Filed Nov. 14, 1918 3 Sheets-Sheet 1

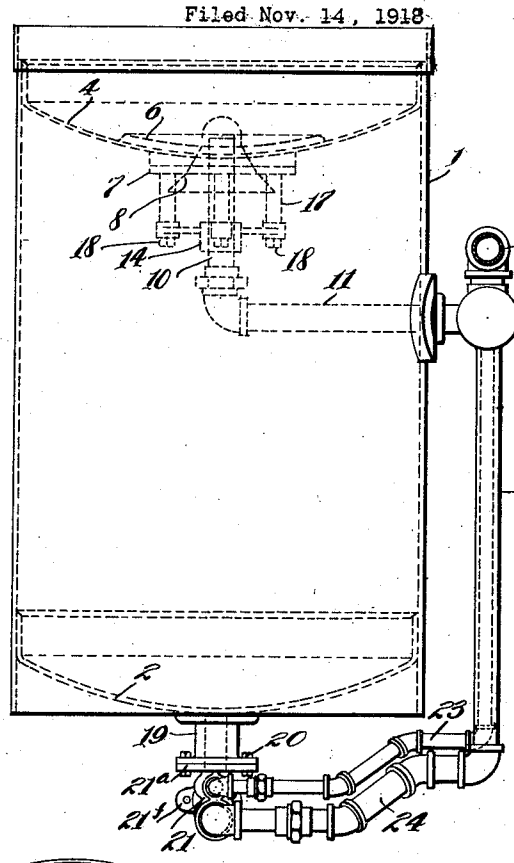


Fig. 1.

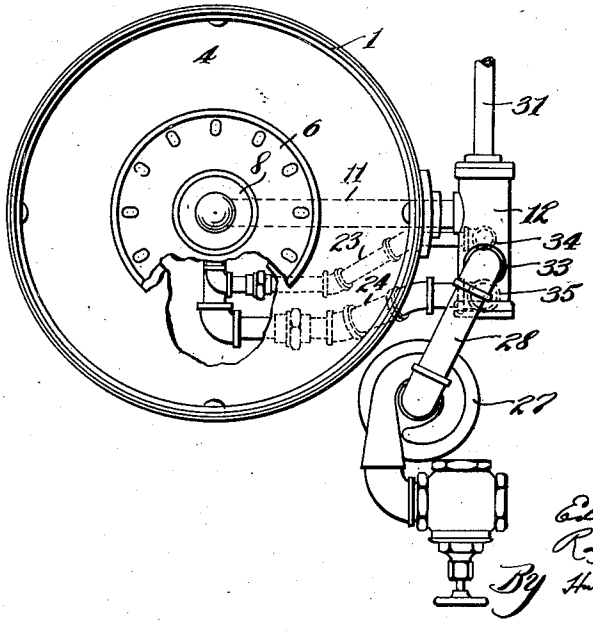


Fig. 2.

Inventors,
Edward J. Moore and
Raymond H. Moore
By Hull, Smith, Brock & West.
Attys

