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K. R. LUNG

2,851,956

PUMPS

Original Filed Jan. 21, 1952

FIG-1

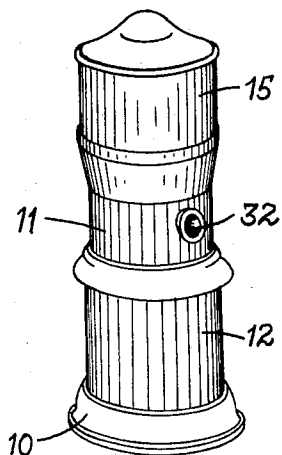


FIG-2

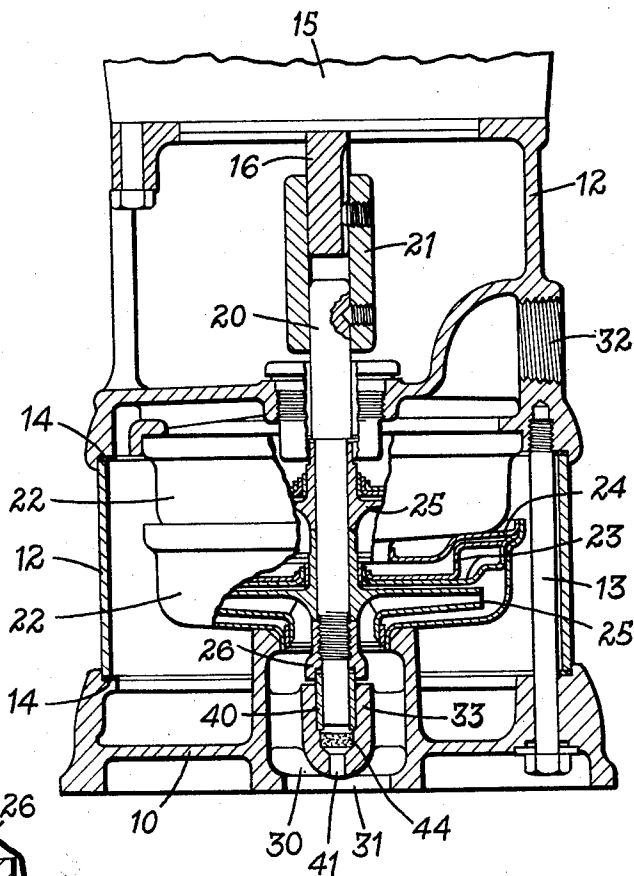
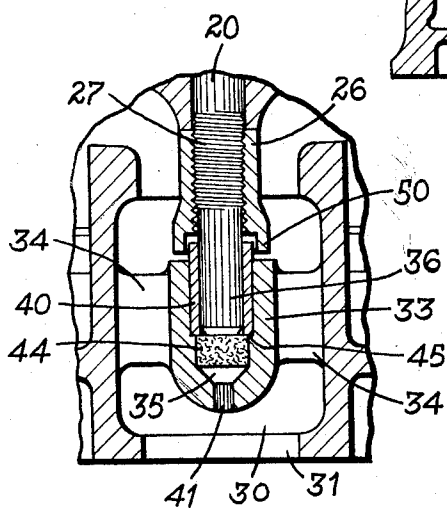


FIG-3



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2,851,956

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Original application January 21, 1952, Serial No. 267,443, now Patent No. 2,753,807, dated July 10, 1956. Divided and this application June 24, 1955, Serial No. 517,793

1 Claim. (Cl. 103—111)

This invention relates to centrifugal pumps. This application is a division of my application Serial No. 267,443, filed January 21, 1952 and issued July 10, 1956, as Patent No. 2,753,807 to the same assignee as this application.

The present invention has special relation to centrifugal pumps of the type wherein one or more impellers are located in a pumping chamber having a main inlet which enters the pumping chamber axially of the impeller shaft, and a primary object of the invention is to provide an improved and simplified bearing assembly which will support the end of the impeller shaft nearest the inlet and which is lubricated during operation by the liquid bearing pumps.

It is also an object of the invention to provide such a bearing assembly for a centrifugal pump which is characterized by special structural features cooperating to prevent access to the shaft and the bearing of grit and other solid material such as may be present in the liquid being pumped.

It is accordingly broadly an object of the invention to provide an improved bearing for the shaft of a centrifugal pump of the type outlined above which is effectively self-lubricating during operation of the pump.

Additional objects and advantages of the invention will be apparent from the following description, the accompanying drawing and the appended claim.

In the drawing—

Fig. 1 is a perspective view showing a centrifugal pump constructed in accordance with the invention;

Fig. 2 is a fragmentary view in axial section of the pump of Fig. 1; and

Fig. 3 is an enlarged fragment of Fig. 2 showing in sectional detail the bearing and support for the drive shaft of the pump of Figs. 1 and 2.

