Dec. 19, 1944. T. C. CROWLEY 2,365,250

CLEANING APPARATUS

Filed June 18, 1943 2 Sheets-Sheet 1

Fig. 1.

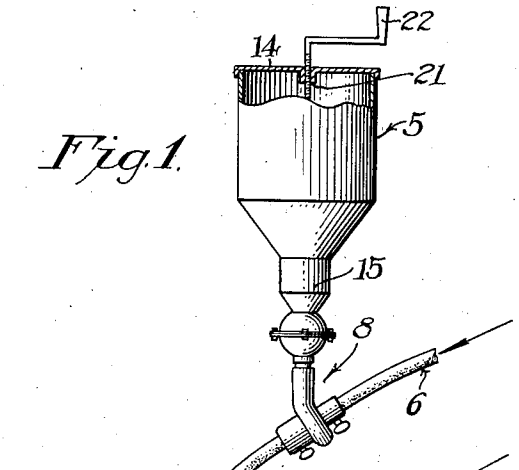


Fig. 2.

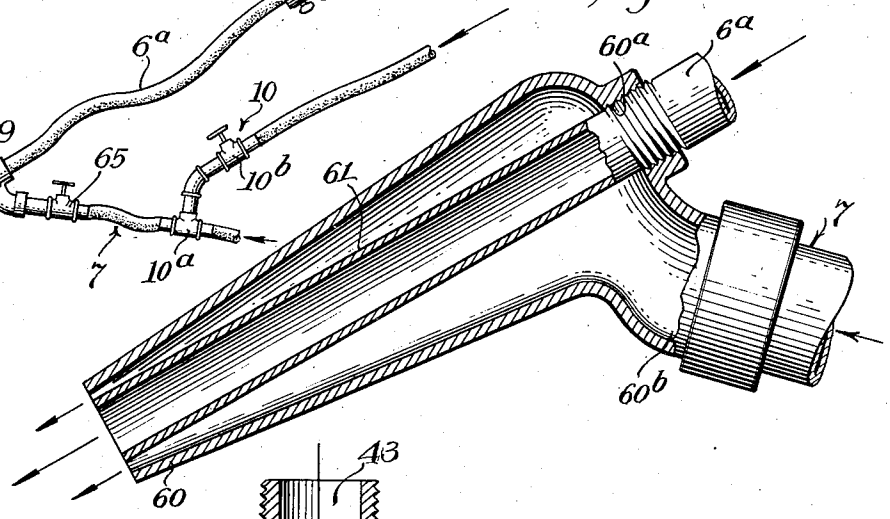
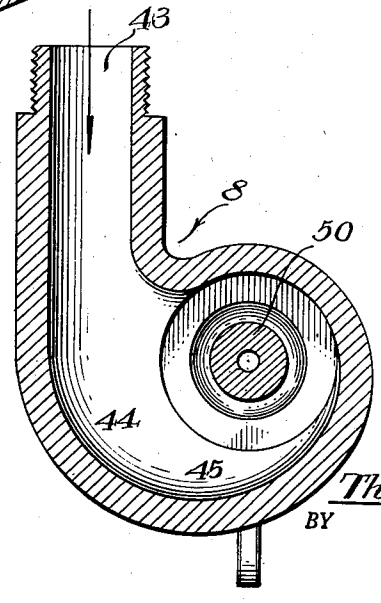


Fig. 3.



