Nov. 15, 1955 F. W. FUNKE 2,723,781

BACK PACK PUMP OUTFIT

Filed Feb. 14, 1950 2 Sheets-Sheet 1

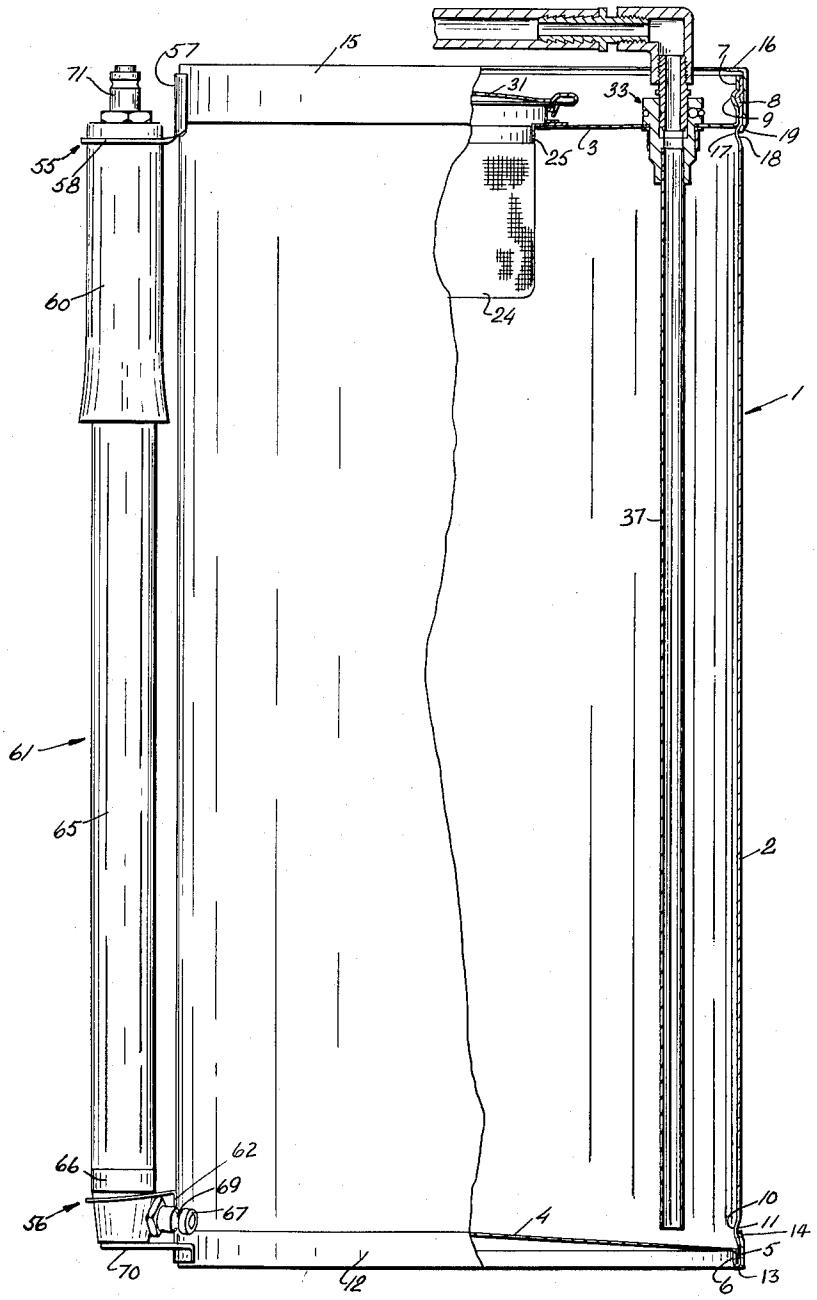


Fig. 1

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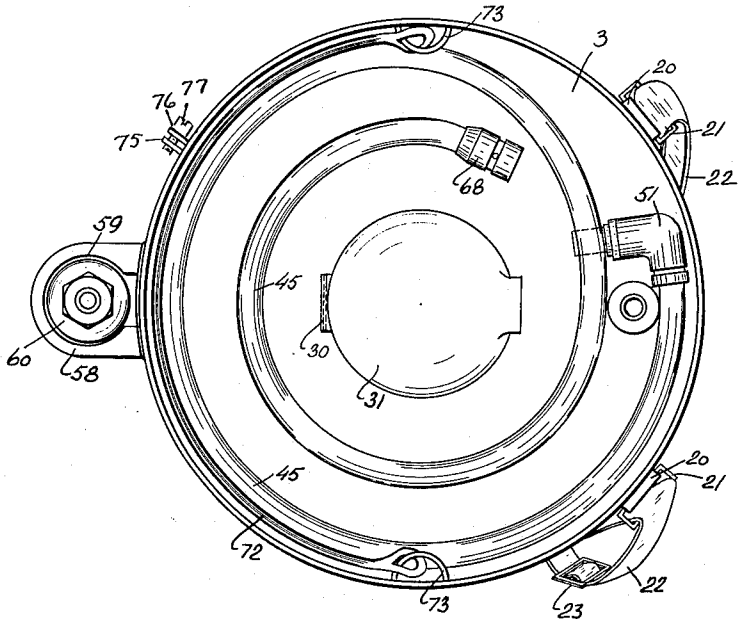


Fig. 2

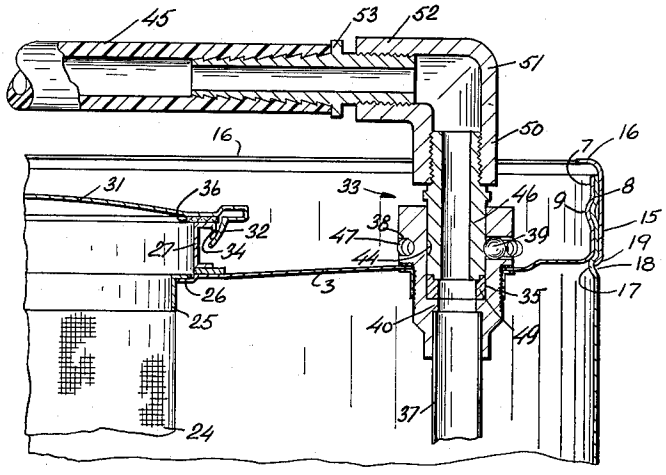


Fig. 4

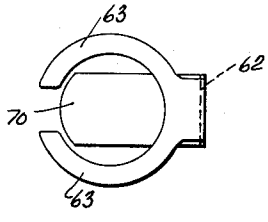


Fig. 3

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BACK PACK PUMP OUTFIT

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6 Claims. (Cl. 222—175)

This invention relates to a back pack pump and has for one of its objects the provision of improved structure in back pack pumps that provides for greater protection and more compactness for the elements thereof during transit, handling, storage and use.

Back pack pump outfits ordinarily consist of a tank for the liquid to be sprayed or discharged, which tanks have a discharge hose connected at one of its ends with the lower end of the tank, and a hand pump connected with the opposite end. The hand pump has heretofore comprised an elongated outer cylinder with a plunger reciprocable therein from one end, the discharge hose being connected with the opposite end. The plunger has been provided with a handle coaxial with the plunger and projecting from the end of the outer cylinder that is opposite the suction hose. The outer end of the cylinder is provided with a packing gland and the outermost end of the handle carries the discharge nozzle. When the plunger and outer cylinder are reciprocated relatively, liquid is drawn into the outer cylinder and is displaced by movement of the plunger into said cylinder, the displaced liquid passing through a check valve in the plunger, through the latter and out of the discharge nozzle.

