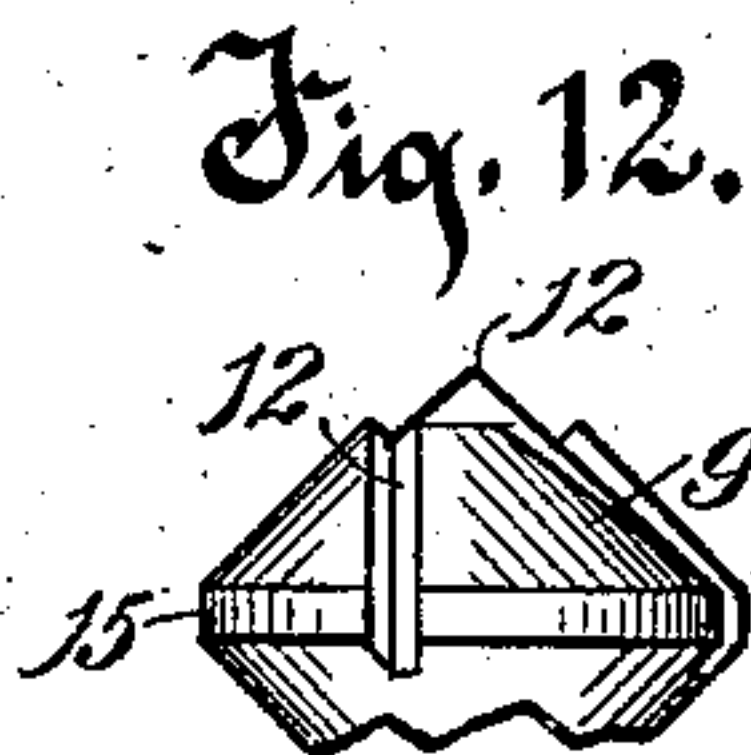
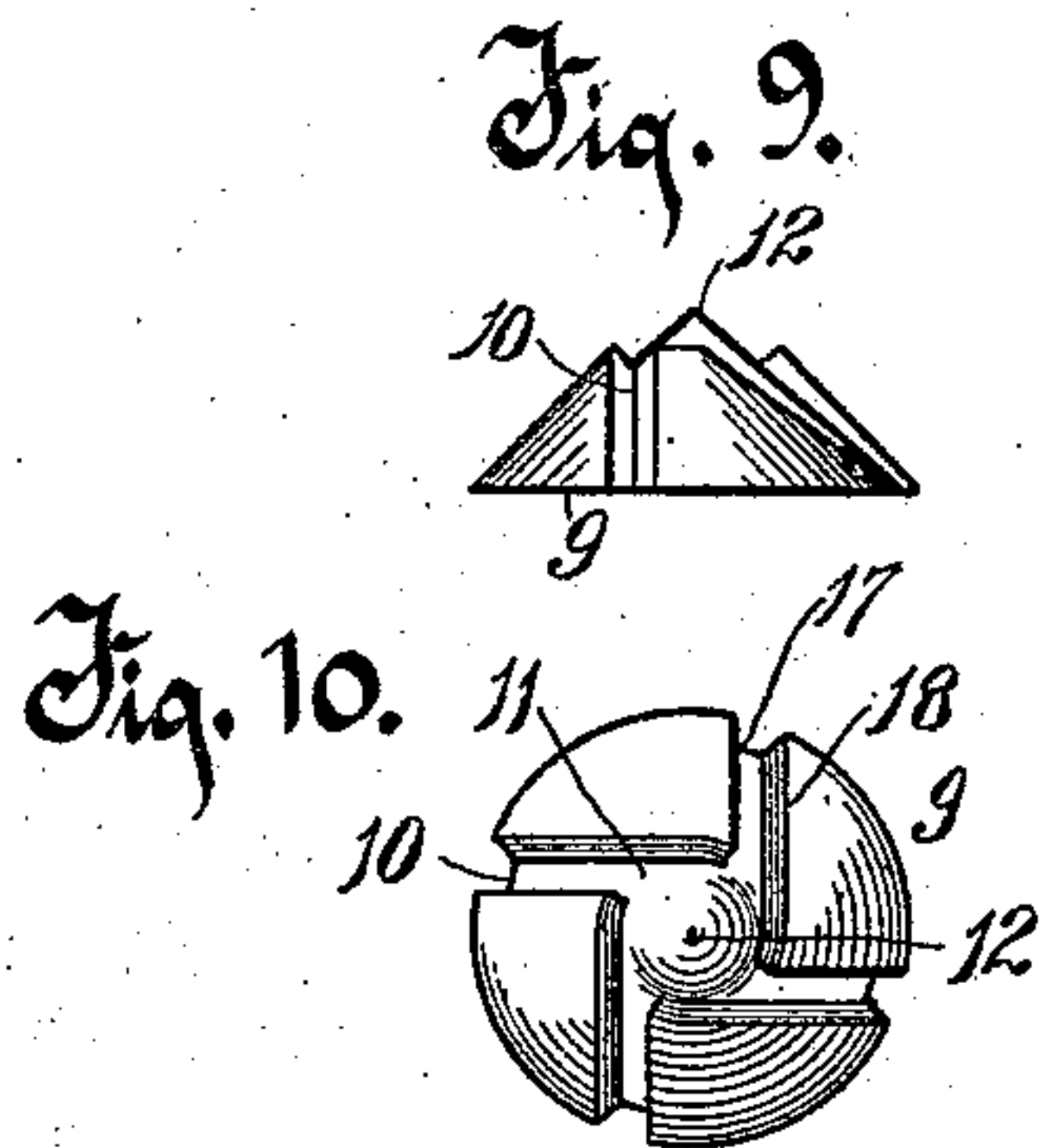
