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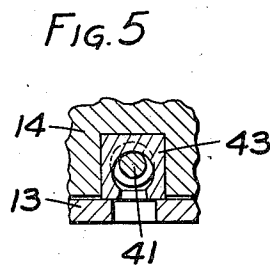
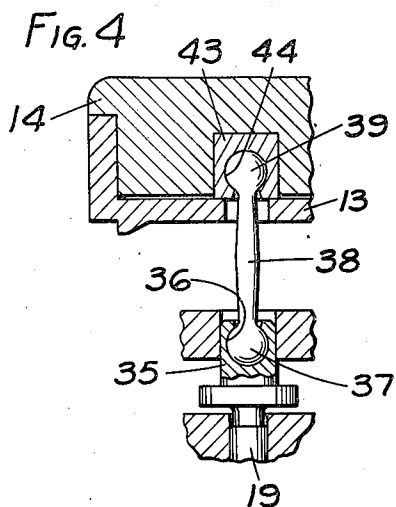
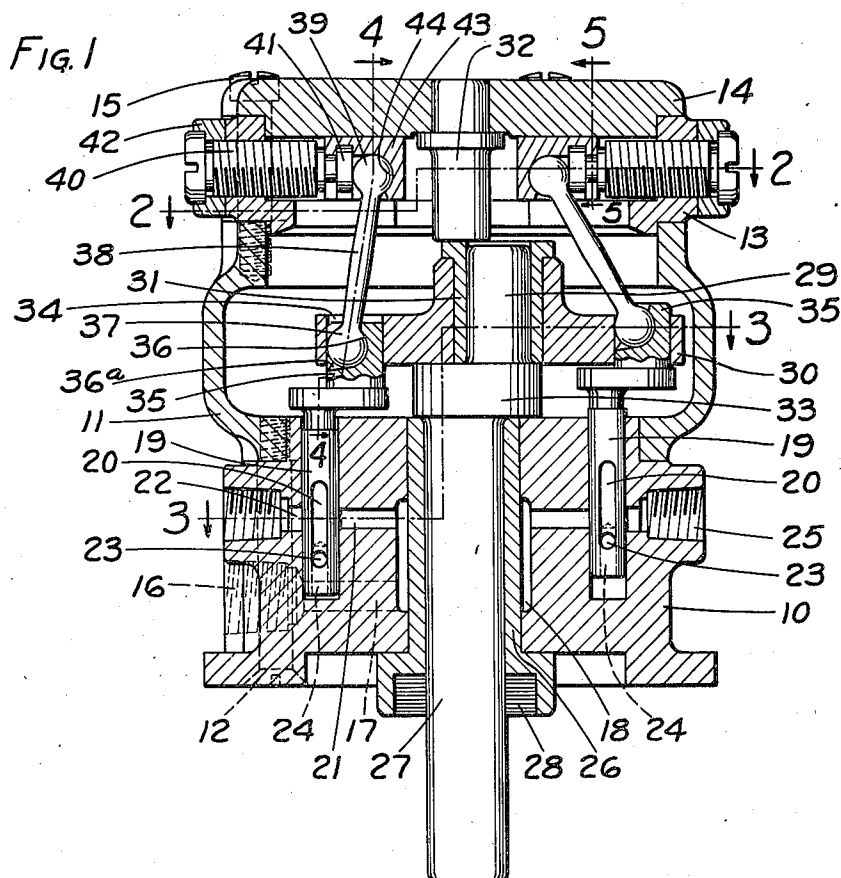
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HYDRAULIC PUMP

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2 Sheets-Sheet 1



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HYDRAULIC PUMP

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The invention refers to pumps and it is its principal object to provide new and useful improvements in the construction of driving links and their connections used in certain types of hydraulic pumps, and particularly the type disclosed in U. S. Patent #2,369,345.

Another object is to provide a simple construction for ball and socket joints to permit them to be easily assembled or disassembled.

A further object is to provide a ball and socket joint in an hydraulic pump actuating member that has a minimum number of parts.

A still further object is to provide an hydraulic pump piston actuating mechanism that is dependable and self-locking after assembly.

Still further objects will become apparent in the following specification and in the drawings in which a preferred embodiment of the invention is shown.

In the drawings:

Fig. 1 is a longitudinal sectional view through the pump assembly;

Fig. 2 is a horizontal sectional view, partly in elevation, along the plane of line 2—2 in Fig. 1;

Fig. 3 is a horizontal cross sectional view along the plane of line 3—3 in Fig. 1;

Fig. 4 is a fragmentary longitudinal sectional view, partly in elevation, along the plane of line 4—4 in Fig. 1; and

Fig. 5 is a fragmentary longitudinal sectional view along the plane of line 5—5 in Fig. 1.

Like characters of reference denote similar parts throughout the several views and the following specification.

Referring to Fig. 1, 10 is a pump base to which a spacer 11 is fastened by screws 12. A support 13 and plate 14 are secured to the top of the spacer by means of screws 15.

