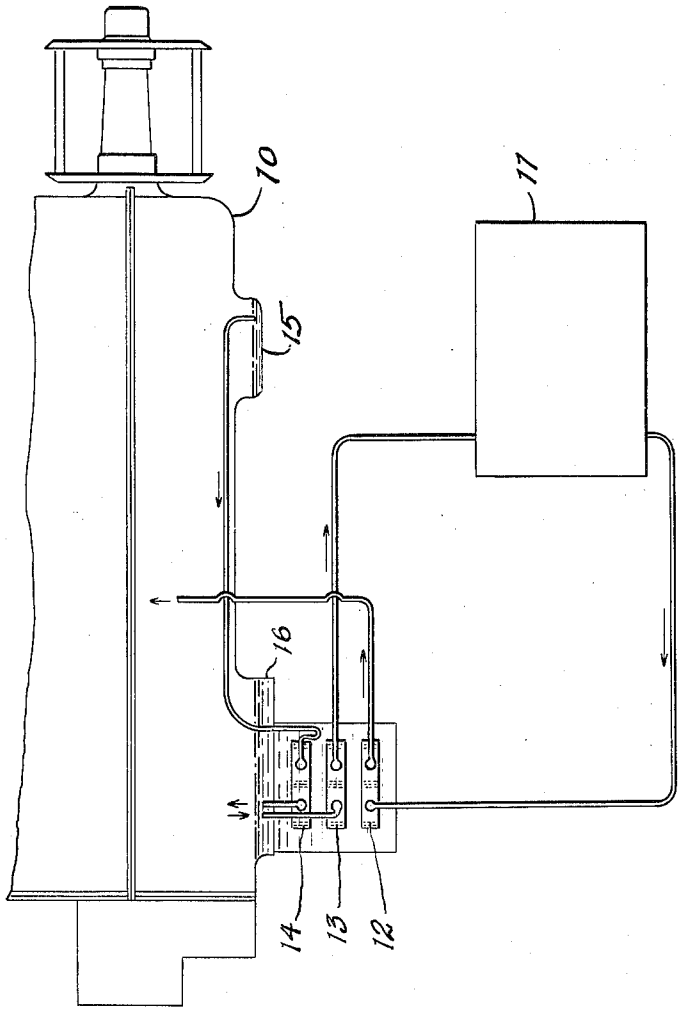
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LUBRICATION SYSTEM FOR AERONAUTICAL MOTORS

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LUBRICATION SYSTEM FOR AERONAUTICAL MOTORS.

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To all whom it may concern:

Be it known that I, ARTHUR NUTT, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Lubrication Systems for Aeronautical Motors, of which the following is a specification.

My invention relates to motors and more particularly to motor lubrication.

In motor lubrication systems of the type disclosed in Patent No. 1,329,038, issued January 27, 1920, a serious and oft-times dangerous drawback has been found to exist, to wit: the tendency to build up air under pressure within the oil supply tank or reservoir. To overcome this objectionable feature it is the present practise to provide an extremely large air vent pipe leading back from said supply tank to the crank case of the motor. Such an arrangement, while relieving the situation, does not in any way attempt to avoid the cause. The presence of air in the supply tank or reservoir is due entirely to the fact that an aeronautical motor in operation, is required to assume, for periods of varying duration, different angular positions, which changes in the position of the motor with respect to the horizontal, cause the oil draining from the various parts of the motor requiring lubrication to shift constantly back and forth from end to end of the crank case or drainage reservoir. Normally the oil draining toward the bottom of the crank case is removed therefrom as fast as it accumulates in order that the crank case or drainage reservoir may be maintained substantially dry. For this purpose either a duplex scavenging oil pump or two independently operating oil pumps are provided, one of which pumps draws its supply of oil from one end of the drainage reservoir and the other of which pumps draws its supply of oil from the opposite end thereof, and both of which pumps independently return such oil by separate paths to the outside oil tank or supply reservoir. As long as both scavenging oil pumps (or at least the intake portions thereof) are immersed in oil such a system of motor lubrication works perfectly. Unfortunately however, when the motor is appreciably inclined to the horizontal, one or the other of the pumps, instead of pumping oil, pumps either oil and air mixed or air alone; and since both pumps deliver separately to the outside oil tank or reservoir, obviously either one or the other of two things are bound to occur i. e. either the air builds up under pressure within the outside supply tank or reservoir or it is vented back, as suggested, again to the crank case of the motor.

The object of the present invention is to overcome entirely the objectionable features above pointed out. In attaining this object I merely so arrange the two scavenging oil pumps as to admit of their operation in series as distinguished from the heretofore independent operation thereof. Instead of one scavenging pump drawing its supply of oil from one end of the motor crank case or drainage reservoir and the other scavenging oil pump drawing its supply from the opposite end of said reservoir and each independently returning such oil to the supply tank, one of said pumps draws its supply of oil from one end of the motor crank case and delivers it to the opposite end thereof whereas the other of said pumps picks up the oil from said last mentioned crank case end and delivers it to the supply tank. In all other respects the operation of the two systems is in principle the same. Moreover, by a series arrangement of the two scavenging oil pumps I find that instead of an emulsion of oil and air being constantly delivered to the supply tank from the motor, a solid steady stream of oil is produced and delivered at all times.

