

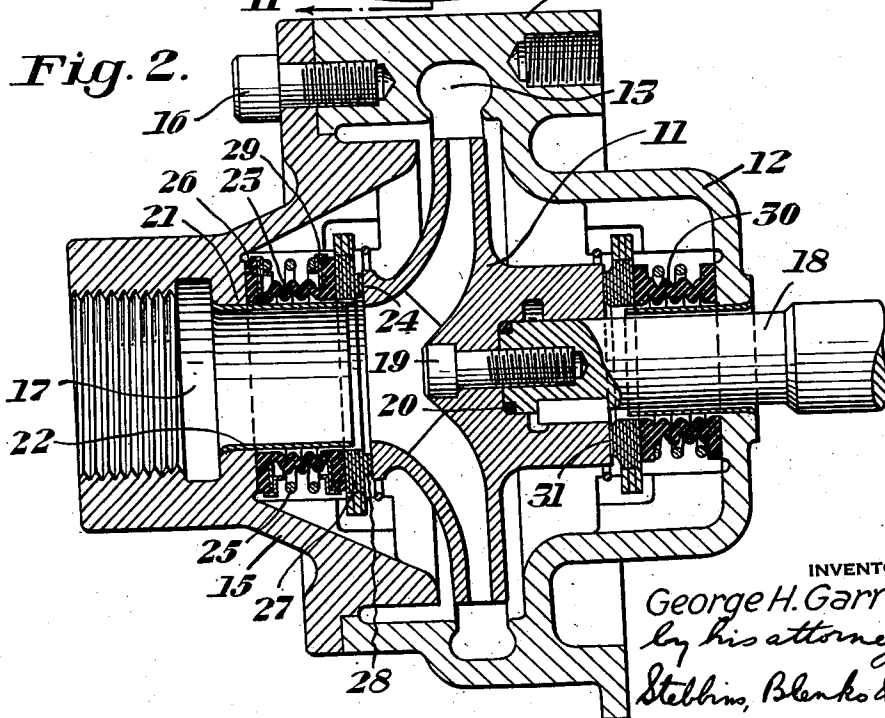
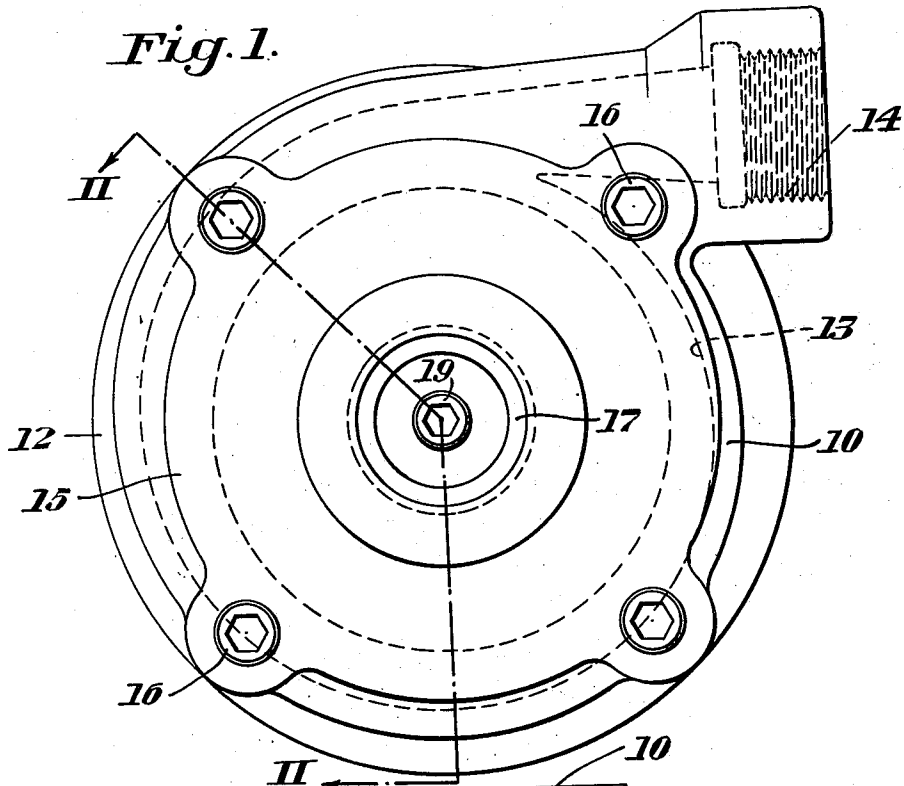
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CENTRIFUGAL PUMP

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CENTRIFUGAL PUMP

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1 Claim. (Cl. 103—103)

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This invention relates to centrifugal pumps and, in particular, to pumps having but a limited capacity.

Centrifugal pumps as heretofore constructed have been characterized by leakage from the discharge side of the impeller to the suction side through the necessary running clearance between the impeller and pump housing. In pumps of large size, the amount of this leakage is but a small fraction of the total output of the pump so that it does not materially reduce the efficiency of the pump. In small pumps the leakage loss may be a substantial proportion of the total liquid delivered so that the efficiency of the pump is materially lower than it would be without such loss.

