

*Installation and Care
of the*

Stewart-Warner
**VACUUM FUEL
FEED SYSTEM**

*Now used as standard equipment by
OVER 90 PER CENT of American
automobile manufacturers.*



Keep this book in your
car for future reference

THE PURPOSE OF THE STEWARTWARNER VACUUM FUEL FEED SYSTEM

The Stewart-Warner Fuel Feed System provides a means of maintaining a steady, uninterrupted flow of fuel at a constant head (from a constant height) to the carburetor, and allows the main supply tank to be located at a lower level than the carburetor.

The Stewart-Warner Vacuum Fuel Feed System made it possible for the car manufacturers to place the main supply tank at the rear of the automobile, make their car bodies lower with resulting greater beauty of lines, lower center of gravity and greater road stability.

The Stewart-Warner Fuel Feed System has also greatly reduced the fire hazard, as only a comparatively small amount of fuel is near the engine. This is recognized by the Board of Fire Underwriters and their approval on this system has resulted in the establishment of lower insurance rates on cars equipped with it.

GENERAL DESCRIPTION

The Stewart-Warner Tank has two separate chambers—the inner or vacuum chamber M and the outer or reserve chamber N (see Fig. 1).

The cover and, therefore, the inner chamber has three openings

1. The fuel inlet A, which is connected to the main supply tank. (The fuel passes through the screen S.)
2. The vacuum opening P, which is connected to the intake manifold. (As in Fig. 2.)
2. The atmospheric opening K.

The outer or reserve chamber also has three openings.

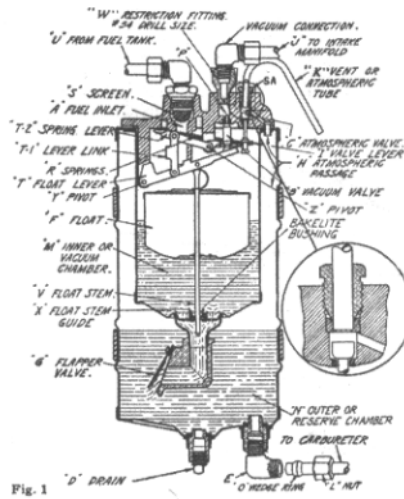
1. At the top the opening H to the atmosphere at all times through vent tube K and atmospheric passage H.

1. In the bottom, opening D. This is closed by drain cock or pipe plug which may be removed for draining or cleaning the tank.

3. Outlet E which is connected to the carburetor float bowl.

HOW IT OPERATES

The pumping action of the pistons in the motor creates a suction or vacuum in the intake manifold. By connecting the Stewart-Warner Tank to the intake manifold, air is



withdrawn from the inner chamber, thus reducing the pressure below that of the atmosphere. The fuel in the main supply tank being under atmospheric pressure is forced into the inner chamber (this action is commonly called suction) from where it flows to the outer chamber, as explained later. As the Stewart-Warner Tank is always installed at a point higher than the carburetor, the fuel flows by gravity to the carburetor,

Figure 2 shows the relative position of the Stewart-Warner Tank and the Carburetor.

By means of an arrangement of four levers and two springs, Float F in the inner or vacuum chamber M operates the vacuum valve B and the atmospheric valve C.

When the vacuum chamber M is empty the float is down, as shown in Fig. 3, the atmospheric valve C is closed and the vacuum valve B is open. The suction of the intake manifold is applied to the inner chamber M through the vacuum connection and open vacuum valve B and reduces the pressure in inner chamber M below that of the atmosphere. This closes flapper valve G, as outer chamber N is at atmospheric pressure. Fuel from the main supply tank is, therefore, forced into inner chamber M, through screen S and fuel inlet A, as this also is at atmospheric pressure.

As inner chamber M fills with fuel float F rises. As float F reaches the top of its stroke the spring lever is pushed above pivot Z causing the springs to lift the valve lever which closes vacuum valve B and opens atmospheric valve C, allowing atmospheric pressure to be established in chamber M.

