July 7, 1964 F. W. ELMORE 3,140,050

PRESSURE CLEANING APPARATUS

Filed Sept. 11, 1962 3 Sheets-Sheet 1

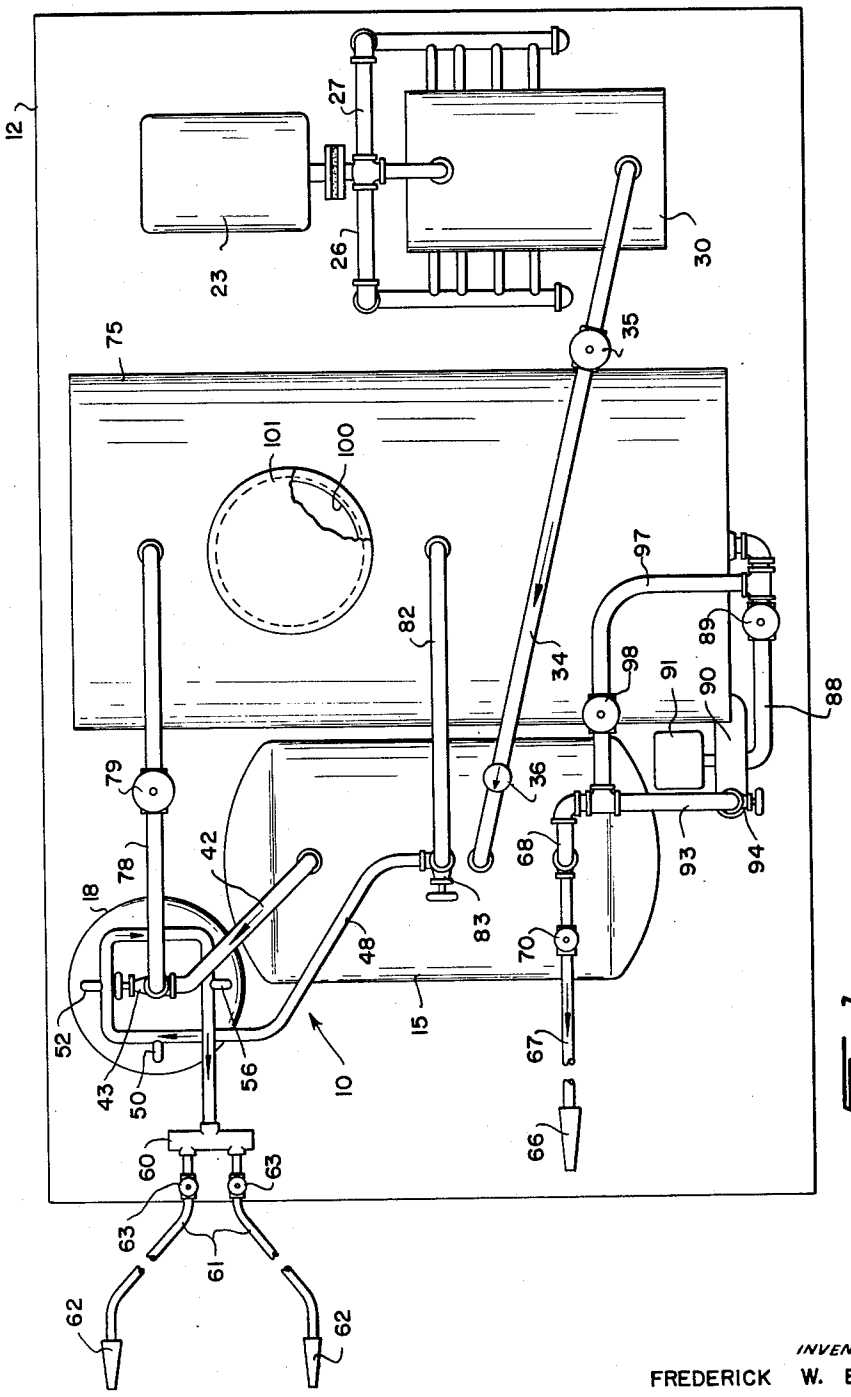


FIG. 1.

