Nov. 18, 1924.

J. A. MORGAN

PUMP

Filed Dec. 9, 1922

1,516,053

2 Sheets-Sheet 1

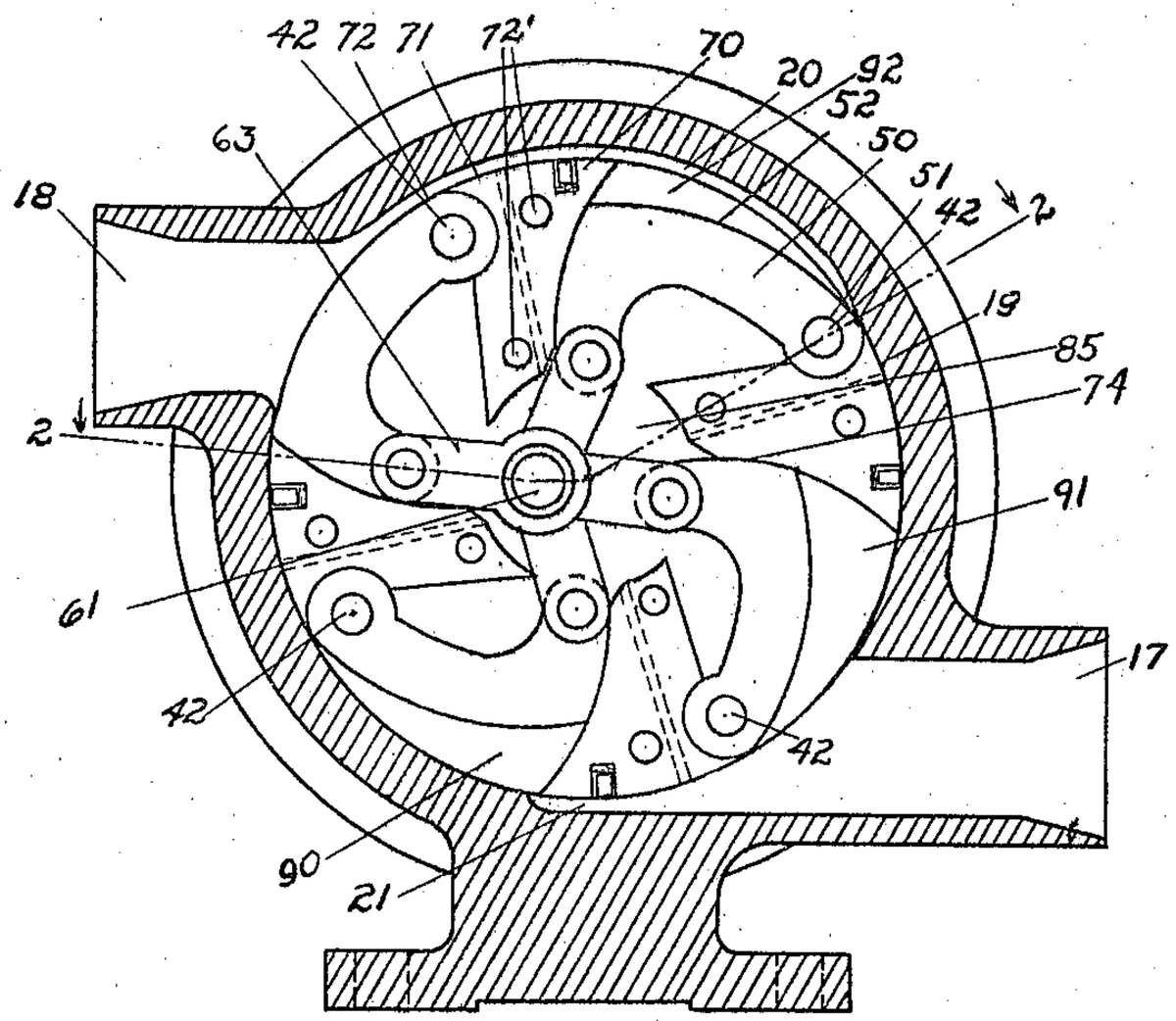

Fig. 1.