When the pump is not in use, it is laid horizontally across the top of the tank with the handle projecting laterally to one side of the tank and the hose at the other side of the tank. No provision is made for quick detachment of the pump from the hose nor of the hose from the tank. With the outlet from the tank positioned at the lower end of the latter, it is obvious that the hose could not be removed without making some provision for sealing the outlet, which has not been done and which would be relatively complicated, expensive and objectionably obtrusive if a satisfactory degree of dependability were insured.

The projecting ends of the present pump, and its position across the top of the tank have always been highly objectionable. The pump is easily damaged and knocked loose, the pump catches on brush and branches, and the tank outfits cannot be stacked. Operators are frequently injured by being thrown off balance in mountainous regions by reason of the pump catching on branches, etc.

With the present invention, the above objections are overcome. The pump and hose may be quickly disconnected from each other, and the hose may quickly be disconnected from the tank. After such disconnection, provision is made for quickly and releasably securing the pump vertically alongside the tank and wholly within the laterally projected confines of said tank and where it cannot catch on brush or branches while the hose may be coiled within a space provided at the top of the tank wholly below the upper edges of the sides of the tank, so that the tanks may be stacked one on top of the other and close together in side by side relation without injury to the pump, hose or tank. The parts may be assembled for use in a few seconds time, there being no loose clips, latches, or other objectionable elements nor any projections where they can catch on foreign objects when the tank is used or carried.

