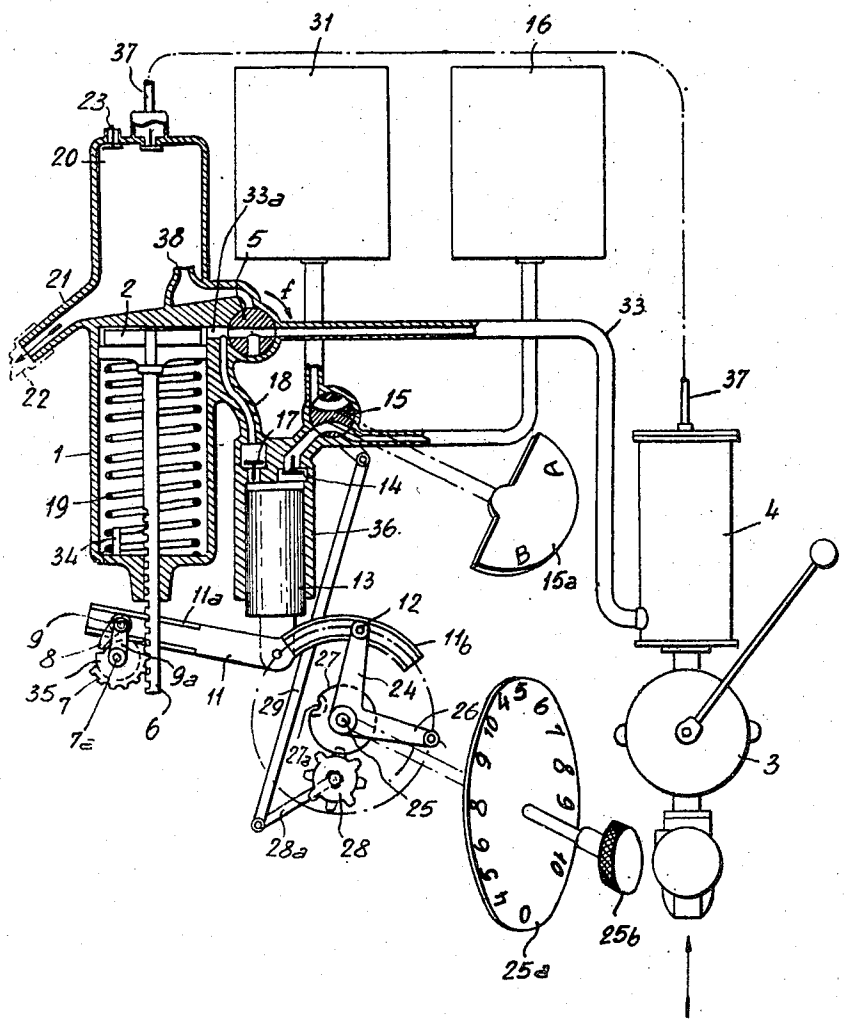
May 5, 1959 L. A. CARRIOL 2,885,119

LIQUID DISPENSING APPARATUS

Filed May 18, 1956 3 Sheets-Sheet 1

Fig. 1



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LIQUID DISPENSING APPARATUS

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Fig.4

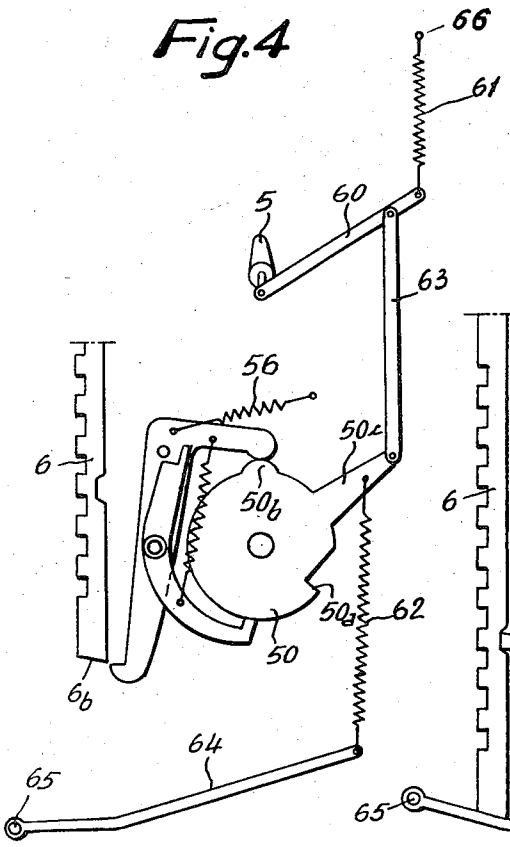


Fig.5