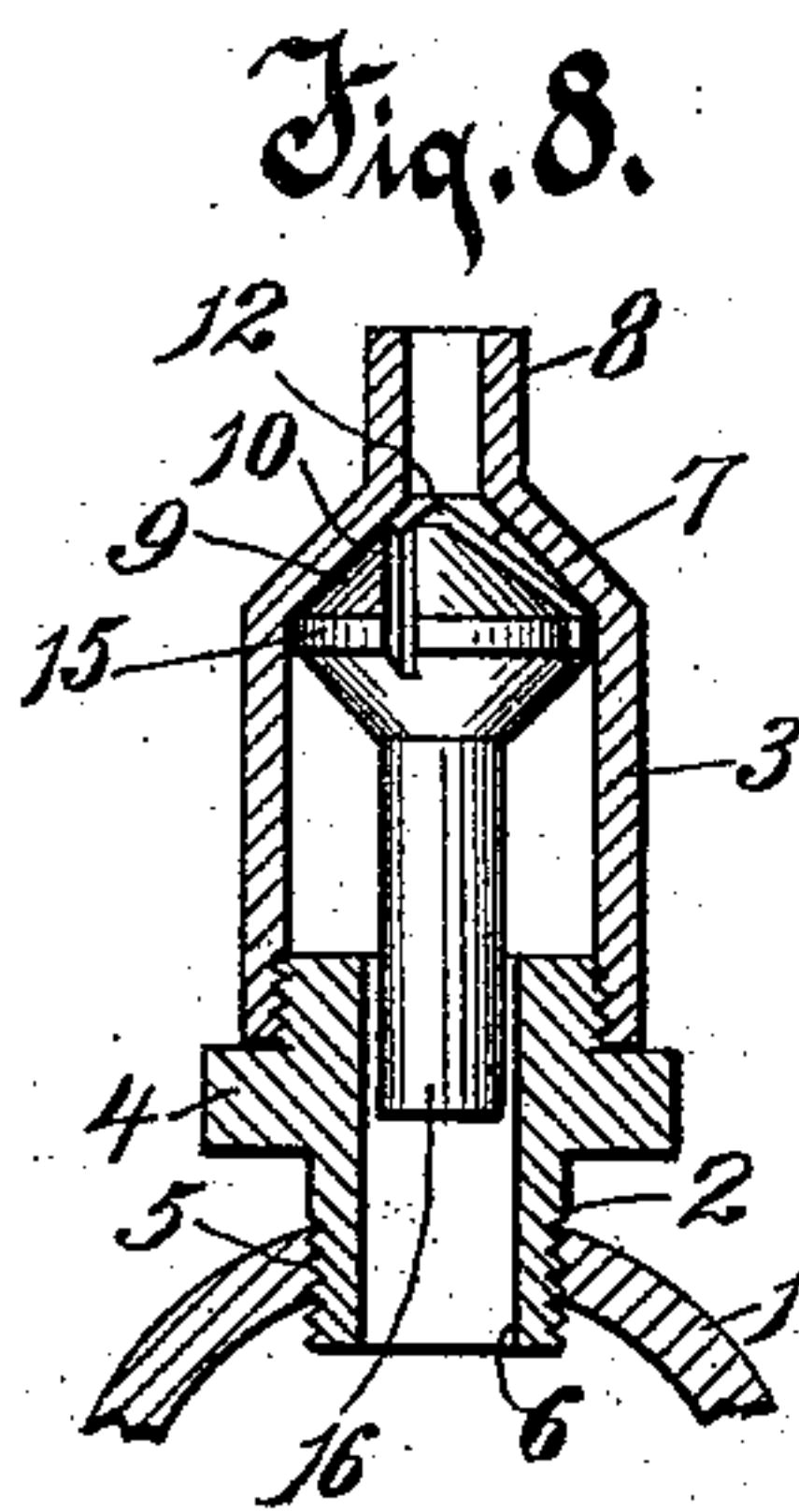
