May 3, 1955 T. W. HORN 2,707,460

CRANK CASE VENTILATOR

Filed April 13, 1953 2 Sheets-Sheet 1

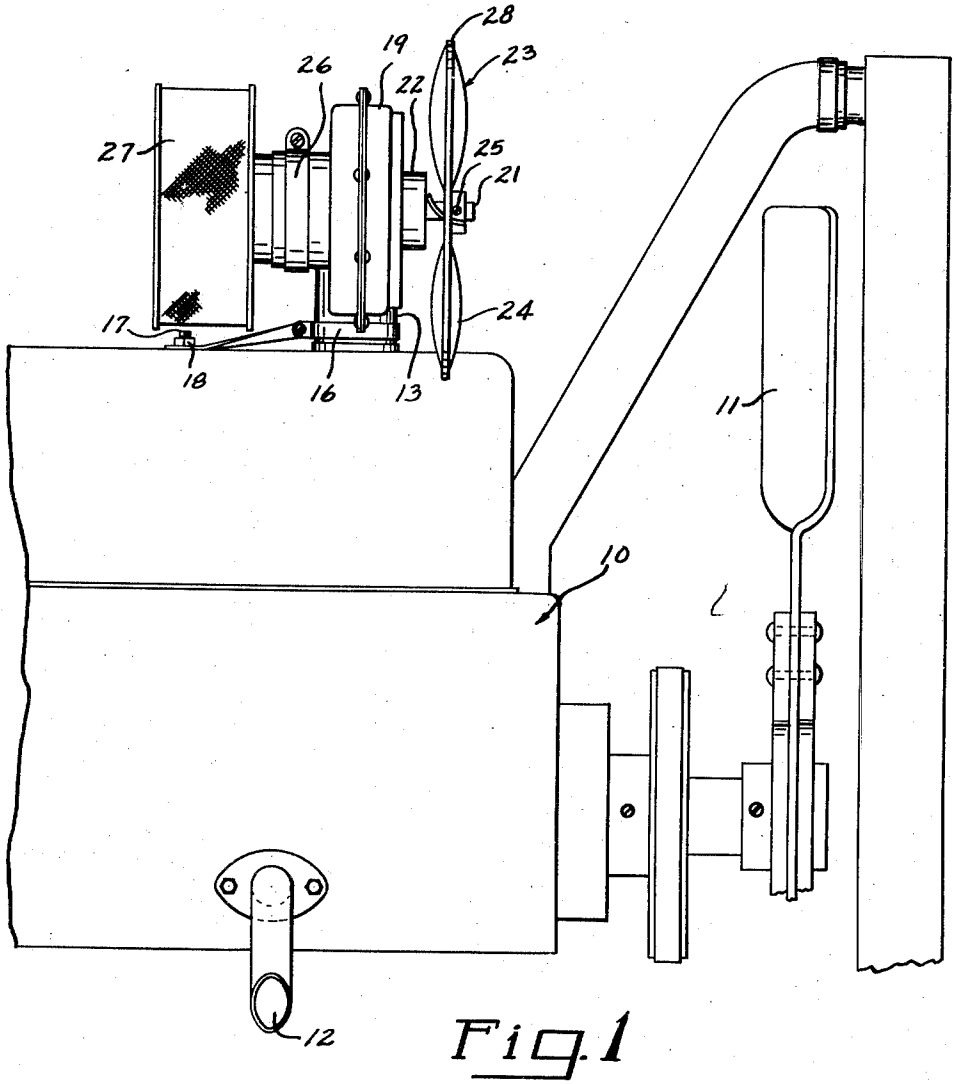


Fig. 1

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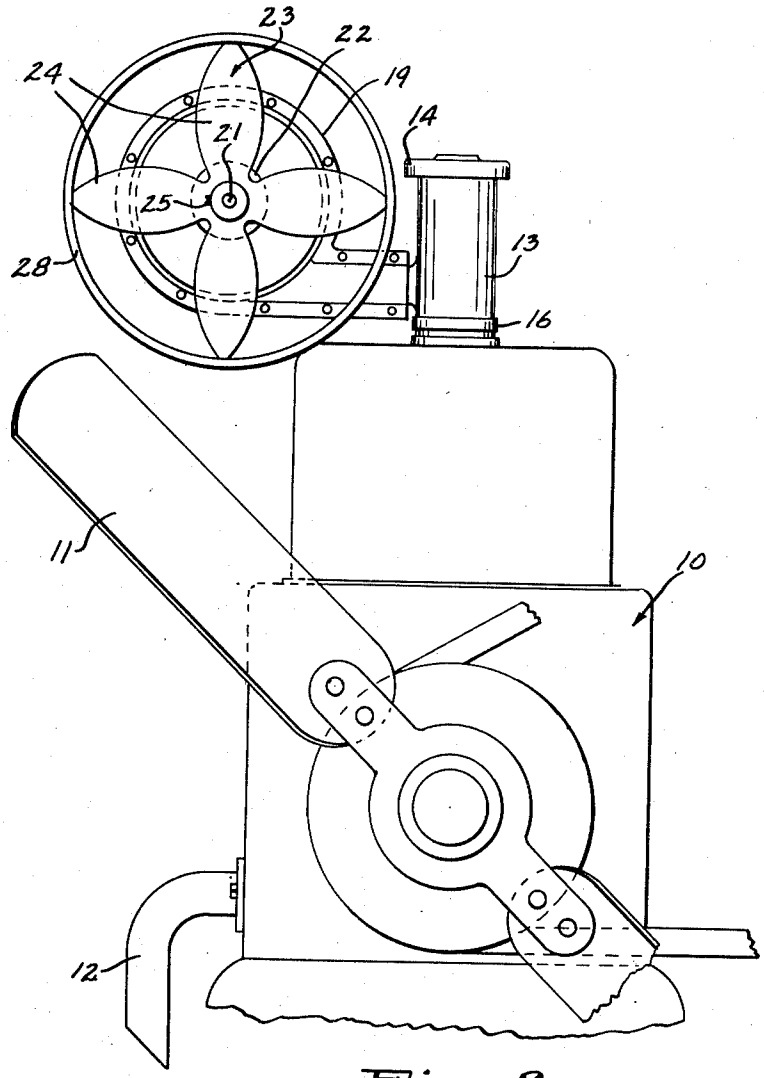


