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CRANK CASE BREATHER

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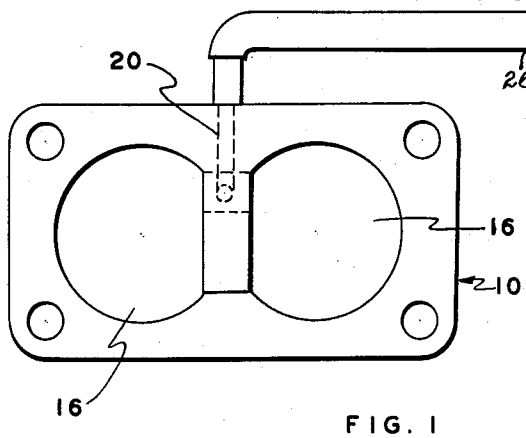


FIG. 1

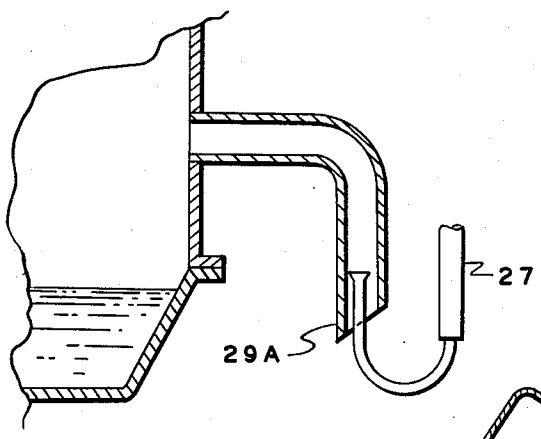
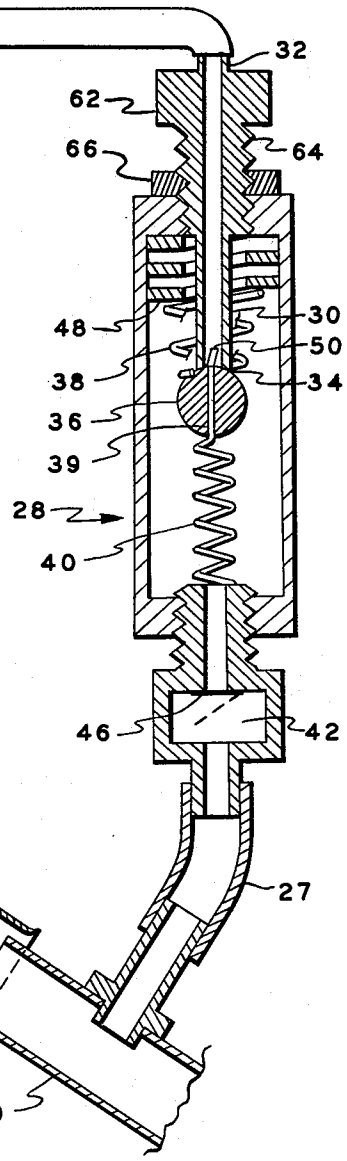


FIG. 2



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CRANK CASE BREATHER

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This invention relates to a device for improving the efficiency and performance of an internal combustion engine.

As is well known, some unburned hydrocarbon gases, as well as some water vapor, "blow by" or flow past the piston rings of the engine into the crank case where they contaminate the oil and form sludge, corrosive acids, solid carbon deposits, and so on.

To remedy this situation, it has been proposed to provide the crank case of the engine with a draft tube which leads from the crank to the atmosphere and which depends on the velocity of the air flowing past the end of the tube to create that degree of suction within the tube which is necessary to withdraw gases from the crank case. A draft tube of this type operates fairly satisfactorily at speeds of about 25 m.p.h., and over but, at lower speeds, and in stop and go city driving, the conventional draft tube is not satisfactory.

It is therefore one object of the invention to produce an improved "breather" for the crank case of an engine which will remove some of the gases from the crank case even when the engine is idling or is going at speeds well below 25 m.p.h.

A conventional draft tube exhausts the gases referred to, which contain combustible components, directly to the atmosphere where they are wasted and pollute the air.

