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WATER PURIFIER

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3 Sheets-Sheet 1

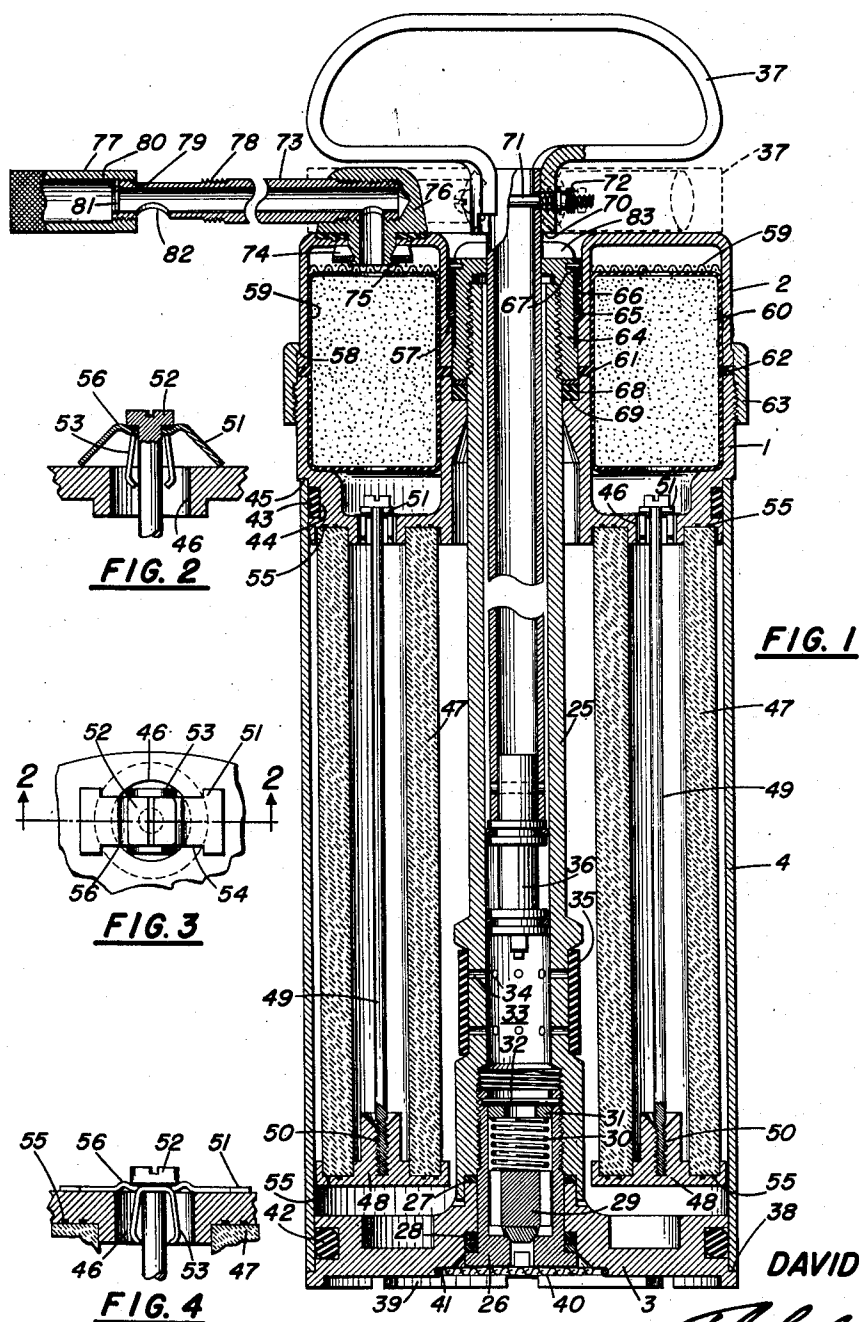


FIG. 1

FIG. 2

FIG. 3

FIG. 4

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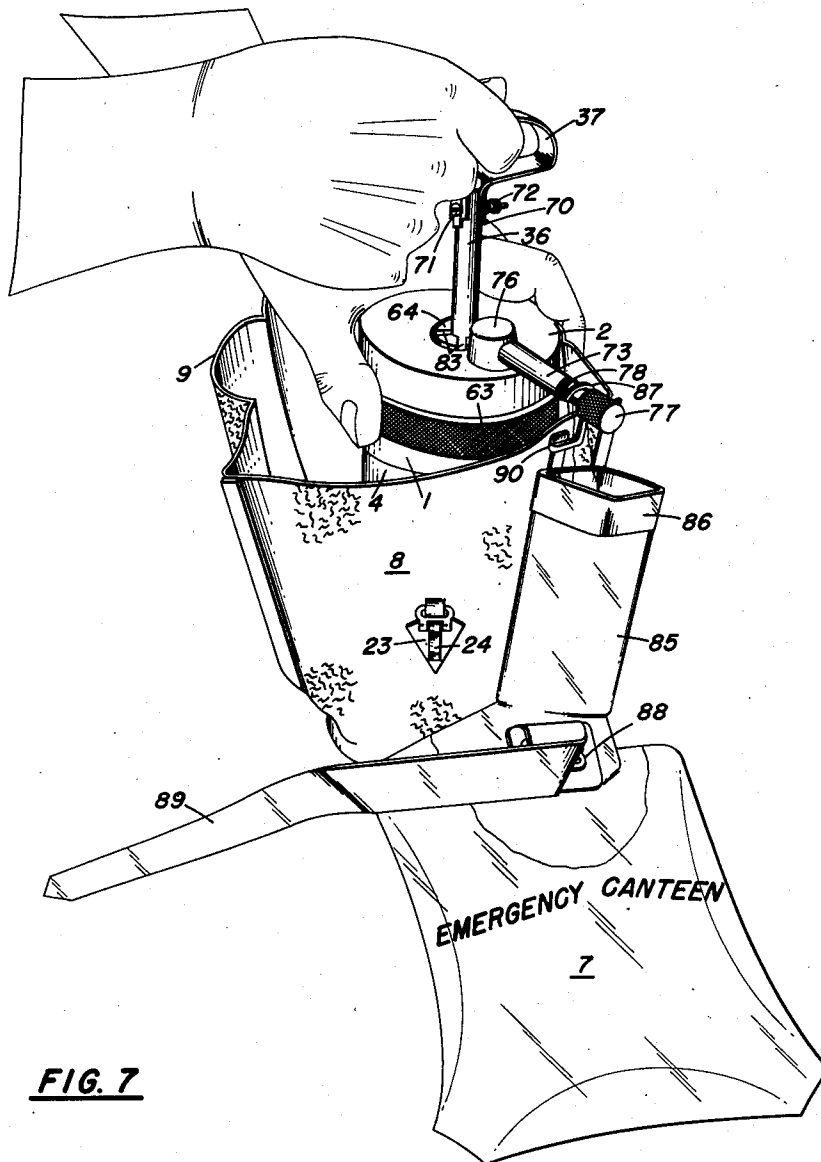


FIG. 7

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WATER PURIFIER

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This invention relates to improvements in personal type of water purifier kits of the kind disclosed in my prior application S. N. 666,939, filed May 3, 1946, on Water Purifier, now Patent No. 2,566,371, dated May 4, 1951. The purification unit of the present kit may be used in conjunction with a carrying case, such as defined in that application, wherein the case comprises a scoop and container for the contaminated water which is to be purified.

The object of this invention is to provide a water purifier kit with an improved purifier unit which will be compact and effective, and will be substantially cylindrical in outer dimensions so as to readily fit in a small cylindrical carrying case adaptable for attachment to a belt.

Another object is to make this unit self-sufficient, so that it will be easily assembled and taken apart without the aid of any tools.

Another object is to provide the above unit with a swiveled effluent spigot and a foldable pump handle which will interfit, in their operative positions, so as to occupy a substantially flat space on top of the cylindrical unit, within the circumference thereof; the spigot being swivable to extend to one side of the unit in its operative position, and having a threaded cap with retaining means to hold it open, while the pump handle is of loop form and is pivoted to the end of the pump plunger shaft.

