No. 725,595. PATENTED APR. 14, 1903.

H. E. SCHRADER.

OSCILLATING PUMP.

APPLICATION FILED OCT. 22, 1900.

NO MODEL.

Fig. 2.

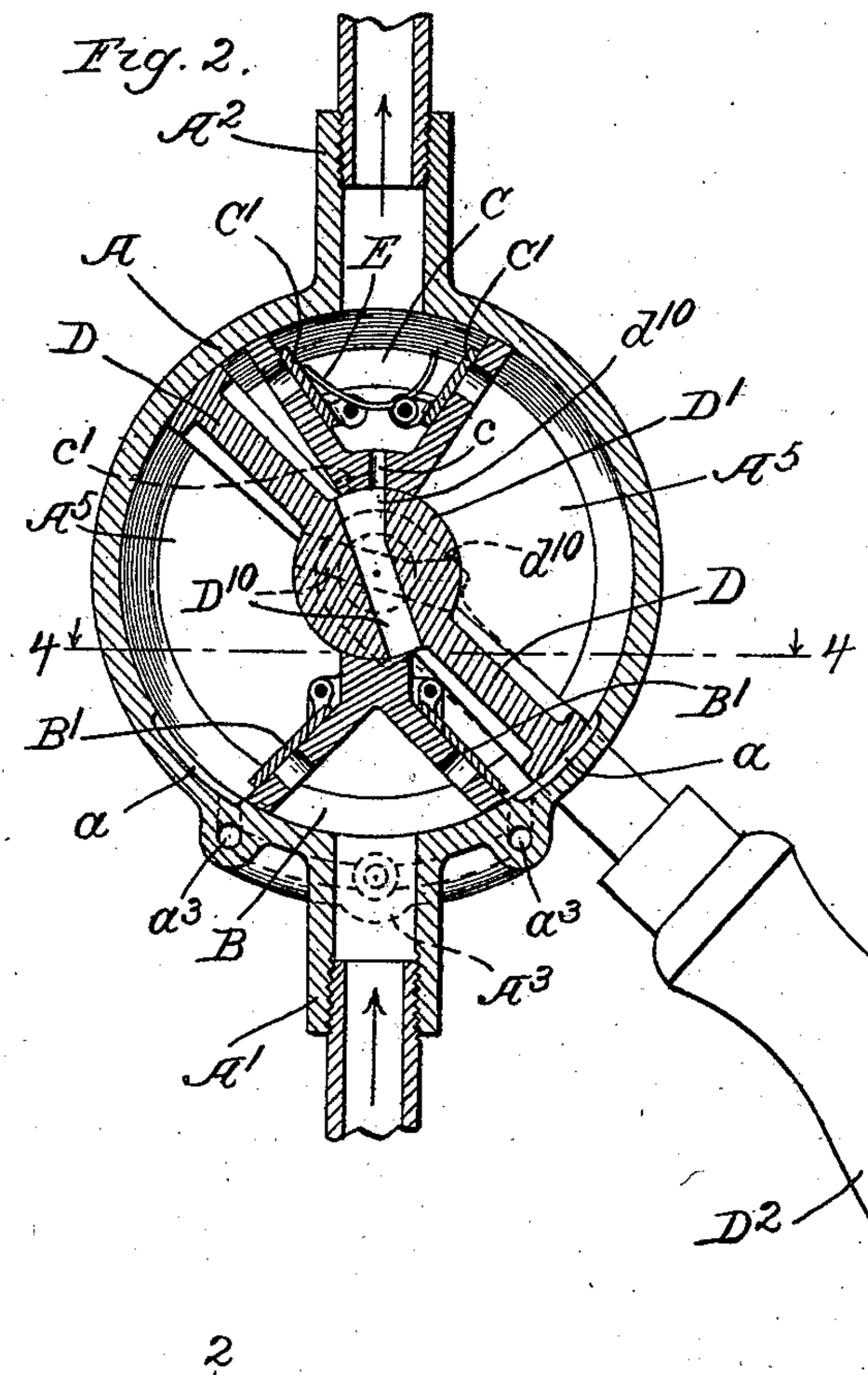


Fig. 4.

