

No. 749,488.

PATENTED JAN. 12, 1904.

W. R. KING.

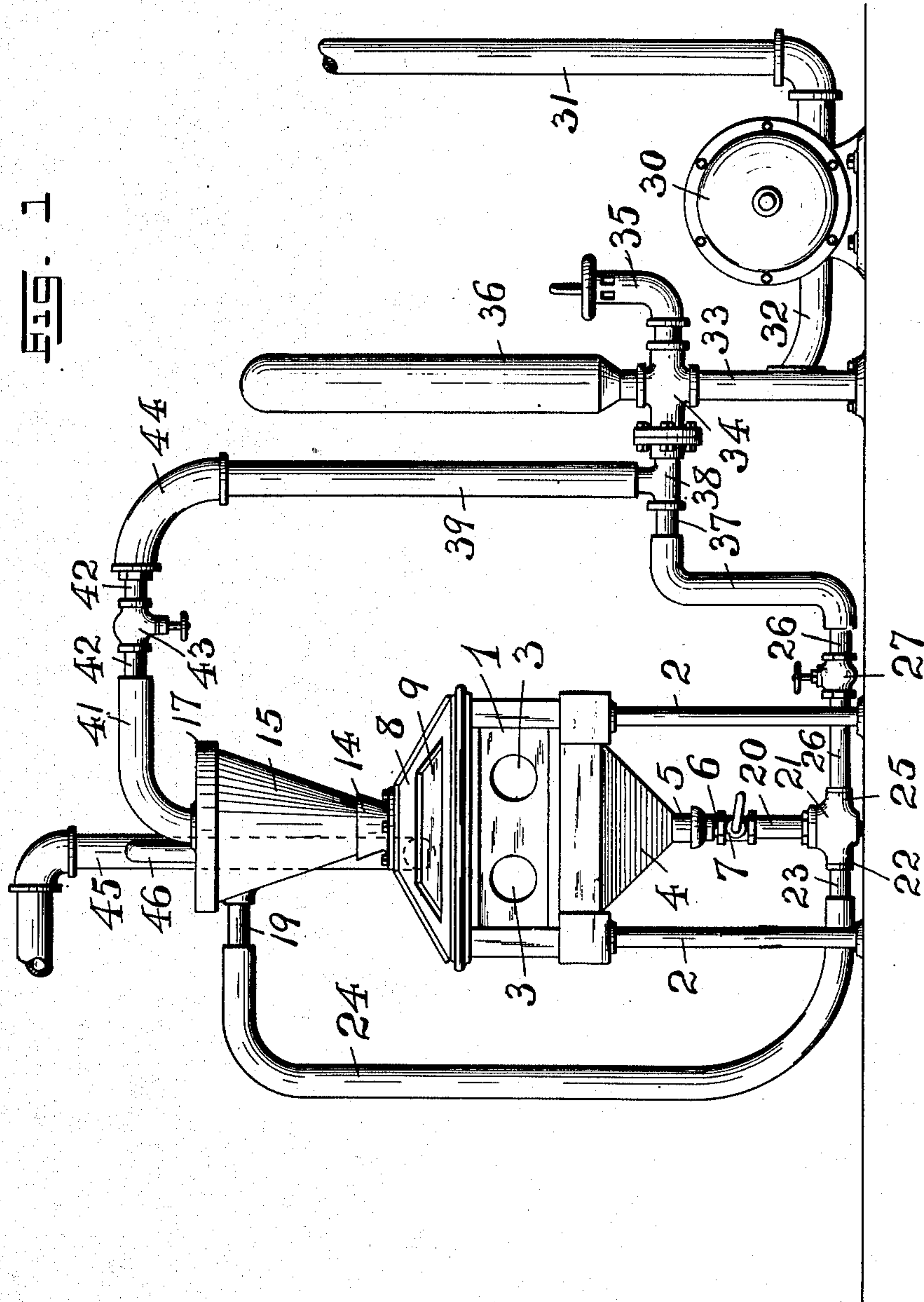
## SAND BLAST APPARATUS.

APPLICATION FILED MAY 21, 1903.

NO MODEL.

