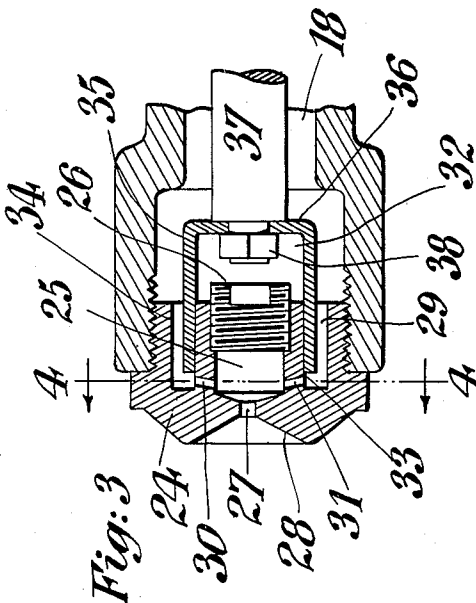
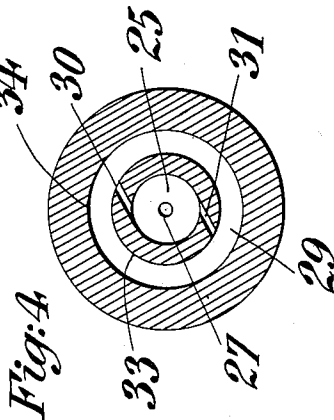
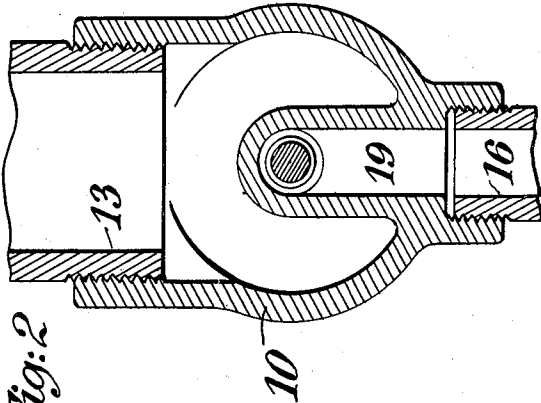
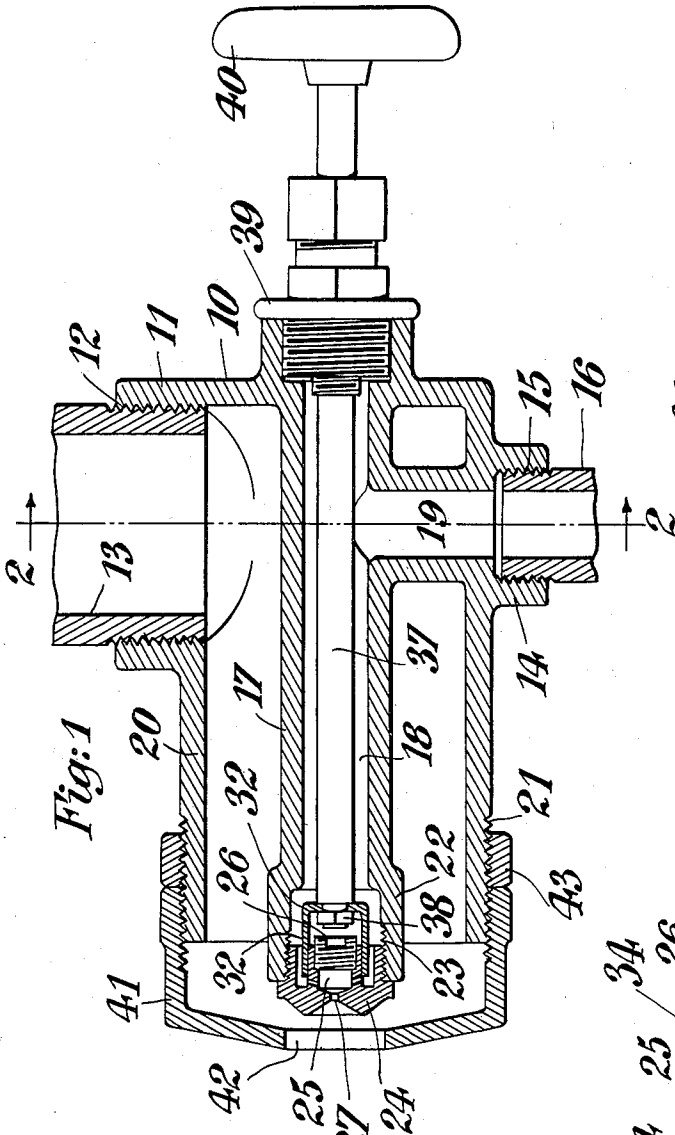


Dec. 19, 1922.

1,439,320.

