C. F. HATMAKER.

SELF MEASURING PUMP.

APPLICATION FILED SEPT. 15, 1908.

954,097.

Patented Apr. 5, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

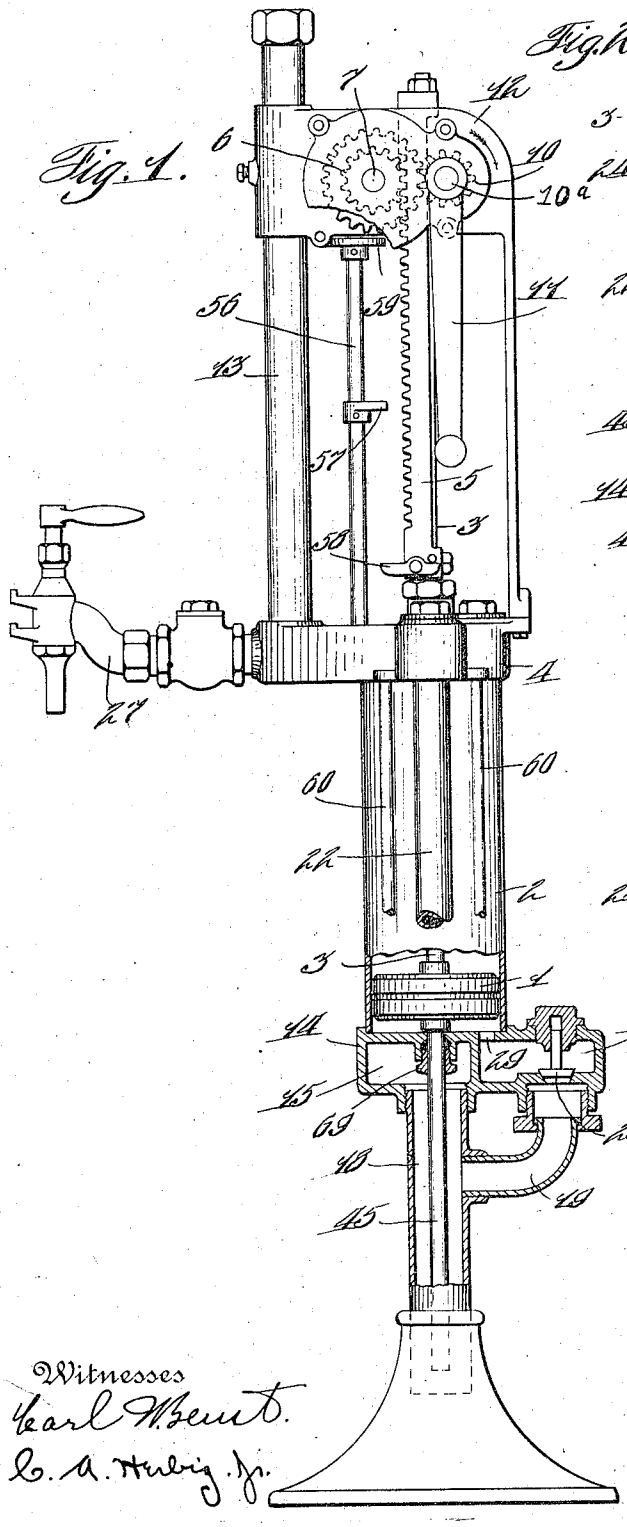


Fig. 2.

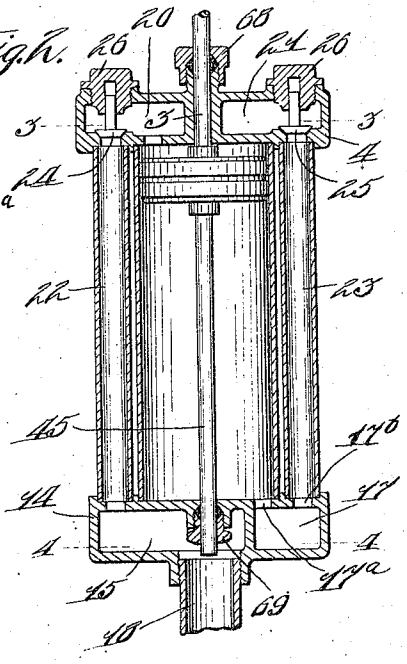


Fig. 3.

