Sept. 19, 1933. M. BIRKIGT 1,927,770

CRANK CASE LUBRICATING SYSTEM

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Fig. 2

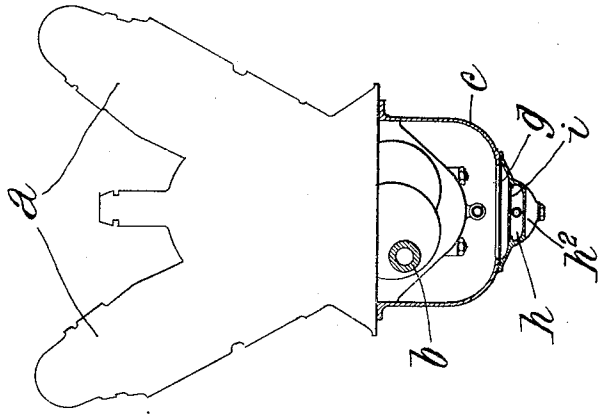
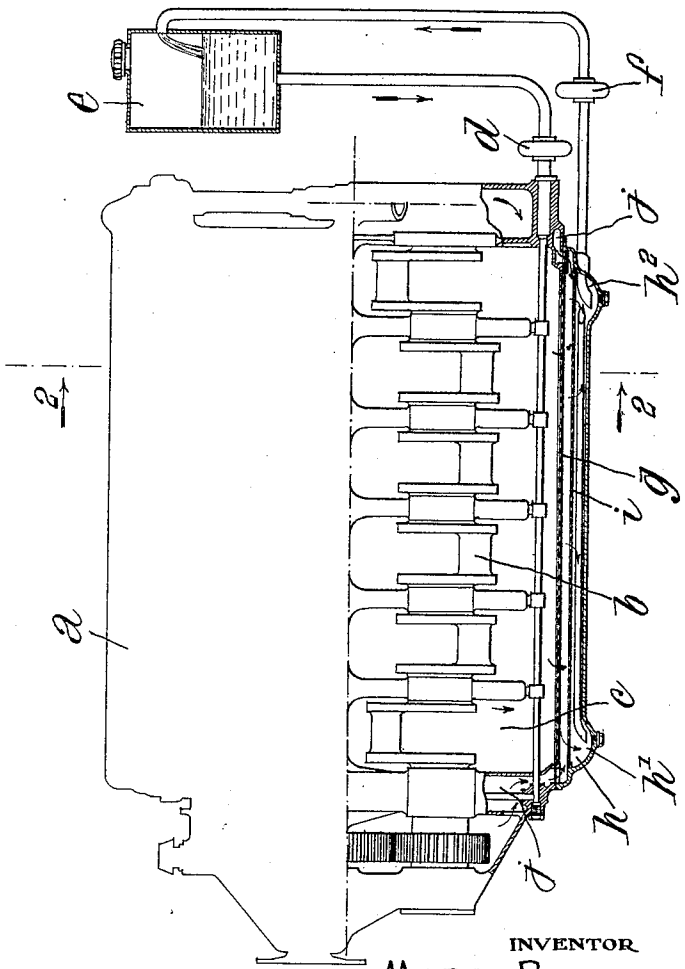


Fig. 1



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CRANK CASE LUBRICATING SYSTEM

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7 Claims. (Cl. 184—6)

The present invention relates to the lubricating portions of crank case assemblies.

Direct observation of the interior of a crank case during rotation of a crank shaft shows that under certain conditions the air currents produced by the latter tend to force the oil at the bottom of the crank case toward the center thereof. Inasmuch as the intake of the lubricating pump communicates generally with both extremities of the bottom of the crank case, oil flows thereinto very irregularly and, during certain intervals, not at all. In other words, the center of the crank case is the locus of an excessive acculation of oil while the ends are correspondingly deficient.

One of the objects of the present invention is to provide means for breaking up the air currents produced inside the crank case by rotation of the crank shaft and so assure even distribution of oil in the bottom of the crank case and over the surface of the oil filter, if any, positioned therein.

Other objects will appear in the course of the detailed description now to be given with reference to the accompanying drawing, in which:

Figure 1 is a partial vertical axial section through one illustrative embodiment of the invention;

Figure 2 is a section taken on line 2—2 of Figure 1.

The invention will be described with reference to a current type of aviation motor but it is to be understood that it may be applied to any type of motor whatever in which lubricant, accumulating in the bottom of a crank case, is aspirated by a lubricating pump and distributed to the various parts of the motor.

Referring to the various figures of the drawing, there is shown a multiple cylinder block *a* provided with pistons and connecting rods of current design, a crank shaft *b* driven by the various connecting rods and enclosed in a crank case *c*. A lubricating pump *d* aspirates oil from a reservoir *e* and delivers lubricant to various parts of the motor. Th oil accumulating in the bottom of crank case *c* flows into a pair of wells h' h^2 situated at opposite extremities thereof from which it is aspirated by a pump *f* of conventional construction and returned to reservoir *e*. The crank case is provided with a wire gauze filter *i* of usual construction acting to prevent impurities passing with the oil into chamber *h* situated thereunder.