It is therefore a still further object of the invention to produce an improved breather whereby the gases referred to are drawn into the intake manifold of the engine where they are burned, thus improving the efficiency of the engine at all speeds.

An engine should idle fast enough to prevent stalling and slowly enough to conserve fuel and this adjustment is effected by a nice balance between the supply of air and fuel.

It is therefore a still further object of the invention to produce an improved breather which allows some gases to flow from the crank case to the intake manifold while the engine is idling without interfering with the idling of the engine.

These and other objects are attained by my invention as set forth in the following specification and as shown in the accompanying drawings in which:

FIG. 1 is a diagrammatic view, partly in plan and partly in section, showing the breather of the invention connecting the conventional carburetor of a conventional internal combustion engine, with the oil fill-in pipe which leads to the crank case of the engine.

FIG. 2 is a diagrammatic view showing the breather of the present invention connecting the carburetor of the engine to the conventional draft tube of the engine.

In the drawings, 10 designates a plate which is adapted to be placed between the bottom of a conventional carburetor and the top of the intake manifold. As shown, plate 10 is designed or used with a dual-throated carburetor and therefore has two openings 16 which, when the parts are assembled, register with the dual throats of the carburetor and with the corresponding openings in the manifold. Plate 10 can be made in one piece and is of sufficient thickness to permit the drilling of a passage 20 there-through which leads from the atmosphere to both openings 16.

In order to draw gases from the crank case of the engine into the intake manifold thereof, I provide tube 26, one end of which is connected to passage 20 and the other

end of which leads to one end of casing 28, the other end of which is connected by tube 27 to the oil fill-in pipe 29, as in FIG. 1, or to the end of a conventional draft tube 29A, as in FIG. 2.

In order to regulate the flow of gases from the crank case to the intake manifold, casing 28 encloses a tube 30, one end of which is connected, as at 32, to tube 26, and the other end of which provides a seat 34 for a ball valve 36 which is normally biased away from said seat by spring 38. Ball valve 36 is biased in the opposite direction by spring 40, the upper end of which preferably passes through the ball valve, as at 39. The other end of casing 28 is connected to a passage 42, subject to the control of thermostat 46.

In the preferred embodiment, the action of spring 38 is supplemented by thermostat 48. It will be noted that spring 38 is stronger than spring 40; that the combined force of suction when the engine is idling (of the order of 12" to 21") and the force of spring 40 is greater than the force of spring 38 and that thermostats 46 and 48 move to open position in response to predetermined elevated temperature conditions and that they close when the temperature drops to a predetermined value.

To insure a minimum flow of gases, even when ball valve 36 is fully seated, I provide the ball valve, or its seat, with one or more slots 50 which by-pass valve seat 34. Slots 50 are preferably spiral so as to impart to the gases flowing there-through a swirling action which helps to keep the passage clean.

The operation is as follows:

When the engine is being started, and immediately after it ignites, thermostat 46 will be in full closing position and no gases can flow, through passage 42, from the crank case into the intake manifold where they can upset the delicate adjustment of the fuel mixture which is necessary for quick starting, especially, when the engine is cold. As soon as the engine has turned over a few times, thermostat 46 opens, but the high idling suction, assisted by spring 40, keeps ball valve 36 seated and only such gases as can pass through slot, or slots, 50 will reach the intake manifold where they will enrich the mixture without causing the engine to stall. When the r.p.m. increases, as by racing the motor, or because the car is moving, the reduced force of suction, combined with the force of spring 40, will be less than the force of spring 38, which now correspondingly unseats ball valve 36 and permits increased flow of gases from the crank case to the intake manifold. Should spring 38 fail to unseat the ball valve, the expansion of thermostat 48 in response to the increased temperature of the engine, will aid spring 38 and will insure the unseating of ball valve 36. The operation of the springs and thermostats is the same whether tube 27 leads into oil fill-in pipe 29, or into draft tube 29A.

It will be seen from the foregoing that, as soon as the engine warms up, and thermostat 46 opens, gases begin to be controllably withdrawn from the crank case to the intake manifold of the engine and that the flow of gases increases and decreases with the load of the engine. The removal of gases from the crank case reduces the formation of sludge and the deposit of carbon and utilizes at least some of the combustible components of the gases which reach, or develop in, the crank case, thereby increasing the efficiency of the engine.

