July 2, 1929. I. H. WILSEY 1,719,639

ROTARY MACHINE

Filed Sept. 3, 1926

Fig. 1.

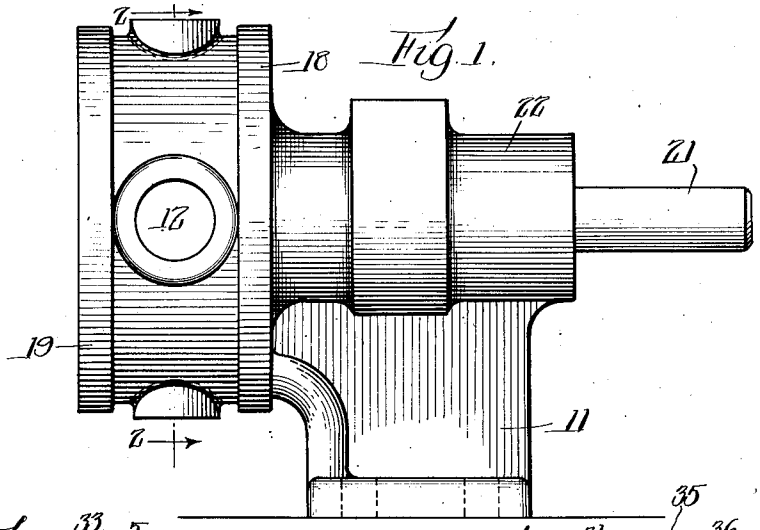


Fig. 2.

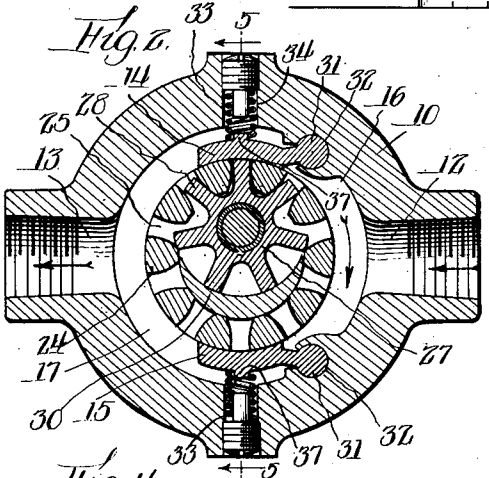


Fig. 3.

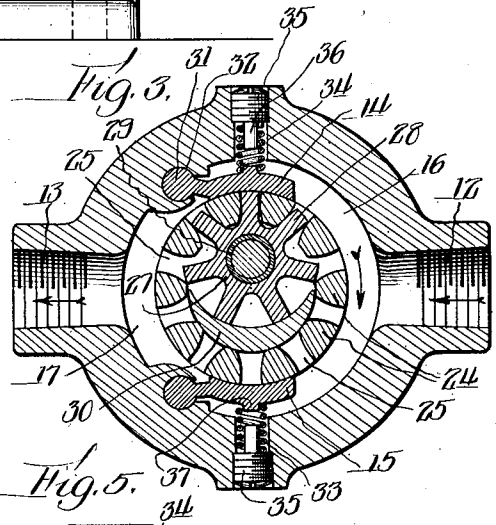


Fig. 4.

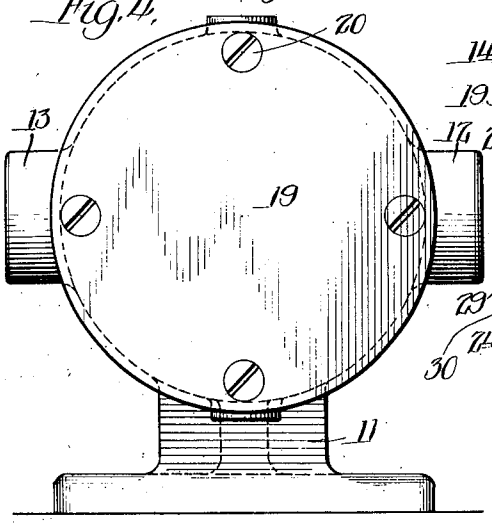
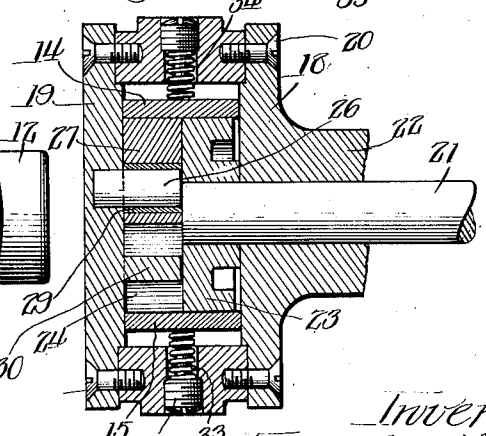


