

Feb. 13, 1934.

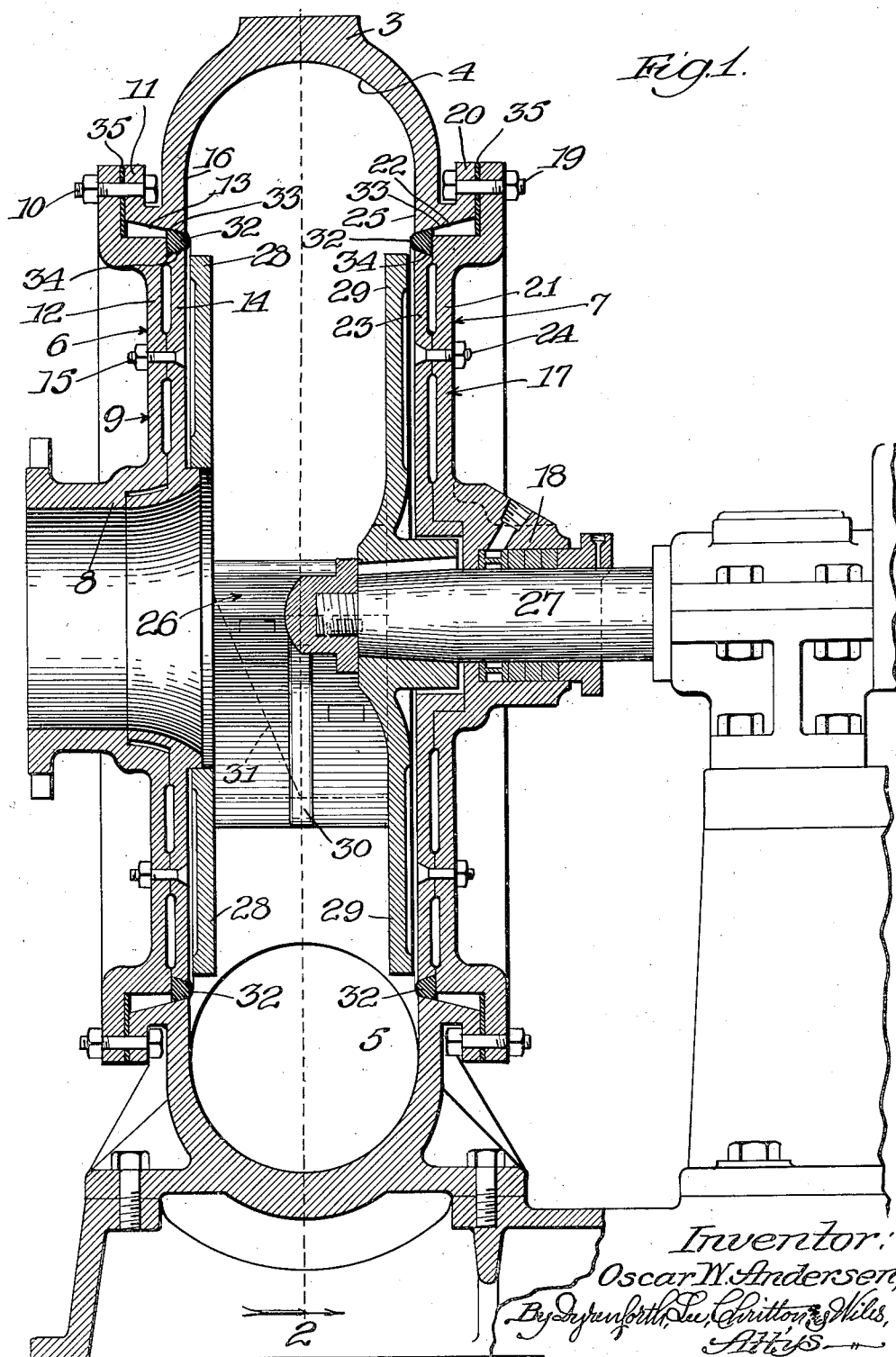
O. W. ANDERSEN

1,947,148

PUMP

Filed Oct. 2, 1930

2 Sheets-Sheet 1



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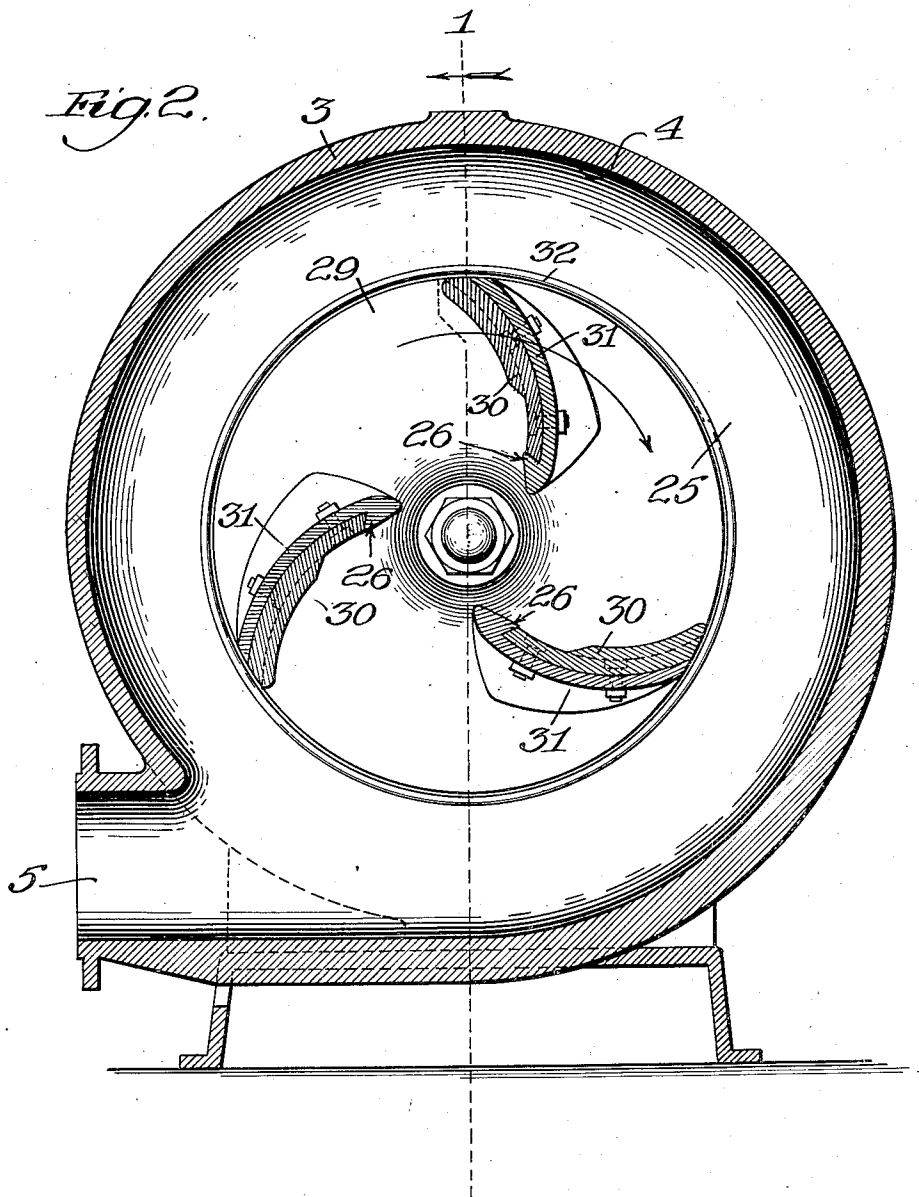
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Inventor
Oscar W. Andersen,
By *Byrdunforth, De Witt, & Miles,*
Attys.

UNITED STATES PATENT OFFICE

1,947,148

PUMP

Oscar W. Andersen, Oak Park, Ill., assignor to
Pettibone Mulliken Company, Chicago, Ill., a
corporation of Delaware

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5 Claims. (Cl. 103—114)

My invention relates more particularly to pumps for pumping water containing relatively small hard particles such as for example sand, and more especially to suction pumps provided for the transferring of gravel from gravel pits, and of the type employing a rotatable impeller element which, in its operation, exerts suction at the inlet of the pump for drawing into the latter the material to be transferred.