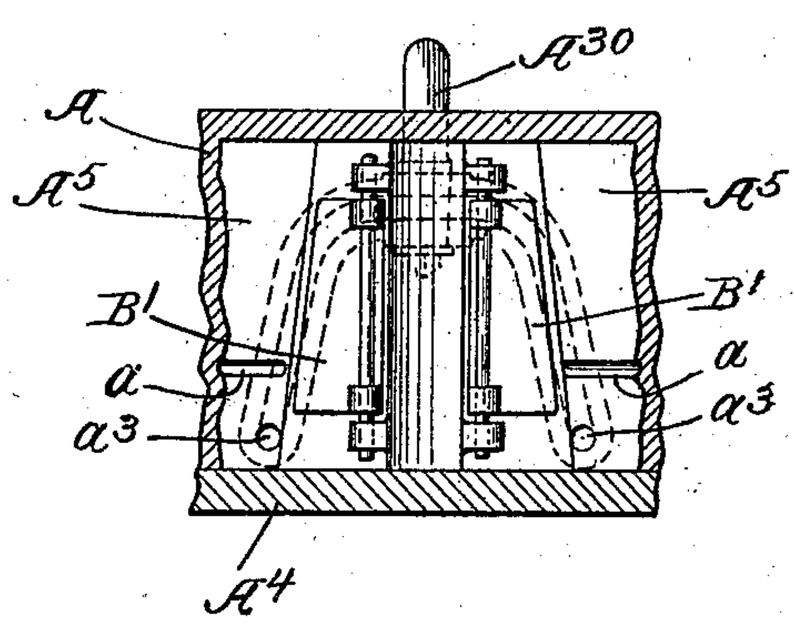


Fig. 3.

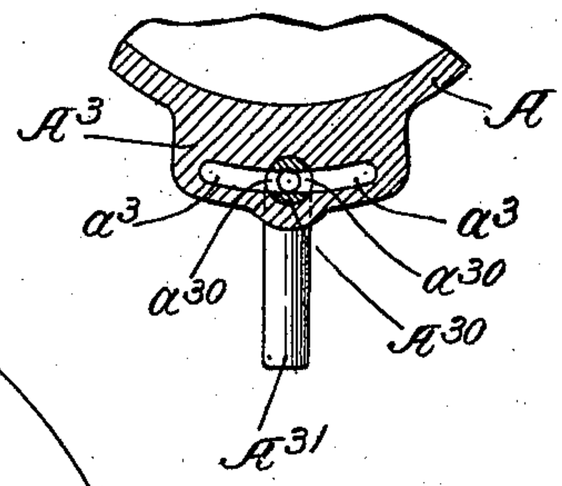


Fig. 1.

