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COMPOSITE WEAR RING FOR CENTRIFUGAL PUMP IMPELLERS

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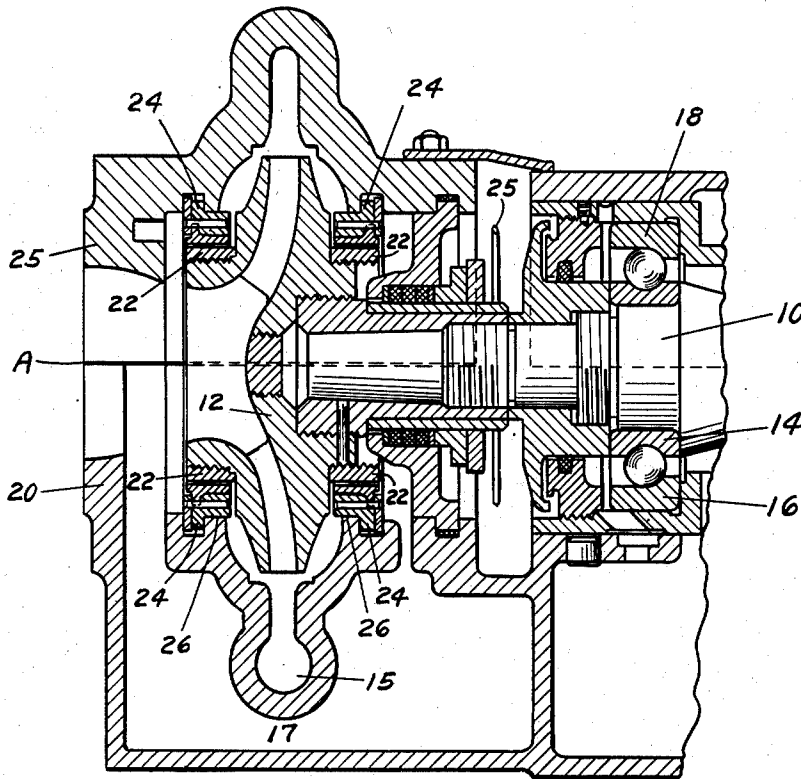


Fig. 1.

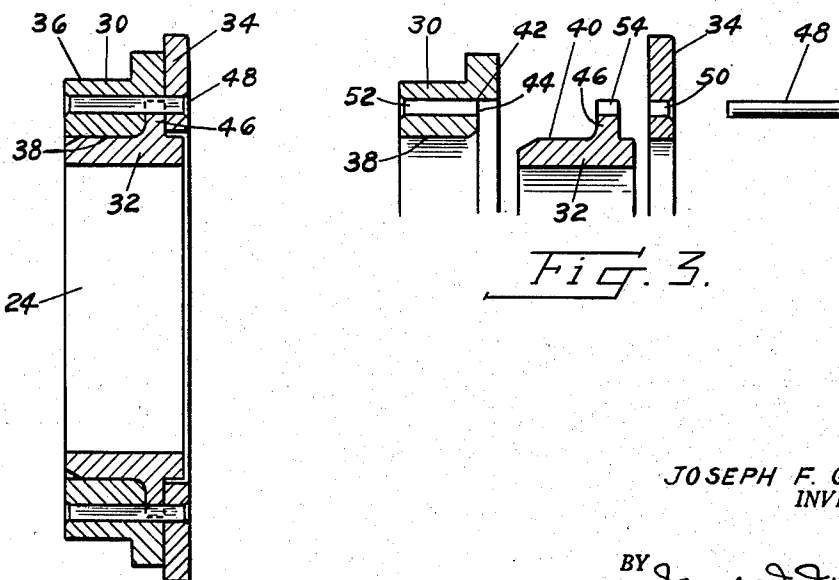


Fig. 3.

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Fig. 2.

UNITED STATES PATENT OFFICE

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COMPOSITE WEAR RING FOR CENTRIFUGAL PUMP IMPELLERS

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2 Claims. (Cl. 286-7)

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The present invention relates to an improved wear ring for the impeller of a centrifugal pump or similar rotary apparatus.

In centrifugal pumps, it is customary to provide co-operating wear rings on the impeller and adjacent part of the pump housing to limit leakage of fluid from the volute on the delivery side of the impeller back to its suction side or passages leading thereto. The wear ring on the impeller and case ring on the body are located outwardly of the bearing for the impeller shaft and the wearing surfaces of the rings on the pump body must be concentric with the aforementioned bearing and at the same time be of wear resistant material to avoid frequent replacement. However, it is necessary to provide a snug fit between the case wear rings and the pump casing which may require expanding them into position.

The present invention contemplates a novel construction of case wear ring which has a body portion that may readily be expanded to fit it snugly into the pump body and a wear ring carried thereby providing a wear resistant surface of hardened material for cooperation with the wear ring on the pump impeller.

The invention will be best understood upon consideration of the following detailed description of an illustrative embodiment thereof when read in conjunction with the accompanying drawing in which:

Figure 1 is a longitudinal sectional view of the impeller end of a centrifugal pump provided with composite wear rings embodying the present invention;

Figure 2 is a sectional elevational view of the composite wear ring detached from the pump; and

Figure 3 is a fragmentary exploded view showing the parts of the composite wear ring.

