July 4, 1961 F. L. MURDOCK, SR 2,990,970

EXTENSIBLE TANK

Original Filed Aug. 19, 1957

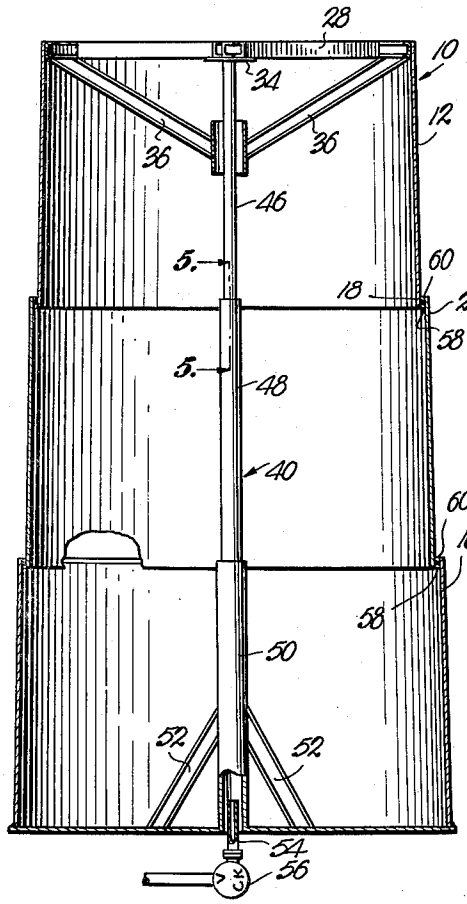

Fig. 1.

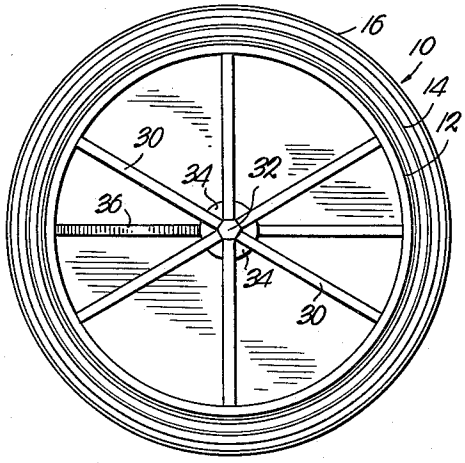

Fig. 2.

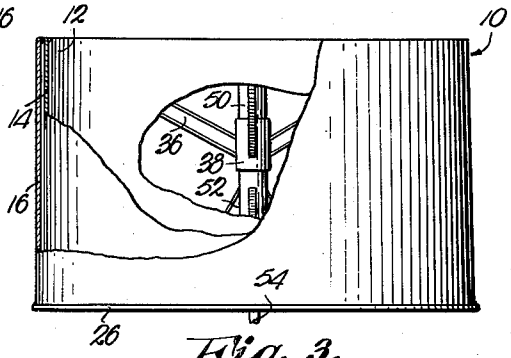

Fig. 3.

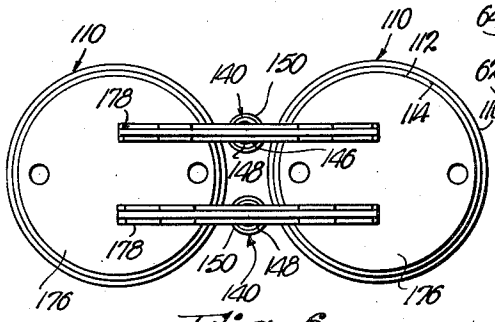

Fig. 6.

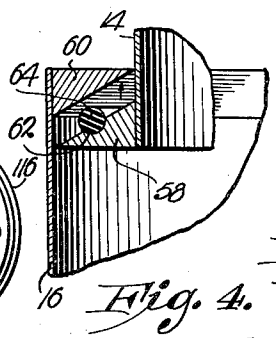

Fig. 4.

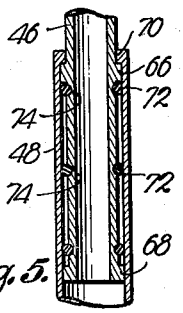

Fig. 5.

