

(No Model.)

2 Sheets—Sheet 1.

W. S. BARNARD, Dec'd.

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FLUID DISTRIBUTER.

No. 580,151.

Patented Apr. 6, 1897.

Fig. 1.

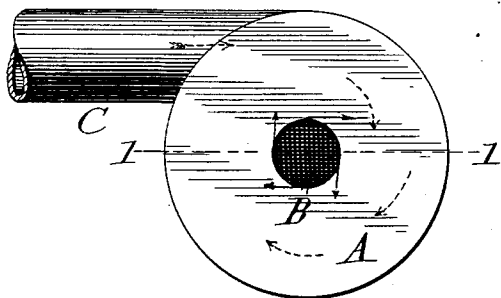


Fig. 3.

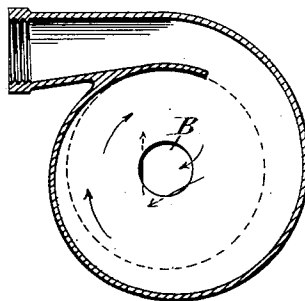


Fig. 2.



Fig. 4.

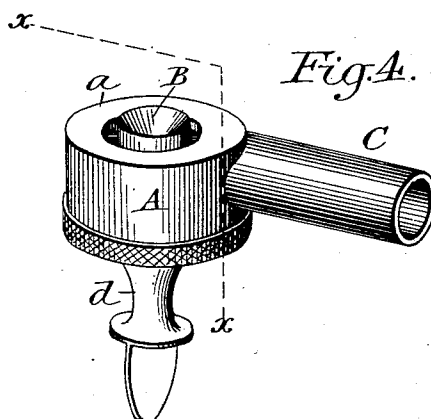


Fig. 5.

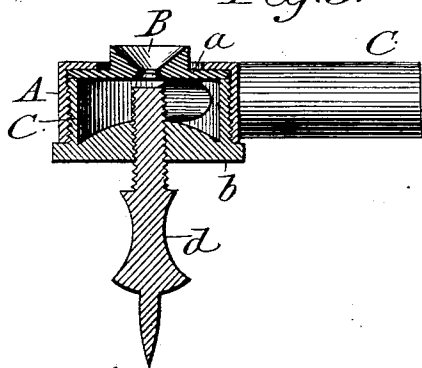
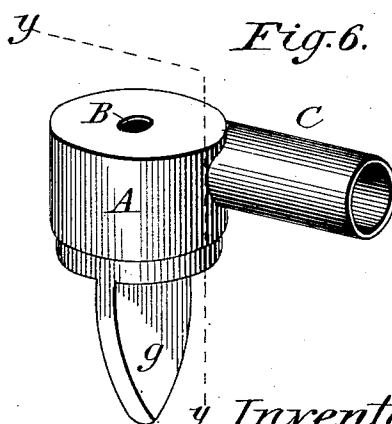


Fig. 6.



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(No Model.)

2 Sheets—Sheet 2.

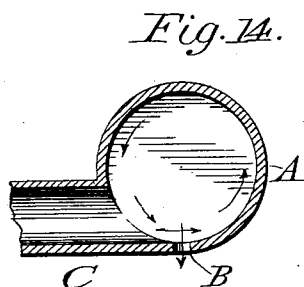
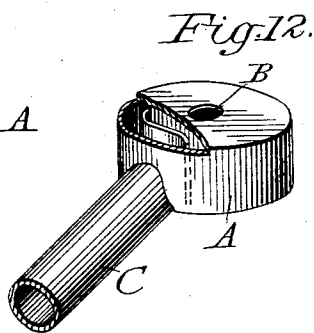
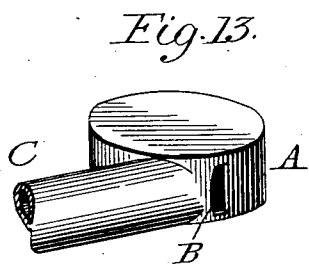
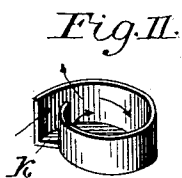
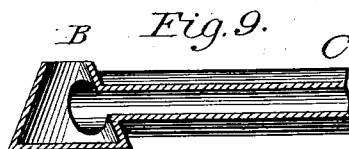
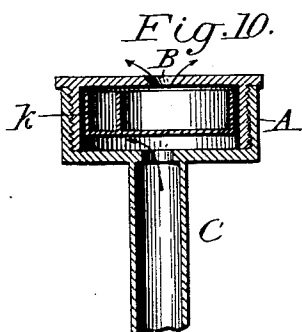
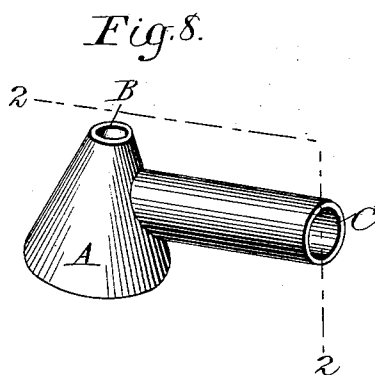
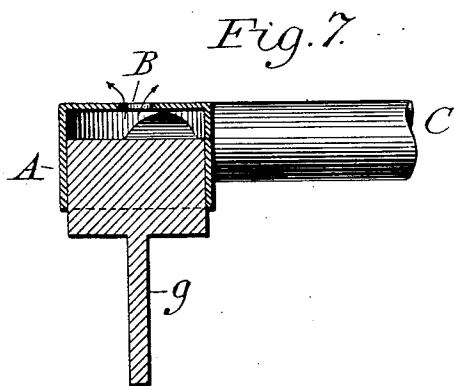
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FLUID DISTRIBUTER.

