June 3, 1930. C. F. ARNOLD 1,761,961

VACUUM GASOLINE SUPPLY SYSTEM

Filed June 20, 1929

Fig. 1

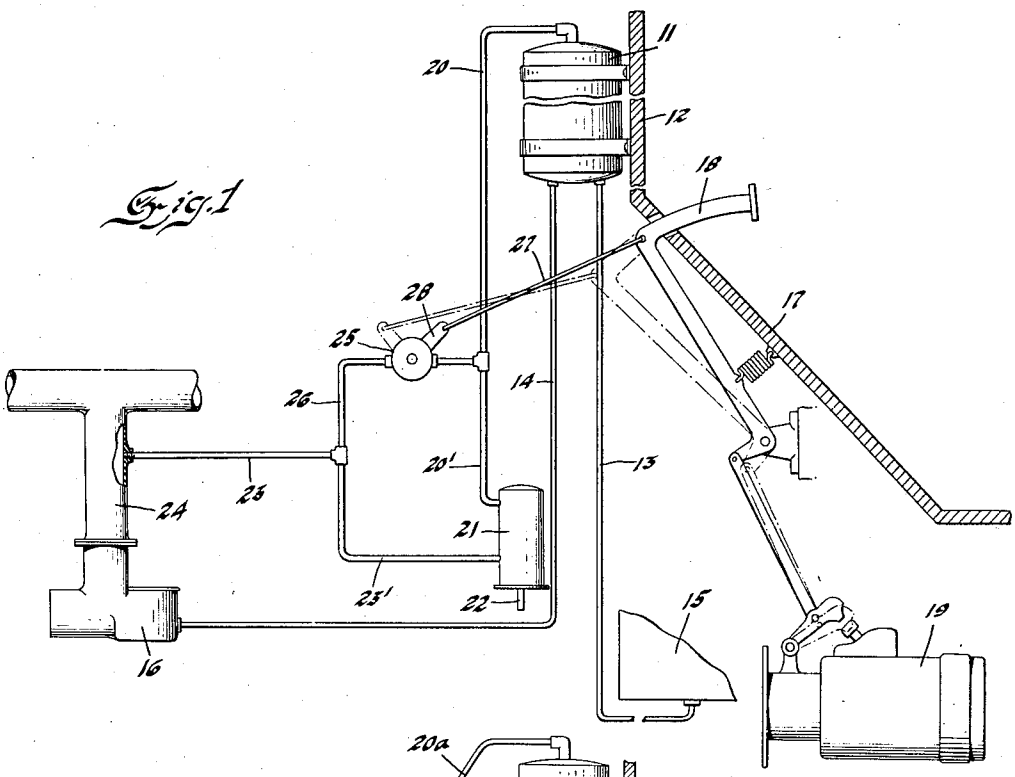


Fig. 2

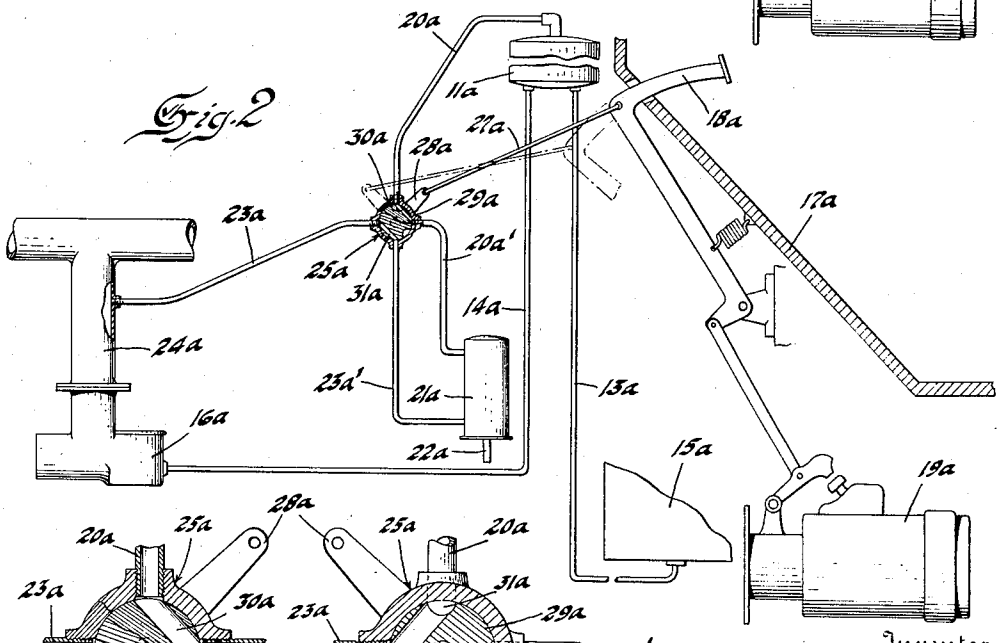


Fig. 3

Fig. 4

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Patented June 3, 1930

1,761,961

UNITED STATES PATENT OFFICE

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VACUUM GASOLINE-SUPPLY SYSTEM

Application filed June 20, 1929. Serial No. 372,421.

