A permeable diaphragm, such as a heavy canvas, is mounted in the pump housing by anchoring the periphery thereof. The diaphragm is anchored to the piston by washers. A piston is axially anchored to one end of the piston rod and the diaphragm is anchored to the piston by a bushing. The outer periphery of the piston is beveled to reduce wear on the diaphragm.

On the small end of the housing member is the tubular extension into which the piston rod extends, being supported by the bushing. On the extended end of the rod is the switch actuator and a similar actuator is mounted on the piston rod adjacent the opposite end. A sliding shaft, mounted in the extension, and having the notch in which the toggle lever of the switch is mounted, is positioned to make contact with the respective actuators at the opposite ends of the stroke of the piston, to reverse the direction of flow of the power fluid. A conduit extends into the housing member at one end, and its outer end is mounted on the flow control valve. The switch is pneumatically connected to the valve actuator and a source of power, such as an air compressor (not shown) has a positive and negative conduit connection into the flow control valve, and a discharge port provides a vent for the negative stroke of the pump.

When the pump is activated, the power fluid will be pumped through the positive conduit connection into the housing member, forcing the piston and diaphragm outwardly, exerting a thrust on the contents of the housing, compressing the contents and opening the valve to discharge the material into the conduit. The diaphragm being permeable, air will flow through the diaphragm, and will aid in pushing the material into the conduit, and will at the same time, maintain the diaphragm free of any granular material at the termination of each power stroke. Upon reaching the end of the power stroke, the actuator will contact the sliding shaft and move same with it until the toggle is closed. The control valve, in turn, will change the air flow in the housing from positive to negative, discharging the air drawn therefrom through the port, and drawing the piston and diaphragm in the opposite direction, permitting the valve to close and drawing the power. As the control valve, and another charge of material, the actuator continues to operate, the sliding shaft and moves same with it until the toggle will have switched and the control valve will change the air flow in the housing from negative to positive, and the cycle is repeated.

While the foregoing is considered a preferred embodiment of the invention, it is by way of illustration only, the broad principle of the invention being defined by the appended claims.

What I claim is:

1. A permeable diaphragm pump, a pair of conical housing members, the wide ends of said members being in abutting relation, an inlet conduit and a discharge conduit leading into one of said members, spring loaded valves in said conduits, a tubular extension on the small end of the other of said housing members, a piston rod mounted in said housing and reciprocating in said extension, an air permeable flexible diaphragm having the periphery anchored between said abutting ends of said housing members, a piston on said piston rod and axially engaged with said diaphragm, and means for reciprocating said piston, opening the inlet valve and closing the discharge valve when the piston moves in one direction and opening the discharge valve and closing said inlet valve when the piston moves in the other direction.

2. In a permeable diaphragm pump, a pair of conical housing members, the wide ends of said members being in abutting relation, an inlet conduit and a discharge con-
duit leading into one of said members, said discharge conduit having an air-inlet for reaerating the material being pumped, spring loaded valves in said conduits, a tubular extension on the small end of the other of said housing members, a piston rod mounted in said housing and reciprocating in said extension, a flexible diaphragm having its outer periphery anchored between said abutting ends of said housing members, a piston on said piston rod and axially engaged with said diaphragm, and means for reciprocating said piston, opening the inlet valve and closing the discharge valve when the piston moves in one direction and opening the discharge valve and closing the inlet valve when the piston moves in the other direction.

References Cited

UNITED STATES PATENTS

1,005,098 10/1911 Van Berendonck 302—41 X
3,048,121 8/1962 Sheesley 103—152
3,070,243 12/1962 Lippke 302—36 X
3,202,464 8/1965 Patton 214—83.28 X
3,299,826 1/1967 Williams 103—152

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