Fig. 5.



Inventor
Irven H. Wilsey,
By Lindsahl Parker & Carlson
Attys.

Patented July 2, 1929. 1,719,639

UNITED STATES PATENT OFFICE.

IRVEN H. WILSEY, OF CHICAGO, ILLINOIS, ASSIGNOR TO JAMES B. TUTHILL, OF CHICAGO, ILLINOIS.

ROTARY MACHINE.

Application filed September 3, 1926. Serial No. 133,349.

The present invention relates to improvements in rotary machines of the gear type.

The general object of the invention is to provide a rotary engine which is simple and inexpensive in construction, which is subject to a minimum amount of wear in operation and is therefore durable, which has a high efficiency, and which will require a minimum power output for a given capacity.

A further object resides in the provision of a rotary machine having cut-off lands separate from the main casing so that the lands may be case-hardened or made of material having good wearing qualities.

Still another object resides in the provision of lands of the above character which are pressed yieldingly into engagement with the peripheral surface of the rotor so that the lands will be self-seating, will follow the contour of the rotor as wear occurs, will move to permit grit, chips, and small particles of any kind to pass through the machine without causing excessive wear, will adjust themselves for different fluid film thicknesses, and will relieve excessive pressures.

Further objects and advantages will become apparent as the description proceeds.

In the accompanying drawings,

Figure 1 is a side elevation of a gear pump embodying the features of my invention.

Fig. 2 is a transverse section of the pump taken substantially along line 2—2 of Fig. 1.

Fig. 3 is a section similar to Fig. 2, but showing a modified form of my invention.

Fig. 4 is an end elevation of the pump.

Fig. 5 is a longitudinal section of the pump taken substantially along line 5—5 of Fig. 2.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Referring more specifically to the drawings, the exemplary embodiment of the invention consists of a pump casing 10 which is supported by a suitable base 11 and which preferably is cylindrical in shape. The interior of the casing is also cylindrical in shape and communicates at opposite sides with fluid admission and discharge ports 12 and 13 which are adapted to be connected in any desired fluid line (not shown). Diametrically opposed lands 14 and 15 are mounted in the peripheral wall of the casing 10, and separate the interior of the casing into fluid admission and discharge chambers 16 and 17. The ends of the casing 10 are closed by removable heads 18 and 19 held in place by a plurality of screws 20.

A rotor is mounted centrally in the casing 10 and on a drive shaft 21 adapted to be connected to a suitable source of power (not shown). The shaft 21 extends outwardly through a bearing hub 22 which in the present instance is formed integral with the outer face of the head 18 and with the base 11. The rotor is substantially smaller in diameter than the interior of the casing 10, and therefore defines with the latter an annular space which is divided by the lands 14 and 15 to provide the chambers 16 and 17 referred to in the foregoing. The rotor comprises a circular plate 23 formed on its inner face with laterally projecting circumferentially spaced internal gear teeth 24 of any suitable form. The spaces 25 between these teeth are adapted upon rotation of the shaft 21 to be moved successively across the lands 14 and 15 from communication with one to the other of the chambers 16 and 17.