This invention aims to utilize a plurality of means, differing in promptitude of response, in the priming or replenishment of a fuel reservoir,—such as a so-called vacuum tank; and preferred embodiments of the invention may include some conveniently manipulable or automatic means, preferably connected with a starter pedal, to assure a prompt reaction, of the character referred to, whenever an engine is started.

Use having been heretofore made of a suction conduit connecting a vacuum tank with an engine intake manifold, to produce a suction effect whereby fuel is elevated into the vacuum tank, and use having also been made of combinations of the above with various types of vacuum pumps (as described in, for example, the U. S. patent applications of Williams, Serial No. 217,449, filed September 3, 1927, and of Armitage, Serial No. 223,476, filed October 1, 1927), it is an object of this invention, interposing a vacuum pump between a suction conduit of the character referred to and a discharge conduit, which may constantly or conditionally communicate with the intake manifold, to provide means for by-passing said pump, at will or at starting, in such manner as to enable the manifold very promptly to exhaust the vacuum tank, for an elevating effect,—without first evacuating the said pump.

In constructions heretofore employed, at small throttle opening and with a consequent high vacuum in the manifold, the withdrawal of air from a vacuum tank through a pump into the manifold may have generally operated satisfactorily; and at full opening of the throttle and low speed, the pump has been relied upon to take the duty of creating or maintaining the necessary vacuum in the vacuum tank,—preferably discharging the withdrawn air into the manifold; but these "combination" systems have not always "primed" promptly. It is accordingly an object of this invention to provide means for an efficient withdrawal of air from the vacuum tank without awaiting an exhaustion of and through the pump; and this result is herein obtained by the interposition of a suitable valve or valves, remotely manipulable from a starter pedal or the like, and serving momentarily to "cut out" the mentioned pump.

By the use of this device, the quantity of air to be removed before an adequate vacuum is produced in the tank may be substantially reduced; and the evacuation of the tank becomes independent of the port position and rapidity of reciprocation of the pump,—the tank evacuation being initiated immediately when the engine begins to rotate.

Other objects of this invention may be best appreciated from the following description of alternative embodiments thereof, taken in connection with the appended claims and the accompanying drawings.

Figure 1 may be construed a diagrammatic vertical sectional view through a part of the dash and a part of the floor of an automotive vehicle (whether adapted for land, water or aerial transportation), elements pertinent to the present invention being shown mainly in elevation, but with some parts broken away.

Figure 2 is a view similar to Figure 1, but showing alternative features.

Figure 3 is a detail view, corresponding to a portion of Figure 2, and showing one valve organization including a central plug of a type suitable for use in this invention,—parts being sectioned in two different planes.

Figure 4 is a view comparable with Figure 3, but showing parts as shifted.

Referring first to conventional details of that specific embodiment of the present invention illustrated in Figure 1,—a vacuum tank 11 is diagrammatically shown as carried by a dash 12 and as provided with an intake pipe 13 and a delivery pipe 14,—these pipes communicating respectively with a fuel tank 15 and a carburetor bowl 16. The dash 12 is shown as continuous with an inclined floor section 17, through which extends a starter pedal lever arm 18 for the manipulation of a starter 19, in the usual manner.

A conduit 20 is shown as connected with the upper portion of the vacuum tank 11; and a continuation 20′ thereof may extend to the inlet of a vacuum pump 21,—which may be operated through a connecting-rod 22 by any usual or preferred means such as a rotating

cam, not shown; said pump may discharge, if desired, through an additional conduit or conduits 23, 23′ connected with an engine manifold 24, the latter incidentally utilizing any fuel values in the vapors withdrawn with air.

