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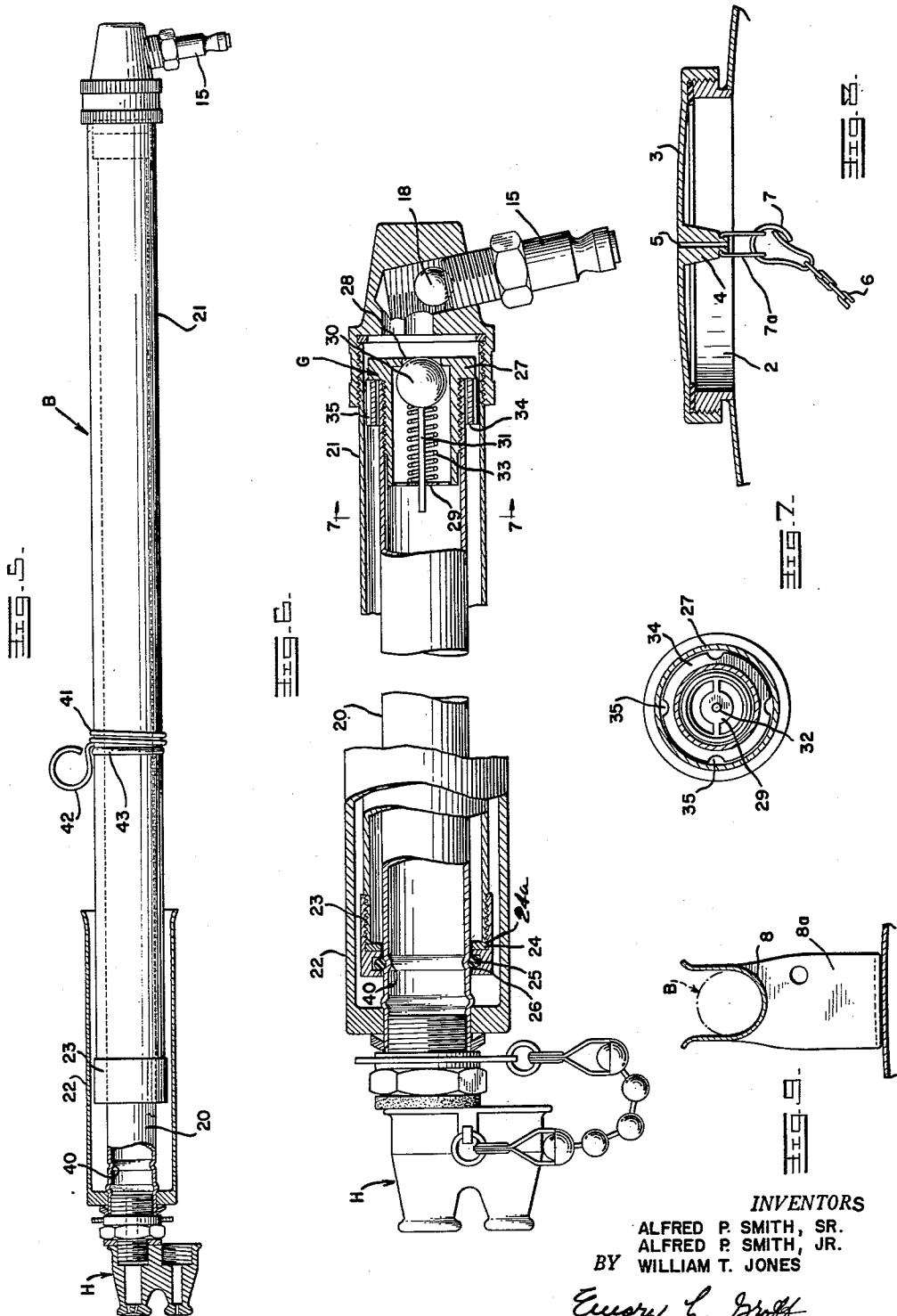
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AMBULANT LIQUID SPRAYING PUMP AND SUPPLY TANK

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This invention relates to a liquid spraying pump and supply tank device of the type known as a back pack pump.

The primary use of back pack pumps is in fighting forest fires or brush fires; however, they may also be used for spraying liquids for other purposes.

A general object of the invention is to provide in a single unit, a back-transportable tank and hand pump which will

(a) Receive liquid feed uniformly and without obstruction into each of two compartments of the tank;

(b) hold or store the liquid with stability by maintaining substantially equal portions in each of the compartments during swaying movements of the tank away from the vertical during walking of the operator; and

(c) Finally discharge liquid past a screen and over a deposition space adjacent the screen, to thus supply to the hand pump for discharge thereby a supply of liquid which is free of large air bubbles and entrained solid material.

