March 12, 1935. P. S. ENDACOTT 1,994,338

LIQUEFIED GAS TRANSPORTING APPARATUS

Filed July 31, 1933

FIG. 1.

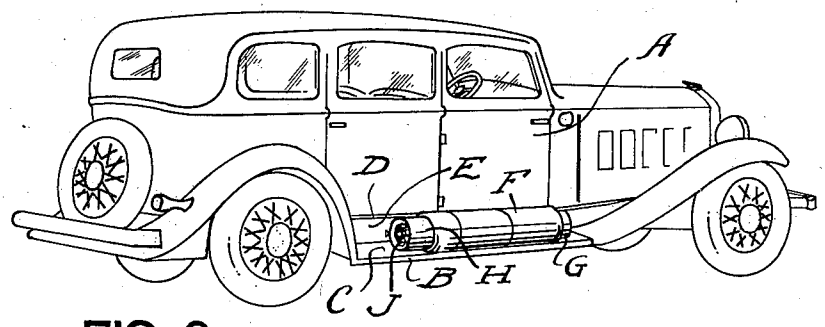


FIG. 2.

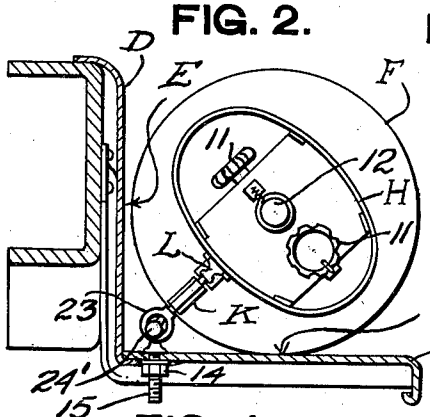


FIG. 8.

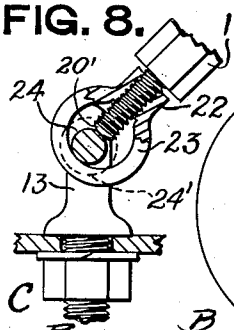


FIG. 3.

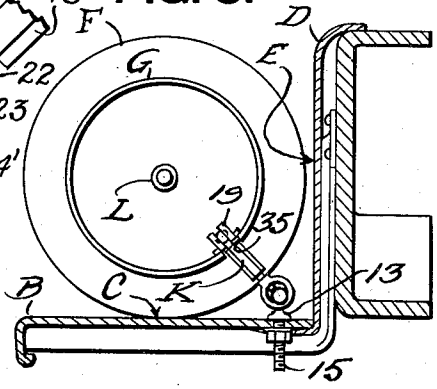


FIG. 4.

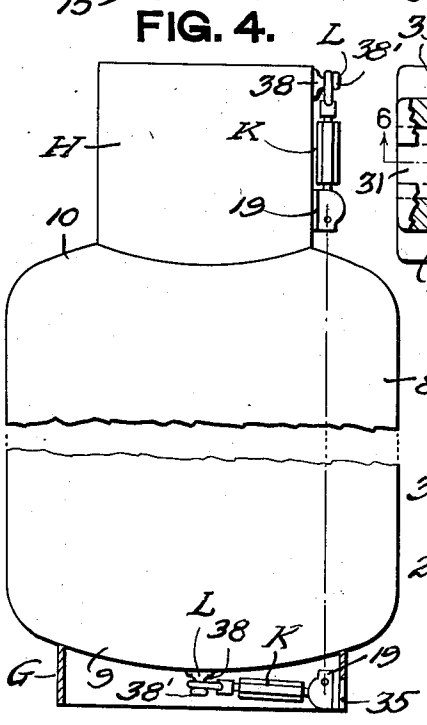


FIG. 5.

