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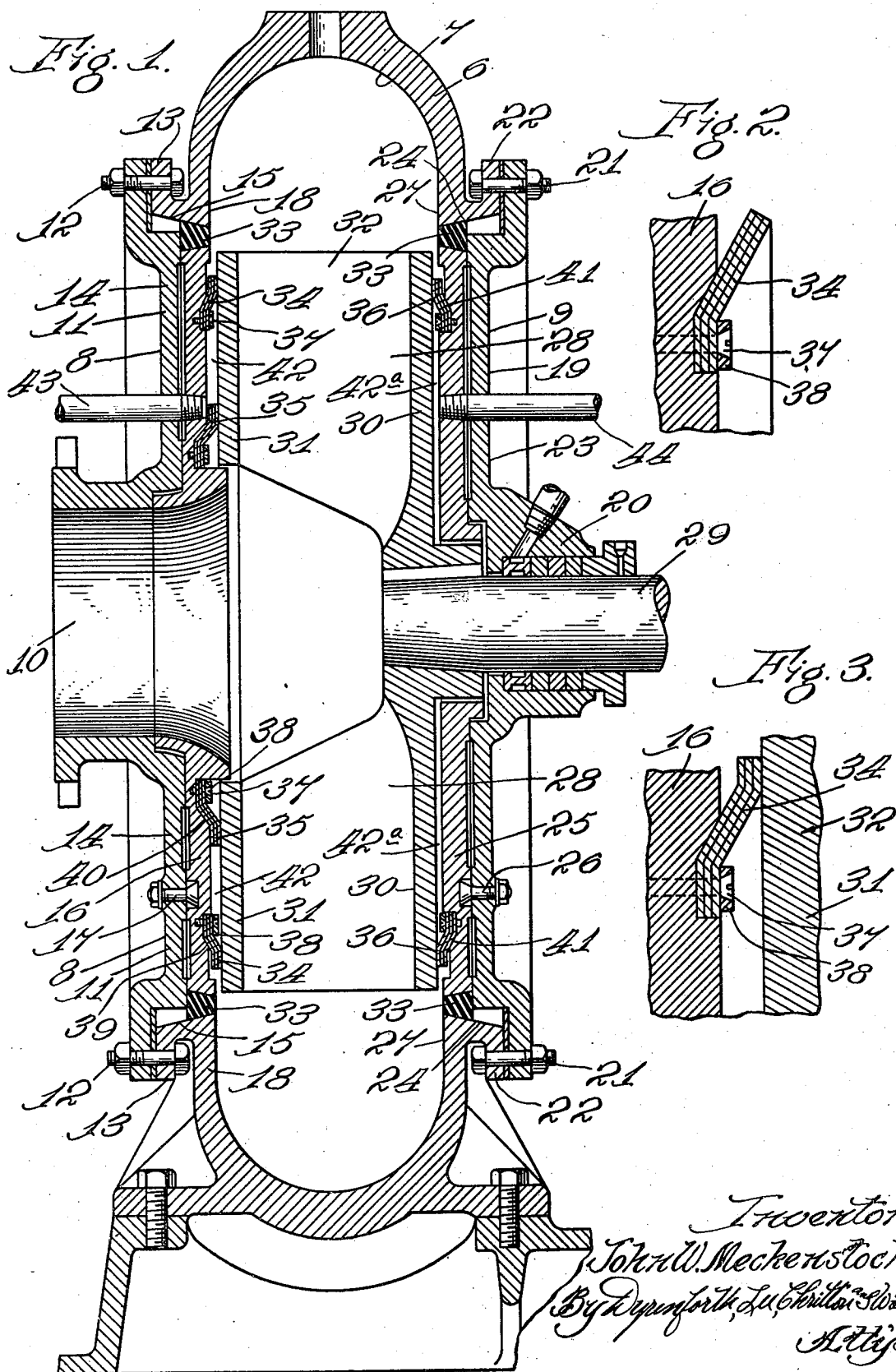
J. W. MECKENSTOCK

