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COMBINATION FUEL PUMP AND CRANK CASE VENTILATOR

Filed May 23, 1929

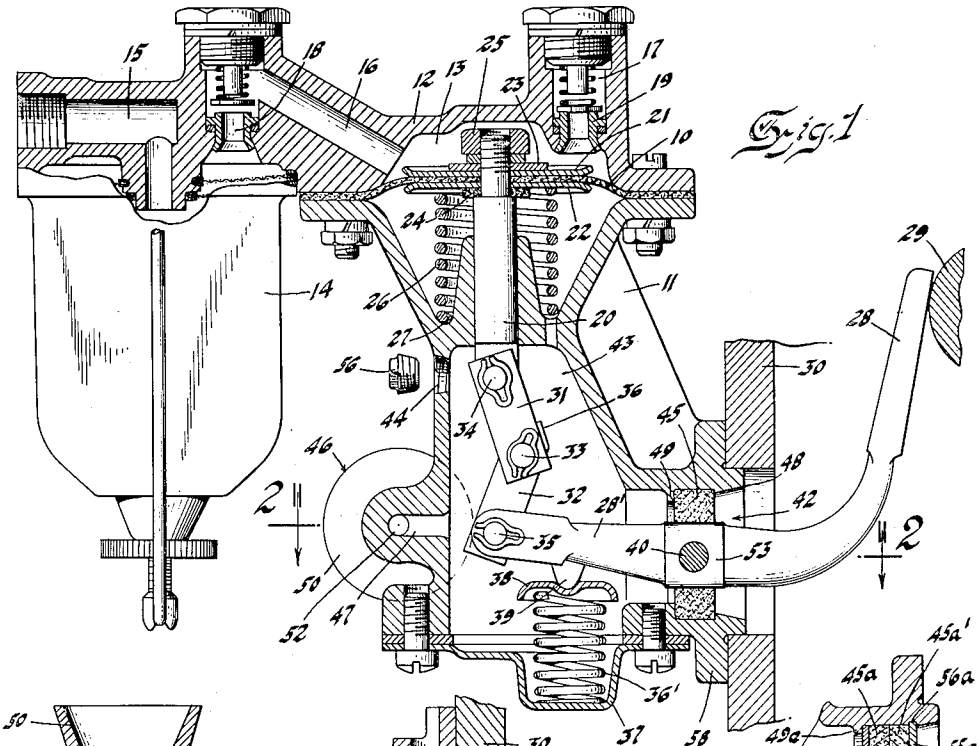


Fig. 1

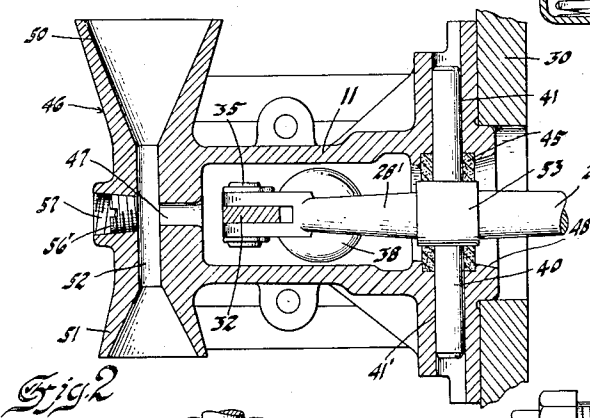


Fig. 2

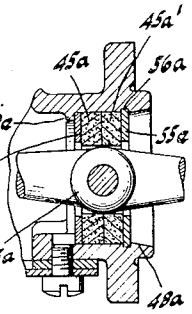


Fig. 3

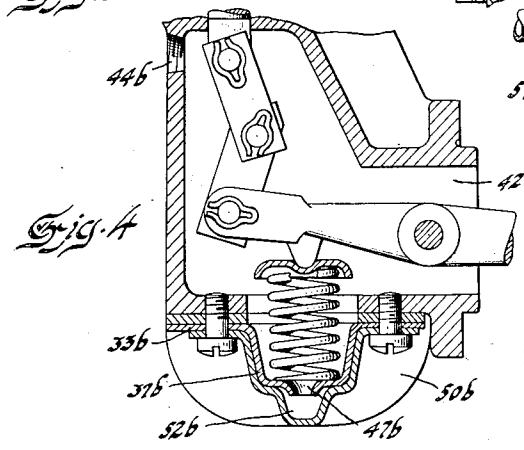


Fig. 4

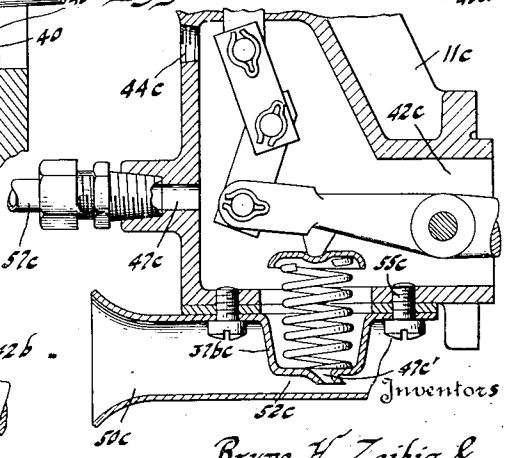


Fig. 5

Inventors

Bruno H. Zeibig &
Joseph Zubaty

By Blackmore, Spencer & Fleischer
Attorneys

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UNITED STATES PATENT OFFICE

BRUNO HENRY ZEIBIG AND JOSEPH ZUBATY, OF FLINT, MICHIGAN, ASSIGNORS TO A C SPARK PLUG COMPANY, OF FLINT, MICHIGAN, A COMPANY OF MICHIGAN

COMBINATION FUEL PUMP AND CRANK CASE VENTILATOR

Application filed May 23, 1929. Serial No. 365,533.

This application relates to fuel pumps suitable for use in connection with automotive engines, and the like; and more particularly to fuel pumps which are directly applied to crankcases in such manner as to permit the operation of said pumps by means of levers or like reciprocable members extending into said crankcases; and the invention aims more particularly to obviate any accumulation of moisture or other condensates within said fuel pumps. It may also aid in temperature control.

Other objects of the invention (which may ordinarily rely upon the principle of the venturi and may serve for the ventilation of crankcases as well as fuel pumps and/or may incidentally provide for a conduction of vapors containing gasoline, or the like, to a manifold or other remote part) may be best appreciated from the following description of illustrative embodiments of said invention, taken in connection with the appended claims and the accompanying drawings.

