(No Model.) 2 Sheets—Sheet 1.

J. FRANKLIN.

APPARATUS FOR IRRIGATING AND SPRINKLING LAND.

No. 479,105. Patented July 19, 1892.

Fig. 1.

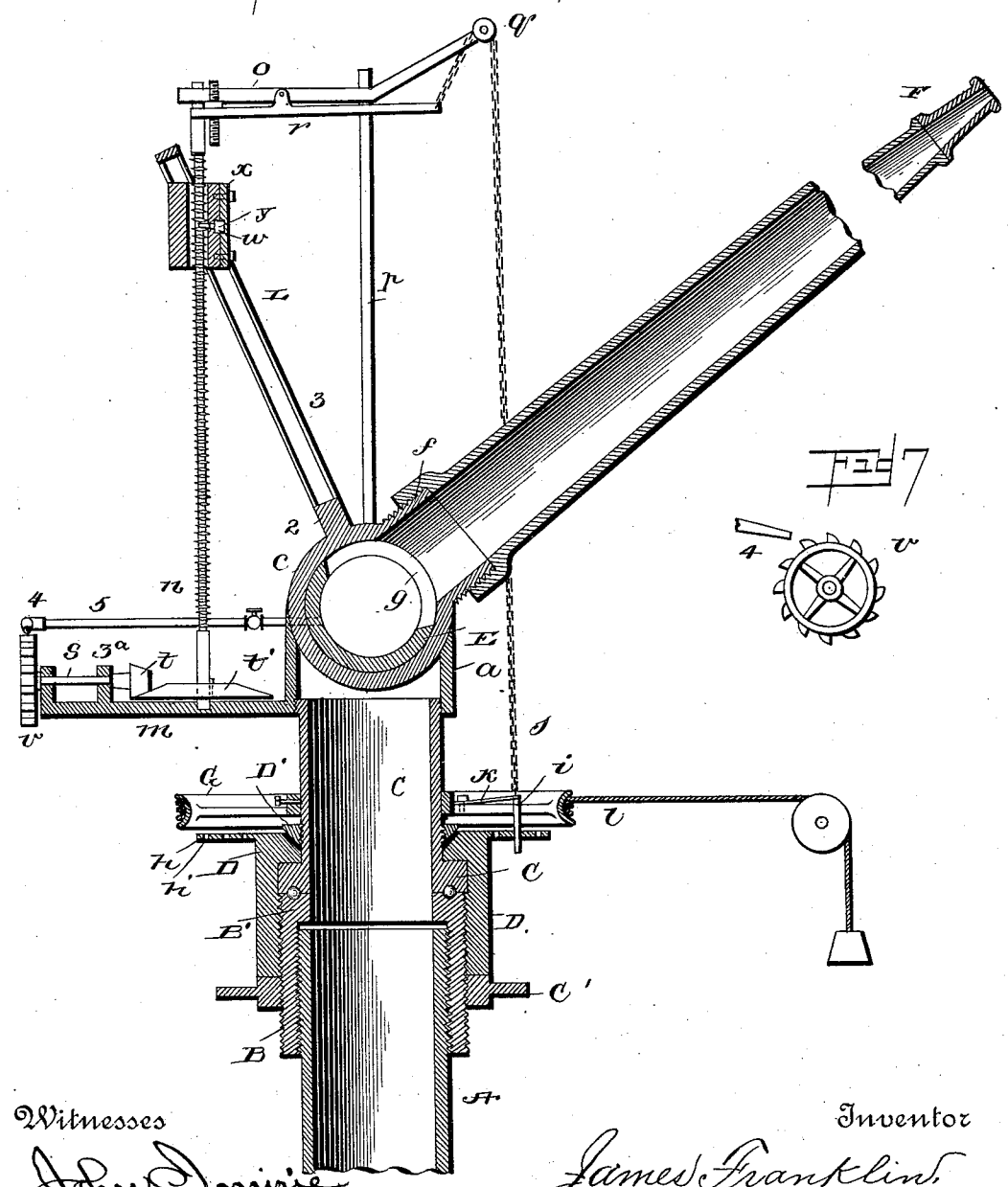

Fig. 7.

Witnesses

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(No Model.) 2 Sheets—Sheet 2.

