Oct. 24, 1950 H. HORNSCHUCH 2,526,751

MOUNTING DEVICE FOR PUMP IMPELLERS

Filed May 27, 1949

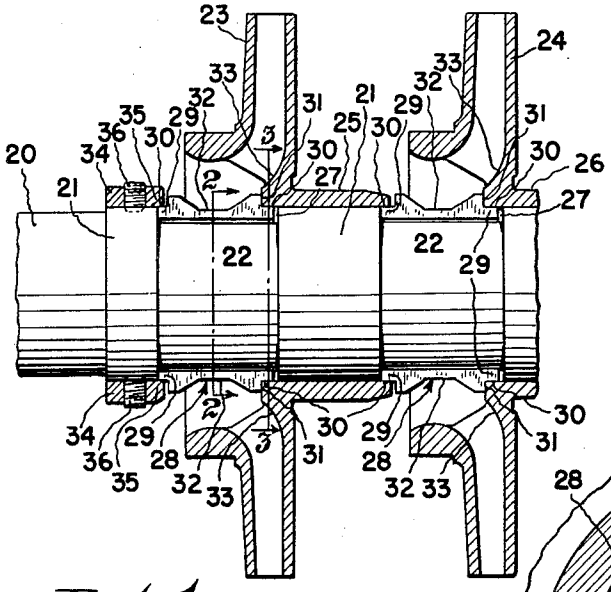

FIG.-1.

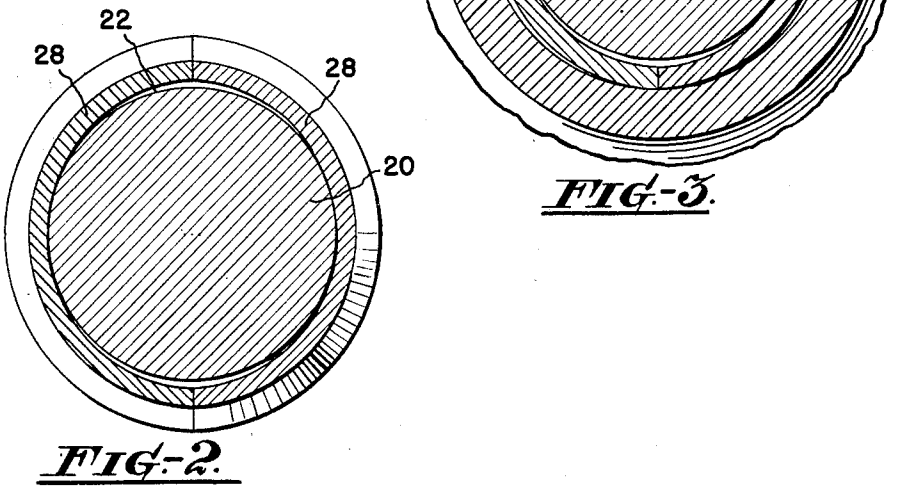

FIG.-3.

FIG.-2.

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Patented Oct. 24, 1950

2,526,751

UNITED STATES PATENT OFFICE

2,526,751

MOUNTING DEVICE FOR PUMP IMPELLERS

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Application May 27, 1949, Serial No. 95,647

5 Claims. (Cl. 287—52)

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My invention relates to pumps, and more particularly to means for mounting a pump impeller on a rotary shaft.

One object of my invention is to limit the endwise movement of an impeller on a shaft.

Another object of my invention is to facilitate the removal of the impeller from the shaft.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawings accompanying this specification:

Figure 1 is a longitudinal view, partly broken away, of a preferred form of my invention,

Figure 2 is a sectional view taken on the line 2—2 in Figure 1, and

Figure 3 is a sectional view taken on the line 3—3 in Figure 1.

Referring more particularly to the drawings, 20 designates the rotary shaft of a multi-stage centrifugal pump having alternately enlarged and reduced portions 21—22, respectively. For the sake of simplicity, only two of the pump's impellers 23—24 are shown. The principle of my invention can be applied to a greater number of impellers, but two are sufficient to adequately describe it.

The hubs 25—26 of the impellers 23—24 are bored out to fit over and are of greater length than the enlarged portions 21 of the shaft so that when the impellers are in their proper positions on the enlarged portions of the shaft the ends of the impeller hubs extend beyond both ends of the enlarged portions and overhang the reduced portions 22 thereby forming annular grooves 27 around the reduced portions of the shaft.

Encircling each reduced portion 22 of the shaft are a pair of sleeve segments 28. The sleeve segments are of slightly less length than the reduced portions of the shaft and are approximately semi-circular. In the preferred form of my invention shown in the drawings, the ends of the sleeve segments are reduced in diameter to form extensions 29 on the sleeves. The peripheral surfaces 30 of the extensions form seating surfaces for the sleeves and the shoulders, formed by the extensions 29 and the main portions 28 of the sleeves, form abutting surfaces 31. In order to obtain good flow characteristics for the eye of the impeller the outer surfaces of the middle sections 32 of the sleeve segments are shaped so as to approximately conform with the curvature of the adjacent portions 33 of the walls of the fluid channels.

