Sept. 20, 1932. J. W. STAUP 1,878,429

DREDGE PUMP

Filed May 9, 1930

Fig. 1.

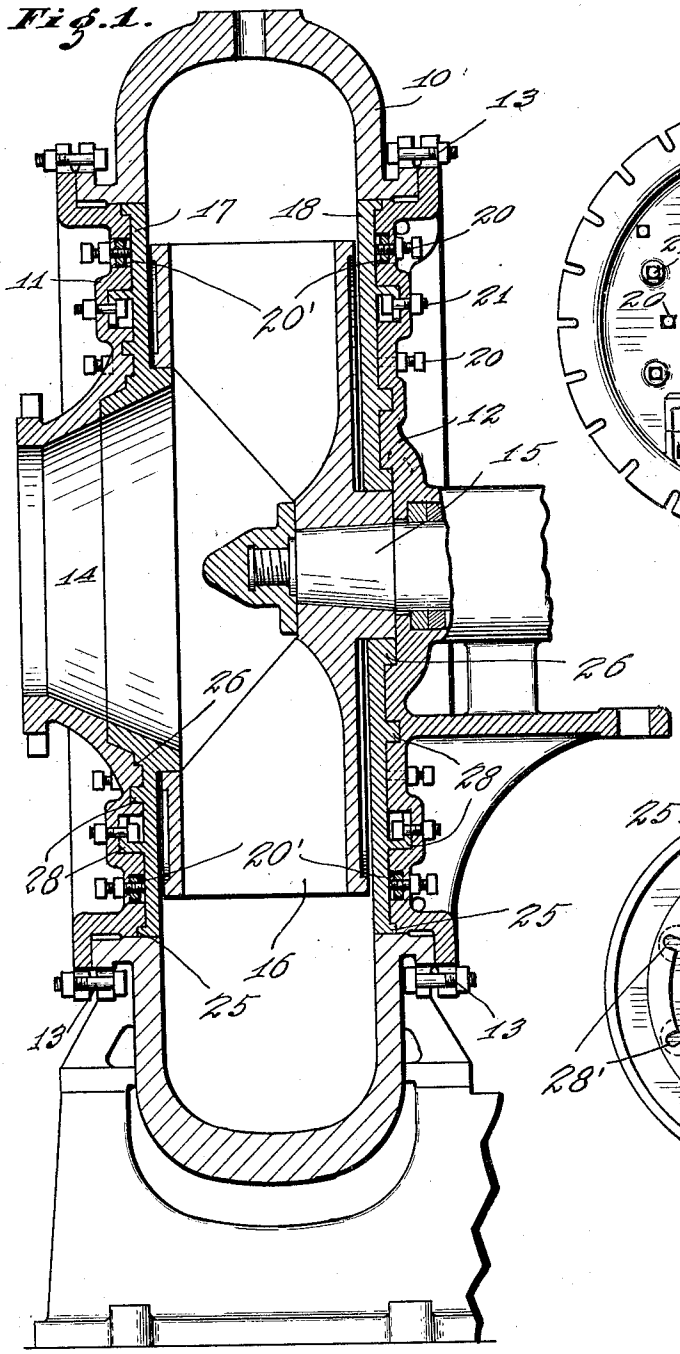


Fig. 2.

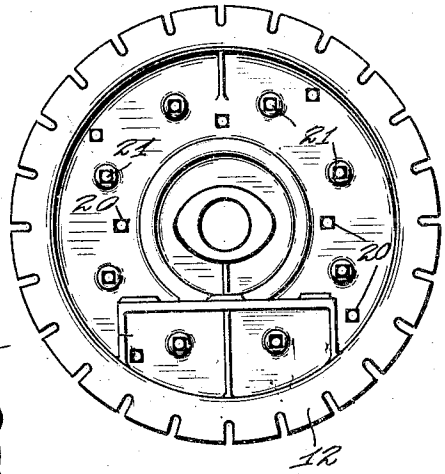
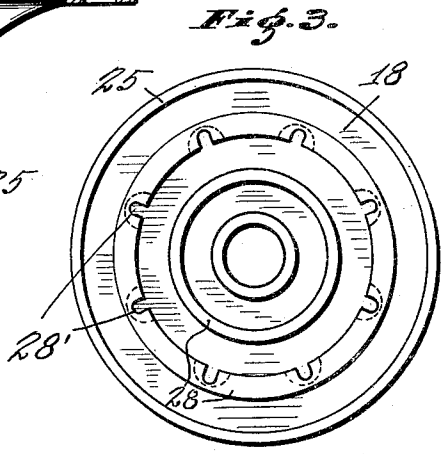