The pump base 10 is provided with an inlet 16 supplying liquid through a passage 17 to an annular well 18. 19 are pistons fitted into the pump base 10. Each of the pistons is adapted to be rotated and reciprocated in its cylinder, by means described later, in such a manner that a groove 20 at the outside of the piston, forming a port with the cylinder wall, communicates alternately with an inlet passage 21 from the annular well 18 during the intake or suction stroke and with a discharge passage 22 during the pumping stroke. Groove 20 is in constant communication through a cross duct 23 and a vertical duct 24 through the lower end of the piston with a chamber below the piston formed by the piston cylinder as shown in Fig. 1. The pump base 10 is provided with threaded outlets 25, each connected to

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a discharge passage 22. The various parts of the pump base 10 so far described, are essentially the same as corresponding ones of the pump disclosed in U. S. Patent #2,369,345.

The center of the pump base 10 is provided with a bearing sleeve 26 which supports a crank shaft 27. Bearing sleeve 26 has an enlarged lower end bearing fluid-tightly against the bottom of the pump base and is provided with a suitable seal 28 preventing leakage between the sleeve and the crank shaft. That end of the crank shaft 27 which protrudes from the bottom of the pump base, is rotated by means of suitable gears (not shown) from a source of power. The upper end of the crank shaft 27 is provided with a crank pin 29 eccentrically disposed with respect to the shaft. A disk 30 is rotatably mounted on crank pin 29 over a bearing 31. A thrust pin 32 fastened centrally to the top plate 14 contacts the top of bearing 31 and together with a shoulder 33 on the crank shaft prevents longitudinal movement of the disk 30.

Disk 30 is provided with a number of holes 34 which serve as bearings for eccentric extensions or crank pins 35 of the pistons 19. The eccentricity of extensions 35 with respect to the axes of pistons 19 is the same as the eccentricity of the crank pin 29 in relation to the crank shaft 27. It will be seen, therefore, that the rotation of the crank shaft 27 results in a corresponding rotation of the pistons 19.

The eccentric extensions 35 of the pistons 19 have each a socket 36 with a slot 36a at its side for the insertion of a ball terminal 37 at the bottom of a link 38. It will be noted that the outer wall of the disk 30 prevents disengagement of the ball terminal by closing the slot. The socket is partially ball shaped so as to confine the terminal 37 within the extension 35 which forces the ball terminal to travel with the crank pin and eliminates lost motion. Link 38 has another ball terminal 39 at its top end.

Radially disposed through the walls of support 13 are regulating screws 40. Each of these screws terminates within the support in a T-shaped head 41. Lock nuts 42 hold the screws 40 in adjusted positions.

43 are regulating blocks of substantially square configuration and slidingly fitted within square grooves radially disposed within the top plate 14. Each one of the blocks 43 has a ball shaped socket 44 within which is fitted ball terminal 39 of one of links 38. That end of each socket 44 which faces the regulation screw 40 is slotted and grooved to receive the T-head end of the screw.

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The block thus travels with the regulating screw and the end of the T-head closes effectively the slot of the socket and retains the ball terminal 39 within it without lost motion.

The lateral displacement of the block 43 by turning the screw 40 adjusts the reciprocation of the piston 19 to which it is connected by link 38, as is clearly brought out in U. S. Patent #2,369,345.

It will be noted that each piston and its co-acting link can be readily assembled by placing the ball terminal 37 within the socket 36 of extension 35 of the piston and pushing the disk 30 over the link 38. The ball shape of the socket 36 and the closing of the slot 36a in its side by the disk 30 prevent disengagement. Similarly the top terminal 39 of link 38 can be placed into socket 44 of its cooperating regulating block 43 through its slot before the top plate 14 is fastened to support 13, and then dropping the block over the T-head of the screw 40. The T-head of the screw 40 holds the top terminal 39 within the socket and prevents disengagement therefrom. The diameters of the thrust pin 32 and that of crank pin 29 are preferably the same so that the disk 30 with bearing 31 can be pushed over the pin 32 to provide necessary clearances when assembling.

Many changes in the form, proportion, combination of parts, and minor details of construction may be resorted to without departing from the principles or sacrificing any of the advantages of the invention as defined in the appended claims.

What I claim as new is:

1. In a pump comprising a cylinder, a rotary and reciprocatory piston in the cylinder, an eccentric extension carried by the piston, an actuating member, a rotary shaft eccentrically connected to said member, said eccentric extension being movably fitted to said member whereby said piston is rotated, means to reciprocate the piston including a link having a ball terminal at each end, one of the terminals being movably fitted within a socket of the eccentric extension of said piston, said socket having a slot at its side for the insertion of the terminal, the said actuating member closing said slot and preventing disengagement of said terminal after insertion, and a regulating block, laterally displaced with reference to the piston axis, having a socket for the other ball terminal of said link.

