

No. 619,442.

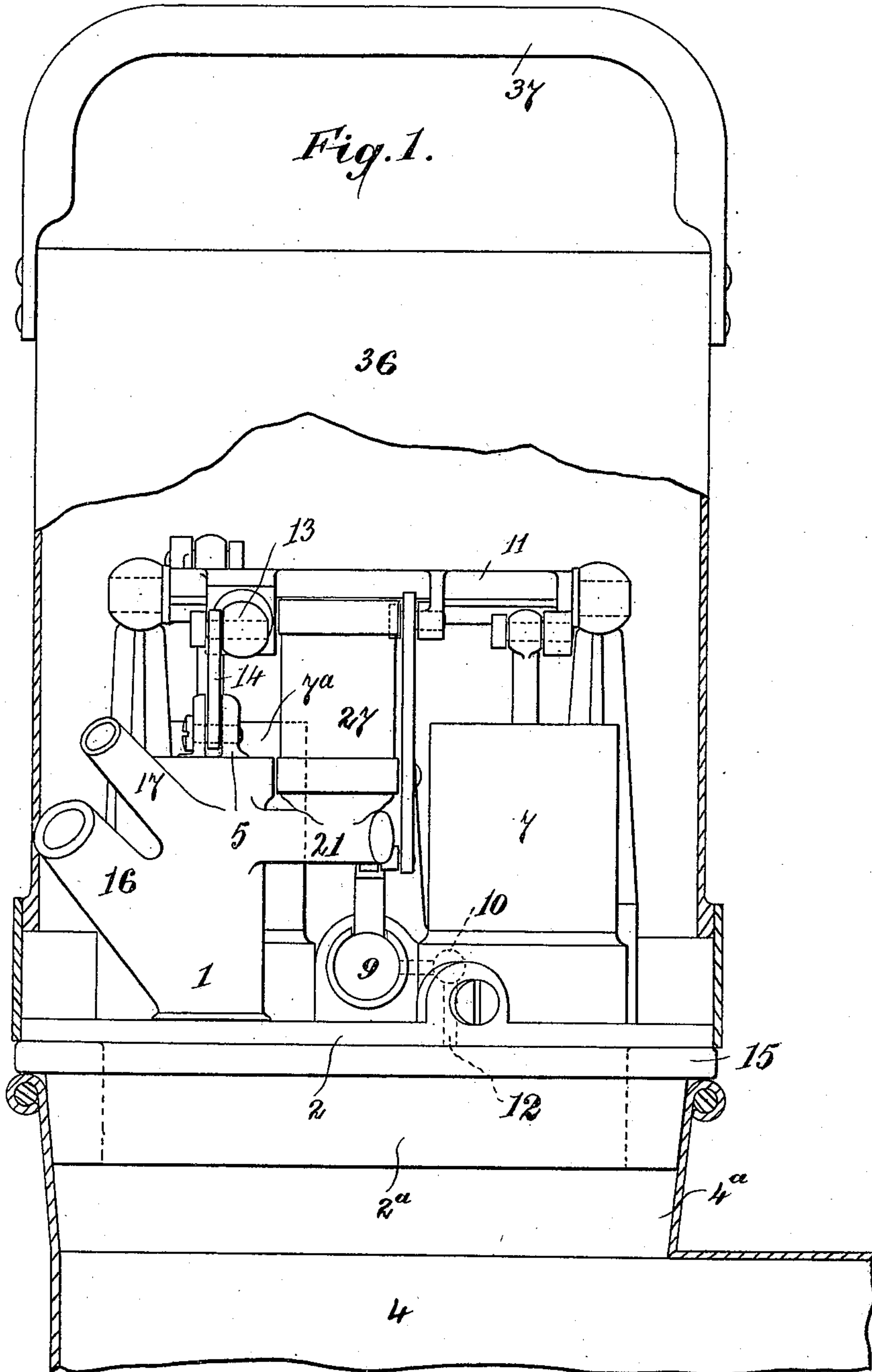
Patented Feb. 14, 1899.

A. SHIELS.  
MILKING APPARATUS.

(Application filed Sept. 27, 1898.)

(No Model.)

