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FILLING APPARATUS FOR TRACTOR GASOLINE TANKS

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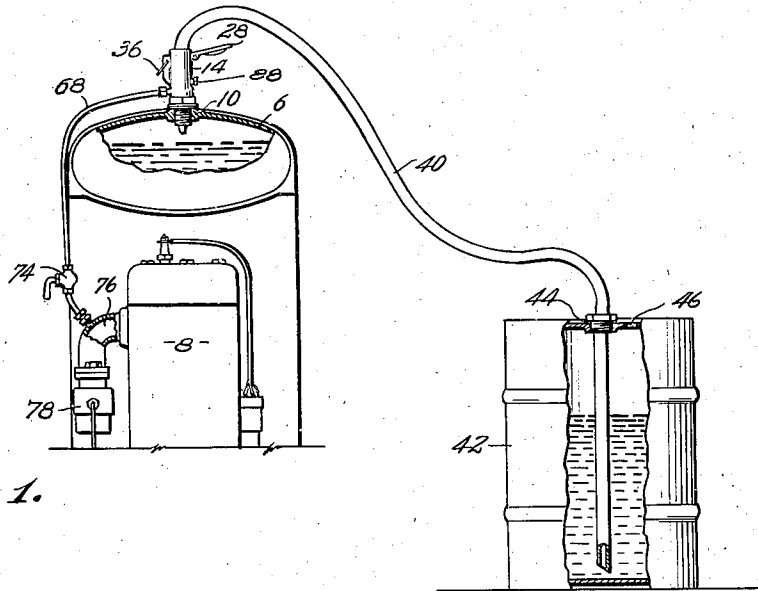


Fig. 1.

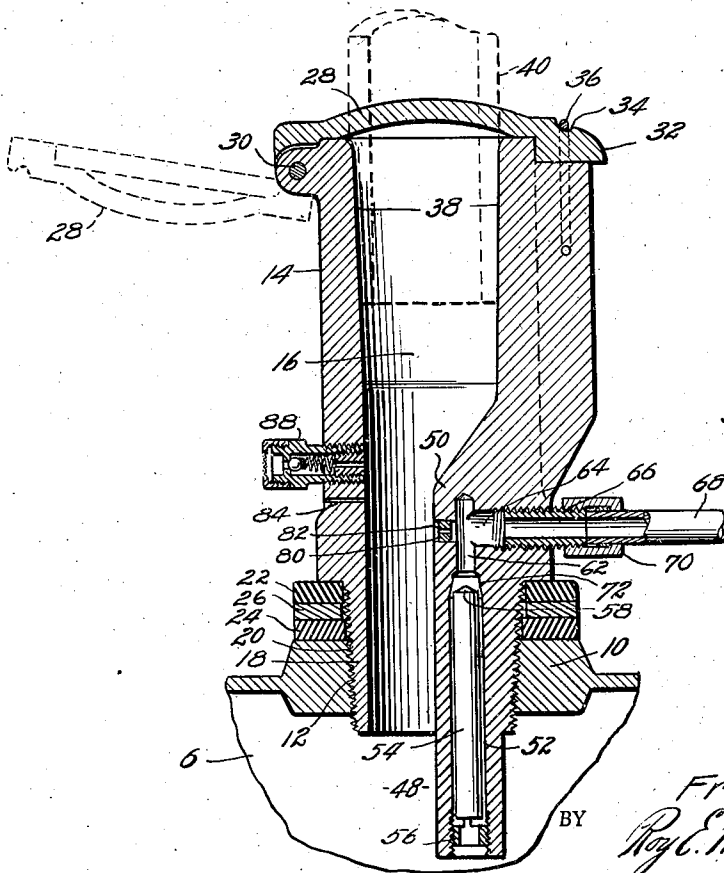
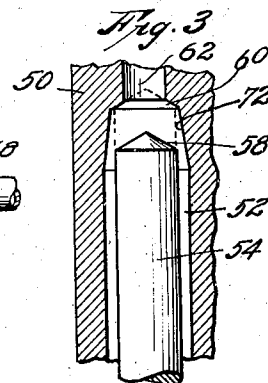


Fig. 2.



