July 3, 1951 C. B. SHANAMAN 2,559,472

PNEUMATIC ACTUATING MEANS FOR METAL PARTS WASHERS

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FIG. 1

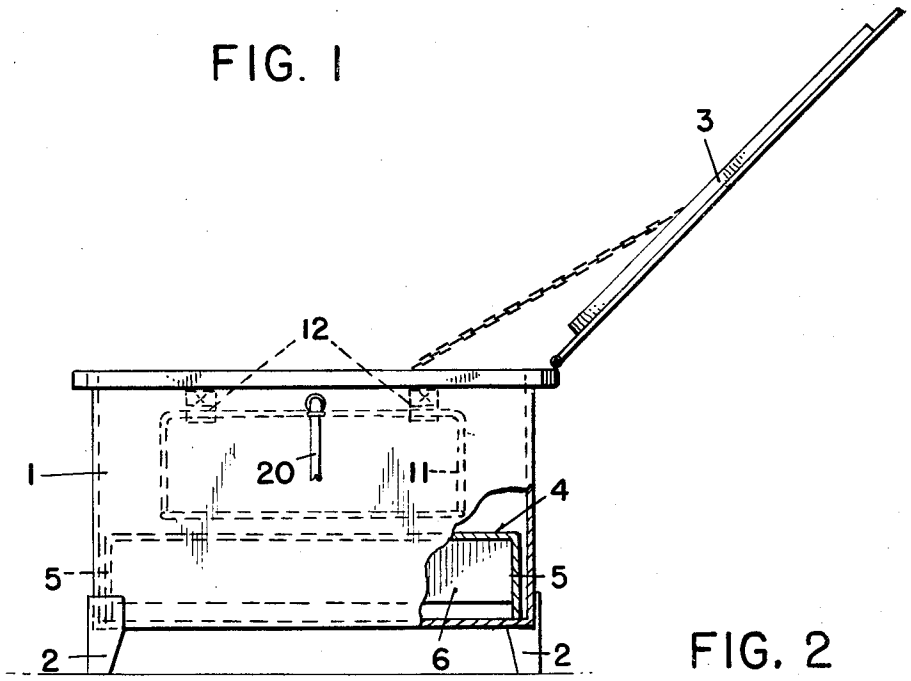
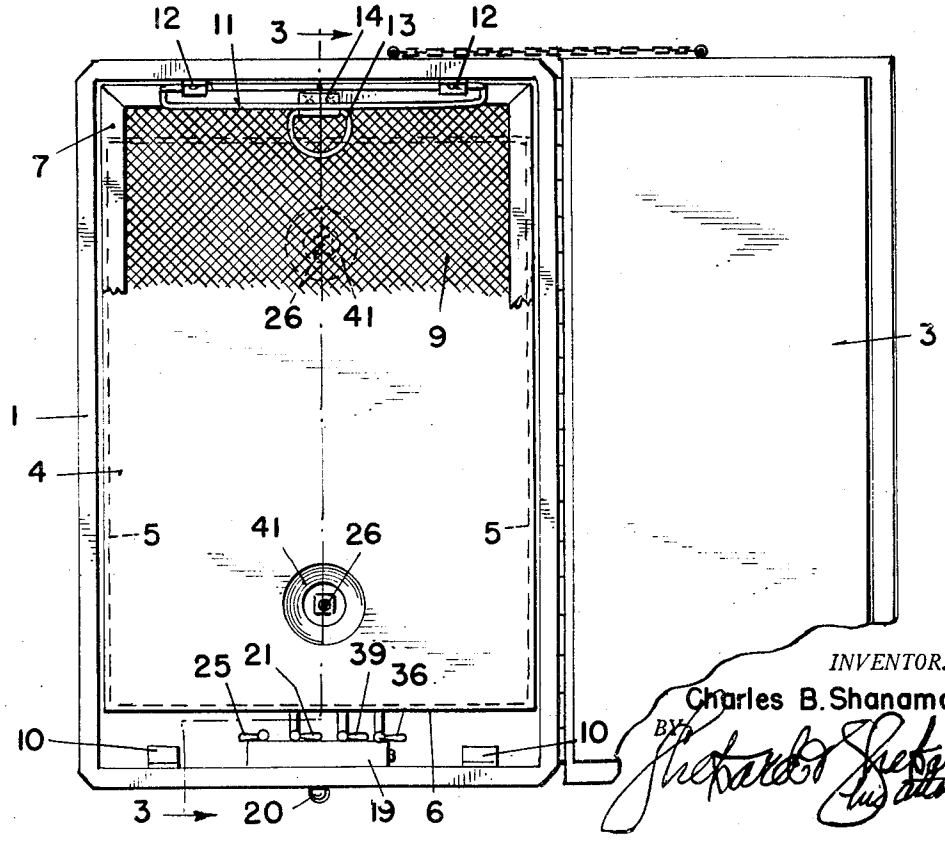


