

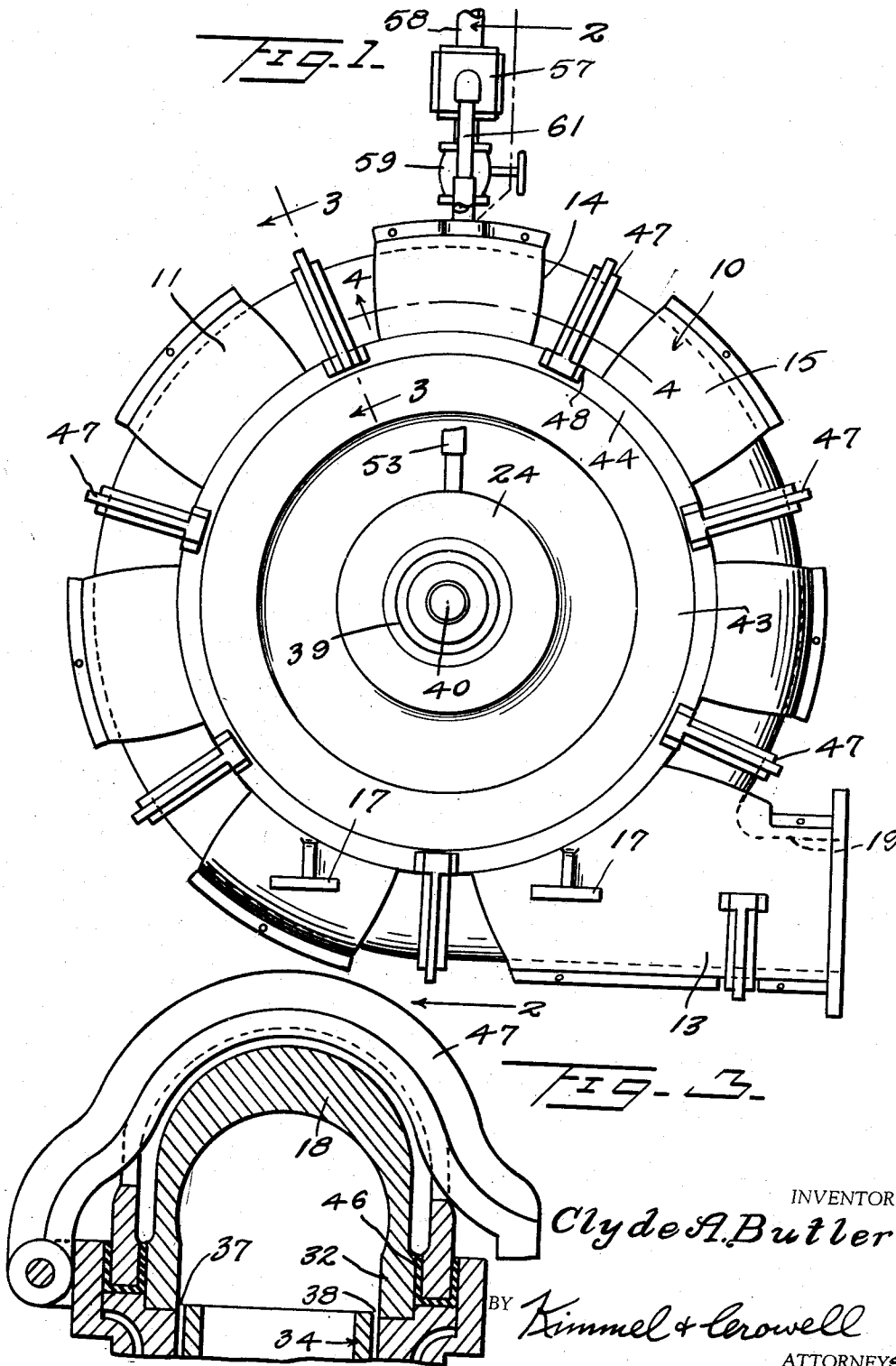
Sept. 28, 1954

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SAND PUMP

2,690,131

Filed March 31, 1952

2 Sheets-Sheet 1



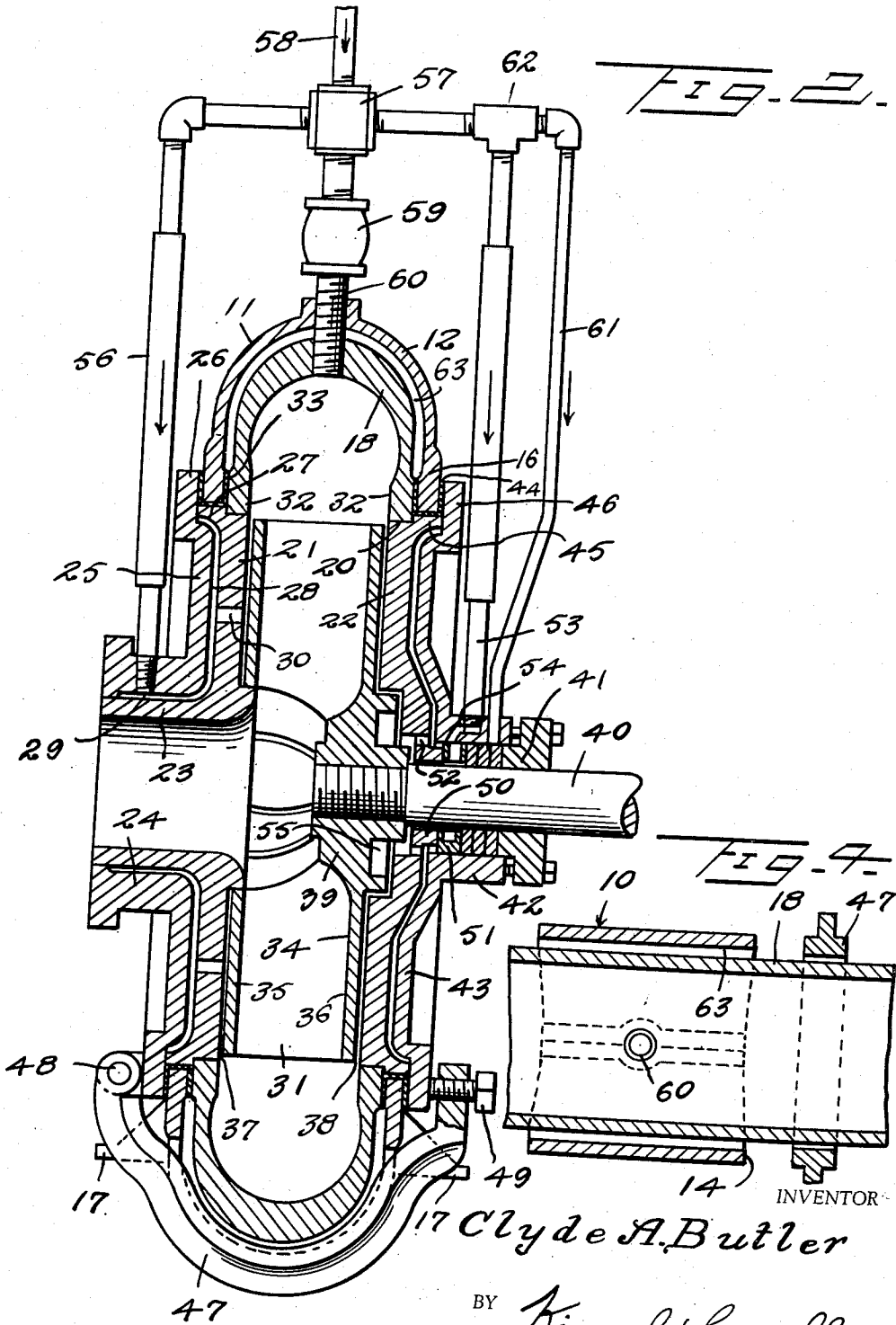
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SAND PUMP

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2 Claims. (Cl. 103—114)

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This invention relates to sand pumps and is an improvement over the construction shown in my prior Patent 2,110,079, issued August 18, 1937, for Sand Pumps.

In a sand pump, particularly of the centrifugal type, the abrasive action of the sand wears through the walls of the pump, and unless a tell-tale means is provided to give warning when the walls have been punctured or cut through, the pump may be completely ruined. It is, therefore, an object of this invention to provide in a centrifugal pump means whereby a leakage in the liner may be readily detected.

