Nov. 14, 1933. K. STELZER 1,934,890

ROTARY PISTON PUMP

Filed Aug. 6, 1931

Fig.5

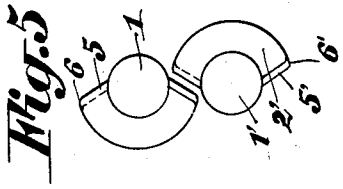


Fig.7



Fig.4

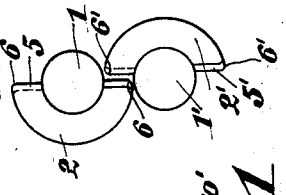


Fig.6



Fig.9

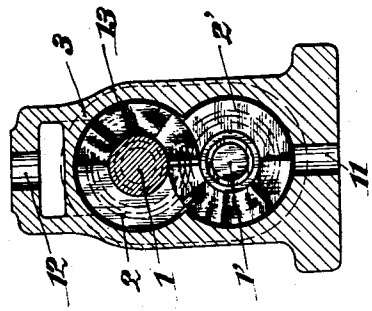


Fig.1

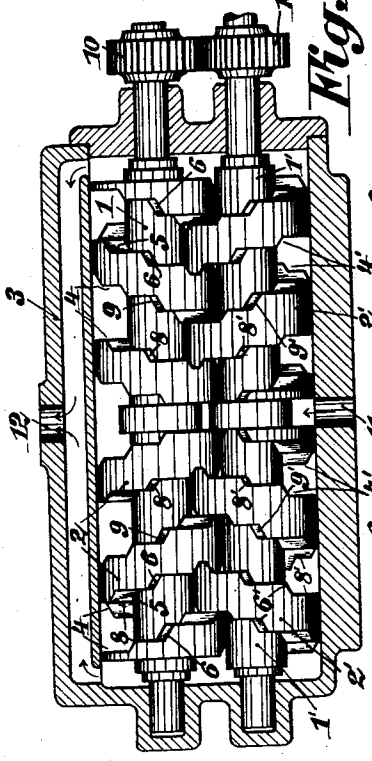


Fig.3



Fig.2

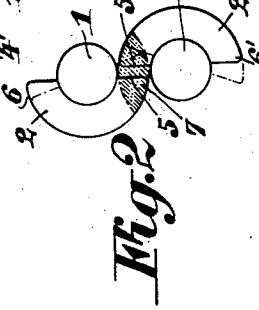
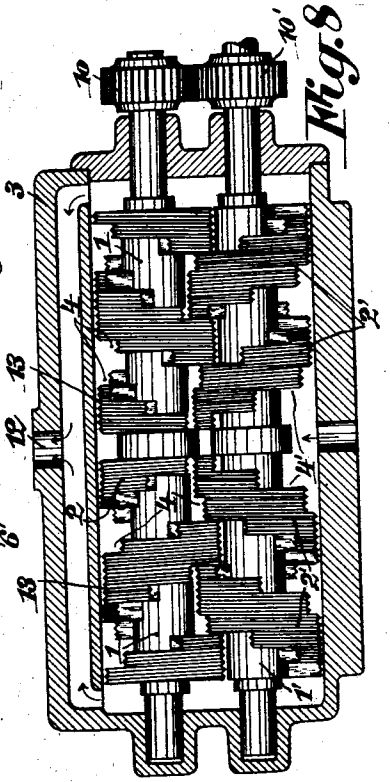


Fig.8



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ROTARY PISTON PUMP

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Application August 6, 1931, Serial No. 555,591, and in Austria August 19, 1930

4 Claims. (Cl. 103—126)

Heretofore rotary piston pumps provided with pistons which are arranged axially side by side, jointly take up the whole circumference and are displaced at a certain angle to one another, are constructed in such a manner that the radial faces of the pistons are formed in accordance with the rolling curves (tooth-profile curves) for the purpose of generating a tight closure throughout the flanks, so that each pair of pistons constitutes an individual pump independently from the axially adjacent pair of pistons.

