(No Model.) 2 Sheets—Sheet 1.

A. CUTHBERT.

NOZZLE HOLDER.

No. 479,249. Patented July 19, 1892.

Fig: 1.

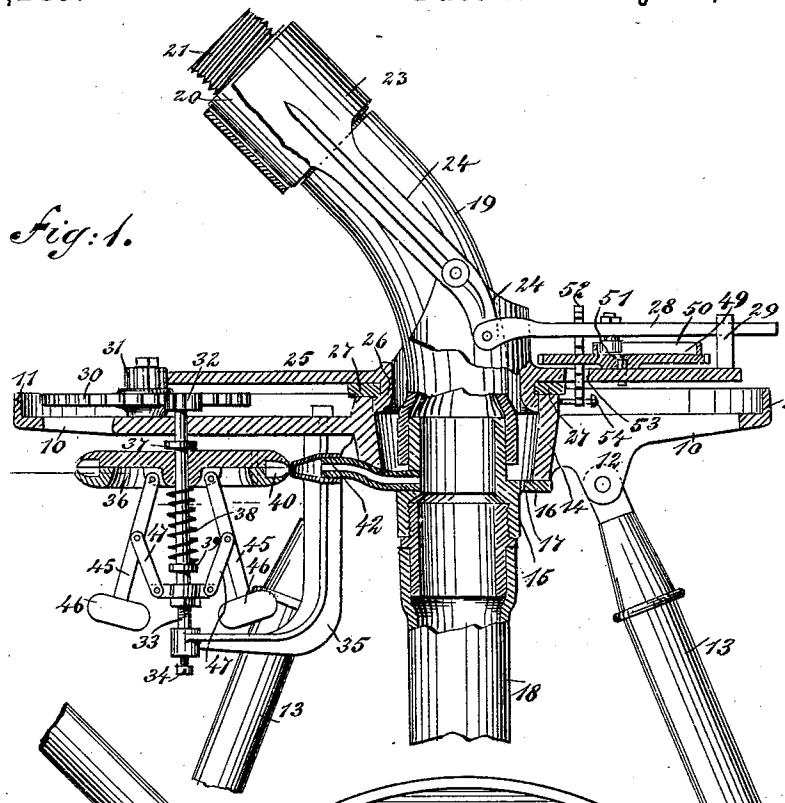
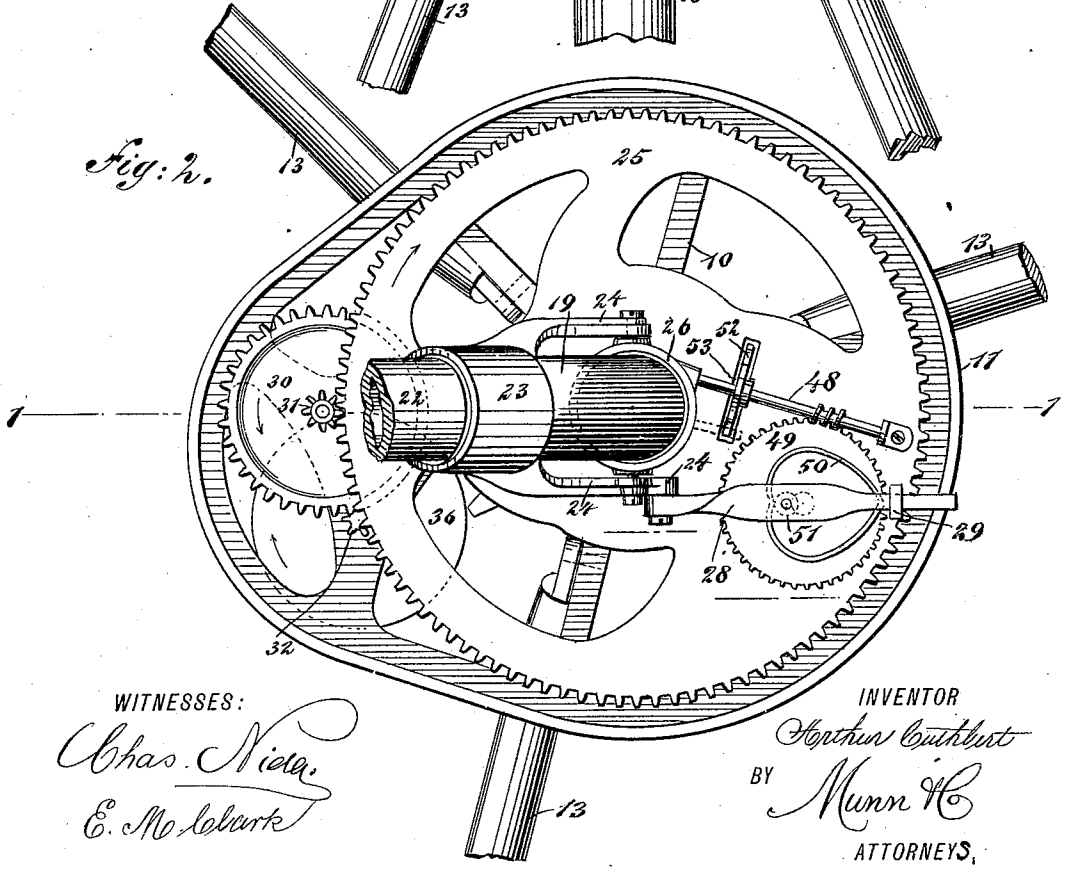


