

May 13, 1924.

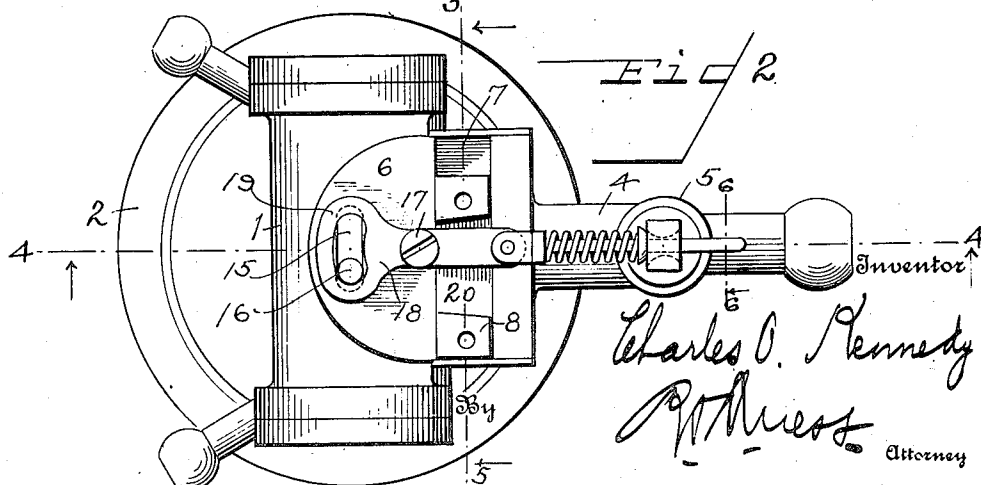
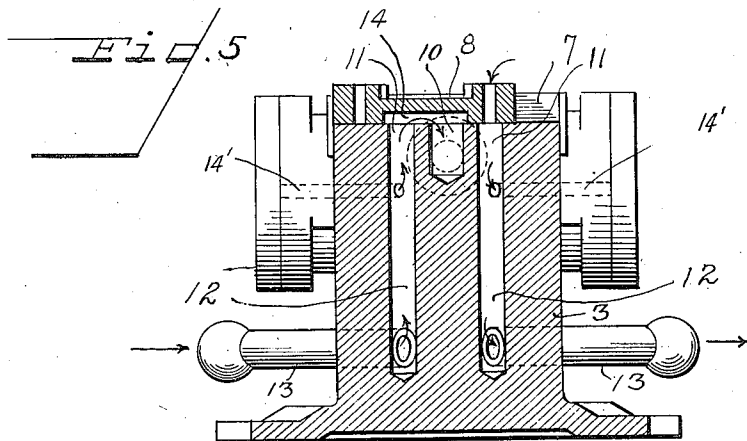
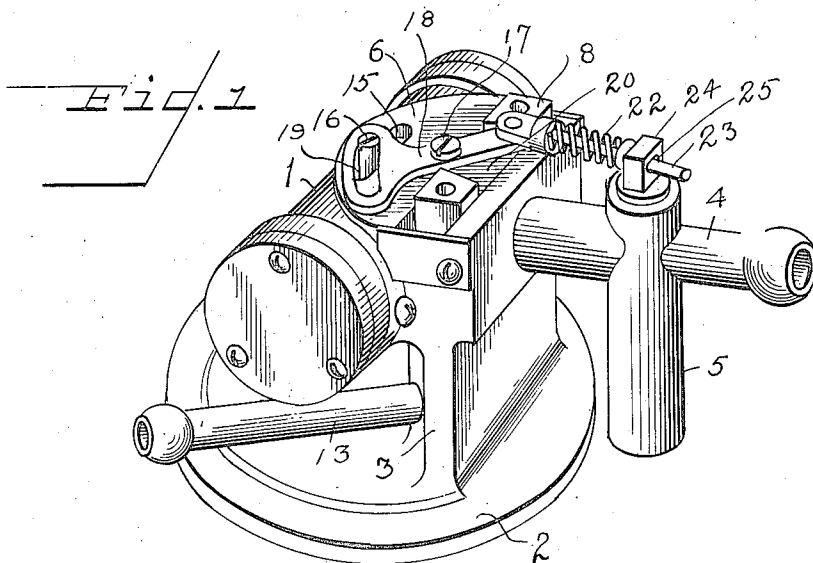
1,493,781

