

No. 661,249.

Patented Nov. 6, 1900.

C. H. LEGGETT.
SPRAYER.

(Application filed May 15, 1900.)

(No Model.)

3 Sheets—Sheet 1.

FIG. 1.

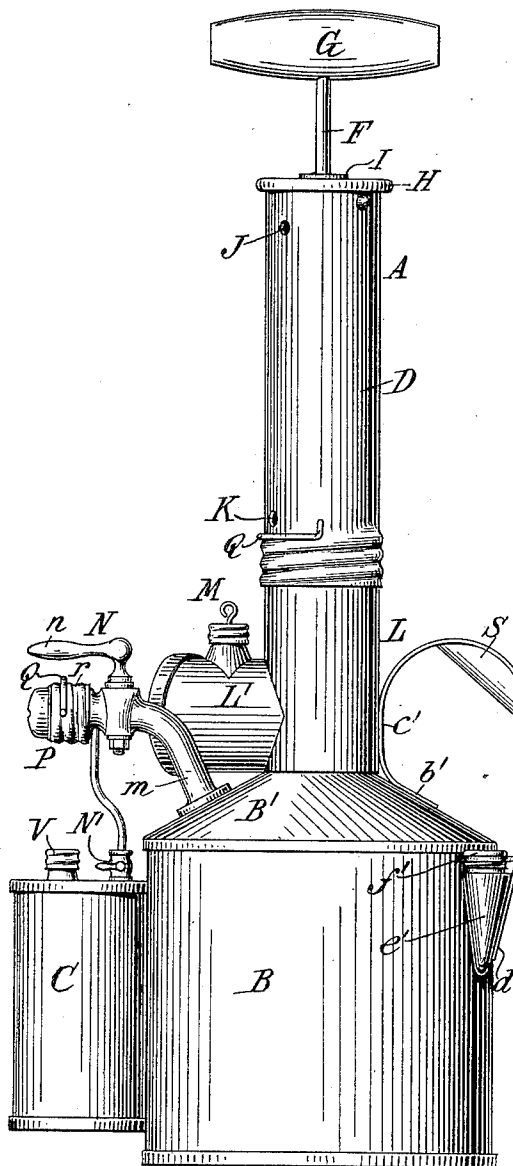
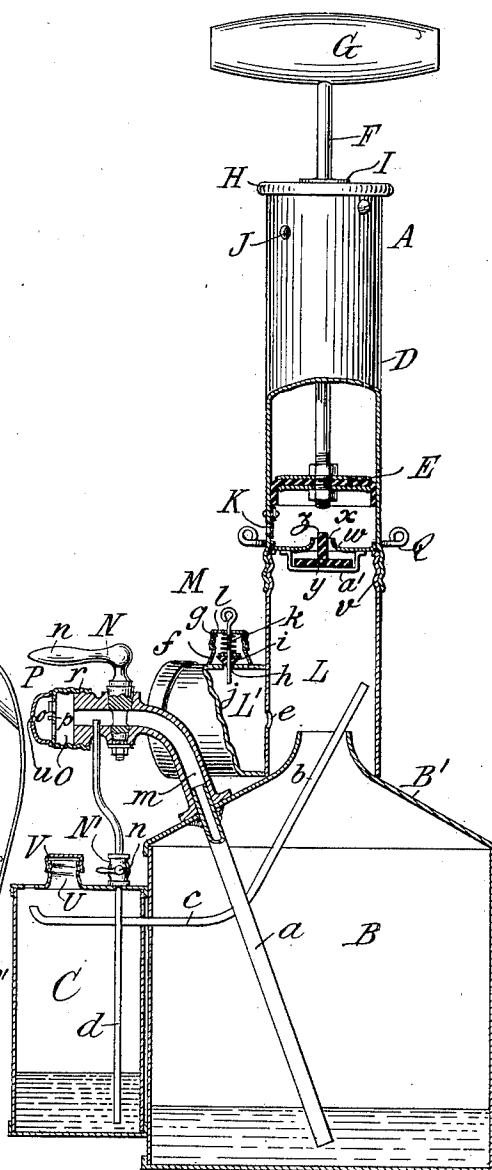


FIG. 2.



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3 Sheets—Sheet 2.

FIG. 3.

