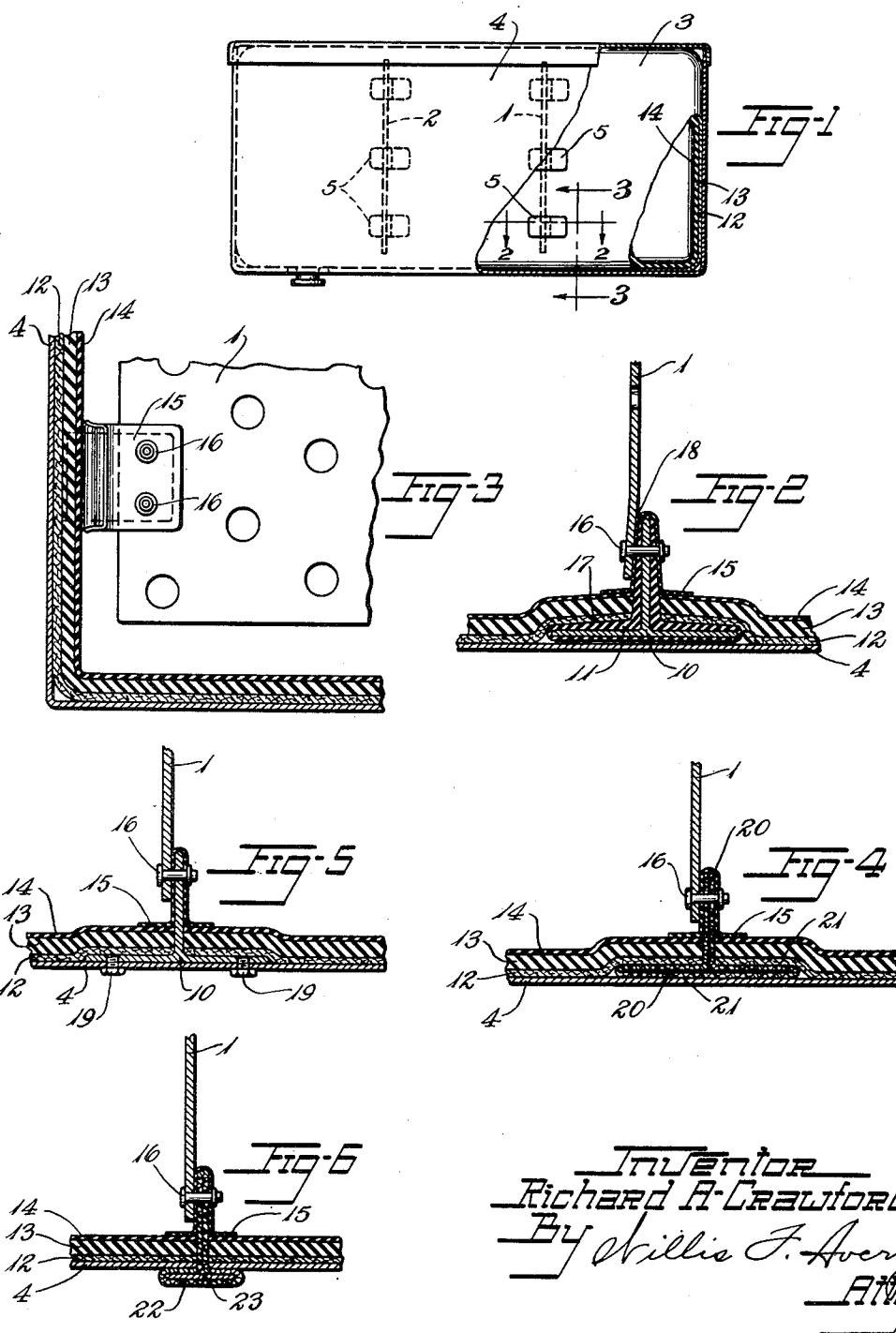


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R. A. CRAWFORD  
SELF-SEALING FUEL TANK

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*Inventor*  
*Richard A. Crawford*  
*By* *Willis F. Avery*  
*Att.*

## UNITED STATES PATENT OFFICE

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## SELF-SEALING FUEL TANK

Richard A. Crawford, Akron, Ohio, assignor to  
The B. F. Goodrich Company, New York, N. Y.,  
a corporation of New York

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This invention relates to self-sealing fuel tanks and pertains specifically to a method for fastening baffles therein.