2,013,499

SEALING MEANS

Filed Aug. 29, 1932

2 Sheets-Sheet 1



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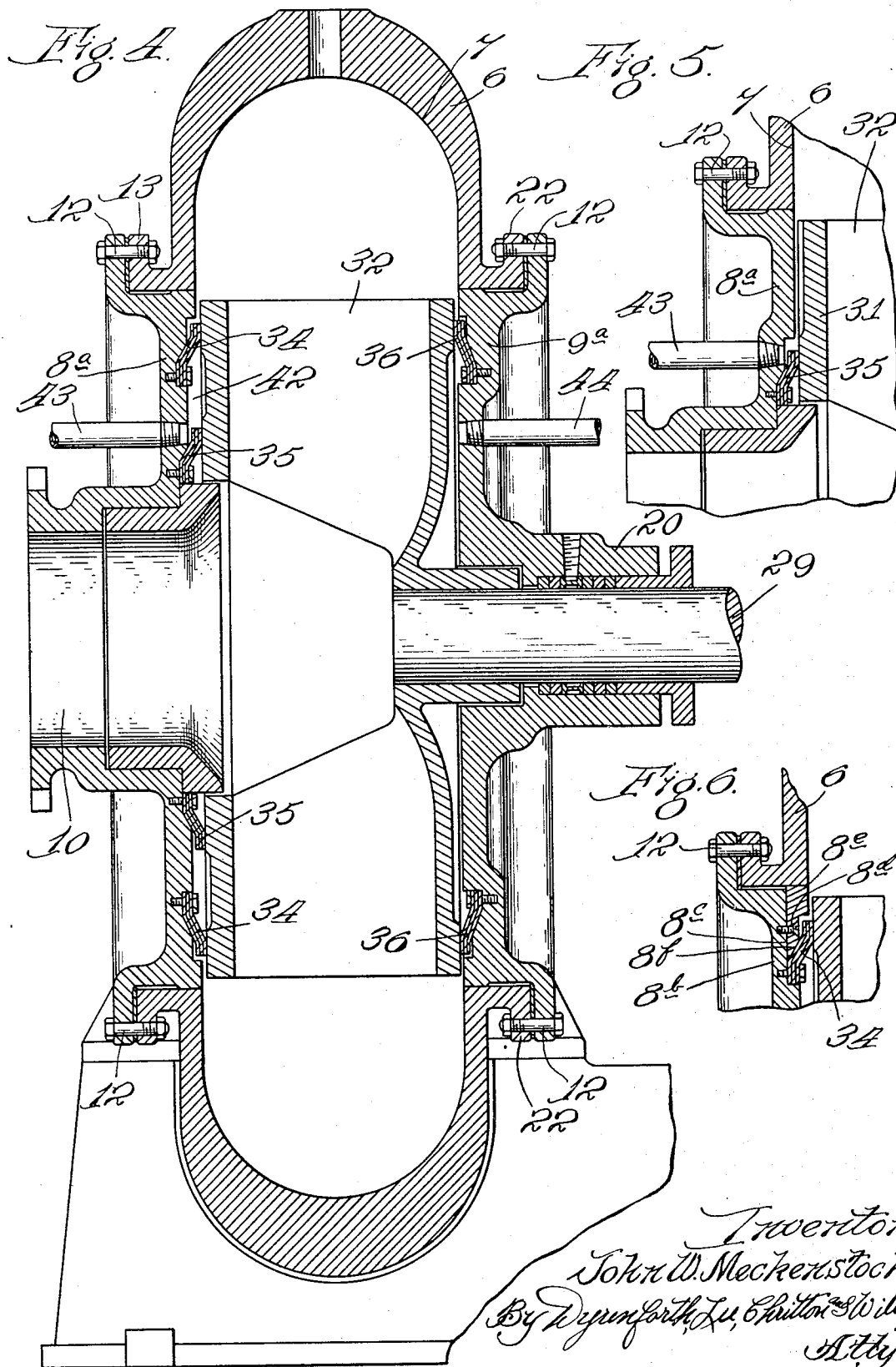
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UNITED STATES PATENT OFFICE

2,013,499

SEALING MEANS

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Application August 29, 1932, Serial No. 630,951

2 Claims. (Cl. 286—7)

My invention relates generally to sealing means and more especially to means for effecting seals between the sides of the impeller and the adjacent side-walls of the casing of a suction-pump, as for example, and particularly, for pumping solids, such as sand or gravel, in suspension in a liquid.

