April 5, 1932. W. B. CAMPBELL 1,852,503

ROTARY PUMP

Filed March 16, 1931 2 Sheets-Sheet 1

Fig. 1.

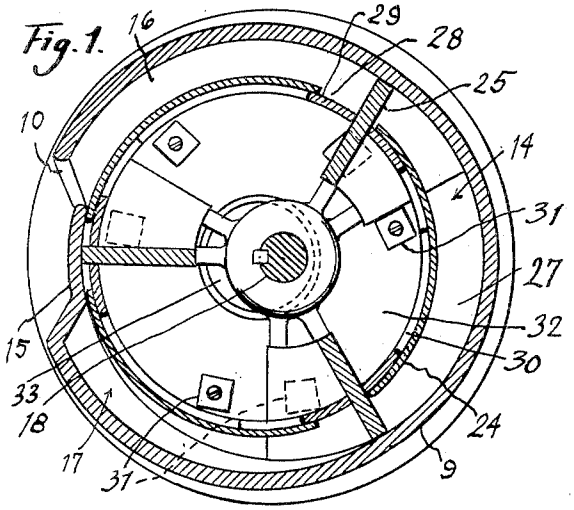


Fig. 3.

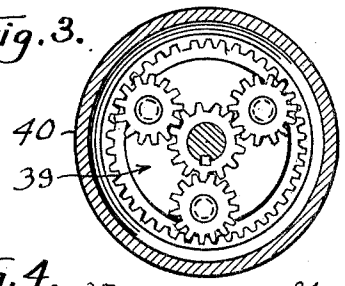


Fig. 4.

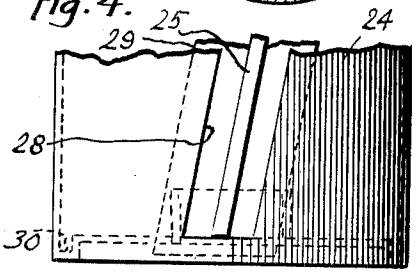


Fig. 2.

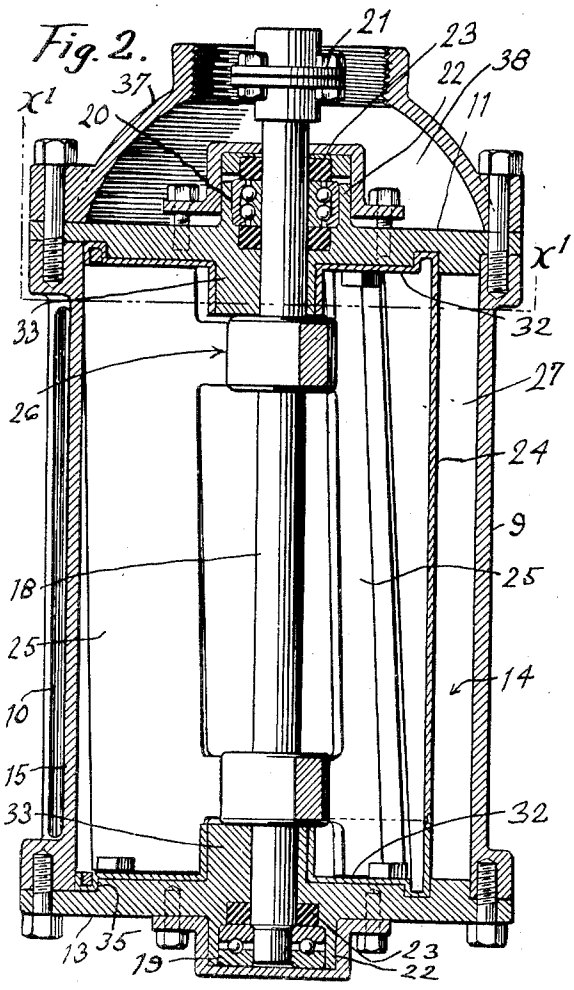
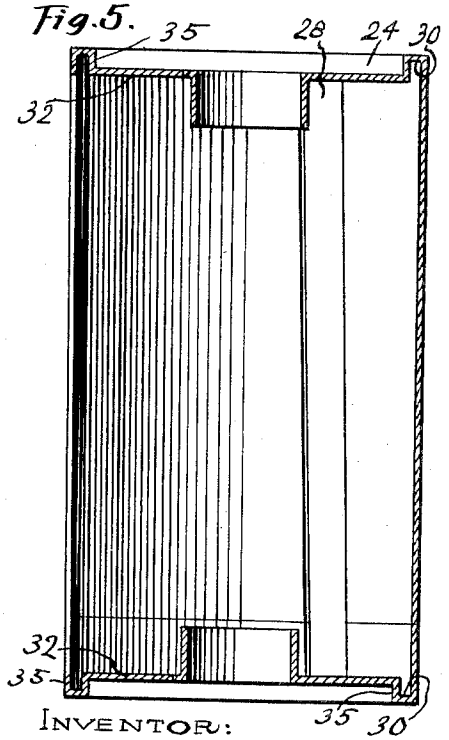


Fig. 5.



