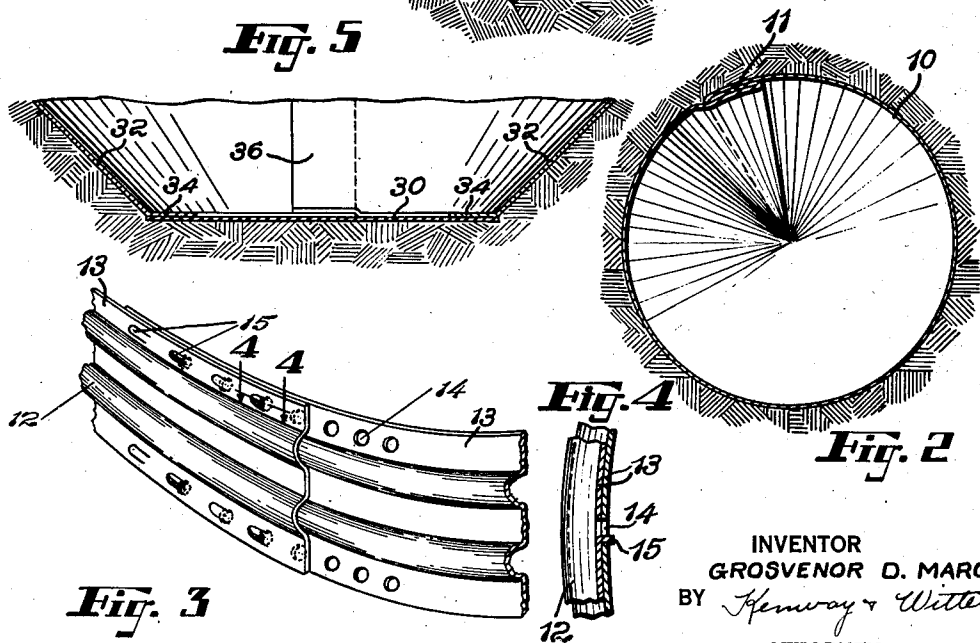
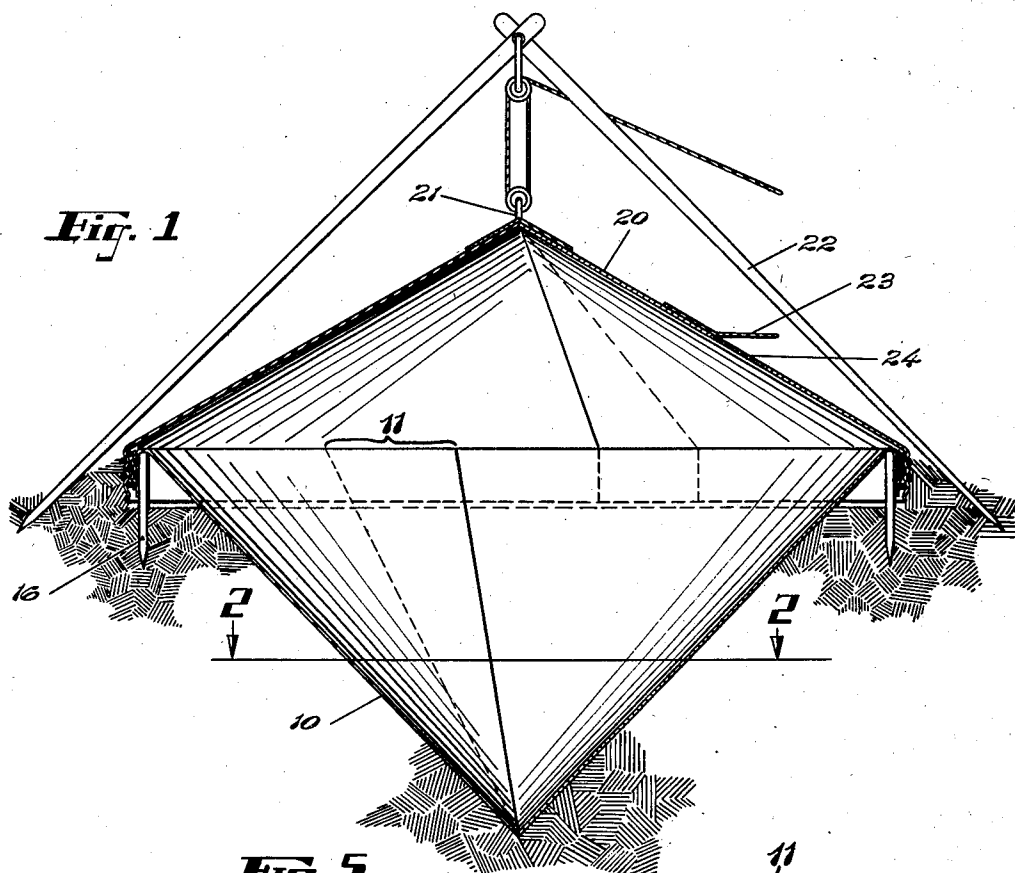


