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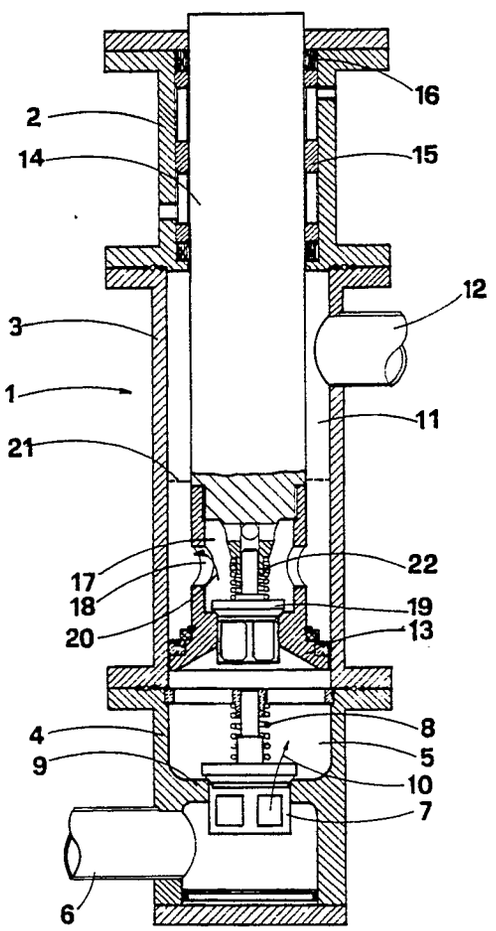
(71) Applicant: **BERTOLI S.r.l. COSTRUZIONI MECCANICHE**
Via Lasagna, 15/A
I-43100 Parma(IT)

(72) Inventor: **Bertoli, Vittorio**
Via La Malfa, 10
I-43100 Parma(IT)

(74) Representative: **Lanzoni, Luciano**
c/o BUGNION S.p.A. Viale Trento Trieste, 25
I-41100 Modena(IT)

(54) A single cylinder reciprocating pump.

(57) In a single cylinder high pressure reciprocating force pump of the type used in packaging, batching and homogenizing processes, the barrel (1) of the cylinder is divided into suction and delivery chambers by a piston (13) of which the rod (14) occupies half the cross-sectional area of the delivery chamber (11); the pumped fluid passes through two valves, the first a conventional foot valve (7) in the suction chamber (5), the second incorporated into a cavity (17) formed internally of the piston (13) which lies open to the suction chamber (5) on the one hand and to the delivery chamber (11) on the other.



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The invention relates to a reciprocating pump of single cylinder design.

Reciprocating force pumps are characterized by an intermittent operating cycle in which suction and delivery strokes occur in alternation one with the other.

Whilst pumps of the type in question are capable of operating at high pressures, a continuous output conventionally requires at least two cylinders of which the respective plungers are timed to stroke such that the suction and delivery actions remain substantially uninterrupted; with two cylinders, for example, the cycles are staggered by 180°. The object of the present invention is to obtain continuous delivery from a reciprocating pump of single cylinder embodiment, and thus to achieve a lower rated power per unit of head in relation to that of comparable multi-cylinder embodiments. The stated object is comprehensively realized in a single cylinder reciprocating pump according to the present invention, which is of the type comprising a cylinder barrel, slidably accommodating a piston of which the rod is reciprocated by a pneumatic motor or a rod-and-crank mechanism, and divided by the piston into a suction chamber and a delivery chamber connecting respectively with a suction inlet and a delivery outlet, and a check valve located between the suction inlet and the piston, and is characterized in that the piston affords a cavity, lying open to the suction chamber on the one hand and to the delivery chamber on the other, and housing a check valve, and in that the cross sectional area of the piston rod is half that of the cylinder barrel.

The invention will now be described in detail by way of example with the aid of the accompanying drawing, which illustrates the pump in longitudinal section.

With reference to the drawing, 1 denotes a cylinder barrel consisting substantially in three sections: a top section 2, a middle section 3 and a bottom section 4.

The bottom section 4 serves to encompass a suction chamber 5 provided with a suction inlet 6 and accommodating a check valve 7, biased by a spring 8 against a seating formed in a web denoted 9, which is designed to allow passage of the pumped fluid only in the direction of the arrow denoted 10. The middle section 3 serves to encompass a delivery chamber 11, and is provided with an outlet 12 at the upper end; the chamber 11 slidably accommodates a piston 13 of which the rod 14 is reciprocated by means not illustrated in the drawing, for example a pneumatic motor or a rod-and-crank mechanism.

The top section 2 of the barrel houses rings 15 and seals 16 by which the rod 14 is guided and rendered fluid-tight.

According to the present invention, the piston 13 affords an internal cavity 17 connecting by way of holes 18 with the delivery chamber 11, and able to connect also with the suction chamber 5 by way of a directional valve denoted 19, which is biased by a spring 22 against a seating incorporated into the piston 13 and designed to allow passage of the pumped fluid only as in the direction of the arrow denoted 20.

Likewise according to the invention, the circular cross sectional area of the rod 14 is substantially equal to half that of the delivery chamber 11, also circular.

The phantom line denoted 21 marks top dead centre of the cycle, and thus indicates the stroke limit. In the pump thus embodied, fluid is directed into the chamber denoted 11, hence into the pressure end of the barrel 1, not only during the suction stroke when passage to the chamber 11 is allowed by both the valves 7 and 19, but also during the forcing stroke; it will be observed, in fact, that fluid prevented from returning through the inlet 6 by the conventional check valve 7 is able to pass through the additional piston valve 19 into the delivery chamber 11.