C. O. KENNEDY

PULSATOR FOR MILKING MACHINES

Filed Jan. 3, 1919

2 Sheets-Sheet 1



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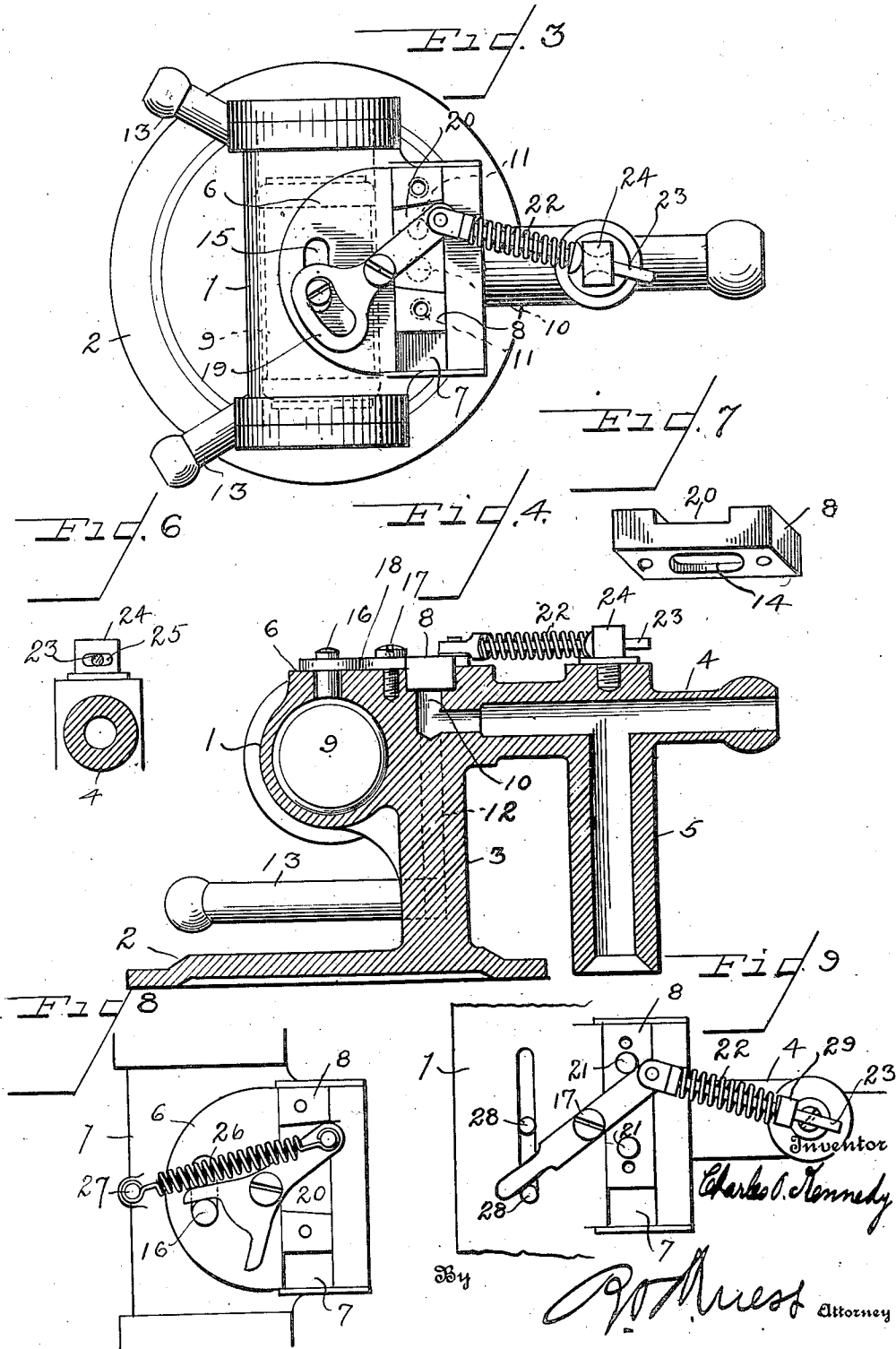
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2 Sheets-Sheet 2



Patented May 13, 1924.