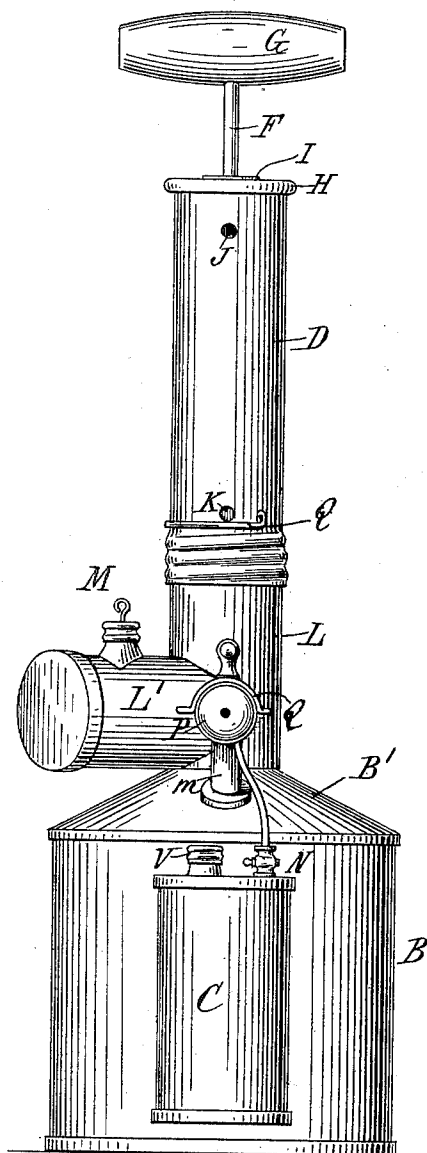


FIG. 4.

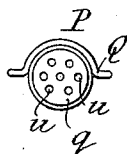


FIG. 5.

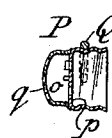


FIG. 6.

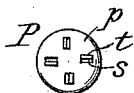
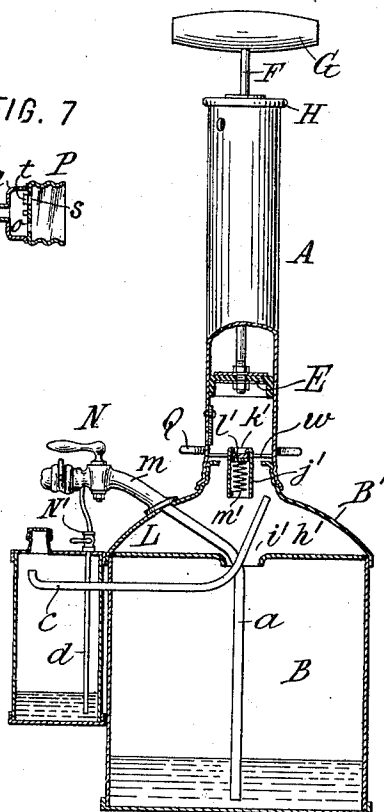


FIG. 7.



FIG. 8.