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Filed March 16, 1931 2 Sheets-Sheet 2

Fig. 6.

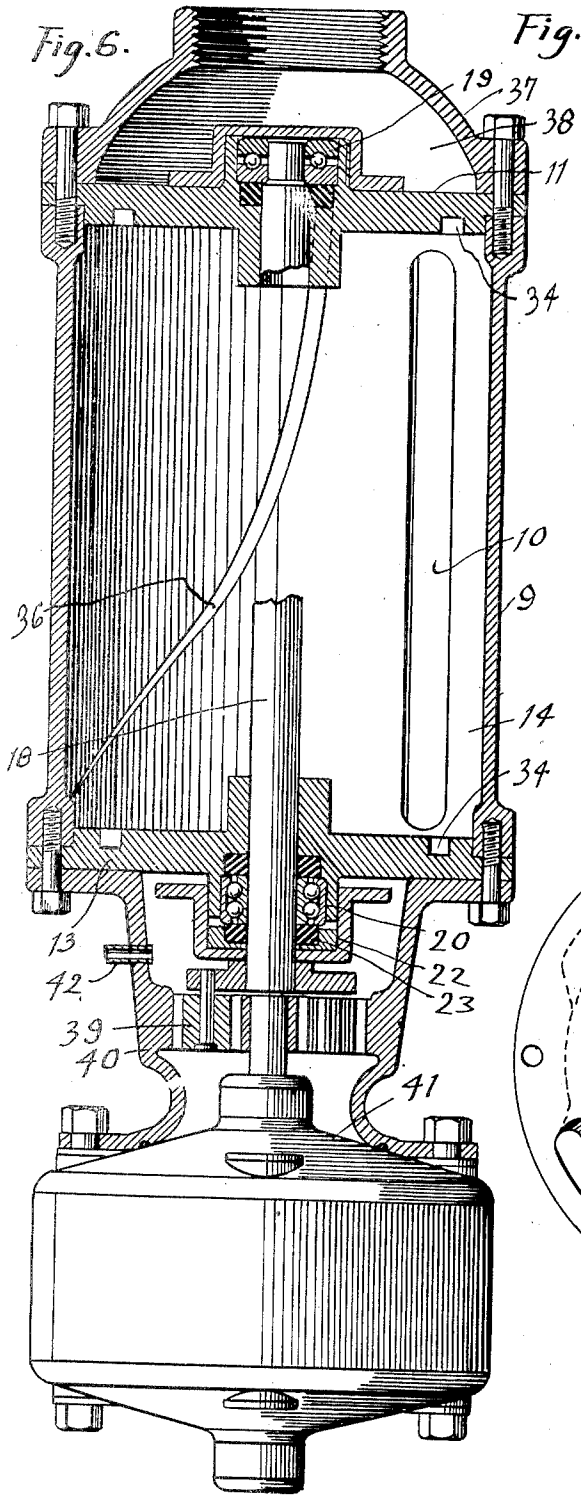


Fig. 7.

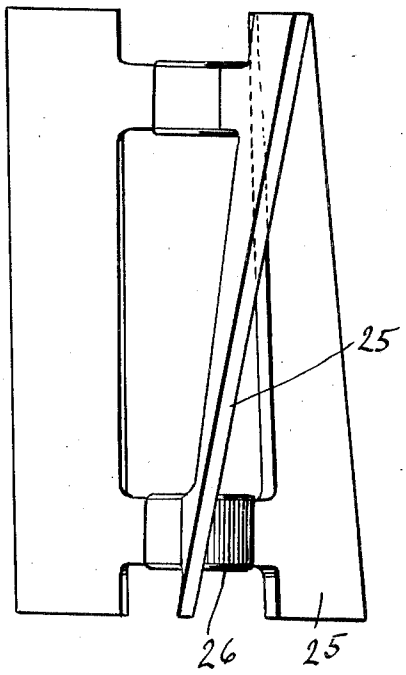
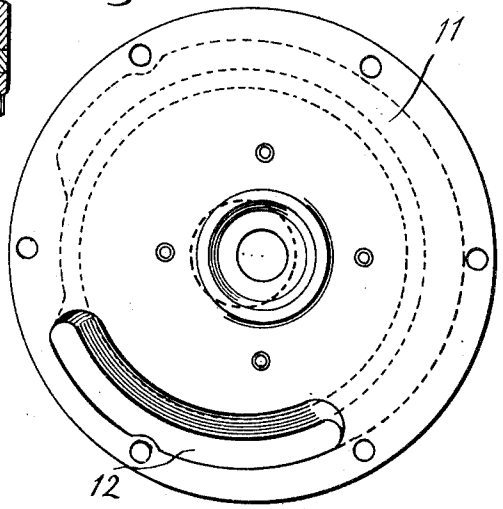