Fig. 3.



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UNITED STATES PATENT OFFICE

JOHN W. STAUP, OF TERRE HAUTE, INDIANA

DREDGE PUMP

Application filed May 9, 1930. Serial No. 450,909.

My invention is concerned with centrifugal pumps, particularly with pumps of the type having an axially adjustable wearing plate which can be maintained in proper relation to the pump-impeller. It is the object of my invention to produce such a pump in which by-passing of the pumped liquid back of the wearing plate will be prevented.

In carrying out my invention, I provide within the pump-casing, and desirably on each side of the impeller, a wearing plate mounted for axial adjustment; and I provide each wearing plate and the adjacent end-wall of the pump casing with engaging cylindrical surfaces each pair of which forms a seal preventing any radial flow of liquid between the wearing plate and such end-wall.

The accompanying drawing illustrates a pump embodying my invention: Fig. 1 is an axial section through the pump-casing and impeller; Fig. 2 is an elevation of one end-plate of the pump-casing; and Fig. 3 is an elevation showing the exterior surface of a wearing plate.

The pump casing in which my invention may be embodied is susceptible of considerable modification, that shown in the drawing comprising an annular body 10 and end-plates 11 and 12 which are mounted on opposite sides of the body 10 as by means of bolts 13. One of the end-plates, here shown as the end-plate 11, is provided with an inlet opening 14, and the other end-plate is provided with a bearing for an impeller shaft 15 which projects into the interior of the casing and has mounted upon it an impeller 16.

The construction and operation of such a pump, in general, is well understood. As the impeller is rotated, liquid is drawn in through the inlet opening into the impeller 16. Such liquid escapes from the impeller under the action of centrifugal force to the outer portion of the casing from which it is discharged through a suitable outlet opening (not shown).

In such a pump, it is desirable that the axial end faces of the impeller be closely adjacent to stationary surfaces which may be the inner surfaces of wearing plates. These surfaces, and the axial end-faces of the impeller, are susceptible to wear, particularly when the pump is employed to pump liquids containing sand or other abrasive material. To compensate for the wear thus produced, it has been proposed to make the wearing plates axially adjustable from without the casing in order that a proper fit between the impeller and the wearing plate may be maintained at all times.

In the pump shown in the drawing, there are two wearing plates 17 and 18 associated respectively with the end plates 11 and 12. Associated with each wearing plate are a series of adjusting screws 20 and a series of adjusting bolts 21. The former are screw-threadedly received in nuts 20′ located in non-circular recesses in the inner faces of the end-plates or heads 11 and 12 and bear at their inner ends against the outer surfaces of the wearing plates, while the adjusting bolts 21 are secured to the wearing plates and pass outwardly through the end plates to receive their associated nuts. It will be apparent that the adjusting screws 20 can be employed to force the wearing plates inwardly toward the impeller, while the bolts 21 can be employed to move the wearing plate in the opposite direction, or away from the impeller. This adjusting means, while permitting any desired adjustment of the wearing plates, still holds each wearing plate positively in any position of adjustment.

