March 19, 1940. H. H. CHAPIN 2,194,112

TANK CONSTRUCTION FOR SPRAYERS

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Fig. 1.

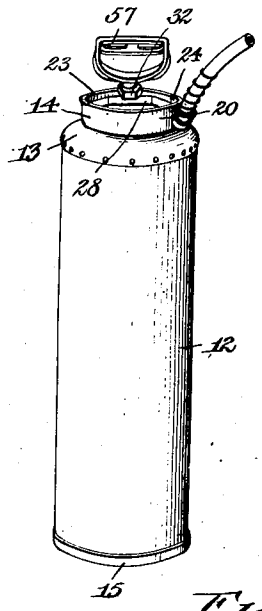


Fig. 2.

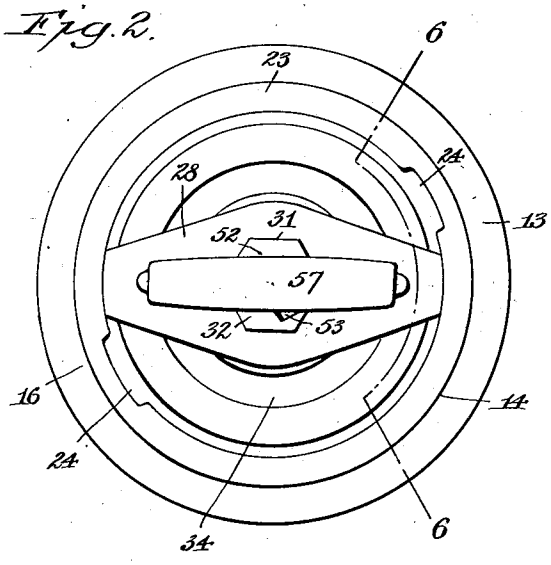


Fig. 4.

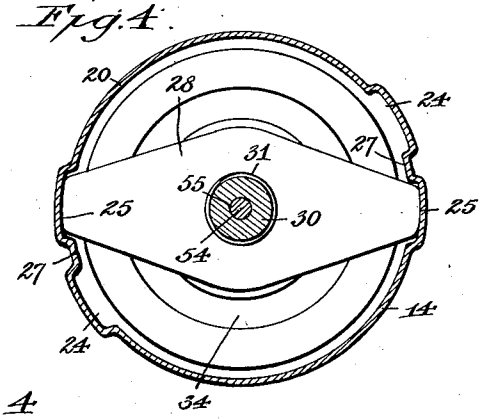


Fig. 3.

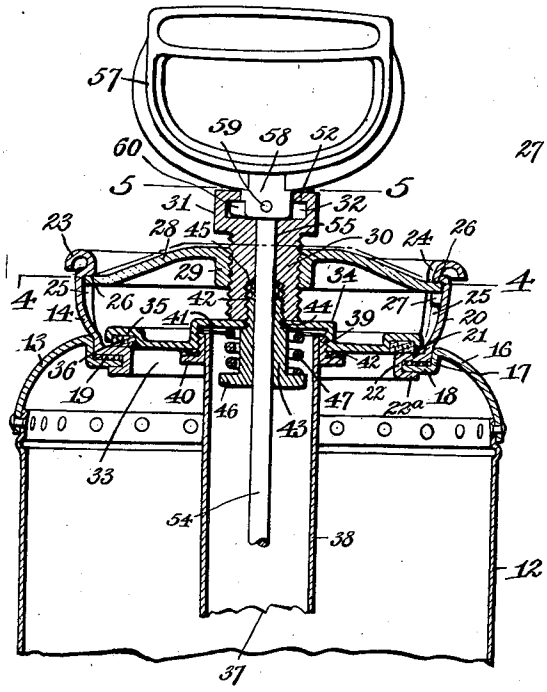
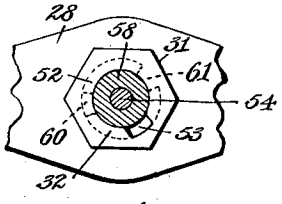


Fig. 5.



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Fig. 6.

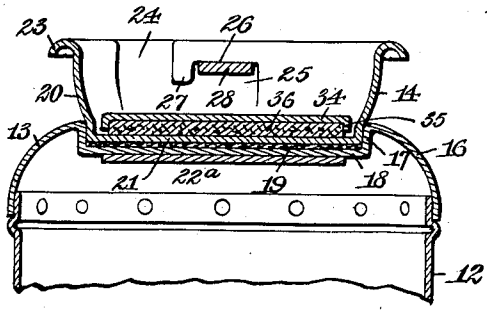


Fig. 7

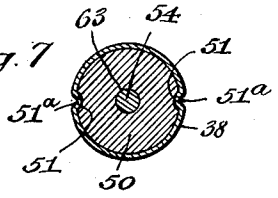


Fig. 9.

