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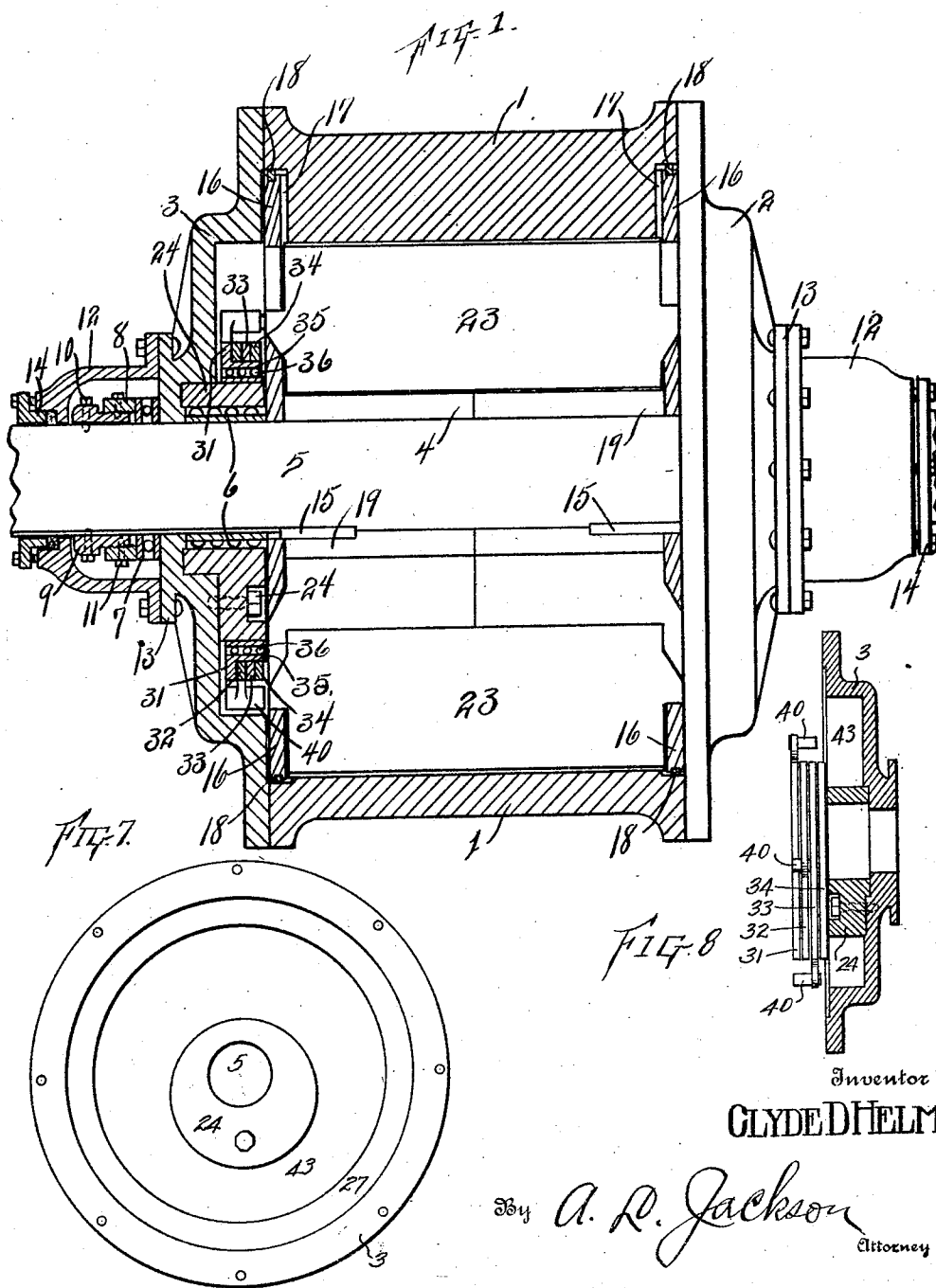
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C. D. HELM