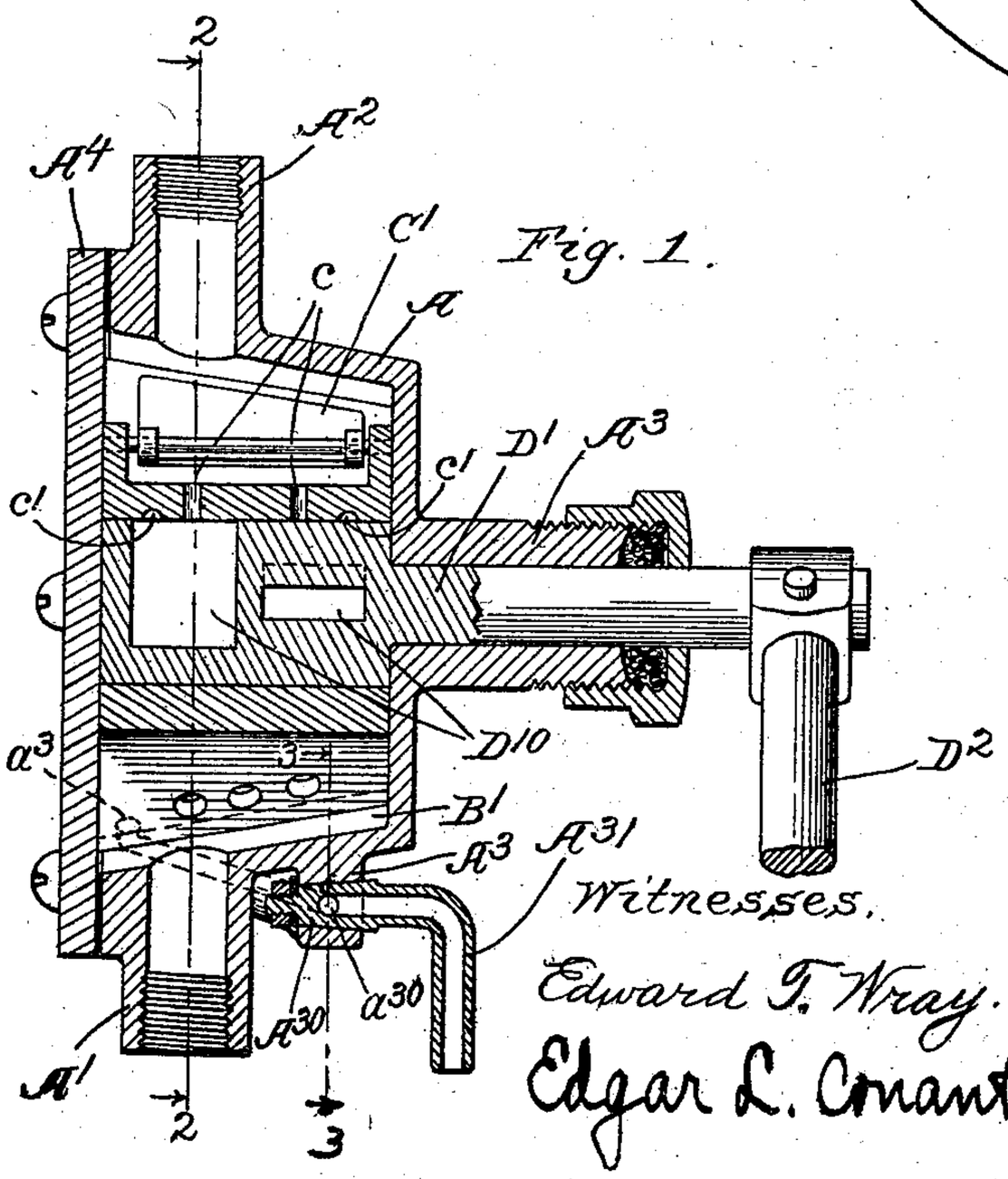
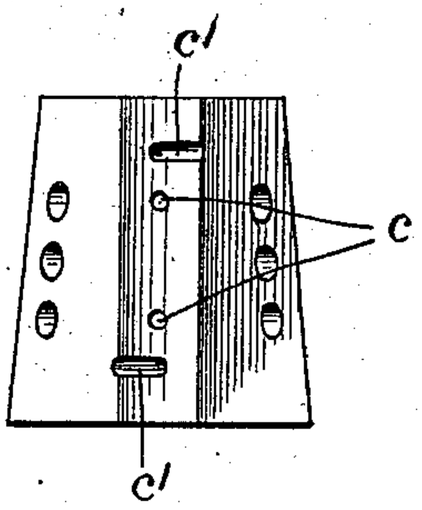


Fig. 5.



Witnesses.

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UNITED STATES PATENT OFFICE.

HUGO E. SCHRADER, OF CHICAGO, ILLINOIS.

OSCILLATING PUMP.

SPECIFICATION forming part of Letters Patent No. 725,595, dated April 14, 1903.

Application filed October 22, 1900. Serial No. 33,825. (No model.)

To all whom it may concern:

Be it known that I, HUGO E. SCHRADER, a citizen of the United States, and a resident of Chicago, in the State of Illinois, have invented certain new and useful Improvements in Oscillating Pumps, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an improved construction of oscillating pump with the specific purpose of affording better means than heretofore for draining the pump-chambers and connected pipes to prevent freezing.

In the drawings, Figure 1 is an axial section of my improved pump. Fig. 2 is a section at the line 2 2 on Fig. 1. Fig. 3 is a detail section at the line 3 3 on Fig. 1. Fig. 4 is a detail section at the line 4 4 on Fig. 2. Fig. 5 is an inverted plan of the outlet-chamber.

