Dec. 13, 1938. L. D. BOYCE 2,139,801

CRANKCASE VENTILATOR

Filed May 14, 1936

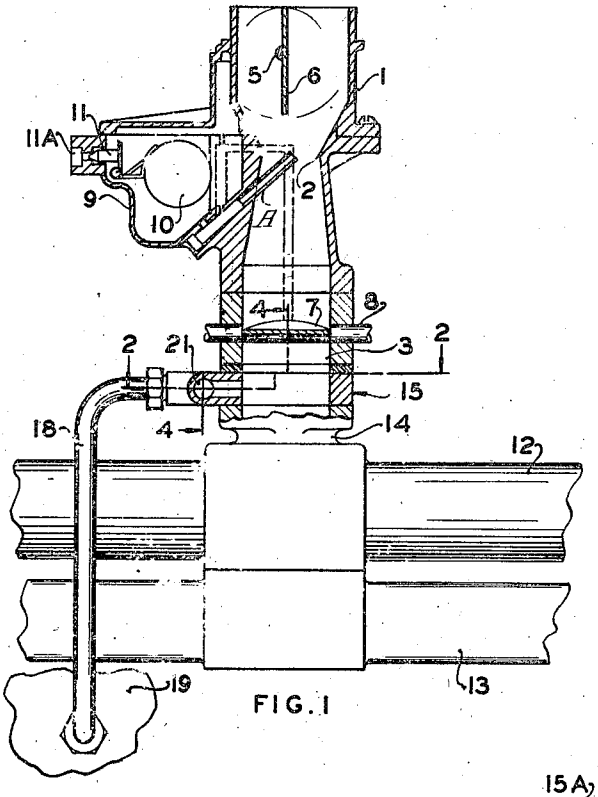


FIG. 1

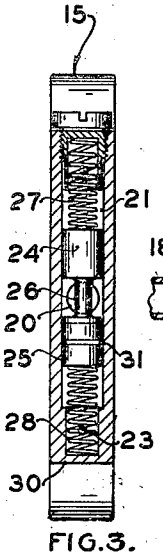


FIG. 3.

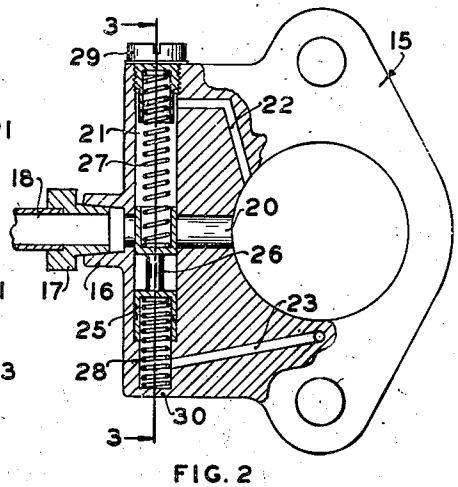


FIG. 2

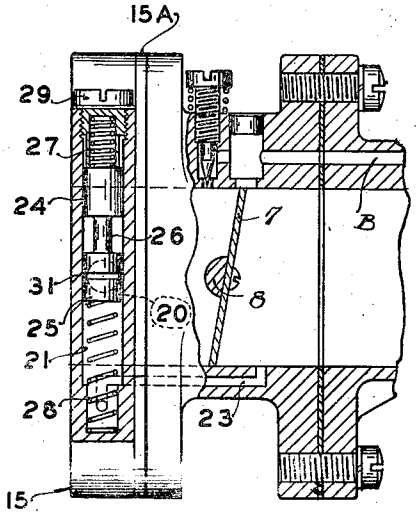


FIG. 4

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CRANKCASE VENTILATOR

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3 Claims. (Cl. 123—119)

This invention relates to ventilating systems for internal combustion engines and consists particularly in means for drawing fumes from the engine crank case through the fuel intake passages by suction.

In warm weather the oil in automobile crank cases vaporizes substantially creating fumes which frequently escape into the passenger space of the vehicle, causing unpleasantness and discomfort. In cold weather, vaporization of the oil may be substantially reduced but at such times gasoline and moisture mix with the oil causing dilution and forming sludge. Ventilation of the crank case space will substantially reduce or eliminate the undesirable effects of both of these conditions.

The main object of the present invention is to provide novel means for conditioning or ventilating the crank case of an internal combustion engine.

A more detailed object is to provide means for drawing off and disposing of nauseating fumes arising from the crank case, particularly in warm weather.

Another object is to provide novel means for drawing off gasoline and water vapors from the crank case, which would otherwise tend to condense and mix with the oil, diluting the same and forming sludge.

Still another object is to provide novel means for injecting oily fumes into the engine intake manifold, to provide upper cylinder and valve lubrication. These objects and other more detailed objects hereafter appearing are attained substantially by the structure illustrated in the accompanying drawing in which:

Figure 1 is a side view of a portion of an internal combustion engine and carburetor embodying the invention, the carburetor being sectioned.

Figure 2 is a substantially horizontal section and top view of a part of the structure in Figure 1 and taken on line 2—2 thereof.

Figure 3 is a vertical transverse detail section taken on the line 3—3 of Figure 2.

Figure 4 is a partial vertical section taken substantially on line 4—4 of Figure 1.

