This invention relates to improvements in rotary fluid pumps and motors, and more particularly in that class of pump or motor employing vanes in the rotors adapted to bear resiliently against the walls of the pump or motor casing and against the companion rotor to function as packing preventing losses due to escape of the fluid between the two rotors and between the individual rotors and the walls of the rotor chamber.

The principal object of the invention is to provide a vane which with its novel retaining means will be highly efficient in operation due to its self-aligning characteristics, strong and durable, and capable of withstanding excessive and complex strains and stresses to which these vanes are subjected in high pressure mechanism.

The invention further resides in certain novel and improved structural details including novel means for releasing the vanes from the retaining means.

In the attached drawings:

Figure 1 is a fragmentary sectional view of a rotary pump in which the rotors are equipped with vanes made in accordance with the present invention;

Fig. 2 is a section on the line 2–2, Fig. 1, and

Figure 3 is a fragmentary section on the line 3–3, Fig. 2.

Referring to the drawings, the pump illustrated therein comprises a casing 1 having intake channels 2, 2 and discharge channels 3, 3 all communicating with a rotor chamber 4 in which are mounted in well known manner a pair of cooperating rotors 5 and 6. These rotors are mounted upon shafts 7, 7 which are journaled in the casing in the usual manner. The rotors 5 and 6 are of the intermeshing type having teeth or projections 8 which are adapted to enter correspondingly formed recesses in the opposed rotor. The rotors are adapted to rotate in the direction indicated by the arrows, and as the rotors revolve, the fluid is carried between the rotors and the walls of the chamber 4 from the intake side to the discharge side of the casing, also as indicated by the arrows. In this type of pump in order to preserve the efficiency and the differential pressure between the intake and discharge sides of the pump, it is necessary to have a close fit not only between the rotors themselves but between the rotors and the walls of the rotor chamber. In order to preserve this close fit, I have provided in the ends of the rotor extensions 8 spring-pressed vanes which bear resiliently upon the walls of the casing and upon the opposing rotor faces, all as clearly illustrated in Fig. 1.

It has been extremely difficult in pumps of this general character or motors of like nature in which the operating pressures are extremely high to provide a retaining means for the packing vanes which is capable of withstanding the heavy and complex stresses and strains to which it is subjected. The vanes in order to function properly must have free radial movement in the rotors, but must be held with substantial rigidity from axial movement in the rotor. The pressures tending to give the vanes this axial movement in the rotors are extremely high and are continually changing in direction, and it is essential that this axial movement be prevented because of the tendency of the vanes to cut into and groove the plates abutting the ends of the rotors with a resultant damage to the parts and decrease in efficiency of the machine.

In providing a vane-retaining means meeting these requirements, I provide the rotary extensions 8 with radial slots 9 having at the bottom a transverse offset 10, and the vanes 11 are correspondingly formed to fit the recesses 9 and with a transverse flange 12 at the bottom which fits behind the shoulder at the outer end of the groove extension 10 and limits the outward movement of the vane in the slot. Obviously the vane is introduced into the slot from one end of the latter. From the bottom of the slot 11 a cylindrical passage 13 extends radially inwardly, and this passage is adapted for reception of a hollow retaining pin 14 which is normally held pressed outwardly by means of a spring 15 which occupies the hollow interior of the pin 14 and is confined between the pin and the bottom of the recess. Depending on the width of the rotors, one
or more of these retaining pins may be employed, although generally it is desirable to employ at least two, as shown in Fig. 2 of the drawings.

5 In the under side of the vanes 11, I provide one or more transverse grooves or recesses 16, and these grooves are placed in alignment with the cylindrical passages 13 and are formed to neatly receive the upper ends of the pins 14, as clearly illustrated, whereby the vanes are retained by the pins against axial movement in the slots in the rotors which they individually occupy. As illustrated, the vanes 11 and the slots 10 are so relatively proportioned that the vane is permitted a predetermined amount of axial movement in the slot, the spring 15; however, acting through the pin 14 in obvious manner and to retain the vanes in a maximum projected position in which the outer end of the vane projects appreciably beyond the periphery of the rotor.

In order to insert the vanes in the slots, it is only necessary to force the pins 14 inwardly to a sufficient extent to permit of the insertion. It is necessary, however, in order to release the pins from the slots 10, both in inserting and withdrawing the vanes, to force the pins inwardly to an extent clearing the said slots, and to make this possible I provide in the vanes narrow passages or apertures 17 extending from the outer end of the vane into the slots 16 at points directly above the normal pin position. By inserting a heavy wire or other suitable tool into and through the passage 17, the pins 14 may be depressed sufficiently to clear the sides of the slots 16 to thereby permit axial movement of the vane in the rotor either for purposes of insertion or withdrawal.

It will be noted that by employing the slots 16 extending transversely of the vanes for reception of the upper ends of the retaining pins 14, the pins do not prevent any transverse movement or rocking of the vanes in the slots which they occupy, whereas they effectively prevent movement of the vanes in the rotors in an axial direction. The pins 14 which are made amply large to withstand the strains placed upon them therefore interfere in no way with the normal self-adjusting characteristics of the vane, but are entirely effective to prevent the undesirable movements. By making the pin hollow, the length both of the pin and of the spring is maintained at a maximum.

I claim:

1. A rotor for rotary pumps and motors having a peripheral and longitudinal slot, a vane mounted in said slot and having therein limited movement radially of the rotor, said vane having on its inner face a transverse slot, a pin mounted in the rotor and adapted to enter the slot to prevent movement of the vane axially of the rotor, and a spring resiliently retaining the pin in the slot.

2. A rotor for rotary pumps and motors having a peripheral and longitudinal slot, a vane mounted in said slot and having therein limited movement radially of the rotor, said vane having on its inner face a transverse slot and an opening extending from the outer face of the vane into the transverse slot, a pin slidably mounted in the rotor and adapted to enter the slot at the inner end of said opening to prevent movement of the vane axially of the rotor, and a spring resiliently projecting the pin into the slot.

3. A rotor for rotary pumps and motors having a peripheral and longitudinal slot, a vane mounted in said slot and having therein limited movement radially of the rotor, said vane having on its inner face a transverse slot, a hollow pin mounted in the rotor and adapted to project into the said transverse slot to prevent movement of the vane axially of the rotor, and a spring extending into the hollow pin and abutting the rotor to resiliently retain the pin within the slot.

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