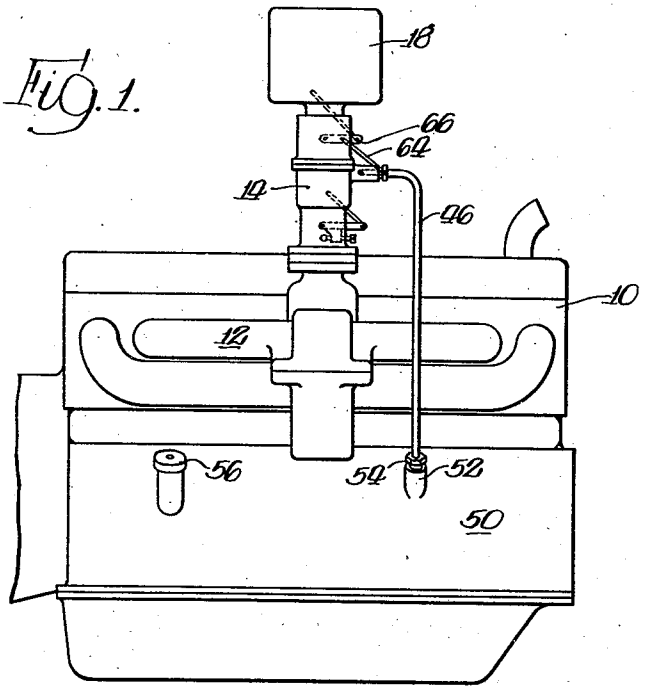
Aug. 4, 1942. W. L. CHANDLER ET AL 2,291,879

CRANK CASE VENTILATOR

Filed April 15, 1940

Fig. 1.



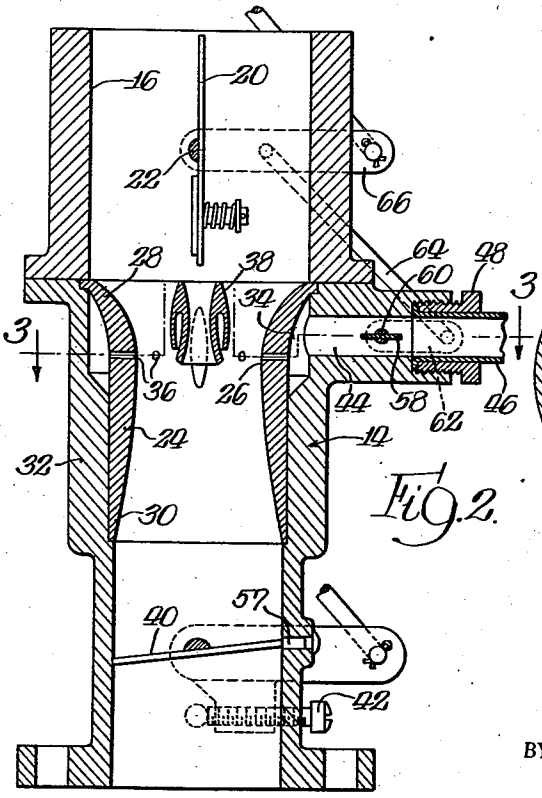
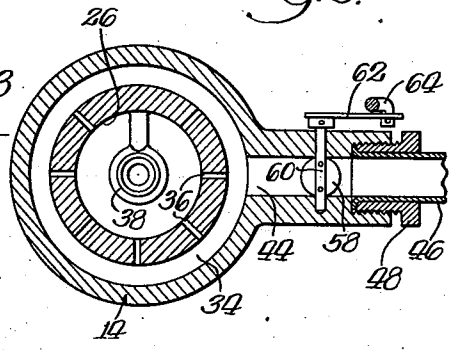


Fig. 2.

Fig. 3.



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CRANKCASE VENTILATOR

William Lee Chandler and Robert Douglas Wilson, Cedar Rapids, Iowa

Application April 15, 1940, Serial No. 329,770

3 Claims. (Cl. 123—119)

Our invention belongs to that class of devices utilized in connection with internal combustion engines for removing water, water vapor and combustion products from the crank case and valve mechanism chambers of such engines.

