July 31, 1934. G. A. BARKER 1,968,119

VENTILATING SYSTEM

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Fig. 1.

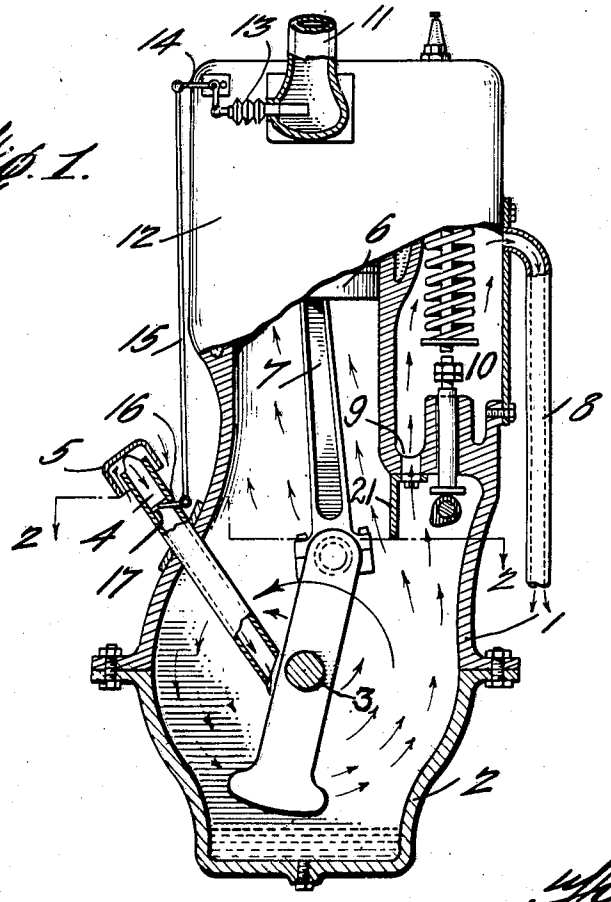
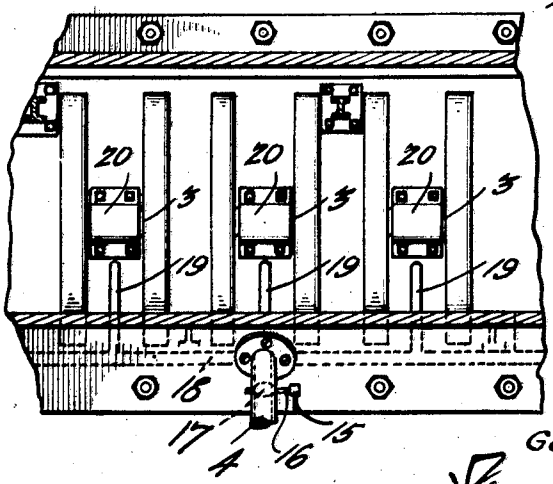


Fig. 2.



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VENTILATING SYSTEM

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11 Claims. (Cl. 184—196)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

This invention described herein may be manufactured and used by or for the Government for Governmental purposes, without the payment to me of any royalty thereon.

This invention relates to crankcase ventilation for engines, particularly to those of the internal combustion type, but it is not limited to this class alone.

The principal object of this invention is to improve the crankcase ventilation of an engine.

Another object is to admit the incoming air to that portion of the crankcase where the pressure is the lowest during operation of the engine.

Another object is to utilize the rotation of the crankshaft, cranks and counterweights which have a natural blower action to improve the circulation of air and thus assist the ventilation.

Another object is to bring the incoming, cool air in closest proximity to the main bearing, crankshaft and connecting rod bearings.

Another object is to control the amount of air entering the crankcase according to the speed and temperature of the engine.

In the present engines the breather pipe is located on the side of the crankcase and only extends a very short distance in the interior of the crankcase. The crankcase ventilation is dependent upon two conditions: 1st by the whirling motion of the air inside the crankcase, and 2nd by the natural rise of air to the outlet, due to convection currents. In the first instance, because of the general shape and inherent conditions of the conventional engine, this whirling action is inadequate to draw in sufficient air. Further the air which is drawn in comes in contact only with the connecting rod bearings and does not reach the main bearings or the crankshaft throws. In the second case the height between the inlet pipe and exhaust pipe is so small it is obvious the benefit derived from this condition is very slight.

It is very evident that the present crankcase ventilation system in use is inadequate especially as the present tendency is to increase the normal operating speed of the engines.

At slow speed the ventilation and cooling of the crankcase and parts therein are of minor importance, but as the speed increases the temperature of course rises and consequently the cooling at high speed is very desirable and essential.

It is obvious that the high speed rotation of the crankshaft, counterweights, etc., produces the same effect as impellers in centrifugal blowers. Hence with higher engine speeds the circulation of the air will be more rapid. It is apparent that the lowest pressure in the crankcase (during operation of engine) is at the center of rotation of the crank assembly or in the vicinity of the crankshaft, which of course has the impeller action of the rotating crank assembly and will be below atmospheric pressure. It is therefore readily seen that the logical location for the breather pipe would be to have it extend in proximity to the center of rotation of the crank assembly where the crankcase pressure is below atmospheric and thus induce a natural flow of air to this low pressure area.

