Feb. 11, 1941. M. C. THOMPSON 2,231,782

MEANS FOR ATOMIZING CLEANING FLUIDS

Filed July 17, 1939 2 Sheets-Sheet 1

Fig. 1

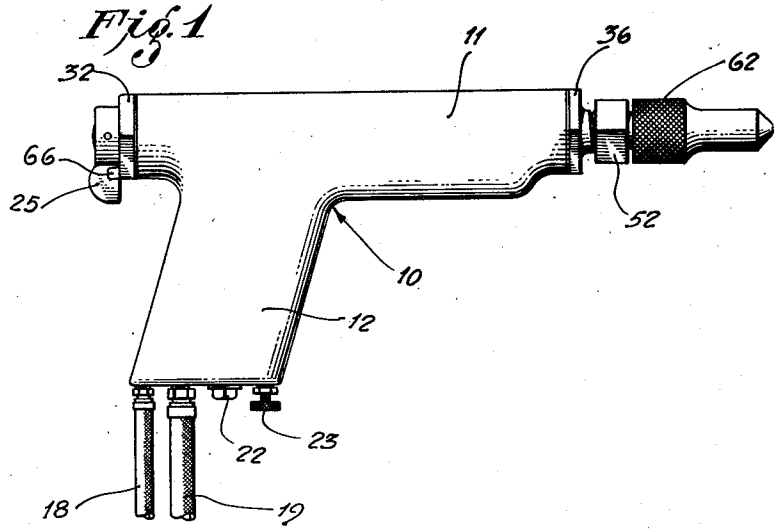
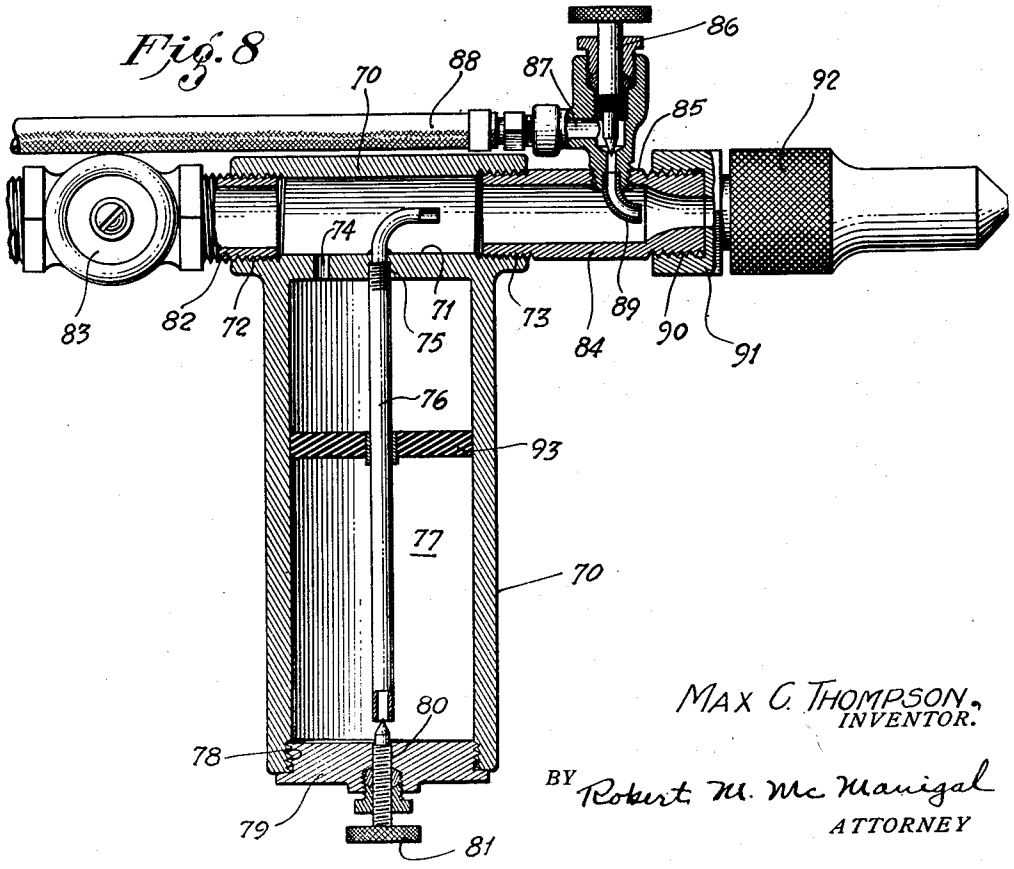


