

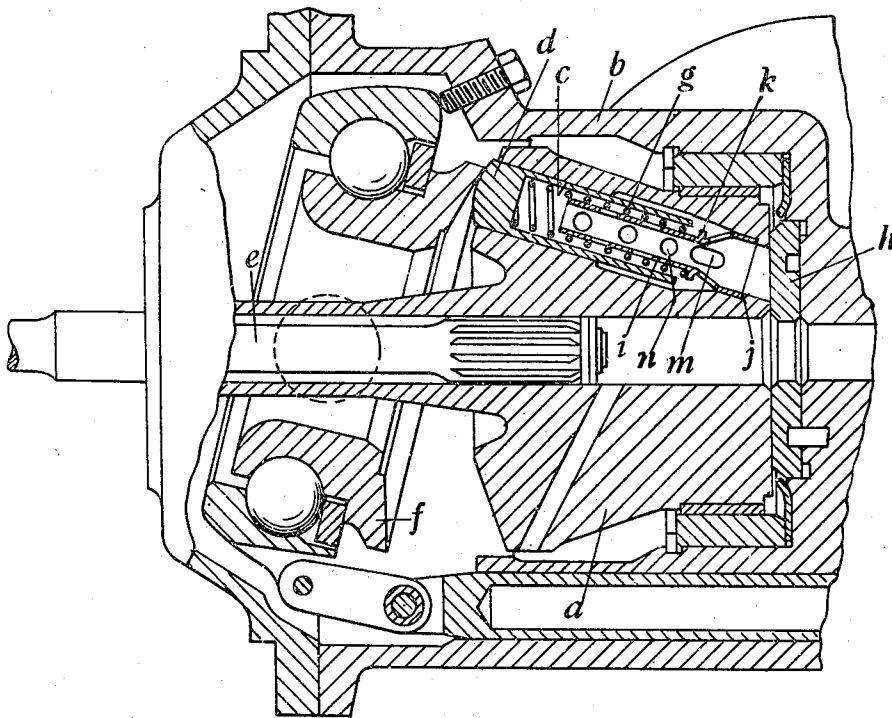
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RECIPROCATORY PUMP AND THE LIKE

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RECIPROCATORY PUMP AND THE LIKE

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This invention relates to reciprocatory pumps and the like, and more particularly swash plate pumps, of the kind having at least one hollow plunger slidable in a cylinder bore, movement of the plunger in the inward direction being effected by a pressure applied to the outer end of the plunger, and the reverse movement by a compression spring accommodated in the plunger and bore. The object of the invention is to minimise risk of accidental breaking of the springs while in use.

The invention comprises in a pump of the aforesaid kind the combination with the cylinder bore, or each such bore, of a perforated guide tube which is supported at one end in the bore and extends along the interior of the spring, and is provided at a distance from the said end with a shoulder for supporting one end of the spring, the tube being perforated at a position between the said end and the shoulder as well as along the part which extends into the spring.

The accompanying drawing is a sectional side view of a swash plate pump embodying the invention.

The pump shown in the drawing comprises a rotary cylinder block *a* arranged in a casing *b* and having formed around its axis a plurality of bores as *c*. In each of the bores *c* is arranged a reciprocatory hollow plunger as *d* which at one end is closed and adapted to project from the cylinder block *a*. The latter is adapted to be driven by a shaft *e* which extends through one end of the casing *b*. During rotation of the cylinder block *a* the plungers as *d* are moved in one direction under the action of pressure exerted on the outer ends of the plungers by an angularly adjustable swash plate *f*, and in the opposite direction by compression springs as *g* situated in the bores as *c*, the springs serving also to hold an end face of the block in contact with a seating piece *h* in the casing *b*. The seating piece *h* is formed in the usual manner with liquid inlet and outlet ports (not shown) which communicate respectively with the pump inlet and outlet (also not shown).

In carrying the invention into effect as shown, I arrange in each bore as *c*, a guide tube *i* for the spring *g*. The guide tube *i* is expanded at one end so that it can be supported on a narrow shoulder *j* formed in the bore *c* near the end adjacent to the seating piece *h*, and at a suitable distance from this end of the guide tube *i* there is formed thereon an external annular shoulder *k* which forms an abutment for one end of the spring *g*, the abutment for the other end of the

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spring being formed by the closed outer end of the plunger *d*. The guide tube *i* extends into the spring *g* for any convenient distance, and the external diameter of the part of the guide tube lying within the spring is only a little less than the internal diameter of the spring. Also the guide tube *i* is formed with perforations *m* between the shoulder *k* and the adjacent end of the tube, and with perforations *n* along the part which lies within the spring *g*, to enable liquid to flow freely into and out of the bore *c* and plunger *d* when the pump is working.

By means of a guide tube constructed and arranged as above described I have been able greatly to minimise the risk which normally exists of spring breakage when the pump is in use. While the invention is primarily intended for swash plate pumps it may, however, be applied to other reciprocatory plunger pumps or the like in which a spring is accommodated within a hollow plunger and the cylinder bore. Also subordinate constructional details may be modified to suit different requirements.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a reciprocatory pump or the like having inlet and outlet ports for fluid, the combination of at least one cylinder bore, a hollow plunger slidable in the bore, means for moving the plunger in one direction, a compression spring located within the plunger for moving it in the opposite direction, a perforated guide tube for the spring extending along the interior thereof and supported at one end in the bore, and a shoulder on the said guide tube spaced from said end thereof for supporting one end of the spring, the tube being perforated at a position between the said end and shoulder as well as along the part extending within the spring to enable fluid to flow freely between the interior of the said tube and the said bore under the action of the said plunger.

2. In a reciprocatory pump or the like having inlet and outlet ports for fluid, the combination of at least one cylinder bore, a hollow plunger slidable in the bore, means for moving the plunger in one direction, a coiled compression spring located within the plunger for moving it in the opposite direction, a perforated guide tube for the spring extending along the interior thereof and having an enlarged end supported in the bore, and a shoulder on the said guide tube spaced from the supported end thereof for supporting one end of the spring, the tube being perforated at a position between the said end and shoulder as well as

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along the part extending within the spring to enable fluid to flow freely between the interior of the said tube and the said bore under the action of the said plunger.

3. In a reciprocatory pump or the like of the swash plate type having inlet and outlet ports for fluid, the combination of at least one cylinder bore in a rotatable member, a hollow plunger slidable in the bore, swash plate means for moving the plunger in one direction, a coiled compression spring for moving it in the opposite direction, a perforated guide tube for the spring extending along the interior thereof and having one end supported in the bore, and a shoulder on the said guide tube spaced from the supported end thereof for supporting one end of the spring, the tube being perforated at a position between the said end and shoulder as well as along the part extending within the spring to enable fluid to flow freely between the interior of the said tube and the said bore under the action of the said plunger.

4. In a reciprocatory pump or the like of the swash plate type having inlet and outlet ports for fluid, the combination of at least one cylinder bore in a rotatable member and inclined with

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respect to the axis of rotation thereof, a hollow plunger slidable in the bore, swash plate means for moving the plunger in one direction, a coiled compression spring for moving it in the opposite direction, a perforated guide tube for the spring extending along the interior thereof and having an enlarged end supported in the bore, and a shoulder on the said guide tube spaced from the supported end thereof for supporting one end of the spring, the tube being perforated at a position between the said end and shoulder as well as along the part extending within the spring to enable fluid to flow freely between the interior of the said tube and the said bore under the action of the said plunger.

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REFERENCES CITED

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

FOREIGN PATENTS

Number	Country	Date
26,185	Netherlands	Sept. 15, 1931