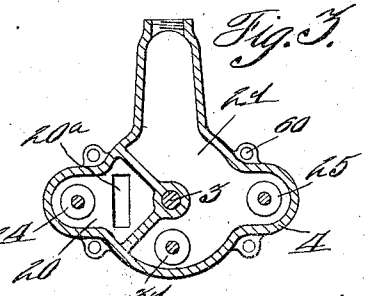
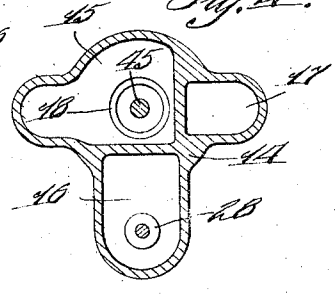


Fig. 4.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 5.

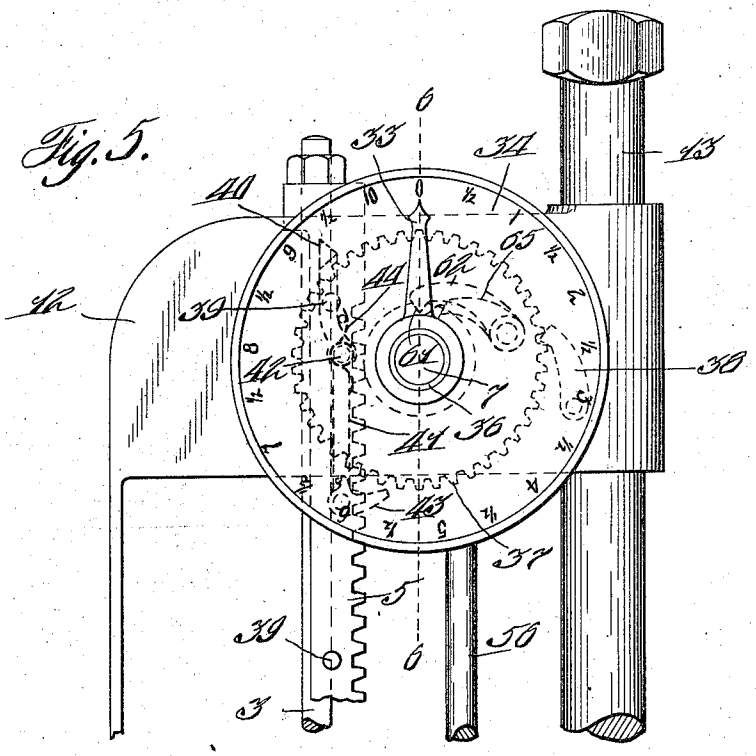

Fig. 6.

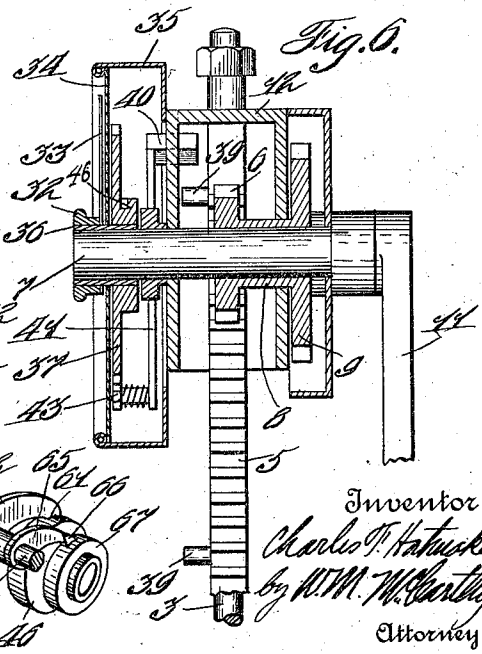

Fig. 7.