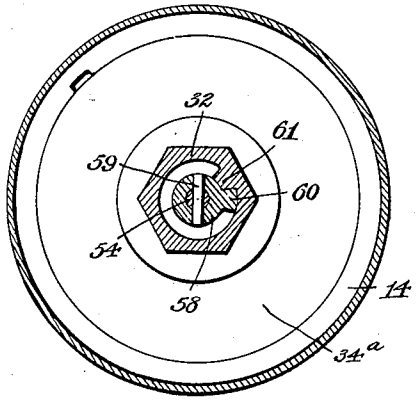


Fig. 8.

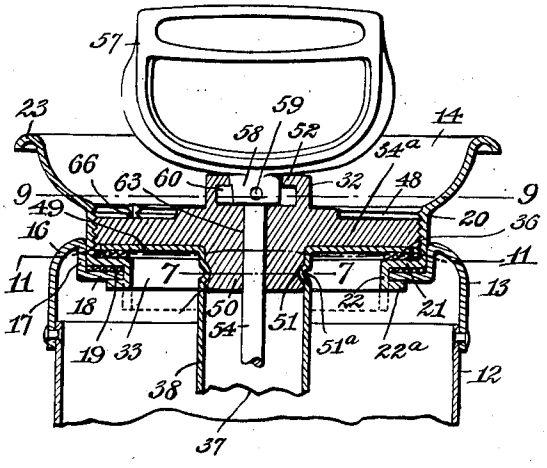


Fig. 11.

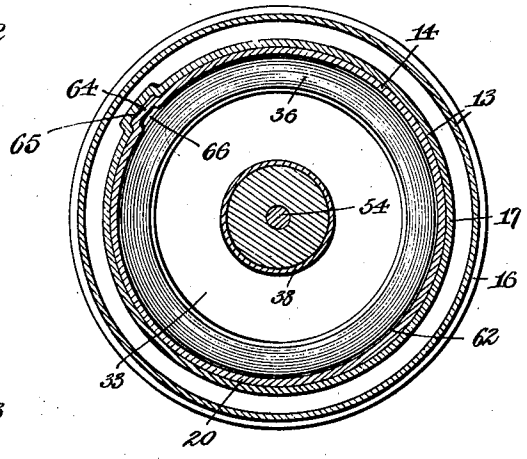
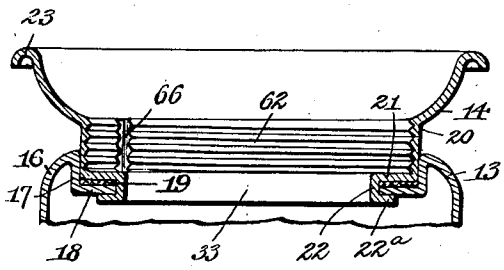


Fig. 10.



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UNITED STATES PATENT OFFICE

2,194,112

TANK CONSTRUCTION FOR SPRAYERS

Horace H. Chapin, Batavia, N. Y., assignor to R. E. Chapin Manufacturing Works, Inc., Batavia, N. Y., a corporation of New York

Application September 20, 1938, Serial No. 230,790

22 Claims. (Cl. 221—77)

This invention relates to compressed air sprayers in which means for building up the pressure forms part of the sprayer, but it more particularly relates to the construction of the pressure tank proper and parts associated therewith.

One of the objects of my invention is to provide a tank with an improved gasket seat whereby assurance is had that leakage of air from the tank cannot take place.

Another object of my invention is to provide a simple and effective means for attaching the pump cylinder to the closure of the tank.

A further object is to provide an improved closure whereby a secure sealing of the tank is assured, and to construct the tank structure so that pressure within the tank can be quickly relieved upon slight opening movement of the closure.

A still further object is to provide a closure for a sprayer tank in association with a funnel or turret, and in threadingly connecting said two elements together while preventing rotative movement of the funnel or turret when excessive pressure is applied to the closure in sealing the tank.

With the above and other objects to appear hereinafter, this invention consists in the novel features of construction and in the combination and arrangement of parts to be hereinafter described and more particularly pointed out in the subjoined claims.

Fig. 1 is a perspective view of a compressed air sprayer of the general type to which my invention is applied.

Fig. 2 is a top plan view of the same, the spray hose and its connection to the tank being omitted.

Fig. 3 is a vertical section through the upper end of the sprayer.

Fig. 4 is a cross section taken on line 4—4, Fig. 3.

Fig. 5 is a cross section taken on line 5—5, Fig. 3.

Fig. 6 is a section taken on line 6—6, Fig. 2.

Fig. 7 is a cross section taken on line 7—7, Fig. 8.