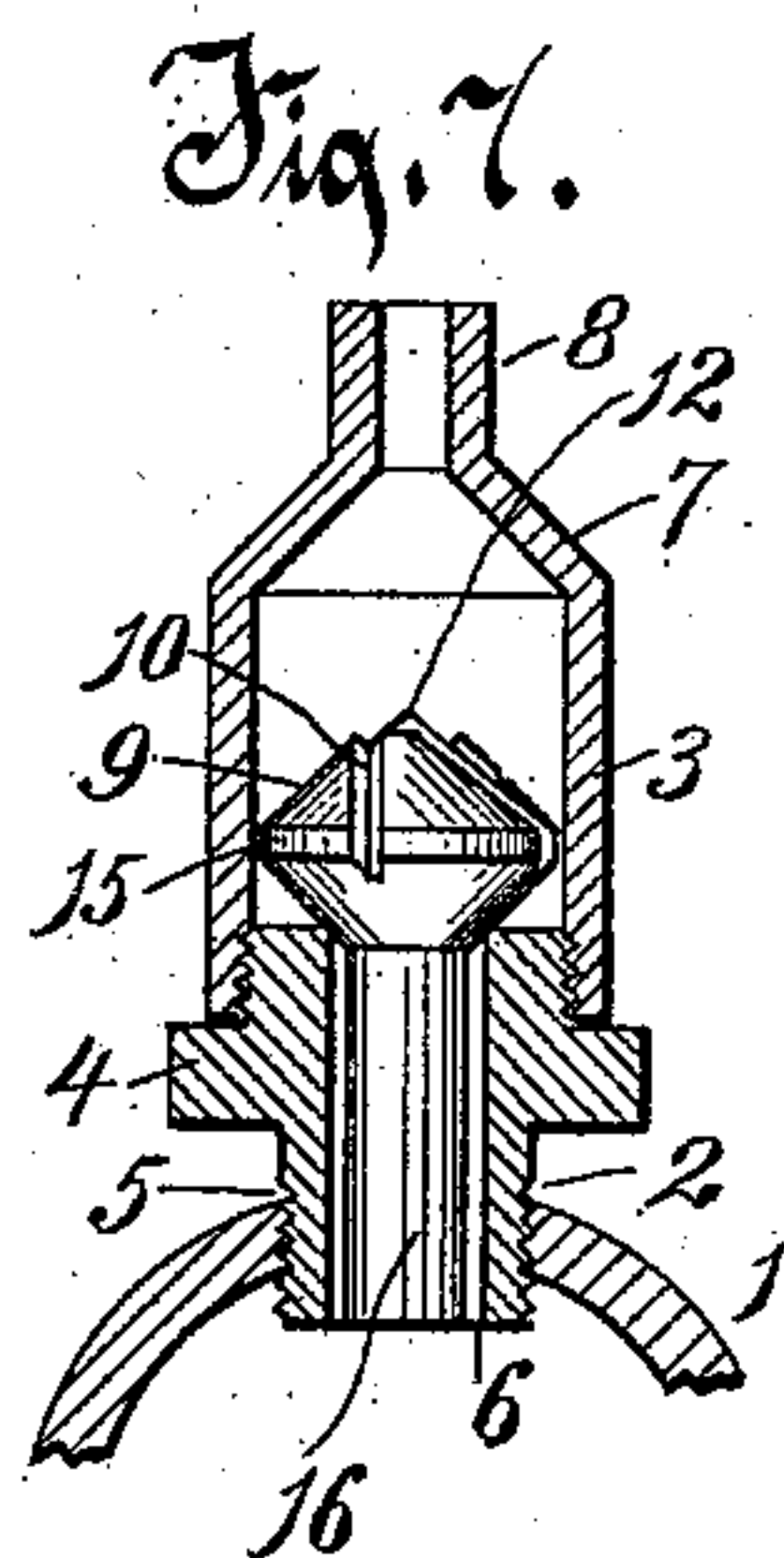
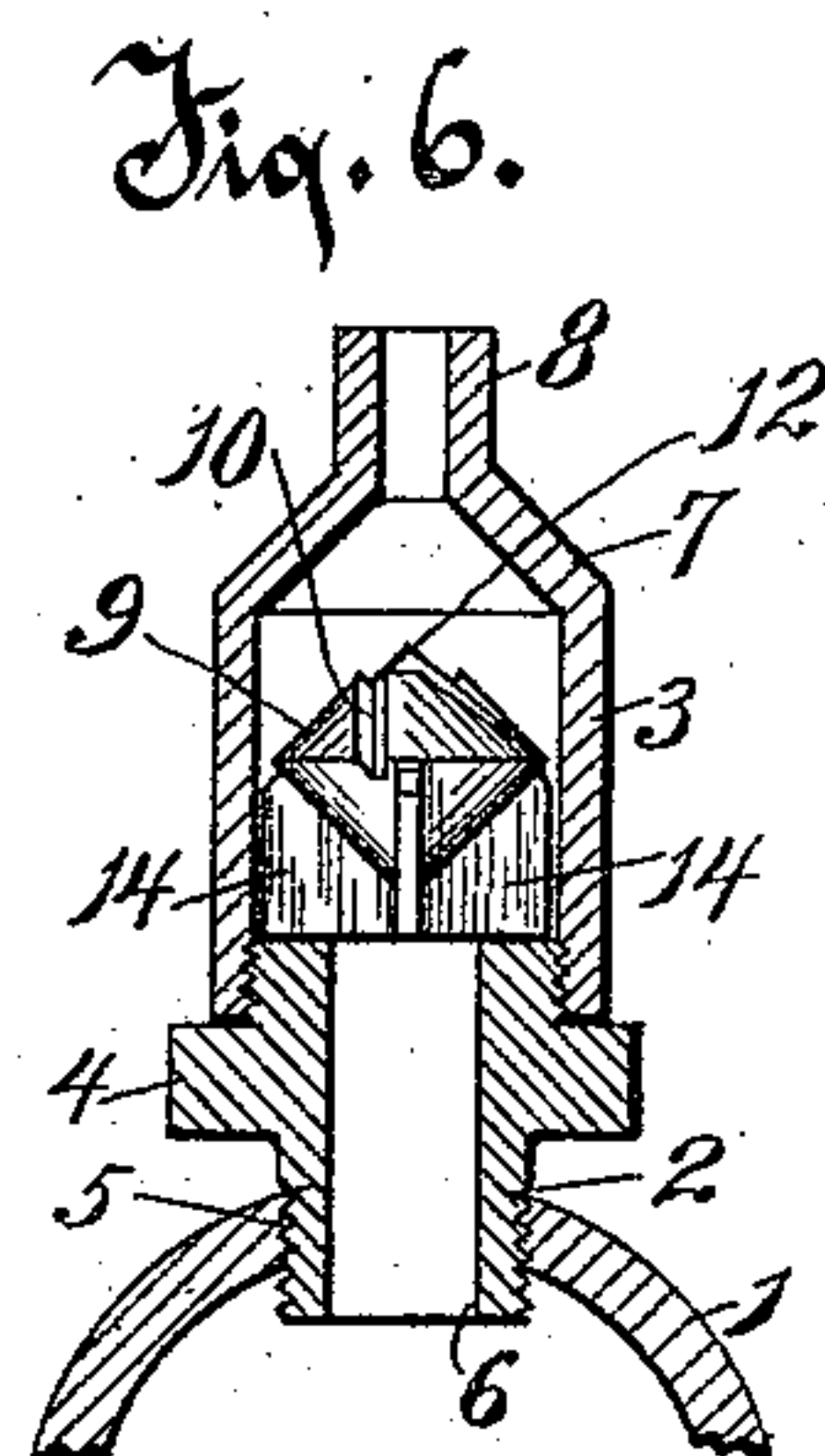