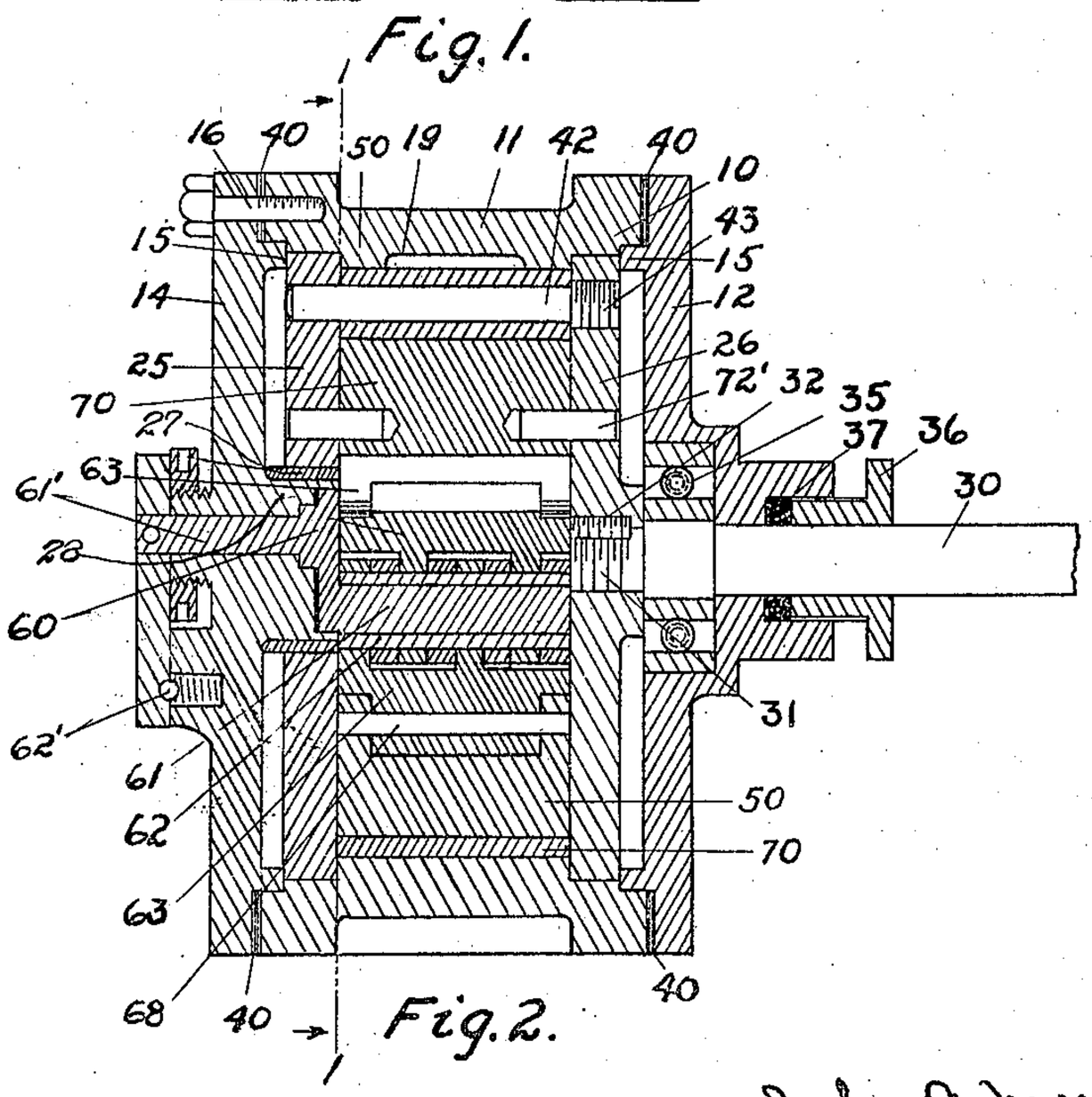

Fig. 2.

