Feb. 13, 1962 J. W. MECKENSTOCK 3,020,850

DREDGE PUMP SEAL

Filed Feb. 27, 1958

Fig. 1.

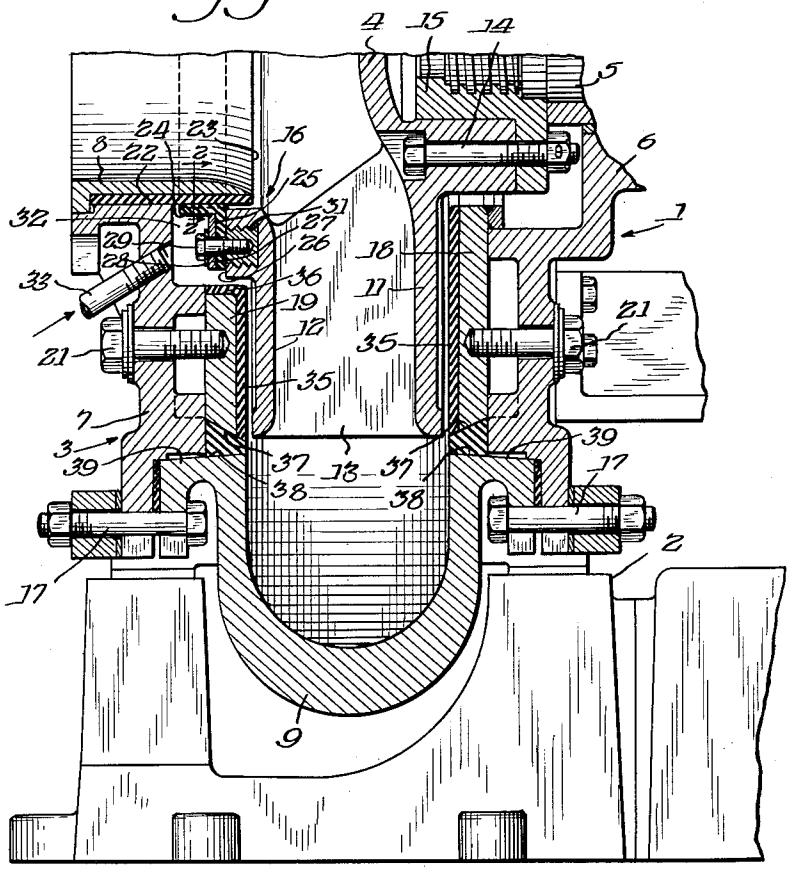


Fig. 2.

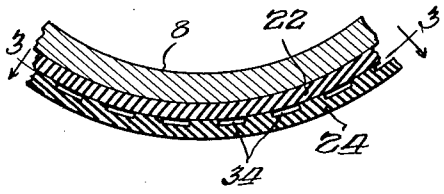


Fig. 3.

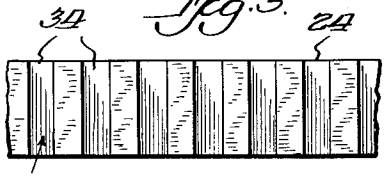
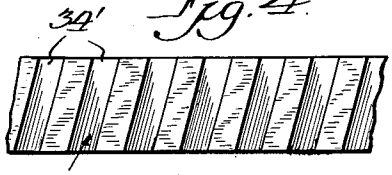


Fig. 4.



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DREDGE PUMP SEAL

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The invention relates generally to dredge pumps and the like, and more particularly to a novel arrangement for eliminating wear on certain elements thereof. In centrifugal pumps handling solids, as for example dredge pumps, the solid material carried by the fluid often has an abrasive wearing effect, resulting in considerable wear on certain portions of the pump, particularly around the suction intake throat and portions adjacent the impeller. While means for operatively sealing the juncture of the impeller and suction throat of the pump have been employed, such means in the past have not proved effective and have in themselves been subject to excessive wear. The present invention therefore has among its objects the production of a novel structure for materially reducing wear at the points mentioned, resulting in a pump structure having exceptionally long life and requiring a minimum amount of maintenance.

