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S. H. WEAVER

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FASTENING DEVICE FOR PUMP IMPELLERS

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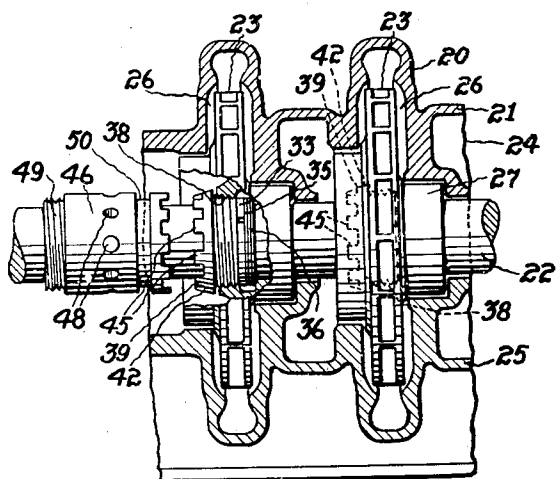


FIG-1.

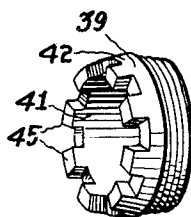


FIG-4.

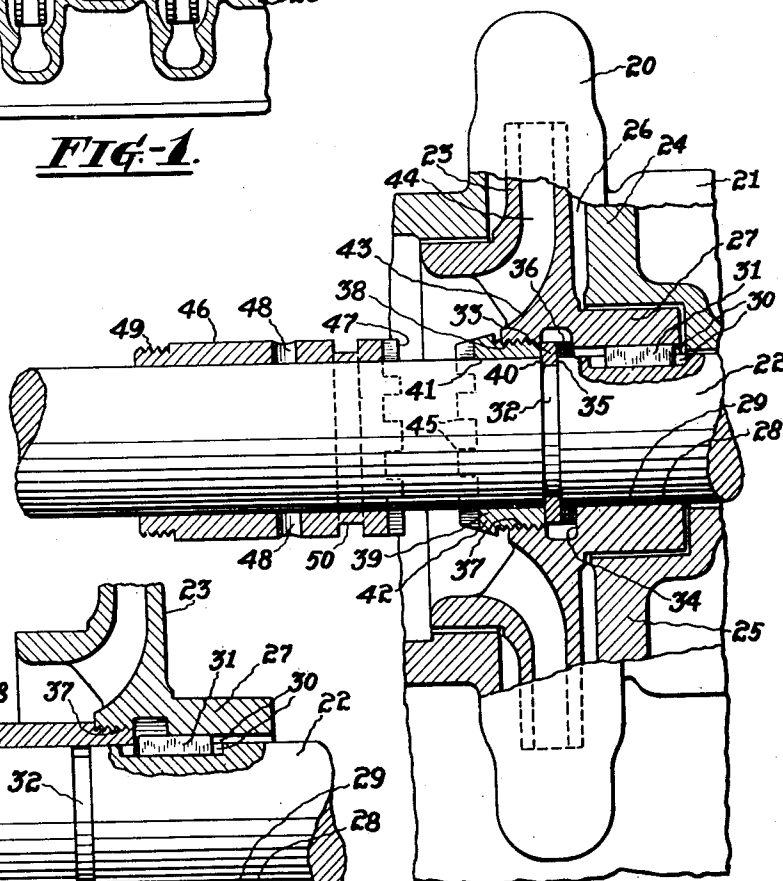


FIG-2.

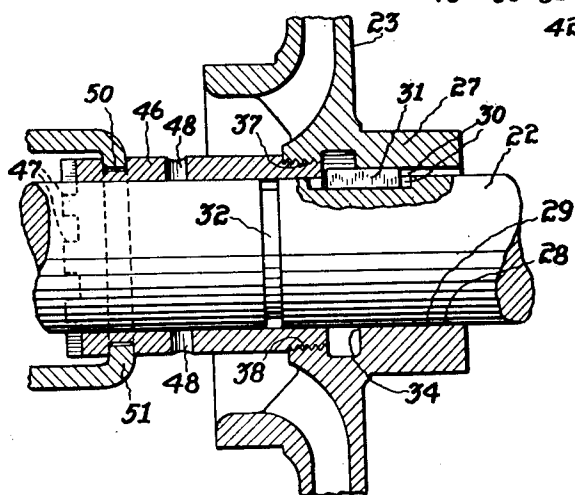


FIG-3.