Fig: 2.



WITNESSES:

Chas. Nieda.

E. McClarke

INVENTOR

Arthur Cuthbert

BY Munn & Co

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

A. CUTHBERT.

NOZZLE HOLDER.

No. 479,249. Patented July 19, 1892.

Fig: 4.

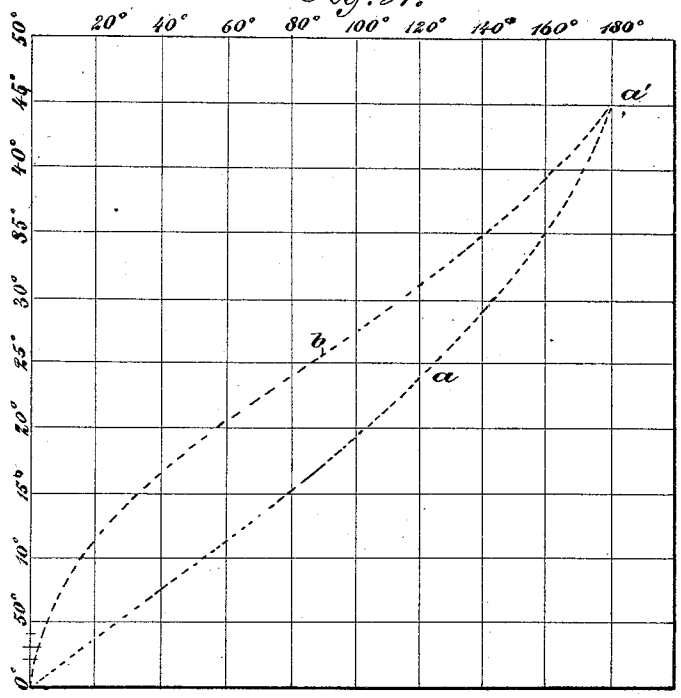


Fig: 3.