Pumps of this type as commonly provided are formed of casings comprising annular peripheral sections of channel form with their channels opening toward the centers of the casings and end, or side, forming sections which are located at the open sides of the first-referred-to sections and complete the casing-enclosures in which the impellers are mounted for rotation.

It often occurs in practice that the annular joints between the channel sections and the end, or side sections are not sufficiently tight to preclude entry therein of water and relatively fine particles of hard material, such as sand being pumped and which, in the operation of the pumps, remain in the joints, setting up an abrading action on the casing sections, oftentimes resulting in such impairment of the casings at said joints as to render the casings unfit for further use and requiring the discarding of the same before they have otherwise become worn by the material forced through the pump, to an extent impairing them for use.

My primary object is to provide means for preventing the abrading action at the joints exposed to the material being pumped by the fine particles in the material, and thus prolong the life of the pump structures.

Referring to the accompanying drawings:

Figure 1 is a view in vertical sectional elevation of a pump structure embodying my improvement, the section being taken at the irregular line 1 on Fig. 2 and viewed in the direction of the arrow; and

Figure 2, a section taken at the line 2 on Fig. 1 and viewed in the direction of the arrow.

Referring to the construction of pump shown in the accompanying drawings, the casing of this pump comprises an annular, peripheral, section 3 provided about its inner periphery with a channel 4 opening toward the center of the section 3 and of progressively increasing depth and wall thickness toward the discharge outlet thereof represented at 5.

The casing also comprises end, or side, forming sections 6 and 7, the section 6 having a central suction opening 8 therethrough and com-

prising a main disk-like member 9 secured at its circumferential portion, by bolts 10, to an annular external flange 11 on the section 3, the member 9 having an inwardly offset portion 12 at which it extends into the opening 13 in the adjacent side of the section 3. The section 6 also comprises a disk-like liner member 14 secured to the inner face of the member 9 by bolts 15, the inner face of the liner member 14 being substantially flush with the adjacent inner, annular, surface 16 of the section 3.

The section 7 is formed of a main disk-like member 17, which has a centralized tubular portion 18, and is secured at its circumferential portion by bolts 19 to an annular, external, flange 20 on the section 3, the member 17 having an inwardly offset central portion 21 at which it extends into the opening 22 in the adjacent side of the section 3. The section 7 also comprises a disk-like liner member 23 secured to the inner face of the member 17 by bolts 24, the inner face of the liner member 23 being substantially flush with the adjacent inner surface 25 of the section 3.

The pump also comprises an impeller 26 located in the casing and secured to an end of a shaft 27 journaled in the tubular portion 18 of the casing section 7 and driven by any suitable means (not shown).

The impeller 26 comprises a pair of parallel, spaced-apart, ring-like portions 28 and 29 secured together by a series of crosswise extending web portions 30 which are curved in cross-section as shown and extend at their inner ends short of the axis about which the impeller rotates, the portions 28 and 29 and webs 30 being preferably cast as a one-piece structure. The webs 30, shown as provided with liner members 31, constitute the blades of the impeller.

It may be here stated that in accordance with common practice the impeller 26 is driven in the direction of the curved arrow in Fig. 2 and operates to exert suction at the opening 8 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 peripheral portion of the casing along which the material travels to the outlet of the pump.

The joints between the circumferential portions of the liner members 14 and the adjacent inner marginal edges of the casing 3 are exposed to the material being pumped, these joints, in the

particular construction, being located outwardly beyond the circumferences of the liner members 14, and to avoid entry of fine hard particles into these joints and thus avoid the above noted objectionable wear of the casing section 3 at these joints, I provide, in accordance with my invention, sealing means therefor comprising, generally stated and preferably, rings 32 of packing material, preferably vulcanized soft rubber, which closely fit the opposed surfaces of the section 3 and the liner members 14 at the joints referred to.

Preferably the rings 32 are of tapered form in cross-section, as shown, and the surfaces of the section 3 and the liner members 14 between which these rings are interposed are tapered as represented at 33 and 34, respectively, to converge inwardly relative to each other, whereby upon applying the end sections 6 and 7 to the section 3 as shown, the rings 32 become compressed and effectually seal the joints at which they are located against the entry of the fine hard particles.