As the pressure in both chambers is now equal the fuel flows by gravity through flap-per valve G into outer or reserve chamber N allowing the float F to drop gradually.

As the float reaches the bottom of its stroke the springs are pulled below pivot Z and the valve lever opens vacuum valve B and closes atmospheric valve C. The intake manifold vacuum again lowers the pressure in inner chamber M. fuel is forced into inner chamber and the operation is repeated.

This operation is continued at a rapid rate until the fuel level in chamber N comes to a balance with the fuel lever in chamber M and operates thereafter as the carburetor demands the fuel.

As the gravity chamber N is always open to the atmosphere, through passage H and vent tube K, a perfect, even flow of fuel to the carburetor is maintained by gravity

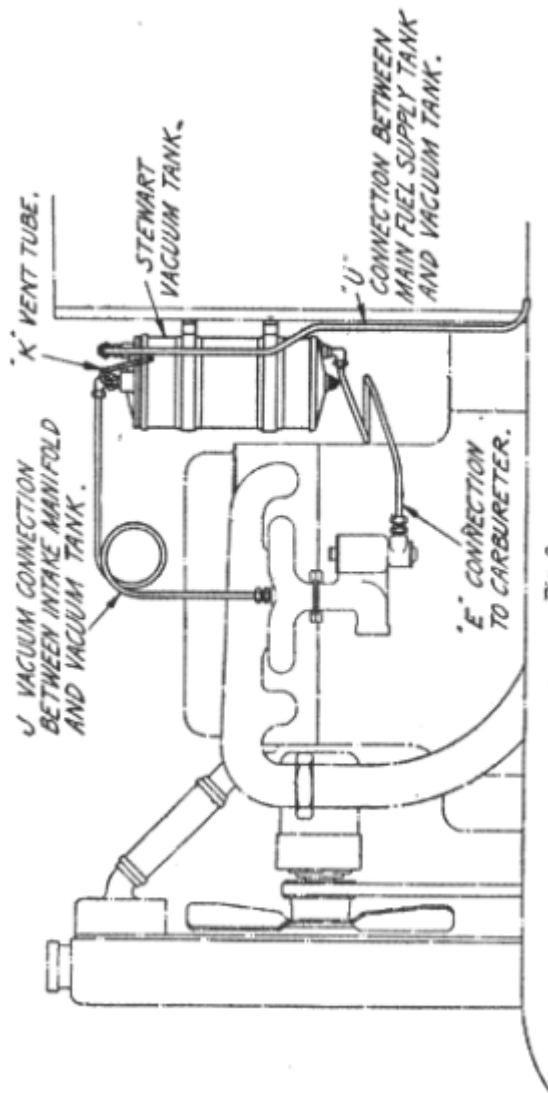


Fig. 2

TYPICAL INSTALLATION OF STEWART-WARNER VACUUM FUEL FEED SYSTEM

FILLING THE TANK ON FIRST STARTING

Close the throttle to establish the greatest vacuum in the manifold, and turn over the engine with the starting motor for about ten seconds, or while counting ten slowly. Wait a few seconds to allow the fuel to flow to the carburetor, then start the engine as usual.

Some tanks have a hole in the top with a pipe plug in it to provide more direct means of priming the carburetor. A pint will be ample.

CARE OF THE STEWART-WARNER VACUUM TANK

No care whatever is required of the tank and it is quite unlikely that you will ever have to touch it because of any imperfect functioning of the tank.

INSTRUCTIONS FOR DISASSEMBLING

It is not necessary to remove the tank from the car to repair it. When the cover is removed the float and operating mechanism is found attached. The inner shell M may be lifted out, exposing the flapper valve.

1. Disconnect the fuel line U and vacuum line J connections.
2. Remove the eight screws from the top.
3. Loosen the cork gasket by running a knife under it. In the new tanks only one gasket is used. The inner shell has a narrow flange so that the gasket covers both the flange and the screw holes in the outer shell. This gasket is wider than the old -one formerly used.
4. Lift the cover with the mechanism and float attached.
5. Lift out the inner shell, if required.