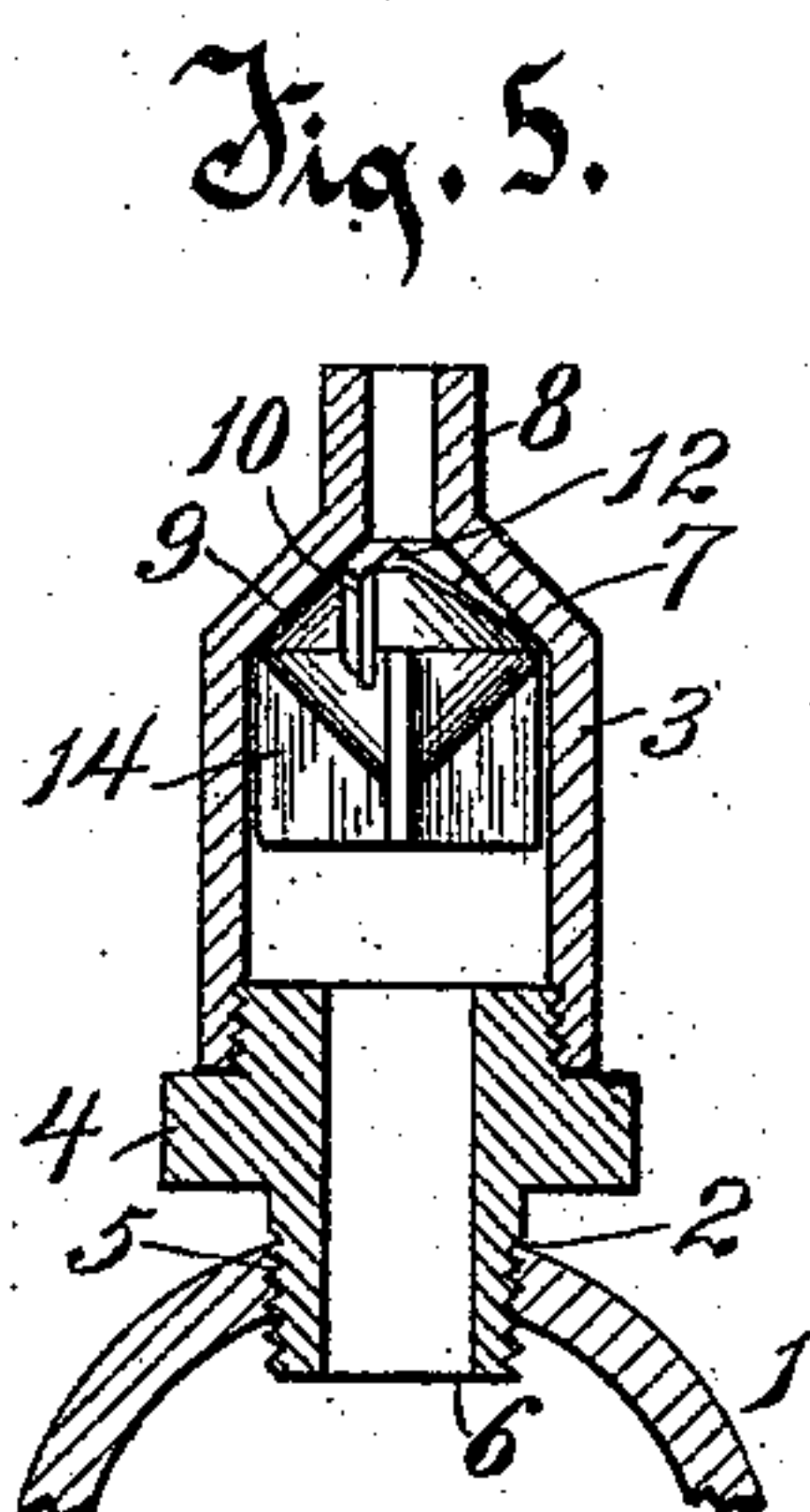
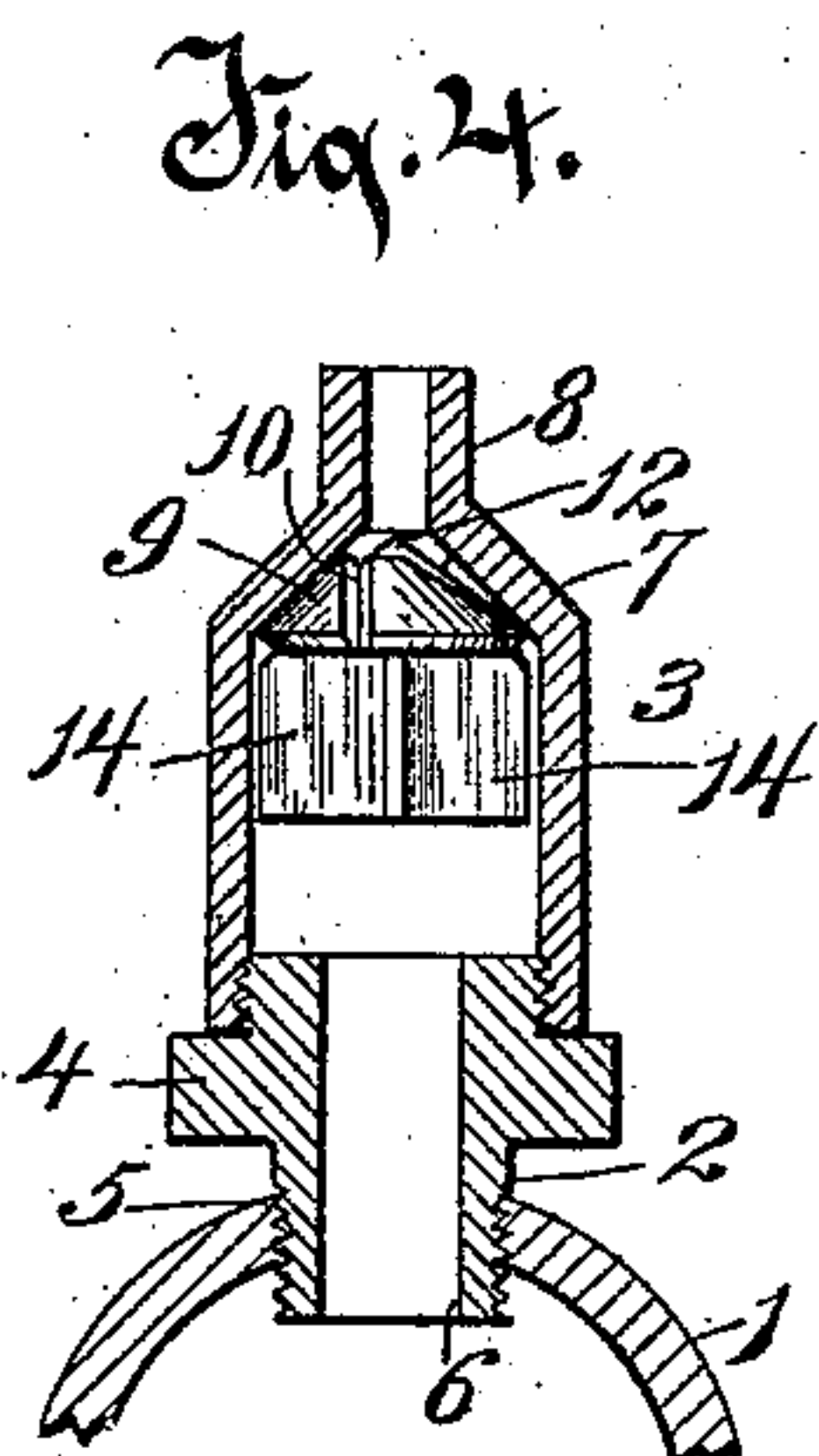
