June 18, 1935. B. MITCHELL 2,004,958

ROTARY PUMP

Original Filed Aug. 22, 1931

FIG. 2

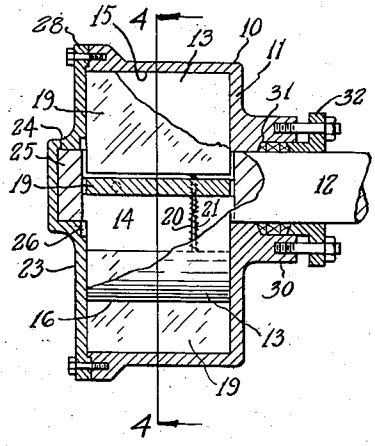



FIG. 3

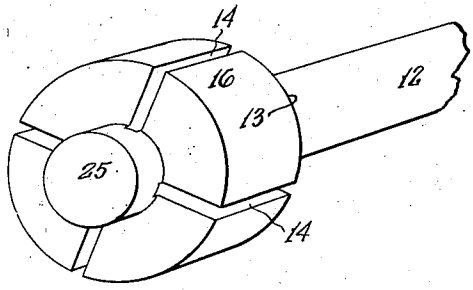



FIG. 4

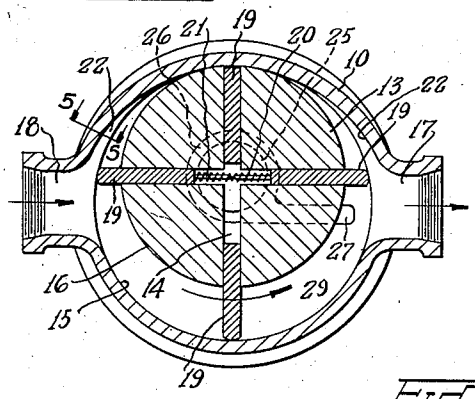



FIG. 1

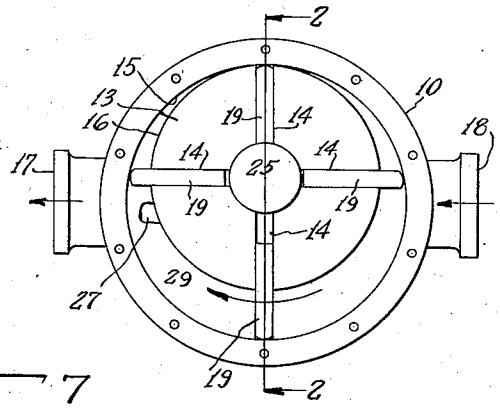



FIG. 7

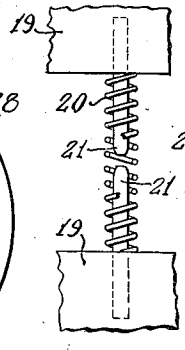



FIG. 6

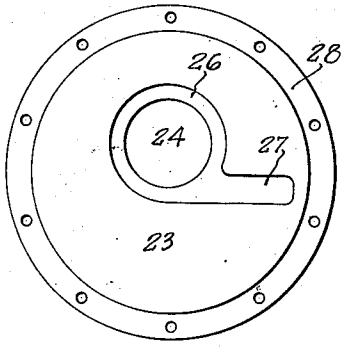
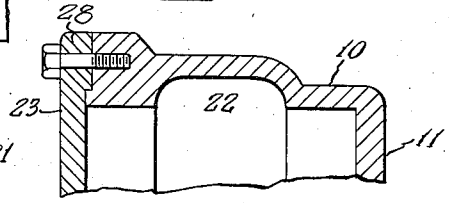



FIG. 5




INVENTOR
B. MITCHELL

BY E. B. Birkenhead

ATTORNEY

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# UNITED STATES PATENT OFFICE

2,004,958

## ROTARY PUMP

Bryce Mitchell, Seattle, Wash.

Application August 22, 1931, Serial No. 558,672
Renewed September 17, 1934

3 Claims. (Cl. 103—138)

This invention relates generally to rotary pumps, and particularly to the type employing radially movable blades on the rotor thereof.

The main object of this invention is to provide an improved form of rotary pump employing radially movable blades in which an improved balancing action is obtained for the blades, and in which the maximum amount of efficiency is obtained from a given expenditure of construction labor and materials.

These, and other objects, will become apparent from the specification following as illustrated in the accompanying drawing, in which:

Fig. 1 is an interior view of the pump showing the cover plate removed.

Fig. 2 is a longitudinal section along the line 2—2 in Fig. 1.

Fig. 3 is a perspective view of the rotor.

Fig. 4 is a section taken along the line 4—4 in Fig. 2.

Fig. 5 is a section taken along the line 5—5 in Fig. 4.

Fig. 6 is an inside view of the cover plate.

Fig. 7 is an enlarged detail of the spring between the blade members.

