No. 743,696. PATENTED NOV. 10, 1903.

A. S. DIXON.

ATOMIZER.

APPLICATION FILED JUNE 30, 1902.

NO MODEL.

Fig. I

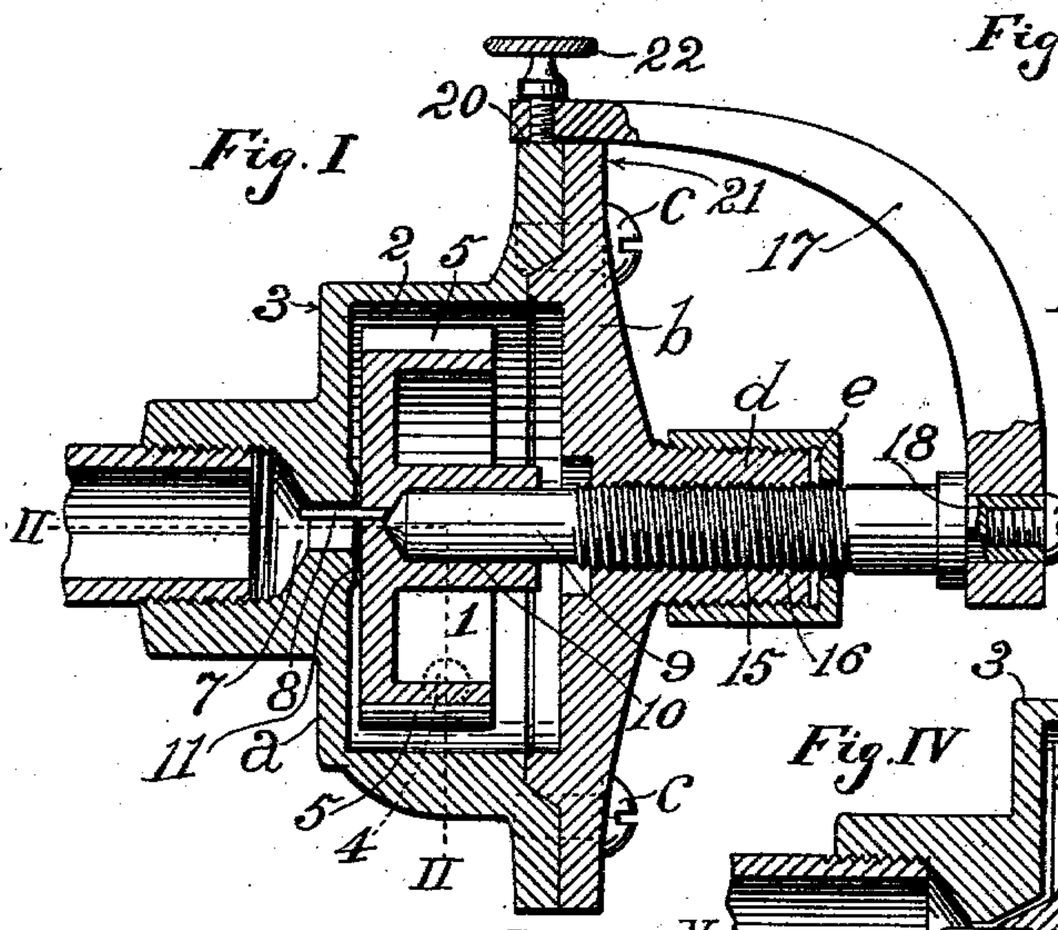


Fig. VI

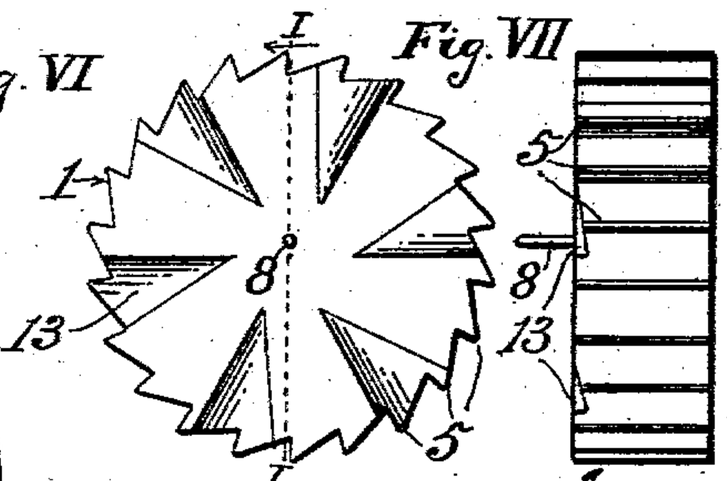


Fig. VII

Fig. IV

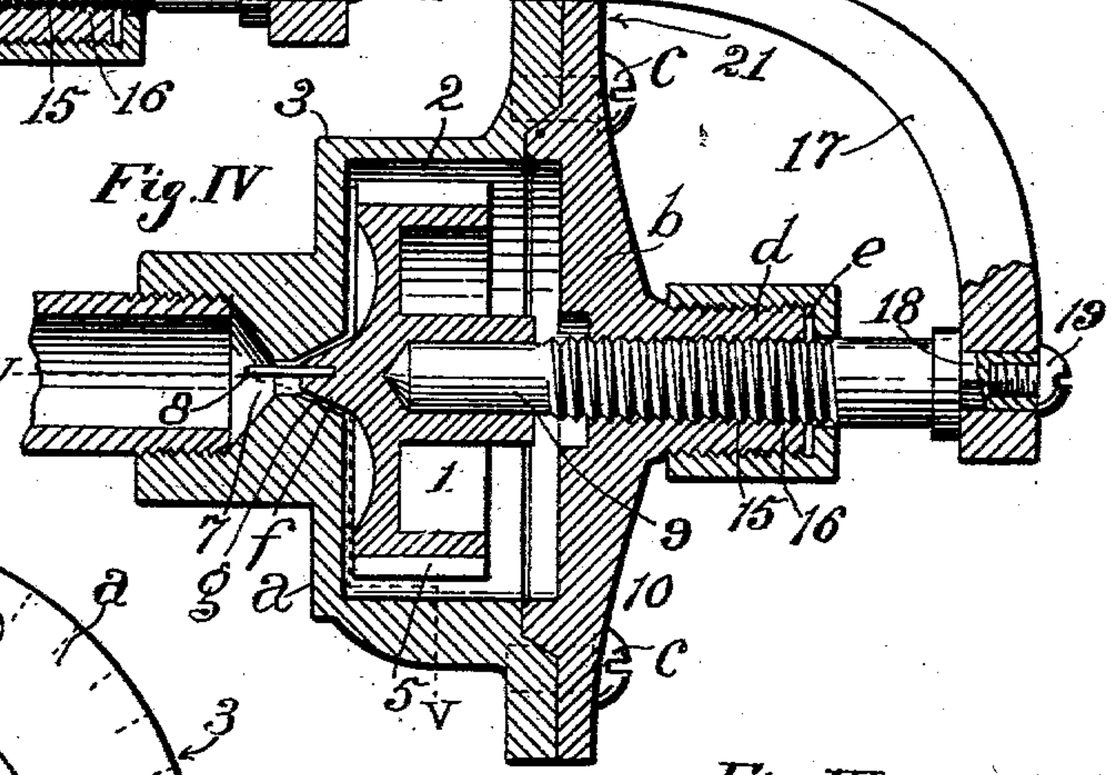


Fig. II

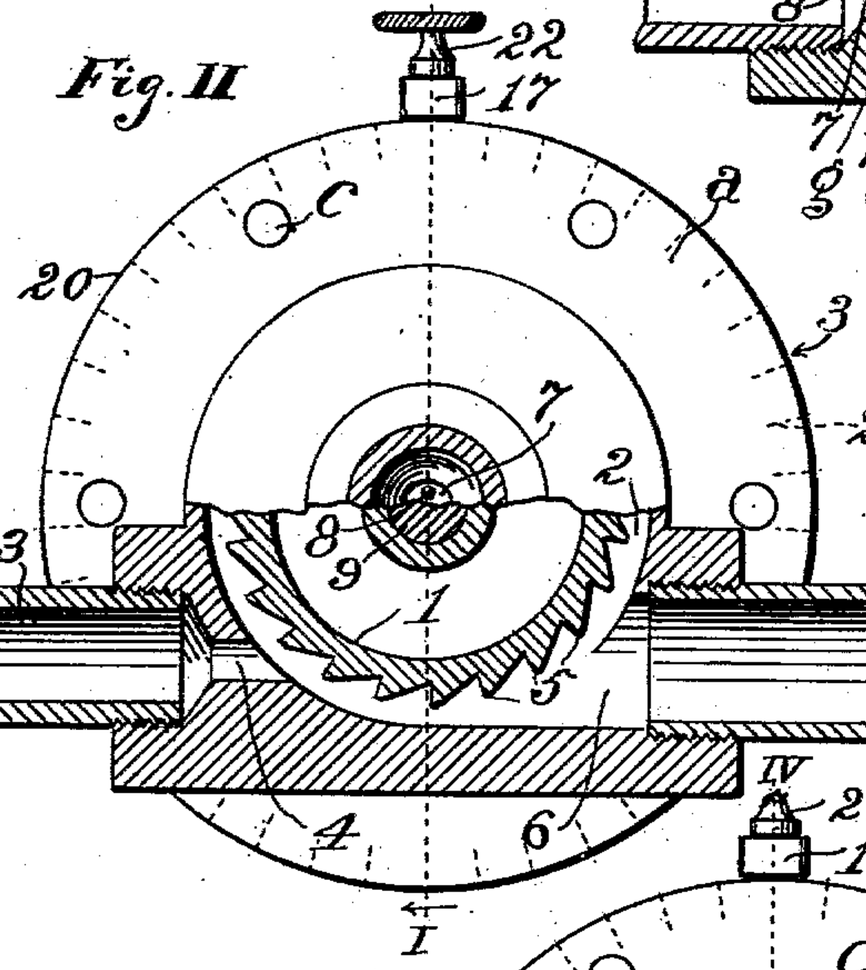


Fig. III

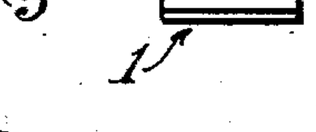
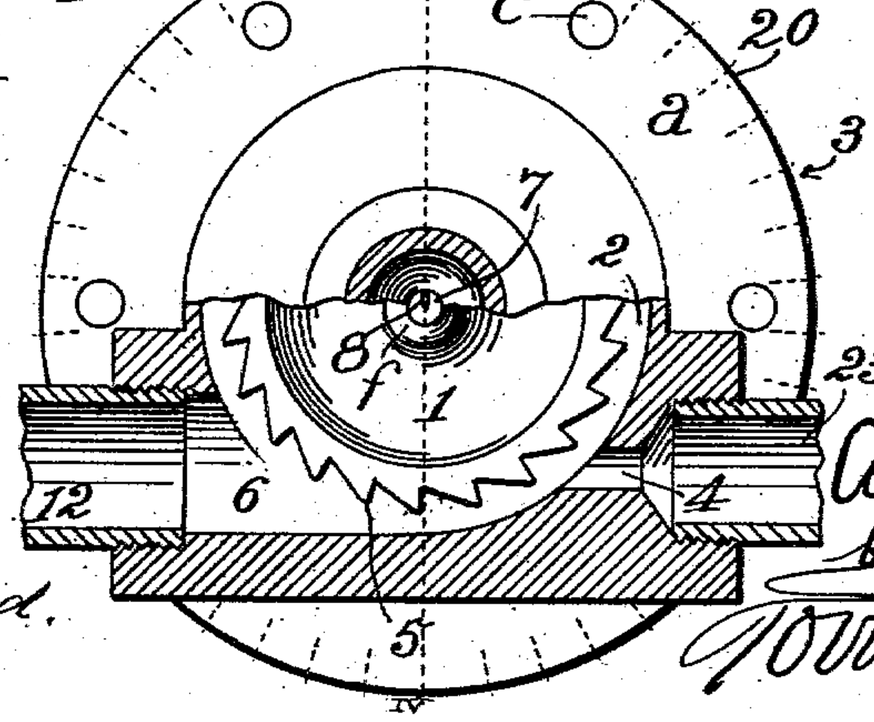


Fig. V



Witnesses
C. C. Holly.
J. Townsend.

Inventor
Albert S. Dixon
by
Townsend Bros.
his attys.

No. 743,696. Patented November 10, 1903.

UNITED STATES PATENT OFFICE.

ALBERT S. DIXON, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO ASPHALT PAPER PIPE COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

ATOMIZER.

SPECIFICATION forming part of Letters Patent No. 743,696, dated November 10, 1903.

Application filed June 30, 1902. Serial No. 113,822. (No model.)

To all whom it may concern:

Be it known that I, ALBERT S. DIXON, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Atomizer, of which the following is a specification.

This invention is designed for breaking up and atomizing liquids under the pressure of an expansive fluid for spraying or distributing the liquid.

A special object of the invention is to provide means whereby thick hydrocarbons may be reduced to vapor and supplied in perfectly-regulated quantities to the fire-box of a furnace, so that the fire may be constantly maintained at any determined volume and force.

In this invention a rotary member is mounted in a chamber which is formed in a body having an inlet arranged to direct a jet of expansive medium, as steam or air, tangentially against the periphery of said rotary member, an outlet through which the said expansive medium may escape from the chamber after giving a rotary impulse to said member, and an inlet for the liquid fuel. The rotary medium is desirably furnished with projections, which may be formed as teeth or by notches or otherwise.

An object of the invention is to construct and arrange parts so as to avoid wear and to increase the life of the apparatus.

