Jan. 23, 1945. J. LLOYD 2,367,953

FUEL TANK OR CONTAINER

Filed Sept. 24, 1942 4 Sheets-Sheet 1

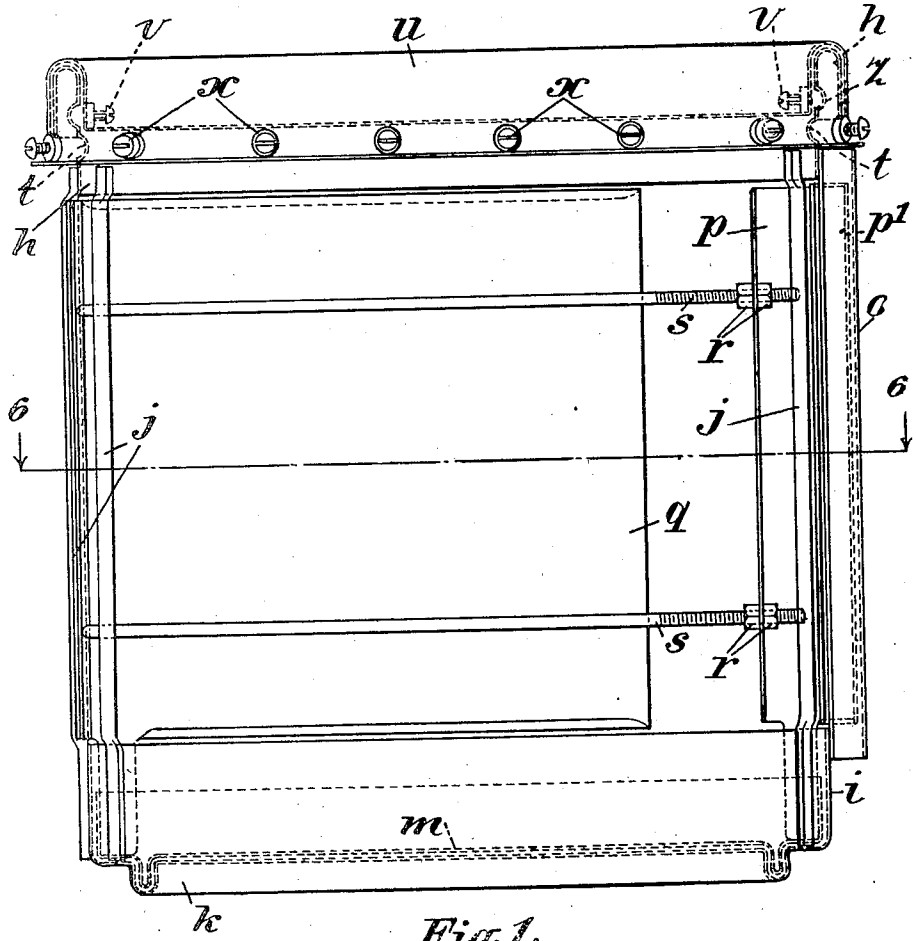



Fig. 1.

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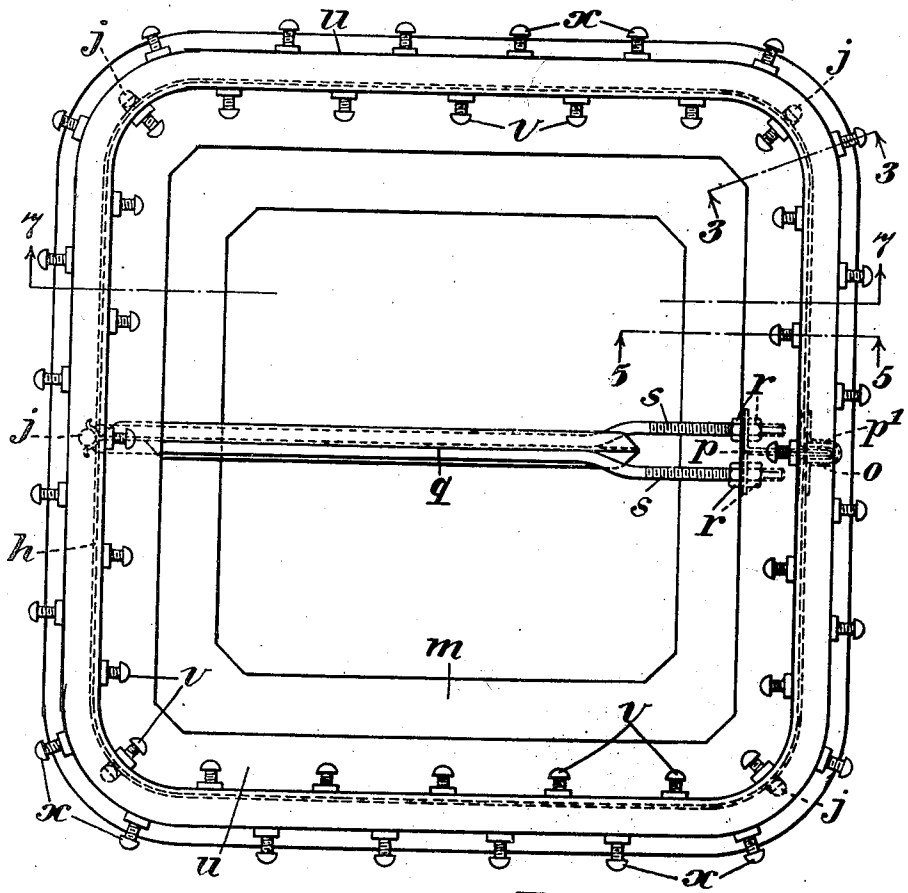