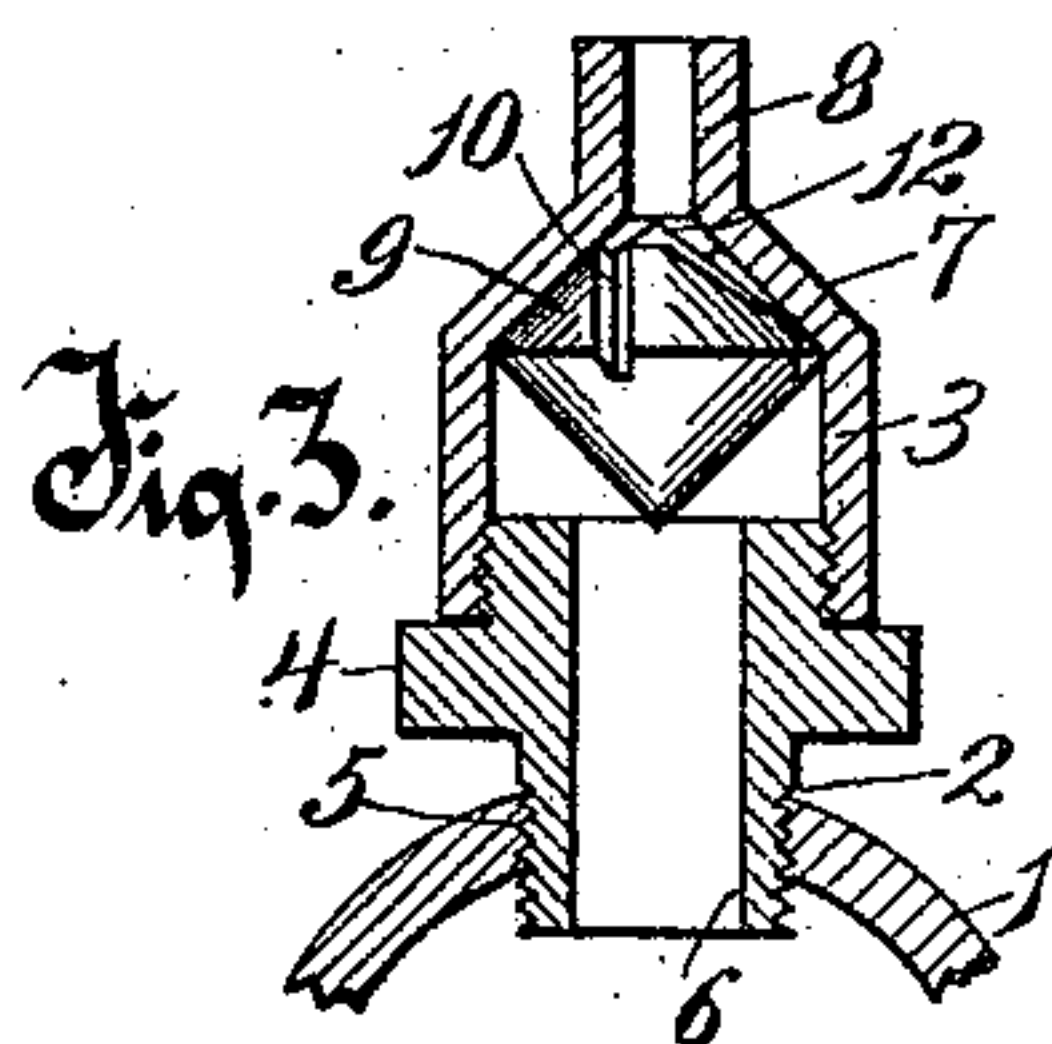