Another object of the invention is the production of such a structure wherein a lubricating fluid, as for example, water, may be provided to lubricate the elements of the seal.

A further object of the invention is the production of such a sealing structure which may utilize two semi-resilient surfaces and at the same time reduce wear thereon to a minimum.

A further object of the invention is the production of a novel liner structure which will provide an effective seal between the liner members and the pump shell, and at the same time substantially eliminate wear on the liner members.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts:

FIG. 1 is a radial sectional view through a pump structure embodying the present invention;

FIG. 2 is a sectional view taken approximately on the line 2—2 of FIG. 1;

FIG. 3 is a sectional view taken approximately on the line 3—3 of FIG. 2; and

FIG. 4 is a figure similar to FIG. 3, illustrating a modified form of construction.

Referring to the drawings and more particularly to FIG. 1, the reference numeral 1 indicates generally a pump structure, illustrated as being supported on a suitable base 2, and comprising a hollow casing or housing 3 having an impeller 4 rotatably mounted therein on a driving shaft 5. The casing 3 includes a pair of spaced generally annular shaped side plates 6 and 7, with the shaft 5 extending through the plate 6 and adapted to be connected to a suitable source of power. Likewise, the side plate 7 is provided with a central fluid inlet opening therein which is defined by a tubular suction throat liner 8. The spaced side plates 6 and 7 are operatively connected adjacent their outer edges by an annular peripheral shell indicated generally by the numeral 9.

The impeller 4 generally includes a pair of spaced side wall 11 and 12 connected by a plurality of generally radially extending webs or blades 13, the side plate 11

being suitably connected by bolts 14 or other means to a hub 15 or the like carried by the shaft 5, whereby the impeller is rotatable therewith. The opposite side wall 12 is provided with a central suction inlet opening 16 therein adjacent the inner end of the suction throat liner 8.

The structure thus far described is generally similar to previous pump structures of the type here involved, wherein fluid enters the impeller structure adjacent the axis thereof and by the action of centrifugal force is urged to the periphery of the impeller into the chamber formed by the shell 9 from which it is discharged through a generally tangentially arranged outlet.

In the embodiment of the invention illustrated, the shell 9 and side plates 6 and 7 are connected together by a plurality of bolts 17 in a manner similar to that employed in previous pumps of this type, and positioned adjacent the side walls 11 and 12 of the impeller are liner members 18 and 19 secured to the side plates 6 and 7 by bolts 21 or other suitable means.

The suction throat liner 8, as illustrated, is provided with an outer peripheral covering 22 of semi-resilient material such as natural or synthetic rubber, or suitable semi-resilient plastics, the covering 22 extending to the inner end 23 of the liner and cooperable with a concentrically arranged tubular member 24, also formed of suitable semi-resilient material, carried by and rotatable with the impeller 13. In the embodiment of the invention illustrated, the member 24 is secured to the impeller by means of an annular shaped flange ring 25 extending radially outward from the member 24 and adapted to be clamped between the adjacent face 26 of the impeller and the opposing face 27 of a ring 28, the entire assembly being held in position by a plurality of bolts 29 extending through the ring 28 and flange 25 into the impeller structure, the latter in the present instance being provided with an insert 31 into which the bolt 29 is threaded.

The side plate 7 is suitably formed to provide an annular shaped chamber 32 adjacent the member 24 and the covering 22 of the liner 8, which is adapted to be connected to a suitable supply of fluid, normally water, under pressure by means of an inlet pipe 33 or the like, whereby fluid may enter under suitable pressure and pass between the covering 22 and the tubular member 24, as well as between the side wall 12 and adjacent face of the liner 19. To facilitate the passage of liquid between the members 22 and 24, suitable passageways may be provided in either the member 22, the member 24, or both. In the embodiment illustrated in FIGS. 1, 2 and 3, the tubular member 24 is provided with a plurality of grooves 34 which are illustrated as extending longitudinallly in parallel arrangement with respect to the axis of the member 24, the grooves being illustrated as being more or less rectangular in cross section.

