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DRAIN

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2 Claims. (Cl. 123-119)

This invention relates generally to internal combustion engines, and more particularly, to a device for effectively draining condensed water vapor from an automotive crankcase ventilation system.

It has been found that when automotive crankcase breather devices or ventilation systems are exposed to relatively low ambient temperature conditions, such as when being used in relatively cold climates, there is a tendency for water vapor within the crankcase blowby gases being communicated through the system to condense and collect therewithin. The present invention is directed towards an extremely simple and effective drain device for removing such condensation, which device operates entirely automatically and without admitting additional air into the system.

It is accordingly a primary object of the present invention to provide a simple, economical and effective drain device for removing condensed water vapor from an automotive crankcase ventilation system.

It is another object of the present invention to provide a drain device of the above character whose operation is entirely automatic.

It is still another object of the present invention to provide a drain device of the above character which operates without admitting additional air into the ventilation system.

It is yet another object of the present invention to provide a drain device for an automotive crankcase ventilation system which will not become easily clogged with crankcase residue and contaminants.

Other objects and advantages of the present invention will become apparent from the following detailed description taken in conjunction with the accompanying drawing, wherein:

FIGURE 1 is a longitudinal cross-sectional view of a preferred embodiment of the drain device of the present invention as seen in operative association with a schematic representation of a conventional internal combustion engine, and

FIGURE 2 is an enlarged cross-sectional view taken along the line 2-2 of FIGURE 1.

Referring now to FIGURE 1, a drain device 10, in accordance with a preferred embodiment of the present invention, is shown in operative association with an internal combustion engine, generally designated 12, having a crankcase 14 and an air cleaner unit 16 which is provided with a suitable air filter element 18. The air cleaner unit 16 is operatively connected through a carburetor assembly 20 and an intake manifold 22 to the intake section of the engine 12. A crankcase ventilation or recirculation system, which includes primary and secondary breather pipes 24 and 26, respectively, is operatively associated with the engine 12. The primary breather pipe 24 is provided in two sections, the shortest of which communicates the crankcase 14 with an inlet port 28 of the drain device 10, and the other of which communicates an outlet port 30 of the drain device 10 with the air cleaner unit 16. The secondary breather pipe 26 is communicable at one end with the primary breather pipe 24 through a T-fitting 32, and at the opposite end with the carburetor assembly 20. During operation of the engine 12, the breather pipes 24 and 26 respectively recirculate blowby gases which accumulate within the crankcase 14

back to the air filter unit 16 and the carburetor assembly 20.

In accordance with the principles of the present invention, the drain device 10 includes an annular housing 34 having an open upper end which is closed by an annular housing cover 36 that is press-fitted or similarly attached to the housing 34. The cover 36 is formed with the inlet and outlet ports 28 and 30 which communicate the two sections of the primary breather pipe 24 with the interior of the housing. The lower end of the housing 34 is formed with a downwardly extending conical section 38 which terminates at the lower end in a drain aperture 40 and which defines an annular seating surface 42 within the lower end of the housing 34. A spherical or ball-like float 44 is disposed within the housing 34 and is adapted to be normally seated upon the surface 42, thereby providing a substantially fluid-tight seal between the drain opening 40 and the interior of the housing 34. The float 44 is preferably in the form of a hollow, air-tight plastic ball, such as the type commonly known as a "ping-pong" ball. It will be apparent, of course, that the float 44 may assume a multiplicity of alternate forms and be fabricated of a wide variety of other materials.

The housing 34 is formed with a plurality of circumferentially spaced, radially inwardly extending bosses or dimples, generally designated 46, which serve as a guide means to prevent the float 44 from indiscriminately moving or rattling within the housing 34 upon operation of the engine 12.

During normal operation of the engine 12, blowby gases are communicated from the engine's crankcase 14 into the interior of the housing 34 by the shorter section of the breather pipe 24, which gases are thereafter communicated from the housing 34 into the air cleaner unit 16 by the longer section of the breather pipe 24. A preselected quantity of the blowby gases being communicated into the air cleaner unit 16 by the pipe 24 are transmitted through the secondary breather pipe 26 into the carburetor assembly 20 where they are combined with the air fuel mixture and transmitted directly into the intake manifold 22. Any condensation which accumulates within the breather pipes 24 and 26 will drain downwardly through the pipes 24 and 26 and into the interior of the housing 34. At such time as a sufficient quantity of condensation has accumulated within the housing 34, the float 44 will be buoyed or floated upward from the seating surface 42 in the lower end of the housing 34, whereby the condensation within the housing 34 will drain out through the drain aperture 40. After the condensed water vapor has drained out of the housing 34, the float 44 will again become seated on the surface 42, thereby closing the drain opening 40. It may be noted that when the float 44 becomes unseated from the surface 42, the condensed water vapor draining out of the housing 34 between the float 44 and the surface 42 acts as a seal to prevent air from entering the housing 34 through the opening 40, thus assuring that additional air will not be admitted into the ventilation system through the drain device 10.

A particular feature of the drain device 10 of the present invention resides in its extremely simple, economical construction, and also from the fact that the device will not become easily clogged with crankcase contaminants or residue to possibly restrict the desired flow of blowby gases therethrough.

While it will be apparent that the preferred embodiment herein illustrated is well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What is claimed is:

1. In combination in a crankcase ventilation system

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communicating blowby gases from the crankcase to the air intake section of an internal combustion engine,
 a tubular breather pipe communicable at one end with said crankcase and at the opposite end with said air intake system,
 a condensed water vapor collecting housing communicable with said breather pipe,
 said housing being formed with a downwardly extending conical section defining a drain opening and an annular seating surface, and
 a hollow air-tight plastic ball in said housing movable to and from a position engaging said seating surface and closing said drain opening,

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said housing being formed with a plurality of guides adapted to limit the movement of said ball within said housing.

2. The combination as set forth in claim 1 wherein
 5 said hollow air-tight plastic ball consists of a ping-pong ball.

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