Fig. 2

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2,707,460

CRANK CASE VENTILATOR

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5 Claims. (Cl. 123—41.86)

This invention relates to a crank case ventilator for internal combustion engines and has for an object the provision of such a ventilator wherein a substantial volume of clean filtered air is forced into the crank case at a low pressure to drive out undesirable products of combustion and unused volatile products liberated within the crank case, thus preventing condensation of such products therein.

Another object of my invention is to provide a crank case ventilator of the character designated which shall continue to force air into the crank case for a short period of time after the engine has been stopped, thus removing the remaining gases therefrom.

A further object of my invention is to provide a crank case ventilator for internal combustion engines which is propelled by the air blast from the engine cooling fan and in which a substantially constant flow of air is forced into the crank case at both idling and high speeds.

A still further object of my invention is to provide a crank case ventilator of the character designated which shall be simple of construction, economical to manufacture, and one which is adapted for easy installation on conventional internal combustion engines.

Heretofore in the art to which my invention relates, various means have been proposed for ventilating the crank case of internal combustion engines. However, so far as I am aware, none of them have proposed introducing a substantially constant flow of clean filtered air into the crank case at low pressure to drive out undesirable volatile products liberated within the crank case. As is well known, undesirable products of combustion enter the crank case past the pistons and rings, resulting in carbon and sludge formation that are detrimental to the performance and life of an engine. Also, when oils are heated to a high temperature they tend to vaporize and break up into separate compounds, which if not scavenged or drawn out of the engine, form undesirable deposits. Such undesirable products cannot be effectively removed by creating a partial vacuum in the crank case due to the fact that air would be drawn in through all normal or abnormal openings.

A direct blast from the cooling fan through a filter is not satisfactory for the reason that air velocities from the cooling fan vary considerably. Accordingly, air filters which would permit passage of air at a low velocity would allow too much air to pass at high velocities, thus blowing usable oil out of the engine. Also, to restrict the flow of air at high velocities would block low velocity air entirely.

Briefly my invention comprises forcing air into the crank case by means of a small turbine type blower which is driven by a fan located in the path of the air blast from the engine cooling fan. The blower draws air into the crank case through a filter and forces the same at low pressure through the crank case and thence out through the regular breather pipe. To remove the undesirable gases from the crank case after the engine has been stopped and to assure that a constant flow of air is

supplied to the crank case at both high and low speeds, a weighted inertia member is provided which causes the blower to continue rotation for a short period of time after the engine is stopped.

Apparatus embodying features of my invention is illustrated in the accompanying drawings forming a part of this application in which:

Fig. 1 is a side elevational view showing the apparatus mounted on a conventional type internal combustion engine; and,

Fig. 2 is a front elevational view of the apparatus shown in Fig. 1.

Referring now to the drawing for a better understanding of my invention I show an internal combustion engine indicated generally at 10. The engine 10 is provided with the usual cooling fan 11, breather pipe 12, and oil filler conduit 13. A suitable cap 14 is provided for the oil filler conduit. Some internal combustion engines are not provided with vertically extending oil filler conduits, the oil being introduced through an opening at the top of the engine. With such engines I add the oil filler conduit 13 by mounting the same on the engine in communication with the opening at the top thereof. The oil filler conduit thus mounted on the engine, is secured in place by any suitable means such as by a light metal clamp 16 which surrounds the conduit 13 and is provided with a suitable opening at the outer end thereof which fits over a valve cover stud 17 and is clamped in place by means of a nut 18.

