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R. BIRMANN
OIL PUMP AND SEPARATOR
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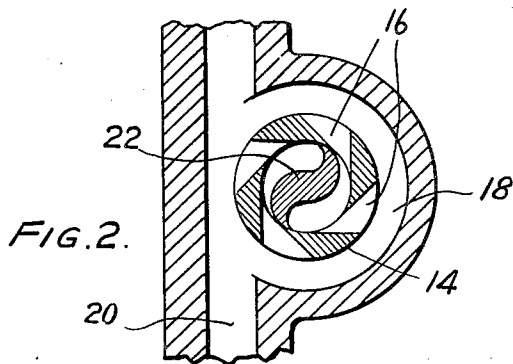
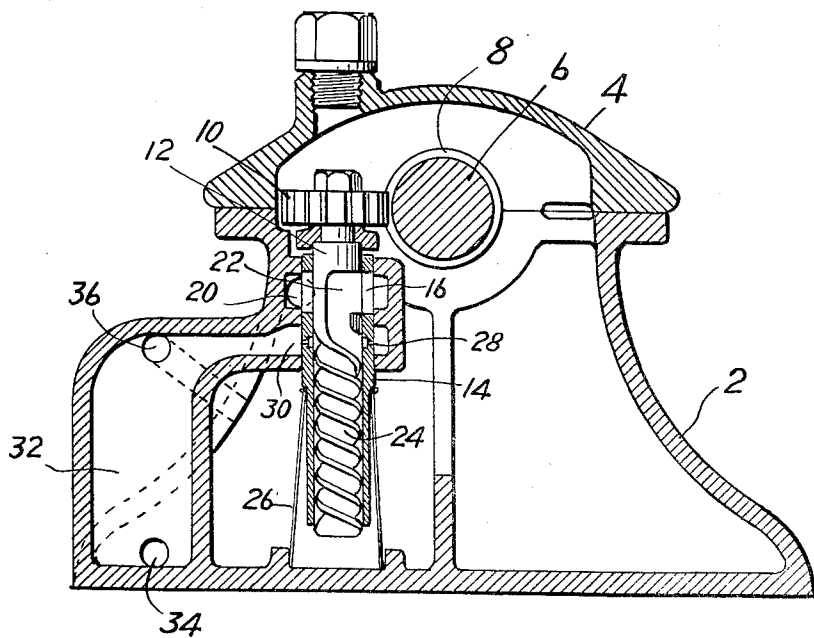


FIG. 1.

WITNESS:

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UNITED STATES PATENT OFFICE

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OIL PUMP AND SEPARATOR

Original application filed October 16, 1928, Serial No. 312,767. Divided and this application filed October 16, 1928. Serial No. 312,768.

This invention relates to an oil pump and more particularly to a pump for supplying lubricating oil under pressure to bearings and having means incorporated therein for separating from the lubricating oil water or the like which would prevent proper lubricating action.

This case is a division of my application Ser. No. 312,767, filed October 16, 1928, relating to controlling means for turbines. The pump disclosed and claimed in this application is shown in combination with a boiler feed pump in the application referred to and is particularly adapted for the use disclosed therein.

Heretofore various types of oil pumps have been used for supplying lubricating oil under pressure to bearings. One type of pump which has come into great favor consists of intermeshing gears by which the oil is drawn between the intermeshing teeth and delivered under pressure. A pump of this type is, however, not satisfactory for extremely high speeds by reason of the fact that the teeth of the intermeshing gears are very likely to become broken and excessive wear occurs, necessitating frequent replacement.

For high speed work, the type of pump which readily suggests itself as probably offering the greatest advantages is a centrifugal type. In attempting, however, to use a centrifugal pump at high speed it is found that the operation is unsteady, first, because a centrifugal pump must be primed before it will operate and failure to prime may result from foaming of the oil under vacuum, and secondly, because the pump at high speed tends to "dig itself dry" by drawing air from the surface of the oil supply directly into the intake.

In a steam turbine or an impeller which is pumping water there is considerable likelihood of water mixing to some extent with the supply of lubricating oil for the machine. The presence of water in the lubricating oil prevents the proper action of the oil in a well-known manner and proper lubrication may be prevented.

It is one object of the present invention

to provide an impeller type of oil pump which will avoid the objections referred to above, being self priming and avoiding any tendency to draw air into the intake.

It is a further object of the invention to provide means for separating condensed or entrained water from the lubricating oil and more specifically to provide a combined pump and separator.

Furthermore specific objects of the invention will become apparent as the description proceeds.

In the drawings:

Fig. 1 is a transverse section through the casing and main shaft of a turbine driven pump and through the pump forming the subject matter of the present invention.

