

July 18, 1967

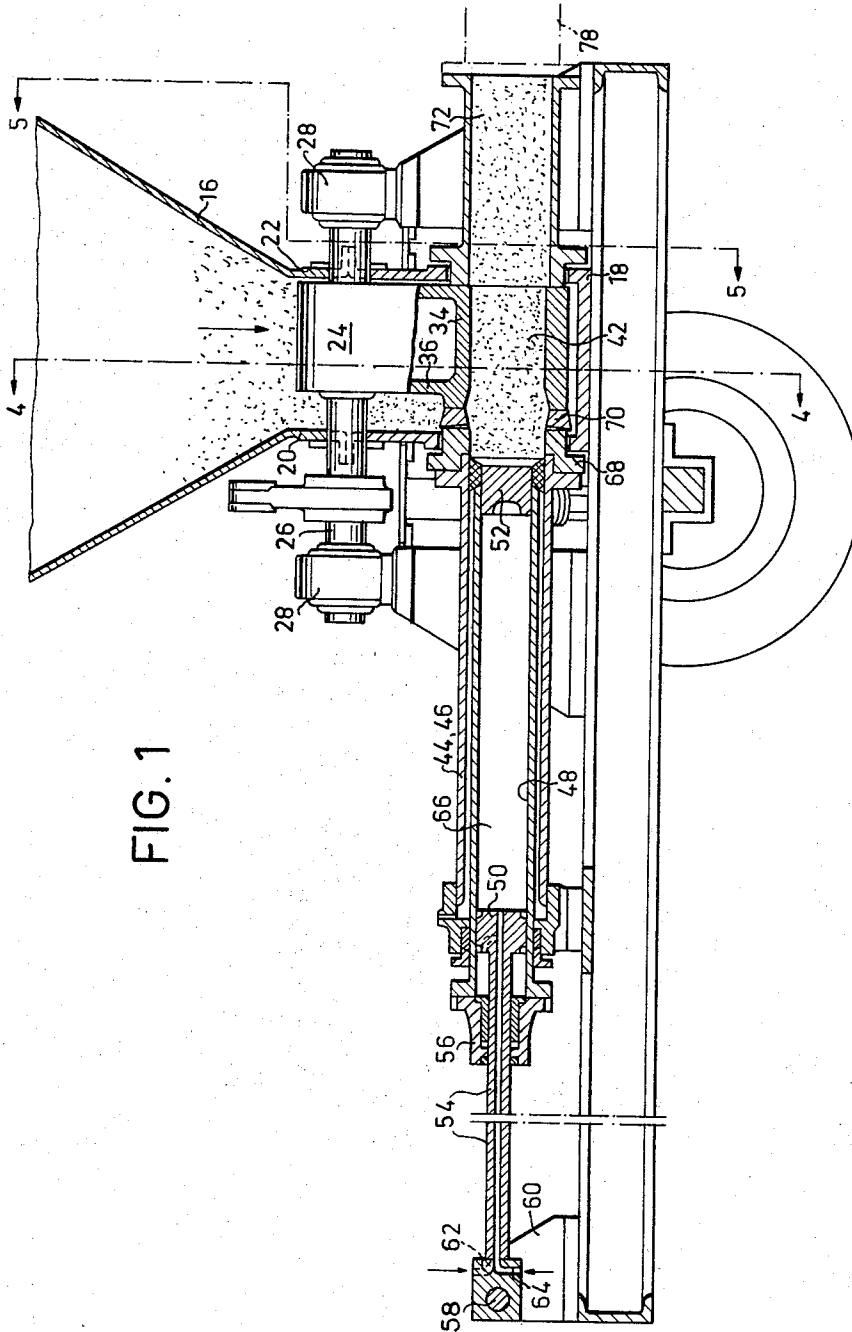
Filed Dec. 15, 1964

O. C. G. WENNBERG
PISTON PUMP FOR CONVEYING CONCRETE OR OTHER
MASSES OF SIMILAR CONSISTENCY

3,331,332

4 Sheets-Sheet 1

FIG. 1



INVENTOR
OLOV C. G. WENNBERG
BY *Young + Thompson*
ATTYS.

