May 16, 1933. J. S. COFFIN, JR 1,909,095

CENTRIFUGAL PUMP

Filed Jan. 21, 1930

Fig. 1.

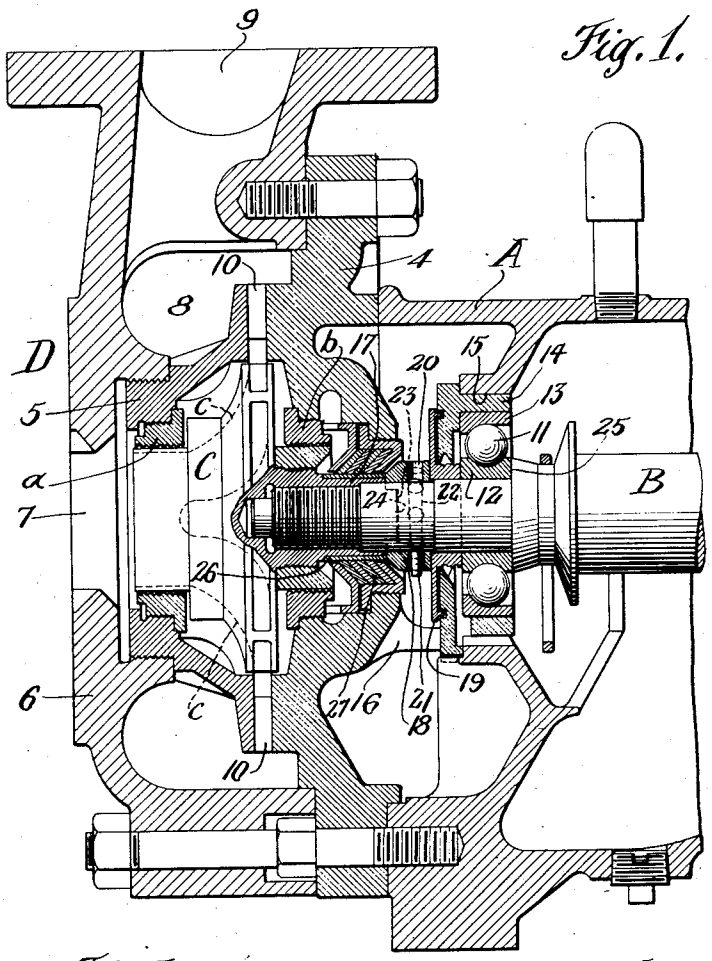


Fig. 3.

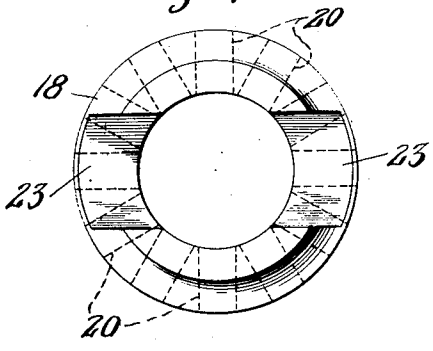
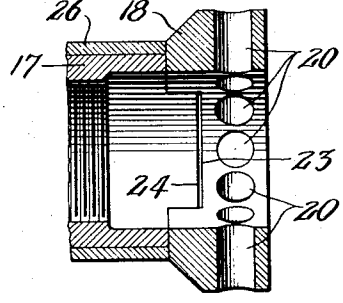


Fig. 2.



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CENTRIFUGAL PUMP

Application filed January 21, 1930. Serial No. 422,269.

This invention relates to improvements in centrifugal pumps and has particular reference to impeller mountings and assemblies for high-speed centrifugal pumps of the type employing axial-entrance, peripheral-discharge impellers.

One of the primary objects of my invention is the provision of a simple, and effective impeller assembly for such pumps.

Another object of the invention is to provide an impeller assembly having its parts arranged for ready accessibility.

A further object resides in the provision of improved means for securely locking high-speed impellers to their shafts.

Still another object is to provide an improved locking member for impeller assemblies.

A further object is to provide an impeller assembly having means, separable in its entirety from the impeller, for locking or keying the impeller to its shaft.

A still further object resides in the provision of an impeller assembly for centrifugal pumps including a novel arrangement of such elements as bearings, sealing means, packing means and other essential parts directly associated with the impeller.

How the foregoing, together with such other objects and advantages as may hereinafter appear, or are incident to my invention, are realized, is illustrated in preferred form in the accompanying drawing, wherein—

Fig. 1 is a fragmentary section through a pump embodying my invention.

Fig. 2 is an enlarged section through a portion of the impeller illustrating an important detail of my invention in association therewith; and

Fig. 3 is a face view of the detail illustrated in Fig. 2 with the impeller portion omitted.