Another object of this invention is to provide a centrifugal pump embodying a skeleton-like outer shell with a liner disposed loosely within the shell, so that any break-through of the liner can be immediately detected.

A further object of this invention is to provide an improved sealing means between the liner and the other components of the housing which will seal the several components together, and at the same time provide a means whereby a break-through in the inner portion of the liner may find an outlet through the seal without damaging the outer shell components.

A further object of this invention is to provide in a pump of this kind means whereby water may be circulated within the pump structure so as to wash out any sand which may cut into the housing components, the impeller, or the shaft and bearings.

A further object of this invention is to provide a pump structure which is so constructed and arranged that the liner may be easily and quickly replaced.

With the above and other objects in view, my invention consists in the arrangement, combination and details of construction disclosed in the drawings and specification, and then more particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a detailed side elevation of a sand pump constructed according to an embodiment of this invention.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a fragmentary sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a fragmentary sectional view taken on the line 4—4 of Figure 1.

Referring to the drawings, the numeral 10 designates generally an outer housing or shell which is formed of complementary skeleton-like housing members 11 and 12, which are of substantially

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circular form and are provided at the lower portion thereof with an outlet neck 13.

The housing 10 is formed of a plurality of circumferentially arranged cutouts 14 providing spaced housing members 15, which are connected together at their inner ends by an annular flange 16. A pair of base plates 17 are carried by each shell member 11 and 12 adjacent the lower portion thereof adapted to be secured to a suitable base structure whereby the housing 10 is adapted to be disposed in an upright position.

A substantially ring shaped liner 18 is disposed within the housing 10 and is formed with a neck 19, projecting into the neck or outlet 13. The liner 18 opens inwardly and is adapted to seat in annular rabbets 20, which are formed in inner disc shaped liner plates 21 and 22. The liner plate 21 is formed with a nipple 23 extending into a nipple 24 carried by an outer disc-shaped plate 25, and the nipple 23 constitutes an intake means whereby sand and water is adapted to be drawn into the interior of the pump.

The outer plate 25 is formed with an annular flange 26 bearing against an outwardly projecting flange 27 carried by the liner plate 21, and a space 28 is formed between the two plates 21 and 25. A cylindrical space 29 is also formed between the intake nipple 23 and the outer nipple 24. Liner plate 21 is formed with a plurality of openings 30 which communicate the space 28 with the impeller chamber 31.

The annular flange 16 of the outer shell is interposed between the flange 26 and a flange 32, which is formed on the liner 18, and an annular gasket 33 is interposed between the flange 16 and the flanges 26 and 32. The gasket 33 is of U-shape in transverse section and provides a means whereby sand cutting through the flange 32 may cut through the gasket 33 and finally break through the outer shell without effecting any abrading action on the outer shell components.

An impeller 34 is rotatable disposed in the impeller chamber 31 and the opposite sides 35 and 36 of the impeller 34 are disposed in slight spaced relation to the inner faces of the liner plates 21 and 22, as indicated at 37 and 38, so that water circulating through the space 28 and the openings 30 may circulate between the impeller plate 30 and the plate 21, and thereby wash out any sand particles which may enter the space 37. The impeller 34 includes a hub 39 which is secured to a drive shaft 40, and the drive shaft 40 is journaled through a packing gland 41 carried by the hub or boss 42 of a second outer disc-shaped plate 43.

The plate 43 includes an outer annular flange 44 confronting the flange 16 of the shell 10, and flange 44 bears against a flange 45 carried between liner plate 22. A rubber gasket 46, which is U-shaped in transverse section, is interposed between the flange 32 of liner 18 and the flanges 16 and 44. The liner plates 21 and 22 and the outer shell plates 25 and 43 are tightly secured to the housing member 10 by means of a plurality of arcuate clamping bars 47 which are pivotally secured, as at 48, to outer plate 25 and extend through a space 14 to a point overlapping the outer flange 44 of outer plate 43.