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Nov. 18, 1924. 1,516,053

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Filed Dec. 9, 1922 2 Sheets-Sheet 2

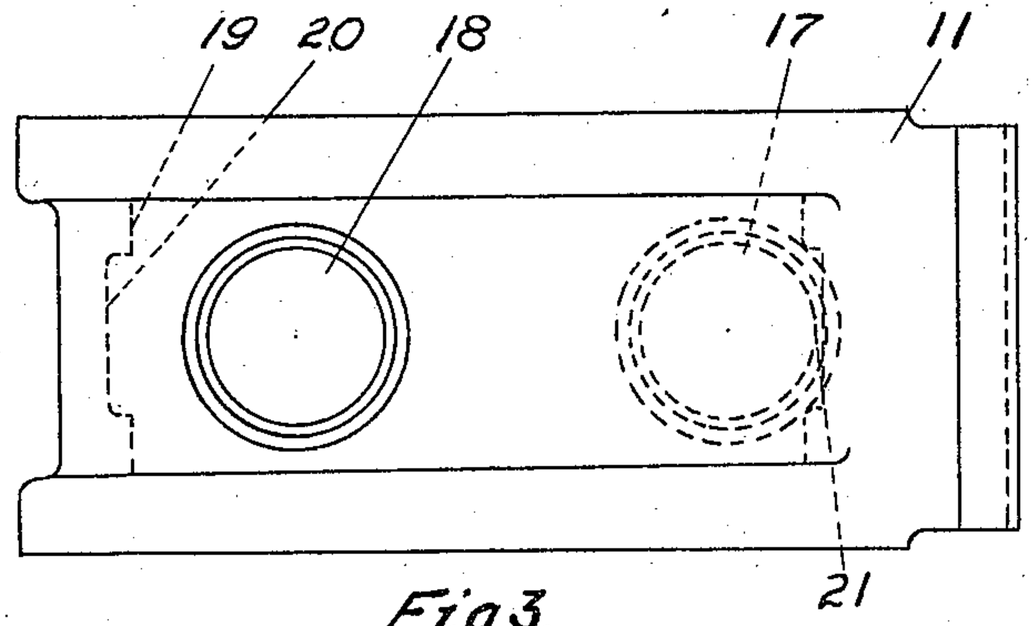

Fig.3.

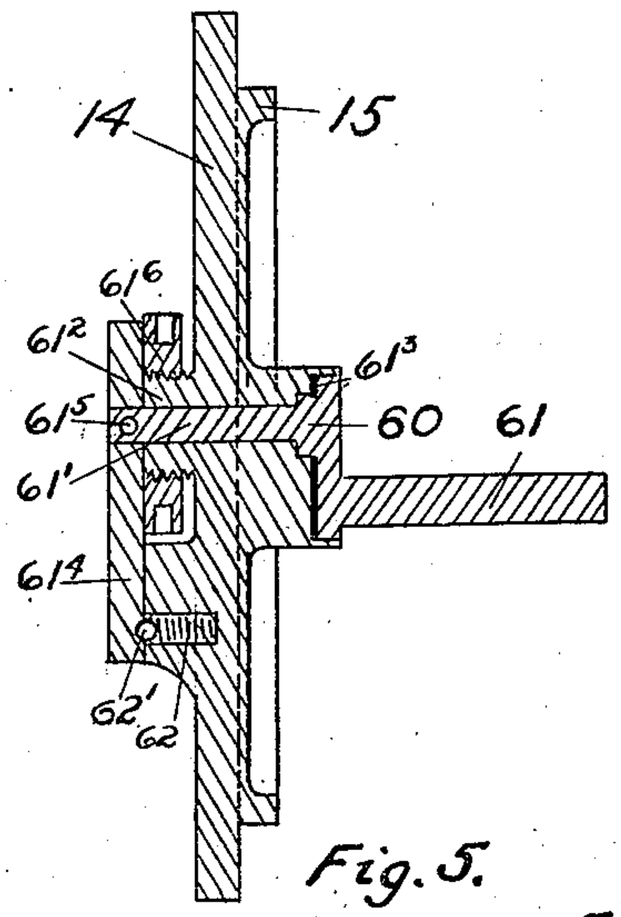

Fig.5.

