Sept. 25, 1945. J. G. READ 2,385,730

CENTRIFUGAL PUMP

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Fig. 1.

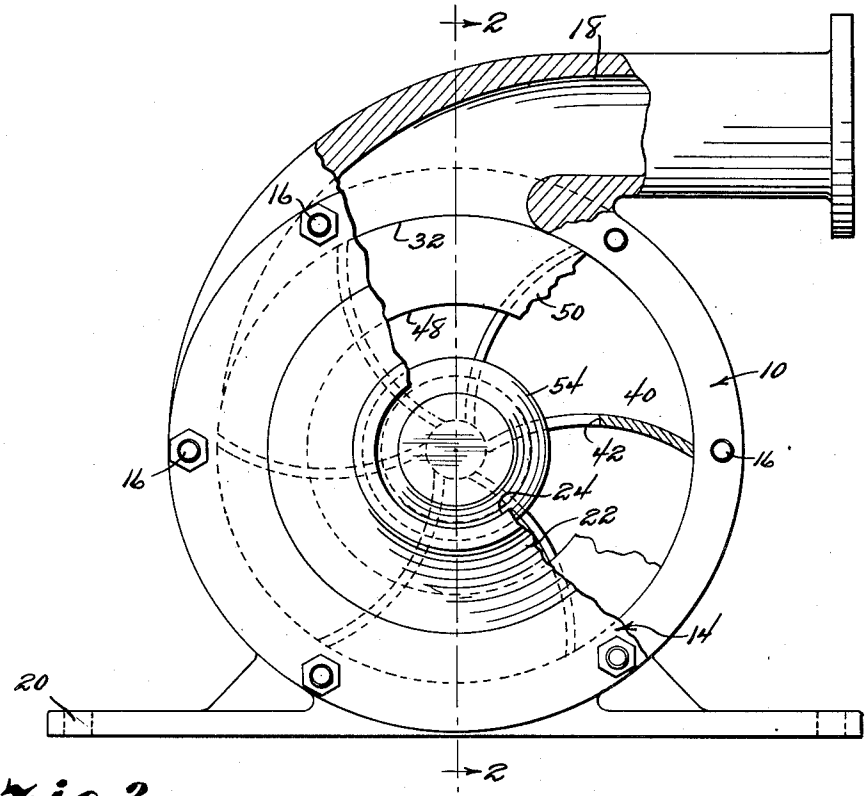
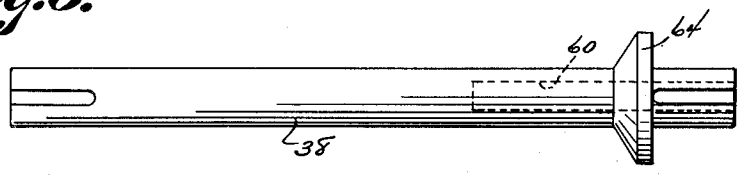


Fig. 3.