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Fig 2

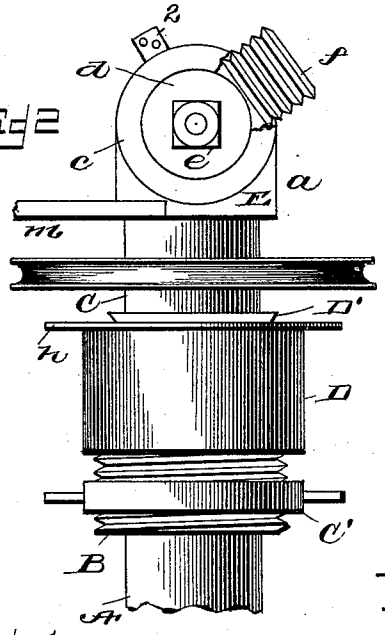


Fig 3

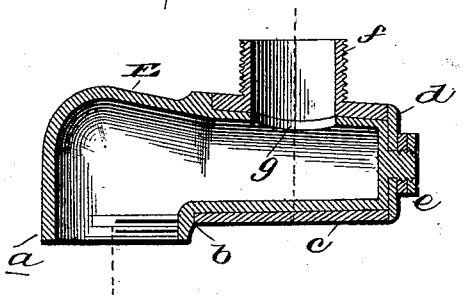


Fig 5

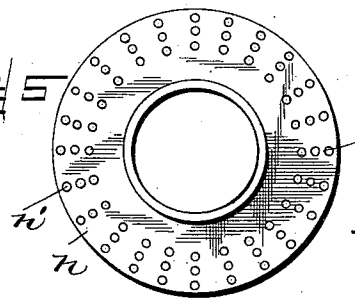


Fig 4

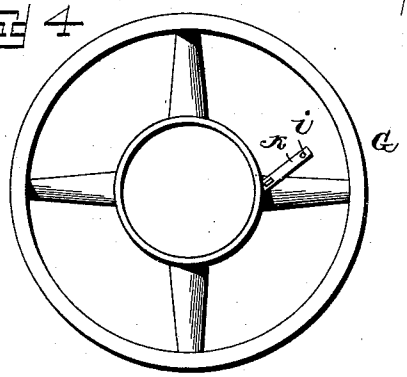


Fig 9

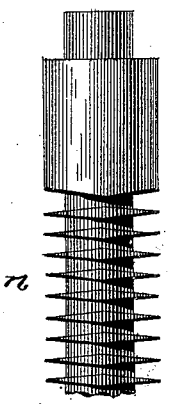


Fig 8

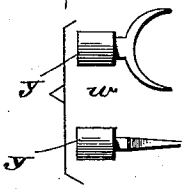


Fig 10

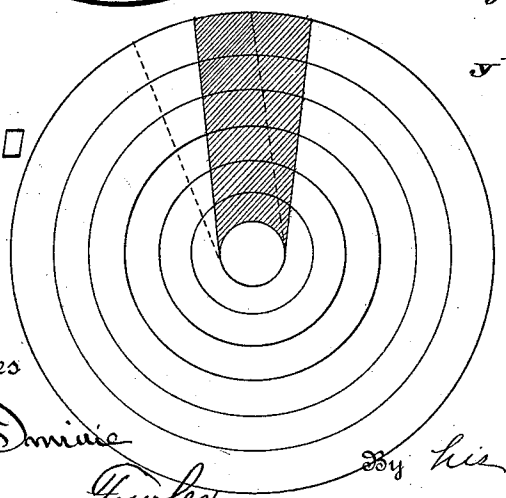
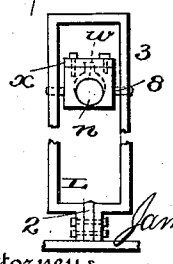


Fig 6



Witnesses

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UNITED STATES PATENT OFFICE.

JAMES FRANKLIN, OF MONTVERDE, FLORIDA.

APPARATUS FOR IRRIGATING AND SPRINKLING LAND.

SPECIFICATION forming part of Letters Patent No. 479,105, dated July 19, 1892.

Application filed October 23, 1891. Serial No. 409,603. (No model.)

