(No Model.) 2 Sheets—Sheet 1.

C. V. POLLOCK.

NOZZLE.

No. 574,570. Patented Jan. 5, 1897.

Fig. 1.

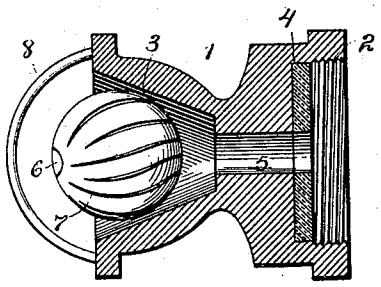

Fig. 2.

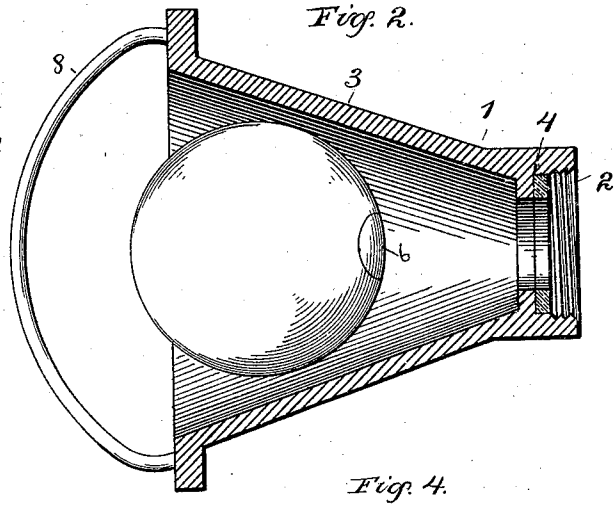

Fig. 3.

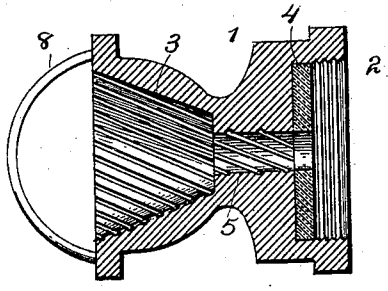

Fig. 4.

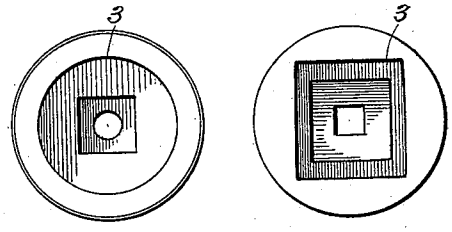

Fig. 5.

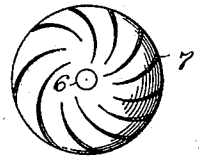

Fig. 6

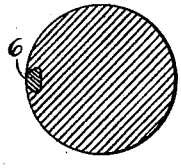

Fig. 7.

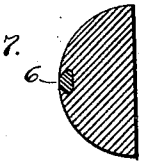

Fig. 8.

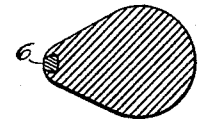

Fig. 9.

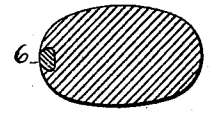

Fig. 10.

Witnesses.
Victor J. Evans.
Marie Nelson

Inventor.
C. V. Pollock.
By E. M. Marble & Son
Attorneys

(No Model.) 2 Sheets—Sheet 2.

C. V. POLLOCK.

NOZZLE.

