April 20, 1965 W. E. JACKSON 3,179,097

VENT VALVE FOR PREVENTING EXCESS CRANKCASE PRESSURE OR VACUUM

Filed June 4, 1963

Fig. 1

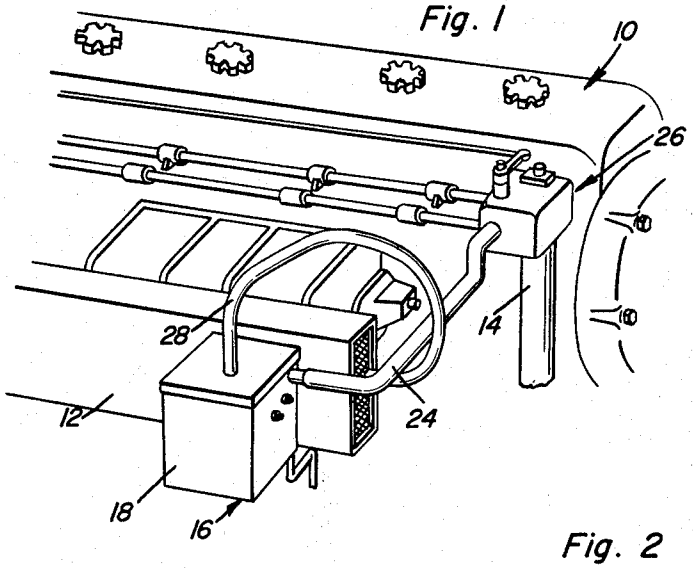


Fig. 2

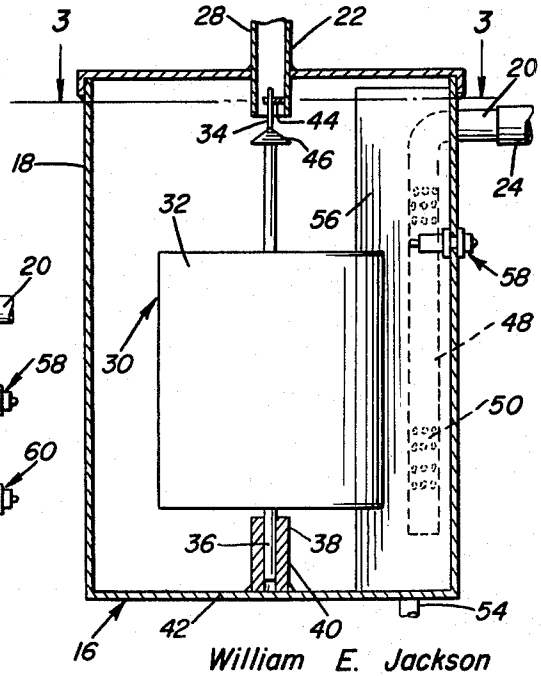
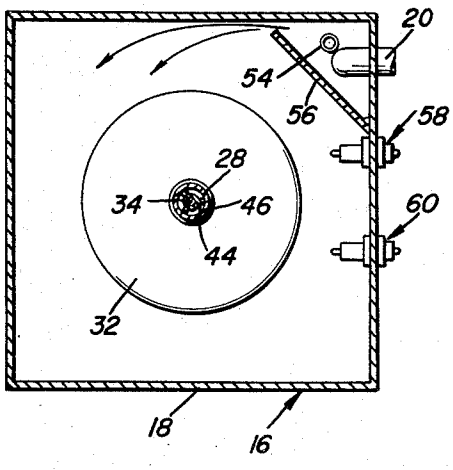


Fig. 3



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United States Patent Office 3,179,097 Patented Apr. 20, 1965

3,179,097

VENT VALVE FOR PREVENTING EXCESS CRANKCASE PRESSURE OR VACUUM

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Filed June 4, 1963, Ser. No. 285,424
8 Claims. (Cl. 123—119)

This invention relates to a novel and useful crankcase vent assembly for internal combustion engines. The vent assembly of the instant invention includes a closed reservoir having an inlet opening in an upper portion thereof adapted to be communicated with the interior of an internal combustion engine crankcase for receiving oil saturated fumes from the crankcase and the reservoir also includes an outlet opening in an upper portion thereof adapted to be communicated with a suitable source of vacuum such as the intake manifold of the same internal combustion engine.

By providing such a closed reservoir, the tendency of any build up of pressure within the crankcase of an internal combustion engine is reduced and any oil having a tendency to be thrown out of the crankcase vent pipe of the internal combustion engine may be trapped within the closed reservoir.