FIG. 2



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FIG. 3

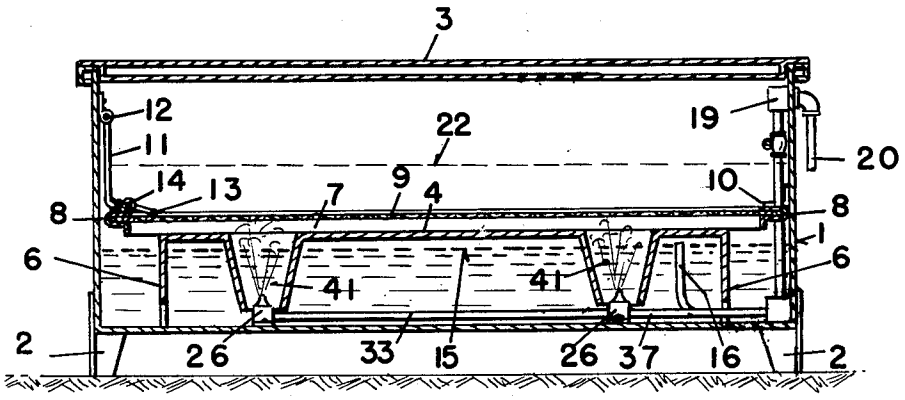
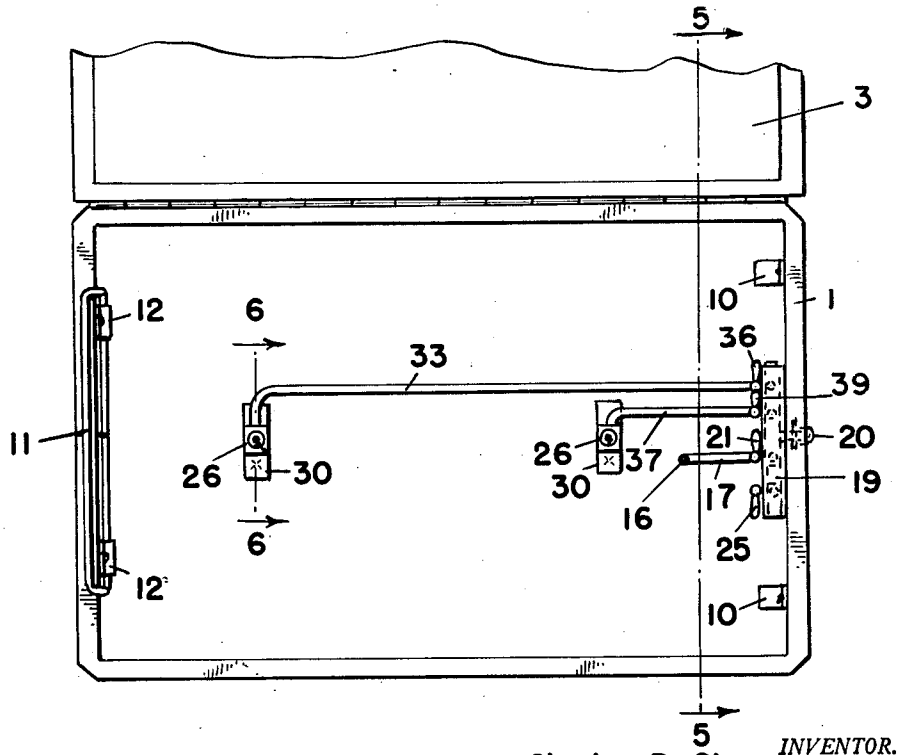