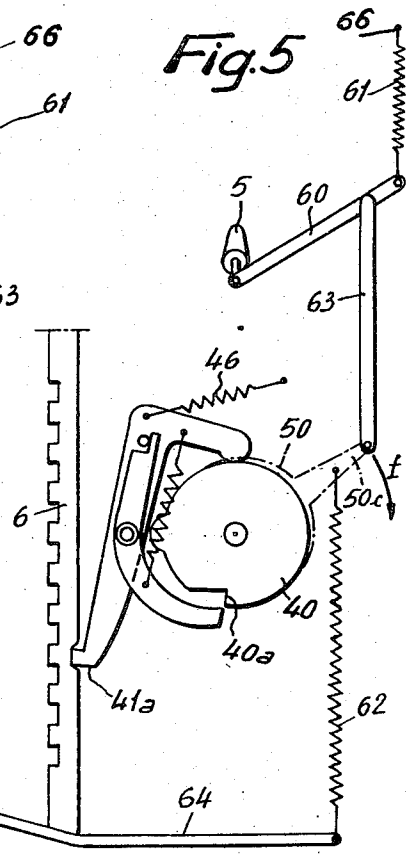
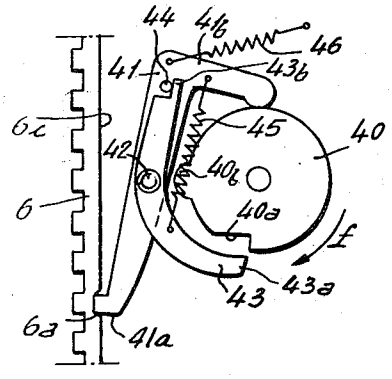


Fig.2



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LIQUID DISPENSING APPARATUS

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Fig.6

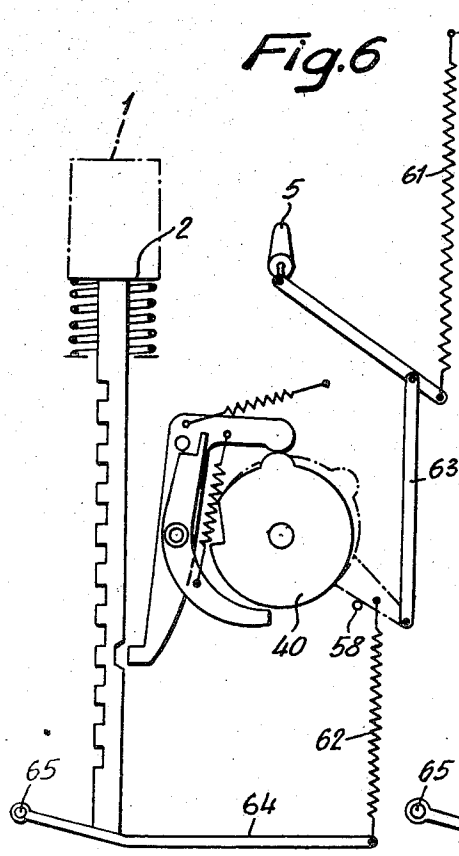


Fig.7

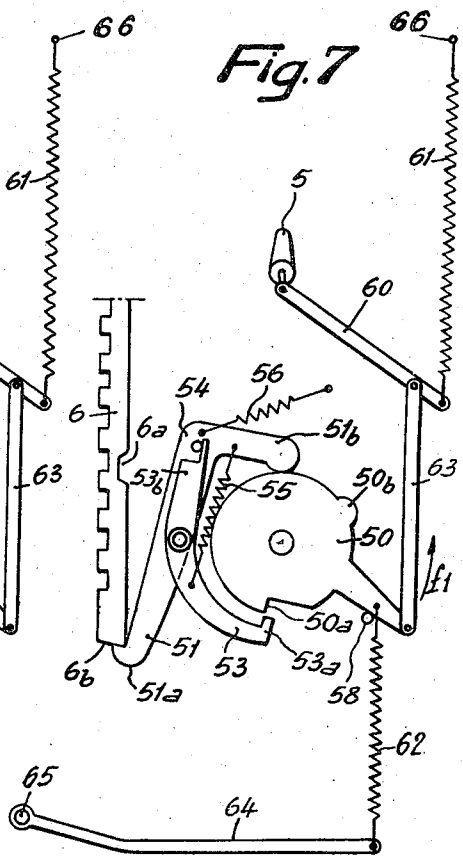
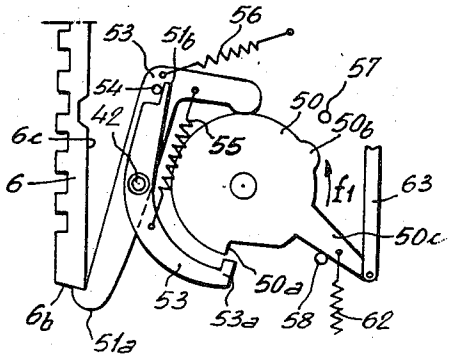