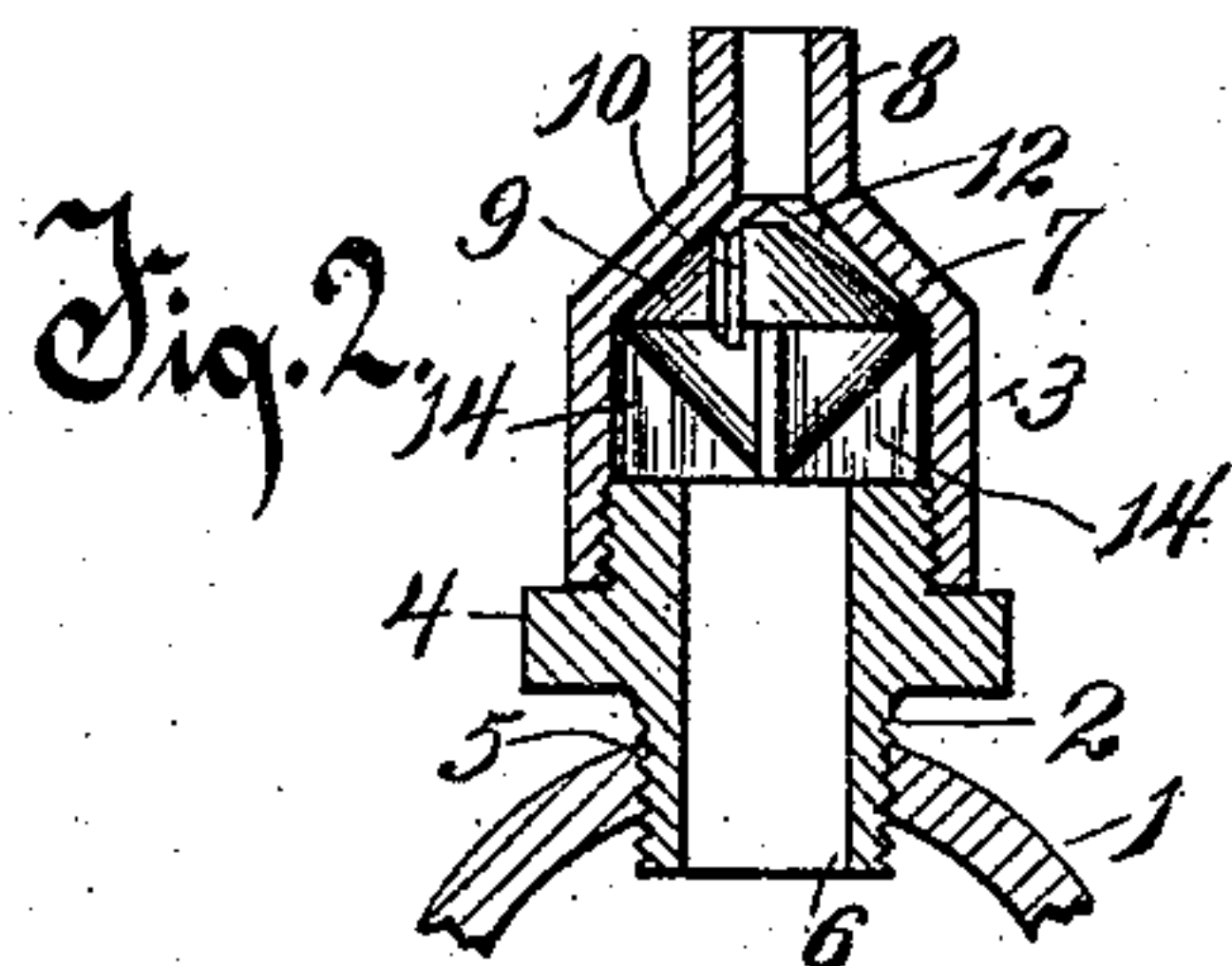
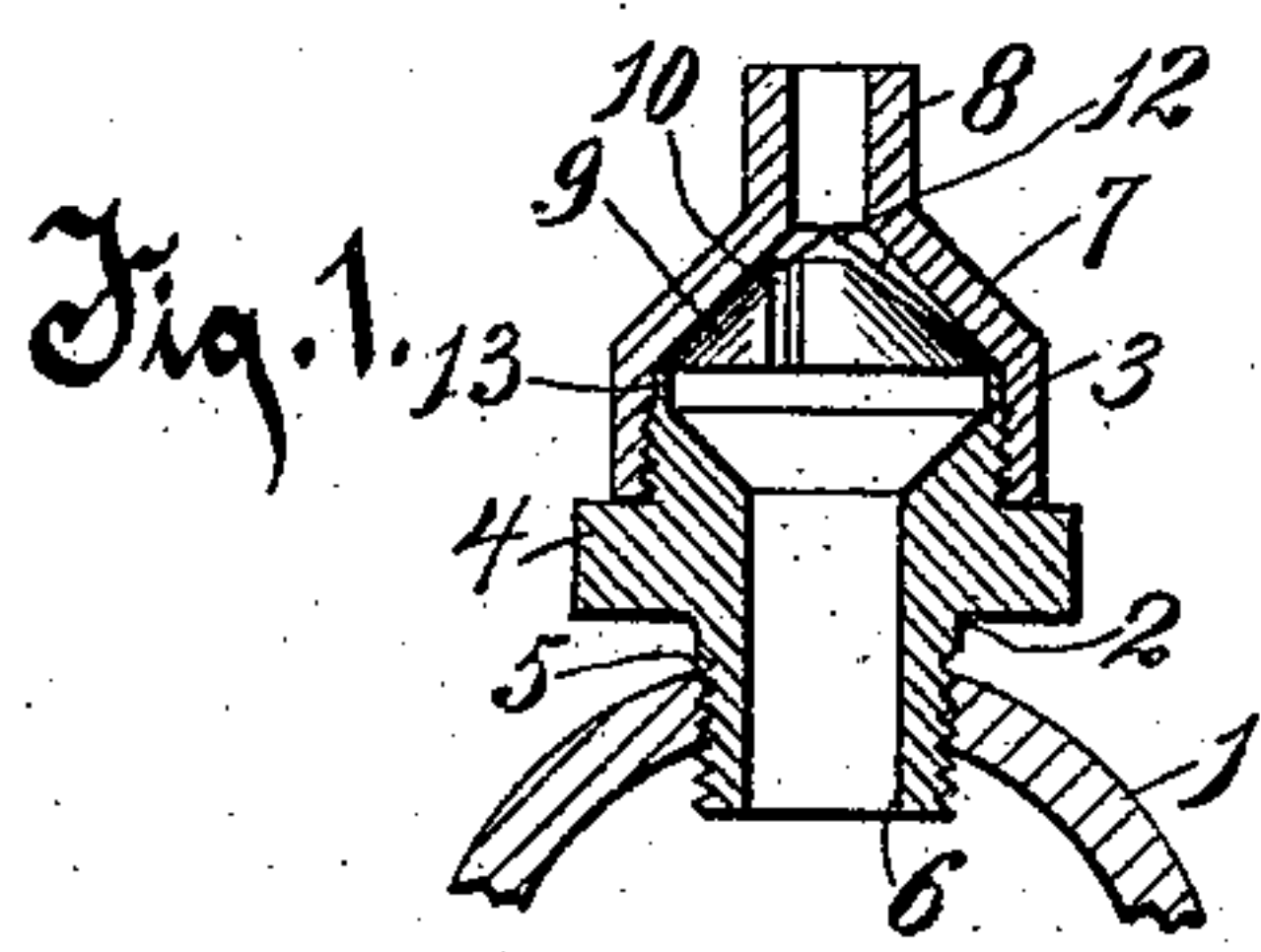