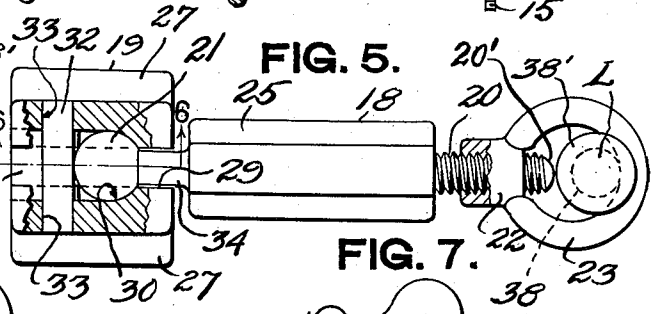
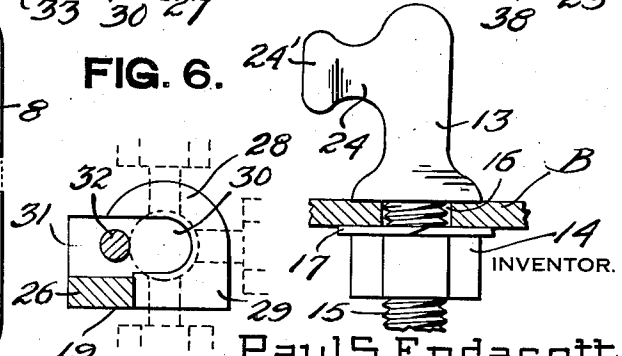


FIG. 7.

FIG. 6.



INVENTOR.

Paul S. Endacott

BY

Lancaster, Allwine and Rommel

ATTORNEYS.

Patented Mar. 12, 1935 1,994,338

UNITED STATES PATENT OFFICE

1,994,338

LIQUEFIED GAS TRANSPORTING APPARATUS

Paul S. Endacott, Detroit, Mich., assignor to Phillips Petroleum Company, Bartlesville, Okla., a corporation of Delaware

Application July 31, 1933, Serial No. 683,091

9 Claims. (Cl. 224—29)

The present invention relates to customer's apparatus for the transportation of liquefied gas, such as propane, and more particularly to apparatus whereby the customer may use the family automobile or other vehicle for such purpose.

Heretofore it has been the most general practice to "service" customers with liquefied gas for domestic and an analogous purposes, according to what is generally known as the "one-drum" and the "two-drum" systems.

According to the "one-drum" system the customer has on his premises a drum, hereinafter called a tank, for storage of liquefied gas and other equipment for utilization of the gas. The customer's equipment is generally serviced by the vendor transporting and introducing into the tank a supply of the liquefied gas. In order to make reasonably sure that the customer will have at all times a ready supply of the liquefied gas in storage, without attention on the part of the customer to the equipment, trips are made periodically by truck to the customer's equipment. A truck for such purpose is shown in patent on the invention of Paul S. Endacott, No. 1,897,161, granted February 14, 1933.

This system has many advantages mainly among which is the low investment in tanks, since only one tank is provided as a part of the customer's equipment and it remains on the customer's premises indefinitely. This is in contradistinction to the "two-drum" system, where at least two tanks ordinarily form a part of the customer's equipment, altho gas is generally being drawn from but one of the tanks at a time.

The "two-drum" system involves a servicing operation on the part of the customer as well as the vendor. The customer, when he has utilized all of the liquefied gas in one tank, goes to the equipment and, by the manipulation of valves brings into use the second filled tank. He then notifies the vendor, as by mail or telephone, to come for the empty tank and replace it with a filled tank. The service man is thus required to either make by use of a truck, a special trip to the customer's equipment or include it as a stop if traveling a route in order to substitute a filled tank for that which has been emptied and to be in readiness to be drawn upon when the occasion arises. The "two-drum" system, it will be seen has high investment requirements, that is, at least two tanks for each customer, and expensive distributing costs.

Both the "one-drum" and "two-drum" systems are necessarily restricted to relatively small geographical areas which have high concentration of population beyond the gas mains, for it is unprofitable for the vendor, or too expensive for the purchaser if these servicing trucks must travel a considerable distance from the vendor's service station or depot.