One of my objects is to provide a novel, simple and inexpensive construction of sealing means which as it wears away in use will be automatically adjustable to maintain an effective seal and therefore be self-compensating.

Another object is to provide sealing means of such construction that the pressure of the fluid against it, in use, serves to force the sealing means into tight engagement with the structure at which the seal is to be effected.

Another object is to provide sealing means in a suction-pump so constructed that flushing water for washing the sand and grit from the joints between the impeller sides and the adjacent side-walls of the casing may be employed to the best advantage and without loss thereof; and other objects as will be manifest from the following description.

Referring to the accompanying drawings:

Figure 1 is a view in vertical sectional elevation of a suction-pump for pumping sand or gravel and embodying my invention.

Figure 2 is a fragmentary sectional view illustrating one of the similar sealing constructions of Fig. 1, the seal being shown connected with the adjacent side-wall of the pump-casing, but dissociated from the impeller with which it cooperates.

Figure 3 is a similar view showing the way the seal deforms when associated with the impeller.

Figure 4 is a view like Fig. 1 of a different construction of pump also embodying my invention.

Figure 5 is a fragmentary sectional view of still another modification embodying my invention; and

Figure 6, a fragmentary view of still another modification embodying my invention.

Referring to the construction of pump shown in Figs. 1, 2 and 3, the casing of this pump comprises an annular, peripheral, section 6 provided about its inner periphery with a channel 7 opening toward the center of the section.

The casing also comprises end, or side, forming sections 8 and 9, the section 8 having a central suction opening 10 therethrough and comprising a main disk-like member 11 secured at its circumferential portion, by bolts 12, to an annular external flange 13 on the section 6, the member

11 having an inwardly offset portion 14 at which it extends into the opening 15 in the adjacent side of the section 6. The section 8 also comprises a disk-like liner member 16 secured to the inner face of the member 11 by bolts 17, the inner face of the liner 16 being substantially flush with the adjacent inner, annular, surface 18 of the section 6.

The section 9 is formed of a main disk-like member 19 which has a centralized tubular portion 20 and is secured at its circumferential portion by bolts 21 to an annular, external, flange 22 on the section 6, the member 19 having an inwardly offset central portion 23 at which it extends into the opening 24 in the adjacent side of the section 6. The section 9 also comprises a disk-like liner member 25 secured to the inner face of the member 19 by bolts 26, the inner face of the liner member 25 being substantially flush with the adjacent inner surface 27 of the section 6.

The pump also comprises an impeller 28 located in the casing and secured to an end of a shaft 29 journaled in the tubular portion 20 of the casing-section 9 and driven by any suitable means.

The impeller in accordance with common practice, comprises a pair of parallel, spaced-apart, ring-like portions 30 and 31 secured together by a series of crosswise extending web-portions 32 which are curved in cross section and extend at their inner ends short of the axis about which the impeller rotates, the portions 30 and 31 and webs 32 being preferably cast as a one-piece structure, the webs 32 constituting the vanes of the impeller.

The casing of the particular construction shown also includes means for sealing the annular joints between the section 6 and the side members 8 and 9, at the surfaces 15 and 16, respectively, these means which are of the same character as the sealing means forming the subject of the application of Oscar W. Andersen for U. S. Patent Serial No. 485,984, filed October 2, 1930, comprising rings 33, as for example of rubber, and of wedge-shape in cross-section held in place by the liner members 16 and 25.