A is the pump casing or body. It is preferably in the form of a cone-frustum with the axis horizontal, having a boss A′ for an inlet connection at the lower side and a similar boss A^2 at the upper side for an outlet connection, a boss A^3 for shaft-bearing, and stuffing-box for the shaft of the oscillating diaphragm at the forward side, and a removable plate A^4 at the rear side.

B is an inlet-chamber, which is secured within the casing A at the lower side, spanning the inlet-opening through the boss A′. C is a similar outlet-chamber secured in the casing at the upper side directly opposite the inlet-chamber and spanning the outlet through the boss A^2. Spaces left between the inlet and outlet chambers within the casing constitute substantially sectoral piston-chambers A^5 A^5, oppositely located with respect to the axis.

D is the diaphragm-piston, having a shaft D′, which obtains seat in the facing inner walls or ends of the inlet and outlet chambers, respectively, and occupying the space between said chambers constitutes with them a complete partition between the two sectoral chambers A^5 A^5, cutting off or closing the communication which would otherwise exist between the said two chambers at the center. The diaphragm-piston D thus comprises two wings extending off from the shaft D′ in the two chambers A^5 A^5, respectively, and adapted to operate as pistons in said chambers as the shaft oscillates.

Inlet-valves B′ B′ are mounted upon the outer sides of the walls of the inlet-chamber B, and outlet-valves C′ C′ are similarly mounted upon the inner sides of the walls of the outlet-chamber C. All these valves may be relied upon to close by gravity; but between the outlet-valves there may be secured a spring E, which operates substantially as a lever, causing the opening of one of the inlet-valves to close the other if through any defective action it should not be closed by gravity or by the movement of the water.

Through the shaft D′ of the diaphragm-piston there are formed two passages D^{10} D^{10}, one toward one end and the other toward the opposite end of the shaft, within the casing, the distance between them being immaterial, provided only they are independent of each other. Each of these passages leads from one side to the other of the diaphragm and also from one to the other of the sectoral chambers A^5 A^5.

The operation of the pump as thus far described will be understood to be that when the diaphragm-piston is to be oscillated by means of the operating-lever handle D^2, attached to the shaft D′, movement in one direction causes water to be drawn in through one of the inlet-valves into one of the sectoral chambers A^5, and from that sectoral chamber through one of the passages D^{10} into the other sectoral chamber A^5, both chambers being thus filled by the same stroke, and upon the reverse movement the water will be forced out in advance of the secondarily-filled chamber A^5 through the outlet-chamber and from the primarily-filled chamber A^5 through the passage D^{10} into the secondarily-filled chamber, the contents of both chambers being thus discharged at this stroke through one of the outlet-valves, while at the same time the inlet-valve which was closed in the first stroke opens and water enters, filling both sectoral chambers A^5 behind the diaphragm-wings as the water is expelled from the chambers in advance of the same.

It will be understood that the ordinary use of this pump would leave all the chambers always full of water. To prevent freezing, it is necessary to provide for evacuating all the chambers at will. For this purpose I provide drain-ducts a^3 a^3, leading from the lower rear corner, which is the lowest point of each of the sectoral chambers A^5, immediately adjacent to the walls, respectively, of

