

No. 818,776.

PATENTED APR. 24, 1906.

J. D. MURRAY.  
SAND BLAST APPARATUS.  
APPLICATION FILED MAY 5, 1905.

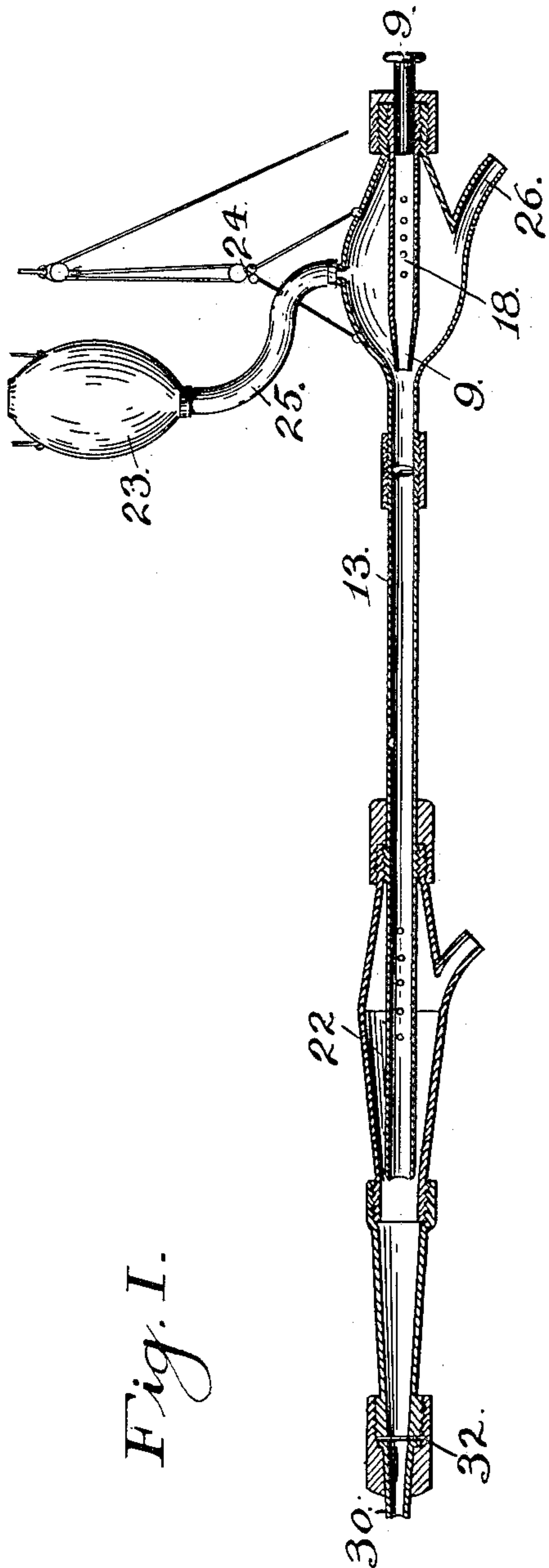


Fig. I.