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EXTENSIBLE TANK

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Original application Aug. 19, 1957, Ser. No. 678,833, now Patent No. 2,887,243, dated May 19, 1959. Divided and this application Nov. 17, 1958, Ser. No. 774,339

7 Claims. (Cl. 220—8)

This invention relates to portable receptacle construction and more particularly, to a collapsible fluid-receiving tank which may be readily transported in its collapsed condition and then erected in an up-right position ready for immediate use in a short period of time.

The collapsible tank herein presented is especially adapted for use by oil well cleaning and reconditioning contractors wherein it is necessary that they have available a large capacity liquid tank and which may be collapsed and transported from well to well in a minimum of time and at a relatively small cost.

As the producing life of a flowing or pumping well is extended, the rate of production will be reduced at a rate commensurate with the reduction of reservoir pressure and gas depletion, the amount of caving that has occurred, the restriction of sand drainage which is caused by deposition of paraffin and other residues on the surfaces of the well pores, and the proximity of salt water. Many of these factors can be overcome and remedied by cleaning and reconditioning of the well and there are many companies now engaged in the full-time occupation of cleaning and reconditioning clogged and similarly constricted wells which have ceased to flow or cannot be pumped at an adequate rate.

The precipitation of mineral salts from oil field water and the deposition of mud, silt, waxy and asphalt materials cause lost production in the oil well and it is frequently necessary to remove "paraffin" from the well so that it may be brought back into normal production. The term "paraffin" as commonly applied by field men and oil well operators includes mud, silt, sand, asphalt and some water and mineral matter in addition to natural paraffin wax.

Many types of cleaning and reconditioning operations have been suggested and such processes include "blowing" the well with dynamite and nitroglycerine, as well as mechanical reconditioning including bailing, sand-pumping, re-drilling, and reaming, but in many instances these processes are completely unsatisfactory and it is more desirable to utilize methods wherein solvents or other fluids are directed into the well casing so as to loosen, dissolve, or otherwise remove the deposits from the well which are preventing normal flow and which preclude pumping of the oil from the well.

Various liquid methods of cleaning and reconditioning oil wells are known and utilized including introduction of solvents such as hot oil, kerosene, gasoline or a mixture of gas-oil and benzine into the well in order to dissolve the paraffinic substances, the introduction of steam or hot water into the well casing under pressure, circulating hot oil or water through the well, as well as the introduction of certain acids into the well between the casing and the tubing. Other methods of a similar nature which are utilized, include the introduction of heat-producing chemicals such as sodium hydroxide, calcium carbide and water, and aqueous aluminum compositions into the well.

Manifestly, these methods just referred to involving the utilization of liquids, require that the reconditioning contractors have available relatively large liquid-receiving tanks wherein the materials may be stored for ready use at the exact moment needed. Such large tanks are frequently not available at the well site and it, therefore, becomes necessary for the contractor to transport such

tanks with his equipment. This involves a considerable number of additional vehicles, as well as a number of men which are needed to erect and disassemble sectional tank assemblies. Although the operators could transport one-piece tanks of considerably volume, this has been found substantially impractical because of the fact that it is usually desirable to mount the tanks upon a tractor-trailer and this necessarily limits the over-all height of the tanks which are disposed upon the trucks because of obstructions encountered such as bridges or the like.

It is, therefore, the most important object of this invention to provide a portable tank which is constructed of a plurality of normally upright, tubular sections disposed in telescoped relationship and which are adapted to be moved to extended positions so as to present an elongated, collapsible fluid-receiving tank.

It is a further important object of this invention to provide a portable tank of the type described which includes structure for moving the telescoped sections into their extended positions under the influence of fluid pressure so that the tank may be erected in a very short period of time.

Another important object of the invention relates to the provision of a collapsible tank as referred to wherein the telescoped sections are movable to and from extended positions with proximal adjacent ends thereof disposed in partial overlapping relationship and wherein there is provided sealing means between the overlapped portions of the sections so as to prevent loss of fluid between the ends when the tank is filled with liquid or the like.