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RESERVOIR FOR LIQUIDS

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RESERVOIR FOR LIQUIDS

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1 Claim. (Cl. 150—0.5)

This invention relates to storage reservoirs for liquids and consists in a field reservoir of substantial capacity which may be quickly installed or established under emergency conditions with minimum labor requirements and from material which if desired may be conveyed to the location by air. The reservoir of my invention is designed particularly to meet the requirements of a critical period in warfare where establishing an advanced air field with provision of a temporary storage space for gasoline or oils is of vital importance. It is important that such a reservoir should be leakproof and weatherproof, located substantially below the ground, easily camouflaged and of sufficient capacity to serve the planes using the field until more permanent storage can be provided. It is even more important, however, that the reservoir should be ready for service when the first gasoline trucks arrive at the new field so that they can discharge without delay and return for more fuel.

With these considerations in view an important feature of the reservoir of my invention consists in an impervious flexible sheet inserted in and conforming to the walls of an upwardly and outwardly tapering or flaring hole in the earth, together with holding or binding means for the peripheral edge of the sheet and a flexible cover section supported in convex form above and extending at its periphery outside the binding means. A reservoir of this character has all the advantages above discussed. The only materials required may be carried in a plane and dropped by parachute if desired. The excavation requires little manual work, and in many cases can be effected by the explosion of a bomb of the penetration type or can be quickly blasted out by a single explosive charge set at a proper depth. The sides of such a hole will naturally be at the angle of repose for that particular soil and so no retaining wall will be required.

The material required for a conical reservoir comprises merely two circular sheets of flexible material impervious to the liquid to be stored, sectional binding means and a tripod or the like for supporting the cover section. For example, in the case of gasoline a circular sheet of reinforced Thiokol is entirely adequate for the base section of the reservoir. The binding means may consist of a sectional ring having capacity for circumferential adjustment. The complete reservoir may be set up in a very short time by a team of two parachute troopers properly instructed for the purpose. The reservoir lends itself to natural camouflage and its appearance from the air is exactly

that of a shell hole except that the shadows are reversed in position. The reservoir, moreover, is safe except against a direct hit, since its contents is entirely or substantially below the level of the earth.

These and other features of the invention will be best understood and appreciated from the following description of preferred embodiments thereof selected for purposes of illustration and shown in the accompanying drawing in which,

Fig. 1 is a view of one embodiment of the invention in vertical section,

Fig. 2 is a sectional view on the line 2—2 of Fig. 1, and showing the lap or pleat, and

Fig. 3 is a fragmentary view illustrating in detail the construction of the binding means,

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

Fig. 5 is a fragmentary view of a modified construction in vertical section.

In the preferred embodiment of the invention the reservoir is of conical configuration and I prefer, by way of example, to illustrate and describe a construction of this type.

The principal and base section of such a reservoir is formed from a circular sheet of flexible material, such as Thiokol, reinforced with an intermediate layer of canvas. A flat sheet 24 ft. in diameter is adequate for a reservoir holding about 4,000 gals. Sheets between 15 and 30 ft. in diameter are particularly well suited to the requirements of reservoirs of the type herein disclosed.

The first step in preparing the ground for the base section of the reservoir is to form a substantially conical hole therein, and this may be accomplished by exploding a single charge located at the right depth in the ground. The exact angle of the walls is immaterial as the circular sheet may be folded with a pleat to accommodate any angle, just as a filter paper is folded into a funnel. It is of course, assumed that sharp rocks and projections if any, will be removed from the sides of the hole, and it is desirable that the earth should be banked up somewhat about the margin of the hole to increase its capacity and take care of drainage in the vicinity of the reservoir.

