PUMP FOR PUMPING LIQUIDS AND APPARATUS EMBODYING SAME

Fig. 4

Fig. 5

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The present invention relates to a pump for pumping liquids and apparatus embodying same. More particularly, although not exclusively, the invention is concerned with a pump for use with apparatus for distributing a liquid fertiliser over the ground or a liquid disinfectant over a floor, but may advantageously be used for analogous purposes, either independently or in combination with other apparatus.

The object of the invention is to provide a simple, inexpensive and yet efficient pump for pumping liquids which will accurately pump a required pre-determined volume of liquid.

Broadly, according to the present invention, there is provided a pump for pumping liquid which comprises a casing, a roller having a covering of compressible liquid-absorbent material rotatable in said casing, means for conveying liquid to a chamber in said casing and into contact with the surface of said roller, and means for compressing the roller to eject liquid therefrom under pressure into a discharge passage or outlet.

According to a preferred embodiment of the invention, the covering of the roller consists of very soft resilient sponge or foam rubber of the kind comprising cavities which are not sealed from one another so that it will readily absorb liquid. Alternatively, sponge plastics material, felt or other compressible absorbent material may be used.

The means for compressing the roller preferably comprises a hinged plate or flap which extends longitudinally of the roller and which also serves to isolate the liquid-receiving chamber from said outlet.

According to another aspect of the invention as applied for distributing a liquid over the ground or a floor, the apparatus comprises a pump as set forth above which is adapted to support thereabove a hopper or container for a bulk supply of the liquid, and is adapted to receive a supply pipe leading from said hopper, and the roller is fitted to a shaft provided at its ends with ground wheels whereby said roller is rotated when the apparatus is wheeled, the liquid outlet being connected to a spray bar or bars.

To enable the invention to be clearly understood, an embodiment thereof will now be described by way of example with reference to the accompanying drawings as applied to apparatus for distributing a liquid over the ground or in a floor.

In the drawings:

FIGURE 1 is a perspective view of the apparatus.
FIGURE 2 is a vertical transverse section, drawn to a larger scale and taken through the distributing roller.
FIGURE 3 is a partial sectional view taken on the line III—III of FIGURE 2.
FIGURE 4 is a sectional plan view taken on the line IV—IV of FIGURE 2, and
FIGURE 5 is a transverse section illustrating a modified form of roller which may be substituted for the roller shown in FIGURES 2 and 4.

Referring to the drawings, the apparatus comprises a hopper or container 1 of any suitable shape which is supported by a platform 2 having a front locating lip or flange 3 and which forms the upper part of a pump housing 4 which, as clearly shown in FIGURES 2 and 4, comprises two castings which are abutted together face to face and which have interposed between them a gasket 5.

This housing 4 is shaped to provide a cylindrical casing which is closed at its ends and which accommodates a rotatable liquid-distributing roller 6 comprising a core 6a having a covering 7 of any suitable kind of spongy liquid-absorbent material such as sponge rubber, foam rubber or the like. The roller 6 is fixed to a shaft 8 provided at its ends with ground wheels 9 whereby the roller is rotated as the apparatus is wheeled over the ground.

The liquid from the hopper 1 passes to the pump housing 4 through a pipe 10 which opens at its upper end through a hole in the floor of the hopper 1 and, as shown clearly in FIGURE 2, opens at its lower end 16 into a chamber 11 at the lower port of the pump casing 4.

The admission of liquid to this chamber 11 is controlled by a hinged pressure-applying plate or flap 12 extending longitudinally of the roller and which can pivot at its upper edge about a seal 13 serving in conjunction with the plate 12 to isolate the chamber 11 from a liquid discharge passage 14 extending forwards from the pump housing.

The hinged flap 12 also serves to squeeze or compress the covering 7 of the roller so as to eject therefrom, under pressure, liquid which has been absorbed by the spongy material as it passes through the chamber 11.

In the specific embodiment being described, the movement of the hinged flap 12 is effected by means which is readily accessible to the user of the apparatus, said means comprising a finger piece 15 (FIGURE 1) pivoted at 16 to a handle 18 and which, when swung, effects axial displacement of a rod 17 extending axially of said handle 18. The lower end of this rod 17 is fitted with a return spring 19 (FIGURE 2) and is pivoted at 20 to a link 21 which is connected to one side edge of the plate 12 adjacent to the upper edge thereof so as to swing this plate 12 about the hinge constituted by the seal 13.

It will be seen that when the plate 12 is swung to the chain-dotted position shown in FIGURE 2, water from the pipe 10 is permitted to enter the chamber 11, and (6) the plate act to compress and squeeze the covering 7 of the roller 6 so as to eject therefrom the liquid absorbed by said covering and discharge same under pressure into the passage 14.

