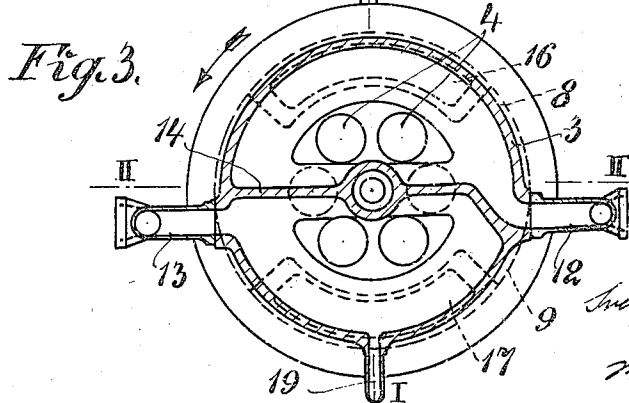
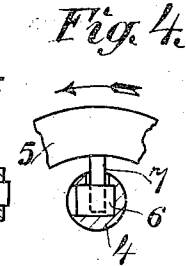
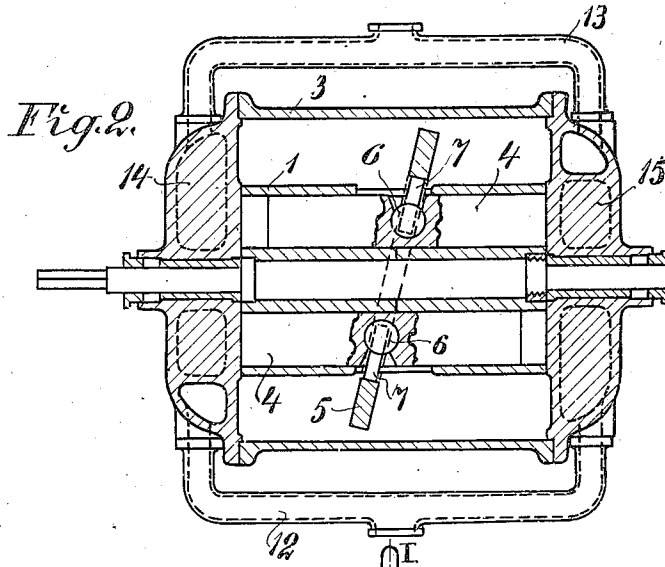
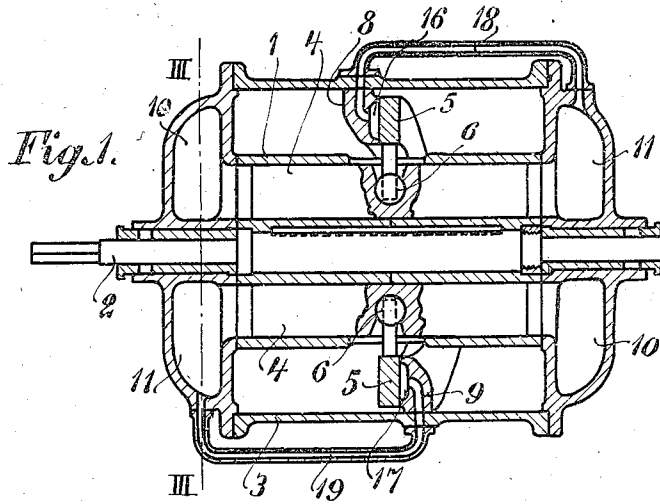


S. LARSSON.
 ROTARY PUMP OR ENGINE.
 APPLICATION FILED SEPT. 12, 1917.

1,297,700.

Patented Mar. 18, 1919.
 3 SHEETS—SHEET 1.



Inventor:
 Sven Larsson
 by attorneys
 Brown & Swank

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Fig. 5.

