March 25, 1952 C. O. J. MONTELIUS 2,590,561

SCREW PUMP

Filed Sept. 25, 1948

Fig. 1.

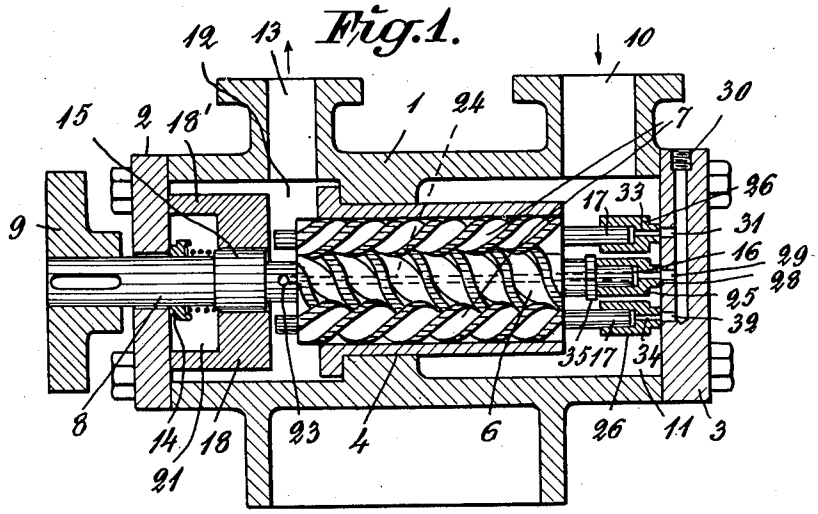


Fig. 2.

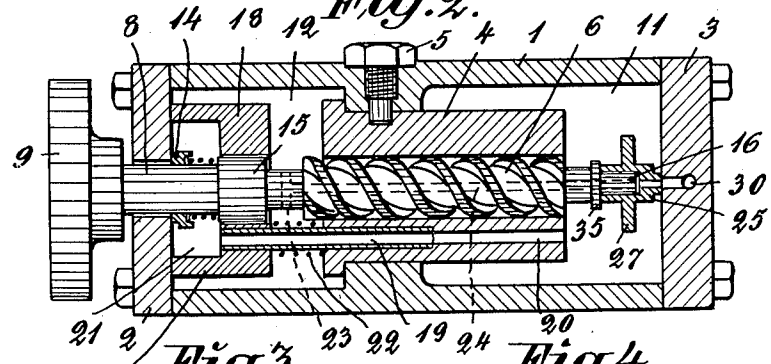


Fig. 3.

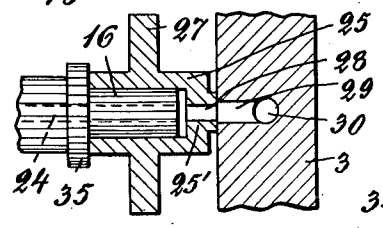
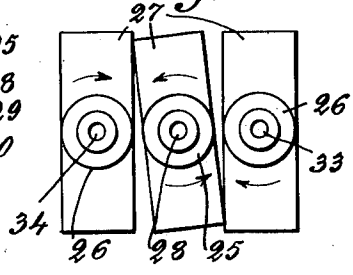


Fig. 4.



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SCREW PUMP

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2 Claims. (Cl. 103—128)

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The present invention relates to screw-pumps consisting of two or more intermeshing screw-rotors running in a closely fitting housing, one or more of which screw-rotors are provided with balancing-pistons. In such pumps a tight fit between the threads of the screws can be obtained and it is possible to allow the screw-rotors to run in the bores of their housing in the same manner as shafts in their bearings. Especially at high pressures this construction, however, requires a very small clearance between the thread-tops of the screws and the housing as well as between the balancing pistons and their bores.

It is obvious that this construction requires that the bores of the pistons are exactly co-axial with the bores of the housing or at least that the divergences are considerably smaller than the clearances between the screw-rotors and the bores of the housing. This requires great precision of manufacture.

According to the present invention the construction is improved by the screw-rotors being supported by the housing, the balancing pistons locating freely movable but well fitting sleeves which are held against fixed stop surfaces by the working pressure of the pump.

By the invention all the screw-rotors may thus be carried solely by the bores of the housing acting as bearings, the balancing pistons of the screws carrying their sleeves, which are allowed to adjust themselves to the pistons and thus also to the screw-rotors.

By adoption of the invention it becomes possible to machine the housing without any close tolerance, no radial bearings for the screw-rotors being necessary beyond their support solely by the cylindrical surfaces of the bores, the piston sleeves being freely adjustable to the positions of the screw-rotors.

