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2,971,505

ATTACHMENT FOR INTERNAL COMBUSTION ENGINE

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Fig. 1

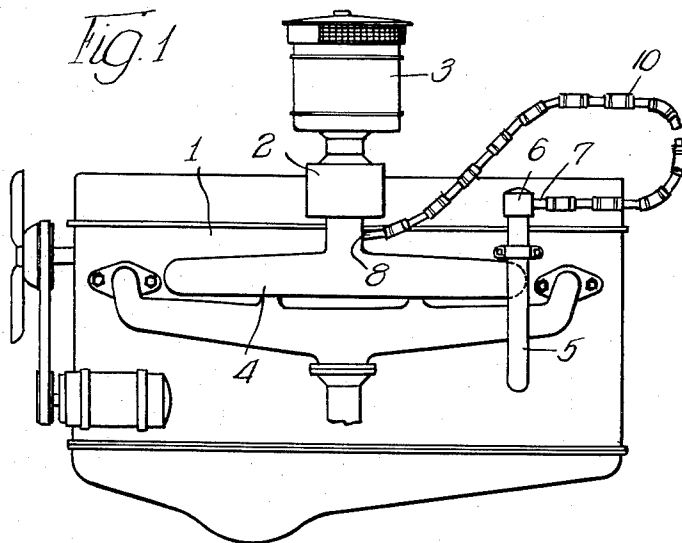


Fig. 2

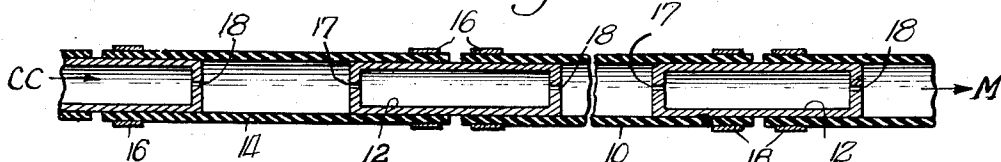


Fig. 3

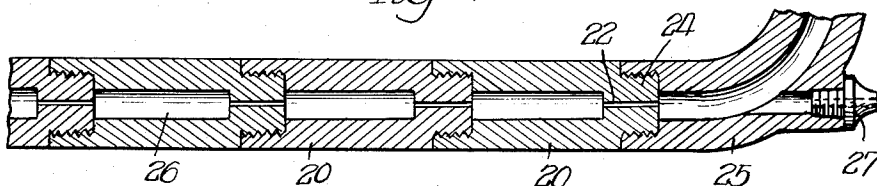


Fig. 4

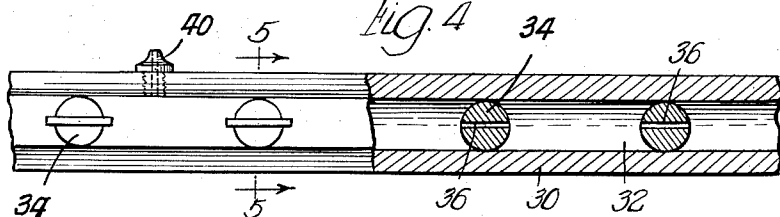
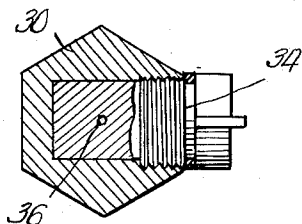


Fig. 5



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ATTACHMENT FOR INTERNAL COMBUSTION ENGINE

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13 Claims. (Cl. 123—119)

This invention relates to internal combustion engines and is particularly related to the fuel system thereof.

The primary object of the invention is to provide a device that can be easily regulated for removing the desired amount of gases and vapors from the crankcase of an internal combustion engine and to introduce such gases and vapors into the intake manifold of the engine for mixture with the fuel vapors from the carburetor, whereby fuel economy results, the power of said engine is increased and maintained, the formation of sludge in the crankcase is practically eliminated and carbon deposits are removed and thereafter prevented. The vapors from the crankcase which ordinarily are discharged into the air and sometimes find their way into the vehicle are thus utilized and thereby prevented from being obnoxious to the passengers in the vehicle.

A large quantity of air circulates throughout the crankcase of an engine during ordinary operation thereof, and the constant heating and cooling of same causes moisture or condensation to form in the crankcase which mixes with the oil and forms a sludge, a particularly damaging situation insofar as the effectiveness of the oil is concerned.