With these and other objects in view, which will more readily appear as the nature of the invention is better understood, the invention consists in the novel construction, combination, and arrangement of parts, hereinafter more fully described, illustrated and claimed.

A preferred and practical embodiment of the invention is shown in the accompanying drawings, in which:

FIGURE 1 is a rear elevational view of the tank, pump and carrying straps, with the ventilating shield and rear wall of the tank partly broken away.

FIGURE 2 is a perspective view showing the tank carrying rack with attached straps.

FIGURE 3 is a fragmentary view of a portion of the inside of the tank showing a strainer covering the tank outlet.

FIGURE 4 is a partial fragmentary view showing the quick disconnect coupling connecting the hose to the inlet end of the pump.

FIGURE 5 is an elevational view of the pump unit partly in section.

FIGURE 6 is an elevational view partly in section showing the novel means of locking the inner and outer cylinders of the pump together to prevent accidental displacement and also showing the valve means at the inlet end of the pump.

FIGURE 7 is a sectional view taken on the line 7-7 of FIGURE 6.

FIGURE 8 is a detail cross sectional view of the filler cap illustrating the venting means.

FIGURE 9 is a detail cross sectional view through the combined handle and pump cradle.

Similar reference characters designate corresponding parts throughout the several figures of the drawing.

The invention includes generally a tank A; a hand pump B; a hose C connecting the tank to the pump; adjustable straps D, D' secured to the tank and adapted to fit over the shoulders of the operator; and a carrying rack E provided with straps F, F'.

The tank A has a form fitting perforated shield or backplate 1 secured to and spaced from the outer surface of continuous side wall W for the purpose of preventing the cold wall of the tank from contacting the back of the

operator, and also to provide for circulation of air. The top of the tank is provided with an externally threaded filler opening 2 and an internally threaded filler cap or cover 3. The cover 3 is provided with air venting means for the purpose of letting air into the tank when water is being pumped out, to prevent the tank from collapsing. The venting means comprises a tubular member 4 depending from the inner surface of the cover top wall and communicating with an aperture 5 therein. The advantage in providing the member 4 is to minimize leakage of water through aperture 5 when the water is splashing around within the tank due to the activity of the operator. The cover 3 is detachably secured to the tank proper by means of a chain 6, one end of which is secured inside of the filler opening 2, the other end of which is provided with a snap hook 7 adapted to engage a ring member 7a swivelly secured to the tubular member 4.

An arched handle 8 having offset leg portions 8a is mounted on the top of the tank to the rear of the filler opening and serves the dual function of a handle and a cradle for holding the pump B when the latter is not in use. In other words, the handle 8 is transversely arcuate to receive the pump cylinder, as will presently appear.

Inside of the tank A and substantially in the middle thereof, a vertical baffle plate 9 is welded, riveted, or otherwise secured to the side walls to prevent the contents of the tank from surging from side to side, thus throwing the tank out of balance when the operator is moving about. The plate 9 does not extend clear to the top of the tank, but terminates several inches therebeneath, and the lower, outer edges 10 of the plate are cut away on an angle to provide communicating passages for the liquid so it can pass restrainedly from one section of the tank to the other.

The discharge outlet 11 of the tank is located in one side wall contiguous to the bottom wall and has a steeply inclined planar strainer or screen 12 secured to the side wall of the tank, covering the outlet to prevent any debris from entering the hose C and clogging the pump. It has heretofore been a common practice to install a strainer at the filler opening of the tank. By placing the strainer in such a location it has a tendency to cause water to splash when the tank is being filled by a bucket, resulting in a waste of water. When fighting fires in an area where water is in short supply, such water waste is undesirable. The screen 12 is sufficiently steep, desirably around 60° from the horizontal, to shed foreign materials which could be undesirably fed into the tank with the liquid through the top unscreened opening 2. In addition, the strainer supplements the stabilizing effect of the baffle plate 9 at the location of the discharge outlet 11 so as to provide an outlet chamber which insures the presence of liquid to avoid pumping air instead, as the container moves under motion of the body of the wearer in walking.