FIG. 4



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FIG. 5

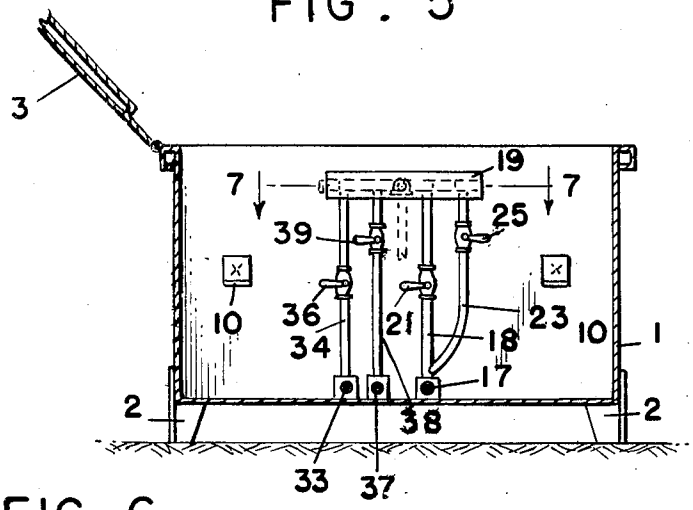


FIG. 6

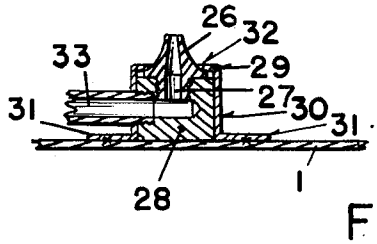


FIG. 7

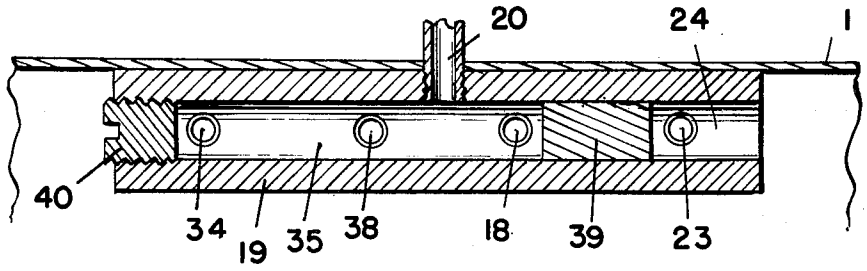
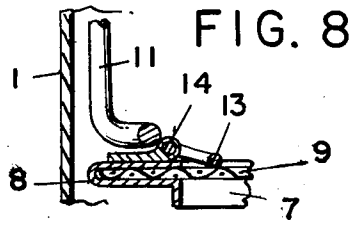


FIG. 8



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UNITED STATES PATENT OFFICE

2,559,472

PNEUMATIC ACTUATING MEANS FOR METAL PARTS WASHERS

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Application October 30, 1947, Serial No. 782,983

4 Claims. (Cl. 134—94)

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This invention relates to cleaning devices of the type including a bath of cleaning liquid which is to be brought into contact with metal parts to be cleaned, such as automobile parts, machine parts and the like.

One of the objects of the present invention is to provide for the convenient introduction of the parts to be cleaned and the convenient removal thereof from the tank or container which contains and houses the cleaning liquid, and to provide for the convenient and effective draining of the parts after they have been subjected for a predetermined period of time to the cleaning liquid.

Another object of the invention is to provide for the introduction of the parts to be cleaned into the device and to support the parts above and out of contact with the cleaning liquid which, according to the present invention, is subsequently brought to a level slightly above the parts to be cleaned, and then a turbulence is provided in the cleaning liquid in which the parts are submerged so as to carry away from the parts such portions of the liquid as have become more or less foul by contact with the parts to be cleaned and to bring cleaner portions into contact with the parts.

As above described, according to the present invention, the level of the original charge of liquid is below the level at which the parts to be cleaned are supported, and provision is made for raising the liquid to a level slightly above the part to be cleaned and to hold it there during the cleaning period, and thereafter to lower the level of the liquid below the level of the cleaned parts so that the latter may drain while still remaining within the container and in a more or less dry condition preparatory to being removed from the device.