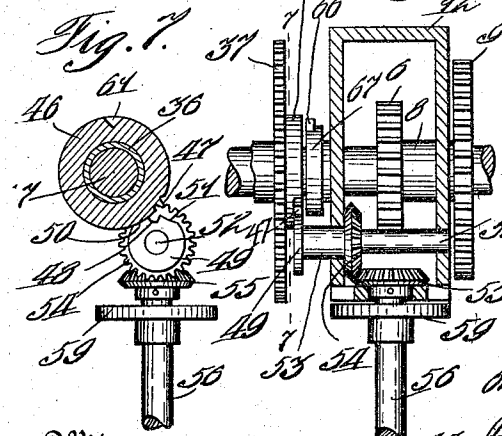

Fig. 8.

Fig. 9.

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SELF-MEASURING PUMP.

954,097. Specification of Letters Patent. Patented Apr. 5, 1910.

Application filed September 15, 1908. Serial No. 453,115.

To all whom it may concern:

Be it known that I, CHARLES F. HATMAKER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Self-Measuring Pumps, of which I declare the following to be a full, clear, and exact description.

This invention relates to self measuring pumps.

One of the objects of the invention is to provide means for predetermining the quantity of liquid to be discharged.

Another object of the invention is to provide means for rendering the discharging means of the pump ineffective after a predetermined quantity has been discharged.

Another object of the invention is to provide means for automatically regulating the movement of the discharging means.

With these and incidental objects in view, the invention consists in certain novel features of construction and combinations of parts the essential elements of which are set forth in appended claims and a preferred form of embodiment of which is hereinafter described with reference to the drawings which accompany and form part of this specification.

Of said drawings: Figure 1 represents a side elevation partly in section of the improved pump. Fig. 2 represents a vertical section through the cylinder of the pump and the pipes connecting the head and base. Fig. 3 represents a transverse section on line 3—3 of the head of the cylinder as shown in Fig. 2. Fig. 4 represents a transverse section on line 4—4 of the base of the cylinder as shown in Fig. 2. Fig. 5 represents an enlarged side elevation of the upper part of the pump looking in the opposite direction from Fig. 1. Fig. 6 represents a vertical section taken on line 6—6 of Fig. 5. Fig. 7 represents an elevation of the upper part of the automatically operating finger shaft and coöperating mechanism, a part of which is shown in section. Fig. 8 represents a side elevation partly in section of the mechanism shown in Fig. 7; and some additional parts. Fig. 9 represents a detail perspective of the locking mechanism for the operating handle.

Described in general terms this invention comprises an improved form of a double acting self measuring pump, with means for predetermining the amount of liquid to be discharged after which the discharging means is automatically rendered ineffective or locked from operation.

This invention also comprises an automatically operating device for limiting the movement of the discharging means or piston, so that said discharging means will be returned to normal or starting position in discharging a predetermined quantity.

Furthermore, this invention comprises means for discharging an equal quantity upon each stroke of the piston in either direction.

The piston 1 which plays in a cylinder 2 has projecting upwardly therefrom a piston rod 3. This rod has secured to its upper end, above the head 4 of the cylinder, a rack plate 5 with which a pinion 6 secured to a shaft 7 meshes, (see Fig. 6). A sleeve 8 surrounding the shaft 7 connects said pinion 6 with a gear 9, with which meshes a pinion 10 secured to a short shaft 10^a to which is also secured an operating handle 11. While this gearing as shown is so proportioned that four turns of the operating handle in the direction of the arrow (Fig. 1), will rotate the shaft 7 twice and give the rack plate 5 and piston 1 a full stroke upwardly, which will draw within the cylinder 2 below the piston a half gallon of liquid and discharge from above the piston an equal quantity. It is to be understood that any other ratio may be used without departing from the scope of the invention. On the reverse movement of the operating handle the piston will discharge the quantity previously drawn in below and draw into the cylinder a corresponding quantity above said piston, as hereinafter fully described.

