March 1, 1932. H. E. ADAMS 1,847,548

REVERSIBLE HYDROTURBINE PUMP

Original Filed April 16, 1930 3 Sheets-Sheet 1

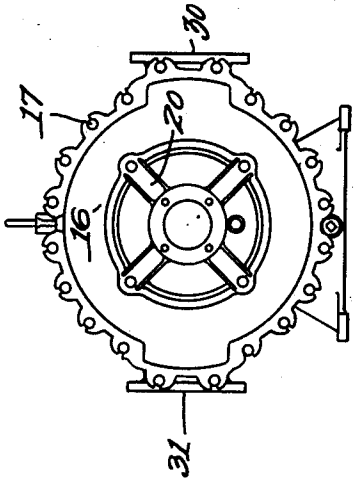


Fig. 2

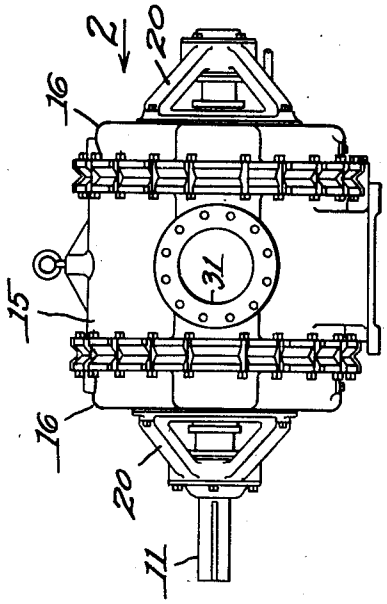


Fig. 1

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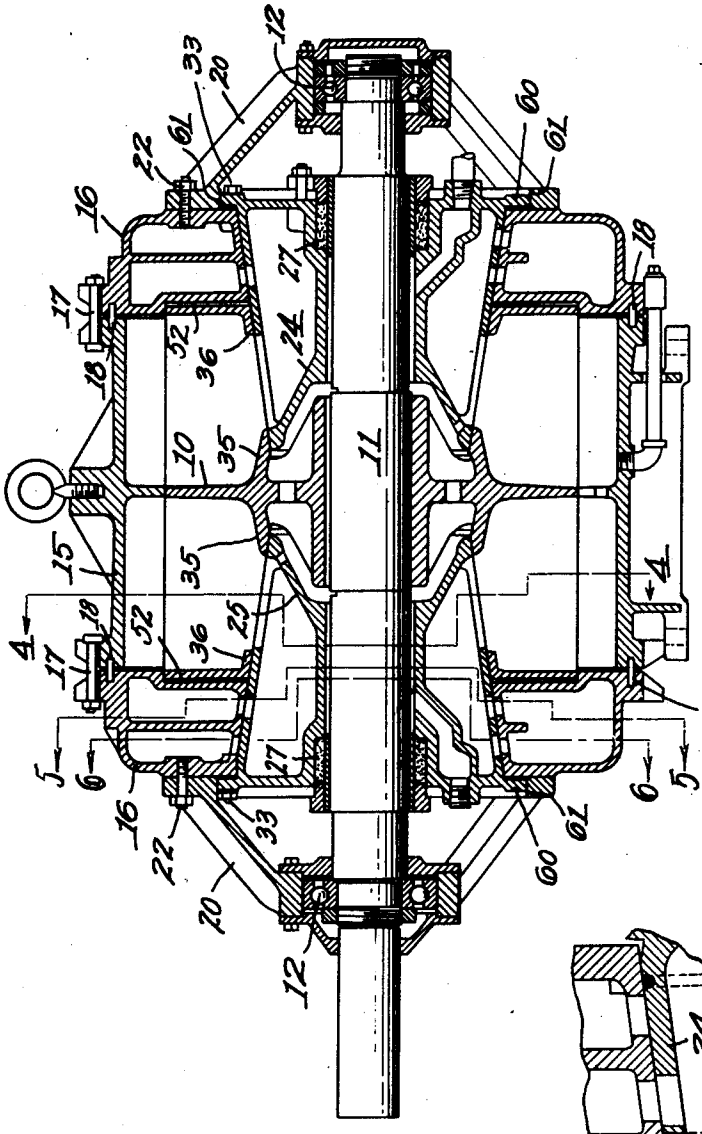


Fig. 3.

Fig. 7.

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REVERSIBLE HYDROTURBINE PUMP

Original Filed April 16, 1930 3 Sheets-Sheet 3

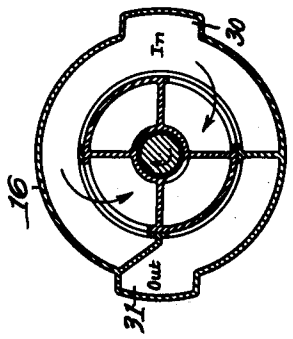


Fig. 6.