Fig. 8



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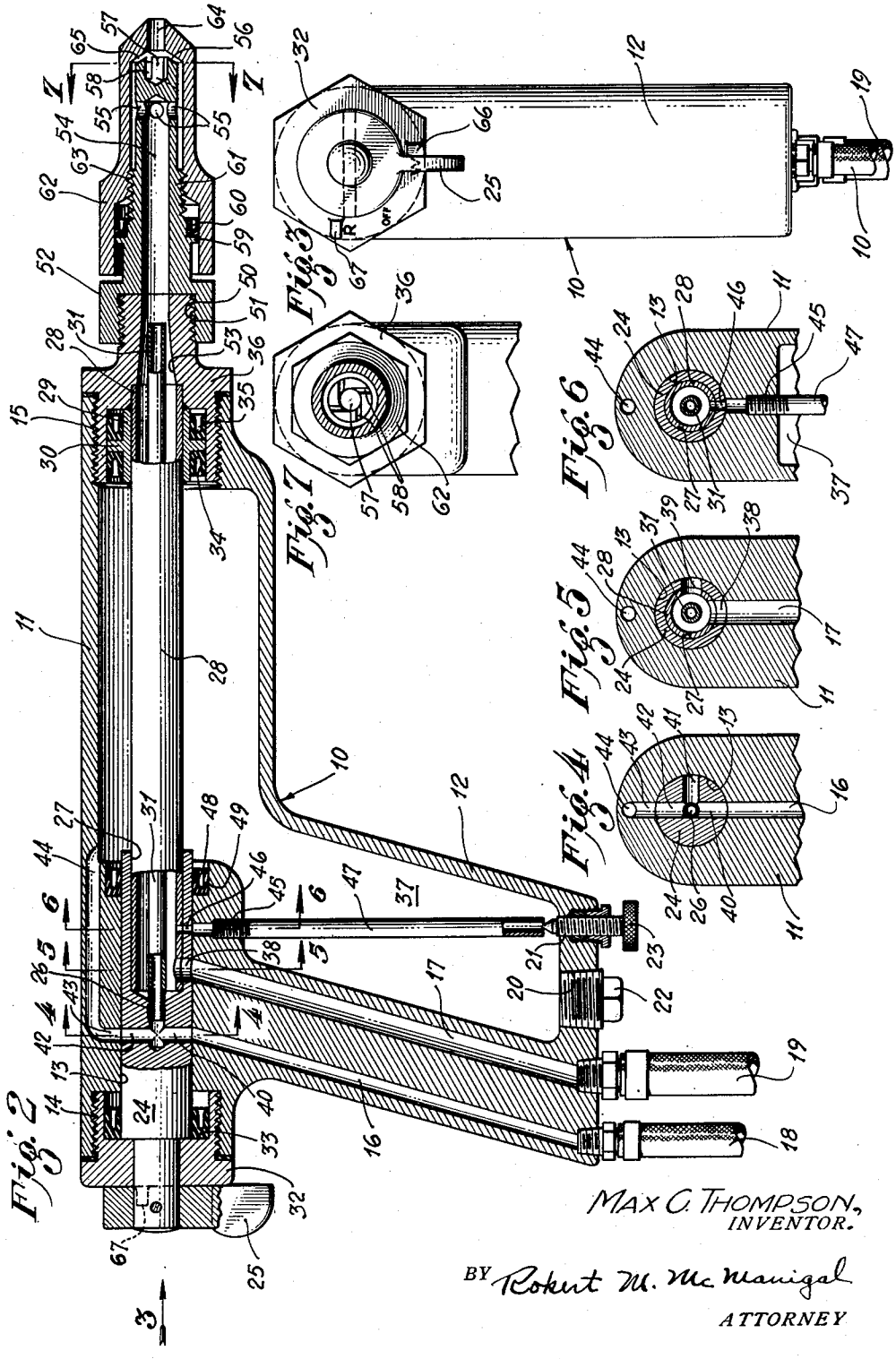


