June 14, 1927. 1,632,304

J. A. MAURER

PUMP FOR VISCOUS LIQUIDS

Filed March 9, 1925

Fig. 1.

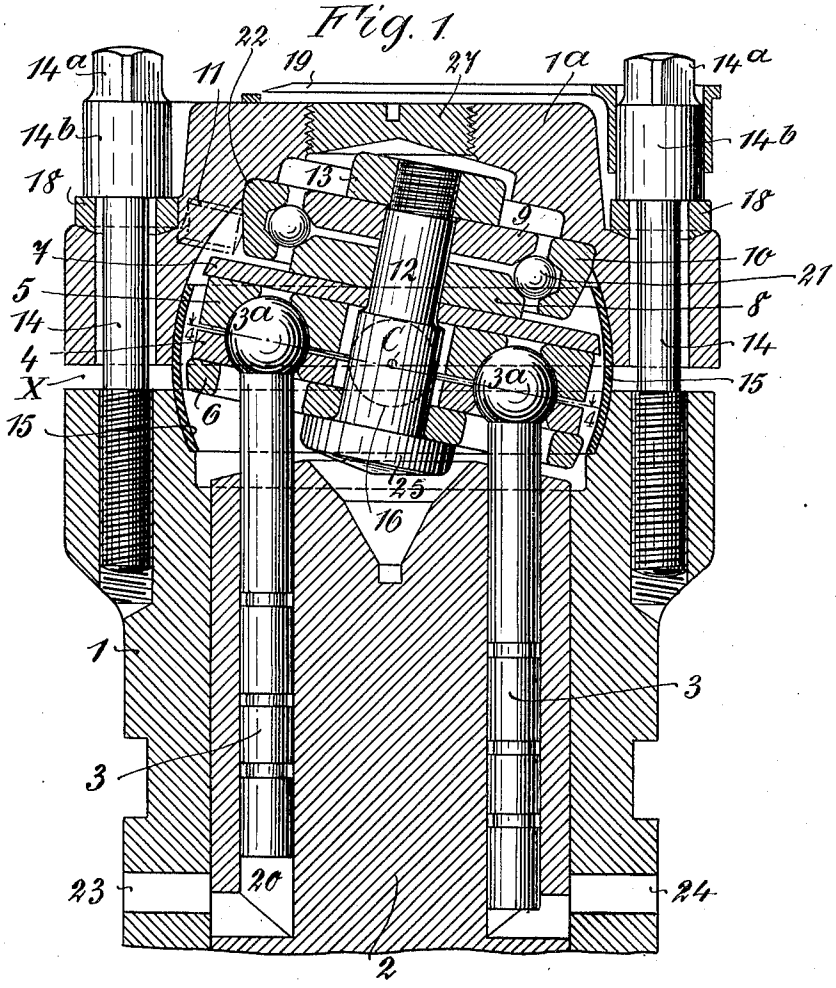


Fig. 2.

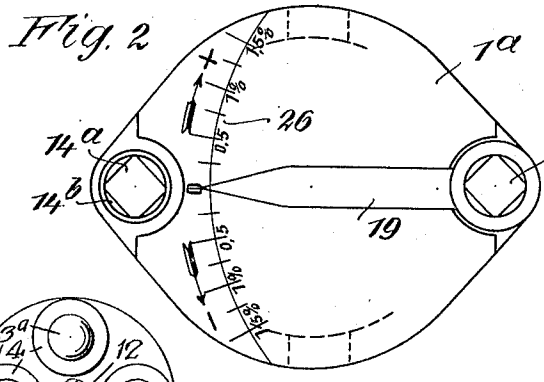
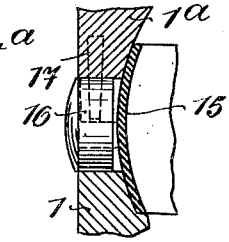


Fig. 3.



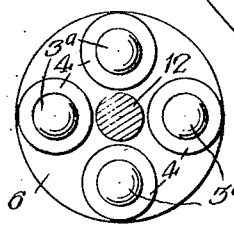


Fig. 4.

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Patented June 14, 1927. 1,632,304

UNITED STATES PATENT OFFICE.

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PUMP FOR VISCOUS LIQUIDS.

Application filed March 9, 1925, Serial No. 14,298, and in Germany August 21, 1923.