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FILLING APPARATUS FOR TRACTOR
GASOLINE TANKS

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5 Claims. (Cl. 123—198)

This invention relates to improvements in filling apparatus for gasoline tanks and particularly to a filling apparatus suitable for transferring gasoline or similar liquid fuel products from a container to an engine fuel tank positioned thereabove.

Much labor and danger attends the present method of filling the fuel tanks of tractors, combines, motor launches, etc. from storage tanks, because of the position the operator must take while pouring the gasoline from a bucket into the fuel tank, which is usually positioned too high to be filled from the ground. Furthermore there is danger of fire due to the gas fumes radiating from the exposed gasoline, and the fact that some of the gasoline may be spilled in the transfer.

It is the principal object of the present invention to produce a filling apparatus for fuel tanks which will constantly maintain the fuel passing from the fuel container to the fuel tank, completely confined to prevent spilling or evaporation to the atmosphere, and a means whereby the liquid fuel is raised by the differential of pressure in the storage tank and the engine fuel tank through the means of the suction of the engine.

Another object of this invention is the provision of a fuel tank filling means having automatic valve means whereby the flow of liquid to the tank is stopped when the liquid level in the tank has reached a pre-determined height, thereby preventing back flow of the liquid fuel to the container.

A further object of the invention is the provision of a filling apparatus for fuel tanks having means whereby a limited amount of gas from the fuel tank will be fed to the engine during the tank filling operation even though the regular fuel supply through the carburetor is stopped.

Other objects are simplicity and economy of construction, efficiency and ease of operation, and adaptability for use with the various types of motor vehicles using a liquid fuel.

With these objects in view, reference will now be had to the drawing wherein:

Figure 1 is an elevational view partly broken away of a filling apparatus for engine fuel tanks embodying this invention.

Fig. 2 is an enlarged central sectional view of the pump portion of the filling means with parts shown in dotted lines.

Fig. 3 is an enlarged fragmentary sectional view of the valve structure.

Throughout the several views like reference characters refer to similar parts and the numeral 55

6 designates a liquid fuel tank positioned above the motor 8 of the typical farm tractor or of any other type of automotive vehicle having an internal combustion engine as the motive power.

Tank 6 is provided with a neck 10 through which is formed an opening to the tank. This neck 10 is internally threaded at 12.

The main body 14 of the apparatus has a central bore 16 which extends lengthwise there-through. The lower portion 18 of body 14 is offset and threaded at 20, and screwed into the threaded neck 10 of the tank, whereby communication between the tank and body member is provided.

A pair of gaskets 22 and 24 are spaced apart by the metal washer 26 and fitted over the lower portion 18 of the body member and serve to seal the joint between the neck 10 and the body member. The upper portion of the body member 14 is provided with a cover 28 hinged at 30 to the body member and having a tongue 32, notched at 34, to receive a spring wire bale 36 to secure the cover in the closed position. The upper end of central bore 16 is tapered at 38 to present a frusto-conical recess to receive the free end of the flexible tube 40 to form an air-tight joint therewith. The other end of tube 40 is inserted into a fuel container 42 through a top opening 44 and extends to a point adjacent the bottom of the container. When a vacuum is created in the fuel tank 6, as hereinafter described, the atmospheric pressure on the liquid surface in the container 42, due to the inlet opening 46, will force the liquid fuel through tube 40 and into tank 6 through body member 14.

An automatic valve control means 48 is provided in the body member 14 to permit the suction of air from the fuel tank and to cause a breaking of the vacuum line when the liquid fuel reaches a pre-determined level in the fuel tank filling apparatus for gasoline tanks.

Projecting into bore 16 is a rib 50 which extends downwardly from the threaded end of body member 14 into tank 6. This rib is cylindrically recessed at 52 to receive the cylindrical valve member 54 which normally rests on the sleeve 56 which is threaded into the lower end of rib 50 for longitudinal adjustment therein. The upper end of sleeve 56 is offset to permit air to pass between the valve and the sleeve. The diameter of valve 54 is slightly less than the diameter of recess 52 to admit air therebetween and its upper end is conical in shape at 58 to form a valve suitable for co-acting with the valve seat 60 formed in the body member 14. The upper end portion

72 of recess 52 into which the upper end of valve 54 projects is frusto-conical in shape, thus making it possible to vary the air inlet between the valve member 54 and the recess 52.