ROTARY PUMP AND THE LIKE

Filed Feb. 5, 1924

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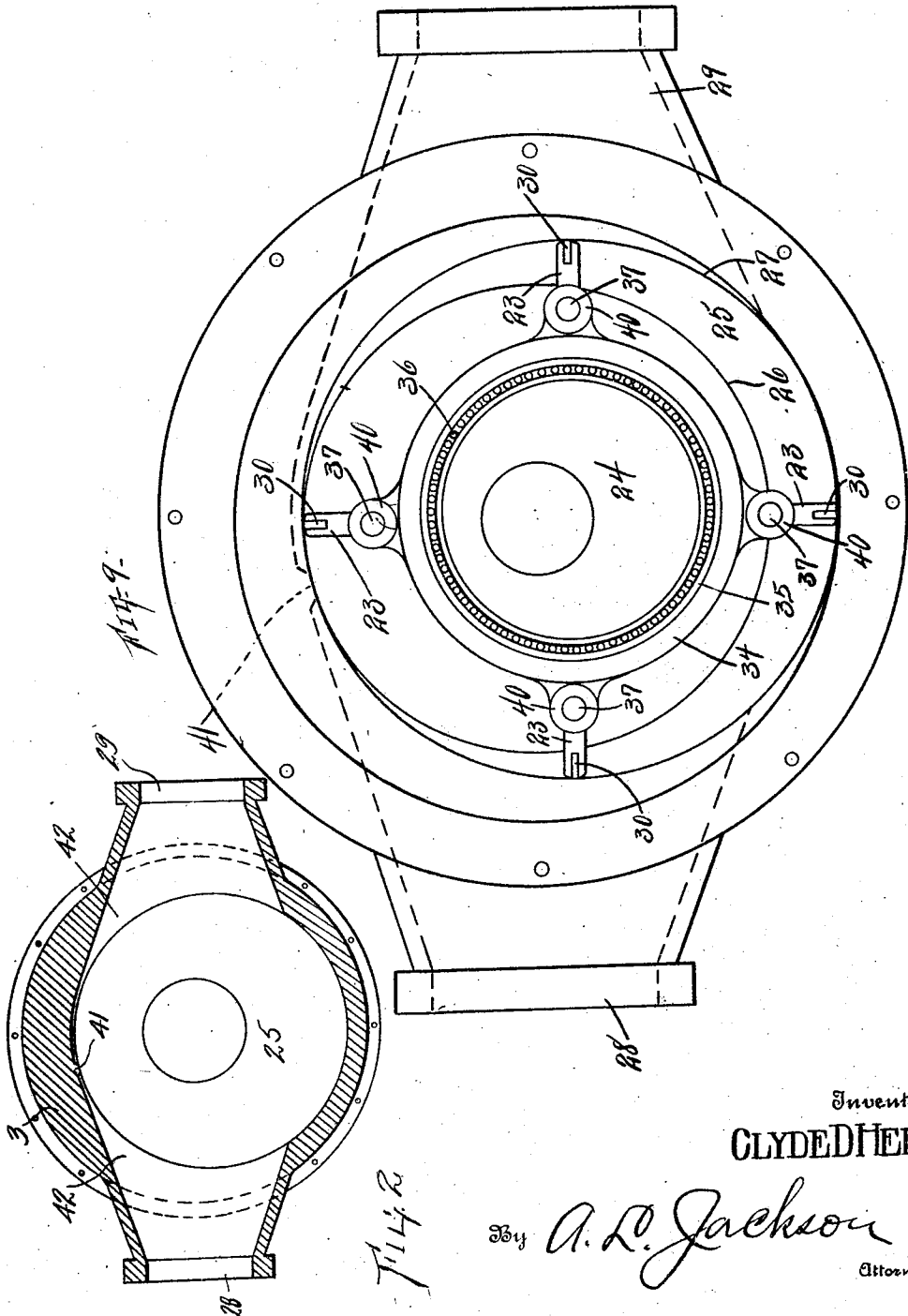
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