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Freeman

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[54] **HYDRAULIC TRANSMISSION SYSTEM**

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[51] **Int. Cl.** **F16h 39/46**

[58] **Field of Search** 60/450, 445, 449, 452; 417/212, 270, 213, 221; 91/491, 497

[56] **References Cited**

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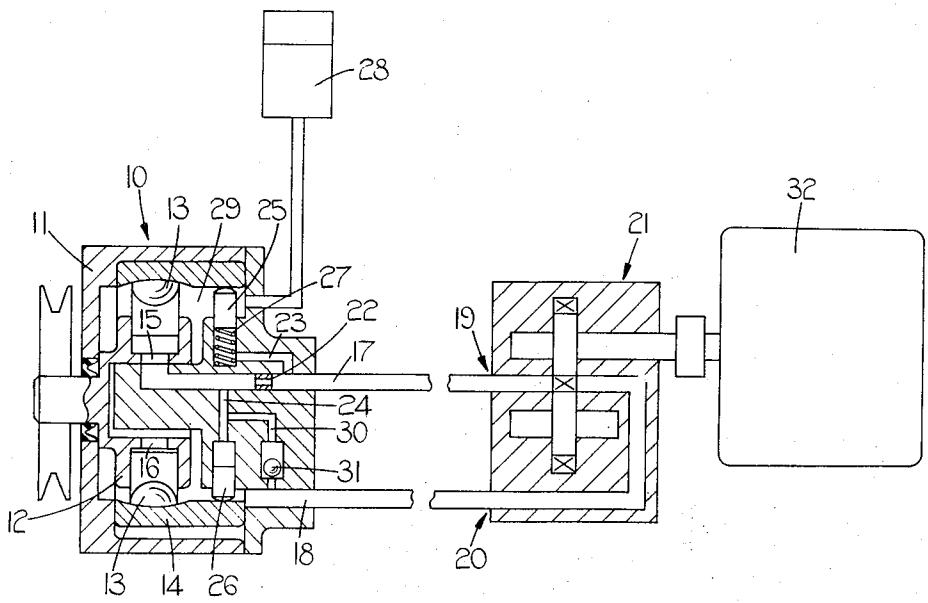
Primary Examiner—Edgar W. Geoghegan

