

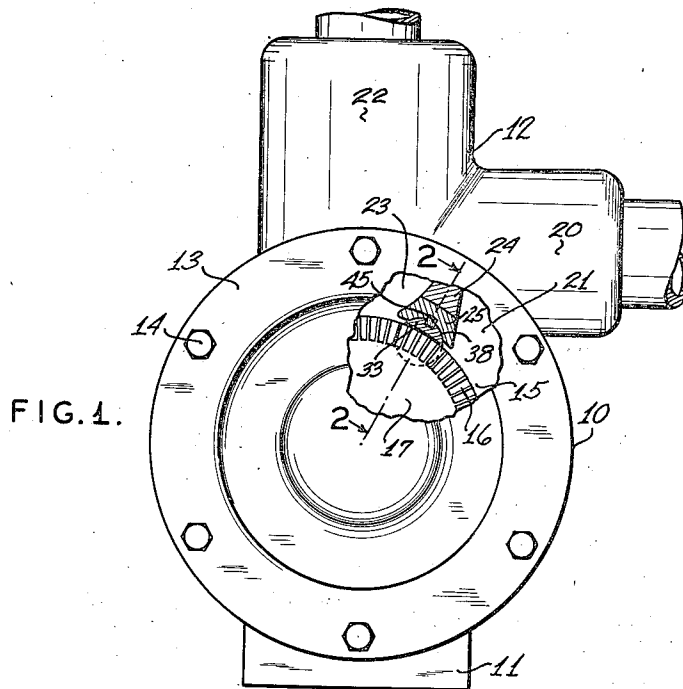
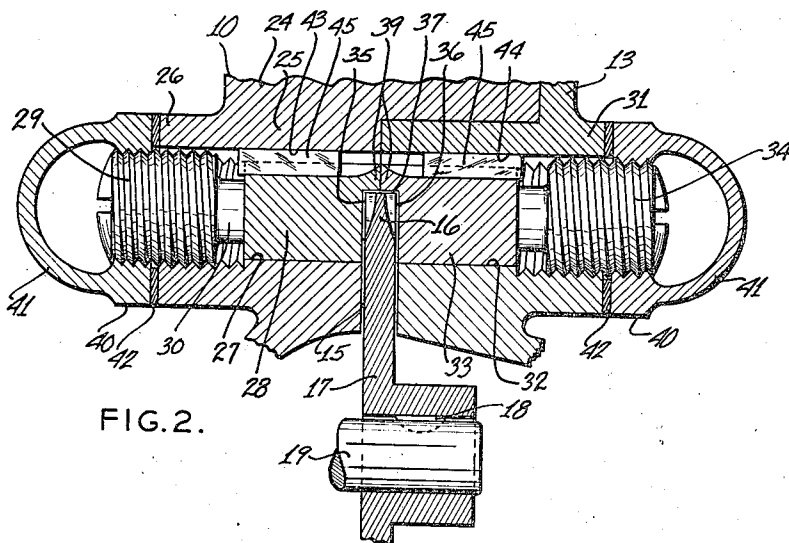
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PERIPHERAL PUMP

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PERIPHERAL PUMP

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This invention relates to fluid pumps, particularly those of types having rotating impellers, and is advantageously utilized in pumps of peripheral type to provide an improved pump chamber and impeller sealing means for the zone of the pump chamber between the inlet and discharge passages therefor, the form and mounting arrangement of the sealing means being such as to facilitate adjustment, as well as ready removability and replacement thereof, all without necessitating any disassembly of the remainder of the pump assembly.

The principal object of the invention then resides in the provision of improved sealing means for the purpose indicated, characterized by coacting, substantially cylindrical seal plugs, each having a shouldered end, the plugs being non-rotatably seated in transverse recesses formed in the pump casing between the inlet and discharge passages thereof, and being arranged in opposed relation such that the shouldered ends abut and cooperate to form a groove or slot closely receiving the peripheral portion of the impeller.

Another object resides in the provision of improved impeller seal plugs arranged in cooperating, opposed relation transversely of the pump casing and on opposite sides of the impeller, such that the plugs may be readily and easily assembled to or removed from the casing without disturbing the remainder of the pump assembly.

A further object appears in the provision of renewable seal plugs for the purpose indicated, of improved construction and so mounted in the pump casing as to facilitate assembly and adjustment thereof, to provide a more effective and efficient impeller sealing function of the plugs relative to the pump impeller, than has been obtained heretofore.

Further objects and advantages will appear as the following description proceeds and when taken in connection with the accompanying drawing, in which:

Fig. 1 is an assembly elevation of a peripheral type pump incorporating impeller seal plugs according to the present invention, a portion of the pump casing being broken away to reveal the seal plug assembly, partly sectioned as shown; and Fig. 2 is a greatly enlarged, fragmentary section transversely of the pump casing, showing the preferred type of impeller seal means in operative position, the view being taken along line 2—2 of Fig. 1.