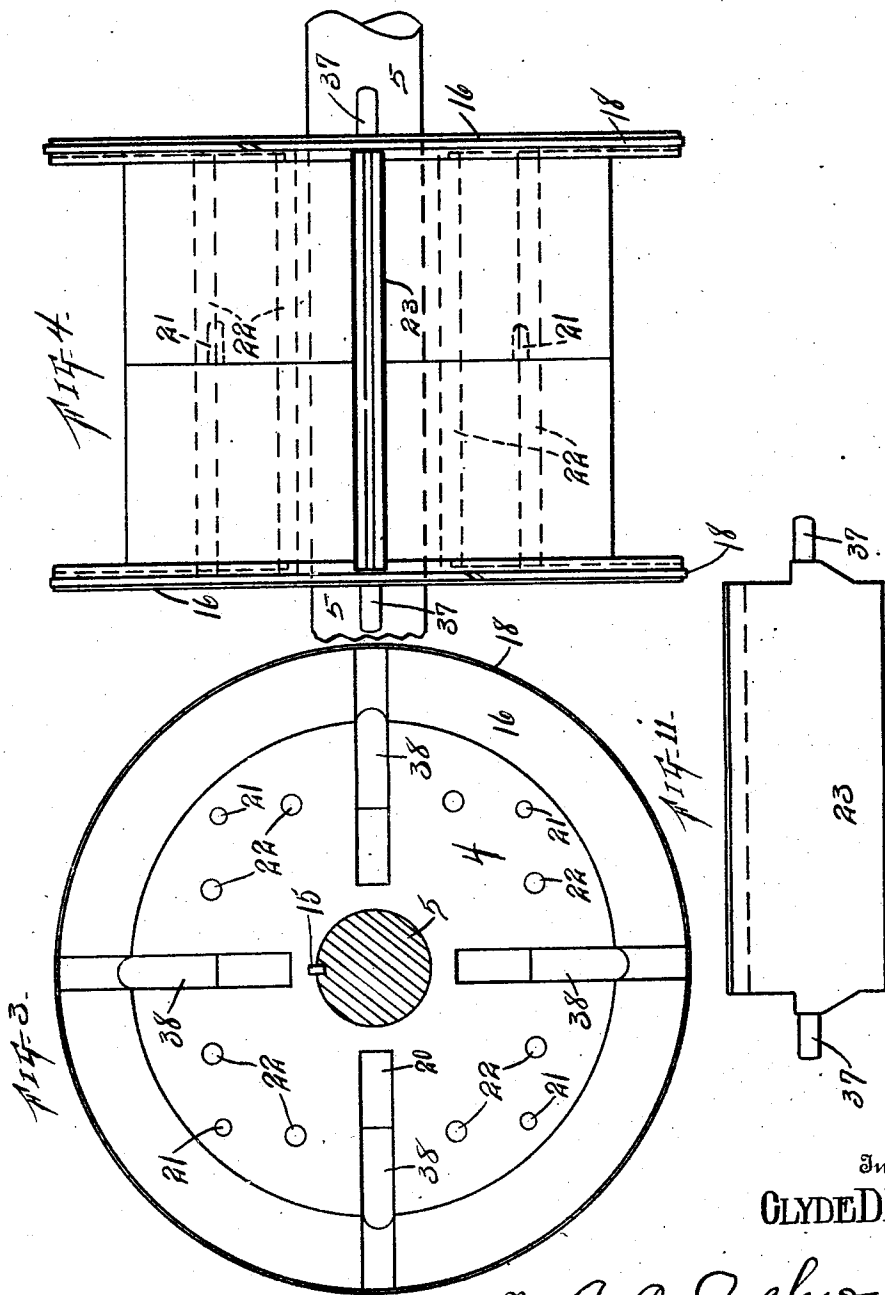
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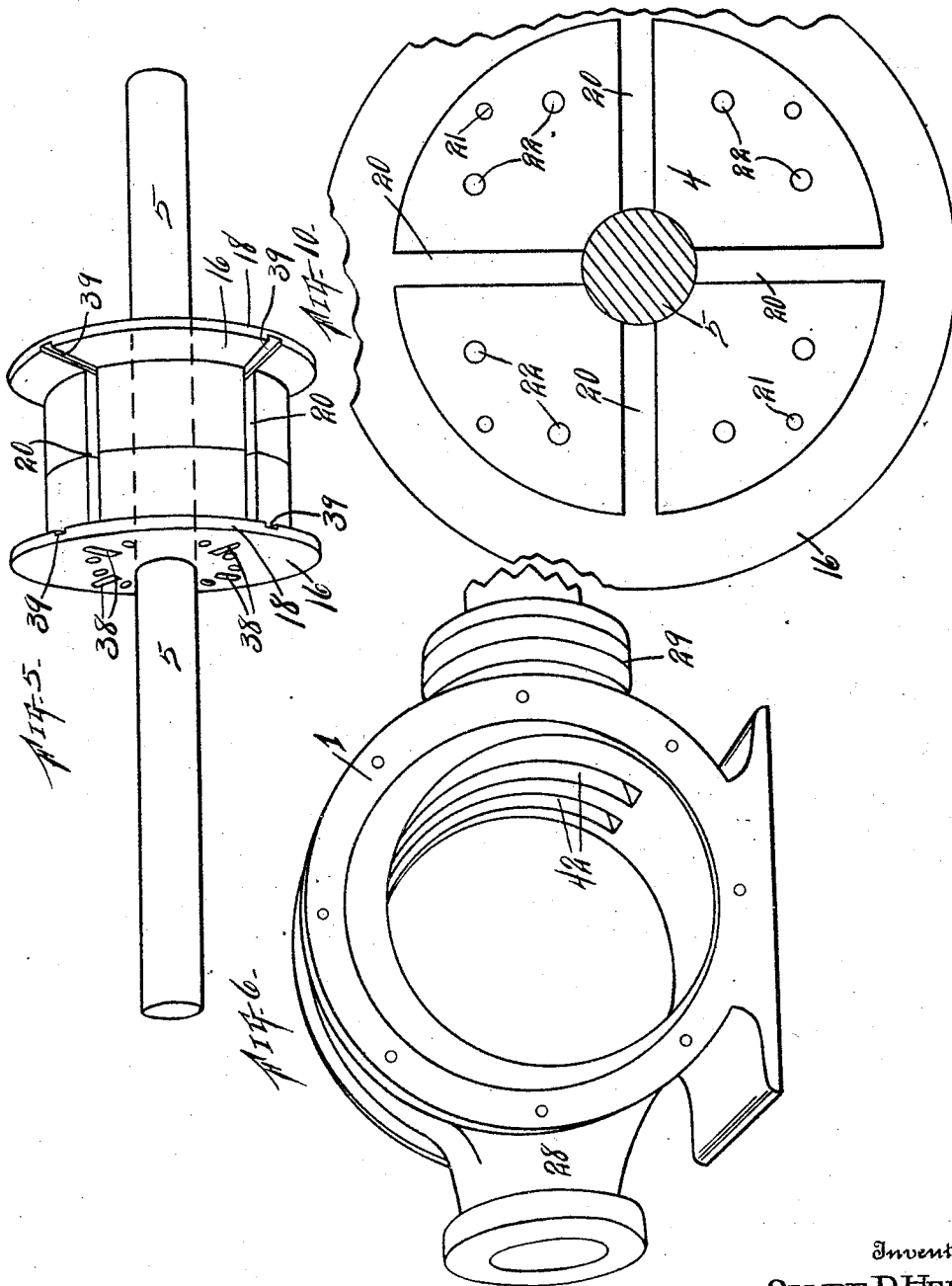
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