The principal object of the present invention is to provide apparatus particularly well adapted for, but not necessarily limited to use where the customer operates the liquefied gas storage and utilization equipment on his premises and looks after the transportation of the empty or partially empty tank to a supply depot or station, and a filled tank from such depot or station to his equipment. In doing so the customer may use any suitable vehicle for transportation of the tank and its contents. For instance, the family automobile may be used and since, in the outlying rural sections trips are frequently made to the more populated sections where there are various supply establishments, this transaction may take place while on other errands. Thus liquefied gas may be made available to those located in sections where the cost of servicing of the customer's equipment according to the "one-drum" and "two-drum" systems above referred to, would be prohibitive. It is preferred to make the tanks relatively smaller than those used where the equipment is serviced by the vendor. For instance, a filled tank of 45 lbs. capacity may be readily lifted and carried or rolled over the ground by the average adult without difficulty and serve as a source of supply for several days, or a month or more according to the length of time the equipment is in operation and the number and kind of appliances in use during such operation, before the tank must again be detached from the customer's equipment and replaced by a tank containing a further supply.

Another object of the invention is to provide a neat, simple, safe and compact tank for liquefied gas and means for attaching same to a part of a vehicle in such a manner that it may be readily transported with a reasonable degree of safety on vehicles such as an automobile.

Another object of the invention is to provide an attaching device that is simple in construction, easy to operate, and dependable, so that the cost of manufacture and maintenance is relatively low. The user from a mere inspection or slight manipulation of it will observe its operation, and may securely couple the tank to the

running board, trunk rack, or other portion of the vehicle.

Other objects and advantages of the invention will appear in the following detailed description, taken in connection with the accompanying drawing, forming a part of this specification, and in which drawing:—

Figure 1 is a perspective view of an automobile showing a tank constructed according to the present invention, attached thereto for transportation.

Figure 2 is a view partly in section thru a portion of the vehicle, showing the tank secured in place, and looking toward what is normally the top end of the tank.

Figure 3 is a similar view, but looking toward the bottom end of the tank.

Figure 4 is a fragmentary view partly in elevation and partly in vertical section of the tank.

Figure 5 is a detail view partly in plan and partly in section of one of the fastening devices.

Figure 6 is a detail view in section of a lug forming a part of the fastening device taken on the line 6—6 of Figure 5.

Figure 7 is a detail view of the preferred form of post carried by the vehicle and forming a part of the fastening device, a portion of the running board being shown in vertical section.

Figure 8 is a detail view partly in vertical section and partly in elevation of portions of the fastening device adjacent an automobile running board or other support for the tank.

In the drawing, wherein similar characters designate similar parts and characteristics of parts thruout the views, A is a vehicle such as an automobile, preferably including a running board B or other structure presenting a horizontal surface C, and an apron D or other structure presenting an upright surface E, the surfaces D and E being in angular relation to one another; F a tank for liquefied gas, including a foot ring or collar G and a head ring or collar H; J means for controlling exit of gas from the tank, K fastening devices for detachably securing the tank F to the vehicle A; and, L means for holding the parts of the fastening device in snug relation to the tank when not in use.

The vehicle A may be of any suitable type or model. The preferred location of the tank during automotive transit is not inside the passenger compartment, but rather on the running board, trunk rack, or other external structure, first, to prevent the possible release of gas inside the car in the event of very unusual interior automative accidents, and second to prevent the possibility of injuries coincident with lifting the tank from the ground to a height such as would be required if placed in the passenger compartment. It is to be understood therefore that the usual portions, forming a part of standard vehicle structures may be used for support of the tank during transit, or suitable minor alterations, or additions to the vehicle may be made to accommodate the tank.

Propane is a liquefied gas under superatmospheric pressure. Its weight, volume for volume, is considerably less than that of water. Since it is desired to provide a tank to accommodate propane which will last the average family several days or perhaps a month or more, the tank is elongated and preferably comprises a cylindrical main body portion 8, with the foot ring or collar G at its lower end 9, and the ring or collar H at its upper end 10, the latter serving to protect the means J which, in the example shown, includes one or more valves 11, the outlet of which is shown provided with a cap 12 to exclude the entrance of dust, dirt and moisture.

