

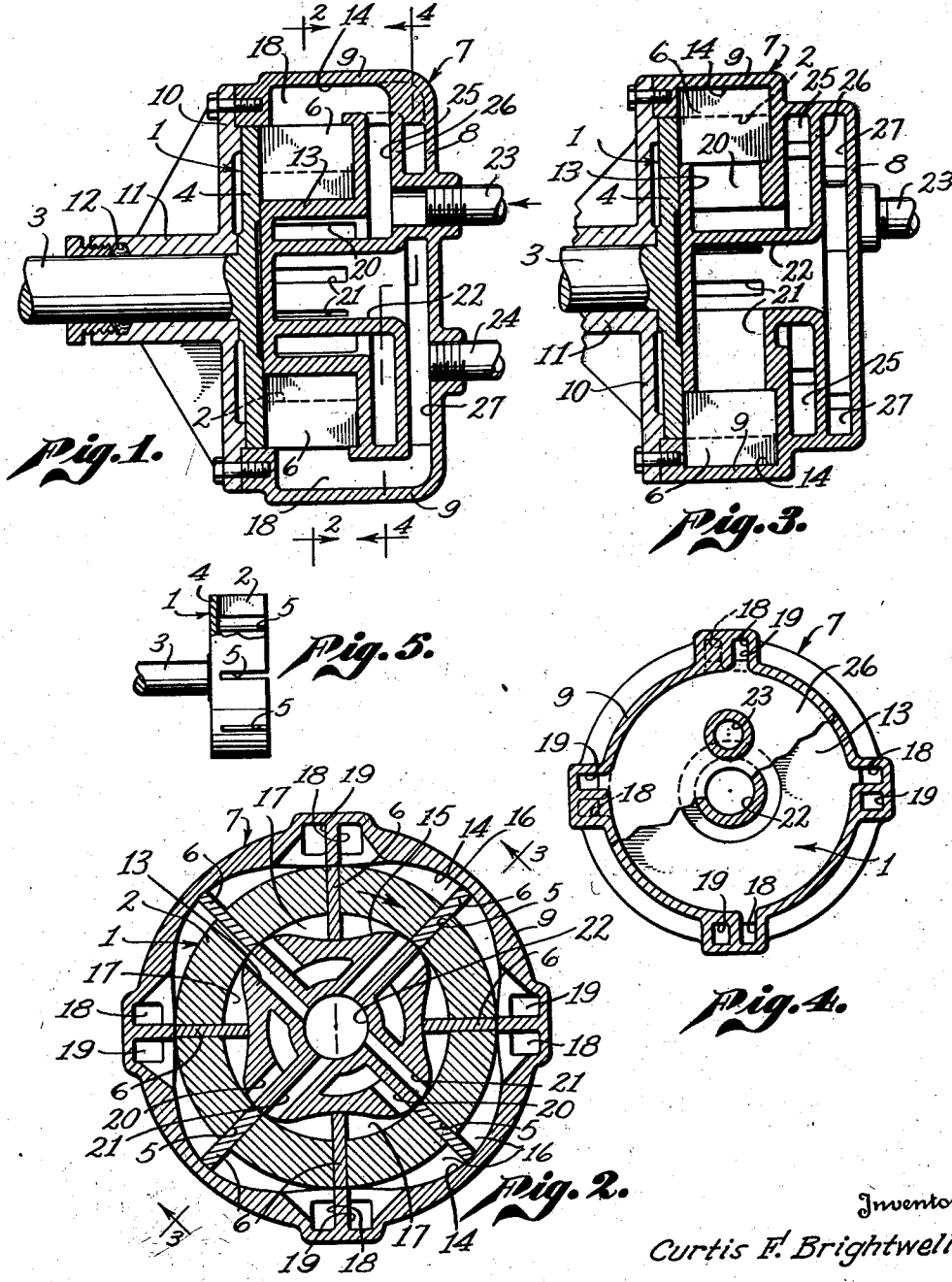
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MOTOR OR PUMP

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MOTOR OR PUMP

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1 Claim. (Cl. 103—136)

This invention relates to rotary apparatus, such as rotary motors and rotary pumps or compressors.

One of the objects of the invention is to produce a rotary device of this kind presenting a plurality of blades carried by the rotor, and which, as the rotor rotates, pass successively through a plurality of chambers for the operating fluid so that each blade is active at a plurality of points in its revolution.