Mounted at the side of the oil filler conduit 13 and communicating therewith is the housing of a small turbine type blower 19. The turbine blower is propelled by a drive shaft 21 mounted in suitable bearings 22 at the forward end of the blower housing. Mounted at the forward end of the shaft 21 in position to be propelled by the cooling fan 11 is a fan 23 having a plurality of blades 24. The fan 23 is held against rotation with respect to the shaft 21 by means of a set screw 25. The volume of air introduced into the crank case is predetermined by the size of the turbine blower and the size and pitch of the blades 24. If necessary, a strap 26 may surround the blower housing 19 and be fixedly attached to some convenient part of the engine to hold the device against shifting. Mounted at the end of the blower housing 19 opposite the fan 23 is an air filter 27.

Encircling the tips of the blades 24 of the fan 23 is a relatively heavy ring 28 which provides sufficient inertia whereby the fan 23 continues to rotate for 30 to 60 seconds after the engine stops. As the fan 23 continues to rotate, the blower 19 is driven thus continuing forcing clean air into the crank case to remove the remaining gases therefrom and preventing condensation of the gases therein.

Due to the inertia of the fan 23, caused by the ring 28, the blower 19 rotates at a substantially constant speed. That is, the speed of the fan 23 tends to vary slowly with the changes in air velocity from the cooling fan 11, which velocity changes with extreme rapidity with acceleration and deceleration of automobile engines. Also, the filter 27 being mounted at the rear of the blower 19, the air from the cooling fan 11 flows past the filtering surface and not directly thereagainst. As the blast of air passes the filter at very high engine speeds, a vacuum is created immediately adjacent the filtering surface. Due to the resistance of the filter element to high velocity air passing therethrough and the vacuum thus built up at high speeds the volume of air blown into the engine is reduced and the blower is slowed down. Another factor which prevents the blower 19 from increasing its speed in proportion to the increase in speed of the engine cooling fan 11 is the fact that there is an increase in pressure within the crank case caused by the piston action therein.

This adds somewhat to the blower load and together with the inertia of the fan **23** and the vacuum created adjacent the filter surface **27** prevents excess air from being blown into the crank case.

From the foregoing it will be seen that I have devised an improved means for ventilating the crank case of an internal combustion engine. By providing means for forcing filtered air through the crank case while the engine is running and for a short period of time after the engine stops, the undesirable products of combustion and other volatile gases are removed before condensation thereof. The removal of these gases immediately after the engine stops is very desirable in view of the fact that all motion within the engine ceases at that time and the residual gases, being heavier than air, tend to condense and settle in the oil and on parts of the engine thus forming sludge and dilution of the oil. It will also be seen that there are no adjustments to be made, since the air flow is predetermined by the size of the turbine blower and size and pitch of the blades of the fan **23**.

While I have shown my invention in but one form it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. In apparatus for ventilating the crank case of an internal combustion engine having an oil inlet, a breather pipe and a cooling fan, an air blower mounted on the engine and communicating at its air outlet with said oil inlet, means filtering the air as it passes through the intake of said air blower, and means propelled by the air blast from the cooling fan and operatively connected to said air blower for rotating the same while the engine is running and for a short period of time after the engine is stopped.

2. In apparatus for ventilating the crank case of an internal combustion engine having an oil inlet, a breather pipe and a cooling fan, an air blower mounted on the engine with its outlet in communication with said oil inlet, a filter at the intake of said blower for filtering the air as it passes therethrough, and a fan driven by the air blast from said cooling fan and operatively connected to said air blower for driving the same while the engine is running and for a short period of time after the engine is stopped.

3. In apparatus for ventilating the crank case of an internal combustion engine having an oil filler conduit, a breather conduit and a cooling fan, an air blower mounted on said filler conduit with its air outlet in communication with said filler conduit and with its air intake on the opposite side thereof from the cooling fan, a drive shaft for said blower, a fan fixedly mounted on said shaft outwardly of said blower in position to be propelled by the air blast from said cooling fan, and a filter at the intake of said blower for filtering the air as it passes therethrough.

4. In apparatus for ventilating the crank case of an internal combustion engine having an oil inlet, a breather conduit and a cooling fan, an air blower mounted on the engine with its intake on the side thereof opposite the cooling fan and communicating at its outlet with said oil inlet, means filtering the air as it passes through the intake of said air blower, a drive shaft for said blower, an air propelled member mounted non-rotatably on said drive shaft outwardly of said blower in position to be propelled by the air blast from said cooling fan, and a weighted inertia member on said air propelled member causing rotation thereof for a short period of time after the cooling fan is stopped.

5. In apparatus for ventilating the crank case of an internal combustion engine having an oil inlet, a breather conduit and a cooling fan, an air blower mounted on the engine with its intake on the side thereof opposite the cooling fan and communicating at its outlet with said oil inlet, means filtering the air as it passes through the intake of said air blower, a drive shaft for said blower, an air propelled fan rigidly mounted on said drive shaft outwardly of said blower in position to be propelled by the air blast from said cooling fan, and a relatively heavy ring secured to and encircling the tips of the blades of the air propelled fan causing rotation thereof for a short period of time after the cooling fan is stopped.

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