The vent assembly of the instant invention also includes a float valve assembly operatively associated with the outlet opening in the reservoir and automatically operable for closing the outlet opening in response to an increase of the height of the oil level in the reservoir beyond a given point. The float valve is provided in order to prevent oil from being discharged from the reservoir through the outlet opening in the event the reservoir is filled. If the float valve were not provided and the outlet opening of the reservoir were in constant communication with the intake manifold of the associated internal combustion engine, if that engine was a diesel engine, there would be a tendency for the excess oil being discharged from the oil reservoir and into the intake manifold of the engine to cause the diesel engine to "run away."

In addition to being provided with a float valve for automatically closing the outlet opening of the reservoir, the reservoir is also provided with pressure and relief valves for venting the reservoir to the ambient atmosphere in the event either excess vacuum or pressure is formed within the reservoir.

The main object of this invention is to provide a crankcase vent assembly for internal combustion engines which will be capable of effecting a slight vacuum in the crankcase of the internal combustion engine even though the internal combustion engine, without the benefit of the vent assembly of the instant invention, has a tendency to build up pressure in the crankcase.

A further object of this invention is to provide a vent assembly capable of effecting a slight vacuum in the crankcase of an internal combustion engine and yet preventing oil saturated fumes from reaching the air intake of the engine by which the vacuum in the crankcase is effected.

A final object of this invention to be specifically enumerated herein is to provide a crankcase vent assembly in accordance with the preceding objects which will conform to conventional forms of manufacture, be of simple construction and easy to install so as to provide a device that will be economically feasible, long lasting and relatively trouble free in installation.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a fragmentary perspective view of a portion of a diesel internal combustion engine shown with the crankcase vent assembly of the instant invention operatively mounted thereon;

FIGURE 2 is an enlarged vertical sectional view taken substantially upon a plane passing through the longitudinal center line of the reservoir of the vent assembly; and

FIGURE 3 is a horizontal sectional view taken substantially upon the plane indicated by the section line 3—3 of FIGURE 2.

Referring now more specifically to the drawings, the numeral 10 generally designates a diesel internal combustion engine including an intake manifold 12 and a crankcase breather pipe 14.

The crankcase vent assembly of the instant invention is generally referred to by the reference numeral 16 and comprises a closed reservoir or housing 18 including an inlet fitting 20 and an outlet fitting 22 which are each communicated with the interior of the upper portion of the reservoir 18. The inlet fitting has one end of a conduit 24 secured thereto and the other end of the conduit 24 is communicated with the crankcase breather pipe 14 by means of a control valve assembly 26. The outlet fitting 22 comprises one end of a conduit 28 whose other end is communicated wiht the interior of the intake manifold 12.

A float assembly generally referred to by the reference numeral 30 including a float member 32 is supported in the housing 18 by means of upper and lower vertical pins 34 and 36. The pin 36 is reciprocable in a blind bore 38 formed in an upstanding boss 40 secured to the inner surface of the bottom wall 42 of the housing 18 while the pin 34 is reciprocable through an apertured brace 44 mounted in the end portion of the conduit 28 which projects down into the upper end of the housing 18. The pin 34 includes a generally conical valve head 46 which is seatingly receivable in the lower end of the conduit 28 projecting into the housing 18. Accordingly, it may be seen that upon upward movement of the float member 32 the inlet end of the conduit 28 will be closed by means of a valve head 46.

The inlet fitting 24 includes a vertically disposed portion 48 disposed within the housing 18 and the portion 48 has a plurality of apertures 50 formed therein. The lower discharge end of the vertical portion 48 may or may not be closed as desired but it will be appreciated that oil saturated fumes being drawn into the reservoir through the fitting 22 by means of the vacuum formed in the reservoir 18 will be drawn outwardly through the openings or apertures 50. Accordingly, the fluid flow of fumes passing through the vertical portion 48 of the fitting 22 will be modified in a manner to enable the oil particles within the fumes to be precipitated out. The oil particles will then fall to the bottom of the reservoir 18 and collect in the reservoir 18.

The reservoir 18 includes a liquid outlet pipe 54 which opens upwardly through the bottom 42 of the reservoir 18 and may be utilized to drain off accumulated oil from the reservoir 18.

In addition to the perforated vertical portion 48 of the inlet fitting 22 comprising means for modifying the fluid flow of fumes entering the reservoir 18, the reservoir 18 is also provided with a baffle wall 56 which further modifies the fluid flow of fumes passing through the reservoir 18 and assists in separating the oil particles from the chankcase fumes.

With attention now directed to FIGURE 3 of the drawings, it may be seen that the reservoir 18 also includes pressure and vacuum relief valve assemblies generally

referred to by the reference numerals 58 and 60 respectively which are utilized to vent the interior of the reservoir 18 to the ambient atmosphere in the event of an excessive increase or decrease of pressure within the reservoir 18.