For the purpose of preventing flow of liquid between the end plates and the wearing plates, I provide, as previously stated, cylindrical surfaces on the wearing plates and end plates, which surfaces respectively engage to provide a multiplicity of seals. As shown in the drawing, the periphery of each end plate fits closely the bore of the casing-body 10 to provide one pair of sealing surfaces. In addition, each wearing plate is provided at its periphery with an outwardly extending annular flange 25 which is received within a rabbet groove in the adjacent wearing plate. The inner surfaces of this flange and the engaging inner surface of the rabbet groove provide another seal. A similar annular flange or shoulder 26 near the inner end of each wearing plate is re-

ceived in an associated rabbet groove in the adjacent end-plate to provide an additional seal. Further, between the center and exterior of each wearing plate, there may be one or more additional annular flanges 28 which are received in annular grooves in the associated end plate. Each of these intermediate flanges with its associated groove provides two sets of sealing surfaces.

If desired, one of the flanges 28 may be provided with a series of undercut slots 28′ for the reception of the heads of the bolts 21.

While I have shown all the flanges as being on the wearing plates and all the flange-receiving grooves as being on the end plates, it will be apparent that this arrangement, in any or all instances, can be reversed if desired.

The sealing surfaces should be cylindrical so that axial adjustment of the wearing plate will not interfere with their interengagement. The seals provided by the sealing surfaces prevent any liquid from flowing from the periphery of the casing-body 10 toward the center of the pump between the wearing plates and the end-plates. If such flow of liquid were permitted, it would find its way again into the impeller to be re-pumped, and this would represent a substantial loss in efficiency. Further, where the liquid being pumped carries abrasive material, any flow back of the wearing plates would seriously abrade the adjusting means.

I claim as my invention:

1. In a centrifugal pump having an impeller and a casing provided with end-walls between which the impeller rotates, a wearing plate between said impeller and one of said end-walls, means for adjusting said wearing plate toward or away from said impeller, provisions associated with said wearing plate and its associated wall for preventing radial flow of liquid between such end-wall and wearing plate comprising an annular flange on one of said parts and an annular flange-receiving groove on the other part, the axially extending sides of such flange and groove being concentric cylindrical surfaces, the cylindrical surfaces of said flange cooperating with those of said groove to provide seals preventing radial flow of liquid between such end-wall and wearing plate.

2. In a centrifugal pump having an impeller and a casing provided with end-walls between which the impeller rotates, a wearing plate between said impeller and one of said end-walls, means for adjusting said wearing plate toward or away from said impeller, provisions associated with said wearing plate and its associated wall for preventing radial flow of liquid between such end-wall and wearing plate comprising an annular flange on said wearing plate and an annular flange-receiving groove on said end-wall, the axially extending sides of such flange and groove being concentric cylindrical surfaces, the cylindrical surfaces of said flange co-operating with those of said groove to provide seals preventing radial flow of liquid between such end-wall and wearing plate.

3. In a centrifugal pump having an impeller and a casing provided with end walls between which the impeller rotates, a wearing plate between said impeller and one of said end walls, an annular rabbet groove in said end wall having cylindrical side surfaces, a complementary annular flange on said wearing plate having cylindrical surfaces mating with the side surfaces of said groove and having a series of undercut slots, bolts extending through said end wall into said groove and having their heads received in said undercut slots, nuts on said bolts outside said end wall whereby said wearing plate may be drawn toward said end wall, and thrust screws in said end walls whereby said wearing plates may be pushed toward said impeller.

4. In a centrifugal pump having an impeller and a casing provided with end walls between which the impeller rotates, a wearing plate between said impeller and one of said end walls, a plurality of annular rabbet grooves in said end wall having cylindrical side surfaces, complementary annular flanges on said wearing plate having cylindrical surfaces mating with the side surfaces of said grooves, one of said flanges having a series of undercut slots, bolts extending through said end wall into the groove associated with the flange having said undercut slots and having their heads received in said undercut, nuts on said bolts outside said end wall whereby said wearing plate may be drawn toward said end wall, and thrust screws in said end walls whereby said wearing plates may be pushed toward said impeller.

In witness whereof, I have hereunto set my hand at Terre Haute, Indiana, this 6th day of May, A. D. one thousand nine hundred and thirty.

JOHN W. STAUP.