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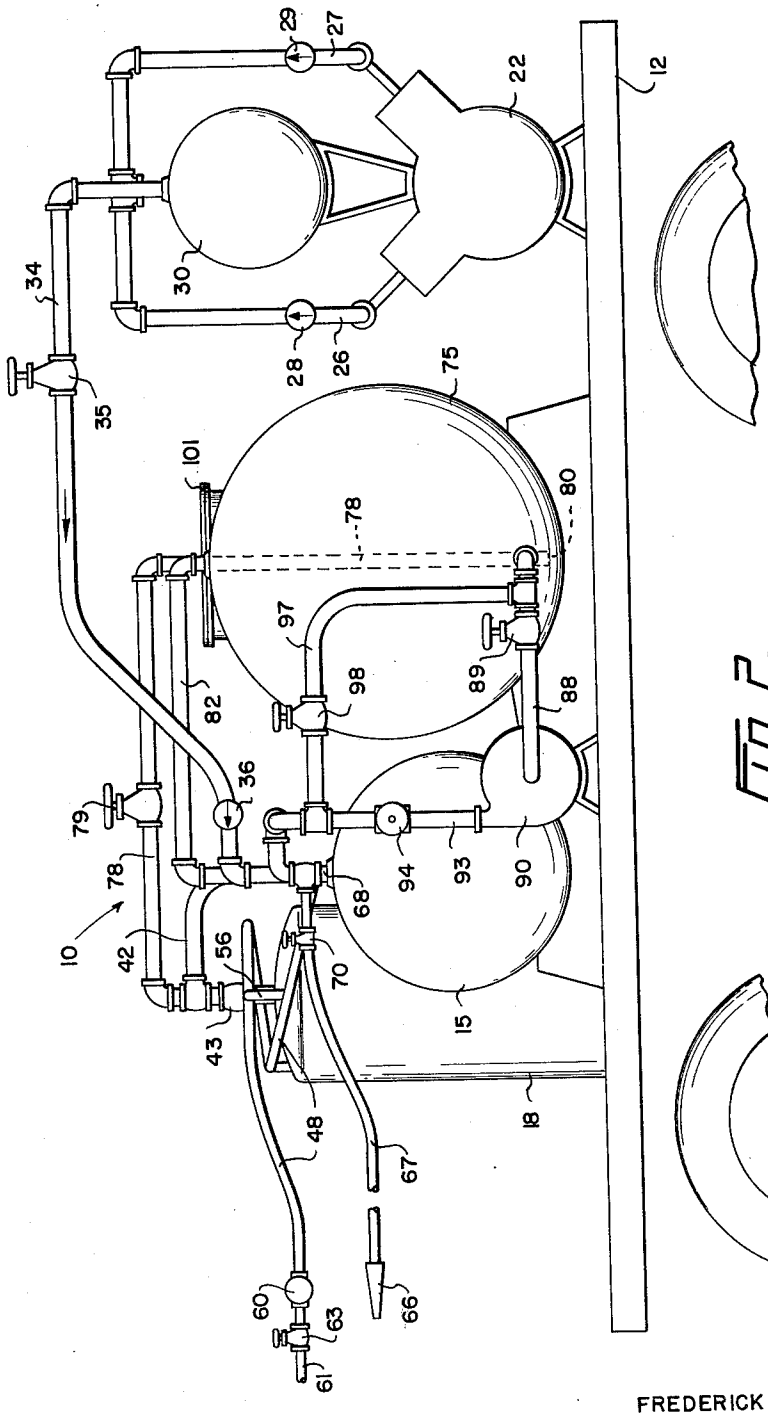


FIG. 2.

