SELF-MOTIVATING AUTOMATIC SYPHONING TANK SYSTEM

The present invention relates to self-motivating automatic siphoning and equalizing tank system, and refers more particularly to liquid transfer means in a multiple tank liquid storage system whereby the liquid in the multiple tanks is maintained at an equal level through the use of a siphon tube between the tanks and means to prime said siphon tube to initiate siphoning action therebetween.

In multiple tank liquid storage systems such as saddle tank fuel storage units it has been past practice to provide a separate fuel pump, wiring harness and discharge line for the individual tanks of the unit. With such systems a shuttecock or selector valve is provided to be operated when it is necessary to switch from one tank to another. Such systems are expensive to install and maintain and require manual operation.

Therefore applicants provide a liquid transfer system which allows fuel to be taken from a single tank of a multiple tank liquid storage unit, and which automatically maintains the liquid in all of the tanks of the storage unit at an equal level. The system as disclosed eliminates multiple pumps, wiring harnesses and discharge lines. Also, no manual selection of tanks is required with applicants' system.

One of the essential objects of the present invention is to provide improved liquid transfer means for a multiple tank storage system which will equalize the liquid level in the individual tanks of the system.

Another object is to provide improved means for initiating siphon action in a siphon tube, the siphon tube operating to equalize the liquid level in a multiple tank liquid storage system.

Another object is to provide means to feed fluid into a siphon tube acting between two tanks of a multiple tank liquid storage unit to initiate siphoning action between the two tanks to equalize the level of the liquid therein.

Another object is to provide means to feed back fluid from a discharge line from a pump pumping fluid from one tank of a multiple tank storage system to a siphon tube connecting the one tank with another tank of the storage system to initiate siphoning action between the tanks to equalize the fluid level in them.

Another object is to provide means to initiate siphoning action in a siphoning tube between two tanks of a multiple tank fuel storage unit which is simple in construction, easy to manufacture and efficient in use.

Other objects and features of the invention will become apparent as the description proceeds, especially when taken in conjunction with the accompanying drawings, illustrating a preferred embodiment of the invention, wherein:

FIGURE 1 is a front elevation view of a multiple tank liquid storage system in accordance with the present invention as applied to a saddle tank system.

FIGURE 2 is a top plan view of the system of FIGURE 1 showing the top surface thereof partially broken away.

FIGURE 3 is a sectional view of the system of FIGURE 1 taken along the line 3—3.

FIGURE 4 is an enlarged sectional view of the adapter 26 of FIGURES 1, 2 and 3.

In the specific embodiment of this invention illustrated in the drawings a saddle tank generally indicated 10 of the type suitable for truck installation is provided with a fuel transfer system generally indicated 12. The fuel transfer system 12 includes a siphon tube 14 extending from the bottom of tank 16 of saddle tank 10 across the saddle portion 18 thereof and to the bottom of tank 20. Fuel pump 22 is mounted within tank 20 at the bottom thereof. Fuel discharge line 24 is provided between pump 22 and fuel utilization means (not shown).

Adapter 26 is inserted in fuel discharge line 24 within tank 20. A second adapter 28 is inserted in the siphon tube 14 within tank 16. Priming or feed back line 30 is connected between adapters 26 and 28 providing feed back means for fuel under pressure from pump 22 into siphon tube 14 to initiate siphon action therein so that the fuel level in tanks 16 and 20 are maintained level.

In the specific embodiment of this invention illustrated in the drawings a saddle tank generally indicated 10 of the type suitable for truck installation is provided with a fuel transfer system generally indicated 12. The fuel transfer system 12 includes a siphon tube 14 extending from the bottom of tank 16 of saddle tank 10 across the saddle portion 18 thereof and to the bottom of tank 20. Fuel pump 22 is mounted within tank 20 at the bottom thereof. Fuel discharge line 24 is provided between pump 22 and fuel utilization means (not shown).