Fig. 8.



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UNITED STATES PATENT OFFICE

WILLIAM B. CAMPBELL, OF LOS ANGELES, CALIFORNIA

ROTARY PUMP

Application filed March 16, 1931. Serial No. 523,028.

This invention relates to improvements in rotary force pumps, and its objects are, to provide a simple, durable, inexpensive and efficient pumping device, capable of pumping air, gas, water, oil, or other fluid medium, to provide a pumping device always primed for starting, to provide a solid blade impeller which will impel a maximum quantity with minimum driving power, to protect the bearings, and to avoid pressure on the runner, all effective to impel a fluid with force, with minimum wear of operative parts, and with minimum driving power.

In carrying out my invention, I provide a pump casing enclosing a working space, a rotor mounted therein having a plurality of inclined blades, and induction and eduction ports in the casing, whereby a maximum quantity of fluid medium is entrained, deflected and delivered through the eduction port with maximum force and minimum friction.

Other details will be more fully set forth hereinafter, and defined in the appended claims.

In the drawings: Figure 1 is a sectional plan taken on line X^1—X^1, of Fig. 2. Fig. 2 is a sectional elevational of the pump. Fig. 3 is a plan of the driving gear mechanism. Fig. 4 is a fragmentary and side elevation of a runner showing an impeller blade projecting therethrough. Fig. 5 is a sectional elevation of the runner. Fig. 6 is a sectional elevation of the pump casing with certain of the operative parts removed. Fig. 7 is a side elevation of the impeller. Fig. 8 is a top plan of the upper casing head.

The mechanical features of my improved pump consist of a casing 9, having induction port 10, an upper casing head 11 having eduction port 12, and lower casing head 13, the casing elements enclosing a working chamber 14. Casing 9 has a longitudinal inwardly projecting abutment 15 between induction chamber 16 and eduction chamber 17. Rotatable shaft 18 is journalled in casing heads 11 and 13, and is provided with a thrust bearing 19, in casing head 13, and ball bearing 20 in casing head 11, and has a coupling 21 whereby a driving shaft may be connected thereto. Shaft 18 is eccentrically disposed relative to working chamber 14. Stuffing boxes 22, provided with packing 23, protect bearings 19 and 20.

Rotary drum 24, mounted within the working chamber, cooperates with the casing, and with blades 25, of rotor 26, to form a transition space 27, between induction chamber 16 and eduction chamber 17. Drum 24 has inclined and peripheral slots 28 through which blades 25 project. Slots 28 have a certain width allowing relative angular movement of the blades therein, and, to maintain the cut-off between the induction and eduction ports and chambers, shield members 29, slidable in grooves 30 in each end of the drum, are provided. Shield members 29 overlap the edges of slots 28, and abut against blades 25 and against the walls of the drum, thereby maintaining closure of slots 28. Abutments 31 on drum ends 32, are preferably of rubber or other resilient material, and serve to limit movement of the impeller blades, preventing them from impinging on edges of slots 28, thereby eliminating metallic clicking noise during the operation of the pump.

Drum 24, driven by the impeller blades, is mounted on projecting hubs 33, integral with the casing heads. Grooves 34 receive projecting flanges 35 of the drum. This arrangement allows the impeller blades to extend contiguous with the walls of the casing heads while traveling through transition passage 27. Eduction chamber 17 has an inclined bottom 36 whereby the fluid medium travels therethrough with minimum pressure. Cap 37, at the upper end of the pump casing, encloses a discharge chamber 38 above eduction port 12.