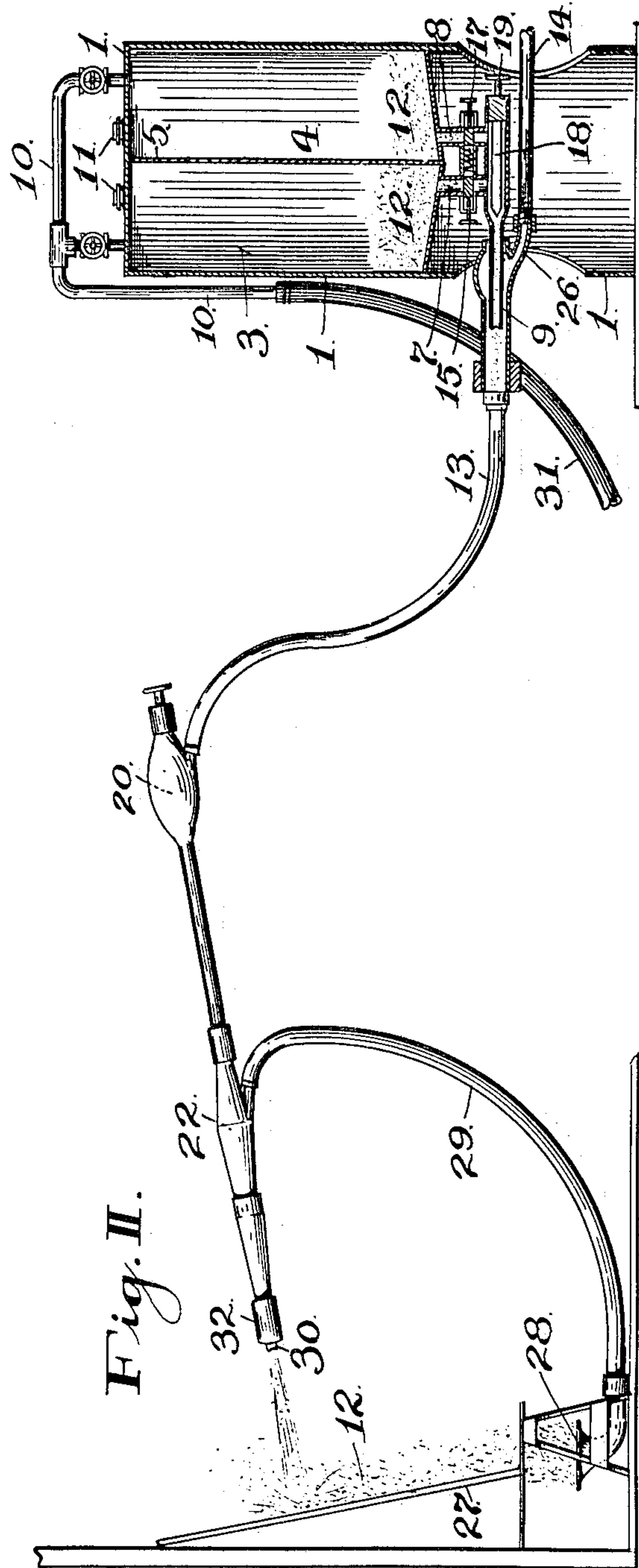


Fig. II.

Witnesses:  
Arthur L. Slee.  
Elmer Wickes.

Inventor:  
John D. Murray  
by J. Richards & Co. Attys.



# UNITED STATES PATENT OFFICE

JOHN D. MURRAY, OF SAN FRANCISCO, CALIFORNIA.

## SAND-BLAST APPARATUS.

No. 818,776.

Specification of Letters Patent.

Patented April 24, 1906.

Application filed May 5, 1905. Serial No. 258,965.

*To all whom it may concern:*

Be it known that I, JOHN D. MURRAY, a citizen of the United States of America, residing at San Francisco, county of San Francisco, and State of California, have invented certain new and useful Improvements in Sand-Blast Apparatus; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to certain improvements in what is technically called the "sand blast," and especially to the application of this art to scaling and cleansing marine vessels of iron or steel and other structures of like nature, also of the parts—such as plates, bars, or castings of metal—that enter into such structures, and is an improvement on my previous Letters Patent No. 773,665, dated November 1, 1904, and No. 783,218, dated February 21, 1905, both relating to sand-blast apparatus for like purposes.

My present improvement consists in a series, preferably three, of inductive nozzles, and between these, or anterior to the last one, a second or supplementary inlet-way for sand and detritus that is drawn in and applied successively through the scouring nozzle or nozzles, thus enabling the use by circulation of chilled iron shot or iron sand that has greater abrasive effect, but is too expensive to be applied once and wasted, as in the case of common sand; also consists in means of closing the first inlet for pure sand, so the third or second and third nozzle and the same apparatus can be employed to discharge waste sand and debris from where it has accumulated, within a vessel, for example.

My invention also includes a sand-containing receptacle with the compartments forming a relay or reserve store of sand, so the application can be continuous and without the delay for refilling, also an improved open-ended hollow needle-valve that receives air through its axis to impinge centrally in the induction-passage; further consists in an improved form of nozzles that adds to their effect and permits their easy and inexpensive renewal when abraded by the sand and includes means to sustain and adjust the apparatus, as hereinafter described and illustrated.

The objects of my invention are to permit the use of abrading material, including chilled

iron sand, in such manner that it will be circulated and not wasted and by means of the same apparatus remove when required from inclosed places accumulated spent sand and detritus that causes hindrance of the work, such as from the interior of ships, also to increase the force and efficiency of the sand-jet and provide for its continuous application.

To these ends I employ apparatus as shown in the accompanying drawings, forming a part of this specification.

Figure I is a longitudinal section through the nozzles and operating parts, also indicating the manner of supporting the movable parts of the same and for supplying sand from an elevated point, as in the rigging of ships; Fig. II, a side view, partially in section, of my improved apparatus, including a two-compartment receiver in an operating position.

