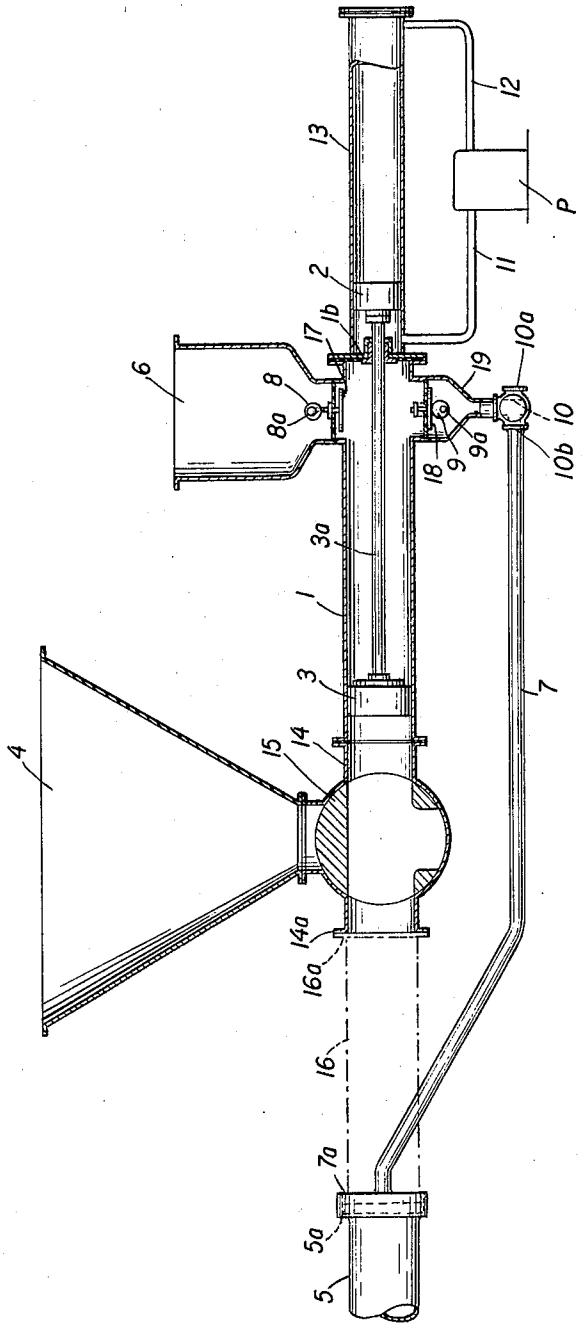
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DEVICE FOR CONVEYING CONCRETE, MORTAR OR SIMILAR VISCOUS MATERIALS

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DEVICE FOR CONVEYING CONCRETE, MORTAR OR SIMILAR VISCOUS MATERIALS

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The present invention relates to a device for conveying viscous materials, and in particular to devices for conveying concrete, mortar, or the like.

In plants for conveying viscous materials such as concrete, mortar, and the like, care must be taken that the discharge pipe is emptied during the interruptions in the operation of the device and the concrete filling the discharge pipe is cleaned and washed away from the inside of the discharge pipe, since otherwise the material which remains and hardens in the discharge pipe will lead to clogging and stoppages of the device when the equipment is again put in operation. The cleaning operation required for this purpose and which is usually effected by means of compressed air is extremely troublesome and time consuming.

It is therefore an object of the present invention to eliminate the above mentioned disadvantages and to provide means for an easy and fast emptying and cleaning of the discharge pipe of the concrete conveying device.

It is a further object of this invention to provide means for the use of the wash water both for said flushing of the cylinder and piston of the pump and for emptying and cleaning of the discharge pipe of the device.

Still another object of this invention is to provide valve means for alternatively directing the wash water to the cylinder of the pump, or to the discharge pipe of the device.

With these and other objects in view, the invention will now be described in more detail and with reference to the accompanying drawing an exemplary embodiment of the invention in which the pump of the concrete conveying device is a hydraulic driving means, and in which—

An embodiment of the invention is shown diagrammatically in the drawing.

In a pump cylinder 1 a piston 3 is mounted for reciprocating movement and connected by means of a piston rod 3*a*, which extends through an end wall 1*b* of the cylinder 1, with a piston 2 which forms part of a hydraulic drive system indicated diagrammatically by a pump aggregate P connected by conduits 11, 12 with a cylinder 13 in which the piston 2 is reciprocably mounted. The conduits 11, 12 are connected with the cylinder 13 at opposite ends thereof outside the stroke range of the piston 2, and the pump aggregate P includes control means (not shown) adapted to direct the fluid flow from the pump alternately through said conduits 11 and 12. Such control means are, of course, well known in the art and need not be described or shown in detail here.