TO REASSEMBLE

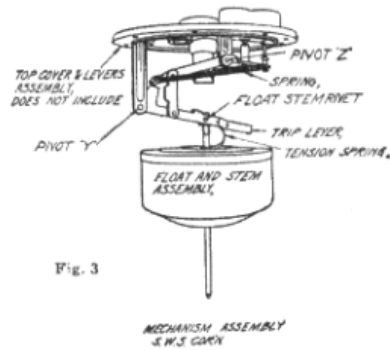
1. Replace the inner shell.
2. Replace gasket in position, with the large hole in edge over the vent tube H in the outer shell. Before replacing the gasket be sure there are no broken or damaged places.

Be sure there are no pieces of gasket or other foreign matter on the cover or shell. The gasket is soft: enough to take up small irregularities in the surface if they are clean.

3. Replace the cover with the mechanism attached. In doing this, be sure that it is placed so that the short vent tube in the outer shell is directly under the corresponding vent opening in the cover. Also be sure, as the cover is lowered, that the float stem enters the guide, as shown in Fig. 1. If it enters as it should the mechanism will not trip unless the tank is half full of fuel. The tank cannot operate unless the stem is properly entered.

4. Insert the eight cover screws and tighten them.

5. Connect the fuel and vacuum line



TROUBLES—THEIR CAUSES AND REMEDIES

General; It is very seldom that there is any trouble with the mechanism of the tank. Practically all reported failures of the fuel supply are found, on careful investigation, to be really failures of some part foreign to the tank itself, such as the carburetor, clogging or leaking of connecting lines, etc., as described below.

FAILURE TO DRAW FUEL

1. Air leak in vacuum line or fitting. Air leak in supply line or fittings front supply lank to vacuum tank. This may be caused by loose or broken fittings at the vacuum tank, supply trunk or manifold or by split, broken or wore tube. It will be most likely to prevent operation on open throttle, but will not cause total failure unless the leak is very had. To repair, replace broken tube or fitting or tighten loose fittings.

2. Plugging of supply tank vent (usually in the tiller cap). This may also cause some gasoline to be forced out of the vacuum tank vent, duo to expansion of the gas in the supply tank creating a pressure.

3. Restriction in supply tube U. Any restriction will limit the flow of fuel. Restriction may be caused by dirt clogging the screen 8, at the vacuum tank or the entrance to the tube at the supply tank, especially when a valve or screen of any kind is used. It may also be caused by a sharp bend in the tube or dirt clogged in the tube at bends, etc.

OVER-RICH MIXTURE OR "FLOODING" ENGINE

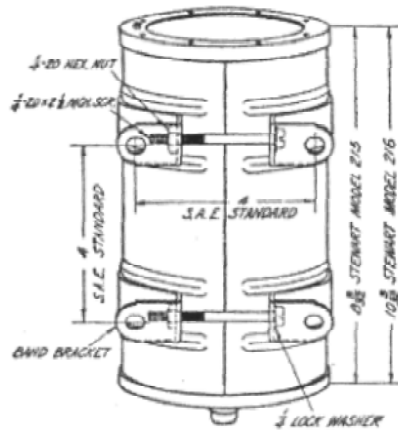
Float Leak. A leak in the float will cause it to till partly, tail to open promptly, or at all. the atmospheric valve and clue the vacuum valve. This will cause gasoline to till the inner chandler and be drawn through the vacuum valve into the manifold. resulting in at over-rich mixture or flooding the engine, especially on idling. To repair. see "Instructions for Disassembling." Punch a very small pin hole in the Boat and empty it of fuel. Solder the leak and pin hole, then test by immersing it in a pan of hot water. If no bubbles are seen, the float is all right.

