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Efficient Pressure-Transformer for Fluids

A new fluid transformer utilizes a fluid under pressure at one level to drive a series of free pistons in a positive displacement pump. The pump in turn delivers a hydraulic fluid at a different pressure level to a load (such as one or more hydraulic actuators or servomotors). The transformer is made of corrosion-resistant materials and is extremely light and compact in relation to its capacity.

A fuel-driven hydraulic motor drives a rotary-selector control valve that guides fluid under pressure to a free piston positive displacement pump. The device sequentially moves a number of fairly large pistons whose movements are transmitted to a corresponding series of relatively small pistons; these small pistons deliver the relatively high pressure hydraulic fluid output of the transformer against the ultimate load.

With a free piston pump, the requirement for conventional rotating cylinder blocks, heavy thrust bearings, and shaft seals is avoided. Normal problems of efficiency, weight, size and complexity are essentially eliminated, and an extremely efficient, simple, and light weight construction is achieved.

While initially designed for use as a pressure booster or intensifier, this transformer can also be used as a pressure de-intensifier and flow booster in which pistons of smaller diameter are acted upon by drive fluid to drive larger diameter pistons which generate lower pressure and higher flow in the pump fluid than in that of the driving fluid.

Note:

Requests for further information may be directed to:

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Reference: TSP70-10595

Patent status:

This invention has been patented by NASA (U.S. Patent No. 3,262,395), and royalty-free license rights will be granted for its commercial development. Inquiries about obtaining a license should be addressed to:

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