

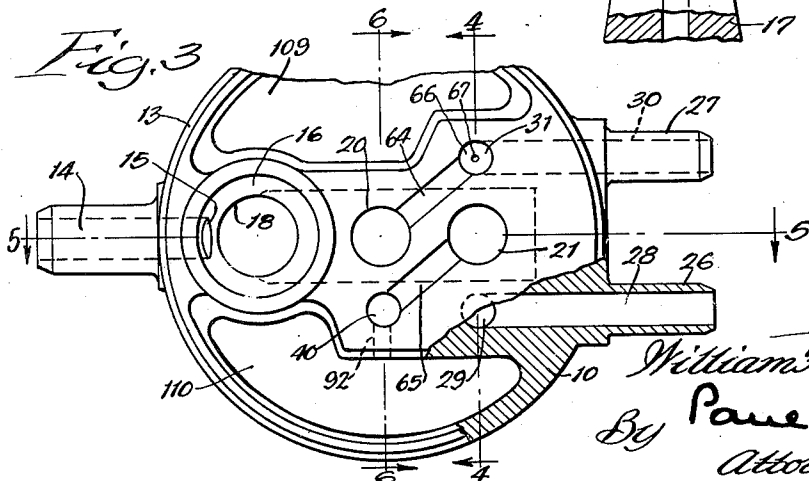
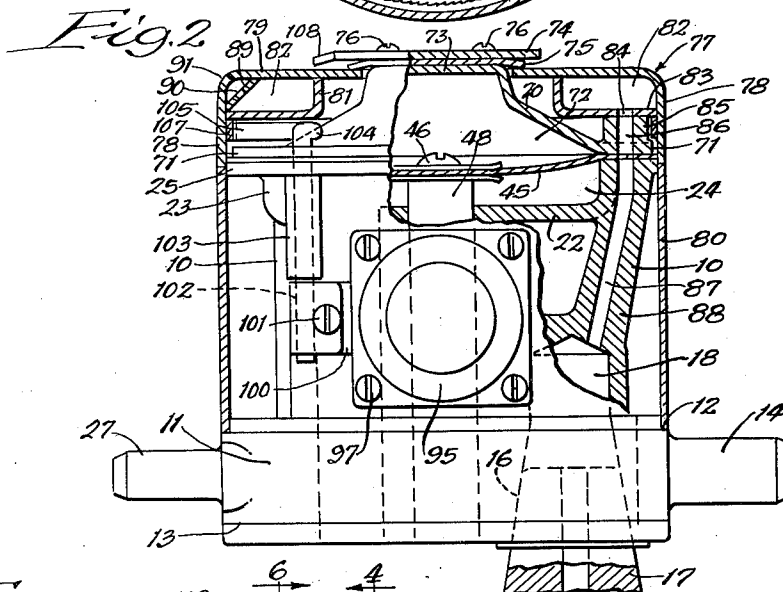
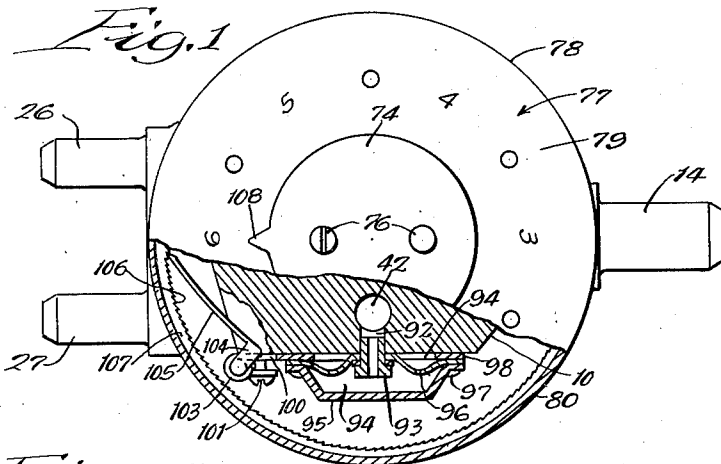
Aug. 30, 1949.