July 18, 1967

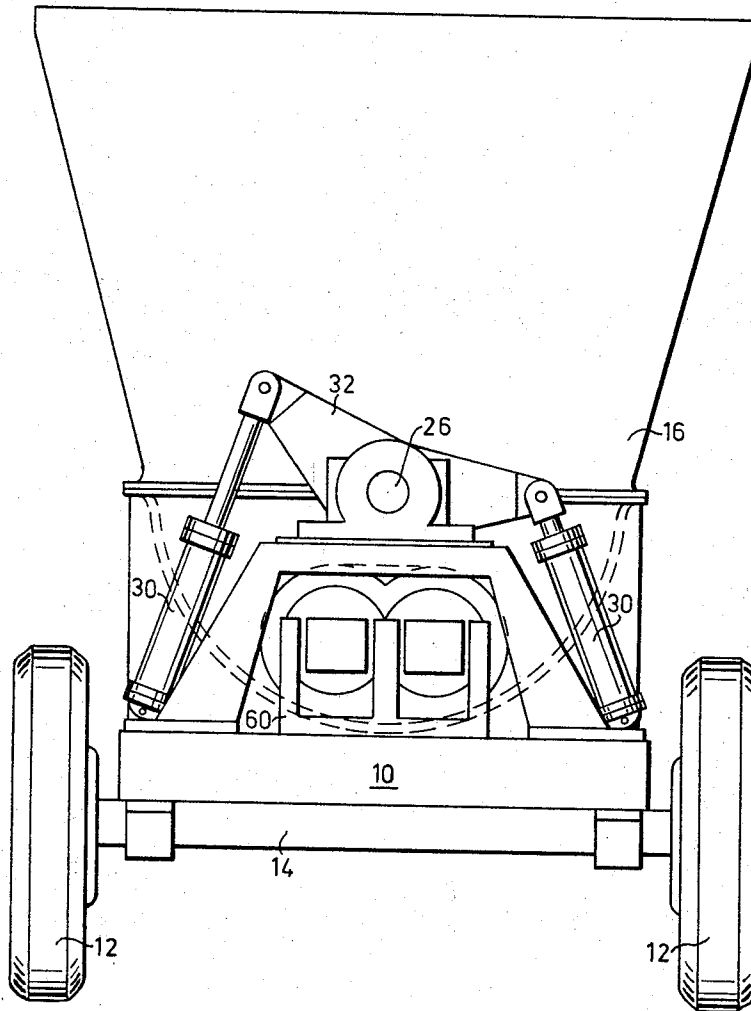
O. C. G. WENNBERG
PISTON PUMP FOR CONVEYING CONCRETE OR OTHER
MASSES OF SIMILAR CONSISTENCY

3,331,332

Filed Dec. 15, 1964

4 Sheets-Sheet 2

FIG. 2



INVENTOR

OLOV C. G. WENNBERG

BY

Young & Thompson
ATTYS.