Figure 1 illustrates a downdraft carburetor including a mixture passage having an air inlet horn 1, venturi 2, and an outlet portion 3. Pivoted on shaft 5 in the air horn is a choke valve 6, and throttle valve 7 is pivoted on shaft 8 near the lower portion of the carburetor. Suitable control means (not shown) are provided for operating the choke and throttle valves. A bowl 9 adjacent the mixture passage has a float 10 controlling needle valve 11 in inlet connection 11a so as to maintain fuel within the bowl at a substantially constant level. Fuel is supplied through main nozzle A and idling passage B, both conventional.

Located beneath the carburetor is an intake manifold 12 constituting a fuel intake passage and exhaust manifold 13 which may be conveniently formed, as shown, in a combined structure having a flanged riser portion 14. Inserted between riser 14 and outlet 3 of the carburetor is a collar member 15 having a fitting 16 connected by nipple 17 to a conduit 18 which extends downwardly into the usual crank case, a portion of which is shown at 19. A heat insulating gasket 15a may be inserted between the collar member and the carburetor.

Collar member 15 includes a centrally hollowed body portion forming a part of the carburetor mixture passage and communicating through orifice 20 with a horizontal chamber or cylinder 21, one portion of which communicates with the mixture passage beneath the throttle through a passage 22 and the opposite portion of which communicates with the mixture passage above the throttle through a passage 23.

Received for reciprocation within cylinder 21 is a piston-type valve member including portions 24 and 25 connected by stem 26. Portions 24 and 25 are cup-shaped and receive coiled springs 27 and 28 which seat, respectively, against a plug 29 at one end of cylinder 21 and wall 30 at the other end thereof. The side wall of portion 24 of the valve member is of unbroken, cylindrical shape and the wall of portion 25 has a central, annular recess 31.

Springs 27 and 28 are calibrated so that when the engine is at rest, and during the cranking period when the depression beneath the throttle does not substantially exceed a half inch of mercury, the piston valve member will be in a position as shown in Figure 2 with portion 24 thereof sealing orifice 20 and cutting off communication between ventilator conduit 18 and the interior of the mixture passage. During operation of the engine, when the throttle is substantially closed, as during idling, suction beneath the throttle is at a maximum and the piston member will be drawn towards plug 29, compressing spring 27 as shown in Figure 4. In this position, portion 25 of the valve member extends across orifice 20 and annular recess 31 will permit a relatively small amount of suction to bleed past the valve member so that there will be continual ventilation of the crank case during idling.

As the suction within the mixture passage equalizes, due to opening of the throttle, the valve member will be moved toward wall 30 opposite plug 29 and immediately suction will be communicated to conduit 18 through the space between portions 24 and 25 of the valve member, causing fumes and vapors to be drawn through the intake manifold and passed out through the exhaust ports. Under normal operating conditions, the valve member will be substantially centered relative to orifice 20, as shown in Figure 3. Even under lowest operating suction conditions, as for instance when the throttle is fully opened and the engine moving slowly under a heavy load, a portion of orifice 20 will be open, permitting crank case ventilation.

The two springs 27 and 28 are provided to stabilize the valve member, particularly during low suction periods. Spring 27 is preferably slightly stronger than spring 28 so as to urge the valve member to the position shown in Figure 2 when the pressures above and below the throttle are substantially equal. Collar member 15, being directly in engagement with the manifold riser, is heated substantially to the same extent as the manifold, and this prevents condensation and freezing of moisture adjacent the valve member and in orifice 20.

Obviously the ventilating effect produced under different operative conditions may be varied by altering the size of orifice 20 and passages 22 and 23, the shape of the valve member, or the relative strengths of springs 27 and 28. The ventilating conduit is shown in communication with the intake passage beneath the throttle in such a position that oily fumes drawn through the intake manifold can function as upper cylinder and valve lubrication. This particular location of the ventilating conduit connection with the mixture passage is not essential and, if desired, this conduit may communicate with the carburetor above the throttle or with another portion of the intake system. The valve member may be conveniently controlled, as shown, by relative pressures on the opposite sides of the throttle valve. This is likewise, not essential and the ventilating control may be effected by differences in pressure between any convenient portion of the intake system and the crank case, or other parts of the intake passage. Also the novel ventilating mechanism may be advantageously utilized where a space other than the crank case is to be conditioned.

These modifications and others may be made in the illustrated structure, as will occur to those skilled in the art, without departing from the spirit of the invention and the exclusive use of all such modifications as come within the scope of the appended claims is contemplated.

I claim:

1. In an internal combustion engine, a walled space to be ventilated, a fuel intake passage including a carburetor throttle valve, a conduit connecting said space and said passage and including a chamber, a valve member in said chamber, and suction connections between said chamber and portions of said passage immediately on opposite sides of said throttle valve.

2. In an internal combustion engine, an intake passage, a walled space to be ventilated, a conduit connecting said space and said passage, a cylinder communicating with said conduit, and a spring-loaded, suction-controlled piston in said cylinder having a portion constructed and arranged to close said conduit when suction in said passage is no greater than cranking suction, said piston having a bypass recess positioned to permit relatively slight bleeding of suction past said piston at periods of greatest suction in said passage.

3. In an internal combustion engine, an intake passage, a walled space to be ventilated, a conduit connecting said space and said passage, a cylinder communicating with said conduit, and a spring-loaded, suction controlled piston in said cylinder, having a portion constructed and arranged to close said conduit when suction in said passage is no greater than cranking suction, said piston also having a by-pass recess positioned to permit relatively slight bleeding of suction past said piston at periods of high suction in said passage, and a part between said portion and said recess positioned to permit substantially full communication through said conduit during normal, open throttle operation of the engine.

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