July 17, 1923. 1,462,296

E. J. MOORE ET AL

SAND BLAST APPARATUS

Filed Nov. 14, 1918 3 Sheets-Sheet 2

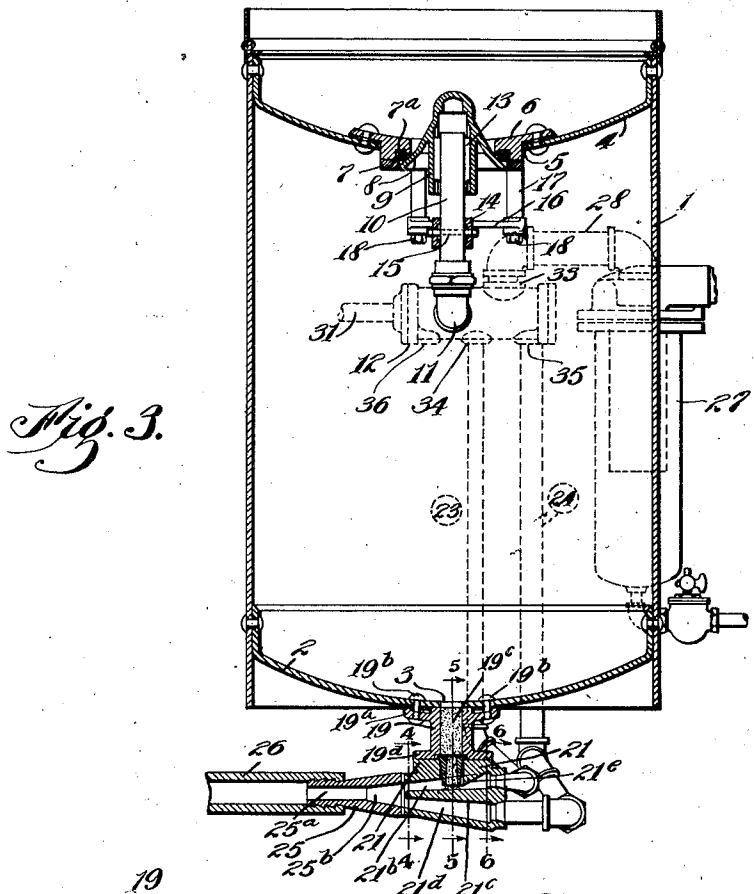


Fig. 3.

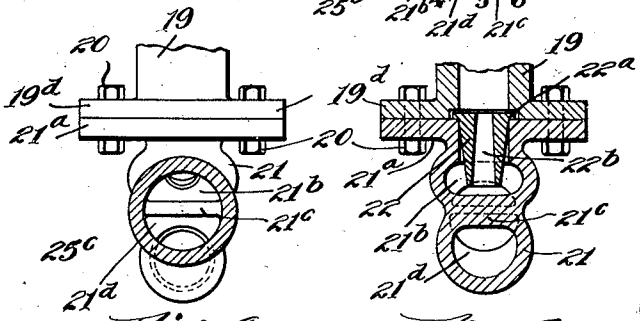


Fig. 4.

Fig. 5.

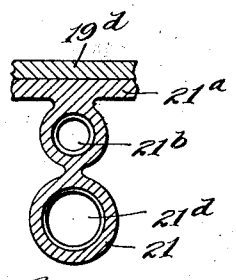


Fig. 6.

Inventors,
Edward J. Moore and
Raymond H. Moore.
By Hull, Brock & West.
Attys.

July 17, 1923. 1,462,296

E. J. MOORE ET AL

SAND BLAST APPARATUS

Filed Nov. 14, 1918 3 Sheets-Sheet 3

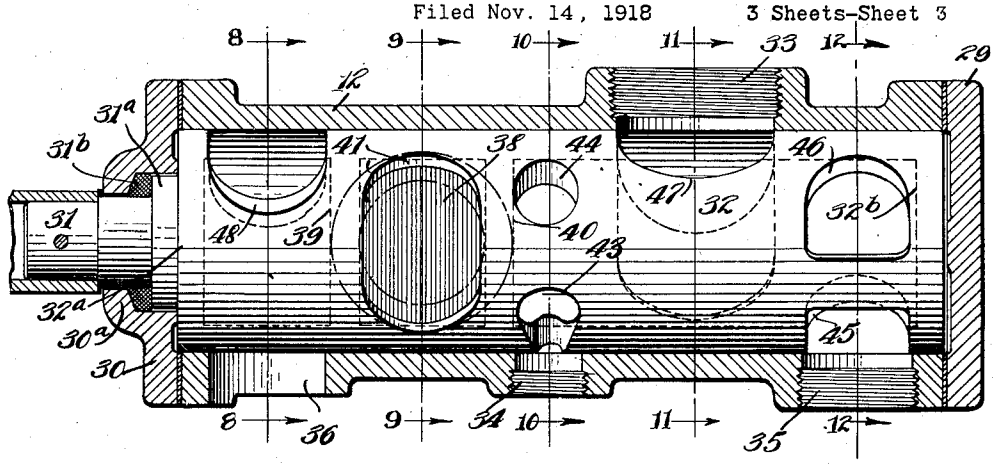


Fig. 7.

