

Feb. 28, 1928.

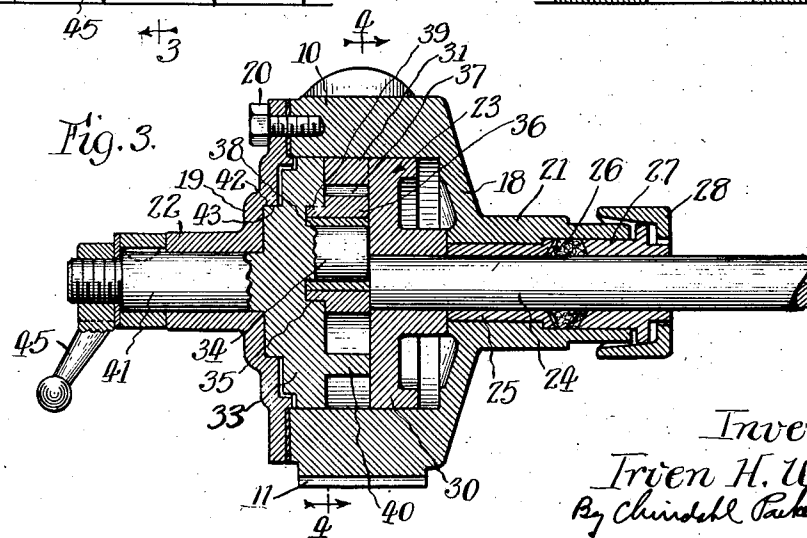
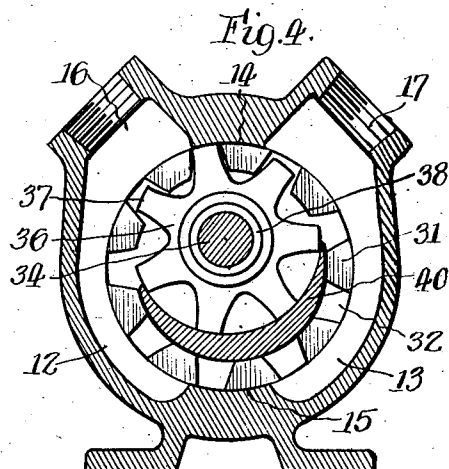
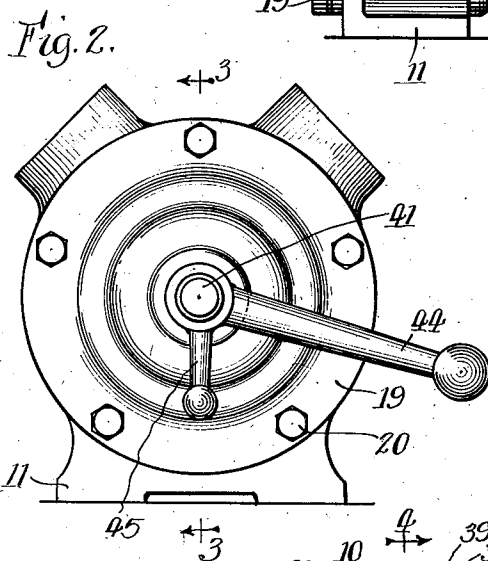
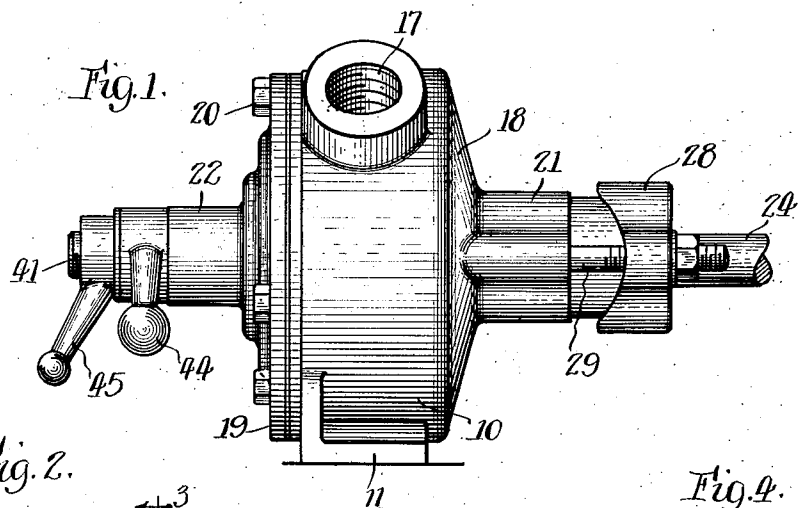
1,660,464

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ROTARY MACHINE

Filed March 12, 1926

2 Sheets-Sheet 1



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Fig. 5.