It will be appreciated that as fluid, such as water, may be passed between the opposing surfaces of the member 22 and 24, during operation of the pump, foreign matter, such as that contained in the fluid being pumped, will not pass between such surfaces, as might otherwise be the case, with a resulting scoring or other injury to the seal, and at the same time adequate lubrication by the fluid passing between such surfaces results, so that wear on such members is materially reduced.

The liners 18 and 19 likewise may be provided with novel means for preventing wear thereon as well as providing a very efficient seal between the liner and the shell 9. As illustrated, each of the liners 18 and 19 is provided along its inner face adjacent the impeller 13 with a covering 35 of suitable material such as rubber, plastic, etc., the coating of the liner 19 extending around the inner edge 36 thereof. The outer peripheral edge of each liner is beveled as indicated at 37 and formed with the cover-

ing 35, adjacent the edges 37 are ring shaped gasket members 38, the latter and the covering 35 being suitably molded or otherwise applied to the liners. As illustrated in FIG. 1, the inner annular shaped edges 39 of the shell 9 taper or flare outwardly and the adjacent edge or face of the gaskets 38 are formed complementally thereto, whereby the gasket structure when assembled with the shell 9 and side plates 6 and 7 will be compressed by the action resulting from the wedge shape of the gasket and associated parts to form a very effective seal.

While I have illustrated the grooves 34 as extending substantially parallel to the axis of the member 24 and of generally rectangular cross section, obviously the shape and direction of the slots or grooves may be varied, FIG. 4 illustrating grooves 34' which extend diagonally, and in like manner the grooves may be curved instead of being substantially straight, and also may be semi-circular or of other shape in cross section.

It will be particularly noted that while I have provided a structure which may use relatively soft, semi-resilient material in the sealing structure, the throat seal utilizing cooperable members both of which may be formed from semi-resilient material, excessive wear, which might otherwise result, is eliminated by the provision of adequate lubrication thereof. It will also be noted that while I have provided a very efficient, durable structure, the latter is, at the same time, quite simple and may be readily and simply produced at comparatively low cost.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting ourselves to the exact form, construction, arrangement and combination of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. In a pump structure, the combination of a pump casing comprising a pair of spaced side plates and an annular peripheral shell extending between and connecting said side plates, a hollow impeller having spaced sidewalls connected by radially extending blades, positioned within said casing and carried by a driving shaft extending through one of the side plates, the opposite side plate having a central suction fluid inlet therein, cooperable with a suction inlet in said impeller, a tubular member forming a liner for the suction throat of the casing, the outer peripheral surface of which adjacent the suction inlet of the impeller is provided with a covering of a semi-resilient material, an annular shaped member carried by said impeller having a tubular portion of semi-resilient material concentric with the covering on said throat liner, said casing having an annular shaped chamber therein adjacent said tubular portion, said casing having a fluid inlet communicating with said chamber whereby fluid may flow between and lubricate portions of opposed faces of said resilient covering and resilient portion, and respective annular shaped liner structures carried by said side plates, the inner faces of said liners being covered with semi-resilient material, the outer peripheral edges of said liner members being beveled and provided with resilient wedge shaped gasket rings associated with said covering, said shell having tapered annular surfaces engageable with the outer peripheral surfaces of the respective gasket rings operable to compress the latter between such surfaces and the peripheral edges of the associated liners.

2. In a pump structure, the combination of a pump casing comprising a pair of spaced side plates and an annular peripheral shell extending between and connecting said side plates, a hollow impeller rotatably mounted within said casing, the latter having a central suction fluid inlet therein, and respective annular shaped liner structures carried by said side plates, the inner faces of said liners being covered with semi-resilient material, the outer peripheral edges of said side plates being beveled and provided with resilient wedge-shaped gasket rings associated with said covering, said shell having tapered annular surfaces engageable with the outer peripheral surfaces of the respective gasket rings operable to compress the latter between such surfaces and the peripheral edges of the associated liners.

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