Fig. 8 is a vertical section through the upper portion of a compressed-air sprayer embodying certain features of my invention as disclosed in the preceding figures, showing a modification of the closure structure from that shown in the preceding figures and wherein additional features of my invention are disclosed.

Fig. 9 is a cross section taken on line 9—9, Fig. 8.

Fig. 10 is a section similar to Fig. 8 showing the closure and pressure pump removed from the tank.

Fig. 11 is a cross section taken on line 11—11, Fig. 8.

Having reference to the drawings in detail, the numeral 12 designates the body of the tank and it is preferably provided with a shoulder wall 13 to which is connected a funnel or turret 14. The manner of seaming or connecting the funnel or turret to the shoulder wall is an important feature of this invention and assures a perfectly flat gasket-seat without any possibility of cracks or metal fractures being formed during the act of seaming these parts together.

The body portion 12 of the tank is cylindrical and closed at its lower end by a bottom 15. The shoulder wall 13 is riveted or otherwise secured at its lower end to the upper end of said cylindrical portion, it being directed upwardly and inwardly, as at 16, thence downwardly, as at 17, and finally inwardly, as at 18, to form an inwardly directed flange serving as the boundary for a comparatively large axial opening in said shoulder wall. This formation provides what may be termed a central depressed portion in the shoulder wall having an inwardly directed flange; and while the conformation of this shoulder wall is shown somewhat different in form in Figs. 8 and 10 than illustrated in the preceding figures of the drawings, other variations in form may be provided so long as provision is made for securing the shoulder wall to the body portion 12 of the tank in the manner herein described. The inwardly directed flange 18 forming the bottom of the depressed portion of said shoulder wall, which depressed portion I prefer to employ because of the advantages it affords, serves as a seat for a comparatively thin gasket or packing ring 19 situated in the depresed portion of said shoulder wall.

The upper portion of the funnel or turret 14 is preferably flared upwardly, as shown in Figs. 3 and 8, slight variation in curvature being shown in these two figures, and if desired this funnel or turret may be cylindrical in formation or otherwise formed.

The body portion of this funnel or turret, designated 20, whether cylindrical, upwardly flaring, or otherwise formed, is provided at its lower end with an inwardly directed portion 21 and a cylindrical depending portion 22 which is designed to fit into the large central opening formed in the depressed portion of the shoulder wall 13. Regardless of the diameter or conformation of the major part of this body portion

20, its lower end is of a diameter to snugly fit within the depressed portion of said shoulder wall and thus afford the desired stability between the funnel and the shoulder wall, and the inwardly directed portion 21 of said funnel or turret is designed to be firmly pressed against the gasket or packing ring 19. After thus fitting these parts together, the lower end of the depending portion 22 is bent or flanged outwardly against the underside of the inwardly directed flange 18 forming the bottom of the depressed portion of said shoulder wall, as at 22a, proper pressure being applied to assure an air-tight connection at the seam thus formed to connect the funnel or turret to the shoulder wall, while fully concealing the gasket or packing ring 19.

The tendency of sheet-metal of the type used in sprayers of this type is to crack when a free flange is formed around another portion of sheet-metal, and should such tendency arise in the seam defined, there would be no possibility of air passing through such a crevice or fracture leaking beyond the gasket or packing 19. Moreover, the inwardly directed portion 21 of the funnel or turret serves as a closure or gasket seat, and by reason of this seat being formed a distance from the edge of the material, all possibility of fracturing the metal in this region is clearly avoided and a perfectly flat unbroken and even seat devoid of crimps provided. It will of course be understood that the funnel or turret, before being formed to shape, is blanked out of sheet-metal having an opening therein of somewhat smaller diameter than the opening formed in the shoulder wall of the tank, so that the seaming or connecting together of these two elements may be effected in the manner hereinbefore stated.

The confining wall of the funnel or turret, whether upwardly flaring, cylindrical, or otherwise formed, is preferably recurved at its upper end, as at 23, and in the construction shown in Figs. 1 to 7 this wall has at diametrically opposite points vertically trending recessed portions 24 opening to the upper recurved edge of said confining wall. Said recessed portions or depressions 24 are formed by pressing the metal outwardly at these regions with the depression gradually diminishing in depth downwardly; and spaced a short distance from each of these recessed portions or depressions are additional recessed portions or depressions 25 formed in a like manner but terminating at their upper ends short of the upper recurved edge of the confining wall so that a downwardly facing shoulder 26 is provided at the upper ends of said shorter recessed portions or depressions. The lower portions of the depressions 24 and 25 are connected together beneath stop members 27 positioned between said depressions and extending downwardly along the upper regions of both recessed portions or depressions, as best shown in Fig. 3. Said stop members 27 are established by retaining the normal conformation of the confining wall of the funnel or turret, whereas the recessed portions or depressions 24 and 25 at opposite sides of said stop members are formed by pressing the metal of the confining wall outwardly and extending the same downwardly while gradually reducing the depth of each of said recessed portions along its lower region to gradually merge into the normal contour of the confining wall along its lower end.