As nut 56 is screwed upwardly the area of the opening between the valve 54 and the wall of recess 52 will be lessened. This variation in the area of the inlet opening makes it possible to regulate the closing of valve 54. The reduced upper portion 62 of recess 52 communicates with the laterally disposed recess 64. This recess 64 is threaded to receive the nipple 66 to which is attached suction pipe 68 by means of the coupling 70. This suction pipe 68 is provided with a control valve 74 and communicates with the intake 76 to engine 8. In the operation of engine 8 a suction, due to the action of the pistons in the cylinders, sucks the fuel from the carburetor 78 through the intake 76 and also creates a suction through pipe 68 thereby producing a lowering of the pressure in fuel tank 6.

Since in some instances the fuel supply in the carburetor may be exhausted, provision is made for drawing the fuel from the gas being delivered from drum 42 to the fuel tank 6 through the suction pipe 68. This means contemplates the provision of a sleeve 80 having an aperture 82 of relatively small diameter inter-connecting bore 16 with suction pipe 68 through recess 64.

Since aperture 82 is relatively small and a suction is always created therethrough during the tank filling operation, it is provided that the volume of suction pipe 68 is sufficiently large to exert a relatively high vacuum in recess 52 above the cylindrical valve 54.

In the filling operation, when the engine 8 is running and the air is forced from tank 6 by the suction created through pipe 68, the liquid fuel in container 42 will be lifted through tube 40 which is positioned in the upper tapered end portion of bore 16 and be delivered into tank 6. When the liquid level in tank 6 raises to seal the lower end of recess 52 in rib 50 then the valve 54 will be raised to valve seat 50 thereby preventing the flow of air upwardly through recess 52, however, a slight flow of gaseous mixture will pass through aperture 82 to the engine. An opening 84 formed through the wall of body 14 connects the interior of said body member with the atmosphere. This opening is slightly larger than the aperture 82 thereby insuring a reduction of the pressure in tank 6 which will permit the liquid in tube 40 to flow back to the container 42 so that as the operator removes the outer end of tube 40 from body member 14 there will be no gasoline in the tube to spill onto the engine parts.

In practice, it has been found convenient to make the aperture 82 about $\frac{1}{1000}$ of an inch in diameter and the opening 84 about $\frac{4}{1000}$ of an inch. To prevent too high a pressure against the walls of tank 6, a safety valve 88 is positioned in the wall of body member 14 to communicate with the vacuum chamber of the fuel tank. This valve is of a standard type and is adapted to be adjusted at any desired pre-determined partial vacuum.

Since this valve is adjusted to a relatively high vacuum, it will not interfere in any manner with the normal operation of the device during the filling of the tank. The best procedure in the use of this filling apparatus is as follows:

The apparatus is mounted on the tractor parts as indicated and described and then in-tested to be sure that all connections are air-tight, let the

engine idle slowly with the valve 54 open to create a good suction in intake 76, open valve 74 so that the air is drawn from fuel tank 6 thereby reducing the pressure therein whereby gasoline will be forced from the drum 42 from tube 40 to the tank 6.

As soon as the tank is filled to a pre-determined level valve 54 will close and air will rush in through opening 84 to reduce the pressure in tank 6, thus making it possible to safely remove tube 40 and close the cover member 28 which will prevent escape of gas fumes therefrom.

The opening 84 will admit sufficient air at all times to permit proper gravity flow of the liquid fuel to the carburetor. In most of the filling operations the difference of liquid level in the fuel supply drum and the fuel supply tank seldom exceed 6 feet which would necessitate the production of only a relatively low vacuum, however should the distance be greater, thus necessitating a higher vacuum for operation, sleeve 56 could be adjusted to regulate the closing time of valve 54.

Minor changes might be made in the structure and relative relation of the various parts without departing from the spirit of this invention.