To all whom it may concern:

Be it known that I, JAMES FRANKLIN, a citizen of the United States, residing at Montverde, in the county of Lake and State of Florida, have invented certain new and useful Improvements in Apparatus for Irrigating and Sprinkling Lands, as set forth in the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a vertical sectional view of an apparatus embodying my invention. Fig. 2 is a side elevation of the same, showing the discharge-nozzle broken away. Figs. 3 to 9, inclusive, represent details of constructions to be hereinafter described. Fig. 10 is a diagram showing concentric circles descriptive of the area to be sprinkled, the shaded portion indicating the surface watered.

My invention relates to a means of effecting the automatic sprinkling of lands by a column of water projected from a single nozzle, to which is connected a mechanism which imparts a continuous and alternately rising and falling motion to the nozzle, whereby the nozzle is moved in a continuous and steady manner from the angle which gives the maximum range to a position which is nearly or quite vertical; and my invention consists in the constructions and combinations of devices producing the desired results, as I shall hereinafter fully describe and claim.

To enable others skilled in the art to which my invention appertains to make and use the same, I will now describe its preferred construction and indicate the manner of carrying the same out.

Referring to the accompanying drawings for a more complete explanation of my invention, A represents the vertical portion of a supply-pipe, which may connect directly with the water-mains or with the discharge from any well-known form of pumping apparatus (not shown) for delivering the water under pressure to said pipe. The upper end of the pipe A is threaded to receive a bushing B, which is also externally threaded, and has its upper end formed with an inwardly-turned flange B′, adapted to form a seat for a bushing or section of pipe C, whose lower flange is engaged by the flange of a coupling-sleeve D, surrounding the meeting ends of the pipe C and bushing B and engaging the exterior threads of the latter to securely couple the parts together and make a water-tight joint. On the bushing B below the coupling is a jam-nut C′, which is screwed up against the coupling to prevent the latter moving.

From the description thus far given it will be observed that the parts A, B, and D are fixed and that the pipe C is so mounted that it may have an axial movement, the said coupling D having a groove or channel in its upper surface surrounding the pipe C and provided with a packing and screw-gland D′ to form a stuffing-box and make a water-tight connection.

To the upper portion of the pipe C is screwed the right-angled extension or nipple *a* of the turning plug E, this turning plug being a casting with a passage through it communicating at one end with the passage in the pipe C and having an outlet communicating with the discharge-nozzle, as I shall hereinafter describe. The body of the plug E lies in an approximately horizontal plane at right angles to the column of water in the pipes A and C, and said plug has its exterior surface formed with a shoulder *b*, against which the inner end of a sleeve *c*, surrounding the plug, is fitted, said sleeve being held in place between this shoulder and a collar *d* by nuts *e*, while from one side of the sleeve projects a threaded nipple *f*, communicating with a port *g*, formed in the side of the plug and forming the passage through which the water passes to the discharge-nozzle F. This discharge-nozzle is of the usual or any well-known form and is adapted to discharge the water and to have a movement about the turning plug, so that its inclination may be periodically varied by an automatic mechanism to be hereinafter stated.

In placing the parts previously mentioned together the pipe C is inserted in the coupling-sleeve D and the upper end of the pipe is screwed into the nipple *a* of the plug E. The coupling-sleeve D is then slipped upon the pipe C and then screwed down on the bushing B, drawing the parts together, but not tight enough to prevent the pipe C and its connected parts from turning freely, which adjustment is readily ascertained by the attendant moving the plug laterally. Having secured the desired adjustment, the operator

runs the jam-nut up under the coupling-sleeve to hold the parts in their adjusted positions.

To disconnect the apparatus, as when it is desired to transport it to another point, the operator first loosens the jam-nut, then unscrews the coupling-sleeve D, when the whole upper portion of the apparatus becomes detached and may be carried by hand by the operator to another point and then put together and coupled to another main or supply pipe in the manner previously stated. To save expense and not having a jam-nut for each place, he may also remove the jam-nut from the bushing and remove it with the other parts.

The screw-threads of the bushing B and coupling D may be large for quick work, and in the joint between the contacting surfaces of the pipe C and bushing B may be placed balls to reduce the friction if the circumstances require their use.

