Aug. 16, 1932. R. SCHITTKE 1,872,609

CRANKCASE VENTILATION

Filed Jan. 30, 1930

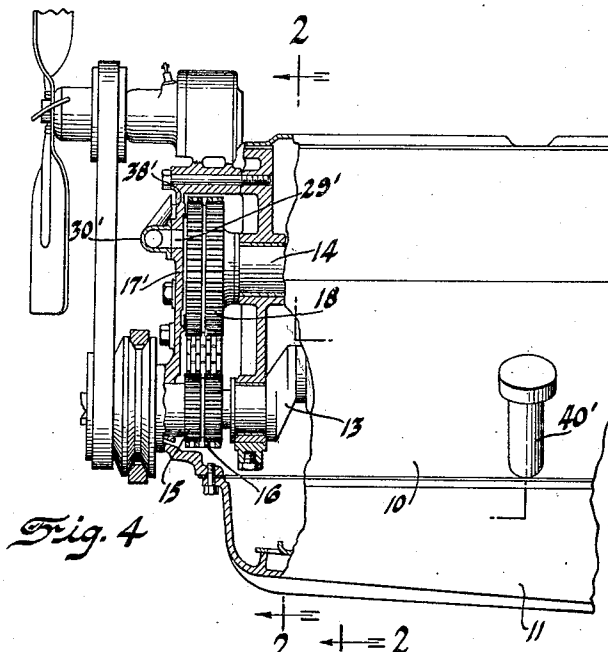


Fig. 4

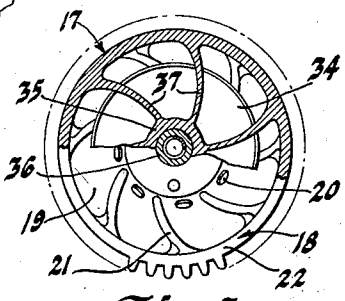


Fig. 3

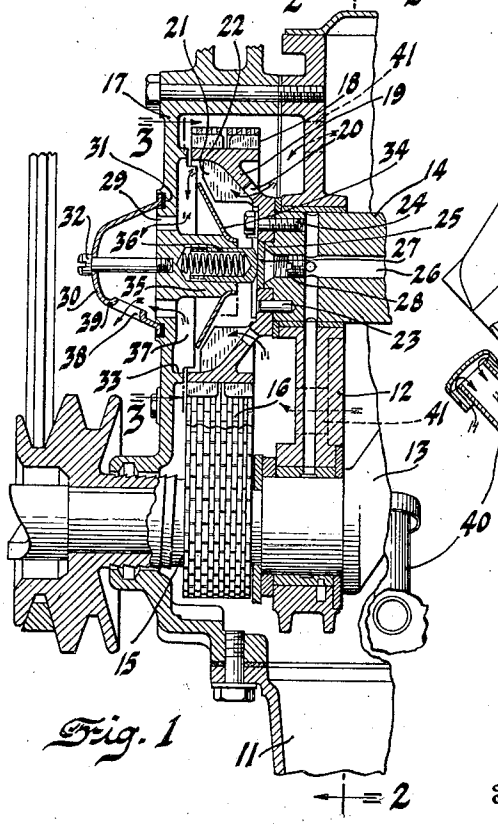


Fig. 1

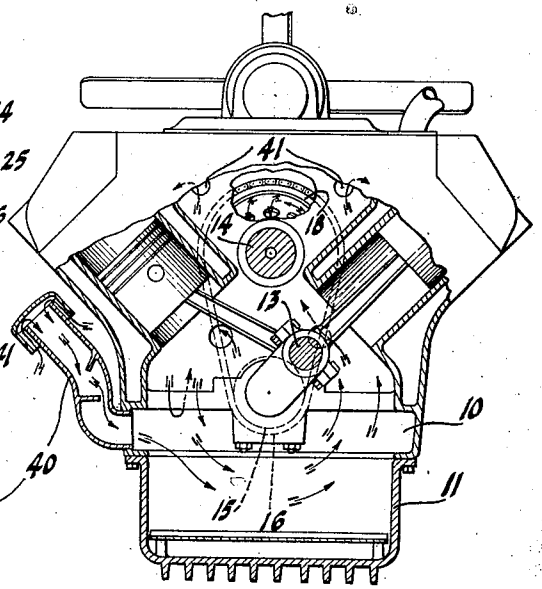


Fig. 2

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UNITED STATES PATENT OFFICE

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CRANKCASE VENTILATION

Application filed January 30, 1930. Serial No. 424,625.

It is an object of this invention to ventilate an engine crankcase by means such as a fan or blower combined with a gear and so secured upon one of the usual engine-comprised shafts as to obviate all necessity for the employment of additional housing or bearing or driving means for the fan or blower element; and preferred embodiments of the present invention contemplate such a modification and use of a driven sprocket on one end of the camshaft as to effect a continuous movement of air through, and preferably an ejection of air from, the crankcase whenever the engine is in operation.

