Jan. 30, 1923.

1,443,762

C. G. SMITH.
SAND BLAST APPARATUS.
FILED JUNE 10, 1921.

2 SHEETS-SHEET 1

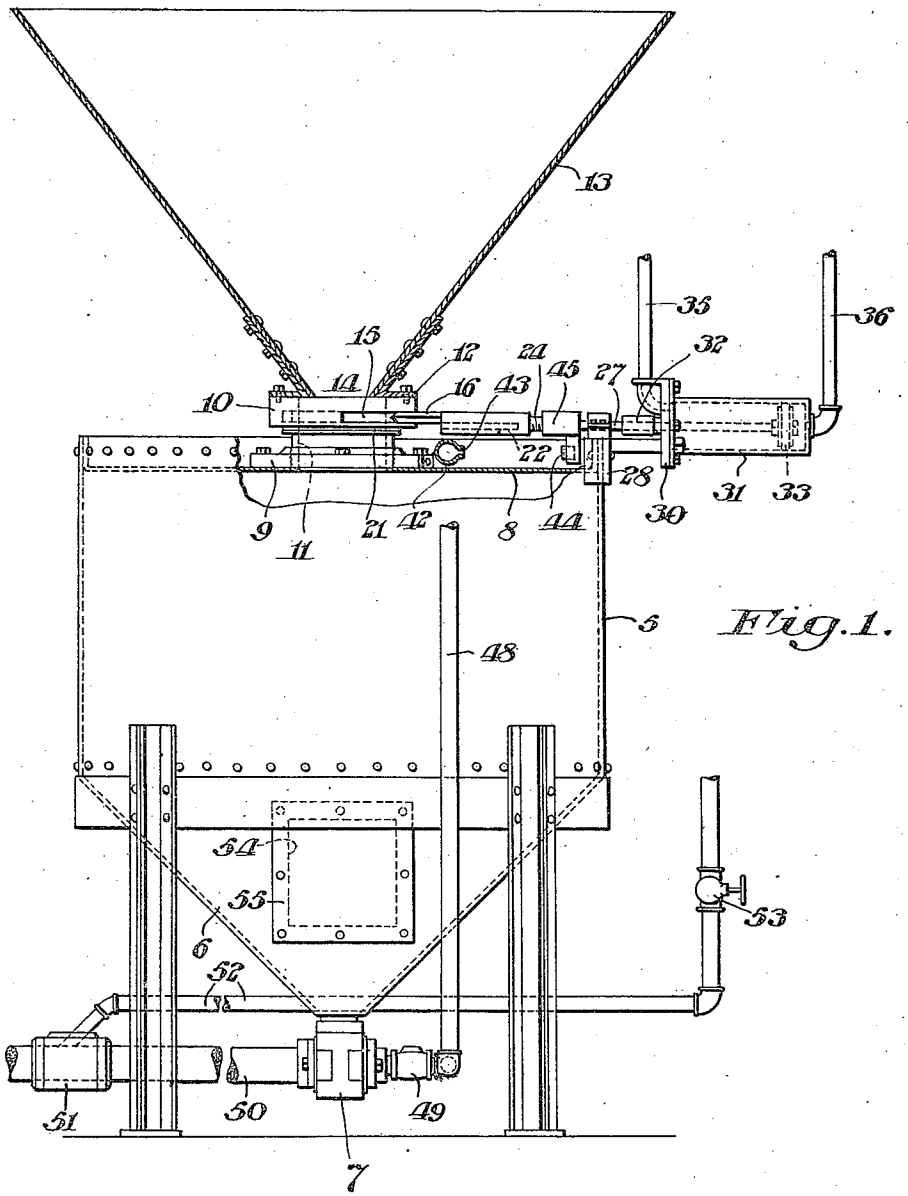


Fig. 1.