the inlet-chamber out through the casing and through the drain-cock boss A^3, in which a drain-cock A^{30} is seated, both ducts a^3 opening through such seat, and the drain-cock having drain-ports a^{30} a^{30}, which register simultaneously with both the ducts a^3 a^3 at one position of the cock, while at another position both the ducts are closed. Preferably for convenience I make the drain-cock in the form of a hollow elbow and make the ports in such position that they register with the ducts a^3 when the lever-arm A^{31} thereof hangs down, so that it will serve as a discharge-port, while the horizontal position of the said lever-arm or port corresponds to a closing position of the drain-ports. Notwithstanding this provision for drainage the chambers of the pump would remain unemptied without some provision for venting them at the top, and besides this the outlet-chamber and discharge-pipes connected therewith would remain full without special provision for emptying them. To accomplish both purposes—that is, to vent the chambers A^5 and to drain the outlet-chamber and connecting pipes—I make in the bottom of the outlet-chamber small leak or drain ports c c, one near each end, and I widen the mouth at the upper end of the passages D^{10} D^{10} through the diaphragm-piston shaft, as seen at d^{10} d^{10}, so that at the limit of the oscillation of the piston in one direction one of said extended mouths d^{10} will lap at one end onto one of the drain-ports c, while at the other limit of the diaphragm's oscillation the similarly-extended mouth d^{10} of the other passage will lap upon the other drain-port c. This construction, it will be observed, creates at the limit of oscillation a communicating passage from the outlet-chamber down through the shaft into the portion of the chamber A^5 below the wing of the diaphragm-valve which is at that time at the lowest position, so that the water from the outlet-chamber and pipes connected therewith can by this passage get by the diaphragm and reach the drain-duct a^3 at one side. I also form in the wall of the casing A slight recesses a a in position to afford short and narrow by-passes around the diaphragm-piston at the lowest position of its wings, respectively, at each side, and at that position the water may escape from the chamber A^5 at the side at which the diaphragm is in its lowest position; but in order to permit such an escape a vent must still be provided for the chamber A^5, and this I effect by making slight notches or recesses c' c' in the lower wall of the outlet-chamber, which constitutes the upper seat of the shaft, one such notch being made at each edge, the notch at one edge being at a little distance from one of the drain-ports c, that at the other edge being a similar slight distance from the other drain-port c, the distance in each case being such that the mouths of the passages D^{10} D^{10}, respectively, when lapping the ports c c, respectively, will also lap the notch c' nearest such port, this lap being effected by the extension d^{10} of the mouth which operates to connect the port c with the notch or vent-port c', independently of the fact that it is a part of the passage D^{10}, since for this purpose it may be considered merely as a recess in the case of the shaft. With this construction it will be understood that at either limit of the oscillation of the diaphragm communication is made from the outlet-chamber and pipes connected therewith through one of the drain-ports c by way of the extension d^{10} of the mouth of the passage D^{10} to the vent-port c', thus admitting the pressure of the water in the outlet-chamber and pipes to the upper part of the chamber A^5, so that said chamber A^5 will be drained at the same time, either by the water from the outlet-chamber taking that course to reach the drain-port a^3, or, if the water takes a course through the passage D^{10}, then when the outlet-chamber and pipes are emptied atmospheric pressure being admitted to the upper part of the chamber A^5 to drain by way of the by-pass a and drain-port a^3. This description may be taken as applying to the chamber A^5 at the side at which the diaphragm is at its lowest position. The chamber at the other side will be vented through the other passage D^{10} as soon as the water begins to move out of the first chamber, followed by the air entering in the course indicated, so that all chambers and passages of the pump will be drained upon the opening of the drain-cock A^{30} when the diaphragm-piston is at either limit of its oscillation.

I claim—

1. A pump comprising a casing inclosing substantially sectoral piston-chambers formed about a common axis; a diaphragm-piston oscillating in the piston-chambers, having its shaft conaxial therewith, and closing communication between them; an inlet and an outlet chamber alternating with the piston-chambers about the axis; inlet and outlet valves mounted on the walls of the inlet and outlet chambers respectively; valve-controlled drainage-passages leading from substantially the lowest points of the piston-chambers respectively; vent-passages leading into the upper part of the piston-chambers respectively, and means by which the oscillation of the piston controls said vent-passages.

2. A pump comprising a casing inclosing two substantially sectoral chambers formed about a common axis; a diaphragm-piston oscillating in the piston-chambers, having its shaft conaxial therewith and closing communication between them; an inlet and an outlet chamber alternating with the piston-chambers about the axis; inlet and outlet valves on the walls of the inlet and outlet chambers respectively; drainage-passages leading from substantially the lowest points of the piston-chambers respectively; a valve for controlling discharge through such passages at will, and venting communications from the outlet-

chamber leading into the piston-chambers respectively, whereby said piston-chambers communicate with each other through the outlet-chamber when the latter is emptied, the piston-shaft being adapted to close such communication except at a selected position.

