Feb. 4, 1930. C. H. DEARBORN 1,746,215

CRANK CASE VENTILATOR VALVE

Filed Oct. 19, 1927 2 Sheets-Sheet 1

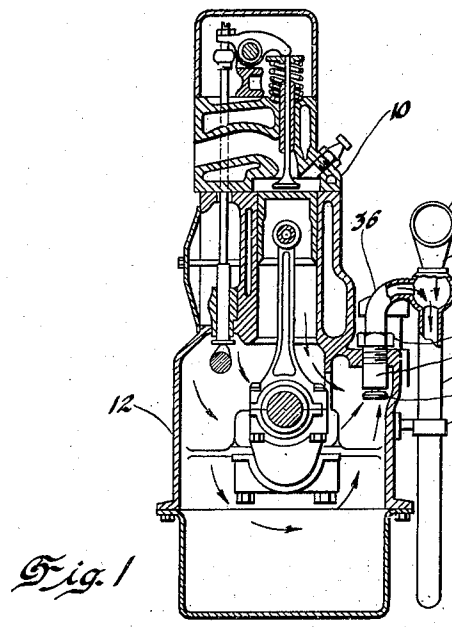


Fig. 1

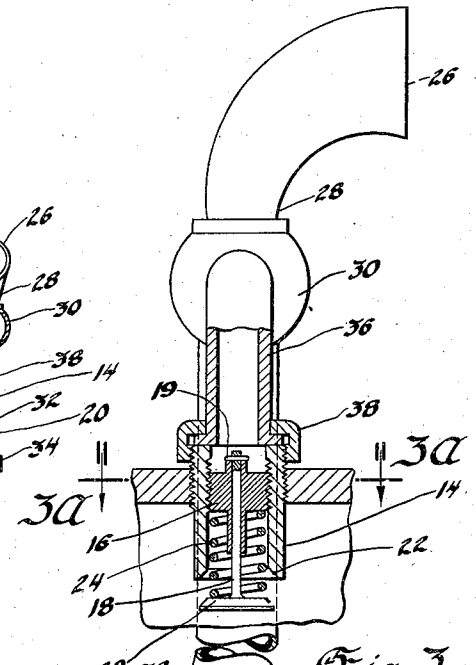


Fig. 3

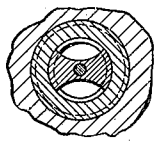


Fig. 3A

Fig. 2

Inventor

C. H. Dearborn

By Blackwood, Spencer & Fish

Attorneys

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CRANK CASE VENTILATOR VALVE

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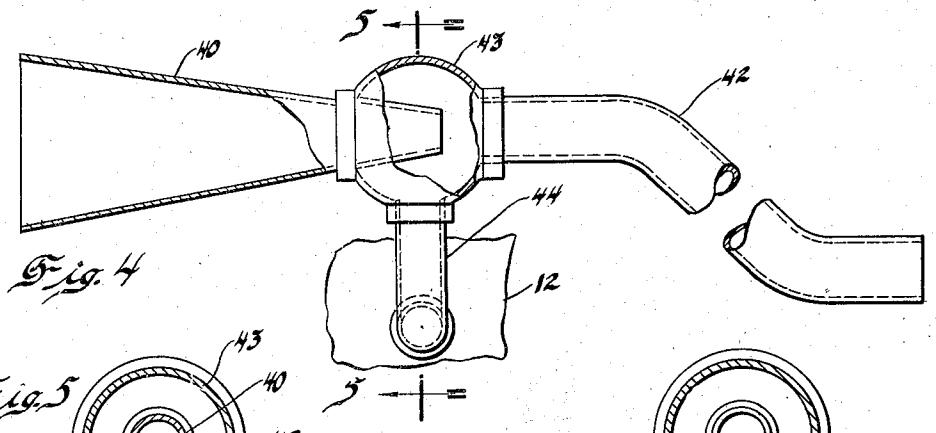