It is well known that there is more or less leakage of combustion products, and sometimes of raw fuel, past the pistons and into the crank case in the ordinary automotive engine. Furthermore, it is customary to provide a breather opening whereby the crank case communicates with the atmosphere, and moisture which enters through this opening condenses on the interior engine surfaces when the engine is cold.

The presence of these alien substances in the lubricating oil is very harmful, resulting in dilution of the oil, formation of acids, and the creation of an emulsion, under the violent churning action of the crankshaft, which emulsion is believed to have close relation to the formation of sludge. It is therefore desirable to remove the water, fuel and combustion vapors from the lubricant chamber as rapidly as possible while the engine is in operation, in order to maintain the lubricating quality of the oil and to prevent deterioration of bearing surfaces.

To this end, we provide a passage connecting the lubricant chamber with the constricted portion of the venturi in the engine carburetor. The flow of air through the venturi when the engine is operating causes a suction in the passage, and results in a flow through the crank case by which the deleterious vapors are continually removed.

We are aware that it is old to provide a passage connecting the crank case with the carburetor air intake port, or with the engine intake manifold. The first mentioned arrangement, however, necessarily upsets the carburetor air-fuel ratio. The second arrangement has a similar disadvantage, from the fact that the suction in the passage is greatest at closed throttle position, which results in a large flow of air into the carburetor under idle engine conditions, giving an incorrect mixture; furthermore, the suction is lowest under open throttle or heavy load conditions, when adequate crank case ventilation is most needed.

The disadvantages above described are eliminated by our invention, by which we provide maximum ventilating effect when the throttle is open and the engine is running at high speed, and relatively low suction at closed throttle settings, so that the idle mixture is not affected.

An additional object of our invention is to provide means whereby the current of air drawn from the crank case is introduced into the carburetor in such a way as to cause a turbulence which aids carburetion.

With these and other objects in view, our invention consists in the construction, arrangement and combination of the various parts of our device whereby the objects contemplated are obtained, as hereinafter more fully set forth, pointed out in our claims, and illustrated in the accompanying drawing, in which:

Figure 1 is an elevational view of an internal combustion engine incorporating the device of our invention.

Figure 2 is an enlarged, vertical sectional view through the carburetor Venturi passage.

Figure 3 is a horizontal sectional view taken on the line 3—3 of Figure 2.

In the accompanying drawing we have used the reference numeral 10 to indicate generally an internal combustion engine, having an intake manifold 12 and a carburetor 14. In the drawing a down-draft carburetor is shown, but the application of our invention is obviously not limited to carburetors of any particular type.

The carburetor air intake passage 16 may be capped by an air cleaner 18 and controlled by a shutter valve 20 mounted on the shaft 22. At an intermediate point in the carburetor air passage we provide the Venturi sleeve 24 which has a constricted throat 26 and relatively large inlet and exit portions 28 and 30. The sleeve 24 is mounted in the main body 32 of the carburetor casing, and is so shaped relative thereto as to provide an annular space 34 surrounding the constricted portion 26 of the Venturi sleeve. A plurality of radially extending ports 36 extend from the inner surface of the constricted portion 26, through the wall of the Venturi sleeve 24, to communicate with the annular space 34, which thus constitutes a manifold.

Located within the constricted portion of the Venturi tube is the carburetor jet 38, through which the fuel is drawn into the air stream.

In the portion of the carburetor air passage adjacent the intake manifold, the usual throttle valve 40 is provided. This valve may have an adjusting screw 42 by which the idle setting may be made as desired.

A bore 44 passes through the wall of the carburetor body 32 from the annular manifold 34. As a continuation of the passage formed by the bore 44 we provide the tubing 46 which may be fastened in the body 32 in any suitable manner, as by a lock nut 48. The tubing 46 connects with the crank case 50 of the engine 10 through

a fitting 52 in which the tubing may be secured by another lock nut 54. Instead of being connected to the crank case, the tubing 46 may if desired be connected to the valve chamber, or to any other point which communicates freely with the principal lubricant containing chambers of the engine 10.

When the engine is in operation a current of air is drawn through the carburetor 14, entering through the air cleaner 18, and flowing in turn through the air intake passage 16, the Venturi passage 24, and past the throttle control valve 40. The reduced cross sectional area of the Venturi passage at 26 causes the velocity of air at this region to be relatively high, with a consequent reduction of pressure in directions normal to the direction of air flow. The result is a reduced pressure at the ports 36, which tends to cause suction of air from the crank case through the passage 46 and the annular space 34.