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ROTARY PUMP AND THE LIKE.

Application filed February 5, 1924. Serial No. 690,738.

My invention relates to rotary pumps and motors; and the object is to provide a rotary pump or motor of high efficiency and in which the driving elements operate with the least possible friction and in which positive control is provided for making the outer edges of the propellers run in a true circle so that friction against the interior of the surrounding wall is prevented and to provide sealing means for the propellers to prevent leakage between the propellers and the surrounding wall. Another object is to provide a pump or motor in which the power elements run in a true circle and to provide off-set bearings and controlling elements operating from said bearings to control the motion of the propellers. The object is to provide water and steam motors, pumps for air, gases, ammonia, and other liquids. Other objects and advantages will be fully explained in the following description and the invention will be more particularly pointed out in the claims.

Reference is had to the accompanying drawings which form a part of this application.

Fig. 1 is a longitudinal section of the rotor and a part of the casing shown in section and a part shown in side elevation.

Fig. 2 is a cross-section of the casing.

Fig. 3 is an interior elevation of one of the rotor heads.

Fig. 4 is an elevation of the rotor, showing, in dotted outline, the position of the blades or propellers.

Fig. 5 is a perspective view of the rotor and the shaft.

Fig. 6 is a perspective view of the cylindrical part of the casing.

Fig. 7 is an interior elevation of one of the casing heads.

Fig. 8 is an elevation of the control yokes and a section of one casing head.

Fig. 9 is an elevation of the pump with one head of the casing removed.