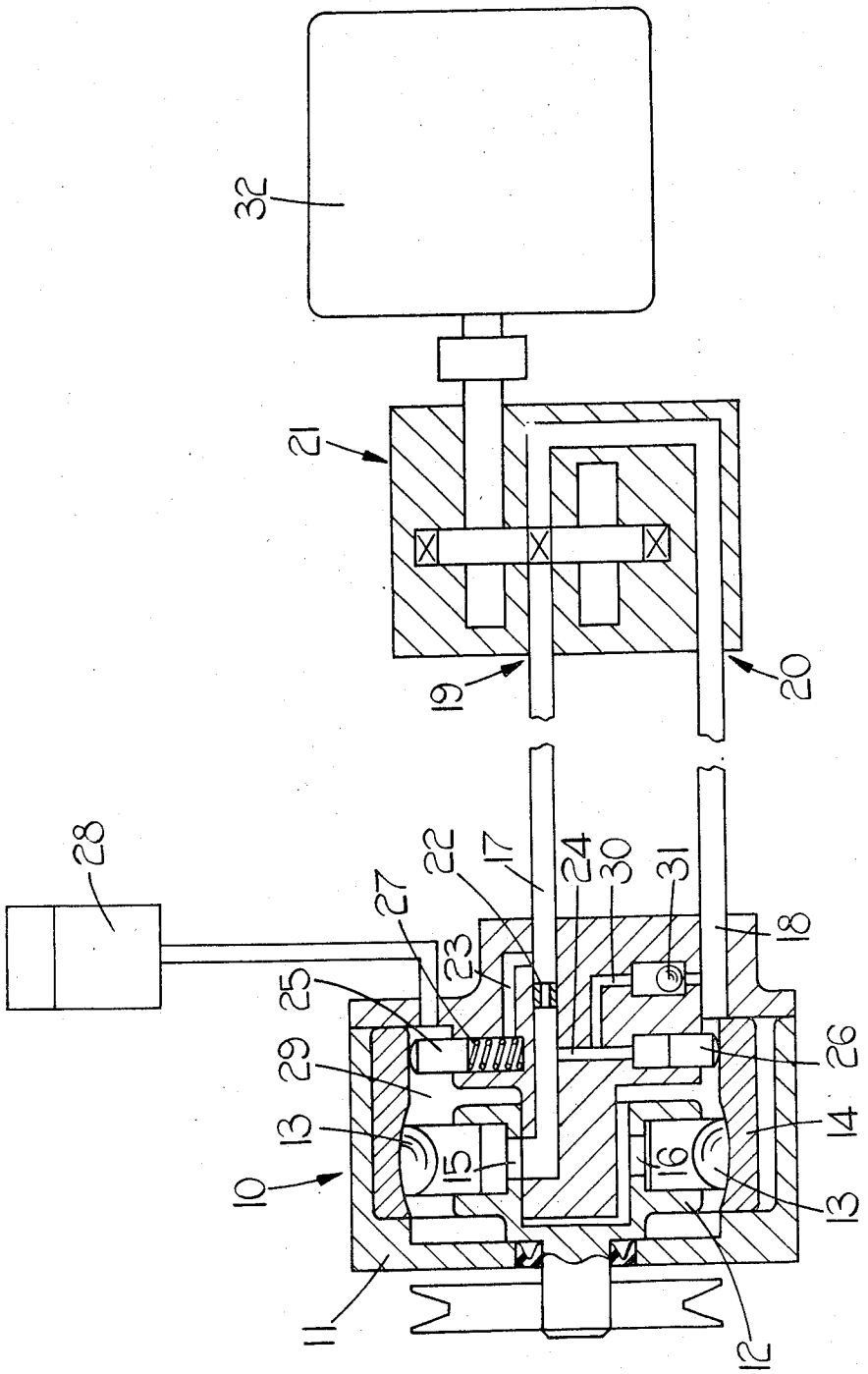
Attorney, Agent, or Firm—Holman & Stern

[57] **ABSTRACT**

An hydraulic transmission system comprises a pump **10** with a housing **11,** a rotor **12** therein and a plurality of radial pistons **13** in the rotor. A ring **14** surrounds the rotor and causes the pistons **13** to reciprocate in use. A servo device **25,26** for displacing the ring is fed by a pressure signal derived by a flow restrictor, through which liquid returning to the pump from an associated motor **21** passes. The speed of the motor is controlled automatically by variation of the eccentricity of the ring **14.**

5 Claims, 1 Drawing Figure




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HYDRAULIC TRANSMISSION SYSTEM

This invention relates to hydraulic transmission systems and has as an object to provide such a system in a convenient form.

A hydraulic transmission system according to the invention comprises a pump having a housing, a rotor supported therein, a plurality of radial pistons slidable in the rotor, a ring surrounding the rotor engageable by the pistons and displacable to vary its eccentricity with respect to the rotor, a pair of ports in the rotor for fluid displaced by the pistons, passages communicating with the said ports and with a motor driven, in use, by the pump, a flow restrictor in one of the said passages, actuating means responsive to the difference in the fluid pressures on opposite sides of the restrictor to displace the said ring and means for biasing the ring towards one extremity of its displacement, the arrangement being such that an increase in the said fluid pressure difference urges the ring against the biasing means in a direction to reduce the strokes of the pistons.

Reference will now be made to the accompanying drawings which shows diagrammatically an example of a system according to the invention.

A pump **10** has a housing **11** and a rotor **12** within the housing **11.** Slidable in the rotor **12** are a plurality of pistons **13** whose outerends engage a ring **14** which is movable in a plane normal to the axis of the rotor **12** so as to have a varying degree of eccentricity with respect thereto. Ports **15, 16** in the rotor **12** respectively communicate with passages **17, 18** in the housing **11.** Passages **17, 18** themselves communicate respectively with an inlet **19** and outlet **20** of a gear-type hydraulic motor **21.** The passage **17** also connects with a chamber **29** defined between the housing **11** and rotor **12.**

Passage **17** includes a flow restrictor **22,** on respective sides of which are passages **23, 24** through which fluid pressure reaches actuating means in the form of pistons **25, 26** which are slidable in diametrically opposite radial bores in a part of the housing in side the ring which engage the ring **14** internally at diametrally opposed points. The piston **25** is also acted upon by a spring **27** to bias the ring **14** to a position of maximum eccentricity with respect to the rotor **12.** A fluid supply **28** communicates with the chamber **29** and hence with the port **16.** A passage **30,** including a non-return valve **31** effectively connects the passages **17, 18.** The motor **21** is used to drive an external apparatus for example an alternator **32.**

In use the pump **10** is driven by an external means, e.g., an internal combustion engine not shown, and operates in a known manner to produce a fluid flow which is dependent on the speed of the rotor **12** and the strokes of the pistons **13,** the fluid in passages **17, 18** respectively being at high and low pressure. Fluid flow results in a proportionate pressure drop across the restrictor **22.** The net force exerted on the pistons **25, 26** by the pressure difference in the passages **23, 24** causes the ring **14** to be displaced, against the bias of the spring **27,** in a direction to reduce the strokes of the pistons **13.** For a given fluid flow there will therefore be a corresponding eccentricity of the ring **14.**

An increase in the speed of the rotor **12** results in an increased fluid flow which in turn acts as described to reduce the eccentricity of the ring **14** and hence to reduce the flow until an equilibrium condition is restored. A decrease in the speed of the rotor **12** similarly results in an increased eccentricity to restore an equilibrium condition. The rate of fluid flow from the pump **10,** and hence the speed of the motor **21** may thus be maintained within predetermined limits, irrespective of the speed of the external driving means.

In an alternative arrangement the actuating means may be spherical and may conveniently comprise steel bearing balls.

I claim:

1. An hydraulic transmission system comprising a pump having a housing, a rotor supported therein, a plurality of radial pistons slidable in the rotor, a ring surrounding the rotor engageable by the pistons and displacable to vary its eccentricity with respect to the rotor, a pair of ports in the rotor for fluid displaced by the pistons, passages communicating with the said ports and with a motor driven, in use, by the pump, a flow restrictor in one of said passages, actuating means responsive to the difference in the fluid pressures on opposite sides of the restrictor to displace said ring and means for biassing the ring towards one extremity of its displacement, said actuating means comprising a pair of actuating elements slidable in diametrally opposite bores in the housing within said ring, said actuating elements engaging said ring internally and said bores communicating with said one passage on opposite sides of said flow restrictor, the arrangement being such that an increase in the said fluid pressure difference urges the ring against the biassing means in a direction to reduce the stroke of the pistons.

2. A system as claimed in claim **1** in which said actuating elements are pistons.

3. A system as claimed in claim **1** in which said actuating elements are balls.

4. A system as claimed in claim **1** in which said biasing means comprises a spring within one of said bores and acting on said actuating element.

5. A system as claimed in claim **1** in which the motor is a gear type motor.

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