3 SHEETS—SHEET 1.

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**WITNESSES:**

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**INVENTOR:**

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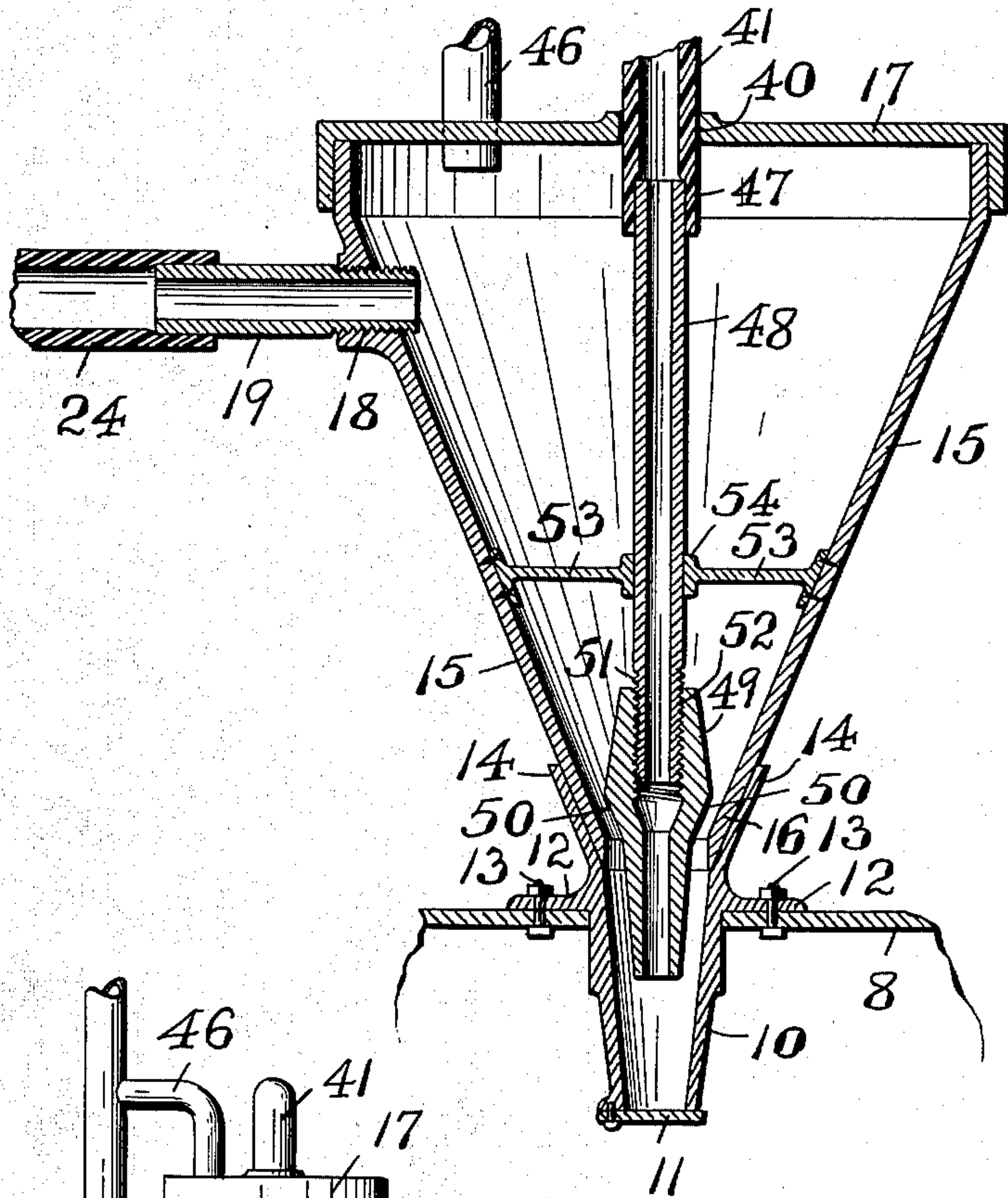