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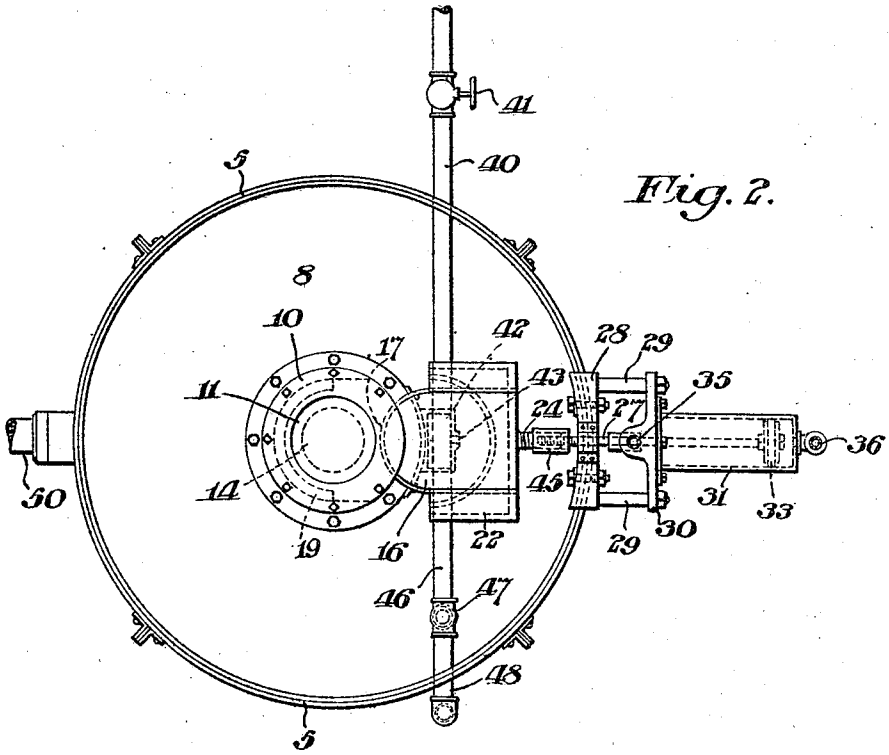


Fig. 2.

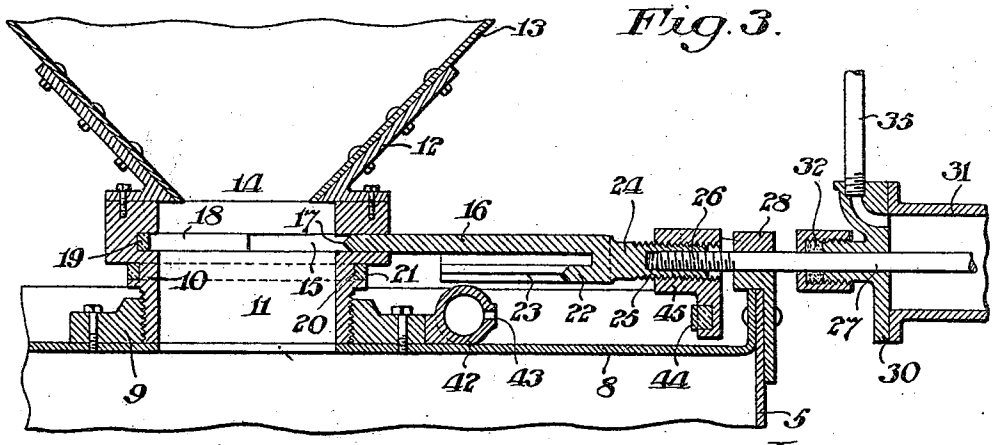


Fig. 3.

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UNITED STATES PATENT OFFICE.

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SAND-BLAST APPARATUS.

Application filed June 10, 1921. Serial No. 476,624.

To all whom it may concern:

Be it known that I, CHARLES G. SMITH, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sand-Blast Apparatus, of which the following is a specification.

My invention relates to sand blast apparatus, and it relates more particularly to an improved form of pressure tank and the associated parts, including the hopper and the means for permitting the sand to pass from the hopper to the tank. Heretofore, the common type of sand blast apparatus comprised, among other parts, the provision of a tank in which the supply of sand was kept under pressure. In the base of the pressure tank, there was usually provided a sand trap, by means of which the sand was permitted to pass into a current of air to be conveyed, through suitable piping and hose, to the outlet nozzle. The pressure tank was also provided at the top with a funnel-like hopper into which the replenishing supply of sand was either placed or was permitted to fall after being used, a valve being provided between the hopper and the pressure tank, which valve closed the tank when the sand was being used therefrom, but which was opened when it was necessary to permit a fresh supply of sand to pass from the hopper into the pressure tank. In the operation of the valve of the type most commonly used, it frequently occurred that when nails and other foreign objects would become mixed with the sand in the hopper, the same would choke the valve, not only preventing the sand from passing to the pressure tank, but also preventing the closing of the valve when it was desired to resume the use of the sand from the pressure tank. The operating mechanism of such valves was also located within the hopper, being surrounded by the sand in the hopper, which arrangement resulted in rapid destruction of the parts by reason of the sand getting into the working parts of the valve and its operating mechanism.