Said recessed portions or depressions form parts of bayonet joints at diametrically opposite points of the confining wall and are adapted to receive the ends of a saddle member or yoke bar 28, which ends form the other parts of said bayonet joints. Said saddle member or yoke bar is in the form of a cross bar having a hub 29 internally threaded to receive the externally threaded shank 30 of a power or clamping screw 31 having a hollow head 32, for a purpose to appear hereinafter.

It will be apparent from the foregoing that the tank is provided with a comparatively large opening 33 at its upper end surrounded by the seam connecting the funnel or turret 14 with the shoulder wall, which opening is closed by a cap or closure 34, against the upper face of which the power or clamping screw 31 bears. On the under side and around the marginal portion of this cap or closure an annular recess 35 is formed, into which is fitted a gasket or washer 36 which bears against the inwardly directed portion 21 of the seam connecting the funnel or turret 14 with the shoulder wall 13. This inwardly directed portion or gasket seat 21 is perfectly flat, and by reason of the absence of inherent fractures, due to the peculiar formation of the seam provided, assures a perfect seal for the tank without possibility of any leakage of air, regardless of the pressure within the tank.

Axially disposed within the tank is an air or pressure pump 37, and in the construction shown in Fig. 3 this pump has its cylinder 38 provided with a ring 39 at its upper end which is welded, riveted, soldered, or otherwise securely fastened to the cylinder and has an outstanding annular flange 40 at its lower end. The ring 39 is externally screw-threaded and threaded into a depression 41 formed centrally in the underside of the cap or closure 34 and therefore may be considered a boss or depending projection on the cap or closure 34. In any event it serves as a pump-head for the air or pressure pump. A washer 42 is seated on the annular flange 40 and is compressed between the latter and the under side of the cap or closure 34 directly around the depression 41 formed therein. The shank 30 of the power or clamping screw 31 has an axial bore 42 formed therein which is screw-threaded, and 43 designates a packing nut situated within the pump cylinder and having its upper end reduced and screw-threaded to enter the axial bore 42, thus forming an upwardly facing shoulder on said packing nut which bears against the under side of the cap or closure within the depression 41 formed therein. The reduced upper end of said packing nut is passed through an axial opening 44 in the cap cover; and between the upper end thereof and the inner end of the axial bore 42 in the shank of the power or clamping screw, packing 45 is placed. The packing nut has an outstanding flange 46 at its lower end and it is surrounded by a spiral spring 47 bearing at one end against the under side of the cap or closure 34, and at its other end against the outstanding flange of the packing nut.

From the foregoing it will be clear that the cap or closure and the pump are connected together and that the pump is securely packed against leakage by the washer 42 and the packing 45; also that the power screw 30 and the saddle member or yoke bar 28 are always maintained in connection with said cap or closure and pump, even though the saddle member or yoke bar may be moved relative to the clamping screw or the latter relative to the saddle or yoke bar. The spiral spring 47 guards against loosening of the pump from the cap or closure and also

tends to maintain the packing nut in tightened condition.

In Fig. 8 the cap or closure for the tank is designated by the numeral 34ª and it is externally threaded to threadingly engage internal screw threads 48 formed in the cylindrical lower portion of the funnel or turret, and the pump cylinder 38 is provided at its upper end with a comparatively large annular flange 49 which bears against the washer 36, which in this instance may be seated on the gasket seat 21. The cap or closure bears firmly against the large annular flange 49 of the pump, and when tightened in the funnel or turret 20 assures a firm seal for both the pump and the tank.

In Fig. 3 the hollow head 32 is shown as forming part of the power or clamping screw 31, while in Fig. 8 it is formed integral with the cap or closure 34ª, but in each instance the hollow head has an inwardly extending flange 52 at its upper end which is cut away at one point to form a passage or notch 53.

While in Fig. 3 the pump is shown threadingly connected with the cap or closure 34, in the construction shown in Fig. 8 the cap or closure has a depending axial boss or pump-head 50 which at diametrically opposite points is notched, as at 51, a short distance above the lower end of the boss. The pump cylinder is made of comparatively thin brass or other resilient sheet-material so that it can be conveniently slipped onto the axial boss 50; and in order to retain said cylinder on said boss the cylinder is provided at diametrically opposite points with internally projecting nubs 51ª adapted to enter the notches 51. When connecting the pump cylinder with the cap or closure 34ª by exerting pressure upwardly on said cylinder, the cylindrical wall of the latter will yield at least at the regions where the nubs 51ª are located. These nubs may therefore be considered as resiliently mounted, due to the fact that they project from a portion of the pump cylinder which will spring outwardly when the connection of the cylinder to the cap or closure is being made.