Fig. 2

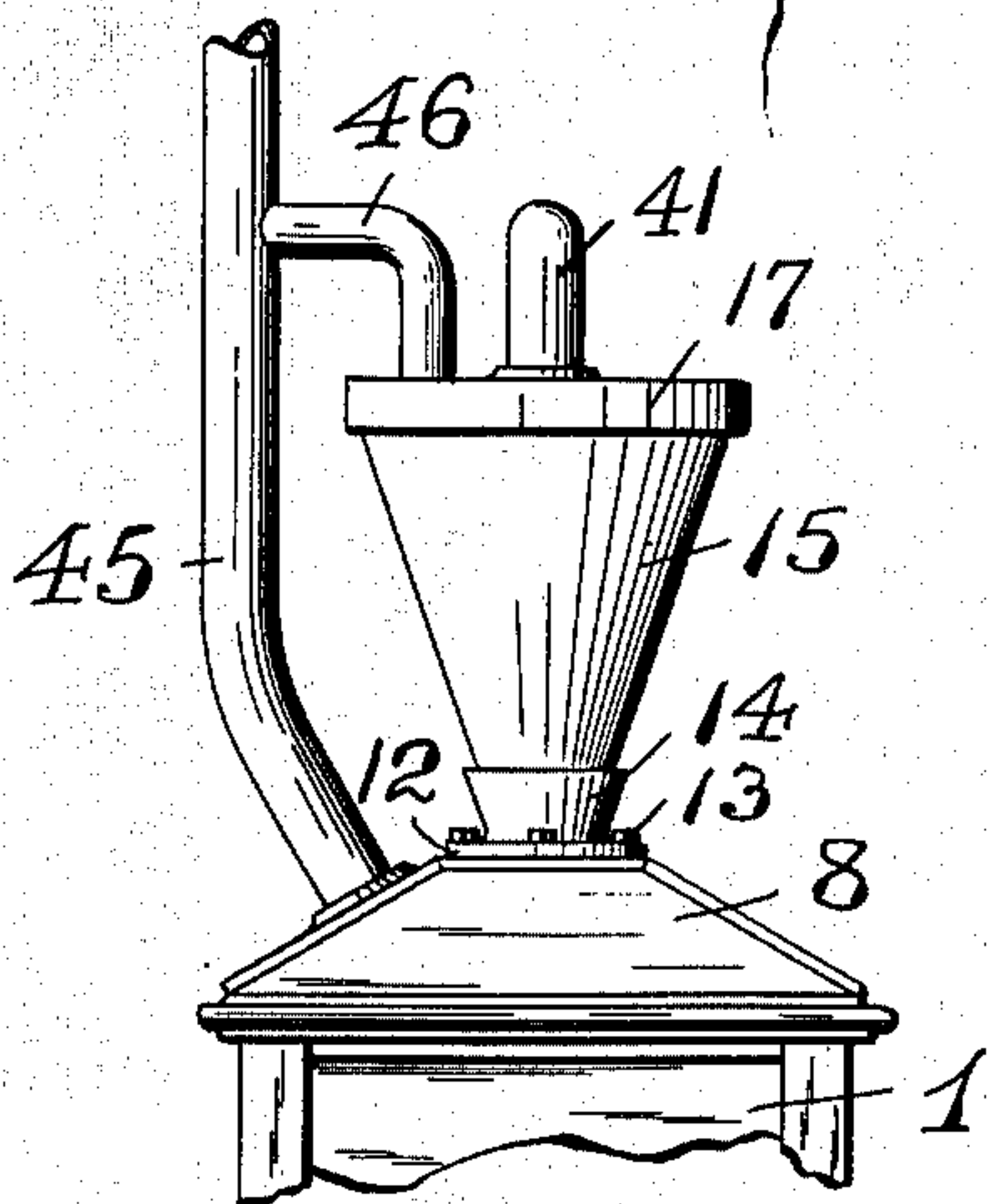


Fig. 3

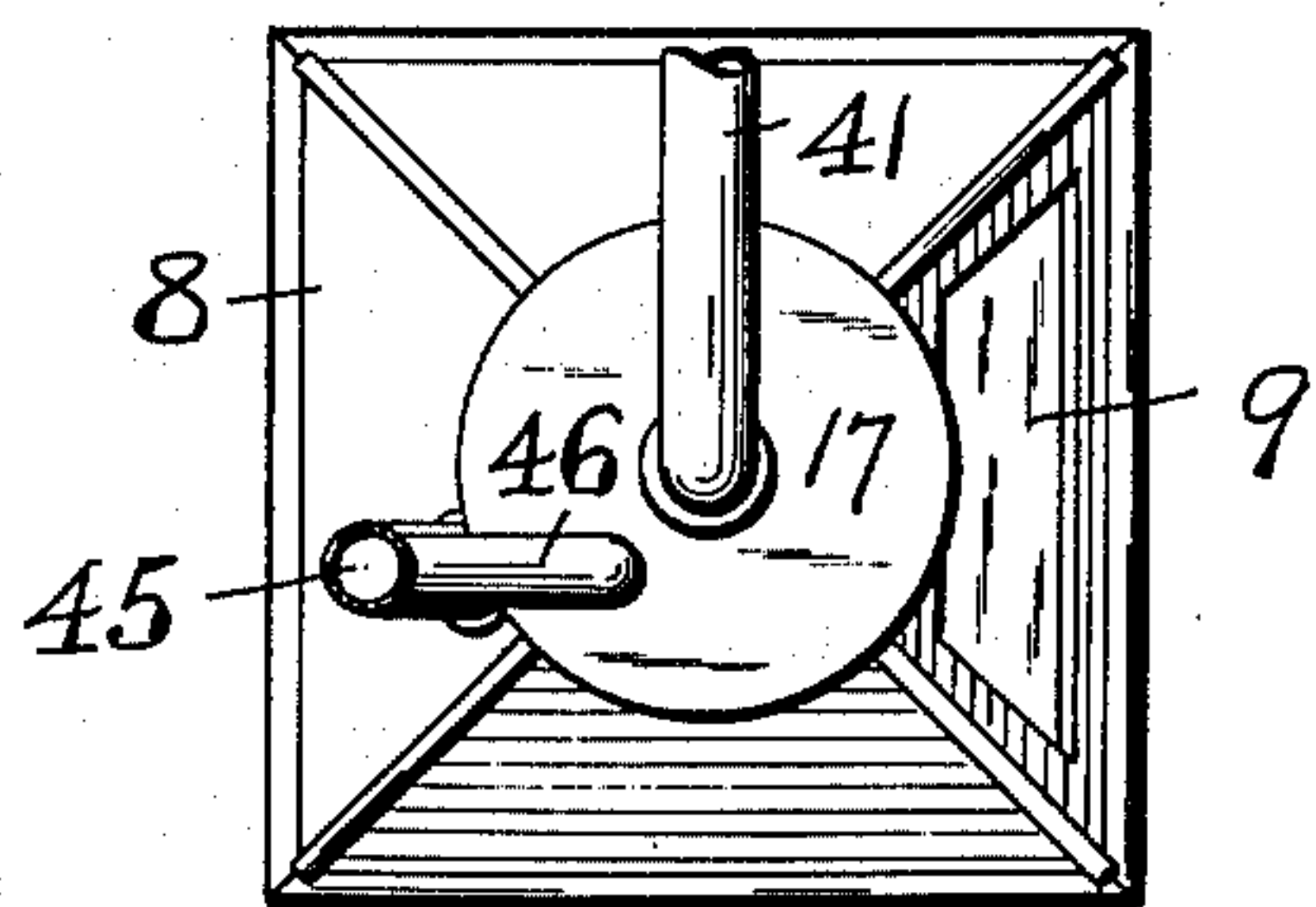


Fig. 4