Another object of the invention is the provision of improved connections between the tank and pump that permits swinging the pump and its nozzle in any desired direction without causing objectionable tension on the hose, and the pump is of the positive piston type that enables it to efficiently draw liquid from the tank through a pick up tube that extends through the top of the tank, whereby no special valves or the like are required to prevent loss of liquid when the hose is disconnected from the pick-up tube. The swingability of the hose also permits the pump to be efficiently used by either a right or a left handed person.

A still further object of the invention is the provision of cooperating means on the tank and pump for releasably securing the pump vertically alongside the tank and in a position directly behind the operator when the tank and pump are being carried, with the tank between the pump and operator.

Other objects and advantages will appear in the description and drawings.

In detail, Fig. 1 is a part elevational and part sectional view of the tank and pump, the latter being wholly shown in elevation.

Fig. 2 is a top plan view of the tank and pump with the hose indicated in stored position in the top of the tank.

Fig. 3 is a fragmentary enlarged top plan view of the means at the lower end of the pump for securing it to the tank.

Fig. 4 is an enlarged fragmentary sectional view of the hose coupling and closure in the top wall of the tank.

In detail, the tank, generally designated **1**, is vertically elongated and has cylindrical side walls **2**, a top wall **3**, and a bottom wall **4** (Fig. 1). The bottom wall **4** is preferably upwardly spaced from the lower edges of the side walls and is formed with a downwardly extending flange **5**. The side walls are then crimped or spun over this flange **5** as at **6** thus enclosing the flange between the crimped over portion **6** and the lower end of the side wall.

The top wall **3** is spaced below the upper edges of the side walls and is formed with an upwardly directed flange **7** that extends to the upper edges of said side walls. The flange **7** and the upper end portion **8** of the side walls may be locked together by spinning, rolling or crimping providing an inwardly projecting rib **9** therearound as indicated in Figs. 1 and 4.

Bottom wall **4** is preferably slightly bowed upwardly from its edges toward the center, and adjacent said edges, the side walls are bent or spun to form an inwardly projecting rib **10** that provides an outwardly opening channel **11** at a point just above the edges of said bottom wall.

A band **12** is removably secured over the lower marginal portions of the side walls and is formed with a radially inwardly projecting flange **13** that extends across the lower edges of said side walls for supporting the tank on flange **13** rather than on the edges of said side walls. A slightly inwardly inclined flange **14** extends into channel **11** when the band is clamped against said marginal portions thereby making the band rigid with the tank. This band takes the wear of sliding the tanks and carries a pump clip and support as well as shoulder strap clips as will later be explained.

A band **15** at the top of the tank (Figs. 1, 4) is substantially identical with band **12** and it also carries shoulder strap clips and a pump clip. Flange **16** is the same as flange **13** and extends over the upper edges of the side walls.

The side walls **2** are formed with an inwardly projecting rib **17** at a point just below the level of the top wall **3**, thus

providing an outwardly opening channel 18 into which a lower flange 19 of band 15 extends (Fig. 4).

Bands 12, 15 are of heavy gauge metal, thus preventing leaks due to excessive wear at the top and bottom edges of the tank, and, as above mentioned, the bottom flange takes all of the chafing wear when the tank is handled or due to shifting when carried on trucks. The upper band takes wear when tanks are stacked, as does the lower band.

Top and bottom bands 12, 15 are provided with loops 20 (Fig. 2) for conventional rings 21 to which the ends of shoulder straps 22 are secured. Only the top loops and rings are shown in Fig. 2 the bottom ones being hidden by the top ones, but they are of identically the same structure. The shoulder straps are of the conventional type, being provided with buckles 23 or any other suitable means for releasing them from the tank and for adjusting them for length if and when they may not be needed, or for replacement.

The top wall or head 3 is formed with a circular central opening, and a basket type strainer 24 is supported in said opening by a flange 25 around the upper edge of said basket that rests on the marginal portion 26 of the top wall 3 around said central opening. The basket projects downwardly into the tank and is easily and quickly removable for cleaning and emptying.

An annular flange 27 adjacent said marginal portion 26 and outwardly thereof is secured to said top wall 3 and projects upwardly therefrom a distance less than the distance between said top wall 3 and the level of the upper edge of the tank.