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UNITED STATES PATENT OFFICE

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FASTENING DEVICE FOR PUMP IMPELLERS

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7 Claims. (Cl. 287-52)

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This invention relates to pumps, and more particularly to a device for securing an impeller to the shaft of a centrifugal pump.

One object of the invention is to facilitate the operation of placing a pump impeller in the correct assembled position on a shaft.

Another object is to reduce the cost of securing the impeller against movement axially of the shaft.

A further object is to enable the impellers to be conveniently adjusted axially of the shaft in order to assure the correct positioning thereof within the chambers containing them.

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

In the drawings accompanying this specification and in which similar reference numerals refer to similar parts,

Figure 1 is a longitudinal elevation, partly in section, of a portion of a centrifugal pump having the invention applied thereto.

Figure 2 is a view similar to Figure 1, somewhat enlarged, showing an impeller secured to the shaft in accordance with the practice of the invention.

Figure 3 is a view similar to Figure 2 illustrating the manner in which the impeller may be conveniently removed from the shaft, and

Figure 4 is a perspective view of a detail.

Referring more particularly to the drawings, 20 designates a portion of a centrifugal pump comprising a casing 21, a shaft 22 therein and impellers 23 on the shaft.

The casing 21 is of the horizontally split type comprising upper and lower sections 24 and 25 that may be secured together in any well known manner. The casing sections are suitably recessed interiorly to provide chambers 26 for the accommodation of the impellers and to provide the usual passages (not shown) for conveying liquid from one chamber to another.

In accordance with the practice of the invention, means are provided for securing the impeller 23 in the assembled position upon the shaft and also for conveniently adjusting the impeller axially of the shaft in order to position it correctly within the chamber containing it. To these ends the hub 27 of the impeller is provided with a bore 28 a portion 29 of which has a slide fit on the shaft. The hub 27 and the shaft have the usual slots 30 for the accommodation of a key 31 serving to hold the impeller and the shaft against relative rotary movement, and in the periphery of the shaft, adjacent an end of the key slot, is

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an annular groove 32 for the accommodation of a split ring 33.

The portion 29 of the bore extends only to the intermediate portion of the impeller and at its inner end is a shoulder 34 to seat either directly against a side 35 of the ring 33 or, as illustrated, against one of a group of liners 36 that may be interposed between the shoulder and the ring 33 whenever required to position the impeller correctly upon the shaft.

The opposite hand portion 37 of the bore 28 is of enlarged diameter and is provided with internal threads 38 for the accommodation of threads on the exterior of a sleeve 39 the inner end of which seats against the opposed side surface 40 of the ring 33 for clamping the impeller to the ring. The bore 41 of the sleeve 39 is also a slide fit on the shaft, and on the end of the sleeve lying exteriorly of the impeller hub is an annular enlargement 42 that is sloped to conform with the adjacent surfaces 43 of the waterways 44 in the impeller.

The end of the sleeve adjacent the enlargement 42 is slotted radially to define a series of teeth 45 for engagement with a tool whereby the sleeve 39 is turned into and out of its assembled position. A tool suitable for this purpose may, as shown, be in the form of a sleeve 46 adapted to encircle the shaft and has teeth 47 in one end for interlocking engagement with the teeth 45. In the intermediate portion of the sleeve 46 are apertures 48 to receive the end of a lever (not shown) whereby the sleeve may be rotated, and on the opposite end of the sleeve are external threads 49 which, upon reversal of the sleeve upon the shaft as illustrated more particularly in Figure 3, may be threaded into engagement with the threads in the impeller hub and thereby serve as a link between the impeller and mechanism commonly employed for pulling an impeller from the shaft. The sleeve is accordingly provided with an external annular groove 50 for engagement with a puller only the hooked portions 51 of which are shown.

The sleeve 46 is readily slidable and rotatable on the shaft 22 and will, of course, be removed from the shaft after the impellers are correctly secured in position.