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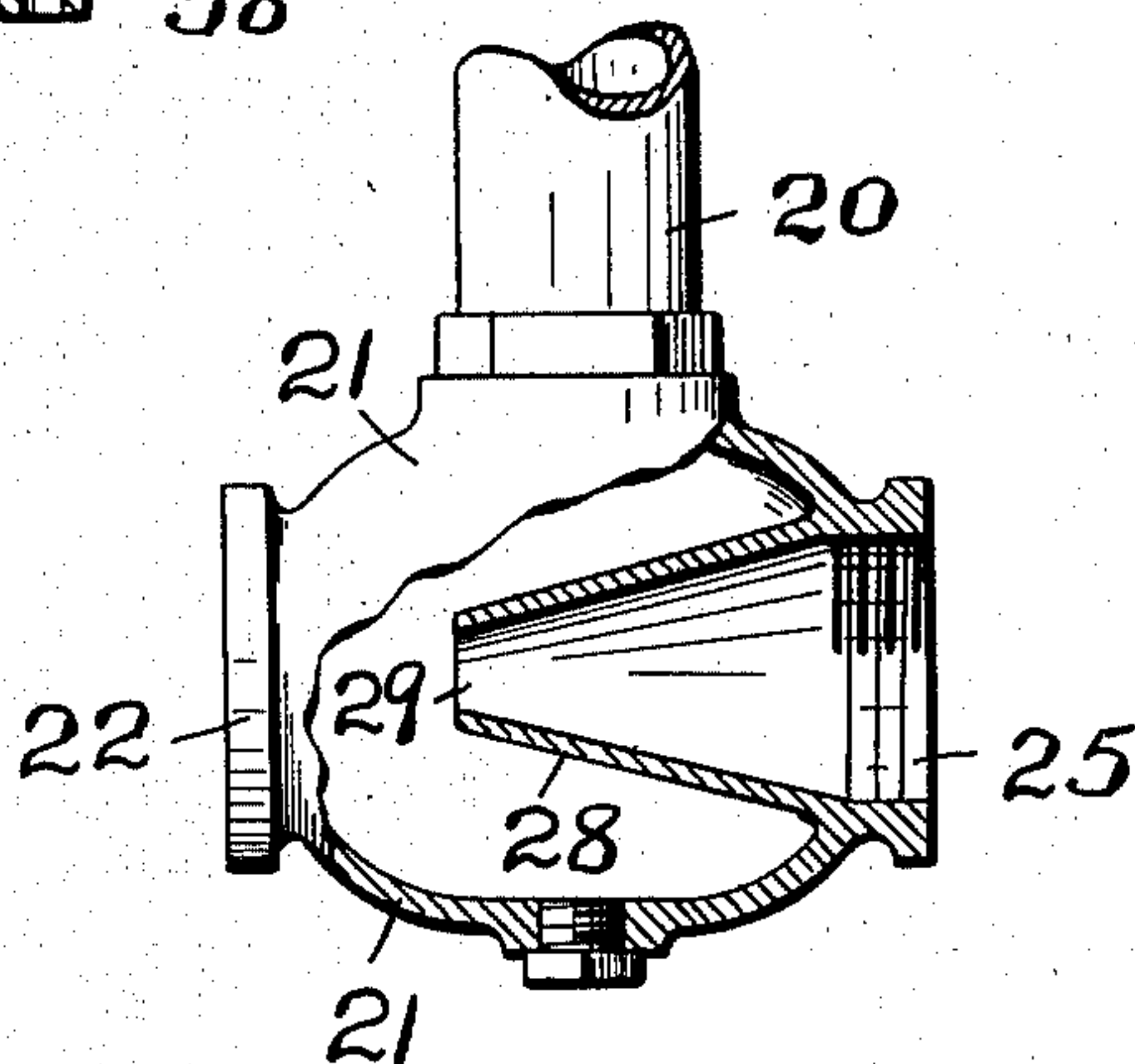
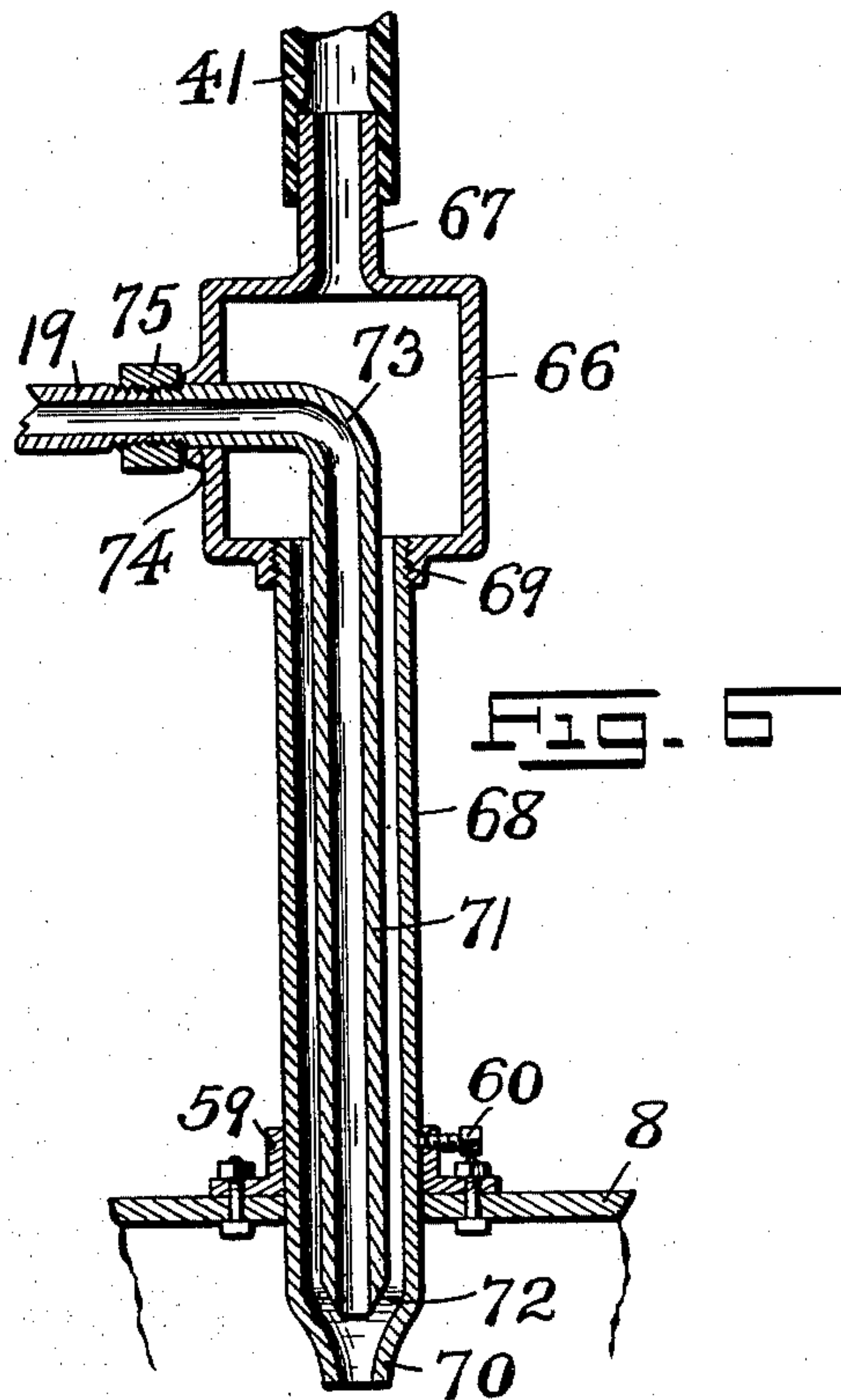
