April 23, 1935. S. M. MATTICH 1,998,902

AIR PRESSURE FLUSHING GUN

Filed June 22, 1933

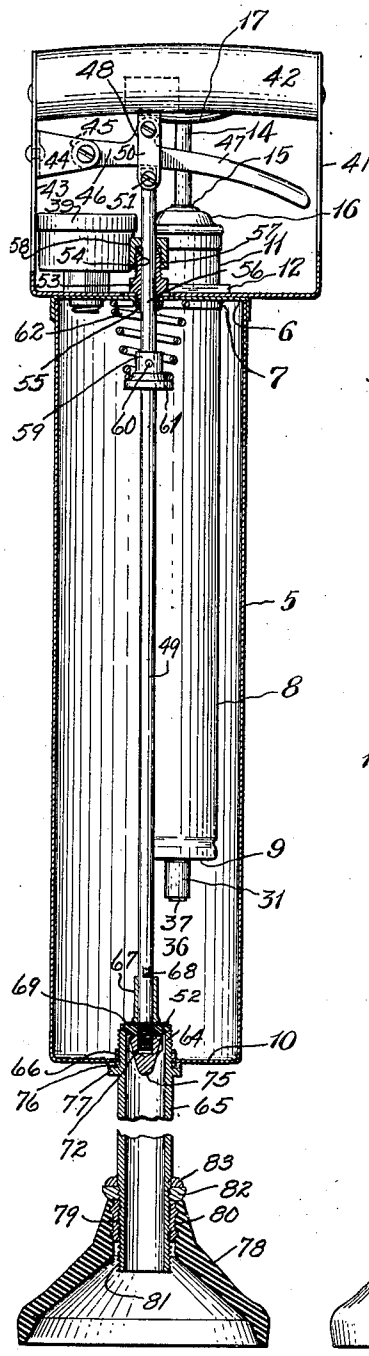

FIG. 2

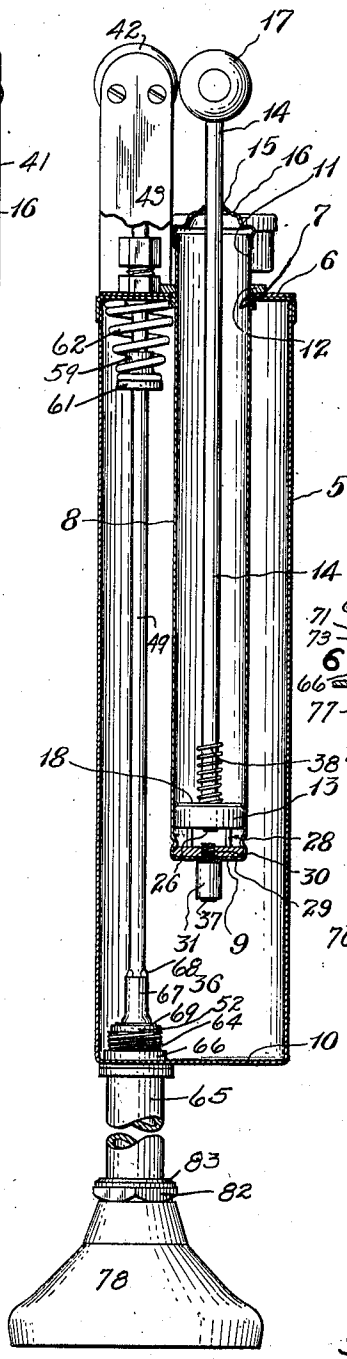

FIG. 1

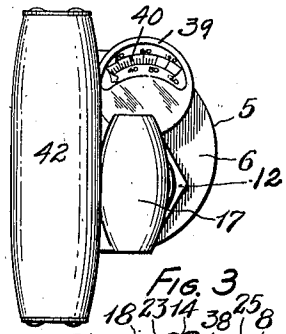

FIG. 3

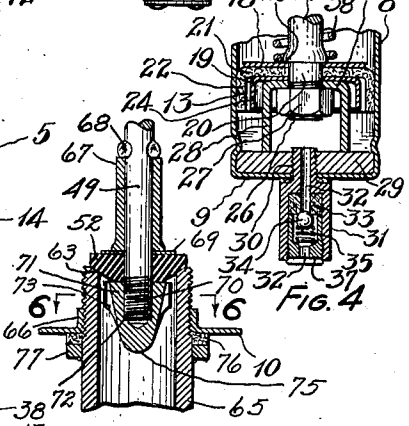

FIG. 4

FIG. 5

FIG. 6

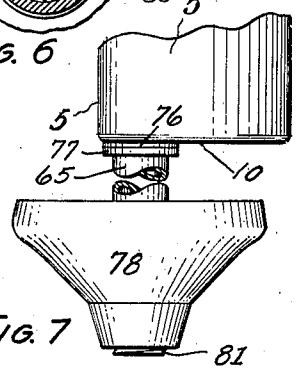

FIG. 7

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AIR PRESSURE FLUSHING GUN

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5 Claims. (Cl. 230—234)

This invention relates to air pressure flushing guns, and has for its principal object to provide a hand tool comprising an elongated shell of metal whose lower end has connected thereto a short metal tube for receiving from said shell a strong shot of compressed air or gas, and the shell is provided therein with a cylindrical pump device, suspended from the upper end thereof, and means external of the latter for manually operating the piston within the cylinder as a force pump, to surcharge the air in the shell, while suitable valve connection is made between the small tube and the shell, to prevent outflow from the latter until such valve connection is broken, as by manual actuation by a stem operated by mechanical force, from a lever adjacent the handle connected with the pump piston.

It is an especial advantage of my novel construction that my interior pump device mounted within the shell referred to, may compress the air therein to so great extent, that the outwardly directed shot of compressed air from the gun, when the valve is released, will be forced therethrough by the said compression. My detailed structure for accomplishing these favorable results will be fully explained in certain of the following pages. My complex "gun" is designed to suddenly "shoot" a directed blow of compressed air therefrom upon manual release of the delivery valve.

My novel tool is peculiarly effective in opening clogged pipes wherever they exist, and do so without positioning the body of the tool closely adjacent the obstruction or stoppage. It is effective in removing clogged conditions in auto radiators, for clearing supply water pipes and gas lines for shackle bolts, and lubrication by inserting grease in the stem of the gun thereby discharging instantly to give sufficient force to the blow. In fact, the character of nozzle used at the outlet of the gun may be varied to use as a sprayer, and for practically all conditions of plumbing where there are closed pipes not normally released.