Referring to the drawing by suitable characters of reference, the peripheral pump assembly illustrated, includes a casing section 10 provided with

a mounting standard 11 and an upper L-shaped extension 12 providing fluid inlet and discharge passages later to be indicated, and a complementary casing section 13 removably secured to the section 10 as by suitable bolts or cap screws 14. The casing sections in assembly, provide an annular impeller chamber or channel, as indicated at 15, in which rotates the bladed peripheral portion 16 of a disc type impeller or pump rotor 17. The impeller is secured by a suitable key 18, upon the inner end of a pump shaft 19, the shaft being suitably journaled (not shown) in the casing section 10 and projecting outwardly thereof (not shown) for coupling to a pump operating motor or other prime mover.

As appears in Fig. 1, the portion 20 of the casing extension 12, provides a fluid inlet passage 21 in communication with the pump chamber 15 and the impeller therein, while the extension portion 22 provides a fluid outlet or discharge passage 23 for the casing chamber 15. The two passages are separated by a dividing wall 24, preferably formed integrally with the casing structure, the dividing wall being extended into the impeller channel 15 to provide a transverse barrier therein, with the lower end 25 of the wall overlying the impeller periphery, as shown in Fig. 1.

In order to prevent an undesirable by-pass movement of fluid from the discharge passage to the inlet or suction passage of the pump, between the impeller periphery and the lower end 25 of the barrier or bridge 24, the prevailing practice has been to employ a separate sealing means at the bridge zone, having a minimum clearance with the impeller periphery. However, such sealing members as have been utilized heretofore for this purpose, have not been accessible for adjustment, repair or replacement without necessitating disassembly of the pump casing. Accordingly, in keeping with the purposes hereinbefore stated, the arrangement provides a markedly effective sealing means so arranged in the pump assembly as to be fully accessible from the exterior of the pump casing, thus avoiding the objections noted hereinabove.

Fig. 2 illustrates the preferred form and arrangement of sealing means according to the present invention, located in the zone of the bridge 24 as shown in Fig. 1. Formed on the casing 10 is an external lateral boss 26, and extending laterally through the boss and casing is an aperture or bore 27. The casing portion of the bore is smooth-walled for the reception of a cylindrical seal member or plug 28, while the

portion of the bore in the boss 26 is internally threaded to receive a threaded set screw 29, the inner end 30 of which normally abuts the plug 28. The casing section 13 is similarly externally bossed, as at 31, and is provided with a like bore 32 adapted for the reception of a second plug 33 and set screw 34, the casing bores 27, 32 and seal plugs 28, 33 being in axial register in the pump assembly, as shown in Fig. 2. The inner opposed ends of the plugs 28 and 33 are formed to provide shouldered recesses, as at 35 and 36 respectively, which in the assembly abutment of the plugs as shown in Fig. 2, cooperate to provide a recess or groove 37 to receive or embrace the peripheral, fluid-impelling portion of the pump impeller. The plug recesses 35 and 36 may be accurately milled and machined to provide for the desired minimum operating clearance or running seal for the impeller. As appears in Fig. 1, the lateral aperturing of the casing sections to receive the seal plugs, is effected in the zone of the bridge 24, such that the lower end 25 of the bridge is thereby cut away in arcuate form, as at 38, to accommodate the projecting shoulders 39 of the seal plugs (Fig. 2) so that these shoulders may abut in assembly, in overlying relation to a definite, limited arc of the impeller periphery. The assembly abutment of the plug shoulders 39 then determines the sealing position of the plugs relative to the impeller, such as to maintain the minimum operating clearance or running seal therewith. The plugs are retained in such position by the set screws 29 and 34, and the latter are held or locked in adjustment, each by a lock nut 40 which in the present example, may be formed to provide an enclosing cap 41. A suitable gasketing washer 42 may be provided as shown, to preclude fluid leakage at the juncture of the cap and casing.

To assure proper seating of each plug and further, to prevent rotational displacement thereof in the casing bore, key-ways 43 and 44 are formed in the plug and casing respectively, to receive a key element 45. Thus while prevented from turning by reason of the keys 45, the plugs may be readily displaced in the axial direction, as for seating adjustment or removal and replacement purposes. The seal plug arrangement as now described, wherein the plugs project laterally of the casing, and from each side or lateral face of the impeller, provides for ready insertion and assembly seating of the plugs after assembly of the pump, and thereby enables adjustment of the plugs from the exterior of the casing, through the set screws 29 and 34 as rendered accessible upon removal of the cap-nuts 40.

When the pump is employed to move a fluid containing gritty or abrasive matter, the first sign of wear or erosion in the pumping channel appears at the bridge or partition portion 25, for at this point the fluid mass must be diverted into the outlet passage 23, and effectively prevented from passing on into the inlet side of the pump. Therefore, the sealing means at this point or zone must be capable of ready adjustment as to operating clearance. The plug type of sealing means above described is well adapted for this purpose, since in the presently improved arrangement thereof, they may be readily adjusted or removed and replaced without disturbing or requiring disassembly of, the remainder of the pump. And since the plugs are small and inexpensive, they may be discarded if badly eroded, and new ones inserted, or if slightly worn, the

abutting ends may be dressed down and the recesses 35 and 36 machined so that the desired rotor clearance will be again established.