W. H. HARSTICK
MILKER PULSATOR TIMER

2,480,239

Filed Nov. 7, 1945

3 Sheets-Sheet 1



Inventor:
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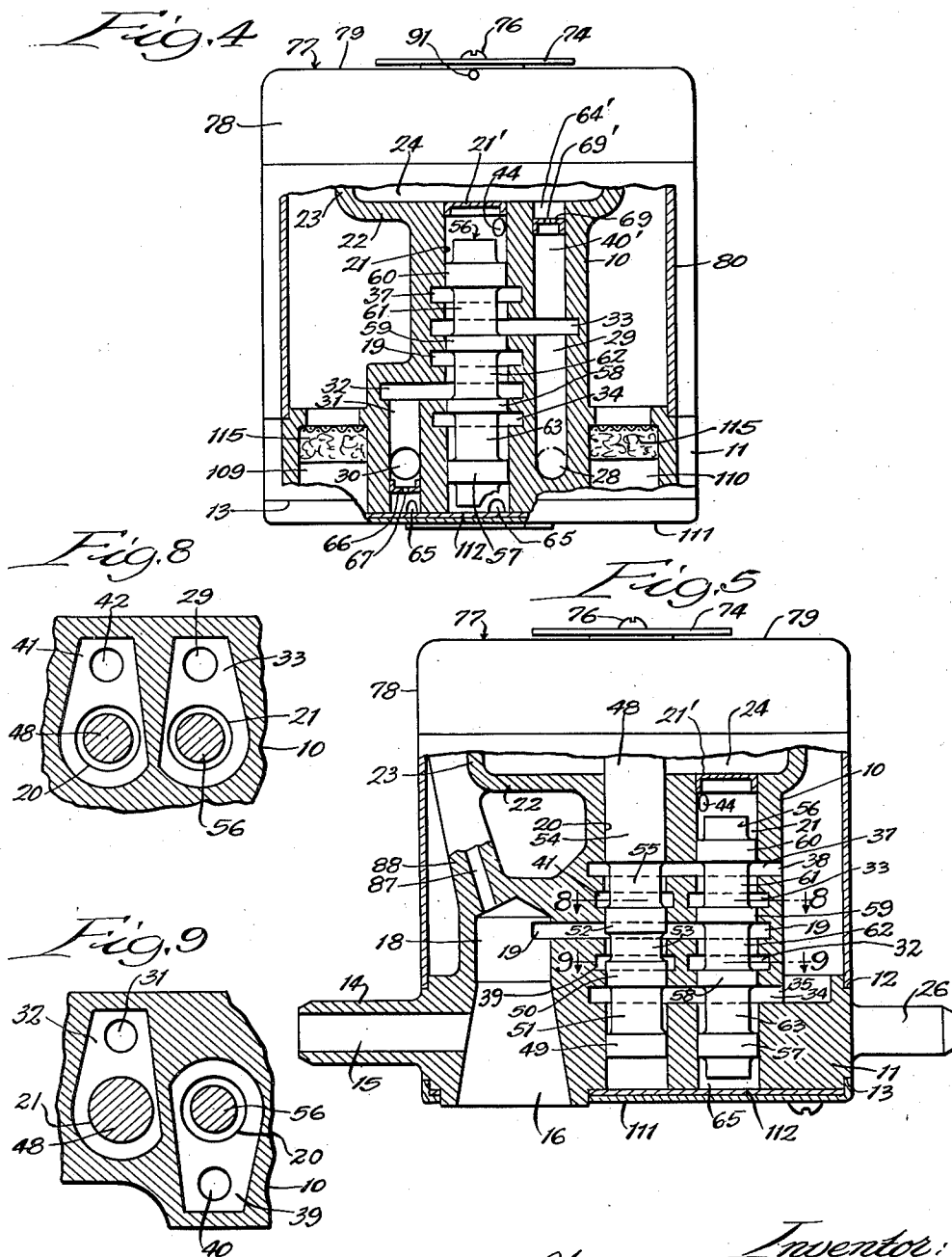
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3 Sheets-Sheet 2



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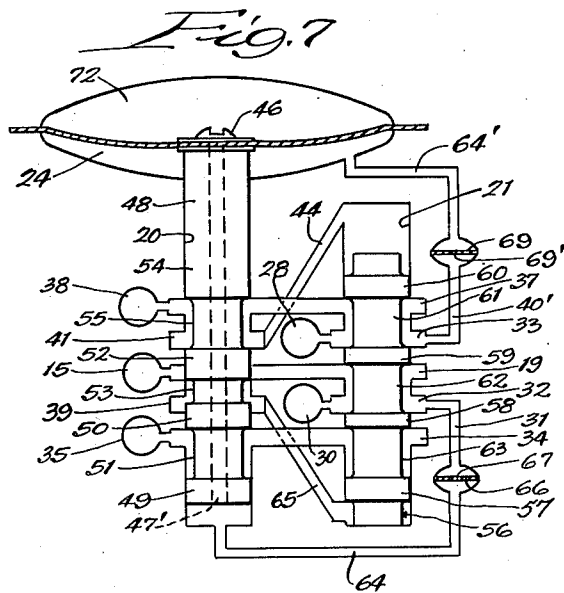
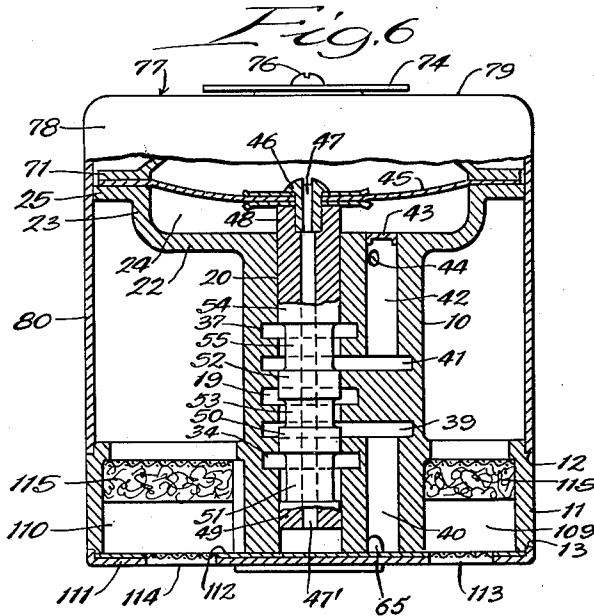
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,480,239