Fig.2.

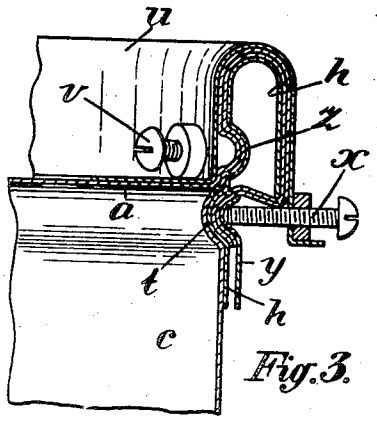



Fig.3.

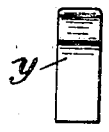



Fig.4.

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FUEL TANK OR CONTAINER

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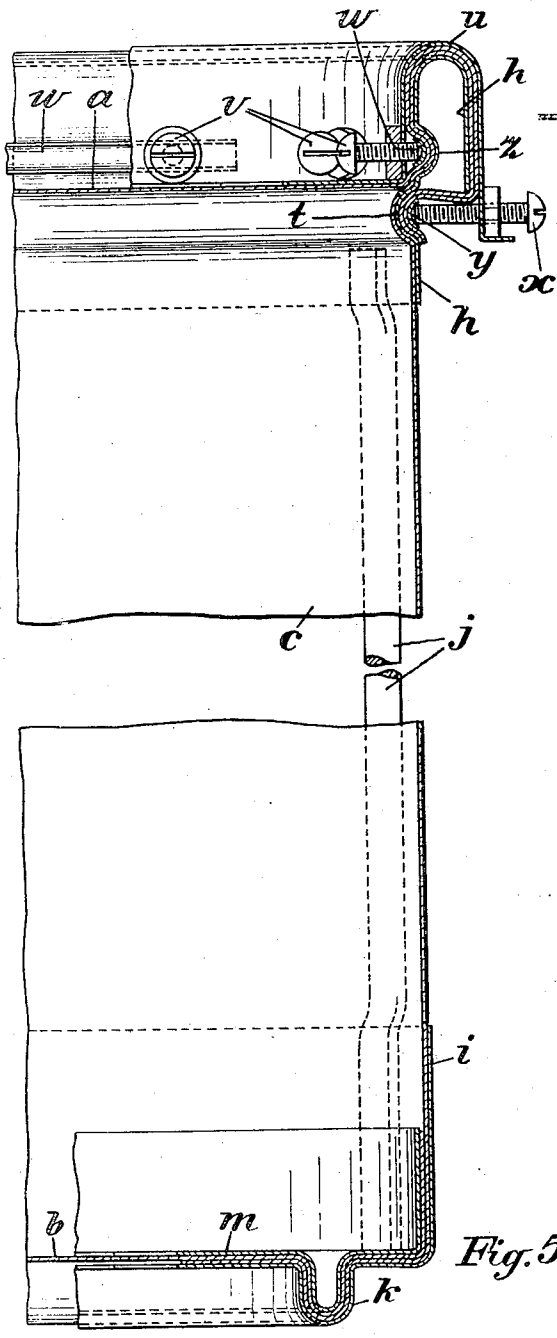



Fig. 5.