Adapter 26 is inserted in fuel discharge line 24 within tank 20. A second adapter 28 is inserted in the siphon tube 14 within tank 16. Priming or feed back line 30 is connected between adapters 26 and 28 providing feed back means for fuel under pressure from pump 22 into siphon tube 14 to initiate siphon action therein so that the fuel level in tanks 16 and 20 are maintained level.

Saddle tank structure 10 comprises a pair of like cylindrical tanks 16 and 20 of conventional type. The tanks 16 and 20 are bridged by a connecting hollow saddle section 18 as shown in FIGURE 1.

Fuel pump 22 of conventional design is mounted in tank 20 at the bottom as indicated schematically in the drawings. A suitable handle 32 which is normally closed by removable cover 34 permitting access to pump 22 is provided at the top of tank 20. Each tank 16 and 20 are also equipped with a filling fitting 36 and 38 respectively covered by vented closure caps 40 and 42.

Tanks 16 and 20 can both be filled from either side by means of open saddle portion 18. In these respects the tanks are conventional.

Fuel transfer system 12 includes an elongated siphoning tube or conduit 14 which is of inverted U-shaped form as shown in FIGURE 1 and is disposed within the tanks 16 and 20 and connecting saddle portion 18. Siphoning tube 14 is secured to one of the walls of these members by brackets 44 as indicated in the drawings.

A check or surge valve 46 is connected to that end of the siphoning tube terminating near the bottom of tank 16. The check valve 46 operates to initiate siphon action in siphon tube 14 due to surging fuel in tank 16 when the saddle tank 10 is mounted on a mobile unit such as a truck thereby maintaining fuel levels equal in tanks 16 and 20.

According to the present invention means are provided to initiate siphon action in siphon tube 14 even when tanks 16 and 20 are not mobile mounted and to improve the siphon action in tube 14 when tanks 16 and 20 are mobile mounted.

Fuel discharge line 24 is conventionally provided between pump 22 and a utilization device such as the carburetion system of a truck (not shown). As best shown in FIGURE 2 applicants insert an adapter 26 shown in FIGURE 4 in the fuel discharge line 24 within tank 20. A second adapter 28 which may be a conventional Y-shaped fuel line fitting is provided in siphon tube 14 within tank 16 as shown in FIGURE 1. Connected between adapters 26 and 28 is priming or feed-back line 30 through which fuel from the fuel discharge line 24 is fed back to the siphon tube 14 to increase the siphon action thereof.

Adapter 26 may also be a conventional Y-shaped fuel line fitting coupled into the fuel discharge line 24 by the usual couplings 48. It is essential however, that the arm 50 of adapter 26 have a restricted orifice 52 therein to limit the amount of fuel feed back into siphon tube 14.

A practical inside diameter for the fuel discharge line 24, the feed-back line 30 and siphon tube 14 is ½ inch. The restricted orifice 52 should be configured such that it be of the order of ⅛ inch diameter. To facilitate connection between arm 50 and line 30 a conventional reduction coupling 54 is provided. The members of the fuel trans-
fer system 12 may be made of conventional materials such as copper or a suitable plastic or a combination of such materials.

In use, the system constructed as described above operates to maintain the fuel level in the tanks 16 and 20 at an equal level. Fuel is pumped from tank 20 only, thus eliminating the need for dual pump installations and switching of tanks. Due to the restricted orifice 52 in arm 50 of adapter 25, most of the fuel pumped by pump 20 through fuel discharge line 24 continues to the fuel utilization means. A small portion of this fuel under pressure from pump 22 is diverted through restricted orifice 52 in arm 50 of adapter 26 to feed tank 30. The fuel in line 30 is injected into siphon tube 14 through adapter 28 thereby priming siphon tube 14 in an improved manner to initiating siphon action equalizing the fuel level in tanks 16 and 20.