MILKER PULSATOR TIMER

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tion of New Jersey

Application November 7, 1945, Serial No. 627,197

14 Claims. (Cl. 31—58)

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This invention relates to a pulsator for milkers. More specifically, it relates to a particular type of slide-valve pulsator and to a timing device therefor. The pulsator of the present application operates generally according to the same principles utilized in the conventional pulsators now widely used for milking machines. The particular type disclosed in this application is similar in several respects to the pulsator shown in the Anderson Patent 1,113,942. In this type two reciprocating valve members are utilized, one being a free piston and the other being connected to and operated by a diaphragm.

A principal object of the present invention is to provide an improved pulsator of the sliding piston valve type.

Another principal object is to provide a timing device for a pulsator which gives an audible signal at the termination of a preselected time interval.

A subsidiary object is to provide a timing device for a pulsator which emits an audible signal without stopping or otherwise interfering with the operation of the pulsator.

Other objects will appear from the disclosure. According to the present invention, a single diaphragm is attached to the end of a piston type slide valve which in turn controls the application of different pressures to the ends of a second free piston slide valve. The entire pulsator is so constructed that there is a minimum of parts and so that manufacture may be facilitated.

To provide for the timing feature of the present invention and the emission of an audible signal at the expiration of the predetermined time interval, a rotatable element is provided with a ratchet mechanism operating by the same pulsations utilized in the milking operation. Power for said device is therefore furnished by the vacuum producing means which operates the pulsator. By a very simple mechanism the ratchet device operates the rotatable member, sufficiently small teeth being provided so that one complete cycle of the rotating member gives the maximum time interval required for any milking operation. Indexing members are provided whereby the rotatable member may set for any given time interval below the maximum, at the termination of which communication is made between the vacuum chamber in the pulsator body and the atmosphere, a sound-producing device being interposed whereby a whistle or a similar audible signal is produced.

In the drawings,

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Figure 1 is a plan view broken away in horizontal section to better illustrate the ratchet operating mechanism;

Figure 2 is a partial elevation with a portion of the casing broken away to better show the ratchet mechanism, and with a portion of the pulsator further broken away to show the internal structure thereof;

Figure 3 is a bottom view of the pulsator shown in Figure 2;

Figure 4 is a section taken on the line 4—4 of Figure 3;

Figure 5 is a section taken on the line 5—5 of Figure 3;

Figure 6 is a section taken on the line 6—6 of Figure 3;

Figure 7 is a diagrammatic view illustrating the operation of the pulsator shown in the previous figures;

Figure 8 is a section taken on the line 8—8 of Figure 5; and

Figure 9 is a section taken on line 9—9 of Figure 5.

As shown in the drawings, a pulsator unit is built around a cast-metal body designated in its entirety by the reference character 10. Said body casting is formed with a plurality of bores and cored passages to provide for the moving parts of the pulsator and for the distribution of fluid pressures to provide the desired results.

The pulsator body 10 is provided with a circular base 11 having an annular recess 12 around its upper portion and an annular recess 13 around its lower portion. A cylindrical projecting fitting 14 extends at one point from said base to provide means for connection with a hose for supplying vacuum to the pulsator body. Said fitting is provided internally with a bore 15 which provides a conduit connecting with a large conical shaped cavity 16 extending upwardly from the bottom of the pulsator. Said cavity is adapted to fit in an air-tight manner on a conical projection 17 extending from a milk-pail cover. The cavity 16 is joined with an upwardly extending cylindrical bore 18 which connects with a cored passage 19 extending across the pulsator body parallel to the base 11. Said passage 19 intersects a cylindrical central bore 20 extending vertically through the pulsator body and a spaced vertical cylindrical bore 21 also extending through the pulsator body.

The bores 20 and 21 extend through an upper wall 22 integral with the pulsator body, the upper end of the bore 21 being closed by a sealing member 21'. The wall 22 is provided with a cylindri-

cal flange 23 which forms a portion of a diaphragm chamber 24 at the upper portion of the pulsator body. The flange 23 is connected with a radially extending flange 25 for purposes to be hereinafter described.