The pump according to the present invention does not consist of individual pumps but of a battery of piston-parts which do not call for a tight closure at the flanks because the piston-parts, arranged side by side in the form of a step screw, form in any position of rotation a chamber (compartment) which is closed at both ends by the overlapping lateral faces of the piston-parts and axially moves during the rotation of the piston-parts. The length of the permanently closed helical compartment corresponds to one complete rotation of the step screw.

In view of this fundamental idea, according to which the packing or tightening rolling curves are dispensed with which otherwise are necessary in the case of individual pumps, it is possible according to the present invention to provide a clearance between two co-ordinated smooth flanks in parallel position, said clearance allowing the peripheral edges to move past the surfaces of the flanks without contact.

This idea of the present invention can be realized by different positions of the flank-faces. However a particular feature of the present invention consists in inclining the flank-faces with respect to the axis of rotation for the purpose of promoting the axial feed of the fluid.

Although a clearance remains between the flanks, so that a jamming by the fibres or any other coarse constituents of the fluid cannot take place, it is nevertheless necessary that the pistons of the rotary piston pumps pass close to the wall of the casing or to the shaft of the opposite piston. A further object is to prevent the jamming of fibres or like constituents of the fluid at these places. In the event of smooth surfaces the liquid is pressed out of the viscous and fibrinous fluid at the said places, while the solid parts of the fluid are pressed flat against these places. These firmly adhering parts of the fluid form a kind of lining which hampers the rotation and even may stop the pistons.

According to the present invention the pressing flat of the solid constituents of the fluid is prevented by the arrangement of grooves or channels on the smooth outside of the pistons, whereby the material drawn in between the piston and casing or piston and shaft is not pressed flat but is pressed only along the vertex of the grooves or channels. The latter are either ring-shaped or screw-shaped, whereby the parts of the fluid present between pistons and casing or piston and shaft are fed forward by rotation in accordance with the screw-threads, which extend in accordance with the direction of feed.

Some modes of carrying out the present invention are illustrated by way of example on the accompanying sheet of drawings in which:—

Fig. 1 shows in sectional elevation the co-operating pairs of piston-parts.

Figs. 2, 3, 4 and 5 illustrate piston-parts with different flanks.

Figs. 6 and 7 are side views of the piston-parts shown in Figs. 4 and 5.

Figs. 8 and 9 show a pump provided with grooved pistons in sectional plan view and in vertical section respectively.

The pump comprises two cylindric rotary members 1, 1′ (Figs. 1 and 8) which are coupled with one another by toothed wheels 10, 11′ and on which are arranged axially side by side the piston-parts 2, 2′. The pistons thus formed are enclosed in a casing 3, provided with an admission part 11 and a discharge port 12 for the fluid. Each piston-part 2, 2′ is displaced at a certain angle with respect to the axially adjacent piston-part, so that two step screws are formed which leave a helical chamber 4 between their threads. These chambers or compartments are closed at the periphery by the wall of the casing and in the axial direction, after a complete revolution of the step screw, by the overlapping lateral faces of the corresponding piston-ports 2, 2′ as indicated in Fig. 2 by the sectioned part 7.

Therefore the length each chamber or compartment in the axial direction from closure to closure corresponds to the pitch of the screw during a complete revolution. During the rotation of the members 1, 1′, the chambers move in the axial direction and thus feed the fluid.