The object of my present invention is to provide an improved form of pressure tank and its associated parts for sand blast apparatus, in which the sand will have a clear passage from the hopper to the interior of the pressure tank when the valve is open, which will be so constructed and arranged as to reduce to a minimum the likelihood of foreign substances obstructing the passageway and fouling the valve, and in which the operating mechanism of the valve will be so located as to be readily accessible for the purpose of repair, as well as removed from the body of the sand, so that the wear on the same will be greatly reduced. A further object of my invention is to so construct and arrange the pressure tank and its associated parts whereby certain conveniences and economies in the operation of the same will be effected, as will hereinafter more fully appear. A further object of my invention is to provide an improved form of automatic means for relieving the pressure within the tank when the valve is open to permit a fresh supply of sand to pass from the hopper to the interior of the pressure tank. A further object of my invention is to provide means for introducing an auxiliary regulatable supply of air to the pipe line for the delivery of the mixture of air and sand, whereby the relative quantities of the air and sand may be more readily controlled for the purpose of effecting a more efficient action of the apparatus.

The nature and characteristic features of my invention will be more readily understood from the following description, taken in connection with the accompanying drawings forming part hereof, in which—

Figure 1 is a side elevation, partly in section, of a pressure tank and its associated parts for sand blast apparatus, embodying the main features of my present invention;

Fig. 2 is a top or plan view thereof, with the hopper removed; and

Fig. 3 is an enlarged sectional detail view more clearly illustrating the construction of the valve and the adjacent parts.

Referring to the drawings, in the particular embodiment of my invention therein shown, 5 is the pressure tank, preferably made of sheet metal and of cylindrical form with a conical base 6, at the bottom apex of which a sand trap 7, of the usual construction, is mounted. The top plate 8 of the pressure tank 5 is provided with a centrally arranged pipe flange 9 bolted thereto, and in said pipe flange 9 there is mounted a valve housing 10 having a central cylindrical aperture 11 forming a passageway for the entrance of the sand into the pressure tank 5. A flange member 12 is secured to the top of the housing 10 and forms a support for a

conical hopper 13, having a throat or opening 14 at the base thereof of a diameter less than that of the central passageway 11 in the valve housing 10, for a purpose to be hereinafter explained.

The valve housing 10 is slotted on one side, as at 15, to permit the passage therethrough of a valve gate 16, the front end 17 of which is of semi-circular contour and V-shaped in cross section. On the interior of the valve housing 10, on the side thereof opposite the slot 15, there is provided a semi-annular groove 18 in which is mounted a gasket 19 of rubber or similar resilient material, so that when the valve gate 16 is pushed inward to close the passageway 11 through the valve housing 10, the gasket 19 will prevent the passage of the air under pressure within the tank 5. On the outside of the valve housing 10, below the level of the slot 15, there is provided an annular groove 20, in which is mounted a rubber gasket 21, and the valve gate 16 is provided on its under side with a member 22, the front end 23 of which has a semi-circular contour and is V-shaped in cross section, and is so located with respect to the main portion of the valve gate 16 that when the valve gate 16 is pushed inward to its closed position, the front end 23 of the extension 22 will engage the gasket 21 and thereby prevent leakage from below the under surface of the valve gate when the same is closed.

The rear end of the valve gate 16 is provided with a cylindrical extension 24 having an interiorly threaded hole 25 which is engaged by a complementally threaded end 26 of a piston rod 27. The piston rod 27 is supported in a suitable bearing bracket 28 which is secured to the upper rim of the pressure tank 5. The bearing bracket 28 is also provided with standards 29 extending horizontally therefrom, the ends of which serve to support a cylinder head 30 of a cylinder 31, into which the piston rod 27 extends through a stuffing box 32. The piston rod 27 is provided on its end with a piston 33 which is adapted to be actuated by means of air or other suitable medium supplied through the pipes 35 and 36 to the respective ends of the cylinder 31.