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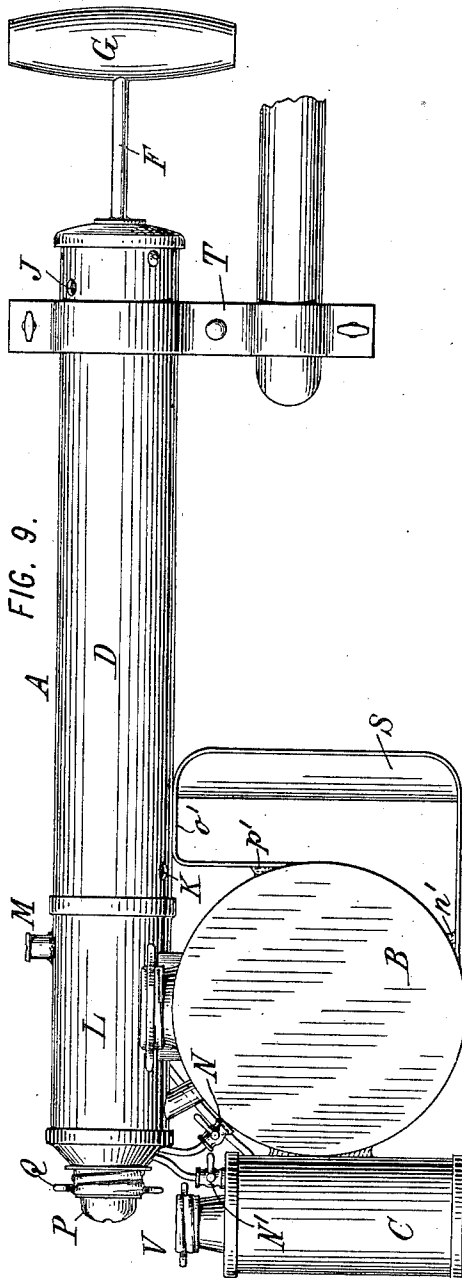
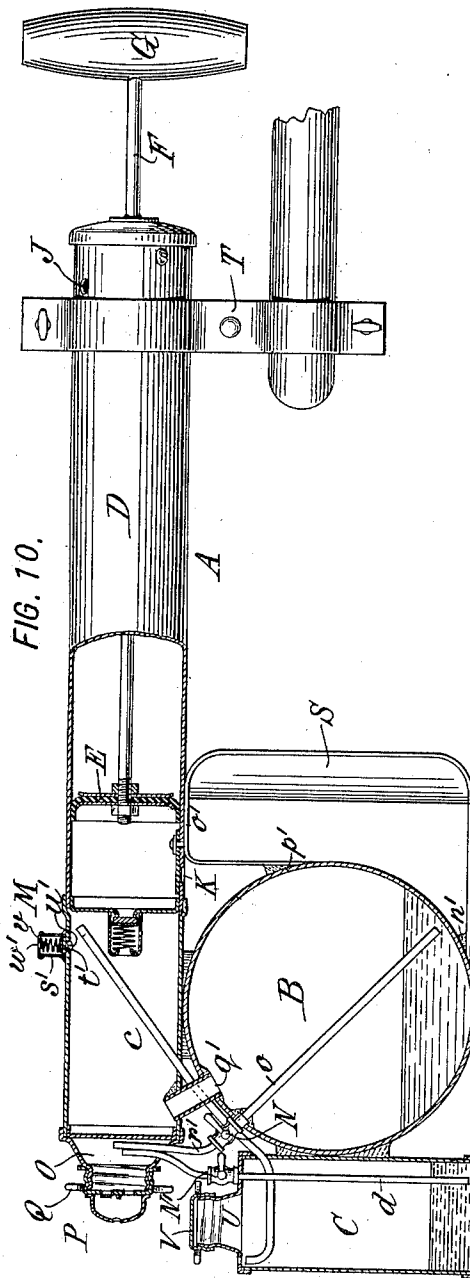
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WITNESSES:

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INVENTOR:

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UNITED STATES PATENT OFFICE.

CLINTON H. LEGGETT, OF NEW YORK, N. Y.

SPRAYER.

SPECIFICATION forming part of Letters Patent No. 661,249, dated November 6, 1900.

Application filed May 15, 1900. Serial No. 16,737. (No model.)

To all whom it may concern:

Be it known that I, CLINTON H. LEGGETT, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Sprayers, of which the following is a specification.

This invention relates to sprayers, and aims to provide certain improvements therein.

In spraying trees and the like it is frequently desirable that the liquid should be forced a considerable distance, and atomizers are not sufficient for this purpose, since the liquid, being finely subdivided, has not sufficient bulk to readily overcome the resistance of the atmosphere.

My present invention aims to provide an improved sprayer which is especially adapted for such use and which in its preferred form is especially adapted for spraying mixtures of two or more liquids.

To this end in carrying out the preferred form of my improvements I provide a hand-operated and manually-transportable spraying device which combines a pump, a water reservoir or tank, a holder for kerosene or other liquid, an air-pressure or storage chamber between the tank and holder and the pump, a mixing-chamber into which the liquids are forced and in which they are thoroughly commingled, and a discharge-nozzle through which the combined liquids are ejected.

I also provide certain other features of improvement in construction, arrangement, and operation of the improved device, all of which will be hereinafter fully set forth.

In the accompanying drawings, which illustrate certain modifications of my invention, Figure 1 is a side elevation of the preferred form of my improved sprayer. Fig. 2 is a view, partly in vertical axial section, of the sprayer shown in Fig. 1. Fig. 3 is a front elevation. Fig. 4 is a front elevation of the discharge-nozzle. Fig. 5 is an axial section thereof. Fig. 6 is a front view of the rear wall of the nozzle. Fig. 7 is an axial section of a modified form of discharge-nozzle. Fig. 8 is a vertical axial section, partly in elevation, of a modified form of sprayer. Fig. 9 is a side elevation of a hand-sprayer embodying my

invention, and Fig. 10 is a similar view partly in vertical longitudinal section.