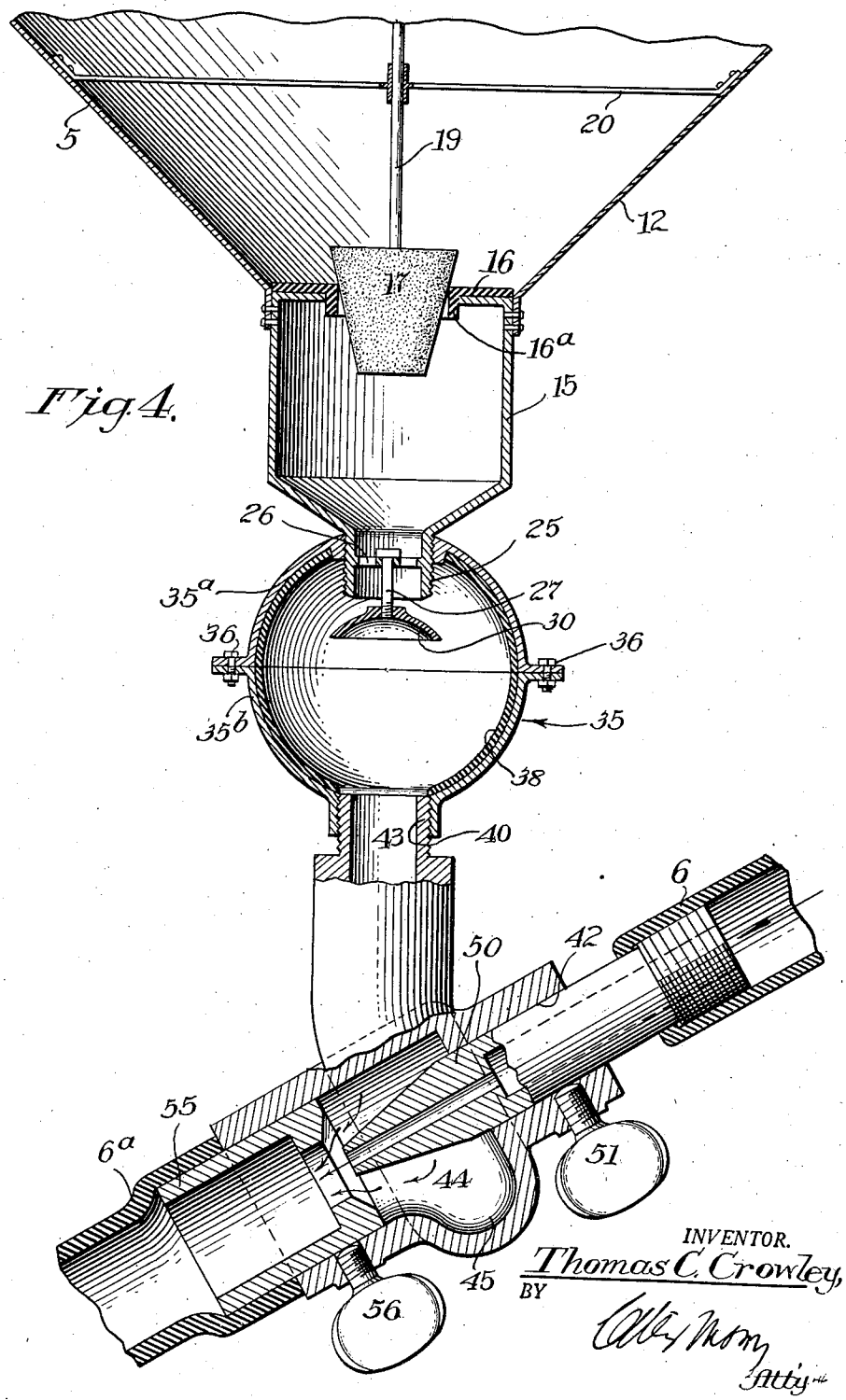
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Fig. 4.



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UNITED STATES PATENT OFFICE

2,365,250

CLEANING APPARATUS

Thomas C. Crowley, Altadena, Calif., assignor to Turco Products, Inc., Los Angeles, Calif., a corporation of California

Application June 18, 1943, Serial No. 491,317

2 Claims. (Cl. 51—8)

My invention has to do with method and apparatus for cleaning surfaces and it is among the principal objects of the invention to provide apparatus wherein a pulverulent abrasive such as sand is admixed with another cleaning agent or agents in such manner as to provide an efficient cleaning operation without the creation of objectionable dust.

It is another object to provide in such an apparatus means for taking care of any back pressures that might be created.

Another object of the invention is to provide a cleaning unit incorporating the advantages of sand blasting as well as steam and chemical cleaning and which is capable of performing in a single cleaning operation that which has heretofore required two separate operations.

My invention also contemplates a novel and highly efficient method of cleaning surfaces.

Still further and subordinate advantages are provided by my invention and how those as well as the objects pointed out are achieved will be best understood from the following detailed explanation of a presently preferred adaptation, for which purpose I shall refer to the accompanying drawings in which:

Fig. 1 is an elevational view, partly in section, showing the complete unit;

Fig. 2 is an enlarged longitudinal section showing the nozzle member;

Fig. 3 is a longitudinal cross-sectional view of an admixing element; and

Fig. 4 is a fragmentary medial sectional view taken through a portion of the abrasive hopper and the member shown in Fig. 3.

Referring now to the drawings I show in Fig. 1 a cleaning unit consisting of an abrasive-containing hopper 5, a line 6 for passing fluid under pressure from a source, not shown, a line 7 for passing a vapor and/or liquid cleaning agent, a mixing member 8, a final admixing and nozzle member 9, and a chemical delivery line 10.