2. The vent tube R, or passage H. may become clogged with dirt, which will cause a failure of fuel to flow from the outer chamber to the carburetor. Clean out the affected part.

3. **The atmospheric valve C may not seat properly**, due to dirt, corrosion, etc. This will prevent building up of vacuum in inner chamber, and if it will not seat tight by cleaning, a new valve or seat may be necessary. (Examine this valve from above by removing sleeve SA.)

If the vacuum valve B does not seat properly, there will be a continuous flow of air coming in through the atmospheric valve and out the vacuum valve while the tank is dumping. This will not interfere with the operation of the tank or engine.

4. The atmospheric valve C may fail to open under extreme conditions of high vacuum in inner chamber and weak springs. As the vacuum valve does not close till after the atmospheric valve opens, fuel will be drawn through the vacuum valve into the manifold and cause a too rich mixture. This condition is prevented on all tanks of 1924 and later make, by the float lever striking the valve lever and opening valve C.



OUTSIDE SHELL ASSEMBLY
WITH BRACKETS

Fig. 4

A sufficiently high vacuum in the inner chamber to cause failure of some earlier model tanks may be caused by plugging the supply tank vent, too small a delivery pipe from the supply tank, kinks in it or clogging of screen S.

5. On a ear that has been idle for some time with gas left in vacuum tank, the **flapper valve may leak**, permitting air to flow in sufficient quantities to prevent the vacuum building up in the inner chamber. This is usually due to dirt under the valve or corrosion. Dirt can generally be washed out by pouring a small amount of fuel in the plug opening at the top. In rare cases the bakelite valves that were first used failed to seat because of capillarity between the upper end of the flapper and the valve body. This is cured by installing a new valve which has a small boss on the upper end. Test the valve by holding up to the light. If it appears very slightly bent, press the valve down moderately with the finger, if this closes the valve it is O. K. If not, a new valve must be installed.

6. **Corrosion of the flapper valve seat** may cause the flapper to stick and prevent the fuel from flowing to the outer chamber.

7. **Noise**, in some of the older tanks which used brass flappers, a rattle was produced at certain speeds. This has been eliminated by the use of bakelite flappers and by a bakelite washer in the float stem guide. Re-place the inner shell and valve assembly with a new one.

REPLACING PRESSURE FUEL SYSTEM WITH THE STEWART-WARNER VACUUM FUEL FEED SYSTEM

When the Stewart-Warner Vacuum Fuel System is sold DIRECT to a CAR OWNER, we furnish the following parts and fittings :

One Stewart-Warner Vacuum Tank, with bracket.

One Solderless Coupling.

Three Solderless Elbows.

The Stewart-Warner Vacuum Tank is installed on the engine

side of the dash. If the tank cannot be installed under the hood it may be placed on the driver's side of the dash. Bear in mind these four points in placing and attaching the vacuum tank:

1. The top of the Stewart-Warner Vacuum Tank must be above the level of gasoline in the main supply reservoir when full, even when the car is going down steep grades.

2. The bottom of Vacuum Tank must be not less than three inches above carburetor,

3. Do not install Stewart-Warner Vacuum Tank directly over generator, nor over any terminals on which gasoline could possibly leak.

4. It is usually necessary to ream the carburetor float valve hole to about double its present area to permit a sufficient flow of fuel by gravity from the vacuum tank for open throttle operation.

Where necessary to bend tubing, do so with a round bend, so that the diameter of the tubing is not made smaller at the bend and so that there are no sharp curves. Never cut the tube with shears, use a hacksaw or file, and square the end. Attach the vent tube as shown in Fig. 1. See that the compression collar 17741 is in place, with flat side down, and that the tube goes in as far as possible before the sleeve is screwed down. Screw into the bottom of the vacuum tank the coupling elbow like the one marked E, Fig. 1, and two of these into the top at U and J.