Another object of the invention is to make provision for feeding to such device thick heavy hydrocarbon oils without any liability of clogging.

The invention may be applied in various forms, and I do not limit myself to any specific construction, the purpose in view being to produce a construction by means of which the liquid will be mechanically broken up and mixed in a most effective way with an expansive medium before it reaches the nozzle or pipe through which it is finally ejected.

The accompanying drawings illustrate the invention.

Figure I is a vertical axial section of the atomizer ready for use. Fig. II is an elevation of the same, partly in section on line II II of Fig. I. Fig. III is a view of the end of the nozzle shown in Fig. II. Fig. IV is a view of another form of the invention. Fig. V is a broken elevation of the same, partly in section on line V V of Fig. IV. Figs. VI and VII are end and side views, respectively, of a form of the rotary member.

1 designates a toothed rotary member arranged to rotate in a chamber 2, formed in a body 3, which has an inlet 4 for an expansive medium arranged to direct a jet of such medium tangentially against the teeth 5 of said member 1 below the axis of said member and toward an outlet 6, which is desirably of a considerable diameter compared with that of the inlet 4.

7 is an inlet for the liquid fuel, which inlet communicates against the closed end of the rotary member 1. For the purpose of regulating the inflow and for readily keeping said inlet open and free the inlet 7 may be located opposite the end of the rotary member 1 and axially relative to such rotary member, and said member may be provided with a projection in the form of a finger or pin 8, arranged eccentrically, so that as the rotary member turns the part 8 will act as a wiper to keep the oil-inlet 7 clear. This pin or projection may be of any form which may serve the purpose stated.

9 is a spindle on which the rotary member 1 may be mounted to rotate freely, a socket 10 in said member being provided for this purpose and desirably extending from the end opposite the oil-inlet 7 toward such inlet a greater or less distance.

The inlet 4 is desirably opposite the outlet 6, so that a large proportion of the expansive medium may pass almost directly through the chamber 2, first having acted upon the toothed periphery of the member 1. A portion of said expansive medium, however, will be enmeshed between the teeth, and other portions will be spread out laterally to pass around at the ends of the rotary member, which may be arranged by any suitable means, such as the bead 11 and the spindle 9, to rotate freely in the chamber 2, with a clear space all around the member 1 to allow an intermingling of the expansive medium and the liquid. A further advantage of lo-

cating the lower notched periphery of the member 1 in line between the inlet 4 and the outlet 6 is that the expansive force of said medium will tend to support the rotary member in the chamber, thus lightening said member on its bearing, avoiding wear, and increasing the life of the parts. This arrangement also applies the expansive force to lift the liquid which is admitted at the axis of the rotary member, so that said liquid will not immediately pass to the outlet 6, but will partake of the rotation and will be thrown to the periphery of the chamber by centrifugal force and will be acted upon in said chamber by the rotary member and the expansive fluid and will finally issue through the outlet 6 well broken up and intermingled with the expansive fluid.

12 represents a nozzle or discharging appliance, which may be of any requisite form to receive vapor from the outlet 6 and deliver it to the fire-box or wherever else the atomized liquid is to be applied.

The inlet 7 communicates against the closed end of the rotary breaker and mixer 1, communicating into the chamber 2 in alinement with the axis of said rotary member. The rotation of the member 1 thus serves by centrifugal action to break up the oil as it is thrown out toward the periphery of the member 1 and to admix therewith steam rising from the tangential inlet 4. To heighten the centrifugal action of the rotary member 1 upon the liquid, the closed or imperforate end or face of said member, which is toward the liquid-inlet 7, may be notched or corrugated in radial or other lines.

13 designates a form of corrugation which I deem desirable.

The nozzle-outlet 14 is desirably of large cross-sectional area compared with the cross-sectional area of the inlet 4, so that no great pressure will be produced by the expansive medium inside the chamber 2. The body of the nozzle 12 between the chamber 2 and the nozzle-outlet 14 will be of considerably larger cross-sectional area than such outlet, so as to form a nebulizing-chamber between the mixing-chamber 2 and the outlet 14. Desirably the pipe or body of the nozzle 12 will be of such length as to allow the body 3 of the atomizer to be located at a convenient distance from the front of the furnace, so that it will not become overheated.

It is desirable that means be provided for moving the rotary member 1 toward the liquid-inlet 7, thus to regulate the amount of liquid which may flow under a given pressure into the chamber 2. For this purpose the spindle 9 may have a screw-threaded portion 15, which screws through a female screw 16 in a portion of the body 3, so that when the spindle is turned in one direction it will advance toward the inlet 7, thus to force the rotary member toward said inlet to limit the flow of oil therethrough.