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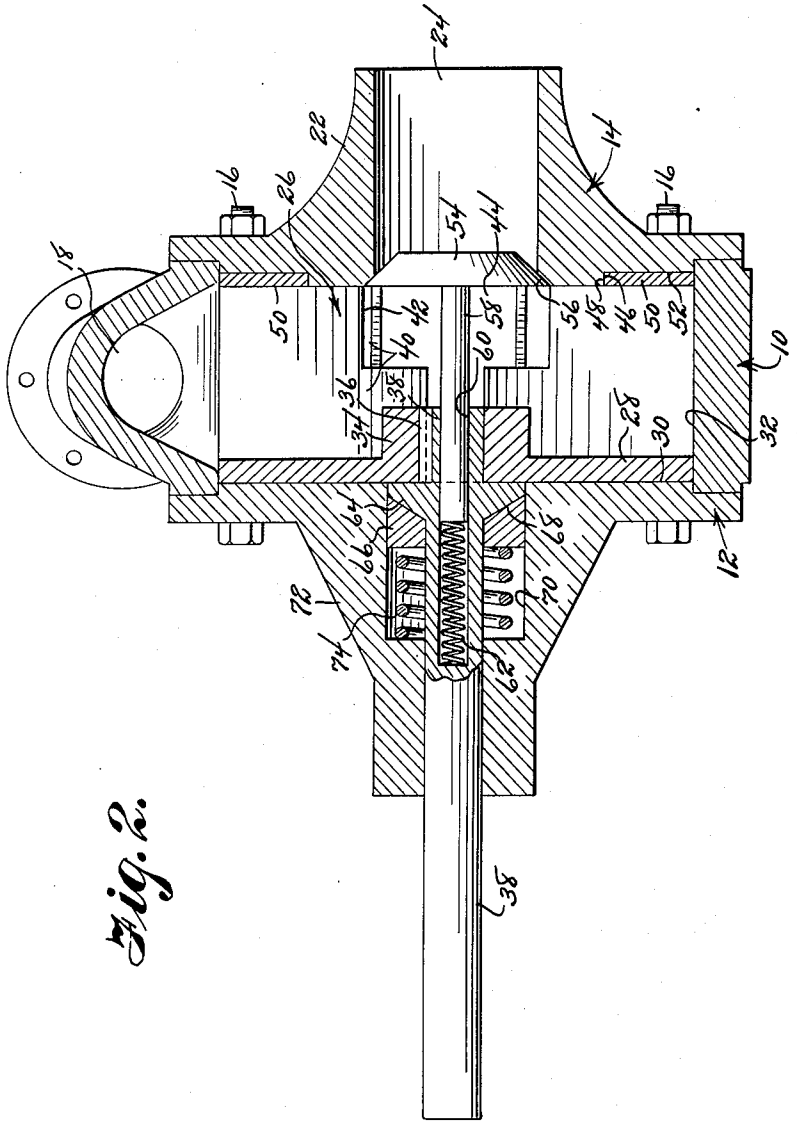


Fig. 2.

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UNITED STATES PATENT OFFICE

2,385,730

CENTRIFUGAL PUMP

James G. Read, New Smyrna Beach, Fla.

Application August 13, 1943, Serial No. 498,558

4 Claims. (Cl. 103—103)

My invention relates to the art of pumping liquid, and has among its objects and advantages the provision of a centrifugal pump.

In the accompanying drawings:

Figure 1 is an elevational view partly in section of the pump in accordance with my invention;

Figure 2 is a sectional view along the line 2—2 of Figure 1; and

Figure 3 is a view of a shaft employed for driving the impeller of the pump.

In the embodiment selected for illustration, I make use of an impeller housing section 10, an impeller shaft housing section 12 and an intake housing section 14. The three sections 10, 12 and 14 are fixedly secured into a unitary structure by bolts 16. The section 10 is provided with a discharge 18, in addition to a base 20 which may be bolted to a suitable supporting structure.

Section 14 is provided with a lateral extension 22 provided with an intake opening 24 coaxially positioned with respect to the impeller 26. The impeller 26 comprises a plate 28 fitting against the face 30 of the section 12 and having a diameter such as to fit snugly with respect to the inner face 32 of the impeller housing section 10. A hub 34 is formed on the plate 28 and is keyed at 36 to a drive shaft 38. Blades or vanes 40 are fixedly secured to the plate 28 and the hub 34, which vanes are cut out at 42 adjacent the section 14 to provide a chamber or opening 44 coaxially arranged with respect to the inlet 24.

An annular shoulder 46 is provided on the section 14 having bearing engagement with the inner face 48 of a flat ring 50 secured to the vanes 40 at the end of the impeller 26 opposite the plate 28. Ring 50 has an outside diameter corresponding to that of the impeller 26. The ring 50 has face engagement at 52 with the section 14.

A valve 54 is arranged for operation inside the chamber 44, which valve has seating engagement with a valve seat 56 on the section 14 except when the pump is in operation to close the opening 24 and maintain the pump in a primed condition. A stem 58 is attached to the valve 54 and is slidably arranged in a bore 60 in the shaft 38. Inside the bore 60 is arranged a compression spring 62 acting on the stem 58 to yieldingly hold the valve 54 against the seat 56.