The pump illustrated comprises in general a bearing housing A, a drive shaft B, a pump runner or impeller C carried at the end of the drive shaft, and pump casing structure D. The casing structure comprises a plate-like member 4, an inner casing member 5, and an outer casing member 6 adapted to be detachably secured together. The casing has an axial inlet 7 for the fluid to be pumped, a delivery chamber or bowl 8 and a discharge outlet 9.

The impeller C is of the axial-inlet, peripheral-discharge type and has a plurality of water passages *c*.

A plurality of diffuser passages 10 are provided in the pump casing in surrounding relation to the impeller C through which fluid discharged by the impeller passes to the outer fluid chamber or bowl 8.

An anti-friction bearing 11 is provided for the drive shaft, the inner race 12 of which is carried by the shaft and the outer race 13 by a cage or retainer 14 fitting a bore 15 in the casing. The bearing cage 14 is held in place by means of lugs 16 on the casing member 4. Suitable wearing ring devices *a* and *b* are provided at each side of the impeller.

Referring now more particularly to the impeller assembly, it will be seen that the impeller C is provided with an internally threaded hub 17, and the drive shaft B with an externally threaded end portion whereby the impeller may be screw-threaded onto the shaft. A collar or nut-like member 18, preferably of hardened steel is mounted on the shaft next to the hub 17 and a sealing member or oil deflector 19 is mounted between the collar 18 and the inner race 12 of the bearing 11.

The collar 18 is provided with a plurality of radial holes 20 for the reception of a tapered dowel 21 which fits a taper bore 22 in the shaft B, and recesses 23 are provided in the end face of the collar 18 which is toward the impeller hub. Jaws 24 are provided on the impeller hub 17 for engagement with the recesses 23 of the collar.

The impeller may be secured on the shaft by screwing it onto the shaft until the jaws 24 engage the recesses 23 of the collar and then applying a spanner wrench to the holes 20 in the collar, it being obvious that when the wrench is turned the impeller will screw along the shaft and press the nut, the member 19 and the inner race 12 of the bearing

firmly against each other and against a shoulder 25 provided on the drive shaft.

Through the employment of a nut-like member or collar 18 which is separable from the impeller I am not only enabled to make it of hard material, but inasmuch as a great number of holes are needed to secure proper registry with the hole in the shaft for the taper pin, I am also enabled to make this member of much more liberal proportions than the hub of the impeller. It is obvious that if the end portion of the impeller hub were made larger in an attempt to gain the above advantages, the impeller could not be withdrawn.

Furthermore, it should be noted that in the event the impeller pin should be sheared, due, for example, to sudden torque caused by failure of bearings, the impeller would not be harmed by the shearing of the locking pin, while in cases where the pin goes through the impeller hub, such a failure would in all probability mean that the impeller would have to be replaced.

Another advantage of employing the separable collar 18 resides in the fact that I am enabled to employ a renewable sleeve 26 on the hub 17 where the packing device 27 operates. Thus when wear of the sleeve 26 takes place, it may be renewed without the necessity of drilling a great many holes for the impeller locking pin.

From the foregoing, it will be seen that driving forces are transmitted from the drive shaft to the impeller through the threads and through the shoulder 25 and members 12, 19 and 18, instead of merely through the taper pin, as is the case in impeller assemblies in which the taper pin engages the hub of the impeller. In my improved construction the pin 21 is more in the nature of a locating and additional locking means than a driving medium.

It is also pointed out that if it is more convenient in assembling to turn the impeller itself, rather than turn the collar or nut-like member 18, this may be done by gripping the impeller and screwing it onto the shaft, in which case the collar 18 performs the function merely of a locking device.

I claim:—

1. In a centrifugal pump, a shaft, bearing means for the shaft, an impeller threaded to said shaft, a collar on the shaft interposed between the impeller and the bearing means, and interengaging means on the collar and impeller providing a connection enabling turning of the impeller by the collar.

2. In a centrifugal pump, a shaft, bearing means for the shaft, an impeller threaded to said shaft, a collar on the shaft interposed between the impeller and the bearing means, and spline means connecting the collar to the impeller whereby the impeller may be screwed up on the shaft by rotating the collar.

3. In a centrifugal pump, a shaft, bearing means for the shaft, an impeller threaded to said shaft, a collar on the shaft interposed between the impeller and the bearing means, and interengaging means on the collar and impeller, said collar being adapted to lock the impeller in position.

4. In a centrifugal pump, a shaft, bearing means therefor, an impeller threaded to said shaft, a collar interposed between said impeller and said bearing means, said collar engaging with said impeller and forming a means whereby said impeller may be screwed into position.

In testimony whereof I have hereunto signed my name.

JOEL S. COFFIN, JR.