17 is a handle fastened to an angular portion 18 of the spindle by a screw 19 for turning the spindle. Desirably the body 3 has a circular portion 20, which may be marked with a scale 21, and the arm 17 extends into position to swing around the periphery of said circular portion.

22 is a set-screw screwed through the arm 17 and against the periphery of the circular portion 20 to fix said arm in any determined position. The purpose of this is to enable the attendant to gradually adjust the spindle 9 to any depth in the chamber 2, so as to hold the rotary member 1 positively toward the liquid-inlet 7. The scale enables the attendant to determine the arc through which the arm moves. It is not in practice necessary to provide any means for moving the rotary member 1 away from the inlet 7 other than the pressure of the liquid as it enters the chamber 2. It is to be understood that the liquid must be introduced into the chamber under a sufficient head, and this may be provided by any of the well-known means for such purpose. The adjustment of the rotary member 1 toward the inlet 7 must be made with reference to the head or pressure of the liquid and the pressure of the expansive medium.

It is to be understood that the steam will be applied through a valved pipe 23, the valve of which is not shown in the drawings, and that to increase the fire an increased amount of steam and oil will be admitted to the chamber 2. To increase the amount of oil thus admitted, the handle 17 may be turned to unscrew the spindle 9 and draw it away from the liquid-inlet 7, thus allowing a greater quantity of oil to be admitted. At the same time more steam should be turned on. To reduce the fire, the handle 17 will be turned in a reverse direction, thus forcing the spindle 9 and the rotary member 1 toward the inlet 7 to reduce the space through which the oil may enter the chamber.

The body 3 may be formed of two members *a* and *b*, fastened together by screws *c*, and the member *b* may be provided with a screw-threaded hub *d*, which is provided with the female-screw-threaded portion 16, and the spindle 9 is inserted through said bearing and screwed through the screw-threaded portion 16.

e is a packing-gland on the end of the hub *d*.

The inlet 4 is desirably contracted to form a nozzle to direct a jet forcibly against the toothed periphery of the rotary member 1. It is to be understood that said rotary member may be variously formed and that I do not limit myself to the specific form of tooth or arm 5 against which the jet is to impinge. The form which is shown in the drawings is at present deemed most desirable for the purpose specified.

In order to allow a more delicate adjustment of the oil-feed through the inlet 7, the end of the rotary member 1 may be furnished with a conical center *f*, and the inner end of

the inlet 7 may be conical, as shown at *g* in Fig. IV, so that corresponding movements of the arms 17 and the resultant endwise movements of the members 1 in the two forms shown would cause a less variation adjustment of the inlet in the case of the form shown in Figs. I and II than in the form shown in Figs. IV and V.

I make what I call "right" and "left" hand burners to adapt the appliance to differently-arranged furnaces, it being desirable that the inlet and outlet 4 and 12 be at the lower side of the apparatus and that the handle 17 shall always be on the side away from the furnace-door. (Not shown.) In Figs. I, II, VI, and VII what I call a "left-hand" burner is shown, and in Figs. IV and V what I term a "right-hand" burner is shown.

In practical operation of the device as applied for hydrocarbon-furnaces the appropriate quantities of oil and expansive medium, as steam or air, will be supplied through the inlets 7 and 4, respectively, whereupon the impact of the expansive medium upon the rotary member will drive the same, and the oil will be broken up and carried into the chambered discharge body or pipe 12, where the liquid and expansive medium will become further intermingled and will then issue through the contracted outlet or nozzle-mouth 14, which is desirably arranged flatwise in the usual manner of such nozzles. To adjust the fire, the arm 17 may be moved in one or the other direction to increase or decrease the flow of the oil in the chamber 2, and the amount of expansive medium will likewise be adjusted by the usual valves. (Not shown in the drawings.)

The appliance may be employed for uses other than those herein specified.

As described, it is seen that the rotary breaker and mixer 1 forms, in effect, a rotary valve between which and the walls about the opening or axial inlet 7 any dirt, sand, or other impurities contained in the oil are effectually ground up, and that by regulating, as, for instance, by change of position of the spindle 9, the distance of the face or side of the rotary breaker and mixer 1 from these walls any desired inlet of oil is secured.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. An atomizer, comprising a closed chamber, a toothed rotary member provided with a closed end and mounted in said chamber, said chamber having an inlet entering said chamber at a right angle to the radius of said toothed member and adapted to deliver expansive medium against the periphery thereof, an inlet entering said chamber axially with respect to and communicating against the closed end of said toothed member, and an outlet, substantially as described.

2. A body having a chamber, a rotary member therein having a toothed periphery; means for supplying liquid to said chamber at the axis of the rotary member; an eccentric device connected with the rotary member to clear the inlet for said liquid; means for applying an expansive medium to the toothed periphery to drive the rotary member; said body being furnished with an outlet for the liquid and expansive medium.