July 18, 1967

O. C. G. WENNBORG
PISTON PUMP FOR CONVEYING CONCRETE OR OTHER
MASSES OF SIMILAR CONSISTENCY

3,331,332

Filed Dec. 15, 1964

4 Sheets-Sheet 3

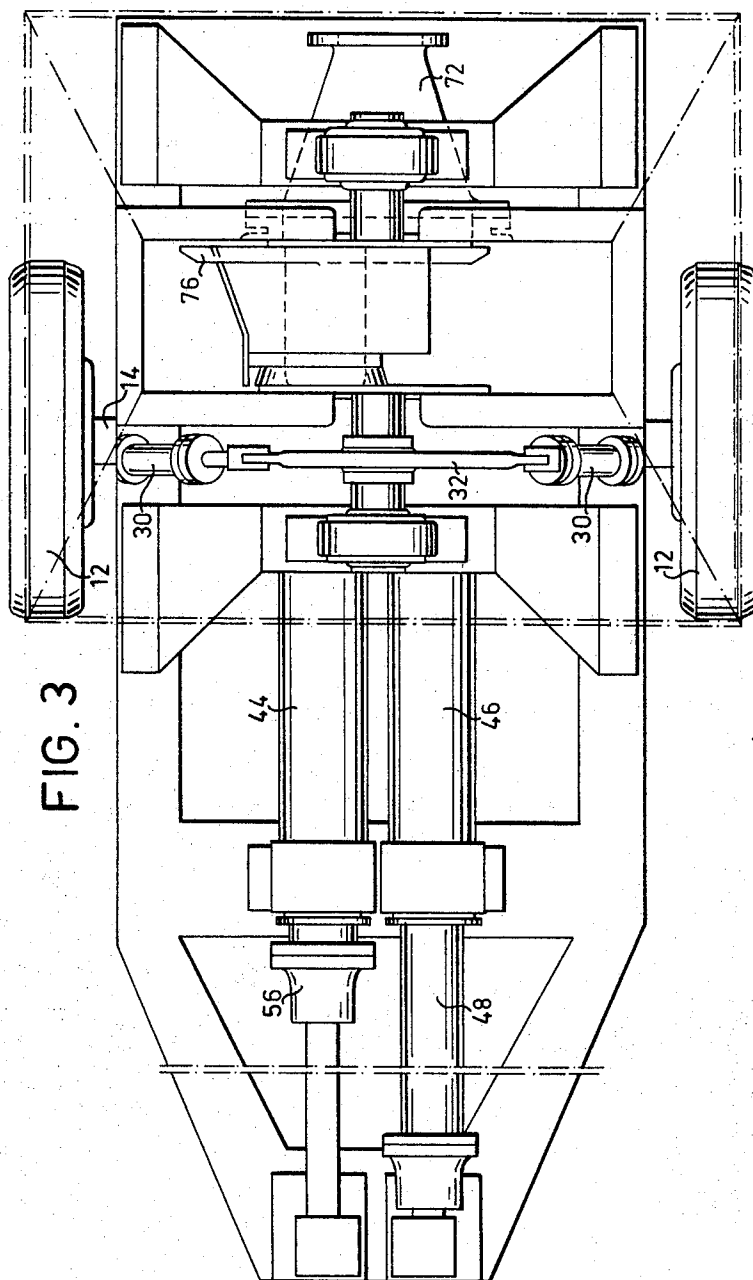


FIG. 3

INVENTOR
OLOV C. G. WENNBORG
BY
Young & Thompson
ATTYS

July 18, 1967

Filed Dec. 15, 1964

PISTON PUMP FOR CONVEYING CONCRETE OR OTHER
MASSES OF SIMILAR CONSISTENCY

3,331,332

4 Sheets-Sheet 4

FIG. 4

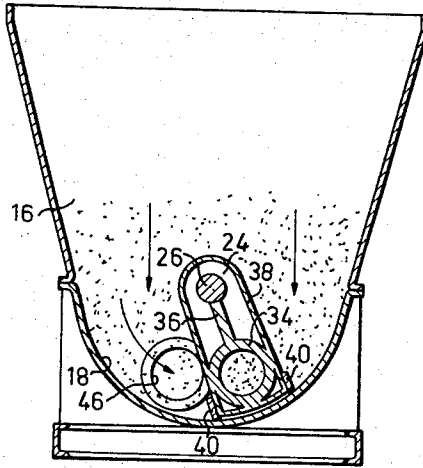
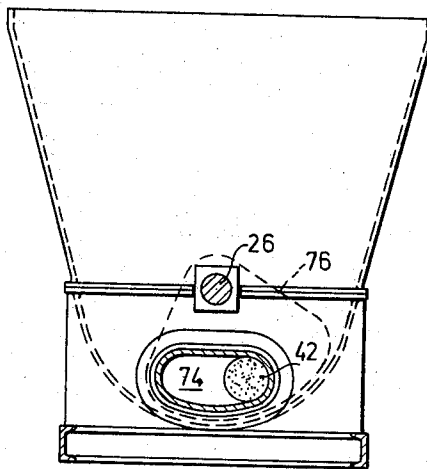


FIG. 5



INVENTOR.
OLOV C. G. WENNERBERG
BY *Young & Thompson*
ATTYS.