54 designates the plunger rod, to the lower end of which the usual plunger (not shown) is secured for reciprocal movement within the cylinder. In Fig. 3 this rod is shown as slidably and rotatably arranged within co-inciding bores 55, 56 formed in the power or clamping screw 31 and the packing nut 43, respectively, also through the packing 45 interposed between said two last-mentioned elements. In Fig. 8 this plunger rod is passed through an axial bore 63 in the cap or closure 34ª and its depending boss.

The plunger rod 54 is provided at its upper end with a handle 57 equipped with a depending boss 58 conveniently enterable into or withdrawable from the hollow head 32 of the power or clamping screw 31, or from the hollow head 32 formed on the cap or closure 34ª, shown in Fig. 8. This handle may be secured to the plunger rod by means of a pin 59 passed through the boss 58 and through said rod, or it may be threaded thereon or otherwise secured, as may be desired. Extending laterally from the boss is a stop lug 60 of a size to be passed through the passage or notch 53 and of a length which will permit of movement within the hollow head under the inwardly extending flange 52 thereof. On the outer wall of this hollow head an inwardly extending stop lug 61 is arranged, and depending upon the direction of rotation of the plunger rod 54, and consequently the handle 57, the stop lug on the handle will engage one or the other side of the stop lug 61 in the hollow head, thereby limiting the independent rotation of the plunger rod and handle and causing the power or clamping screw, shown in Fig. 3, to rotate with said plunger and handle upon further attempt to rotate such parts; thus the power or clamping screw may be rotated within the saddle member or yoke bar 28 to cause the tank cap or closure to be firmly seated against the gasket seat 21 provided by my improved method of seaming the funnel or turret to the shoulder wall of the tank. In the construction shown in Fig. 8 similar action takes place under rotative movement of the plunger rod 54 and handle 57, since in that case the stop lug 60 on the handle will also engage one or the other side of the stop lug 61 in the hollow head, depending on the amount of rotation given the plunger rod and handle, thereby limiting the independent rotation of the plunger rod and handle and causing the cap or closure 34ª to rotate with said plunger and handle upon further attempt to rotate such parts. Thus the cap or closure may be rotated either to open or close the tank.

Assuming the stop lugs 60 and 61 to be in the positions shown in Fig. 9, rotative movement of the handle or plunger rod counter-clockwise will cause the power or clamping screw, shown in Fig. 3, to be elevated in the saddle member or yoke bar 28. With these parts so arranged, the saddle member or yoke bar may be inserted into the bayonet recesses or depressions 24 until the ends thereof reach a level below that of the lower ends of the stop members 27, whereupon said saddle member or yoke bar may be turned clockwise with or without the clamping screw rotating therewith, so as to bring said ends into the recesses or depressions 25. With the parts thus positioned, the tank cap or closure 34 will be positioned directly over the gasket seat 21 and be in loose contact therewith, and upon turning the handle 57 clockwise the stop lug 60 thereon will engage the opposite side of the stop lug 61 formed in the hollow head 32. Continued rotation of the handle would compel the power or clamping screw to be threaded downwardly through the saddle member or yoke bar which would be retained against rotation by the side walls of the recesses or depressions 25 directly opposite the stop members 27. As the pressure on the power or clamping screw increases, the saddle member or yoke bar will be elevated in firm contact with the downwardly facing shoulders 26 of the recesses or depressions 25, and simultaneously therewith the lower end of the power or clamping screw will press the tank cap or closure firmly against the gasket or closure seat 21 so as to effectively seal the tank.

In the case of the construction shown in Fig. 8, and again assuming the stop lugs 60 and 61 to be in the positions shown in Fig. 9, rotative movement of the handle or plunger rod counter-clockwise will cause the cap or closure 34 to be unseated from the gasket seat 21, or more particularly the washer 36; and upon continuing such rotative movement of the cap or closure, the latter may be entirely unthreaded from the funnel and removed therefrom so as to leave the tank open. When sealing the tank by means of the cap or closure 34ª, the handle and plunger rod are rotated clockwise, which will bring the stop lug 60 on the handle 57 into contact with the side of the stop lug 61 in the hollow head opposite that with which it is shown engaged in Fig. 9, and upon further rotative movement in

a clockwise direction the cap or closure 34 will be securely threaded into the funnel or turret. It will be apparent therefore that simple rotative movement of the handle will result in the opening or closing and effective sealing of the tank. In Fig. 8 the funnel or turret is shown as having its cylindrical or lower portion extending upwardly to a greater extent than shown in the preceding figures, and this is for the purpose of providing a fairly large range of screw threads therein for a secure fastening of the cap or closure to the funnel or turret.