The above described gearing and handle are suitably mounted in a frame work 12 extending upwardly from the head 4 of the piston, a portion of said frame work being supported by a post 13 also extending upwardly from the head 4. This frame work 12 acts as a guide for the rack plate 5. The cylinder 2 is mounted in a base 14 having two independent and separate inlet chambers 15 and 16 and an outlet chamber 17. A suction pipe 18 enters the inlet chamber 15 while an elbow 19 of said pipe enters the chamber 16 of the base. The head 4 is divided into one inlet chamber 20 and one

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outlet chamber 21. A pipe 22 connects the inlet chambers 15 and 20 of the base and head respectively while a similar pipe 23 connects the outlet chambers 17 and 21 of the said base and head. Suitable valves 24 and 25 control the ingress of the liquid from the base to the head through the pipes 22 and 23 respectively, the said valves being provided with caps 26 screw threaded in the upper side of the head 4, and through which access may be had to said valves. A faucet 27 is connected to the outlet chamber of the head and through which the liquid passes to suitable receptacles (not shown).

When the piston 1 is raised, as previously described, the vacuum created thereby will raise a valve 28 mounted in the chamber 16, and draw the liquid through elbow 19 into said chamber from whence it passes into the cylinder through a port hole 29, the liquid in the cylinder above the piston being forced through an opening in the head 4 into the outlet chamber 21 and thence through the faucet 27. This opening in said head is controlled by a valve 31 (see Fig. 3) which is similar to the valves 24 and 25, it being understood that when the valves 28 and 31 are opened, the valves 24 and 25 are closed, and when the latter valves are opened, the former are closed. Upon the downward movement of the piston, the liquid previously drawn in by the upward movement of said piston will be forced through a port hole 17^a into the chamber 17 of the base 14 and thence through a port hole 17^b and pipe 23 to the discharge chamber 21 of the head 4, the liquid at the same time being drawn into the cylinder above the piston through the pipe 18, chamber 15, pipe 22, chamber 20 and a port hole 20^a.

Referring now to Figs. 5 and 6, the means for predetermining the quantity to be discharged will be described: Loosely mounted upon the opposite end of the shaft 7, from which the gear 9 is secured, is a knob 32 provided with a pointer 33, which plays over a dial 34, the latter being suitably secured within a casing 35 attached to the frame work 12. This knob 32 is secured to a short sleeve 36 surrounding the shaft, the inner end of said sleeve having fast thereto a gear wheel 37 with which a pawl 38 engages to prevent accidental displacement of said knob and gear wheel. The dial 34 is provided with a series of numerals from 0 to 10, with the fractions ½ between said numerals representing quantities to be discharged from ½ gallon to 10 gallons. Whenever it is desired to discharge a certain quantity, say 5 gallons, the knob is turned toward the right in Fig. 5, until the pointer 33 points to the numeral 5. Now upon turning the handle 11 in the direction of the arrow (Fig. 1), the piston 1 and rack 5 will be raised upwardly through means of the previously described gearing. Projecting laterally from the rack 5 are two pins 39, (see Figs. 5 and 6), which, as the said rack moves upwardly engage with a bevel offset 40 extending from the upper end of a lever 41 suitably pivoted as at 42 to the frame work 12 and rock said lever so that the lower end of same will move forwardly. As the rack descends by the reverse movement of the operating handle the pins 39 will again engage the bevel offset 40 and rock said lever. As the lower end of said lever is moved forwardly a spring pressed one way pawl 43 carried by the lower end of the lever 41 will engage the teeth of the gear wheel 37 and rotate the latter and the pointer 33 connected thereto backward step by step. This operation is continued until the pointer 33 reaches zero, by which time the five gallons are discharged. After each rocking of the lever 41 by the pins 39, it is returned to the position shown in Fig. 5 by a light coil spring 44 which surrounds the pivoted point 42 of said lever. In this position the pawl 43 is free of the teeth of the gear wheel 37 so the latter may be rotated when the pointer is moved in predetermining a new quantity. As the pointer 33 is always moved in one direction during the discharging operation of the pump, it will be seen that it may be moved in the shortest direction to predetermine the quantity to be discharged, that is, if a quantity above five gallons is to be discharged, the pointer 33 may be moved toward the left in Fig. 5 and for any quantity not exceeding five gallons, to the right. The movement of the pointer in either direction unlocks the discharging means as hereinafter described.