Another important object relates to the provision of interengageable means on the partially overlapped portions of the sections which operate to limit the extent of movement of the telescoped sections with respect to each other and which also receive the sealing means therebetween so as to prevent loss of liquid from the tank.

Another important object of the invention relates to structure for moving the telescoped sections into their extended positions and which is located externally of the tank so that if desired, the structure may be utilized to move the sections of a plurality of tanks into their extended positions.

In the drawings:

FIG. 1 is a central, vertical, cross-sectional view of a collapsible, portable tank made in accordance with one form of the instant invention, certain parts being broken away to illustrate details of construction.

FIG. 2 is a plan view of the tank illustrated in FIG. 1.

FIG. 3 is a side elevational view of the tank shown in FIG. 1, the tank being illustrated in its collapsed condition with the inner sections thereof telescoped within the outer section and certain parts thereof broken away and in section to reveal details.

FIG. 4 is a fragmentary, enlarged, cross-sectional, detailed view of a portion of the tank shown in FIG. 1 and illustrating more clearly the construction of overlapped, adjacent ends of a pair of the sections of the tank.

FIG. 5 is a fragmentary, enlarged cross-sectional view taken on line 5—5 of FIG. 1; and

FIG. 6 is a plan view of a modified form of the instant invention showing a pair of collapsible, portable tanks.

The preferred form of the invention which is shown in FIGS. 1 to 5 inclusive, comprises a collapsible tank generally designated **10** and which includes a plurality of tubular, upright sections **12, 14** and **16** which are normally disposed in telescoped relationship as shown in

FIG. 3, it being noted that section **14** may move into and out of section **16** while section **12** is reciprocable to and from a position within section **14**. The extended positions of sections **12** and **14** are illustrated in FIG. 1, wherein it can be seen that the lowermost portion **18** of section **12** partially overlaps the uppermost portion **20** of section **14** and by the same token, the lowermost portion **22** of section **14** overlaps the upper end portion **24** of section **16**.

The lowermost end of section **16** is closed by a circular bottom wall **26** and an annular channel member **28** is welded to the uppermost end of section **12** on the innermost face thereof. A plurality of radially extending spokes **30** are secured to a central hub **32** and to the innermost face of annular member **28**. Secured to the lowermost part of hub **32** is a circular pressure plate **34** and a plurality of angularly disposed bracing members **36** are secured to the lowermost part of annular member **28** and extend radially toward the axis of section **12**. An upright tubular sleeve **38** is secured to the innermost ends of members **36** and is located on the vertical axis of section **12**.

Means for moving sections **14** and **12** into their extended positions, as illustrated in FIG. 1, comprises structure broadly designated by the numeral **40** which includes a plurality of elongated, tubular members **46**, **48** and **50** disposed in telescoped relationship, it being noted that there is a tubular member for each of the sections **12**, **14** and **16** respectively.

The uppermost end of tubular member **46** is secured to pressure plate **34** and the lowermost end of tubular member **50** rests on and is secured to bottom wall **26**. A plurality of angularly disposed, radially extending brackets **52** are located within section **16** and extend from and are secured to bottom wall **26** and are welded to tubular member **50** so as to support the same on the vertical axis of section **16**. An inlet conduit **54** passes through bottom wall **26** and communicates with tubular member **50** and a check valve **56** is located in conduit **54** for controlling flow of fluid therethrough. The inside diameter of tubular sleeve **38** is substantially equal to the outside diameter of tubular member **50** and, therefore, when sections **12** and **14** are telescoped within section **16**, sleeve **38** operates to maintain section **12** in correct alignment with respect to section **14** during transportation of tank **10**.

Outwardly extending annular flanges **58** are secured to the lowermost portions **18** and **22** of sections **12** and **14** respectively, and inwardly extending flanges **60** are welded to the uppermost portions **20** and **24** of sections **14** and **16** respectively. As is clear from FIG. 4, flanges **58** and **60** are substantially triangular in transverse cross section and the angular surface of flange **58** is configured so as to substantially conform with the corresponding surface of flange **60**. A sealing ring **62** is provided on each of the flanges **58** and is preferably disposed in a circular groove **64** so that when the annular surfaces of flanges **58** and **60** are brought into proximal relationship, sealing ring **62** is pressed therebetween.

