

March 1, 1938.

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2,110,079

SAND PUMP

Filed April 13, 1937

2 Sheets-Sheet 1

Fig. 1.

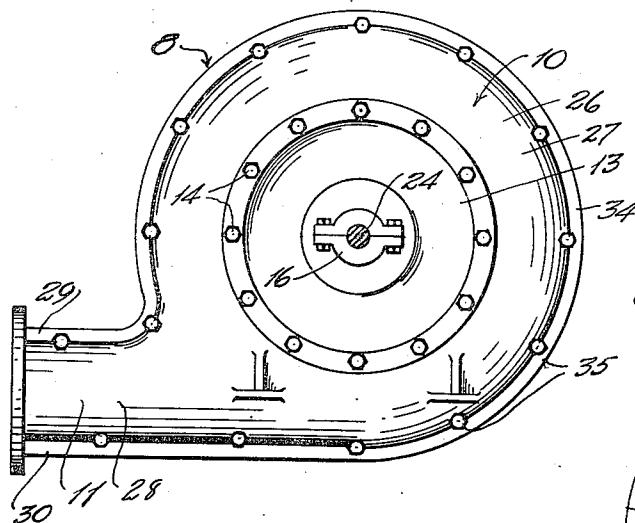


Fig. 8

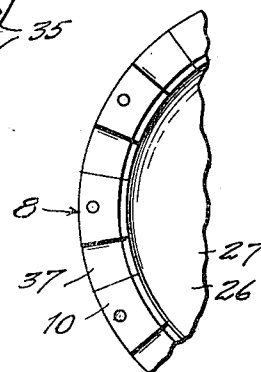


Fig. 2

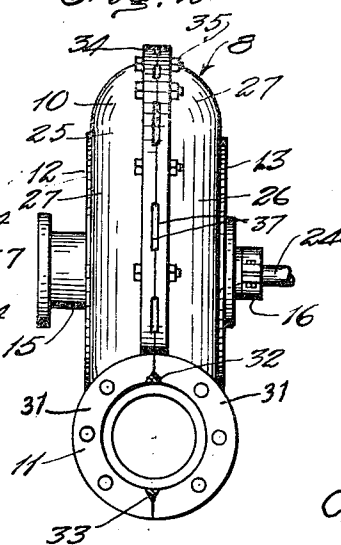
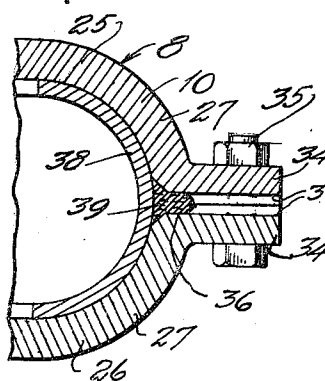


Fig. 6.