3 Sheets—Sheet 1.



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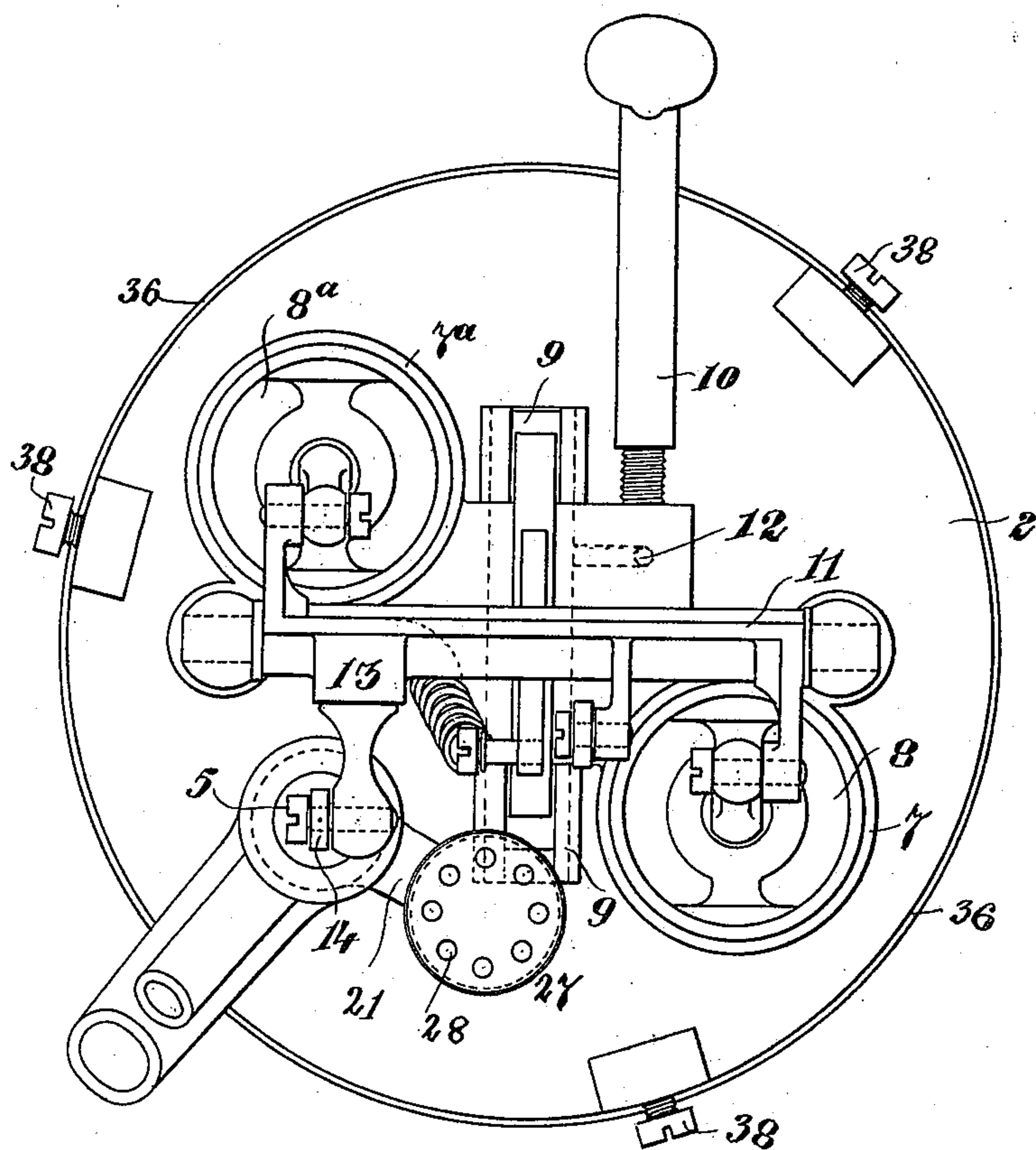
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3 Sheets—Sheet 2.

Fig. 2.