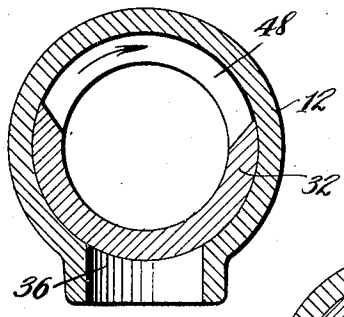


Fig. 8.

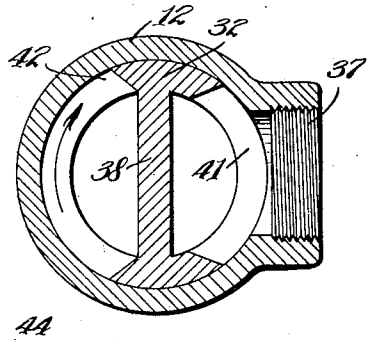


Fig. 9.

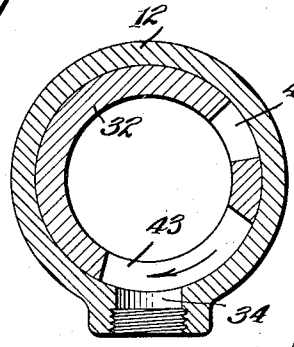


Fig. 10.

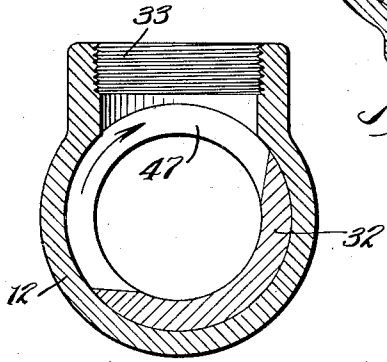


Fig. 11.

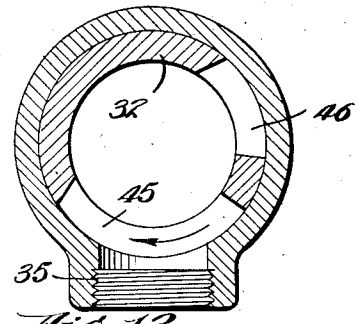


Fig. 12.

Inventors,
Edward J. Moore and
Raymond H. Moore,
By Hull, Smith, Brock & West,
Attys.

Patented July 17, 1923. 1,462,296

UNITED STATES PATENT OFFICE.

EDWARD J. MOORE AND RAYMOND H. MOORE, OF CLEVELAND, OHIO, ASSIGNORS TO THE W. W. SLY MANUFACTURING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

SAND-BLAST APPARATUS.

Application filed November 14, 1918. Serial No. 262,508.

To all whom it may concern:

Be it known that we, EDWARD J. MOORE and RAYMOND H. MOORE, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Sand-Blast Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to sand blast apparatus and has for its general object to increase the efficiency, flexibility, and durability of such apparatus. Further and more limited objects of the invention are to provide an improved means for supplying the sand from the container therefor to the point at which it is subjected to the action of the impelling fluid; to improve the construction and operation of the sand-blast head; and to so construct and arrange the parts as to prolong the lives thereof and to reduce to a minimum the occasions for and the expense of renewing such parts. We accomplish the foregoing and other objects to be set forth hereinafter in and through the construction illustrated in the drawings forming part hereof, wherein Fig. 1 represents an elevation of an apparatus constructed in accordance with our invention but with the air drier omitted for sake of clearness; Fig. 2 is a plan view of such apparatus, showing a part of the cover for the tank or reservoir broken away; Fig. 3 a central vertical sectional view through such apparatus; Figs. 4, 5 and 6 are enlarged sectional details corresponding respectively to the lines 4—4, 5—5, and 6—6 of Fig. 3, looking in the direction of the arrows; Fig. 7 a central longitudinal sectional view of the air valves; and Figs. 8, 9, 10, 11, and 12 sectional details corresponding respectively to the lines 8—8, 9—9, 10—10, 11—11, and 12—12 of Fig. 7 and looking in the direction of the arrows.