No. 580,151.

Patented Apr. 6, 1897.



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UNITED STATES PATENT OFFICE.

WILLIAM S. BARNARD, OF CANTON, ILLINOIS, ASSIGNOR TO WILLIAM NICHOLS, OF BOSTON, MASSACHUSETTS; MARY N. BARNARD ADMINISTRATRIX OF SAID WILLIAM S. BARNARD, DECEASED.

FLUID-DISTRIBUTER.

SPECIFICATION forming part of Letters Patent No. 580,151, dated April 6, 1897.

Application filed August 4, 1882. Serial No. 68,466. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. BARNARD, of Canton, in the county of Fulton and State of Illinois, have invented certain Improvements in Fluid-Distributers, of which the following is a specification.

The aim of this invention is to provide a simple and efficient device intended, mainly, for the distribution of fluid in a thin film or spray.

Distributers constructed in accordance with my system possess as two leading and distinctive features a chamber wherein the fluid is caused to receive a reverberatory and gyratory motion and a discharge-opening through which the fluid is delivered from the chamber and immediately released without passing, as in other distributers, through an elongated passage or tube. The chamber is not in any sense a reservoir, but is an eddy-passage or reverberatory passage so arranged in respect to its inlet and outlet that fluid delivered under pressure through said inlet must undergo a recurrent motion or recoil to reach the outlet and escape.

My invention may be embodied with diverse details of form and construction, while retaining the distinctive characteristics above named.

In its preferred form my distributer consists of a body containing a chamber of discoid form having a discharge-opening at one pole of its axis and an eccentric inlet at the periphery from a pipe or antechamber. The fluid in passing through acquires a rapid gyratory or reverberatory motion in the chamber and escapes through the side opening in the form of a hollow expanding jet. Owing to the tendency of the escaping fluid to retain its direction of movement on escaping it is dispersed from the margin of the outlet-opening in a whirl of tangents.

Instead of making the agitation-chamber of true circular form it may be of a spiroidal or other form differing to a greater or less extent from the circular, provided only that the fluid is permitted to pursue the course indicated above. Moreover, the inlet opening or passage by which the fluid is directed into the chamber may be varied in location

and in form to a considerable extent without changing, essentially, the action of the device. For example, the inlet may open obliquely through one or the other of the side faces of the chamber, provided only that it directs the fluid to the outer part of the chamber or out of line with the outlet in such manner as to establish and maintain the gyratory or inwinding course of the current toward the discharge-opening.

The accompanying drawings illustrate my distributer in a few of its many forms, all embodying the features above described.

Instead of providing the device with the central or axial discharge-opening, as above described, it may have said opening in the periphery, provided the inlet is arranged to project the inflowing fluid past and beyond the outlet-opening within the chamber, so as to compel the fluid to pursue the circulatory or reactionary movement within the chamber before escaping. The drawings also illustrate one device of this form.

While my distributers are more particularly intended for the dispersion of liquids under pressure, they may be advantageously used in connection with a blast of air, gas, steam, or their equivalents for the distribution of powders and granular substances and also in connection with a blast of air, steam, or gas for the atomization and distribution of liquids.

Referring to the accompanying drawings, Figure 1 is a face view of a distributer constructed on my plan in its preferred form. Fig. 2 is a cross-section of the same on the line 1 1. Fig. 3 is a transverse section of the device in a form very similar to that presented in Fig. 1. Figs. 4 and 5 are respectively a perspective view and a central cross-section of the device in another form, with a movable plug to regulate the discharge. Figs. 6 and 7 are respectively a perspective view and a cross-section of the device in still another form, with an adjustable plug. Fig. 8 is a perspective view, and Fig. 9 a cross-section, of the device with a conical body. Fig. 10 is a vertical cross-section through the center of the device in still another form. Fig. 11 is a perspective view of the plate used in

the device represented in the foregoing figure to insure a gyratory motion of the water. Fig. 12 is a perspective view of the device in still another form, a portion of the top being broken away to show the internal water-passage. Figs. 13 and 14 are respectively a perspective view and a transverse section of the device in still another form.

