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R. CHILTON
OIL SEPARATING DEVICE

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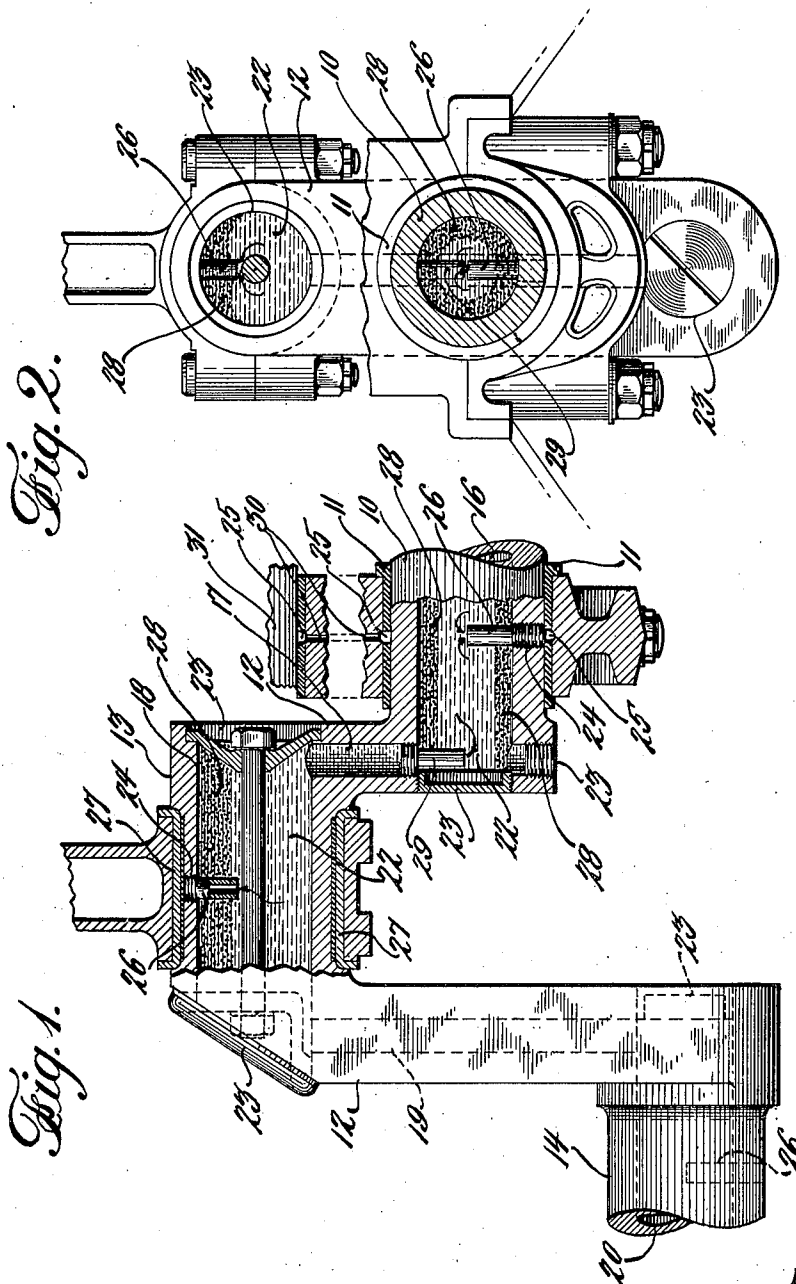


Fig. 2.

Fig. 1.

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ROLAND CHILTON, OF KEYPORT, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO HEALEY-AEROMARINE BUS COMPANY, INC., A CORPORATION OF NEW YORK.

OIL-SEPARATING DEVICE.

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This invention relates to improvements in devices for the separation of foreign matter from lubricating oils, and more specifically this invention applies to that class of machinery wherein the lubricating medium is positively circulated and it is the essential object of this invention to afford improved means for continuously separating any metal particles or other foreign matter from such oil during the operation of the machine.

Screen filters are generally used for this purpose, but on account of the extreme fineness of the foreign matter such as metal and other particles of an abrasive nature with which lubricating oil becomes charged, it is impossible to construct a practical screen fine enough to arrest such particles and which would not rapidly become clogged up with this material.

Centrifugal separating machines are now extensively used for cleaning used oil in bulk and such machines are extremely efficient in removing even the smallest particles. The primary object of this invention is to incorporate means embodying this well-known centrifugal method of oil cleaning, as a part of the machine to be lubricated, so as to deal continuously with the oil therein during the operation of the machine. I attain this object by associating with a rotating part of the machine to be lubricated, means to utilize the centrifugal action from such rotation to separate and trap the heavy particles from the lubricating oil. It is found that

one of the principal causes of bearing wear in machines in general and especially in high speed machines, is the cutting or abrasive actions of the solid metallic or other particles which become entrained in the oil. In pressure lubricated devices, especially where the same oil is continuously circulated, it is found that such abrasive wear is most noticeable immediately behind the points at which the oil holes feed into the bearings or journals and this invention specially contemplates the avoidance of this source of wear by more completely removing from the oil these particles with respect to which the conventional filters are ineffective.