A. W. MORSE.
NEBULIZER OF LIQUIDS.
FILED DEC. 17, 1919.



Albert W. Morse
INVENTOR.

BY *Walter E. Wollheim*
ATTORNEY

UNITED STATES PATENT OFFICE.

ALBERT W. MORSE, OF FOREST HILLS, NEW YORK.

NEBULIZER OF LIQUIDS.

Application filed December 17, 1919. Serial No. 345,566.

To all whom it may concern:

Be it known that I, ALBERT W. MORSE, a citizen of the United States, and a resident of Forest Hills, in the county of Queens and State of New York, have invented certain new and useful Improvements in Nebulizers of Liquids.

This invention relates to nebulizers of liquids, that is, apparatus for causing liquids, and particularly fuel-oils to assume the form of an extremely fine mist; and the invention particularly relates to nebulizers of the free swirling type hereinafter disclosed, wherein the swirling action is obtained, not by moving parts or by stationary baffles in the discharge passage, but by the direction of admission into the passage.

In nebulizers of this kind free action is obtained by the tangential direction of inlet orifices into a so-called swirl chamber within the discharge nozzle, substantially as described in the Patent #876108 issued Jan. 7th 1908 to Stringham and Elmendorf.

At the present time, liquid nebulizing devices, which depend upon liquid pressure to operate, have a maximum available capacity under a given liquid pressure which is determined by the total area of the inlet orifices to the swirl chamber. To increase the capacity under a given pressure, it is necessary to bore out these orifices. To decrease the capacity, it is necessary to throttle the liquid pressure, by a valve in the liquid fuel supply pipe. When this valve is throttled, the liquid pressure is decreased at the nozzle or more particularly at the inlet orifices to the swirl chamber. As this pressure is decreased, the nebulizing becomes coarser and coarser, due to the fact that the swirling force is decreased. Eventually this force becomes so small that it is not sufficient to overcome fluid tension and no nebulizing effect whatever is produced.

It is one of the particular objects of this invention to provide the discharge nozzles of the nebulizers above described, with means which maintain a constant liquid pressure at the outlet nozzle and vary the size of the inlet orifices to the swirl chamber to suit the capacity desired. the swirling force remaining constant. In this manner nebulization is not injured, since only the area of the inlet orifices is varied. This means that the device in which the nebulizer is used is just as efficient when operating at minimum ca-

capacity as when operating at maximum capacity.

Other objects of the invention will appear in the following specifications in which a preferred form of the nebulizer is described.

The invention is illustrated by means of the accompanying drawings in which

Fig. 1 is a vertical longitudinal sectional view of a burner;

Fig. 2 is a transverse cross sectional view taken along the plane of line 2—2 in Fig. 1.

Fig. 3 is an enlarged fragmentary sectional view of the regulating means of the discharge nozzle, and

Fig. 4 a cross sectional view along the plane of line 4—4 in Fig. 3.

Like characters of reference denote similar parts throughout the several views and the following specifications.

10 is a hollow casing of substantially T shape, one branch 11 of which is tapped at 12 for an air supply pipe 13, communicating with the interior of casing 10. Opposite the branch 11 is another branch 14, threaded interiorly at 15 for connection with a fuel supply pipe 16. Extending lengthwise through the casing 10 and being an integral part therewith, is a hollow spindle 17, its center duct 18 being in communication with the fuel supply pipe 16 by means of a passage 19. A center branch 20 of casing 10 is threaded exteriorly at 21. The end of hollow spindle 17, is enlarged at 22, projects outside of branch 20 of casing 10 and is interiorly threaded at 23 to receive a spray nozzle 24.

Spray nozzle 24 is provided in its center with a hollow core 25 cylindrical in shape, called the swirl chamber. 26 is a plug screwed into the lower part of spray nozzle 24 for the purpose of machining the swirl chamber. On the top of the chamber 25 and in its center is a circular outlet opening 27. The outside of the top of the spray nozzle is chamfered at 28, so as to give the liquid passing through the outlet, the shape of an inverted cone its apex being the outlet 27. 29 is an annular recess extending into the spray nozzle, being concentric with the axis of the spray nozzle and its chamber 25. 30 and 31 are ducts or inlet orifices, joining the innermost portion of the recess 29 with the upper part of the chamber 25. These ducts 30 and 31 are positioned so as to impinge the

circumference of the chamber 25 tangentially, as is clearly shown in Fig. 4. They are further slightly inclined towards the outlet end.

32 is a cup shaped valve member, adapted to slide within the recess 29, so as to be in sliding engagement with an inner wall 33 of recess 29; an outer wall 34 of recess 29 and outer surface 35 of valve 32 being in spaced relation to each other to provide passage for a liquid. A lower end 36 of valve 32 is fastened to a valve stem 37 by means of a nut 38. This valve stem 37 extends through the center duct 18 of casing 10 and is in screw threaded engagement with a bonnet 39 of the usual valve construction, which bonnet is screwed into the casing 10 concentric with the spray nozzle 24. 40 is a hand wheel attached to the extreme outside projecting end of the stem 37, for the purpose of easily manipulating the valve.