Another object is to provide the unit with a suitable carrying case, such as mentioned above but being further equipped with several vials of preliminary purifying material, a cleaning brush and a foldable flexible skin canteen, which make the personal kit more complete, efficient and self-sufficient for any emergency.

Another object is to provide the above canteen with a neck portion having a reenforced collar, preformed to normally maintain the reinforcing collar at the end of the neck in an open position, and a swivelled hook and clip combination attached to said collar for turning the hook up to hang over the effluent spigot so that the canteen opening is held directly under the open spigot, the clip portion of the hook fitting over the outer edges of the collar to hold the neck closed when the hook is turned down over the edges of the folded collar as the collar is held flattened.

Another object is to further provide the canteen with a strap having its one end fixed on one side of the base of the neck, and a buckle fixed on each side of the base of the neck, so that the neck collar, after being clipped closed

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by the hook combination, may be rolled up to the base of the neck, and the strap may then be passed over the neck through the buckle on the other side of the base to hold the neck rolled up, and the free end of the strap may then be fixed to the other buckle so as to form a loop by which the filled canteen may be carried or hung over a belt.

Another object is to simplify and improve the operation of the purifier by providing novel means for suspending and sealing the tubular filter tubes in place on a mid-section of the cylindrical purifier unit, so as to prevent their being accidentally cocked in assembling, and to render their replacement simple.

Another object is to provide the above unit with an annular end or cap section fitting over the top of the mid-section around the top of the plunger pump and held down by outer and inner annular flanged sleeve nuts threaded to the mid-section and the pump cylinder respectively, an annular perforated bag of loose filter material being held by its inner and outer integral flanges between the adjacent cap section and the mid-section edges, in the annular chamber thus formed between said sections, for the effluent liquid to pass through from the inside of the filter tubes to the effluent outlet in the swivelled joint of the spigot in the top of the cap section.

A further object is to make the internal sleeve nut serve also as a packing gland nut between the pump cylinder and the internal edge of the mid-section by interposing an annular pressure spring between an external collar on said nut and an internal flange on said cap section for holding down the internal edge of said cap section against the internal flange of the annular filter bag on the corresponding edge of said mid-section, and at the same time providing a ring of resilient sealing material between the lower end of said nut and a flange on the internal edge of said mid-section to form a seal between the pump cylinder and the internal edge of the mid-section to isolate the space in said unit in the lower section thereof around the pump cylinder and filter tubes into which the fluid is forced by the plunger pump during operation thereof before it goes through the filter tube walls, from the annular chamber between the sections.

A further object is to provide the unit with a lower end section comprising a base having a central opening over which the pump cylinder is held in place by a flanged inlet valve casing threaded into the lower end of said pump cylinder thru said base, said base having an external

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flange and an annular groove around its periphery above the flange with a packing ring therein, and a cylindrical sleeve having a force fit over said packing ring at its bottom end and a similar fit over another packing ring at its upper end which is mounted in an annular groove around the lower end of the mid-section below a corresponding flange.

A further object is to provide an expansible annular perforated bag of loose filter material for the annular chamber between the cap and mid-sections, made of vinylite or other suitable sheet material formed into a doughnut shaped shell having inner and outer flanges around its mid-section, and perforated around its upper and lower ends, the shell being filled with a loose filter material for the final step in the filter system incorporated in the filter unit, as the filtrate passes through the annular chamber.

Other and more specific objects will become apparent in the following detailed description of the personal filter kit constructed in accordance with the present invention, having reference to the accompanying drawings, wherein:

Fig. 1 is a sectional view of the filter unit;

Figs. 2 to 4 are detail views, on an enlarged scale, of a portion of the tube suspension means, Fig. 4 showing the position the parts assume when the tube is installed;

Fig. 5 is a perspective view of the case in closed position, the contents comprising the rest of the kit being hidden from view;

Fig. 6 is a perspective view of the complete kit, showing the case cap opened to expose the top of the filter unit to view, and the other elements removed from their respective pockets in the case, and

Fig. 7 is a perspective view of the several parts of the kit in operation.

