

Aug. 2, 1932.

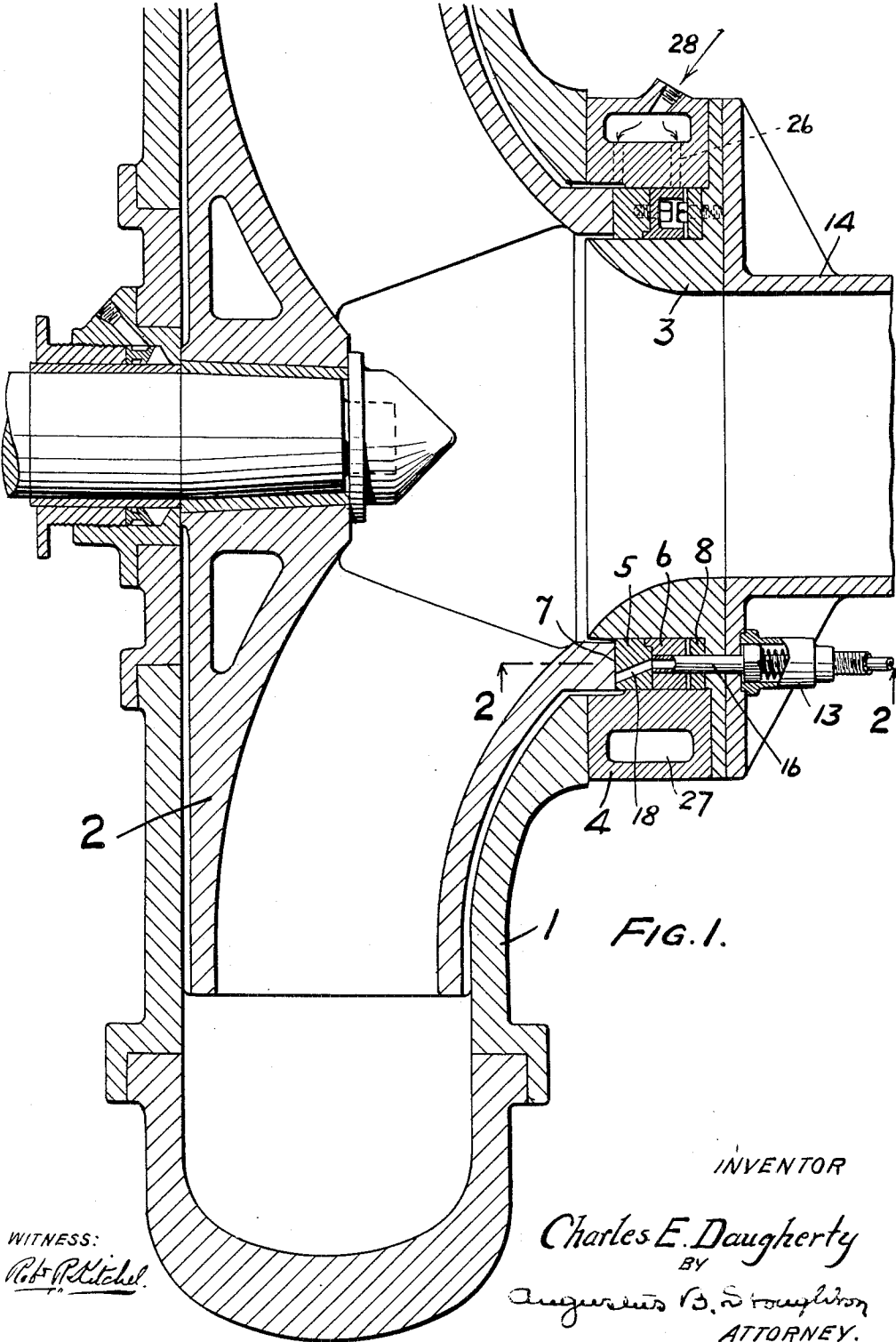
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DREDGING OR LIKE PUMP