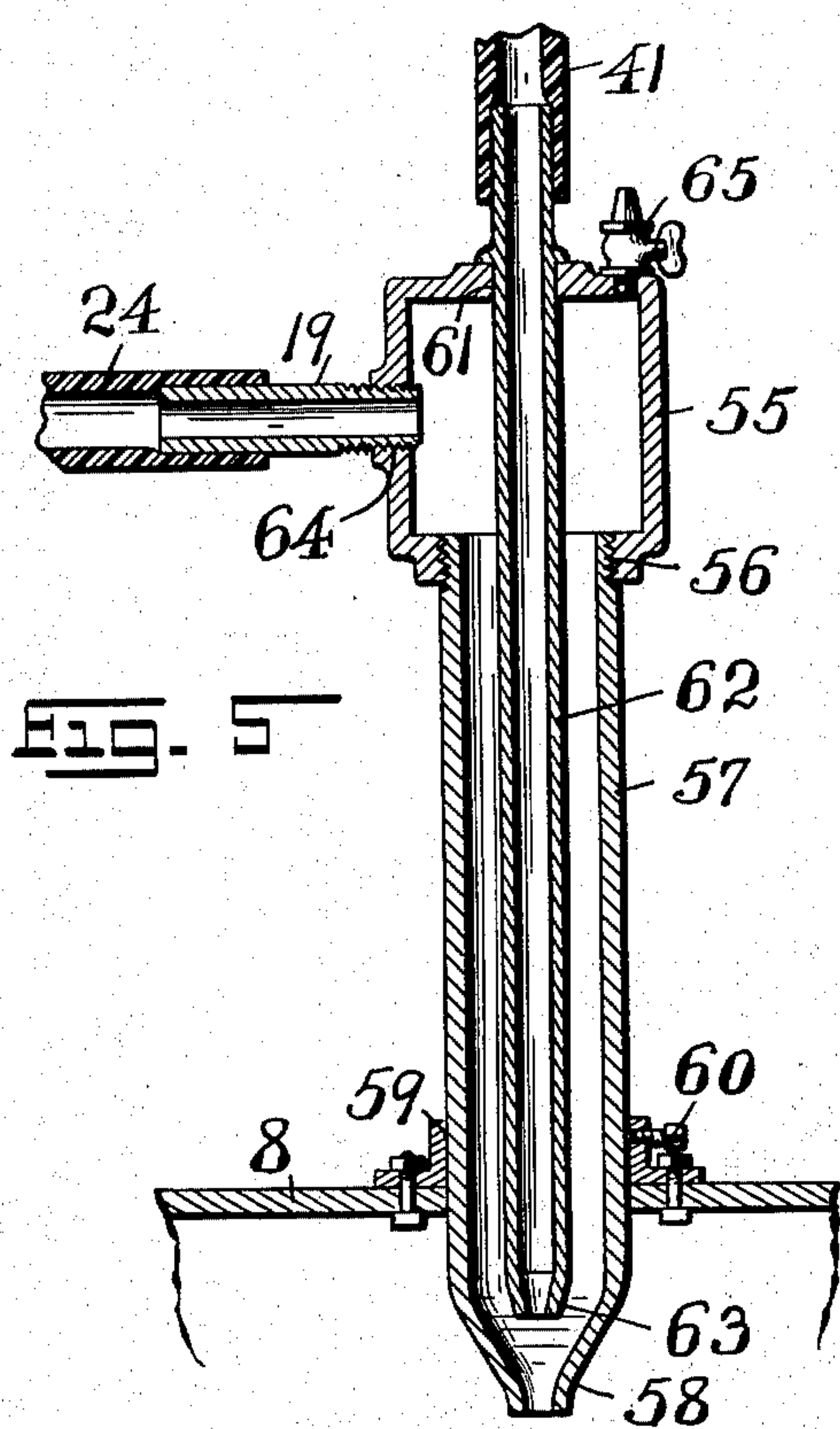
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3 SHEETS—SHEET 3.