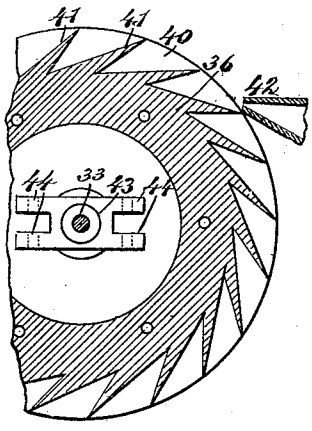
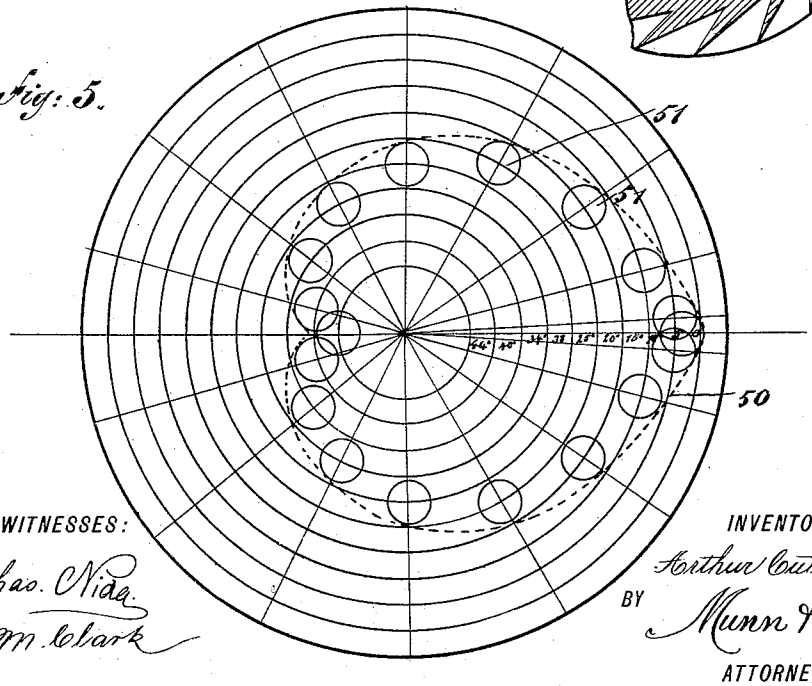


Fig: 5.



WITNESSES:

Chas. Nida.

E. M. Clark

INVENTOR

Arthur Cuthbert

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

ARTHUR CUTHBERT, OF LONDON, ENGLAND.

NOZZLE-HOLDER.

SPECIFICATION forming part of Letters Patent No. 479,249, dated July 19, 1892.

Application filed August 31, 1891. Serial No. 404,247. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR CUTHBERT, of Acton, London, W., England, have invented a new and improved Nozzle-Holder, of which the following is a full, clear, and exact description.

My invention relates to improvements in nozzle-holders; and the object of my invention is to produce a device to automatically direct a jet of water so that every part of the area within range of the jet will receive an equal amount of water. This equal distribution is effected by simultaneously deflecting the end of the nozzle from which the jet proceeds and revolving the nozzle, it being held normally in a vertical position, the deflecting and revolving motions being rightly proportioned to each other throughout. In order to see how these two motions are to be proportioned, it is necessary to consider them mathematically. As the nozzle is deflected from the vertical through forty-five degrees, the range of the jet changes from zero to maximum, the value of maximum depending upon the size of the supply-pipes, hose, and nozzle, and the pressure under which the water is furnished, and if the nozzle be simultaneously revolved around a vertical axis a sufficient number of times during this deflecting it is plain that an area will be watered the radius of which is equal to the maximum range of the jet. If the jet is deflected in proportion to the revolution—as, say, through one degree in each revolution—then the rate of time of each revolution must be varied in the inverse proportion to the area irrigated at each degree of deflection. Thus when the deflection is only one degree the area is very small and the revolution must be proportionately rapid; but if the revolutions remain constant as to time the rate of deflection must be varied inversely to the area watered at each angle. The latter is the principle which I have adopted and which I consider is the key to my invention, finding that it lends itself to the simplest mechanical means.

To this end my invention consists in a nozzle-holder, the construction of which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a broken vertical section of the nozzle-holder taken on the line 1 1 in Fig. 2. Fig. 2 is a broken plan view of the same. Fig. 3 is a broken inverted sectional plan of the driving-wheel of the motor. Fig. 4 is a diagram the ordinals of which represent degrees of deflection from the vertical and the abscissa for curve $o^\circ\ a\ a'$, range of jet, and for curve $o^\circ\ b\ a'$, either area or time. The curve $o^\circ\ a\ a'$ is the result of experiments which I have made and shows the relative range of a jet of water for all angles from the vertical to forty-five degrees. The area watered while the jet is descending from any angle in vertical to forty-five degrees is in direct proportion to a square of the range, for the range is the radius of the area. So if the abscissa of curve $o^\circ\ a\ a'$ is squared, considering the abscissa at forty-five degrees as one, the result will be the curve $o^\circ\ b\ a'$. The abscissa of this curve will represent the total area watered at all angles in deflecting the nozzle from the vertical to forty-five degrees, and consequently, since the time is in direct proportion to the area, the relative time that the deflector must take to reach any degree and shows the rate at which it should move at each degree; and Fig. 5 is a diagrammatic view showing, on an enlarged scale, the method of drawing the cam which operates the deflector.