Thus, throughout the pumping cycle, the fluid is obliged always to move in the direction of the arrows 10 and 20, being unable to return in the direction of the inlet.

Claims

1) A single cylinder reciprocating pump, comprising:

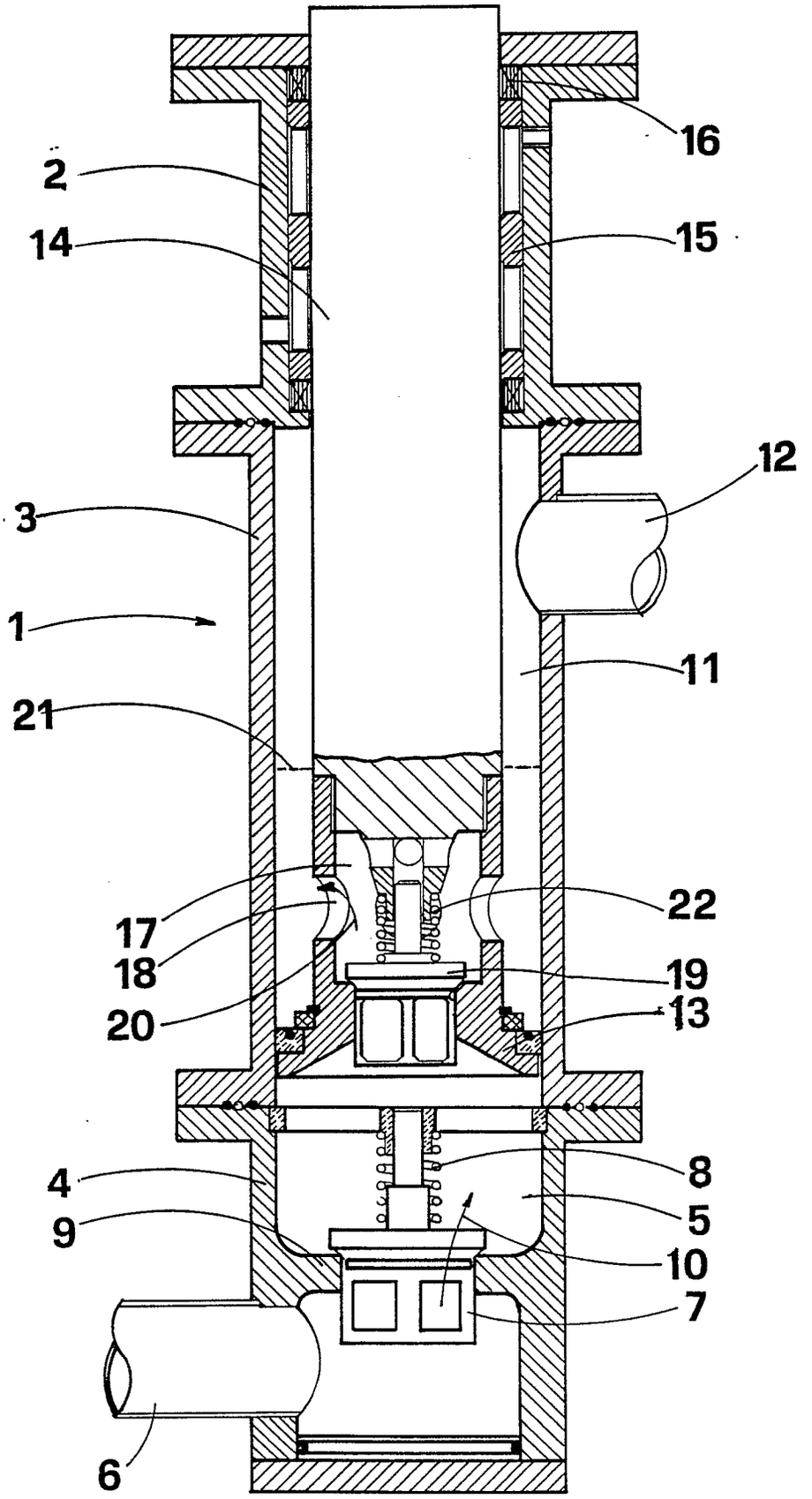
-a cylinder barrel (1), slidably accommodating a piston (13) of which the rod (14) is reciprocated by a pneumatic motor or a rod-and-crank mechanism, and divided by the piston into a suction chamber (5) and a delivery chamber (11) connecting with an inlet (6) and an outlet (12), respectively; and

-a check valve (7) located between the inlet and the piston,

characterized

-in that the piston (13) affords a cavity (17) open to the suction chamber (5) on the one hand and to the delivery chamber (11) on the other, and housing a check valve (19); and

-in that the cross sectional area of the rod (14) is half that of the cylinder barrel (1).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EUROPEAN SEARCH REPORT

Application Number

EP 90 83 0101

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	DE-A-2307818 (INOUYE SHOKAI) * page 1, paragraph 1 - page 2, paragraph 2 * * page 3, paragraph 3 - page 4, paragraph 1; figures 1, 5 *	1	F04B11/00 F04B21/04
X	US-A-2837898 (AHLSTRAND) * column 2, line 50 - column 4, line 19 * * column 6, lines 3 - 24; figures 1, 2 *	1	
X	EP-A-254450 (GEBERTH) * page 11, line 10 - page 14, line 6; figure 3 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	08 MAY 1990	BERTRAND G.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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