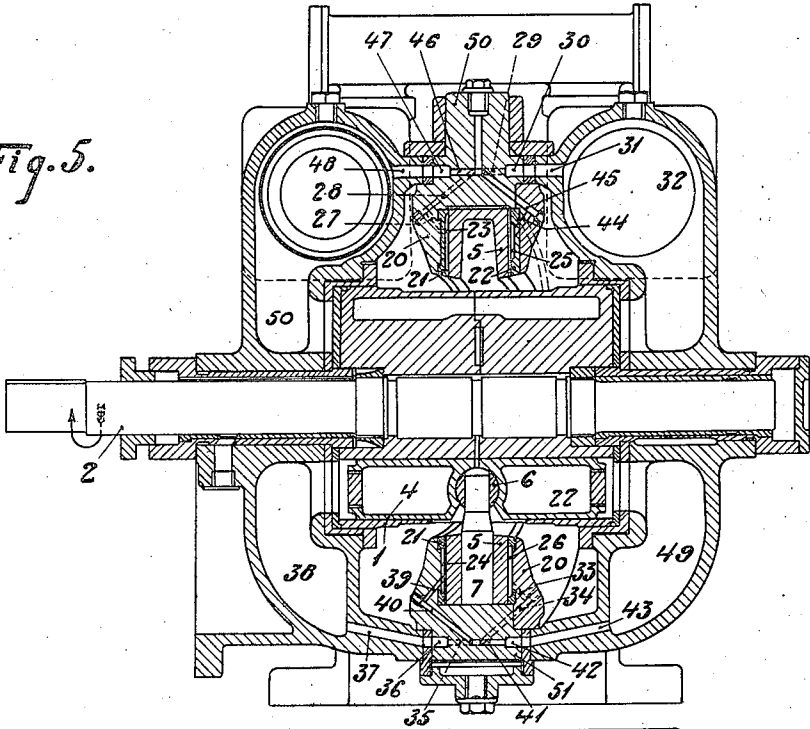
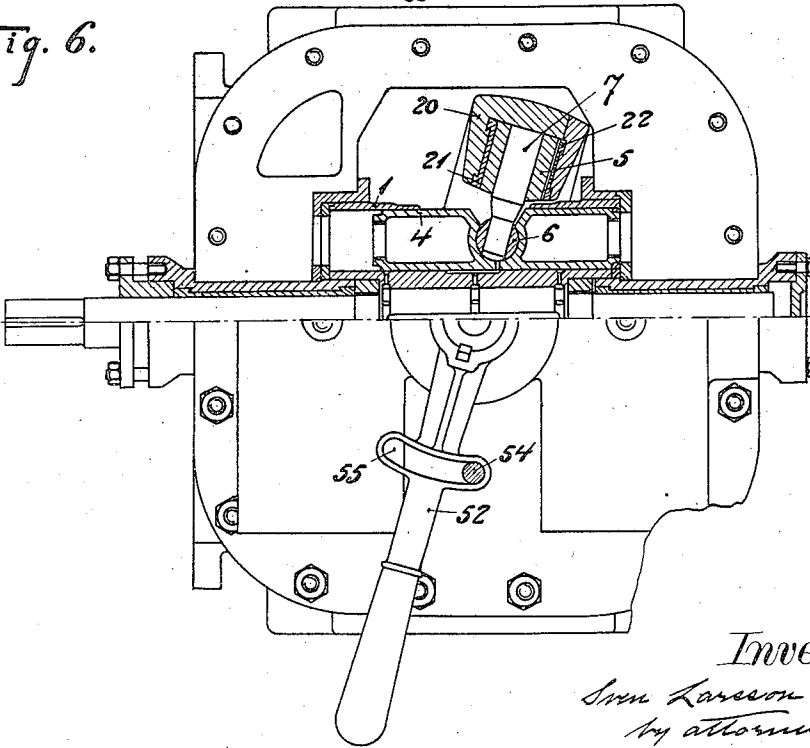


Fig. 6.



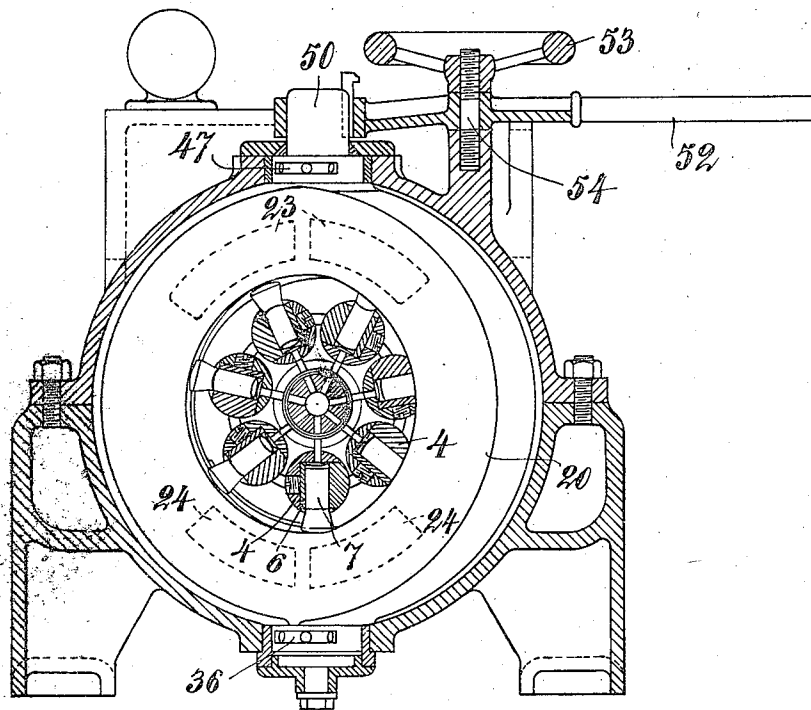
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Fig. 7.