Hingedly or otherwise secured at 30 (Fig. 2) to said flange 27 at one side thereof is a closure 31 that functions to close the central opening in the top wall 3. This closure may be provided with a depending spring lip 32 (Fig. 4) at its edge opposite the hinge 30. This spring lip 32 is adapted to yieldably engage over a radially outwardly projecting flange 34 on flange 27 and a gasket 36 is adapted to be positioned between the closure and said flange 34.

If desired closure 31 may be bodily removable from the tank by merely providing a plurality of spaced spring lips 32 around the same and omitting the hinged connection, but in any event the closure is below the plane of the upper edges of the tank.

The central opening in the top wall 3, and the upstanding flange 27 that carries the closure are spaced a substantial distance from the edges of said top wall, whereby an upwardly opening annular channel will virtually be formed at the upper end of the tank. This channel, as will later be explained more in detail, is adapted to hold a coiled discharge hose.

At a point spaced between the closure 31 and the edges of the top wall 3 the latter is formed with an opening in which a hose coupling 33 is secured, and which coupling has a vertical through bore 35 in the lower end of which is secured the upper end of a vertically extending pick up tube 37. The pick up tube 37 extends to a point only slightly spaced above the bottom of the tank and adjacent one side of the latter.

Coupling 33 terminates at its upper end below the level of the upper edge of the tank, and said coupling is formed with an annular outwardly opening groove 38 in its outer side above the level of top wall 3. The bottom of this groove is recessed and apertured at spaced points for holding a ball 39 in each recess with one side of each ball projecting into bore 35 above an inwardly projecting annular shoulder 40 in said bore between the said balls 39 and the upper end of the pick up tube.

A discharge hose 45 is provided, and this hose is provided with a nipple 46 at one end that is adapted to slidably fit in the upper end of bore 35 in the coupling 33. This nipple 46 has an outer annular groove 44 that is adapted to receive the inwardly projecting sides of balls 39, and balls 39 are yieldably urged inwardly by an external contracting spring 47 that holds them in their respective recesses and apertures. Spring 47 may be a coil or strip of spring material. By pulling the nipple axially outwardly with a predetermined force, it will pull out of the coupling 33, and it is readily reinserted into the latter by a reverse force. When the nipple is held in the coupling, it is readily revolvable in the latter, and a packing or seal 49 may be positioned on shoulder 40 between the nipple and said shoulder.

Nipple 46 is threaded into one arm 50 of an elbow 51 and the other arm 52 of said elbow is threadedly secured to a nipple 53 that is in turn secured to one end of the hose.

By the above structure, the hose may be freely swung about the axis of the coupling 33 so the pump, which is on the end of hose 45 opposite the coupling may be used with equal facility by a right or a left handed operator or may be swung to any laterally directed position relative to the tank without bending the hose or placing a strain on the same.

The loops 20 for rings 21 that are connected with the shoulder straps are preferably substantially at the side of the tank nearest the pick up tube 37, and are equally spaced from said tube so that the elbow 51 that connects with nipple 46 is directly and centrally behind the back of an operator carrying said tank. This position of the elbow enables the hose to be swung to either side of the body of the operator with equal facility for use by either a right handed person or a left handed person, as above noted. Also, with the elbow positioned practically on the same line as the loops 20 and equidistant between them, the tank is balanced and does not objectionably tilt to one side or the other as the pump is used or when the tank is being carried, as it would were the elbow at one side or the other relative to the pair of loops or at the rear side of the tank.

In using the words "rear," "rearwardly," "forward" or "forwardly," relative to the tank, these are used relative to the side the loops 20 are on, said loops being generally on the forward side of the tank, or the side that faces forwardly when the tank is carried on the back of a person.

Centrally on the rear side of the tank, are a pair of vertically aligned pump holders, there being an upper holder 55 and a lower holder 56. These are respectively rigidly secured to the upper band 15 and to the lower band 12. Upper holder 55 comprises a vertical leg 57 that may be welded to upper band 15 centrally of the rear side of said band 15. This leg is provided with a horizontal rearward extension 58 that is formed with a central aperture 59 (Fig. 2) into which the upper end of the tubular handle 60 of the vertically disposed pump 61 extends. The extension 58 is slightly below the level of the lower edge of the upper band 15 so that the upper end of the pump, when held by holders 55, 56, will not project above the level of the upper edge of the tank.

The lower holder 56 also has a vertical leg 62 that is secured to the lower band 12, and the upper end of said leg is formed with a rearwardly directed fork providing rearwardly directed arms 63 horizontally spaced.

