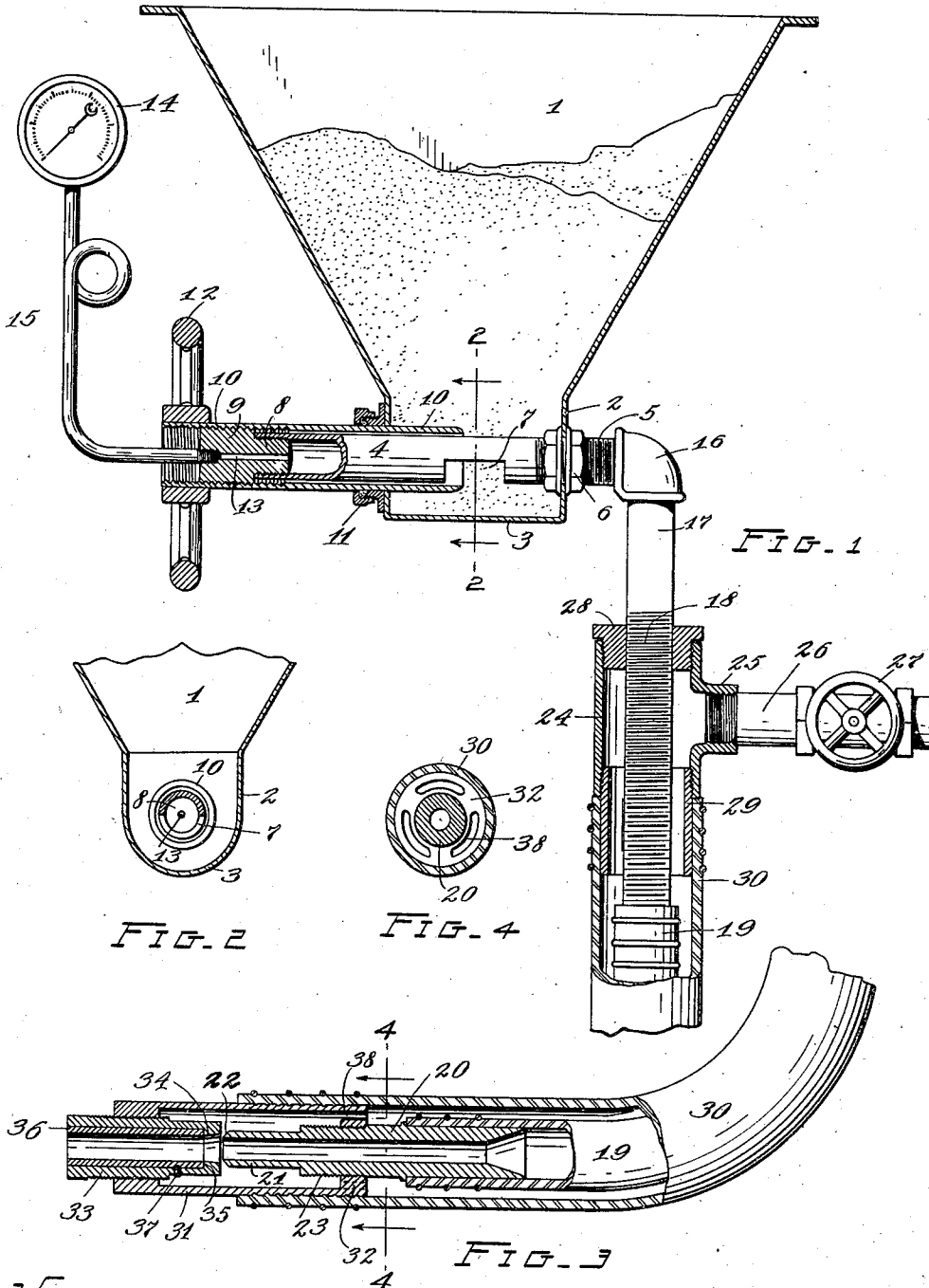


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SAND BLAST APPARATUS.
APPLICATION FILED JAN. 17, 1912.

1,073,149.

Patented Sept. 16, 1913.



Witnesses =

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UNITED STATES PATENT OFFICE.

GEORGE R. LAWRENCE, OF CLEVELAND, OHIO, ASSIGNOR TO THE W. W. SLY MANUFACTURING COMPANY.

SAND-BLAST APPARATUS.

1,073,149.

Specification of Letters Patent.

Patented Sept. 16, 1913.

Application filed January 17, 1912. Serial No. 671,766.

To all whom it may concern:

Be it known that I, GEORGE R. LAWRENCE, a citizen 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 objects to provide an apparatus of this character that will give a steady flow or discharge of sand; that will be capable of effectively regulating the flow of air and sand through the discharge nozzle; that will be extremely convenient in operation and relatively simple and inexpensive of production.