My invention relates to improvements in pumps for viscous liquids, and more particularly in pumps which are used for supplying viscous matter to the spinning nozzles in the manufacture of artificial silk, and which consist of a rotary body provided with one or more pockets disposed parallel or substantially parallel to the axis of the body and each having a plunger or piston mounted therein, and a swash plate engaging the ends of the plungers or pistons and adapted to impart reciprocating movement thereto. One of the objects of the improvements is to provide a pump of this type in which the friction of the plungers or pistons within their pockets caused by the engagement thereof with the inclined swash plate is reduced, which friction causes an increased wear of the plungers and the walls of their pockets and reduces the efficiency of the pump. With this object in view my invention consists in providing the plungers or pistons with spherical heads engaged by a rotatable member made in two sections and formed with spherical cavities engaging the said heads, said member being slidably disposed between a pair of relatively fixed disks.

For the purpose of explaining the invention an example embodying the same has been shown in the accompanying drawing in which the same reference characters have been used in all the views to indicate corresponding parts. In said drawing,

Fig. 1 is a partial sectional elevation of the pump,

Fig. 2 is a top plan view showing the scale marks indicating the position of the swash plate, and

Fig. 3 is a detail sectional view showing the manner of mounting the head on the body of the pump.

Fig. 4 is a detail view of the means for mounting the piston heads.

In the example shown in the drawing the pump consists of a cylinder 1, a drum 2 rotatably mounted therein and formed with pockets 20 disposed parallel to and eccentrically of the axis of the drum 2, a head 1^a secured to the cylinder 1 by means of screw bolts 14, and a swash plate consisting of a pair of disks 8 and 9, a ring 10 and anti-friction balls 21 provided in race ways formed by the said plates 8, 9 and the disk 10, the ring 10 being mounted in a suitable recess 22 of the head 1^a and fixed in position by screws 11. The inner ends of the pockets 20 communicate with intake and delivery ports 23 and 24 of a construction known in the art, and they have plungers 3 reciprocating therein which are formed with spherical heads 3^a. The said heads are connected with each other by a rockable member composed of pairs of annular disks 4 and 5 formed with spherical cavities corresponding to the heads 3^a, and the said disks are in sliding engagement with a pair of disks 6 and 7 disposed at opposite sides of the disks 4 and 5. The outer disk 7 is in engagement with the disk 8, and the disks 4, 5, 6, 7, 8, 9 are connected with one another by an axial bolt 12 passed through axial bores of the said parts and holding the same in position between its head 25 and a nut 13. As appears from Fig. 1 there is sufficient clearance between the bolt 12 and the disks 4 and 5 permitting transverse displacement of the said disks relatively to the disks 6 and 7 caused by the reciprocating movement of the plungers 3 and the rocking movement of the disks 4, 5. Therefore the disks 4, 5 are adapted to follow the elliptical movement of the heads 3^a of the plungers 3. Therefore any lateral pressure of the said disks on the plungers is avoided, and the friction and the wear of the said plungers and the walls of the pockets are reduced to a minimum.

The head 1^a is adapted to be rocked relatively to the cylinder 1 after unscrewing the bolts 14, for setting the plates 8, 9 and the ring 10 in different angular positions relatively to the axis of the drum 2 and for varying the stroke of the plungers 3. As shown the said head and the adjacent part of the cylinder 1 are formed with spherical inner walls having their center coinciding with the center C of the rotary movement of the spherical heads 3^a, and the said spherical walls are engaged by a ring 15 having a spherical outer face and providing a tight joint whereby the inner part of the head 1^a is closed against the outside, and the head is centered relatively to the axis of the cylinder 1. The head is rockably supported on a pair of diametrically opposite trunnions 16 the axis of which passes through the center C, and which are secured to the cylinder 1 by

means of pins 17. Therefore all the rotary and rockable movements take place about the same center C, so that the relative displacements of the said parts and the necessary clearance thereof are reduced to a minimum. For setting the swash plate 8, 9, 10 in different angular positions the bolts 14 are first loosened within the cylinder 1 by means of a suitable key placed on the square ends of the said bolts, whereupon the head 1^a is rocked according to the desired stroke of the plungers 3, and the bolts 14 are again screwed down for fixing the head 1^a in position. There is sufficient clearance between the bolts 14 and the walls of the bores provided therefor within the head 1^a, and washers 18 having spherical bottom faces are placed between the heads 14^b and the head 1^a, so that the heads 14^b find a full support on the top faces of the washers 18 in any position of the head 1^a. Preferably one of the bolts 14 is provided at its outer end with a pointer 19 moving in front of scale marks 26 indicating the angular position of the swash plate.