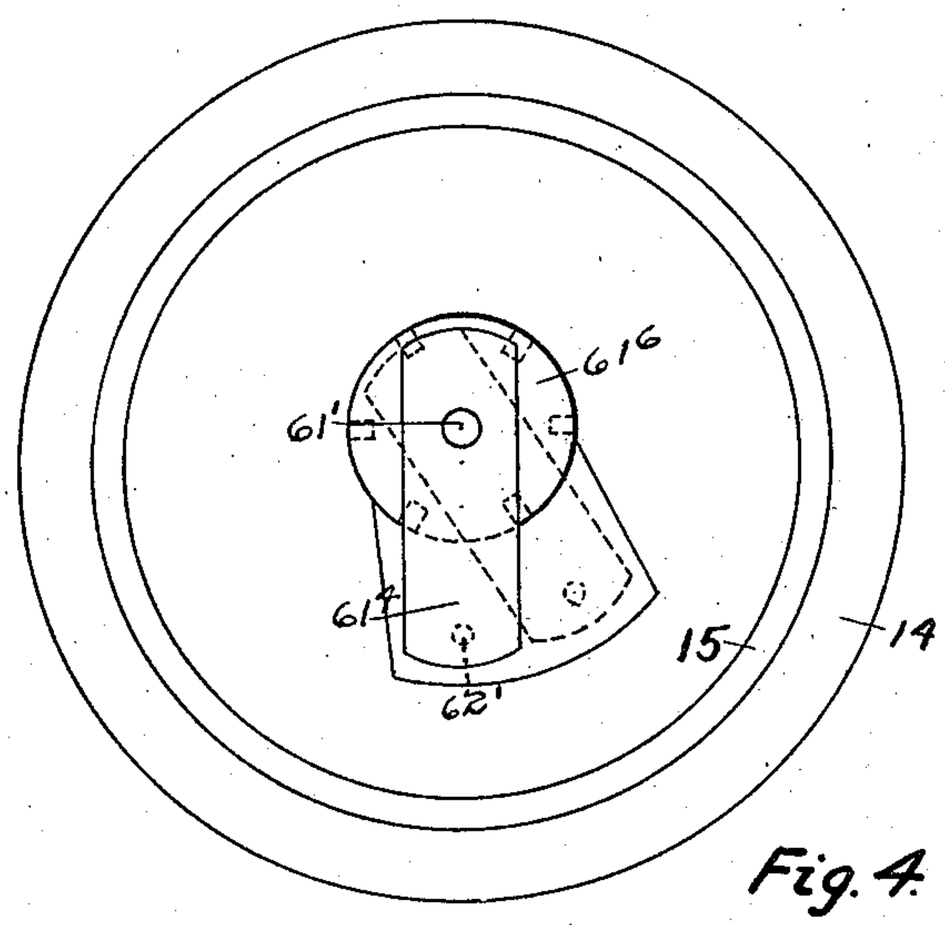

Fig.4.

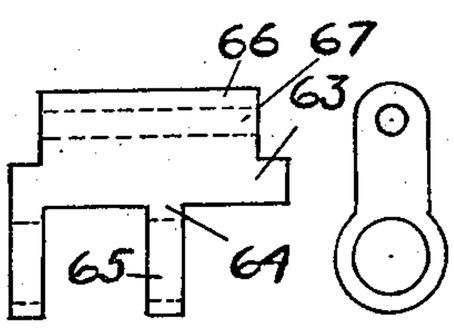

Fig.10.

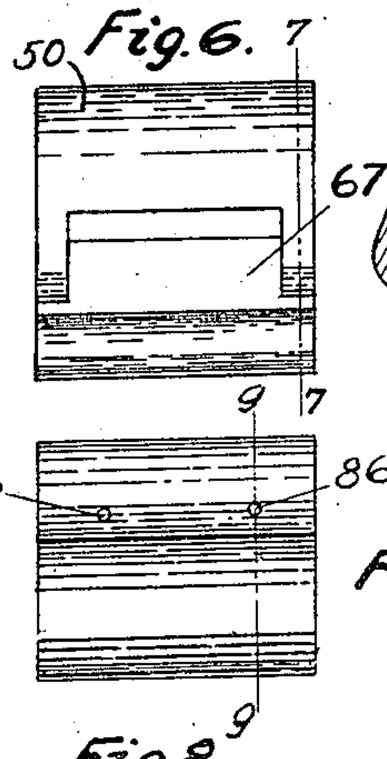

Fig.6. Fig.8.

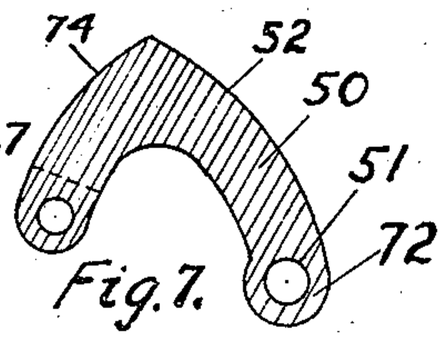

Fig.7.