In single cylinder double acting pumps without the equalizing rod 45 which will be hereinafter described, it is essential that the piston be returned to normal or starting position in discharging any desired quantity because less liquid is discharged upon the up stroke of the piston than upon the down stroke due to the displacement of some of the liquid by the piston rod. Heretofore when it was desired to discharge a quantity which exceeded that discharged by a complete reciprocation of the piston and which did not amount to that discharged by two complete reciprocations of the piston, no means were provided to automatically limit the stroke of the piston so that the limited reciprocation of the piston would discharge the quantity exceeding a complete reciprocation, and therefore, it is desired to claim this feature broadly without regard to the character of the mechanism employed. To accomplish this result, the following mechanism has been devised: Mounted upon the extreme inner end of the sleeve 36 and forming a part of the gear 37, is a disk 46 provided with a single tooth 47, (see Figs. 6, 7

and 8). Upon the movement of the knob 32 to predetermine the quantity to be discharged, the tooth 47, (Fig. 7), will engage a notch 48 in a disk 49, and give the latter a partial rotation. This disk 49 is provided with concave portions 50 and 51 which engage the periphery of the disk 46 and said disk 49 is locked thereby in either of two positions. The disk 49 is loosely mounted upon a stub shaft 52, suitably secured in the frame work 12, and is provided with a sleeve 53 which carries at its other end a bevel gear 54, the latter meshing with a similar gear 55 fast to the upper end of a vertical shaft 56, which is guided by the head 4 and frame work 12. This shaft 56 has a finger 57, (Fig. 1) which, when the pointer 33 is at zero stands in the path of a flip pawl 58 attached to the lower end of the rack plate 5. The finger 57 is located approximately midway the length of said shaft and is only moved out of the path of the flip pawl 58 when the shaft 56 is rotated by moving the pointer 33 to indicate a gallon or more. The timing of the return of the shaft 56 carrying the finger 57 by means of the lever 41, pawl 43 and intermediate connections, is such that the finger 57 is not moved in the path of the flip pawl 58 to intercept the upward movement of the rack plate 5 and consequently the piston 1 unless a quantity comprising a half gallon is to be discharged, in which case the last upward movement discharges only a quart and the return movement an equal quantity, or in other words, the finger is returned to normal position just as the last half gallon is to be discharged, the piston then being in its upper position when even gallons are discharged, and in its lower position when fractions of a gallon are discharged. The pawl 58 flips idly by the finger 57 when the rack 5 is returned in discharging the last half gallon of even quantities. The upward movement of the piston 1 in discharging a half gallon is limited by a disk 59 secured to the finger shaft 56, with which the flip pawl 58 contacts, while the downward movement of said piston is limited by its coming into contact with the base 14. Suitable tie rods 60 connect the base and head to securely hold them in place.

