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F. H. MESSINGER

2,226,008

PUMP

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Fig. 1.

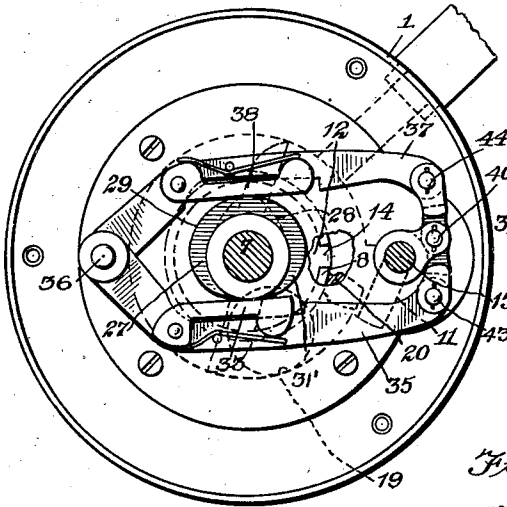


Fig. 2.

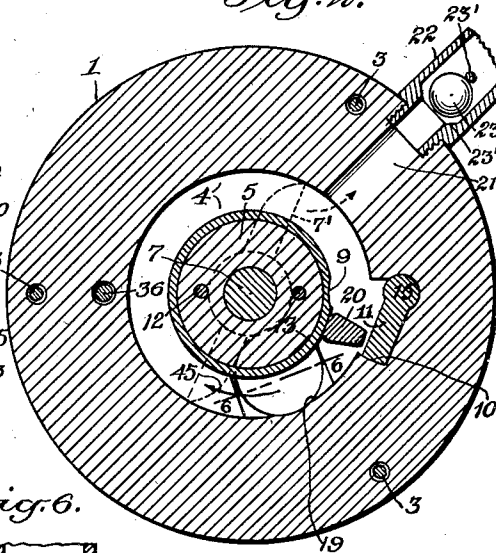


Fig. 6.

Fig. 3.

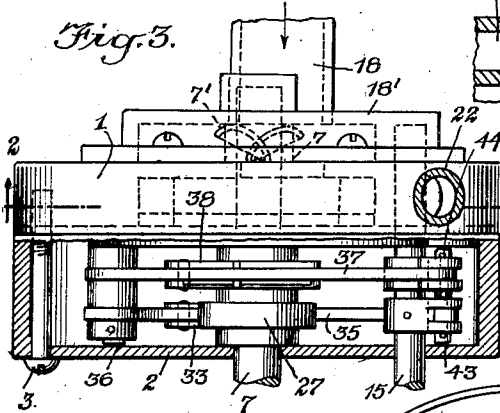
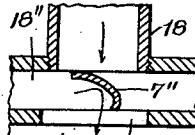


Fig. 5.

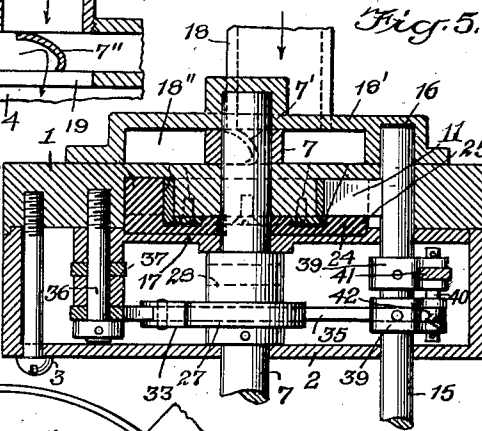
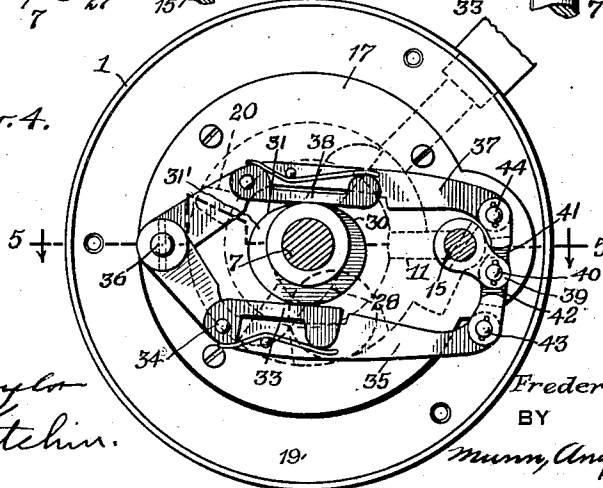


Fig. 4.