Describing by reference characters the various parts illustrated herein, 1 represents a cylindrical tank having a concave bottom 2 provided with a central orifice 3. The tank is also provided with a concave head 4 provided with an enlarged central opening 5. Surrounding the opening 5 is a ring 6 the opening whereof registers with the opening 5. This ring is shown as riveted to the cover 4 and is provided in its lower surface with a pair of annular recesses containing respectively the gaskets or packing rings 7, 7^a, said gaskets or rings being of rubber, fiber, or other suitable material, and forming a double seat for a valve. This valve comprises a conical body 8 the lower portion of which cooperates with the seat 7, 7^a. The valve body 8 is provided with a central sleeve 9 which is closed at its upper end, the valve being slidably mounted upon the upper end of the vertical branch 10 of a pipe 11 which projects through the wall of the tank 1 and which is connected to a valve, the casing whereof is indicated at 12. The interior of the sleeve 9 is provided with a longitudinally slotted bushing 13, whereby passages are provided for air supplied through the pipe 11 to the interior of the receptacle 1. The pipe 10, 11 is supported from the cover 4 by means of a collar 14 secured to the branch 10 by means of a pin 15 and provided with spider arms 16 each carrying a sleeve 17 and adapted to abut at its upper end against the ring 6. Bolts 18 extending through said sleeves, secure the collar 14 and arms 16 and the parts supported thereby to the ring 6. In practice, the receptacle 1 will be placed beneath a sand bin and the sand chute will discharge into the cupped top of the tank, whence it may be delivered through the valve 8 into the latter.

19 denotes an outlet connection which is secured to the central portion of the bottom 2, as by means of a flange 19^a and bolts 19^b. This connection is provided with a central port 19^c registering with the central opening 3. At its bottom, the connection is flanged, as indicated at 19^d. Bolts 20 connect said flange with the corresponding flange 21^a on the top of the sand-blast head, indicated generally at 21. This head is provided with an upper passageway 21^b and a lower passageway 21^d separated by a partition 21^c the upper surface whereof provides a shelf for the temporary support of sand supplied from the receptacle 1 through the passageway 19^c and the nipple 22. This nipple is provided with a flange 22^a by which it is supported on top of the head 21, the bottom of the connection 19 being recessed for the reception of such flange. The passageway 22^b through the nipple is flared from the top to the bottom whereby the cross-sectional area of said passageway increases from the inlet end to

the delivery end thereof, and clogging of the passageway is prevented.

A pipe 23 which is connected to the valve casing 12 discharges into the passageway 21^b. Immediately in front of the connection between the pipe 23 and the passageway 21^b, the latter is provided with a downwardly inclined baffle 21^e, the lower end whereof terminates substantially flush with the bottom of the nipple 22. This baffle is generally triangular in section, increasing in width toward the nipple 22.

The pipe 24, extending from the valve casing 12, communicates with the passageway 21^a. Secured to the discharge portion of the blast head is a nozzle 25, said nozzle having a central passageway 25^a merging at its rear or receiving end with a flaring mixing passageway 25^b, the rear end of said nozzle being in close proximity to the partition 21^c. The nozzle 25 is detachably connected to the head by means of lugs or ears 21^b on the head and similar ears (not shown) on the nozzle. A sand blast tube or hose 26 is detachably connected to the delivery end of the nozzle 25.

The pipes 23 and 24 are supplied with air (or other fluid) under pressure through the valve 12, the said valve being shown as connected to an air drier 27 by a pipe 28; the drier may be of the construction shown in the application of Raymond H. Moore, No. 232,972, filed May 6, 1918.

Cooperating with the pipes 10, 11, 23 and 24 is a valve, the casing whereof is indicated generally at 12. The valve comprises, in addition to said casing, an interior rotatable sleeve provided with partitions and having ports adapted to register with corresponding ports in the casing in such manner as, by rotation of said sleeve, to supply air under pressure through the pipes 10, 11 and through the valve 8 to the interior of the tank or receptacle 1 thereby to produce a pressure upon the sand therewithin; to supply air through the pipes 23 and 24 to the sand blast head; to cut off the supply of air through the pipes 10 and 11; to cut off the supply of air through the pipes 23 and 24; vent the tank, cut off the supply through the pipe 28, and to allow the air in the last mentioned pipes to be vented to the atmosphere, thereby to remove any obstructions that may be in these lines.