The air for maintaining the pressure within the tank 5 is supplied by means of a pipe 40 from any suitable source of supply, the same being controlled by means of a valve 41 of any preferred type. The pipe 40 extends to a housing 42, which is preferably secured to the pipe flange 9 carried by the top plate 8 of the pressure tank. The housing 42 is provided with an outlet aperture 43 which is adapted to be closed, when the valve gate 16 is in its closed position, by means of a closure member 44, preferably made of rubber or similar resilient material, which is carried by a bracket 45 adjustably mounted on the member 24 extending from the rear end of the valve gate 16, the arrangement being such that before the valve gate 16 can be opened, the aperture 43 of the housing 42 will be exposed, for a purpose to be presently explained. A continuation 46 of the pipe line extends from the housing 42 to a T-connection 47, whereby air under pressure is supplied to the pressure tank 5 during the normal operation of the same. A continuation 48 of the pipe line extends from the T 47 to beneath the pressure tank 5, where the same is connected to a check valve 49, which, in turn, is connected to one end of the sand trap 7 mounted at the lower end of the pressure tank 5. A pipe line 50 extends from the sand trap 7 for the purpose of delivering the mixed sand and air to the nozzle, not shown, of the sand blast apparatus. If desired, there may be interposed in the pipe line 50 an angle fitting 51 for introducing an additional supply of air in an angular direction by means of a pipe line 52, which is controlled by means of a valve 53 suitably located in said pipe line, which pipe line also extends from the source of supply of the air under pressure.

For the purpose of removing any foreign objects which might accumulate in the bottom of the pressure tank 5 and thereby obstruct the sand trap 7, the conical base portion 6 is provided with an opening 54 which is normally closed by means of a plate 55 secured over the opening 54. By removing the plate 55, any foreign objects which may have accumulated at the bottom of the pressure tank 5 may be readily removed without dismantling the apparatus.

The operation of the apparatus may now be readily understood. In the normal functioning of the same, that is, when the sand blast is being used at the nozzle, a supply of the sand will be maintained within the tank 5, and the pressure of the air will, as before stated, be maintained within the tank 5 by means of the T-connection 47, so that the pressure within the tank will be substantially equal to the pressure in the pipe line from the source of supply. The air will also pass through the continuation 48 of the pipe line, thence through the check valve 49 (which is provided to prevent blowing back of the sand into the pipe line 48), the air thence passing through the sand trap 7 which, as is well known to those skilled in the art, will permit the sand to fall from the pressure tank 5 at a suitable rate and become mixed with the air and carried along through the pipe line 50 to the nozzle, where the same is used for cleaning castings or other similar operations.

It will sometimes be found, in the operation of the device, that the sand will be carried in a greater relative quantity than is desired, and to overcome this condition an

additional quantity of air may be injected into the pipe line 50 by means of the fitting 51 and the air supply pipe 52, which auxiliary supply is controlled by the valve 53, so that at all times proper conditions of the mixture of air and sand at the nozzle may be secured.

It may here be noted that by the provision of the conical base 6 of the pressure tank 5 the full capacity of the pressure tank 5 may be utilized, and all of the material readily utilized or removed therefrom, which is not the case where a substantially horizontal base on the pressure tank is used, as there will always be in such structures an accumulation of the sand around the sides of the base which cannot be readily removed therefrom.

When the sand in the pressure tank 5 becomes exhausted, or so diminished in amount that it is desirable to replenish the supply, a suitable quantity of sand is placed within the hopper 13, or has previously been permitted to accumulate therein (that is, where the hopper 13 is located beneath the sand blast room where the discharge nozzle is used). The valve 41 is then closed to prevent the passage of the air under pressure to the pressure tank 5, as well as to the sand trap 7. Air under pressure is now supplied to the front end of the piston 33 within the cylinder 31, which will cause the valve gate 16 to be retracted. Immediately after the movement of the valve gate 16 commences, and before the same has been sufficiently retracted to open the passageway 11 in the valve housing 10, the outlet 43 of the housing 42, to which the pipe line 46 is connected, will be exposed by the retraction of the closure member 44, and the pressure in the tank will thereby be automatically relieved, and blowing back of the sand through the throat 14 at the base of the hopper 13 will be prevented. The valve gate 16 will then continue to be retracted to its open position, and the sand will be permitted to pass through the throat 14 at the base of the hopper 13 and through the passageway 11 of the housing 10 to the interior of the pressure tank 5. It will be noted that the throat 14 of the hopper 13 is of a diameter less than the passageway 11, so that there will be no tendency or likelihood of any foreign objects, such as nails or other materials, becoming fouled within the passageway 11 or on any parts of the valve structure, and the diameter of the throat 14 being sufficiently large, there will be no tendency for obstructions to gather at that point.