WITNESSES

G. W. Taylor
A. L. Ritchie.

INVENTOR

Frederick H. Messinger

BY

Munn, Anderson & Sibley
ATTORNEYS

UNITED STATES PATENT OFFICE

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PUMP

Frederick H. Messinger, New York, N. Y.

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2 Claims. (Cl. 103—124)

This invention relates to pumps and particularly to an improved rotary pump, an object being to provide a simple and yet very strong pump structure which will pump a maximum volume at a high pressure.

Another object of the invention is to provide a pump for forcing water from a suitable source to a desired point at varying pressures, which pressures may be adjusted during the functioning of the pump.

A still further object of the invention is to provide an improved pump structure utilizing a single movable abutment and a rotary pump blade coacting to force successive batches or volumes of water or other liquid through an outlet opening or pipe.

A further object, more specifically, is to provide a pump with a swinging abutment and a blade moving in a circle with associated parts for completing the pump structure including a cam and lever means for shifting the abutment into and out of functioning position.

In the accompanying drawing—

Fig. 1 is a side elevation of a pump disclosing an embodiment of the invention, the covering cap being removed;

Fig. 2 is a sectional view through Fig. 3 approximately on the line 2—2;

Fig. 3 is a top plan view of the pump shown in Fig. 1 with certain parts broken away for illustrating certain interior mechanism;

Fig. 4 is a view similar to Fig. 5 but showing the parts in a different position;

Fig. 5 is a sectional view through Fig. 4 approximately on the line 5—5, the covering cap being shown in position;

Fig. 6 is a detail fragmentary sectional view through Fig. 2 approximately on the line 6—6.

Referring to the accompanying drawing by numerals, 1 indicates what may be termed the base of the pump. The base may be a casting properly drilled and machined to receive various parts hereinafter fully described. As shown in Figs. 3 and 5, there is provided a covering or protecting cap 2, which is clamped into position by suitable screws 3. This cap may be readily removed so as to have access to certain cams and levers hereinafter fully described. In forming the base 1 there is provided a chamber 4 which is a circle and which is preferably rectangular in cross section though it could be made some other shape in cross section. By machining out this chamber the center portion 5 is provided with a bore 6 so as to accommodate the end portion of shaft 7. A ring or wearing band 8

of metal is snugly fitted over the portion 5 and is provided with an arc-shaped recess 9 for receiving the arc-shaped end 10 of the swinging abutment 11. A retaining plate 12 is held in place by suitable screws 13. This retaining plate is provided with an extension 14 (Fig. 1) fitting into a suitable notch in the ring 8, said extension projecting over the recess 9. As indicated in Figs. 2 and 5, the abutment 11 is formed integral with or rigidly secured to a rock shaft 15 which is journaled in a suitable recess or bore 16 and also in a face plate 17. If desired this shaft 15 could extend a short distance beyond the cap 2 whereby it would have free bearing members. As hereinafter fully described the shaft 15 at one end moves the abutment to the open position shown in Figs. 1 and 2 and rocked to the other extreme position to move the abutment to the closed position shown in Figs. 4 and 5.