According to the present invention, moving parts are dispensed with. Air under pressure is employed for raising or elevating the level of the original charge of liquid to its cleaning position without adding thereto, and also to provide for the lowering of the liquid at the end of the cleaning operation and to permit draining of the parts that have been cleaned. Also, air under pressure is employed for causing turbulence in the cleaning liquid in the elevated portion thereof so as to circulate the liquid around and in contact with the parts to be cleaned.

With these and other objects in view, the present invention consists in the combination and arrangement of parts as will be hereinafter more fully described, illustrated in the accompanying

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drawings and pointed out in the appended claims, it, of course, being understood that changes in the form, proportion, size and minor details may be made, within the scope of the claims, without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings,

Figure 1 is an end elevation of the cleaning device of the present invention with the lid or cover in open position.

Figure 2 is a plan view of Figure 1.

Figure 3 is a vertical sectional view on the line 3—3 of Figure 2.

Figure 4 is a plan view of the device with the lid or cover open, the means for supporting the articles during the cleaning operation and other parts of the device being removed.

Figure 5 is a cross sectional view on the line 5—5 of Figure 4.

Figure 6 is an enlarged detail sectional view on the line 6—6 of Figure 4.

Figure 7 is an enlarged fragmentary sectional view on the line 7—7 of Figure 5.

Figure 8 is an enlarged fragmentary sectional view illustrating the manner of holding down one end of the tray or support for the parts to be cleaned during the operation of the device.

As shown in the accompanying drawings, the present device includes a tank 1 of any desired shape and size, here shown as rectangular in shape. The tank may be supported in a slightly elevated position upon suitable legs or feet 2 so as to support the bottom of the tank above the floor upon which the tank is supported. The top of the tank is open and is provided with a suitable lid or cover 3 which should have such a tight fit with the open top of the tank as to prevent the escape of inflammable gases from the cleaning liquid within the tank.

Within the tank and supported on the bottom thereof there is a substantially horizontal shelf 4 and in the form of an inverted pan, the depending longitudinal side walls 5 of which rest upon the bottom of the tank so as to support the shelf part 4 at a suitable elevation above the bottom of the tank. Each depending end wall 6 of the shelf preferably terminates short of the bottom of the tank so as to provide passageways for the circulation of cleaning liquid to and from the interior of the pan-like support 4. If desired, the end wall 6 may reach to the bottom of the tank and rest thereon, in which event an opening or openings should be provided in the part 6 for the circulation of the cleaning liquid as above described.

Resting upon the top of the shelf 4 is a tray 7 consisting of an open rectangular frame in the form of an angle bar as best shown in Figures 3 and 8 of the drawings, the horizontal member of the angle bar being bent over upon itself as at 8 to form a substantially U-shaped socket or bead to receive the marginal edges of the body 9 of the tray which is in the form of a screen or reticulated material, the bead portion 8 of the frame being pinched down upon the material 9 so as to hold it in place.

Obviously other forms of the reticulated or perforated screen may be employed, the important thing being to provide a horizontal screen for the support of the parts to be cleaned and to permit of the cleaning liquid being moved upwardly through the screen and subsequently drained downwardly therefrom. One end of the tray is introduced beneath and held down upon the part 4 by being introduced beneath a pair of brackets or projections 10 carried by the adjacent end of the tank. The opposite end of the tray is held down by means of a latch in the form of a bail 11 pivoted or hinged at its upper side as at 12 in suitable eyes or other means secured to the inner face of the adjacent end wall of the tank. The bail 11 is of a size such that when swung downwardly it will forcibly engage the top face of the tray 9, preferably the angular frame thereof, in such a manner as to removably hold the tray down upon the shelf 4. By swinging the bail 11 upwardly upon its hinge 12, the adjacent end of the tray will be released and may be elevated and pulled out from beneath the brackets 10 whenever it is desired to remove the tray. For this manipulation of the tray, there is provided a link handle 13 which is hinged in an eye 14 provided upon the top of the end frame bar of the tray 9, and this eye is also employed as a catch or abutment behind which the lower cross bar of the bail 11 may be forced when the bail is swung downwardly to hold the tray in place. The bail 11 may, of course, be readily pulled out from behind and in contact with the eye 14 whenever it is desired to release the tray 9, but during the operation of the device the bail 11 will hold the tray firmly in place on top of the shelf 4.