This incoming air comes in direct contact with the main bearings, crankshaft and connecting rod bearings and affords a very effective cooling of these parts.

One or more breather pipes may be used according to the design of the engine. In the case of an eight cylinder in line engine, one breather pipe may be used for each main bearing and for a radial engine only one breather pipe may be used effectively.

Another method would be to use one breather pipe to lead into the crankcase which may or may not have therein a regulating valve and attached to the breather pipe are pipes which will lead to the main bearings or other desirable locations.

It can readily be seen that in an engine operating at a high speed there will be a considerable amount of air passing through the crankcase. Depending on variation in temperature due to the changing seasons, it becomes necessary to circulate a varying amount of air through the crankcase to effect proper cooling. Therefore the breather pipe or passage, may be provided with a valve to control the air entering the same. In order to make this condition automatic the control valve may be operated by a thermostat regulated by the temperature of the water in the cooling system, or by a thermostat located within the crankcase. With this mechanism it is possible to regulate, to a certain extent, the temperature in the crankcase.

Referring more particularly to the accompanying drawing in which corresponding parts are indicated by similar reference characters:

Fig. 1 is an end elevation of the engine partly in section showing the crank case, piston assembly, valve assembly and breather tubes with air control mechanism, and

Fig. 2 is a plan view of a portion of the engine in section, taken along the line 2—2, showing a

modification of the intake breather tube construction.

The numeral (1) indicates the upper portion of the crank case and cylinder block assembly. (2) designates the lower portion of the crankcase, (3) the crank shaft, (20) the crank shaft bearings, (5) breather pipe cover, (6) piston, (7) connecting rod, (8) exhaust breather pipe, (9) a port connecting the upper portion of the crankcase with valve spring housing (10), and (21) shows a baffle plate used to direct the stream of circulating air within the crankcase.

At the upper portion of the cylinder is shown the outlet water pipe (11), of the cooling jacket (12). Within the outlet pipe (11) is sealed a thermostat (13), which on change in temperature of the cooling water, through the operation of the intermediary bell crank (14), link (15) and crank (16), rotates the butterfly valve (17) thus increasing or decreasing the admission of air to the crank case respectively with the increase or decrease in temperature of the engine, or if desirable the valve (17) may be operated manually.

In the modification shown in Figure 2 the breather pipe (4) is connected to a conduit (18), located within the crankcase parallel to the center line of the crank shaft. From this conduit (18) are led feed pipes (19) which terminate in proximity to the crank shaft bearings. With this latter construction the intake air of the breather pipe is led directly to each of the crank shaft bearings.

The operation of this ventilation system is as follows:

The air enters the breather pipe and passes to the outlet near the crank shafts main bearings. The impeller action of the crankshaft imparts an outward and rotary motion to the air, thus causing a pressure on the crankcase slightly above atmospheric and by the baffle plate extending downward directs the rotating air to the passage, or opening, between the valve lifting assembly and the cylinder wall into the compartment with the valve springs, valve stems, etc.

The air leaves the aforesaid compartment and passes to the atmosphere or to the carburetor by a pipe attached to the valve cover plate. This air carrying a quantity of oil or oil mist and passing adjacent to the valve stems and valve lifting assembly, provides an efficient lubrication and cooling system.

The replenishing of oil to the crankcase may be accomplished by a separate pipe (in case the control valve (17) is used) independent of the breather pipe and in which it would admit the oil directly into the crankcase or by the oil being admitted through the valve cover plate as disclosed in Patent Number 1,916,248, filed November 23, 1931, for a lubricator.

I have not, for the sake of clearness, deemed it necessary to illustrate the usual adjuncts of the engine, such as carburetor, distributor, air cleaners and the like, since they constitute no part of the present invention.

It is to be understood that the above described constructions are only exemplary and may be replaced by mechanical equivalents without departing from the scope of the invention.

Having described my invention, what I claim as new and wish to secure by Letters Patent, is:

1. In an internal combustion engine of the reciprocating type, a cylinder block, a cooling jacket enclosing said cylinder block, intake and outlet pipes connected to said cooling jacket, a crankcase, bearings mounted within said crankcase, a crankshaft rotatably mounted within said bearings, a breather pipe with intake opening exterior to said crank case and an outlet opening lying within the low pressure area of said crankshaft and adjacent to said bearings for conducting a cooling medium thereto, a control valve mounted within said breather pipe for regulating the flow of said cooling medium, a thermostatically controlled means for operating said valve mounted in the aforesaid outlet pipe of said cooling jacket, and an exhaust breather pipe connected to said crankcase for conducting the said cooling medium therefrom.