Fig. 4

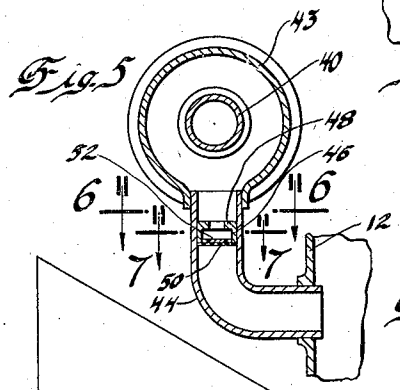


Fig. 5

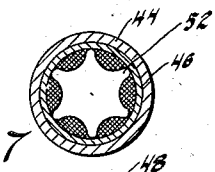


Fig. 7

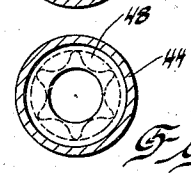


Fig. 6

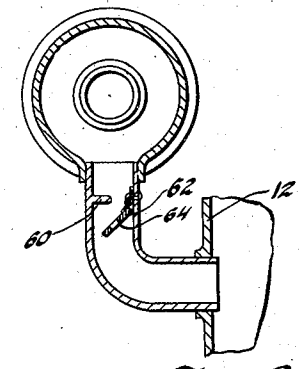


Fig. 8

Fig. 9

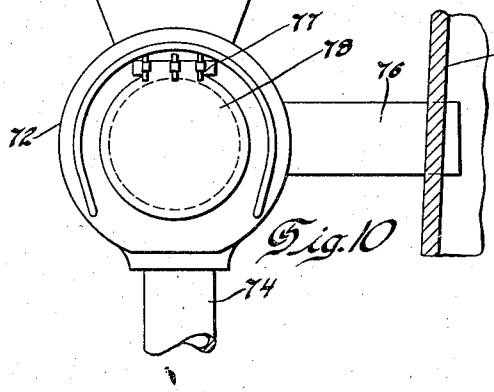


Fig. 10

Inventor

C. H. Dearborn

By Blackwood, Spencer & Hubbell

Attorneys

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UNITED STATES PATENT OFFICE

CLINTON H. DEARBORN, OF HAMPTON, VIRGINIA, ASSIGNOR TO A C SPARK PLUG COMPANY, OF FLINT, MICHIGAN, A COMPANY OF MICHIGAN

CRANK-CASE-VENTILATOR VALVE

Application filed October 19, 1927. Serial No. 227,235.

This invention relates to crankcase ventilation and has to do particularly with crankcase ventilation for an internal combustion engine of the type used in an automotive vehicle.

It is an object of the invention to provide a new and improved crankcase ventilating system which is operated by the current of air resulting from the movement of the car or moving rearward from the fan. It has been proposed, before my invention, to connect the crankcase with a current of air in such a way as to permit that current of air to exercise suction on the contents of the crankcase. This suction has the effect of removing the more volatile of the contents of the crankcase such as gasoline and water vapors which may have entered between the walls of the cylinders and pistons. Such a ventilating device, if constructed to be efficient at low engine speeds, may operate disadvantageously at higher speeds. At high speeds the greater air current exercises greater suction upon the contents of the crankcase and may take therefrom not only the more volatile substances but fine particles of the less volatile lubricating medium. This is especially likely to occur in hot weather when the motor is quite hot. Under such conditions but little ventilation is needed in the crankcase as the diluents are then vaporized.

It is an object of my invention to avoid such disadvantages while retaining all the advantages of an efficient crankcase ventilating system operating on the principle of suction produced by a current of air. More specifically it is an object of this invention to provide an improved and simplified controlling means for such a ventilating system.

Other objects and advantages of the invention will appear in the course of the following description, taken in connection with the accompanying drawing and appended claims.

In the drawing:

Figure 1 is a front view, partly in section and with parts broken away.

Figure 2 is a side elevation partly broken away.

Figure 3 is an enlarged sectional detail view of the valve mechanism.

Figure 3ª is a section on the line 3 of Figure 3.

Figure 4 is a side view of a modified form of my invention.

Figure 5 is a section on the line 5—5 of Figure 4.

Figure 6 is a section on the line 6—6 of Figure 5.

Figure 7 is a section on the line 7—7 of Figure 5.

Figure 8 is a view similar to Figure 5, showing a modified form of regulating valve.

Figure 9 is a side view with parts broken away, showing a still further modification of my invention.

Figure 10 is a rear view of the structure shown in Figure 9.

Referring to the drawing, I have shown in Figure 1 a section of a conventional vertical internal combustion engine 10 of the type used in an automotive vehicle. Threaded in an aperture in the crankcase 12 is an externally and internally threaded valve casing 14 in which is threaded the valve stem supporting plug 16 which is provided with a central opening in which the valve stem 18 is vertically reciprocable. A valve 20 is provided on the end of the stem 18 and is bevelled to fit in the bevelled valve seat 22, being normally held unseated in the position illustrated in Figure 3 by the coil spring 24 surrounding the valve stem between the valve 20 and plug 16. Downward movement of the valve stem 18 is limited by pin 19 in the valve stem. The plug is perforated in any desired manner, such as being slotted, as shown in Figure 3ª, in order to permit the passage of air through the valve casing 14. I thus provide a valve or damper in the connection between the

crankcase and the venturi described below.

Connected with the valve casing 14 on the outside of the crankcase is the venturi or suction device. This device comprises an inlet having an enlarged open end 26 and a restricted portion 28 fixed in the enlarged upper end 30 of the outlet pipe 32 which is supported in a bracket 34 fixed to the side of the crankcase. The enlarged end 30 is connected by a pipe 36 with the crankcase, the flanged lower end of the pipe 36 being fixed over the valve casing 14 by the clamping nut 38.