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UNITED STATES PATENT OFFICE.

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ROTARY PUMP OR ENGINE.

1,297,700.

Specification of Letters Patent. Patented Mar. 18, 1919.

Application filed September 12, 1917. Serial No. 191,051.

To all whom it may concern:

Be it known that I, SVEN LARSSON, a subject of the King of Sweden, and resident of Hornsgatan 85, Stockholm, in the Kingdom of Sweden, have invented certain new and useful Improvements in Rotary Pumps or Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

In rotary pumps or engines hitherto known and of that class, in which a plurality of pistons movable axially in a rotary drum are moved axially by a movable, suitably guided disk, which has an oblique position with relation to the drum and is rotated by the same the guiding of the said disk offers some difficulties. The mounting of the said disk on an oblique shaft, as is the case in some pumps, results in a considerable axial thrust on the rotating system. In other pumps of the class in question the oblique disk is generally guided at its periphery. Owing to the fact that the peripheral velocity of the disk in large pumps is very great, there is a considerable sliding friction, if the pressure on the disk resulting from the pistons is to be sustained by a stationary abutment.

The object of this invention is to remove the said disadvantages. This is gained by the pressure on the disk resulting from the pistons being sustained by a hydraulic pressure, acting upon the disk opposite to the pistons passing the pressure chamber of the pump. According to one form of the invention the said disk is guided at its periphery by a ring, U-shaped in cross section, which can swing in one or the other direction and is provided with means for effecting hydraulic pressure on each side of the disk. By swinging the said ring to a central position or beyond the same the capacity of the pump can be altered or the direction in which the pump forces the liquid through the pump can be reversed, as more particularly described in the following specification.

In the accompanying drawings Figures 1 to 4 show one form of the invention. Fig. 1 is a longitudinal section on the line I to I of Fig. 3. Fig. 2 is a longitudinal section on the line II to II of Fig. 3. Fig. 3 is a cross section on the line III to III of Fig. 1. Fig. 4 shows the connection of the piston with the oblique disk. Figs. 5 to 7 inclusive show a second form of the invention. Fig. 5 is a

longitudinal vertical section of the pump. Fig. 6 is a top view and partially a horizontal section of the same, and Fig. 7 is a cross section of the pump, showing the disk in a side view.

In the drum 1, Figs. 1 to 3 inclusive, which is fixed to the shaft 2, journaled in the casing 3 of the pump and rotated in any suitable manner, a plurality of pistons 4 are fitted. 5 is a ring-shaped disk surrounding the said drum. Each of the said pistons 4 is connected with the said disk 5 by means of a pin 6, which can rotate in a transverse bore in the piston 4 and slide longitudinally in the same, and a pin 7, which is fixed to the disk 5 and can slide in a transverse bore in the pin 6, Fig. 4. The disk 5, which is guided in the manner stated below, has an oblique position and rotates with the drum 1 and the pistons 4, being acted upon by the latter by means of the pins 6 and 7. While the drum 1 together with the pistons 4 is rotated, the said pistons 4 are reciprocated in the drum, being acted upon by the disk 5 by means of the pins 7 and 6. The disk 5 is guided by two curve shaped pieces 8, 9, fixed to the casing 3 and sustaining the pressure of the pistons 4 upon the disk 5. At each end of the drum 1 a suction chamber 10 and a delivery or pressure chamber 11 are provided, which communicate with the suction and the delivery pipes 12, 13 respectively of the pump. The said chambers are separated from one another by walls 14, 15 fitting closely to the end surfaces of the drum 1. The chambers 10, 11 are so located with relation to the oblique disk 5, that the pistons 4, when passing the suction chambers 10, are moved from the same and thus suck the liquid into the piston chambers respectively, while the pistons 4, when passing the delivery or pressure chambers 11, are moved in the opposite direction and eject the liquid from the said piston chambers. The curve shaped pieces 8, 9 provided on opposite sides of the drum 1, are adapted to sustain the pressure of the pistons 4 upon the disk 5. The said disks 8, 9 are located opposite to the pressure chambers 11, 11 respectively and on opposite sides of the disk 5. In order to remove, fully or partially, the pressure of the disk 5 against the curve shaped pieces 8, 9 the latter are provided with cavities 16, 17 respectively, which cavities through channels or pipes 18, 19 communicate with the pressure chambers

11, 11 respectively of the pump, so that liquid contained in the said cavities has the same pressure as the liquid contained in the chambers 11, 11. Consequently, the pressure in the cavities, acting upon the disk 5, will counter-balance the pressure of the pistons on the said disk.