Pressure screw or bolt 49 is threaded through the free end of clamping bar 47 and bears against flange 44, as shown in Figure 2. A bearing bushing 50 is disposed loosely about shaft 40 adjacent the outer end of hub 39, and a skeleton-like washer 51 is also disposed loosely about shaft 40 and bears against the outer end of bearing ring 50.

There are a series of openings 52 at the inner portion of plate 22 so that water may flow from a water supply pipe 53 through a channel 54 formed in hub 42 into a central water chamber 55 and then flow outwardly in space 38, thereby keeping any sand particles from entering the bearing and gland of the pump. Water is supplied to space 23 from a water supply pipe 56, and the two pipes 53 and 56 are connected to a coupling 57 which is connected by a pipe 58 to a source of water pressure supply. Water for priming of the pump is conducted from fitting 57 through a valve 59 to a nipple 60 which extends through the outer shell 10 and is fixed within the upper portion of liner 18, as shown in Figure 2.

A pipe 61 extends from a T-shaped fitting 62 at the upper end of pipe 53 downwardly into the boss 42, so as to provide water under pressure for the gland 41, in order that the gland 41 will not be unduly cut by any sand which may creep outwardly along the shaft 40.

In the use and operation of the pump, the intake 23-24 is connected to a suction line, and the outlet 13 is connected to an exhaust line. Water is discharged from supply line 53 and pipes 53, 56 and 61 into the chambers or spaces 28, 29, 37 and 38 so that as impeller 34 is rotated, any sand creeping between the impeller 34 and the liner plates 21 and 22 will be washed out.

After the pump has been in operation for a predetermined period, the abrasive action of the sand and other particles may cut through the liner 18 and when liner 18 is completely broken through by the abrasive action of the sand, the water and sand will flow through the opening formed by the break-through of the sand in the space 63, which is formed between the liner 18 and the shell 10. The water and sand entering the space 63 may be readily detected in the cutout portions 14 of the shell so that when water is detected in the spaces or cutouts 14, the pump can be immediately stopped and a new liner inserted.

In the event the sand should cut through either or both flanges 22 of liner 18, the sand may also cut through the gaskets 33 and 46. The cutting through of the sand through the gaskets 33 and 46 will take place before the flanges 16, 26 and 44 have been damaged. In this manner, if the sand should cut through either one or both of the gaskets 33 and 46, these gaskets may be replaced with the replacement of the liner 18.

The rabbets or channels 20 in the liner plates 21 and 22 provide a means whereby the outer liner 18 will be held concentrically of the impeller 34, and these channels or rabbets 20 will also provide a means whereby the liner and shell components may be tightly clamped together by the clamping members 47.

I do not mean to confine myself to the exact details of construction herein disclosed, but claim all variations falling within the purview of the appended claims.

What is claimed is:

1. In a sand pump, an outer substantially circular casing formed of complementary housing members, each member having spaced cutouts extending inwardly from the periphery thereof, a circular liner in said casing, a pair of outer disc-shaped shell members having outer annular flanges confronting said housing members, a pair of inner disc-shaped liner plates, channelled gaskets encompassing the inner edges of said housing members, the inner edges of said housing members being of circular shape and interposed between said first named liner and the flanges of said shell members, and bowed clamping bars carried by one of said shell members engaging in the cutouts of said housing members and extending over said circular liner, the free end of each clamping bar confronting the flange of the other shell member, and a clamping screw threaded through the free end of each bar bearing against the flange of said other shell member for clamping said shell members, said housing members and said liners together.

2. In a sand pump, an outer casing formed of complementary housing members having spaced cutouts, a circular liner in said outer casing having portions thereof exposed through said cutouts, a pair of outer disc-shaped shell members, a pair of inner disc-shaped liner members, said pair of liner members each having a rabbet within which said first named liner engages, the inner edges of said housing members being interposed between said first named liner and said shell members, sealing means between said housing members and said first named liner, means engaging in said cutouts clamping said shell members to said housing members and simultaneously clamping said housing members to said circular liner, there being a space between said shell members and said inner liner members, at least one of said inner liner members having openings therethrough, an impeller rotatable between said inner liner members, said impeller having opposite faces spaced from said inner liner members, and means connecting said first named space with a water supply source for circulating water under pressure in said first named space and through said opening into the space between said impeller and said inner liner members to wash sand particles from said latter named space.

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