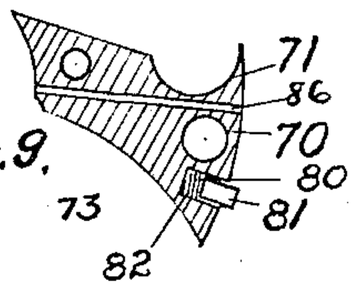

Fig.9.

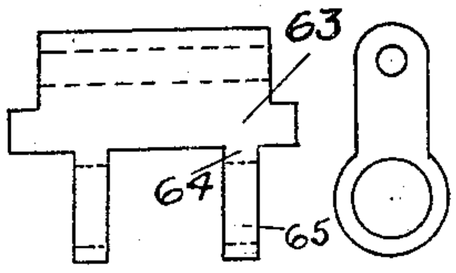

Fig.12.

Fig.13.

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UNITED STATES PATENT OFFICE.

JOHN A. MORGAN, OF LOS ANGELES, CALIFORNIA.

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Application filed December 9, 1922. Serial No. 605,758.

To all whom it may concern:

Be it known that I, JOHN A. MORGAN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a certain new and useful Improvement in Pumps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to means for transmitting power to or from a fluid and the mechanism set forth is adapted to serve as a pump or as a turbine or for other purposes. For simplicity of description, however, the device is described as a pump but I wish it to be clearly understood that it is equally well adapted to serve as a turbine or in other capacities.

The general object of the invention is to provide a rotary pump of such construction that a maximum of efficiency will be obtained and in which the operating parts are few in number, are easily made, and readily assembled.

One of the objects of the invention is to provide a rotary pump, having a rotating member carrying circumferentially and radially moving pistons, with means so that the time and the amount of throw of the pistons toward and from the inner wall of the casing of the pump may be adjusted.

Another object of the invention is to provide a rotary pump with means carried by one or more of the members comprising the pump so that leakage between the moving parts of the pump and the casing of the pump is prevented.

A further object of the invention includes the provision of means so that should any fluid passing through the pump, enter the center chamber of the pump, this fluid will be automatically removed by the rotary action of the pump.

An additional object of the invention is to provide a rotary pump with channels on the inner surfaces thereof leading from the discharge orifice, and to the suction orifice, so that the time during which the discharge and suction is effective may be increased.

Further and other objects of my invention will be apparent from the following specification taken in connection with the accompanying drawing wherein: Fig. 1 is a transverse section through a pump embodying the features of my invention; the section being taken on line 1—1, Fig. 2. Fig. 2 is a section taken on the broken line 2—2, Fig. 1. Fig. 3 is an elevation showing the central part of the pump casing. Fig. 4 is an elevation of an end closure plate for one end of the pump casing. Fig. 5 is a central section, of the closure shown in Fig. 4. Fig. 6 is an elevation of one of the pistons. Fig. 7 is a section of a piston taken on line 7—7, Fig. 6. Fig. 8 is an elevation of one of the abutments. Fig. 9 is a section of an abutment taken on line 9—9, Fig. 8. Fig. 10 is an elevation, and Fig. 11 an end view of a link used to connect an abutment with the eccentric pin. Fig. 12 is an elevation, and Fig. 13 an end view of another link.

Referring to the drawing by reference character, I have shown at 10 a casing comprising a central portion 11 and end closure numbers 12 and 14. The end closures are shown as provided with a boss 15 which fits within the central portion of the casing members. The central part and the ends of the casing may be secured together in any suitable manner as for instance by means of bolts 16.

The central portion 11, of the casing, is shown as provided with an inlet 17 and an outlet 18. This portion has a circular inner peripheral wall 19 which may be provided with an inwardly facing discharge groove 20 which extends circumferentially from the outlet 18 to thus increase the time of discharge. An inwardly facing suction groove 21 extending circumferentially from the inlet, likewise extends the time of suction.

Within the casing I provide a pair of opposed, circular, rotary plates, 25 and 26. The plate 25 as shown is mounted to rotate on a bushing 27 which is arranged upon a boss 28 on the plate 14. The plate 26 has secured thereto a drive shaft 30 which shaft is threaded as at 31 to the plate 26 and is locked thereto by means of the locking screw 32. The shaft 30 may be provided with a suitable bearing, shown as a ball race 35.