Fig. 1 is, for the most part, a vertical section through the body of one popular type of fuel pump, as this may be modified to embody or illustrate the present invention.

Fig. 2 is a view taken substantially as indicated by the line 2—2 of Fig. 1, but showing features of modification hereinafter referred to.

Fig. 3 is a detail view, corresponding to a lower right-hand portion of Fig. 1, but showing other features of modification.

Fig. 4 is a vertical sectional view, corresponding to a lower portion of Fig. 1, but suggesting an alternative and removable form of the Venturi device.

Fig. 5 is a view comparable with Fig. 4, but showing a Venturi device somewhat like that of Fig. 4 as differently oriented, and showing also an optional pipe connection.

Conventional parts of the organization illustrated in Fig. 1 include a reciprocatory pumping element in the form of a diaphragm 10, shown as retained between a main structural element 11 in the form of a pump body, and a subsidiary structural element 12,—providing a pump chamber 13 and also serving to support a fuel filtering unit 14.

The subsidiary structural element 12 may be provided with usual passages 15, 16 and 17, for the advance of the pumped fuel past an inlet valve 18 and an outlet valve 19; and the diaphragm 10 may be manipulable by means such as a handling element 20,—shown as secured thereto by means comprising cupped disks 21 and 22, washers 23 and 24, and a nut 25. The washer 24, as well as the diaphragm 10, may be formed of such material as to obviate leakage past the flat surfaces engaged thereby.