Referring now to the several views in the drawings, the water purifier kit comprises the purifier unit which has a casing composed of a mid-section or central section 1, a cap or top section 2 and a lower or base section made up of the base 3 and cylindrical sleeve 4; several vials 5 of preliminary purifying material; a cleaning brush 6; a foldable flexible skin canteen 7; and a carrying case 8, which has additional pockets for storing the other elements besides the purifier unit, to make a complete but compact personal purifier kit, ready for mounting on a cartridge belt or the like, as shown in Fig. 5.

The carrying case 8 is of semi-rigid impervious material, with a more flexible portion 9 of its side wall unfoldable to enlarge its capacity, and to form a scooping means, when the cap 10 is lifted. A pocket 11 for the brush 6 is provided along one side of the case and another pocket 12 for the vials 5 is provided along the other side, with a wider pocket 13 across the back of the case for the emergency canteen 7, when folded up for storage. The pocket 13 has a flap 14 with a tongue portion 15 for slipping under the loop strip 16 to hold the flap closed over the pocket. Pockets 11 and 12 are open at the top and are held closed by the cap 10, when it is pushed down over them in secured position. Cap 10 is fixed as by rivets 17 at the back to a hinge strip 18 which together with the loop strip 19 are fixed to the back of the case. The loop strip holds the hanger wire 20 which is commonly used for hanging the case on a cartridge belt. The front of the cap 10 has a tongue 21 with an opening 22 therein, and the case 8 has a buckle 23 fixed in front with a spring clip 24 for pass-

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ing through the opening 22 and springing down over the tongue 21 to secure the cap 10 in closed position.

The purifier unit has a pump cylinder 25 extending centrally thereof, and is fixed to the base 3 by the flanged inlet valve casing 26 which is passed through the central opening in the base and is threaded into the lower end of the pump cylinder. Sealing rings 27 and 28 are used between the base and the end of the cylinder and the valve casing flange respectively, to seal the pump chamber and the purifier casing from each other and from the outside. The inlet valve 29 is held on its seat by spring 30 which is backed by a washer 31 stopped by pin 32 fixed across the upper end of the valve casing 23.

The pump chamber 25 is provided with a plurality of outlet openings 34 in the cylinder wall, closed by a sleeve valve 35 or resilient material which is responsive to the pressure in the pump chamber to expand and permit the flow of fluid through said outlet openings when the plunger 36 is forced down during hand operation by means of the handle 37.

Base 3 is provided with an external shoulder 38 to fit against the lower end of sleeve 4, and a castellated peripheral flange 39 to rest on the bottom of any liquid container without blocking off ingress of the liquid into the purifier unit by way of the inlet valve casing 26, which opens through the bottom. Below the valve casing opening the base is further provided with a screen 40 held in place by a spring ring 41. A groove around the periphery of the base above shoulder 38 holds a ring 42 of sealing material to form a seal between the base and the sleeve 4 when these two elements are pressed together as shown.

The upper end of sleeve 4 is similarly sealed at the top by the ring 43 of sealing material held in groove 44 of the mid-section 1, which is also provided with a shoulder 45 to fit against the upper end of sleeve 4. The mid-section is of an annular trough shape fitting around the pump plunger and forming a transverse partition in the casing. A series of inlet openings 46 is formed in the bottom wall of the partition with a circular groove in the under surface of said wall around each opening for receiving the upper end of a filter tube 47. Each tube is provided at its lower end with a supporting and sealing disc 48 having a similar groove for its lower end. Each disc 48 is drawn up into sealing engagement with the corresponding tube by a rod bolt 49 threaded into a central lug 50 on the disc. A spring guide washer 51 is used under the square head 52 of the rod bolt 49. This washer in its normal unsprung position, as shown in Fig. 2, centers the bolt 49 in the opening 46 by reason of its guide fingers 53 which have been stamped out of the sides of the washer material, as may be seen at 54 in Fig. 3, and preformed by bending them down so as to space their ends within a circle the size of the openings 46. Thus they guide the bolt as it is screwed up so that it will not cock the tube 47 off center to cause leakage at the end seals 55 when the tubes are mounted in place. The slight ridges 56 on top of the washer are spaced so as to form locking means for the square head 52 by springing up at the opposite sides of the head each time either pair of them are turned into parallel relation with the ridges.