The means employed to vary the inclination of the discharge-nozzle are capable of modification; but a practical and preferred form is disclosed in the present drawings. The means consist in forming the upper edge of the coupling with a wide flange or plate *h*, whose surface is formed with two or more concentric circles of perforations *h'*, adapted to receive a pin *i*, connected with a chain or connection *j* and having a spring *k* bearing against it to keep the pin in the holes.

Secured to the rotatable pipe C by set-screws or otherwise is a large grooved pulley G, around which is wound a cord or chain *l*, the outer end of which passes over a guide-pulley at any suitable point and is connected with a weight. From the arrangement of these parts it will be observed that when the chain connection is caused to pull upon the pin *i* (by a tripping mechanism to be hereinafter explained) the pin is lifted out of its hole, thereby disconnecting the rotary and non-rotary parts with each other and enabling the weight to act upon the pulley G and impart to it a slight rotary movement equal to the distance between two adjoining holes. Now as the pulley G is fixed to the rotary pipe C, which carries the plug E and nozzle, it is evident the nozzle is moved laterally, so as to discharge in a plane at one side of where it last discharged, whereby a new surface or area is sprinkled. When the pin *i* is pulled out of its hole to permit this movement of the nozzle and adjunctive parts, it remains upon the surface of the pulley G until the next succeeding hole aligns itself with the pin, when the spring *k* at once projects the pin into the new hole and stops further rotary movement of the turning post or pipe C by connecting said pipe with the non-rotary coupling-sleeve D. The machine can therefore only revolve the distance between adjacent holes. As the width of the spread of the stream varies with the different quantities and pressures of water, I have found it desirable to employ the two or more circles of holes to give different angles between the axes of the streams of water in their several positions, and to make the pin engage any of the concentric circles of holes I bolt or secure its spring to the pulley G or its arms, so that its position may be readily changed when desired. The flange of the coupling D also serves as a means by which the coupling may be screwed on and off the bushing. The sleeve *c*, which surrounds the plug E and carries the hose-nozzle, is also provided with a lug 2, which projects from its outer surface almost at right angle to the hose-nozzle, and to this lug are bolted or secured separated plates 3, forming a lever-arm L; or, if preferred, this arm may be made of one piece, slotted, as shown, to form a guide for a traveling nut to be hereinafter mentioned, whereby the nozzle and its sleeve are moved upon the plug E, so as to alternately rise and fall, or vice versa. This movement is due to the following mechanism: Secured to the upper end of the rotatable pipe C is the plug E, from which extends a platform *m*, having a step or seat for the lower end of a screw *n*, whose upper end is journaled in a bearing in a horizontal arm or support *o*, secured to a vertical standard or post *p*, rising from the plug E, said arm or support *o* carrying at its opposite end a guide-pulley *q*, over which the chain or connection *j* from the spring-actuated pin *i* extends. Below the arm *o* and pivotally secured thereto at a point one side of its center is a rocking bar or lever *r*, one end of which lies in proximity to the screw and in the path of the traveling nut X, while the opposite end has the free end of the chain or connection *j* secured to it. The extension or platform *m* has upwardly-extending lugs 3^a, in which a horizontal shaft *s* is mounted, said shaft carrying at its inner end a beveled friction-wheel *t*, adapted to engage and drive a similar friction-wheel *t'* on the lower end of the screw, whereby the latter is rotated. The outer end of the shaft *s* carries a small water-wheel *v* of the usual impulse or impact form, having buckets on its surface adapted to receive the impact of a stream of water discharged from a nozzle 4 on a pipe 5, leading from the water-passage of the plug E. From this description it will be seen that the water discharging from the pipe 5 against the water-wheel rotates the latter and its friction-gear and imparts a rotary movement to the screw *n*. This screw is of double form—that is, it has its threads crossing each other and inclined right and left, as shown in Fig. 9—and the dog *w*, which engages and travels upon it, has a female thread or beveled portion adapted to engage the threads of the screw. The dog is contained in a two-part nut *x*, through which the screw passes, and said shuttle has a cylindrical extension *y* seated in the nut, so that the dog may be turned axially at the limits of the movement of the nut, whereby its inclination is changed to enable it to be automati-

cally transferred from the right-hand threads to the left-hand threads, so that the movement of the nut continues without interruption and the inclination of the hose-nozzle automatically changed.