An indicated in Figure 3, it will be seen that the normal level 15 of the charge of cleaning fluid is slightly below the level of the shelf 4 so as to provide an air space between the top of the liquid 5 and the shelf 4 into which air under pressure may be introduced by an upstanding tubular nozzle 16 having its open top above the level of the charge of cleaning fluid when the device is not in operation for cleaning purposes. This nozzle is connected by a horizontal pipe 17 extending along the bottom of the tank to the lower end of an upstanding pipe 18 which rises to and has its upper end connected with a horizontally disposed manifold 19 secured to the inner face of the adjacent end wall of the tank. A suitable supply pipe 20 is provided for connection with a source of air under pressure and in turn is connected to the manifold 19 as shown in Figure 7 of the drawings. A suitable hand operated valve 21 is provided in the pipe 18 so that air under pressure may be conducted from the manifold 19 to the nozzle 16 and into the space between the level 15 of the cleaning liquid and the bottom of the shelf 4 whereby the level of the liquid beneath the shelf 4 may be lowered and the liquid forced out of the pan-like structure 4 and upwardly to a suitable level, such as indicated at 22 above the top of the tray 9 in order that the parts supported on the tray may be covered with the cleaning liquid. Provision is made for exhausting the air pressure from between the shelf 4 and the top of the liquid therebeneath through the nozzle 16 and pipe 18, through an exhaust pipe 23 connected to the pipe 18 and to an exhaust chamber 24 in one end of the manifold 19, as well shown in Figures 5 and 7 of the drawings. The pipe 23 is provided with a suitable hand valve 25 for releasing the air pressure as described. When the air pressure is released, the level of the liquid above the tray will fall to a position below the shelf 4, thus permitting draining of the wet parts on the tray without the loss of any cleaning liquid drained from the parts and ensuring that the parts will be in a dry condition when removed from the tank.

For the purpose of providing a turbulence in that part of the cleaning liquid in which the parts are submerged, there is provided a plurality of air jets 26, two such jets being shown, but it, of course, being understood that any number of jets may be employed. A specific embodiment of jet has been shown in Figure 6 wherein it will be seen that the jet consists of a tubular nozzle having an exteriorly screw-threaded tubular shank 27 which is screwed into the metal block 28 resting on the bottom of the tank 1. The jet is provided with an external annular flange 29 at its base and disposed to rest upon the top of the block 28. A substantially U-shaped metal strap or bracket 30 embraces the top and opposite sides of the block 28 and is provided with the flanges 31 which are spot-welded or otherwise secured to the bottom of the tank 1. This bracket has an open end 32 in its top through which the nozzle 26 projects. As shown in Figure 4 of the drawings, one of these nozzles is connected by a horizontal pipe 33 running along the bottom of the tank and connected to the lower end of an upstanding pipe 34 which is in turn connected to the bottom of the manifold 19 and communicates with a chamber 35 in the manifold so that air under pressure may be conducted from the manifold through the hand operated valve 36 in pipe 34 and thence to pipe 33 and finally to the jet 26. Similarly, the other jet is connected by a horizontal pipe 37 to the lower end of an upright pipe 38 the upper end of which is connected to the manifold 19 and communicates with the chamber 35 and is provided with a hand valve 39 whereby air under pressure may be conducted to the other jet. It will here be explained that the pipe 18 for conducting air under pressure to the nozzle 16 communicates at its upper end with the chamber 35, and that there is a partition 39 in the manifold so as to separate the exhaust chamber 24 from the supply chamber 35.

While any preferred form of manifold may be employed, that shown in the accompanying drawings consists of a solid bar of metal having the supply chamber 35 bored therein from one end and the exhaust chamber 24 bored therein from the opposite end so as to provide the partition 39 separating the two chambers. The exhaust chamber 24 is open at its outer end to the atmosphere, while the outer end of the supply chamber 35 is closed, as by means of a suitable plug 40.