Blow-by gases and fuel vapors also frequently by-pass the pistons and rings and mix with the oil and condensation in the crankcase, thereby diluting same. Vapors from this collection of engine wastes escape through the breather pipe of the crankcase.

By providing a connection from the top of the crankcase to the intake manifold, utilizing the vacuum of the latter, these otherwise harmful vapors (if permitted to collect in the crankcase) can be withdrawn from the crankcase and fed into the combustion chamber of the engine cylinders, there to augment the fuel. The water vapors reduce carbon deposits on valves, spark plugs, pistons, etc., and the oil vapors lubricate the moving parts at the engine head.

These and other objects and advantages of the invention will become more apparent in the following description thereof.

Referring now to the accompanying drawing forming part of this application and wherein like reference characters indicate like parts.

Fig. 1 is a side elevation of an internal combustion engine showing one application of the invention thereto.

Fig. 2 is a longitudinal cross sectional view through the connection of the invention.

Fig. 3 is a view similar to Fig. 2 of a modified form of the invention.

Fig. 4 is a view similar to Fig. 2 of a still further modification of the invention.

Fig. 5 is a cross section on the line 5-5 of Fig. 4.

Referring to the drawings in detail, an internal combustion engine is shown at 1, it being provided with the usual carburetor 2, air cleaner 3, intake manifold 4, and breather pipe 5 from the crankcase of the engine, which breather pipe is sometimes closed by a cap such as indicated at 6.

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My invention comprises forming a connection between the crankcase and the intake manifold of the engine, as for example, by providing a nipple 7 in connection with the breather pipe cap 6, and another such nipple 8 in connection with the intake manifold of the engine. Between these nipples 7 and 8 is connected the hose or conduit 10. Thus upon operation of the engine, a regulated portion of the suction from the intake manifold will draw a portion of the vapor, ordinarily escaping from the breather pipe, into the intake manifold and utilize same for lubrication, for augmenting the fuel supply, and for eliminating most of the carbon deposits.

I have found that the structure of the hose or conduit is very important. On the intake stroke of the pistons, fuel is drawn by suction from the carburetor to the combustion chamber through the intake manifold. The amount of the waste vapors withdrawn from the crankcase, after the installation of this invention, of course, is much less than the fuel drawn from the carburetor 2, but in any event, not sufficient to interfere with the operation of windshield wipers and possibly other equipment which operates on vacuum.

My conduit 10 is made up of a plurality of like units 12 which in the preferred form are relatively short hollow cylinders which have closed ends. One end of each of the units 12 is provided with an axial opening 17 and the other end is also provided with a slightly smaller opening 18. Openings 17 are about $\frac{1}{16}$ inch in diameter and the openings 18s are about $\frac{3}{64}$ inch in diameter. In other words, the opening in the end of the cylinder which is toward the crankcase is larger than the opening in the opposite end. These cylinders are spaced a short distance from each other and are connected by similar short lengths of rubber hose or other substance or material 14, such as used for windshield wiper vacuum lines. As viewed in Figs. 2 to 4, the left end of the conduit is connected to the breather pipe and the right end is connected to the intake manifold. Thus the movement of the waste vapors is from left to right through the conduit. The hose units 14 of conduit 10 are clamped to the ends of the cylindrical units 12 by means of hose clamps 16. Within the cylinders 12 is a considerable expansion chamber, and the space in the hose units 14 between the cylinders also provides an expansion chamber. Thus the vapors alternately contract to pass through a small opening into an expansion chamber, then contract to pass through a smaller opening into another expansion chamber, creating a waste condensing action, and repeat this movement throughout the conduit until it reaches and enters the intake manifold. The attachment of the conduit 10 to the intake manifold at nipple 8 and to the breather pipe at nipple 7 may be a slip or screw fit so that either or both ends may be easily removed for cleaning by forcing compressed air therethrough.

It has been demonstrated that four of these cylindrical units 12 connected together in spaced relation by hose units 14 are adequate for the purpose and has resulted in much smoother operation of motors, particularly of the valve in head type, and with an unusual savings in fuel consumption. With four cylindrical units 12 there would be four of the small openings and four or the larger openings the vapors would have to alternately pass through.

In Fig. 3 I have shown the conduit between the breather pipe 5 and the intake manifold as comprising a series of bushing units 20 which are screwed together, and each has a small opening 22 drilled axially through the male end 24 of each unit. The remainder of each bushing has a larger bore 26 therein which acts as the expansion chamber for the vapors passing therethrough. For cleaning this modification, the units 20 are simply

separated and air blown therethrough to clean out any carbon particles that may have been sucked in with the vapors. This waste condensing action breaks up any particles of crankcase sludge which may have been drawn into the conduit and reduces the same to oil vapors by the time it reaches the intake manifold.