3. An atomizer, comprising a closed chamber, a rotary member provided with a closed end and with a toothed periphery, said chamber having an inlet entering said chamber tangentially and adapted to deliver expansive medium under pressure against the periphery of said rotary member, an inlet entering said chamber axially with respect to said rotary member and adapted to deliver liquid under pressure into said chamber in line with the axis of said member and against the closed end thereof, and an outlet substantially as described.

4. An atomizer comprising a body having an inlet for liquid and a rotary member having an eccentric projection moving in said inlet to keep it clear.

5. The combination of a body having an inlet and a rotary member having an eccentric projection moving in said inlet to keep it clear; said body being also furnished with an inlet and an outlet for an expansive medium.

6. An atomizer comprising a toothed rotary member provided with a closed end and a body having a chamber in which said member is arranged to rotate, and an outlet and two inlets, one of said inlets being arranged to direct an expansive medium tangentially onto the toothed periphery of the rotary member, and the other inlet being arranged axially with respect to said rotary member and adapted to deliver liquid into said chamber against the closed end of the rotary member.

7. An atomizer comprising a toothed rotary member having a closed end, and a body having a chamber in which said member is arranged to rotate, and an outlet and two inlets, one of said inlets being arranged to direct an expansive medium tangentially onto the toothed periphery of the rotary member and toward said outlet, and the other inlet arranged axially with respect to said rotary member and adapted to deliver liquid against the closed end of said rotary member.

8. An atomizer comprising a toothed rotary member having a closed end, a body having a closed chamber in which said member is arranged to rotate, an outlet through which the contents of the chamber may be discharged, and two inlets, one of which is arranged to direct an expansive medium onto the rotary member tangentially, and the other is arranged axially with respect to said rotary member, adapted to deliver liquid against the closed end of said rotary member at a right angle to the delivery of said expansive medium against said rotary member, said outlet being arranged tangentially of the rotary member.

9. An atomizer having a toothed rotary member having a closed end, and a body hav-

ing a chamber which contains the rotary member and is supplied on one side of the axis of said member with an expansive medium, and has an outlet for such medium on the other side of said axis and also has an inlet for liquid entering said chamber axially with respect to said rotary member and adapted to deliver liquid against the closed end of said rotary member at a right angle to the delivery of the expansive medium thereto.

10. An atomizer comprising, in combination, a rotary member having a closed end, and a closed chamber wherein the same is mounted, said chamber provided with an expansive-medium inlet entering said chamber tangentially and adapted to deliver expansive medium under pressure against the periphery of said rotary member to cause the same to rotate, a liquid-inlet entering said chamber axially of said rotary member and adapted to deliver liquid against the closed end of said rotary member at a right angle to the direction of delivery of expansive medium to said rotary member, and said chamber provided with a tangential outlet arranged opposite said tangential inlet.

11. An atomizer comprising in combination, a rotary member having a closed end and a toothed periphery, and a rotary chamber wherein the same is mounted, said chamber provided with an expansive-medium inlet entering said chamber tangentially and adapted to deliver expansive medium under pressure against the periphery of said rotary member to cause the same to rotate, a liquid-inlet entering said chamber axially of said rotary member and adapted to deliver liquid against the closed end of said rotary member at a right angle to the direction of delivery of expansive medium to said rotary member, and said chamber provided with tangential outlet arranged opposite said tangential inlet.

12. An atomizer, comprising in combination, a body provided with a chamber, a rotary member mounted on a movable shaft, and having a closed end, said chamber having an expansive-medium inlet provided into said chamber, a liquid-inlet entering into said chamber and adapted to deliver liquid against the closed end of said rotary member, and an outlet, and means whereby said shaft may be moved to cause the closed end of said rotary member to regulate the delivery of liquid through said fluid-inlet, substantially as described.

13. An atomizer comprising a toothed rotary member, a body having a chamber in which said member is arranged to rotate, and an outlet, and two inlets, one of said inlets being arranged to direct an expansive medium onto the periphery of the member, and the other inlet being arranged to supply liquid to the end of the rotary member, and means on the rotary member for keeping the last-named inlet open.

14. An atomizer comprising a toothed rotary member, a body having a chamber in which said member is arranged to rotate, and an outlet, and two inlets, one of said inlets being arranged to direct an expansive medium onto the periphery of the member, and the other inlet being arranged to supply liquid to the end of the rotary member, means for moving the rotary member toward the last-named inlet, and means on the rotary member for keeping the last-named inlet open.