Fig. 2

Fig. 3

Fig. 7

Fig. 6

Fig. 5

Fig. 4

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MEANS FOR ATOMIZING CLEANING FLUIDS

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Application July 17, 1939, Serial No. 284,906

7 Claims. (Cl. 299—84)

This invention relates to a new means for atomizing cleaning fluids for use in washing automobiles and other equipment.

Various devices have been used for spraying cleaning solutions on the bodies of automobiles and other equipment for cleaning purposes. Some of these have been as follows:

1. Water has been pumped from a tank charged with cleaning solution, through a nozzle.

2. Cleaning solution has been forced from a pressure tank into a stream of water.

3. Cleaning solution from a stationary tank has been forced through a nozzle by means of air.

All of the above devices involve the use of considerable equipment, including storage tanks for the cleaning solution at some distance from the nozzle, or limit the spraying process to cleaning fluid only, without means for rinsing. These difficulties are eliminated by the means of my invention.

The object of my invention is to provide a means for diluting and atomizing a cleaning fluid for washing equipment which requires a minimum of equipment and of storage space.

Another object of my invention is to provide a cleaning gun which weighs only a few pounds and is easy to operate with one hand during the washing and rinsing operations.

Another object of my invention is to provide a gun which is provided with a chamber which is adapted to hold sufficient concentrated cleaning fluid to wash several automobiles.

Another object of my invention is to provide a process of diluting and atomizing a cleaning fluid in a portable gun which comprises forcing cleaning fluid into a stream of water and then atomizing said mixture of cleaning fluid and water by means of a stream of air.

Another object of my invention is to provide an inexpensive, light, portable cleaning gun which can be easily connected by means of hoses to any source of air and water under pressure for instant use, thus utilizing equipment already at hand for a further useful purpose.

A further object of my invention is to provide a compact unit which can be controlled at the gun for both cleaning and rinsing equipment without having to stop and return to a stationary supply tank to change from either cleaning solution to clear water or vice versa.

Another object of my invention is to provide a portable cleaning gun having a chamber adapted to hold a concentrated cleaning fluid, and adapted to be connected by hoses to air and water under pressure, means for forcing cleaning fluid into the stream of water passing through the gun, and suitable controlling means whereby a mixture of air and water, or an atomized mixture of air, water and cleaning fluid may be forced from and regulated at the gun. The gun is also provided with means for instantly varying the amount of cleaning fluid in the mixture.

My invention has many other objects, advantages, and features, some of which, with the foregoing, will be set forth at length in the following description where I shall outline certain forms of my invention which I have selected for illustration in the drawings accompanying and forming a part of the present specification.

Referring to the drawings:

Figure 1 is a side elevation of a cleaning gun embodying the features of my invention.

Figure 2 is a longitudinal section of the cleaning gun shown in Figure 1.

Figure 3 is an end view of the cleaning gun shown in Figure 1.

Figure 4 is a section taken on the line 4—4 of Figure 2.

Figure 5 is a section taken on the line 5—5 of Figure 2.

Figure 6 is a section taken on the line 6—6 of Figure 2.