Referring to the drawings, A represents an air-pump, B a water-tank, and C an oil-reservoir. The pump A may be any suitable force-pump, but is preferably formed with a cylinder D, within which is a cupped leather piston E, operated by a rod F through the medium of a handle G, which rod is guided in the head H of the cylinder and is arrested by a stop I on the rod striking the head, so that the piston shall be stopped at a predetermined point in its movement.

J is a relief-aperture communicating with the pump-chamber in the cylinder at rear of the piston, and K is an inlet-valve in front of the piston. The oil-reservoir may be any suitable vessel for holding kerosene or a suitable emulsion of which it is a constituent or any other liquid or material which it is desired to spray.

According to one feature of improvement I provide an air-chamber L, which is interposed between the pump and the water-tank and oil-reservoir, so that pressure may be stored up by operating the pump and allowed to act upon the liquid or liquids, thus permitting manipulation of the pump with the sprayer resting upon the ground or in other advantageous position for applying power to the pump and subsequent elevation of the sprayer to direct the discharge in any desired direction, using the power thus stored to effect the spraying operation.

The air-chamber L may be any suitable chamber connected with the pump and with the water-tank, and preferably also with the oil-reservoir, so that pressure is communicated from the chamber to the reservoir and tank to effect the discharge of the water and oil. As shown in Fig. 2, the chamber L is formed with cylindrical walls of approximately the same diameter as the pump-cylinder D, to which it is connected at its upper end, and the lower walls of the chamber are fixed to the upper wall of the tank B. It will be seen that the walls of the chamber L constitute a reduced continuation of the tank B in axial alinement with the latter. The upper wall of the tank is formed with an aperture or perforation b, which permits communi-

cation of the air-chamber L, so that pressure from this chamber acts upon the surface of the water in the tank B and forces the water upwardly through the discharge-pipe *a*. The oil-reservoir C is connected to the chamber L in any suitable manner, preferably as shown, through the medium of an air-pipe *c* extending from the upper part of the reservoir into the chamber, and thus communicating pressure from the latter to the reservoir above the surface of the oil or other liquid contained therein and forcing such liquid upwardly through its discharge-pipe *d*. As shown, the air-pipe *c* extends through the front wall of the tank B and upwardly through the tank, passing through the hole *b*. The air-pipe is thus protected from all strain and cannot be accidentally displaced. I preferably provide a supplemental air-chamber L', which is shown as a cylindrical member of approximately the same diameter as the chamber L, and extends at a right angle to the direction of said chamber. The walls of the chamber L' partially embrace those of the chamber L, the latter being perforated at *e* to permit communication therethrough. By thus providing a supplemental air-chamber I am enabled to obtain a greater storage capacity for the air while retaining simplicity of construction and without unduly increasing the height of the sprayer. It will be seen that as the height of the liquid in the reservoir decreases the air-pressure may be stored therein in addition to the chamber L, thus increasing the available storage capacity of the device.

According to another feature of improvement I provide a safety-valve M for the air-chamber, so that at a predetermined pressure in said chamber the valve will act automatically to reduce any excess, thus avoiding any danger of straining the walls of the chamber or of the tank and reservoir and insuring safety to the user and durability to the sprayer. The safety-valve may be located at any appropriate point in the chamber L, if desired; but I prefer to connect it with the supplemental chamber L', as shown. The valve M may be of any suitable construction; but I prefer that shown, which comprises a hollow valve-shell *f*, open at its upper end and suitably screw-threaded to receive a cap *g*. The shell *f* is fixed to the wall of the chamber L' in any suitable manner, as by soldering or otherwise, and this wall is formed with a valve-seat *h*. I provide a valve proper, *i*, which normally seats upon the seat *h*, and which preferably consists of a conical plug of soft rubber, and I provide a valve-stem *j*, which, as shown, carries the plug *i* at its lower end and at its upper end passes through a suitable perforation formed in the cap *g*. The valve may be normally held against its seat by any suitable means adapted to yield at a predetermined pressure, this means being shown as a simple spiral spring *k*, pressing against the under face of the cap *g* and the upper face of the plug *i*. I also provide

means for the adjusting pressure at which the valve M will operate, this being done in the present construction by screwing or unscrewing the cap *g*. The cap is formed with an aperture *l*, which upon operation of the valve permits escape of air from within the valve-shell. The valve may be inspected or repaired by unscrewing the cap *g*, and in order that none of the parts of the valve may be lost I form a rod with a head *j*, as shown, by means of which this rod and the spring and plug are fixed to the cap, while freely permitting such movements of the valve as are necessary to produce the desired effect.