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*Geo. D. Richards*  
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# UNITED STATES PATENT OFFICE.

WILLIS R. KING, OF NEW YORK, N. Y., ASSIGNOR TO THE HANSON & VAN WINKLE COMPANY, A CORPORATION OF NEW JERSEY.

## SAND-BLAST APPARATUS.

SPECIFICATION forming part of Letters Patent No. 749,488, date January 12, 1904.

Application filed May 21, 1903. Serial No. 158,093. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIS R. KING, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Sand-Blast Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

The present invention has reference to sand-blast machines; and this invention relates more particularly to that class of sand-blast machines or apparatus wherein the force of a jet of air or other similarly-acting medium drives particles of an abrading material, such as sand or the like, against the surfaces of metal, glass, or other articles of manufacture to cut and suitably ornament the same.

The main purpose of this invention is to provide a simply-constructed apparatus and a simple and efficient arrangement of devices for continuously conducting the abrading material through an operating-chamber, a forced stream or jet of air or other similarly-acting medium commingling with the supply of abrading material at a nozzle located above the work, the action of the blast or force of air or other medium being such that the jet or stream of abrading material is more effectively distributed over the article which is to be treated.

Other objects of the present invention are to facilitate the operations of surfacing and to give enhanced results with the use of a reduced amount of sand or other abrading material.

Other objects of the present invention not at this time more particularly specified will be clearly evident from the following detailed description of my invention.

The present invention therefore consists in the novel construction of sand-blast machine hereinafter set forth; and, furthermore, this invention consists in the various arrange-

ments and combinations of devices and their parts, as well as in the details of the construction thereof, all of which will be hereinafter more fully described, and then finally embodied in the clauses of the claim.

The invention is clearly illustrated in the accompanying sheets of drawings, in which—

Figure 1 is a front elevation of a sand-blast apparatus and devices connected therewith, all embodying the principles of the present invention. Fig. 2 is a transverse vertical section, on an enlarged scale, of a feed hopper, nozzle, and pipe connections to be used with the operating chamber or compartment in which the jet or stream of abrading material is forced upon the surface of the article. Fig. 3 is a side elevation of the said hopper and a portion of the operating-chamber, and Fig. 4 is a top or plan view of said hopper. Figs. 5 and 6 are transverse vertical sections of modified means for forcibly bringing an abrading material into the operating-chamber, and Fig. 7 is a longitudinal vertical section of valve employed with my invention.

Similar characters of reference are employed in all of the said above-described views to indicate corresponding parts.

Referring now more especially to Fig. 1, the reference character 1 indicates a casing forming the operating chamber or compartment, which may be of any suitable construction, the same being preferably arranged upon standards or supports, as 2, and being provided in one of its sides with an opening or openings 3 for the insertion of the hands and for properly manipulating the work within the said chamber or compartment. The bottom 4 of the said casing 1 is preferably made in the shape of a funnel or hopper, being formed with an outlet 5, to which is attached a pipe or duct 6, provided with a valve 7. The dome 8 of said casing, which may be made in the manner of a removable cover, is provided with glass or other suitable windows 9 for the inspection of the work within the casing 1 and for noting the proper supply of the abrading material. Suitably arranged in an opening in said dome 8 is a nozzle 10, which may be closed at the bottom by means of a suitable



gate 11 and is provided with a flange 12 or other suitable support resting directly upon said dome 8 and secured in place by means of bolts or screws 13. The said nozzle 10 is provided above the said flange 12 with a funnel-shaped receiving portion 14, in which is suitably secured the outlet 16 of a hopper 15. This hopper is closed at the top by means of a removable cover 17 or other suitable closing device, and connected with an opening, as 10 18, preferably in the side of said hopper 15, is a pipe 19. Connected with the previously-mentioned valve 7 is a pipe 20, which leads into the interior of a fitting 21, as shown and 15 for the purposes hereinafter more particularly specified. Connected with an outlet 22 of said fitting 21 is another pipe 23, which is connected with the pipe 19 by means of a flexible or other suitable tube 24. The said fitting 21 is 20 made with another inlet, as 25, with which is connected a pipe or duct 26, provided with a valve 27. The interior of the said fitting 21 is preferably made with a cone-shaped baffle 28, having an opening 29, with which the one 25 end of the pipe or duct 26 is in direct communication.

The reference character 30 indicates a suitable blower, having a suitable inlet, as 31, connected therewith and an outlet 32. This outlet 30 is preferably connected with a stand or other suitable pipe 33, having a four-way fitting 34, with the respective openings of which are connected a safety-valve 35, an air-chamber 36, and an outlet or discharge duct or pipe 35 37. This pipe 37 is suitably connected with the pipe or duct 26 and has a fitting 38, to which is attached another pipe or duct 39. Slidably and adjustably arranged in an opening 40 in the cover 17 of the hopper 15 is a flexible or 40 other suitable tubing 41, which is attached at its one end outside of said hopper to a pipe 42, in which there may be a valve 43. This pipe 42 is connected by means of an elbow 44 with the pipe or duct 39, all of which is clearly illustrated in Fig. 1 of the drawings. 45

Leading from the dome 8 of the casing 1 is a dust-exhaust or back-pressure pipe or duct 45, with which may be connected a pipe or duct 46, having its free end portion movably 50 arranged in a suitable opening in the cover 17 of the hopper 15. This pipe or duct 46 is also for the purpose of carrying off the dust from the hopper 15 when the apparatus is in operation.