A flange 64 is provided on the shaft 38 for face engagement with the plate 28. A metallic sealing ring 66 is mounted on the shaft 38 for engagement with the angular face 68 on the flange 64. Both the flange 64 and the sealing ring 66 lie in a bore 70 in the lateral projection 72 on the section 12. Inside the bore 72 is positioned a compression spring 74 which urges the sealing ring 66 against the angular face 68.

In operation, the ring 50 rotates on the shoulder 46 so that the shoulder constitutes a bearing for the impeller 26. Thus I eliminate the necessity of an outside supporting bearing for the impeller shaft. This construction is a sturdy one and is such as to permit the use of impeller vanes considerably larger than those in standard centrifugal pumps. By increasing the impeller vane area, the pump capacity is greatly increased in a pump structure of relatively small diameter. The ring 50 and the shoulder 46 are arranged so as not to obstruct the inlet opening 24, as is true of present type impeller supporting bearings located axially of the intake housing.

Valve 54 functions as a check valve to maintain the pump primed at all times so as to eliminate the necessity for outside check valves and foot valves. The valve is forced back against its seat 56 by the head water in the discharge line and in the pumping system when the pump is shut down. Spring 62 acts as an aid in closing the valve. When the pump is set in operation, the valve 54 is forced back from the seat 56 by the incoming water flowing through the inlet opening 24. The ring 66 and the flange 64 provide a liquid-tight seal of the metallic type. Packings of the non-metallic type are a constant source of trouble in centrifugal pumps. Different pump capacities may be obtained by changing two parts of the pump, namely, the housing section 10 and the impeller 26. Thus the pump capacity may be changed to suit various conditions through mere substitution of two parts, which parts are standardized so as to cooperate with the sections 12 and 14.

A pump of the type described may be operated in either a vertical or horizontal position. A pump turning in either a left-hand or a right-hand direction may be obtained by changing the impeller to either right- or left-hand positions and reversing the housing section 10. This section is so constructed that reversal thereof changes the direction of discharge.

Without further elaboration, the foregoing will so fully illustrate my invention, that others may, by applying current knowledge, readily adapt the same for use under various conditions of service.

I claim:

1. In a centrifugal pump of the type having an impeller and a drive shaft coaxial with the impeller and connected therewith, and a housing about the impeller having an intake and an outlet, a valve coaxial with the shaft and impeller,

and formed with a stem, the shaft having a bore receiving the stem, and a spring in the bore and engaging the stem to urge the valve into a closing position with respect to the inlet when pressure of fluid is relieved in the inlet.

2. In a centrifugal pump of the type having an impeller and a drive shaft coaxial with the impeller and connected therewith, and a fluid inlet and outlet, a valve to close the inlet when the head of fluid in the inlet is relieved, said valve having a stem and the valve and stem being coaxial with the impeller and shaft, a spring for urging the valve to closing position, and the blades of the impeller and the shaft being formed respectively with cut away portions and a bore to receive the valve and its stem, and the spring being carried in the bore to act on the stem.

3. In a centrifugal pump of the type having an impeller and a drive shaft coaxial with the impeller and connected therewith, and a housing having a fluid outlet, and a fluid inlet located coaxial of the impeller and shaft and formed with a valve seat, a valve engaging the seat to close the inlet when the pressure of fluid is relieved, said valve having a stem receivable in a bore in the shaft and located coaxial with the shaft and impeller, a spring in the bore urging the valve to its seat, and the impeller blades cut away to accommodate the valve head and provide a chamber coaxial with the inlet.

4. In a centrifugal pump having an impeller and a drive shaft coaxial with the impeller and connected thereto, a housing about the impeller having an intake and an outlet, a valve coaxial with the shaft and impeller and formed with a stem, the shaft having a bore receiving the stem, and a spring for urging the valve into closing position with respect to the inlet when pressure of fluid is relieved in the inlet.

JAMES G. READ.