The end of the cylinder 1 opposite to the end wall 1*b* is connected with an opening in the housing 14 of a three-way valve 15 which normally has a flange 14*a* at its outlet connected with a flange 16*a* of a short length of pipe 16 indicated in broken lines in the drawing for a purpose which will be explained. The housing 14 has an inlet opening which is in communication with a supply container 4 disposed above the valve housing 14. Adjacent the end wall 1*b* the cylinder 1 is connected with a water tank 6, and the connection is controllable by means of a check valve 17 adapted to open automatically at a predetermined pressure difference between the tank 6 and the cylinder 1. Also adjacent the end wall 1*b* the cylinder 1 is provided with a second check valve 18 at the inlet to a conduit 19 connected with a three-way valve 10. The check valve 18 is adapted to open automatically at a predetermined pressure difference between the cylinder 1

and the conduit 19. The three-way valve 10 has a discharge opening 10*a* and an outlet 10*b* in communication with a pipe 7 which at its opposite end has a flange 7*a* shown connected to a flange 5*a* of a discharge pipe 5. Adjacent the check valve 17 there is mounted a cam shaft 8*a* to which is secured a cam 8 adapted in one rotary position to hold the check valve 17 open. To a similar cam shaft 9*a* a cam 9 is secured which is adapted in one rotary position to hold the check valve 18 closed. The cam shafts 8*a* and 9*a* are operable from the outside of the tank 6 and conduit 19, respectively.

In normal operation, when concrete mixture is being conveyed from the container 4 to the discharge pipe 5, the valve 15 is first turned 90° in the counterclockwise direction from the position shown to establish communication between the tank 4 and the cylinder 1. This position of the valve 15 is maintained during the movement of the piston 3 toward the right so that concrete is supplied from the container 4 into the cylinder 1 by the combined action of gravity and suction. The valve 15 is then rotated in the clockwise direction through 90° to the position shown in the drawing and maintained in this new position during the stroke of the piston 3 toward the left so that the concrete in the cylinder 1 is forced out towards the discharge pipe 5. This operation is repeated whereby every full stroke of the piston 3 results in an additional quantity of concrete being forced out towards the discharge pipe 5. The turning of the valve 15 may be accomplished manually but is preferably achieved automatically by means (not shown) which connect the reciprocable system 2, 3, 3*a*, with the valve 15. During this conveying operation the short pipe section 16 is connected to the flanges 14*a*, 5*a*, and the flange 7*a* has been disconnected from the flange 5*a* and together with the pipe 7 swung to the side to permit insertion of the pipe 16.

During this operation the check valve 18 is normally maintained closed by the cam 9 and the check valve 17 is maintained open by the cam 8 so that flush water is permitted to flow freely back and forth between the water tank 6 and the cylinder 1 as the piston 3 reciprocates. Comparatively small quantities of abrasive material escape from the valve 15 past the piston 3 so that this kind of flushing is entirely satisfactory for considerable periods of time.

When it becomes desirable to replace the more or less contaminated flushing water with clean water, the cams 8 and 9 are rotated, manually or otherwise, to release the valves 17, 18 for automatic operation through the pressure differentials mentioned above. The valve 10 is then turned so as to connect the conduit 19 with the discharge opening 10*a* and to prevent flow to the pipe 7. Obviously when the piston moves toward the right in the drawing, the increasing pressure in the cylinder 1 opens the valve 18 and maintains the valve 17 closed, thereby allowing the water in the cylinder 1 to escape through the discharge opening 10*a*. When the piston 3 then moves toward the left in the drawing the valve 18 is automatically closed and the valve 17 is automatically opened due to the obvious pressure differentials created. This operation may be allowed to continue until the cylinder 1 has been thoroughly flushed and cleaned. Naturally, if reasonable water consumption were no object, the cams and cam shafts would be superfluous and the automatic operation of the check valves could be maintained continuously.

When the concrete conveying operation is to be interrupted for a sufficient period of time to present danger of setting of the concrete remaining in the discharge pipe 5, as for instance over night, the short pipe 16 is removed and the flange 7*a* is secured to the flange 5*a* to establish connection between the valve 10 and the pipe 5 through the pipe 7. At the same time, the valve 15 is returned to

the position shown in the drawing to shut off flow of concrete from the container 4 and the valve 10 is rotated through 180° to the position shown to establish connection between the conduit 19 and the pipe 7 while closing the discharge opening 10*a*. The cams 8, 9 are retained in position to permit automatic operation of the check valves 17, 18, as explained above. Obviously, the result will be that a new quantity of flush water from the tank 6 will be forced by the piston 3 through the pipe 7 to the discharge pipe 5 at every movement of the piston 3 toward the right in the drawing.

The present invention is not limited to the use of a pump actuated by a hydraulic drive 2 but any other type of drive can be used.

Although I have shown one embodiment of the present invention, it is to be understood that the same was merely for the purpose of illustration and that changes and modifications may readily be made therein by those skilled in the art, without departing from the spirit and scope of the invention.