The machine is provided with an open frame 10, which is provided around its periphery with an upwardly-extending flange 11 to protect the cog-wheels and to strengthen the frame, and the frame has on the under side depending lugs 12, to which are pivoted supporting-legs 13, so that when the frame is erected it is like the ordinary tripod. The frame has a central opening through it, which opening is surrounded by the flange or wall 14, and a hose-coupling 15 is held in the opening, being secured to the under side of the flange 14, the said coupling having a flange 16, which facilitates its attachment to the flange 14, and through the flange 16 is a drip-hole 17, which permits any escaping water to run off. The supply pipe or hose 18 is secured to the under side of the coupling in the ordinary way, and a flexible hose 19 is secured to the upper

side, and this hose carries at its upper end a nozzle 20, having a screw end 21, which enables any kind of a nozzle, as the broken nozzle 22 in Fig. 2, to be screwed to it. The nozzle 20 is held loosely in the sleeve 23 of the deflector, which sleeve has depending legs 24 on opposite sides, and these legs are pivoted near the bottom to projecting supports on the horizontal cog-wheel 25, so that the deflector will turn with the cog-wheel. The cog-wheel has a recessed hub 26, which fits against the upper wall of the flange 14, and the wheel is held in place by a split ring 27, which enters the recess and rests upon the top of the flange 14, to which it is secured by screws or otherwise. One of the legs 24 of the deflector is prolonged and extends downward beyond its pivot, and this elongated end is pivoted to a lever 28, which extends outward over the top of the cog-wheel 25, and its outer end portion is held to move freely in a keeper 29, which keeper is secured to the top surface of the cog-wheel 25. The cog-wheel 25 meshes with a pinion 31, which serves to turn the cog-wheel, and this pinion is cast integrally with a cog-wheel 30, which is mounted in the frame of the machine near one edge of the cog-wheel 25 and a little beneath the same, and the cog-wheel 30 meshes with a pinion 32 on the upper end of the motor-shaft 33, which shaft is arranged vertically, as shown in Fig. 1, and has its lower end resting on a screw 34 in the end of a bracket 35, which bracket is secured to the under side of the main frame, so as to support the motor-shaft. The shaft may be nicely adjusted by means of the screw and all wear may be taken up. The motor-wheel 36 is keyed to the shaft 33 so as to turn therewith, but so that it may slide vertically thereon, and this wheel 36 presses on the upper side against a collar 37 on the shaft and is supported by a spring 38, which is coiled around the shaft and rests upon a collar or nut 39. The wheel 36 has a peripheral groove 40, having a somewhat narrow entrance, and this groove is traversed tangentially by a series of partitions 41, thus forming a series of buckets which are adapted to receive water from a jet-pipe 42 and thus propel the wheel. This jet-pipe 42 issues from the coupling 15, so that when the water is turned on through the supply-pipe 18 a portion of the current will be shunted through the pipe 42 and will drive the motor-wheel and consequently revolve the main cog-wheel 25 and the deflector connected therewith. The wheel 36 has a plate 43 on the under side, cast integrally with it, on the opposite ends of which are parallel lugs 44 and between these lugs are pivoted the shanks 45 of the governor-weights 46, which weights by their centrifugal force balance the spring 38, and the shanks of the weights are connected with a collar on the shaft 33 by means of links 47. It will thus be seen that if the speed of the motor gets too high the centrifugal force will cause the weights 46 to spread, and the wheel 36 will thus be pulled down, so that only a portion of the water from the jet will enter the groove in the wheel, and as the speed slackens the weights will fall toward the shaft and the wheel will be raised so as to receive the full force of the jet.