The cylindrical casing body 12 is provided with a pair of heads 29 and 30 secured to opposite ends thereof, the head 30 being provided with a packing gland 30^a through which there extends an operating handle 31 projecting from the adjacent head 32^a of the rotary sleeve 32. The inner end of the handle 31 is enlarged, as shown at 31^a, and packing material 31^b is interposed between such enlargement and the interior surface of the gland 30^a.

The valve casing 12 is provided with a threaded connection 33 in the upper portion thereof for the pipe 28 and with threaded connections 34 and 35 in the lower portion thereof for the pipes 23 and 24 respectively. It is also provided at the end opposite the connection 35 and in the lower surface portion thereof with a vent port 36. In addition, the casing is provided at one side with a threaded connection 37 for the pipe 11.

The rotary cylindrical valve 32 fits within the casing 12 and is provided at the end opposite the head 32^a with a head 32^b. A Z-shaped partition extends across the valve 32. This partition comprises a central longitudinal wall 38 extending in Fig. 7 from the top to the bottom of the valve, a transverse wall 39 extending from one end of said partition to the inner wall of the valve on one side of the wall 38 and a transverse wall 40 extending from the opposite end of the wall 38 to the other side of the inner wall of the valve. The partition comprising the walls 38, 39 and 40 divides the valve into non-communicating portions. The valve is provided on one side of the wall 38 with a port 41 adapted to register with the casing connection 37 from which the pipe 11 leads to the valve 8, (see Fig. 9). This port is of considerably greater angular extent than the bore of connection 37, for a purpose to be described hereinafter. On the opposite sides of the wall 38 the valve is provided with a port 42 of greater angular extent than port 41, the purpose of which will be described hereinafter.

By reference to Figs. 7 and 10 it will be seen that the valve is provided with an elongated port 43 and a shorter port 44 adapted to register with the connection 34 from which the pipe 23 extends and, by reference to Fig. 12, it will be seen that the casing is provided with an elongated port 45 and a shorter port 46 adapted to register with the outlet connection 35 from which the pipe 24 extends. The valve is provided with a port 47 of greater angular extent than any of the previously described ports and adapted to register with the inlet connection 33 through which air is admitted to the valve from the drier through the pipe 28, (see Fig. 11).

At the extreme left hand end, the valve is also provided with an elongated port 48 adapted to register with the vent connection 36, (see Fig. 8).

It will be understood that the sectional views shown in Figs. 8 to 12 inclusive show the positions of the ports and connections corresponding to one position of the valve within its casing.

With the parts constructed and arranged as described, the operation will be as follows:—

Assuming that the valve is closed and is

being turned in the direction indicated by the arrows to bring the respective parts thereof in register with the corresponding casing connections, air will first be admitted to the interior of the valve through the port 47 and pass through the port 41, pipes 10, 11 and into the valve 8, lifting and closing the latter and creating a feeding pressure in the tank. Further rotation of the valve will supply air through the port 45 and pipe 24 to the passageway 21^a beneath the partition 21^c. Still further rotation of the valve will supply air through port 43 and pipe 23 to the upper passageway 21^b above the partition 21^c. The pressure within the tank (say sixty pounds per square inch) will maintain the valve 8 closed and will force the sand through the port 19^c and nipple 22 on top of the shelf provided by the upper side of the partition 21^c. The sand accumulating upon the shelf will be swept away by the comparatively slow movement of the air supplied through the pipe 23. As it passes beyond the discharge end of the shelf, it is caught by the air under high pressure supplied through the pipe 24; the sand and air are mixed in the chamber 25^b and are conducted through the nozzle and the hose 25 to the point of use. By a further rotation of the valve, the supply through port 41 to the valve 8 and the tank is cut off.