Thus, the location of the strainer according to this invention is highly advantageous. It is observed from FIGURES 1 and 3 that the bottom of outlet opening 11 is slightly spaced above the inside bottom of the tank, and the bottom of the holes in the screen 12 are also spaced an equal amount from the inside bottom of the tank, thus forming a space between screen and outlet for the deposition and collection of non-fluid heavy foreign materials. The discharge structure thus provides means to stop both liquid-floating and deposited-from-liquid materials from entering the pump and causing the latter to clog and malfunction.

The hose C has connected at one end thereof a female coupling member 13, and at its other end a male coupling member 14. The female coupling member 13 is adapted to receive a related male member 15 secured to the inlet

end of pump B whereas the male coupling member 14 is connected to related female member 16 secured to an elbow fitting 17 communicating with discharge outlet 11 of the tank. The details of the coupling members form no part of this invention, and the parts thereof essential to an understanding of their function are shown in FIGURES 4, 5 and 6. The advantage of using such fittings in connection with the tank and pump of this invention is their ease of connection and disconnection and the positive cutoff feature of the female fitting when the male member 14 is removed. This prevents water from flowing out of the filled tank A through outlet 11 and elbow 17, and also prevents siphoning which would normally occur since the outlet is below the water level.

The pump B comprises generally an inner cylinder 20 slidably arranged within an outer cylinder 21, and a telescoping type handle 22 secured at the discharge or inner end of the inner cylinder.

The outer cylinder 21 has threaded thereon at its inlet or inner end the male member 15 of the well known quick disconnect fitting type. At the outer end of cylinder 21 a packing gland nut 23 is threadedly engaged thereon and includes a gasket 24 seated in an annular groove 24a and an O ring member 25 seated within an annular groove 26. The member 25 may be made of rubber, plastic or other resilient material. The O ring is of lesser inside diameter than the outer diameter of cylinder 20 and provides an absolute tight seal between the inner and outer cylinders even with 400 or 500 pounds of pressure, and replaces the graphite packing commonly used.

The inlet or inner end of the inner cylinder 20 is internally threaded and is provided with a check valve assembly G comprising an externally threaded casing 27, an orifice 28 in the outer end thereof and a stop or guide member 29 secured across its inner end. Within the casing 27 there is contained a ball 30 having one end of a stem 31 secured thereto. The opposite end of the stem 31 passes through an opening 32 in the guide member 29. A spring 33 surrounding stem 31 bears against ball 30 at one end and against guide 29 at the other end, thus exerting sufficient pressure on ball 30 to normally maintain it in seated position in orifice 28.

Pressure of incoming fluid against ball 30 caused by reciprocation of the pump will overcome the tension of spring 33, unseat ball 30 and permit fluid to pass through inner cylinder 20. Ball 30 will automatically be re-seated over orifice 28 by spring 33 when reciprocation of the pump is stopped. Secured to the outside of the valve assembly casing 27 is a nut 34, which has a plurality of axially arranged channels 35 formed in its outer surface. The nut is in substantially close fit with the inner wall of outer cylinder 21 and replaces the leather or felt packing frequently used. The latter are undesirable from the standpoint that they have a tendency to dry out over a period of time and thus cause faulty operation or possible failure of the pump. Use of the nut 34 assures that the pump of this invention is always ready for dependable action, even though it has been in storage for a long period of time.

With the foregoing arrangement of parts, movement of the inner cylinder 20 by handle 22 outwardly or to the left in FIGURES 5 and 6 creates a suction which causes first air and then liquid to enter through the fitting 15 and channels 35 into the space between outer cylinder 21 and inner cylinder 20. The return stroke of the cylinder causes compression of the air and fluid resulting in the seating of ball 18 and the opening of check valve G to permit liquid to flow through cylinder 20 and out through nozzle H. Continuous reciprocation of cylinder 20 provides a strong steady stream of fluid which may be easily directed onto a fire or any object desired to be sprayed.

In order to provide an effective locking means for retaining the inner and outer cylinders in closed position relative to each other, the inner cylinder 20 is provided

with an annular groove 40 near its outer discharge end. When the cylinders are moved into their innermost position shown in FIGURE 6, the O ring 25 which is normally slightly compressed, expands to return to its normal shape and fits snugly into the groove 40. The fit thus obtained between the inner and outer cylinders is tight enough to prevent them from separating from each other by jarring or by gravity, such as would normally occur in slide type pumps when the nozzle end of the pump is pointed downwardly and is not held in some manner. All that is necessary to release the cylinders from their locked relationship is a slight outward movement on the handle 22. Locking of the two members is thus efficiently effected without the necessity of any external accessories or fixtures, which are undesirable from the standpoint of cost and inconvenience.