As best shown in Figs. 1 and 4, the hopper has a conical lower side wall portion 12 and a cover lid 14. An outlet member 15 is secured within the neck of the hopper and has a top wall presenting an opening within which the circular flange 16*a* of a plate 16 is disposed to provide a seat for a valve 17 to control feed of the abrasive to the unit. Valve 17 is preferably made of a resilient material such as cork or relatively soft rubber, inasmuch as the hopper is to contain sand or other pulverulent material, not shown. A valve stem 19 is journaled for rotation in a bracket 20 and adjacent its top end it is threadedly mounted in an opening 21 in the cover 14, and has an operating crank 22. Thus, as the crank 22 is manually rotated, the valve 17 may be raised or lowered to open or close the hopper outlet. The lower end of the outlet member 15 tapers to a neck 25 within which a spider 26 is secured to slidably support the stem 27 of a soft rubber check valve 30.

A spherical member 35 consisting of halves 35*a*, 35*b* has a top opening threadedly mounted on the neck 25. The halves of the spherical member are secured together by nuts and bolts 36 passing through their flanged portions. Inasmuch as the material passing through member 35 is of an abrasive nature, I find it preferable to line member 35 as with a suitable plastic lining 38.

The mixing member 8 has its inlet end 40 threadedly mounted in the outlet end of member 35 and has a transverse bore 42 and a longitudinal bore 43 communicating with a mixing chamber 44. Bore 43 discharges into a curved pocket 45 opening into the bottom of chamber 44. A nipple 50 is mounted in bore 42, being held against escape by wing screw 51, the discharge end of the nipple extending beyond the point of discharge of bore 43 into the chamber. The outlet hose 6*a* is connected to the mixing chamber 8 by means of adapter 55 held in position by wing screw 56. To prevent back pressure in chamber 44, adapter 55 and line 6*a* are of relatively large interior diameter. In a typical use of my apparatus the inlet end of line 6 is connected to an air compressor, not shown, although for some uses it may be connected to a source for supplying water under pressure, likewise not shown.

The nozzle member 9 is comprised of a body portion 60, having a threaded opening 60*a* and an inlet 60*b*, the latter opening angular to the longitudinal axis of the body. A discharge tube 61 has its inlet end threaded into the opening 60*a* and is there connected to hose 6*a*. The discharge end of tube 61 is concentric with the discharge of the body 60 and is spaced from the inner surface thereof.

A line 7, which preferably has its inlet end connected to a source of steam, not shown, has its discharge end connected to opening 60*b* of the nozzle, there being a manual control valve 65 in the line. Chemical supply line 10 has its discharge end connected into line 7 by means of a T 10*a* and has its inlet connected to a liquid or chemical source, not shown. A manual control valve 10*b* may be provided in line 10.

In operation, with valves 17, 65 and 10*b* open and line 6 connected to an air compressor, the

sand or other abrasive material in the hopper drops by gravity into pocket 45 in chamber 44 and is there picked up by the vacuum created by the discharge of air under pressure from nipple 50, and is carried along to be discharged through tube 61 in the nozzle. Bore 42 through mixing chamber 8 is preferably disposed in a downwardly sloping plane to further facilitate the abrasive being picked up by the air stream. Simultaneously, the steam enters the nozzles through line 7, carrying in admixture therewith a chemical from line 10. The chemical and steam enter the nozzle in a swirling stream and are discharged from the nozzle annularly of the discharge end of tube 61, so that the pulverized abrasive being discharged from tube 61 is encircled by the tubular stream of steam and cleaning chemical. If for any reason there should occur any back pressure in chamber 44, the rubber check valve 30 immediately flexes into contact with the end of neck 25 and stops the gravity flow of sand so long as the back pressure remains.

While, in the foregoing, I have resorted to considerable detail of structure and association of parts in describing a particular example of my invention, I wish it to be understood that I have done so merely to make my invention understood and that I do not limit my invention to such details. On the contrary, my invention is only to be limited as appears in the appended claims.

I claim:

1. Cleaning apparatus comprising, in combination, a hopper adapted to contain a pulverulent abrasive, a line for supplying steam under pressure, a nozzle having concentric substantially coplanar discharge orifices, a fluid line capable of delivering fluid under pressure and having its outlet communicating with the innermost of the discharge orifices, and a passageway leading from the hopper to the fluid line whereby abrasive is received from the hopper by gravity flow and deposited in the fluid line, a check valve in said passageway seating towards the hopper, said line for supplying steam under pressure having its outlet end communicating with the outermost of the discharge orifices.

2. Cleaning apparatus comprising, in combination, a hopper adapted to contain a pulverulent abrasive, a line for supplying steam under pressure, a nozzle having concentric substantially coplanar discharge orifices, a fluid line capable of delivering fluid under pressure and having its outlet communicating with the innermost of the discharge orifices, and a passageway leading from the hopper to the fluid line whereby abrasive is received from the hopper and deposited in the fluid line, a valve seat in said passageway, a relatively soft elastic check valve normally spaced from said seat and being flexible thereagainst by virtue of fluid pressure, said line for supplying steam under pressure having its outlet end communicating with the outermost of the discharge orifices.

THOMAS C. CROWLEY.