A further object of the invention is to provide a construction operating on this principle, in which the blades can be guided radially with respect to the rotor.

A further object of the invention is to provide a construction of this type, capable of being used as a motor, or as a pump or compressor, and involving the use of an annular rotor in which the blades are guided radially, and to provide a construction enabling fluid chambers to be formed on the inner sides of the annular body of the rotor and also on the outer sides.

A further object of the invention is to provide a rotary apparatus of this type, in which the blades are freely movable, and in which the position of the blades is controlled entirely through the contact of their opposite edges with the adjacent walls of the stator, at the same time constructing the stator in such a way that the guide faces of the stator cooperate with the rotor to form operating chambers for the fluid on opposite sides of the annular wall of the rotor.

A further object of the invention is to improve the general construction of motors or pumps of this type.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combination of parts to be described hereinafter, all of which contribute to produce an efficient motor or pump.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claim.

In the drawing:

Figure 1 is a longitudinal section through an embodiment of my invention, in which blades reciprocate radially as the rotor revolves. In this view the driving or driven shaft is shown partly in section and partly in elevation, while the rotor and stator are shown completely in section. This view particularly illustrates the arrangement of inlet and outlet ports, together with the manifold chambers, which communicate with the same.

Fig. 2 is a vertical cross-section taken on the line 2—2 of Fig. 1, and particularly illustrating the general arrangement of the parts on the interior of the device, and illustrating the blades in mid position in the fluid chambers that are

formed on the outer side of the rotor. This view also illustrates the arrangement of the inlet and outlet ports and the manner in which they communicate with their manifold chambers.

Fig. 3 is a cross-section taken on the line 3—3 of Fig. 2, and particularly illustrating two diametrically opposite blades in their outermost position. This view should be contrasted with Fig. 1 that shows the blades in their innermost position. This section also passes through one of the inlet ports on one side of the axis and through one of the outlet ports on the other side of the axis.

Fig. 4 is a section taken on the line 4—4 through the main head of the stator, and further illustrates the arrangement of inlet and outlet ports in the same.

Fig. 5 is a side elevation in partial section of the rotor removed from the apparatus.

Before proceeding to a more specific description of the embodiments of the invention illustrated in the drawing, it should be stated that the preferred construction of the apparatus involves the use of a rotor rotating within a stator or casing, and the rotor is provided with means for guiding blades which, as the rotor revolves, pass along a path between opposite curved faces on the stator, which engage the opposite edges of the blade, and cause the same to shift its position as it passes through fluid chambers formed by the said curved faces. At points where they recede from the face of the rotor, inlet ports are provided; and outlet ports are provided at the other end of each chamber. The device may be used as a fluid-operated motor or as a pump or compressor. In one embodiment of the invention the blades are guided in a radial direction on the rotor, and shift radially in and out as the ends of the blades pass through the fluid chambers. In another embodiment of the invention the blades are mounted in the rotor for shifting longitudinally of the axis of rotation. This latter embodiment of the invention may take two forms, in one of which the blades on opposite sides of the rotor are independent of each other, and another form in which the blades are in diametrically opposite pairs connected together rigidly through slots formed in the central portion of the rotor. While any embodiment of the invention will operate effectively, the embodiment in which the blades are guided radially, has the advantage that in the preferred construction pairs of blades are located diametrically opposite to each other, and these blades move outwardly at the same time, and move inwardly at the same time; and hence the centrifugal forces acting on these blades, balance each other. In either embodiment of the invention the construction is such that as the rotor revolves, the blades pass successively through a series of chambers in which the blades are subjected to a driving impulse in case the ap-

paratus is in the form of a motor, or in which the blades impel forward the liquid or gas in case the apparatus is being used as a pump or compressor. By reason of the fact that the blades are operating actively at a plurality of points in each revolution, it will be evident that a substantially uniform torque will be imparted to the driven shaft if the apparatus is operating as a motor. If operating as a pump or compressor, it will give a steady torque resistance, and for this reason this construction has many advantages over reciprocating types of pumps and compressors.

Referring particularly to Figs. 1 to 5, I indicate the rotor which preferably has an annular body 2 with a relatively thick wall, and if desired, this annular body may be connected integrally to a shaft 3 through a disc-form head 4, which is integral with the shaft and with the annular body or drum 2. The rotor body 2 is provided with substantially radial guide slots 5 for guiding blades 6 that shift radially in and out as the rotor rotates in the stator 7. This stator is in the form of a casing enveloping the rotor, said casing including a head 8 with a circumferential wall 9 that surrounds the drum 2 of the rotor. The stator includes a detachable head 10 which carries an integral bearing 11 and stuffing box 12 for the shaft 3.