Fig.3



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United States Patent Office 2,885,119 Patented May 5, 1959

2,885,119

LIQUID DISPENSING APPARATUS

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Application May 18, 1956, Serial No. 585,817

Claims priority, application France May 28, 1955

4 Claims. (Cl. 222—72)

In certain liquid dispensing apparatus, the liquid is metered by a piston moving inside a cylinder, the capacity of which is equal to the metering unit and this cylinder is placed alternately in the filling and draining positions under the control of a valve. In order to avoid errors in the amounts dispensed, voluntary or not, the operation of this valve is prevented, except when the piston is at one of its extreme positions, by means of a locking device which is controlled by a rod associated with the piston.

An object of this invention is a particular type of embodiment for such an apparatus and especially means for making the operation of the valve automatic.

In particular, there are used, for the control of the valve, two opposing springs of different strengths, the weaker spring acting directly on the valve and tending to move it from the draining to the filling positions, while the stronger spring is placed under tension by the displacement of the piston rod during the last portion of the filling, and causes, at the end thereof, the movement of the valve from the filling to the draining position while tensioning the weaker spring, and the tension of the stronger spring is released at the end of the draining so as to allow the return of the valve to the following position under the influence of the tensioned weaker spring.

Preferably:

(*a*) One end of the stronger spring is attached at the end of a swinging arm which is in the path of the end of the piston rod.

(*b*) The thrust of the rod on said arm is exerted during the second portion of the filling of the cylinder.

By way of example only the appended drawing shows, diagrammatically, the parts of a mixing and dispensing apparatus in accordance with the present invention.

Figure 1 is a diagrammatic view of this apparatus.

Figures 2 and 3 are views of the locking device of the valve controlling the output of this apparatus.

Figures 4 to 7 show four positions of the locking device represented in Figures 1 and 2.

The apparatus represented comprises a first metering cylinder **1**, inside which a piston **2**, a so-called first piston can move. The volume of the cylinder is equal, for instance, to one litre. A pump **3** sucks in gasoline stored in a tank, not shown, and forces it into a separator **4** then, through a conduit **33**, under the control of a three way cock **5** into the cylinder **1**, pushing back the piston **2** until it comes against a stop **34**. This piston **2** carries a rack **6** which gears with a toothed pinion **7**, mounted free on a shaft **7***a*, and going through a rotation of 360° for a complete run of the rack **6**. A cam **35**, associated with the pinion **7**, is formed with a notch into which a pawl **8** mounted on an arm **9***a*, can engage. Arm **9***a* is mounted free on the shaft **7***a* and carrying a roller **9** in such a manner that the pinion **7** drives the arm **9***a* in one direction only through the cam **35** and pawl **8**. The assembly **7**, **8**, **9**, **9***a* constitutes a free wheel crank arm driven by the rack **6**. On the other hand, the roller **9** is guided in the U-shaped end **11***a* of a lever **11**. The other end **11***b* of this lever **11** is in the shape of a circular arc, and its

cross section also has a U shape, which is entered by one of the rollers **12**, the position of which is adjustable and which acts as a fulcrum for the pivoting of the lever **11** as will be seen later. The rotation of the roller **9** thus causes the lever **11** to swing, substantially about the roller **12**. The rocking motion of the lever **11** thus obtained, displaces a piston **13**, a so-called second piston, moving inside a cylinder **36**, a so-called second cylinder. It should be noted that the piston **2** controls positively one reciprocation of the piston **13** during its downwards run, and does not drive anything during its upward motion owing to the presence of the free wheel mechanism **7**, **8**, **9**, **9***a*. The upper portion of the cylinder **36** is in communication, on the one hand, through a conduit **18** with the portion **33***a* of the conduit **33** located downstream of the valve, or valve means **5** under the control of a forcing valve **17**, and on the other hand with one of the oil tanks **16** or **31**, under the control of a suction valve **14** and of a two way cock **15**. The oil from the tank **16** or **31**, which is in communication with the cylinder **36** is thus sucked into the latter when the piston **13** moves down and forced out in the conduits **18** and **33***a* by the piston when the same moves up.

