SLIDING SEGMENT ROTARY FLUID POWER TRANSLATION DEVICE

FIELD OF INVENTION

This invention relates to pumps, compressors, and fluid motors to include internal combustion engines and flow volume measurement devices.

DESCRIPTION OF PRIOR ART

It has been obvious for some time that an effective and efficient device which could directly translate mechanical torque and rotation to fluid flows and pressures, or vice versa, obviating reciprocating motion translation, would be a desirable goal. It is not surprising therefore that many such devices of various constructions have been proposed.

Several of the devices (See Pat. Nos. 865,206 to Ranck Sept. 3, 1907, 1,054,898 to Bendixson Mar. 4, 1913, and 3,764,241 to Cartland et al. Oct. 9, 1973) apparently similar to the present invention, consist of a rotor having a single vane, said vane penetrating an opening provided in an eccentrically disposed annular member having a unique rotation axis and bearing means. Rotation of the rotor vane causing said annular member to also rotate. This construction is difficult to dynamically balance, the annular member is subject to oblation and binding by localized internal pressures, and the working fluid ports must be quite small.

Another type employs multiple rotor vanes. (See Pat. No. 3,194,220 to Dowel et al. July 13, 1965) These vanes are hinged; provided with a central axis pivot which permits the vanes to be angularly relocated during rotation. The ring sections are subject to distortion and binding, being required to transmit torque loads between pivoting rotor vanes and those rotatably attached to the drive shaft. Working fluid ports must be small to prevent working fluid backflow as the rotor vanes traverse the port opening. The poppit valve, timing, and valve operation means impose most of the limitations normally associated with reciprocating devices thereby negating many of the advantages commonly associated with rotary devices.

OBJECTS AND ADVANTAGES

Accordingly I claim the following as my objects and advantages of the present invention: to provide a reliable, efficient, and effective mechanism for translating fluid pressure to torque and continuous rotation or vice versa at minimal cost by maintaining a basic construction essentially involving circles and plane surfaces, to provide a device having multiple or compound work cycles whereby said work cycles can be paralleled, staged, or perform various discrete functions, and to provide a device which can substantially combine the attributes commonly associated with accelerating or dynamic device types and those attributed to positive displacement devices.

In addition I claim the following objects and advantages: to provide a device capable of adjustable, regulated, working fluid flow volume, pressure, and reversible flow regardless of rotation, or adjustable torque and reversible rotation regardless of working fluid flow direction, and to provide a device which can be quickly and easily, disassembled for maintainence or cleaning, and reassembled and adjusted by relatively untrained personel.

DRAWING FIGURES

FIG. 1 is an comprehensive, exploded view of an adjustable, reversible embodiment of the present invention.

FIG. 2 is an isometric view, partially sectioned, of a rotor and segments assembly. The segments are shown as if supported in a working device.

FIG. 3 shows an externally adjustable working fluid volume and pressure pump or variable torque fluid motor embodiment of the present invention. The front confinement plate is removed and the embodiment is adjusted for maximum working fluid output or torque.

FIG. 4 shows the embodiment of FIG. 3, adjusted for minimum, or zero working fluid output or torque.

FIG. 5 shows a side view of a partially sectioned cantilevered foot mount and adjustment assembly. The adjustable embodiment of FIGS. 3 and 4, is shown in exploded view.

FIG. 6 shows a front view of an adjustable, reversible flow or reversible rotation embodiment, with the front cover removed.

FIG. 7 shows a front view of an internal combustion engine embodiment, with the front confinement plate and barrel sectioned along line 8—8.

FIG. 8 is a side view with the mounting assembly partially shown and partially sectioned, and the front cover and barrel sectioned along line 8—8 of FIG. 7.

SLIDING SEGMENT ADJUSTABLE PUMP OR FLUID MOTOR—DESCRIPTION

FIG. 1, is an essentially complete device illustrating the relationship between the various device components and assemblies. Four main assemblies comprise the device; the main rotor assembly **20**, the segments assembly **30**, the housing assembly **40**, and the mounting and adjustment assembly **50**.

The rotor assembly **20**, more clearly shown in FIG. 2, comprises a a rotor hub **24**, rigidly mounting multiple, radial rotor vanes **26**, which terminate at, and are affixed to, a concentric rotor containment ring **28**. All of the above components share a common co-axial dimension and the rotor described above can be finished as an assembly to insure flat, parallel, rotor ends. The main rotor assembly **20**, is rotatably affixed at the center of the rotor hub **24**, to a drive shaft **22**, by a key **23**, or other suitable means.

The segments assembly **30**, forms an annulus eccentrically located within the minor diameter of the main rotor containment ring **28**, and is comprised of two (or more) relatively thin, concentric, circumferentially incomplete, rings. Each ring comprising ring segments **32**, interspaced by segment gaps, or vacant ring spaces. The segment gaps permit the segments **32**, which concentrically overlap, to slide past one another to form chords of various lengths as required by eccentric rotation. The segments and segment gaps, alternated in radially adjacent rings, form a barrier to radial movement of the working fluid, dividing the internal volume of the main rotor **20**, into two discreet volumes hereafter called work cycles.

The segments **32**, have co-axially protruding edges which slideably engage the segments bearings **49**, FIG. **1**, provided in the internal surfaces of the axial confinement plates **42**. Co-rotation of the segments is compelled by the rotor vanes **26**, which penetrate each of the segments, usually near one end of the segment by means of a opening which conforms closely to the rotor