The drawing illustrates a preferred embodiment of the invention comprising a base or suction casting 10, an upper or discharge casting 11 and a cylindrical casing 12 which extends between the castings 10 and 11 and is held in assembled relation therewith by a plurality of bolts 13. These parts cooperate to form the housing of the pump as a whole, and they are provided with suitable gaskets 14 for sealing the junctions between the casing 12 and the castings 10 and 11. The upper casting 11 also supports the drive motor 15, and the motor shaft 16 extends downwardly into the interior of casting 11. The drive shaft 20 for the pump impellers is secured to motor shaft 16 by a coupling 21 as shown.

The drawing illustrates a multi-stage centrifugal pump which includes a plurality of pumping units each including a diffuser casing 22, a two-piece diffuser 23, a cover plate 24 and a centrifugal impeller 25. These units are stacked in casing 12 between castings 10 and 11, and the several impellers are secured in driven relation on the shaft 20 and held thereon by a nut 26 threaded on the threaded portion 27 of shaft 20 which is spaced above the lower end thereof. The base casting 10 includes a

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central portion which defines the suction inlet 30 to the series of impellers 25 and their successive pumping chambers which are formed within the casing 12 by the diffuser casings 22 as described in detail in my above application Serial No. 267,443, the inlet 30 having a port 31 adapted for connection to a supply pipe (not shown). The outlet port 32 from the uppermost pumping unit is in the casting 11.

The base casting 10 also includes an annular boss 33 which is supported within the inlet 30 by a plurality of cast ribs 34 and defines a socket 35 for receiving and supporting the lower end portion 36 of the impeller shaft 20. A sleeve bearing 40 is press-fitted or otherwise mounted within the socket 35, and the shaft end portion 36 is journaled in this bearing, which preferably extends at its upper end a short distance above the top of boss 33.

The sleeve bearing 40 is of a type adapted for lubrication by the water or other liquid being handled by the pump. Accordingly, a passage 41 is provided in the lower end of the boss 33 and extends completely therethrough into the bottom of the socket 35. Thus when in the operation of this pump the suction developed by the impellers 25 draws liquid through the inlet 30, some of this liquid will also be drawn through the passage 41 into and through the socket 35 for lubrication of bearing 40.

In order to prevent possible access by abrasive material in the liquid to the bearing surface of bearing 40, filter means such as a plug 44 of felt or other fibrous material is mounted in the bottom of socket 35. As shown, the socket is counterbored at 45 to limit the extent of insertion of the sleeve within the socket, thus assuring that the filter plug 44 will remain uncompressed for proper filtering action while permitting the filter to pass therethrough to the bearing surface to be lubricated. It will also be noted that the retaining nut 26 for the impellers 25 includes a skirt portion 50 which forms an inverted cup of greater diameter than the bearing 40 arranged to overhang the upper end of bearing 40 both radially and axially. In operation, therefore, in addition to the direct effect of the impeller suction which tends to draw liquid through the socket 35 for lubricating purposes, this skirt portion 50 acts as a spinner creating a radially outward force effective on the upper end of socket 35 to apply direct suction on the socket while at the same time repelling solid materials which may be present in the liquid flowing past the outside of the socket.

It will accordingly be seen that the invention provides an extremely simple bearing construction and support for the impeller shaft which is not only effective in operation but which is also easy to maintain. Thus positive provision is made for maintained lubrication of the bearing surfaces by the liquid being pumped while at the same time gritty particles in the liquid are prevented from reaching these bearing surfaces. Then if after an extended period of use, the filter pad 44 should accumulate a sufficient amount of solid material to prevent it from proper filtering action, it can easily be removed and replaced by simple temporary disassembly of the base casting 10 from the remainder of the pump.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claim.

What is claimed is:

In a pump including a housing defining a pumping chamber having an impeller therein, the combination of means in said housing defining a suction inlet located

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in centrally aligned relation with one end of said chamber, a shaft supporting said impeller in said chamber and extending outwardly from said chamber with one end thereof located in said inlet, means in said housing forming a socket located centrally within said inlet for said end of said shaft, a bearing received in said socket and supporting said shaft end therein, said socket having an entry passage located substantially centrally of the outer end thereof in position to receive a portion of the liquid drawn through said inlet for flow through said socket to lubricate said bearing, a filter member positioned in said socket between said bearing and said passage to prevent access of solid material to said bearing, and means on said shaft outwardly of said socket forming a cup of greater diameter than said bearing overlying the adjacent edge of said bearing both radially and axially to create a radially outward force effective both to apply direct suction on said socket for urging lubricating liquid

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therethrough and also to repel from said bearing foreign solid material in the liquid flowing through said inlet outwardly of said socket.

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