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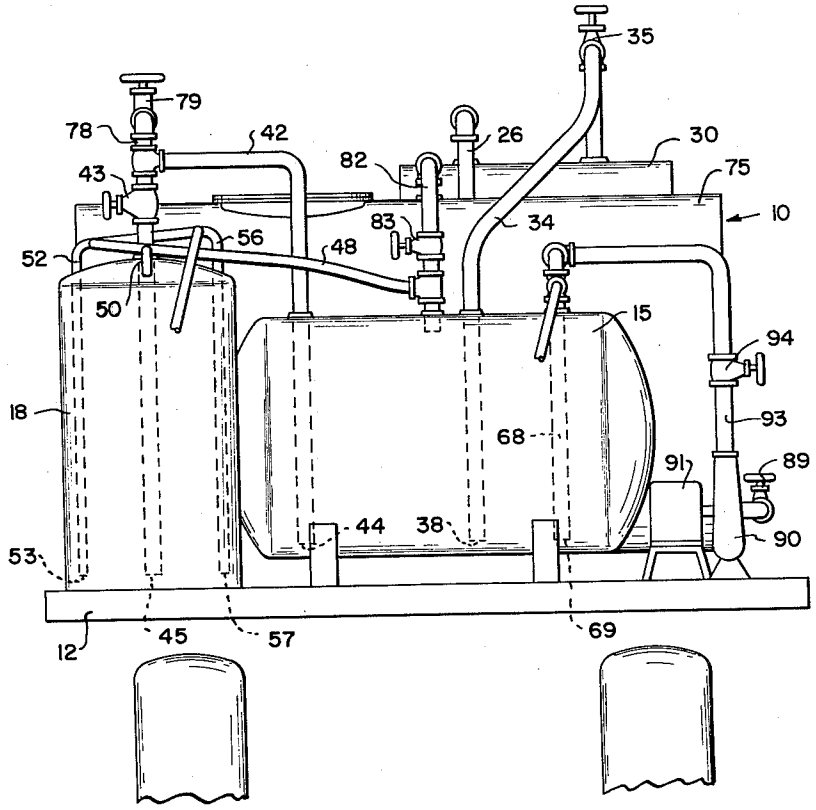


FIG. 3.

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PRESSURE CLEANING APPARATUS

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This invention relates to apparatus for cleaning and spraying surfaces with cleaning and coating solutions.

This apparatus is primarily designed for cleaning barns and stables and spraying the walls thereof with lime, but it may be used for cleaning buildings of any type and for spraying any liquid. The apparatus although made up of fairly large components is such that it may be placed on a moving platform or the deck of a truck.

This apparatus is so designed that air alone or an atomized solution may be directed through a nozzle to clean and coat floors, walls and ceilings of buildings such as barns and stables. It may also include means for directing the solution in liquid form on to the surfaces through a nozzle. When a solution such as lime and water is used, the problem is to keep the lime from settling out of the water, and the present apparatus accomplishes this in a very simple and effective manner.

Pressure cleaning apparatus according to the present invention comprises a closed main tank for holding a cleaning solution, a closed booster tank, means for directing air under pressure to the main tank, means for directing solution from the main tank to the booster tank, valve means for controlling said solution directing means, atomizing means at the booster tank for directing atomized solution from the latter tank to at least one discharge nozzle, and means for directing air from the main tank to said atomizing means, whereby when said valve means is closed, air only is directed through the atomizing means, and when the valve means is open atomized solution is directed from said atomizing means to a nozzle connected thereto. Thus, merely by closing the valve means the operator can direct air under pressure through the discharge nozzle to blow dust and dirt off the walls being cleaned and out of corners where it is difficult to get at. Then simply by opening the valve means he sprays the solution, usually lime, over the surfaces and into the corners that he has blown clear of dust and dirt. The solution is atomized before it is discharged, and it is directed under pressure against the wall so that it not only covers the wall but tends to blow loose dirt and particles away from it. It is preferable to provide means for directing solution in liquid form to a discharge nozzle. This is used when it is desired to apply a heavy coating of the solution to the wall, and/or when the wall is clean and does not need to be blown clear of dirt either by air alone or by atomized solution.