A further object of the invention is to provide an improved form and construction of nozzle and improved means whereby the flow of sand may be regulated in accordance with the grade of sand used and other varying conditions of use.

With the foregoing objects in view, the invention may be defined further as consisting of the combinations of elements embodied in the claims hereto annexed and illustrated in the drawings forming a part hereof, wherein—

Figure 1 represents a sectional view of the hopper and portions of the sand and air conduits of my apparatus; Fig. 2—a sectional detail corresponding to the line 2—2 of Fig. 1, looking in the direction of the arrows; Fig. 3—detail view partly in section and partly in elevation, of the discharge ends of the sand and air ducts, including the nozzle. Fig. 4—a sectional detail corresponding to the line 4—4 of Fig. 3 and looking in the direction of the arrows.

Describing by reference characters the various parts illustrated herein, 1 denotes the hopper or sand receptacle, the same being of general frusto pyramidal shape and having at its lower end an extension 2, generally rectangular in section, provided with a round, closed bottom 3.

4 denotes a pipe section comprising part of the sand conduit, said section extending across the bottom extension 2 and preferably parallel with and a short distance above the rounded bottom 3. This pipe section is provided with a thread 5 having a pair of clamping nuts 6 thereon, by means

of which it is secured to the inner and outer surfaces of one of the end walls of the bottom extension 2. The pipe section 4 is provided with a port 7, which may be conveniently formed by cutting out a semi-cylindrical portion of said pipe section and so assembling the parts that the port will be directed downward, as shown in Figs. 1 and 2. The port will preferably be located above the central portion of the bottom extension. The end of the pipe section 4, opposite the nuts 6, extends through the other end wall of the bottom extension 2 a considerable distance and is provided with an internal thread for the reception of the reduced threaded end 8 of a plug 9. The enlarged end of this plug is of greater diameter than the pipe section 4 and is provided with an external thread for the reception of an internal thread provided in the outer end of a sleeve 10. This sleeve projects through an aperture in the wall of the bottom extension opposite the nuts 6, the sleeve being mounted in a stuffing box 11 which projects from the cooperating wall of the bottom extension. An operating handle 12 is secured to the sleeve in a suitable manner for the purpose of adjusting the sleeve along the pipe section 4, so as to control the effective area of the port 7. The plug 9 is provided with a bore 13, and this bore is placed in communication with a vacuum gage 14 by means of a pipe 15 threaded into the outer end of the plug.

The pipe section 4 is shown as threaded into an elbow 16, from which there extends a second pipe section 17 having an external thread 18 thereon. Secured to the end of the pipe section 17 is a hose or similar flexible pipe 19. This flexible pipe may be of any desired length, according to the conditions of use. At its lower or discharge end it is connected to a suitable metallic nozzle section 20 by which sand supplied through the pipe 19 is discharged. The nozzle section 20 is provided with a discharge end 21, which is reduced in diameter as compared with the body of said section and is provided with a tapered end 22. Beyond the reduced portion 21 the nozzle section is enlarged and is provided with an external thread 23 for purposes to be described hereinafter.

The sand conduit comprising the pipe sections, 4, 17 and 19 extends for the greater

part of its length through the air supply conduit, the following construction being employed for this purpose. 24 denotes a T having a connection 25 into which the air supply pipe 26 is threaded, said pipe being provided with a valve 27. One end of the T is closed by means of a plug 28, which is threaded into said T and has a threaded bore by means of which it and the T are connected with the pipe section 17. In the end of the T opposite the plug 28 there is threaded a bushing 29, and to this bushing there is secured the hose or similar flexible pipe 30 which surrounds the pipe 19 and forms therewith an annular passageway for the air discharged into the T 24.

In the lower or discharge end of the pipe 30 there is mounted a nozzle section 31, the parts being so arranged that said section shall surround the nozzle section 20, the latter section being mounted and centered within the section 31 by having the portion 23 thereof threaded into the bore of a spider 32 carried by the inner end of the nozzle section 31 and preferably formed therewith. The forward or discharge end of the nozzle section 31 is provided with an inwardly directed flange having an internally threaded bore for the reception of a nozzle section 33, the last mentioned section being provided at its inner end with an outwardly tapering seat 34, merging with a shoulder 35, which shoulder forms an abutment for a bushing 36, which may be slipped or driven into the bore of the section 33, the parts being so proportioned that when the bushing is so inserted its bore will form in effect a continuation of the enlarged end of the seat 34. The bushing may be conveniently retained in place by means of a set screw 37 and is made of specially hardened steel to enable it to withstand the action of the sand.