1

3,331,332

PISTON PUMP FOR CONVEYING CONCRETE OR OTHER MASSES OF SIMILAR CONSISTENCY

Olov Carl Gustav Wennberg, Karlstad, Sweden

Filed Dec. 15, 1964, Ser. No. 418,438

Claims priority, application Sweden, Dec. 19, 1963,

14,236/63

3 Claims. (Cl. 103—170)

This invention relates to piston pumps for conveying concrete or other masses of similar consistency, wherein feed pistons provided each in a working cylinder alternately force the mass from a supply container to a common discharge duct the inlet of which is alternately put into communication with the cylinders by means of a valve device. A great number of different valve structures have been suggested for this purpose, but all of them suffer from the inconvenience that they get worn after a short time, especially because of the strongly abrasive material which is passed through the pump. The main object of the invention is to provide a valve device having a high abrasion resistance and durability.

In its broadest aspect the invention is characterized in that the inlet of the common discharge duct is common to both cylinders and that the total inlet area is at least twice the cross-sectional area of the through passage of the valve device. Due to this arrangement the valve member can be in the form of a simple short tube one end of which is always in direct communication with the inlet of the common discharge duct. Consequently, the alternate closure necessary in many of the prior-art structures is not required in a valve device according to the invention. Further, the tube of the valve can be given a simple reciprocating motion with its axis remaining parallel to itself during the motion.

In order to prevent return flow from the discharge duct to the supply container when one of the pistons is making its power stroke, the tubular valve may be provided with a cover plate which closes the portion of the common inlet which is actually non-operative. The valve device may be essentially in the form of a slide with a through passage for the mass arriving from the cylinders. This slide is movable between a position in which the through passage registers with one of the cylinders and a second position in which the passage registers with the other cylinder. According to the most simple construction the movement of the valve is a pivotal movement about a revolving shaft which is advantageously parallel to the axis of the through passage.

An embodiment of the invention is described hereinbelow with reference to the annexed drawings. FIG. 1 is a substantially vertical sectional view of the entire pump, FIG. 2 a corresponding end elevation viewed from the right in FIG. 1, and FIG. 3 a corresponding top view. FIG. 4 is a vertical cross-sectional view taken along the line 4—4 in FIG. 1, and FIG. 5 is a vertical cross-sectional view along the line 5—5 in FIG. 1.

In the embodiment exemplified the piston pump is mounted on a frame 10 which is supported by wheels 12 mounted on a transverse axle 14. The pump is combined with a container 16 for supplying the concrete mass. The lower part of the supply container 16 has a part cylindrical bottom 18 and planar side walls 20, 22 which together form a valve casing in which a slide valve 24 is movable. The slide valve 24 is secured to a shaft 26 which extends through the walls 20 and 22 and outside thereof is mounted in bearings 28. The shaft 26 can be turned to and from by means of a pair of hydraulic pistons movable in cylinders 30 mounted each on one side of the shaft. The pistons are articulated to a cross-piece 32 which is keyed onto the shaft 26.

2

The valve member on the slide valve 24 consists essentially of a short tube 34 which by means of an arm 36 is secured to the shaft 26 and made integral with a cap 38 which encloses the shaft 26 and protects the shaft from the concrete mass in the container. The lower end of the cap is connected to a pair of strippers 40, one on each side of the cap for engagement with the bottom 18 of the container 16.

The through passage 42 in the tube 34 of the slide valve can be put into communication with one or the other of two cylinders 44, 46 each of which is provided with a tubular piston 48 adapted to slide on a stationary plunger 50. The piston 48 is closed at one end by a piston head 52 and surrounds the plunger rod 54 by means of a packing 56 at its other, outer end. The outer end of the plunger rod 54 is secured to a pin 58 which is supported by a bracket 60 mounted on the frame 10. The plunger 50, 54 has longitudinally extending ducts 62, 64 which alternately supply pressure liquid to the interior 66 of the piston 48 and withdraw the liquid therefrom. In FIG. 3 the piston 48 of the cylinder 46 is shown in an outer end position in which its stuffing box 56 is close to the bracket 60, whereas the piston of the cylinder 44 is in an inner end position shown in FIG. 1.