A pair of fittings or nipples 26 and 27 are formed integral with the base 19 extending diametrically opposite with respect to the fitting 14. The nipple 26 is provided internally with a bore 28 cored in the pulsator body and communicating with a vertical bore 29. The nipple 27 is provided with a bore 30 communicating with a vertical bore 31. As best shown in Figure 4, the bore 31 terminates at its upper end in a transverse passage 32 which intersects the bore 21. As also shown in Figure 4, the vertical bore 29 extends upwardly to the top wall 22 of the pulsator body, being connected by a laterally extending passage 33 with the bore 21.

As best shown in Figure 5, a laterally extending passage 34 intersects the bores 20 and 21, terminating at 35 in communication with the atmosphere around the pulsator body. A passage 37 also intersects the bores 20 and 21, terminating with a side opening 38 which communicates with the atmosphere around the pulsator body. As also shown in Figure 5, a laterally extending passage 39 intersects a bore 40 and the vertical bore 21.

A transverse passage 41 communicates with the bore 20 and with a vertical bore 42. Said bore 42 extends through the upper wall 22 and is closed by a plug 43. A transverse bore 44 communicates with the bore 42 and with the bore 21 near their upper ends.

A flexible diaphragm 45 fitted against the flange 25 is secured by a fitting 46 having a bore 47 therein to a cylindrical slide valve 48 which operates as a plunger in the central bore 20. Said plunger is provided with a head portion 49 at its lower end which slidably fits in a substantially airtight manner in the bottom of the bore 20. A second piston portion having a cylindrical contact surface 50 is formed on the valve 48 spaced from the head portion 49 by an annular channel 51. A third piston portion having a contact surface 52 is provided on the valve 48 spaced from the portion 50 by an annular recess 53. A fourth piston portion having a contact surface 54 is formed on the valve 48 spaced from the portion 52 by an annular recess 55. Said contact portions, together with the recesses, are adapted to cooperate with the transverse passages formed in the pulsator body, as will be hereinafter described.

A free slide valve 56 is mounted for reciprocating in the bore 21. Said valve is provided with a cylindrical contact portion 57, a second spaced cylindrical contact portion 58, a third cylindrical contact portion 59 and a fourth cylindrical contact portion 60. An annular recess 61 separates the portion 60 from the portion 59. An annular recess 62 separates the cylindrical portion 59 from the cylindrical portion 58. An annular recess 63 separates the contact portion 58 from the contact portion 57. Said slide valve also cooperates with the transverse passages formed in the pulsator body as will be hereinafter described.

A cap 70 mounted over the diaphragm 45 has a flange 71 mating with the flange 25. Suitable means are provided for clamping the two flanges together against the peripheral edge of the diaphragm which acts as a gasket to provide the

chamber 24 on one side of the gasket and a chamber 72 in the cap 70.

The cap 70 is provided with a flattened portion 73 at the top, to which a cover and indicator member is secured. Between said member and the flat portion 73 a spring device 75 is fitted, said device having finger portions which extend radially outwardly for a purpose to be hereinafter described. The member 74 is secured in position by screws 76.

A member 77, which can be considered as a cap, has a cylindrical wall portion 78 and an annular top wall 79 joined to the cylindrical wall. Said annular wall fits around the flattened portion 73 of the cap 70, and the spring fingers 75 abut the outer surface of the annular wall to hold the cap 77 in position.

The cylindrical wall 78 is of the same diameter as a cylindrical wall 80 which fits in the annular recess 12 and slidably engages the periphery of the flange 25. The cap 77 is loosely fitted so that it may be readily rotated and will be hereinafter described.

An annular member 81 right-angled in cross section is fitted within the cap 77 and secured thereto in an air-tight manner to provide a compartment 82. The horizontal lower portion 83 of said member is adapted to abut upwardly extending projections 85 formed on or secured to the cap 70. Preferably three of these projections are formed although only one is illustrated in the drawing. Said projections form a bearing surface on which the cap 77 is rotatable. The projection 85 illustrated is formed internally with a bore 86 which registers with a bore 87 formed in a portion 88 of the pulsator body 10. The bore 87 communicates with the bore 18 which at all times is under vacuum.

A small baffle wall 89 is mounted across the corner of the cap 77, at one location being provided with an opening 90 which, together with an opening 91 at the juncture of the walls 78 and 79, provides a sound-emitting device or whistle when vacuum is applied to the chamber 82. The horizontal wall 83 is provided with an opening 84 which at one position in the rotating movement of the cap 77 comes into alinement with the bore 86 whereby air flow is created through the openings 90 and 91 giving an audible signal.

A bore 92, as shown in Figure 1, communicates with the pulsator mechanism at a point where there is a pulsating pressure being the bore 42 in the construction illustrated. Said pulsating pressure is transmitted through a fitting 93 to a compartment 94 formed between a cap 95 and a diaphragm 96. Said cap secures, by screws 97, the diaphragm to a carrier member 98. Said member is provided with a large central opening 99 to permit securing the central portion of the diaphragm 96 to the pulsator body by means of the fitting 93.