(No Model.)

J. F. DORNFELD.  
SPRAYING NOZZLE.

No. 532,541.

Patented Jan. 15, 1895



Witnesses.

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# UNITED STATES PATENT OFFICE.

JOHN F. DORNFELD, OF CHICAGO, ILLINOIS.

## SPRAYING-NOZZLE.

SPECIFICATION forming part of Letters Patent No. 532,541, dated January 15, 1895.

Application filed December 20, 1893. Serial No. 494,216. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN F. DORNFELD, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Spraying-Nozzles or Atomizers, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention has relation to improvements in spraying nozzles or atomizers for reducing liquids into spray, for cooling, disinfecting, and other purposes.

The purpose to which I more especially desire to adapt my device is for moistening and cooling large volumes of air used in pneumatic malting by diffusing a cooled liquid in spray to render it more effective in absorbing the sensible heat of the room.

The primary object of the device is to have a perfect atomizing and self cleaning apparatus; and with this object, and others, in view, the invention consists of the devices and parts as hereinafter described and claimed, or their equivalents.

The generic features of the invention are, first, considering the broadest extent and purview of the invention, the provision of a plug held within a casing, the plug provided with a groove or grooves leading to a central point thereof, said grooves adapted to receive water, which passes through the same to the central point, and is directed from said central point to the upper opening for final discharge; secondly, the provision of a plug within a casing, the plug provided with eccentric grooves leading to a central point thereof, said grooves adapted to receive and discharge water as above set forth, and thirdly, more limitedly, the provision of a plug having a conical upper side provided with a groove or grooves running from a central space, of which space the apex of the cone is the center, to the base of said cone.

In the accompanying drawings, Figure 1, is a vertical sectional view of one form of my improved atomizer applied to a main pipe, said pipe being in fragmentary transverse section. Fig. 2, is a similar view of another form of the device. Fig. 3, is a similar view of another form in which the plug is capable of vertical play, said plug in the figure being shown in its raised position. Figs. 4, 5 and

6 are similar views of other forms in which the plug has vertical play. Figs. 7 and 8 represent vertical sections of another form of the device in which the plug has vertical play, the former figure showing the plug in its lower position and the latter figure showing the plug in its raised position. Fig. 9, is a detail elevation of the form of plug used in Fig. 1. Fig. 10, is a plan view showing the construction of the top of all of the different forms of plugs illustrated. Fig. 11, is an enlarged fragmentary detail of the form of plug illustrated in Figs. 2, 3, 5 and 6; and Fig. 12, is a similar view of the form of plug shown in Figs. 7 and 8.

Like numerals of reference denote like parts throughout the several views.

Referring to the drawings, the numeral 1 indicates a main pipe through which the fluid is conducted.

In Figs. 1 to 8 inclusive the casing of the atomizer consists of a lower or base piece 2, and an upper or cap piece 3. The former is provided medially with an annular shoulder 4, while its opposite extremities are threaded. The lower threads engage a threaded opening 5 in the main pipe, and the upper threads receive the internal threads at the lower end of the cap piece 3, said cap piece being screwed therein until its lower extremity comes into contact with the annular shoulder. The base piece is tubular throughout so as to provide an opening 6. The upper end of the cap piece is of truncated conical shape, as indicated at 7, and from the apex of the cone extends a straight integral tube 8.

Within the outer casing above described is arranged removably a plug 9, which, while differing as to details in several of the views, yet, retains the same generic characteristics throughout.

The structural feature which is common to all the figures of the drawings consists in the provision of a conically-shaped outer side or head to the plug, provided with a groove or grooves 10 running eccentrically from a central space 11, of which space the apex 12 of the cone is the center.

In Figs. 1, 2 and 3 the cap piece 3 is somewhat shorter than in the other figures of the drawings, Figs. 1 and 2 illustrating a fixed or stationary plug.



In Fig. 9 is shown in detail the plug employed in a structure similar to that shown in Fig. 1, said plug having the upper conical grooved surface, and a lower flat surface, the latter resting on a thin shoulder 13 projecting from the upper end of the base, and the former coming into contact with the conical surface of the cap piece 3, the latter being screwed down over the plug until the two registering conical surfaces come in contact.

Fig. 2 differs from Fig. 1 in providing a plug of double conical form, the lower cone having projecting therefrom a series of brackets 14, preferably four, which brackets rest on the upper end of the base piece 2. The cap in this form is also screwed down over the plug until the two conical surfaces come in contact. In Figs. 1 and 2, when it is desired to clean the grooves in the plug, it is necessary to unscrew the cap piece.

Fig. 3 is similar to Fig. 2 excepting that the brackets 14 are omitted. This permits the plug to play up and down, and thereby automatically clean itself, as will hereinafter more fully appear.

In Fig. 4 the cap piece 3 is longer than in the preceding figures, which is also true of Figs. 5, 6, 7 and 8. The plug illustrated in Fig. 4 is provided with a conical top and a flat bottom, the same as in Fig. 1. A series of brackets similar to 14 depend from the flat bottom, but inasmuch as these are of less length than the cap piece, the plug is afforded a certain amount of vertical play. These depending brackets serve to centrally guide the plug in its vertical movement. They normally rest upon the top of the lower or base piece 2, but when fluid, under pressure, enters the tubular opening of the base piece, the plug is raised to the position illustrated in the figure. In this form of construction, it will be noticed also that the plug is of less diameter than the casing, which permits any extraneous or deleterious matter to pass freely by as the plug is raised or lowered.

