

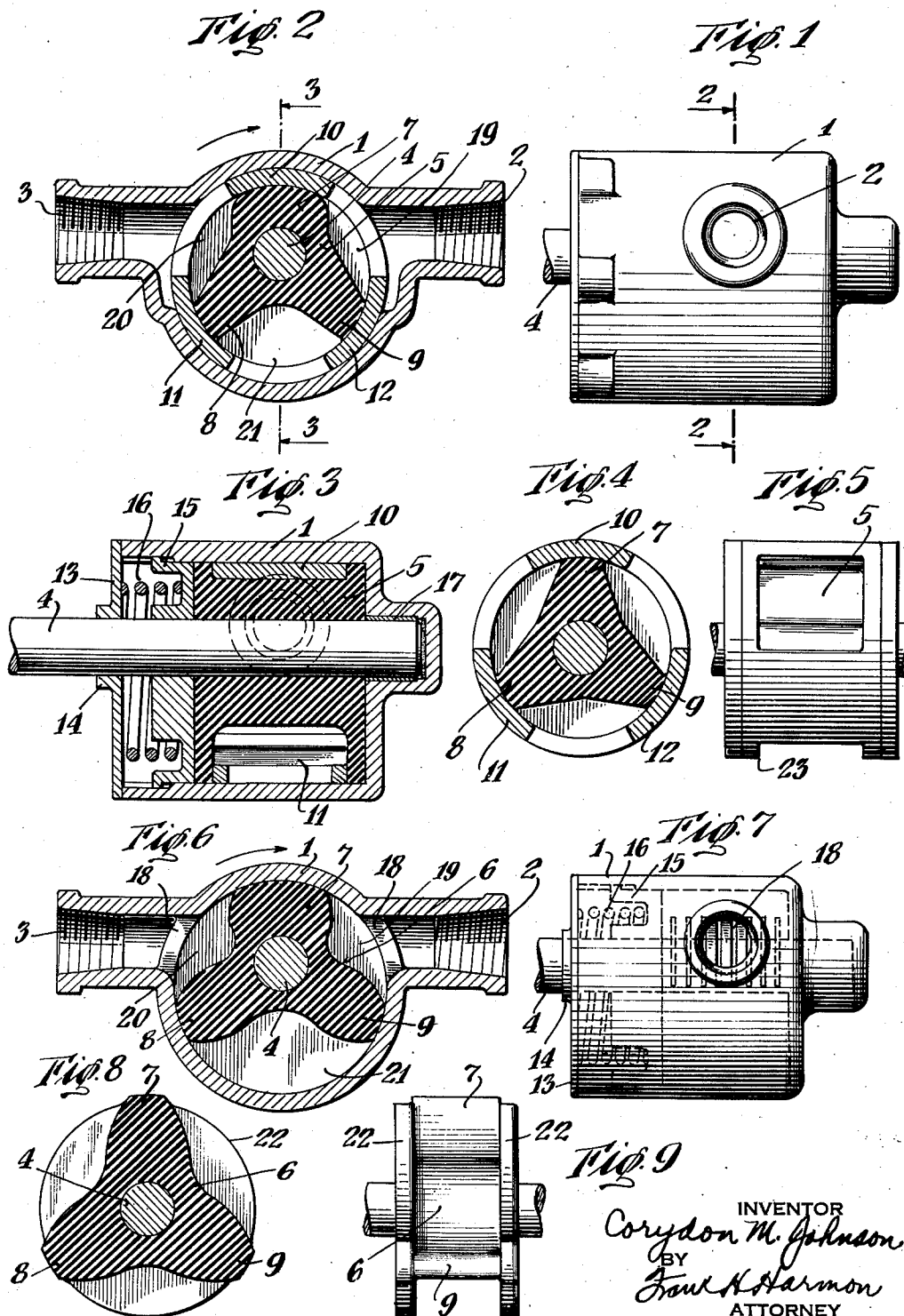
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ROTARY PUMP

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ROTARY PUMP

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This invention relates in general to improvements in rotary pumps and more particularly to pumps which are reversible in operation so as to act as either pressure or vacuum pumps.

An object of the invention is to provide such a pump which will be simple and durable in construction and reliable and efficient in operation.

Another object of the invention is to provide a pump with such rotatable members that will serve the dual function of providing a pumping action and at the same time act as a packing so as to prevent leakage.

A further object of the invention is to provide such a pump that the vanes thereof will during their rotation inherently create varying pressure areas such that will assist in the rotation of the pump.

Another object of the invention is to provide an automatic means for taking care of any wear that may come about in the operative parts of the pump, so that the same will at all times be sealed against leakage of fluid.

With the foregoing and other objects in view, the invention consists in the combination of parts and in the details of construction hereinafter set forth in the following specification and appended claims, certain embodiments thereof being illustrated in the accompanying drawing, in which:

Figure 1 is a side view of the pump;

Figure 2 is a view in section taken along line 2—2 of Figure 1;

Figure 3 is a view in section taken along line 3—3 of Figure 2;

Figure 4 is a view in cross-section taken through one type of rotor;

Figure 5 is a side view of that shown in Figure 4;

Figure 6 is a view in longitudinal section taken through the casing and a rotor of a form modified from that shown in Figure 4;

Figure 7 is a view similar to Figure 1, showing the follower in dotted lines;

Figure 8 is a view in section taken through the type of spider used in the pump as shown in Figure 6;

Figure 9 is a side view of the rotor of the type used in Figure 6.

Referring more particularly to the drawing, there is shown a suitable casing 1 having an inlet 2 and an outlet 3. Inside of this casing may be arranged a pump shaft 4 which is eccentrically mounted with relation to the circular part of the casing. The rotary element of the pump generally consists of a spider of the type generally referred to at 5 in Figure 2, or of the type generally referred to at 6 in Figures 6 and 8.