The carrier member 98 is formed with an extension 100 which is secured by a screw 101 to a vertical pin or shaft 102. Said pin is journaled in a boss 103 extending downwardly from the flange 25 of the pulsator body. The pin extends upwardly, being provided with an arm 104 and a spring pawl member 105 extending from said arm. Said pawl member is adapted to engage ratchet teeth 106 formed on an annular ring 107 secured to the cylindrical portion 78 of the cap 77 for rotation therewith. The spring pawl 105 is so shaped and located relative to the pin 102 that the movement of the cap 95 as affected by the pulsating pressure is sufficient to engage

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successive teeth and to thereby slowly rotate the cap 77.

It will be noted that index numbers from 1 up to 6 are provided on the top wall 79 of the cap 77 and that a pointer 198 is formed on the member 74. The normal rate of operation of a milking pulsator is such that the numerals indicate the number of minutes required to move the pulsator the angular distance at which the numerals appear. The opening 84 is located relative to the numerals and the point 108 such that when the ratchet pawl has moved the cap the angular distance selected, registration is with the bore 86 and an audible signal is produced.

As best shown in Figures 4 and 6, the base 11 of the body structure 10 is provided with cored chambers 109 and 110. Said chambers communicate with the space around the body 10 of the pulsator as defined by the cylindrical wall 80. A bottom cover 111 is fitted over the annular portion 11 of the pulsator body, said bottom having flanged edges fitting into the recesses 13. Said bottom is suitably secured in position on the pulsator body. A gasket 112 is positioned beneath the bottom 111. Openings 113 and 114 are provided in the bottom in registration, respectively, with the chambers 109 and 110. Screens are provided over the openings to eliminate the entrance of large particles of foreign material. Filtering material 115 is mounted in the chambers 109 and 110 to filter out the finer particles of dirt and foreign material to prevent their entrance into the mechanism of the pulsator through the openings 35 and 38.

In the pulsator as above described, the fitting 14 is connected with a line in which vacuum is produced by suitable means such as a pump. This source of vacuum is continuous and is of a sufficient degree below atmospheric pressure to operate the slide valves of the pulsator and the ratchet device of the timer.

By means of the passage 19, which intersects the bores 20 and 21, vacuum is supplied at all times to these two bores at the point of their intersection with the passage 19. Vacuum is also supplied at all times through the conduit 87 with the bore 86. As previously described, the bore 86 is put into communication with the chamber 82 when the opening 84 in the plate 83 registers with the bore 86. At that time a signal is emitted, as previously described.

As the passages in a pulsator of this type extend in all three directions, it is believed a clearer description can be given of the operation of the pulsator by referring first to the diagrammatic showing of Figure 7. This showing rather closely resembles the actual structure in so far as the diaphragm and the piston valves are concerned—also as to the transverse passages which intersect these bores. The other conduits and passages are illustrated in their functional relation to said transverse passages. Also, the control restrictions in the conduits to regulate the rate of movement differ materially from the actual constructions shown in the other figures. After a description of the diagrammatic showing, certain comparisons will be made to illustrate the location of certain of the elements in the actual construction.

Referring to Figure 7, the vacuum supplied from the conduit 15 is applied at all times to the transverse passage 19. With the valves in the position shown in Figure 7 this vacuum or pressure reduction is transmitted through the bore 21 in the annular passage 62 provided by a

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reduction in diameter of the valve 56 below the cylindrical sealing portion 59. Vacuum is then delivered through the transverse passage 32 to the conduit 30, which is the conduit leading to one of the inflations or milker units. With the valves in the position shown in Figure 8, suction is being delivered to the inflation connected to the conduit 30. Vacuum is also transmitted through the conduit 31 and a continuing conduit 64 to the lower end of the bore 20 and therefrom through a conduit 47' formed in the piston valve 48 to the chamber 72 at the upper side of the diaphragm 45. A restricting member 66, which is provided with a metered orifice or bleed opening 67, located functionally between the conduit 64 and the conduit 31, restricts the rate of air flow from the upper diaphragm chamber 72 thereby regulating the time required for the movement of the valve 48 to bring about a second step in the cycle of operation. Said valve moves upwardly at a predetermined rate until the piston portion 52 moves upwardly past the bottom of the passage 41. Vacuum is then applied to the conduit 44 leading to the upper end of the bore 21. At the same time, the piston portion 50 of the valve 48 moves upwardly past the lower surface of the passage 39, whereby the passage 65 is put into communication, by means of the recess 51, with the passage 34 which communicates with the atmosphere. The pressure differential thus produced at the opposite ends of the valve 56 shifts said valve upwardly in the bore 21. After said shift, vacuum which is applied through the transverse passage 19 to the passage 33 due to the overlapping of said passages by the recess 62 on the valve 56, is transmitted to the passage 28 and therefrom to the teat cup inflation.

