

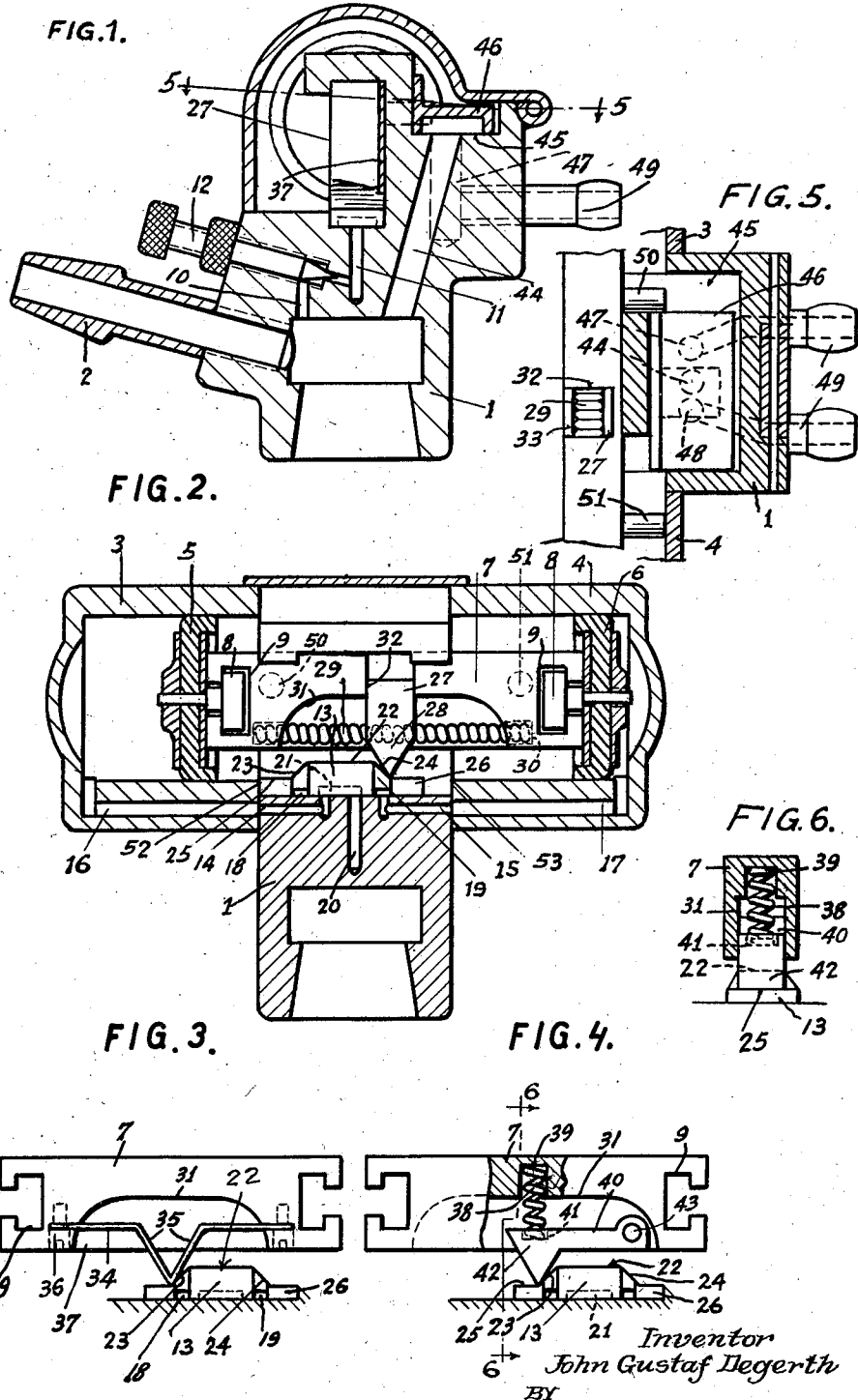
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PULSATOR FOR MILKING MACHINES

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PULSATOR FOR MILKING MACHINES

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This invention relates to improvements in pulsators for milking machines, and its objects are as follows:

First, to produce the pulsations of the pulsator valve by elastically operable means which is carried solely by and moves with a piston rod, said means automatically displacing the valve in the direction of movement opposite to that of the piston rod when the latter nears the end of a particular movement.

Second, to provide a reciprocable piston rod which comprises the sole carrier for the elastically operable means, the latter being adapted to glide over a level place on the valve and periodically engage certain declines in such a manner as to cause automatic displacement of the valve during the reciprocations of the piston rod.

Third, to make said elastically operable means in the form of a cam which, in at least one instance, comprises a pointed bolt slidably guided on the piston rod in such a manner as to be subject to the flexure of a spring which is mounted on the piston rod in a spanning position between the approximate extremities of the piston rod.

Fourth, to make the foregoing cam directly operable against the pulsator valve so as to eliminate all intermediary connections.