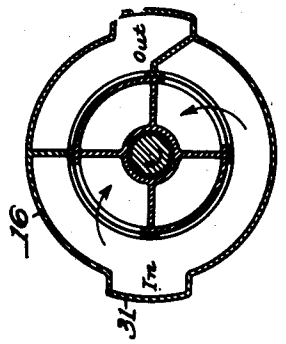


Fig. 6A.

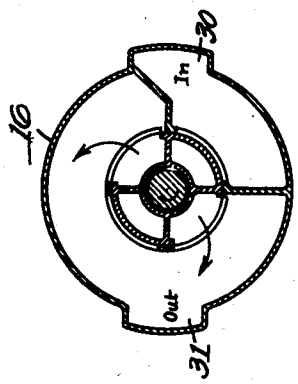


Fig. 5.

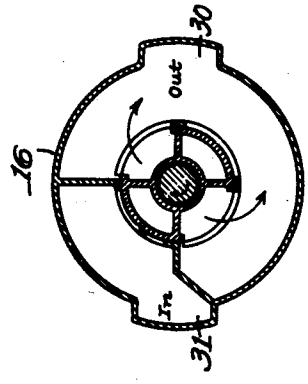


Fig. 5A.

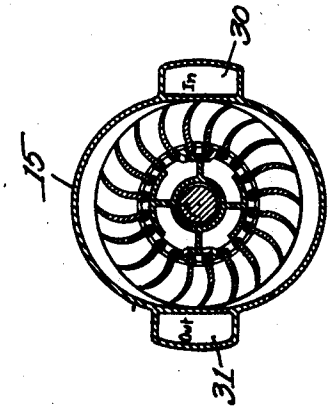


Fig. 4.

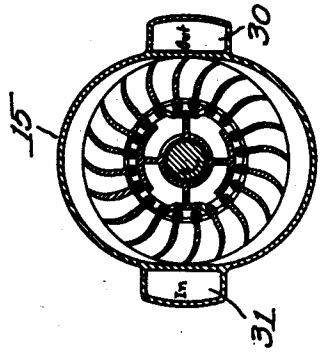


Fig. 4A.

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Patented Mar. 1, 1932 1,847,548

UNITED STATES PATENT OFFICE

HAROLD E. ADAMS, OF SOUTH NORWALK, CONNECTICUT, ASSIGNOR TO NASH ENGINEERING COMPANY, OF SOUTH NORWALK, CONNECTICUT, A CORPORATION OF CONNECTICUT

REVERSIBLE HYDROTURBINE PUMP

Original application filed April 16, 1930, Serial No. 444,837. Divided and this application filed December 13, 1930. Serial No. 502,209.

This is a division of my application, Serial No. 444,837, filed by me April 16, 1930.

This invention relates to hydro-turbine pumps of the type employing water or other liquid as the pumping medium and in which the water alternately enters and recedes from a series of pockets in a revolving rotor within an eccentric casing. The pump is preferably provided with tapered or conical port members extending within the opposite side portions of the revolving rotor.

An important object of the invention is to provide a construction in a hydro-turbine pump by which certain of the parts may be readily re-arranged or reversed in position in such a way as to cause the rotor to revolve in a different direction or to adapt the pump to either a right or a left hand drive.

My invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of the invention is shown in the drawings, in which

Fig. 1 is a front elevation of one form of my improved pump;

Fig. 2 is a right hand end view thereof;

Fig. 3 is an enlarged sectional front elevation of the pump shown in Fig. 1;

Figs. 4, 5 and 6 are sectional end elevations, taken along the lines 4—4, 5—5 and 6—6 in Fig. 3, respectively;

Figs. 4A, 5A and 6A are views similar to Figs. 4, 5 and 6, but showing the parts differently arranged, and

Fig. 7 is an enlarged detail sectional view to be described.

Referring particularly to Fig. 3, I have shown a hydro-turbine pump having a rotor 10 mounted on a shaft 11 and rotatable in anti-friction bearings 12—12. The rotor 10 revolves in a casing 15 having heads 16—16 secured thereto by bolts 17 and held from displacement by dowels 18.

Brackets 20 are secured to the members 16 by bolts 22 and support the ball bearings 12. Tapered or conical port members 24 and 25 are mounted in the heads 16 concentric with the axis of the shaft 11. Suitable packing 27 is provided between the members 24 and 25 and the shaft 11 to prevent the escape of liquid along these surfaces.