In operation, a vacuum is formed in the reservoir 18 by means of the conduit 28 which communicates the interior of the reservoir 18 with the intake manifold of the internal combustion engine 10. As fumes are drawn into the reservoir 18 from the crankcase of the internal combustion engine 10 via the chankcase breather pipe 14, the oil particles in the fumes are precipitated out and collect in the bottom of the reservoir 18. If for any reason the vacuum within the reservoir 18 becomes excessive, the vacuum relief valve assembly 60 will be actuated to relieve the excess vacuum condition within the reservoir 18. The maintaining of a slight partial vacuum within the crankcase of the internal combustion engine 10 will of course lessen the seepage of lubricating oil past inefficient gaskets and through other small openings outwardly of the crankcase. If the level of oil collected in the reservoir 18 should exceed a predetermined height, the flow valve assembly 30 will close the inlet end of the conduit 28 thereby terminating communication of the reservoir 18 with the intake manifold 12. In this instance, inasmuch as the reservoir 18 is in communication with the interior of the crankcase of the internal combustion engine 10 by means of the conduit 24, the pressure within the crankcase of the internal combustion engine 10 might become excessive and in this instance the pressure relief valve assembly 58 will be actuated to relieve the excess pressure condition.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A crankcase vent assembly for internal combustion engines, said assembly comprising a closed reservoir including an inlet in an upper portion thereof adapted to be communicated with the interior of an internal combustion engine crankcase for receiving oil saturated fumes from said crankcase and also having an an outlet in an upper portion thereof adapted to be communicated with a suitable source of vacuum such as the intake manifold of said engine, said reservoir means including means communicated with the interior thereof and operative to prevent an excessive build-up of pressure as well as an excessive drop of air pressure in said reservoir relative to the pressure of the ambient atmosphere.

2. The combination of claim 1 wherein said reservoir includes float valve means operatively associated with said outlet for closing the same in response to an increase of the height of the oil level in said reservoir beyond a given point.

3. A crankcase vent assembly for internal combustion engines, said assembly comprising a closed reservoir including an inlet in an upper portion thereof adapted to be communicated with the interior of an internal combustion engine crankcase for receiving oil saturated fumes and from said crankcase and also having an outlet in an

upper portion thereof adapted to be communicated with a suitable source of vacuum such as the intake manifold of said engine, said reservoir including float valve means operatively associated with said outlet for closing the same in response to an increase of the height of the oil level in said reservoir beyond a given point, a pressure relief valve in an upper portion of said reservoir operable for venting said reservoir to the ambient atmosphere upon an increase of the pressure of the atmosphere within said reservoir beyond a given point.

4. The combination of claim 3 including a vacuum relief valve in an upper portion of said reservoir operable for venting said reservoir to the ambient atmosphere upon a reduction of the pressure of the atmosphere within said reservoir beyond a given point.

5. The combination of claim 2 including fluid flow modifying means in said reservoir for modifying at least a portion of the flow of fumes entering said reservoir through said inlet and separating oil particles from said fumes and allowing said particles to fall downwardly to the bottom of said reservoir.

6. The combination of claim 5 wherein said reservoir includes a liquid outlet opening formed in a lower portion thereof adapted to be communicated with a suitable collection tank.

7. A crankcase bent assembly for internal combustion engines, said assembly comprising a closed reservoir including an inlet in an upper portion thereof adapted to be communicated with the interior of an internal combustion engine crankcase for receiving oil saturated fumes from said crankcase and also having an outlet in an upper portion thereof adapted to be communicated with a suitable source of vacuum such as the intake manifold of said engine, including a vacuum relief valve in an upper portion of said reservoir operable for venting said reservoir to the ambient atmosphere upon a reduction of the pressure of the atmosphere within said reservoir beyond a given point.

8. A crankcase vent assembly for internal combustion engines, said assembly comprising a closed reservoir including an inlet in an upper portion thereof adapted to be communicated with the interior of an internal combustion engine crankcase for receiving oil saturated fumes from said crankcase and also having an outlet in an upper portion thereof adapted to be communicated with a suitable source of vacuum such as the intake manifold of said engine, said reservoir including float valve means operatively associated with said outlet for closing the same in response to an increase of the height of the oil level in said reservoir beyond a given point, a pressure relief valve in an upper portion of said reservoir operable for venting said reservoir to the ambient atmosphere upon an increase of the pressure of the atmosphere within said reservoir beyond a given point, said reservoir including a a liquid outlet opening formed in a lower portion thereof adapted to be communicated with a suitable collection tank.

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