The two-part nut has pins, lugs, or rollers 8 projecting from its sides and entering the slot of the lever-arm L of the sleeve, and when the parts are in operation the nut travels upon the screw and operates upon the walls of the slot, so as to rock the sleeve in its seat and change the angle of the nozzle. As the nut moves down upon the lever-arm, the nozzle changes its angle; but as the motion of the nozzle would be objectionable unless it was variable the effect of apparently shortening the length of the lever-arm as the nut travels upon it will be manifest. To make this more plain, I now refer to the diagram, Fig. 10, which discloses a circular area of land divided into concentric circles. The diameters of these circles increases in regular ratio outwardly, the shaded portion showing an area of land watered by the discharge from the nozzle when held against horizontal movement by the pin and its adjuncts; but when moved through its vertical arc from the angle giving greatest horizontal distance to the stream to nearly ninety degrees. Now if after watering this shaded portion of land the nozzle is rotated in its horizontal plane to cause the water to fall upon a new area of ground, (see dotted lines,) so that the two streams will overlap at the outer circle, and if this be done successively until the nozzle has made one complete revolution in a horizontal plane the whole surface of land within the circles will have been watered. The several circles of land are, however, in different areas, and if the nozzle rises and falls at a regular speed as the water falls at a fixed and regular speed and flow the interior circular ring would receive too much water and the exterior circles too little. If the circle be divided into a number of concentric rings of the same breadth, their areas will vary from the center outward or in arithmetical progression, and it might be supposed that the angular change of the nozzle in the same times should be in the same rates. The spread of the stream is, however, not the same at all angles of elevation, and the same different rate of angular change would be necessary to obtain an equal distribution, so that the smaller inner circles should receive the same quantity of water per square foot as the larger circles. These results are produced by the mechanisms herein disclosed, and it will be understood that as the nut travels from the lowest part of the slot to the highest the arm of the lever increases until the maximum length is at the upper end. When the nut is at its lowest point, the nozzle is at its greatest elevation, and a slight movement of the nut on the threaded screw will produce a much greater movement in the position of the nozzle, while a similar movement from the nut when at the opposite end will create a less amount of movement in the nozzle. Consequently the stream falls but a short time on the inner circles and a much longer time on the outer circles.

To make the apparatus rotate horizontally at the proper moment, the free end of the pivoted bar or lever receives a screw provided with a lock-nut, whereby this end of the lever, which lies in the path of the traveling nut at the end of the latter's limit of movement, is struck by the nut, and its opposite end, drawing upon the chain or connection, will raise the pin out of the hole in the flange of the coupling-sleeve and permit a partial rotation of the apparatus, as before described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus for sprinkling lands, a discharge-nozzle connecting with the source of water-supply and having a lever-arm extension, a follower adapted to travel up and down said extension to vary the inclination of the nozzle, and means for operating the follower, substantially as herein described.

2. In an apparatus for sprinkling lands, a nozzle mounted on a turning post so that it may move in horizontal planes, and a means for automatically locking the turning post to a non-rotary portion of the apparatus, whereby the horizontal movement of the nozzle is limited.

3. In an apparatus for sprinkling lands, a discharge-nozzle mounted on a horizontal axis, a follower adapted to move up and down on the nozzle to cause the discharge end of said nozzle to move in a reverse direction and to continuously rise and fall in vertical planes from a position approximately horizontal to one nearly vertical, and means for actuating the follower, substantially as herein described.

4. In an apparatus for sprinkling lands, the combination of a nozzle mounted upon a vertical turning post, a follower adapted to travel up and down said nozzle to move its outer ends in vertical planes, and a mechanism actuated by the follower to release the turning post at the predetermined times, whereby said post may move horizontally, substantially as herein described.

5. In an apparatus for sprinkling lands, a turning post adapted to be fitted to a source of water-supply and a nozzle mounted on said post at one side of its axis, in combination with means for automatically moving the discharge end of the nozzle in vertical planes from the point of maximum range to nearly vertical, and vice versa, and a means for periodically rotating the post, whereby the discharge end of the nozzle is moved horizontally.