The clearance between the disks 4, 5 and the spherical heads 3^a is adjusted by means of the nut 13. In order that such adjustment may be made without dismounting the head 1^a, the said head is provided with a screw-threaded bore normally closed by a screw-threaded plug 27.

While in describing the invention reference has been made to a particular example embodying the same I wish it to be understood that my invention is not limited to the construction shown in the drawing, and that various changes may be made in the general arrangement of the apparatus and the construction of its parts without departing from the invention.

I claim:

1. In a pump, the combination, with a rotary drum provided with a plurality of pockets disposed parallel to and eccentrically of the axis of rotation of said drum, plungers or pistons provided within said pockets and adapted to be reciprocated therein, an annular swash member formed internally with bevelled race ways, a disk shaped member within said swash member formed externally with bevelled race ways, anti-friction balls confined between said pairs of race ways, a guide member connected with said disk shaped member and formed with a guide pocket disposed transversely of the axis of said drum, and slide members within said pocket and in universal engagement with the projecting ends of said pistons or plungers.

2. In a pump, the combination, with a rotary drum provided with a plurality of pockets disposed parallel to and eccentrically of the axis of rotation of said drum, plungers or pistons having spherical heads provided within said pockets and adapted to be reciprocated therein, an annular swash member formed internally with bevelled race ways, a disk shaped member within said swash member formed externally with bevelled race ways, anti-friction balls confined between said pairs of race ways, a guide member connected with said disk shaped member and formed with a guide pocket disposed transversely of the axis of said drum, and slide members within said pocket formed with spherical cavities engaging the spherical heads of said pistons or plungers.

3. In a pump, the combination, with a rotary drum provided with a plurality of pockets disposed parallel to and eccentrically of the axis of rotation of said drum, plungers or pistons having spherical heads provided within said pockets and adapted to be reciprocated therein, a swash member, a guide member in rotary engagement with said swash member and composed of a pair of plates spaced from each other to provide a guide pocket, means to connect said plates, and members slidable within said guide pocket and connecting the projecting ends of said pistons or plungers to the guide members.

4. In a pump, the combination, with a rotary drum provided with a plurality of pockets disposed parallel to and eccentrically of the axis of rotation of said drum, plungers or pistons having spherical heads provided within said pockets and adapted to be reciprocated therein, an annular swash member formed internally with bevelled race ways, a disk shaped member within said swash member formed externally with bevelled race ways, anti-friction balls confined between said pairs of race ways, a guide member connected with said disk shaped member and composed of a pair of spaced disks providing a transverse guide pocket, members slidable within said pocket and connecting the projecting ends of said pistons or plungers to the guide members, and a screw and its nut adjustably connecting said plates and disk shaped member.

5. In a pump, the combination, with a cylinder, a head secured to said cylinder and formed with an axial hole, means for closing said hole, a drum rotatable within said cylinder and formed with cylindrical pockets disposed substantially parallel to and eccentrically of the axis of said drum, a swash ring fitted in said head, a disk shaped member rotatably guided within said ring and held thereby as against displacement in the direction of the axis of said drum, a guide member composed of a pair of spaced plates providing a transverse guide pocket, annular members transversely slidable within said guide pocket and in universal engagement with the projecting ends

of said plungers or pistons, and a screw and its nut adjustably connecting said plates and disk shaped member, said nut being in position for being accessible through said hole made in said head.

6. In a pump, the combination, with a cylinder, a head rockingly mounted on said cylinder, a pair of screws fixing said head on the cylinder, indicating means connected with one of said screws for indicating the position of said head relatively to said cylinder, a drum rotatable within said cylinder and formed with pockets disposed parallel to and eccentrically of the axis of said drum, and a swash plate in engagement with said pistons or plungers for reciprocating the same upon rotation of said drum and mounted in said head.

7. In a pump, the combination, with a cylinder, a head having a fulcrum on said cylinder the axis of which intersects the axis of said cylinder, a drum rotatable within said cylinder and formed with pockets disposed parallel to and eccentrically of the axis of said drum, pistons or plungers within said pockets formed with spherical heads, a swash member fitted within said head, a guide member rotatable on said swash member and formed with a transverse guide pocket, and members transversely slidable within said pocket and formed with spherical cavities engaging the spherical heads of said pistons or plungers for holding the same to the guide members, the plane connecting the centers of said cavities including the axis of the fulcrum of said head.

In testimony whereof I hereunto affix my signature.

JOHANN ALFRED MAURER.