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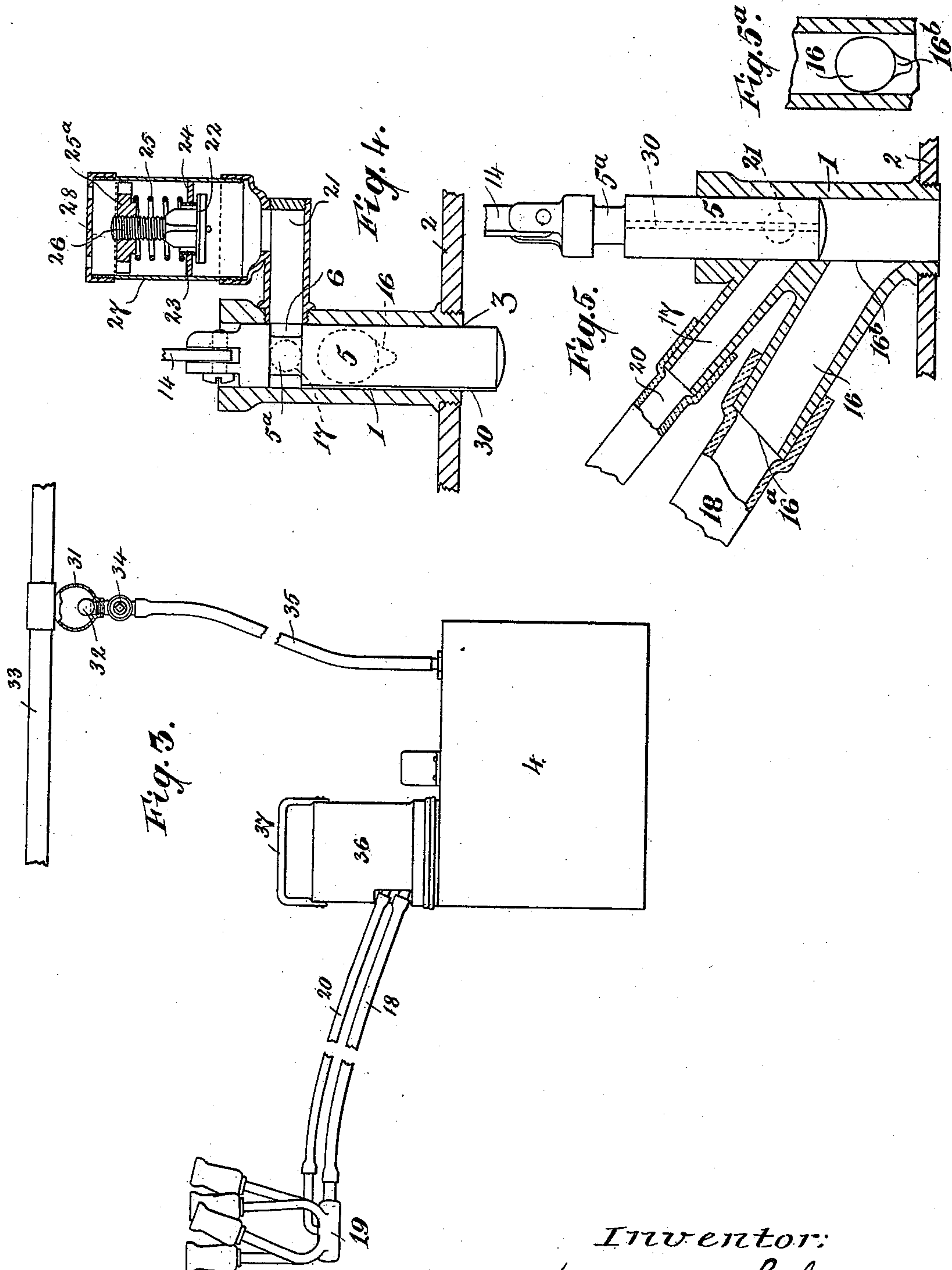
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(No Model.)

3 Sheets—Sheet 3.



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# UNITED STATES PATENT OFFICE.

ALEXANDER SHIELS, OF GLASGOW, SCOTLAND.

## MILKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 619,442, dated February 14, 1899.

Application filed September 27, 1898. Serial No. 692,001. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER SHIELS, M. B., C. M., B. Sc., of 190 Bath street, Glasgow, Scotland, have invented certain new and useful Improvements in Milking Apparatus, of which the following is a specification.

This invention relates to vacuum milking-machines; and it has for its object to improve and simplify their construction.

At present with pulsating vacuum milking-machines the milk during the milking operation is caused to surge backward and forward in the pipe leading from the teat-cups to the milk-pail. My invention is mainly designed to overcome this drawback by providing improved pulsating mechanism and accessories.

The invention is a development of the inventions described in the specifications of my prior patents, Nos. 513,624, 556,217, 558,666, and Serial No. 596,638.

In order that my said invention may be properly understood, I have hereunto appended three explanatory sheets of drawings, whereon—

Figure 1 is a front view, partly sectioned, of the apparatus shown in position upon a milk-pail, which latter is broken away. Fig. 2 is a plan view of the apparatus, the casing being removed. Fig. 3 is a view of the apparatus, showing the pipe connections and milk-pail. Figs. 4 and 5 are detail sectional views of the pulsator mechanism. The section at Fig. 5 is taken at right angles to that at Fig. 4. Fig. 5<sup>a</sup> is a detail view.