The release or delivery valve used is sufficiently delicate to effect a very positive closure when desired, and I have therefore included in my structure an improved trigger lever upon the outer position of and upon the upper end of the gun cylinder, where manual and sudden release against the normal pressure of the valve for release of same, may be readily applied. Such manual release of the valve actuator includes a bracket mechanism for mounting therein a suitable fulcrum for pivoting said lever for movement in the plane of the bracket, and permitting actuation of the lever and thereby upward pulling of the connection with the release valve, to apply suddenly the gas or air stroke through the valve by lifting the valve off its seat, later to be further explained.

It is an especial object of my pressure gun that the piston valve of the pump shall be strong and effective to enable the user to compress the air in the outer shell to a high degree of compression which with my effective structure may be as high as 75 to 90 pounds per square inch, as indicated on the scale of a pressure gage. This high compression in the said shell makes still more necessary an effective means of operation for the release valve in the short tube leading out from the shell as shown and hereafter described.

It is a general object of my invention to improve the several elements of the same, so that there shall result an especially effective coordination between the force pump, the outer shell, the efficient trigger mechanism for the release and their assemblage for manual cooperation as needed. To this end I have hereinafter described the structure of the mechanism for its useful and novel purposes, claimed the parts and combinations for which I desire Letters Patent, and which I have illustrated in the accompanying drawing, in which:

Figure 1 is a vertical longitudinal section of my pressure gun, certain parts being shown in elevation;

Figure 2 is a longitudinal sectional view of the shell together with the discharge nozzle, certain parts of the upper end of the tool being shown in elevation, and the plane of the section being at an angle to that in Fig. 1;

Figure 3 is a plan view of the upper end of the tool;

Figure 4 is a detail central section on an enlarged scale, of the lower end of the pump cylinder and valve tube leading therefrom;

Figure 5 is a transverse section in an enlarged scale, of the valve and associated parts of the connection of the discharge tube with the bottom of the outer shell;

Figure 6 is a transverse section of the nozzle connection, taken in the plane indicated by the line 6—6 of Fig. 5, and

Figure 7 is an elevational detail of the connection of the nozzle cup with the shell, the cup being shown in inverted position.