During the forward movement of the vehicle a blast of air passes in through the enlarged opening 26 and restricted portion 28 into the enlarged portion 30 and out through the rearwardly extending pipe 32. This creates a region of low pressure within the enlarged portion 30 with the result that air is drawn through the pipe 36 from the crankcase. As the blast of air increases, due to an increase in speed of the car and/or the fan, the suction within the enlarged portion 30 increases and tends to cause an increased flow of air from the crankcase. This increased flow of air causes the valve 20 to move against the tension of the spring 24 toward closed position, thus reducing the effective size of the aperture and limiting the current of air from the crankcase through the ventilating device. The damper or valve in the connection between the crankcase and venturi is thus controlled by the passage of air through the venturi.

In the modified form of my invention as shown in Figures 4 to 7 inclusive, the venturi, comprising the cone-shaped inlet 40 and outlet pipe 42, is connected by means of the elbow joint 44 with the crankcase 12, the horizontal portion of the joint 44 being supported in an aperture in the crankcase 12 while the vertical portion extends within the enlarged portion 43 of the pipe 42. The valve is supported in the vertical portion of the joint 44 and comprises a cylindrical element 46 carrying an annular flange 48. A screen 50 is fixed over the lower end of cylindrical element 46 and vertically movable within said element between the screen 50 and flange 48 is the star-shaped valve 52. As the rate of flow of air from the crankcase through the elbow joint 44 increases the star-shaped valve 52 is moved upward and cuts down on and limits passage of air from the crankcase to the venturi.

The structure of the modification shown in Figure 8 is the same as that shown in Figures 4 to 7 inclusive except in the specific structure of the damper. As shown in Figure 8 a baffle 60 is provided in the elbow joint and vertically swingable adjacent thereto is a disk valve 62 provided with an aperture 64. The disk 62 swings upward as the current increases and acts as a damper.

In the modification shown in Figures 9 and 10, a slightly modified form of venturi is provided, comprising a cone-shaped inlet 70 connected with an enlarged substantially spherical element 72 which in turn has connected therewith the outlet pipe 74. A pipe 76 connects the element 72 with the crankcase. Pivoted over an opening in the element 72 and normally spring pressed in closed position by means of coil spring 77 is a disk valve 78. This valve is directly in the way of the blast of air through the inlet 70 and when the force of the blast reaches a certain point, the resistance of the spring 77 is overcome and the valve 78 is forced open, thus permitting the entrance of air from the outside and reducing the suction effect of the venturi and the amount of air drawn from the crankcase. Any desired or usual openings may be provided in the crankcase for permitting the entrance of air. I have indicated at 50 in Figure 2 a breather of conventional type.

I claim:

1. An internal combustion engine having a crankcase provided with an air inlet, a suction connection to the crankcase for applying suction thereto to produce a flow of air therethrough, and means in said suction connection operated by increase of suction for closing said connection to reduce the vacuum applied to the crankcase.

2. An internal combustion engine having a crankcase provided with an air inlet, an aspirator for applying suction to the crankcase, and a valve in said aspirator operated by increase in suction to cut down the capacity of the aspirator for the conduction of air therethrough from the crankcase.

3. An internal combustion engine having a crankcase provided with an air inlet, an air outlet, means for directing a flow of air across said outlet to produce an aspirating action thereon, and means associated with said outlet responsive to increased suction thereon for decreasing the capacity of said outlet.

4. An internal combustion engine having a crankcase provided with an air inlet, an air outlet, means for directing a flow of air past said outlet to produce an aspirating effect thereon to remove vapors from the crankcase, and a valve in said outlet responsive to suction for reducing the capacity of said outlet as the engine suction increases, and means for normally maintaining said valve in full open position.

5. An internal combustion engine having a crankcase provided with an air inlet, an outlet tube, an air blast operated aspirator arranged to direct a blast of air across said outlet tube to produce an aspirating effect thereon to withdraw vapors from the crankcase, a valve in said outlet tube, a spring for urging the valve to open position, said valve being moved toward closing position by increase in suction produced by said aspirator.

6. An engine fitting comprising a tubular member adapted to be fitted in an opening in the engine crankcase, a suction operated valve in said tubular member, and means for normally maintaining the valve in open position.

7. An engine fitting comprising a tubular member adapted to be fitted in an opening in an engine crankcase, a guide in said member apertured for the passage of air, and a valve slidably mounted in said guide arranged to shut off communication through said pipe, and a spring normally urging the valve away from closing position.

In testimony whereof I affix my signature.

CLINTON H. DEARBORN.