Referring to the drawings, whereon the same reference-numerals wherever repeated indicate the same parts, the vacuum pulsating apparatus (which is in some respects similar to that described in the specification of my prior patent, No. 513,624 of 1894) consists of a cylinder 1, which is fitted on the base-plate 2 and is open at its lower end 3, so as to communicate with the interior of the milk-pail 4, which latter may be of the construction generally used with vacuum milking-machines. In the cylinder 1 is a plunger 5, which has a reduced part 5<sup>a</sup>, forming, as shown in Fig. 4, with the wall of the cylinder, an annular passage or port 6. The plunger is reciprocated within the cylinder 1, so as to cause the vacuum to pulsate by means of a vacuum-motor, preferably of the same character as that de-

scribed in the specification of my prior patent, Serial No. 596,638, although any other suitable and well-known type of vacuum or other motor may be used. The motor shown upon the drawings consists generally of the trunk-cylinders 7 and 7<sup>a</sup>, with their pistons or plungers 8 8<sup>a</sup>, the automatic valve 9 for controlling the action of the motor, and the spindle screw-valve 10 for regulating the vacuum-supply to the motor. 11 is the rock-shaft operated by the pistons 8 8<sup>a</sup>, and this rock-shaft by means of the arm 13 and link 14 reciprocates the plunger or piston 5. The base-plate 2, which is provided with a downward and tapered extension 2<sup>a</sup>, which fits plug-like into the mouth 4<sup>a</sup> of the milk-pail, carries the vacuum-motor, as well as the pulsating mechanism, as clearly indicated in Figs. 1 and 2. The vacuum in the pail exerts a sucking action upon the lower end of the plunger 5. A small hole 12 (see dotted lines, Figs. 1 and 2) leads from the valve 9 to and through the under side of the base-plate 2, so that the vacuum in the pail can drive the motor. The orifice of the vacuum-passage 12 can be regulated so as to admit more vacuum from the pail or lessen the admission by means of the screw spindle-valve 10. By this arrangement the speed of the vacuum-motor can be easily controlled.

15 is a rubber packing-ring.

The cylinder 1 of the pulsator has two lateral branches, one, 16, a vacuum and milk branch near its lower end and one, 17, an air-admission branch. The lower branch 16 (and also, if necessary, the upper branch 17) is inclined upward at an angle, as shown at Fig. 5, and has its end 16<sup>a</sup> cut away at a slant. Fitted in connection with this lower branch 16 is a flexible pipe 18, leading to the milk-chamber of the "claw" or four-branched base-piece 19 of the teat-cups, while fitted in connection with the upper branch 17 is a second pipe 20, leading also to the said milk-chamber. The cylinder 1 is also provided with a lateral branch 21, having upon it an automatically-controlled air-admission or vacuum-destroying valve 22. The valve 22 is arranged with its rubber face bearing against the seat 23 around the opening in the partition 24, and it is normally held in this position by the spring 25, which bears against the plate 25<sup>a</sup>,



(or a three-armed guide,) which latter is connected, by means of the screw 26, to the valve 22. As will be seen, the valve is inclosed in a casing 27, fitted on the branch 21, and provided with a perforated cover 28. Air holes or passages are made in the plate 25<sup>a</sup>, which latter when necessary can be screwed upon the screw 26, so as to regulate the tension of the spring 25.

Communication is provided between the annular space 6 of the plunger 5 and the interior of the milk-pail by means of a small passage-way or groove 30 in the plunger or the cylinder. The tension of the spring 25 is so adjusted that when the plunger 5 is in the position shown at Fig. 4—i. e., with the passage 6 in communication with the pipes 17 and 21—the full suction in the milk-pail, acting upon the valve 22, (owing to the groove 30,) will overcome the spring 25 and open the valve, thereby allowing air to gain admission to the pipes 17 18 and teat-cups and destroy the vacuum in the cups down to a point (the minimum) when the power of the spring 25 will be sufficient to overcome the reduced suction and again close the valve. When the plunger is in the position Fig. 5, communication between the branch 21 and pipe 17 is cut off, while when the plunger is in the position Fig. 4 communication between the pail and the pipe 16 is cut off.

The lower or vacuum branch 16 is, where it communicates with the interior of the cylinder 1, made with a slightly-elongated and somewhat oval or pear-shaped opening 16<sup>b</sup>. (See also Fig. 5<sup>a</sup>.)

If desired, the plunger can be made in two separate parts suitably jointed together.

