Feb. 7, 1950 C. E. REEDY 2,496,677

TANK CAR NOZZLE

Filed April 19, 1947 2 Sheets-Sheet 1

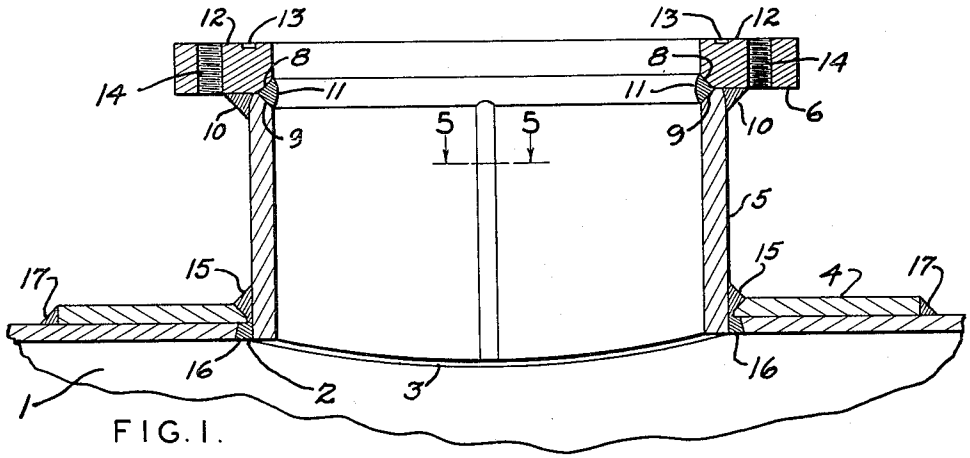


FIG. 1.

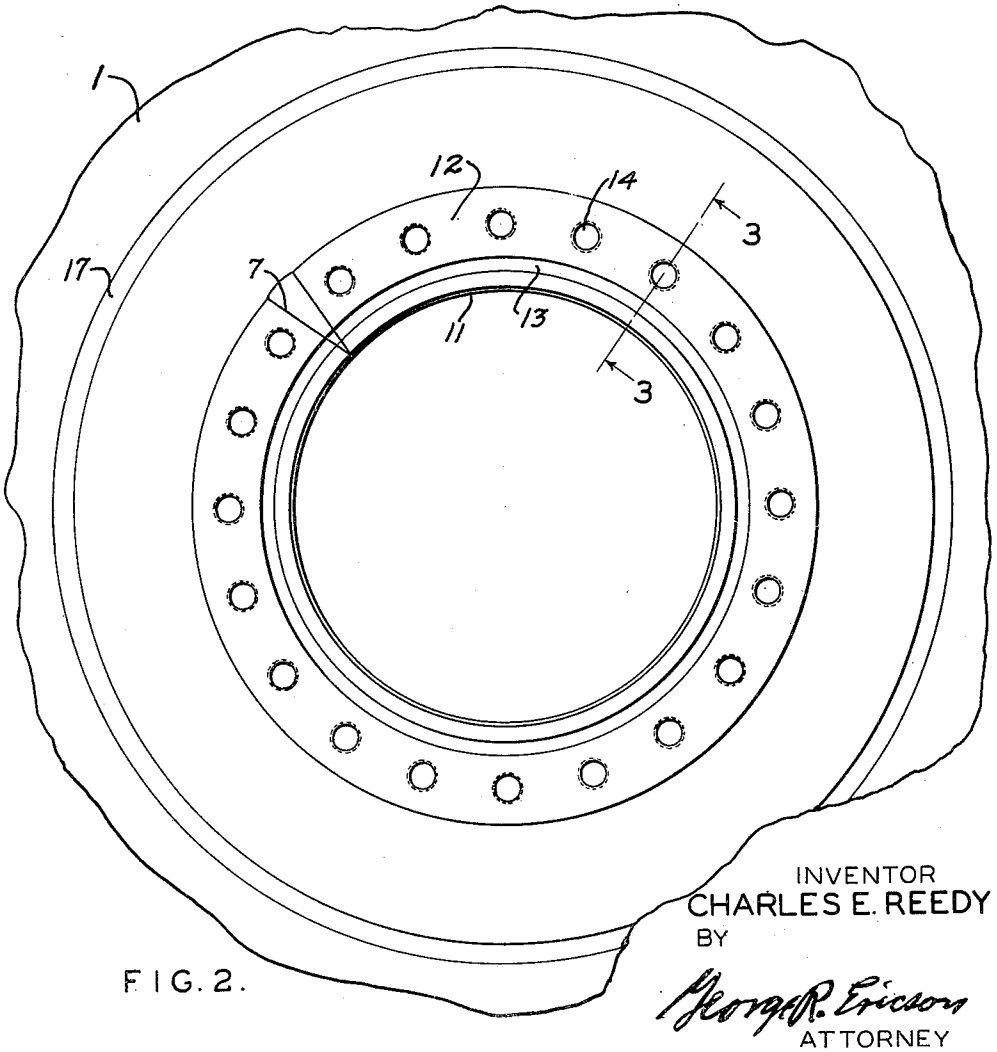


FIG. 2.