In Figure 1, the numeral 10 designates the shaft of a centrifugal pump which has an impeller 12 secured thereto at its outer end. Inwardly of the impeller on the pump shaft 10 there is mounted a ball bearing 14 whose fixed raceway 16 is fitted snugly against the machined bearing surface 18 provided therefor in the body of the pump housing and which determines the axis of rotation of the pump shaft. It is customary to provide the impeller 12 and the adjacent portions of the pump housing with wear rings 22 and 24, respectively, so as to minimize leakage between the volute 15 on the delivery side of the impeller and passage 17 in the suction side. In order to carry out this function and avoid seizing of the

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rings, it is necessary that the internal face which constitutes the wear surface of the ring 24 be concentric with the bearing surface 18 and therefore with the wearing surface of ring 22.

At the water end of the pump the body is parted on the horizontal center line A as indicated in Figure 1 so that the rotary assembly including shaft 10 with the impeller, wear rings 22, 24 along with certain other parts such as bearing 14 attached may be dropped into the bottom half 20 of the pump body before the pump case cover 25 is applied. Before this can be done the wear ring 24 must have been snugly test fitted into the bore 26 provided therefor in the pump body and the bore 38 of the ring 24 bored in its internal diameter to be concentric with the shaft bearing surface 18. In carrying out this operation the wear ring 24 separated from the impeller is placed in the groove 26 and expanded or rolled into the pump body to obtain a snug fit. After its external diameter has been expanded to provide a snug fit in the pump body and its internal diameter 38 has been bored to concentricity with the shaft bearing, the wear ring 24 is removed from the pump body and assembled as shown in Fig. 2. It is then assembled with the impeller 12 by mounting it over the wear ring 22 attached to the impeller. The impeller with the two sets of wear rings 22, 24 assembled as well as other appurtenances may then be lowered into position in the lower half 20 of the pump body and the upper half 25 then attached inasmuch as the procedure outlined above has provided for obtaining a snug fit of the wear rings 24 in the body and the concentricity of their wear surfaces with the shaft bearing surface 18 also the wear surface on the wear ring 22 attached to the impeller.

The use of wear rings on the impeller and their assembly in the pump body as described above has been conventional procedure for some time but due to the necessity of expanding the body wear ring 24 to provide a snug fit in the pump body, this ring has had to be made of material of such softness that it can be so expanded or rolled and as a consequence it has lacked the desired wearing qualities. This and other disadvantages of prior constructions are overcome by the composite wear ring constructed in accordance with the present invention and shown in detail in Figs. 2 and 3. As shown in these figures each wear ring 24 which fits in the pump body comprises three main parts, a carrier 30, a wear ring 32 and a retainer plate 34 for holding the ring in assembled relation on the car-

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rier. The carrier 30 is made of a soft metal which permits it to be expanded in the bore 26. After having been made snug in the pump body the carrier 30 is bored so that its internal diameter 38 is accurately concentric with the shaft bearing surface 18. The carrier 30 is then removed from the pump body and the ring 32 which is of hard wear resisting metal is inserted in the carrier 30. The internal diameter 38 of the annular carrier member 30 is slightly smaller than that of the external diameter 40 of the wear ring 32. In the form shown one end face of the carrier 30 is countersunk to provide a shoulder 42 and seat 44 against which a peripheral or circumferential flange 46 on the wear ring 32 rests. These two parts are held in assembled relation by an annular retainer plate 34 whose internal and external diameters are of such dimensions that lying against the end face of the carrier 30 it overlaps the end face of wear ring 32 or the flange 46 thereof. With the parts in assembled relation they are held against separation by means of a pin or rivet inserted through apertures 50 and 52 in the retainer plate 34 and carrier 30 respectively. Where it is considered desirable to prevent rotation of the ring 32 in the carrier 30, slots 54 opening from the peripheral face of the flange 54 may be provided so that the fastening pin 48 seats therein to hold the ring against rotation at the same time it performs the function for holding the carrier 30 wear ring 32 and plate 34 in assembled relation.

With the construction described above, although the carriers 30 must be made of base metal which has sufficient softness to permit it to be expanded or rolled to a snug fit in the pump body, the case rings 32 carried thereby may be made of a different material having the extreme hardness necessary for long wear in association with the rings 22 mounted on the impeller.

What I claim is:

1. In a centrifugal pump having an impeller shaft that extends through a bearing and is provided with wear rings for cooperation in determined concentrically spaced relation with case rings mounted in bores in the pump body be-

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yond said bearing; an assembly for mounting a case ring in the pump body so that its bore after mounting may be made concentric with said bearing comprising; an annular carrier member of expansible material having an external diameter approximately that of the bore therefor in said body and an internal bore made concentric with said bearing and of a diameter to receive the case ring, one end face of said annular carrier member being countersunk about the bore therein to provide a seat; a case ring of wear resistant material snugly fitted in concentric relation within the said internal bore of said carrier and formed with a peripheral flange contacting said seat and having an internal diameter corresponding substantially to the external diameter of the wear ring on said shaft; an annular retainer ring having internal and external diameters of such dimensions as to overlap beyond said carrier member and case ring when mounted against one end face thereof, and means for fastening said retainer to said carrier for holding said case ring in place.

2. A case ring as defined in claim 1 wherein the flange on said case ring is formed with at least one recess on its peripheral face and said fastening means for said retainer means is seated in said recess to prevent rotation in said case ring in said carrier.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,525,884	Plummer	Feb. 10, 1925
1,580,701	Travers	Apr. 13, 1926
2,015,233	Pfieger	Sept. 24, 1935
2,440,947	Hart	May 4, 1948

FOREIGN PATENTS

Number	Country	Date
544,674	Great Britain	of 1942