2. In an internal combustion engine of the reciprocating type, a cylinder block, a cooling jacket enclosing said cylinder block, intake and outlet pipes connected to said cooling jacket, a crankcase, bearings mounted within said crankcase, a crankshaft rotatably mounted within said bearings, a valve spring housing, an interconnecting passage between said crankcase and said valve spring housing, a breather pipe, with an intake opening exterior to said crankcase and an outlet opening lying within the low pressure area of said crankshaft and adjacent to said bearings for conducting a cooling medium thereto, a control valve mounted within said breather pipe, for regulating the flow of said cooling medium, a thermostatically controlled means for operating said valve mounted in the aforesaid outlet pipe of said cooling jacket, and an exhaust breather pipe connected to said valve spring housing for conducting the said cooling medium therefrom.

3. In an internal combustion engine of the reciprocating type, a cylinder block, a cooling jacket enclosing said cylinder block, intake and outlet pipes connected to said cooling jacket, a crankcase, bearings mounted within said crankcase, a crankshaft rotatably mounted within said bearings, a valve spring housing, an interconnecting passage between said crankcase and said valve spring housing, a breather pipe, with an intake opening exterior to said crankcase and an outlet opening lying within the low pressure area of said crankshaft and adjacent to said bearings for conducting a cooling medium thereto, a control valve mounted within said breather pipe, for regulating the flow of said cooling medium, and a thermostatically controlled means for operating said valve mounted in the aforesaid outlet pipe of said cooling jacket.

4. In an engine having a water jacket, a crank shaft, and a crank case serving as a lubricant reservoir, a breather pipe terminating in the low pressure area of said crank case provided with an air inlet valve and a thermostatically controlled means in the vicinity of the water jacket and operatively connected to the said air inlet valve to vary the amount of air entering said crank case in direct ratio with the rise in temperature of the water in the water jacket.

5. In an internal combustion engine having a cylinder block, a cooling jacket enclosing a portion of said block, a crankcase, bearings mounted within the crankcase, and a crank shaft rotatably mounted within said bearings, the combination of a breather pipe with intake opening exterior to said crankcase, and an outlet opening lying within the low pressure area of said crank shaft and adjacent the said bearings for conducting a cooling medium thereto; a control valve mounted within said breather pipe for regulating the flow of the cooling medium; a thermostatically controlled means for operating said valve, said means

governed by the temperature of said cooling jacket; and an exhaust breather pipe connected to said crankcase for conducting the cooling medium therefrom.

6. In an internal combustion engine having a cylinder block, a cooling jacket enclosing a portion of said block, a crankcase, bearings mounted within the crankcase, and a crank shaft rotatably mounted within said bearings, the combination of a valve spring housing; an interconnecting passage between the crankcase and said valve spring housing; a breather pipe with intake opening exterior to said crankcase and an outlet opening lying within the low pressure area of said crank shaft and adjacent to said bearings for conducting a cooling medium thereto; a control valve mounted within said breather pipe for regulating the flow of the cooling medium; a thermostatically controlled means for operating said valve, said means governed by the temperature of said cooling jacket; and an exhaust breather pipe connected to said valve spring housing for discharging the cooling medium after said medium has passed from the crankcase through said passage and valve spring housing.

7. In a device for ventilating the crankcase of an internal combustion engine, means for admitting a cooling medium at substantially atmospheric temperature into the low pressure area of the engine shaft; means for controlling the flow of the admitted medium in accordance with the temperature of the engine cylinder; and means for exhausting the medium from the high pressure area of the engine shaft.

8. In a device for ventilating the crankcase and lubricating a part of an internal combustion engine, means for admitting a cooling medium at substantially atmospheric temperature into the low pressure area of the engine shaft; means for controlling the flow of the admitted medium in accordance with the temperature of the engine cylinder; and means for exhausting the medium from the high pressure area of the engine shaft, the exhausted medium carrying oil vapor effecting lubrication of a part of the engine.

9. In a device for ventilating the crankcase and lubricating a part of an internal combustion engine, means for admitting a cooling medium at substantially atmospheric temperature into the low pressure area of the engine shaft; means for controlling the flow of the admitted medium in accordance with the temperature of the engine cylinder; and means for exhausting the medium from the high pressure area of the engine shaft, the exhausted medium carrying oil vapor effecting lubrication of a part of the engine outside of the crankcase.

10. In a device for ventilating the crankcase of an internal combustion engine, means for admitting a cooling medium at substantially atmospheric temperature into the low pressure area of the engine shaft; means for controlling from a remote point the flow of the admitted medium in accordance with the temperature of the engine; and means for exhausting the medium from the high pressure area of the engine shaft.

11. In a device for ventilating the crankcase of an internal combustion engine, means for admitting a cooling medium at substantially atmospheric temperature into the low pressure area of the engine shaft; means for controllably increasing the flow of the admitted medium in accordance with the increase of temperature of the engine; and means for exhausting the medium from the high pressure area of the engine shaft.

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