I provide means for regulating the flow of the oil from the reservoir and water from the tank, preferably in such manner that these are independently controlled, so that the proportion of water and oil may be accurately determined, thus insuring the best results for particular uses to which the sprayer is being applied. This is accomplished in the present construction by the relative sizes of the oil and water pipes and also by providing a valve or cock N N' for each of the discharge-pipes *a* and *d* of the water-tank and oil-reservoir, respectively, the valve N being connected directly to the wall of the tank by an elbow *m*, which is preferably of such shape that it is fixed at one end to the wall at right angles to the latter and extends horizontally at its other end. The elbow *m* may be soldered or otherwise connected to the valve and tank, and its inner end receives the end of the pipe *a*, as shown. The valve N' is located at a convenient point on the air-pipe *d*, preferably outside the reservoir, as shown, so that it may be easily accessible, and preferably both valves are located at the front of the sprayer, so that they may be conveniently reached by the user, and preferably adjacent to each other, so that both may be manipulated with the hand in practically the same position.

Both valves N N' are of common construction, each being provided with a handle *n*, by means of which the flow of liquid through the oil-pipe and water-pipe may be accurately gaged, so that the resultant emulsion may contain such proportion of oil and water as may be best suited for particular requirements.

According to another feature of improvement I provide a mixing-chamber O, into which the water and oil are led from their respective reservoirs and in which they are thoroughly mixed before being discharged. This mixing-chamber may be variously constructed and arranged; but for convenience I prefer to place it at a point adjacent to the discharge-opening, so that the combined water and oil after being mixed may be immediately discharged, so that there is no danger of their separation before their ejection. The mixing-chamber is shown as a small reservoir fixed to the valve N and into which said valve discharges, the oil-pipe *d* preferably extending upwardly into said valve ad-

jacent to said chamber, so that it discharges the oil across the direction of discharge of the water. The force of the oil and water upon reaching the chamber is such that they are thoroughly mixed and a nearly-perfect emulsion is produced.

I provide for a still further mixing action of the oil and water, so that there will be no danger of their separation before being discharged, this feature of my invention consisting of an improved discharge-nozzle P. The nozzle P is formed with a chamber or space *o*, rear wall *p*, and front wall *q*. The rear wall *p* is preferably formed with a rearwardly-extending screw-threaded portion *r*, adapted to screw over the end of the valve N, whereby the nozzle P may be separably connected to such valve, thus forming the chamber O. The rear wall *p* is provided with a series of openings *s*, (see Fig. 6,) each of which is formed by striking up a lip *t* angularly to said wall, so that when the liquid is forced through these openings a rapid rotary motion is imparted to it within the chamber *o*. Obviously this rotary motion might be given to the liquid in other ways. The front wall *q* is shown as a cap soldered to the wall *r* and is provided with a discharge opening or openings *u*. When it is desired that the liquid shall be ejected in a single stream, but one hole *u* is used, while if a finer subdivision of the liquid is desirable a number of holes *u* will be employed, as seen in Figs. 4 and 5. To provide for the convenient screwing and unscrewing of the nozzle P, I provide a handle or handles Q, which preferably consists of a single piece of wire bent at its middle to partly embrace the side of the nozzle and having its ends extended approximately radially of the nozzle, so that they may be conveniently grasped by the user.

According to another feature of improvement I provide means for connecting the pump-cylinder to the water-tank or air-chamber, this being effected in the construction shown by forming the upper wall of the air-chamber with a screw-threaded portion *v* and providing a suitable screw-thread upon the lower end of the pump-cylinder which is adapted to engage the threads upon the wall of the tank, thus providing a strong and durable connection between the pump and tank and at the same time permitting separation of these parts by the mere act of rotating the cylinder. It will also be noted that the tank may be charged by unscrewing the pump-cylinder, which thus forms a closure for the tank when in place thereon.