No. 574,570. Patented Jan. 5, 1897

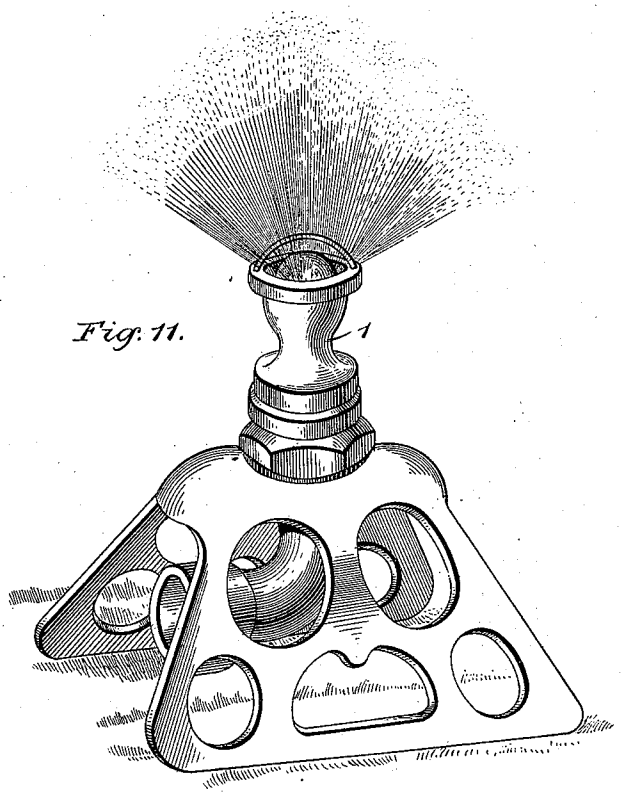

Fig. 11.

Witnesses.
Victor J. Evans.
Marie Nelson

Inventor
C. V. Pollock.
By. E. M. Marble & Son
Attorneys.

UNITED STATES PATENT OFFICE.

CHARLES V. POLLOCK, OF DES MOINES, IOWA.

NOZZLE.

SPECIFICATION forming part of Letters Patent No. 574,570, dated January 5, 1897.

Application filed October 20, 1894. Serial No. 526,507. (No model.)

To all whom it may concern:

Be it known that I, CHARLES V. POLLOCK, a citizen of the United States, residing at Des Moines, in the county of Polk and State of Iowa, have invented certain new and useful Improvements in Nozzles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in nozzles, and particularly to improvements in that class thereof known as "spraying-nozzles," that is, those which are designed to spray water for sprinkling lawns, flowers, &c.; and it consists in the improved spraying-nozzle, which will be hereinafter fully described, and particularly pointed out in the claims.

In United States Letters Patent No. 488,220, granted to me on December 20, 1892, I described a spraying-nozzle whose essential features are a nozzle-piece having a longitudinal bore or passage terminating in a flaring or bell-shaped mouth, the bore being restricted considerably near the mouth, and a ball placed loosely in said mouth. The operation of this spraying device is as follows: When the nozzle is attached to a hydrant or other suitable source of supply and water or other fluid under pressure is turned on, the ball is caused to rotate by the action of the water upon it, but still is held in place in the bell-mouth, a well-distributed spray being caused by such rotation. I further stated that the only effect of increasing the water-pressure was to increase the speed of rotation of the ball, and consequently the amount of spray produced, and, further, that the spraying-ball might have a perfectly smooth surface or that its surface might be grooved or channeled, the function of said grooves or channels being to increase the rapidity of rotation of the ball, and consequently the size of spray produced.

My present invention is directed toward increasing the rapidity of rotation of the ball or spraying device with a given water-pressure and lies in providing means for allowing the grooves or channels cut in the surface of the ball to exert their full rotative impulse.

It consists in weighting the ball, either naturally by the manner of forming the same or artificially by an inserted weight, so that one portion of its surface is heavier than any other corresponding portion, and preferably in so forming the grooves on the ball that they radiate or diverge from the loaded portion as a center, the result being that when the water is turned on and passes through the nozzle, particularly if the spraying-nozzle be arranged vertically, the ball will at once take a position with the weighted portion in the center of the jet, and consequently with the grooves or channels so arranged as to be enabled to exert their maximum rotative impulse.