For cleaning the units shown in Fig. 3, it will be noted that the end unit 25 toward the intake manifold is in the form of an elbow with a tapped fitting 27 in the form of a spring check valve, screw-threadedly applied to said elbow with the axial opening therethrough in axial alinement with the openings 22, whereby compressed air may be forced through said fitting 27 and blow any accumulation of wastes in the line back into the crankcase.

Another modification of the conduit is shown in Figs. 4 and 5.

Here a section of pipe 30, having an opening 32 longitudinally therethrough, is provided with transverse tapped holes into which are screwed plugs 34, which plug up and close the opening 32. These plugs 34, however, each have small transverse holes 36 therethrough and when the plugs are turned so that opposite ends of the openings 36 are disposed within the opening 32, the waste vapors passing through pipe 30 must pass through the small openings 36. The same effect is thereby produced as in the other described modifications.

I have also shown in Fig. 4 a fitting 40 screwthreadedly applied to the conduit 30, by means of which air may be forced within the conduit for the purpose of cleaning out the conduit and openings 36. If the opening 36 of any plug becomes completely stopped, that plug may be removed for cleaning.

The member of the individual units 12, 20, or 34, and the size of the small openings 17 or 18, 22, or 36, respectively, therein, may be varied to suit the size of the engine and amount of vacuum so that the operation of my invention will not reduce the vacuum to the point where it would interfere with proper carburization or operation of windshield wipers, automatic chokes, or the like. It is obvious too that the conduit unit could be built into the motor at the factory in case of installation in new cars.

From the above it should be apparent how the device operates. Upon starting of the engine 1, the action of the pistons therein causes a vacuum to be created in the intake manifold which draws gas therein from the carburetor 2. Since the nipple 3, of relatively small diameter, is connected to the intake manifold, the vacuum therein draws the waste vapors from the breather pipe of the crankcase into the intake manifold where it mixes with the gas, augmenting the same, and also lubricating the moving parts in the head of the engine, as well as dissolving carbon deposits, resulting in a much smoother operating engine.

I claim:

1. The combination with an internal combustion engine having an intake manifold and a crankcase, a conduit having one end in communication with the crankcase to receive vapors therefrom, the other end of said conduit being in communication with the intake manifold, whereby the vacuum within said manifold draws vapor from the crankcase to said manifold, said conduit

having means comprising a series of alternate small openings and chambers for causing said vapors to successively pass therethrough to said manifold.

2. The invention set forth in claim 1, said conduit means comprising a series of units each having a plurality of different sized openings therein.

3. The invention set forth in claim 1, said conduit means comprising a plurality of hollow cylindrical units having ends, said ends having different sized small openings axially therethrough.

4. The invention set forth in claim 1, said small openings being of the same size.

5. The invention set forth in claim 1, said conduit having means communicating with the interior thereof, whereby the conduit may be cleaned by forcing compressed air through said means.

6. The invention set forth in claim 1, said conduit comprising a series of units and connectors, said units having a plurality of different sized openings and passage-ways therein.

7. The invention set forth in claim 1, said conduit comprising a series of units and connectors, said connectors connecting said units in spaced relation whereby the spaces between the units within the connectors provide additional chambers for the vapors to pass through to said manifold.

8. The invention set forth in claim 1, said conduit including a unit comprising a plurality of relatively small openings therein.

9. The invention set forth in claim 1, wherein the number of the individual units and the size of openings therein are proportioned to the amount of vacuum required for the proper functioning of the invention.

10. The invention set forth in claim 1, said conduit means comprising plugs transversely of and closing the conduit, each plug having a small transverse opening therethrough, both ends of said openings being in communication with the interior of the conduit.

11. The invention set forth in claim 1, said conduit comprising a plurality of bushings secured together, each bushing having a small axial hole and a chamber therein through which said vapors pass.

12. The combination with an internal combustion engine having an intake manifold and a crankcase, a connection with the manifold, a connection with the crankcase, said connections having relatively small openings therethrough in communication with the manifold and with the crankcase, and a conduit connecting said connections, said conduit having a series of alternate small openings and chambers therein through which said vapors pass.

13. The invention set forth in claim 12, said conduit means comprising a plurality of units, each having a hole therethrough, the opposite ends of said hole being in communication with the interior of said conduit.

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