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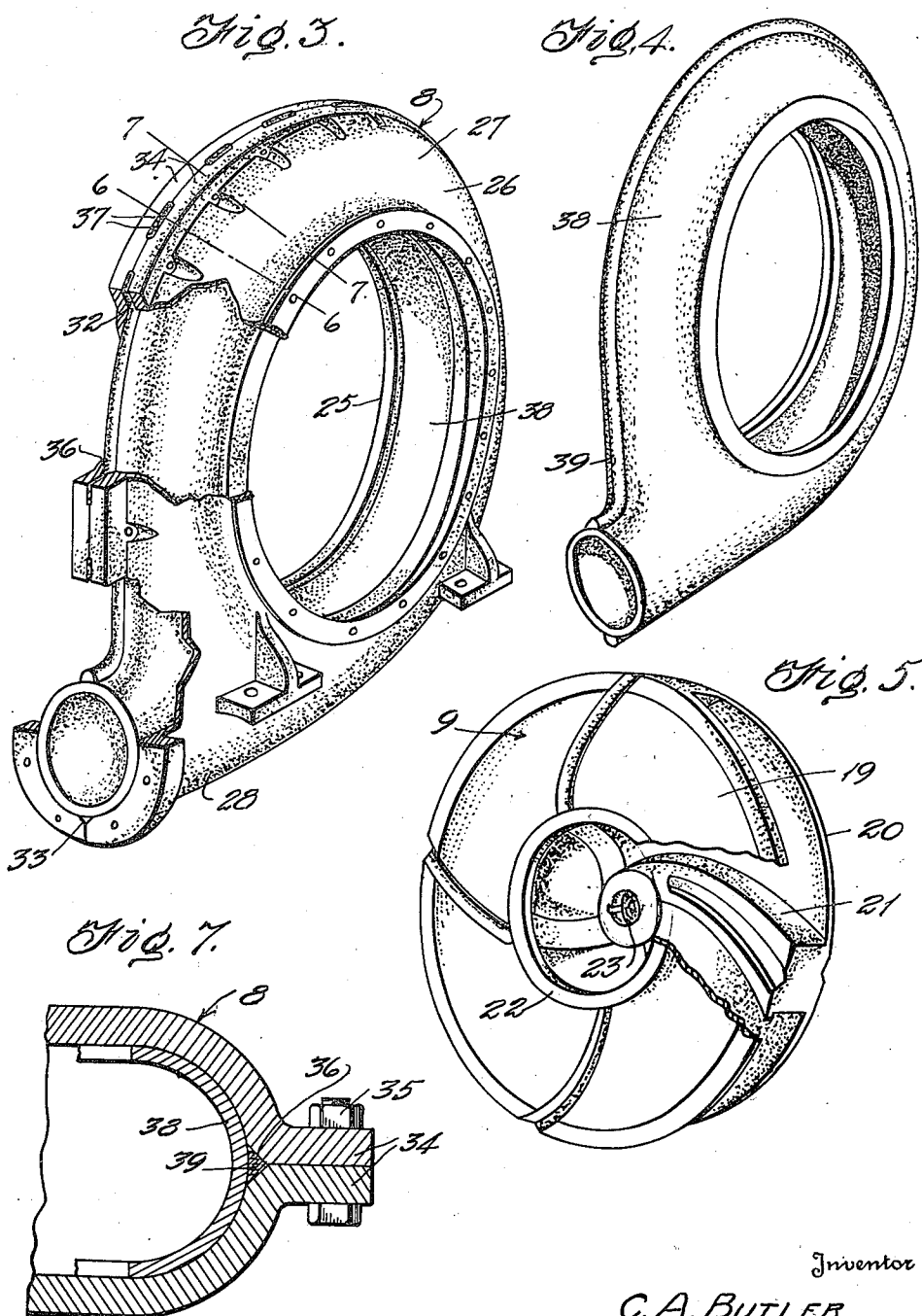
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UNITED STATES PATENT OFFICE

2,110,079

SAND PUMP

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Application April 13, 1937, Serial No. 136,671

6 Claims. (Cl. 103—114)

This invention relates to sand pumps designed primarily for conveying a liquid containing sand in suspension, but it is to be understood that it is to be employed in any connection for which it may be found applicable, such by way of example as conveying a liquid containing other abrasive materials in suspension.

As is well known, pumps of such class are constructed with an impeller casing or outer shell provided throughout with a liner element of any suitable material. The casing or shell is formed of a pair of detachably anchored together sections. The liner element, due to the abrasive action of the sand wears through resulting in wear on the inner face of the casing or shell. In some instances before such condition of the liner element becomes known, the wear on the casing or shell is to such an extent that the pump must be discarded as an entirety or that one or both sections become so worn or impaired that a new section or a new casing or outer shell must be substituted.

The object of this invention is to provide, in a manner as hereinafter set forth, a sand pump including means for indicating immediately that the liner element is worn through before wear is had on the inner face of the casing or outer shell, at which time the operation of the pump is discontinued and a new liner element is substituted whereby the life of the outer casing or shell is prolonged.

A further object of the invention is to provide, in a manner as hereinafter set forth, a sand pump including means whereby a leakage may be had to indicate when the liner element of the casing or outer shell is worn through due to an abrasive action from the sand.

Further objects of the invention are to provide, in a manner as hereinafter set forth, a pump of the class referred to which is simple in its construction and arrangement, strong, durable, compact, thoroughly efficient in its use, including a means to provide for indicating when its inner lining wears through, preventing wear on the inner face of the casing or outer shell, readily relined when occasion requires and comparatively inexpensive to set up.