At the same time vacuum is applied through the conduits 40' and 64' to the lower diaphragm chamber 24, the flow of air from said chamber being restricted by an orifice member 69 having a metering opening 69' therein. The withdrawal of air from the chamber 24 moves the valve 48 in a downward direction. With the valve 56 in its upper position, the passage 34, which communicates with the atmosphere, is put into communication by means of the recess 63 with the passage 32 which communicates through the conduits 31 and 64 and the bore 47 and with the upper diaphragm chamber 72. This entrance of air permits the diaphragm chamber to move downwardly when the valve 56 is in its upper position. As above described, the valve 48 continues its downward movement until the upper end of the bore 21 is again put into communication with the atmosphere through the conduit 44, and the lower end of the bore 21 is put into communication with the source of vacuum through the conduit 65. Said valve then shifts to the position shown in Figure 7 completing the cycle of operation.

The operation of the actual structure, as shown in Figures 1 to 6, inclusive, is identical with that shown in the diagrammatic view of Figure 7. All the parts bear corresponding reference characters, and those which are so similar as to be readily identified will not be further explained. There are some differences, however, which will be explained to show that the actual structure operates exactly as shown in the diagrammatic view. In the actual construction, the source of vacuum is obtained through the conduit 14 having the bore 15 therein, the cavity, and the bore 13 which communicates with the transverse passage 19. In the diagrammatic showing the bore 15 is rep-

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resented as communicating directly with the transverse passage 19. In the actual construction, the inflations are adapted to be connected to two fittings 25 and 27. The fitting 26 has a bore 28 which communicates with a vertical bore 29 intersecting the transverse passage 33 as best shown in Figure 4. In the diagrammatic showing, the bore 28 is illustrated as communicating directly with the transverse passage 33.

In the actual construction, the fitting 27 is provided with a bore 30 which communicates with a vertical bore 31 intersecting the transverse passage 32. In the diagrammatic showing the bore 30 is represented as communicating directly with the transverse passage 32.

In the actual construction, the passage 44 as indicated in the diagrammatic drawing includes a vertical bore 42 and a transverse bore 44, the vertical bore communicating with the transverse passage 41 and the transverse bore 44 communicating with the upper end of the valve bore 21. In the actual construction, the passage 65 as illustrated in the diagrammatic view includes a vertical bore 46 and a transverse passage as shown in Figure 3 cored in the bottom of the body 10 and completed by the cover 111.

The passage 65 of the diagram is illustrated in Figure 6 by a vertical bore 40 and a transverse passage 65. The metering member 66 with its orifice is illustrated in Figure 4.

The conduits 40' and 64' as shown illustrated in the diagrammatic view are provided by a construction as shown in Figure 4 and include a vertical passage 40' and communicate with the transverse passage 33 and the metering member 69 communicating with the lower diaphragm chamber 24, there being a short passage 64' above said metering member.

It will thus be seen that the working structure as shown in Figures 1 to 6, inclusive, operates in principle identically with that shown in the diagrammatic view of Figure 7.

Although a preferred actual embodiment has been illustrated, it is understood that applicant claims as his invention all modifications embodying the principles of the diagrammatic view which fall within the scope of the appended claims.

What is claimed is:

1. A timer for milker pulsators having a body structure, means for connecting a vacuum line with said body, means for connecting a milker unit to said body and pressure operated valves within said body for producing pulsating pressure for said milker unit, comprising in combination with said body structure, a member rotatably mounted on said body structure, conduit means projecting from the body structure, valve means operable by said member for controlling flow through said conduit means, means for transmitting vacuum to said conduit means, a signaling device operable by the flow of fluid through said conduit, means upon actuation of said valve means, and means operated by the pulsating pressure for rotating said member.

2. A timer for milker pulsators having a body structure, means for connecting a vacuum line with said body, means for connecting a milker unit to said body and pressure operated valves within said body for producing pulsating pressure for said milker unit, comprising in combination with said body structure, a member rotatably mounted on said body structure, conduit means projecting from the body structure being adaptable to slidably engage a portion of said member during rotation thereof, means for transmitting

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vacuum to said conduit means, said member being provided with an opening adapted to register with said vacuum conduit at one point in the rotation of the member, means communicating with said opening and the atmosphere including an observable indicating device, and means operated by the pulsating pressure for rotating said member.

3. A timer for milker pulsators having a body structure, means for connecting a vacuum line with said body, means for connecting a milker unit to said body and pressure operated valves within said body for intermittently supplying vacuum and atmospheric pressure to said milker unit thereby producing pulsations, comprising in combination with said body structure, a member rotatably mounted on said body structure, conduit means projecting from the body structure, being adaptable to slidably engage a portion of said member during rotation thereof, means for transmitting vacuum to said conduit means, said member being provided with an opening adapted to register with said vacuum conduit at one point in the rotation of the member, means communicating with said opening and the atmosphere including an observable indicating device, means operated by the pulsating pressure for rotating said member and index means on the member whereby it may be set at variable locations to determine the elapsed time until actuation of the indicating device.