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UNITED STATES PATENT OFFICE.

CHARLES O. KENNEDY, OF CELINA, OHIO.

PULSATOR FOR MILKING MACHINES.

Application filed January 3, 1919. Serial No. 269,421.

To all whom it may concern:

Be it known that I, CHARLES O. KENNEDY, a citizen of the United States, residing at Celina, in the county of Mercer and State of Ohio, have invented certain new and useful Improvements in Pulsators for Milking Machines, of which the following is a specification.

My invention relates to improvements in milking apparatus and more particularly to pulsators therefor. It is to be understood however that the mechanism is not limited to use in connection with milking apparatus, but may be used in other connections and associations where intermittent variations of fluid pressure control, either suction or compression effect, are to be attained. Likewise it is understood that the lost motion valve tumbler mechanism may be applied to other mechanism than air operated pulsators.

The object of the invention is to simplify the structure as well as the means and mode of operation of such devices, whereby they are not only cheapened in construction, but are more efficient in operation, positive in action, economical in manufacture, automatic, and unlikely to get out of repair.

A further object of the invention is to provide an improved form of valve tumbler mechanism for transforming the slow initial movement of the actuating piston into a snap action of the valve.

A further object is to provide a simple compact construction in which a single valve is utilized as pulsator and control valve for governing the fluid action on the teat-cups and on the actuating piston.

With the above primary and other incidental objects in view as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation, or their equivalents, as hereinafter described and set forth in the claims.

Referring to the drawings, Fig. 1 is a perspective view of an assembled pulsator embodying the invention forming the subject matter hereof. Fig. 2 is a top plan view thereof showing the tumbler mechanism for the valve at approximately the moment of reversal, the prime actuator, i. e. the piston, at almost the limit of its stroke and the spring actuated toggle in a dead center position, from which position the final move-

ment of the prime actuator will effect a snap movement of the operator and valve to reverse position. Fig. 3 is a similar view showing such parts after the snap movement of the operating lever and valve has taken place. Fig. 4 is a transverse sectional view on line 4-4 of Fig. 2. Fig. 5 is a sectional detail view on line 5-5 of Fig. 2. Fig. 6 is a detail view on line 6-6 of Fig. 2 showing the guide stud for the plunger which carries the actuating spring. Fig. 7 is a detail perspective view of the valve. Fig. 8 is a detail view of a modification involving a bifurcated operating lever in lieu of the slotted form disclosed in Figs. 2 and 3, and also showing a tensioned retractile spring in lieu of the compression spring shown in preceding figures, it being understood that the spring or the form of operating lever may be independently substituted for like elements in the other figures. Fig. 9 is a detail plan view of further modifications in which the operating lever comprises a finger or arm alternately engaged by spaced pins or studs carried by the piston or prime mover, and the valve is shown provided with spaced pins alternately engaged by the operating lever, in lieu of the shouldered recess shown in preceding figures. It is to be likewise understood that either of these modified features may be independently substituted for corresponding constructions in the other views.

Like parts are indicated by similar characters of reference throughout the several views.

In constructing the device there is employed a main frame having embodied therein a cylinder 1 arranged in horizontal position and supported upon a base 2 by an upright or standard 3. Projecting laterally from the cylinder 1 is the main suction conduit 4 having a pendant branch conduit 5 adapted to communicate with the interior of the milk pail or receiver upon the cover of which the device is designed to be mounted.