A first mixing of the oil and gasoline thus takes place in the conduit or passage **33***a*, before the arrival into the metering cylinder **1**. When the piston **2** strikes the stop **34**, the cylinder **1** therefore contains one litre of an oil and gasoline mixture. During this downward motion the piston **2** compresses a spring **19**. When the cock **5** has been turned 90° in the direction of the arrow *f*, and the operation of the pump **3** has been stopped, the cylinder **1** is in communication with a container **20**, a so-called predispensing container, the piston **2** moves up under the action of the spring **19** and forces the litre of mixture into the container **20** through a thin slot **38** which again stirs the mixture. The mixture flows from the container **20** through a connection **21** into a flexible hose **22**, the free end of which has previously been introduced into the tank of a motorcycle, not shown. A flap valve **23** allows air to pass into the container **20** and a conduit **37** connects the air outlet of the separator with the upper portion of the container **20**.

It is quite obvious that the amplitude of displacement of the piston **13** and consequently the amount of oil to be injected into one litre of the mixture, is a function of the position of the roller **12** since the amplitude of the motion of the roller **9** is constant. The roller **12** is mounted on a lever **24** rotating about an axle **25** and which can be controlled from outside. The portion **11***b* of the lever **11** has the shape of a circular arc, the center of which is located, in the position of the lever **11** shown in Fig. 1, substantially at the center line of the axle **25**. The lever **24**, when it comes out of the groove **11***b* of the lever **11** is replaced by a lever **26** keyed on the same axle **25** and having the same length. When the roller **12** of the lever **26** engages the groove **11***b* for replacing the lever **24**, a side catch **27***a* of a cam **27** mounted on the shaft **25** and associated with these levers **24** and **26** rotates the pinion through a certain angle. The rotation of this pinion **28** causes the rotation of the cock **15** through a connecting rod **28***a*, associated with the pinion **28** and a rod **29** and consequently the cylinder **36** is no longer in communication with the tank **16**, but with the tank **31**. If the two tanks contain oils of different grades, the possibility is thus given of obaining mixtures of gasoline with one or the other of the grades of oil. It should be noted that during the whole time when one of the levers **24** or **26** is engaged in the grooves **11***b*, the lever **29** remains motionless since the groove **11***b* has the shape of a circular arc, the center of which is substantially on the axle **25**. Similarly, the rotation of the shaft **25** for adjusting the position of the roller **12** has no action on the lever **11** and consequently

on the piston 13 which is at the upper dead center. This prevents a mixing of oils of different grades, the conduit 18 being practically as narrow as possible.

For preventing errors in the metering, the rotation of the cock 5 should be prevented during the filling or draining of the metering cylinder 1 and the rotation of the cock 5 should be allowed only when the piston 2 is at one of its extreme positions.

On a shaft parallel with the rotation axle for the cock 5 two cams 40 and 50 are keyed. An arm 50*c* of the latter cam is connected by means of a powerful spring or first spring means 62 to the end of a rocking arm 64 rocking about an axle 65 and being located in the path of the rack 6. The arm 50*c* is also connected through a connecting rod 63 with an arm 60 associated with the body of the cock 5 and connected with one end of a spring 61, or second spring means, less powerful than the spring 62, spring 61 is attached, at its other end, to a fixed point 66.

The first cam 40 is circular, and comprises a notch 40*a* and a bump 40*b*. On the other hand, on a shaft 42 parallel with the one which carries the cams 40 and 50, two levers 41 and 43 are mounted for free turning movement. The end 41*a* of arm 41 cooperates with the rack 6 and enters a notch 6*a* in the low position of the piston, as may be seen in Figure 2. The arm 41*b* of this lever 41 can come on the path of the bump 40*b* only when the end 41*a* is in the notch 6*a*. The arm 43*a* of the lever 43 can enter the notch 40*a*, while the other arm 43*b* may be pushed by a stud 44 carried by the arm 41*b*. A spring 45 constantly tends to move the arms 41*b* and 43*a* closer together. Another spring 46 attached to the arm 41*b* tends to engage the hook shaped end 41*a* into the notch 6*a*.