Referring now to the fastening devices K, each preferably comprises a fixed unit or post 13 carried by the vehicle, (shown attached to the running board B by a nut 14 on screw threaded shank 15 extending thru a hole 16 in the running board, there being a lock washer 17 interposed between nut 14 and the running board); and a companion unit 18, preferably in the form of an elongated pivoted clasp carried by the tank.

Clasp 18 preferably comprises a lug 19; a screw 20 swiveled to lug 19 as by ball head 21, located at one end of the screw, the other end being preferably rounded as at 20'; a nut 22 on screw 20; and, a coupling terminal 23 rigid with the nut, for engagement with the fixed unit or post 13.

In the example shown, the unit or post 13 is provided with a hook or bill 24, about which the coupling terminal 23 may be disposed and subsequently drawn into intimate contact therewith, by rotation of the screw 20. To facilitate rotation of the screw, it may be provided intermediate its ends with a polygonal portion 25, suitable to receive a wrench or to be grasped between the index finger and thumb of the hand when a wrench is not available, or its use is not desired. The hook or bill 24 is preferably provided with an enlargement or head 24' which prevents the coupling terminal from slipping off the hook or bill until the screw 20 has been rotated a number of turns to feed the nut 22 outwardly sufficient to permit the terminal 23 clearing the head 24' when the clasp 18 is swung about its pivot.

Lug 19 preferably comprises a base 26 having parallel flanges 27; a bearing 28, provided with a slot 29 leading from a semi-spherical socket 30 and a lateral way 31 leading to socket 30; and a cross pin 32 received in openings 33, which align, and the axes of which traverse the lateral way 31, so that when the ball head 21 is in the socket 30, and the pin 32 is in place, having a tight fit in openings 33, the ball head 21 cannot pass out of lateral way 31 altho the screw 20 is swiveled to the lug and may be swung to various positions as indicated by dotted lines in Figure 6, the shank 34 of the screw being accommodated in slot 29.

It is preferred to fasten one of the clasps 18 to the foot ring G as shown in Figures 3 and 4 and with this end in view, the ring G is provided with a slot 35 which aligns with slot 29 of lug 19, the lug being welded or otherwise secured, as by flanges 27 to the inner circumference of the ring. It will be observed that the clasp 18, as shown in Figure 4, may be disposed in snug relation with the bottom of the tank, that is, closely adjacent thereto, when not in use, or, as shown in Figure 3 may be swung to a position so as to extend radially of the axis of the tank, beyond the peripheral plane thereof when used to secure the tank to the vehicle. When in the latter position, the clasp 18 extends thru slot 35 in the foot ring. In order to hold the clasp in snug relation to the tank as shown in Figure 4, the tank is provided with means L, which in the example shown, is in the form of a post 38 provided with a head 38'. By swinging the clasp so as to be disposed wholly within the confines of ring G, and manipulating the screw 20, the terminal 23 may be placed about the post 38, and

upon rotating the screw in the opposite direction, the terminal 23 may be drawn into intimate contact with the post, the same as is possible in connection with bill or hook 24 of post 13.

It is preferred to dispose the other clasp on the exterior of ring or collar H, as shown in Figures 2 and 4. The lug 19 is welded or otherwise secured in place, preferably adjacent the juncture of the ring or collar H with the main body 8 of the tank, so that when the clasp 18 is not in use it may be retained with its axis extending parallel to the axis of the tank, by post 38, as shown in Figure 4, but when in use to retain the tank on the vehicle, it is swung to assume a position extending radially of the axis of the tank, and beyond the peripheral plane of the tank, as shown in Figure 2, where its terminal 23 engages hook 24 of post 13.