The top of the cylinder and adjacent portion of the main frame is flattened to form a table or deck 6 in which is formed a longitudinal channel or recess 7 forming a valve seat for a reciprocatory valve 8. Whereas it has heretofore been customary to employ separate valves governing the action of the fluid pressure upon the prime mover and the flow of actuating fluid to

and from the teat cups of the milking apparatus or other associated mechanism, in the present instance the reciprocatory valve 8 is made to perform both of these functions.

6 Located within the cylinder 1 is a reciprocatory piston 9, shown in dotted lines in Fig. 3 and herein referred to as the prime mover. The piston 9 is free within the cylinder and is actuated either by exhausting the air from one end of the cylinder and admitting air at atmospheric pressure to the opposite end of the cylinder, or by supplying air under compression to one end of the cylinder and opening the other end to atmosphere, according to whether the device is being operated under a vacuum or compression system.

To enable the single valve 8 to perform the double function of governing the prime mover 9 and controlling the fluid pressure operated associated mechanism, the valve seat within the recess 7 is provided with a central exhaust port 10 communicating with the passage of the main suction conduit 4 while on either side of the exhaust port 10 are ports 11 communicating with vertical passages or conduits 12 in the upright or standard 3 of the main frame. The passages 12 communicate at their lower ends with lateral conduits or nipples 13 extending divergently intermediate the base 2 and cylinder 1 of the main frame. The actuating media conduits or tubes (not shown in the drawing) leading to the associated pressure operated teat cups or other mechanism are connected to and form continuations of the conduits or nipples 13. The valve 8 is formed with a pocket or recess 14 in its under side which, when the valve is at the limit of its stroke in either direction is adapted to connect one of the ports 11 and corresponding conduit 12 with the exhaust conduit port 10 as shown in Fig. 5. At the same time the valve 8 uncovers the opposite port 11, admitting air under normal or atmospheric pressure through such port 11, passage 12 and conduit 13. Thus the devices of whatever character, which may be connected with the conduits 13 are alternately exhausted and supplied with actuating fluid, by the shifting to and fro of the valve 8. To enable the control of the piston 9 by the same movement of the valve 8, there are provided branch conduits or passages 14' leading from the passages or conduits 12 to the opposite ends of the cylinder 1. The arrangement is such that the exhaustion of one of the passages 12 and conduit 13, likewise exhausts the corresponding end of the cylinder 1 through the branch conduit 14', while air is admitted to the opposite end of the cylinder to actuate the piston or prime mover through the uncovered port 11 passage 12 and passage 14' connected therewith. The piston or prime mover is thus alternated to

and fro by air pressure in unison with the reversal of the valve by which the actuating fluid is directed first to one end and then to the opposite end of the cylinder.

To effect the alternation or reversal of the valve, a valve tumbler mechanism is provided by which the slow initiating movement of the piston or prime mover is translated into a snap action of the valve as the piston approaches the limit of its stroke in either direction. To this end there is provided in the top of the cylinder 1 a slot 15 through which projects a pin or stud 16 carried by the piston. Pivoted at 17 on the deck or table of the device is an oscillatory operating lever 18 having a slotted head 19, into the slot of which the stud or pin 16 also extends. The slot in said head 19 is of slightly less length than that of the path of travel of the pin 16. The construction is such that the operating lever is moved in unison with the piston by the engagement of the stud or pin 16 with one end of the slot of the head 19 until the pin 16 approaches the limit of its movement, beyond which the operating lever is capable of further movement independent of the piston and pin 16 the extent of which is determined by the length of the slot in the head 19. As shown in Figs. 1, 2 and 3 the opposite end of the operating lever is engaged within a recess 20 in the upper face of the valve 8. In Fig. 9 two pins 21 carried by the valve perform the same functions as the shouldered recess 20. The shoulders of the recess 20 or the pins 21 as the case may be are so located in relation one with the other that the operating lever is permitted its full degree of movement under the influence of the piston between said engaging points. As shown in Fig. 2 sufficient clearance is provided to insure the nonengagement of the operating lever and the shoulder or pin of the valve engaged thereby until the operating lever has passed the central position and is operating through its snap movement independent of the piston and beyond the position to which it has been moved by the action of the piston. This final snap movement is effected by a spring 22 which in Figures 1, 2 and 3 is shown as a compression spring coiled about a rod or plunger 23, pivoted at one end to the valve engaging end of the operating lever 18, the opposite end of which plays to and fro through a guide or keeper 24. The guide 24 has been shown as a stud mounted on top of the main suction conduit 4 and provided with a transverse flared slot or opening 25 through which the rod or plunger 23 reciprocates with a swinging or oscillatory movement. The spring plunger 23 and the valve actuating arm of the operating lever form a toggle like arrangement which is oscillated to and fro past dead center position. The movement of the operating lever under the influence of