INVENTOR
CHARLES E. REEDY
BY
George R. Ericson
ATTORNEY

Feb. 7, 1950 C. E. REEDY 2,496,677

TANK CAR NOZZLE

Filed April 19, 1947 2 Sheets-Sheet 2

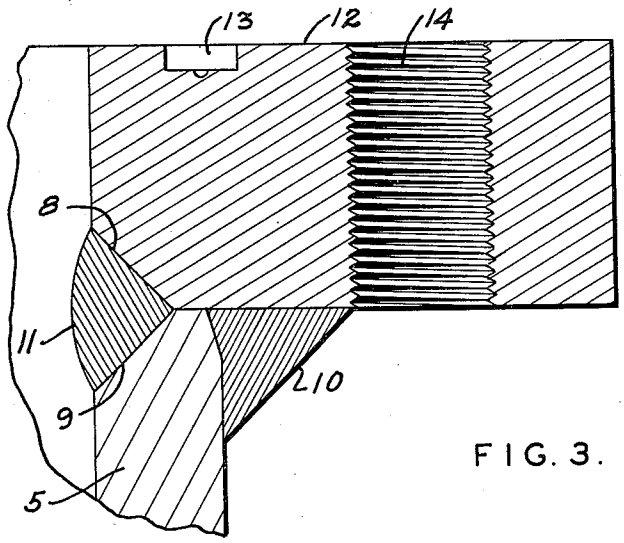


FIG. 3.

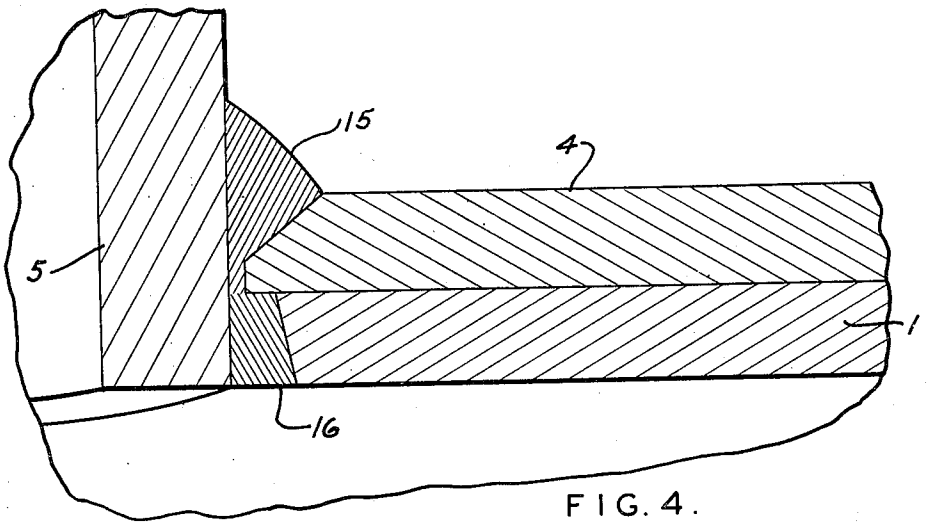


FIG. 4.

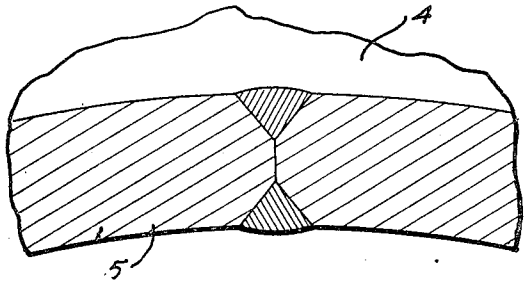


FIG. 5.

INVENTOR
CHARLES E. REEDY
BY
George R. Ericson
ATTORNEY

Patented Feb. 7, 1950 2,496,677

UNITED STATES PATENT OFFICE

2,496,677

TANK CAR NOZZLE

Charles E. Reedy, West Milton, Pa., assignor to American Car and Foundry Company, New York, N. Y., a corporation of Delaware

Application April 19, 1947, Serial No. 742,568

1 Claim. (Cl. 285—106)

1

This invention relates to tank car nozzles and particularly to nozzles for high pressure tanks intended to contain inflammable or dangerous fluids. Considerable difficulty has been experienced in previous designs on account of the development of leaks in unexpected places. The serious results of explosions due to leakages of this kind are so serious that every possible precaution must be taken against any failure due to the design of the tank or nozzle.