In the practice of this invention, in order to provide for a very prompt evacuation of the tank 11, preferably utilizing the suction conduit 20 and the discharge conduit 23, the pump may be momentarily by-passed by manually manipulable means such as valve element 25 including a rotatable plug,—shown as interposed in a so-called "shunt" conduit 26, and as connected with the starter pedal arm 18 by means of a rod or link 27. In this embodiment of the present invention the mentioned valve plug need have but one passage therethrough, and it will be understood that depression of the mentioned starter pedal incidentally and automatically shifts an arm 28 connected with the valve element 25 from a position such as that shown in full lines to a position such as that indicated in dotted lines, thereby opening the relatively short passage provided by the interconnecting conduit 26 and enabling any vacuum in manifold 24 to act, directly through conduits 20 and 23, in the creation of a vacuum in the tank 11 and a consequent priming or replenishment in the fuel supply therein.

In the embodiment illustrated in Figure 2 (wherein mentioned reference characters are employed, but with the addition of an "a" to each character) the valve 25^a will be seen to be of a somewhat specialized type. That is to say, the valve organization comprising plug 29^a may have connected therewith not only the suction conduit 20^a and the discharge conduit 23^a, but conduits $20^{a\prime}$ and $23^{a\prime}$, leading respectively to and from the pump 21^a; and the plug 29^a of said valve organization may include a plurality of passages subject to concurrent manipulation by means such as the rod or link 27^a,—shown as connected with the starter pedal arm 18^a.

For example, the valve plug 29^a, as best shown in Figures 3 and 4, may include a pair of substantially parallel transverse passages 30^a and 31^a adapted, during normal running, respectively to interconnect the conduit 20^a with the conduit $20^{a\prime}$, and the conduit 23^a with the conduit $23^{a\prime}$,—the last-mentioned conduits being shown in Figures 3 and 4 as disposed in a slightly "nearer" plane than the conduits 20^a, $20^{a\prime}$; and, upon a shifting of the valve operating arm 28^a from a position such as that shown in Figure 3 (in which the connections are favorable to the action of the pump 21^a) to a position such as that in which said valve arm is illustrated in Figure 4, the conduit 20^a may be directly connected with the conduit 23^a (notwithstanding the mentioned difference in planes) by means such as an intercommunicating channel shown at 31^a.

If desired, in order that, incidentally to a continuing operation of pump 21^a, a comparatively high vacuum may be produced within a conduit $20^{a\prime}$ during intervals of such direct intercommunication of conduits 20^a and 23^a (and in preference to merely opening some intercommunication between conduits $20^{a\prime}$ and $23^{a\prime}$ through valve plug 29^a) an additional channel 32^a may be provided,—adapted to establish communication, at the times referred to, between the conduit $23^{a\prime}$ and an opening $33^{a\prime}$ into the external air.

Except in the respects indicated, the construction described in connection with Figures 2–4 inclusive, will be seen to function similarly to that with Figure 1.

Although but two embodiments of the present invention have been referred to in detail, it will be understood not only that various features thereof might be independently employed, but also that numerous additional modifications might easily be devised,—without involving the slightest departure from the present invention.

I claim:

1. In an automotive vehicle organization including a tank for engine fuel; a plurality of means, differing in promptitude of response, for advancing fuel thereto by suction; a conveniently manipulable element; and means rendering manipulation of said element effective to operate the more promptly responsive of said fuel advancing means,—said conveniently manipulable element being a starter pedal.

2. In an automotive vehicle organization including a fuel tank and a self-starter manipulable by a starter pedal: a pump; a conduit leading from said tank to said pump; an engine manifold; and means connecting said conduit with said manifold upon the depression of said starter pedal.

3. In a fuel supply system including a vacuum tank and a primary means for advancing fuel thereto; a secondary means for at times advancing fuel to said tank; and a remotely manipulable control for the mentioned means,—said last-mentioned means being connected with a starter pedal.

4. In a fuel supply system including a vacuum tank and a primary means for advancing fuel thereto; a secondary means for at times advancing fuel to said tank; and a remotely manipulable control for the mentioned means,—said secondary means including a conduit discharging into an engine manifold, and said remotely manipulable control means including a valve whereby said discharge conduit is placed in direct communication with a conduit leading from said vacuum tank.

5. In a fuel supply mechanism for internal combustion engines, an engine starting mechanism; a fuel reservoir, a vacuum tank and a conduit connecting said reservoir and vacuum

tank; a primary and a secondary means for advancing fuel to the vacuum tank; and means controlled by the starting mechanism for rendering effective said secondary means for admitting fuel to said vacuum tank.

In testimony whereof I affix my signature.

CHARLES F. ARNOLD.