In each instance the spider is generally made up of flexible material and preferably of oil-proof rubber. Referring to Figure 8 the spider 6 is comprised of three projections 7, 8 and 9 and the spider is preferably vulcanized to the shaft 4 so that the spider itself is concentric with relation to the shaft and held between the collars 22 which are loosely mounted on the shaft. When this spider and shaft are inserted in the casing, as shown in Figure 6, it will be seen that the projection 7, by reason of the eccentricity of the shaft 4 with relation to the casing, is most subjected to compression when it rotates to the top of the casing, as shown in Figure 6.

The other two projections, 8 and 9, are equally compressed with each other and become less and less compressed with each other as they reach the bottom of the casing. The spider, when the pump is used as a pressure pump, rotates in a clockwise direction, so it will be seen that the projection 8 will become more and more compressed while the projection 9 will become less compressed until it passes past the dead center point in the bottom of the casing.

If it be found that the wearing of the rubber spider through friction with the interior of the casing becomes too great, the rotor may take the form, as shown in Figures 2 and 4, wherein the same type of spider is used, except that the spider may have vulcanized thereto a bronze sleeve or ring 23, the sides of which are cut away between the projections, leaving three sectors. Thus, projection 7 is inside of bronze sector 10, while projections 8 and 9 are inside of bronze sectors 11 and 12, respectively, while the concentricity of the shaft with relation to the spider remains the same, and the eccentricity of the shaft 4 with relation to the casing and the bronze sectors remains the same as described in connection with that type of spider shown in Figure 6.

As shown in Figure 3, there may be provided a plate 13 formed with a bearing 14 for the shaft 4 and a slidable follower 15. Between the plate 13 and the follower 15 is arranged a compression spring 16 for compressing the rubber spider longitudinally so that it will act as a packing for the shaft between its bearings 14 and 17.

As shown in Figure 7 the inlet to the circular part of the casing may be slotted at 18 in order that the spider may not be subjected to deformation in passing the inlet and outlet openings.

Referring to Figures 2 and 6, regardless of the particular type of spider employed, that is to say whether it be of the type shown in either Figure 2 or 6, as the fluid to be pumped enters the casing

when the spider is in the position shown in Figures 2 and 6, the spaces 19 and 20 between the adjacent spiders are substantially balanced, while the space 21 is considerably larger. A tendency towards suction of fluid from the inlet 2 is brought about by the subsequent diminishing of fluid pressure in the space 19 when it assumes the greater proportions shown at 21. As the rotor is further rotated it assumes the position shown at 20. Between the position shown at 21 and 20, however, the space has been considerably reduced, so that the fluid pressure within the space has increased and as the space becomes aligned with the outlet 3, the fluid pressure will force the fluid through the outlet 3, thus completing the function of the displacement pump. Thus it will be seen that there has been provided a rotary displacement pump which is reversible so as to be used as either a pressure or a vacuum pump for fluids of any nature. It will also be seen that there has been provided a pump which is inherently self-aligned and self-sealing against leakage and which has further the inherent properties of positiveness, ease and efficiency and inexpensive in construction and operation and least liable to wear and mal-function.

I claim:

1. In a rotary pump, a casing, a rotary shaft excentrically arranged with relation thereto, a rotor comprising a spider formed of a block of material that is inherently elastic and compressible to a relatively high degree and having vanes of greater dimensions when not compressed than the bore of said casing, and arranged substantially concentric with relation to said shaft and secured thereto so as to be compressed and deformed at all times when placed within said casing, and so that the vane under maximum compression due to its relative position with respect to the casing is of relatively greater thickness tangentially than the other vanes in their corresponding positions of lesser compression.

2. In a rotary pump, a casing, a rotary shaft excentrically arranged with relation thereto, a rotor comprising a spider formed of a block of material that is inherently elastic and compressible to a relatively high degree and having vanes of greater dimensions when not compressed than the bore of said casing, and arranged substantially concentric with relation to said shaft and secured thereto so as to be compressed and de-

formed at all times when placed within said casing, and so that the vane under maximum compression due to its relative position with respect to the casing is of relatively greater thickness tangentially than the other vanes in their corresponding positions of lesser compression, each of the vanes of said spider having fixed at its outer extremity a rigid bearing member to bear against the interior wall of said casing.

3. In a rotary pump, a casing, a rotary shaft excentrically arranged with relation thereto, a rotor comprising a spider formed of a block of material that is inherently elastic and compressible to a relatively high degree and having vanes of greater dimensions when not compressed than the bore of said casing, and arranged substantially concentric with relation to said shaft and secured thereto so as to be compressed and deformed at all times when placed within said casing, and so that the vane under maximum compression due to its relative position with respect to the casing is of relatively greater thickness tangentially than the other vanes in their corresponding positions of lesser compression, said spider being provided with an automatic resiliently urged follower device for compressing said spider longitudinally to form a packing ring for said pump.

4. In a rotary pump, a casing, a rotary shaft excentrically arranged with relation thereto, a rotor comprising a spider formed of a block of material that is inherently elastic and compressible to a relatively high degree and having vanes of greater dimensions when not compressed than the bore of said casing, and arranged substantially concentric with relation to said shaft and secured thereto so as to be compressed and deformed at all times when placed within said casing, and so that the vane under maximum compression due to its relative position with respect to the casing is of relatively greater thickness tangentially than the other vanes in their corresponding positions of lesser compression, each of the vanes of said spider having fixed at its outer extremity a rigid bearing member to bear against the interior wall of said casing, said spider being provided with an automatic resiliently urged follower device for compressing said spider longitudinally to form a packing ring for said pump.

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