Filed Oct. 22, 1930

2 Sheets-Sheet 1



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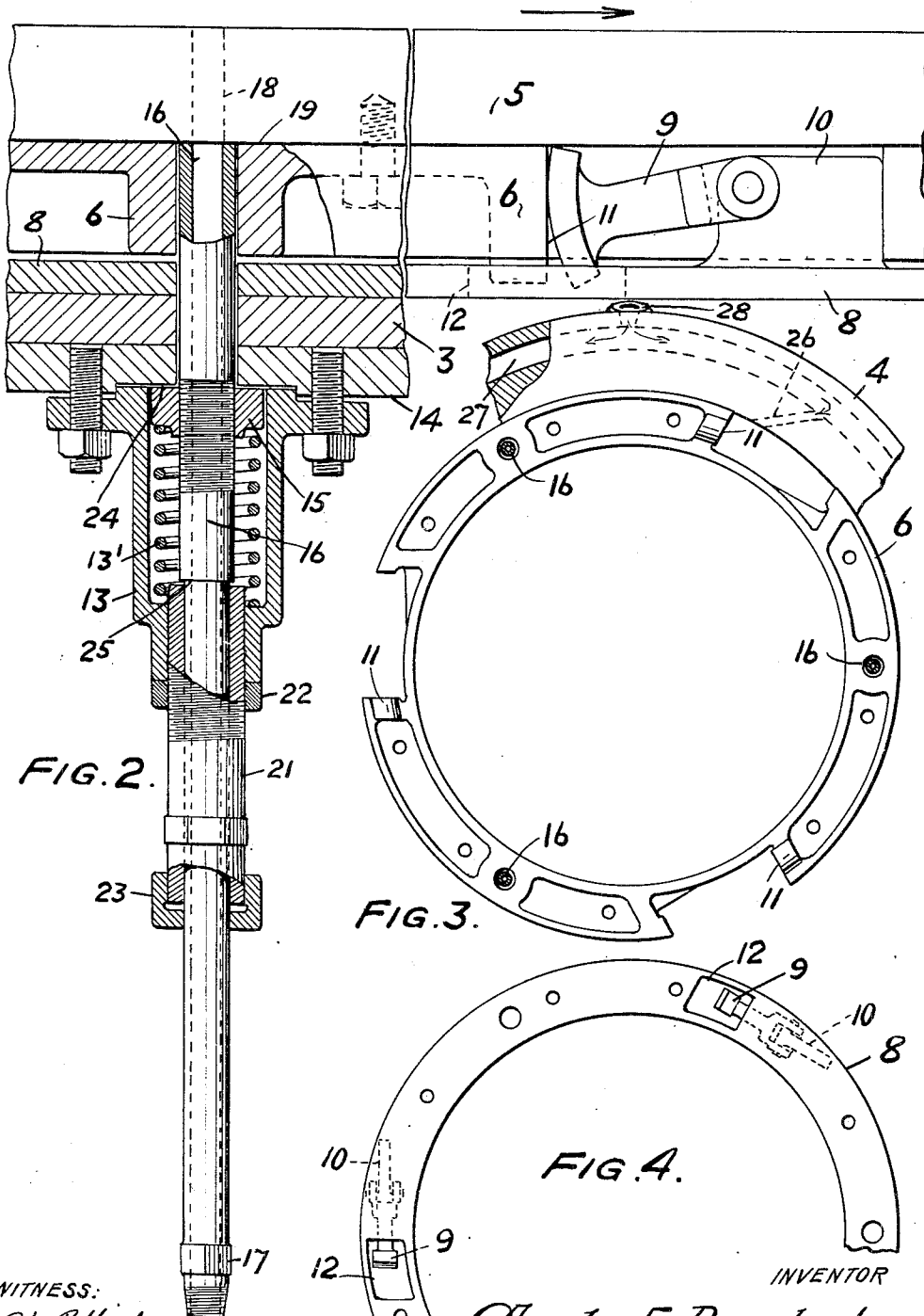
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DREDGING OR LIKE PUMP

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It is well known that in centrifugal pumps there is pressure in the volute or casing around its outer periphery due to the whirling action of the water, and there is more or less of a vacuum in the suction entrance to the impeller created by the same action, thus there is a great tendency for a rush of water down between the front shroud of the impeller and the front cover of the pump in an attempt to get from the pressure side of the pump into the vacuum space. In a dredge pump where highly abrasive materials are being dealt with, the described rush of material creates rapid wear on the front shroud of the impeller, and on the inside face of the front cover, reducing the efficiency of the pump as the amount of leakage increases.

The principal object of the present invention is to overcome the above mentioned defects and disadvantages and to properly and efficiently seal a dredge pump at the suction entrance. Another object of the invention is to increase or prolong the useful life of the pump.

To these and other ends hereinafter set forth or appearing, the invention comprises the improvements to be presently described and finally claimed.

In the following description reference will be made to the accompanying drawings forming part hereof and in which

Figure 1 is a transverse sectional view of so much and of such parts of a centrifugal dredging pump as are necessary for an illustration of the present invention in application thereto.