When a number of cows are being milked simultaneously, in order to prevent the destruction or reduction of the vacuum in each milk-pail by the admission of air to the byre-pipes through the teat-cups of one cow falling off or from other cause, the byre-cocks, to which the pipes leading to the milk-pails are connected, are provided with or fitted in conjunction with a cut-off device consisting of a hollow chamber 31, having a downward extension into which one branch of the byre-cock is screwed and also a light ball-valve 32 in it, which valve immediately on the destruction of the vacuum in the main byre-pipe 33 closes down on its seat formed by or on the end of the branch of the byre-cock or around the orifice of the extension of the chamber, and thereby cuts off communication between the byre-pipe and the local milk-pail.

In Fig. 3, 34 is the byre-cock, and 35 the vacuum-pipe connection leading to the pail 4.

The pulsating mechanism and motor are inclosed within a suitable cover or casing 36, which can, when desired, be readily removed. This casing may have a handle 37 and be clamped in place by screws 38.

By having the two pipe connections, one for the passage of air to destroy the vacuum at the teat-cups to the minimum at each pulsa-

tion and the other for the passage of the milk and for the vacuum, the detrimental churning of the milk in the milk-pipe is obviated.

By making the lower or vacuum branch of the cylinder inclined and with the end cut at a slant not only is the free flow of the milk permitted, but should the teat-cups fall off the flexible pipe connection 18 will bend down over the mouth of the branch and prevent ingress of air to the milk-pail and so prevent unnecessary loss of vacuum.

The movements of the plunger 5 produce the pulsations, and as the opening 16<sup>b</sup> is, as shown at Fig. 5<sup>a</sup>, of a pear shape the vacuum, acting upon the teat-cups, is at first gradually increased from the minimum and then more quickly increased until the maximum is reached in accordance with the uncovering of the passage 16<sup>b</sup> at the upstroke of the plunger 5. On the downstroke of the plunger the vacuum action is reversed, as it is at first quickly and then more slowly reduced from the maximum to the minimum.

The groove 30 insures that a minimum vacuum shall always act upon the teat-cups.

Having now fully described my invention, what I desire to claim and secure by Letters Patent is—

1. In vacuum pulsating milking-machines the combination with the pulsating mechanism of means for preventing the churning of the milk in the milk-pipe, substantially as set forth.

2. The combination in vacuum milking-machines of means for producing the vacuum, means for causing the vacuum to pulsate and means coöperating with the pulsating means for preventing the milk churning in the milk-pipe leading to the milk-pail, substantially as set forth.

3. The combination in vacuum milking-machines of means for producing the vacuum, means for causing the vacuum to pulsate, a milk-pipe connected with the pulsating means and leading from the milk-pail to the teat-cups and a second air-pipe leading from the pulsating means also to the teat-cups, substantially as set forth.

4. The combination in vacuum milking-machines of means for producing the vacuum, means for causing the vacuum to pulsate, pneumatic means for operating said pulsating means and means for preventing the milk churning in the milk-pipe consisting of a milk-pipe connection to the teat-cups and a separate air-pipe connection also to the teat-cups said pipes being fitted in conjunction with the pulsating means, substantially as set forth.

5. In vacuum milking-machines the combination of means for producing the vacuum, means for pulsating the vacuum consisting of a cylinder with a plunger therein said cylinder having a branch with an air-admission valve thereon and said plunger having an annular groove, a vacuum-motor for operating the pulsating means and a vacuum and milk-pipe connection leading from the aforesaid



cylinder to the teat-cups and an air-pipe connection leading also from the cylinder to the teat-cups, substantially as set forth.

5 6. In vacuum milking-machines the combination of the mechanism for producing the vacuum, the mechanism for pulsating the vacuum consisting of a cylinder with a plunger therein, there being an annular groove-  
10 port made on the cylinder, a branch connected with the cylinder leading to an air-admission valve, an inclined branch connected with the cylinder leading to the teat-cups and a separate air branch also leading to the teat-cups, and pneumatic means for operating the pul-  
15 sating mechanism, substantially as set forth.

7. The pulsating mechanism consisting of

the open cylinder, the plunger working in the cylinder, there being a groove 5<sup>a</sup> on the plunger, and a groove 30 in the plunger, means for reciprocating the plunger, the air-admission branch provided with an automatically-  
20 acting air-admission valve, the vacuum and milk-pipe connection having the pear-shaped opening 16, 16<sup>b</sup> and the obliquely-cut end 16<sup>a</sup>, and the air-pipe connection 17, substantially  
25 as set forth.

Signed at Glasgow, county of Glasgow, Scotland, this 14th day of September, 1898.

ALEXANDER SHIELS.

Witnesses:

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WILLIAM FLEMING.