Due to the fact that, after the cap or closure is firmly tightened, a user of the sprayer might apply undue pressure and over-tighten the cap or closure, there would be a tendency to cause the seam connecting the funnel or turret with the shoulder wall of the tank to become loosened and thus allow the escape of air under pressure from the tank at this point. To guard against this, the cylindrical wall of the lower portion of the funnel or turret is provided with an outwardly directed rib 64 which enters a recess 65 on the inner side of the downwardly directed portion 17 of the shoulder wall. The outwardly directed rib 64 and its receiving recess 65 may be disposed at one or more points in the circumference of the metallic sheet-metal parts in which they are formed. The rib 64 extends upwardly from the lower end of the cylindrical portion of the funnel or wall to a plane even with the upper end of the screw-threads 62 formed therein, and in forming this rib an internal groove 66 is provided in said cylindrical portion which is at least coextensive with the region of the screw-threads 62. The depth of this groove is slightly greater than the depth of the screw-threads formed in the funnel or turret, so that it is employed as a release for the air under pressure within the tank and is placed in connection with the interior of the tank immediately separation of the tank cap or closure from the washer is effected. The air from within the tank may then pass over or under the washer and the pressure be relieved through the groove 66, which may be referred to as a pressure release. This feature of my invention is employed only when the tank cap or closure is threaded into the funnel or turret and is not required in the construction of closure illustrated in Figs. 1 to 7.

It may here be stated that a gasket or washer seat, which may also be referred to as a closure-seat, formed by bending one sheet-metal member around the edge of another to completely surround the marginal portion of the latter, guards against fractures and unevenness being formed in the gasket seat when the surface in the so bent region of said first-mentioned sheet-metal member distant from its edge is utilized as the gasket seat.

Where, in the claims, reference is made to portions of the funnel forming the seam connection with the shoulder wall being in contact with the latter, it is intended to mean that the gasket embodied in said seam structure be considered as forming either part of said funnel or of said shoulder wall, unless otherwise expressly specified.

Moreover, where the gasket or packing ring 19 is not expressly included in the claims, the claims are to be considered as of sufficient scope to include or exclude said gasket or ring, since there are ways known to applicant by means of which an air-tight seam can be provided without the use of such gasket or packing ring; although, from an economical point of view, employment of a gasket or packing ring is preferable.

Having thus described my invention, what I claim is:

1. In a sprayer having a compressed air tank including a closure, an air pump depending from said closure and having an elongated cylinder adapted to extend into said tank, and co-operating means on said cylinder and closure including a nub and groove whereby said pump can be attached to or removed from said closure by movement of said pump cylinder in an axial direction under force.

2. In a sprayer having a compressed air tank including a closure having a depending boss, an air pump depending from said closure and adapted to extend into said tank, said pump including a pump cylinder having its upper portion surrounding said depending boss, said boss having a depression formed therein and said pump cylinder having an internally projecting nub adapted to enter said depression upon forceful axial movement relatively of said pump and closure.

3. In a sprayer having a compressed air tank and a closure for the same, a pump depending from said closure and adapted to extend into said tank, said pump including a pump cylinder having its upper portion surrounding a portion of said closure, and co-operating means on said closure portion and said pump cylinder including a nub and annular groove whereby said pump can be attached to or removed from said closure portion by relative forceful axial movement of said closure and cylinder.

4. In a compressed-air sprayer having a closure equipped with a depending projection, an air-pump having a pump cylinder whose upper portion surrounds said projection, said projection having peripheral notches circumferentially spaced and said pump cylinder having circumferentially spaced internal nubs adapted to enter said notches under relative movement axially of said depending projection and cylinder.

5. In a compressed-air sprayer having a closure equipped with an axially disposed depending pump-head, an air pump comprising a pump cylinder having its upper portion surrounding said pump-head and being formed of resilient sheet material, said pump-head having peripheral notches at diametrically opposite points and its lower edge rounded and said pump cylinder having inwardly projecting nubs at diametrically opposite points adapted to enter the notches of said pump-head under relative forceful axial movement of said pump-head and pump cylinder, the regions of said pump cylinder at said nubs yielding outwardly during the act of forcing said nubs over the lower edge of said pump-head and while moving along the peripheral face of said pump-head preparatory to entering said notches.

6. In a compressed-air sprayer having a closure equipped with an axial boss having a depression in its peripheral surface, an air pump depending from said closure and adapted to extend into said tank, said air pump comprising a pump cylinder having its upper end surrounding said boss and being formed of resilient sheet-metal, said pump cylinder having an internal projection resiliently mounted and adapted to enter the depression in said boss under relative axial movement of said pump head and cylinder.