In practice, whenever it is intended to place an impeller on the shaft the impeller is first moved to the vicinity of the annular groove 32, say to the right hand side thereof in Figure 2 of the drawings. The key 31 is then placed in the slot 30 in the shaft and next the impeller may be moved

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to the left to effect engagement of its slot 30 with the key. Thereafter a liner, or liners, is arranged about the shaft between the groove 32 and the shoulder 34 and the split ring is placed into the groove 32.

With the parts in these positions, the impeller is next moved toward the left to a position permitting inter-engagement of at least a few of the threads on the hub and the sleeve, and upon continued threading of the sleeve 39 into the hub and after its end surface engages the split ring the impeller is drawn leftward and securely clamped to the ring. This rotative movement of the sleeve 39 will, of course, be effected by means of the sleeve 46, as will also be the reverse movement required for disconnecting the impeller from the ring 33.

In Figure 2 of the drawings, four liners are shown interposed between the split ring and the shoulder 34. It will, however, be readily understood that the number has been selected merely for illustrative purposes and will vary with the degree of adjustment of the impeller axially of the shaft as necessitated by any misalignments of casing surfaces or deformities that may be caused in the pump casing during the casting thereof.

I claim:

1. A fastening device, comprising a shaft having an annular member thereon, an impeller having a bore to receive the shaft and the annular member, a shoulder within the bore, and means threadedly connected to the impeller seating against one side of the annular member for pressing the shoulder against the opposite side of said member upon rotation of the said means for securing the impeller against endwise movement with respect to the shaft.

2. A fastening device, comprising a shaft having an annular member thereon, an impeller having a bore to receive the shaft and the annular member, a shoulder within the bore to cooperate with one side of the annular member for preventing endwise movement of the impeller in one direction on the shaft, and a sleeve threaded into the bore acting against the opposed side of the annular member for preventing endwise movement of the impeller in the opposite direction.

3. A fastening device, comprising a shaft having an external annular groove, a split ring in the groove, an impeller having a bore to receive the shaft and the split ring, a shoulder in the intermediate portion of the bore to cooperate with one side of the split ring for preventing endwise movement of the impeller on the shaft in one direction, a sleeve threaded into the bore to cooperate with the opposed side of the split ring to hold the impeller against movement in an opposite direction relatively to the shaft, and means for preventing relative rotation between the shaft and the impeller.

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4. A fastening device, comprising a shaft, an annular member on the shaft, an impeller slidable axially of the shaft, one or more removable liners interposed between the annular member and the impeller for adjusting the impeller axially of the shaft, and means for clamping the impeller to the annular member.

5. A fastening device, comprising a shaft, an annular member thereon having opposed seating surfaces, an impeller having a bore to receive the shaft, a shoulder in the bore opposed to one seating surface, means interposed between the shoulder and said one seating surface whereby the impeller may be adjusted axially of the shaft, and adjustable means seating against the other seating surface for clamping the impeller to the annular member.

6. A fastening device, comprising a shaft, an annular member thereon having opposed seating surfaces, an impeller having a bore to receive the shaft, a shoulder in the bore opposed to a seating surface, one or more removable liners interposed between the shoulder and a seating surface for adjusting the impeller axially of the shaft, and adjustable means carried by the impeller seating against another seating surface for securing the impeller to the annular member.

7. A fastening device, comprising a shaft, an annular member thereon, an impeller on the shaft, a shoulder on the impeller opposed to a side surface of the annular member, one or more removable liners interposed between the annular member and the shoulder for adjusting the impeller axially of the shaft, and a sleeve threadedly connected to the impeller and acting against the annular member for securing the impeller to the said annular member.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
50,190	Watson	Sept. 26, 1865
459,909	Hogan	Sept. 22, 1891
1,779,204	Andersen	Oct. 21, 1930
1,803,136	Schulze	Apr. 23, 1931
1,822,945	Weis	Sept. 15, 1931
1,871,092	Smith	Aug. 9, 1932
1,938,402	Renner et al.	Dec. 5, 1933
2,210,811	Kelpsch	Aug. 6, 1940
2,378,974	Bower	June 26, 1945

FOREIGN PATENTS

Number	Country	Date
662,270	France	Mar. 18, 1929
317,469	Great Britain	July 11, 1929