Also, as is evident from FIG. 5, the lowermost ends of tubular members **46** and **48** respectively are provided with a pair of spaced, outwardly extending circumferential flanges **66** and **68** and the uppermost ends of tubular members **48** and **50** are provided with inwardly extending, circumferential flanges **70**. Each of the lower ends of tubular members **46** and **48** is provided with sealing means between flanges **66** and **68** thereof which preferably comprises a series of spaced, circular sealing rings **72** which are disposed in circumferential grooves **74** formed in tubular members **46** and **48** respectively. The rings **72** are of sufficient cross-sectional area to engage the innermost face of a corresponding tubular member **48** and **50** and thus preclude leakage of fluid from within structure **40**.

As heretofore noted, tank **10** is particularly adapted to be disposed upon tractor trailers or similar type vehicles and inasmuch as it is usually desirable to permanently mount tank **10** upon the bed of the vehicle, an opening is provided in the bed of the truck (not shown) so that conduit **54** may pass therethrough and thereby allow wall **26** to lie flat on the truck bed.

Tank **10** is normally transported in the collapsed condition illustrated in FIG. 3 and after the vehicle has reached the well site and it is desired to move sections **12** and **14** into their extended positions as shown in FIG. 1, fluid under pressure, either air or water, is directed into structure **40** after check valve **56** has been opened. As pressure builds up within structure **40** and against pressure plate **34**, tubular member **46** initially moves upwardly within tubular member **48** until flange **58** on section **12** and flange **66** on tubular member **46** engage the flange **60** and the flange **70** on section **12** and tubular member **48** respectively. When this occurs, continued upward movement of sections **46** and **48** causes section **14** to move upwardly from within section **16** until the flange **58** on section **14** and the flange **66** on tubular member **48** engage flange **60** and flange **70** on section **16** and tubular member **50** respectively. When sections **12** and **14** have been moved into their extended positions illustrated in FIG. 1, check valve **56** is closed and the pressure maintained within structure **40** operates to retain sections **12** and **14** in their extended positions. The use of pressurized fluid to move sections **12** and **14** is particularly convenient because well cleaning contractors have available a large amount of equipment for directing fluids under pressure to desired locations and it is only necessary for such operators to connect their compressing or pumping equipment to conduit **54** and thus quickly move sections **12** and **14** to the position shown in FIG. 1. Also, sections **12** and **14** may be quickly collapsed into the telescoped position shown in FIG. 3 by merely opening check valve **56** and allowing the fluid therein to flow through conduit **54** to a point of outlet. The weight of sections **12** and **14** is sufficient to push the fluid out of structure **40** and the sections **12** and **14** automatically telescope.

Although portable tank **10** has been illustrated and described as being open at the top thereof, it can be appreciated that the uppermost end of section **12** may be closed by any suitable means and that inlet and outlet openings be provided in the top thereof. In lieu thereof, conduit means may also be connected to section **16** adjacent the lowermost part thereof so that fluid material may be directed into and removed from tank **10**.

A modified form of the invention is illustrated in FIG. 6 wherein it can be seen that there is provided a pair of portable, collapsible tanks **110**, each of which includes a plurality of upright, tubular sections **112**, **114** and **116** disposed in telescoped relationship, it being noted that each of tanks **110** is provided with interengageable flange means at those portions normally disposed in partially overlapped relationship when sections **112** and **114** have been moved to their extended positions. Tanks **110** are also provided with a bottom wall (not shown) and a circular top wall **176** at the uppermost end of section **112**. Means for moving sections **112** and **114** into their extended positions include a pair of spaced structures **140** which are located between tanks **110** externally thereof. Each of the structures **140** includes a plurality of tubular members **146**, **148** and **150** which are disposed in telescoped relationship and which are essentially of the same construction as tubular members **46**, **48** and **50** of tank **10**.