Figure 7 is a section taken on the line 7—7 of Figure 2.

Figure 8 is a longitudinal section of a modification of my invention.

The numeral 10 indicates a body member having a transverse portion 11 and a handle 12. The transverse portion 11 is provided with an opening 13 extending through the entire portion, and both ends of said transverse portion 11 are provided with internal threads 14 and 15 respectively. The handle 12 is provided with passageways 16 and 17 respectively, the upper ends of which communicate with the opening 13 and the lower ends of which are adapted to be connected to air and water hoses 18 and 19 respectively. The lower end of the handle 12 is also provided with threaded openings 20 and 21 into which threaded plug 22 and needle valve 23 are adapted to be threaded.

A rotatable valve 24 is provided, the outer end of which is provided with a handle 25 and the inner end of which is provided with a threaded bore 26 and a counter bore 27. A tubular member 28 is secured in the counter bore 27, and the other end of said tubular member is provided with a collar 29 having an intermediate annular

flange 30. A smaller tubular member 31 is threaded into the center of the threaded bore 26.

The rotatable valve 24 and the tubular member 28 are adapted to be inserted in the opening 13. A plug 32, the inner end of which is counterbored and a pressure seal packing ring 33 provided in said counterbore, is adapted to be threaded into the threaded end 14 of the body member 10. Pressure seal packing rings 34 and 35 are provided on both sides of the annular flange 30 and plug 36 is then threaded into the threaded end 15 of body member 10. It can readily be seen that the rotatable valve 24 and tubular member 28 are maintained in fluid tight engagement in the body member 10.

A large portion of both the transverse portion 11 and of the handle 12 of the body 10 are hollow as indicated at 37, thereby forming a chamber which is adapted to hold a supply of concentrated cleaning fluid which is adapted to be poured into said chamber by first removing the plug 22. The inside of the tubular member 28 communicates with water passageway 17 by means of ports 38 and 39 which extend through the rotatable member 24 and the tubular member 28. The tube 31 communicates with air passageway 16 by means of ports 40 and 41. The air passageway 16 is also adapted to communicate with the fluid chamber 37 by means of port 40 and a port 42 which is directly in line with said port 40, an opening 43 and a passageway 44 in the body member 10.

The upper portion of the body member 10 is provided with a threaded opening 45 which communicates with the tubular member 28 by means of port 46, which extends through both the rotatable member 24 and the tubular member 28. A tube 47 is adapted to be threaded into said threaded opening 45. The lower end of the tube is adapted to serve as a valve seat for the needle valve 23. Pressure seal packing 48 is provided in a counterbore 49 between the rotatable member 24 and the inner end of the body member 10 in order to provide a fluid tight engagement between said members.

As clearly shown in Figure 2, the smaller tube 31 extends beyond the larger tube 28 and any suitable means may be provided at said end in order to atomize the mixture of water, cleaning fluid and air.

As an instance of this arrangement, the outer end of the plug 36 is provided with external threads 50 which are adapted to engage the internal threads 51 of a nozzle member 52. The plug 36 is provided with a tapered bore 53 which communicates with a central bore 54 of the nozzle member. The nozzle member 52 is also provided with a plurality of openings 55 extending from said central bore 54 to the periphery of said nozzle member. As clearly shown in Figure 2, the end portion of said nozzle member 52 is beveled as indicated at 56 and is provided with a central cylindrical recess 57 with the wall defining the recess provided with a plurality of slots 58. Said slots 58 are directed tangentially with the outer wall of the slots substantially tangent to the cylindrical recess 57. The member 52 is also provided with a shoulder 59 and a pressure seal packing ring 60 is adapted to be placed against said shoulder. The intermediate portion 61 of the nozzle member 52 is threaded and a cap member 62 having threads 63 is adapted to be threaded thereon.

The outer end of the cap 62 is frusto-conical in shape and is provided with a discharge opening 64 and with a beveled portion 65 corresponding to the beveled portion 56 of the nozzle member 52.