The main head 8 of the casing or stator 7 is preferably formed with an integral neck 13 that projects into the circular opening within the drum 2. The inner face 14 of the wall 9 of the casing and the outer face 15 of the neck 13 constitute guide faces that extend along curved lines alternately approaching and receding from the rotor. These curved faces touch the rotor at a plurality of points, and at the points where they recede from the face of the rotor, outer fluid chambers 16 are formed and inner chambers 17 are formed. These guide faces 14 and 15 in a radial direction are exactly the same distance apart as the radial dimension of the blades or vanes 6.

There may be as many blades 6 as desired, but it is preferable to have an even number of blades so that they will be disposed opposite to each other in pairs. In the present instance as illustrated in Fig. 2, I illustrate eight blades and four outer fluid chambers 16, and four inner chambers 17. Corresponding to each outer chamber 16 there is an inlet passage or port 18 and an outlet passage or port 19, the former being at the point where the blade enters the chamber 16, and the latter at a point where the blade leaves the chamber 16. Either of these ports 18 or 19 can operate as an inlet, but assuming that the port 18 is an inlet, the direction of rotation of the rotor will be clockwise as indicated by the arrow in Fig. 2.

The neck 13 is likewise provided with a plurality of inlet and outlet ports so that there is an inlet port 20 corresponding to each chamber 17, and an outlet port 21 for the same. The outlet ports 21 preferably communicate with a main central outlet duct 22.

All of the inlet ducts are connected up by a manifold of any suitable construction so as to be supplied with operating fluid through an inlet pipe 23, and all of the outlet ducts are connected up by a manifold to an outlet pipe 24. In the present construction I prefer to accomplish this

by forming an inlet manifold chamber 25 in the head 8, which is separated by a dividing wall 26 from a manifold outlet chamber 27 that is in communication with the main outlet duct 22.

In the operation of the device illustrated in Figs. 1 to 5, if it is operating as a motor the operating fluid will flow in through the inlet ports and exert pressure upon the projecting portions of the blades 6 within the chambers 16 and 17, and cause the rotor to rotate in the direction of the arrow. As this rotation occurs the faces 14, which are disposed in wavy curves, operate as cams to shift the blades alternately in and out so that after passing through an outer chamber 16 they immediately pass through an inner chamber 17.

As soon as a blade arrives at an outlet chamber, of course, the driving fluid or liquid will flow out at this point. If the device is operating as a compressor, the shaft 3 will be driven by a motor or other means, and the fluid or liquid admitted by the inlet ports in advance of the blades, will be impelled forwardly and compressed or forced out through the outlet ports.

It should be understood that in practicing the invention, the device may be constructed so that the blades 6 cooperate only with the chambers 16 on the outer side of the rotor, or the blades 6 may cooperate only with the chambers 17 on the inner side of the rotor. However, I prefer to have the blades cooperate with both of these inner and outer chambers when it is necessary to attain the greatest amount of efficiency from the device.

It is understood that the embodiment of the invention described herein is only one of the many embodiments this invention may take, and I do not wish to be limited in the practice of the invention, nor in the claim, to the particular embodiment set forth.

What I claim is:

In apparatus of the kind described to operate with a fluid, the combination of a rotor having an annular body with substantially radial guide slots therein for guiding blades, blades mounted in said slots, a stator comprising heads with a circumferential wall between the same, having outer guide faces engaging the outer edges of the blades, one of said heads having an integral neck projecting into the said annular body, the outer side of said neck having inner guide faces for the blades engaging the inner edges of the blades, each of said guide faces extending along a curved line alternately approaching, so as to touch the adjacent face of the rotor and receding from the adjacent face of the rotor so as to form a plurality of chambers to receive the fluid extending along the path of movement of the blades as the rotor revolves, said stator having an inlet corresponding to each chamber and an outlet corresponding to each chamber, and said guide faces operating to shift each blade alternately inwardly and outwardly as the rotor revolves, the head carrying the said neck having an outer wall, an inner wall and an intermediate partition wall between the same, with a common inlet chamber formed between the partition wall and one of said head walls, communicating with all of said inlets, and having an outlet chamber between the partition wall and the other head wall communicating with all of said outlets.

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