I do not limit myself to weighting a ball having a grooved surface, though the increase in rapidity of rotation in such a ball is much more marked than in a ball having a perfectly smooth surface, for weighting even a ball having a perfectly smooth surface in a measure increases the rapidity of its rotation, as it forms an axis on which all rotative movement takes place.

My invention further consists in certain details of construction of the nozzle-piece proper, which will be hereinafter specifically pointed out.

My invention is fully represented in the drawings which accompany and form a part of this application, in which the same reference-numerals refer to the same or corresponding parts, and in which—

Figure 1 is a view, partly in section, of my spraying-nozzle, the ball being shown in position in the bell-mouth. In this figure are also represented the means I use for holding the ball in position in the bell-mouth when the jet of water is not on. Fig. 2 is a view similar to Fig. 1, but the nozzle-piece there shown is of a larger size, the object in showing two sizes of nozzles being to indicate the different relative proportions of parts which I use with different sizes of nozzles. Fig. 3 is a view similar to Fig. 1, but differing from the said figure in that the passage leading from the longitudinal bore to the bell-shaped mouth is rifled, as is also the bell-shaped mouth itself. The ball is not shown in this figure. Fig. 4 shows two modified forms of the enlarged or bell-shaped mouth. Fig. 5 is a bottom view of the spraying-ball, showing the load of the same and the general direction of the grooves leading therefrom. Fig. 6 is a section of the ball shown in Fig. 5, illus-

trating particularly the load placed in the ball. Figs. 7, 8, 9, and 10 show in section different forms of spraying devices which may be used instead of that shown in Fig. 1. Fig. 11 is a view of my complete spraying-nozzle in position on a stand and in operation.

Referring to the drawings, 1 represents the nozzle proper. It may be made of any size and adapted for use with any kind of hose or bracket or standard. It is preferably made of brass or iron, but other materials may be used for its construction, if desired. The only essential features which this nozzle must possess in order to enable it to successfully perform its function are, first, a central longitudinal bore 2; second, an enlarged or bell-shaped mouth 3 at the end of the bore, and, third, a shoulder 4 in the bore near the mouth 3, restricting the opening for the passage of water and therefore increasing the velocity of the water flowing through the nozzle.

The sizes and shapes of the central bore, the enlarged mouth, and the restricted opening relative to each other may be altered within quite wide limits, and still the nozzle will successfully form in conjunction with a proper spraying device a satisfactory and efficient spray.

It will be noted that in the nozzle shown in the drawings I have changed the relative proportions of the bore and shoulder from that shown in my patent previously referred to, and that in the construction shown in Fig. 1 I provide quite a passage 5 between the bore and the mouth through which the water passes before it finally issues into the mouth. My reason for so doing has been that I found that while it is essential that there be a restricted opening through which the water passes just before it strikes the spraying device, the length of bore from said opening to the point of connection with the hose is not essential. I have, therefore, only made the bore slightly more than long enough to allow for the attaching of the hose to the nozzle. For use with small water-pressure I have further found that to secure the best results it is essential to utilize to the fullest extent the rotative impulse caused by increase of velocity due to the restricted opening between the bore and mouth, and consequently in Fig. 1 I make use of the passage-way 5, extending from the shoulder 4 to the mouth of the nozzle. Water passing from the comparatively large bore 2, where its velocity is comparatively small, into the restricted passage 5, where its velocity is comparatively great, has a tendency to rotate. This rotative tendency I sometimes still further increase by rifling the passage-way 5, as shown in Fig. 3, and, further, by rifling the enlarged opening or mouth 3, in which the spraying device rests, as in this manner I add to the result obtained. When using fire-pressure, in which case I use a large nozzle-piece, such as is shown in Fig. 2, the greater pressure makes the use of a passage 5 of considerable length unnecessary, a sufficiently widely-diffused stream being obtained without it.