The lower end of the outer cylinder 65 of said pump has an inlet fitting 66 secured thereto, which fitting has a laterally projecting nipple 67 thereon for securement into a coupling 68 on the end of hose 45 that is opposite the elbow 51.

This coupling is substantially the same as the coupling 33, except that the end of hose 45 is secured to the same instead of the pick up tube 37. Nipple 67 is the same structure as nipple 46, and is formed with an annular outwardly opening groove 69 or recess for the balls that are carried by the coupling.

Spaced below the lower holder 56 is a flat horizontal plate 70 that functions to support the lower end of the pump, or to engage the lower end of the fitting 66, the latter being on the lower end of the pump when the latter is secured on the tank.

As seen in Fig. 1, the arms **63** of the forked lower holder are bowed downwardly intermediate their ends, and they are preferably resilient.

In securing the pump to the tank, the upper end of the pump and handle **60** are inserted upwardly into the opening **59** in the upper holder and then the lower end is swung toward the tank with the nipple **67** facing rearwardly and with the lower end of the pump on plate **70**. The outer cylinder carrying the nipple **67** is then rotated in either direction and the nipple will raise one of the arms **63** as it is rotated past the downwardly bowed center of the arm. After the nipple has passed the bowed center the arm will move downwardly under tension holding the nipple substantially against the tank and holding the lower end of the pump to the tank so it cannot be removed except by forceably turning the pump back past the arm that holds it.

United States Letters Patent No. 2,649,335 of August 18, 1953, in which it will be seen that the handle **60** is carried by a cylinder or plunger that is reciprocable within the outer cylinder **65**, and which inner cylinder carries a positive piston at its end that is nearest the fitting **66**, whereby a positive suction is created upon reciprocation of the handle **60** and inner cylinder relative to the outer cylinder for drawing liquid in the tank through the pick up tube into the outer pump cylinder for ejection through nozzle **71** carried by the inner cylinder or plunger.

It is pertinent to note that the overall length of the pump is much less than in the case of conventional pumps for the reason that the handle **60** telescopically receives the upper end of the outer cylinder **65** instead of projecting beyond said cylinder. This makes it practical to employ the pump in a vertical position on a knapsack type tank and so that it will come within the laterally projected confines of the tank.

The hose **45**, when received from the tank and pump is coiled within the upper end of the tank above the top wall and when so coiled it is entirely within the space enclosed by the upwardly projecting sides of the tank.

Also, a U-shaped hand bail **72** is adapted to fit within the upper end of the tank. Loops or eyes **73** carried by the band **15** may project inwardly from said band into the space above the top wall **3** for receiving the looped ends of the bail **72**. When the bail is down it lies within the confines of the upper end and does not interfere with the hose or with the stacking of one tank on the other.

It is pertinent to note that the pump and hose may be removed from a tank and as in fire fighting, a number of tanks without the hose, may be supplied to a fighter who applies the hose to each as it is emptied and the empty tanks may be carried by their bails to a source of supply for refilling and re-delivery to the fire fighter.

The tanks, fully equipped, are adapted to be stacked one on top of the other, and to be tightly packed in side by side relationship. The pump will fit in the interstice between it and other tanks in the same tier or layer.

The removable securing of the bands **12, 15** to the tank may be done by providing transversely split bands having ears **75, 76** at their ends (Fig. 2) through which a tightening screw **77** extends. As pointed out, these bands are of heavy gauge metal, and ear **76** on each band may be threaded for the screw **77** with the screw freely passing through an aperture in ear **76**. Only the top band is shown in Fig. 2 but the clamping structure on band **12** is identical and is directly below that shown in Fig. 2.

The main reason for making the bands **12, 15** removable is to enable quick replacement of the tank should the latter be injured, without discharding the shoulder straps and clips and the pump clips, which has heretofore been necessary because such clips have been riveted or otherwise irremovably secured to the tank.

In this connection, it may be said that the mortality rate for tanks in back pack outfits is very high due to rusting out from corrosive waters, punctures from sharp tools and destruction from heavy articles falling on them. For this reason, the removable bands having the more

durable parts of the outfit (pump, hose, shoulder straps) secured thereto for removal therewith, is an important feature. Even the pickup tube, outlet fitting, strainer screen and cap may be quickly transferred to a stripped tank if desired. It is to be noticed that the coupling **33** is readily unscrewed from the top wall **3**.