The numeral 5 designates an elongated outer cylindrical shell having certain openings in the ends for connections with operating parts and having an imperforate side wall. The upper end

6 of said shell 5 is provided with a relatively larger opening 7 for mounting a pump cylinder 8 therethrough of which the lower end 9 normally is positioned in spaced relation from the lower end 10 of the outer shell 5. The upper end 11 of the cylinder 8 will ordinarily rise above the head 6 and be held thus by the provision of a sleeve nut 12 engaging the edges of the opening 7.

Within said cylinder 8 a piston 13 is mounted for reciprocation by the plunger rod 14 whose upper end extends through a central opening 15 in a closure cap 16 detachably mounted by threading upon the upper end 11, the exterior end of said rod 14 being provided with a cross actuating handle 17, as shown in Figs. 1 and 3. This piston 13 is shown in special detail in Fig. 4 in which centrally apertured washers 18 and 19 are shown mounted in spaced relation on a short reduced lower end 20 of the plunger rod 14, a cup washer 21 serving as space means and comprising the peripheral rim 22 which suitably fits the inner surface of the side wall of the cylinder 8.

The metal washer 18 is fitted upwardly against the shoulder 23 of the rod, and the lower washer 19 is also of metal and its flanged periphery 24 is sufficiently smaller to readily permit the rim of the washer 21 to hug the wall surface outside the metal flange loosely on the up stroke of the piston, but tightly on the down or force stroke, as will be clear.

Below the flanged metal washer 19 is mounted a centrally apertured and flanged metal plate 25 whose flanges are much longer than the flanges 24 and thereby shapes the plate as a U-shaped band whose aperture receives therein the threaded end 26 upon which the nut 27 is threaded to hold the parts 18 to 27 inclusive properly assembled on the rod 14 for reciprocation therewith by manual actuation, as will be evident. It will thus result that the up-stroke of the rod and its piston, will serve to permit air to pass the piston in a downwardly direction since the rim 22 will tend to contact the flange 24 of washer 19, while on the downward stroke of the piston, no air will pass the piston because no leakage will exist about the flange 24. The piston 13 may continue downwardly until the legs 28 of the plate 25 strike a centrally-apertured plate 29 at the bottom of the cylinder 8, said aperture being threaded to receive therein the threaded tip or reduced end 30 of a cylindrical valve holder 31 which latter is provided with a longitudinal opening 32 to permit passage of air under compression therethrough by the pumping action.

Said holder 31 is, provided with a suitable packing 33, a ball 34 held in the line of the opening 32, and a coil compression spring 35 normally serving to lift the ball against the opening, and whose force is overcome by the downward thrust of the air forced thereagainst by the piston on its down stroke. There results an effective force pump, the air above the piston in the cylinder being replaced by entrance thereinto at the opening 15 in the cap upon the down stroke of the rod 14. The successive strokes of the piston therefore, produce a continuous compression of the air in the outer shell outside the pump cylinder. No outlet from this inner chamber 36 of the shell 5 is permitted except through an escape nozzle mechanism hereinafter to be described in detail. The opening 32 is completed by insertion of a threaded sleeve 37 centrally apertured.

Above the disc 18 of the piston 13, a compression coil spring 38 is mounted on the rod 14, and serves to limit the upward movement of the piston by contact with the cap 16, as will be understood. Adjacent the upper end 11 of the cylinder 8, a pressure gauge 39 is provided to indicate on the scale 40 the degree of compression attained at any time in the operation of the pump.

Upon the head 6 of the shell 5 I have further provided a bracket 41 in U-shape for the ready mounting between its upper ends of a handle 42 whose axis will be substantially parallel with that of the handle 17. The structure shown represents the part 42 mounted for resisting downward thrust of the hand; and beneath such handle 42, and from one of the vertical standards 43 of the bracket 41, I fixedly mount an extended support 44 having a transverse aperture 45 to which is pivoted one end 46 of a suitable trigger lever 47, to the intermediate part of which at an apertured protuberance 48 a vertical stem 49 is pivotally connected through the intermediacy of spaced links 50 pivoted to such protuberance and the lower ends pivoted at 51 to the upper end of said stem, so that an upward pull on the lever 47 while the hand rests upon the handle 42, will move the stem 49 upwardly and axially for operating a nozzle valve 52 adjacent the bottom 10 of the shell 5, now to be described.