The second cam 50, like the cam 40 is circular and comprises a notch 50*a* and a bump 50*b*. The cam 50 is controlled by a lever 50*c*, the displacements of which are limited to 90° by stops 57 and 58. On the other hand, two levers 51 and 53 are mounted free on the shaft 42. The arm 51*a* cooperates with the rack 6 and can move into the path of the end 6*b* of the rack 6 as may be seen in Figure 3. The other arm 51*b* of this lever 51 can come in the path of the bump 50*b* only when the arm 51*a* is in the position represented in Figure 3. The arm 53*a* of the lever 53 can enter the notch 50*a*, while the other arm 53*b* can be pushed by a stud 54 carried by the arm 51*b*. A spring 55 constantly tends to move the arms 51*b* and 53*a* closer to each other. Another spring 56 attached to the arm 51*b* tends to push the hook shaped arm 51*a* against the rack 6.

In the extreme upper position of the piston 2, the arm 51*a* comes under the end 6*b* of the rack 6 and prevents any downward motion of the rack 6 and consequently of the piston 2. On the other hand the arm 53*a* is held out of the notch 50*a* by the stop 54 (Figure 3), the end 41*a* of the lever 41 strikes, under the action of the spring 46 against the edge 6*c* of the rack 6 and the arm 43*a* strikes against the circular portion of the cam 40. Nothing, therefore, opposes the rotation of the shaft carrying the cams 40 and 50 and consequently the spring 61 which has previously been tensioned as described above brings the cock 5 from the draining position back to the filling position, a position which is materialized by the contact of the arm 50*c* with the stop 57.

Due to this rotation of the cams 40 and 50 the bump 50*b* pushes the arm 51*b* and causes the arm 51*a* to be released from the end 6*b* of the rack 6, allowing the latter to move down, and the arm 43*a* falls into the notch 40*a*, so that the cock 5 cannot be brought back in the direction of the arrow *f*. The cock 5 cannot be operated either in the direction of the arrow f_1, as the stop 57 prevents any rotating of the lever 50*c* in that direction. The cock 5 is thus immobilized but the rack 6 is released. The filling of the cylinder 1 then takes place.

A little before the piston 2 strikes the stop 34, the end 6*b* of the rack 6 comes in contact with the arm 64 and thus tensions the spring 62 (Figure 6).

When the piston 2 strikes the stop 34, the notch 6*a* takes up a position opposite the end 41*a* of arm 41. The end 41*a* enters this notch 6*a* under the action of the spring 46. Due to this pivoting of the lever 41, the stop 44 tips the lever 43 clockwise. The arm 43*a*, therefore, is released from the notch 40*a*. Nothing prevents any more the rotation of the cock 5 in the direction of the arrow *f*. The spring 62, tensioned as indicated above, rocks the lever 50*c* through 90° in the direction of the arrow *f*, until it strikes the stop 58. This displacement of the arm 50*c* causes a tensioning of the spring 61 through the connecting rod 63. In addition, the cock 5 is brought to a position which places the cylinder 1 in communication with the container 20. Due to that rotation, the bump 40*b* pushes back the arm 41*b* and the end 41*a* is withdrawn from the notch 6*a*. The rack 6 is thus released. The cylinder 1 can thus be drained into the tank 20 but at the same time the arm 53*a* enters the notch 50*a* under the action of the spring 55, which prevents any rotation of the lever in the direction of the arrow f_1, which in turn prevents the spring 61 from losing its tension.

As soon as the draining has started, the notch 6*a* is no longer facing the end 41*a* of arm 41 and the latter rests on the edge of the rack 6. On the other hand, it is impossible to rotate the cams 40 and 50 and consequently the cock 5 due to the penetration of the arm 53*a* into the notch 50*a* and due to the striking of the control arm 50*c* against the stop 58.

When the draining has been completed, the cycle is repeated.

Thus the cock 5 can be operated only when the piston 2 is at its extreme positions.