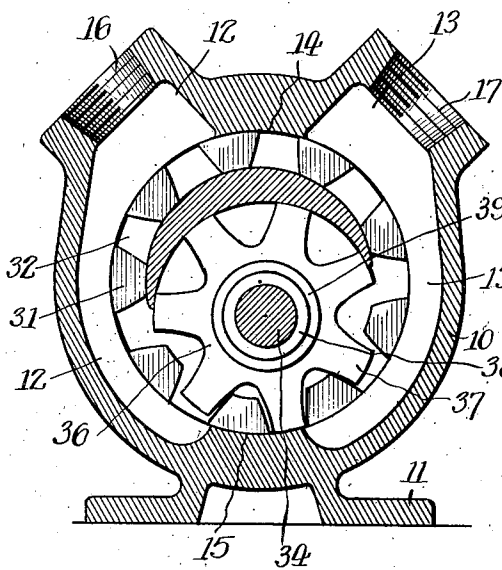


Fig. 6.

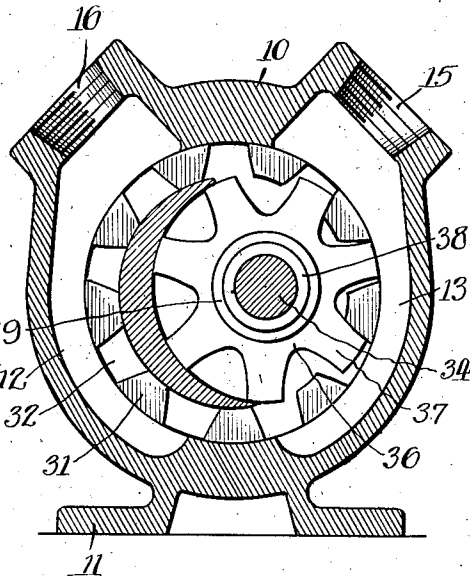


Fig. 7.

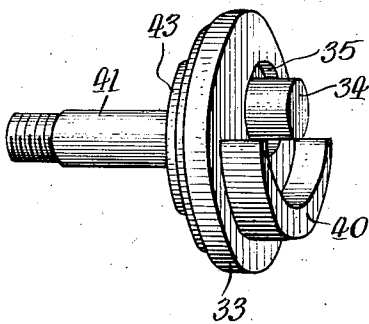
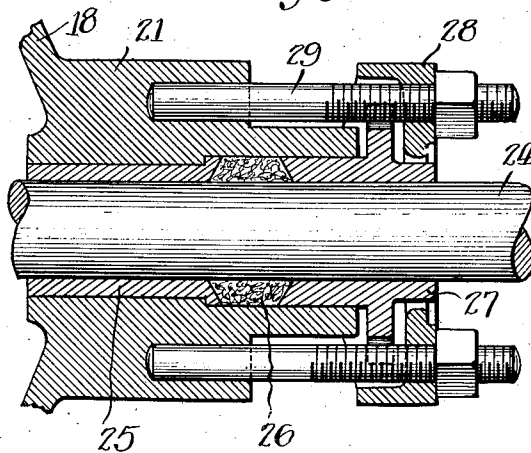


Fig. 8.



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UNITED STATES PATENT OFFICE.

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ROTARY MACHINE.

Application filed March 12, 1926. Serial No. 94,149.

The invention relates to improvements in rotary machines which may be used either as hydraulic pumps or engines, and relates more particularly to rotary machines of the gear type.

The primary object of the present invention is to provide a new and improved rotary gear hydraulic machine which is adjustable to vary the direction of flow and the volume of flow in either direction, thereby dispensing with the usual by-pass means employed for this purpose, saving the power expended in handling the fluid that is ordinarily by-passed, and permitting starting under no load conditions with negligible starting torque.