Fig. 2 is a horizontal section through the impeller portion of the pump.

A casing 2 provided with a cover 4 provides a chamber for lubricating oil. Extending horizontally through suitable bearings formed in the casing and as more particularly shown in my application referred to above is a main shaft 6 provided with a spiral gear 8 meshing with a cooperating spiral gear 10 connected to the rotor of the oil pump.

The oil pump comprises a rotor 12 having suitable bearings in a cylindrical housing 14 which is mounted within the casting forming the wall of chamber 2. Diverging exit passages 16 in the top of the cylindrical housing receive the discharge from the rotary pump, leading the same into an annular passageway 18 communicating through suitable cored passages 20 with the bearings for the main shaft.

The upper portion of the pump rotor is provided with impeller blades 22 formed as shown in Fig. 2 and arranged to impart a high rotational velocity to the oil to drive the same through the diverging exit passages 16 in which the velocity head is partially transformed into pressure head.

The lower portion of rotor 12 is formed with screw threads 24 which, during the rotation of the rotor, tend to force oil from chamber 2 through filter screen 26 into the impeller portion of the pump. The portion

of the tube through which screw 24 extends is an inlet passage to the impeller.

By the construction described, the oil is supplied by screw 24 under an initial pressure to the impeller, the oil being lifted from the supply positively rather than because of the vacuum created in the impeller. As a consequence, the tendency to foam at the intake is prevented and the vortex which is commonly formed in the centrifugal pump, permitting air from the surface of the oil supply to enter the impeller, is prevented.

A cylindrical groove 28 is formed in the inner wall of cylindrical housing 14 and a suitable number of apertures extend outwardly from these grooves into communication with an annular chamber 30 which in turn communicates with a separating chamber 32. At the bottom of chamber 32 is an exit 34 which is normally closed by a plug valve or the like, not shown. Overflow passageway 36 extends from the top of chamber 32 to the lubricant chamber 2, providing an overflow for oil within chamber 32.

As oil containing admixed water is forced upwardly by screw 24 a rotary motion is imparted thereto. Since the water is heavier than the oil, the water forms a layer on the outside of the upwardly moving oil, which layer is trapped within ring 28 from which the water passes outwardly through the small holes communicating with the ring into annular passage 30 and thence into chamber 32. Oil, of course, passes into the chamber together with the separated water. In the chamber, separation of the oil and water takes place by gravity. Accordingly, from time to time the water which has collected may be drawn off through opening 34 while the oil which is continuously being forced into chamber 32 will overflow through passage 36 back to the lubricant chamber. The separator openings are, of course, made so small that only a fraction of the pump oil passes outwardly therefrom, the greater portion of the oil entering impeller 22 and being forced thereby to the bearings for the purpose of lubrication.

What I claim and desire to protect by Letters Patent is:

1. A pump for liquids, consisting of heavier and lighter constituents, comprising a housing, a rotary impeller within the housing, an exit for the discharge from said impeller, an inlet passage to said impeller, means for imparting rotary motion to liquid flowing through said inlet, and a passageway in the wall of said inlet to permit the escape of liquid centrifugally separated from the main body of liquid.

2. A pump for liquids, consisting of heavier and lighter constituents, comprising a housing, a rotary impeller within the housing, an exit for the discharge from said impeller, an inlet passage to said impeller, a

supply chamber with which said inlet passage communicates, means for imparting rotary motion to liquid flowing through said inlet, a passageway in the wall of said inlet to permit the escape of liquid centrifugally separated from the main body of liquid, a chamber for receiving the centrifugally separated liquid, and an overflow from said last named chamber to the supply chamber for lighter liquid constituents passing through the passageway with the separated heavier constituents.

3. A pump for liquids, consisting of heavier and lighter constituents, comprising primary pumping means, an exit for the discharge from said pumping means, an inlet passage to said pumping means, means for imparting rotary motion to liquid flowing through said inlet passage, and a passageway in the wall of said inlet passage to permit the escape of liquid centrifugally separated from the main body of liquid.

4. A pump for liquids, consisting of heavier and lighter constituents, comprising a vertical cylindrical housing, a rotary member within the housing, impeller blades at the upper portion of said rotary member, a helical screw at the lower portion of said rotary member, said housing having inlet and exit openings at its bottom and top respectively, and a passageway in the wall of said housing between the inlet and exit openings to permit the escape of liquid centrifugally separated from the main body of liquid.

In testimony of which invention, I have hereunto set my hand at Trenton, New Jersey, on this 10th day of October, 1928.

RUDOLPH BIRMANN.