Self-sealing fuel tanks are widely used in airplanes, tanks, and other military vehicles which are exposed to gunfire. The self-sealing tank wall structure usually comprises an inner oil-resistant lining, e. g., a thin layer of metal, oil-resistant synthetic rubber, cellulose ester or ether, or the like; an intermediate sealing layer consisting of a self-adhesive material which swells when in contact with gasoline or oil, such as unvulcanized rubber; and an outer cover of leather, rubber, fabric, or some similar tear-resistant material. A supporting shell of metal, wood, or some similar relatively rigid material is provided to prevent distortion of the tank when filled. In many such tanks it is necessary to provide baffles in order to reduce the splashing and to keep a supply of the fuel over the outlet at all times, and also to prevent excessive strains on the supporting framework, especially in airplanes, caused by distortion of the tank walls due to the weight of the liquid. It is necessary to fasten the baffles to the walls of the tank because a baffle assembly which is merely fitted loosely into the inside of the tank soon chafes through the thin gasoline-resistant lining and causes destruction of the tank. It has been found to be impractical to construct the tank in the form of separate cells placed in the compartments of a baffled metal tank because of the great expense and labor involved, and because of the excessive weight of the finished tank. The same objections apply to tanks constructed in the form of baffled tanks of metal or other suitable material and lined with a bullet-sealing gasoline-resistant lining.

I have now discovered a method for constructing a baffled self-sealing tank which is inexpensive and which makes possible the repair or replacement of the baffles without difficulty. Several embodiments of my invention are shown in the appended drawing, in which

Fig. 1 is a side elevation, partly broken away and in section, of the finished tank with baffles in place;

Fig. 2 is a detailed section taken along line 2—2 of Fig. 1;

Fig. 3 is a detailed section taken along line 3—3 of Fig. 1;

Figs. 4, 5, and 6 are detailed views, corresponding to Fig. 2, showing various modifications of the structure.

In Fig. 1, the baffles 1, 2 are shown in position inside the tank 3 which is enclosed in a shell 4

of metal, wood, or other rigid supporting material. The baffles are held in position by T-shaped members, the leg of the T extending through the tank wall, and the head 5 of the T-member resting flat against the outer surface of the tank 3 underneath the supporting shell 4. In Figs. 2 and 3, the details of the structure are shown. The core 10 of the T-shaped member may be made of metal, wood, fiber, fabric impregnated with a resinous material, impregnated fiber, vulcanized fiber, hard rubber, synthetic resinous material, or other suitable rigid materials. A layer 11 of a gasoline-resistant material such as polychloroprene, a copolymer of butadiene with acrylonitrile, or the like is molded over the rigid core in order to act as a cushion to prevent the sharp edges of the core 10 from cutting into the wall of the self-sealing tank. The wall of the tank proper, comprising an outer tear-resistant cover 12, a sealing layer 13, and an inner oil-resistant lining 14, is slotted to permit the passage therethrough of the leg of the T-shaped member. The joint between the leg of the T and the inner surface of the tank wall is sealed with a strip of oil- and gasoline-resistant material 15, preferably the same material as is used to line the tank. The baffle 1 may be made of metal, an oil-resistant resinous material such as polyvinyl alcohol, polyvinyl chloride, or the like, fiber impregnated with a gasoline-resistant resin, vulcanized fiber, or other stiff gasoline-resistant material. The baffle is fastened to the leg of the T with a rivet or bolt 16, while the head of the T is fastened to the tank wall with a layer of adhesive at 17. A layer of adhesive 18 may also be used to reinforce or even to replace entirely the rivet 16.