Fig. 10 is an end view of the rotor without the heads, and Fig. 11 is a view of one of the propellers.

Similar characters of reference are used to indicate the same parts throughout the several views.

The pump is provided with a circular casing wall 1 and heads 2 and 3 bolted thereto. A rotor 4 is mounted therein by means of a shaft 5. The shaft 5 is journaled in the heads 2 and 3 and roller bearings 6 are pro-

vided for the shaft 5 in the heads 2 and 3. End thrust bearings 7 are provided for the heads 2 and 3. The bearings 7 are adjustable by means of a collar 8 and a collar 9. The collar 8 is screwed on a collar 9. The collar 9 is adjusted on the shaft 5 and made rigid therewith by bolts 10. The collar 8 may then be adjusted and fixed on the collar 9 by bolts 11. The collars 8 and 9 are protected by caps 12 which are bolted to flanges 13 on the heads 2 and 3. Packing glands 14 for the pump are attached to the caps 12. The rotor 4 is made to move with the shaft 5 by means of the key 15.

The rotor 4 has heads 16 and the cylinder 1 has interior annular grooves 17 in which the heads 16 project. The outer peripheries of the heads 16 have annular grooves therein and packing or sealing rings 18 are mounted in these grooves for sealing purposes. The heads 16 have inwardly projecting hubs 19 and cut-outs are made in the heads 16 and in the rotor 4 to receive propellers. The rotor 4 has four radially disposed slots 20 to receive the propellers. The heads 16 are positioned on the rotor 4 by dowel pins 21 and the heads 16 are attached to the rotor 4 by bolts 22.

The propellers 23 are mounted in the slots 20 in the rotor 4 and are movable radially in these slots. The propellers are driven by the rotor and means are provided for controlling the movement of the propellers. The rotor 4 revolves with the shaft 5 as the center. But the heads 2 and 3 have circle bearings 24 which are off-set relative to the center of the shaft 5. A cavity 25 concentric relative to bearing 24 is formed in the casing but eccentric relative to the shaft 5 and the periphery of the rotor will follow the circle 26, shown in Fig. 9, but the outer edges of the propellers 23 will follow the circle 27 and thus compel the fluid which is being pumped to pass through the lower part of the space 25. The fluid will be received through the intake 28 and discharged through the outlet 29. The outer edges of the propellers 23 are provided with slots therein for sealing bars 30 which are loosely mounted in the slots. The outer edges of the propellers are made to follow the circle line 27 by means of the control yokes 31, 32, 33, and 34, which are mounted on the bearing 24 of the casing. It will be understood that the heads 2 and 3 are both provided with bearings 24 and that the yokes

31, 32, 33, and 34 are provided on both heads. The yoke 31 has a sleeve 35 on which ring yokes 32, 33, and 34 are loosely mounted. The sleeve 35 runs on ball bearings 36 which
 5 engage the bearing 24. Each blade 23 has lugs or trunnions 37 which project through slots 38 in heads 16 and the ends of the propellers 23 run in grooves 39 in the inside of heads 16 and these grooves 39 are in align-
 10 ment with slots 20 in the rotor 4. Each ring 31, 32, 33, and 34, has a bearing 40 to receive a trunnion 37. The slots 38 are radially disposed to guide the movement of the propellers 23. Thus positive drive of the
 15 propellers radially is afforded by the bearing cams 24 and the control rings 31, 32, 33, and 34 and the revolving drive is afforded by the shaft 5. The rings 31, 32, 33, and 34 prevent friction of the propellers against the inner
 20 periphery of the casing 1 and the loosely mounted sealing bars 30 co-operate with the propellers. A positive cut-off or division 41 is provided to form a seal for the rotor. Fluid is taken in through intake 28 and the
 25 fluid passes through the slots 42 which extend to the seal 41. The outlet 29 has the same openings or grooves 42. The object is to prevent the trapping of the water or other fluid, in case of heavy pressure. Cavi-
 30 ties 43 are made in the casing heads 2 and 3 for the propeller control rings 31-34. The motor has rotor driven with main shaft 5 as the center of the drive and has an off-set propeller control and a load is taken on
 35 gradually and discharged gradually. The propeller control rings 31-34 have slight movement relative to each other to compensate for off-center positions and to prevent binding. In operation, two diagonally op-
 40 posite bearings 40 do not always remain diagonally opposite.