The inner ends of the cylinders 44, 46 are bolted to a flanged ring 68 which is inserted in the wall 20. The inner face of this ring cooperates with an annular knife 70 mounted on the inlet end of the tube 34. The annular knife 70 serves to cut off the run of concrete when the slide is moving from a position registering with one of the cylinders 44, 46 to a position registering with the other cylinder. The tube 34 has substantially the same cross-sectional area as the cylinder 44 or 46 or a slightly greater cross-sectional area. On its outlet side the tube 34 communicates with a discharge duct 72 the inlet 74 of which is common to both cylinders 44, 46, the total area of the inlet 74 being at least twice the cross-sectional area of each cylinder. The shape of the inlet 74 is shown in FIG. 5, where the through passage 42 of the slide 34 is in the right-hand end position. In order to have only one of the cylinders 44, 46 at a time communicating with the oval inlet opening 74 and to prevent the concrete mass from being forced back into the container 16, the slide valve is provided with a cover plate 76 which closes the portion of the common inlet 74 of the discharge duct 72 which is actually non-operative. The discharge duct 72 is adapted to be connected to a suitable conveying pipe indicated by chain-dotted lines 78 in FIG. 1.

The mode of operation of the piston pump as described is substantially as follows. Concrete mass supplied into the container 16 also fills the lower part thereof so that the bottom 18 is covered except for the part which is screened by the strippers 40 on the slide valve 24. In the position shown in FIG. 4 the open end of the cylinder 46 is in communication with the interior of the container 16 whereas the tube 34 of the slide 24 registers with the cylinder 44. The piston 48 in the cylinder 46 is in its inner end position and is about to start a suction stroke. To this end pressure liquid is supplied for instance through the duct 64 to the rear side of the plunger 50 and at the same time liquid can be withdrawn from the interior 66 of the piston 48 through the duct 62. As the piston 48 is moving outwards concrete mass is drawn from the container 16 into the cylinder 46 until the piston 48 arrives at its outer end position in the cylinder 46. Thereupon the slide 24 is swung from the end position in which its through passage 42 registers with the cylinder 44 to the other end position in which the passage 42 registers with the cylinder 46. Pressure fluid is now supplied to the piston 48 in the cylinder 46 on the front side of the plunger 50 while liquid is discharged from the rear side of the plunger through

3

the duct 64 or 62. As a result the piston 48 is forced into the cylinder and performs a power stroke during which concrete mass is forced through the passage 42 of the valve and through the discharge duct 72 into the conveying pipe 78. A corresponding cycle of operation takes place in the other cylinder 44, and it will be understood that a power stroke in one of the cylinders corresponds to a suction stroke in the other cylinder.

The annular knife 70 cuts the flow of concrete when the valve is moving from one end position to the other end position. The flow of concrete need not be cut off at the outlet end of the tube 34 of the valve because the inlet 74 of the discharge duct 72 is always in communication with the through passage 42 of the slide valve.

Due to the fact that the slide valve is disposed within the container and in operation performs a reciprocating pivotal movement while scraping the bottom of the container the mass will be stirred in the container and thereby prevented from settling or stratifying which is especially advantageous with masses such as concrete.

What I claim is:

1. A piston pump for concrete and the like, comprising plural feeding pistons, a discharge duct common to said pistons, said pistons being adapted alternately to force the pumped material to said common discharge duct, a valve device having a through passage and adapted to control the flow of material into an inlet of said discharge duct, said inlet being common to both pistons and having a total inlet area at least twice the cross-sectional area of said through passage.

4

2. In a piston pump having plural cylinders and feeding pistons for reciprocation in the cylinders for forcing material alternately from the various cylinders into a discharge duct having an inlet common to said cylinders; the improvement comprising a valve slide having a through passage for said material, means to reciprocate the valve slide between feed positions, said valve slide in one position registering between one cylinder and said discharge duct and in a further position registering between another cylinder and said discharge duct, and a cover member on said valve slide to prevent flow of material from said through passage into one cylinder when the piston of another cylinder is feeding the discharge duct.

3. A piston pump as claimed in claim 1, said discharge duct having an oval inlet opening and a substantially circular outlet opening.

References Cited

UNITED STATES PATENTS

863,004	8/1907	Smith	137—625.45
2,467,945	4/1949	Pottmeyer	137—625.4
3,146,721	9/1964	Schwing	103—49
3,181,469	5/1965	Schumann	103—49

FOREIGN PATENTS

910,526 2/1946 France.

DONLEY J. STOCKING, *Primary Examiner.*

LAURENCE V. EFNER, WILLIAM L. FREEH,

Examiners.