While the embodiment of the invention illustrated in the drawings depicts the invention as applied to a saddle tank of the type installed on trucks, other applications of the invention in both moving and stationary installations will be obvious to those skilled in the art. Modification of the invention such as the placing of the pump and lines outside of the tanks is possible. Therefore applicants do not wish to be limited to the single embodiment of their invention disclosed above.

The drawings and the foregoing specification constitute a description of the improved "Self-Motivating Automatic Siphoning and Equalizing Tank System" in such full, clear, concise and exact terms as to enable any person skilled in the art to practice the invention, the scope of which is indicated by the appended claims.

What we claim as our invention is:

1. A saddle tank fuel transfer system comprising a pair of laterally spaced tanks mounted in substantially the same horizontal plane and connected by an open saddle portion, a siphon transfer tube extending from the bottom of one of said tanks of the saddle tank across the saddle portion and terminating at the bottom of the other of the tanks, a surge valve in the end of the siphon tube at the bottom of said one tank, a fuel pump and a pump discharge line connected to said fuel pump operably associated with said other tank, a Y-shaped adapter having a restricted orifice in one arm thereof installed in the pump discharge line, a second Y-shaped adapter inserted in the siphon transfer tube and a priming line between the arm of the first adapter having the restricted orifice therein and the second adapter whereby fuel under pressure from said pump may be discharged into the siphon tube to initiate siphon action therein to equalize the liquid level in the two tanks.

2. A saddle tank fuel transfer system comprising a pair of laterally spaced tanks mounted in substantially the same horizontal plane and connected by an open saddle portion, a siphon transfer tube extending from the bottom of one of said tanks across the saddle portion and terminating at the bottom of the other of said tanks, a surge valve in the end of the siphon tube at the bottom of said one tank, a fuel pump and a pump discharge line operably associated with said fuel pump, a pump discharge line adapter having three hollow intersecting arms, two of which connect the adapter in the pump discharge line, a siphon tube adapter having three hollow intersecting arms, two of which connect the siphon tube adapter to the siphon tube, and a priming line connected between the third arm of the discharge line adapter and the third arm of the siphon tube adapter, the third arm of the discharge line adapter having a restricted orifice therein limiting the quantity of fuel discharged into said siphon tube from the discharge line whereby a determined amount of fuel under pressure from said pump may be discharged into the siphon tube to initiate siphon action therein to equalize the fuel level in the two tanks.

3. A saddle tank fuel transfer system comprising a pair of laterally spaced tanks mounted in substantially the same horizontal plane and connected by an open saddle portion, a siphon transfer tube extending from the bottom of one of said tanks across the saddle portion and terminating at the bottom of the other of said tanks, a surge valve in the end of the siphon tube at the bottom of said one tank, a fuel pump installed in said other tank and a pump discharge line operably associated with said fuel pump, a pump discharge line adapter having three hollow intersecting arms, two of which connect the adapter in the pump discharge line within said other tank, a siphon tube adapter having three hollow intersecting arms, two of which connect the siphon tube adapter to the siphon tube within said one tank, and a priming line connected through said saddle portion of the saddle tank between the third arm of the discharge line adapter and the third arm of the siphon tube adapter, the third arm of the discharge line adapter having a restricted orifice therein limiting the quantity of fuel discharged into said siphon tube from the discharge line whereby a determined amount of fuel under pressure from said pump may be discharged into the siphon tube to initiate siphon action therein to equalize the fuel level in the two tanks.

4. A vehicle mounted fuel storage and transfer system comprising a pair of laterally spaced tanks mounted in substantially the same horizontal plane and connected by an open saddle portion, a siphon transfer tube extending from one of said tanks across the saddle portion and terminating in the other of the tanks, a fuel pump associated with said other tank, a pump discharge line connected to said fuel pump and a restricted feedback conduit connected at opposite ends to the siphon transfer tube and pump discharge line for feeding a portion of the fuel pumped through the pump discharge line into the siphon transfer tube to initiate siphon action wherein whereby the liquid level in the two tanks is maintained at the same level.