It has been observed that at high motor speeds, pumps *f* cease to aspirate lubricant at irregular intervals, the lubricant accumulating above screen *i* and, more particularly, toward the center thereof where it is caught up by the air currents produced by rotation of the crank shaft. Undesirable accumulations of lubricant, therefore, are produced in the crank case.

To break up these air currents and assure an even distribution of lubricant over screen *i*, a perforated plate is positioned substantially as shown in the drawing in the space between the crank shaft and filter *i*. The dimensions of the holes in plate *g* may, of course, vary with the particular motor being used. In actual practice excellent results are obtained by making the dimensions of the orifices through plate *g* at least 20 times greater than the corresponding orifices through filter *i*. In a certain particular type of motor satisfactory results were obtained using a filter of current design and a plate *g* having holes therethrough measuring 4 millimeters in diameter. Diameters less than 4 millimeters may, of course, be used. It is to be understood that the holes through plate *g* need not be circular but may take the form of elongated slots, oval apertures, or the like, it being clearly understood that the function of this plate is to break up the air currents just above filter *i* while opposing a minimum of resistance to the flow of oil toward the latter.

The distance between elements *g* and *i* may be varied at will. Good results have been obtained by spacing them at a distance of 15 to 20 millimeters in aviation motors of current design.

If the motor includes such elements as compressors, reducers, or valve controls whose supply of lubricant can be distributed before its return to the crank case, conduits such as *j* may be provided for taking care of these oil supplies, said conduits discharging underneath screen *g* and above filter *i* (if such a filter forms part of the assembly).

The invention is not to be taken as limited to crank case assemblies in which a filter is employed. Obviously, screen or baffle *g* would function equally well to break up air currents tending to unevenly distribute the oil in the bottom of a crank case not supplied with a filter.

In actual test, it is found that aviation motors supplied with air baffles of the type of element *g* show a very constant oil consumption per horsepower hour of operation irrespective of the speed of rotation, excessive lubrication at high speeds being entirely prevented.

When air screens such as element *g* are used,

they need not necessarily extend over the whole length of the crank shaft, though such a form of construction is preferable. In certain special types of motors it may be desirable or even advantageous, to dimension and position said screen so as to break up the air currents immediately adjacent certain parts of the crank shaft or its bearings.

What I claim is:

1. In a motor provided with a crank shaft, a crank case, a filter positioned in said crank case, and means in said crank case between said filter and crank shaft for breaking up air currents produced inside said crank case during rotation of said crank case, said last named means offering a lesser resistance to flow of lubricant than said filter, whereby lubricant is permitted to spread evenly over the filter without the formation of uneven accumulation of lubricant by the air currents.

2. In a motor provided with a crank shaft, a crank case, means for discharging oil from said crank case, an oil filter positioned inside said crank case above said discharging means, and means for breaking up air currents produced inside said crank case during rotation of the crank shaft, said last named means being positioned in said crank case in spaced relation to and above said oil filter and being independent thereof, whereby oil is permitted to spread evenly over the filter without the formation of uneven accumulations of lubricant by the air currents.

3. In a motor provided with a crank shaft, a crank case, a screen positioned inside said crank case under said crank shaft, said screen having a plurality of holes therethrough exceeding one millimeter in section, and serving to break up air currents produced by rotation of said crank shaft, and means for discharging oil from said crank case at a point below said screen, whereby oil is permitted to spread evenly below said screen without the formation of uneven accumulations of oil by the air currents.

4. In a motor provided with a crank shaft, a crank case, means for discharging oil from said crank case, a filter above said discharging means having orifices formed therethrough, and a screen having apertures formed therethrough, the apertures in said screen having dimensions at least twenty times greater than the orifices through said filter, said screen being positioned above said filter, whereby oil is permitted to spread evenly over the filter without the formation of uneven accumulations of lubricant by the air currents produced by rotation of said crank shaft.

5. In a motor provided with a crank shaft, a crank case, means for discharging oil from said crank case, and means between said discharging means and crank shaft for breaking up air currents produced inside said crank case during the rotation of said crank shaft, said last named means offering free passage to both oil and the impurities contained therein, whereby oil is permitted to spread evenly on the side of said current breaking means opposite the crank shaft without the formation of uneven accumulations of oil by the air currents.

6. A structure as defined in claim 5 in combination with means for delivering oil to said crank case at a point situated between said first and second means.

7. In a motor provided with a crank shaft, a crank case, an oil filter positioned inside said crank case, means between said filter and crank shaft for breaking up air currents produced inside said crank case during rotation of said crank shaft, said means being positioned above and in spaced relation to said oil filter, and means for delivering oil to said crank case at a point situated between said oil filter and said means, whereby oil is permitted to spread evenly over the filter without the formation of uneven accumulations of lubricant by the air currents.

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