What I claim is:

1. A device for conveying viscous materials such as concrete, mortar and the like, comprising a pump having a cylinder and a reciprocable piston therein, a supply container for the material to be conveyed connected with one end of said cylinder, a discharge pipe connected to said end of said cylinder, valve means at the junction of said supply container, cylinder, and discharge pipe adapted to selectively connect said cylinder with said supply container and with said discharge pipe, means for reciprocating said piston, a wash water container in communication with the other end of said cylinder for flushing one face of said piston and the inside of said cylinder, a pressure pipe connected with one of its ends to said other end of said cylinder, the other end of said pressure pipe being adapted to be connected to said discharge pipe upon disconnection of said discharge pipe from the pump, a check valve between said wash water container and said cylinder opening towards said cylinder, and another check valve between said cylinder and said discharge pipe for permitting the flow of said wash water under pressure into said pressure pipe and into said discharge pipe for emptying and cleaning of said discharge pipe.

2. A device for conveying viscous materials such as concrete, mortar and the like, comprising a pump having a cylinder and a reciprocable piston therein, a supply container for the material to be conveyed connected with one end of said cylinder, a discharge pipe connected to said end of said cylinder for conveying said material, valve means at the junction of said supply container, cylinder, and discharge pipe adapted to selectively connect said cylinder with said supply container and with said discharge pipe, means for reciprocating said piston, a wash water container in communication with the other end of said cylinder for flushing one face of said piston and the inside of said cylinder, a pressure pipe connected with one of its ends to the other end of said cylinder, the other end of said pressure pipe being adapted to be connected to said discharge pipe upon disconnection of said discharge pipe from the pump, a first check valve disposed between said wash water container and said cylinder, means for holding said first check valve in open position during the operation of the device for delivering said material, and a second check valve disposed between said cylinder and said discharge pipe for permitting the flow of said wash water under pressure into said pressure pipe and into said discharge pipe for emptying and cleaning said discharge pipe.

3. A device for conveying viscous materials, such as concrete, mortar and the like according to claim 2, including means for maintaining said second check valve closed during the operation of said device for delivering said material.

4. A device for conveying viscous materials, such as concrete, mortar and the like, comprising a pump with a cylinder having an associated supply container for the material to be conveyed and opening towards one end of said cylinder, a piston reciprocable in said cylinder to draw a charge from said supply container and to deliver it to a discharge pipe connected to said pump, valve means at the junction of said supply container, cylinder, and discharge pipe adapted to selectively connect said cylinder with said supply container and with said discharge pipe, the face of the piston nearest said end of the cylinder being in contact with said material to be delivered, a wash water container opening towards the other end of said cylinder so that said cylinder and the adjacent face of said piston are flushed with water during the operation of said device for delivering said material, an outlet at said other end of said cylinder, a pressure pipe for receiving the wash water from said outlet and to supply such water to the discharge pipe during emptying and flushing of said discharge pipe, means for controlling the flow of wash water from said wash water container into said cylinder, means for controlling the flow of wash water from the cylinder to said discharge pipe, and means for rendering said last mentioned control means inoperative during the operation of the device for delivering said material.

5. A device for conveying viscous materials such as concrete, mortar and the like according to claim 2, including a three-way valve disposed between said cylinder and said pressure pipe, and an outlet for the wash water connected to said three-way valve.

6. In a device for conveying viscous material, such as concrete, mortar, and the like from a supply container into a discharge pipe by first sucking a quantity of said viscous material from said supply container into a cylinder by means of a power driven piston reciprocably mounted in said cylinder and then shifting first valve means connecting said supply container with said cylinder so as to shut off said connection and open a connection between said cylinder and said discharge pipe through which said piston during its return stroke forces said quantity of viscous material towards and into said discharge pipe, a flush tank connected with said cylinder at the opposite end thereof from said valve means, a first check valve separating said flush tank from said cylinder and adapted to open at a predetermined pressure difference between said flush tank and said cylinder, an outlet conduit connected with said cylinder at the same end thereof as said flush tank and having a discharge opening therein, a second check valve in said outlet conduit adapted to be opened by a pressure difference between said cylinder and said discharge opening which is so selected as to cause said second check valve to open substantially at the same time as said first check valve closes, and vice versa, a pipe section removably secured in said discharge pipe, a flush pipe secured with one end thereof to said outlet conduit and adapted to be connected with its other end to said discharge pipe upon removal of said removable pipe section, and second valve means in said conduit selectively operable to establish communication between said outlet conduit and said flush pipe while closing said discharge opening in said outlet conduit, and to shut off said communication while opening said discharge opening.

7. A device as set forth in claim 6, including first means associated with said first check valve for forcibly maintaining said first check valve in open position, and second means associated with said second check valve for forcibly maintaining said second check valve in closed position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,060,409	Ball	Nov. 10, 1936
2,093,970	Longenecker	Sept. 21, 1937
2,667,280	Lane	Jan. 26, 1954
2,708,140	Reed	May 10, 1955