With the parts constructed and arranged as described, the operation will be as follows: The sleeve 10 will be adjusted by the handle 12 to regulate the effective size of the port 7 in connection with the grade of sand used. As is well known, the finer the sand the less air will be required to feed it to the point of use. Air will be turned into its conduit by operating the valve 27 and will flow around the sand conduit, through the ports 38 in the spider 32, around the nozzle section 20 and through the section 33, thereby creating a suction upon the former nozzle section, which section will draw the sand from the hopper through its conduit. It will be observed that ample clearance is provided between the sand and air conduits to accommodate the full capacity of the pipe 26. The ports 38 will also be of sufficient area not to materially reduce or interfere with the flow of air to the nozzle section 33. By this arrangement,

there will be practically no frictional resistance to the flow of air through its conduit to the entrance of the discharge nozzle section 33. By adjusting the nozzle section 33 toward and from the section 20 the flow of air, and consequently the flow of sand, may be adjusted simultaneously in accordance with the conditions of use.

In the apparatus disclosed herein, there will be no feed of sand by gravity from the hopper, since the sand is obliged to move laterally through the hopper into the conduit section 4 and since such movement cannot occur through the gravity of sand, the sand not being sufficiently fluid to permit this movement. The gage 14 indicates to the operator the amount of vacuum that is being produced in the sand conduit and hopper. Any sudden diminution in this vacuum indicates leakage in the air or sand conduit or the necessity for filling the hopper. Should it be necessary to cut off the blast, this can be accomplished by bringing the valve seat 34 in contact with the tapered end of the nozzle section 20 which results in cutting off the flow of air and thus the flow of sand.

Having thus described my invention, what I claim is:

1. In a sand blast apparatus, the combination of a receptacle, a conduit for sand having a pipe section extending into said receptacle above the bottom and provided with a downwardly directed port, a sleeve surrounding the said pipe section and adjustable thereon to vary the effective area of said port, a fluid pressure supply conduit surrounding the discharge end of the sand conduit, and means for regulating the flow of air through the latter conduit.

2. In a sand blast apparatus, the combination of a sand receptacle, a sand conduit comprising a pipe section extending through the opposite walls of said receptacle above the bottom thereof and provided with a port in its lower surface, a sleeve adjustably mounted on the end of said pipe section and projecting into the receptacle and arranged to control the effective area of said port, a fluid pressure supply conduit arranged to discharge past the discharge end of the former conduit to create a suction therein, and means for controlling the flow of the fluid through its conduit.

3. In a sand blast apparatus, the combination of a receptacle, a pipe section extending across the receptacle and having a port in its lower surface above the bottom of such receptacle, a plug for the end of said section, a sleeve adjustably mounted on said plug and surrounding said conduit section and adapted to overlap the port thereof, a nozzle section with which the sand conduit communicates, and a fluid pressure supply pipe communicating with

said nozzle section and arranged to create a suction around the discharge end of the sand conduit.

4. In a sand blast apparatus, the combination of a receptacle for sand, a conduit connecting therewith and comprising a flexible pipe having at its discharge end a nozzle section provided with an annular seat surrounding its mouth, a pressure fluid conduit having a nozzle section surrounding the former nozzle section and provided with an interiorly cylindrical elongated discharge passageway common to both conduits, said last mentioned section being substantially coaxial with said first mentioned nozzle section and being adjustably mounted with respect thereto, the diameter of said discharge passageway being not materially less than that of said first nozzle section and said second nozzle section having a seat surrounding said passageway and adapted to cooperate with said first seating portion whereby the flow of pressure fluid may be regulated.

5. In a sand blast apparatus, the combination of a fluid pressure supply conduit having at its discharge end a sleeve provided with an apertured spider, said sleeve having an internally threaded bore, a discharge nozzle section threaded into said bore and having at its inner end a valve seat, and a sand conduit having a nozzle section threaded into said spider and having a valve cooperating with said seat.

6. In a sand blast apparatus, the combination of a fluid pressure supply conduit having at its discharge end a sleeve provided with an internal spider and with an

inwardly directed flange spaced from said spider, said flange and spider each being provided with a threaded bore, a discharge nozzle section threaded into a bore of said flange, a sand nozzle adjustably threaded in said spider, a sand conduit secured to said nozzle, and a removable liner secured in said discharge nozzle section.

7. In a sand blast apparatus, the combination of a discharge nozzle comprising a sleeve having threaded into its outer end a nozzle section, said nozzle section having at its inner or receiving end a beveled seat having a shoulder at the outer and smaller end of said seat, a bushing removably fitted in said nozzle section and adapted to abut against said shoulder, and a sand conduit having a nozzle section cooperating with the seat on the first-mentioned section.

8. In a sand blast apparatus, the combination, with a conduit for sand and a nozzle carried by said conduit, of a second nozzle surrounding said first nozzle and spaced therefrom to define an annular passageway, a pressure fluid conduit connected to said second nozzle and communicating with said annular passageway, a hollow cylindrical discharge section carried by said second nozzle forward of and in alignment with said first nozzle and a cylindrical hardened steel bushing removably secured within said discharge section.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

GEORGE R. LAWRENCE.

Witnesses:

J. B. HULL,
BRENNAN B. WEST.