A further object is to provide a variable rotary gear pump or engine having no valves for varying the flow, and in which wear effecting flow may be compensated for.

Still another object is to provide a variable gear pump that does not leak liquid or vapor when handling volatile liquids, thus eliminating fire hazard and other obnoxious conditions.

A further object is to provide a variable gear pump which is simple and inexpensive in construction, and which is accurate and efficient in operation over a wide range, particularly at partial loads since no part of the fluid is by-passed.

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 an end elevation of the pump.

Fig. 3 is a longitudinal sectional view of the pump taken substantially along line 3—3 of Fig. 2.

Fig. 4 is a transverse section of the pump taken substantially along line 4—4 of Fig. 3, the gear parts being shown in position to produce a maximum flow in one direction.

Fig. 5 is a view similar to Fig. 4 but with the gear parts adjusted through 180° to reverse the direction of flow through the pump.

Fig. 6 is a view similar to Fig. 4 but with the gear parts adjusted into a neutral position in which no flow results.

Fig. 7 is a perspective view of the adjustable head.

Fig. 8 is a fragmentary plan view of a detail of construction.

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 particularly to the drawings, the exemplary embodiment of the invention consists of a pump casing 10 which is formed integral with a suitable base 11, and which preferably is cylindrical in shape. The interior of the casing 10 is formed in opposite sides with two arcuate fluid admission and discharge chambers 12 and 13 which are separated at their adjacent ends by diametrically opposed lands 14 and 15. The upper ends of the chambers 12 and 13 communicate respectively with ports 16 and 17 which preferably open from the casing 10 at right angles, and which are adapted to be connected in any desired fluid line (not shown). Of the casing 10, one end is closed by a fixed head 18 preferably formed integral therewith, and the other end is normally closed by a removable head 19 secured thereto by means of a plurality of screw bolts 20. The heads 18 and 19 are formed respectively with outwardly and axially projecting bearing hubs 21 and 22.

A rotor 23 is mounted in the casing 10, and is provided with a drive shaft 24 adapted to be connected to a suitable source of power (not shown). The shaft 24 extends outwardly through the bearing hub 21, and in the present instance through a bushing 25, a suitable packing 26, and a packing gland 27, in the hub. The gland 27 is clamped tightly against the packing 26 by a stuffing box 28 which fits over the reduced outer end of the hub 21, and which is adjustably secured to the casing 10 by means of fixed studs 29. The rotor 23 comprises a circular plate 30 formed at its outer end with laterally projecting and circumferentially spaced internal gear teeth 31. The spaces 32 between these teeth are adapted upon rotation of the shaft 24 to be moved

successively across the lands 14 and 15 from communication with one to the other of the chambers 12 and 13.

Mounted between the outer end of the rotor 23 and the head 19 is a rotatably adjustable carrier 33 which in the present instance is in the general form of a disk. On its inner face the carrier 33 has a pin 34 and an annular recess 35 about the pin, the pin extending inwardly between the teeth 31 and eccentrically of the shaft 24. An idler pinion 36 having teeth 37 is rotatably mounted on a bushing 38 on the pin 34, and has a hub 39 fitting into the recess 35. The pinion 36 meshes at one side with the teeth 31 of the rotor 23, and will be rotated upon rotation of the latter. The other side of the pinion 36 is spaced from the teeth 31, and is separated therefrom by a crescent shaped projection or partition 40 extending inwardly from the carrier 33 and bearing against the inner ends of the teeth 31 and the outer ends of the teeth 37 through approximately 180 degrees. The outer and inner curved surfaces of the partition 40 thus conform respectively to the curvature of the internal gear and of the pinion 36.

To adjustably support the carrier 33, it is provided with a shaft 41 in alinement with the shaft 24 and extending outwardly through the hub 22, and the head 19 and the carrier are formed with coacting annular shoulders 42 and 43 respectively, concentric to the shaft 41. Keyed to the outer end of the shaft 41 is an adjusting handle 44. A locking lever 45 is threaded onto the shaft 41 next to the handle 44, and upon being tightened will clamp the carrier 33 in adjusted position against the head 19.

