Oct. 6, 1936. H. F. BARR ET AL 2,056,762

CRANKCASE VENTILATION

Filed Jan. 6, 1936 2 Sheets-Sheet 1

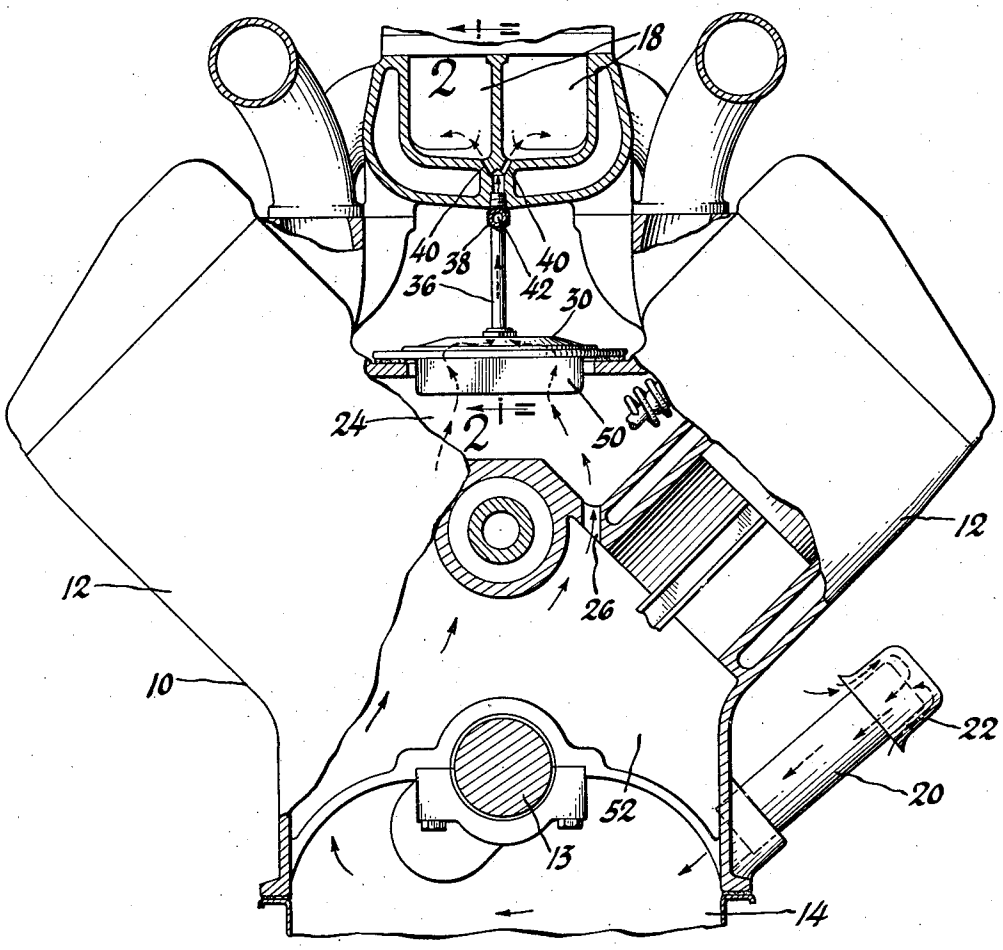


Fig. 1

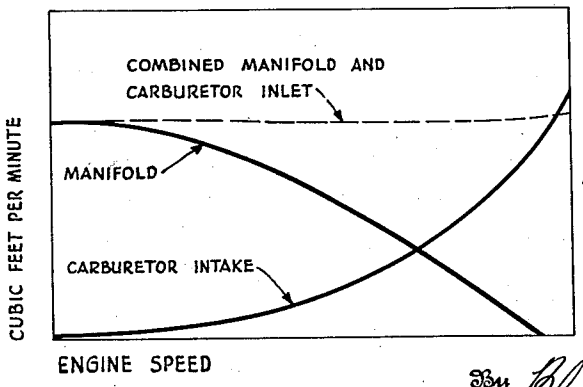


Fig. 4

Inventors
Harry F. Barr
Charles F. Arnold &
John F. Gordon

By Blackmore, Spencer & Flint
Attorneys

Oct. 6, 1936. H. F. BARR ET AL 2,056,762

CRANKCASE VENTILATION

Filed Jan. 6, 1936 2 Sheets-Sheet 2

Fig. 2

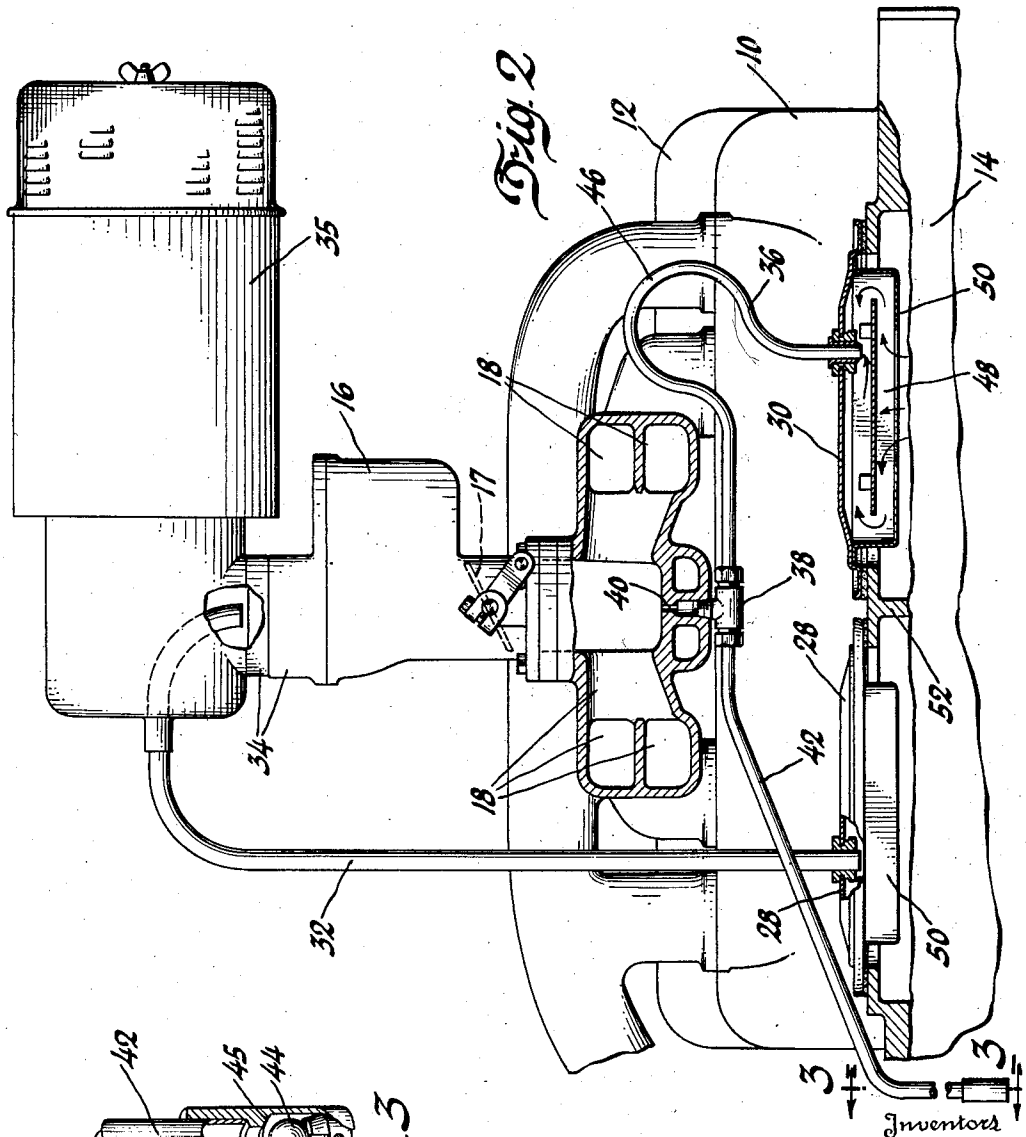


Fig. 3

Inventors

Harry F. Barr

Charles F. Arnold &

John F. Gordon

By Blackmore, Spencer & Flint

Attorneys

Patented Oct. 6, 1936

2,056,762

UNITED STATES PATENT OFFICE

2,056,762

CRANKCASE VENTILATION

Harry F. Barr, Charles F. Arnold, and John F. Gordon, Detroit, Mich., assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application January 6, 1936, Serial No. 57,722

4 Claims. (Cl. 123—196)

This invention has to do with a crankcase ventilating system for internal combustion engines. Most modern internal combustion engines are provided with means for passing air through the engine crankcase to remove from the engine oil diluents, such as water and unburnt fuel, entering by leakage past the pistons. Usually the necessary flow of air is obtained by applying to the crankcase either the suction existing in the engine manifold or in the carburetor air intake or the suction, sometimes called "road suction", produced by extending an outlet from the crankcase below the automobile so as to be exposed to the aspirating effect produced by the motion of the car.