The diaphragm 10, or other reciprocatory pumping element, may be normally advanced (subject to any pressure built up in the pump chamber 13) by resilient means such as a spring 26,—shown as engaging the cupped element 22 and a fixed stop 27; and pressure-determined or otherwise variable intake strokes may be imparted thereto (from, for example, an actuating element such as a lever 28, engaging a cam 29 within a crankcase 30) through a thrust-refusing connection such as a pair of links 31 and 32,—shown as centrally interconnected by a pivot 33 and as terminally connected, by additional pins 34, 35, to the handling element 20 and to an inner end or arm 28′ of the lever 28. Alignment of the pins 33, 34 and 35 may be prevented by means such as a stop 36, on the links 32, tangentially or otherwise engaging a cooperating face upon the link 31; and the lever 28 may be constantly pressed into engagement with the cam 29, or its equivalent, by means such as a compression spring 36′, shown as confined between a cupped bottom plate 37 and an oppositely cupped element 38, engaging a projection 39 upon the lever arm 28′. Said lever is shown as pivoted upon a pin 40, in bearing openings 41, 41′, extending at right angles to an opening 42, leading from the interior of the crankcase into a lower compartment 43 of the pump body 11.

Coming now to the more novel features shown in Fig. 1, a small opening 44 being optionally provided for the admission of air into the mentioned compartment 43, some suitable plug 45, formed of felt or the like, may be inserted in the opening 42, and saturated, or permitted to become saturated, with

oil. In the embodiment here referred to, the plug 45, assumed to have been provided with an opening for pin 40, is shown as inserted past a conical surface 48. Said plug may be resiliently compressed during its insertion and it may seat against a collar 49,—optionally cast integral with the body 11. A Venturi organization 46, communicating with additional opening 47, is shown as comprising a funnel-shaped intake element 50 and a similar but smaller exit element 51,—these being connected by a passage 52 with which the mentioned opening 47 communicates. The parts last mentioned are shown in Figs. 1 and 2 as cast integral with the body 11.

Referring to alternative and optional features, that portion of the lever 28 through which the pin 40 extends is shown at 53, in Figs. 1 and 2, as substantially cylindrical in general form, its cylindrical axis being at right angles to that of the pin 40; and the plug 45 may be correspondingly apertured and/or formed in separate sections adapted to be assembled in the manner above implied. The pin-receiving portion 53*a* of the alternative organization shown in Fig. 3 is generally spherical in form; a plug comprising like sections 45*a* and 45*a'* may be retained between washers 54*a* and 55*a*; and, assuming the former to engage a fixed stop 49*a*, "washer" 55*a* may resemble somewhat a "Welch plug" in the manner of its insertion past a conical or other surface 48*a* and/or into a groove 56*a*, if provided.

In the form shown in Fig. 4, the provision of opening 44*b* and the use of a plug in the opening 42*b* being alike optional, the bottom plate or spring-receiving cup 37*b* is shown as carrying, or as modified to constitute, a Venturi organization including a funnel element 50*b* having a constricted passage 52*b* with which an opening 47*b* communicates,—the result being a withdrawal of air, vapors, or the like, therethrough.

In Fig. 5, in connection with which it may be assumed that the direction of advance, in view of the position of attachment of the pump body 11*c*, is unfavorable to the use of a funnel positioned in the manner of funnel 50 as in Figures 1 and 2 or funnel 50*b* as in Figure 4; and opening 47*c* is shown as having connected therewith an air-circulating pipe 57*c*,—which may lead to an engine manifold, or other remote part adapted to utilize any fuel values in the withdrawn air or vapors; or, alternatively, air may be admitted through the pipe 57*c* and permitted to exit through opening 44*c*, opening 42*c* and/or an opening 47*c'*,—the latter leading into a Venturi passage 52*c*, shown as extending at right angles to the passage 52*b*, illustrated in Fig. 4. To facilitate its attachment at any desired angle, the plate 37*bc* may be provided with equidistant openings for screws 55*c*, or equivalent means; and it will be understood that a sufficient oil saturation of the mentioned plugs, if they are used, may result from their position of use. They should be resilient; but need not be impermeable.