An internal combustion engine is an example of a lubricated mechanism which has high speed rotating parts and the application of my invention to the crank shaft of such an engine is shown in the drawings.

To realize the advantages of my invention in the most complete manner it is desirable to so situate the oil separating device or devices so that all the oil reaching the mechanism must pass through these separators.

It should be understood that these abrasive particles with which the oil becomes charged are in the main of greater mass than the oil and hence are very susceptible to the centrifugal method of separation.

The principal object therefore of this invention is to provide a suitable oil separating device having novel and improved features and of such construction so as to utilize the high speed of the rotating parts to be lubricated and the centrifugal force generated thereby to cause the impurities in the oil to become separated therefrom and to be restrained from circulation therewith.

A further object of this invention is to provide simple and efficient means and of such construction as to be readily applicable to any rotary lubricated mechanism for the purification of lubricating oil used in connection therewith and whose efficiency will remain constant.

To these and other ends, the invention consists in certain improvements and the combinations and arrangements of parts, all as will be more fully hereinafter described, the features of novelty being pointed out particularly in the claims at the end of the specification.

In the drawings:—

Figure 1 is a fragmentary longitudinal side view, partly in section, of a crank shaft with its associated crank and crankpins showing my invention applied thereto.

Figure 2 is an end view of the parts as shown in Fig. 1 with the plug in the end of the crankpin removed.

In the present instance 10 denotes the crank shaft of an engine supported in a bearing 11, the crank 12 and the crank pins 13, 14 are integral with the crank shaft 10. The parts above enumerated are bored so as to form a continuous passage or duct 16, 17, 18, 19, 20 for the oil 22 which is caused to circulate therethrough by pressure, to lubricate the bearings 11 and 27 through openings in the journal portions. Suitable capped or plugged openings 23 are provided at various points, the purpose of which will be more fully described hereinafter. In the journal portions of said crank shaft and

crank pins I have formed tapped holes 24 into which I have inserted the screw threaded tubes 26 disposed approximately radial to the axis of said journals and of such length so that one end will be substantially at or adjacent to the axis of the bores 16, 18 and 20; the other end of the tubes being substantially flush with the surface of the journal. Suitable oil grooves 25 may be provided in the bearings to register with the threaded ends of the tubes 26.

In pressure lubricated devices oil is caused to circulate through the bores or ducts like 16, 17, 18, 19, 20 of my showing, by suitable means (not shown) and reaches the bearings by means of openings provided in the journal portions, the oil however soon becomes impregnated with impurities with detrimental results as explained hereinbefore. I eliminate these objectional features and separate the impurities from the oil with which it becomes charged by securing into the openings 24 the tubes 26 in the above described manner.

The rotation of the crank shaft 10 and the throw of the crank 12 which operates at high speed causes the relatively heavy impurities 28 of the oil 22 to become separated therefrom due to the centrifugal forces acting thereon and to seek a position furthest from the center of rotation within said duct where they are held entrapped, assuming approximately the position as shown in the drawings.

The tube 29 screw-threaded into bore 17 prevents the impurities 28 contained in the shaft bore 16 from being centrifugally forced into the crank bore 18, the clear or purified oil 22 is consequently retained near the center of rotation and as the ends of the tubes 26 are disposed as near this center as convenient, it will be readily seen that the clear oil will therefore be forced through the tubes 26 to the bearings 11 and 27; the tubes 26 thus preventing material suspended

in the oil 22 from reaching the bearings in question.

As shown in Fig. 1, 30 denotes an oil passage connecting with the groove 25 and which may lead to associated bearing surfaces 31 to which the clarified oil can be conveyed from the bore 16, through the passage 30.

Periodical cleaning of the duct may be accomplished by the removal of the caps or plugs of the openings 23.

It is understood that my invention is not restricted in its application to the particular form of mechanism shown in the drawings, but may be used in connection with any suitable rotatable driving or driven means.

Variations may be resorted to within the scope of the invention and portions of the improvements may be used without the others.

Having thus described my invention, I claim:—

In a device of the class described, a crank shaft, a crank on said crank shaft and mounted eccentrically with respect to the axis thereof, said crank having a bearing surface thereon, a conduit in said crank shaft adapted to supply oil, a chamber in said crank adapted to receive oil from said conduit, an outlet from the outer portion of said chamber spaced from the inlet in a direction parallel to the axis of the crank shaft, and adapted to supply oil to the bearing surface, and a baffle within said chamber between said inlet and said outlet intercepting the flow of oil whereby heavier than oil particles entering said chamber from the inlet will be projected towards the part of the chamber away from the center of rotation by centrifugal force, and prevented from entering the outlet by the baffle.

Signed at Keyport in the county of Monmouth and State of New Jersey, this 1st day of November A. D. 1922.

ROLAND CHILTON.