Having thus described the invention, what is new and desired to be secured by Letters Patent is:

1. The combination with an internal combustion engine having an intake chamber of sub-atmospheric pressure and an engine fuel tank, a hollow body member communicating with said tank, a fuel container positioned below said engine fuel tank, a suction tube connecting said chamber through said hollow body member and fuel tank with said fuel container, a valve operable when the liquid in said tank reaches a pre-determined level to partially close the source of suction to said elevated tank, a restricted aperture whereby fluid fuel from said engine tank passes to said chamber of low pressure when said valve is closed and an atmospheric bleed hole relatively larger than said aperture communicating with said fluid fuel tank whereby the vacuum in said elevated tank is reduced gradually until the flow of fluid fuel from said container to said engine tank is stopped.

2. The combination with an internal combustion engine having an intake chamber of sub-atmospheric pressure and an engine fuel tank having an inlet opening, of a hollow body member communicating with said inlet opening, a tubular member extending from an open fuel supply container positioned below said engine fuel tank to the upper end of said hollow body member whereby a continuous conduit is formed from the fuel supply container to the engine fuel tank, said body member having an air inlet opening communicating with the outside atmosphere and having a relatively smaller opening communicating with said source of low pressure, a passageway including said hollow body member connecting said elevated tank with said low pressure chamber, a valve controlled by the liquid level in said engine fuel tank to close said passageway whereby only a small quantity of fluid fuel is delivered to said chamber of low pressure through said smaller opening as the pressure in said engine fuel tank is increased, and means to adjust said valve whereby it may be caused to operate at different degrees of vacuum.

3. The combination with an internal combustion engine having an intake chamber of sub-atmospheric pressure and an engine fuel tank

having an inlet opening, of a hollow body member communicating with said inlet opening, a tubular member extending from an open fuel supply container positioned below said engine fuel tank to the upper end of said hollow body member whereby a continuous conduit is formed from the fuel supply container to the engine fuel tank, said body member having an air inlet opening communicating with the outside atmosphere and having a relatively smaller opening communicating with said source of low pressure, a passageway including said hollow body member connecting said elevated tank with said low pressure chamber, a valve controlled by the liquid level in said engine fuel tank to close said passageway whereby only a small quantity of fluid fuel is delivered to said chamber of low pressure through said smaller opening as the pressure in said engine fuel tank is increased.

4. The combination with an internal combustion engine having an intake chamber of sub-atmospheric pressure and an engine fuel tank having an inlet opening, of a hollow body member communicating with said inlet opening, a tubular member extending from an open fuel supply container positioned below said engine fuel tank to the upper end of said hollow body member whereby a continuous conduit is formed from the fuel supply container to the engine fuel tank, said body member having an air inlet opening communicating with the outside atmosphere and having a relatively smaller opening communicating with said source of low pressure, a passageway including said hollow body member connecting said elevated tank with said low pressure

chamber, a valve controlled by the liquid level in said engine fuel tank to close said passageway whereby only a small quantity of fluid fuel is delivered to said chamber of low pressure through said smaller opening to operate the engine, as the pressure in said engine tank is gradually increased by air entering through said air inlet opening to a predetermined degree to automatically release said valve and open said passageway.

5. The combination with an internal combustion engine having an intake chamber of sub-atmospheric pressure and an engine fuel tank having an inlet opening, of a hollow body member communicating with said inlet opening, a tubular member extending from an open fuel supply container positioned below said engine fuel tank to the upper end of said hollow body member whereby a continuous conduit is formed from the fuel supply container to the engine fuel tank, said body member having an air inlet opening communicating with the outside atmosphere and having a relatively smaller opening communicating with said source of low pressure, a passageway including said hollow body member connecting said elevated tank with said low pressure chamber, a valve controlled by the liquid level in said engine fuel tank to close said passageway whereby only a small quantity of fluid fuel is delivered to said chamber of low pressure through said smaller opening as the pressure in said engine fuel tank is increased, and a spring actuated atmospheric valve adjustable to vary the maximum degree of vacuum in said engine fuel tank.

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