55 Referring now to Fig. 2 of the drawings, it will be seen that there is attached in any suitable manner to the end portion 47 of the tubing 41 a pipe 48, said pipe being provided at its lower end with a discharge-nozzle 49, 60 which terminates directly within the inner portion of the previously-mentioned mixing-nozzle 10, substantially as illustrated. This discharge-nozzle 49 is preferably made with the tapering surface 50 conforming with the 65 inner tapering surface of the hopper 15, as

shown, whereby a suitable passage in the manner of a valve is provided for the flow of the sand or other abrading material from the hopper 15 into the mixing-nozzle 10 and thence into the interior of the casing 1. By raising 70 or lowering the said discharge-nozzle 49 by sliding the tubing 41 in the opening 40, as will be clearly understood, the said passage for the abrading material may be made larger or smaller, whereby the flow and the supply of 75 the material through the nozzle 10 can be easily regulated according to circumstances. Another means for raising or lowering the said nozzle 49 is that illustrated in said Fig. 2, and the same consists in providing the lower end 80 portion of the pipe or tube 48 with a screw-thread 51, the nozzle 49 being made with a corresponding screw-threaded socket 52, so that the said nozzle 49 can be turned up or down 85 upon the thread 51 to suitably adjust the nozzle 49, as will be clearly evident. That the said pipe or duct 48 may be retained in a fixed central position against vibration in the hopper 15 a brace or braces 53, provided with a central hub 54, in which the pipe 48 is arranged, may be secured within the said hopper 15, as illustrated. 90

Having thus described one general arrangement and construction of the parts of the apparatus, I will now set forth in detail the operation of the same. 95

Having placed a sufficient quantity of sand or other abrading material either in the hopper 15 or in the casing 1, the valve 7 and the gate 11 are opened. The valves 27 and 43 are 100 also opened and the blower 30 set in motion. Immediately the air is forced through the respective pipes or ducts into the fitting 21 and also by means of the pipe 48 into the mixing-nozzle 10. Now whether the sand or other 105 abrading material was placed in the hopper 15 or in the casing 1 by its own gravitation it will flow from the outlet 5 through the valve 7 and pipe 20 into the fitting 21 and directly in front of the opening 29 of the baffle-plate 110 28 in said fitting. The air coming from the pipe 26 and being forced from the opening 29 immediately takes up the sand and blows it through the pipes 23, 24, and 19 back into the hopper 15, where it falls by gravitation 115 into the mixing-nozzle 10, and is then forced by the air coming from the nozzle 49 directly into the operating-chamber of the casing 1 and upon the work which is being manipulated by the operator directly beneath the 120 stream or jet of sand. Thus a continuous circulation of the sand or other material is maintained, the sand or other material being repeatedly used over and over, without any undue loss of the sand or loss of time on the part 125 of the workman. During the operations of the apparatus any back pressure is relieved through the pipes 45 and 46, which also carry off the dust that arises from the sand.

That the sand or other suitable abrading 130



material may be properly and forcibly conducted in a stream or jet from the mixing-nozzle 10 I have found by practical demonstration to obtain the best results that it is essential to conduct the jet of air to the interior of the stream of sand, for which reason I conduct the sand through the space formed between the outer surface of the nozzle 49 and the lower interior surface of the hopper 15, leading the jet of air directly into the interior of the jet of sand, and thereby causing all the particles of the sand or other material used to pass from the outlet of the nozzle 10 with the greatest possible force and greater efficiency in more effectively abrading the surface of an article or a piece of glass or metal which is manipulated in the chamber of the casing 1 and beneath the said nozzle 10.

In lieu of the hopper 15 I may employ the modified arrangement of parts illustrated in Fig. 5 of the drawings. In this construction I use in place of the hopper 15 a box or casing 55, provided with a large and preferably screw-threaded opening 56, in which is secured the end of a sand-conveying tube or duct 57, having a lower discharge end 58. This tube 57 extends through an opening in the casing 1 and is adjustably held in a collar 59 on said casing by means of a set-screw 60, as shown. Within the said tube 57 and slidably arranged in an opening 61 in the upper part of the box 55 is an air-tube 62, having a discharge end 63, located in close proximity to the discharge end 58 of the tube 57, and upon its upper end above the said box 55 it has attached thereto the flexible tubing 41. Secured in a suitable opening 64 in the side of the said box 55 is the pipe 19, to which is attached the flexible or other tubing 24 in the manner of the construction of apparatus represented in Figs. 1 and 2. The said casing or box 55 may also be provided with an outlet or cock 65 for relieving any back pressure or for the removal of any dust during the operation of the apparatus. Instead of forcing the air directly into the interior of the jet of sand or other abrading material, as set forth in the constructions illustrated in said Figs. 1, 2, and 5, I may reverse this arrangement, and, if desired, I may feed the sand directly into a column of air. This arrangement is clearly illustrated in Fig. 6. In this device a casing or box 66 is used, the said box having an inlet 67, to which the tubing 41 is attached. The air is forced directly into the said box 66 and into an outlet-tube 68, which is secured in an opening 69 in the lower part of the box. This tube 68 is secured in the opening in the casing 1 by means of the collar 59 in the manner illustrated. The said tube 68 is also provided with a discharge-nozzle 70. Suitably arranged within said tube 68 is a sand-conveying tube 71, having a discharge-nozzle 72 and having its upper elbow portion 73 arranged in the said box 66 and slipped through an

opening 74 in the side of the said box, where it is held by a nut or union 75. Into this nut or union 75 is also secured the screw-threaded end of the said conveying-pipe 19. The operation of this device will be clearly understood from an inspection of said Fig. 6, and it will be clearly seen that by this means the air is mixed with the sand or other abrading material by encircling the same instead of being forced directly into the interior of the stream or jet of abrading material, as in the other constructions.

From the above description of my invention it will be evident that I have devised a simply-operating and efficient sand-blast apparatus.

I am fully aware that changes may be made in the various arrangements and combinations of the devices and their parts, as well as in the details of the construction thereof, without departing from the scope of my present invention. Hence I do not limit my invention to the exact arrangements and combinations of the devices and their parts as described in the previous specification and as illustrated in the accompanying drawings, nor do I confine myself to the exact details of the construction of the said parts.