In the drawing, wherein my improved system of motor lubrication is diagrammatically illustrated, 10 designates the bottom half of the motor crank case or the drainage reservoir, 11 the outside oil tank or supply reservoir, 12 the pressure or delivery oil pump, 13 and 14 the two scavenging oil pumps, and 15 and 16 the two oil sumps or crank case depressions formed at the base of the drainage reservoir and into which the induction pipes leading respectively to the two scavenging pumps 13 and 14 extend. The arrows indicate the direction of the flow of the oil.

In operation, and assuming the motor of which the lubrication system forms a part is installed upon an airplane executing a steep glide or is flying horizontally, the scavenging oil pump 14 picks up the oil as it falls by gravity into the oil sump 15 at or near the propeller end of the motor and

delivers it to the oil sump 16 at or near the opposite or anti-propeller end of the motor. The scaveging oil pump 13 at the same time picks up the oil in the oil sump 16 and delivers it to the outside oil tank or supply reservoir 11. Both oil intakes i. e. the oil intake for the pump 13 and the oil intake for the pump 14, being immersed in oil, a steady solid stream of oil is delivered to the tank 11 by the pump 13 and a steady stream of oil is delivered from the sump 15 to the sump 16 by the pump 14. In flying at a steep climbing angle, except for the fact that the pump 14 is pumping either oil and air mixed or air alone, the operation of the system is the same. Air however, tho admitted to the pump 14 under the conditions stated, is of no moment since the pump 14 discharges into the sump 16 where the pumped air is liberated and immediately permitted to again enter the crank case from which it was originally withdrawn. Meanwhile the pump 13 is constantly pumping oil from the crank case to the tank 11, and since the pumping capacity of each scavenging pump is equal to or greater than the pumping capacity of the pressure or delivery pump 12, obviously a substantially dry crank case is maintained.

If desired, the disposition of the pumps may be otherwise than shown, and likewise, if desired, the pump 13 may be placed at the propeller end of the motor and the pump 14 made to withdraw oil from the anti-propeller end. Moreover plunger pumps may be used instead of gear pumps and the supply tank made a part of the motor crank case by partitioning it off.

While I have described my invention in detail in its present preferred embodiment, it will be obvious to those skilled in the art after understanding my invention, that various changes and modifications may be made therein without departing from the spirit or scope thereof. I aim in the appended claims to cover all such modifications and changes.

What is claimed is:

1. A lubrication system for traveling motors including a drainage reservoir, an oil duct having its inlet end within said reservoir and its outlet end likewise within said reservoir but at a point remote from said inlet end, a scavenging oil pump operable to withdraw oil from said drainage reservoir at the inlet end of said oil duct and to deliver it again to said reservoir at the outlet end thereof, a supply reservoir, a second scavenging oil pump operable to withdraw oil from said drainage reservoir and to deliver it to said supply reservoir, and a delivery pump operable to withdraw oil from said supply reservoir and to deliver it again to the motor.

2. A lubrication system for traveling motors including a drainage reservoir, an oil duct having its inlet end within and at one end of said reservoir and its outlet end likewise within and at the opposite end of said reservoir, a scavenging oil pump operable to withdraw oil from said drainage reservoir at the inlet end of said oil duct and to deliver it again to said reservoir at the outlet end thereof, a supply reservoir, a second scavenging oil pump operable to withdraw oil from said drainage reservoir and to deliver it to said supply reservoir, and a delivery pump operable to withdraw oil from said supply reservoir and to deliver it again to the motor.

3. A lubrication system for traveling motors including a drainage reservoir, a supply reservoir, a scavenging oil pump operable to withdraw oil from one end of said drainage reservoir and to deliver it to said supply reservoir, an oil duct having its inlet end at the opposite end of said drainage reservoir and its outlet end at the end of said reservoir from which the oil is withdrawn by said scavenging oil pump, a second scavenging oil pump operable to withdraw oil from said drainage reservoir at the inlet end of said oil duct and to deliver it again to said reservoir at the outlet end thereof, and a delivery oil pump operable to withdraw oil from said supply reservoir and to deliver it again to the motor.

4. A lubrication system for traveling motors including a drainage reservoir having depressions formed therein at or near its opposite ends, an oil duct having its inlet end within one of said depressions and its outlet end within the other of said depressions, a scavenging oil pump operable to withdraw oil from said drainage reservoir at the inlet end of said oil duct and to deliver it again to said reservoir at the outlet end thereof, a supply reservoir, a second scavenging oil pump operable to withdraw oil from the depression in said drainage reservoir at the outlet end of said oil duct and to deliver it to said supply reservoir, and a delivery oil pump operable to withdraw oil from said supply reservoir and to deliver it again to the motor.

In testimony whereof I hereunto affix my signature.

ARTHUR NUTT.