6. In an apparatus for sprinkling lands, a turning post adapted to be fitted to the source of water-supply and having a nozzle mounted on a horizontal axis at one side of the vertical axis of the turning post, said nozzle having an

inclined lever-arm extending from it, in combination with a follower adapted to travel upon said arm to move the nozzle about its axis, whereby its inclination is varied, and means for actuating the follower.

7. In an apparatus for sprinkling lands, a turning post adapted to be fitted to a source of water-supply and having a nozzle mounted on a horizontal axis at one side of the vertical axis of the turning post, a lever-arm projecting at an inclination from the head of the nozzle, a follower adapted to travel upon said arm and to cause the discharge end of the nozzle to continuously rise and fall, and a mechanism tripped by the follower to impart a movement to the nozzle in a horizontal plane.

8. In an apparatus for sprinkling lands, a vertical turning post normally held against movement, a discharge-nozzle mounted on said post at one side of its vertical axis, an arm projecting at an inclination from the head of said nozzle, a follower adapted to travel up and down said arm to change the inclination of the nozzle, and a mechanism tripped by the follower at the limit of its movement for automatically and periodically releasing the vertical turning post from a locked position and enabling it to have a slight rotary movement, whereby the discharge end of the nozzle is moved in a horizontal plane.

9. In an apparatus for sprinkling lands, a discharge-nozzle mounted so as to have a slight movement in a horizontal plane and having a horizontal axis about which it may be turned to change its inclination, an arm projecting at an angle from the head of the nozzle, a follower adapted to travel continuously up and down the lever-arm, whereby the discharge end of the nozzle alternately rises in one movement of the follower and lowers in the succeeding movement, means for operating the follower and imparting a periodical and partial rotation to the turning post.

10. In an apparatus for sprinkling lands, the bushing B, the pipe C, seated to rotate thereon, and a coupling-sleeve uniting said bushing and pipe so as to form a turning post, said sleeve having a flange provided with concentric circles of holes, in combination with a discharge-nozzle carried by the pipe C at one side of its axis, a spring-actuated pin carried by the turning post and adapted to normally engage the concentric circles of holes in the coupling-sleeve, and means for effecting the periodical and automatic disengagement of said pin with the holes, whereby the turning post may partially rotate and move the discharge end of the nozzle in a horizontal plane.

11. In an apparatus for sprinkling lands, the combination, of a discharge-nozzle mounted on a horizontal axis and fitted to a vertical turning post, whereby the nozzle has both a vertical and horizontal movement, a slotted lever-arm projecting at an inclination from the head of the nozzle, a nut adapted to travel on said arm, a screw for operating the nut and causing it to move the discharge end of the nozzle to different angles in a vertical plane, means for rotating the screw, a spring-actuated pin for locking the turning post to a non-rotary part of the apparatus, a pivoted lever at the limit of movement of the nut and actuated by said nut, and a connection from said lever to the spring-actuated pin, whereby the latter may be withdrawn and the turning post periodically moved, substantially as and for the purpose described.

12. In an apparatus for sprinkling lands, a nozzle mounted upon a horizontal axis and a slotted lever-arm projecting from said nozzle, in combination with a vertically-supported screw having right-and-left threads, means for rotating the screw, a nut adapted to travel upon the slotted lever-arm and having a dog engaging the threads of the screw, so that it may be transferred from the right-hand threads to the left-hand threads at the limit of each movement of the nut, whereby the inclination of the nozzle is varied, substantially as herein described.

13. In an apparatus for sprinkling lands, a nozzle mounted to move in horizontal and vertical planes and having an inclined lever-arm, a means for temporarily holding the nozzle against horizontal movement, a double-threaded screw, a water-wheel and interposed gearing for revolving the screw, a nut adapted to travel upon the lever-arm and having a dog engaging the threads of the screw and mounted so that at the limit of movement of the nut the dog automatically shifts from one set of threads to the other, whereby the nozzle is continuously and automatically raised and lowered, and vice versa, and a pivoted adjustable lever, and connections automatically tripped by the traveling nut and temporarily releasing the nozzle, so that it may be turned in a horizontal plane, substantially as herein described.

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Witnesses:
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