The sleeve segments are so shaped that their

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chord lengths are greater than the diameter of the impeller bore and the thickness of the extensions 29 is less than the width of the grooves formed by the overhanging portions of the impeller hubs and the reduced portions of the rotary shaft. Because of this construction, the sleeve members are tensed when their extensions 29 are inserted in the annular grooves and this tension keeps them in firm frictional contact with the impeller hub.

In order to provide means for holding the ends of the last pair of sleeve segments to be placed on the shaft the remaining enlarged portion 20 is provided with an annular member 34 having one end 35 overhanging the adjacent reduced portion 22 of the shaft and encircling the ends of the sleeve segments therein. The annular member is removably fastened to the enlarged portion 21 by means of set screws 36 and when in place holds the ends of the associated pair of sleeve segments on the shaft.

In the operation of my invention an impeller is placed on the shaft and when it is in proper position it forms an annular groove with the reduced portion of the shaft as previously described. A pair of sleeve segments are then placed around the reduced portion of the shaft. The extensions on the sleeve segments extend, at one end, into the annular groove around the reduced portion of the shaft and, at their other end, abut the next enlarged portion of the shaft. The impeller is then moved forward so that it abuts the abutting surface 31 on the end of the sleeve which extends into the annular groove. Endwise movement of the impeller toward the suction end of the pump, in the arrangement shown, is thereby limited. Another impeller is next placed on the shaft and when in position its hub extends over and encircles the extensions of the sleeve segments abutting the enlarged portion 21 of the shaft and confines the sleeve segments on the shaft. In a like manner, remaining impellers and sleeve segments are placed on the shaft. The last pair of sleeve segments to be placed in position are confined at their outer ends by the annular member 34 instead of by another impeller.

When removing the impellers the annular member 34 is removed first. This frees the associated ends of the adjacent pair of sleeve segments. By prying the ends of the segments away from the shaft the segments are then removed. With the sleeve segments removed, the impeller adjacent thereto may be dismounted from the shaft. The removal of this impeller

frees the adjacent ends of the next set of sleeve segments which are taken off the shaft in the same manner as the first set thus allowing the next impeller to be removed. This process continues until all of the impellers have been dismounted from the shaft.

In practice, my invention has been found to possess desirable features. By using sleeve segments and by placing the segments under tension the removal of the impellers of any pump equipped with my invention is greatly facilitated. Because of their length and spring-like action the sleeve segments pop out of the annular grooves very readily when pried away from the shaft. The impeller hubs are constructed so that the amount of overhang thereof is greater than the amount of axial movement of the sleeve segments thus preventing the sleeve segments from disengaging due to centrifgual force or to shocks from rough handling.

I claim:

1. In a mounting for pump impellers, a rotary shaft, an impeller on the shaft and having a bore, a pair of sleeve segments on the shaft extending at one end into the bore and having chords greater than the diameter of the bore to cause the tensing of the segments for maintaining them in firm frictional engagement with the surface of the bore, and an abutment on the shaft for the other ends of the segments.

2. In a mounting for pump impellers, a rotary shaft, an impeller on the shaft and having a bore, a pair of sleeve segments on the shaft extending at one end into the bore and having chords greater than the diameter of the bore to cause the tensing of the segments for maintaining them in firm frictional engagement with the surface of the bore, an abutment on the shaft for the other ends of the segments, and means on the abutment to overlie the peripheral surfaces of said other ends of the segments.

3. In a mounting for pump impellers, a rotary shaft, an impeller on the shaft and having a bore, a pair of sleeve segments on the shaft extending at one end into the bore and having chords greater than the diameter of the bore to cause the tensing of the segments for maintaining them in firm frictional engagement with the surface of the bore, an abutment integral with the shaft, and an annular member on the abutment overlying the peripheral surfaces of said other ends of the segments.

4. In a mounting for pump impellers, a rotary shaft having abutments thereon, a plurality of impellers on the shaft each having a bore, and sleeve segments interposed between adjacent abutments and extending at their ends into the bores of the adjacent impellers and having chords greater than the diameters of the bores in the impellers so as to place them under tension when inserted into the bores of the impellers.

5. In a mounting for pump impellers, a rotary shaft, an abutment on the shaft, an impeller on the shaft and having a bore to cooperate with the peripheral surface of the shaft to define an annular recess about the shaft, and a pair of sleeve segments abutting the abutment and extending at their ends into the annular recess, said segments having a thickness less than the width of said recess and a chord length greater than the diameter of the bore of the impeller.

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No references cited.