The cap section 2 is of complementary trough shape to the mid-section 1, so that its edges match those of the mid-section, and has inner and outer external shoulders 57 and 58 respec-

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tively. An annular bag 59 of loose filter material 60, which is perforated at its ends is held in the chamber formed between the cap section and mid-section by its inner and outer integral flanges 61 and 62 respectively being held between the corresponding edges of the sections 1 and 2. These flanges also serve as sealing rings when the cap section 2 is tightened down over the mid-section 1 by a flanged sleeve nut 63 cooperating with the outer shoulder of the cap section and a sleeve nut 64 threaded to the pump casing 25 and cooperating with the inner shoulder of the cap section through a ring 65 and compression spring 66 held at its upper end by a ring 67 fixed to the sleeve nut 64. The lower end of the sleeve nut cooperates with a sealing ring 68 on a shoulder 69 of the mid-section 1 adjacent the pump casing 25 to form a seal at that point. The surface of the sleeve nut 63 is knurled for easy turning by hand. The sleeve nut 64 has a series of diametrically opposed slots 83 into which the lugs 70 of the handle 37 may be inserted when the pump plunger is pushed all the way down, for easy operation of the nut by means of the handle 37.

The handle 37 is of a spring bronze material and is formed in a loop as shown with its ends biased against the opposite sides of the plunger shaft 36. A pivot bolt 71 is passed through these ends and the plunger shaft so that the handle may be swung down flat over the end of the purifier unit when stored away, as shown more clearly in Fig. 6. The ends are curved to fit around the shaft 36 when in operating position, and the handle will therefore snap into this position when turned up. The bolt may be used if necessary to tighten the handle on the shaft in this position by screwing up on the nut 72.

The cap section 2 has an opening in its upper wall, in which the spigot 73 is swivelly mounted. A flat horseshoe spring 74, locking under the shoulder 75 of the swivel fitting 76, is provided for biasing the spigot into sealed relation with the cap section without restricting its turning movement. The spigot may be turned in over the end of the purifier unit when stored, or swung out as shown in Figs. 1 and 7 during operation. A screw cap 77 is attached to the spigot and may be screwed on the thread 78 for keeping dirt out, or unscrewed over the thread 79 during operation. A stop lug 80 passed thru the end of the spigot tube is formed on the end of a spring ring 81 clipped into an internal groove in the end of the tube. The stop lug acts against an internal shoulder at the inner end of the thread in the cap 77. Spring ring 81 may be inserted or removed through the spigot outlet side opening 82.

A screen 84 is fixed in the cap section 2 to keep the upper end of bag 59 from moving against the spigot inlet opening or the upper wall of the cap section and closing off the perforations in the upper end of the bag.

The other component parts of the kit include a canteen 7 which is made of flexible material, such as Vinylite e. g., and has a neck 85 with a reenforced collar 86 preformed to stay in open position, as may be seen in Fig. 7. A swivelled hook and clip combination is attached to one side of the reenforced collar and has a clip portion 90 for slipping over the edges of the collar when it is pressed closed, and a hook portion 87 which is used for hanging the canteen over the spigot with the open collar under the spigot outlet when filling the canteen. A pair of buckles

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88 is fixed on opposite sides of the canteen at the base of the neck, and a strap 89 is fixed to one side of the canteen above the corresponding buckle, so that the loose end of the strap may be passed over the rolled-up neck after the canteen is filled and unhooked off the spigot, and the clip 90 slipped over the closed collar and rolled up in the neck, the loose end of the strap being then passed through the buckle on the other side of the canteen to hold the neck in rolled-up position. The remaining length of the strap may then be formed into a loop by fixing its extremity to the other buckle. The filled canteen may then be easily carried by means of this loop, which may be hung over a belt in well-known fashion. When not in use, the canteen may be folded up into a compact fold and put away in its pocket 13 on the carrying case 8.

The brush 6 may be an ordinary bristle brush with a wire handle for scrubbing the inside of the filter tubes, and may also be used for the outside. The preliminary filtering material in the vials 5 may be any well-known filtering composition for eliminating impurities in the dirty water after it is scooped up in the container 3 with the scooping edge 9. Each vial may have a sufficient amount of purifier for the treatment of one container full of the water before it is pumped through the purifier unit.