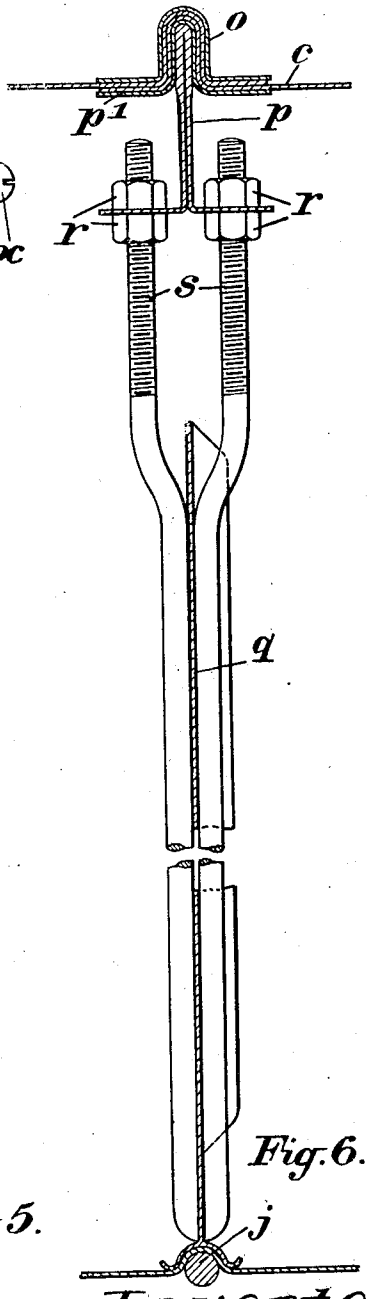



Fig. 6.

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FUEL TANK OR CONTAINER

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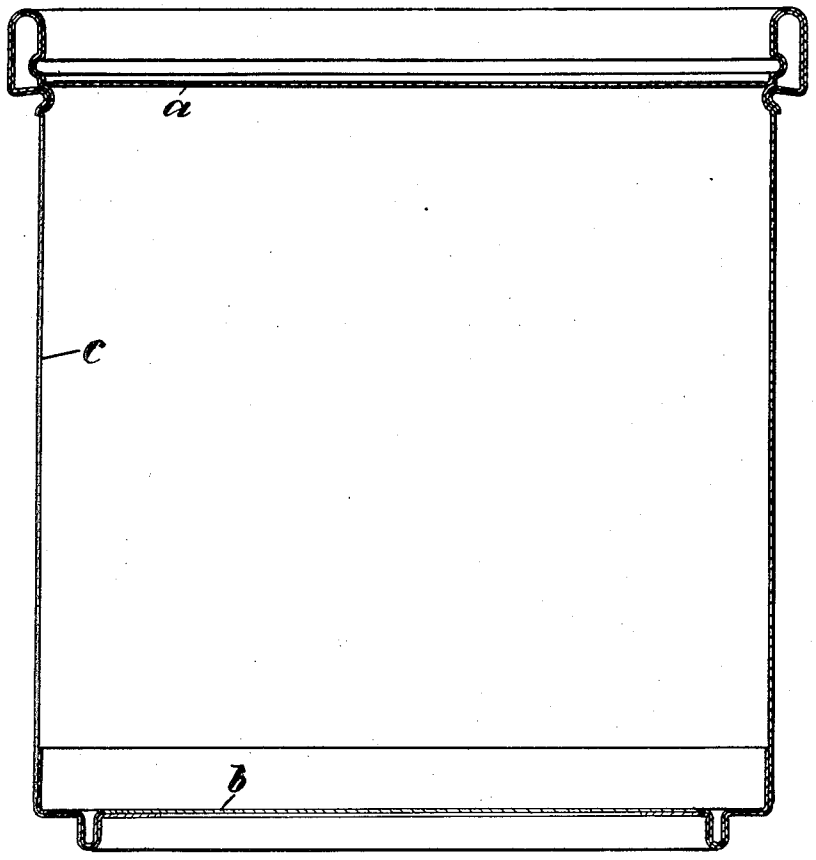



Fig. 7.