It should also be pointed out that a dial 25*a*, associated with the shaft 25 and controlled by a knob 25*b*, indicates which one of the levers 24 or 26 is in engagement with the portion 11*b* of the lever 11 and the percentage of oil mixed to the gasoline. In addition, a disc 15*a*, associated with the cock 15 makes it possible to indicate outside which grade of oil has been added to the gasoline.

What is claimed is:

1. In an apparatus for delivering a predetermined volume of fluid, in combination, a metering cylinder formed in the region of one end thereof with a passage; a piston mounted in said cylinder for sliding movement between a first end position in which said piston is at said one end of said cylinder and a second end position in which said piston is at the other end of said cylinder; means tending to move said piston from said second to said first position thereof; first conduit means communicating with said passage for feeding fluid under pressure into said cylinder to move thereby said piston from said first to said second end position thereof; second conduit means communicating with said first conduit means for discharging fluid from said cylinder; valve means located at the junction of said first and second conduit means and movable between a filling position in which said valve means connects said first conduit means with said passage so that fluid under pressure may be fed into the cylinder whereby said piston moves from said first to said second end position thereof and a discharge position in which said valve means connect said passage with said second conduit means so that fluid in said cylinder may be discharged therefrom by the action of said means moving said piston from the second to the first end position thereof; valve operating means operatively connected to said valve means for moving said valve means between said filling position and said discharge position thereof and comprising first spring means tending to move said valve means from said filling position to said discharge position and second spring means tending to return said valve means from said discharge position to said filling position thereof, said first spring means being stronger than said second spring means and being

tensioned as said piston approaches said second end position thereof and the tension of first spring means being released as said piston moves from said second end position to said first end position thereof, said second spring means being tensioned when said first spring means move said valve means from said filling position to said discharge position thereof; and locking means cooperating with said valve moving means for preventing movement of said valve moving means during movement of said piston between said end positions thereof and for releasing said valve moving means in either of the two end positions of said piston so that when said piston reaches its second end position, said valve moving means will move said valve means under the action of the tensioned first spring means from the filling position to the discharge position thereof while said second spring means is tensioned and so that when the piston reaches the first end position thereof said valve means will be moved by the second spring means of said valve moving means from the discharge position to the filling position thereof.

2. In an apparatus for delivering a predetermined volume of fluid, in combination, a metering cylinder formed in the region of one end thereof with a passage; a piston mounted in said cylinder for sliding movement between a first end position in which said piston is at said one end of said cylinder and a second end position in which said piston is at the other end of said cylinder; means tending to move said piston from said second to said first position thereof; a member fixedly attached to said position for movement therewith; first conduit means communicating with said passage for feeding fluid under pressure into said cylinder to move thereby said piston from said first to said second end position thereof; second conduit means communicating with said first conduit means for discharging fluid from said cylinder; valve means located at the junction of said first and second conduit means and movable between a filling position in which said valve means connects said first conduit means with said passage so that fluid under pressure may be fed into the cylinder whereby said piston moves from said first to said second end position thereof and a discharge position in which said valve means connect said passage with said second conduit means so that fluid in said cylinder may be discharged therefrom by the action of said means moving said piston from the second to the first end position thereof; valve operating means operatively connected to said valve means for moving said valve means between said filling position and said discharge position thereof and comprising first spring means tending to move said valve means from said filling position to said discharge position and second spring means tending to return said valve means from said discharge position to said filling position thereof, said first spring means being stronger than said second spring means, said second spring means being tensioned when said first spring means move said valve means from said filling position to said discharge position thereof; a rocking arm located in the path of said member, said rocking arm being mounted for turning movement about one end thereof and being connected at the other end thereof to said first spring means and said member acting on said rocking arm intermediate the ends thereof to turn the rocking arm as said piston approaches said second end position thereof so that said first spring means being tensioned when said piston approaches said second end position thereof and the tension of said first spring means being released as said piston moves from said second end position to said first end position thereof; and locking means cooperating with said valve moving means for preventing movement of said valve moving means during movement of said piston between said end positions thereof and for releasing said valve moving means in either of the two end positions of said piston so that when said piston reaches its second end position, said

valve moving means will move said valve means under the action of the tensioned first spring means from the filling position to the discharge position thereof while said second spring means is tensioned and so that when the piston reaches the first end position thereof said valve means will be moved by the second spring means of said valve moving means from the discharge position to the filling position thereof.