To the above ends essentially and to others which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts as will be more specifically described and as illustrated in the accompanying drawings wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications may

be resorted to which fall within the scope of the invention as claimed.

In the drawings:

Figure 1 is a side elevation of the pump,

Figure 2 is a top plan view,

Figure 3 is a fragmentary view in perspective of the pump,

Figure 4 is a perspective view of the liner element for the outer shell of the pump and showing the arrangement therewith of the gasket to normally prevent leakage of sand from the outer shell,

Figure 5 is a perspective view of the impeller,

Figure 6 is a section on line 6—6, Figure 3,

Figure 7 is a section on line 7—7, Figure 3, and

Figure 8 is a fragmentary view in elevation looking towards the inner face of the flange of one of the sections of the outer shell or casing.

Referring to the drawings, 8 generally indicates an outer shell or casing for an impeller 9. The shell 8 includes an annular body part 10 open at each side and a tubular extension 11 at the bottom of and disposed tangentially to body part 10. The shell 8 also includes a pair of circular side cheeks 12, 13 for closing the sides of body part 10. The latter in connection with the cheeks provides a chamber for the impeller 9. The extension 11 forms an outlet for the impeller chamber. The side cheeks are detachably secured to the sides of body part 10 by the holdfast means 14. The side cheek 12 is formed axially thereof with an annular intake 15 for the impeller chamber adapted to be connected to a feed not shown. The side cheek 13 is provided with an axial opening, not shown, and a lateral bearing 16 having its inner face forming a flush continuation of the wall of said axial opening.

The impeller 9 is of circular form and includes a pair of spaced parallel circular discs 19, 20 having arranged therebetween and integral with their inner faces a plurality of radially disposed spaced curved blades 21 merging into each other at their inner ends and having their outer ends flush with the edges of the discs. The disc 19 has an enlarged central opening 22 which aligns with the intake 15 and constitutes an intake for the impeller. The latter is provided at its axis with an opening 23 aligning with the axis of the opening 22. The shaft for the impeller is indicated at 24 and extends into opening 23 and is to be keyed to the impeller. The shaft 24 extends outwardly from the impeller, through the axial opening in cheek 13, through the bearing 16 and is connected to an operating means therefor not shown.

The body part 10 is formed of a pair of oppositely disposed, like sections 25, 26 and each includes a hollow annular portion 27 and a hollow extension 28 at the lower part of and disposed tangentially to the portion 27. In cross section the portion 27 is upon a segment of a circle. The extension 28 is disposed on its lower lengthwise edge, is of semi-circular contour in cross section, has extending from its upper and lower lengthwise edges oppositely disposed vertical flanges 29, 30 respectively, and has its outer end formed with a semi-circular lateral flange 31. The opposed edges of the extensions 28 of the sections 25, 26 are oppositely bevelled to provide upper and lower V-pockets 32, 33 respectively, when sections 25, 26 are anchored together by a means to be referred to. The inner side of the portion 27 of each section of body part 10 is formed with a continuous flange 34 which merges at one end into the inner end of flange 29 and at its outer end with the inner end of flange 30. The flange 34 extends outwardly from the inner side edge of the section 25 or 26. When the sections 25, 26 are anchored together, the flanges 30 thereon abut, the top flanges 29 on the extensions 28 abut and the bottom flanges 30 on the extensions 28 abut. The sections 25, 26 are detachably anchored together by the holdfast means 35. The inner side edges of the sections 25, 26 are bevelled to provide a V-pocket 36 when the sections are anchored together. One end of pocket 36 forms a continuation of the inner end of pocket 32. The other end of pocket 36 merges into the inner end of pocket 33.

Each section of body part 10 is formed with a series of spaced integral grooves 37 which extend from the outer edge of the flange 34 on the section to the inner face of annular portion 27 of the section. When the sections are anchored together the grooves 37 of one section coat with the grooves 37 of the other section to form leak passages which are normally closed by a means to be referred to.