Therefore it is not necessary to make provision for a tight closure at the radial flanks 5, 5′. In view thereof the latter are flat and according to this invention leave between them a sufficient clearance, that their peripheral edges 6, 6′ can move past the faces of the other accorded flanks. Besides the feature of simpler manufacture of smooth flanks of this kind, a further feature of the present invention consists in that during the

rolling action closed corner-spaces are not formed from which the fluid can be displaced with difficulty only, because the corner-space remains open owing to the provision of the clearance. This is of the greatest importance when feeding viscous and fibrinous fluids. The provision of the clearance has the further advantage that the operation is absolutely smooth and without shocks and that fibres do not adhere in case the clearance is enlarged beyond the size necessary for the movement. It is of advantage to round off or chamfer the peripheral edges in order to prevent the cutting or tearing of the fibres. The edges 8, 8' and 9, 9' (Fig. 1) facing the axis of rotation can be rounded off or chamfered for the purpose of facilitating the axial feed of the fluid within the working compartments.

In the construction shown in Fig. 2, the flanks 5, 5' are disposed parallel to a plane, passing through the piston-axes, in the moment in which the flanks are positioned parallel to one another. In view of the arrangement of the clearance, the sum of the peripheral angle of two coordinated piston-parts is less than 360 degrees. In the event of like piston-parts, the clearance is disposed symmetrical with respect to a plane passing through the piston-axes. The position of the clearance becomes unsymmetrical with respect to this plane if the two co-ordinated piston-parts are of unlike length, without altering the efficiency of the pump.

In the construction shown in Fig. 3, the flanks 5, 5' are inclined with respect to a plane, passing through the piston-axes, in the moment in which the flanks are positioned parallel to one another.

As shown in Figs. 1, 4, 5, 6 and 7, the flanks 5, 5' may be suitably inclined with respect to the axis of rotation, in order to promote the axial feed of the fluid, present between the flanks.

The edges passing in the direction of the axis of rotation may be rounded off or chamfered in order to promote the flow and the displacement of the fluid in accordance with the progressing screw-thread.

If desired only the advancing or forward edges may be rounded off or chamfered in accordance with the direction of rotation of the piston However also all edges may be rounded off or chamfered if required.

The outside of the rotary pistons of the pump shown in Figs. 8 and 9 is provided with grooves 13, in order to prevent the jamming of fibres or like. The grooves may be ring-shaped or screw-shaped as illustrated. The screw-shaped grooves feed the jammed material in an axial direction in the compartment 4.

Pistons provided with grooves may be also used in connection with rotary piston pumps of other constructions.

I claim:—

1. A rotary piston pump particularly adapted for pumping viscous and fibrinous fluids comprising in combination a casing and parallel pistons arranged therein and consisting of a battery of interengaging rotary piston-parts disposed side by side in the form of a step screw, the flanks of said piston-parts being in the shape of flat faces inclined at the same angle with respect to their axis of rotation.

2. A rotary piston pump particularly adapted for pumping viscous and fibrinous fluids comprising in combination a casing and parallel pistons arranged therein and consisting of a battery of interengaging rotary piston-parts disposed side by side in the form of a step screw, the flanks of said piston-parts being in the shape of flat faces inclined at the same angle with respect to their axis of rotation and further inclined in the parallel position with respect to the plane passing through both axes of rotation of the piston.

3. A rotary piston pump particularly adapted for pumping viscous and fibrinous fluids comprising in combination a casing and parallel pistons arranged therein and consisting of a battery of interengaging rotary piston-parts disposed side by side in the form of a step screw, the flanks of said piston-parts being in the shape of flat faces inclined at the same angle with respect to their axis of rotation, two co-ordinated flanks of the piston-parts forming in any position of rotation a clearance allowing the peripheral edge of one flank to move past the other flank without contact.

4. A rotary piston pump particularly adapted for pumping viscous and fibrinous fluids comprising in combination a casing and parallel pistons arranged therein and consisting of a battery of interengaging rotary piston-parts disposed side by side in the form of a step screw, the flanks of said piston-parts being in the shape of flat faces inclined at the same angle with respect to their axis of rotation and further inclined in the parallel position with respect to the plane passing through both axes of rotation of the piston, and two co-ordinated flanks of the piston-parts forming in any position of rotation a clearance allowing the peripheral edge of one flank to move past the other flank without contact.

KARL STELZER.