Various obvious modifications in the form and arrangement of the several components and parts may be made without departing from the spirit and scope of the present invention as defined in the appended claims.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. A purifier unit comprising a closed tubular casing having base, central and top sections, a hand piston pump centrally fixed to said base section and including a piston rod protruding through the top casing section, a filter unit circumferentially positioned around said pump, an inlet device in the base casing section, an outlet device on the end of the top section, and a foldable pump handle attached to the protruding pump piston rod, said foldable pump handle comprising a loop of spring bronze, the ends of which are firmly biased against opposite sides of the upper end of the pump rod and are pivoted on a bolt passing through them and the rod, said ends being curved to fit around said rod when the handle is in operating position, causing them to spread when the handle is folded down and causing the handle to drop into operating position when pulled up.

2. A purifier unit as defined in claim 1, wherein said outlet device is in the form of a swivelled spigot tube having a side opening therein, a closure cap slidable over the outlet side opening of said tube and having an internal screw-thread at its open end of smaller outside diameter than the internal diameter of the rest of the cap, and a complementary thread section on said spigot tube on each side of its outlet opening for cooperation with said cap to hold it in closed or open position respectively.

3. A purifier unit comprising a closed tubular casing having base, central and top sections, a pump fixed to said base section and extending axially through said casing, a transverse partition having angularly spaced apertures separat-

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ing said middle and top casing sections, filter tubes circumferentially suspended by said partition in line with said apertures, and inlet and outlet devices for said casing, tube suspension means comprising an open spring washer over the partition opening, a bolt passed through said opening and tube, and a grooved end pressure disc fitting over the base end of the tube in sealing relation therewith and threaded to the end of said bolt for holding the upper edge of said tube in sealing relation against the lower surface of said partition around said opening.

4. A purifier unit as defined in claim 3, wherein said spring washer has flanges stamped out of it and bent to form a guide with respect to the opening for centering the bolt therein to prevent cocking of the tube during installation.

5. A purifier unit as defined in claim 4, wherein said bolt has a square head and said spring washer has slight ridges adjacent and parallel to opposite sides of the bolt head serving as locking means to prevent accidental loosening of said bolts when installed.

6. A purifier unit comprising a casing having a base section, a pump having a shaft centrally fixed to said base section, a water inlet in said base section communicating with said pump, a bottom sleeve section, an annular lower trough-shaped mid-section closely fitting around said pump, the bottom of said trough forming a transverse partition in said casing, a matching inverted trough-shaped upper cap section overlying said lower trough-shaped section, filter tubes suspended from said partition, a filter bag suspended in the annular chamber formed between said opposed trough-shaped sections having inner and outer annular flanges fitting between the inner and outer edges of said trough-shaped sections and acting as sealing gaskets therebetween, a flanged sleeve nut screwed to said mid-section over an outer external shoulder on said cap section, a second flanged sleeve nut screwed on the top of said pump over packing means to form a seal between said mid-section and said pump, resilient means biased against an external inner shoulder on said cap section and retained by a stop

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on said second sleeve nut for providing a more positive sealing pressure between the inner edges of said trough-shaped sections and for drawing the base and the mid-section against the ends of the sleeve section which has a pressed seal peripheral fit therewith, and a purified water outlet secured to said cap section and in communication with said chamber.

7. A purifier unit comprising a closed tubular casing having base, central and top sections, a hand piston pump centrally fixed to said base section and including a piston rod protruding through the top casing section, a filter unit circumferentially positioned around said pump, an inlet device in the base casing section, an outlet device on the end of the top section, and a pump handle attached to the protruding pump piston rod, said outlet device being in the form of a swivelled spigot tube having a side opening therein, a closure cap slidable over said side opening and having an internal screw-thread at its open end of smaller outside diameter than the internal diameter of the rest of the cap, a complementary thread section on said spigot tube on each side of its outlet opening for cooperation with said cap to hold it in closed or open position respectively, an internal shoulder at the inner end of the spigot cap thread, and a lug secured to the end of said spigot tube for engagement with said shoulder thereby to stop outward movement of the cap.

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