Fifth, to insure the advantage of extreme simplicity in the construction of the pulsator, which simplicity enables the pulsator to be easily taken to pieces and reassembled.

In the drawing:—

Figure 1 is a cross section of the pulsator.

Figure 2 is a longitudinal section thereof, parts being shown in elevation.

Figure 3 is a diagram illustrating a modification wherein a leaf spring is formed to comprise the elastically operable means.

Figure 4 is a second modification which mainly involves a change in form of the cam.

Figure 5 is a detail cross section taken approximately on the line 5—5 of Figure 1, particularly illustrating the liquid valve.

Figure 6 is a cross section taken on the line 6—6 of Figure 4.

Referring first to Figure 1, the pulsator block 1 is adapted to be placed on a milking pail. It has a nipple 2 with which a vacuum pipe is connectible. Carried by the pulsator block are two cylinders 3, 4 (Fig. 2) for the pistons 5, 6.

These two pistons are connected with each other by means of a piston rod 7. The pistons 5, 6 have heads 8 (T-shaped in Figure 2) which fit in correspondingly shaped slots 9 in the ends

of the piston rod in such a manner as to have ample room to move sidewise.

The action of the vacuum moves the pistons 5, 6 alternately toward the respective cylinders. The vacuum created at the nipple 2 can be traced through channels 10, 11 (Fig. 1) in which there is regulation by means of a screw or needle valve 12. The position of the needle valve regulates the speed of pulsation. A pulsator valve 13 controls the vacuum with respect to channels 14, 15 (Fig. 2), from which channels other channels 16, 17 lead to the chambers (left and right) behind the pistons 5, 6.

In the position shown in the drawing (Figs. 1 and 2) the effect of the vacuum will be felt in the channels 10, 11 (Fig. 1), channels 14, 16 (Fig. 2) and the chamber behind the piston 5. The piston and rod assemblage will be impelled toward the left end of the pulsator.

As soon as the assemblage gets near the left end position, the pulsator valve 13 will be moved to the right, whereupon the suction will be transferred from channels 10, 11 to channels 15, 17 (Fig. 2) and to the chamber at the right end of the piston 6. This will impel the assemblage toward the right and back to the position shown in Figure 2. There are holes or ports 18, 19 in the pulsator valve 13 (Fig. 2), one or the other of these connecting the respective channels 14, 15 and the companion cylinder chamber to atmosphere by means of a center inlet 20 when not under vacuum.

For this purpose the pulsator valve has a cross-over port 21. This valve is of a special shape: Its central body is fairly heavy as shown, there being a level place 22 on top. The longitudinal extremities of this level place end in declines 23, 24, and these merge into steps 25, 26 which, like the place 22, are level but occupy a plane lower than the place 22.

Reference has been made to elastically operable means for automatically shifting the valve 13. This means can be made according to any one of several forms in the drawing. In Figure 2 a bolt 27 has a point 28, made by a double bevel, which is adapted to glide across the level place 22 of the valve 13, down one or the other of the declines 23, 24 and onto the level steps 25, 26. The double bevel comprises bias cuts at the lower end of the bolt 27, acting as a cam so that a certain elastic factor will cause a quick movement of the pulsator 13 in a direction of movement opposite to that of the piston rod when the latter is almost at the end of its movement in a particular direction.

The so-called elastic factor comprises a coil spring 29 (Fig. 2). This is a resilient spring as springs usually are. It is a complete helix from end to end, and it occupies a spanning position 5 on the piston rod, the cam 27 being situated between its points of support in sockets 30 at the ends of a recess 31 in the side and bottom of the piston rod. These sockets constitute end mounts for the spring.

A guide slot 32 (Figs. 2 and 5) extends off from the recess 31 to slidably receive the bolt 27. The bolt has a slot 33 (Figs. 1 and 5) at the bottom of which the spring 29 is lodged. The tendency of the spring 29 is to stay straight in its spanning 15 position. When the bolt 27 rises by virtue of its point 28 riding up one or the other of the declines 23, 24, the spring will flex. It is this flexure and the normal tendency of the spring to remain straight that keeps the cam 27 (bolt) in perpetual contact with the top contour of the valve 13.

Figure 3 illustrates the first modification of the elastically operable means. Here a blade or leaf spring 34 has a mid formation 35 which is to be 25 identified as the equivalent of the cam 27. It is pointed and is movable by the inherent elasticity or flexibility of the leaf spring. The latter is mounted at 36 on the piston rod in a spanning position between the approximate extremities of the piston rod. The breadth of the spring 34 and cam formation 35 is sufficient to cause the inner side of these parts to slide against the wall 37 of the recess (the wall being plainly shown in Figure 1), therefore causing the cam 35 also to be 35 slidably guided.

In Figure 4 a coil spring 38, inserted at one end in a socket 39 leading off from the piston rod recess 31, bears down on a lever arm 40 which has a similar socket 41, although shallow, to receive it. The lever arm has a cam 42 which is to be identified as the equivalent of the cams 28, 35 in Figures 2 and 3. Like the latter it is also 40 slidable against the wall of the recess. The lever arm is pivoted at 43 at one end of the recess 31.