I have invented a centrifugal pump particularly adapted for use in the smaller sizes, having means for sealing the running clearance between the impeller and pump housing against leakage therethrough from the discharge side to the suction side. The sealing means preferably has the form of an extensible sleeve surrounding the inlet to the impeller. The sleeve is fixed relative to the housing and has a bearing surface adapted for sliding engagement with a cooperative surface on the impeller.

Further novel features and advantages of the invention will become apparent during the following detailed description and explanation which refer to the accompanying drawing illustrating the preferred embodiment. In the drawing,

Figure 1 is an end elevation looking toward the pump inlet; and

Figure 2 is a section through the pump housing and impeller taken along the plane of line II—II of Figure 1.

Referring in detail to the drawing, the pump of my invention comprises a housing 10 enclosing an impeller 11. The housing comprises a cylindrical member 12 open at one end having the usual volute 13 leading to an outlet 14, and a closure 15. The closure is secured to the open end of the cylindrical member 12 by screws 16 and has an axial inlet 17.

The impeller is secured to a shaft 18 extending through a hole in the closed end of the housing, by a screw 19 and is also keyed thereon, the impeller being bored to receive the end of the shaft. Pumps of the type to which the invention relates are usually employed as auxiliaries and are frequently mounted directly on the equipment which they serve, such as an internal-combustion engine, and are driven by a shaft projecting from

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the latter. The shaft 18 is typical of such drive and is journaled in suitable bearings (not shown) in the main apparatus, such as an engine. A rubber sealing ring 20 is positioned in an annular seat on the extreme end of the shaft.

An internal shoulder or neck 21 is formed in the closure 15 and an inlet or suction sleeve 22 is seated thereon. The sleeve or tube extends inwardly toward the impeller 11 and terminates a short distance therefrom. An extensible sealing sleeve 23 is disposed around the sleeve 22 and extends from the shoulder 21 to an end face 24 machined on the impeller around the central eye or inlet thereof. The sleeve 23 comprises a flanged, corrugated rubber tube having a compression spring 25 normally tending to lengthen it. The outer flange 26 bears on the shoulder 21. The inner flange has a sealing ring 27 of suitable material secured thereto. The ring 27 has a shoulder 28 adapted to slide on the surface 24 of the impeller as the latter turns. The tube 23 fits loosely on the suction sleeve 22 and its inner end is positioned thereby generally with respect to the surface 24. The spring 25 bears on metal sheathing rings 29 disposed against the flanges of the rubber tube. The friction between the outer flange 26 and the shoulder 21 prevents rotation of the sleeve. The shoulder 28 of the sealing ring 27 and the sealing surface 24 around the impeller eye may be finished to such precision that leakage from the volute 13 around the impeller and back into the inlet is practically precluded. There will naturally be some wear of the rubbing surfaces of the seal and impeller but this will be slight since continuous lubrication is provided by the liquid handled by the pump. The compression spring 25, furthermore, causes the rubber tube to elongate as required to take up any wear of the rubbing surfaces which may occur. The corrugations in the tube permit longitudinal extension thereof.

A sealing sleeve 30 generally similar to the sleeve 23 bears against the cylindrical member 12 of the housing adjacent the opening which receives the shaft 18 and against a surface 31 on the side of the impeller opposite the inlet. The sealing sleeve 30, of course, prevents leakage from the housing through the shaft opening.

It will be apparent from the foregoing, that my invention provides a pump suited for construction in smaller sizes, in which the loss of efficiency by leakage through the clearance between the impeller and pump housing is reduced to a negligible amount, if not entirely eliminated. The efficiency of the pump is thus materially in-

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creased and, in fact, may even be doubled as compared to pumps of smaller sizes previously known. The addition of the sealing sleeve represents but a trifling increase in the cost of the pump. What is more important, it does not introduce any maintenance problem since the sleeve exhibits but little wear even after long service and can easily be replaced if desired.

Although I have illustrated and described but a preferred embodiment of my invention, it will be recognized that changes in the details of construction shown may be made without departing from the spirit of the invention or the scope of the appended claim.

I claim:

In a centrifugal pump, a housing open at one end, a shaft extending into the other end of the housing, a closure for said open end of the hous-

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ing having an inlet coaxial with said shaft, an impeller on said shaft having a central inlet at the end nearer said closure, a sealing surface on the impeller normal to the axis thereof and extending around said impeller inlet, a metal suction sleeve extending from said housing inlet toward said impeller inlet and terminating adjacent the latter, a telescoping tube of rubber like material fitting on said suction sleeve, extending therealong from the closure to the impeller and making sealing engagement with both of them at its ends, respectively, said suction sleeve serving to position the inner end of the tube generally with respect to said sealing surface, and a wearing ring on the end of the tube having sliding engagement with said surface.

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