I have found that the design can be improved by building up the nozzle from hot rolled plate or sheet steel welded together into a unitary structure which is welded to the body of the tank. I have found that this method of construction can be further improved by forming the parts in such a manner that no laminations in the flange can be directly exposed to the pressure in the tank. I have done this by forming the flange by bending a straight bar into a circle and then welding the ends together. It will be understood that the laminations which may cause leakage or failure in the flange are developed by exposure of the end grain of the metal to the pressure in the tank. Incipient flaws which cannot be detected by X-rays may appear parallel to the grain of the metal and can be developed by pressure and fatigue to a point where they cause leakage or possible failure. In my design, this possibility is eliminated because only the side of the grain is exposed to the pressure.

The strength of my nozzle flange is further increased by initially tensioning the metal in the periphery while the metal on the inside is in compression. This is accomplished by welding a V-shaped section of the flange and wall.

The invention will be better understood upon reference to the following specification and accompanying drawings referring to which

Fig. 1 is a vertical sectional view of a tank having my improved nozzle applied thereto, the main part of the tank being broken away.

Fig. 2 is a plan view of the structure shown in Fig. 1.

Fig. 3 is a detail sectional view taken along the line 3—3 of Fig. 2 looking in the direction of the arrow.

Fig. 4 is an enlarged detail view showing the weld at the junction of the tank base and nozzle.

Fig. 5 is a detail view taken along the line 5—5 of Fig. 1 showing the seam or weld in the nozzle body.

The reference numeral 1 indicates the wall of a tank such as that of a tank car for transporting propane gas or other dangerous or explosive

2

fluids under pressure. The side of the tank wall is cylindrical and is perforated at 2 to receive the nozzle which is circular and cross sectioned and provided with a grooved end portion as indicated at 3 corresponding to the contour of the tank wall. The nozzle comprises a saddle member 4, a cylindrical body member 5 and a flange 6.

The saddle member is cut out of a plate which may, for the particular instance cited, be approximately ¾" in thickness, the same as the wall of the tank. The body 5 of the nozzle is formed by bending a sheet metal plate approximately 1" in thickness into a circle and welding the joint as shown in Fig. 5. This body member is preferably formed with the grain of the metal running circumferentially so as not to have any cross grain surfaces exposed to the pressure in the tank. The flange 6 is formed by taking a straight square bar or metal rolled with the grain parallel to the ring of the bar and then bending the bar into a circle so as to leave no cross grain exposures on the inside of the ring. This results in a ring having a V-shaped opening as indicated at 7 which is filled with a weld preferably made by the submerged arc method but substantially none of this welded material is exposed to the pressure inside the tank. After bending and welding the ring is formed with a chamfer 8 and the body member with a chamfer 9 which is superposed to form a V-shaped groove as shown in Fig. 1. The flange and body members are then welded together with a fillet weld 10 and a weld 11 filling the V groove on the inside and the nozzle flange is then turned to furnish the surface 12 and form welded groove 13. The flange bolt holes 14 are then drilled and tapped after which the nozzle and saddle are welded together into the tank as indicated at 15, 16 and 17. By this method I provide a nozzle in which no cross grain surfaces are exposed to the pressure in the tank and the possibility of failure due to laminations is greatly reduced.

The circumferential width of the V-shaped weld 7 is made greater in proportion to the periphery of the flange 12 than the thickness of the weld at the inner side is to the inside diameter of the ring. For this reason the shrinkage of the welded portion causes the metal at the periphery to be placed in tension, and that at the inside of the ring in compression, thus improving the strength and resistance of the ring to leakage.

I claim:

In a tank nozzle for high pressure tanks, a tubular sheet metal nozzle member formed with its grain running circumferentially, a flange member mounted at one end of the nozzle and having

its inner circumferential face forming a continuation of the nozzle inner wall and lying flush therewith, said flange member comprising a ring formed from a bar of stock with the grain of the metal running circumferentially, said ring including between its ends a transverse weld insert of V-form with the apex of the V insert terminating at its inner face, said weld insert by virtue of contraction during cooling acting to apply tension to the metal in the periphery of the ring, while the metal on the inside of the ring is placed under compression, a fillet weld connecting the inner surface of the ring and the adjacent inner surface of the nozzle, whereby a structure is formed in which no laminations are directly exposed to the pressure in the tank to which the nozzle may be connected.

CHARLES E. REEDY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,701,256	Brown	Feb. 5, 1929
1,853,556	Fairweather	Apr. 12, 1932
1,978,608	Straty	Oct. 30, 1934
2,011,719	Kidd	Aug. 20, 1935
2,273,736	Raymond	Feb. 17, 1942