On its inner face, the removable head 19 has a pin 26 which extends inwardly into the circular space between the teeth 24, and eccentrically of the shaft 21. An idler pinion 27, having teeth 28 of any suitable form adapted to fit into the spaces 25 between the teeth 24 is rotatably mounted on a bushing 29 on the pin 26. The pinion 27 meshes at one side, in the present instance adjacent the land 14, with the teeth 24 of the rotor, and will be rotated upon rotation of the latter. The other side of the pinion 27 is spaced from the teeth 25, and is separated therefrom by a crescent-shaped projection or partition 30 formed integral with and extending inwardly from the removable head 19 and bearing against the inner ends of the teeth 24 and the outer ends of the teeth 28 through approximately 180°. The outer and inner

curved surfaces of the partition 30 thus conform respectively to the curvature of the internal gear and of the pinion 27.

By making the lands 14 and 15 separate from the casing 10, said lands can be case-hardened or made of material highly resistant to wear, thereby prolonging the life and efficiency of the pump. While the lands may be mounted in the casing 10 in any suitable manner, I prefer to mount them for pivotal movement into and of engagement with the rotor. Referring to Figs. 2 and 3, each land is provided in the form of a plate fitting between the heads 18 and 19, and shaped to conform to the curvature of the rotor. On one end, each land is formed with a ball 31 which fits into a socket 32 formed in the inner peripheral wall of the casing. Each land is yieldingly held in engagement with the periphery of the rotor by a spring 33 which is, in the present instance, mounted in a bore 34 opening radially through the casing wall. The outer end of each bore 34 is closed by an adjustable screw-threaded plug 35 having a pin 36 on its inner end which pin extends into the outer end of the spring 33 and serves to hold the latter in position. The inner end of the spring 33 seats on a projection 37 on the outer face of the land. The ball and socket joints for the lands 14 and 15 are preferably located in the same side of the casing, and may be adjacent the port 12, as shown in Fig. 2, or adjacent the port 13, as shown in Fig. 3. One form may be quickly changed to the other form by merely reversing the casing 10 between the heads 18 and 19.

By providing lands yieldingly engaging the rotor, it will be seen that grit, dirt and other substances can pass through the pump without causing excessive wear. In pumps with rigid lands, after wear occurs, leakage often results. The lands provided in the present invention, may be made of material highly resistant to wear, and are also self-seating and will follow the contour of the rotor as wear occurs. The pump is well adapted for different kinds of liquids having different film thicknesses, since the lands will yield to permit the natural film of liquid. This results in a considerable saving of power, since the power required to break the natural film of liquid is high.

In operation, let it be assumed that the rotor is turning in a clockwise direction. Fluid will then enter the port 12 and chamber 16, and will be discharged into the chamber 17 and out of the port 13. In the construction shown in Fig. 2 in which the ball and socket joints for the lands are located in the chamber 16, if the pressure in the chamber 17 is built up by outside piping, valves, and the like, (not shown), the pressures acting against the inner and outer sides of the lands will practically balance each other, thereby stabilizing wear, leakage, running friction, etc. In the construction shown in Fig. 3 in which the ball and socket joints for the lands are located in the chamber 17, if the pressure in said chamber exceeds a predetermined value, it will cause the lands to move away from the periphery of the rotor to permit relief of said pressure. The predetermined maximum pressure can be adjusted by adjusting the compression in the springs 33. It will be evident that by this construction, any desired pressure may be maintained without the use of outside pressure regulating valves.

I claim as my invention:

1. A rotary machine having, in combination, a hollow casing having inlet and outlet passages, a rotor in said casing, said rotor having internal gear teeth, an idler pinion engaging said teeth, a crescent partition between one side of said pinion and said teeth, and a pair of diametrically opposed lands separated from and mounted in said casing, said lands being adapted to engage the periphery of said rotor to successively cut off the spaces between said gear teeth from said passages.

2. A rotary machine having, in combination, a hollow casing having inlet and outlet passages, a pair of movable lands pivotally mounted in said casing at opposite sides of said passages, rotary fluid transmitting means having a plurality of fluid-carrying spaces and disposed between said lands and cooperating therewith to bring different fluid-carrying spaces successively into and out of communication with said inlet and discharge passages, and means tending to hold said lands against said first mentioned means, the inner faces of said lands being partially exposed to the pressure in said outlet passage.