15. An atomizer, comprising, in combination, a body provided with a chamber, a rotary member mounted on a shaft having its bearing on one side of said chamber, said member provided with a closed end portion, said chamber having an expansive-medium inlet, a liquid-inlet entering the chamber from the opposite side of said chamber to said shaft, and an outlet, and means whereby said rotary member may be moved away from or toward said liquid-inlet to regulate the introduction of liquid into said chamber, substantially as described.

16. An atomizer comprising a body having a chamber, an outlet and two inlets, and a toothed rotary member in the chamber having its axis in line with one of the inlets, the other inlet adapted to deliver fluid against the periphery of said rotary member, said rotary member arranged to limit said first-named inlet, means for moving said member with relation to such inlet, and a projection from said member extending into said inlet to keep the same free.

17. The combination of a body having a chamber furnished with two inlets or openings in its wall communicating directly into said chamber and an outlet, a spindle extending into the chamber, and a rotary member having a socket and mounted on said spindle and arranged to rotate in said chamber, and having a portion adapted to regulate the aperture of one of said inlets.

18. The combination of a body having a chamber furnished with two inlets or openings in its wall communicating directly into said chamber and an outlet, a screw-threaded spindle extending into the chamber, and a rotary member having a socket mounted on said screw-threaded spindle and arranged to rotate in said chamber, and having a portion adapted to regulate the aperture of one of said inlets, and means for controlling said spindle.

19. In an atomizer, the combination, with a body provided with a closed chamber, of a shaft extending from one of the walls thereof, a rotary member mounted thereon, said chamber having a tangential inlet, an axial inlet and an outlet, and means for moving said rotary member to regulate the admission through said axial inlet, substantially as described.

20. In an atomizer, the combination, with a body, provided with a closed chamber, of a shaft extending from one of the walls thereof, a toothed rotary member mounted there-

on in said chamber, said chamber having a tangential inlet adapted to discharge against the periphery of said toothed member, an axial inlet adapted to discharge at the side of said rotary member, and an outlet and means for moving said rotary member to regulate the admission through said axial inlet, substantially as described.

21. In an atomizer, the combination, with a body, provided with a closed chamber, of a shaft extending from one of the walls thereof, a toothed rotary member, provided with a closed side portion, mounted on said shaft in said chamber, said chamber having a tangential inlet adapted to deliver expansive medium to the periphery of said rotary member, an inlet entering said chamber in line with the said shaft and adapted to deliver against said closed portion, and an outlet, substantially as described.

22. In an atomizer, the combination, with a body, provided with a closed chamber, of a shaft extending from one of the walls thereof, a toothed rotary member, provided with a closed side portion, mounted on said shaft in said chamber, said chamber having a tangential inlet adapted to deliver expansive medium to the periphery of said rotary member, an inlet entering said chamber in line with the said shaft, means whereby said shaft may be moved to regulate said last-named inlet, and an outlet, substantially as described.

23. In an atomizer, the combination, with a body, provided with a closed chamber, of a movable shaft extending into said chamber from one wall thereof, a toothed rotary member loosely mounted thereon, said chamber having a tangential expansive-medium inlet adapted to communicate against the periphery of said rotary member, an inlet communicating into said chamber axially with respect to said rotary member, means for keeping said inlet clear, and an outlet, substantially as described.

24. In an atomizer, the combination, with a body, provided with a closed chamber, of a movable shaft extending into said chamber from one wall thereof, a toothed rotary member loosely mounted thereon, said chamber having a tangential expansive-medium inlet adapted to communicate against the periphery of said rotary member, an inlet communicating into said chamber axially with respect to said rotary member, means for keeping said inlet clear, means whereby said shaft may be moved to regulate said axial inlet, and an outlet, substantially as described.

25. In an atomizer, the combination, with a body, comprising a closed chamber, of a shaft extending into said chamber, a rotary member, said rotary member provided with a closed end and a toothed periphery, said closed end provided with a series of corrugations, said chamber having a tangential inlet into said chamber adapted to direct an expansive medium against the periphery of said rotary member, an inlet into said chamber axial with respect to said rotary member adapted to deliver liquid at the end of said rotary member, and an outlet, substantially as described.

26. In an atomizer, the combination with a body comprising a chamber having an axial inlet and a tangential inlet and an outlet, of a spindle adjustably mounted in said body opposite said axial inlet, a rotary member loosely mounted in said chamber, means for rotating said spindle to regulate the admission of liquid from said axial inlet, and means for preventing the operation of said spindle-rotating means.

27. In an atomizer, the combination with a body comprising a chamber, of an adjustable shaft or spindle extending into said chamber, a rotary member revoluble in said chamber, said chamber having a liquid-inlet, means for moving said shaft to regulate said inlet, and said chamber having an expansive-medium inlet, and an outlet.