The following mechanism is employed for gradually deflecting the nozzle so that as it is revolved the jet which issues from it will strike upon all portions of the surrounding ground: A worm-shaft 48 is mounted on the top of the wheel 25, and this worm-shaft meshes with and turns a wheel 49, which wheel has a somewhat heart-shaped cam-flange 50 produced thereon, and the flange engages a friction-roller 51, which roller is pivoted on the under side of the lever 28. The wheel 49 turns freely on its pivot, and as the cam revolves it will actuate the lever 28 and thus move the deflector. It will be understood that the current of water flowing through the nozzle will have a tendency to raise the same into a vertical position, and consequently the water-pressure will hold the friction-roller 51 against the surface of the cam, so that the cam will have the necessary effect on the lever and deflector; but in case the pressure should not be sufficient it is obvious that a spring-pressure may be substituted for the water-pressure, so as to hold the roller against the cam. The worm-shaft 48, which drives the cam-wheel 49, has a star-wheel 52 thereon, which projects downward through a slot 53 in the cog-wheel 25, and this star-wheel is adapted to engage projecting pins 54, which are secured to the outer surface of the flange 14 and are arranged in the path of the star-wheel. It will thus be seen that as the star-wheel is carried around by the cog-wheel 25 it will engage these projections and will turn the cam-wheel and operate the deflector, and it is obvious that a greater or less number of these projecting pins may be used, according as the cam-wheel is to be turned faster or slower.

The diagram in Fig. 5 shows the manner of laying out the cam 50 so that the pressure of the friction-roller 51 thereon will give the necessary rate of deflection to the nozzle, and it will be understood that the cam may be adjusted so as to give any desired rate of deflection; but it is not necessary to mathematically carry out the figures in this specification.

The operation of the machine is as follows: The water rushes up through the nozzle from the supply-pipe, and at the same time a portion of the current is diverted to the motor-wheel, and the movement of the wheel turns the main cog-wheel and the deflector in the manner described, so that the nozzle is pointed to all parts of a circle having a vertical axis, and the operation of the cam on the deflector causes it to be gradually lowered and then raised, so that the water will be equally distributed upon all the surrounding ground within the range of the jet.

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

1. A nozzle-holder comprising a revoluble support, a pivoted deflector in which a nozzle is loosely held, carried by the said support, and means for swinging the deflector on its pivots as the support is revolved, substantially as described.

2. A nozzle-holder comprising a frame having a hose-coupling in an opening therein, a horizontal revoluble wheel mounted on the frame, a nozzle-holding deflector pivoted to the said wheel, and means for swinging the deflector on its pivot as the wheel is revolved, substantially as described.

3. A nozzle-holder comprising a frame having a central opening therein, a hose-coupling secured in the opening and provided with a side jet-pipe, a revoluble deflector mounted above the hose-coupling and adapted to support a nozzle, a water-motor mounted on the frame and having its wheel in the path of the jet-pipe, a gear mechanism connecting the deflector with the motor, and a cam-operated lever mechanism for changing the angle of the deflector, substantially as described.

4. A nozzle-holder comprising a frame having a central opening therein, a hose-coupling secured in the opening, a deflector mounted above the coupling and adapted to support a nozzle, a centrally-apertured wheel mounted horizontally upon the frame, a lever held to slide on the wheel and connected with the deflector, a cam mechanism for operating the lever, and a motor for revolving the wheel, substantially as described.

5. The combination, with the frame having a central opening therein to receive a pipe, the revoluble wheel held to turn horizontally around the central opening, the nozzle-holding deflector pivoted on the wheel, and the lever pivoted to the deflector and held to slide on the wheel, of a cam-wheel mounted on the main wheel and adapted to engage a roller on the lever, a worm-shaft for operating the cam-wheel, and a star-wheel secured to the worm-shaft and adapted to engage fixed projections on the main frame, substantially as described.

6. The combination, with the motor-shaft and the motor-wheel held to slide thereon, of a spring arranged to support the wheel and weights adapted to balance the spring, said weights being pivoted to the under side of the wheel and having a link connection with the shaft, substantially as described.

7. In a nozzle-holder, the combination, with the revoluble wheel held to turn horizontally, as described, of a deflector comprising a sleeve having depending legs pivoted to the central portion of the wheel, and a lever mechanism for changing the position of the deflector in relation to the wheel, substantially as described.

ARTHUR CUTHBERT.

Witnesses:
C. W. RUSSELL,
H. SADD.