Similar numbers of reference refer to similar parts throughout the several views.

Referring in detail to the drawing, the pump itself consists of a cylindrical casing 10 having one closed end 11 in which journals the shaft 12 of a rotor 13 which is provided with a plurality of intersecting slots 14 which pass entirely through the shaft 12. The shaft 12 is eccentrically mounted with relation to the cylindrical casing 10; in fact the inner surface 15 of the casing 10 and the outer surface 16 of the rotor 13 are tangent to each other at one point. Diametrically opposite each other and equi-distant from this point of tangency are the outlet opening 17 and the inlet opening 18.

The main reason for making these opposite is so the pump may be inserted in a pipe line without any other form of mounting and without changing the direction of the line, and also that the water may be permitted to flow through the pump in as straight a line as possible.

Within the slots 14 are positioned the blades or vanes 19. Between each pair of opposite blades 19 is disposed a spring 20 which may either be mounted on the pins 21 or held in recesses within the blades themselves.

The interior of the casing 10 is provided with a groove 22 to prevent fluids from becoming trapped in the converging space adjacent to the point of tangency, and to prevent the forming of a vacuum on the suction side of the pump which cannot be filled with fluid.

Turning now to the cover plate 23 same will be seen to contain a circular recess 24 in which journals the end 25 of the shaft 12. Surrounding the recess 24 is an annular groove 26 having a tangential extension 27 reaching almost to the rim 28 of the cover plate 23.

In Fig. 4 it will be noted that the tangential portion 27 is approximately parallel to the nearest vane 19. As the rotor is revolved in the direction indicated by the arrows the respective blades 19, commencing at the point of tangency referred to, move outwardly, first under the urging of the springs 20 and then under influence of pressure maintained within the annular space 26, due to the fact that after each blade 19 passes a point in its travel which is opposite the point of tangency it causes pressure to be built up within the space 29 which communicates with the tangential groove 27. In other words, there is always a pressure within the grooves 27 and 26, and the groove 26 communicates with the intersecting portion of the slots 14—that is, the axial zone of the rotor 13—urging all of the blades 19 outwardly with equal force.

In the past many forms of rotary pumps have been constructed, some depending upon spring action for obtaining this outward thrust and others depending upon the pressure built up within the pump, which would function only during a portion of the travel, and my device is distinguished therefrom by the fact that the outward thrust of the blades 19 is maintained continually while the pump is in operation.

Another point of difference between my pump and others seemingly similar resides in the fact that there is no axial displacement of the fluid behind the vanes, that is, the fluid between the axis of the rotor and the nearest side of the vane, since in my pump the displacing action is replaced by a very slight surging action around the axis of the rotor, due to the fact that there is relatively no movement between the members of any one pair of opposite blades.

While I have referred to this invention as a pump, it is obvious that same could be employed as a compressor or engine without departing from the spirit of the invention.

Referring to Fig. 2 it will be observed that there is provided a stuffing box 30 around the shaft 12 in which box is placed a suitable packing 31 which is held by the gland 32.

I claim:

1. A rotary pump comprising a cylindrical casing having diametrically opposite inlet and outlet openings whose center line is normal to a line passing through the shell and rotor centers, a rotor mounted eccentrically within said casing having its center on one side of the center line passing through said openings, said rotor having a plurality of intersecting radial slots formed therethrough, a slidable blade mounted in the outermost portion of each slot each pair of opposite blades having springs between same for urging same outwardly the length of said springs remaining substantially constant, and a cover for one end of said casing having a rotor journal formed therein said journal having an annular groove around same communicating with all the blade slots, said annular groove having a branch communicating with said outlet opening approximately substantial to its center line whereby a uniform outward thrust against the blades will be exerted by the pressure being built up within the pump throughout the complete rotation of the rotor, in addition to a nominal spring pressure continuously and uniformly exerted against the blades throughout their rotation due to the fact that the spring length remains constant.

2. A rotary pump having a cylindrical stator and a cylindrical rotor eccentrically disposed therein, said rotor having normally intersecting slots passing entirely through same and intersecting at the axis of the rotor, each slot having a pair of slidable blades mounted therein, the blades of each pair having springs extending across the space between same for urging same apart, said springs engaging opposite blades at adjacent ends thereof and having a substantially uniform compression throughout the cycle, and a journal formed in the end of said rotor communicating with the intersecting blade slots and with the pressure side of the pump whereby a constant pressure is maintained within the axis of the rotor at all times for the purpose of urging all of the blades outwardly and with uniform force throughout the complete revolution of the rotor.

3. A pump as described in claim 2 in which the areas of the intersecting slots exceed the areas of the ends of the blades and in which there is a free flow of fluid from one slot to the other and in which one pair of blades contracts while another pair expands thereby preventing the compression of fluid between the blades.

BRYCE MITCHELL.