The fastening devices for detachably securing the tank to the vehicle, as shown in the drawing and above described, are strong, readily attached by an untrained person, and securely anchor the tank in place under the worst conditions of vibration and strain during transit, since they permit drawing the terminals 23, and feeding of the rounded ends 20' of the screws 20 into intimate contact with their respective hooks 24, as shown more in detail in Figure 8. Thus the clasps 18 cooperating with the companion units or posts 13 act as tension and compression members, depending upon the forces coming upon the tank F to keep it out of contact with the vertical surface E and in proper place upon surface C. By this arrangement the running board may be used to firmly support the tank during transit without denting or scratching or otherwise marring the apron D or other parts adjacent the running board.

If the screw part of the clasp 18 becomes damaged, it may be replaced by driving out pin 32 and sliding the ball head 21 along lateral way 31, and after a new screw has been placed, the pin 32 may be driven into place.

In reduction to practice, it has been found that the form of the invention illustrated in the drawing and referred to in the above description, as the preferred embodiment, is most efficient and practical; yet realizing that conditions concurrent with the adoption of the apparatus will necessarily vary, it is desired to emphasize the fact that various minor changes in details of construction, proportion and arrangement of parts may be resorted to, when required, without sacrificing any of the advantages of the invention as defined in the appended claims.

What is claimed is:

1. As an article of manufacture, an elongated cylindrical tank, and an elongated attaching device pivoted to the tank to lie, in one position, when not in use, in snug relation to the tank, and to extend, in another position, when in use, radially of the axis of the tank.

2. In apparatus of the class described, an elongated tank, a foot ring carried at one end of the tank, provided with a slot, a clasp of a length less than the diameter of said ring, and means located inside the ring pivotally connecting the clasp to the tank so that it may lie, in one position, when not in use, inside the ring and extend, in another position, when in use, outside the ring thru said slot.

3. In apparatus of the class described, an elongated cylindrical tank, a clasp of a length less than the diameter of the tank, and means pivotally connecting the clasp to an end of the tank and to one side of the axis thereof so that it may be swung to one position, to lie snugly adjacent said end when not in use, and so that it may be swung to another position, to extend outwardly of the peripheral plane of the tank when in use.

4. As an article of manufacture, an elongated tank for liquefied gas, control means carried by an end portion of the tank for control of egress of gas therefrom, a protecting ring on the tank about said control means, and an elongated fastener pivoted to the ring to lie substantially parallel to the axis of the tank when not in use, and to extend radially of the axis of the tank when in use.

5. As an article of manufacture, an elongated cylindrical tank, a collar smaller in diameter than and disposed at an end of the tank, and an elongated fastener pivoted at one end portion to the collar and adapted to be swung to extend radially beyond the peripheral plane of the tank when in use, and to be swung to lie inwardly of the peripheral plane of the tank when not in use.

6. A fastener for securing a tank to a support comprising a lug, a screw swiveled to the lug, a nut on the screw, and a coupling terminal carried by the nut.

7. In apparatus of the class described, the combination with an elongated cylindrical tank and a flat supporting surface therefor, such as the running board of a vehicle, said tank resting on its side, of fastener units rigid with the support and spaced apart a distance approximately equal to the length of the tank, and companion fastener units for detachable connection with said first mentioned units pivotally carried by the ends of the tank, said second mentioned units movable to lie closely adjacent the same when not in use, and to extend radially of the axis of the tank when connected to their companion units of the support, to keep the tank from rolling on the support.

8. In apparatus of the class described, the combination with an elongated cylindrical tank and a flat support therefor, such as the running board of a vehicle, said tank resting on its side, of posts rigid with the support and spaced apart a distance approximately equal to the length of the tank, companion clasps for detachable connection with said posts, pivotally carried by the ends of the tank, said clasps movable to extend radially of the axis of the tank when detachably connected to their companion posts to keep the tank from rolling on its support, and movable to lie closely adjacent the tank ends when not in use, and companion posts carried by the tank ends for detachable connection with said clasps when in said last mentioned position.

9. In combination with an automobile including a running board and an apron to one side and extending above the running board, an elongated cylindrical tank resting on its side upon said running board, and means for detachably retaining the tank against rolling movement on the running board and spaced from said apron.

PAUL S. ENDACOTT.