By this time the port 46 is registering with the connection 35 and the vent port 48 is beginning to open, the air still being admitted through the port 47. Further rotation of the valve brings the vent port 48 of the valve into register with the connection 36 and further opens the vent port, allowing the air in the tank to be discharged into the atmosphere, at which time the valve 8 will open by gravity. Some air is still flowing through the port 48 (which is now closing) and the valve body and through the ports 44 and 46 into the pipes 23 and 24. Because of the restriction presented by the nozzle 25, a large proportion of air supplied through these pipes will blow back through the nipple 22 and passageway 19^c into the tank (which is now open to the atmosphere), thereby dislodging any material which may tend to accumulate within these parts. Still further rotation of the valve closes the port 47, and the tank may thereupon be recharged with sand and the operation repeated.

Having thus described our invention, what we claim is:—

1. The combination, with a tank having an inlet in the top thereof and an outlet in the bottom thereof, of a sand blast head having an upper and a lower passageway for pressure fluid and communicating with said outlet, a valve casing, a pressure-fluid supply pipe connected to said casing, a pipe leading from said casing to and within said tank and having an upwardly extending portion in axial alignment with the inlet, an upwardly seating valve reciprocably mounted on the upwardly directed portion of said pipe, a pipe leading from said casing to the upper passageway of said head, a pipe leading from said casing to the lower passageway of said head, and a valve within said casing adapted to distribute air from the first mentioned pipe to the three last mentioned pipes, said valve and said casing being provided with vent connections whereby rotation of the valve will vent the said tank.

2. The combination, with a tank having an inlet in the top thereof and an outlet in the bottom thereof, of a sand blast head having an upper and a lower passageway for pressure fluid and communicating with said outlet, a valve casing, a pressure-fluid supply pipe connected to said casing, a pipe leading from said casing to and within said tank and having an upwardly extending portion in axial alignment with the inlet, an upwardly seating valve reciprocably mounted on the upwardly directed portion of said pipe, a pipe leading from said casing to the upper passageway of said head, a pipe leading from said casing to the lower passageway of said head, a vent connection for said casing, and a rotary valve in said casing having ports cooperating with said pipes and said vent connection whereby, through the rotation of said valve, the pressure fluid supplied from the first mentioned pipe may be delivered successively to the tank, to the pipe communicating with the lower portion of the head, the pipe communicating with the upper portion of the head, the pressure-fluid cut off from the second pipe, the pressure in the tank vented through the second pipe and the vent connection, and the pressure in the third and fourth pipes may be blown backwardly from the head into the tank to prevent clogging of the outlet.

3. The combination, with a tank having an inlet in the top thereof and an outlet in the bottom thereof, of a sand blast head having communication with said outlet, a valve casing, a pressure-fluid supply pipe connected to said casing, a pipe leading from said casing to and within said tank and having an upwardly extending portion in axial alignment with the inlet opening, an upwardly seating valve reciprocably mounted on the upwardly directed portion of said pipe, a pipe leading from said casing to said head, a vent connection for said casing, and a valve in said casing having ports cooperating with said pipes and said vent connection whereby, through the rotation of said valve, the pressure fluid supplied from the first mentioned pipe may be delivered successively to the tank, to the pipe communicating with the head, the pressure fluid

cut off from the second pipe, the pressure in the tank vented through the second pipe and the vent connection, and the pressure in the third pipe may be blown backwardly into the tank through the head to prevent clogging of the outlet.

4. The combination, with a tank having an inlet in the top thereof and an outlet in the bottom thereof, of a pipe extending from said casing into said tank and discharging thereinto and having a pipe extending from said casing into said tank and discharging thereinto having an upwardly directed portion in axial alignment with the inlet, an upwardly seating valve slidably mounted on such portion of said pipe and adapted to open and close the inlet, a pressure-fluid supply pipe communicating with said casing, a pipe leading from said casing to said head, and a valve in said casing having a venting port and additional ports so arranged that, by rotary movements of said valve, it is adapted to supply air under pressure from the second mentioned pipe simultaneously to the first and third mentioned pipes, to vent the tank through said first mentioned pipe and the vent port of the casing, and to cut off the supply to the third mentioned pipe.