Drill and tap the intake manifold for connecting the vacuum line, as shown in Fig. 2. Be very careful to avoid tapping at a point in the manifold which is protected by a water jacket. Into the hole which you have tapped, screw a coupling elbow. Turn this elbow down hard so as to make an air tight joint. Be sure you connect this to the proper opening which is marked "Vacuum Line" on the top of the tank. Join the tubing with the coupling elbow, as shown in Fig. 1. Unscrew the nut L and remove the wedge ring O. Slip the end of the tubing through the nut L, then through the wedge ring O. Put the end

of the tubing into the coupling elbow, slip the nut L over the ring O and tighten it on the threads on the elbow. The inside walls of the nut so press upon the wedge ring that it binds upon the tubing, and thus makes an absolutely liquid and air-tight joint. Make connection E, from the carburetor to the bottom of the Vacuum Tank, and connection U, between the top of the Vacuum Tank, marked "Fuel Line" on cover and the old fuel line. As the fuel line in different cars varies in size it may be necessary to procure a coupling nut of a size at one end to fit our five-sixteenth-inch connection and at the other end to fit the old tube.

REPLACING GRAVITY FUEL FEED WITH THE STEWART-WARNER VACUUM FUEL FEED SYSTEM

When the Stewart-Warner Vacuum System is to be installed on cars having the gasoline tank under the front seat, or in a compartment at the rear of the car, the most important point to be remembered is the location of the air vent. The air vent positively must be placed at as high a point as is possible under the hood. Regular instructions on preceding pages cover all the operations necessary to install the system. The Vacuum Tank should be placed at a point where the top of the tank at the very least is above the level of the top of the gasoline tank under the seat. It should be placed higher, if possible. The best location for the tank is on the engine side of the dash. On some cars it will not be found possible to place the Vacuum Tank on the dash, and in *such* cases the tank can be fastened to the intake manifold. It will not be difficult to make a bracket for this purpose.

VENT TUBE OVERFLOW

The air vent allows an atmospheric pressure to be maintained in the lower chamber, and also serves to prevent an overflow of gasoline in descending steep grades. If once in a long while a small amount of gasoline escapes, no harm will be done and no adjustment is needed. However, if the vent tube

regularly overflows, one of the following conditions may be responsible:

(a) Air hole in main gasoline tank filler cap may be too small or may be stopped up. The expansion of the gasoline vapor causes a pressure which forces the fuel into the vacuum tank and out the vent. If the hole is too small, or if there is no hole at all, the system will not work. Enlarge hole to one-eighth-inch diameter, or clean it out.

(b) If pressure system was displaced by vacuum feed, the pressure system may not have been disconnected: if so, disconnect same. There must be no pressure in the main gasoline tank,

(c) The vacuum tank may be too close to the hot motor, in which case place it further from this source of heat. You can also remedy the overflow by attaching a length of tubing to the vent connection and carrying it to the highest point under the hood.

(d) The vacuum tank may not be installed quite high enough above the carburetor. If the bottom of the tank is not three inches above the carburetor, raise the tank.

GUARANTEE

We will repair or replace, free of charge, at our branches, or at any of our authorized service stations, any Stewart-Warner Product or part that proves defective in material or workmanship within ninety days from date of sale to end buyer, provided transportation charges have been prepaid.

Stewart-Warner assumes *sole responsibility to the user* for all its products--but not for its installation unless made at our service stations.

Write direct or call at our nearest service station if any product is not perfect, and send the mechanism or parts direct to them and not your dealer. *All free replacements must be made* and free service rendered *by our service stations only*.

OTHER

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Custombilt Accessories

Used on twelve million cars

Speedometers

The world's standard

Vacuum Tanks

Universal—Incomparable

Shock Absorbers

*Make Bad Roads Good and Good
Roads Boulevards*

Electric Windshield Cleaners

Perfect Vision—No Collision

Spotlights

They're the car's eyes

Rear Vision Mirrors

Reflect your good Judgment

Motor Horns

Get the right of way

Hand Horns

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Pep, Power, Pleasure, Economy

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