According to another feature of improvement I provide a valve for the pump of novel construction, this being shown in Fig. 2. As shown in this figure, the pump-cylinder carries at its lower end a disk *w*, which extends entirely across the cylinder above its lower screw-threaded portion, being fixed thereto in any suitable manner. The disk *w* has a central perforation *x*, through which air may

be forced into the chamber L. The valve proper consists of a flat disk of rubber or other suitable material and a stem *z*, formed in the upper side of said disk and projecting through the opening *x*. The valve is held in position by a strap *a'*, which limits the downward movements of the valve and permits its upward movement, so that it may seat against the disk *w* and close communication through the opening *x*. The valve thus provided is of extremely cheap and simple construction, positive in action, and durable in use.

According to another feature of improvement I form the water-tank so that it is capable of supporting the pump and oil-reservoir, being adapted to rest upon the ground or other flat surfaces, and preferably the tank is formed as a cylindrical vessel, having a conical top B', which serves to receive the strains incident to manipulation of the pump A. By another improvement I locate the pump-cylinder in a vertical plane, so that when the sprayer is placed upon its bottom the pump-handle may be reciprocated in a substantially vertical direction, whereby the tank receives the strains incident to such manipulation, and preferably the pump-cylinder and tank are concentrically arranged, so that the strains are evenly distributed. I provide a handle S, which is fixed at one end at *b'* to the conical wall B' of the tank, whence it is continued upwardly and soldered at *c'* to the wall of the air-chamber L and at its other end is soldered at *d'* to the tank. I preferably provide an additional charging spout or opening *e'*, which consists of a conical shell soldered or otherwise fixed to the wall of the tank and provided at its upper end with a screw-threaded cap *f'*. Preferably, as shown, I interpose the spout *e'* between the wall of the tank and the lower end of the handle *d'*. The spout thus serves as a convenient attaching-face for the handle.

The oil-chamber C is shown as fixed to the front wall of the tank B and supported thereby, the connection being effected in any suitable manner. The reservoir C is preferably of less height than the tank B, so that it does not contact with the ground, and the connection between the two is thus relieved of any strain. A suitable charging-hole U is provided for the oil-reservoir, which is closed by a screw-cap V, as shown.

In use oil may be placed in the reservoir C through the charging-hole U, and the pump-cylinder may be disconnected from the water-tank and water introduced into the latter through its opening *b* to the desired level, whereupon the pump will be screwed in position on the top of the tank. The sprayer will be placed upon the ground and the pump reciprocated until the desired pressure is obtained in the chamber L, whereupon the valves N N' will be suitably adjusted and the spray directed over the plant or shrub by means of the handle S. The safety-valve M will prevent too great pressure in the chamber L

and may be used as an indicator for indicating to the user when reciprocation of the pump should stop. The strains incident to the pumping operation will be all received by the walls of the tank, and when the pump-cylinder and tank are axially in alinement such strains will be evenly distributed over the tank. The water and oil will be thoroughly agitated and mixed in the mixing-chamber and prevent it from separation in the nozzle and eject it through the latter while in the form of spray or a single stream, as may be desired.

As shown in Fig. 7, instead of a single hole *u* a nozzle *g'* may be provided for the cap *P*. This is shown as fixed to the front wall *q* of the cap and having an opening through it leading to the chamber *o*.

It will be seen that my invention provides improvements which can be readily and advantageously availed of, and it will be understood that I do not limit myself to any of the particular details of construction, arrangement, and combination of parts and features shown as constituting the preferred form of my invention, since such improvements may be employed in whole or in part, according to such modifications or circumstances as the judgment of those skilled in the art may dictate, without departing from the spirit of my invention.

In Fig. 8 the air-chamber is shown as formed entirely within the tank *B*, the tank being divided at its upper end by a partition or wall *h'*, crossing the tank and having an aperture or opening *i'*, through which passes the water-discharge pipe *a* and the air-pipe *c*. This affords a very compact and simple construction, and the partition *h'* increases the strength of the tank. The pump-cylinder is here shown screwing directly on the conical wall *B'* of the tank and receives the thrust strains of the pump, as before. A modified form of pump-valve is shown in this figure, and consists of a valve-shell *j'*, opening at its upper end into the pump-cylinder and at its lower end into the chamber *L*, it being fixed to the wall *w* by soldering or otherwise. The shell *j'* has at its upper end an inwardly-turned flange *k'*, which forms a seat against which the valve *l'* is normally held by a spring *m'*. The lower end of the spring *m'* is fixed to the shell *j'*, as shown. The valve face or disk *l'* is of less diameter than the interior diameter of the shell *j'*, and when pressure is exerted at its upper side it moves downwardly from its seat *k'*, permitting inflow of air to the chamber *L*.