the prime mover or piston to a dead center position places the spring 22 under compression. A slight additional movement of the piston carries the lever beyond dead center
 5 whereupon the lever is instantly actuated by the spring 22 independent of the piston, and carries with it the valve 8 to its opposite position, thereby effecting the reversal of the piston by directing the air pressure to the
 10 opposite end of the cylinder.

The expansion of the spring 22 firmly holds the valve 8 in its operated position thus preventing rebound until the piston begins its return movement, after which the
 15 valve is held by the preponderance of external atmospheric pressure until again reversed when the piston has approached the opposite limit of its stroke. As will be noted by reference to Fig. 2 the operating lever is
 20 well started upon its snap action under the influence of the spring before picking up the valve by engaging the shoulder of the recess 20 or the pin 21 as the construction may be. This insures a quick full stroke of the valve
 25 without any preliminary partial movement. The valve tumbler mechanism is thus reduced to a minimum number of operating parts, and the lost motion connections between the operating lever and the valve and
 30 that between the piston and lever, insures a quick acting construction. During the initial movement of the operating lever it moves independent of the valve 8 but in unison with the piston 9, while during its
 35 final movement the valve moves in unison with the operating lever while the latter moves independent of the piston.

In Fig. 8 there is shown a modified application of the actuating spring, in which
 40 a retractile spring 26 is connected at one end to the valve engaging end of the lever 18 and at its opposite end to a fixed stud 27. The spring is tensioned by the movement of the lever to a dead center position, and by
 45 its retraction serves to oscillate the lever in either direction from such position. In Fig. 9 the end of the lever is alternately engaged by studs or pins 28 carried in spaced relation by the piston. One of the pins 28 en-
 50 gages the lever and moves it with the piston movement to a dead center position or slightly beyond, after which the lever is moved away from and independent of the pin 28 by the actuating spring. Upon the
 55 return stroke the lever is engaged and operated by the second of said pins. These pins are spaced apart sufficiently to permit the independent movement of the lever. In
 60 lieu of a transversely slotted guide or keeper 24, such guide may be swiveled and so capable of oscillatory movement with the spring plunger as shown in Fig. 9 at 29.

From the above description it will be
 65 apparent that there is thus provided a device of the character described, possessing

the particular features of advantage before enumerated as desirable, but which obviously, is susceptible of modification in its form, proportions, detail construction, and arrangement of parts, without departing
 70 from the principle involved or sacrificing any of its advantages.

While, to comply with the statute the invention has been described in language more or less specific as to certain structural fea-
 75 tures, it is to be understood that the invention is not limited to the specific details shown, but that the means and mechanism herein disclosed comprises but one of several modes of putting the invention into
 80 effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention I 85 claim—

1. In a pulsator mechanism of the character described, the combination with independent conduits through which fluid pressure pulsations are transmitted to an associated mechanism, and a fluid pressure operated prime mover, of a single set of supply and exhaust ports for the fluid pressure common to the said transmission conduits and the pressure operated prime mover, and single valve member controlling said common ports to govern the action of the fluid pressure pulsations through said conduit and to the prime mover, and means engageable alternately with the valve and prime mover and movable independent of each for alternating said valve by the action of the prime mover. 90