The cleaning gun is adapted to be operated as follows:

A supply of concentrated cleaning fluid is poured into the fluid chamber 37 after which the threaded plug 22 is again securely threaded into the opening 20. The air and water lines communicating with the gun are then turned on and the rotatable valve 24 is rotated into the "Wash" position shown in Figures 2 and 3. Air from the conduit 18 flows through ports 40 and 42, opening 43 and passageway 44 and forces cleaning fluid from the chamber 37 into the stream of water in the tube 28 which also serves as a mixing chamber. The amount of cleaning fluid forced into the tube 28 can be regulated at will by adjusting the needle valve 23.

The cleaning fluid and water are mixed in the tube 28 and the mixture is forcibly ejected into the tapered bore 53 of the plug 36, where it is mixed with air. The mixture then passes through the central bore 54 of the nozzle member 52, out through the openings 55 and around the lower portion of said nozzle member, from which it passes inwardly through the slots 58 into the recess 57, thus imparting a rotary motion to the mixture. As the cap 62 is backed away from the nozzle member 52 more of the mixture is free to pass around the outer beveled end 56 of the nozzle so that this water is added to the stream passing through the slots 58.

I prefer to adjust the cap 62 on the nozzle member 52 so that the cleaning mixture is sprayed on the automobile or other equipment in the shape of a wide fan in order to obtain an economical coverage.

After the automobile or other equipment is completely sprayed, I prefer to rub the cleaning mixture on it with a rag or mit. The rotatable valve 24 is then turned to the "Rinse" position which closes ports 38, 40 and 46, thus shutting off the cleaning fluid, but still allowing streams of water and air to flow through ports 39 and 41 and the remainder of the cleaning gun on to the object to be rinsed.

In rinsing, I prefer to adjust the cap 62 on the nozzle member 52 so that most of the water passes between the beveled portions 56 and 65 of the members 52 and 62 respectively, thereby ejecting a straighter stream of water and air.

Stops 66 and 67 may be provided to limit the movement of the handle 25 between wash and rinse positions, the intermediate position being the "off" position.

After the washed equipment is thoroughly rinsed the handle 25 is rotated to the "off" position.

In some instances I prefer to wash and rinse part of the automobile or other equipment before washing the entire object.

I have found that it is both more economical and practical to wash equipment with my cleaning gun than any other known equipment.

I prefer to construct most of the gun, and particularly the body member 10, from a light material such as aluminum or duraluminum, although the latter is preferred.

Instead of using air pressure to force the cleaning fluid into the stream of water, the water pressure can be used for this purpose. The modification shown in Figure 8 is an instance of this arrangement. In this modification, the body member 70 is provided with a bore 71, which is

threaded at both ends as indicated at 72 and 73 and which is provided with openings 74 and 75. The opening 75 is threaded and a tube 76 is adapted to be threaded therein.

Most of the body member 70 is hollow as indicated by the numeral 77 in order to provide a chamber for cleaning fluid. The body member 70 is also provided with threaded opening 78 which is adapted to receive a threaded plug 79. The plug 79 is provided with a threaded opening 80 and a needle valve 81 is adapted to be threaded in said opening. The lower end of the tube 76 is adapted to form a valve seat for the needle valve 81.

The water hose 82 provided with a valve 83 is adapted to be threaded into the threaded end 72 of the bore 71. The connecting member 84 is adapted to be threaded into the other end 73 of the bore 71.

The upper side of the connecting member 84 is provided with a threaded opening 85 and an angle needle air valve 86 is threaded into said opening 85. The other port 87 of said angle needle valve 86 is connected to an air hose 88. An elbow 89 is provided in the lower end of the needle valve 86 in order to direct the air in the proper direction.

An elbow is also provided in the upper end of the threaded opening 75 in order to direct the cleaning fluid in the proper direction.