In Figs. 9 and 10 I have shown a modification, suitable for sprayers of smaller capacity, the sprayer being adapted to be supported by grasping the handle *S* with one hand while reciprocating the pump-plunger with the other. The water-tank *B* is fixed to the walls of the air-chamber *L*, the handle *S* being soldered at *n'* to the lower side of the tank and being connected at its upper end

at *o'* to the pump-cylinder, whence it is continued angularly to the cylinder and is again soldered to the tank at *p'*, thus supporting both the cylinder and tank and affording an exceedingly strong connection between the two. In this construction the chamber *L* is formed as a continuation of the pump-cylinder, the former being screwed or otherwise connected to the cylinder, as shown. Air is fed from the air-chamber to the tank by a pipe *q'*, as shown. The mixing-chamber *O* is arranged at the end of the air-chamber, and water is led to this chamber by a suitable pipe *r'*, passing through the upper wall of the tank into the lower wall of the mixing-chamber. A modified form of safety-valve *M* is shown in Figs. 9 and 10, this comprising a shell *s'*, fixed to the upper wall of the chamber *L*, within which is a disk *t'*, normally closing an aperture *u'* in said wall under tension of a spring *v'*. Upon a predetermined excess of pressure the disk *t'* is forced from its seat, which permits air to escape from the chamber *L* into the shell *s'* and to the outer air through an opening *w'* in the upper end of the shell.

It is often desirable to elevate the sprayer beyond the ordinary reach, and this may be conveniently done with the present construction of sprayer by a clamp *T*, adapted to clamp the cylinder to a rake or hoe handle, the pump being reciprocated until the chamber *L* is charged with the necessary pressure, when the sprayer is elevated and directed by the handle until the pressure is exhausted, when the operation may be repeated, if necessary.

What I claim is—

1. In sprayers, the combination with an air-pump, of a water-tank, and a liquid-reservoir outside said tank and connected therewith, of an air-pressure chamber connected to said pump, and connections from said tank and reservoir with said chamber.

2. In sprayers, the combination with an air-pump, and a water-tank and liquid-reservoir connected thereto, of a liquid-pressure chamber for receiving air from said pump, and connections leading from said chamber to the upper end of said water-tank and liquid-reservoir.

3. In sprayers, the combination with an air-pump, of a water-tank beneath said pump, and an air-pressure chamber above the upper end of said tank and below the lower end of said pump.

4. In sprayers, the combination with an air-pump, a liquid-reservoir, and a water-tank, of an air-pressure chamber connected to said pump, reservoir and tank and a safety-valve for said chamber.

5. In sprayers, the combination with an air-pump, a water-tank, and a liquid-reservoir, of an air-pressure chamber interposed between said tank and pump, and communicating with the upper end of said liquid-reservoir, discharge-pipes for said liquid and water, a discharge-nozzle connected to said pipes, and valves adjacent to said nozzle for regu-

lating the discharge from said water-tank and liquid-reservoir.

6. In sprayers, the combination with a pump, a water-tank and a liquid-reservoir, of a mixing-chamber connected to said tank and reservoir, means for mixing the liquids in said chamber and a discharge-opening in said mixing-chamber.

7. In sprayers, the combination with a pump, a water-tank and a liquid-reservoir, and a mixing-chamber outside of said tank and reservoir, means for mixing the liquids in said chamber, pipes leading from said tank and reservoir to said mixing-chamber, and a discharge-opening in said mixing-chamber.

8. In sprayers, the combination with a pump, a water-tank, and a liquid-reservoir,

of a mixing-chamber connected to said tank and reservoir, means for mixing the liquids in said chamber and a discharge-nozzle screw-ing on the wall of said mixing-chamber.

9. In sprayers, the combination with a pump, a water-tank and a liquid-reservoir, of a mixing-chamber, pipes leading from said tank and reservoir in said chamber, and having discharge-openings adjacent to each other, the one arranged to discharge across the other.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

CLINTON H. LEGGETT.

Witnesses:

GEORGE H. FRASER,
EUGENE V. MYERS.