United States Patent

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[54] **CONCRETE PUMP ASSEMBLY**
1 Claim, 2 Drawing Figs.

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[50] **Field of Search** 103/169, 170, 227, 228; 417/317, 531, 532, 515, 900

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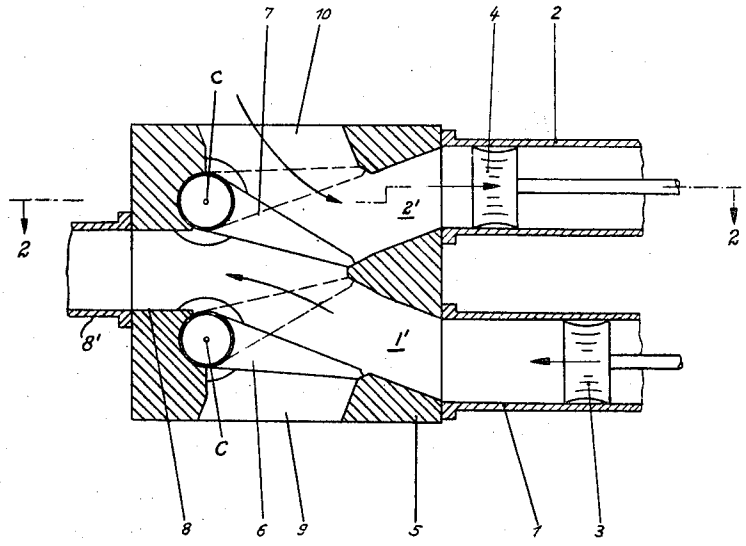
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ABSTRACT: Concrete pump assembly regulated by control flap valves with two pump cylinders and a common outlet opening. On two sides of the outlet opening in a control housing is a pair of control flap valves, which are rockable about their axes and alternately connect one of the two pump cylinders with the outlet opening and at the same time connect the other pump cylinder with a suction opening.