4. A timer for milker pulsators having a body structure, means for connecting a vacuum line with said body, means for connecting a milker unit to said body and pressure operated valves within said body for producing pulsating pressure for said milker unit, comprising in combination with said body structure, a member rotatably mounted on said body structure, conduit means projecting from the milker body being adaptable to slidably engage a portion of said member during rotation thereof, means for transmitting vacuum to said conduit means, said member being provided with an opening adapted to register with said vacuum conduit at one point in the rotation of the member, means communicating with said opening and the atmosphere including a sound-emitting device, and means operated by the pulsating pressure for rotating said member.

5. A timer for milker pulsators having a body structure, means for connecting a vacuum line with said body, means for connecting a milker unit to said body and pressure operated valves within said body for intermittently supplying vacuum and atmospheric pressure to said milker unit thereby producing pulsations comprising in combination with said body structure, a member rotatably mounted on said body structure, conduit means projecting from the milker body, being adaptable to slidably engage a portion of said member during rotation thereof, means for transmitting vacuum to said conduit means, said member being provided with an opening adapted to register with said vacuum conduit at one point in the rotation of the member, means communicating with said opening and the atmosphere including a sound-emitting device, means operated by the pulsating pressure for rotating said member and index means on the member whereby it may be set at variable locations to determine the elapsed time until emission of an audible signal.

6. A timer for milker pulsators having a body structure, means for communicating said body with a vacuum line, means for connecting a milker unit to said body and pressure operated valves within said body for intermittently supplying a

pulsating pressure to said milker unit, comprising in combination with said body structure a member rotatably mounted on said body structure, a conduit means projecting from the milker body, being adaptable to slidably engage a portion of said member during rotation thereof, means for transmitting vacuum to said conduit means, said member being provided with an opening adapted to register with said vacuum conduit at one point in the rotation of the member, means communicating with said opening and the atmosphere including a signaling device, and means operated by the pulsating pressure for rotating said member, said member being provided with a plurality of ratchet teeth, a pawl member adapted to engage said teeth for rotating the rotatable member in one angular direction, vacuum operated means connected to said pawl means and to a pulsating pressure portion of the milker body whereby said pawl member continually rotates the member during operation of the milker, said ratchet teeth being such in number that one rotation of the member requires the maximum time necessary for a complete milking operation, and index means on the rotatable member whereby it may be set at variable locations to determine the elapsed time until emission of a signal.

7. A timer for milker pulsators having a body structure, means for communicating said body with a vacuum line, means for connecting a milker unit to said body and pressure operated valves within said body for intermittently supplying a pulsating pressure to said milker unit, comprising in combination with said body structure a member rotatably mounted on said body structure, conduit means projecting from the milker body, being adaptable to slidably engage a portion of said member during rotation thereof, means for transmitting vacuum to said conduit means, said member being provided with an opening adapted to register with said vacuum conduit at one point in the rotation of the member, means communicating with said opening and the atmosphere including a sound-emitting device, and means operated by the pulsating pressure for rotating said member, said member being provided with a plurality of ratchet teeth, a pawl member, adapted to engage said teeth for rotating the rotatable member in one angular direction, vacuum operated means connected to said pawl means and to a pulsating pressure portion of the milker body whereby said pawl member continually rotates the member during operation of the milker, said ratchet teeth being such in number that one rotation of the member requires the maximum time necessary for a complete milking operation, and index means on the rotatable member whereby it may be set at variable locations to determine the elapsed time until emission of an audible signal.

8. A timer for milker pulsators having a body structure, means for communicating said body with a vacuum line, means for connecting a milker unit to said body and pressure operated valves within said body for intermittently supplying a pulsating pressure to said milker unit, comprising in combination with said body structure a member rotatably mounted on said body structure, conduit means projecting from the milker body, being adaptable to slidably engage a portion of said member during rotation thereof, means for transmitting vacuum to said conduit means, said member being provided with an opening adapted to register with said vacuum conduit at one point in the rotation of the mem-

ber, means communicating with said opening and the atmosphere including a sound-emitting device, said member being provided with a plurality of ratchet teeth, a pawl adapted to engage said teeth for rotating the rotatable member in one angular direction, vacuum operated means connected to said pawl means and to a pulsating pressure portion of the milker body whereby said pawl continually rotates the member during operation of the milker, said ratchet teeth being such in number that one rotation of the member requires the maximum time necessary for a complete milking operation, and index means on the member whereby it may be set at variable positions to determine the elapsed time until emission of an audible signal.