Fig. 2 is a transverse sectional view taken generally on the line 2—2 of Fig. 1 and drawn to an enlarged scale.

Fig. 3 is a front elevational view of two of the rings shown in Fig. 1 with a portion of one of the rings omitted, and

Fig. 4 is a similar view of another of the rings shown in Fig. 1 with a portion thereof broken away.

Referring to the drawings, 1 is the front cover of the pump and 2 is the pump impeller. There is a fixed throat ring 3 and a fixed throat ring sleeve 4. The latter may be cast as part of front cover. 5 is a liner ring which may well be of cast iron and it is secured or bolted to an adjusting ring 6 which may well be made of a high resisting alloy steel. The parts 5 and 6 thereof constitute operatively a unitary structure which is axially slidable with respect to the surface 7 at the eye of the impeller. 8 is a fixed anchor plate. The parts 5, 6 and 8 are arranged in the annular space provided between the throat ring sleeve 4 and the throat ring 3. 9 are arcuate stops turnably mounted between the anchor plate 8 and the adjusting ring 6 to facilitate axial sliding movement and to oppose rotary movement of the adjusting ring 6 and the liner ring 5. The stops 9 are pivoted to lugs 10 on the fixed anchor ring or plate 8, and the arcuate faces of these stops cooperate with lugs 11, on the adjusting ring 6 which extend through or into openings 12 in the anchor plate or ring 8. The arrow in Fig. 2 indicates the direction of motion of the face 7 of the impeller which is omitted from Fig. 2 but upon which the liner ring 5 rides. The purpose of the turnable stops 9 is, in cooperation with parts that will be presently described, to prevent rotation of the liner ring 5 and to compensate for irregularity in or in the movement of the surface 7 of the impeller. There are spring pressed means acting on the liner ring to yieldingly hold it up to the impeller surface 7. 13 indicates spring cages bolted to the flange of the suction nozzle 14. It may be remarked that as in case of the stops 9, three are shown and one described, so in the present case three spring cages are shown but one of them will be described. The spring cage 13 carries a helical spring 13' and a square nut 15, which is threaded onto the hollow stem 16. This hollow stem has a square

17 near its outer end for the engagement of a wrench. When starting to turn in on these hollow stems, the first action is to carry the liner ring 5 and the adjusting ring 6 against the face of the impeller 7. Any further adjustment on these stems raises the square nut 15 from its seat and compresses spring 13' to any desired amount, thus giving any desired pressure between the cast iron ring 5 and the face 7 of the impeller. Clear water carried at a pressure of, for example, fifteen to twenty pounds higher than the pressure on the main dredge pump is fed through the hollow stem 16 and through the diagonal hole 18 drilled in the cast iron ring or liner ring 5 directly to the face where the impeller and the cast iron ring 5 rub together. This pressure tends to make the stem 16 kick back from the face 19 of the ring 5. This action is prevented or opposed by a follower sleeve 21 screwed into the outer end of the spring cage 13, and the follower sleeve 21 is locked into any position by the nut 22. At the outer end of the follower sleeve 21 is a stuffing box nut 23, which prevents leakage at that point. When assembling the pump, the three stems 16 should be screwed inward equally so that the cast iron ring 5 will be brought against the face 7 of the impeller, and these stems should be further adjusted so as to raise the nut 15 about $\frac{1}{2}$ of an inch off its seat at 24. The follower sleeves 21 should be adjusted in as far as they will go so that their inner ends will come directly against the shoulders 25 of the stems. These follower sleeves should then be backed out one and one-half turns so as to allow a slight play of all of these parts to take care of the impeller not running true. The throat ring sleeve 4 has cored or drilled holes 26 of which six happen to be shown and which are inclined at an angle to the radius, Fig. 3, in order to introduce six jets of water almost tangentially to the inside diameter of the sleeve. The object of these six water jets is to counteract the swirling tendency of the material which has rushed down between the impeller and the front cover of the pump and has been prevented from going through into the vacuum at the eye of the impeller by reason of the contact between the cast iron sealing ring 5 and the runner face 7. Therefore these jets are introduced in the opposite direction to the rotation of the impeller. If this swirling action is not prevented rapid wear results on the inside surface of throat ring sleeve 4 as well as on the inside curved face of the front cover. Different and equivalent methods can be used for introducing the six water jets in the throat ring sleeve 4. In pumps of large diameter these six holes can be drilled and a pipe may be bent in the shape of a horseshoe with six branches coming out therefrom connecting with the six holes. In pumps of small diameter the throat ring

sleeve and front cover are incorporated in one casting and due to the small diameter of the cover, these holes cannot be drilled out. In this case a water jacket in the shape of an annular core 27 is cast around the outer diameter of the throat ring sleeve 4, and the six jets are cored from this annular core into the inner periphery of said part 4. In this case it is necessary to provide only one pipe connection 28 at some point on the periphery of the said annular core 27, and this is shown in the drawings. The three water connections to the hollow stems 16 are fed by a pipe bent in the form of a horseshoe with three branches issuing therefrom.