Said stem 49 extends through the head 6 of the shell by means of a threaded sleeve 53 having reduced and externally threaded ends and a longitudinal and central aperture 54 for receiving the stem. The lower end 55 is intended for threaded mounting in the threaded opening 56 of the head 6, as shown in Fig. 2, while the upper end 57 will receive a threaded cap 58 also centrally apertured.

The upward movement of the stem 49 is limited by a sleeve 59 mounted on the stem within the shell and spaced from the threaded end 55 and secured thereon by a cross pin 60. At the lower end of the sleeve a flanged rim 61 extending integrally from the sleeve, is provided for receiving the downward pressure normally resulting from the compression coil spring 62 whose upper end contacts the head 6 of the shell, and the lower end resting upon said rim 61. The normal effect of the spring is a downward thrust of the rod 49 upon the valve 52 to close it against the beveled edge 63 of the inner end 64 of an outwardly extending tube or conduit 65, whose exterior threads of the end 64 closely engage the interiorly threaded rim 66 which has been bent inwardly for the purpose.

About the smooth and lower end of the stem 49 I mount a tubular and smooth sleeve 67 which is slidable upon said stem, but will ordinarily be held against further normal movement by contact with separate external protuberances 68 fixed on the stem. Below said sleeve a centrally apertured disc 69 fits the stem accurately and rests upon the frusto-conical and centrally apertured valve member 52 before referred to. The lower end of the stem is threaded at 70 exteriorly to receive thereon a star-shaped metal nut 71 having an inner threaded socket 72 for the purpose. The periphery of the upper portion of the nut is provided with spaced vertical wings 73 providing troughs 74 therebetween. The lower end of the nut is formed with a dull point 75.

It is thus seen that the member 52 may be adjusted axially upon the stem 49 by rotation of the nut 71 on the threaded end 70, while the tube 65 may be adjusted in the inner rim 66 by

rotating the tube, a packing 76 being compressed by a flange 77.

Since the parts 64, 65, 66, 76 and 77 provide so effective a connection between the conduit 65 and the nozzle opening of the bottom 10, it is quite clearly seen that the connection between the interior 36 of the shell 5 and the cup 78 or its equivalent mounted on the lower end of the said conduit, will be very positive and almost absolute. It is further evident that the single opening from the end 10 is afforded by this connection, and the flow of air or other gases through said conduit will be controlled by the rise of the valve member 52 against the pressure of the spring 62.

Efficient means will be employed to mount this cup 78 or other form of cup-shaped device for the lower end of the conduit 65, preferably adjustably thereon, the particular element to be employed to direct the force of the "blow" struck through the tube 65 when the valve 52 is opened, being more or less inconsequential, so far as the main invention is concerned, and which includes rather, the very positive actuation of the valve, and the very delicate valve I have found especially valuable for the function required. This requirement is necessary because the very high degree of compression intended to be attained in the cavity 36 is difficult to oppose, unless a positive means of actuating the valve is used.

A suggestive form of cup 78 here shown, is provided with a threaded sleeve 79 upon which the central opening 80 of the cup is molded, for adjustably engaging the threaded end 81 of the conduit, a nut 82 limited in its upward movement by the annulus 83 thereabove. Fig. 7 of the drawing illustrates the cup in inverted position on the conduit 65. It is by no means to be understood that the cup member 78 is essential, or that in many cases it will be found even desirable, but it is shown as a suggestive adaptation for some uses.

The mounting of the part 78 here shown for detachable connection on the tube 65, including the end 81 permits as one adaptation, a connection of a tube having an end having inner threads for receiving a smaller tubular member thereon, either within said cup 78 or mounted after removing the cup member 78, the smaller member permitting entrance thereof within an opening to be cleared, by release of said pressure through the tube 65, by a sudden force exerted by the high pressure in cavity 36, by which such so-called "knock-out" force through parts 65 and such detachable tubular member very effectively clears the passage to be opened, through the tool including the parts 5, 65 and said thrust connection by the actuated valve 52 normally closed by force exerted down upon the edge 63 of the tube 65, above explained.