In the operation of the device, a charge of cleaning liquid is poured into the tank until the level thereof is below but near the open top of the nozzle 16. The tray 9 is then introduced

and held down upon the top of the shelf 4 so as to hold the latter in place against the lifting effect of the air under pressure introduced between the shelf and the level 15 of the liquid. The valve 25 being closed, the valve 21 is open so as to discharge air under pressure through the nozzle 16 and thus lower the level 15 of the liquid and force liquid upwardly through the tray 9 to any suitable level such as indicated at 22, the parts to be cleaned having previously been placed upon the tray 9 or they may be placed in position after the liquid has been lifted to the level 22. It will, of course, be understood that the level 15 of the liquid within the pan-shaped part 4 is always maintained above any openings in the vertical side walls of the part 4 so that there may be no escape of air from between the level of the liquid and the bottom of the part 4. After the level 22 has been established, the valve 21 is closed so as to hold the liquid at the level 22. Then the valves 36 and 39 are opened so as to supply air under pressure to the jets 26 each of which jets is located within the open bottom of an upwardly flared Venturi tube 41, the top end of which opens upwardly through the shelf 4, whereby the effect of the air under pressure escaping through the nozzle 16 causes a turbulence in the cleaning liquid above the shelf 4 and around and in contact with the parts to be cleaned supported upon the tray 9. The Venturi effect also draws liquid from beneath the shelf 4 upwardly through each of the tubes 41 into the space above the shelf 4, thus producing a circulation of cleaning liquid which will successively present cleaner portions of the liquid to the parts to be cleaned and thus cleaning the parts in a simple and effective manner without requiring any moving elements as a part of the cleaning device. After a predetermined period of time, the supply of air under pressure to the jets 26 is cut off and then the exhaust valve 25 is opened so that air beneath the shelf 4 may exhaust through the nozzle 16 and the pipe 23 into the exhaust chamber 24 of the manifold and thence into the atmosphere, thus lowering the level 22 of the cleaning liquid to the level 15 thereof, whereupon the cleaned articles will be above the liquid level 15 and cleaning fluid on the parts will drain therefrom downwardly through the tray 9 into space below the shelf 4.

Having thus described my invention, what I claim is:

1. A cleaning device for cleaning substantially small parts, comprising a tank for containing a cleaning liquid, an open-work substantially horizontal shelf for the support of the parts to be cleaned, a closed-top chamber within the tank and below the shelf and having its lower portion in connection with the interior of the tank below the shelf, means for introducing fluid pressure into the upper portion of the chamber and above the level of cleaning liquid therein for lowering said level and forcing liquid upwardly through the open-work shelf to a level thereabove and for permitting the escape of fluid pressure from the chamber to lower the level of the liquid below that of the shelf, and fluid pressure jets disposed to direct fluid pressure into liquid above the shelf and produce turbulence therein.

2. A cleaning device for cleaning substantially small parts, comprising a tank for containing a cleaning liquid, an open-work substantially horizontal shelf for the support of the parts to be cleaned, a closed-top chamber within the tank and below the shelf and having its lower portion in communication with the lower portion of the tank, a manifold mounted within the tank and having an inlet for the introduction of fluid pressure, a pipe having its discharge end within the upper portion of the chamber and its other end connected to the manifold and provided with a supply valve and venting means, a jet nozzle within the tank and below the shelf and disposed to direct a jet fluid under pressure upwardly through the open-work shelf, and a pipe connecting the jet with the manifold and provided with a control valve.

3. A cleaning device for cleaning substantially small parts, comprising a tank for containing a cleaning liquid, an open-work substantially horizontal shelf for the support of the parts to be cleaned, a closed-top chamber within the tank and below the shelf and in communication with the lower portion of the tank, pipe means for introducing fluid under pressure into the upper portion of the chamber for lowering the level of a cleaning liquid therein and elevating the level above the shelf, the top of the chamber having an opening therein, a Venturi tube depending from the top of the chamber and around the opening therein, a jet device within the lower portion of the Venturi tube, and means for introducing fluid pressure into the jet to cause turbulence in liquid above the shelf.

4. A cleaning device for cleaning substantially small parts, comprising a tank for containing a a cleaning liquid, a closed-top chamber within the tank and having its lower portion in communication with the interior of the tank, an open-work substantially horizontal shelf removably supported upon the top of the chamber, a bracket carried by the interior of the tank and having one end of the shelf disposed below and engaged by the bracket, a bail-shaped member hinged to the interior of the tank opposite the bracket and of a length to engage the top of the shelf and hold it down upon the top of the chamber, said bail being capable of being swung upwardly to release the shelf, and pipe means for introducing fluid under pressure into the upper portion of the chamber for lowering a liquid level therein and raising the liquid level above the shelf.

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