The purpose of the three sectors 9 is to allow for easy sliding movement of the rings 5 and 6 in spite of rotating force exerted on said rings by the impeller rubbing on the face of the ring 5. Were ordinary type jaw clutches employed, the pressure would be so great between the jaws on part 6 and on part 8 due to the rotating effect of the runner that these rings 5 and 6 would not slide freely in and out.

It will be obvious to those skilled in the art to which the invention relates that modifications may be made in details of construction and arrangement and matters of mere form without departing from the spirit of the invention which is not limited to such matters or otherwise than the prior art and the appended claims may require.

I claim:

1. In a centrifugal dredging or like pump having a front cover and a pump impeller and a fixed throat ring sleeve and a throat ring and designed for opposing flow of material between the front shroud of the impeller and the front cover of the pump, the combination of a liner ring and an adjusting ring constituting a unitary structure axially slidable with respect to the surface at the eye of the impeller and a fixed anchor plate, all arranged in an annular space provided between the throat ring sleeve and the throat ring, arcuate stops turnably mounted between the anchor plate and adjusting ring to facilitate axial sliding movement and to oppose rotary movement of the adjusting ring and liner ring, spring pressed means having limited movement and acting on the liner ring to yieldingly hold it up to said impeller surface, means for introducing liquid under pressure through the spring pressed means to said surface, and means for introducing liquid through the throat ring sleeve and discharging it obliquely against the direction of movement of the impeller between the throat ring sleeve and said liner and adjusting rings into the space between the front shroud and the cover plate near the eye of the impeller.

2. In a centrifugal dredging or like pump having a front cover and a pump impeller

and a fixed throat ring sleeve and a fixed throat ring and designed for opposing flow of material between the front shroud of the impeller and the front cover of the pump, and in combination, packing means arranged in an annular space provided between the throat ring sleeve and the throat ring, and jet means for introducing water under pressure through the throat ring sleeve to the space between the front shroud of the impeller and the front cover of the pump.

3. In a centrifugal dredging or like pump having a front cover and a pump impeller and a fixed throat ring sleeve and a fixed throat ring and designed for opposing flow of material between the front shroud of the impeller and the front cover of the pump, and in combination, packing means arranged in an annular space provided between the throat ring sleeve and the throat ring, and jet means inclined at an angle to the radius for introducing water under pressure substantially tangential to the inside diameter of the throat ring sleeve and through the throat ring sleeve to the space between the front shroud of the impeller and the front cover of the pump.

4. In a centrifugal dredging or like pump having a front cover and a pump impeller and a fixed throat ring sleeve and a fixed throat ring and designed for opposing flow of material between the front shroud of the impeller and the front cover of the pump, packing rings arranged in an annular space provided between the throat ring sleeve and the throat ring, means for introducing water through the packing means to the rubbing face of the latter on the end face of the impeller, spring pressed means acting on the packing means, stop means for limiting the retrograde movement of the spring means, and means for introducing water under pressure through the throat ring sleeve and past the packing means and into the space between the front shroud of the impeller and the front cover of the pump.

5. In a centrifugal dredging or like pump having a front cover and a pump impeller and a fixed throat ring sleeve and a fixed throat ring and designed for opposing flow of material between the front shroud of the impeller and the front cover of the pump, packing means arranged in an annular space provided between the throat ring sleeve and the throat ring, resilient means acting on the packing means, and means for introducing water under pressure through the throat ring sleeve and past the packing means and into the space between the front shroud of the impeller and the front cover of the pump.

6. A centrifugal dredging pump having a casing, an impeller in said casing, a packing ring slidably mounted for axial movement with respect to the end surface of said impeller, and movable stops having arcuate

ends and pivotally mounted on a non-rotating portion of the pump, the arcuate ends engaging the packing ring so that the line between the point of contact of said arcuate surface with said packing ring and the pivot of said stop is approximately perpendicular to the direction of axial movement of said packing ring so that said stops oppose rotation and facilitate axial movement of said packing ring.

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