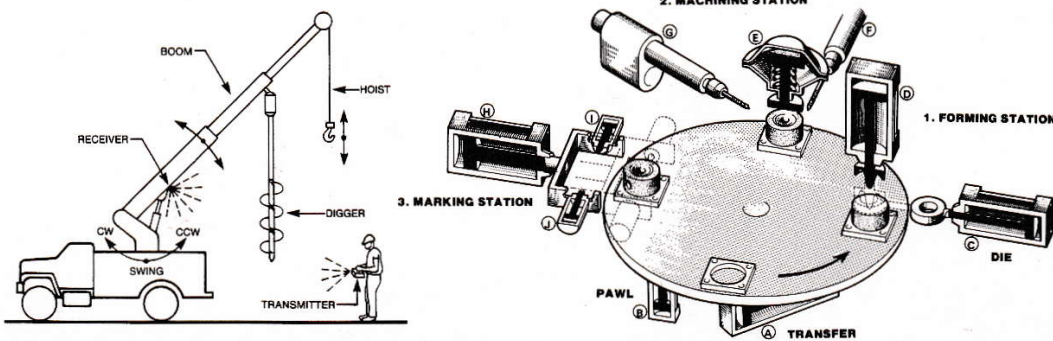

FLUID POWER DESIGN HANDBOOK

FRANK YEAPLE

Second Edition, Revised and Expanded



Fluid Power Design Handbook

Second Edition, Revised and Expanded

Frank Yeaple

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losses are reduced. The gear-pump drive also has some of the advantages of an eddy-current clutch, which include compact design and good shock absorption characteristics.

HYDROSTATIC DRIVES

A hydrostatic drive consists of a positive-displacement pump driving a positive-displacement fluid motor, usually in one of the basic arrangements shown in Fig. 7.11. The pumps and motors are available in many forms, including external gear, internal gear, vane, radial piston, and axial piston. Each design (Fig. 7.12) with minor modifications can be either a pump or a motor.

Any pump or motor can be varied in speed; for example, with a valving system to vary the flow to the fluid motor or with a variable-speed prime mover to drive the pump.

However, only vane and piston-type pumps and motors can have variable displacement. Gear pumps have constant displacement and must be rotated at variable speed to adjust flow.

Adjustable radial-piston and vane pumps and motors have movable pressure rings that change the eccentricity of the vanes or pistons relative to the shaft, thus changing the displacement. Adjustable axial-piston pumps and motors usually have swash plates or wobble plates that determine the effective stroke of the pistons — or the valve block itself can be tilted. But the principles are the same.

Fluid motor speed is dependent on output flow of the pump divided by the displacement per revolution of the motor. Input torque to the pump (for a constant-speed electric motor) and output torque of the hydraulic motor for a given efficiency depend on pressure and displacement. In a positive-displacement pump-motor drive, pressure rises to whatever level is required to move the load at the set displacement

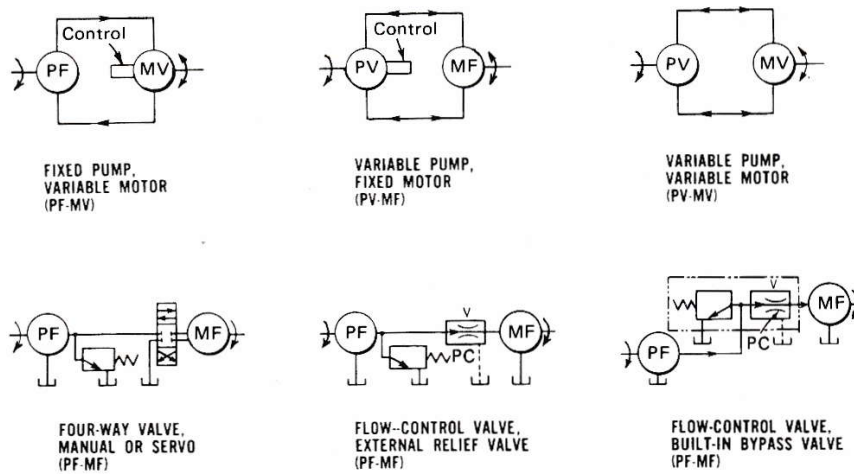


Fig. 7.11 Some typical arrangements for hydrostatic drive elements.

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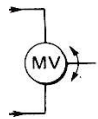
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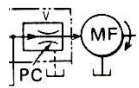
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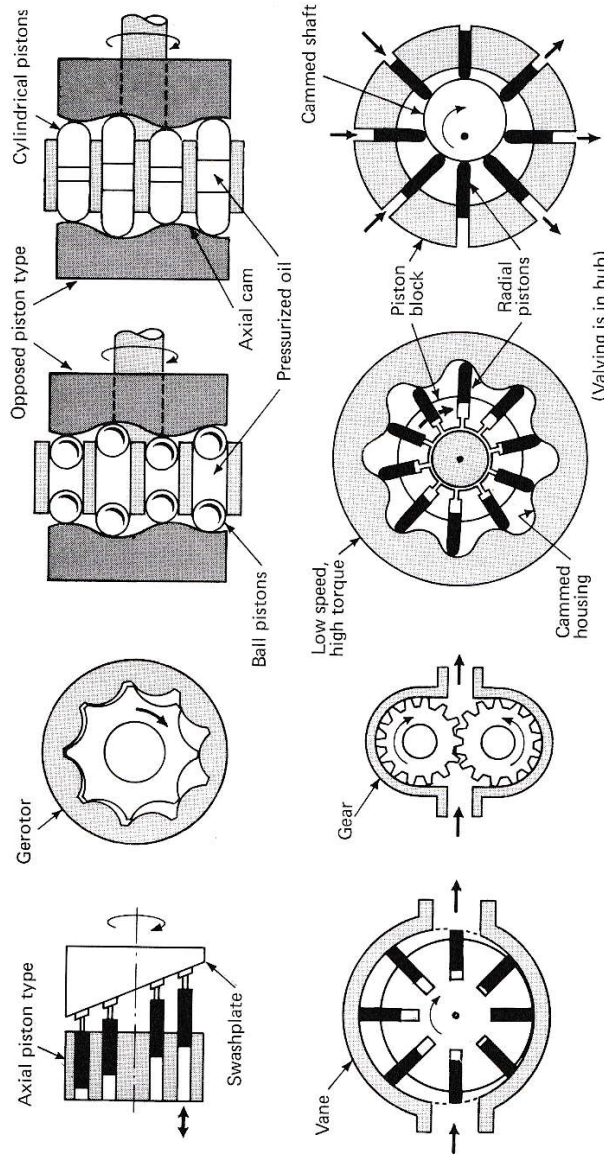


Fig. 7.12 Eight types of hydrostatic motors.

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