It will be noted that a tubular member 18 is secured in any desired manner to a housing 18' which in turn is secured in any desired manner, as for instance by bolts or welding, to the base 1. This housing forms a pump chamber 18'' and in this chamber an impeller 7' is keyed or otherwise rigidly secured to shaft 7. This impeller as illustrated in Fig. 6 is provided with a peculiar cup-shaped end portion 7'' for forcing the water from chamber 18'' through the port or bore 19 whereby the water is discharged with some force or pressure into chamber 4. The water flowing into chamber 18'' may be under some pressure if desired and the impeller 7' will increase this pressure so that the water or other liquid may properly and quickly pass into chamber 4 to be moved by the blade 20. As the blade 20 functions the liquid will be brought under rather high pressure and eventually discharge out through the discharge opening 21, as shown in Fig. 2, at any desired pressure but preferably at a very high pressure. A tubular member 22 is threaded into the bore 21, as shown in Fig. 2, and this threaded member carries a ball valve 23 which will remain open as the liquid moves outwardly but will quickly and automatically close if there should be any back pressure. An abutment or stop 23' prevents the ball from moving too far from its seat 23''.

The driving shaft 7 is keyed or otherwise rigidly secured to a rotor 24, which rotor consists of a disk having an annular inwardly extending protuberance or flange 25 which slidingly fits into the chamber 4. The rotor is also provided with a central boss 26 which fits into an aperture in the retaining plate or ring 12, as shown

particularly in Fig. 5. In addition, at one point the flange 25 is enlarged and forms the blade 20. From Fig. 5 it will be noted that the blade has a snug or sliding fit in chamber 4 and when the pump is in use the blade moves in a circle at a rather high rate of speed. The driving shaft 7 may be connected with an electric motor or other prime mover and may be actuated at any desired speed. By varying the speed of shaft 7 through the prime mover, the pressure of the liquid moving out of the pump will vary accordingly.

It will be readily understood that the abutment 11 must move out of the way each time the blade 20 passes the abutment. In order to accomplish this result and properly time the movements of the abutment in respect to the blade 20, there are provided what may be termed a closing cam 27 rigidly secured to shaft 7 and an opening cam 28. As these cams are keyed or otherwise rigidly secured to shaft 7 they will operate in unison. From Figs. 1 and 4 it will be observed that the cam 27 has an arc-shaped portion 29 which is almost a half circle. This arc-shaped portion forms what is known as a dwell and during this dwell the abutment 11 is arranged as shown in Fig. 5 and as shown in dotted lines in Fig. 4. From the arc-shaped portion 29 the cam surfaces 30 and 31 merge into a tubular boss 32. The surface 31 at approximately the point 31' acts as a closing section or cam when it strikes the spring-pressed friction member 33 pivotally mounted at 34 on the closing arm 35. This closing arm is pivotally mounted on a pin 36 carried by the plate 17. The opening cam 28 is a very short cam and almost sharp at its apex. The cam quickly moves the opening lever 37 to quickly open the abutment 11 and the respective cams 27 and 28 are so proportioned as to size and position that as soon as the blade 20 passes the abutment 11 the latter will quickly swing to the dotted position shown in Fig. 4 and will remain in that position until the blade 20 has its leading edge positioned at the edge of opening 9 nearest the abutment 11. Substantially at this moment the abutment moves out of the way so that the confined liquid between the abutment and the blade will be allowed to move into the other part of chamber 4.

The opening lever 37 is also pivotally mounted on pin 36 and is provided with a spring-pressed friction plate 38. As shown in Fig. 3 the two levers are spaced apart and, consequently, the cams 27 and 28 are spaced apart. As the opening cam 28 releases lever 37, the section at point 31' will begin to act on the friction member 33 and will swing lever 35 to close the abutment. The cam will continue to move after the abutment has closed as it moves with the rotor 24. However, as the portion 29 is arc-shaped there will be no movement of the lever until the cam 27 starts to function, whereupon cam 28 will release the lever 35 and permit cam 28 to swing the abutment 11 to an open position. It will therefore be seen that the abutment 11 during the functioning of the pump will swing in and out but will be stationary during the movement of the blade 20 for approximately three-quarters of its travel.