Having formed the hole, the sheet 10 is folded into a cone and placed in inverted position, surplus material being folded into the flat pleat 11 as shown in Fig. 2. The width of this pleat may be just sufficient to cause the material of the sheet to conform smoothly with the walls of the hole in the earth so that there will be no strain on the sheet material. The latter will accommodate itself to considerable unevenness and is simply

held under compression between the earth and the liquid subsequently delivered to the reservoir.

The circumferential edge of the lower sheet 10 is secured by lacing or otherwise to a stiff binding comprising circular ring sections 13. These sections are identical in shape and size so that they may be nested in compact space for transportation. They are light and stiff in construction, being formed preferably of sheet metal with stiffening corrugations 12. One end of each ring section is provided with a series of spaced perforations 14 with which cooperate tongues 15, blanked out in the adjacent end of the adjacent section, but left in flat condition so that any tongue may be bent into any selected perforation depending upon the diameter of the particular reservoir in which the ring is installed. The ring sections are supported in whatever position they are located by stakes 16 driven at suitable intervals into the ground. It will be understood that the diameter of the hole in the earth and its shape may vary substantially and yet the circular sheet 10 may be satisfactorily fitted to the hole practically regardless of its size and the pitch of its walls by folding the sheet in the manner already indicated.

A conical hole 8 ft. deep and 16 ft. wide at the top will provide for a reservoir having a capacity of 3990 gals, and requires a bottom sheet 24 ft. in diameter. A hole 10 ft. deep and 20 ft. wide will provide for a reservoir holding 7800 gals, and will require a bottom sheet 30 feet in diameter. A sheet 24 ft. in diameter of reinforced Thiokol satisfactory for the intended purpose weighs about 150 lbs. and may be easily handled by two men, while a 30 ft. sheet might require the services of three men.

The roof or cover comprises a similar but slightly smaller circular sheet 20 of the same material having a suspension ring 21 in the center by which it may be suspended from a tripod 22, spanning the hole and also the lower sheet therein. The lower peripheral edge of the cover 20 is carried smoothly over the edge of the lower sheet and secured to the ring sections 13. It thus provides a conical impervious cover for the reservoir. It is equipped with a down-turned flap 23 arranged as a cover over a hand hole 24 admitting a filling source or a source with a strainer attached to a dispensing pump. A roof slope of substantially 30° is appropriate and satisfactory. As shown in the drawing, the earth is banked up against the retaining ring to continue the roof slope, to give drainage and avoid causing unnecessary shadows. The tripod 22 may be made of light tubing of neutral color and if desired, the surrounding soil may be dusted over

the cover sheet with the result that it is extremely difficult to pick out the reservoir from the surrounding landscape.

In addition to the advantage already discussed it will be noted that the apex of the inverted bottom section forms, in effect, a sump where sand or water naturally tend to collect and so may be avoided in drawing oil from the reservoir.

It will be apparent that the reservoir comprising my invention is not necessarily of the shape illustrated and above described, conical, pyramidal and frustum shapes being quite within the possibilities thereof. It will also be apparent that the sheet comprising the reservoir liner need not be folded to form a pleat as above described, but the liner can be formed from independent pieces cemented together at their junctions or the pleat at 11 can be removed and a flat piece cemented therein in its stead. Furthermore, the specific retaining means comprising the sections 13 are not essential since other means may be found quite satisfactory and in some cases it is possible that the edges may be satisfactorily secured by bankings of earth and stones.

In Fig. 5 I have illustrated a form of my invention embodying a flat bottom wall 30 and outwardly-upwardly tapering walls 32, a top cover being provided therefor in any suitable way, as by the means above described. In this case the bottom and sides of the liner sheet can be formed in the most convenient and suitable manner, as by pieces cut to pattern and cemented along their cooperating edges, as at 34 and 36.

Having thus disclosed my invention what I claim as new and desire to secure by Letters Patent is:

A field reservoir for liquids, comprising an earth-encompassed and supported cup-like sheet of liquid-impervious material having closed bottom and side walls supported at their outer faces against the exposed surface of an open hole in the earth, the side walls flaring upwardly-outwardly and in supported contact with an earth surface of like contour in said hole, an inverted cup-like sheet of liquid-impervious material above and forming a cover over the reservoir, means supporting the cover exteriorly thereof and inwardly of its margin, said sheets being of flexible material capable of being folded into a compact body and unfolded without affecting their liquid impervious character, and means including a sectional frame binding together the peripheral edges of the reservoir and cover sheets around the margin of the reservoir.

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