Means are provided at the other end of the connecting member 84 to atomize the mixture of water, cleaning fluid, and air. As an instance of this arrangement the connecting member may be provided with external threads 90 and members 91 and 92 similar to nozzle member 52 and cap 62 respectively, threaded thereon.

A diaphragm 93 constructed of rubber or other suitable material may be provided in the chamber 77, forming a comparatively loose fit with the walls of said chamber.

In this modification the water pressure forces a portion of the concentrated cleaning fluid in the chamber 77 into the stream of water in the bore 71 where it mixes with the water. The pressure on both sides of the diaphragm 93 is the same and there is therefore no tendency for the water above the diaphragm to leak by the diaphragm into the concentrated cleaning fluid or vice versa.

Although the diaphragm 93 may be omitted, I prefer to provide one in that if said diaphragm is omitted, the water passing through the opening 74 dilutes the concentrated cleaning fluid in the chamber 77.

The construction of the remainder of this modification and the remainder of the use and operation of said modification are deemed to be apparent from the description of the cleaning gun shown in Figure 1 and will therefore not be repeated herein.

In another modification (not shown) similar to that shown in Figure 8, the opening 74 is omitted and a conduit connects the air hose 88 with the chamber 77, the conduit being provided with a check valve to prevent the flow of cleaning fluid into the air-line.

In another modification (not shown) of my invention, instead of providing the chamber for the concentrated cleaning fluid in the portable gun, I provide a cleaning fluid container which is connected to the gun by two conduits (one to provide for the pressure) and which is adapted to be carried by the other hand.

From the foregoing description taken in connection with the accompanying drawings, the uses, advantages, and operation of my invention will be readily understood by those skilled in the art to which the invention appertains. While I have described the principle of operation together with the forms of my invention which I now consider to be the best embodiment thereof, I desire to have it understood that the articles shown are merely illustrative and that the invention is not to be limited to the details disclosed herein, but is to be accorded the full scope of the appended claims.

I claim:

1. A cleaning gun comprising a portable body member and reservoir assembly, said reservoir being adapted to hold a supply of cleaning compound, a mixing chamber in said body member, valved means for supplying water to said mixing chamber, a passageway in said body member connecting said reservoir with said mixing chamber, means for admitting fluid above the cleaning compound in said reservoir to facilitate flow thereof through said passageway into said mixing chamber, a discharge nozzle in open communication with said mixing chamber, valve controlled air supply means for supplying compressed air to said discharge nozzle to effect atomization of the fluid supplied to the mixing chamber, and means independent of said water and air supply means for preventing the flow of cleaning compound through said passageway into said mixing chamber, whereby to eject at will an atomized water spray containing cleaning compound or one free therefrom.

2. A cleaning gun comprising a portable body member and reservoir assembly, said reservoir being adapted to hold a supply of cleaning compound, a mixing chamber in said body member, valved means for supplying water to said mixing chamber, a passageway in said body member connecting said reservoir with said mixing chamber, means for admitting air above the cleaning compound in said reservoir to facilitate flow thereof through said passageway into said mixing chamber, a discharge nozzle in open communication with said mixing chamber, valve controlled air supply means for supplying compressed air to said discharge nozzle to effect atomization of the fluid supplied to the mixing chamber, and means independent of said water and air supply means for preventing the flow of cleaning compound through said passageway into said mixing chamber, whereby to eject at will an atomized water spray containing cleaning compound or one free therefrom.

3. A cleaning gun comprising a portable body member and reservoir assembly, said reservoir being adapted to hold a supply of cleaning compound, a mixing chamber in said body member, valved means for supplying water to said mixing chamber, a passageway in said body member connecting said reservoir with said mixing chamber, means for admitting water above the cleaning compound in said reservoir to facilitate flow thereof through said passageway into said mixing chamber, a discharge nozzle in open communication with said mixing chamber, valve controlled air supply means for supplying compressed air to said discharge nozzle to effect atomization of the fluid supplied to the mixing chamber, and means independent of said water and air supply means for preventing the passage of cleaning compound through said passageway into said mixing chamber, whereby to eject

at will an atomized water spray containing cleaning compound or one free therefrom.