Heretofore, when the back pack is being worn and the pump is not in use, the latter has been carried by means of clamps secured to the tank, which, of course, is mounted on the operator's back. In many cases it is highly desirable that the operator have the pump carried across his chest where it is immediately available for use and will leave his hands free for other purposes, such as grasping small shrubs and bushes while climbing up steep slopes or while climbing up a ladder.

In order to provide such an arrangement a coiled spring 41, one end of which is bent outwardly and formed into a loop 42, is slipped over the outer cylinder 21, and locked in a set position to the bead 43. The carrying straps D, D' have conventional snap hooks 44 at each end which hook onto the legs of the tank handle 8 and rings 45, respectively, mounted on the sides of the tank. The strap D is provided with an extra hook 46 which hooks onto loop 42 on cylinder 21 to support it in position across the operator's chest when it becomes necessary to carry it in this manner.

Referring to FIGURE 2 of the drawings, the carrying rack E comprises a base plate 50 provided with an up-turned peripheral flange 51, and having openings 52, 52, adapted to receive bolts for the purpose of attaching the plate to the floor or running board of a vehicle. A plurality of racks may thus be conveniently arranged in side by side relationship. The flange 51 is provided with openings (not shown) at opposite points in the front and rear thereof to afford attaching means for the straps F, F'. With the rack secured to the vehicle, the tank with the pump resting in handle 8 is placed therein and the strap F is brought over the pump and connected with a strap F' thereby securing the tank in place in the vehicle and obviating sliding and jostling of the tanks when being carried in a vehicle over rough terrain.

We claim:

In a liquid spraying apparatus transportable on the back of the user, in combination,

a fluid holding casing adapted to quickly receive, hold, and discharge liquid at atmospheric pressure, the casing being of transversely elongated shape, said casing including integral top, side, and bottom walls, said top wall having an unobstructed centrally located filler cap opening open to the atmosphere to receive liquid and said side wall having a discharge outlet in the side wall and continuous to said bottom wall,

a pump connected with said discharge outlet, the improvement comprising means within said casing for stabilizing its fluid contents while the user is walking and operating the pump to balance the load on the back of the user and also to insure constant liquid flow to the discharge outlet,

said means including,

an internal vertical baffle disposed perpendicularly across the short dimension of said casing substantially at the axis of the filler opening and terminating at the top a short distance beneath the top wall, and having a bottom edge contacting the bottom

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wall and with bottom edge cut away at an angle adjacent each vertical wall to thus provide liquid passages both at the top and at the bottom, said baffle defining with the side walls equal sized fluid stabilizing compartments in communication with said discharge outlet,

and a combined single plane strainer and baffle member disposed at a steep angle from the bottom wall and over said discharge outlet toward the related vertical wall of the casing, the bottom edges of the internal baffle and the strainer being parallel to provide a fluid outlet chamber, the bottom of the strainer openings and the bottom of the discharge outlet being in a common plane parallel to the bottom wall to provide between said plane and the bottom wall, a space for the deposition of non-fluid heavy foreign materials,

said vertical baffle and combined strainer and baffle member cooperating to maintain equalization of fluid pressure at either side of the baffle and in said chamber during the pumping operation of fluid from said outlet,

whereby, when the container is in use, a fluid head is constantly maintained at the discharge outlet until

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the pump has exhausted the strained fluid contents in the outlet chamber of the casing.

References Cited in the file of this patent

UNITED STATES PATENTS

451,862	Moncrieff	May 5, 1891
755,967	Thiele	Mar. 29, 1904
816,858	Ham	Apr. 3, 1906
1,364,347	Bobrick et al.	Jan. 4, 1921
1,798,708	Smith	Mar. 31, 1931
1,924,741	Hoopes et al.	Aug. 29, 1933
1,993,684	Rogers	Mar. 5, 1935
2,017,319	McMullen	Oct. 15, 1935
2,091,731	Gredell	Aug. 31, 1937
2,225,380	Sperry	Dec. 17, 1940
2,350,184	Oys	May 30, 1944
2,575,936	Andrews	Nov. 20, 1951
2,649,335	Funke	Aug. 18, 1953
2,684,787	Charpiat	July 27, 1954
2,732,977	Charpiat	Jan. 31, 1956
2,752,200	Santarelli	June 26, 1956

FOREIGN PATENTS

12,158	Great Britain	June 14, 1901
636,926	France	Apr. 19, 1928