3. A rotary machine having, in combination, a hollow cylindrical casing having inlet and outlet passages, removable heads closing the ends of said casing, a pair of diametrically opposed lands in said casing, each land being pivoted at one end to said casing, said pivots being adjacent to and at opposite sides of one of said passages, and the backs of said lands being exposed to the pressure in the other of said passages, rotary fluid transmitting means disposed between said lands, and yielding means tending to hold said lands against said first mentioned means.

4. A rotary machine having, in combination, a hollow casing having inlet and outlet passages, a rotor in said casing, said rotor having internal gear teeth, an idler pinion engaging said teeth, a crescent partition between one side of said pinion and said teeth, a pair of diametrically opposed lands pivotally mounted in said casing, and means for pressing said lands against the

periphery of said rotor, said lands serving successfully to cut off successive spaces between said gear teeth from said passages as said rotor is rotated.

5. A rotary machine, having, in combination, a hollow casing having inlet and outlet passages, a rotor in said casing, said rotor having internal gear teeth, an idler pinion engaging said teeth, a partition between one side of said pinion and said teeth, a pair of spaced lands movably mounted in said casing, and means for holding said lands yieldingly against the periphery of said rotor.

6. A rotary machine, having in combination, a hollow casing having a low pressure inlet and a relatively high pressure outlet, a land movably mounted in said casing, fluid transmitting means coacting with said land and adapted to carry fluid from said inlet past said land to said outlet, the outer surface of said land being vented to the inlet side of said casing and the inner surface of said land being exposed to the outlet side of said casing, so that when the pressure in the latter exceeds the pressure in the former by a predetermined amount it will move the land out of engagement with the means so as to permit pressure relief.

7. A rotary machine having, in combination, a hollow cylindrical casing having an inlet passage and a discharge passage, a gear rotor in said casing, a pinion eccentrically related to and in mesh with said rotor, a cut-off partition disposed between said rotor and said pinion, a pair of spaced lands pivotally mounted in the inner peripheral wall of said casing at opposite sides of said passages, each of said lands having an arcuate face in peripheral engagement with said rotor, spring means tending to hold said lands to said rotor, and means for adjusting the pressure of said spring means.

8. A rotary machine having, in combination, a hollow casing having admission and discharge passages, a rotor having internal gear teeth in said casing, a pinion mounted eccentrically of said rotor and meshing with said teeth, a partition between said pinion and said teeth, and opposed lands movably mounted in said casing between said passages said lands normally engaging the outer periphery of said rotor to cut off the spaces between said teeth as said spaces move successively across the same.

9. A machine of the character described having, in combination, a hollow casing having admission and discharge passages on opposite sides respectively, a rotary member mounted in said casing and having peripheral openings adapted to convey fluid, a land mounted in said casing for movement toward and from said member, and means tending to urge said land toward said member, said land normally engaging the periphery of said rotary member to cut off said openings as the latter move successively across said land from one passage to the other.

10. A machine having, in combination, a hollow casing having an inlet passage and a discharge passage, a rotor in said casing, said rotor having a plurality of gear teeth, a pinion eccentrically related to and in mesh with said rotor, a crescent partition disposed between said rotor and said pinion, a land movably mounted in said casing between said inlet passage and said discharge passage and engaging said rotary parts at a point where the teeth are in mesh substantially to their fullest extent, and means for venting the back of said land to one of said passages.

11. The combination with a rotor casing provided with an intake and a discharge port, a rotor mounted to rotate in the casing and having vanes spaced apart around its periphery, fluid pressure operated movable means mounted in the casing between the said ports and being adapted to form a seal with the outer periphery of the vanes of the rotor, a pinion provided with teeth engaging the vanes of the rotor and in substantial engagement with the said movable means, and a crescent shaped partition forming a substantial seal between the inner peripheries of the rotor vanes and the teeth of the pinion opposite said movable sealing means.

In testimony whereof, I have hereunto affixed my signature.

IRVEN H. WILSEY.