Having thus described my invention, what I claim is—

1. In a sand-blast apparatus, the combination, with a casing, of means connected with said casing for receiving an abrading material, and emitting the same in a jet, and means connected therewith for conducting a jet of air directly into the interior of the jet of abrading material for mixing the same with the air and admitting the same under pressure into said casing, substantially as and for the purposes set forth.

2. In a sand-blast apparatus, the combination, with a casing having an inlet and an outlet, of means connected with said outlet and inlet for permitting a continuous supply of abrading material and emitting the same in a jet through said casing, and means for conducting a jet of air directly into the interior of the jet of abrading material for producing an admixture of the abrading material and air under pressure at the point of inlet into said casing, substantially as and for the purposes set forth.

3. In a sand-blast apparatus, the combination, with a casing having an inlet and an outlet, for emitting an abrading material in a jet of a mixing-nozzle connected with said inlet, and an air-discharging nozzle in said mixing-nozzle, for conducting a jet of air directly into the interior of the jet of abrading material, substantially as and for the purposes set forth.

4. In a sand-blast apparatus, the combination, with a casing having an inlet and an outlet, for emitting an abrading material in a jet, of a mixing-nozzle connected with said inlet, and an air-discharging nozzle adjustably arranged in said mixing-nozzle, for conducting



a jet of air directly into the interior of the jet of abrading material, substantially as and for the purposes set forth.

5. In a sand-blast apparatus, the combination, with a casing having an inlet and an outlet, of a mixing-nozzle connected with said inlet, a hopper secured to said mixing-nozzle, and means for conveying an abrading material and air under pressure into said hopper, substantially as and for the purposes set forth.

6. In a sand-blast apparatus, the combination, with a casing having an inlet and an outlet, of a mixing-nozzle connected with said inlet, a hopper secured to said mixing-nozzle, means for conveying an abrading material and air under pressure into said hopper, and an exhaust connected with said hopper, substantially as and for the purposes set forth.

7. In a sand-blast apparatus, the combination, with a casing having an inlet and an outlet, of a mixing-nozzle connected with said inlet, a hopper secured to said mixing-nozzle, means connected with said hopper for conducting an abrading material into said hopper, a discharge-nozzle within said mixing-nozzle, and an air-duct connected with said discharge-nozzle, substantially as and for the purposes set forth.

8. In a sand-blast apparatus, the combination, with a casing having an inlet and an outlet, of a mixing-nozzle connected with said inlet, a hopper secured to said mixing-nozzle, means connected with said hopper for conducting an abrading material into said hopper, a discharge-nozzle within said mixing-nozzle, an air-duct connected with said discharge-nozzle, and an exhaust connected with said hopper, substantially as and for the purposes set forth.

9. In a sand-blast apparatus, the combination, with a casing having an inlet and an outlet, of a mixing-nozzle connected with said inlet, a hopper secured to said mixing-nozzle, means connected with said hopper for conducting an abrading material into said hopper, a discharge-nozzle adjustably arranged within said mixing-nozzle, and an air-duct connected with said adjustable discharge-nozzle, substantially as and for the purposes set forth.

10. In a sand-blast apparatus, the combination, with a casing having an inlet and an outlet, of a hopper connected with said casing, a sand-conveying pipe connected at one end with said outlet and at the other end with said hopper, means connected with said pipe for conducting air under pressure into said sand-conveying pipe, and means for conducting air under pressure into said hopper, substantially as and for the purposes set forth.

11. In a sand-blast apparatus, the combination, with a casing having an inlet and an outlet, of a mixing-nozzle connected with said

inlet, a hopper attached to said mixing-nozzle, a sand-conveying pipe connected at one end with said outlet and at the other end with said hopper, an air-blast connected with the said sand-conveying pipe, and an air-blast connected with the said hopper for forcing the sand under pressure through the said mixing-nozzle, substantially as and for the purposes set forth.

12. In a sand-blast apparatus, the combination, with a casing having an inlet and an outlet, of a mixing-nozzle connected with said inlet, a hopper attached to said mixing-nozzle, a sand-conveying pipe connected at one end with said outlet and at the other end with said hopper, an air-blast connected with the said sand-conveying pipe, an air-conveying pipe extending through said hopper and terminating in close proximity to said mixing-nozzle, and a discharge-nozzle connected with said pipe and arranged directly within said mixing-nozzle, substantially as and for the purposes set forth.

13. In a sand-blast apparatus, the combination, with a casing having an inlet and an outlet, of a mixing-nozzle connected with said inlet, a hopper attached to said mixing-nozzle, a sand-conveying pipe connected at one end with said outlet and at the other end with said hopper, an air-blast connected with the said sand-conveying pipe, an air-conveying pipe extending through said hopper and terminating in close proximity to said mixing-nozzle, a discharge-nozzle connected with said pipe, and means for adjustably arranging the said discharge-nozzle within said mixing-nozzle, substantially as and for the purposes set forth.

14. In a sand-blast apparatus, the combination, with a casing, and a sand-conveying pipe connected with said casing, of a fitting 21 attached to said conveying-pipe, an air-conveying pipe connected with said fitting, and a baffle in said fitting, said baffle having a screw portion with which said air-conveying pipe is connected, substantially as and for the purposes set forth.

15. In a sand-blast apparatus, the combination, with a casing, and a sand-conveying pipe connected with said casing, of a fitting 21 attached to said conveying-pipe, an air-conveying pipe connected with said fitting, and a cone-shaped baffle in said fitting provided with an opening and said baffle having a screw portion with which said air-conveying pipe is connected, substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 29th day of April, 1903.

WILLIS R. KING.

Witnesses:

FREDK. C. FRAENTZEL,  
GEO. D. RICHARDS.