28. In an atomizer, the combination with a body comprising a chamber, of an adjustable shaft or spindle extending into said chamber, a rotary member revoluble in said chamber, said chamber having a liquid-inlet, means for moving said shaft to regulate said inlet, means for keeping said inlet clear, and said chamber having an expansive-medium inlet, and an outlet.

29. In an atomizer, the combination, of a body having a chamber furnished with two inlets and an outlet, a spindle extending regulably into the chamber, opposite one of said inlets, and a rotary member loosely mounted in said chamber, the longitudinal movement of said spindle adapted to regulate the admission of liquid into said chamber.

30. In an atomizer, the combination, of a body having a chamber furnished with two inlets and an outlet, a spindle extending regulably into said chamber opposite one of said inlets, the longitudinal movement of said spindle adapted to regulate the admission of liquid into said chamber, means for controlling the longitudinal movement of said spindle, and a rotary member loosely mounted in said chamber.

31. In an atomizer, the combination, of a body having a chamber furnished with an axial inlet, a tangential inlet and an outlet, of a spindle extending regulably into said chamber opposite to said axial inlet, and a rotary breaker and mixer loosely mounted in said chamber and provided with peripheral flights, the longitudinal adjustment of said spindle adapted to regulate the admission of liquid through said axial inlet.

32. In an atomizer, the combination, of a body having a chamber furnished with an axial inlet, a tangential inlet and an outlet, of a spindle extending regulably into said chamber opposite to said axial inlet, a rotary breaker and mixer loosely mounted in said chamber and provided with peripheral flights, the longitudinal adjustment of said spindle

adapted to regulate the admission of liquid through said axial inlet, and means for controlling the longitudinal adjustment of said spindle.

33. An atomizer comprising a body having a chamber, an outlet and two inlets, and a toothed rotary member in the chamber having its axis in line with one of the inlets, the other inlet adapted to deliver fluid against the periphery of said rotary member, said rotary member arranged to limit said first-named inlet, and means for moving said member with relation to such inlet.

34. In an atomizer, the combination, with a body comprising a breaking and mixing chamber, of a rotary member revoluble therein, said body provided with an inlet entering said chamber in line with the axis of said rotary member, with a second inlet and an outlet, and means within said chamber and movable toward said axial inlet for regulating the admission of fluid through said axial inlet.

35. In an atomizer, the combination, with a body comprising a breaking and mixing chamber, of a rotary member revoluble therein, said body provided with a liquid-inlet and an expansive-medium inlet and an outlet, and a regulating device extending into said chamber and adapted to be moved toward said liquid-inlet to regulate the admission of liquid through said liquid-inlet.

36. In an atomizer, the combination, with a body comprising a breaking and mixing chamber, a rotary breaker and mixer revoluble therein, said body provided with a liquid-inlet, an expansive-medium inlet and an outlet, a regulating shaft or spindle extending into said chamber and adapted to regulate the admission of liquid through said liquid-inlet, an operating-arm therefor, and means for holding said arm from movement.

37. In an atomizer, in combination, a body comprising a closed cylindrical chamber provided with an inlet opening thereinto axially, an inlet opening into said chamber tangentially, and an outlet, and means within said chamber and movable in alinement with said axial inlet for regulating the admission therethrough, said means constructed and adapted to cut off said inlet at the point where same communicates into said chamber.

38. In an atomizer, in combination, a body comprising a closed cylindrical chamber provided with an inlet opening thereinto axially, an inlet opening thereinto tangentially and an outlet, and means in alinement with said axial inlet and movable into said chamber toward said axial inlet for regulating the admission therethrough.

39. In an atomizer, the combination, with a body comprising a breaking and mixing chamber, of a rotary member revoluble therein, said body provided with an inlet, entering said chamber in line with the axis of said rotary member, with a second inlet and an outlet, and means for regulating the admission of fluid through said axial inlet, said means operating within said chamber and toward said axial inlet to cut off said inlet at the point of its communication into said chamber.

40. An atomizer having a closed cylindrical breaking-chamber, an axial inlet, a tangential inlet and an outlet, and revoluble means within said chamber and forming a regulable, rotary, self-clearing valve for said axial inlet.

41. An atomizer comprising, in combination, a closed breaking and mixing chamber having a liquid-inlet, an expansive-medium inlet and an outlet, and means within said chamber and revoluble in connection with said liquid-inlet forming a regulable, rotary, self-clearing valve.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, in the county of Los Angeles and State of California, this 24th day of June, 1902.

ALBERT S. DIXON.

Witnesses:
JAMES R. TOWNSEND,
F. M. TOWNSEND.