An example of this invention is illustrated in the accompanying drawings, in which,

FIGURE 1 is a plan view of pressure cleaning apparatus mounted on the platform of a trailer,

FIGURE 2 is a side elevation of the apparatus, and

FIGURE 3 is an end elevation thereof.

Referring to the drawings, the pressure cleaning apparatus **10** is mounted on the deck of a trailer **12**. This apparatus includes a main tank **15** and a booster tank **18**. Suitable means is provided for supplying air under pressure to the main tank. In this example, a converted V8 internal combustion engine **22** is used as a compressor, and is drawn by an internal combustion engine **23**. The cylinders of compressor or engine **22** are arranged to pump air through pipes **26** and **27** having check valves **28** and **29** therein to an air tank **30**. A pipe **34** having a shut-off valve **35** and a check valve **36** therein extends from tank **30** to main tank **15**. Pipe **34** extends down into the main tank and terminates near the bottom thereof at **38**, see FIGURE 3.

Main tank **15** is adapted to hold a cleaning solution, such as a mixture of lime and water. This solution is moved from tank **15** to booster tank **18** through a pipe **42** having a control valve **43** therein. Pipe **42** extends from near the bottom of tank **15**, at **44**, see FIGURE 3, into and through the top of tank **18**. It is preferable, although not absolutely necessary, to extend pipe **43** to a point near the bottom of tank **18**, as indicated at **45**.

An air pipe **48** extends from the top of tank **15** above the top of tank **18**, and preferably communicates with the latter tank through a pipe **50** which opens through the top of said tank. Pipe **48** is connected to and forms part of atomizing apparatus which includes a pipe **52** extending from near the bottom of tank **18** at **53** up through the top of said tank and is connected to pipe **48**. Although not absolutely necessary, pipe **48** may be connected to the upper end of another atomizing pipe **56** which extends down to near the bottom of tank **18** at **57**. Pipe **48** also extends from pipe **56** to a header **60** from which one or more hoses **61** extend to one or more discharge nozzles **62**. A control valve **63** is provided for each hose **61**.

The cleaning apparatus described so far can function as a complete unit. When valve **35** is open, air is directed under pressure from tank **30** through pipe **34** into main tank **15**. As pipe **34** extends to the bottom of the main tank, the air entering said tank keeps the liquid therein in constant agitation and so prevents the lime from settling in the tank during operation of the apparatus. If valve **43** is closed, no solution can move from the main tank into booster tank **18**. At this time, air leaves the main tank and moves along pipe **48** to header **60** and thence to each nozzle **62**. At this time the air under pressure may be directed against surfaces for cleaning purposes. When it is desired to spray the surfaces, valve **43** is opened and the pressure in tank **15** forces solution through pipe **42** into tank **18**. As pipe **42** extends to the bottom of tank **18**, the liquid in said tank is kept in a state of agitation. At the same time, air travels through pipe **48** and into the top of tank **18** through pipe **50**. The applies pressure to the surface of the solution in this tank and forces it up through pipes **52** and **56**. The air travelling through pipe **48** also passes over the tops of these pipes to atomize the solution and to direct it to header **60** and through each nozzle **62** that is being used. Thus the atomized solution is directed under pressure through the nozzle or nozzles.

There are times when it may be desirable to apply a thick coating to a surface, or to saturate the surface, and for this purpose a separate discharge nozzle **66** is provided. This nozzle is connected by a hose **67** to a pipe **68** which extends down into tank **15** and terminates at **69** near the bottom thereof. It is desirable to provide a control valve **70** between pipe **68** and hose **67**. When this valve is opened, pressure in tank **15** forces solution through pipe **68**, hose **67** and nozzle **66**. This solution is not atomized, but nozzle **66** is preferably such that the solution sprays therefrom. This arrangement provides means for directing a heavy coating of the solution on to the surface.

