

[54] **PISTON PUMP** 1,528,817 3/1925 Dinnes 92/182
 3,053,197 9/1962 Lambeck 91/488
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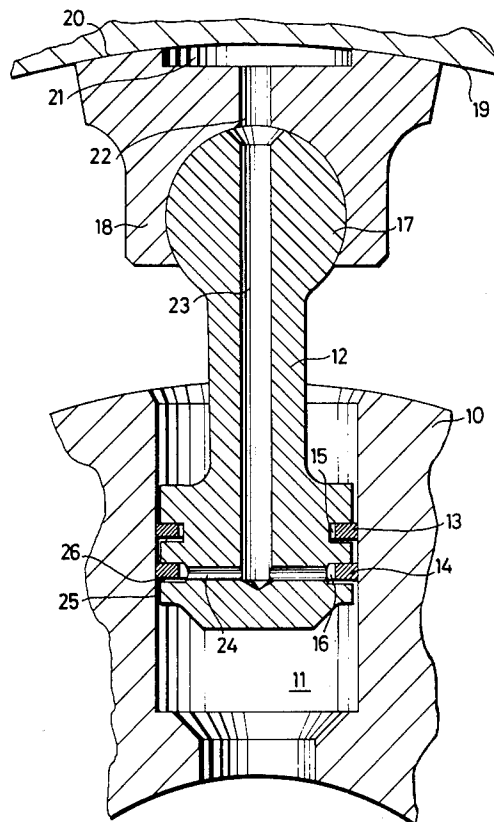
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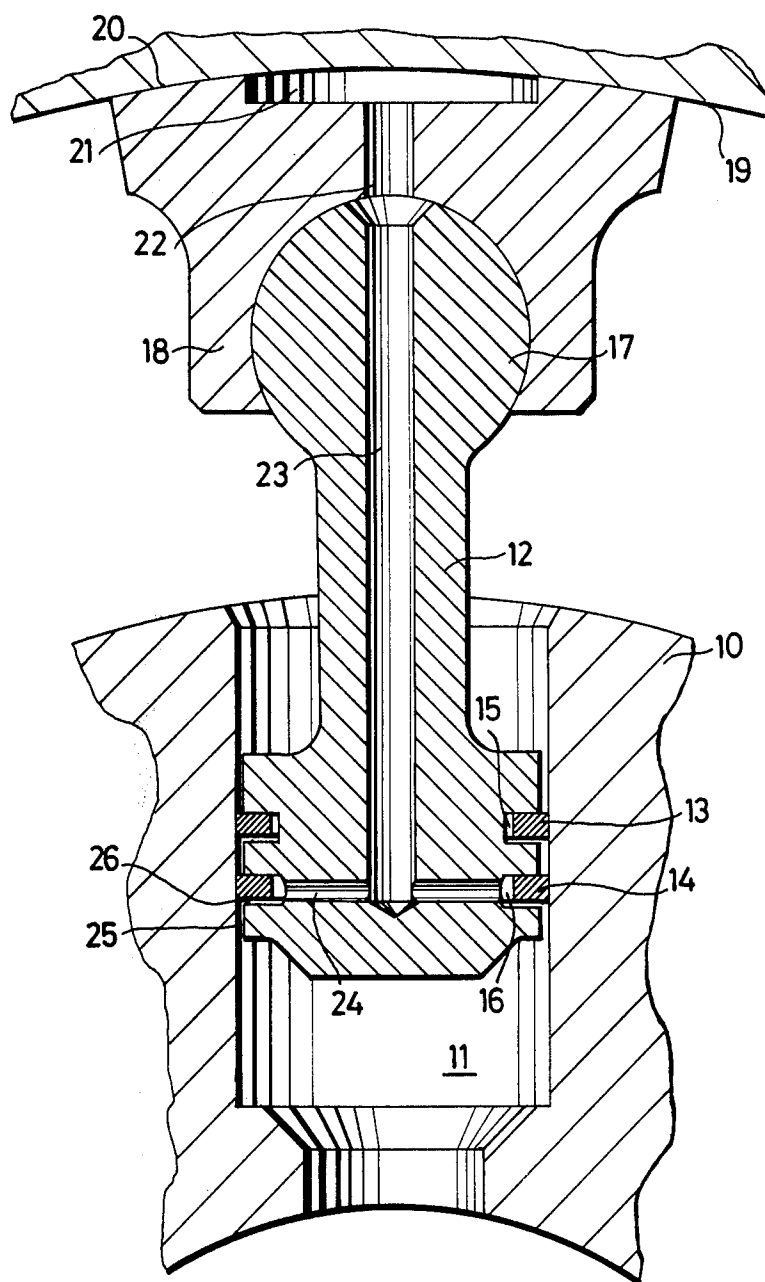
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[57] **ABSTRACT**

A piston pump having at least one piston reciprocally mounted in a piston cylinder. At least one piston ring is mounted on the piston in an annular groove thereof and the outer surface of the ring slidingly contacts the cylinder. A channel leads from the radial inner bottom surface of the annular groove to a decompression chamber.

1 Claim, 1 Drawing Figure





PISTON PUMP

BACKGROUND OF THE INVENTION

The present invention relates to a piston pump having at least one piston reciprocally mounted in a piston cylinder and being provided with at least one piston ring, the outer peripheral surface of which slidably contacts the wall surfaces of the cylinder. The piston ring is mounted in an annular groove, the bottom of which is in communication with a decompression chamber via a channel. The piston is thus hydraulically balanced.