Earlier it was noted that the overall length of the pump is much less than in the case of conventional pumps, but the discharge capacity, per stroke, of the present pump is equal to, if not greater, than the much longer conventional pumps.

I claim:

1. In a back pack pump outfit; a tank having vertically extending side walls, a pair of vertically aligned pump holders on said tank respectively adjacent the upper and lower ends thereof and projecting laterally from one side of said tank for engagement with opposite ends of an elongated, reciprocating, tubular hand pump, said holders being spaced from said upper and lower ends of said tank, and an elongated, reciprocating hand pump carried by said holders substantially wholly disposed within the laterally projected confines of said holder, said pump including an inlet fitting at one end thereof provided with a generally laterally projecting nipple for connection with a hose, one of the holders of said pair being adapted to engage the end of said pump having said inlet fitting including an element engageable with said nipple upon rotation of said element for releasably securing said fitting to said tank against accidental removal therefrom.

2. In a back pack pump outfit; a tank having vertically extending side walls, a pair of vertically aligned pump holders on said tank respectively adjacent the upper and lower ends thereof and projecting laterally from one side of said tank for engagement with opposite ends of an elongated, reciprocating tubular hand pump, said holders being spaced from said upper and lower ends of said tank, and an elongated, reciprocating hand pump carried by said holders wholly disposed within the laterally projected confines of said holders, one holder of said pair including an opening in which one end of said pump is adapted to fit and through which a portion of said pump is adapted to extend, and the other holder of said pair having a pair of arms spaced apart at one of their corresponding ends for insertion of the other end of said pump laterally between said arms when said one end of said pump is in the opening in the other holder of said pair.

3. In a back pack pump outfit; a tank having vertically extending side walls, a pair of vertically aligned pump holders on said tank respectively adjacent the upper and lower ends thereof and projecting laterally from one side of said tank for engagement with opposite ends of an elongated, reciprocating, tubular hand pump, said holders being spaced from said upper and lower ends of said tank, and an elongated, reciprocating hand pump carried by said holders wholly disposed within the laterally projected confines of said tank, said pump including an inlet fitting at one end thereof provided with a generally laterally projecting nipple for connection with a hose, and said holder including means for holding the outer end of said nipple substantially against the side of said tank.

4. In a back pack pump outfit, a tank having vertically extending side walls, a top wall, and a bottom wall, a vertical open ended pick-up tube extending through said top wall close to one of said side walls and to a point adjacent said bottom wall, means for securing the upper end of said pick-up tube to said top wall including a hose coupling projecting above said top wall, but spaced below the plane in which the upper edges of said side walls are disposed, said coupling including a tubular body formed with a central bore coaxial with the axis of said pick-up tube and substantially parallel with the vertical axis of said tank and having radially inwardly projecting spring urged balls at spaced points around its bore for engagement with a nipple to provide for revolvable move-

ment of the latter about the axis of said bore and relative to said body, a hose, an elbow fitting having one end thereof secured to one end of said hose, a nipple on the other end of said elbow rotatably extending into said bore and in engagement with said balls, said bore and said nipple being formed with an axially outwardly opening annular groove in which said balls are adapted to seat, said one end of said elbow being above said plane to permit swinging said hose to any side of said tank across said upper edges of the latter.

5. In a back pump outfit, a tank having cylindrical vertical side walls, a bottom wall and a top wall, an upper band and a lower band encircling said tank at the upper and lower ends thereof respectively, shoulder strap loops and pump holders secured to said bands for securing shoulder straps and a pump thereto, and means for removably clamping said bands to said tank for removal therefrom, together with said loops and holders and for re-clamping to another tank, said tank being formed with annular outwardly opening recesses in the upper and lower ends of the said side walls coaxial with the latter, and flanges on said bands respectively adapted to extend into said recesses when said bands are secured to said tank.

6. In a back pump outfit, a tank having cylindrical vertical side walls, a bottom wall and a top wall, an upper band and a lower band encircling said tank at the upper and lower ends thereof respectively, shoulder strap loops and pump holders secured to said bands for securing shoulder straps and a pump thereto, and means for

removably clamping said bands to said tank for removal therefrom, together with said loops and holders and for re-clamping to another tank, said tank being formed with annular outwardly opening recesses in the upper and lower ends of the said side walls coaxial with the latter, and flanges on said bands respectively adapted to extend into said recesses when said bands are secured to said tank, said bands also being formed with radially inwardly extending flanges adapted to extend over the upper and lower edges of said side walls.

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