Liquid from the passage 14 enters a filter 22 and passes from each side thereof through a bore 23 in a lower portion 24 of the pump casing which constitutes a filter housing and then into a hollow plug 25 which is supported to rotate about its axis in the pump portion 24, the plug 25 having a port 26 which, in a position of use, registers with an outlet port 27 at the outer end of the bore 23.

The outer ends of the two plugs 25 are fitted to, or formed integral with a spray bar 28 formed with a multiplicity of perforations or holes 29 through which the liquid is ejected under the pressure in the form of a spray due to the build up of liquid pressure in the passage 14.

When the apparatus is not being used, the two spray bars 28 can be swung upwardly about the axis of the plugs 25 into inoperative and out of the way positions in which they are located substantially vertically in front of the hopper 1, and they are retained in this position by springs 30 which act on neck portions 31 at the rear ends of the plugs 25.

In operation, liquid pressure tends to build up in the passage 14 due to the squeezing of the covering 7 of the roller 6 by the plate 12 so that the liquid is forced through the filter 22, through the bores 23 into the interior of the plugs 25 and then into the spray tubes 28 and is squirted and discharged in the form of a spray
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through the openings or perforations 29 in the spray bars 28. When the spray bars 28 are swung upwardly into inactive positions, the hollow plugs 25 are also turned about their axes and the ports 26 thereof are moved out of registration with the ports 27 so that liquid cannot escape.

To enable the apparatus to be left standing in a substantially upright position when not in use, it is provided with a pair of hinged rod-like feet 31 which can be swung rearwardly from the back of the appliance into ground engaging positions.

According to a modification, the presser blade or flap is replaced by a small diameter roller which extends parallel to the roller 6 and is adapted to be swung towards the roller 6 to compress the covering 7 thereof to eject liquid therefrom.

When the presser blade 12, or the presser roller as the case may be, is in an operative position, it exerts little or no pressure on the distributing roller 6 and the latter is not therefore permanently deformed when the apparatus is left unused for a long time.

The amount of movement of the pressure member 12 determines the amount of pressure and volume of liquid discharged through the spray bars 28.

In certain cases it is possible that a liquid chemical to be distributed may have detrimental effects on the sponge rubber covering 7 of the roller, and to enable the apparatus to be used for distributing such chemicals the liquid-distributing roller 6 may be withdrawn from the apparatus and a roller made of natural rubber or neoprene as illustrated in FIGURE 5 fitted in place thereof. As shown, this roller is formed with fins or vanes 32 which are slightly spaced apart circumferentially of the roller and extend axially thereof in parallelism. Alternatively, the surface of the roller may comprise a multiplicity of cavities and the cavities can be arranged to provide a honeycomb pattern. The roller is preferably formed with an inner core 33 which is fixed to the shaft 8 and the ends of the roller may be formed with sealing discs 34. In operation the fins 32 are acted upon and flexed and deflected by the hinged plate 12 as the roller rotates and liquid is forced under pressure into the discharge passage 14 as previously described as the fins spring back into normal positions as they move clear of the plate.

I claim:

1. Liquid distributing apparatus comprising a pump casing, a roller having a covering of compressible liquid-absorbent material supported in said casing, a shaft fitted with ground wheels and to which said roller is secured so as to be rotated thereby, a handle upstanding from said pump casing and a hopper for containing a bulk supply of liquid supported by said handle, a liquid-receiving chamber in the pump casing and a supply pipe for conveying liquid from the hopper to said chamber, a hinged pressure-applying plate swingable in the casing against the roller to compress and express liquid therefrom under pressure, actuating means on the handle for swinging said plate, an outlet in said casing through which expressed liquid is discharged, and a spray bar connected to said outlet.

2. Liquid distributing apparatus comprising a pump casing, a roller having a covering of compressible liquid-absorbent material supported in said casing, a shaft fitted with ground wheels to which said roller is secured so as to be rotated thereby, a handle upstanding from said pump casing and a hopper for containing a bulk supply of liquid supported by said handle, a liquid-receiving chamber in the pump casing and a supply pipe for conveying liquid from the hopper to said chamber, a hinged pressure-applying plate swingable in the casing against the roller to compress and express liquid therefrom under pressure, actuating means on the handle for swinging said plate, an outlet in said casing through which expressed liquid is discharged, a pair of turnable hollow plug valves in said outlet, a pair of spray bars each swingably supported to turn one of said plug valves and displaceable from a vertical out-of-use position to a horizontal position of use in which the valve is opened.

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