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OPPOSED-CYLINDER MOTORS

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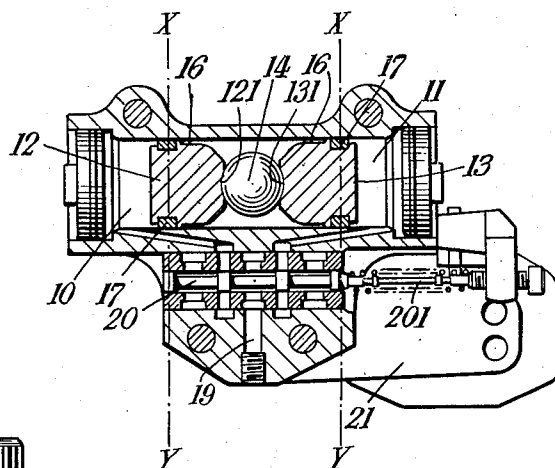


Fig. 1.

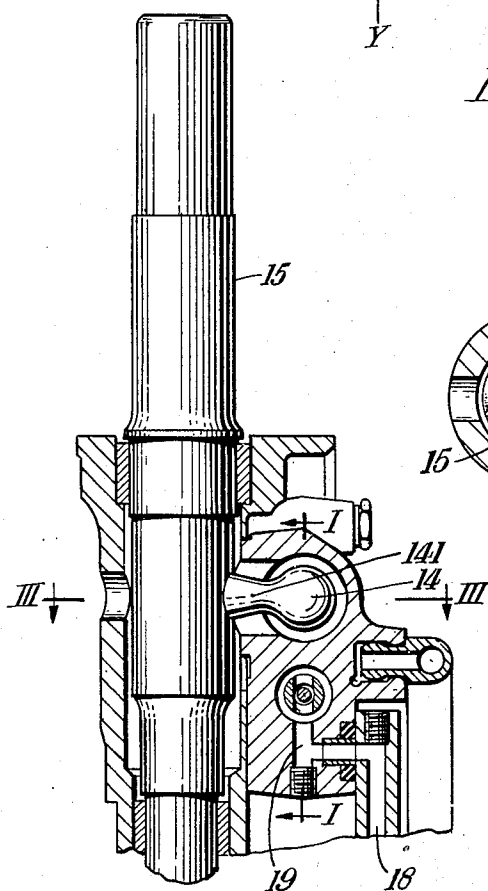


Fig. 2.

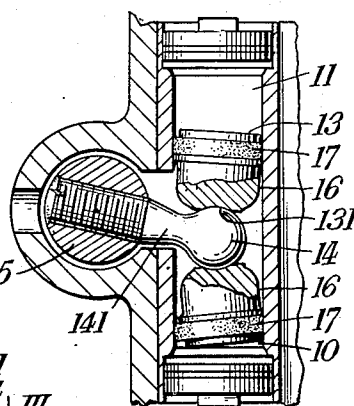


Fig. 3.

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OPPOSED-CYLINDER MOTORS

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1 Claim. (Cl. 121—117)

The invention is concerned with reciprocatory fluid-pressure motors, of the type comprising two opposed cylinders respectively containing pistons at either side of a member which will be actuated by movement of the pistons. For the sake of clarity such member is hereinafter referred to as the "intervening member." The object of the invention is to provide an improved arrangement of the pistons such that they may be capable of cooperating with the intervening member when the latter is mounted for pivotal motion about an axis off-set from the longitudinal axis of the piston.

The invention proposes that in a motor of the aforesaid type, the pistons shall be capable of floating movement in their respective cylinders, being sealed in the cylinders by a single land in each case, and that the pistons shall be provided with part-spherical seatings in which are received spherical portions of the intervening member.

By such an arrangement each piston is permitted to oscillate in its cylinder about a transverse axis substantially co-planar with the single land as hereinafter defined, in response to movement induced by the displacement, in relation to the common axis of the pistons, of the centre of the spherical part of the intervening member.

An embodiment of this invention, as applied to a hydraulic motor for actuating a rotary shaft, such as a shaft carrying a flight control organ of an aerodyne, is illustrated in and hereinafter described with reference to the accompanying drawings. In the drawings, Fig. 1 is a longitudinal sectional view of the motor, taken on the line I—I of Fig. 2 which is a sectional view showing the operative connection between the motor and the aforesaid rotary shaft. Fig. 3 is a sectional view taken along line III—III of Fig. 2.

It will be seen from Fig. 1 that the motor comprises a cylinder having two opposed expansion chambers 10, 11 in which are respectively provided two spaced pistons 12, 13 which are pressed towards each other into contact with a spherical part 14 of an arm 141 (Fig. 2) which is connected to the shaft 15, projecting radially therefrom so as to pivot about the longitudinal axis of the shaft. The said spherical part 14 is received on opposite sides by part-spherical seatings 121, 131 respectively in the adjacent faces of the pistons 12, 13. Pressure between the

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pistons and the part 14 is maintained by the pressures in the chambers 10, 11, and each piston is sealed in its respective chamber by a single land 16 incorporating a flexible joint ring 17, which is capable of tolerating a substantial degree of oscillatory movement of the piston about the transverse axis XY in the plane containing said joint ring 17. The oscillatory movement of the pistons, 12, 13 is depicted in Fig. 3.

It will be understood that as the arm 141 partakes of movement about the axis of the shaft 15, the consequent displacement of the centre of the spherical part 14 transversely of the common axis of the pistons 12, 13 will cause the pistons to oscillate within their chambers 10, 11 about axes in the planes of their respective joint rings 17. A sufficient degree of such oscillatory movement of the pistons can be tolerated without loss of pressure in the chambers.

The drawing illustrates the hydraulic pressure feed duct 18 which communicates with the valve-chest inlet 19. The numeral 20 indicates the valve, the position of which determines the direction of the operative movement of the motor pistons 12, 13 and therefore the direction of rotation of the shaft 15. Said valve 20 may be actuated by an automatic electrically operated relay housed in a casing 21 which is located adjacent the motor and which is arranged to communicate control movement to the valve 20 through push-rod mechanism 201.

What I claim as my invention and desire to secure by Letters Patent is:

A reciprocatory fluid-pressure apparatus including a cylinder having two opposed expansion chambers respectively containing pistons one at each side of an intervening member mounted for pivotal motion about an axis off-set from the longitudinal axes of the pistons, said pistons being capable of floating movement in their respective cylinders and each comprising a single land incorporating a flexible joint-ring sealing the piston in its cylinder, and said intervening member having part-spherical surfaces which are received in part-spherical seatings in the opposing ends of the pistons, such that the pistons are free to oscillate, about transverse axes substantially co-planar with their respective joint-rings, in response to movements induced by the displacement of the centre of the spherical part of the intervening member in relation to the common axis of the pistons.

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