A packing gland 36 may serve to secure packing 37 adjacent the joint between the casing and the shaft 30. Likewise, suitable packing 40 may be interposed between the central portion and the end covers of the casing to make the latter fluid tight.

Extending between the rotary plates 25 and 26 I show four quadrantly arranged shafts 42. The ends of each of these shafts

terminate in the plates 25 and 26 and one end of each of the shafts may be secured to the plate 26 by threads as shown at 43.

Mounted upon each of the shafts 42, just described, I show pistons 50 which have apertures 51 at their ends to receive the shaft 42. The face 52 of the pistons contiguous to the inner wall 19 of the casing has the same radius as the casing thereby insuring a close fit between the two parts.

Arranged upon the end closure 14 I show a member 60 having a shaft 61 fixed eccentrically thereto. Mounted upon this shaft 61 is a bushing 62 and arranged upon this bushing are a plurality of connecting links 63.

The links 63 are here shown as four in number and are composed of pairs of links such as are shown in detail in Figs. 10 to 13. By referring to these figures of the drawing it will be seen that the links 63 have projections 64 thereon which are apertured as at 65. The apertures 65 are intended to receive the shaft 61. The arrangement of the projection 64 is such that when the four links are assembled as shown in Fig. 2, the four projecting portions 64 form a solid column. Opposite the projection 64 the links 63 are provided with bearing portions 66 which are apertured as at 67 to receive shafts 68, for a purpose to be described.

One end of each piston 50 as shown in Figs. 6 and 7 is provided with a recess 67 which is adapted to receive a projection 66 on each link 63. The arrangement being such that the shaft 68 connects the links 63 and the pistons 50.

Between each pair of pistons 50 I provide an abutment 70. These abutments are recessed on one face 71 to receive the semi-cylindrical enlargement 72 on a piston. The face 73 of each abutment opposite the pistons is struck with a radius corresponding to the radius of the opposed face 74 of each piston 50. It will thus be seen that the piston 50 has a close sliding fit with the abutment 70. The surface of each abutment adjacent the inner surface 19 of the casing likewise conforms to the curvature of the casing. The abutments 70 may be secured to the rotary plates 25 and 26 by suitable dowels 72′ and clearly shown in Figs. 1 and 2.

Although the abutments have a close fit with the wall of the casing, nevertheless in order that the parts may move freely there is a slight clearance necessary and this clearance would cause a loss in the efficiency of the pump. To overcome this objection I provide recesses 80 in the face of the abutments adjacent the casing and in these recesses 80 I insert strips 81 of fibre or other material. These strips may extend the full width of the abutments. Springs 82 may be used to urge the fibre into contact with the wall of the casing. Means other than the spring pressed fibre strips may be used to prevent leakage but I have found that these strips are very efficient.

It frequently happens that the fluid passing through the pump will find its way, in more or less quantities into the chamber 85 surrounding the shaft 61 and thus affect the efficiency of the pump. To remedy this difficulty, in one or more of the abutments, I provide one or more holes 86 which extend entirely through the abutments. By referring to Fig. 9 it will be seen that these holes extend from the inner portion of the abutment to the face which is adjacent the inner wall of the pump casing. With these channels present any fluid in the central cavity 85 will be drawn from this cavity by the vacuum created during the suction stroke.

The pump is driven by means of the shaft 30 thereby causing rotation of the plates 25 and 26 together with the pistons and abutments. When the device is operated as a pump the direction of rotation is anti-clockwise as shown in Fig. 1, and as the shaft revolves the pistons move toward and from the inner wall of the casing. This movement of the pistons is due to the fact that the shaft 61 is eccentric to the axis of the shaft 30 about which the plates 25 and 26 rotate and as the eccentricity varies with different positions of the shaft 61 the pistons move in and out.

In Fig. 1 the two pistons which are adjacent the inlet 17 are moving away from the wall 19 of the casing and are drawing water into the cavities 90 and 91. While this occurs the upper piston is moving outwardly and is forcing the fluid from the cavity 92 through the channel 20 to the discharge 18. The piston opposite the discharge has moved to the outer limit of its stroke so that the fluid formerly confined by it has been ejected.