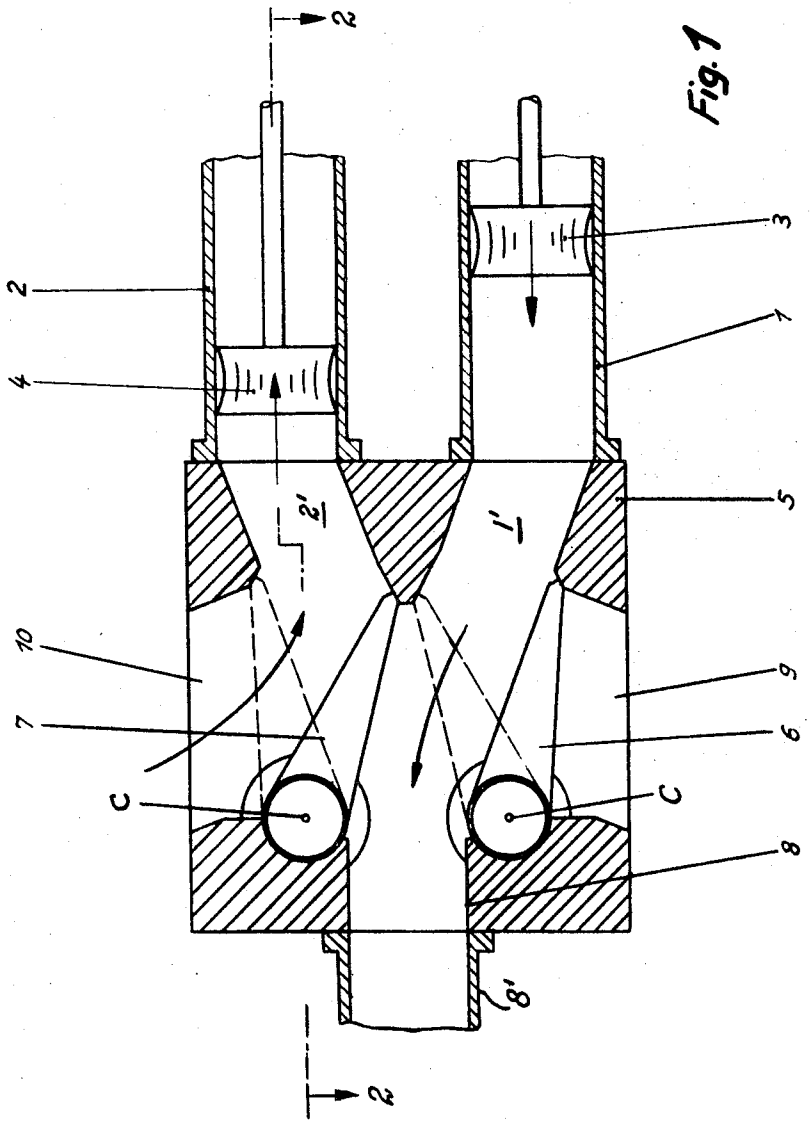


Fig. 1

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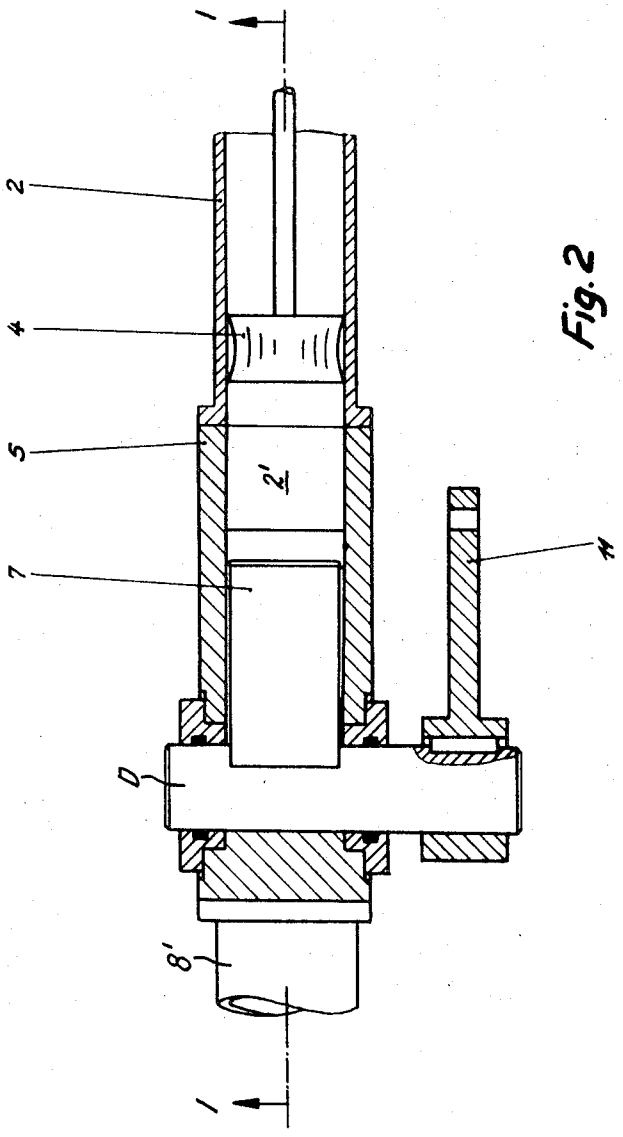


Fig. 2

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CONCRETE PUMP ASSEMBLY

BACKGROUND OF THE INVENTION

With the concrete pumps today predominantly carried out with two pump cylinders, different control systems are utilized. One of the usual ways is to employ flat slide valves, which by means of hydraulic cylinders are pressed into channels of the control housing and are drawn out again. This technical solution has the disadvantage of a rather high wear, as well as appreciable packing problems, because flat slide valves must be guided on rods which lead outwardly, where they are connected by cross tie rods against which the hydraulic cylinders operate. The sealing of the reciprocating guide rods becomes more difficult if the latter through wear have lost their uniform round cross section. Since these pumps have two outlet apertures, the necessity additionally exists of employing a collecting pipe joining the two outer channels.

Additionally, flat slide valves appeared more favorable than rotary valves used predominatingly earlier, which can be sealed more easily, because they have a particularly high degree of wear and because in the vicinity of their end positions they act as stone-crushers. On account of the large surfaces which are under pressure, great friction moments must be overcome upon their movement, particularly at high pressures in the conveyor conduit.

Another type of construction utilizes a two-armed valve which, in its end positions, separates one pump cylinder from the other, and connects one cylinder with the outlet aperture, the other with a suction opening lying between the two pump cylinders. This type of construction has the advantage that the packing towards the outside is simple, because it is a matter of sealing the rotating movements of thin pins. The further advantage is the small size of the surfaces causing friction.

The disadvantages of this type of construction lie in the particularly unfavorable flow conditions, which results in frequent plugging up of the control housing. The diameter of the suction aperture which lies between the two pump cylinders, determines the size of the deflection of the feed stream on the path from the end of the pump cylinder to the outlet aperture of the control housing. On this account a relatively small suction aperture must be utilized. Upon the suction operation, the concrete is additionally deflected at least 180°.