It may here be stated that in accordance with common practice the impeller operates to exert suction at the opening 10 which latter, in practice, would be connected with a pipe (not shown) the inlet end of which would be submerged in the material to be acted on by the pump, the material thus drawn into the pump casing being driven by the blades of the impeller against the inner pe-

ripheral portion of the casing along which the material travels to the outlet of the pump.

As will be understood, negative pressure existing at the inlet of the pump and a positive pressure being created by the impeller a portion of the fluid pressure will flow from the high pressure side to the inlet, low, pressure side unless prevented and thus result in decreased effectiveness of the pump. Furthermore, grit, such as sand, being pumped will be carried into the spaces between the impeller and the side walls and especially the side wall at the inlet side of the casing, and thus subject the parts to undue and objectionable wear.

It is thus desirable to seal the spaces between the impeller and the side walls of the casing and this is one of the purposes of the present invention, the means shown for this purpose comprising inner and outer spaced-apart sealing rings 34 and 35 carried by the casing-wall 8 and a sealing ring 36 carried by the casing-wall 9, these several rings being shown as disposed concentrically about the central longitudinal axis of the pump.

Each sealing ring is formed of resilient elastic material, such as soft rubber, the rings being formed either of a single ring section or, as shown, of a plurality of flatwise opposed ring sections of material of the character above stated.

The ring 34, shown as associated with the liner member 16, is secured at its inner annular marginal edge to the liner 16 as by screws 37 extending through a ring 38 which bears against the ring 34 and also through this ring and screwed into the liner member 16, the latter having an annular bevel-surface 39, forming an abutment surface, inwardly offset from the portion of the liner member 16 at which the ring 34 is secured whereby the free annular portion of the ring 34 beyond the attaching screws 37 is deflected inwardly toward the disk portion 31 of the impeller as shown, the width of the ring 34 being such that its extreme outer annular marginal edge portion, in the assembled position of the parts, is deflected in an outward direction into a condition in which it flatwise engages the ring-portion 30 of the impeller. Figure 2 illustrates the inward deflecting of the outer marginal edge portion of the ring 34 in the applying of the ring to the liner member 16, and Fig. 3 illustrates the position assumed by the terminal annular marginal edge portion of the ring 34 when the side plate 8 is applied to position relative to the impeller.

The ring 35 likewise is secured to the liner member 16 as explained of the ring 34 and co-operates with an annular bevel surface on the liner member 16 and represented at 40, as explained of the ring 34, causing the outer annular marginal edge portion of the ring 35 to be deflected inwardly and lap the ring portion 31 of the impeller, as shown.

The ring 36 is shown as secured to the liner member 25 as explained of the ring 34 and co-operates with a bevel surface 41 on liner member 25 for the purpose as explained in connection with ring 34.

As will be noted, the sealing rings, by reason of the deformation of their free marginal edges into flatwise engagement with the adjacent ring-like side portions of the impeller and against their tendency to return to the condition shown in Fig. 2, are rendered self-adjusting so to speak, not only in the initial assembling of the parts, but also as the outer marginal edges of the rings wear away in use, thereby maintaining sealing engage-

ment between the impeller and the side walls 8 and 9 of the casing.

Furthermore where the sealing rings are secured in position at their inner marginal edge portions leaving their outer marginal edge portions free to deform, the sealing function thereof is augmented by reason of the pressure of the fluid at the high pressure side of the pump exerted against these outer marginal edge portions tending to force them into close contact with the ring portions of the impeller.

There being a tendency for the grit to enter the spaces between the side plates 8 and 9 and the ring portion 31 of the impeller due to the differential fluid-pressures as above referred to, I have illustrated in this particular construction means which may be employed to flush from the space represented at 42 between the sealing rings 34 and 35 and the space 42^a bounded by the ring 36, any grit which may pass the rings 34 and 36, these means involving the supplying of water, or other suitable fluid, to the spaces 42 and 42^a as through the pipes represented at 43 and 44, respectively, and which would be connected to any suitable source of the fluid under pressure, the fluid being supplied thereto either continuously or intermittently.