Although main tank **15** may be made as large as desired, it is preferable to keep it relatively small and to provide a reserve tank **75**. A pipe **78** having a control valve **79** therein extends from pipe **42** to tank **75**, and terminates near the bottom thereof, as indicated at **80** in FIGURE 2. Valve **79** is normally closed. Another pipe **82** having a control valve **83** therein extends from the top of tank **75** to the top of tank **15**, and in this example pipe **82** is connected to pipe **48** so that the both of said pipes communicate with the top of tank **15**.

Suitable means is provided for transferring solution from tank **75** to main tank **15**. In this example, a pipe **88** having a valve **89** therein extends from the bottom of tank **75** to a pump **90** which is driven in any suitable

manner, such as by means of an internal combustion engine **91**. The outlet of pump **90** is connected by a pipe **93** having a valve **94** therein to pipe **68** extending into main tank **15**.

A pipe **97** having a valve **98** therein extends between pipes **88** and **93**, by-passing pump **90** and valves **89** and **94**. Reserve tank **75** is provided with a large opening **100** in the top thereof normally closed by a removable cover **101**.

Before transferring solution from reserve tank **75** to main tank **15**, it is desirable to agitate or stir the solution in the reserve tank. This is done by closing valves **43**, **83**, **89** and **94**, and opening valves **79** and **98**. If there is solution in tank **15**, the pressure in said tank directs the solution through pipes **42** and **78** and pipes **68**, **93**, **97** and **88** into tank **75** near the bottom thereof to agitate the solution therein. If there is no solution in tank **15**, air is directed into the reserve tank through said pipes for agitating purposes, said air escaping from the tank through opening **100**. Valves **79** and **98** are then closed, and valves **89**, **94** and **83** opened. Pump **90** is operated to transfer solution from tank **75** to tank **15**, while air escapes from the latter tank through pipe **82**. When tank **15** is full, valves **89**, **94** and **83** are closed and valve **43** opened, after which the apparatus is operated in the usual manner.

What I claim as my invention is:

1. Pressure cleaning apparatus comprising a closed main tank for holding a cleaning solution, a closed booster tank, means for directing air under pressure to the main tank, liquid pipe means for directing solution from the main tank to the booster tank, valve means in said pipe means, atomizing means in communication with the booster tank and to which a discharge nozzle is connected, air pipe means extending from the main tank to said atomizing means to supply atomizing air thereto, and means connecting said air pipe means to the booster tank to supply air to said booster tank, whereby air under pressure supplied to the main tank is directed through said air pipe means to the booster tank and the atomizing means, and when said valve means is open, said air forces solution from the main tank to the booster tank and when said valve means is closed, said air travels alone to said nozzle.

2. Pressure cleaning apparatus comprising a closed main tank for holding a cleaning solution, a closed booster tank, a pipe extending to near the bottom of the main tank and through which air under pressure is directed into said main tank, said air agitating the solution as it enters the main tank, liquid pipe means for directing solution from the main tank to the booster tank, valve means in said pipe means, atomizing means in communication with the booster tank and to which a discharge nozzle is connected, air pipe means extending from the main tank to said atomizing means to supply atomizing air thereto, and means connecting said air pipe means to the booster tank to supply air to said booster tank, whereby air under pressure supplied to the main tank is directed through said air pipe means to the booster tank and the atomizing means, and when said valve means is open, said air forces solution from the main tank to the booster tank and when said valve means is closed, said air travels alone to said nozzle.

3. Pressure cleaning apparatus comprising a closed main tank for holding a cleaning solution, a closed booster tank, a pipe extending to near the bottom of the main tank and through which air under pressure is directed into said main tank, said air agitating the solution as it enters the main tank, a pipe extending from near the bottom of the main tank to the booster tank, a control valve in said pipe, atomizing means in communication with the booster tank and to which a discharge nozzle is connected, and air pipe means extending from the main tank to said atomizing means to supply atomizing air thereto,

and means connecting said air pipe means to the booster tank to supply air to said booster tank, whereby air under pressure supplied to the main tank is directed through said air pipe means to the booster tank and the atomizing means, and when said control valve is open, said air forces solution from the main tank to the booster tank and when said control valve is closed, said air travels alone to said nozzle.