The foregoing description of an improved type of sealing means adapted for application to a peripheral pump, relates to a single preferred embodiment thereof, and it is to be understood that the present sealing means is susceptible of various structural and assembly modifications without departing from the spirit and intended scope of the invention, as defined by the appended claims.

I claim:

1. In a fluid pump of the general character described, including a casing providing an annular fluid channel and adjacent inlet and discharge passages in communication therewith, a pump rotor of peripheral fluid impelling type, operable in said channel, and fluid sealing means in the zone of said channel between said passages, said means comprising laterally adjustable co-operating elements carried by the casing and closely embracing the periphery of the rotor in said channel zone.

2. In a fluid pump of the general type described, a casing providing an annular fluid channel and inlet and outlet passages communicating therewith, a rotor member of peripheral fluid-impelling type, operable in said channel, a partition separating said passages and projecting into said channel, to overlie said rotor, said casing being apertured laterally therethrough in the zone of said partition, and co-operating fluid sealing elements seated in said aperture, said elements closely overlying the rotor periphery and extending closely adjacent the opposite lateral faces of the rotor in the peripheral zone thereof.

3. In a fluid pump of the general type described, a casing providing an annular fluid channel and inlet and discharge passages communicating therewith, a pump rotor of peripheral fluid impelling type, operable in said channel, a partition separating said passages and extending into said channel in overlying relation to said rotor, said casing being apertured laterally therethrough in the zone of said partition, opposed fluid sealing elements removably seated in said aperture on each side of said rotor, said elements closely embracing the rotor periphery in the zone of said partition, and means for retaining said elements in position in said aperture.

4. In a fluid pump of the general type described, a casing providing an annular channel and adjacent inlet and discharge passages communicating therewith, a pump rotor of peripheral fluid impelling type, operable in said channel, said casing being apertured transversely therethrough in the zone of the channel between said passages, opposed fluid sealing elements seated in said aperture, the inner opposed ends of said elements closely embracing the rotor periphery in said channel zone, and means for retaining said elements in position in said aperture, said elements and retaining means being accessible from the exterior of said casing.

5. In a fluid pump of the general type described, a casing providing an annular fluid channel and adjacent inlet and discharge passages in communication therewith, a pump rotor of peripheral fluid-impelling type, operable in said channel, said casing being apertured transversely therethrough in the zone of the channel between said passages, fluid sealing elements seated in said aperture on opposite sides of said

channel, the inner opposed ends of said elements extending closely adjacent the lateral faces of the rotor near the periphery thereof, and being adapted for cooperation in spanning the channel closely above the rotor, and means in said aperture for retaining said elements in position therein, said elements and retaining means being accessible from the exterior of said casing.

6. In a pump of the general type described, a casing provided with a displacement channel along its interior periphery, an impeller having a displacing portion operable in said channel, the casing being formed to provide spaced inlet and discharge ports and conduits, a sealing element in the casing, between the zones of the ports, the sealing element being displaceable in a direction transverse to the impeller, and formed on its inner end to constitute a running seal with one side and the rim of the impeller, and a cooperating abutment portion carried by the casing and coacting with the sealing element.

7. In a pump of the general type described, a casing provided with a displacement channel along its interior periphery, an impeller having a displacing portion operable in said channel, the casing being formed to provide spaced inlet and discharge ports and conduits, a sealing element in the casing, between the zones of the ports, the sealing element being displaceable in a direction transverse to the impeller, and formed on its inner end to constitute a running seal with one side and the rim of the impeller, and a second, companion sealing element, adjustable to and from the impeller rim, carried by the casing and coacting with the sealing element.

8. In a pump of the general type described, a casing provided with a displacement channel along its interior periphery, an impeller having a displacing portion operable in said channel, the casing being formed to provide spaced inlet and discharge ports and conduits, a sealing element

in the casing, between the zones of the ports, the sealing element being displaceable in a direction transverse to the impeller, screw threaded means for displacing the said sealing element, said sealing element being formed on its inner end to constitute a running seal with one side and the rim of the impeller, a cooperating abutment portion carried by the casing and coacting with the sealing element, and means for preventing rotational displacement of the sealing element.

9. In a pump of the general type described, a casing provided with a displacement channel along its interior periphery, an impeller having a displacing portion operable in said channel, the casing being formed to provide spaced inlet and outlet ports and conduits, a sealing element in the casing, between the zones of the ports, the sealing element being displaceable in a direction transverse to the impeller, screw threaded means for displacing the sealing element, said screw threaded means being accessible from the exterior of the casing, a sealing cap constituting a cover overlying the screw threaded means, said sealing element being formed on its inner end to constitute a running seal with one side and the rim of the impeller, and a cooperating abutment portion carried by the casing and coacting with the sealing element.

10. In a pump of the general type described, a casing provided with a displacement channel along its interior periphery, an impeller having a displacing portion operable in said channel, a sealing plug replaceably mounted in a side of the casing and arranged for lateral adjusting movement to and from the impeller in a direction parallel to the impeller axis, the said plug having an arcuately undercut portion near its inner end, adapted to constitute a running seal with one side and the outer edge of the impeller rim.

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