SUMMARY OF THE INVENTION

The invention has the object of overcoming the disadvantages of the last-described type of construction with respect to the unfavorable flow conditions, both as to the suction side as well as to the pressure side in the control housing.

This problem is solved according to the invention in this way, that on two sides of the outlet opening flaps or valves are positioned swingable about axes parallel to one another, which in their two end positions alternately connect one of the two pump cylinders with the outlet opening and at the same time the other pump cylinder with the suction opening correlated to it.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a sectional view substantially on the line 1–1 of FIG. 2 showing a control housing according to the invention, and two pump cylinders of a concrete pump; and

FIG. 2 is a longitudinal sectional view substantially on the line 2–2 of FIG. 1 showing a pump cylinder and the control housing according to the invention.

DESCRIPTION OF PREFERRED EMBODIMENT

A pair of spaced cylinders 1 and 2 contain reciprocating feed pistons 3 and 4 respectively, the piston 3 being shown performing its pressure or feed stroke and the piston 4 being shown performing its suction stroke, as indicated by the respective arrows. The cylinders 1 and 2 are suitably connected to a control housing 5 and register with oppositely inclined passages 1′ and 2′ respectively, which converge and

connect to an outlet passage 8 which communicates with an outlet pipe 8′ suitably connected to the housing 5. Extending laterally from the passages 1′ and 2′ are suction passages 9 and 10 respectively, which communicate with pipes (not shown) leading from the source of concrete.

Within the housing 5 adjacent the mouth of the outlet passage 8 and on opposite sides thereof are rockable or swingable valve flaps 6 and 7. The valve flap 6 controls the passages 1′ and 9 and the valve flap 7 controls the passages 2′ and 10 depending upon their positions of adjustment. The free end of each of the valve flaps is pointed to provide flat surfaces to engage flatwise against the walls of the inclined passages or suction passages depending upon the respective positions thereof.

Each of the valve flaps 6 and 7 is fixed to oscillatable pins C and D respectively, which have bearing in the control housing 5. One end of each of the pins projects outside of the housing to receive an operating arm which is keyed to the respective pin. One of the arms designated as 11 is shown on FIG. 2, but it will be understood that a similar arm is secured to the extending portion of the pin C.

The arms for operating the valve flaps 6 and 7 are driven in any suitable manner so that one of the valve flaps is in a position, as shown in FIG. 1, to uncover the suction opening to enable the piston 4 to draw concrete in to the control housing and at the same time to close off communication between the inclined passage 2′ and the outlet passage 8. At the same time the valve flap 6 is rocked to the full line position of FIG. 1, closing off the suction opening 9 and uncovering the inclined passage 1′ and enabling the piston 3 to force concrete from the housing 5 through the inclined passage 1′, the outlet passage 8 and into the outlet pipe 8′. When the pistons 3 and 4 reverse the movements shown by the arrows on FIG. 1, then the valve flaps 6 and 7 are abruptly rocked to the broken line positions of FIG. 1 when the piston 4 operates to force concrete from the housing 5 and the piston 3 draws or sucks concrete into the housing. Of course, the action above-described continues throughout the pumping operation, as will be readily understood.

I claim:

1. A pump assembly for handling concrete comprising

a housing,

a pair of closely arranged passages disposed wholly within said housing and converging from one side to an intermediate portion within said housing,

an outlet passage within said housing and leading from said intermediate portion with the axis thereof disposed between said converging passages and extending from the side of said housing opposite to said first-mentioned side,

a pair of pump cylinders in closely spaced parallel relation on the outer side of said housing and communicating with the outer ends of said converging passages respectively,

pistons reciprocable respectively in said cylinders for operating concomitantly in opposite directions,

a pair of laterally disposed inlet passages arranged on opposite sides of and wholly within said housing and communicating directly with said intermediate portion for supplying concrete to said converging passages respectively, the inner ends of said lateral passages being juxtaposed to the inner end of said outlet passage and the inner ends of said converging passages,

a pair of oscillatable pins mounted in said housing, one being arranged on each side of said outlet passage and disposed in parallel relation,

a flap valve mounted on each pin for oscillating movement therewith,

said flap valves being so arranged that in one position one valve closes the adjacent inlet passage and uncovers said outlet passage, thereby enabling the piston on that side of the housing to force concrete from the respective cylinder through said intermediate portion and out through said outlet passage, and at the same time enabling the other valve to uncover the inlet passage ad-

jacent thereto, thereby enabling the piston on that side of the housing to draw or suck concrete through the adjacent inlet passage and into the respective cylinder, said

last valve in such position closing off the passage of the said outlet passage, and

means for oscillating said pins.