The shaft 7 is normally locked and consequently the operating handle 11, and is released upon the adjustment of the pointer 33 to any desired quantity in the following manner: The part of the disk 46 secured to the inner end of the sleeve 36 that is out of the plane of the disk 49 has a V shaped notch 61, (see Figs. 5 and 9) upon its upper side, in which rests the rear end of a pawl 62 pivoted upon a stub shaft 63 projecting from the framework 12. This pawl is fast to one end of a sleeve 64, which carries at its other end a pawl 65, the free end of which is normally in the path of a lug 66 projecting from a disk 67 secured to the shaft 7, and thereby locking the shaft from rotation. When the knob 32 is rotated, the disk 46 will also be rotated, camming the free end of the pawl 62 upwardly and through means of the sleeve 64 raise the pawl 65 out of the path of the lug 66, so that the shaft 7 and the disk 67 may be rotated. As the predetermined quantity is discharged the disk 46 will have been rotated back to its normal position, as previously described, and the pawls 62 and 65 returned to their normal positions by gravity or a suitable spring. It is obvious, that if desired, the predetermining feature of the invention may be used as an indicating or registering mechanism to keep account of the quantity of liquid discharged, in which case the locking pawl 65 should be left off and the figures on the dial arranged so as to progress in the opposite direction from that shown.

Heretofore in double acting single cylinder pumps where registers have been employed to keep track of the quantity of liquid discharged, they have been made to register the quantity discharged by a complete reciprocation of the piston at the end of the up-stroke or the return of the piston. This construction is faulty for the reason that if it is desired to discharge a less quantity than that discharged by a complete reciprocation of the piston, a quantity greater than that discharged would be registered or none at all.

In some instances, it is very desirable to discharge the desired quantity by the continued movement of the operating handle in one direction, but the great difficulty heretofore in single cylinder double acting self measuring pumps has been that the same amount of liquid would not be discharged upon one stroke of the piston as upon the other, due to the displacement of the liquid above the piston by the piston rod. This objection has been overcome by the following simple and efficient means. Extending downwardly from the piston, as shown in Figs. 1 and 2, is a rod 45 of the same cross sectional area as the piston rod 3, which displaces the same quantity of liquid below the piston 1 as the rod 3 does above. The rods 3 and 45 pass through suitable packing boxes 68 and 69 which are mounted upon the head 4 and base 14 of the cylinder respectively.

It is to be understood that the dial 34 may be divided into fractions of a gallon representing pints and quarts, or any other quantities desired, as well as the $\frac{1}{2}$ gallon fractions as shown.

While the construction of the pump and the equalizing rod have been specifically described, they are not claimed except in combination with the other elements forming

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the subject matter of this application, as they formed the basis of a divisional application filed February 15, 1909, Serial No. 477,960.

While the form of mechanism herein shown and described is admirably adapted to fulfil the objects primarily stated, it is to be understood that it is not intended to confine the invention to the one form of embodiment herein disclosed, for it is susceptible of embodiment in various forms all coming within the scope of the claims which follow.

What is claimed is:

1. In a self measuring pump, the combination with means for operating said pump to discharge liquid therefrom, of means for predetermining the quantity to be discharged, means for automatically rendering the operating means ineffective when the predetermined quantity has been discharged, and means automatically actuated during the operation of the operating means for limiting the movement of the latter.

2. In a self measuring pump, the combination with means for operating said pump to discharge liquid therefrom, of means for predetermining the quantity to be discharged, and means for automatically locking the operating means when the predetermined quantity has been discharged.

3. In a self measuring pump, the combination with means for operating said pump to discharge liquid therefrom, of an adjustable device for predeterminining the quantity to be discharged, means for automatically rendering the operating means ineffective when the predetermined quantity has been discharged, and means automatically actuated during the operation of the operating means for limiting the movement of the latter.

4. In a self measuring pump, the combination with means for operating said pump to discharge liquid therefrom, of an indicating mechanism comprising a dial and pointer for predetermining the quantity to be discharged, means for automatically rendering the operating means ineffective when the predetermined quantity has been discharged, and means automatically actuated during the operation of the operating means for limiting the movement of the latter.

5. In a self measuring pump, the combination with means for operating said pump to discharge liquid therefrom, of an indicating mechanism comprising a dial and pointer for predetermining the quantity to be discharged, and means for automatically locking the operating means when the predetermined quantity has been discharged.

6. In a self-measuring pump, the combination with an operating mechanism for discharging liquid therefrom, of means for normally locking said operating mechanism, and means for predetermining the quantity to be discharged and unlocking the operating mechanism, the said locking means being arranged to automatically lock the operating mechanism when the predetermined quantity has been discharged.