In Fig. 4 is shown a modification of this structure in which the T-member is formed from a sheet of fabric 20 impregnated with or adhered to a sheet of synthetic resinous material, hard rubber, or the like as a stiffening member. Here the layer 11 of cushioning material is omitted, the head of the T being adhered directly to the outer wall of the tank and also to the metal shell with a layer of adhesive 21. The sealing strip 15 is used to prevent leakage of the gasoline around the T, and the baffle 1 is fastened to the T with a bolt or rivet 16.

In another embodiment of my invention, shown in Fig. 5, the molded cushion 11 of plastic material is also omitted, the rigid core 10 of the T-member being adhered directly to the outer surface 12 of the tank wall and covered inside with a strip 15 of gasoline-resistant rubber or

other similar material. The baffle 1 is fastened to the leg of the T by rivet 18, and in addition the head of the T is fastened to the outer metallic shell of the tank with rivets or screws 19.

In the modification shown in Fig. 6 the T is formed from a continuous loop 22 of fabric which is pushed through a slot in the tank wall and in the metal cover. Into the part of the loop remaining outside of the metal shell is inserted a strip 23 of metal, wood, or the like which serves to expand the loop and form the head of the T. The part of the T extending into the tank is covered with sealing strip 15 and fastened to baffle 1 by means of bolt or rivet 16.

The number of T-members required to hold each baffle in place depends upon the size of the baffle and tank, and upon the particular construction of the T-member used. The baffles may be inserted and fastened either before or after vulcanization of the remainder of the tank, but preferably before. A small opening through the wall of the tank provides access for carrying out the riveting or bolting operation.

The method of my invention is particularly advantageous in that it permits the repair or replacement of baffles after they have been installed, and indeed permits the installation of additional baffles at any time, if they are found to be necessary.

Although I have herein disclosed specific embodiments of my invention I do not intend to limit myself solely thereto, but to include all the obvious variations and modifications which lie within the appended claims.

I claim:

1. A self-sealing fuel tank comprising an outer supporting wall of relatively rigid material and a self-sealing tank wall structure disposed within the supporting wall, a baffle disposed within said tank, and supporting means attached to both the baffle and the self-sealing tank wall structure for

supporting the baffle within the tank, said supporting means comprising a plate member associated in parallel relation with and between said supporting wall and said self-sealing tank wall structure, and a second member extending inwardly of the tank from said plate member through the said self-sealing tank wall structure and sealed thereto at the inner surface thereof.

2. A self-sealing fuel tank comprising an outer supporting wall of relatively rigid material and a self-sealing tank wall structure disposed within the supporting wall, a baffle disposed within said tank, and supporting means attached to both the baffle and the self-sealing tank wall structure for supporting the baffle within the tank, said supporting means comprising a plate member disposed in parallel relation between and fastened to said supporting wall and said self-sealing tank wall structure, and a second member extending inwardly of the tank from said plate member through the said self-sealing tank wall structure and sealed thereto at the inner surface thereof.

3. A self-sealing fuel tank comprising an outer supporting wall of relatively rigid material and a self-sealing tank wall structure, disposed within the supporting wall, comprising an outer layer of tough, tear-resistant material, an intermediate layer of self-adherent material which swells in gasoline, and an inner gasoline resistant layer, a baffle disposed within said tank, and supporting means attached to both the baffle and the self-sealing tank wall structure for supporting the baffle within the tank, said supporting means comprising a plate member disposed in parallel relation between and fastened to said supporting wall and said self-sealing tank wall structure, and a second member extending inwardly of the tank from said plate member through the self-sealing tank wall structure and sealed thereto at the inner surface thereof.

RICHARD A. CRAWFORD.