An opening to atmosphere through the crank case breather 56 permits an actual flow to take place in the manner described. A scavenging action therefore takes place, whereby fresh air is drawn in through the breather 56, and air bearing water, water vapor and combustion products is drawn out through the tube 46, and discharged through the ports 36 into the air stream being drawn by the engine through the Venturi passage 24.

It will be readily appreciated that the suction at the ports 36 will be increased with increasing velocity of air flow through the venturi. Consequently maximum ventilation of the crank case occurs when the throttle valve 40 is in open positions, and the engine is running at high speeds.

Conversely, when the throttle valve 40 is closed there will be relatively little air flow through the venturi, and relatively low suction on the ports 36. Gasoline is drawn by engine suction directly from the carburetor bowl, through the idle jet 57, and since this jet is below the edge of the throttle valve 40, it is not affected by any amount of air introduced above the throttle valve. Consequently, our ventilator does not disturb the critical idle mixture adjustment of the carburetor.

When the engine must be started in extremely cold weather, of course the choke valve 20 is usually rotated somewhat counterclockwise from the position shown in Figure 2, to restrict the air intake and enrich the mixture. We provide a valve 58 mounted on a shaft 60 in the bore 44. The shaft 60 carries a lever arm 62 which is coupled by a link 64 to the lever arm 66. The lever arm 66 controls the shutter valve 20, and hence when the latter is closed, the valve 58, being coupled to it, will also be closed, so that restriction of air intake by the valve 20 will not be offset by air drawn in through the bore 44. This arrangement is necessary only where very severe cold starting conditions are met.

The disposition of the ports 36 radially about the carburetor jet 38 gives rise to an effect which aids considerably in efficient carburetion. We refer to the fact that the air drawn through the passages 36 impinges substantially at right angles upon the mixture of fuel and air flowing through the venturi 24. The turbulence set up by introduction of the flow from the ports 36 into the principal air stream stirs up the fuel and air mixture, resulting in better vaporization, and giving more satisfactory engine operation.

It will be seen, therefore, that our invention gives the advantages of adequate crank case ventilation, without the usually attendant disadvantages of poor carburetion mixtures. Because of the fact that suction on the ports 36 increases with an increase in the quantity of air flowing through the venturi, and vice versa, the provision of our crank case ventilating system does not disturb the air-fuel ratio at various engine speeds, since the amount of air contributed through the ports 36 is proportional to the amount flowing through the venturi. Maximum ventilation is secured under the conditions obtained on long pull open throttle drives, when proper removal of moisture and combustion products from the crank case is most important.

It will be obvious to those skilled in the art that we have shown and described a specific construction by which our invention may be carried out. We do not mean, however, to limit ourselves to the particular construction described. The fundamental feature of our invention resides in the provision of a passage through which air may flow from the lubricant retaining chambers of the engine to a port through the wall of the carburetor venturi in the low-pressure region of the venturi.

Some changes may be made in the construction and arrangement of the parts of our invention without departing from the real spirit and purpose thereof, and it is our intention to cover by our claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

We claim as our invention:

1. In means for ventilating the crank case of an internal combustion engine, a passage through which air for combustion is drawn into the engine, an air inlet control or choke valve in said passage, a Venturi tube in said passage following said inlet valve, a main fuel jet in said Venturi tube, a throttle valve in said passage following said Venturi tube, an idling jet following said throttle valve, and a duct opening into the restricted portion of said Venturi tube and communicating with the crankcase of the engine.

2. In an internal combustion engine having a passage through which air for combustion is drawn into the engine, an air inlet control valve in said passage, a Venturi tube in said passage following said inlet valve in the direction of air flow, a throttle valve in said passage following said Venturi tube, and an idling jet following said throttle valve, the improvement consisting of a ventilating duct opening into said Venturi tube and communicating with the crankcase of the engine.

3. In an internal combustion engine having an air intake passageway in which a choke valve, a venturi, a throttle valve and an idling jet are successively located in the direction of air flow, a ventilating conduit communicating with the crankcase of the engine and opening into the air intake passageway between said choke valve and said throttle valve.

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