With prior arrangements it has not been possible to secure under all conditions the desired flow of air through the crankcase for in each case the suction employed varies with the speed or load of the engine or both. Where engine manifold suction is used it is possible to secure the proper amount of ventilation at low speeds, but the ventilation at high speeds is insufficient owing to lowering of the manifold vacuum when the carburetor throttle valve is opened. Furthermore, the introduction of any great amount of air into the manifold is objectionable in that it makes the mixture too lean, interfering with engine performance, and this factor makes it necessary to restrict the air flow in such a system to an extent to make it inadequate for proper ventilation. Road suction is objectionable in that it is not operative at low speeds, and furthermore in some engine designs it is difficult to install. It also presents the possibility of drawing dust into the engine when the car is moving slowly through dusty regions.

According to our invention the flow of air through the crankcase may be controlled so as to give any desired characteristics without the employment of moving parts by simultaneously making use of several sources of suction having different speed-flow characteristics so that one offsets or supplements the other. These may be so designed that a uniform flow is produced, or, if desired, the flow may be reduced slightly as the speed increases, or increased with increase in speed. The new ventilating system thus provides a simple but effective means of obtaining the desired speed-flow characteristics.

In the preferred form of the invention the crank-case is provided with two suction connections, one leading to the intake manifold and the other to the carburetor air intake. When idling the strong intake manifold suction insures adequate ventilation, while the flow of air through the carburetor air intake is so slight as to produce little or no suction. As the speed of the engine increases the intake manifold suction decreases while the suction through the air intake connection increases since a considerable stream of air is now flowing to the carburetor. The connections may be so designed as to secure a uniform flow of air through the engine at all speeds, and thus the crankcase is at all times adequately ventilated maintaining the engine oil substantially free of undesirable dilution.

In the drawings:

Figure 1 is an end view of a conventional V-type automobile engine having parts broken away to show parts of the ventilating system.

Figure 2 is a view, partly in section, taken substantially along the line 2—2 of Figure 1.

Figure 3 is an enlarged section taken on line 3—3 of Figure 2.

Figure 4 is a graph showing the speed-flow characteristics of two suction connections combined to provide constant flow throughout the speed range.

10 indicates a conventional V-type automobile engine having banks of cylinders 12, crankshaft 13, crankcase 14, carburetor 16, throttle valve 17 and intake manifold 18. The intake manifold is preferably of a twin construction used on V-type engines. The engine is of course provided with the usual cooling jacket, exhaust manifold and other appurtenances.