It will be noted that by this arrangement there is provided a free passage for the sand from the hopper to the interior of the pressure tank, and it will also be noted that the operating parts of the valve are all located outside of the pressure tank and hopper, so that the same are not only removed from the wear caused by particles of sand getting into the working parts, but the same are also readily accessible for adjustment and repair, when necessary.

Having thus described the nature and characteristic features of my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a sand blast apparatus, a pressure tank, a valve housing mounted thereon having an unobstructed passageway extending therethrough, a hopper carried by said housing having a throat communicating with said passageway, a valve gate adapted to be moved transversely across said passageway to close the same, externally mounted means for actuating said valve gate comprising a cylinder, a piston arranged in said cylinder, and a piston rod on which said piston is mounted operatively connected to said valve gate.

2. In a sand blast apparatus, a pressure tank, a valve housing mounted thereon having an unobstructed passageway extending therethrough, a hopper carried by said housing having a throat communicating with said passageway of less diameter than said passageway, and means adapted to be moved transversely across said passageway to close the same.

3. In a sand blast apparatus, a pressure tank, a valve housing mounted thereon having an unobstructed passageway extending therethrough, a hopper carried by said housing having a throat communicating with said passageway of less diameter than said passageway, a valve gate adapted to be moved transversely across said passageway to close the same, and externally mounted means for actuating said valve gate.

4. In a sand blast apparatus, a pressure tank, a valve housing mounted thereon having an unobstructed passageway extending therethrough, a hopper carried by said housing having a throat communicating with said passageway of less diameter than said passageway, a valve gate adapted to be moved transversely across said passageway to close the same, and externally mounted means for actuating said valve gate comprising a cylinder, a piston arranged in said cylinder, and a piston rod on which said piston is mounted operatively connected to said valve gate.

5. In a sand blast apparatus, a pressure tank, a valve housing mounted thereon having an unobstructed passageway extending therethrough, a hopper carried by said housing having a throat communicating with said passageway, a valve gate adapted to be moved transversely across said passageway to close the same, means for actuating said valve gate, a sand trap mounted at the bottom of said pressure tank, an air supply pipe line connected to said pressure tank and to said trap, and means for automatically re-

lieving the pressure in the tank when the valve gate is retracted.

6. In a sand blast apparatus, a pressure tank, a valve housing mounted thereon having an unobstructed passageway extending therethrough, a hopper carried by said housing having a throat communicating with said passageway, a valve gate adapted to be moved transversely across said passageway to close the same, mechanism for actuating said valve gate, a sand trap mounted at the bottom of said pressure tank, an air supply pipe line connected to said pressure tank and to said trap, and means for automatically relieving the pressure in the tank when the valve gate is retracted comprising a housing interposed in the air supply line and having an outlet aperture, and a member for closing said outlet aperture when the valve gate is in the closed position and exposing the same when the valve gate is retracted, said closure member being operatively connected to the valve gate actuating mechanism.

7. In a sand blast apparatus, a pressure tank, a valve housing mounted thereon having an unobstructed passageway extending therethrough, a hopper carried by said housing having a throat communicating with said passageway, a valve gate adapted to be moved transversely across said passageway to close the same, externally mounted means for actuating said valve gate, a sand trap mounted at the bottom of said pressure tank, an air supply pipe line connected to said pressure tank and to said trap, and means for automatically relieving the pressure in the tank when the valve gate is retracted comprising a housing interposed in the air supply line and having an outlet aperture, and a member for closing said outlet aperture when the valve gate is in the closed position and exposing the same when the valve gate is retracted, said closure member being operatively connected to the valve gate actuating mechanism.

8. In a sand blast apparatus, a pressure tank, a valve housing mounted thereon having an unobstructed passageway extending therethrough, a hopper carried by said housing having a throat communicating with said passageway, a valve gate adapted to be moved transversely across said passageway to close the same, externally mounted means for actuating said valve gate comprising a cylinder, a piston arranged in said cylinder, and a piston rod on which said piston is mounted operatively connected to said valve gate, a sand trap mounted at the bottom of said pressure tank, an air supply pipe line connected to said pressure tank and to said trap, and means for automatically relieving the pressure in the tank when the valve gate is retracted comprising a housing interposed in the air supply line and having an outlet aperture, and a member for closing said outlet aperture when the valve gate is in the closed position and exposing the same when the valve gate is retracted, said closure member being operatively connected to the valve gate actuating mechanism.

In testimony whereof, I have hereunto signed my name.

CHARLES G. SMITH.