Broadly, it is an object of this invention to provide simple, inexpensive and concealed but nevertheless efficient means to withdraw water and other vapors from an engine crankcase,—thereby minimizing union of these vapors with chemical elements which would cause corrosion and also obviating formation of ice during cold weather; and it is also an object of this invention to provide a novel gear, suitable for use in various machines requiring ventilation. This gear may comprise not only means for effecting a movement of air therethrough but means for the terminal attachment of said gear to a shaft through which motion is transmitted to additional parts; and preferred embodiments of the invention may involve the use of not only curved blades or impeller elements between the hub and the periphery of a sprocket, but also some use of a conical or other flow-guiding element, either rotative or stationary, and/or the use of stationary curved blades, and/or the use of some special outlet supported by or comprised in a cover fitting, as hereinafter described.

Other objects of the present invention may be best appreciated by the following description, taken in connection with the appended claims and the accompanying drawing.

Figure 1 is a vertical sectional view through the front end of an engine in which the invention is embodied.

Figure 2 is a vertical section, taken substantially as indicated by the line 2—2 of Figure 1, or the line 2—2 of Figure 4.

Figure 3 is a vertical sectional view, taken substantially as implied by the broken line 3—3 of Figure 1.

Figure 4 is a view comparable with Figure 1, but showing an alternative type of air exit fitting.

Referring first to conventional features shown in the drawing, crankcase 10 may be provided with an oil pan 11 and include or enclose any desired structural elements,—such as partial portion web 12 for the support of a crankshaft 13 and a camshaft 14, between which motion may be transmitted by means comprising a lower sprocket gear 15, and a sprocket chain 16.

Coming now to novel features, the mentioned crankcase is shown as comprising also a special front closure plate 17, provided with openings for the advance of air; and the sprocket chain 16 is shown as extending over a novel gear 18, which serves not only to transmit motion to the camshaft 14 but to advance air, for a ventilating effect, through the mentioned openings in the cover plate 17.

The gear 18 is shown as concave, comprising a substantially conical web 19. This web is provided not only with air inlet openings 20 but with backwardly inclined blades 21,—extending inwardly to a point near the mentioned openings and outwardly to a substantially cylindrical tooth-carrying flange 22,—the curvature of the blades 21 being such as to produce a fan or centrifugal blower effect during rotation of the gear 18, to deliver air past the edge of flange 22. The gear 18 is shown as terminally secured to the shaft 14 by means comprising a pin 23 and machine screws 24; and it may be provided with an opening such as that through which a projecting portion 25 of shaft 14 extends to center it on shaft 14.

The cover plate 17 may be provided with any desired number of air inlet or outlet openings 29, shown in Fig. 1 as normally concealed by an outlet fitting or air-directive element 30. This may be seated upon a gasket 31 in a circular or other groove and may be secured by means such as a screw 32. The plate 17 is shown as provided with an inwardly extending flange 33, substantially opposite the mentioned flange 22 of gear 18,—said flanges cooperating to define a blower cham-

ber; and the air-advancing effect obtained by rotation of the backwardly inclined blades 21 may be enhanced by the interposition of suitable guide means, such as a conical element 34.

In preference to securing this conical element to the gear 19, it may be carried by means such as an inward projection or boss 35, shown as integral with the cover plate 17; and said boss may, if desired, be chambered to receive a spring-pressed bearing or retaining element 36 pressing against a small circular plate 27, to axially locate shaft 14. If desired, further to contribute to the efficiency of the described combination gear and blower, the plate 17 may be additionally provided with integral or other stationary blades 37 adapted to direct any air which has advanced between substantially parallel outwardly convergent walls provided by web 19 and conical plate 34. The mentioned stationary blades tend to obviate mere eddying or turbulent disturbance of the air and to deliver the same through openings 29 and the fitting 30,—if the latter is employed and if the concavity of gear 18 is outwardly disposed and if said gear is rotated in the direction above indicated.

The stationary blades 37 and the fitting 34 should be understood to serve not only for the guidance of the air but as a means, cooperating with mentioned movable and stationary parts, in the elimination of droplets of any oily or other vapors which may be pulled over with the air,—the entrained droplets being either thrown to the periphery of the gear 18 or received by the plate 17 or parts carried thereby in such manner as to drain and drip through the narrow slot between flange 33 and gear 18 back into the pan 11, or its equivalent.