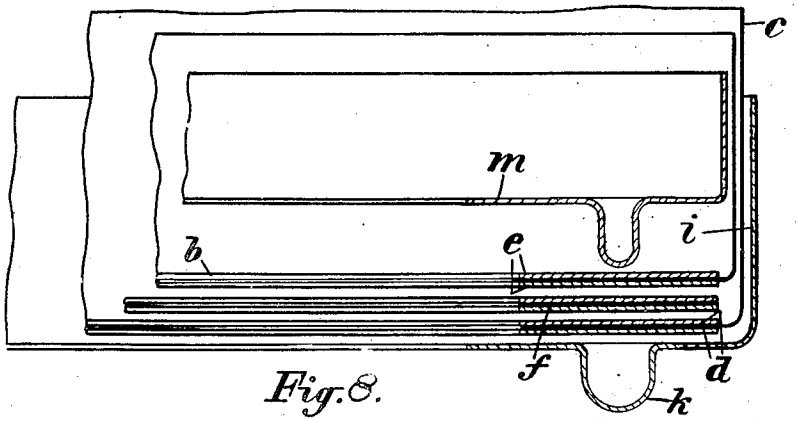



Fig. 8.

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Patented Jan. 23, 1945

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# UNITED STATES PATENT OFFICE

2,367,953

## FUEL TANK OR CONTAINER

Joseph Lloyd, Salford, England, assignor to J. Mandleberg & Company Limited, Pendleton, England, a British company

Application September 24, 1942, Serial No. 459,535
In Great Britain April 1, 1942

2 Claims. (Cl. 150—51)

This invention relates to fuel tanks or containers such as used upon motor and like vehicles and aircraft and has for its object to provide a fabric container, the joints of which are impervious to the percolation or diffusion therethrough of the petrol or like oil or spirit within the container.

The invention consists in a petrol or like fuel tank comprising a top piece of multi-ply impervious fabric, a bottom piece of multi-ply impervious fabric and an enclosing wall of multi-ply impervious fabric having one joint or seam, the enclosing wall overlapping and being jointed at the overlap to the top and bottom pieces, a skeleton frame with separate top and bottom portions which provide nested channels in which the overlapping parts of the enclosing wall and top and bottom pieces are subjected to consolidating and jointing pressure, and an internal adjustable stretcher extending across the skeleton frame which clamps the joint in the enclosing wall against a part of the skeleton frame and so consolidates such joint.

Referring to the accompanying sheets of explanatory drawings:

Figure 1 is an elevation of one form of the skeleton frame used in the production of the improved tank, the material of the tank proper being omitted.

Figure 2 is a plan view of the skeleton frame shown in Figure 1, the material of the tank proper being again omitted.

Figure 3 is a sectional view on the line 3—3 of Figure 2 with the material of the tank in position in the skeleton frame.

Figure 4 is a view of a detail shown in Figure 3.

Figure 5 is a sectional view on the line 5—5 of Figure 2 with the material of the tank proper in position in the skeleton frame.

Figure 6 is a sectional plan view of the stretcher within the skeleton frame on the line 6—6 of Figure 1 with parts of the material of the tank proper in position.

Figure 7 is a sectional view of the tank proper separate from the skeleton frame, the section being on the line 7—7 of Figure 2.

Figure 8 is a sectional view of the assembly of the complete tank at the joint around the base, the parts being shown separated for clearness.

The fuel tank proper comprises a top piece *a*, a bottom piece *b* and a vertical enclosing wall *c* which has one vertical joint or seam.

The fabric employed to produce the top and bottom pieces and enclosing wall is a multi-ply bias fabric (that is with some plies biased to an angle of 45° to the usual warp and weft structure of the fabric), the plies being caused to adhere by coatings (applied by spreading, calendering, padding or like operations) of dissolved Thiokol F or other synthetic rubber-like compound which resists the softening or corrosive action of petrol or like oil or spirit. The two faces of the final fabric are also coated with a solution of a synthetic rubber-like compound.

The joint between the enclosing wall *c* and the bottom piece *b* is made by causing the parts to overlap substantially as shown in Figure 8. At the overlap I provide the fabric of the enclosing wall *c* and of the bottom piece with coatings of a fabric faced with Thiokol or other synthetic rubber-like compound, such coatings being indicated at *d* and *e* in Figure 8. An intermediate layer *f* of a suitable fabric coated at opposite sides with Thiokol or the like is provided between the coated surfaces of the bottom piece and the enclosing wall as shown in Figure 8. It will of course be understood that a suitable adhesive mixture is used for bonding the fabric to the coatings, the intermediate layer and the skeleton frame hereinafter described.

The overlapping parts at the vertical joint may be covered with outer and inner layers of coated fabric and adhesive to form the joint.