In Fig. 1 and Fig. 2, attention may be called to the optional provision of removable plugs 56, 56' in openings 44, 57, to permit the connection of an air delivering or air withdrawing pipe, such as is shown at 57*c*,—the Venturi organization 46 being then rendered inoperative in favor of circulation through said pipe; and it is obviously possible to utilize a Venturi bottom plate, of the type shown in Figs. 4 and 5, in connection with other parts shown in any of the mentioned figures. All forms of the invention being adapted to ventilate a pump body, the incidental ventilation of a crankcase and the utilization of vapors should be regarded as optional.

Although the foregoing description has included mention of but a limited number of the embodiments of the present invention, it will be seen not only that various features thereof might be independently used, but also that numerous modifications, additional to those suggested, might easily be devised by workers skilled in the art to which this case relates,—all without involving departure from the scope of the present invention.

We claim:

1. In a combination: a fuel pump body attached to a crankcase; and means for advancing air through said body to ventilate the same,—said means comprising a Venturi organization secured to said body.

2. In a combination: an engine crank case, a fuel pump body attached thereto; and means for advancing air through said body,—there being a passage between said crankcase and said body and a felt plug closing said passage.

3. In a combination: an engine crankcase, a fuel pump body attached thereto; and means for advancing air through said body,—there being a closable passage between said crankcase and said body and an additional air passage communicating with the interior of said body.

4. In a combination: a fuel pump body suitable for attachment to a crankcase; and means for advancing air through said body,—said means including a Venturi funnel cast integral with said body.

5. In a combination: a fuel pump body suitable for attachment to a crankcase; and means for advancing air through said body,—said means including a venturi which is separate from said pump body.

6. In combination: an engine crankcase, a fuel pump comprising a body attached to said crankcase and having an opening thereto; an operating lever for said pump pivoted to said pump body and extending through said opening; and a closure therefor.

7. In combination: a fuel pump compris-

ing a body suitable for attachment to a crankcase and having an opening thereto, an operating lever for said pump extending through said opening, and permeable means for closing said opening.

8. In combination: a fuel pump comprising a body suitable for attachment to a crankcase and having an opening thereto, an operating lever for said pump extending through said opening, and resiliently yieldable means for closing said opening.

9. A fuel pump comprising a diaphragm pump element, a fluid pumping chamber on one side of the diaphragm; and means for the withdrawal of vapors from the other side of the diaphragm, for utilization elsewhere.

10. In combination: a fuel pump comprising a body suitable for attachment to a crankcase and having an opening thereto, an operating lever for said pump extending through said opening, and resiliently yieldable means for closing said opening, said lever being there substantially circular in cross-sectional outline.

11. In a fuel pump, a diaphragm, a fluid pumping chamber above said diaphragm, and a chamber below said diaphragm housing operating connections thereto, and means to advance air through said latter chamber to ventilate the same.

12. In a fuel pump assembly, an engine crank case, a fuel pump attached thereto comprising a reciprocable diaphragm for advancing fuel, and an operating lever for said diaphragm extending into said crank case through an opening therein, and means to advance air through said fuel pump independently of the advancing fuel to ventilate the pump and withdraw vapors from said crank case.

13. In a fuel pump, a pumping member, a fluid pumping chamber on one side of said pumping member, a chamber on the other side of said pumping member housing operating connections thereto, and means to advance air through said latter chamber to ventilate the same.

14. In a fuel pump assembly, an engine crankcase, a fuel pump attached thereto comprising a pumping member for advancing fuel and operating means for said pumping member, a portion of said fuel pump communicating with the interior of said crankcase, and means to advance air through said fuel pump to ventilate the pump and withdraw vapors from said crankcase.

In testimony whereof we affix our signatures.

BRUNO HENRY ZEIBIG.
JOSEPH ZUBATY.