9. A timer for milker pulsators having a body structure, means for communicating said body with a vacuum line, means for connecting a milker unit to said body and vacuum operated valves within said body for intermittently supplying vacuum and atmospheric pressure to said milker unit, comprising in combination with said body structure, a cap rotatably mounted on said body structure, means on said body structure for centering said cap and for holding resiliently against movement in an axial direction and for frictionally holding it against rotation, a valve plate mounted within said cap and forming an air compartment with a portion of said cap, conduit means projecting from the milker body, being adaptable to slidably engage said plate during rotation thereof, means for transmitting vacuum to said body portion, said plate being provided with an opening adapted to register with said vacuum-supplying body portion at one point in the rotation of the cap, means communicating between said air compartment and the atmosphere including a sound-emitting construction, the interior of said cap being provided with a plurality of small ratchet teeth, a pawl member adapted to engage said teeth for rotating the cap in one angular direction, vacuum operated means connected to said pawl member and to a pulsating pressure portion of the milker body whereby said pawl member continually rotates the cap during operation of the milker, said ratchet teeth being such in number that one rotation of the cap requires the maximum time necessary for a complete milking operation, and index means on the cap whereby it may be set at variable locations to determine the elapsed time until emission of an audible signal.

10. A timer for milker pulsators having a body structure, means for communicating said body with a vacuum line, means for connecting a milker unit to said body and vacuum operated valves within said body for intermittently supplying vacuum and atmospheric pressure to said milker unit, comprising in combination with said body structure, a cap rotatably mounted on said body structure, means carried with said cap and forming an air compartment therewith, conduit means projecting from the milker body, being adaptable to slidably engage said means during rotation thereof, means for transmitting vacuum to said body portion, said means being provided with an opening adapted to register with said vacuum-supplying body portion at one point in the rotation of the cap, means communicating between said air compartment and the atmosphere including a sound-emitting construction, said cap being provided with a plurality of ratchet teeth, a pawl adapted to engage said teeth for rotating the cap in one angular direction, vacuum

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operated means connected to said pawl and to a pulsating pressure portion of the milker body whereby said pawl continually rotates the cap during operation of the milker, said ratchet teeth being such in number that one rotation of the cap requires the maximum time necessary for a complete milking operation, and index means on the cap whereby it may be set at variable locations to determine the elapsed time until emission of an audible signal.

11. A timer for milker pulsators having a body structure, means for communicating said body with a vacuum line, means for connecting a milker unit to said body and vacuum operated valves within said body for intermittently supplying vacuum and atmospheric pressure to said milker unit, comprising in combination with said body structure a cylindrical sleeve enclosing a substantial portion of said body structure, a cap rotatably mounted on said body structure and having a cylindrical wall forming an extension of said cylindrical sleeve and being rotatable concentric with respect thereto, means on said body structure for centering said cap and for holding resiliently against movement in an axial direction and for frictionally holding it against rotation, a valve plate mounted within said cap and forming an air compartment with a portion of said cap, conduit means projecting from the milker body, being adaptable to slidably engage said plate during rotation thereof, means for transmitting vacuum to said body portion, said plate being provided with an opening adapted to register with said vacuum-supplying body portion at one point in the rotation of the cap, means communicating between said air compartment and the atmosphere including a sound-emitting construction, the interior of said cap being provided with a plurality of small ratchet teeth, a pawl member adapted to engage said teeth for rotating the cap in one angular direction, vacuum operated means connected to said pawl member and to a pulsating pressure portion of the milker body whereby said pawl member continually rotates the cap during operation of the milker, said ratchet teeth being such in number that one rotation of the cap requires the maximum time necessary for a complete milking op-

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eration, and index means on the cap whereby it may be set at variable locations to determine the elapsed time until emission of an audible signal.

12. A timer for milker pulsators including a body structure, means for connecting a vacuum line with said body, means for connecting a milker unit to said body and pressure operated mechanism within said body for producing pulsating pressure for said milker unit, comprising in combination with said body structure, an indicating device, and means for actuating said indicating device, said means including structure movable by said pressure operated mechanism in timed relation with the pulsating pressure whereby said indicating device indicates the termination of a timed milking operation.

13. A timer for milker pulsators including a body structure, means for connecting a vacuum line with said body, means for connecting a milker unit to said body and pressure operated mechanism within said body for producing pulsating pressure for said milker unit, comprising in combination with said body structure, a member movably mounted on said body, said member including indicating means, and means for actuating said member, said means including structure movable by said pressure operated mechanism in timed relation with the pulsating pressure whereby said indicating device indicates the time elapsed in a timed milking operation.

14. A timer for milker pulsators including a body structure, means for connecting a vacuum line with said body, means for connecting a milker unit to said body and pressure operated mechanism within said body for producing pulsating pressure for said milker unit, comprising in combination with said body structure, a member rotatably mounted on said body structure, said member including indicating and signalling means, and means for actuating said member, said means including structure movable by said pressure actuated mechanism in timed relation with the pulsating pressure whereby said indicating and signalling means indicates the time elapsed in a timed milking operation.

WILLIAM H. HARSTICK.

No references cited.