4. Pressure cleaning apparatus as claimed in claim 3 including a reserve solution tank, a first valve controlled pipe extending from the reserve tank to the pipe extending between the main booster tanks, a second valve controlled pipe extending from the reserve to the main tank, and pump means connected to said second pipe for transferring solution from the reserve tank to the main tank.

5. Pressure cleaning apparatus comprising a closed main tank for holding a cleaning solution, a closed booster tank, means for directing air under pressure to the main tank, liquid pipe means for directing solution from the main tank to the booster tank, valve means in said pipe means, atomizing means in communication with the booster tank and to which a discharge nozzle is connected, a pipe extending from near the bottom of the main tank and to which another discharge nozzle is connected, air pipe means extending from the main tank to said atomizing means to supply atomizing air thereto, and means connecting said air pipe means to the booster tank to supply air to said booster tank, whereby air under pressure supplied to the main tank is directed through said air pipe means to the booster tank and the atomizing means, and when said valve means is open, said air forces solution from the main tank to the booster tank and when said valve means is closed, said air travels alone to said nozzle.

6. Pressure cleaning apparatus comprising a closed main tank for holding a cleaning solution, a closed booster tank, a pipe extending to near the bottom of the main tank and through which air under pressure is directed into said main tank, said air agitating the solution as it enters the main tank, an atomizing pipe extending from near the bottom of the booster tank and opening out therefrom near the top thereof, an air entrance pipe in communication with the top of the booster tank, a liquid pipe extending from near the bottom of the main tank to the booster tank, a control valve in said liquid pipe, and an air pipe extending from the top of the main tank and connected to the air entrance pipe and to the atomizing pipe, said air pipe extending beyond the atomizing pipe and to which a discharge nozzle is connected, whereby air under pressure supplied to the main tank is directed through said air pipe and the entrance pipe into the booster tank and over the atomizing pipe to draw solution through the latter from the booster tank when said valve is open.

7. Pressure cleaning apparatus as claimed in claim 6 including a pipe extending out of the main tank from near the bottom thereof and to which a discharge nozzle is connected.

8. Pressure cleaning apparatus comprising a closed main tank for holding a cleaning solution, a closed booster tank, means for directing air under pressure to the main tank, means for directing solution from the main tank to the booster tank, valve means for controlling said solution directing means, a discharge nozzle, atomizing means at the booster tank connected to the nozzle for directing atomized solution from the latter tank to said discharge nozzle, and means for directing air from the main tank to said atomizing means, whereby when said valve means is closed air only is directed through the atomizing means, and when said valve means is open atomized solution is directed from said atomizing means to the nozzle connected thereto.

9. Pressure cleaning apparatus comprising a closed main tank for holding a cleaning solution, a closed boost-

er tank, means for directing air under pressure to the main tank, means for directing solution from the main tank to the booster tank, valve means for controlling said solution directing means, a first discharge nozzle, atomizing means at the booster tank connected to the first nozzle for directing atomized solution from the latter tank to said first nozzle, a second discharge nozzle, pipe means for directing solution from the main tank to said second nozzle, and means for directing air from the main tank to the top of the booster tank and to said atomizing means, whereby when said valve means is closed air only is directed through the atomizing means, and when said valve means is open atomized solution is directed from said atomizing means to said first nozzle connected thereto.

References Cited in the file of this patent

UNITED STATES PATENTS

1,194,358	Grant	Aug. 15, 1916
1,448,910	Bolger	Mar. 20, 1923
1,860,136	Bunch	May 24, 1932
2,424,468	Keathley	July 22, 1947
2,918,928	Rednour	Dec. 29, 1959
3,016,200	Boehm	Jan. 9, 1962
3,037,707	Ligon	June 5, 1962
3,083,913	Coffman et al.	Apr. 2, 1963
3,103,312	Damrow	Sept. 10, 1963

FOREIGN PATENTS

845,753	France	May 22, 1939