In the pump shown in Figs. 5 to 7 inclusive the drum 1 is rotated by the shaft 2, and the pistons 4, acting in chambers provided in the said drum 1, are reciprocated by the ring shaped oblique disk 5, rotating with the drum 1 and connected with the pistons 4 by means of the pins 6, 7 in the same manner as in the pump shown in Figs. 1 to 3 inclusive. The disk 5 is guided by a ring 20, U-shaped in cross section and with the gap facing the drum 1. In the inner sides of the shanks of the said U-shaped ring 20 linings 21, 22 respectively are located. In the said linings 21, 22 cavities 23, 24 and 25, 26 respectively are provided. In the drawings the cavities 23 communicate through channels 27, 28, 29, 30 provided in the ring 20, and a channel 31, provided in the casing of the pump, with the pressure or delivery chamber 32 of the same, while the cavities 26, through corresponding channels 33, 34, 35, 36, 37 communicate with the pressure or delivery chamber 38 of the pump, so that the cavities 23, 26 are filled with liquid of the same pressure as the liquid, contained in the chambers 32, 38, and counterbalancing the pressure of the pistons against the disk 5. The cavities 24, 25 on the other hand communicate through channels 39, 40, 41, 42, 43 and 44, 45, 46, 47, 48 respectively with the suction chambers 49, 50 of the pump. On the ring 20 pivots 50, 51 are provided, journaled in the casing of the drum, so that the ring 20 together with the disk 5 by means of a handle 52 can be turned into more or less oblique positions which results in the stroke of the pistons 4 being varied or reduced to *nil*, which is the case when the ring 20 together with disk 5 form right angles with the shaft 2. The capacity of the pump may thus be varied from maximum to *nil*. The said ring 20 together with the disk 5 may be brought also into oblique positions in opposite direction to that shown in Figs. 5 to 7 inclusive, so that the direction, in which the pistons 4 force the liquid through the pump is reversed, *i. e.* the liquid is sucked from the chambers 32, 38 and then forced into the chambers 49, 50. As shown in the drawings, there is a narrow play between the disk 5 and the ring 20 at the cavities 24, 25. As the action of the pump is reversed in the manner just described, the disk 5 is forced during the action of the pump against the ring 20 at the cavities 24, 25. The said channels 30, 36, 42, 47 are provided in the peripheral surfaces of the pivots

50, 51 and extend around the same for such distances, that the communication of the cavities 23, 24, 25, 26 with the chambers 32, 49, 50 and 38 respectively is obtained in the different oblique positions of the ring 20. Consequently, when the action of the pump has been reversed the cavities 24, 25 will contain liquid of the same pressure as the liquid contained in the chambers 49, 50 and counterbalance the pressure of the pistons 4 against the disk 5. The said ring 20 may be locked in its position by means of a hand-wheel 53 in screw-threaded engagement with a pin 54 fixed in the casing of the pump. In the handle 52 a slot 55 is provided for the said pin 54. Consequently, by tightening the hand-wheel the said wheel is forced against the handle 52 and locks the same.

As stated above, the action of the pump shown in Figs. 5 to 7 inclusive may be reversed. For that reason the pump may advantageously be used as a trimming pump in submarine boats, without the shifting of any valves or the like. The invention may be applied also to rotary engines of the class in question.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a rotary pump or engine the combination with a rotary drum, a plurality of pistons movable in the said drum, an oblique disk surrounding the said drum and means connecting the pistons with the said disk, of a device so constructed, that the pressure of the pistons upon the said disk is counterbalanced fully or partially by a hydraulic pressure, acting upon the disk opposite to the pistons passing the pressure chamber of the pump.

2. In a rotary pump or engine the combination with a rotary drum, a plurality of pistons movable in the said drum, an oblique disk surrounding the said drum and means connecting the pistons with the said disk, of stationary segments, which form abutments to the said disk, cavities provided in the bearing surfaces of the said segments, and conduits connecting the said cavities with the pressure chambers respectively of the pump.

3. In a rotary pump or engine the combination with a rotary drum, a plurality of pistons movable in the drum, an oblique disk surrounding the said drum and means connecting the pistons with the said disk, of a stationary ring U-shaped in cross section and embracing the said disk and guiding the same, cavities provided in the inner sides of the shanks of the said ring and conduits connecting the said cavities with the pressure chambers respectively of the pump.

4. In a rotary pump or engine the combination with a rotary drum, a plurality of

pistons movable in the said drum, a disk surrounding the said drum and means connecting the pistons with the said disk, of a stationary ring U-shaped in cross section and embracing the disk and guiding the same, the said ring being journaled in the casing of the pump, means for bringing the ring in different oblique positions with relation to the drum, cavities provided in the

inner sides of the shanks of the ring and 10 conduits connecting the said cavities with the pressure chambers and suction chambers respectively of the pump, substantially as described and for the purpose set forth.

In witness whereof, I have hereunto 15 signed my name.

SVEN LARSSON.