41 is a cup-shaped cap threaded interiorly to fit the threaded end 21 of casing 10. Cap 41 is provided with a circular opening 42, of a diameter smaller than the outside diameter of spray nozzle 24. 43 is a lock nut, also in threaded engagement with branch 21, for the purpose of holding cap 41 in any fixed relation to the spray nozzle.

The operation of this device is as follows:

Oil is admitted into the burner, under pressure, through supply pipe 16 thence through passage 19 into central duct 18. Then through recess 29 by way of inlet orifices 30 and 31 into swirl chamber 25. Owing to the direction of the inlet orifices, tangentially with respect to the wall of chamber 25, the oil is being given a swirling motion, and is finally expelled in a rotary swirl from outlet 27, where it assumes the shape of an inverted cone due to the chamfer 28 on the outside of the nozzle.

Air is admitted, under pressure, into the interior of casing 10 by means of pipe 13, whence it is deflected by cap 41 towards the spray of oil issuing from outlet opening 27, where a vapor of high combustive qualities is the result.

If it is necessary to cut down the capacity of the nebulizer, it is only necessary to screw the stem 37 further within the bonnet 39 when the valve member 36 will gradually cut off the inlet orifices 30 and 31 to a more or less degree, as desired. It will be noted that the full liquid pressure is maintained right at the inlet orifices, on account of which the nebulizing action of the device is not in the least impaired. Furthermore by means of such regulation of the inlet orifices, fuel may be used at much higher pressures than heretofore, because in devices not having this feature the sizes of the inlet orifices are made so small, as to make efficient working practically impossible on account of the choking up of these passages. With my im-

proved valve regulation, if the inlet orifices become clogged it is merely necessary to open fully the valve 37 temporarily and blow out the obstruction.

It is understood that various changes in the form, proportion and minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention as defined in the appended claims. Furthermore, while the nebulizing nozzle is shown in combination with an oil burner, it is understood that this invention may be used in connection with any device utilizing the action of nebulizing liquids.

What I claim as new, is:

1. A nebulizer of liquids comprising a structure having in combination a small swirl chamber closed at one end and having a small outlet at its other end, small orifices admitting a liquid to whirl in the said swirl chamber toward said small outlet, and means to vary the area of said orifices, said means including in combination an annular recess within the nebulizer in communication with the said orifices and a valve member adapted to be reciprocated within the said recess.

2. A nebulizer of liquids consisting of a structure having in combination a small swirl chamber having a substantially flat closure at one end and a substantially conical shape at the other end, and a nebulizing outlet at the point of the conical end, orifices admitting a liquid to whirl in the small swirl chamber toward the nebulizing outlet, and means to vary the area of the said orifices, said means including in combination an annular recess within the nebulizer in communication with the said orifices and a valve member adapted to be reciprocated within the said recess.

3. A nebulizer of liquids comprising a structure having in combination a small passage closed at one end and having a nebulizing outlet at its other end, orifices admitting a liquid into the small passage substantially tangent to the wall thereof and at an angle to the axis thereof, to cause the liquid to whirl in the passage toward the nebulizing outlet, and means to vary the area of the said orifices, said means including in combination an annular recess within the nebulizer in communication with the said orifices and a valve member adapted to be reciprocated within the said recess.

4. A nebulizer of liquids comprising a structure having in combination a small passage of general cylindrical form, closed at one end and having a nebulizing outlet at the other end, orifices admitting a liquid to whirl in the small passage toward said nebulizing outlet, and means to vary the area of the said ori-

5 fices, said means including in combination an annular recess within the nebulizer in communication with the said orifices and a valve member adapted to be reciprocated within the said recess.

10 5. A nebulizer of liquids comprising a structure having in combination a small swirl chamber, having a nebulizing outlet at one end, an adjustable plug closing the other end, orifices admitting a liquid to whirl in the small swirl chamber toward the nebulizing outlet, and means to vary the area of the said orifices, said means including in combination an annular recess within the nebulizer in communication with the said orifices and a valve member adapted to be reciprocated within the said recess.

15 6. A nebulizer of liquids comprising a structure having in combination a small passage of general cylindrical form having an adjustable plug at one end and a sub-

stantially conical shape at the other end, and a nebulizing outlet at the point of the conical end, orifices admitting a liquid into the small passage substantially tangent to the wall thereof and at an angle to the axis thereof, to cause the liquid to whirl in the passage toward the nebulizing outlet, and means to vary the area of the said orifices, said means including in combination an annular recess within the nebulizer in communication with the said orifices and a valve member adapted to be reciprocated within the said recess.

20 In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ALBERT W. MORSE.

Witnesses:

N. D. SMEDLEY,
M. CHURCHILL.