3. A pump, comprising a casing inclosing two substantially sectoral piston-chambers formed about a common axis and oppositely situated with respect thereto; a diaphragm-piston oscillating in the piston-chambers, having its shaft conaxial therewith and closing the communication between them; an inlet and an outlet chamber, alternating with the piston-chamber about the axis, and by their wall toward the axis affording seat for the diaphragm-shaft; inlet and outlet valves mounted on the walls of the inlet and outlet chambers respectively; the diaphragm-shaft having two passages leading respectively from the portions of one sectoral chamber at the other side of the diaphragm to the portions of the other sectoral chamber at the other side of the diaphragm; one of the sectoral chambers having a drainage-passage and a valve to control the same at will; the outlet-chamber wall having a leak-port leading through the shaft's seat, and the shaft having a passage which at one limit of the oscillation of the shaft laps on the leak-port, and at the other end opens into one of the piston-chambers.

4. A pump, comprising a casing inclosing two substantially sectoral chambers formed about a common axis, oppositely situated with respect thereto; a diaphragm-piston oscillating in the piston-chambers, having its shaft conaxial therewith and closing the communication between them; an inlet and an outlet chamber alternating with the piston-chambers about the axis, and by their walls toward the axis affording seat for the diaphragm and shaft; inlet and outlet valves mounted upon the walls of the inlet and outlet chambers respectively; a drainage-passage leading from one of the piston-chambers, and a valve for controlling the same at will; the outlet-chamber having a leak-port leading through the seat of the shaft; said shaft-seat having a recess at one edge, and the shaft having a recess which at one limit of the oscillation of the diaphragm laps at one end over the leak-port, and at the other end over said marginal recess.

5. A pump, comprising a casing inclosing two substantially sectoral piston-chambers formed about a common axis and oppositely situated with respect thereto; a diaphragm-piston oscillating in the piston-chambers, having its shaft conaxial therewith and closing communication between them; an inlet and an outlet chamber alternating with the piston-chambers about the axis and by their walls toward the axis affording seats for the diaphragm-shaft; inlet and outlet valves, mounted on the walls of the inlet and outlet chambers respectively; the diaphragm-shaft having two passages leading respectively from the portions of one of the chambers at one side of the diaphragm to the portions of the chamber at the opposite side; drainage-passages leading from one piston-chamber, and a valve for controlling the same at will; the outlet-chamber having a leak-port leading through the shaft's seat, one end of one of the shaft-passages being laterally extended to lap on said leak-port at one limit of the oscillation of the diaphragm.

6. A pump, comprising a casing inclosing two substantially sectoral piston-chambers formed about a common axis and oppositely situated with respect thereto; a diaphragm-piston oscillating in the piston-chambers, having its shaft conaxial therewith and closing the communication between them; an inlet and an outlet chamber alternating with the piston-chambers about the axis, and by their walls toward the axis affording seats for the diaphragm-shaft; inlet and outlet valves mounted on the walls of the inlet and outlet chambers respectively; passages through the shaft effecting communication of the portion of one sectoral chamber at one side of the diaphragm with the portion of the other sectoral chamber at the opposite side of the diaphragm, the outlet-chamber having a leak-port leading through the seat of the shaft, said seat having a recess, at one edge, one end of one of the shaft-passages being extended to lap both said leak-port and said marginal recess at one limit of the oscillation of the shaft.

7. A pump, comprising a casing inclosing two substantially sectoral piston-chambers formed about a common axis and oppositely situated with respect thereto; a diaphragm-piston oscillating in the piston-chambers having its shaft conaxial therewith and closing communication between them; an inlet and an outlet chamber alternating with the piston-chambers about the axis; inlet and outlet valves, mounted on the walls of said chambers respectively; drainage-passages leading from the piston-chambers respectively at their lowest points substantially; and means for controlling the discharge through such passages at will, the walls of the sectoral chambers having, at the lower side, a recess of sufficient length to extend from one side to the other of the diaphragm-piston when it is at its limit of oscillation, and thereby constitute a by-pass communication from the portion of the chamber above to the portion below the diaphragm, effecting connection with the drain-passage.

In testimony whereof I have hereunto set my hand, at Chicago, Illinois, in the presence of two witnesses, this 13th day of October, A. D. 1900.

HUGO E. SCHRADER.

In presence of—
EDWARD T. WRAY,
EDGAR L. CONANT.