The operation of the pump is as follows: Assuming that the shaft 24 is being driven in a counterclockwise direction as viewed in Fig. 4 and that the carrier 33 is positioned as shown in that figure, with the partition 40 over and a little off center to the right of the lower land 15, the teeth 31 and 37 will move apart to the left and will move together to the right of the land 14, thereby causing fluid to be drawn from the chamber 12 into the spaces between the teeth 37, carried past the partition 40, and forcibly discharged into the chamber 13. Since the separating movement of the teeth 31 and 38 begins at the left end of the land 14, a maximum flow through the pump will be obtained. If the carrier is adjusted into the position shown in Fig. 5, i. e. through 180 degrees, the teeth will move together to the right of the land 15, thereby reversing the direction of the maximum flow. If the carrier 33 is adjusted to position the partition 40 between the lands 14 and 15, at the left as shown in Fig. 6 or at the right directly opposite, no flow will result, since the spaces 32 opening into one of the chambers

12 and 13 are closed by the partition. Since some of the teeth 31 and 37 move apart and others move together in the same side of the casing 10, fluid drawn from the other chamber will be returned thereto. If the carrier 33 is adjusted into different positions intermediate those described above, different volumes of flow in either direction will result.

It will be obvious that I have provided a novel gear pump which is adjustable to give any desired flow in either direction. The adjustment can be easily and quickly effected. The pump is simple and inexpensive in construction, and is efficient and accurate in operation. While the machine has been specifically described as a pump, it is to be understood that it may also be used as an engine.

I claim as my invention:

1. A rotary machine having, in combination, a casing having inlet and outlet ports in opposite sides, an internal gear member rotatable in said casing, said ports extending around opposite sides of said gear member and communicating with the spaces between the gear teeth, an idler pinion meshing with said gear member and mounted eccentrically thereto, a crescent partition between said gear member and said pinion, a carrier rotatably adjustable in said casing about the axis of said member, said carrier supporting said pinion and said partition, means for adjusting said carrier, and means for clamping said carrier in adjusted position.

2. A rotary machine having, in combination, a casing having a removable head and having inlet and outlet ports, an internal gear member rotatable in said casing, said ports extending around opposite sides of said gear member and communicating with the spaces between the gear teeth, a pinion meshing with said gear member and mounted eccentrically thereto, a crescent partition between said gear member and said pinion, a carrier rotatably adjustable on said head and having a shaft extending outwardly there-through, said carrier supporting said pinion and said partition, an operating handle on said shaft for adjusting said carrier, and means for clamping said carrier against said head to lock said carrier in adjusted position.

3. A rotary machine having, in combination, a casing having inlet and outlet ports, cooperating inner and outer gear members in said casing, means for rotating said outer gear member, cut-off means between said outer and inner gear members, and means supporting said inner gear member and said cut-off means, said last mentioned means being adjustable to adjust the position of said inner gear member and said cut-off means relative to said ports so as to vary the flow through said machine.

4. A rotary engine having, in combination, a casing having inlet and outlet ports, a rotor in said casing, said rotor having internal gear teeth, the spaces between which
5 are adapted to communicate successively with said ports, an idler pinion engaging said teeth, a crescent partition between one side of said pinion and said teeth, and a rotatably adjustable member in said casing
10 supporting said pinion and said partition.

5. A rotary machine having, in combination, a casing having a removable head and having inlet and outlet ports, a rotor in said casing, said rotor having internal gear teeth
15 at its periphery, the spaces between said teeth opening at said periphery, a rotatable disk member in said casing, a gear member journaled in said rotatable member and meshing with said internal gear teeth, and
20 means on said rotatable member projecting between said gear member and said internal gear teeth, said member being adjustable to reverse the flow of liquid and to adjust said flow in either direction.

6. A rotary machine having, in combination, a casing having inlet and outlet ports, a rotor having internal gear teeth at its periphery in said casing, means coacting with and rotatable by said gear teeth, a partition between one side of said means and
30 said gear teeth, said partition serving as a cut-off, and means for adjusting said partition and said means into any angular position to obtain any desired flow up to a maximum.
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7. A rotary machine having, in combination, a casing having spaced inlet and outlet ports, cooperating inner and outer gear members in said casing, means for rotating one of said gear members, cut-off means between said inner and outer gear members,
40 and means for adjusting said ports and said cut-off means relatively to each other to vary the flow through said machine.

In testimony whereof, I have hereunto affixed my signature.

IRVEN H. WILSEY.