2. In a pulsator mechanism of the character described, the combination with an associated mechanism to which fluid pressure pulsations are transmitted, of a fluid pressure operated prime mover, a single set of inlet and exhaust ports, branched passages leading from each of said ports one of the branch passages communicating with each port leading to the associated mechanism independent of the prime mover, the other branch passage communicating with each port, leading to the prime mover independent of the associated mechanism, and a movable valve member controlling the single set of ports and actuated in accordance with the movement of said prime mover. 105

3. In a pulsator mechanism of the character described, a cylinder, a reciprocatory piston therein actuated by variations of fluid pressure, a pair of independent conduits through which intermittent fluid pressure pulsations are transmitted to an associated mechanism, branch passages from said conduits to the opposite ends of the cylinder, a single slidable plate-like valve member governing the action of the fluid pressure through said conduits and branch pas- 110
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sages, and means for actuating the valve by the movement of the piston.

4. In a pulsator mechanism of the character described, a fluid pressure operated reciprocatory prime mover, a valve controlling the action of the fluid pressure upon said reciprocatory prime mover, a reciprocatory valve moving in parallel spaced relation with the prime mover operating member pivoted between its ends and capable of movement independent of the valve and prime mover and having operative engagement at its respective ends with both of said members whereby said operating member will move in unison with the prime mover and independent of said valve during its initial movement, and independent of said prime mover and in unison with the valve during its subsequent movement, and an actuating spring tensioned by the movement of the prime mover actuating the valve and operating member through said subsequent movement, substantially as specified.

5. In a pulsator mechanism of the character described, a reciprocatory prime mover, a reciprocatory valve member, said prime mover and valve being alternately movable in reverse directions in relation with the movement of each other, and in parallel paths of travel, an operating lever pivoted intermediate the prime mover and valve and capable of operative engagement with both said members, said operating lever being capable of limited movement independent of each of said members, and means for moving the operating lever independent of the prime mover to effect the movement of the valve substantially as specified.

6. A pulsator for milking apparatus and the like, wherein a fluid pressure actuated mechanism operates to alternately subject a pair of pulsation conduits to variations of fluid pressure, characterized by a single reversible valve simultaneously controlling the influence of the fluid pressure upon the pressure operated mechanism and the respective pulsation conduits, and means for automatically reversing said valve by the operation of the fluid actuated mechanism.

7. In a pulsator mechanism for milking apparatus and the like, the combination with exhaust means of a pair of independent pulsation conduits, a cylinder, a reciprocatory piston therein, the opposite ends of the cylinder being in communication with the respective pulsation conduits, and a single valve simultaneously connecting one end of the cylinder and one of the pulsation conduits with said exhaust means and the other end of the cylinder and pulsation conduit with atmosphere, and means to reverse the valve by the action of the piston.

8. In a pulsator mechanism for milking apparatus and the like, a fluid pressure actuated mechanism, a pair of independent

pulsation conduits alternately subjected to fluctuations of fluid pressure and a control valve and a single set of ports controlled thereby common to both the pressure actuated mechanism and to said pulsation conduits, and means for controlling said valve by the action of the fluid under pressure.

9. In a pulsator mechanism of the character described, a fluid pressure operated prime mover upon which the action of the fluid pressure is governed by the movement thereof, a pair of independent pulsation conduits, a reciprocatory pulsator valve controlling the pulsation conduits and moving parallel to the prime mover, and a coupling member having a lost motion connection with both the prime mover and the valve member, and means to effect the movement of the coupling member independent of the prime mover to actuate the valve member.

10. In a pulsator mechanism, a fluid pressure operated prime mover, a pair of independent pulsation conduits alternately subjected to fluctuations of fluid pressure, a pulsator valve controlling the pulsation conduits, and an operating lever having alternating operative engagement at its ends respectively with the prime mover and said pulsator valve, whereby the operating lever initially moves in unison with the prime mover and independent of the pulsator valve and subsequently moves independent of the prime mover and in unison with the valve, and means for actuating the operating lever through its subsequent movement, substantially as specified.