7. In a self measuring pump, the combination with a normally locked operating mechanism for discharging liquid therefrom, of an indicating mechanism comprising a dial and pointer for predetermining the quantity to be discharged, a cam disk connected to the indicator mechanism for unlocking the operating mechanism, means for operating the indicating mechanism during the discharging of the liquid and a pawl for locking said operating mechanism when the predetermined quantity has been discharged.

8. In a self measuring pump, the combination with a normally locked operating mechanism for discharging liquid therefrom, of an indicating mechanism comprising a dial and pointer, the latter being constructed to be moved over the dial for predetermining the quantity to be discharged, a cam disk connected to the indicating mechanism for unlocking the operating mechanism, a lever actuated by the operating mechanism for returning the pointer of the indicating mechanism during the discharging of the liquid, and a pawl for locking the operating mechanism when the predetermined quantity has been discharged.

9. In a self measuring pump, the combination with means for operating said pump to discharge liquid therefrom, of means governed by the operating means for automatically controlling the extent of movement of the latter.

10. In a self measuring pump, the combination with means for operating said pump to discharge liquid therefrom, of means for predetermining the quantity to be discharged, and means connected to the predetermining means and governed by the operating means for automatically controlling the extent of movement of the latter.

11. In a self measuring pump, the combination with means for operating said pump to discharge liquid therefrom, of an indicating mechanism for predetermining the quantity to be discharged, and means connected to the indicating mechanism and governed by the operating means for automatically controlling the extent of movement of the latter.

12. In a self measuring pump, the combination with a reciprocatory piston, of means for normally locking said piston from operation, a manipulative device for unlocking said piston, and means controlled by said manipulative device for controlling the stroke of said piston.

13. In a self measuring pump, in combination a reciprocatory piston for discharg-

ing a certain quantity of liquid upon each reciprocation, and operating means therefor, and means controlled by said operating means for automatically limiting the reciprocatory movement of the piston so as to discharge a less quantity.

14. In a self measuring pump, the combination with a reciprocatory piston for discharging a certain quantity of liquid upon each reciprocation, an operating means therefor and a finger rod controlled by said operating means for automatically limiting the reciprocatory movement of the piston so as to discharge a less quantity.

15. In a self measuring pump, the combination with a reciprocatory piston for discharging a certain quantity of liquid upon each reciprocation, means for predetermining the number of reciprocations of said piston, and means for automatically limiting the last reciprocatory movement of said piston.

16. In a self measuring pump, the combination with means for operating said pump to discharge liquid therefrom, of means adjustable in different directions for predetermining the quantity to be discharged, and means for automatically rendering the operating means ineffective when the predetermined quantity has been discharged.

17. In a self measuring pump, the combination with means for operating said pump to discharge liquid therefrom, of means adjustable in different directions for predetermining the quantity to be discharged, and means for automatically locking the operating means when the predetermined quantity has been discharged.

18. In a self measuring pump, the combination with means for operating said pump to discharge liquid therefrom, of means actuated by the operating means for automatically controlling the extent of movement of the latter.

19. In a self measuring pump, the combination with a cylinder, of a base and head therefor, operating means for discharging liquid from the cylinder through the base and head, means for predetermining the quantity of liquid to be discharged, and means for locking the operating means after the predetermined quantity has been discharged.

20. In a self measuring pump, the combination with a cylinder, of a base and head therefor, operating means for discharging liquid from the cylinder through the base and head, and means operated automatically during the operation of the operating means for limiting the movement of the operating means.

21. In a self measuring pump, the combination with a cylinder, of a base and head therefor, a piston for discharging liquid from the cylinder through the base and head, operating means for the piston, and a finger rod operated automatically during the operation of the operating means for limiting the stroke of the piston.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES F. HATMAKER.

Witnesses:
A. C. HARNED,
J. F. KENNEY.