20 indicates the air intake to the crankcase preferably provided with a suitable air filter or air cleaner indicated at 22. The air intake 20 is preferably arranged so as to be subject to the pumping action of the engine crankshaft as described and claimed in the prior patent to Ellis No. 1,849,000, granted March 8, 1932. The air from the crankcase, laden with diluents, passes into the valve chamber 24 through suitable openings, one of which is indicated at 26 in Figure 1. The valve chamber is provided with covers indicated at 28 and 30.

Conduit 32 leads from the valve cover 28 to the carburetor air intake 34, which is preferably equipped with a suitable air filter or cleaner 35. The end of the conduit 32 is bent in the direction of flow of air to the carburetor so as to be subject to aspiration.

Conduit 36 leads from the valve cover 30 to a T-fitting 38 communicating with ports 40 leading into the central portions of the twin intake manifold 18 supplying combustible mixture to the cylinders. T-fitting 38 also affords com-

munication between conduit 36 and conduit 42 leading to a point beneath the engine. Conduit 42 is normally closed by a suitable valve 44 held in upper position against its seat 45 by the suction in the manifold. When the engine is not running or when the manifold suction is insufficient the valve drops away from its seat permitting the escape of any fuel which may have found its way out of the manifold. To prevent the passage of fuel into the crankcase through the conduit 36, the latter is provided with an upwardly bent portion 46.

To prevent the passage of oil out of the crankcase through conduits 32 and 36, the entrances to the conduits are provided with baffles as shown at 48 and 50, providing a labyrinth to catch oil.

The system operates as follows: At low engine speed the throttle 17 is closed, the manifold depression will be great and there will be a pronounced suction on conduit 36. As the throttle is opened and the speed increases the manifold suction decreases and the air passing through conduit 36 will correspondingly decrease but the velocity of air passing through the carburetor air intake 34 will increase so that the aspirating effect on conduit 32 will increase drawing air in increasing volume through this conduit into the crankcase.

At low speeds some air will enter the system through conduit 32 rather than through the crankcase inlet. However, owing to the provision of the vertical bulkhead 52 dividing the engine in the center air thus entering must pass through the crankcase in order to reach the conduit 36 so that even this air contributes to the ventilation of the crankcase. However, since the amount so entering is small and since this action only occurs under idling or low speed throttled conditions it would not prove seriously objectionable to have this air pass directly through the valve chamber into conduit 36.

With this arrangement it is possible by making the ports 40 and the conduit 34 of proper diameter to secure almost any desired speed-flow characteristics in the ventilating system. In the graph, Figure 4, are shown the separate speed-flow characteristics of ventilation through conduits 32 and 36, respectively, and the resultant of the two. It will be noted that the resultant is a substantially flat curve indicating a constant volume of air passing through the crankcase at all speeds. However, by modification of the size of the passages a resultant flow of almost any desired characteristics can be obtained.

It will be obvious that instead of extending the conduit 34 to the carburetor air intake it could, if desired, have been extended below the engine so as to be subject to road suction, and the character of the resultant flow would have been substantially the same, since road suction increases with increased car speed.

We claim:

1. In a ventilating system for crankcases of internal combustion engines and the like the combination of a chamber to be ventilated, a conduit leading from said chamber to a source of suction increasing with the engine speed, and a second conduit leading from said chamber to a source of suction decreasing with increase in engine speed.

2. In a ventilating system for internal combustion engines and the like the combination of an engine having a crankcase and a combustible mixture supply system having a throttle valve therein, means for drawing gases from the crankcase connected to said system on one side of the throttle valve and means for drawing gases from the crankcase connected to said system on the other side of the throttle valve.

3. In a ventilating system for the crankcases of internal combustion engines and the like, the combination of an engine crankcase, means for drawing gases from said crankcase including a source of suction increasing with engine speed, and means for simultaneously drawing gases from said crankcase including a source of suction decreasing with increase in engine speed.

4. In the combination as defined in claim 3, the increase in suction of the first named means being substantially equal to the decrease in suction of the second named means throughout the range of engine speed so as to maintain substantially constant suction on the crankcase.

HARRY F. BARR.
CHARLES F. ARNOLD.
JOHN F. GORDON.