Heretofore, radial piston pumps as well as axial piston pumps have slip shoes, cross-heads or pump plates of the pump piston directly hydraulically balanced on the support surfaces by means of a decompression chamber which is filled with hydraulic fluid. These decompression chambers generally were connected with the pressure chambers of the pertinent pump cylinders via channels extending and leading to the piston and thereto connected guide members of the piston.

It was noted, however, that when the entrances to these communication channels are arranged on the surfaces of the piston which face the pressure chamber, the impurities and dirt present in the hydraulic fluid easily enters into the communication channels and in time causes a clogging of these channels. This dangerous condition is in particular present in radial piston pumps, wherein the centrifugal forces favor the settling of solid bodies from the hydraulic fluid at the mouth of the communication channel adjacent to the piston surfaces.

It has already been proposed to locate the entrance to the communication channels at the outer peripheral surface of the piston, so that the hydraulic fluid must traverse, prior to entering into the communication channel, the annular space between the piston and the cylinder wall, into which the larger granular bodies cannot penetrate. This arrangement, however, has the drawback that the communication channels end directly on a surface which is subjected to wear. Furthermore, the annular space between the piston and the cylinder wall increases with increasing running time of the pump and the filtering effect of the annular space therefore decreases as the working time of the pump increases.

SUMMARY OF THE INVENTION

It is accordingly, an object of the present invention to provide an arrangement wherein the aforescribed drawbacks occurring in the communication channels from the decompression chamber are avoided. It is a more specific object of the invention to provide an arrangement wherein the clogging of the communication channels due to solid deposits is avoided even with increased working time of the pump and corresponding wear of the movable parts to the pump.

The aforescribed objects are obtained by means of the novel arrangement of this invention wherein the entrance of at least one of the communication channels is situated at the bottom of an annular groove which serves for holding the piston ring of the piston.

The hydraulic fluid which penetrates into the communication channel must traverse not only the annular space between the piston and cylinder wall surfaces but also the annular space between the piston ring and the

annular groove in which the piston ring is mounted. The gap between the inner radial side of the piston ring and the bottom of the annular groove in which the piston ring is mounted remains for all practical purposes constant during the life of the pump. The wear of the piston rings occurs on the outer radial side and not on the inner radial side which faces the bottom of the annular groove. Therefore, the filtering effect does not change which is effected by the piston ring on the hydraulic fluid which exits from the mouth at the bottom of the piston ring groove. The piston ring of course undergoes constant motion during the operation of the pump which brings about a self-cleaning action in the annular groove of the piston ring so that a free flow of the hydraulic fluid from the mouth of the communication channel is always present.

The aforescribed arrangement is also advantageous from a constructional point of view, because the special groove for collecting leaking fluid that must be present at the mouth of the communication channel when said mouth is joined at the outer periphery of the piston, can be dispensed with.

BRIEF DESCRIPTION OF THE DRAWING

To enable the nature of the invention to be more easily understood, one embodiment of the invention will now be described by way of an example with reference to the accompanying drawing, in which:

The single FIGURE of the drawing constitutes a cross-sectional diagrammatic view in longitudinal section of a piston of a radial piston pump.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The single FIGURE of the drawing illustrates a portion of a cylinder head 10 of a radial piston pump wherein there is a cylindrical bore 11. A piston 12 is reciprocally mounted in the cylindrical bore 11. The piston 12 is provided with two piston rings 13 and 14 which slide along the cylindrical wall surface of the bore 11. Both piston rings 13 and 14 are mounted with play in a known manner in the exterior annular grooves 15 and 16 of the piston 12.

The piston has a spherically shaped head portion 17 which is movable within a mating spherical bushing of a sliding block 18. The sliding block 18 bears against a slide boss 19. In order to hydraulically balance the piston there is provided on the sliding surface 20 of the sliding block 18 a decompression chamber 21. This decompression chamber 21 has a suitably sized cross-section and is in communication with a central communication channel 23 in the piston 12 via a communication channel 22 in the slide block 18. The central communication channel 23 of the piston 12 communicates with a transverse channel 24 which ends into two diametrically opposite mouths located at the bottom of the annular groove 16 of the piston 12 in which the piston ring 14 is loosely mounted.

Thus, fluid may flow from the cylinder 11 through the annular gap 25 between the outer periphery of the piston 12 and the inner cylindrical wall surface of the bore 11, through the annular gap 26 between the piston ring 14 and the annular groove 16, through the transverse channel 24 and into the longitudinal central channel 23 of the piston 12 and then through the communication channel 22 in the slide block 18 and finally into the decompression chamber 21, wherein a hydraulic pressure release of the piston is effected. The annu-

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lar spaces 25 and 26 carry out the aforementioned filtering effect.

Although the invention is illustrated and described with reference to one preferred embodiment thereof, it is to be expressly understood that it is in no way limited to the disclosure of such a preferred embodiment, but is capable of numerous modifications within the scope of the appended claims.

What is claimed is:

1. In a high-pressure piston pump having a cylinder, a piston supported for reciprocation within the cylinder, a decompression chamber, means associated with the piston and in communication with the cylinder for defining a fluid throttling region, and means disposed in the piston and including a radial passage therethrough

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for providing communication between the fluid throttling region and the decompression chamber, the improvement wherein the outer peripheral surface of the piston is provided with an annular groove aligned and communicating with the radial passage, and wherein the fluid throttling region defining means comprises a piston ring disposed loosely in the annular groove and extending outwardly thereof to a position adjacent the cylinder wall, the axial gap defined between one face of the piston and the adjacent side wall of the annular groove defining a self-wiping fluid throttling region that communicates with the radial gap between the outer peripheral surface of the adjacent forward portion of the piston and the surrounding cylinder wall.

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