It is well known that in inductive apparatus a series of throats or successive impulses add force to the fluid or substance being impelled; also, it is known that the abrasive effect of chilled iron sand is much greater than can be attained by silicious sand in removing oxid or other forms of scale from iron or steel surfaces. For the attainment of these ends I employ a receiver, a containing vessel 1 for sand or other abrading material having two compartments 3 and 4, divided by a diaphragm 5, and passages 7 and 8 leading from the chambers 3 and 4 to the first induction nozzle or ejector 9, as shown in Fig. I. Air under pressure is admitted through the pipe 14 and by action of the nozzle produces a partial vacuum in the chambers 3 and 4. Sand 12 is admitted through the pipes 7 or 8 from one of the chambers 3 or 4 to the ejector 9 and is forcibly driven into the pipe 13 by air under pressure entering from the pipe 14, which is connected to an air compressor or pump in the usual manner.

Fresh sand or other abrading material is supplied through the screw-nipples 11, and its flow to the nozzles is regulated by the valves 15 and 17, and the amount of air is controlled by the needle-valve 18, which is moved forward and backward by the hand-wheel 19 to regulate the size of the throat-way of the nozzle 9, as seen in Fig. I. In this manner by alternately filling and connecting the two compartments of the receiver 1 the operation of the apparatus becomes continuous, and no time is lost while



refilling the receiver with sand. This needle-valve 18 is made hollow and perforated on two or more sides to admit air to its interior, which is discharged centrally. This latter provision disposes the sand or abrading material in an annular section, removing the core thereof, and adds to force imparted by the air. This feature I apply to all the nozzles 9, 20, and 22, the action being the same in each case.

In Fig. I, where only two nozzles are shown, the middle one 20 being omitted, I show a suspended vessel 23 for containing the sand or other abrading material, such as is required in operating in places where there is no room for a receiver, such as shown in Fig. II. This vessel 23 can be slung to a ship's rigging or beneath decks, the first nozzle 9 being also suspended, as indicated at 24, a hose 25 conveying the sand or abrading material to the first nozzle 9 and air under pressure entering the nipple 26.

Referring to Fig. II, which indicates the manner of operating when two movable nozzles are employed, 27 is a plate being acted upon, the supply-valves 15 and 17 being closed and the sand or abrading material 12 falling down to be drawn into a suction-nozzle 28 and circulated through a hose 29, a partial vacuum being maintained in this hose by the inductive action of the nozzle 22. This manner of operating is especially applicable in the case of using iron sand, which can be returned to either of the nozzles 22 or 20, also to the receiver 1 and first nozzle 9, by means of a pipe 10, to which the hose 31 can connect from the suction-intake 28, as shown in Fig. II. The apparatus when arranged in the manner shown and the valves 15 and 17 closed can be used to remove spent sand and dust from the hold of a vessel or other confined place through the nozzle 22, this latter being directed overboard or to a suitable receptacle for the debris, as will be understood.

The nozzle-tip 30, which is especially subject to wear, I make in the form of thimble or shell to fit within a screw-follower 32, thereby providing for the instant removal and replacement of the tip 30, as shown in Fig. I.

The abrading material may consist of pure silicious or common sand or iron sand, or these can be mixed together, which is common; so, also, can the number of nozzles be varied, as before explained. The circumstances of use are extremely varied and call

for modifications of various kinds to attain the best results.

Having thus explained the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In sand-blast apparatus, an ejecting-nozzle, a receiver for the abrasive material discharged therethrough, and a pipe connecting said receiver with said nozzle at the rear of the latter, whereby said material is returned and used continuously by the action of the air-blast, substantially as specified.

2. In sand-blast apparatus, a series of ejecting-nozzles acting cumulatively, a reservoir for abrasive material communicating with the rear nozzle of the series, means for supplying an air-blast a receiver for the abrasive material discharged from said nozzles, and a pipe connecting said receiver with the foremost nozzle at the rear thereof, for circulating said abrasive material, substantially as specified.

3. In sand-blast apparatus, a reservoir for containing abrasive material, means for supplying an air-blast, a series of ejecting-nozzles connected by a pipe with said reservoir, an ejector between said air-supply and said pipe connection, and a hollow adjustable needle-valve, perforated in its sides, in said ejector, for regulating the air-blast and causing a graduated central discharge through the ejector, substantially as specified.

4. In sand-blast apparatus, a series of ejecting-nozzles, a suspensory reservoir for abrasive material, pipe connections between said nozzles and said reservoir, an ejector in said suspensory reservoir, means for supplying sand and air under pressure to said reservoir, and a hollow adjustable needle-valve to regulate the discharge through said ejector, substantially as specified.

5. In sand-blast apparatus, a nozzle to apply the abrading material, and a two-part receiver for the latter, the compartments thereof provided with valves communicating with the ejecting-nozzle, operative alternately, whereby a continuous supply can be furnished to the same nozzle, substantially as specified.

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

JOHN D. MURRAY.

Witnesses:

ALFRED A. ENQUIST,  
ELMER WICKES.