The overlapping parts of the top joint are doubled back upon themselves as shown in Figures 5 and 7.

The tank may be vulcanised after it has been completely assembled or vulcanised material may be used.

The fabric tank is assembled inside a skeleton frame of the shape of the finished tank, such frame being made of any suitable metal or material and comprising a top ring *h*, a bottom ring *i* and rods or pillars *j* welded to or otherwise connecting the said top and bottom rings.

The bottom ring *i* is of substantially right angle cross section extending around the bottom of the tank. There is a V or like depression or groove *k* in such bottom ring and a replica *m* of such bottom ring is provided which fits into the ring *i* with the overlapping parts of the bottom piece *b* and of the enclosing wall *c* between so that a part of the overlap is compressed between the V depressions and so effectively jointed and consolidated.

In making the bottom joint, the material of the bottom piece *b* with its coverings or coatings is secured to the outer or bottom side of the replica *m* and the overlap portion of the material of the enclosing wall is moulded into the base

ring *i* with the intermediate layer *f* on the overlap. The replica is then forced tightly into the base ring so that the V grooves or depressions are brought into coincidence and press the overlapping material into intimate union.

The overlapping and coated or covered material for the vertical joint of the enclosing wall c of the tank is pressed into a V groove or channel in a member *o* (Figure 6) which connects the top and bottom rings *h* and *i* of the skeleton frame. An internal stretcher which is shown in Figure 6 in detail and also in Figures 1 and 2 carries a plate *p* at one side which presses on a channelled plate $p^1$ and forces the overlapping material of the vertical joint into the member *o* and at the other side bears upon the material of the enclosing wall as it passes within the pillar *j* which connects the top and bottom rings *h* and *i*. The plate *q* forming part of the stretcher (see Figures 1 and 6) constitutes also an anti-surge device to prevent surging of the petrol or spirit in the tank. A part of the plate *q* extends down into the replica *m* to hold it in place and a part of the plate *p* also extends into the replica for the same purpose. The stretcher is adjustable to exert the necessary pressure at the vertical joint of the surrounding wall, by means of the nuts *r* on the screws *s*.

The top joint between the top of the enclosing wall *c* and the top piece *a* is made by moulding the top portion of the material *c* over the ring *h* which is of substantially inverted channel form in section and then bringing it across to the outer surface of the inner wall of *h* where there is a groove or depression *t*. The material of the top piece of material *a* is moulded on the underside of a cover *u* which has a part of inverted channel form in section to fit over the similarly shaped part of the ring *h* with the layers of material *c* and *a* and their jointing or bonding material between. The end portion of the material *a* comes over the material *c* in the groove or depression *t*. There is a groove or depression at *z* in the top ring *h*. Studs *v* screw through the cover *u* and press upon channel shaped lengths of metal *w* which bear upon the superposed layers of material *c* and *a* so as to consolidate them into effective union. Similar studs *x* screw through the cover *u* and bear upon channel shaped members *y* (a narrow one of which is shown separately in Figure 4) to effect a second consolidation and effective union of the two layers of material *a* and *c*. The studs *x* also serve to prevent the top cover *u* being raised off the ring *h*.

If the fabric of which the tank is made is to be vulcanised after the final assembly in the skeleton frame, warm air is circulated through the tank which is warmed to free it from solvent.

The tank is shown without the usual outlet and filling connections and any other usual fittings which will be provided in any suitable manner.

With my improvement, I ensure satisfactory seaming and welding or bonding of the joints of the fabric constituting the petrol or like tank or container, thus preventing leakage or seepage at such joints.

What I claim is:

1. A petrol or like fuel tank comprising a top piece of multi-ply impervious fabric, a bottom piece of multi-ply impervious fabric and an enclosing wall of multi-ply impervious fabric having one longitudinal joint or seam, the enclosing wall overlapping and being jointed at the overlap to the top and bottom pieces, a skeleton frame with separate top and bottom portions, each provided with spaced and nested channel members between which the overlapping parts of the enclosing wall and top and bottom pieces of fabric are consolidated and jointed and an internal adjustable stretcher extending across the skeleton frame which clamps the joint in the enclosing wall against a part of the skeleton frame and so consolidates such joint.

2. A petrol or like fuel tank as claimed in claim 1, in which the adjustable stretcher within the tank is provided with extensions to hold the separate bottom portion of the tank in place to consolidate the bottom joint.

JOSEPH LLOYD.