It should be noted that the opening formed by the shoulder may be made square, or hexagonal, or of any other form, and that the passage-way between the bore and the enlarged mouth may be straight or conical without in any way changing the action of the nozzle, though the form of the spray will be modified somewhat, and I do not limit myself to any particular shape or size of opening.

The enlarged mouth 3 (shown in Figs. 1, 2, and 3 as bell-shaped) may have a variety of forms and still successfully operate. Thus, it may have a square shoulder at its base, as is shown in one form of Fig. 4, or may be itself square, as is also shown in Fig. 4, or may have other forms, and the angle of inclination of the sides of the bell-mouth may be varied, all these changes in form modifying without changing the result, and I do not limit myself to any particular form. I will state, however, that if a bell-mouth be used the size of the spray will be considerably enlarged by properly increasing the flare of the bell-mouth.

In the enlarged mouth I place the spraying device, which, in Fig. 1, is a round ball. This ball is weighted so that one portion of its surface is heavier than any other corresponding portion, and in so weighting the ball my present invention principally resides. The weighting may be done in the manufacture of the ball, as by suitably forming the molds or artificially by inserting the weight. In Figs. 5 and 6 I illustrate this weight at 6 and one method of holding it in position. I also form on the surface of the ball channels or grooves 7 and preferably arrange them so that they start at or near the weighted point of the ball. To secure the best results, these grooves should diverge spirally from said weighted portion; but they may be circles of the sphere or may be otherwise disposed and still produce a very good result. In forming these grooves or channels care must be taken not to cut them too deep, as if this be done the water will catch in the grooves with such force as to cause the ball itself to be thrown out of the jet and prevent it from producing a satisfactory spray. I preferably form the ball of rubber and weight it with lead, but I may form it of metal or of any other suitable substance, and I may make it either solid or hollow. In weighting the spraying device also I may weight it so that the grooves or channels diverge from said weighted point as a center, or diametrically opposite from the point toward which the grooves converge, according as the spraying-nozzle is to be used, placed vertically, or is to be inverted.

In using my spraying-nozzle, when the nozzle is attached to a line of hose or other suitable source of supply and the water or other liquid is turned on the ball is caused to rotate by the action of the water, and the water itself is formed into a very beautiful spray,

which is made up of drops having a penetrating quality like rain, and does not result in the mist usually formed by spraying-nozzles, which not only blows away without accomplishing its intended object, but evaporates quickly. Particularly if the nozzle be arranged vertically the ball will quickly assume a position, whatever its original position, with the weighted portion of the same in the center of the jet, and consequently with the grooves or channels cut in the surface of the ball in the position in which they can best exert their rotative effect. The speed of rotation of the ball, and consequently the size of the spray produced with a given water-pressure, is thus very much increased over that which would be produced if an unweighted ball were used. The ball is held in place in the nozzle by the action and reaction of the water upon it, no outside holding means being necessary. The greater the head of water used the greater the speed of rotation of the ball, and consequently the greater the size of spray produced.

One of the most important features of my spraying-nozzle is that no back pressure on the hose is created by the use of the same. Consequently the hose is never subjected to a pressure greater than that exerted by the head of water itself, and thus its tendency to burst from this cause is taken away.

To keep the ball from falling out of the mouth when the nozzle is being carried from one place to another, I use a guard 8, which in its simplest form is a simple piece of wire extending across the bell-shaped mouth, with its ends hooked into either side of the same and bent out so as to give the ball the necessary play. This guard performs another function, however, which is important in the practical use of my sprinkler, and it is on account of the second function of the guard that I by it confine the ball within such a narrow limit of outward movement. When the line of hose is not in use, it is of course filled with air, and when water is made to pass through the hose the air must first be expelled before the water can pass. Further, there are frequently leaks where the line of hose is attached to its source of supply and the water as it passes from the source of supply into the hose sucks in air with it, which of course is delivered through the nozzle. If no guard were used to keep the ball in place and prevent it from getting out of the center of the jet where it can perform its spraying function, the water-hammer caused by the first issuance of the water from the line of hose would throw the ball out of position, and consequently would prevent the successful operation of my spraying-nozzle. In the same manner the jets or bubbles of air, which occasionally pass out of the nozzle, would also throw the ball out of position were some holding means not provided. By arranging the guard so as to prevent the ball from being thrown out of the center of the bell-shaped mouth I overcome all difficulties caused by the bubbling air and my nozzle can be used for hours at a time to form a continuous spray. It will be further observed that the slight outward movement which the ball is permitted to make is sufficient to permit any foreign substance existing in the water to escape from the nozzle without clogging the mouth of the same.