When operating the pump, it frequently becomes desirable to change the relative amount of movement of the pistons. To accomplish this, I show a shaft 61 as mounted eccentrically on a rotatable member 60 which is provided with a stem 61^1 shown as passing through an aperture in a lug 61^2 on the closure 14. Suitable packing 61^3 may be interposed between the member 60 and the closure 14.

A lever 61^4 is shown as secured to the stem 61^1 by a pin 61^5. The lug 61^2 is threaded to receive a lock nut 61^6 which when tightened serves to secure the lever 61^4 in any desired position. The lever 61^4 is adapted to move through a small angle as shown in Fig. 4.

Assuming that it is desired to change the throw of the pistons, the lock nut is loosened

and by turning the lever 61^4 which is rigid with the stem 61^1 due to the pin 61^5, the member 60 is rotated the desired amount after which the lock nut is tightened so that it engages tightly against the inner face of the lever 61^4 and the pump is ready for operation.

In order to hold the lever 61^4 at either one of its extreme positions, I provide a pair of apertures 62 in the plate 14 and in these apertures I arrange a spring pressed locking member 62^1. The lever 61^4 is shown as provided with a recess in which the locking members 62^1 may engage.

Having thus described my invention, I claim:

1. A rotary pump having a casing, a rotary member within the casing having a plurality of abutments affixed thereto, a plurality of pistons mounted for movement on said rotary member, means to cause said pistons to move toward and from the casing, said pistons and said abutments forming an inner chamber, a suction orifice in the casing, a discharge orifice in the casing, a channel extending through one of the said abutments and adaped when said one abutment is opposite said suction orifice to cause fluid trapped in the inner chamber of said pump to be drawn therefrom.

2. A rotary pump having a casing, a rotary member therein, a plurality of movable pistons and fixed abutments secured to said rotary member, a chamber within said pump the walls of which are defined by the inner surface of said pistons and abutments, means to form a fluid tight joint between the abutments and the casing, each of said abutments having a channel extending from said chamber to the casing wall through which contained fluid may be withdrawn during the suction stroke.

3. A rotary pump having a casing, a rotary member within the casing having a plurality of abutments affixed thereto and having a plurality of pistons mounted for radial movement thereon, means to cause said pistons to move toward and from the casing, suction and discharge orifices in the casing, a channel extending through one of the said abutments and adapted when said one abutment is opposite said suction orifice to cause fluid trapped in the inner cavity of said pump between the pistons and abutments to be drawn therefrom, and means to form a fluid-tight joint between an abutment and the casing.

4. A rotary pump having a casing, a rotary member within the casing having a plurality of pistons movably mounted thereon, a shaft mounted eccentric to the axis of said rotating member, connecting links between said shaft and said pistons for alternately moving said pistons toward and from the casing, abutments mounted on said member adjacent said pistons and co-acting therewith, means to move said eccentric shaft, said means comprising a rotatable member on which said eccentric shaft is mounted, means to turn and means to lock said rotatable member in turned position.

5. A rotary pump having a casing, a rotary member within the casing having a plurality of pistons movably mounted thereon, a shaft mounted eccentric to the axis of said rotating member, connecting links between said shaft and said pistons for alternately moving said pistons toward and from the casing, abutments mounted on said member adjacent said pistons and co-acting therewith, means to shift said eccentric shaft, means to lock said eccentric shaft in shifted position, said abutments each having a recess therein, means in said recesses to afford a fluid tight joint between the abutments and the casing, said means comprising a fibre insert set in each of said recesses in said abutments, and spring pressed means in said recess to urge said fibre insert against said casing.

6. A rotary pump including a casing, and a rotatable member, abutments fixed to the rotatable member, radially movable pistons carried by said member, a shaft eccentric to the center of revolution of said abutments and piston links revolvable about said shaft and connected to said pistons to cause radial operation of said pistons and means to shift said eccentric shaft to alter the radial movement of said pistons.

7. A rotary pump having a casing having a circular inner peripheral wall, inlets and outlets extending through said wall, a rotatable member within said wall and having abutments fixed thereto, movable pistons carried by said member, a dead-shaft eccentric to said rotatable member, connections between said eccentric dead shaft and said pistons to cause the latter to move radially and means to move said eccentric shaft to adjust the amount of radial movement of said pistons.

In testimony whereof, I hereunto affix my signature.

JOHN A. MORGAN.