It is therefore to be understood that the pump 13 may be actuated by the handle 17, while the handle 42 will remain stationary and serving merely to resist the palm of the operator's hand to render effective the gripping force of the hand to lift the said trigger lever 47 and thereby raising the valve 52 to release the force in the cavity 36 to effect the downward thrust of the air pressure through the conduit 65 and thence outward through the tube attached thereon, as above explained.

Having thus described my invention, I claim:—

1. An air pressure clearance device including a hollow elongated shell having apertured ends, a pump cylinder extending through one of said apertures and suspended therefrom within the shell, a manually actuated piston mounted for reciprocation in said cylinder, a ball valve normally closing the inner end of said cylinder and opened outwardly by air pressure exerted by said piston, the latter comprising a pressure valve normally opening upon the up-stroke of the piston and exerting downward pressure by the down-stroke, a normally closed valve mounted in an aperture in the end of the shell opposite the pump, and actuating means for the last mentioned valve to open the same and including a stem having one end attached to the latter valve and the opposite end of the stem movably connected outside the shell, a manually operated member connected to said outer end of the stem, a compression spring connected to said stem within the shell and adjacent one end of the latter for actuating the valve connected to said stem.

2. An air pressure clearance device including a hollow elongated shell having apertured ends, a pump cylinder extending through one of said apertures and suspended therefrom within the shell, manually actuated means for operating said pump, a pressure conduit detachably connected in an aperture of an end of the shell opposite the pump, a conical valve seated upon the inner end of said conduit, an actuating stem connected with said conduit valve and its opposite end extending through the shell and closure means for an aperture opposite the conduit, a bracket mounted on the shell adjacent said closure means, a lever pivoted in said bracket and connected to the outer end of the stem for manually opening the conical valve, and a spring mounted within the shell and on the stem for opposing the force of the lever.

3. A device of the character described comprising a shell having imperforate side walls and apertured ends, a pump cylinder extending through one of said apertures and suspended therefrom within the shell and having an outlet communicating with the interior of the shell, a pressure conduit mounted in an aperture in an end of the shell opposite the pump and having threaded connection in said aperture, a reciprocating valve controlling the discharge of the air from the shell through said conduit, piston actuating means outside the shell, an actuating stem connected at one end with said conduit valve and the opposite end of the stem extending out through an aperture in the opposite end of the shell, a compression spring mounted upon the stem at an end opposite the latter valve for normally closing the latter, a bracket mounted on the shell adjacent the spring, a lever mounted transverse of the stem and pivoted thereto whereby the lever may be manually actuated to oppose the spring and open the valve.

4. An air pressure gun comprising a hollow shell having apertured ends, a force pump including a cylinder having an apertured head extending outside through one of the apertures of said shell of the gun, a piston rod movable through said aperture of said cylinder head and having on its inner end a piston for reciprocation in said cylinder, a valve carried by said piston resiliently controlled to permit down flow of air on the up stroke of the rod and piston, and pressure flow of air beneath the

piston on the down stroke thereof, the lower end of the pump cylinder having an aperture centrally threaded to receive therein the reduced external threaded upper end of a hollow cylinder whose entire axis is longitudinally apertured, and said main aperture of the hollow cylinder having therein a ball closure normally raised by a pressure coil spring into closing action of said aperture, but releasing the ball closure by downward pressure thereagainst of out-flowing air from the pump cylinder, thereby increasing the pressure in the inner cavity of the shell, a reciprocating valve mounted in an aperture in the head of the shell opposite said pump cylinder, a stem connected at one end with said reciprocating valve, and the opposite end of the stem extending out through a shell aperture, a bracket mounted on the shell adjacent said aperture, and pivoted means mounted on said bracket and attached externally with said valve stem for manually actuating said valve to open the same and permit thrust outward of said pressure in the shell.

5. A device of the character described comprising a compression shell for storing compressed air, a pump connected with said shell and having an outlet communicating with the interior of said shell, manually actuated means for reciprocating a piston in the cylinder of said pump, a pressure conduit detachably mounted in an aperture in an end of the shell opposite the pump, a conical valve seated upon the inner end of said conduit, a ball valve normally closing the inner end of said cylinder and opened outwardly by air pressure exerted by said piston, an actuating stem connected with said conduit valve and its opposite end extending through the shell, lever means mounted adjacent the upper end of the pump piston means and pivoted to said stem for actuating said conduit valve, and a spring mounted within the shell and on the stem for opposing the force of the lever.

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