2. In a pump comprising a cylinder, a rotary and reciprocatory piston in the cylinder, an eccentric extension carried by the piston, an actuating member, a rotary shaft eccentrically connected to said member, said eccentric extension being movably fitted to said member whereby said piston is rotated, means to reciprocate the piston including a link having a ball terminal at each end, one of the terminals being movably fitted within a socket of the eccentric extension of said piston, said socket having a slot at its side for the insertion of the terminal, the said actuating member closing said slot and preventing disengagement of said terminal after insertion, a support, and a regulating block, slidably fitted within said support and laterally displaced with reference to the piston axis, having a socket for the other ball terminal of said link.

3. In a pump comprising a cylinder, a rotary and reciprocatory piston in the cylinder, an eccentric extension carried by the piston, an actuating member, a rotary shaft eccentrically connected to said member, said eccentric extension being movably fitted to said member whereby

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said piston is rotated, means to reciprocate the piston including a link having a ball terminal at each end, one of the ball terminals being movably fitted within a socket of the eccentric extension of said piston, a support, a regulating block, slidably fitted within said support and laterally displaced with reference to the piston axis, having a socket shaped to fit the other ball terminal of said link and having a slot at its side for the insertion of said other terminal, and means in said support closing the slot of the socket in said block preventing disengagement of said other terminal after insertion.

4. In a pump comprising a cylinder, a rotary and reciprocatory piston in the cylinder, an eccentric extension carried by the piston, an actuating member, a rotary shaft eccentrically connected to said member, said eccentric extension being movably fitted to said member whereby said piston is rotated, means to reciprocate the piston including a link having a ball terminal at each end, one of the ball terminals being movably fitted within a socket of the eccentric extension of said piston, a support, a regulating block, slidably fitted within said support and laterally displaced with reference to the piston axis, having a socket shaped to fit the other ball terminal of said link, said socket having a slot at its side for the insertion of said other terminal, and a screw in said support, secured to said block, closing the slot of the socket in said block to prevent disengagement of said other terminal after insertion and to vary the lateral displacement of the block.

5. In a pump comprising a cylinder, a rotary and reciprocatory piston in the cylinder, an eccentric extension carried by the piston, an actuating member, a rotary shaft eccentrically connected to said member, said eccentric extension being movably fitted to said member whereby said piston is rotated, means to reciprocate the piston including a link having a ball terminal at each end, one of the ball terminals being movably fitted within a socket of the eccentric extension of said piston, a support, a regulating block, slidably fitted within said support and laterally displaced with reference to the piston axis, having a socket shaped to fit the other ball terminal of said link, said socket having a slot at its side for the insertion of said other terminal, and a screw in said support having a T-shaped head engaging a groove in the walls of the slot in said block, whereby adjustment of the screw in the support will vary the lateral displacement of the block and the head of the screw prevent disengagement of said other terminal after insertion.

6. In a pump comprising a cylinder, a rotary and reciprocatory piston in the cylinder, an eccentric extension carried by the piston, an actuating member, a rotary shaft eccentrically connected to said member, said eccentric extension being movably fitted to said member whereby said piston is rotated, means to reciprocate the piston including a link having a ball terminal at each end, one of the terminals being movably fitted within a socket of the eccentric extension of said piston, said socket having a slot at its side for the insertion of the terminal, the said actuating member closing said slot and preventing disengagement of said terminal after insertion, a regulating block, laterally displaced with reference to the piston axis, having a socket to fit the other ball terminal of said link, said last mentioned socket having a slot at its side for the insertion of said other terminal, and means closing the slot

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of the socket in said block preventing disengagement of said other terminal after insertion.

7. In a pump comprising a cylinder, a rotary and reciprocatory piston in the cylinder, an eccentric extension carried by the piston, an actuating member, a rotary shaft eccentrically connected to said member, said eccentric extension being movably fitted to said member whereby said piston is rotated, means to reciprocate the piston including a link having a ball terminal at each end, one of the terminals being movably fitted within a socket of the eccentric extension of said piston, having a slot at its side for the insertion of the terminal, the said actuating member closing said slot and preventing disengagement of said terminal after insertion, a support, and a regulating block, slidably fitted within said support and laterally displaced with reference to the piston axis, having a socket to fit the other ball terminal of said link, said last mentioned socket having a slot at its side for the insertion of said other terminal, and means in said support closing the slot of the socket in said block preventing disengagement of said other terminal after insertion.

8. In a pump comprising a cylinder, a rotary and reciprocatory piston in the cylinder, an eccentric extension carried by the piston, an actuating member, a rotary shaft eccentrically connected to said member, said eccentric extension being movably fitted to said member whereby

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said piston is rotated, means to reciprocate the piston including a link having a ball terminal at each end, one of the terminals being movably fitted within a socket of the eccentric extension of said piston, said socket having a slot at its side for the insertion of the terminal, the said actuating member closing said slot and preventing disengagement of said terminal after insertion, a support, a regulating block, slidably fitted within said support and laterally displaced with reference to the piston axis, having a socket substantially ball-shaped to fit the other ball terminal of said link, said last mentioned socket having a slot at its side for the insertion of said other terminal, and a screw in said support, secured to said block, closing the slot of the socket in said block to prevent disengagement of said other terminal after insertion and to vary the lateral displacement of the block.

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REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
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