One of the distinguishing features of this invention is that the rotor runs in a true circle which is concentric with the main shaft
 45 and the propeller control rings are true circles and the bearings 24 are true circles. It is apparent that the rotor may be changed in construction and various changes in the construction, sizes, proportions, and arrange-
 50 ment of the several parts may be made without departing from my invention.

What I claim, is,—

1. A rotary pump comprising a casing composed of a cylindrical member provided
 55 with a circular cavity therein and heads for said cylindrical member provided with curved cavities in their inner faces, a drive shaft and a rotor mounted thereon within said casing and provided with radial grooves
 60 therein, off-set circle bearings on the inner faces of said heads, propellers loosely mounted in said grooves and driven by said rotor, and propeller controlling rings nested to-
 65 gether and mounted and revoluble on said bearings and operatively connected to said

propellers, a pair of rings being used for each propeller.

2. A rotary pump comprising a casing composed of a cylindrical member provided with a circular cavity therein and heads for
 70 said cylindrical member provided with curved cavities in their inner faces, a drive shaft journaled in said casing and a rotor mounted on said shaft and driven thereby within said casing and provided with radial
 75 grooves therein, propellers mounted loosely in said grooves and driven by said rotor, off-set bearing members formed on the inner faces of said heads, and propeller controlling members nested together and surround-
 80 ing and revoluble on said bearings and operatively connected to said propellers.

3. A rotary pump comprising a casing composed of a cylindrical member provided with a circular cavity therein and heads
 85 for said cylindrical member provided with curved cavities in their inner faces, a drive shaft journaled in said casing and a rotor mounted on said shaft and driven thereby within said casing and provided with radial
 90 grooves therein, propellers mounted loosely in said grooves and driven by said rotor, off-set bearing members formed on the inner faces of said heads, and propeller controlling members nested together and mount-
 95 ed in said off-set curved cavities and surrounding said bearings and operatively connected to said propellers and serving to hold said propellers out of contact with the inner periphery of said cylinder.
 100

4. A rotary pump comprising a casing composed of surrounding circular member and heads attached thereto and provided with curved cavities in their inner faces, a drive shaft journaled in said casing and a
 105 rotor mounted thereon and driven thereby within said casing and concentric with said casing and provided with radial grooves therein, propellers mounted loosely in said grooves and movable radially therein and
 110 driven by said rotor, off-set bearing members formed on the inner faces of said heads, and propeller controlling rings mounted in said curved cavities, one ring having a sleeve surrounding said bearings
 115 and the other ring running on said sleeve and all rings operatively connected to said propellers.

5. A rotary pump comprising a casing composed of a surrounding circular member and heads attached thereto and provided with curved cavities in their inner faces, a drive shaft journaled in said casing and a rotor mounted thereon and provided with radial grooves, propellers mounted loosely
 125 in said grooves and movable radially therein and driven by said rotor, off-set circle bearing members formed on the inner faces of said heads, a pair of propeller controlling members having sleeve hubs mounted
 130

and revoluble on said bearing members and three pairs of propeller controlling members mounted on said sleeve hubs and all of said propeller controlling members being operatively connected to said propellers.

6. A rotary pump comprising a casing composed of a surrounding circular member and heads attached thereto and provided with curved cavities in their inner faces, a drive shaft journaled in said casing and a rotor mounted thereon and provided with radial grooves and slots, propellers mounted loosely in said grooves and movable radially therein and driven by said rotor and provided with lugs operating through said slots, off-set circle bearings formed on the inner faces of said heads, and propeller controlling rings nested together and mounted on said bearings and controlling the radial movement of said propellers, said rings having movement relative to each other to

compensate for off-center positions and to prevent binding.

7. A rotary pump comprising a casing composed of a cylindrical member provided with a circular cavity therein and inlet and discharge ports and heads for said cylindrical member, a drive shaft, and a rotor mounted thereon within said casing and provided with heads having radial grooves and slots therein, off-set circular bearings rigid with said heads, a plurality of propellers mounted loosely in said grooves and driven by said rotor and provided with sealing elements in their outer edges, and propeller-controlling members nested together on said bearings and operatively connected to said propellers through said slots.

In testimony whereof, I set my hand, this 12th day of January, 1924.

CLYDE D. HELM.