5. The combination, with a head having an upper passageway and a lower passageway with a partition between said passageways, of a nipple projecting into the upper passageway above said partition, a baffle extending downwardly within the upper passageway and located rearwardly of the nipple, the lower end of said baffle being substantially flush with the lower end of the said nipple, a pressure-fluid pipe communicating with the rear of the upper passageway, a pressure-fluid pipe communicating with the rear of the lower passageway, and a nozzle common to both passageways.

6. The combination, with a head having an upper passageway and a lower passageway with a partition between said passageways and a passageway communicating with the upper passageway between the front and the rear thereof and and above said partition, of a tapered baffle extending downwardly within the upper passageway and located rearwardly of the third passageway, a pressure-fluid pipe communicating with the rear of the upper passageway, a pressure-fluid pipe communicating with the rear of the lower passageway, and a nozzle common to both passageways.

7. The combination, with a head having an upper downwardly inclined passageway and a lower upwardly inclined passageway separated by a partition, of a nipple projecting into the upper passageway and above the said partition, an upwardly and rearwardly flaring baffle located at the rear of said nipple, a pressure-fluid pipe communicating with the rear of the upper passageway, a pressure-fluid pipe communicating with the rear of the lower passageway, and a nozzle having a rearwardly flaring inlet and located in advance of said partition and communicating with the delivery ends of both passageways.

8. The combination, with a head having an upper downwardly inclined passageway and a lower upwardly inclined passageway separated by a partition, the upper passageway diminishing in width from the central portion towards the opposite ends thereof, of a nipple adapted and arranged to discharge material upon said partition at the central portion of the upper passageway, said nipple having a bore increasing in diameter from the inlet to the delivery end thereof, an upwardly flaring baffle extending rearwardly from said nipple, a pressure-fluid supply pipe communicating with the rear end of the upper passageway, a pressure-fluid supply pipe communicating with the rear end of the lower passageway, and a mixing nozzle communicating with the delivery ends of both passageways.

9. The combination, with a head having an upper passageway and a lower passageway separated by a partition, a sand supply nipple projecting into the upper passageway and having therein, a passageway of increasing cross-sectional area from the inlet to the delivery end thereof arranged to discharge material upon said partition, a pressure fluid supply pipe communicating with the rear end of the upper passageway, a pressure fluid supply pipe communicating with the rear end of the lower passageway, and a delivery connection communicating with the delivery ends of the two last mentioned passageways.

10. The combination, with a tank having an inlet and an outlet for sand and a valve arranged to close the inlet by the pressure of fluid within said tank, of a sand-blast head communicating with said outlet, a valve casing having a venting port, a pipe extending from said casing to said tank and discharging thereinto thereby to close said valve and create a feeding pressure within said tank, a pipe extending from said casing to said head, a pipe for supplying pressure fluid to said casing, and a valve within said casing adapted by its movement to supply the pressure fluid delivered thereto to the first-mentioned pipe, to the second-mentioned pipe and the sand blast head, to vent the said tank through the first-mentioned pipe and the venting port, and to deliver pressure fluid through the second-mentioned pipe after such venting operation.

11. The combination, with a tank having an inlet and an outlet for sand and a valve arranged to close the inlet by the pressure

of fluid within said tank, of a sand-blast head communicating with said outlet, a valve casing having a venting port, a pipe extending from said casing to said tank and discharging thereinto thereby to close said valve and create a feeding pressure within said tank, a pipe extending from said casing to said head, a pipe for supplying pressure fluid to said casing, and a valve within said casing adapted by its movements to supply the pressure fluid delivered thereto to the first-mentioned pipe, to the second-mentioned pipe and the sand blast head, and thereafter to cut off the supply to the first-mentioned pipe, to vent the said tank through the first-mentioned pipe and the venting port, to supply pressure fluid through the second pipe, and to cut off communication between the third-mentioned pipe and the casing.

In testimony whereof, we hereunto affix our signatures.

EDWARD J. MOORE.
RAYMOND H. MOORE.