Fig. 5 is similar in all respects to Fig. 4 excepting that the plug has a conical bottom, and the brackets 14, when the plug is raised, extend up to and against the conical surface of the cap piece. This, it will be noticed, is not true of Fig. 4, wherein the brackets fall short of the cone of the cap, when the plug is raised.

Fig. 6, is similar to Fig. 5, excepting that the brackets 14 therein shown are arranged in the same manner as in Fig. 4, that is to say, the upper ends of said brackets terminate at such points that, when the plug is raised, they will not contact with the conical surface of the cap.

Figs. 7 and 8 represent the same form of device, Fig. 7 showing the plug in its lower position, and Fig. 8 the plug in its raised position. In these figures the plug is shown as of double conical form, the upper and lower cones being connected by a plane surface 15 which affords a greater bearing surface for the plug in its up and down movement. The

grooves 10 in this structure are also continued down across the plane surface 11, so as to permit the water to freely enter therein. In this form the plug is also shown as provided with a stem 16 depending from the under cone. This stem fits in the opening 6 of the base piece, and acts as a guide for the plug in its vertical movement.

It will be noticed, particularly from Fig. 10, that one side, 17, of each groove 10 is straight, while the opposite side 13, is slightly inclined, thus forming a groove of an approximate V-shape.

In the structures illustrated in Figs. 1 and 2 it is not intended that the plug should have any vertical movement, and consequently when water is introduced into the main pipe under pressure, said water will enter the opening of the base piece, and thence pass up into the groove or grooves 10 of the plug eccentrically meeting the central space 11, and guided therefrom to the tube 8 by the apex 12 of the cone, in a rotating manner, which rotation will continue for some length outside of the nozzle, thus breaking the water up into fine atoms. In the forms illustrated in the other figures of the drawings, however, it is intended that the plugs should have a vertical movement, and consequently when water is introduced into the main pipe under pressure, as before described, the plug will be at once forced upward, as shown in Figs. 3, 4, 5 and 8, and the water will then take the same course as pointed in reference to the other figures of the drawings.

It will of course be understood that, if desired, a number of the atomizing or spraying devices may be arranged along the length of the main pipe. I also do not wish to be understood as limiting myself to the particular number of grooves 10 illustrated in the drawings, inasmuch as there may be more or less of these grooves used as may be desired.

An effectual cleaning of the device may be readily accomplished by alternately raising and lowering the pressure of the fluid, whereby the plug is made to rise and fall. In falling the grooves will automatically clean themselves of any matter which may have settled therein, and owing to the fact that these grooves are of approximate V-shape they will much more readily be self cleaned, owing to the fact that inclined sides are presented tending to more freely permit the clogging matter to pass out of the grooves.

From the constructions above described, it will be found that I provide an invention in which, during the time the device is in the act of spraying or atomizing, two surfaces, by reason of a fluid pressure, are in contact, one of which surfaces being grooved, creased, or fluted for the purpose described, with a space below the same, so as to permit the two surfaces to be separated for the purpose of clearing the grooves, creases or flutes, as the pressure is reduced.



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

1. In a spraying nozzle, the combination, 5  
with an outer casing provided with an inlet and an outlet opening, an interior contact surface, a limiting shoulder, and a space between the contact surface and the shoulder, of a loose plug within the space, and held against 10  
the contact surface by the force of the water, and separable therefrom by gravity, when the pressure of the water is removed, said plug provided with an eccentrically grooved surface, which, when the plug is in engagement 15  
with the contact surface, is adapted to guide the water introduced into the casing to the outlet opening in a revolving stream for final discharge, the grooved surface being automatically cleaned by the movement of the 20  
plug under gravity, after the water pressure is discontinued, said movement by gravity away from the contact surface being limited by the interior shoulder, substantially as set forth.

2. In a spraying nozzle or atomizer, the 25  
combination, with an outer casing provided with an inlet and an outlet opening, and with an interior conical contact surface, of a plug having its outer side of conical shape, said 30  
conically-shaped side adapted to be held in engagement with the contact surface of the casing, and provided with a groove or grooves, said groove or grooves running tangentially from a central space, of which space the apex 35  
of the cone is the center, the groove or grooves receiving water from a source of supply and conducting the water to the central space from which space said water is guided, by the apex or point of the cone, to the outlet opening for 40  
final discharge, substantially as set forth.

3. In a spraying nozzle, or atomizer, the 45  
combination, with an outer casing provided with an inlet and outlet opening, of a plug within the casing, said plug provided with a groove or grooves leading to a central point of the plug, said groove or grooves having one

side or sides straight, and the opposite side or sides inclined, the water adapted to be forced through the groove or grooves to the central point, and directed therefrom to the 50  
outlet opening for final discharge, substantially as set forth.

4. In a spraying nozzle or atomizer, the combination with an outer casing provided with an inlet and outlet opening, and with an 55  
interior conical contact surface, of a plug within the casing said plug of double conical form, the upper and lower cones being connected by an annular plane surface, the upper cone provided with a groove or with grooves 60  
extended across the annular plane surface, the grooved surface adapted to be held in engagement with the contact surface of the casing, and the groove or grooves receiving water from a source of supply, and guiding the 65  
water to the outlet opening for final discharge, substantially as set forth.

5. In a spraying nozzle or atomizer, the combination, with an outer casing provided with an inlet and an outlet opening, and with 70  
an interior conical contact surface, of a plug within the casing, said plug being of double conical form, the outer cone adapted to be held in engagement with the contact surface of the casing, and provided with a groove or 75  
grooves receiving water from a source of supply, and guiding said water to the outlet opening for final discharge, and the inner cone having brackets projecting therefrom, the ends of said brackets adapted to support the 80  
plug in its normal position, and the edges or sides of the brackets fitting against the inner side of the casing, and adapted to guide the plug when moved vertically, substantially as set forth. 85

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

JOHN F. DORNFELD.

Witnesses:

JOHN J. CRESOP,  
H. B. MEADES.