7. In a compressed-air sprayer having a closure provided with an integral depending axial projection and a depression in the peripheral face

of said projection, an air pump depending from said closure and adapted to extend into said tank, said air pump including a pump cylinder having its upper end surrounding said projection and having at said end an annular outstanding flange and an inward projection adapted to enter the depression in said first-mentioned projection upon axial movement relatively of said pump head and cylinder, and a washer in the sprayer construction against which said outstanding flange bears when said closure is fully closed.

3. A sprayer tank having an opening in its top wall surrounded by a washer seat, a washer bearing against said washer seat, a closure marginally in contact with said washer, said washer seat being formed by a seam connecting two sheet-metal members of the sprayer, one of said members having a cylindrical opening therein and the other member being bent around the edge portion of said first-mentioned member at said opening to provide two parallel portions at opposite sides of said edge portion and a right angular connector portion facing the edge wall of said opening, that portion of said two parallel portions distant from the edge of the sheet-metal member of which it forms part serving as the washer seat, said washer seat by reason of its distance from the edge of said last-mentioned sheet-metal member being devoid of all fractures and unevenness.

9. A sprayer having a compressed air tank for liquid provided with a shoulder wall having a circular opening therein and being fashioned to provide a circular depressed portion around said opening having a peripheral wall and a flat bottom wall, the latter defining the size of said opening in said shoulder wall, a funnel having a cylindrical lower portion fitting into the depressed portion of said shoulder wall and having the metal thereof at its lower portion fashioned to provide a flat portion overlying the bottom wall of said depressed portion to form a flat even-surfaced unbroken washer seat, a depending portion entered through the opening in said shoulder wall and facing the edge of the opening therein and a terminal flange underlying said bottom wall.

10. A sprayer having a compressed air tank for liquid provided with a body portion having a central opening in its top wall and fashioned to provide a circular depressed portion around said opening having a peripheral wall and a flat bottom wall, the latter defining the size of said central opening, a funnel having a cylindrical lower portion fitted into said depressed portion and having the metal thereof at its lower portion bent inwardly to provide a flat portion overlying the flat bottom wall of said depressed portion and serving as a flat even-surfaced unbroken closure seat and a depending portion passed through said central opening to lie against the edge of said flat bottom wall, said depending portion being rebent outwardly to underlie said flat bottom wall, and a closure in said funnel held against said closure seat in an air-tight manner.

11. A sprayer having a compressed air tank for liquid provided with a body portion having a central opening in its top wall, a funnel extending upwardly from said top wall and having a portion at its lower end directed inwardly to overlie said top wall immediately around the central opening therein to form a flat even-surfaced unbroken washer seat, a depending portion extending through said opening and a terminal portion bent outwardly underneath said top wall to form a combined seam connection between said top wall and said funnel and an upwardly facing closure seat within said funnel, a concealed packing embodied in said seam connection between portions of said top wall and said funnel, and a closure bearing against said closure seat.

12. A sprayer having a compressed air tank for liquid provided with a body portion having a central opening in its top wall, a funnel extending upwardly from said top wall and having an upstanding confining wall, an inwardly directed flat portion at the lower end of said confining wall overlying said top wall around the central opening therein to form a flat unbroken and uncrimped washer seat, a depending portion at the inner end of said inwardly directed flat portion and an outwardly directed terminal flange in contact with the under side of said top wall at the region immediately surrounding the opening therein, concealed packing interposed between the inwardly extending flat portion of said funnel and said top wall, and a closure within said funnel sealable against the inwardly directed flat portion of the latter and removable therefrom.

13. In a sprayer, a tank structure having an upwardly facing closure seat and an internally threaded cylindrical wall extending upwardly from said closure seat, an externally threaded closure threadingly engaging said cylindrical wall and sealed against said closure seat, and a pressure relief groove extending upward from said closure seat through the threaded region of said cylindrical wall to relieve the pressure of air from within the tank when said closure is being unsealed.

14. In a sprayer, a tank structure having an upwardly facing closure seat and an internally threaded cylindrical wall extending upwardly from said closure seat, an externally threaded closure threadingly engaging said cylindrical wall and sealed against said closure seat, and a pressure relief groove extending upwardly from said closure seat through the threaded region of said cylindrical wall to relieve the pressure of air from within the tank when said closure is being unsealed, said relief groove being slightly deeper than the depth of the screw-threads formed in said cylindrical wall.

15. In a sprayer, a tank structure having a top wall and a funnel extending upwardly from said top wall, said funnel having internally at its lower end a closure seat and being internally threaded along a region extending upwardly from said closure seat, means to connect said funnel to said top wall so as to prevent relative rotative movement of the two, a closure in said funnel sealed against said closure seat and a relief groove extending upwardly from the closure seat through the threaded region of said funnel to relieve the pressure of air from within said tank when said closure is being unsealed.