5. A vehicle mounted fuel storage and transfer system comprising a pair of laterally spaced tanks mounted in substantially the same horizontal plane and connected by an open saddle portion, a siphon transfer tube extending from one of said tanks across the saddle portion and terminating in the other of the tanks, a surge valve in the end of the siphon tube in said one of said tanks, a fuel pump associated with said other tank for pumping fuel therefrom, a pump discharge line connected to said fuel pump through which the fuel pumped by the pump is discharged from said other tank of the means for feeding a portion of the fuel pumped through the pump discharge line into the siphon transfer tube to initiate siphon action wherein whereby the liquid level in the two tanks is maintained at the same level.

6. In a vehicle mounted saddle tank fuel storage, transportation and discharge system, a pair of laterally spaced tanks mounted in substantially the same horizontal plane and connected by an open saddle portion, a fuel pump operably associated with said saddle tank for pumping fuel from one tank thereof, a pump discharge line connected to said fuel pump, and fuel transfer means operable to maintain the level of the fuel in said tanks substantially equal, said fuel transfer means comprising a siphon tube extending from the bottom of said one tank, across the open saddle portion of the saddle tanks to the bottom of the other tank, a priming line for discharging pumped fuel under pressure from the discharge line directly into the siphon tube and separate adapters for connecting said priming line directly to said siphon tube and into said discharge line, each of said adapters including three hollow intersecting arms, one of said three intersecting arms of one of said adapters being connected to said priming line, the other two intersecting arms of said one of said adapters being connected in said siphon line, one of said three intersecting arms of the other of said adapters having a restriction therein and being connected to said priming line, the other two intersecting
arms of said one of said adapters being connected in said pump discharge line.

7. In a vehicle mounted saddle tank fuel storage, transportation and discharge system, a pair of tanks connected by a saddle portion, means for pumping fuel from one of said tanks including a fuel discharge line, and fuel transfer means operable to maintain the level of fuel in said tanks substantially equal, said fuel transfer means comprising a siphon tube extending from one of said tanks into the other tank, a priming line for discharging pumped fuel from the fuel discharge line directly into the siphon tube and an adapter including three hollow intersecting arms for connecting said priming line into said discharge line, two of said arms being connected serially in the discharge line and the third of said arms having a restriction therein and being connected to said priming line.

8. In a vehicle mounted saddle tank fuel storage, transportation and discharge system, a pair of tanks connected by a saddle portion, means for pumping fuel from one of said tanks including a fuel discharge line, and fuel transfer means operable to maintain the level of fuel in said tanks substantially equal, said fuel transfer means comprising a siphon tube extending from the other of said tanks into said one tank, a priming line for discharging pumped fuel from the fuel discharge line directly into the siphon tube within said other tank and an adapter including three hollow intersecting arms for connecting said priming line into said discharge line, two of said arms being connected serially in the discharge line and the third of said arms having a restriction therein and being connected to said priming line.

9. In a vehicle mounted saddle tank fuel storage, transportation and discharge system, a pair of laterally spaced tanks mounted in substantially the same horizontal plane and connected by an open saddle portion, a fuel pump operably associated with said saddle tank to pump fuel from one tank thereof, a pump discharge line connected to said fuel pump, and fuel transfer means operable to maintain the level of the fuel in said tanks substantially equal, said fuel transfer means comprising a siphon tube extending from the bottom of said one tank, across the open saddle portion of the saddle tanks to the bottom of the other tank, a priming line for discharging pumped fuel under pressure from the discharge line directly into the siphon tube, adapter means for connecting said priming line directly into said siphon tube and into said discharge line, and a surge valve in said siphon tube near the bottom of said other tank operable on surging of fuel within said other tank due to vehicle operation to pass fuel into said siphon tube and to prevent fuel from said priming line from being discharged into said other tank whereby priming of said siphon tube is facilitated.

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