A pair of parallel, elongated tie bars **178** are secured to the top walls **176** of each of tanks **110** and also to the uppermost end of a corresponding tubular member **146**. Fluid supply conduits (not shown) are connected to each of the structures **140** respectively and when fluid under pressure is directed into the structures **140**, tubular members **146** and **148** of each of structures **140** is moved into its extended position and which in turn moves sections **112** and **114** into extended positions similar to the posi-

tions of sections 12 and 14 of tank 10. A check valve is also provided in the supply conduits connected to structures 140 to thereby control the flow of fluid thereinto. Operation of structures 140 is similar to the operation of structure 40 of tank 10.

This is a division of my copending application Serial No. 678,833, filed August 19, 1957, entitled "Telescoping Tank," now Patent No. 2,887,243.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In portable receptacle construction, a series of collapsible tanks, each including a plurality of upright, tubular sections normally disposed in telescoped relationship, the lower end of the outermost section of each of the tanks being closed, and the remaining sections of each of the tanks being movable to and from extended positions with proximal adjacent ends of each of the sections of each of the tanks disposed in partial overlapping relationship, there being interengageable means on said adjacent ends of the sections for limiting the extent of movement of the remaining sections with respect to each other as the latter are successively moved to their extended positions; a plurality of tubular, extensible structures disposed externally of the tanks; and means connecting the structures to the uppermost end of the innermost sections of each of the tanks respectively whereby as fluid under pressure is directed to each of the structures to extend the latter, said remaining sections of each of the tanks are successively moved into their extended positions.

2. In portable receptacle construction a plurality of upright tubular sections normally disposed in telescoped relationship, the lower end of the outer section being closed, and the remaining sections being movable to and from extended positions with proximal adjacent ends of the sections disposed in partial overlapping relationship, there being interengageable means on said adjacent ends of the sections for limiting the extent of movement of the remaining sections with respect to each other as the latter are successively moved to their extended positions to thereby present a collapsible, elongated tank; structure for moving said remaining sections successively into their extended positions, said structure including a plurality of tubular members normally disposed in telescoped relationship, there being a member for each section respectively and each of said members being at least coextensive in length with its corresponding section with the outermost and innermost members being secured to the outer and inner sections respectively, the members corresponding to said remaining sections being movable to and from extended positions with proximal adjacent ends of the members disposed in partial overlapping relationship, means between said partially overlapped portions of the members precluding passage of fluid therebetween, and means closing the uppermost end of the inner member; and means communicating with the normally lowermost member for directing fluid thereinto and into the members thereabove under pressure whereby the sections are successively moved into the extended positions thereof under the influence of fluid directed into said members and against said closing means to effect sequential extension of the members.

3. Receptacle construction as set forth in claim 2, wherein said members are provided with interengageable stops on adjacent ends thereof, said interengageable means on said adjacent ends of the sections moving into contacting relationship prior to interengagement of the stops on corresponding adjacent ends of the members.

4. Receptacle construction as set forth in claim 3, wherein said stops include an inwardly extending, annular flange on one of the members and an outwardly extending, annular flange on the adjacent member.

5. Receptacle construction as set forth in claim 4, wherein is provided packing means between each of the members respectively to prevent loss of fluid from the members as fluid is directed thereinto.

6. Receptable construction as set forth in claim 2, wherein said structure is located within said telescoped sections.

7. In portable receptacle construction, a series of collapsible tanks, each including a plurality of upright, tubular sections normally disposed in telescoped relationship, the lower end of the outer section of each of the tanks being closed, and the remaining sections of each of the tanks being movable to and from extended positions with proximal adjacent ends of the sections of each of the tanks disposed in partial overlapping relationship, there being inter-engageable means on said adjacent ends of the sections for limiting the extent of movement of the remaining sections with respect to each other as the latter are successively moved to their extended positions; a plurality of tubular, extensible structures disposed externally of the tanks; means interconnecting the structures to the uppermost ends of the innermost section of the tanks respectively; and sealing means on said sections proximal to inter-engageable means thereon for preventing flow of fluid material from the tanks between those adjacent ends of the sections of each of the tanks which are partially overlapped when at least one of the remaining sections of each of the tanks has been moved to its extended position and material introduced thereinto.

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