In the continuous supplying of the fluid to the spaces 42 and 42^a and at a pressure sufficient to unseat the outer sealing ring 34 and the ring 36, these rings yield only sufficient to permit the flushing fluid to pass between them and the impeller, the flushing fluid thus preventing the flow of grit into the spaces 42 and 42^a and by reason of the high velocity of the fluid produced by the flow thereof through the constricted spaces between the rings 34 and 36 and the impeller effectively preventing the grit from acting on the side plates 8 and 9 and ring portions 30 and 31 outwardly beyond the sealing rings 34 and 36. In the case of the fluid introduced into the space 42 the fluid pressure therein, as will be noted, serves to exert pressure against the outer marginal edge of the sealing ring 35 aiding in the maintenance of a sealed joint between the side plate 8 and the ring portion 31.

In the intermittent supplying of fluid pressure to the spaces 42 and 42^a, the sealing rings 34 and 36 function during the periods the fluid pressure is discontinued or reduced, to automatically seal the joints between the side plates 8 and 9 and the ring portions 30 and 31, respectively, and thus operate as checks to prevent the entry of grit into the spaces 42 and 42^a.

The structure shown in Fig. 4 is of the same general construction as that shown in Figs. 1-3 except that the packing rings 33 and the liner plates 16 and 25 are omitted. Thus the sealing rings 34, 35 and 36, instead of being mounted on liner plates as above described of Figs. 1, 2 and 3, are secured directly to the end sections of the pump casing and represented at 8^a and 9^a which latter present the annular bevel surfaces engaged by the sealing rings 34, 35 and 36 and deflecting them inwardly as explained of the bevel surfaces on the liner members of the construction of the preceding figures of the drawings.

The structure shown in Fig. 5 is of the same general construction as that shown in Fig. 4 except that the outer seal 34 is omitted and the clearance space between the end section 8^a and the impeller is somewhat reduced from a point adjacent the pipe 43 radially outwardly. In this construction the sealing ring 35 serves as a seal against escape of pressure from the high pressure

side of the pump to the low pressure side thereof and fluid pressure supplied through the pipe 43 operates to keep the space between the end section 8^a and the impeller clear of grit and forces the ring into tight engagement with the disk portion 31 of the impeller.

The construction shown in Fig. 6 is the same as that shown in Fig. 4 except for the addition of a liner member located outwardly beyond the outer sealing ring 34. In this construction the main portion of the side member of the casing and herein indicated at 8^b is annularly recessed at 8^c in which recess the ring 34 is mounted, this recess also containing the liner member referred to and forming a part of the side of the casing, this liner member represented at 8^e and held in place by a screw 8^d being beveled along its inner edge as represented at 8^f for performing the function of the bevel surface 39 of Fig. 1.

Where sealing means are incorporated in a pump for pumping liquid free of grit, the sealing means would preferably be located close to the center of the pump as shown of the ring 35 in Fig. 5, for the sake of economy of construction.

While I have illustrated and described certain particular forms of structure embodying my invention I do not wish to be understood as intending to limit it thereto as the invention may be

embodied in other forms of structures, including other types of structures and not necessarily pumps, and the constructions shown variously modified and altered without departing from the spirit of the invention.

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

1. In combination: relatively rotatable members presenting parallel faces perpendicular to their axes; one of said members formed with a frusto conical annular groove; an initially flat annular ring of soft rubber secured at one margin in said groove and thereby strained toward a frusto conical shape; the free margin of said ring pressed by resilience of the ring against the opposing surface of the remaining member.

2. In combination: relatively rotatable parallel members, one of said members formed with a frusto conical groove substantially concentric with the axis of the members; a ring of soft rubber having an initial form in which one surface lies parallel with the surface of said grooved member; said ring secured at one margin in said groove and thereby strained toward a frusto conical surface, the free margin of said ring pressed by resilience of the ring against the opposing surface of the remaining member.

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