Figs. 1 and 2 represent, respectively, a face view and a cross-section of one of my distributors of the class first mentioned. A represents a flat circular body or chamber, of sheet metal, provided in one of its side faces with the central outlet-opening B of circular form, and also provided on the edge or periphery with an inlet or supply pipe C, which opens into the chamber, as shown. The inlet-pipe is arranged to deliver the fluid into the chamber in a line parallel to a tangent to the periphery of said chamber. The fluid passing through the inlet C enters the outer part of the chamber A, and pursuing the centripetal inwinding course before mentioned escapes through the opening B with a rapid rotary motion and is instantly dispersed. The course of the fluid from the time of its entrance until its discharge is indicated, approximately, by the arrow in the drawings. The discharge-opening should be made as large as possible consistent with the proper action of the device to facilitate the discharge of foreign matters which may be contained in the liquid. Owing to the fact that the device contains but a single outlet-opening of comparatively large size and to the fact that the fluid moves substantially in line with the margin of said opening in its circulation, there is far less danger of the discharge being impeded by obstructive matters in the water.

Fig. 3 represents a cross-section of a distributor differing from that shown in Figs. 1 and 2 only in that the chamber or body is made of spiroidal instead of circular form, the fluid being admitted at the edge or periphery and discharged centrally through the side, as above. It is to be particularly noted that in each of the foregoing devices, as well as in the others which are to follow, the outlet-opening is made directly through the wall of the body or chamber and with a thin edge or margin, so that in each case the fluid upon leaving the chamber is instantly set free without being compelled to pass through any tube, passage, or conductor whatever. This immediate or instantaneous release of the fluid upon its leaving the chamber is a marked feature of my distributor in all its forms and is highly advantageous in that it permits the proper dispersion of the fluid before the velocity and direction acquired in the chamber are lost. The flat form of the distributor, with the discharge from the side face, as in the figures above referred to, is very serviceable for many purposes, but is especially advantageous in the application of insecticides to growing plants, as the distributor connected with a suitable source of supply may

be readily and safely drawn upon the surface of the ground in position to direct the spray upward into the plants. This application of the device will, however, form the subject of a separate application.

Figs. 4 and 5 represent in perspective and in cross-section another form of the distributor, having the chamber and the inlet and outlet disposed in substantially the same manner as in the preceding figures, but provided with means for controlling the discharge and for sustaining the device in position on a lawn or other surface where its use may be demanded. A represents the circulation-chamber, B the inlet, and C the discharge-opening. The body is made with its side faces, which may in this case be termed the "top" and "bottom," removable. The upper face *a*, in which the discharge-opening is formed, consists of a circular plate inserted into the body from below and held therein by a peripheral lip or flange, against which it is seated. The lower face *b* consists of a circular plate provided with an annular externally-threaded flange *c*, which is screwed into the body and against the back of the face-plate, so as to hold the latter forward to its place. This construction permits the face to be removed at will and replaced by another having an outlet-opening of different form. Through the back plate there is inserted a screw *d*, which may be adjusted so that its forward end will close or diminish the outlet-opening and thus regulate the rate of discharge. The lower end of this plug outside of the body is made of a flattened and pointed form, as represented, or of any other suitable form to adapt it to be thrust into the ground to sustain the distributor in an upright or other required position. It will be observed that in this device the face through which the outlet-opening passes is made of greater thickness than in the preceding cases, and that the opening is made of conical or flaring form, with the usual thin edge at the point where the fluid leaves the chamber. This tapering or flaring outlet has a certain limited influence in determining the spread of the jet and the extent of the surface which will be covered by the spray. The fluid is given a wider divergence or distribution as the outer diameter of the flaring mouth is increased, and vice versa. This controlling influence of the flaring mouth is not to be associated or confounded with the action of the ordinary nozzle, a delivery-pipe having a long gradually-tapered bore by which the stream is positively and mechanically controlled. In my device the water is released the instant that it leaves the chamber, and the flaring mouth has but an indirect influence on its course.

Figs. 6 and 7 represent in perspective and in cross-section a device having the circular chamber, the central discharge, and the peripheral eccentric inlet, as in the previous examples. The chamber or body is, however, elongated somewhat and closed at the bottom

by means of a sliding plug *g*, which may be forced inward at will to stop or diminish the discharge. The lower end of this plug, which may be held in place by a screw-thread or by friction, as preferred, is pointed and adapted for insertion into the ground to sustain the device.