In use, the pump is submerged, and a discharge tube (not shown) is connected to cap 37. The impeller blades travel consecutively through passage 27, and impinge on the fluid medium to be pumped, forcing the same from the induction to the eduction chamber. Drum 24 is driven by the impeller member. The spiral inclination of the impeller blades serves to lift without compression, the medium to be pumped. The ports and transition passage 27 are all practically of the same area, thereby avoiding friction. The spiral-

ly arranged blades, complete cut-off attained by the drum and shields, and avoidance of congestion in the transition passage, all tend to produce an effective deep well pump.

What I claim is:

1. In a pump, the combination with a casing and casing heads enclosing a working chamber, said casing having induction and eduction ports and chambers, of a shaft journalled in the casing heads, a rotor fixed to the shaft, inclined blades on the rotor, a rotatable drum concentrically mounted relative to the casing disposed in the working chamber, and having longitudinal peripheral slots therein, said blades extending through the slots in the drum, said blades and slots being inclined relative to the axis of the drum, shield members for the blades disposed contiguously to the wall of the drum and blades, and cushioning abutment members disposed on the drum and limiting the angular movement of the blades.

2. In a pump, the combination with a casing and casing heads enclosing a working chamber, and having induction and eduction ports and chambers, of a shaft journalled in the casing heads, a rotor fixed to the shaft and operable in the working chamber, a rotatable drum concentrically mounted in the working chamber and having spirally inclined slots in the periphery thereof, inclined blades on the rotor extending through the slots in the drum, said blades and slots being inclined relative to the axis of the drum, the slots being wider than the thickness of the blades, shield members for the blades disposed contiguously to the wall of the drum and extending to cover said slots, and cushioning abutment members limiting the angular movement of the blades.

3. In a pump, the combination with a casing and casing heads enclosing a working chamber and having induction and eduction ports and chambers, of a shaft journalled in the casing heads, a rotor fixed to the shaft, helical blades integral with the rotor, a rotatable slotted drum concentrically mounted in the working chamber and eccentrically disposed relative to the rotatable shaft whereby said blades travel through a transition space between the drum wall and casing wall, shield members for the blades disposed within the drum and overlapping the drum slots whereby they are maintained in closed position during relative angular movement of the blades, and resilient abutment members disposed on the ends of the drum and serving to limit the angular movement of the blades.

4. In a pump, the combination with a casing and casing heads enclosing a working chamber, and having induction and eduction ports and chambers, of a shaft journalled in the casing heads, and disposed eccentrically relative to the casing heads and casing, a rotor fixed to the shaft and operable in the working chamber, helical impeller blades integral with the rotor, a rotatable drum concentrically and operatively mounted in the chamber and having a series of spiral slots in the periphery thereof conforming with the helical pitch of the blades, said blades extending in and through the slots, the slots being wider than the thickness of the blades, shield members disposed around the inner wall of the drum and overlapping said slots on either side of the blades, and cushioning abutment members for the blades fixed to the ends of the drum.

5. In a pump, the combination with a casing and casing heads enclosing a working chamber, and having induction and eduction ports and chambers, and having an inwardly projecting and longitudinally extending abutment between the induction and eduction chambers, of a shaft journalled in the casing heads, a rotor fixed to the shaft, helical blades integral with the rotor, said shaft being eccentric with the casing whereby the impeller blades will pass the abutment and along an opposed section of the casing wall, a cut-off drum independently rotatable within the working chamber and actuated by the impeller blades, and having helical slots through which the blades extend, said slots being wider than the thickness of the blades, and shield elements slidable in annular grooves in the ends of the drum, and disposed on opposite sides of the impeller blades and overlapping the edges of the slots, and positioned contiguous to the walls of the drum.

6. In a pump, the combination with a casing and casing heads enclosing a working chamber and having an inwardly projecting and longitudinally disposed abutment, of a shaft journalled in the casing heads, a rotor on the shaft, helical impeller blades integral with the rotor and extending contiguous to the inner wall of the abutment and an opposed section of the casing wall, and rotatable cut-off elements independently rotatable within the working chamber and actuated by the impeller blades.

7. In a pump, the combination with a casing and casing heads enclosing a working chamber, and having induction and eduction ports and chambers, and having an inwardly projecting abutment, of a shaft journalled in the casing heads, a rotor fixed to the shaft, helical impeller blades integral with the rotor and in intimate contact with the inner wall of the abutment and an opposed section of the inner wall of the casing, and a plurality of cut-off elements between the induction and eduction ports independently rotatable within the working chamber and actuated by the impeller blades.

In testimony whereof I hereunto affix my signature.

WILLIAM B. CAMPBELL.