The fitting 30 is shown as provided with an air outlet opening 38, surrounded by an inwardly turned flange 39,—the configuration of the fitting 30, the position of the opening 38 and the shape of the flange 39 being such as to reduce or obviate undue back pressure, as resulting from the advance of the engine when used upon an automotive vehicle, and also to obviate drip of condensate therethrough. A pipe may be inserted in or fastened to opening 38 so to convey the vapors to any desired point of discharge, and the form shown in Figure 4 will be seen to differ from that shown in preceding figures primarily in that, for the effects last referred to, the front cover plate 17′ is provided with a special opening 29′, occupying an elevated position relatively to an axis of shaft 14—air being upwardly and rearwardly delivered therefrom by means of a comparatively simple elbow fitting 30′, opening at 38′.

In both of the described embodiments, it will be understood that the special gear 18 is ordinarily so rotated as to advance air outwardly rather than inwardly; and air may accordingly be admitted through any usual or preferred means, such as a filler pipe 40 or 40′, disposed near either end, but preferably nearer the rear end, of a crankcase; and the air so admitted will be seen to be drawn upwardly past web 12 or through any desired openings 41 therein, advancing to a vent or vents in the general manner above described and as indicated by various arrows.

Although the foregoing description has included specific reference to but one type of gear and to but two types of outlet fittings, it should be understood not only that various features of the present invention might be independently employed, and that the disposition of the convexity in gear 18 must depend upon whether an outward or an inward movement of air is to be effected thereby, but also that various features of this invention might be independently employed, and that numerous additional modifications might easily be devised, by workers informed of the foregoing, without involving the slightest departure from the present invention.

I claim:

1. In an internal combustion engine: a crankcase having a ventilation opening; an engine-comprised shaft carrying a gear in proximity to said opening; and means, including blades upon said gear, for advancing air through said opening,—said shaft being a camshaft of said engine.

2. In an internal combustion engine: a crankcase having a ventilation opening; an engine-comprised shaft carrying a gear in proximity to said opening; and means, including blades upon said gear, for advancing air through said opening,—said gear being a sprocket gear for driving said shaft.

3. In an internal combustion engine: a crankcase having a ventilation opening; an engine-comprised shaft carrying a gear in proximity to said opening; and means, including blades upon said gear, for advancing air through said opening,—said gear being terminally secured to said shaft.

4. In an internal combustion engine: a crankcase having a ventilation opening; an engine-comprised shaft carrying a gear in proximity to said opening; and means, including blades upon said gear, for advancing air through said opening,—said gear comprising a concave web having air passages between said blades.

5. In an internal combustion engine: a crankcase having a ventilation opening; an engine-comprised shaft carrying a gear in proximity to said opening; and means, including blades upon said gear, for advancing air through said opening,—said gear comprising a concave web having air passages between said blades and near the inner ends thereof.

6. In an internal combustion engine: a

crankcase having a ventilation opening; an engine-comprised shaft carrying a gear in proximity to said opening; and means, including blades upon said gear, for advancing air through said opening,—said last-mentioned means comprising stationary blades disposed opposite the blades of said gear.

7. In an internal combustion engine: a crankcase having a ventilation opening; an engine-comprised shaft carrying a gear in proximity to said opening; and means, including blades upon said gear, for advancing air through said opening,—said last-mentioned means comprising a conical plate disposed opposite the blades on said gear.

8. In an internal combustion engine: a crankcase having a ventilation opening; an engine-comprised shaft carrying a gear in proximity to said opening; and means, including blades upon said gear, for advancing air through said opening,—said opening being provided with an air-directive fitting.

9. In an internal combustion engine: a crankcase having a ventilation opening; an engine-comprised shaft carrying a gear in proximity to said opening; and means, including blades upon said gear, for advancing air through said opening,—said opening being an outlet opening provided with means to obviate an exit of entrained oil globules therethrough.

10. In an internal combustion engine: a crankcase having a ventilation opening; an engine-comprised shaft carrying a gear in proximity to said opening; and means, including blades upon said gear, for advancing air through said opening,—said crankcase including a cover plate through which said opening extends.

11. In an internal combustion engine: a crankcase having a ventilation opening: an engine-comprised shaft carrying a gear in proximity to said opening; and means, including blades upon said gear, for advancing air through said opening,—said crankcase including a cover plate through which said opening extends, and said opening being provided with an air-directive fitting.

12. In an internal combustion engine: a crankcase having a ventilation opening: an engine-comprised shaft carrying a gear in proximity to said opening; and means, including blades upon said gear, for advancing air through said opening,—said crankcase including a cover plate through which said opening extends, and said plate being provided with blades substantially adjacent said opening.

13. In an internal combustion engine: a crankcase having a ventilation opening: an engine-comprised shaft carrying a gear in proximity to said opening; and means, including blades upon said gear, for advancing air through said opening,—said crankcase including a cover plate through which said opening extends, and a conical guide plate being interposed between said gear and said plate.

In testimony whereof I affix my signature.

ROBERT SCHITTKE.