The members 24 and 25 are also provided with accurately finished end flanges 60, closely fitting in circular recesses 61 in the brackets 20. These recesses 61 are accurately concentric with the ball bearings 12.

The conical port members 24 and 25 are also tightly fitted against conical bearing surfaces in the heads 16 and are secured therein by clamping bolts 33. At their inner ends, the port members 24 and 25 extend into conical center bearing portions 35 and 36 of the rotor 10 and have a close running fit relative thereto.

Suitable inlet and outlet passages are provided in the heads 16, and the port members 24 and 25 are provided with passages and port openings communicating with the inlet and outlet passages in the heads and also communicating with the openings in the bottoms of the pockets in the rotor 10.

With this construction, it will be apparent that the rotor 10, the shaft 11, the bearings 12, the brackets 20 and the conical port members 24 and 25 form an assembly of relatively moving parts, all of which may be easily machined with great accuracy.

When the parts are assembled in the pump casing, the port members 24 and 25 will be definitely located in the pump casing, the brackets 20 will be centered by the port members, the bearings 12 will be centered by the brackets 20, and these bearings will in turn center the shaft 11 and rotor 10, all of these parts being accurately concentric with reference to the port members 24 and 25.

The rotor may thus be made with very slight running clearance relative to the inner ends of the port members 24 and 25, a condition necessary for satisfactory operation of this type of pump.

It is sometimes desirable that the driving pulley or connection in a hydro-turbine pump be placed at the right hand end of the rotor shaft when facing the pump outlet and at the other times it is desirable that the driving connection be made at the left hand end of the shaft. This is readily accomplished with my improved construction by merely

reversing the shaft 11 in the rotor 10 and reassembling the parts.

It is also sometimes desirable to reverse the direction of rotation of the rotor in a hydro-turbine pump without changing the inlet and outlet constructions. This also may be readily accomplished in my improved construction by reversing the rotor 10, and turning the heads 16 one half of a revolution relative to the pump casing 15. The rotor 10 may then be driven in the opposite direction and the pump will function perfectly and without change in the inlet or outlet connections, which are indicated at 30 and 31 respectively in Figs. 4 to 6A.

Comparing Figs. 4 and 4A, it will be seen that the rotor 10 is reversed but that the casing 15 is not reversed. Also comparing Figs. 5 and 6 with Figs. 5A and 6A, the heads 16 are indicated as being rotated 180° in Figs. 5A and 6A, so that they will cooperate with the reversed rotor.

Sealing water is introduced to provide an effective seal between the hub portion 35 of the rotor 10 and the ends of the port members 24 and 25. The joints between the rotor portions 36 and the port members 24 and 25 are also effectively sealed by water from the body of the casing, introduced through the clearance spaces 52 between the ends of the rotor and the inner faces of the heads 16.

I have thus provided a construction in a hydro-turbine pump such that the parts may be readily cast, machined and assembled and such that the alignment may be easily and accurately maintained.

I have further provided a construction in which the same parts may be re-arranged to provide a pump rotating in the opposite direction with respect to the inlet and outlet connections, and I have provided a pump in which the drive may be readily placed at either the right or left hand end of the pump.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:—

1. In a hydro-turbine pump, a rotor having pockets with port openings therein, a casing enclosing said rotor, and heads for said casing, each head having inlet and outlet ports cooperating with said rotor port openings and being so constructed that it may be secured in either of two diametrically opposite angular relations to said casing, whereby said pump may be caused to receive and discharge air in either of two directions while the direction of rotation of the rotor remains unchanged.

2. In a hydro-turbine pump, a rotor having pockets with port openings therein, a casing enclosing said rotor, and heads for said casing, each head having inlet and outlet ports cooperating with said rotor port openings and having passages therein connected to said ports and so disposed that the head may be secured in either of two diametrically opposite angular relations to said casing, whereby said pump may be caused to receive and discharge air in either of two directions while the direction of rotation of the rotor remains unchanged.

3. The combination in a hydro-turbine pump as set forth in claim 2, in which the ports in the casing are formed in separate port members mounted in said heads and interchangeable between said heads when the direction of rotation of the rotor is to be reversed.

4. In a hydro-turbine pump, a rotor having pockets with port openings therein, a casing enclosing said rotor, heads for said casing, and port members mounted in said heads and having inlet and outlet ports cooperating with said rotor port openings, each head having a passage communicating with an inlet port in its associated port member and having another passage communicating with an outlet port in said member when said head and port member are assembled in a predetermined relation.

5. The combination in a hydro-turbine pump as set forth in claim 4, in which each port member has two assembly positions with respect to its associated head, and in which each port in said member communicates with a different passage in the head in each different assembly position.

In testimony whereof I have hereunto affixed my signature.

HAROLD E. ADAMS.