3. In an apparatus for delivering a predetermined volume of fluid, in combination, a metering cylinder formed in the region of one end thereof with a passage; a piston mounted in said cylinder for sliding movement between a first end position in which said piston is at said one end of said cylinder and a second end position in which said piston is at the other end of said cylinder; means tending to move said piston from said second to said first position thereof; a piston rod fixedly connected to said piston and projecting therefrom through the other end of said cylinder outwardly thereof; first conduit means communicating with said passage for feeding fluid under pressure into said cylinder to move thereby said piston from said first to said second end position thereof; second conduit means communicating with said first conduit means for discharging fluid from said cylinder; valve means located at the junction of said first and second conduit means and movable between a filling position in which said valve means connects said first conduit means with said passage so that fluid under pressure may be fed into the cylinder whereby said piston moves from said first to said second end position thereof and a discharge position in which said valve means connect said passage with said second conduit means so that fluid in said cylinder may be discharged therefrom by the action of said means moving said piston from the second to the first end position thereof; valve operating means operatively connected to said valve means for moving said valve means between said filling position and said discharge position thereof and comprising first spring means tending to move said valve means from said filling position to said discharge position and second spring means tending to return said valve means from said discharge position to said filling position thereof, said first spring means being stronger than said second spring means, said second spring means being tensioned when said first spring means move said valve means from said filling position to said discharge position thereof; a rocking arm located in the path of said piston rod, said rocking arm being mounted for turning movement about one end thereof and being connected at the other end thereof to said first spring means and the free end of said piston rod contacting said rocking arm intermediate the ends thereof as said piston approaches said second end position thereof so that said first spring means being tensioned when said piston approaches said second end position thereof and the tension of said first spring means being released as said piston moves from said second end position to said first end position thereof; and locking means cooperating with said valve moving means for preventing movement of said valve moving means during movement of said piston between said end positions thereof and for releasing said valve moving means in either of the two end positions of said piston so that when said piston reaches its second end position, said valve moving means will move said valve means under the action of the tensioned first spring means from the filling position to the discharge position thereof while said second spring means is tensioned and so that when the piston reaches the first end position thereof said valve means will be moved by the second spring means of said valve moving means from the discharge position to the filling position thereof.

4. In an apparatus for delivering a predetermined volume of fluid, in combination, a metering cylinder formed in the region of one end thereof with a passage; a piston mounted in said cylinder for sliding movement

between a first end position in which said piston is at said one end of said cylinder and a second end position in which said piston is at the other end of said cylinder; means tending to move said piston from said second to said first position thereof; a member fixedly attached to said piston for movement therewith; first conduit means communicating with said passage for feeding fluid under pressure into said cylinder to move thereby said piston from said first to said second end position thereof; second conduit means communicating with said first conduit means for discharging fluid from said cylinder; valve means located at the junction of said first and second conduit means and movable between a filling position in which said valve means connects said first conduit means with said passage so that fluid under pressure may be fed into the cylinder whereby said piston moves from said first to said second end position thereof and a discharge position in which said valve means connect said passage with said second conduit means so that fluid in said cylinder may be discharged therefrom by the action of said means moving said piston from the second to the first end position thereof; valve operating means operatively connected to said valve means for moving said valve means between said filling position and said discharge position thereof and comprising first spring means tending to move said valve means from said filling position to said discharge position and second spring means tending to return said valve means from said discharge position to said filling position thereof, said first spring means being stronger than said second spring means, said second spring means being tensioned when said first spring means move said valve means from

said filling position to said discharge position thereof; a rocking arm located in the path of said member, said rocking arm being mounted for turning movement about one end thereof and being connected at the other end thereof to said first spring means and said member acting on said rocking arm intermediate the ends thereof to turn the rocking arm only during the last part of said movement of said piston from said first to said second end position thereof so that said first spring means being tensioned when said piston approaches said second end position thereof and the tension of said first spring means being released as said piston moves from said second end position to said first end position thereof; and locking means cooperating with said valve moving means for preventing movement of said valve moving means during movement of said piston between said end positions thereof and for releasing said valve moving means in either of the two end positions of said piston so that when said piston reaches its second end position, said valve moving means will move said valve means under the action of the tensioned first spring means from the filling position to the discharge position thereof while said second spring means is tensioned and so that when the piston reaches the first end position thereof said valve means will be moved by the second spring means of said valve moving means from the discharge position to the filling position thereof.

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