Reverting to the pulsator block 1, a channel 44 (Fig. 1) leads from a point of communication with the milk pail to a plane 45 on which a liquid valve 46 is slidable. This is a ported valve (Fig. 5) and it alternately connects each of two channels 47, 48 with the channel 44. The channels 47, 48 are connected with notches 49 which lead to the teat cups. The movement of the valve 46 is effected by the piston rod 7 by means of two studs 50, 51 carried thereby (Fig. 5). In Figure 55 2, 52, 53 are stops by which the movement of the pulsator valve 13 is limited.

From what has been stated it will be understood that the so-called elastically operable means is carried solely by and moves with the piston rod 7. Its contact with the pulsator valve 13 is immediate, and its function is to automatically displace that valve in directions opposite to the movement of the piston and rod assemblage when the latter nears the end of a stroke.

The pulsator works in the following way:—In the position shown in Figure 2, air drawn from the cylinder 3 through channels 16, 14, 11 and 10 causes the piston and rod assemblage to move toward the left. The elastically operable means yields in this manner. The spring 29 (Fig. 2) will flex as the cam 28 rides up the decline 24, and remains flexed as the point of the cam glides over the level place 22.

As the piston and rod assemblage nears the end of its leftward movement the cam point

reaches the decline 23. The reflex action of the spring displaces the pulsator valve 13 quickly toward the right by virtue of the cam action and in a direction of movement opposite to that of the assemblage. In the new position the valve 13 5 shifts reversely of the vacuum whereby the piston and rod assemblage will be drawn back to the position shown in Figure 2.

During the movement of the assemblage toward the left the stud 51 (Fig. 5) will engage and move 10 the liquid valve 46 to the left. Later on when the operation is reversed the stud 50 will move this valve toward the right. The operation of milking is thus carried on between the teat cups (not shown) and the interior of the pulsator 15 valve.

I claim:

1. In a pulsator for milking machines having a reciprocable piston and piston rod assemblage and a pulsator valve for controlling the exhaust- 20 tion of air from cylinders in which the piston works; elastically operable means carried by the piston rod in a spanning position between two mounts, said means including a cam, said valve having a contour coacting with the cam which is 25 held in constant contact with the contour by the elasticity of said means, said cam and contour causing reverse shifting of the valve in directions opposite to the assemblage during its reciprocations.

2. In a pulsator for milking machines having a reciprocable piston and piston rod assemblage and a pulsator valve for controlling the exhaust- 30 tion of air from cylinders in which the piston works; a spring and mounts for it on the piston 35 rod between which mounts the spring is sustained in a spanning position, a bolt and means by which it is slidably carried by the piston rod, said bolt being engaged by the spring for tension in one direction, and having a cam point, said valve hav- 40 ing a coacting contour, said contour comprising at least one decline and a level place traversible by the cam point during reciprocation of the assemblage.

3. In a pulsator for milking machines having 45 a reciprocable piston and piston rod assemblage and a pulsator valve for controlling the exhaustion of air from cylinders in which the piston works; a bolt and a guide slot in the piston rod in which the bolt is slidable, said bolt having a slot, 50 a spring occupying the bolt slot and bearing on an end thereof, and mounts between which the spring is sustained in a spanning position on the piston rod, said bolt having a cam point, and said valve having a contour with which said point is 55 held in contact by the spring, said contour including at least one decline traversible by the point during the reciprocations of the assemblage.

4. In a pulsator for milking machines having 60 a reciprocable piston and piston rod assemblage and a pulsator valve for controlling the exhaustion of air from cylinders in which the piston works; said piston rod having a recess providing at least one wall, and elastically operable means 65 working in the recess and being slidably guided by said wall, said means including a cam, said valve having a coacting contour with which the cam is held in constant contact, and said contour including at least one decline traversible by the cam during the reciprocations of the assemblage. 70

5. In a pulsator for milking machines having a reciprocable piston and piston rod assemblage and a pulsator valve for controlling the exhaust- 75 tion of air from cylinders in which the piston works; a leaf spring, mounts between which the

spring is sustained in a spanning position on the piston rod, and a cam on the spring, said valve having a contour with which the cam is constantly engaged by the resilience of the spring, said contour including at least one decline and a level place traversible by the cam during reciprocation of the assemblage.

6. A pulsator for milking machines comprising a reciprocable piston and a piston rod assemblage and a pulsator valve for controlling the exhaustion of air from cylinders in which the piston works, said piston rod having a recess one wall of which forms a guide, a cam, a lever

arm of which the cam is a part, means for so pivotally attaching the lever arm to the piston rod that the cam slidably engages said wall for guidance, and a spring mounted between the piston rod and lever arm so that it travels with the piston rod, said spring tending to press the cam away from the piston rod, said valve having a contour with which the cam is thus held in constant engagement, and said contour including at least one decline and level place traversible by the cam during the reciprocations of the assemblage.

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