16. In a sprayer, a tank structure having a top wall provided with a central opening and a depressed portion around said opening providing a peripheral wall for said depressed portion and a flat bottom wall defining the diameter of said opening, a funnel having a cylindrical portion fitting into said depressed portion and seamed to the flat bottom wall of said depressed portion, said seam providing an upwardly facing closure seat at the bottom of said funnel and said funnel having the interior of its cylindrical portion screw-threaded to extend from said closure seat upwardly, interlocking means between the peripheral wall of said depressed portion and the

cylindrical wall of said funnel to prevent relative rotative movement of the two, a closure sealed against said closure seat, and a relief groove internally within said funnel extending through the threaded region thereof from said closure seat upwardly to relieve the pressure from within the tank when said closure is being unsealed.

17. In a sprayer, a tank structure having a top wall provided with a central opening and a depressed portion around said opening providing a peripheral wall for said depressed portion and a flat bottom wall defining the diameter of said opening, a funnel having a cylindrical portion fitting into said depressed portion and seamed to the flat bottom wall of said depressed portion, said seam providing an upwardly facing closure seat at the bottom of said funnel and said funnel having the interior of its cylindrical portion screw-threaded to extend from said closure seat upwardly, the wall of said cylindrical portion being provided with an outwardly directed rib at the region thereof fitted into said depressed portion and the cylindrical wall of said depressed portion having an internal depression receiving said rib to prevent rotative movement of said funnel on said tank.

18. In a sprayer, a tank structure having a top wall provided with a central opening and a depressed portion around said opening providing a peripheral wall for said depressed portion and a flat bottom wall defining the diameter of said opening, a funnel having its lower end fitted into said depressed portion and seamed to the flat bottom wall of said depressed portion, said seam providing an upwardly facing closure seat at the bottom of said funnel and said funnel having its lower portion internally screw-threaded, the cylindrical wall of said depressed portion being bulged outwardly at one point in its circumference to provide a vertically disposed external rib and a similarly disposed internal groove, the peripheral wall of said funnel being bulged outwardly to form an external vertically disposed rib of a size to fit said internal groove and an internal groove extending through the threaded portion of said funnel from said closure seat upwardly to serve as a pressure relief, and a closure sealed against said closure seat to prevent the escape of pressure from within the tank, said pressure relief groove being brought into use upon the slightest unsealing of the closure from its closure seat.

19. A tank for liquid having a wall provided with a circular opening and a depressed portion around said opening, an element formed of sheet-metal having a circular opening smaller than said first-mentioned circular opening and having a portion distant from the edge of its opening lying flat against the bottom of said depressed portion to form a flat even-surfaced unbroken washer seat, said sheet-metal element fitting into said depressed portion in contact with the peripheral wall of the latter and having a cylindrical portion extending through said opening and a flange at the lower end of said cylindrical portion directed outwardly in contact with the bottom of the depressed portion of said wall, said sheet-metal element being internally threaded above said seat, and an externally threaded closure threaded into said internally threaded element and adapted to be seated in an air-tight manner against said gasket seat.

20. A tank for liquid having a wall provided with a circular opening and a depressed portion around said opening, an element formed of sheet-metal having a circular opening smaller than said first-mentioned circular opening and having a portion distant from the edge of its opening lying flat against the bottom of said depressed portion to form a washer seat, said sheet-metal element fitting into said depressed portion in contact with the peripheral wall of the latter and having a cylindrical portion extending through said opening and a flange at the lower end of said cylindrical portion directed outwardly in contact with the bottom of the depressed portion of said wall, a concealed gasket interposed between the bottom of said depressed portion and said sheet-metal element, the latter having an upwardly facing gasket seat and being internally threaded above said seat, a gasket in contact with said seat and an externally threaded closure threaded into said internally threaded element and adapted to compress said last-mentioned gasket to seal said closure in an air-tight manner.

21. A tank structure having a wall provided with a circular opening, an element fastened to said wall at said opening and provided with internal screw threads, a closure having external screw threads threadingly engaging said internal screw threads, said element and wall having an interfitting rib and groove to prevent rotation of said element with respect to said wall.

22. A tank structure having a wall provided with a circular opening and having the metal of said wall around said opening bent to form a circular depression, said circular depression including a peripheral wall and an inwardly directed flange, an internal screw-threaded element fitted into said depression and fastened to said wall at said opening to prevent axial movement thereof, a closure having external screw threads threadingly engaging said internal screw threads, said peripheral wall and element having means to prevent rotative movement relatively comprising an interlocking rib and groove.

HORACE H. CHAPIN.