The general object of the invention is the attainment of the foregoing advantages. This object and other objects relating particularly to details of construction and operation will become apparent from the following specification read in conjunction with the accompanying drawing, in which:

Figs. 1 and 2 illustrate longitudinal sections in the vertical and horizontal plane respectively through a triple-screw-pump of the type described; and

Fig. 3 illustrates a part of the pump in longitudinal section, while Fig. 4 is an end view of same.

In Figs. 1 and 2 a pump case designated by 1 at each end is provided with covers 2 and 3

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which are attached to the case by screws. In a central and preferably cylindrical bore in the case 1 is inserted a housing 4 secured by a bolt 5 and having three parallel cylindrical intersecting bores. In these bores are supported a central screw-rotor 6 having right-hand threads and two side rotors 7 having left-hand threads. The central rotor 6 is provided with a driving shaft 8 projecting through the cover 2 and may be connected to a suitable source of power by means of a coupling 9.

Liquid flowing through an inlet 10 to a chamber 11 at one end of the case 1 is trapped between the threads of the screws and transferred to a pressure chamber 12 at the other end of the case 1, and discharged through the outlet 13. A plane surface seal 14 fits tightly against the end cover 2 and the shaft and prevents leakage.

In order to counterbalance the axial thrust on the screw 6 from the pressure of the liquid in the chamber 12 the shaft of the central screw 6 at its pressure side is shaped to a piston 15 and at its suction side to a smaller piston 16. The piston 15 is running with a small clearance in a sleeve 18 having an annular projection 18' resting against the cover 2, the sleeve being prevented from rotation by a tube 19 arranged between said sleeve and the housing 4. This tube 19 connects the chamber 21 enclosed between the sleeve 18 and the cover 2 with a bore 20 through the housing 4 and opening to the chamber 11 at the suction side of the pump. The over-pressure in the chamber 12 presses the sleeve 18 against the cover 2. To keep the sleeve 18 pressed against the cover 2 in case there is no over-pressure in the chamber 12 a small spring 22 is inserted between the sleeve 18 and the housing 4.

An axial bore 24 in the screw 6 and in the piston 16, opening into the chamber 12 through a transveral bore 23, transfers the pressure in chamber 12 to the end of the piston 16, which with a small clearance is enclosed by a self-adjusting sleeve 25 having a bottom 25'. The side screws 7 are provided with pistons 17 each carrying a sleeve 26 of the same type. On the outside the sleeves 25 and 26 are provided with extensions 27 engaging each other in order to prevent them from rotating.

The pressure of the liquid in the chamber 12 is transferred by the bore 24 and an opening 28 in the bottom 25' of the sleeve 25 to a corresponding opening 29 in the cover 3, to a bore 30

and from there through the openings 31, 32 to the side-screw sleeves 26.

Any residual force on the central screw 6 towards the suction side is taken by an axial bearing ring 35 running against the sleeve 25. In the opposite direction a displacement of the screw is stopped by the spring of the seal 14.

As soon as the pump has begun to operate, the pressure in the chamber 12 presses the sleeve 18 against the cover 2 in the correct position where it fits the piston 15. If the surfaces of the cover 2 and the annular projection 18' are accurately machined, the adhesion will keep these parts attached to one another, even when the pressure disappears. The sleeve 18 prevents vibrations of the shaft 8 and is even able to take transversal forces, for instance from an unbalanced coupling. The sleeves 25, 26 will align themselves in a similar manner, eliminating any risk of misalignment and undue stresses.

What is claimed as new and desired to be secured by Letters Patent is:

1. A rotary pump comprising a housing having an inlet and an outlet and providing a plurality of intersecting parallel bores, a central power screw and a plurality of idler screws intermeshing with said power screw, said screws being rotatable in said bores, said central power screw being free to move in directions transverse to its axis within limits defined solely by its bore, a balancing piston on said power screw at the outlet end thereof, a sleeve member surrounding and supported by said piston and free to move axially of the piston under action of the working pressure of the pump fluid against a stop surface of the housing and free to move across said surface as determined by said piston.

2. A rotary pump comprising a housing having an inlet and an outlet and providing a plurality of intersecting parallel bores, a central power screw and a plurality of idler screws intermeshing with said power screw, said screws being rotatable in said bores, said central power screw having a shaft extending with clearance through an opening in the housing at the outlet end thereof and being free to move in directions transverse to its axis within limits defined solely by its bore, a balancing piston on said power screw at the outlet end thereof, a sleeve member surrounding and supported by said piston and free to move axially of the piston under action of the working pressure of the pump fluid against a stop surface of the housing and free to move across said surface as determined by said piston, said sleeve member having an annular surface surrounding the shaft opening in the housing and sealing against said stop surface to substantially isolate said opening from the pressure of fluid at said outlet.

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REFERENCES CITED

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

FOREIGN PATENTS

Number	Country	Date
667,108	Germany	Nov. 4, 1938
672,700	Germany	Mar. 8, 1939