The liner element of the pump as indicated at 38 is a one-piece structure formed of any suitable material, of a contour corresponding to that of casing 8 and common to the portions 27 and extensions 28 of the sections 25, 26. The element 38 is removably mounted in the casing 8.

There is interposed between the outer periphery of the element 38 and the inner face of casing 8 the means to normally prevent leakage through the leak passages formed by the coating grooves 37. The said means is arranged throughout the pockets 32, 33, 36, disposed at the inner ends of the leak passages and is in the form of a continuous compressible gasket 39 which is of circular cross section prior to its being installed to normally prevent leakage. When the sections 25, 26 are disposed in encompassing relation with respect to gasket 39 and element 38 and then detachably anchored together the gasket 39 will be clamped between sections 25, 26 and be compressed to an extent to completely fill the pockets 32, 33, 36, bear against the outer periphery of element 38 and be of triangular contour in cross section.

The gasket 39 provides a leak preventive means as long as the element 38 has not been worn through by the abrasive action of the sand. When the element 38 wears through, the abrasion immediately attacks the gasket 39 and the portions of the latter which are arranged at the inner ends of the leak passages wear away to open passages and leakage follows which indicates that

the element 38 has been impaired. Leakage indication or indications will be given before abrasion injures the inner faces of the portions 27 of the sections 25, 26 of the casing 8 to an extent to discontinue the use of said sections.

What I claim is:

1. In a sand pump, a sectional outer casing forming an impeller chamber having an intake and an outlet, a liner element for said casing, said casing being formed with spaced leak passages opening at their outer ends into the atmosphere and at their inner ends into said chamber, means interposed between said casing and element and clamped between the sections of the casing for normally preventing leakage, said means extending across the inner ends of said passages for normally closing the latter to said chamber, and said means having its leak-preventive characteristic destroyed by an abrasive action from the sand when said element is worn through whereby leakage is had through said passages to indicate that said element is impaired.

2. In a sand pump, a sectional outer casing forming an impeller chamber having an intake and an outlet, a liner element for said casing, said casing being formed with spaced leak passages opening at their outer ends into the atmosphere and at their inner ends into said chamber, means interposed between said casing and element and clamped between the sections of the casing for normally preventing leakage, said means extending across the inner ends of said passages for normally closing the latter to said chamber, and said means having its leak-preventive characteristic destroyed by an abrasive action from the sand when said element is worn through whereby leakage is had through said passages to indicate that said element is impaired, the sections of the casing having coating parts to form an internal pocket in which said means is positioned.

3. In a sand pump, a sectional outer casing forming an impeller chamber having an intake and an outlet, a liner element for said casing, said casing being formed with spaced leak passages opening at their outer ends into the atmosphere and at their inner ends into said chamber, means interposed between said casing and element and clamped between the sections of the casing for normally preventing leakage, said means extending across the inner ends of said passages for normally closing the latter to said chamber, said means having its leak-preventive characteristic destroyed by an abrasive action from the sand when said element is worn through whereby leakage is had through said passages to indicate that said element is impaired, said means being in the form of a continuous compressible gasket, and the sections of the casing having coating parts forming an internal continuous pocket in which said gasket is arranged, under a state of compression when the casing sections are detachably anchored together.

4. In a sand pump, a sectional casing providing an impeller chamber having an intake and an outlet, the wall of said chamber being formed with a pocket, said casing being provided with spaced leak-passages extending from the outer periphery of the casing to said pocket, a liner for said wall, and a compressible gasket arranged in said pocket and bearing against said wall and liner for normally closing said passages.

5. In a sand pump, an impeller casing having its inner face provided with a continuous pocket, said casing being formed with spaced leak passages opening at their outer ends into the at-

mosphere and at their inner ends into said pocket, a liner for said inner face extending across said pocket, and a compressible gasket clamped within said casing and having portions thereof for normally closing the inner ends of said passages.

5 6. In a sand pump, an impeller casing formed with leak passages opening at their outer ends into the atmosphere, a liner for said casing, and means clamped within the casing and bearing

against said liner for normally closing said passages at their inner ends, said liner and means being capable of being worn away from an abrasive action within the casing for opening the inner ends of said passages for establishing communication between the interior of the casing and the atmosphere.

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