By preference I provide shims 35 between the lapping surfaces of the section 3 and the sections 6 and 7 and draw these surfaces into tight engagement with the shims by drawing up on the bolts 10, the shims 35 being of such thickness that they will take the strain due to the clamping action of the bolts and the rings 32 will become compressed only to the degree desired.

As pumps for pumping material such as that above referred to are subjected to severe abrading action due to impingement against certain of their parts, of solid material such as sand, gravel and rock in the material being pumped, it is desirable that such surfaces be formed of material highly resistant to wear from such impingement. Accordingly, the casing section 3, as also the liner members 14 are preferably formed of such a metal as for example and preferably manganese steel. The sealing rings 32 preferably are of a material relatively highly resistant to the abrading action of the fine hard particles in the material being pumped, the use of soft rubber, as above stated, being preferred as it has been found, in practice, to possess great lasting quality under the action of the fine particles.

While I have illustrated and described a particular embodiment of my invention, I do not wish to be understood as intending to limit it thereto as the same may be variously modified and altered without departing from the spirit of my invention, and as an example of such a modification of the structure shown, the casing of the pump, instead of being formed of two end sections and a section which extends only at the periphery of the casing, may be formed of two sections one formed in one piece and comprising a peripheral portion corresponding with the section 3 and an end portion corresponding with one of the end members 6 and 7 and the other of the two sections comprising an end section which would close the open side of the casing, and the claims appended hereto are intended to cover such a modification as well as a three-section casing and other modifications thereof.

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

1. A pump comprising a metal casing formed of a portion having an open side, a metal end member positioned at said open side and extending into said opening, the metal of said portion

and member being exposed at the interior surface of the pump at opposite sides of the joint therebetween, an impeller rotatable in said casing, said joint being located closely adjacent the outer margin of the impeller and a sealing ring of compressible material located at said joint and sealing said joint against entry thereto of fine particles in the material operated on by the pump, said ring being of tapered form in cross section and one of the surfaces of said casing at said joint being inclined in a direction to compress said ring into tight sealing position in the assembling of said portion and member.

2. A pump comprising a metal casing formed of a portion having an open side, an end member positioned in said open side and having a liner portion extending into said opening, the metal of said casing portion and said liner portion being exposed at the interior portion of the pump at opposite sides of the joint between said casing portion and said liner portion, an impeller rotatable in said casing, and a sealing ring of compressible material located at said joint and sealing the latter against entry thereto of fine particles in the material operated on by the pump, said ring being of tapered form in cross section and one of the surfaces of said casing at said joint being inclined in a direction to compress said ring into tight sealing position in the assembling of said portion and member, said end member having a portion which, upon assembling said casing portion and said ring, bears against said ring and forces the latter against said inclined surface to make a tight joint.

3. A pump comprising metal parts forming an impeller casing structure with a joint between said parts surrounding the axis about which the impeller rotates and located closely adjacent the outer margin of the impeller, the metal of said parts being exposed at the interior surfaces thereof at opposite sides of said joint to form a space of varying diameters, and resilient packing means compressed in said space at the interior surfaces of said parts and sealing said joint against entry thereto of fine particles in the material operated on by the pump.

4. A pump comprising a metallic impeller housing and an impeller, said housing being composed of a peripheral member having an end opening the wall of which surrounds the axis of the impeller, a resilient packing ring, an end plate having a liner projecting into said opening, the diameters of said opening and liner so varying that the resilient packing ring is compressed therebetween, thereby sealing said openings against entry thereto of fine particles of the pumped material.

5. A pump comprising a metal casing formed of a peripheral section presenting an inwardly opening channel and end openings, end sections closing said openings, said end sections comprising annular liner members in the interior of said casing, the peripheral margins of said members sloping away from said openings, the metal of said peripheral section and said liner members being exposed at the interior surface of the pump at opposite sides of the joint between said peripheral section and said liner members, an impeller rotatable in said casing, and packing means compressed in and sealing said joints against entry thereto of fine particles in the material operated on by the pump.

OSCAR W. ANDERSEN.