11. In a pulsator mechanism for milking apparatus and the like, a cylinder, a piston therein, a pair of independent pulsation conduits, subjected to fluctuations of fluid pressure, a valve alternately opening and closing said pulsation conduits, and branch passages leading from the pulsation conduits to the opposite ends of the cylinder to actuate said piston to reverse the valve.

12. In a pulsator apparatus for milking machines and the like, wherein a pair of independent pulsation conduits are alternately subjected to fluctuations of fluid pressure by the operation of a fluid pressure actuated operating mechanism, characterized by a valve controlling a single set of ports common to both the pulsation conduits and the fluid pressure actuated operating mechanism and means to alternate the valve by the action of the fluid under pressure.

13. In a pulsator mechanism, a main frame comprising a base, a standard or upright carried thereby, a horizontally disposed cylinder carried by the standard, said standard having therein independent pulsation conduits communicating with opposite ends of said cylinder, a slidable plate-like pulsator valve upon the main frame controlling said independent pulsation con-

duits, a fluid pressure operated piston in said cylinder governed by the movement of said pulsator valve and an operative connection between said piston and valve, substantially as specified.

14. In a pulsator mechanism, a fluid pressure operated reciprocatory prime mover, a reciprocatory valve slidable parallel to said prime mover, valve operating means pivoted between its ends and having one end overlying the reciprocatory prime mover and having its opposite end overlying the reciprocatory valve, said means being disconnected from both the valve and prime mover but temporarily engageable first with one and then with the other whereby it is initially actuated by the prime mover independent of the valve and subsequently actuates the valve independent of the prime mover but in reverse direction to the direction of prior actuating movement of the prime mover.

15. In a pulsator mechanism, a fluid pressure operated reciprocatory prime mover, a plate like reciprocatory valve slidable parallel to the prime mover in spaced relation therewith, a lever pivoted between its ends and overlying the valve and prime mover and means borne by the valve and alternately engageable with the prime mover and the valve, but capable of oscillatory movement independent of each, whereby the lever is initially oscillated in unison with the movement of the prime mover independent of the valve and by further movement independent of the prime mover, subsequently shifts the valve in a direction opposite to the said movement of the prime mover.

16. In a pulsator mechanism, a fluid pressure operated reciprocatory prime mover, a reciprocatory valve lying adjacent to and alongside of the prime mover and slidable parallel thereto, and an actuating lever disconnected from both the prime mover and the valve and spaced points of opposite engagement of the lever with the prime mover and with the valve intermediate which

points of engagement the members and lever are free of each other, motion being intermittently transmitted from the prime mover to the lever and thence from the lever to the valve first in one direction and then in the other to independently actuate the valve in a direction opposite to the concurrent movement of the prime mover.

17. In a pulsator mechanism for milking machines and the like, a pair of pulsation conduits alternately subjected to fluctuations of fluid pressure, a pulsator valve controlling said conduits and a fluid pressure means for reversing said valve governed by the variations of fluid pressure within the pulsator conduits.

18. In a pulsator for milking apparatus and the like, a cylinder, a reciprocatory piston therein, a valve governing the admission of fluid under pressure alternately to the opposite ends of said cylinder, and independent pulsation conduits communicating with the opposite ends of the cylinder and subjected to like fluctuations of fluid pressure under control of said valve.

19. In a pulsator mechanism, a cylinder, a reciprocatory piston therein, a reciprocatory valve governing the admission of fluid under pressure alternately to opposite ends of the cylinder, a lever pivoted intermediate the piston and valve and having intermittent engagement with both a spring tensioned by the oscillation of said lever independent of the valve under the influence of the piston which by its reaction operates the lever to move the valve independent of the movement of the piston, and independent pulsation conduit alternately subjected to fluctuations of fluid pressure by the movement of the valve.

In testimony whereof, I have hereunto set my hand this 20 day of December, A. D. 1918.

CHARLES O. KENNEDY.

Witnesses:

B. H. MILLER,
J. P. RILEY.