Figs. 8 and 9 represent in perspective and in cross-section a distributor having its chamber made of conical form, with the outlet-opening at the apex and with the inlet at the periphery, the axis of the inlet being eccentric to the outlet. In this device the fluid pursues substantially the same course as in the device represented in Fig. 1.

Figs. 10 and 11 illustrate a distributor constructed more particularly with reference to its use upon a hose or hand pipe. The body or chamber *A* is made of flat cylindrical form, with the central outlet *B* in the forward face and the inlet or supply pipe *C* applied centrally to the rear face. Within the body between the inlet-pipe and the outlet-opening there is a spiral inlet-passage *k*, by means of which the course of the fluid is changed after it leaves the pipe *C* and before it enters the central chamber or body, the effect of the passage being to cause the water to enter the chamber at the periphery and in a direction at substantially right angles to that in which it is discharged, so that it acquires a rapid rotary motion within the chamber. The passage *k* may be constructed in any suitable manner, but in the present instance it is produced by inserting into the body the contrivance represented in Fig. 11, consisting of a disk having on its front face a spiral rib or flange. When this device is introduced into the body as shown, the water entering from the pipe *C* against the rear face of the disk passes to the outer edge of the same and thence in a spiral inwinding course between the convolutions of the rib or flange in the periphery of the forward chamber, whence it escapes through the outlet-opening. It is to be noted that in this form of device, as in the others, the water pursues a circulatory course, that it enters at the periphery of the chamber, and that its course of direction is changed before it is permitted to escape.

Fig. 12 represents a perspective view of a distributor having the cylindrical or disk-like chamber with the central discharge-opening in the side face and with the inlet-pipe opening through the periphery in a line oblique to the direction of discharge, the arrangement being such that the inflowing current causes a rapid rotation within the chamber.

Figs. 13 and 14 represent in perspective and in cross-section a distributor of the second class mentioned having a peripheral discharge. This device consists of a cylindrical or disk-like body or chamber provided with the discharge-opening *B* in the periphery and with the inlet-pipe *C* parallel or approximately parallel with a tangent to the periphery of the chamber. The inlet is so located

with respect to the outlet that the inflowing current is directed across and beyond the outlet, as indicated by the arrows. The fluid enters at the outer edge of the chamber, pursues a circulatory course therein, and emerges through the opening *B*, the incoming and outgoing currents encountering and crossing each other, as indicated, whereby a violent agitation of the fluid is produced and the outgoing fluid caused to disperse in the form of spray. It will be perceived that in this form of device, as in the others, the fluid enters and escapes in different directions, that the inflowing current is projected past and beyond the outlet into the chamber, and that the inflowing current serves to keep the discharge-opening clear or free from obstructions on the inside.

While I have described and illustrated herein distributors of various forms, it is to be noted as a peculiarity of the construction in each instance that the device contains the chamber of considerable size, that the fluid enters this chamber in a direction different from that in which it is delivered, and that the inlet and outlet openings are arranged in such relation to each other and the walls of the chamber that the fluid is caused to pursue a gyratory or circulatory course before reaching the outlet.

I am aware that hose-sprinklers having a body or chamber provided with numerous perforations have received the water through a tube applied centrally or radially at one side, and also that fountain-nozzles have been constructed of a pipe with an expanded mouth, or have been arranged to deliver the water against a loose plate, and to such structures I lay no claim. Such devices do not contain a chamber with a wall against which the water acts and which serves to cause a retrograde or reactionary motion of the water; neither do they contain a reverberation or reaction chamber into which water is admitted eccentrically.

Having thus described my invention, what I claim is—

1. In a nozzle for spraying liquids a chamber substantially circular in one plane of section provided with an outlet-port, and with an inlet-passage, the axis of which lies in the plane of a circular section and between a diameter and a tangent of such section; whereby a rotary motion is imparted to the liquid in the chamber by the force of the inflow which motion is retained after it escapes from the chamber, substantially as described.

2. In a nozzle for spraying liquids a chamber of substantially circular form in cross-section, provided with a tangential inlet-port, the axis of which lies in the plane of the circular section, and with an outlet-port delivering in a direction transverse to the axis of the inlet-port.

3. A spraying-nozzle comprising a chamber of approximately circular form in cross-section, provided at its periphery with a tan-

gential inlet-port, and at its center with an outlet-port, the axis of which is transverse to that of the inlet-port.

4. A spraying-nozzle comprising a chamber
5 having two approximately circular side walls, and an approximately circular peripheral connecting portion, said chamber provided with an inlet-port adapted to deliver the incoming

fluid against the connecting portion, and one of the said side walls being provided with an opening for the discharge of the fluid.

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Witnesses:

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