It will also be seen that I have produced an inexpensive "breather" which can be easily applied to any car and which can be adjusted to the requirements of a particular car. Also, the entire device can be easily disconnected for periodic cleaning and replacement.

What I claim is:

1. A breather for use in connection with an internal

combustion engine of the type which includes a carburetor and a crank case,

said breather including a hollow casing located between said crank case and said carburetor,

a first tube connecting one end of said casing to said carburetor,

a second tube connecting the other end of said casing to said crank case,

and a heat responsive element intermediate said carburetor and said crank case movable, when subjected to a temperature of a first, relatively low, predetermined value, to a first position in which it obstructs the flow of gases from said crank case to said carburetor,

said heat responsive element being calibrated to move, when subjected to a second, relatively higher, predetermined value, to a second position in which gases can flow from crank to the carburetor.

2. A breather for use in connection with an internal combustion engine of the type which includes a carburetor and a crank case,

said breather including a casing,

a first tube connecting one side of said casing to said carburetor,

a second tube connecting the other end of said casing to said crank case,

a valve including a valve seat leading from the interior of said casing to said first tube, and a valve plug adapted to engage said seat to cut said first tube off from the interior of said casing,

and means yieldably urging said valve plug against said valve seat with a force of a predetermined value, there being a restricted by-pass permanently connecting the interior of said casing in flow relation with said first tube independently of said valve.

3. The structure recited in claim 2 in which the force tending to seat said plug includes the suction of the engine.

4. A breather for use in connection with an internal combustion engine of the type which includes a carburetor and a crank case,

said breather including a casing,

a first tube connecting one side of said casing to said carburetor,

a second tube connecting the other end of said casing to said crank case,

a valve including a valve seat leading from the interior of said casing to said first tube and a valve plug adapted to engage said seat to cut said first tube off from the interior of said casing,

a first means urging said valve plug against said valve seat with a force of a predetermined value,

and a second yielding means normally biasing said valve away from said seat with a force greater than the force of said first yielding means, but less than the combined force of said first yielding means and the force of the negative pressure developed in the carburetor when the r.p.m. of the engine is below a predetermined value.

5. The structure recited in claim 4 and a heat responsive element, operable at a temperature of a predetermined value, biasing said valve plug away from said seat.

6. For use in connection with an internal combustion engine of the type which has a manifold, a carburetor for discharging a fuel mixture thereinto, and a crank case,

a hollow casing,

a tube connecting one end of said casing to said carburetor and said manifold, with the other end of said casing terminating in an air inlet, means connecting said inlet to the interior of the crank case,

and a heat responsive element movable at ambient temperatures to a first position in which said inlet is closed, said element being movable, when subjected to a second temperature of predetermined higher value, to a second position in which said inlet is open in a direction to connect the interior of the crank case with the carburetor.

7. For use in connection with an internal combustion engine of the type which has a manifold, a carburetor for discharging a fuel mixture thereinto, and a crank case,

a hollow casing,

a tube connecting one end of said casing to said carburetor and said manifold, with the other end of said casing terminating in an air inlet,

means connecting said inlet to the interior of the crank case,

a heat responsive element movable at ambient temperatures to a first position in which said inlet is closed, said element being movable, when subjected to a second temperature of predetermined higher value, to a second position in which said inlet is open to connect the interior of the crank case with the carburetor and a valve carried by said tube and including

a valve seat communicating with said tube and a valve plug adapted to engage said seat to close said tube,

a first yielding means biasing said plug away from said seat with a force of a first, predetermined value, and

a second yielding means biasing said plug against said seat with a force of second value lower than said first value, the force of said second yielding means added to the force of negative pressure developed in said manifold when said engine is operating at a predetermined r.p.m. being greater than the force exerted by said first yielding means.

8. The structure recited in claim 7 and a heat responsive element operable, when subjected to a heat of a predetermined value, to cooperate with said first yielding means in effecting movement of said plug away from said seat against the force of said second yielding means and the force of said negative pressure.

9. The structure recited in claim 8 in which said by-pass is a spiral slot.

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