4. A cleaning gun comprising a portable body member and reservoir assembly, said reservoir being adapted to hold a supply of cleaning compound, a mixing chamber in said body member, means for supplying water to said mixing chamber, a passageway in said body member connecting said reservoir with said mixing chamber, means for creating a differential pressure between said reservoir and said mixing chamber to facilitate flow of cleaning compound through said passageway into said mixing chamber, a discharge nozzle in open communication with said mixing chamber, valve controlled air supply means for supplying compressed air to said discharge nozzle to effect atomization of the fluid supplied to the mixing chamber, and means for modifying said differential pressure between the reservoir and mixing chamber to prevent passage of cleaning compound through said passage into said mixing chamber, whereby to eject at will an atomized water spray containing cleaning compound or one free therefrom.

5. A cleaning gun comprising a portable body member and reservoir assembly, said reservoir being adapted to hold a supply of cleaning compound, a mixing chamber in said body member, a water conduit for admitting water into said mixing chamber, a passageway in said body member connecting said reservoir with said mixing chamber, means for admitting air to said reservoir to cause cleaning compound to flow through the passageway into said mixing chamber, a discharge nozzle in communication with said mixing chamber, an air conduit extending in said body member arranged to supply compressed air to said discharge nozzle to effect atomization of the fluid supplied to the mixing chamber, valve means carried by said body member for controlling the flow of water and air through said water and air conduits, and means for cutting off the supply of air to said reservoir to prevent the flow of cleaning compound through said passageway into said mixing chamber, whereby to eject at will an atomized water spray containing cleaning compounds or one free therefrom.

6. A portable cleaning gun comprising a body member having a transverse portion and a handle, said transverse portion and handle providing a chamber for a cleaning fluid, said transverse portion having a bore extending through said portion, separate air and water conduits leading to said transverse bore, a conduit communicating said transverse bore with said chamber, a rotatable valve in said bore, means providing a water passageway and an air passageway in said transverse bore and valve, said passageways communicating with a means for atomizing said fluids, and a conduit communicating said cleaning fluid chamber with said water passageway, said valve being adapted to be manipulated to control the passage of fluids into said passageways, said valve being constructed and arranged to admit water into said water passageway and to admit air into said air passageway and to said conduit to said cleaning fluid chamber to force fluid in said cleaning fluid chamber into said water passageway whereby a fluid having a cleaning fluid content is ejected from said gun when said valve is rotated to one position, to admit air into said air passageway and water into said water passageway whereby a rinsing fluid is ejected from said gun when said valve is rotated to a second position, and to admit no fluid whatever into said passageways when said valve is rotated to a third position.

7. A portable cleaning gun comprising a body member having a tranverse portion and a handle, said transverse portion and handle providing a chamber for a cleaning fluid, said transverse portion having a bore extending through said portion, separate air and water conduits leading to said transverse bore, a conduit communicating said tranverse bore with said chamber, a rotatable valve and a tubular member in said transverse bore, a conduit communicating said chamber with said tubular member, a somewhat smaller tubular member in said first mentioned tubular member, said tubular members communicating with a means for atomizing a mixture of fluids, said valve being constructed and arranged to admit air into said inner tubular member and into said conduit to said cleaning fluid chamber and water into said first-mentioned tubular member whereby a fluid having a cleaning fluid content is ejected from said gun when said valve is rotated to one position, to admit air into said inner tubular member and water into said first-mentioned tubular member whereby a rinsing fluid is ejected from said gun when said valve is rotated to a second position, and to admit no fluid whatever into said gun when said valve is rotated to a third position.

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