It will be noted from Figs. 1 and 5 that the rock shaft 15 has abutment arms 39 pinned or otherwise rigidly secured thereto and pivotally mounted on a pin 40, which pin extends through the respective links 41 and 42, and which links in turn are pivotally connected with the arms 35 and

37 by suitable pivot pins 43 and 44. It will be understood that both of the arms 39 are pinned to shaft 15 as above mentioned, and consequently they will function together and for the same distance.

After all the parts have been arranged as shown in the drawing, the tubular member or pipe 18 is connected with a suitable source of water or other liquid and then the electric motor or other prime mover connected with shaft 7 is started. As the blade 20 moves in the direction of the arrow in Fig. 2 liquid entering through the port 19 will be forced around the chamber 4 toward the opening or outlet 21 as the abutment 11 is in the depression 9. Substantially at the instant that the blade 20 passes or reaches the far side of opening 21, abutment 11 swings out of the way so that the blade 20 may continue its movement whereby the liquid entering behind the blade 20 may be caught and forced around the chamber 4 to outlet 21. While the blade 20 may produce something in the way of suction the pressure of the liquid entering through pipe 18 or created by the impeller 7' functions to maintain the chamber 4 substantially filled with water or other liquid at all times. As the blade 20 passes the port 19 one end of the propeller 9' will immediately begin to function to force water or other liquid through the port 19 in back of the blade 20.

The pump may be operated at various speeds and, if desired, provide a stream of liquid at a comparatively high pressure, as for instance anywhere from fifty to several hundred pounds pressure per square inch.

I claim:

1. A liquid force pump including a base having and annular chamber, an inlet for said chamber, an outlet for said chamber spaced from said inlet, a check valve for preventing liquid from flowing into said chamber through said outlet, a rotor provided with a blade functioning in said chamber, a rotating shaft rigidly secured to said rotor for driving the rotor, a primary and a secondary cam secured rigidly to said shaft, an abutment swingable into and out of said chamber between said inlet and said outlet, a rock shaft for swinging said abutment, and means including both of said cams for causing said rock shaft to function in time with said blade, said means including a pair of levers pivotally mounted at one end, a link pivotally connected to the other end of each of said levers, a pair of arms rigidly secured to said rock shaft and means for pivotally connecting the respective links to the respective arms whereby as said levers function said rock shaft will be moved for shifting the position of said abutment, said primary cam being positioned to actuate one of said levers and cause the same to swing said abutment into said chamber and remain therein a predetermined time, and said secondary cam being positioned to actuate the other lever and cause the same to quickly rock said shaft for quickly swinging said abutment out of said chamber when said blade is passing said abutment and spring-pressed friction members positioned between the respective cams and the respective levers for cushioning the action of the cams against the levers.

2. A liquid pump including a base having an annular chamber, an inlet for said chamber, an outlet for said chamber spaced from the inlet and an abutment receiving notch, a rotor provided with a blade functioning in said chamber, a power shaft rigidly secured to said rotor for

actuating the same, a rotatable primary cam, a rotatable secondary cam, both of said cams being rigidly secured to said shaft, a swingable abutment positioned to swing from said notch into said chamber and from said chamber back into said notch, a rock shaft rigidly secured to said abutment for swinging the same, and means including both of said cams for causing said rock shaft to function in time with said blade, said means including a lever for each of said cams, said levers at one end being pivotally mounted while the opposite ends are adapted to swing back and forth, a link pivotally connected to each of said opposite ends, a pair of arms rigidly secured to said rock shaft, means for pivotally connecting the respective arms to the respective links whereby as said levers function said arms will be alternately pulled for rocking said shaft, said primary cam being positioned to swing one of said levers in a direction for pulling one of said arms on each rotation of said power shaft for swinging said abutment into said chamber and holding the abutment in the chamber a certain time, said secondary cam being positioned to swing the other of said levers for pulling the other of said arms for causing said rock shaft to quickly swing said abutment out of said chamber when said blade is passing said abutment, a pivotally mounted friction shoe for each of said levers and a spring acting on each of said friction shoes for causing them to continually press against said cams and thereby cushion the blow of the cams in respect to said levers.

FREDERICK H. MESSINGER.