In Figs. 7, 8, 9, and 10 I have represented in section several forms of spraying devices which may be used instead of the ball shown in Fig. 1. Thus in Fig. 7 I have indicated the use of a half-sphere instead of a complete sphere or ball. It will be noted that the spraying action of the ball is entirely performed by the lower half of the same and that the upper half of the ball has no spraying action at all. Consequently the hemisphere, or three-quarter sphere, if such be used, produces almost the same result as the complete sphere. In Fig. 8 I have indicated the use of a pear or cone shaped object with its apex extending downward into the bell-mouth. The action of a spraying device of this nature is not as perfect as that of the round ball or the semisphere; but it will produce a very considerable spray and acts in the same manner and due to the same reasons as the previously-mentioned forms. In Fig. 9 I have shown an ellipsoid and in Fig 10 an irregularly-shaped body.

Other forms of what may be termed "spraying devices" may be used besides those indicated. A common acorn, if sufficiently heavy, will produce a considerable spray and will act in the same manner, and due to the same forces, as the ball. It will thus be seen that I do not restrict myself to the use of a round ball, or a hemisphere, or a cone-shaped object, as my present invention includes in its scope and intent any object, round, oval, or otherwise, grooved or not grooved, weighted in one portion of its surface, which, when loosely placed in an enlarged mouth, will rotate, being held in place in the nozzle by the action of the water issuing from the nozzle and without the aid of any outside force.

While I have thus described my spraying-nozzle as being used to spray water, it is apparent that it may also be used for ventilating purposes to spray air, or that it can be used with any other liquid, and I do not restrict myself to its use in connection with water.

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

1. A nozzle having an enlarged mouth and a longitudinal bore communicating therewith and restricted near the mouth, and a spraying-body, one side of which is weighted, placed loosely within the mouth and arranged to be held therein by the action of the fluid flowing through the nozzle, substantially as described.

2. A nozzle having an enlarged mouth and

a longitudinal bore communicating therewith and having an internal shoulder by which the passage of water is restricted near the mouth, and a spraying-body weighted upon one side and having its sides grooved, placed loosely within the mouth and arranged to be held therein by the action of the fluid flowing through the nozzle, substantially as described.

3. A nozzle having an enlarged mouth and a longitudinal bore communicating therewith and restricted near the mouth, and a spraying-body, weighted upon one side, whereby the axis of rotation of the body is determined, and having in its surface grooves diverging from one of the poles of said axis, placed loosely within the mouth and arranged to be held therein by the action of the fluid flowing through the nozzle, substantially as described.

4. A nozzle having an enlarged mouth and a longitudinal passage-way communicating therewith, restricted near the mouth, and rifled, and a spraying-body, one side of which is weighted, placed loosely within the mouth and arranged to be held therein by the action of the fluid flowing through the nozzle, substantially as described.

5. A nozzle having an enlarged mouth with a rifled surface and a longitudinal bore communicating therewith and restricted near the mouth, and a spraying-body, one side of which is weighted, placed loosely within the mouth and arranged to be held therein by the action of the fluid flowing through the nozzle, substantially as described.

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

CHARLES V. POLLOCK.

Witnesses:
WEBSTER BISHOP,
C. F. WEEK.