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A. W. MORSE

LIQUID AND GAS MIXER

Filed Dec. 31, 1919

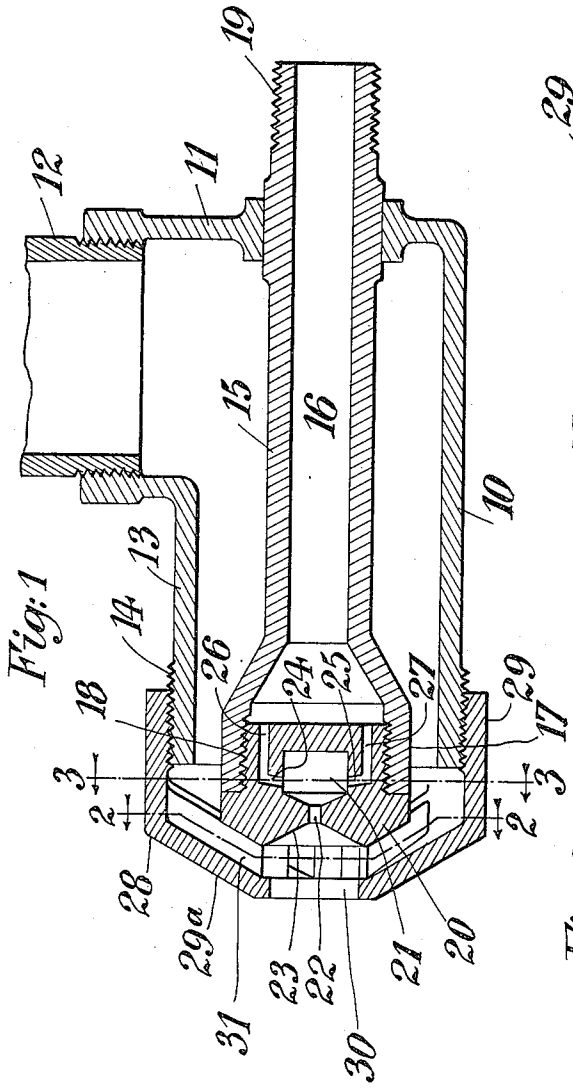


Fig. 1

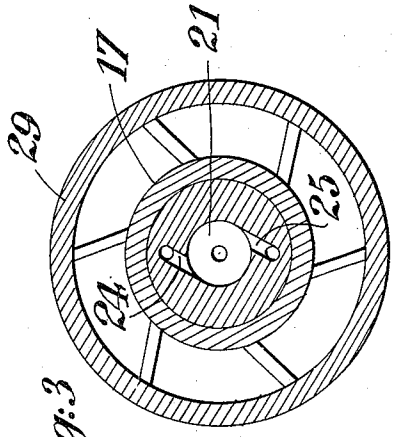


Fig. 3

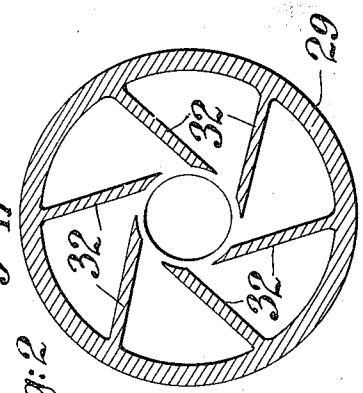


Fig. 2

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UNITED STATES PATENT OFFICE.

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

LIQUID AND GAS MIXER.

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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 Liquid and Gas Mixers.

This invention relates to liquid and gas mixers, and particularly to devices in which the liquid to be mixed with a gas, is atomized by means of free centrifugal action and not by moving parts or by stationary baffles or impact.

The principal objects of the invention are to provide a liquid and gas mixing device which will thoroughly and almost instantaneously mix the two; to provide a liquid and gas mixing device which will at the same time uniformly mix the two; to accomplish this by means of free centrifugal action of the liquid combined with a swirling motion of the gas; to break the liquid up into a hollow swirling cone of minute particles and to deflect the swirling gas into this cone; to accomplish this in an extremely simple manner by utilizing the nebulizer disclosed in Patent #876108 issued January 7th 1908 to Stringham and Elmendorf in combination with certain novel features of construction set forth hereafter.

Other objects will appear in the following specifications in which a preferred form of my liquid and gas mixer, particularly adapted to the mixing of oil and air for burning purposes is described.

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

Fig. 1 is a vertical longitudinal sectional view of the mixer;

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

Fig. 3, is a similar view taken along the plane of line 3—3 in Fig. 1.

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

10 is a hollow casing of substantially L shape. Its shorter branch 11 is threaded interiorly to receive an air or gas supply pipe 12. 13 is the longer branch of casing 10, its terminal being threaded exteriorly at 14. The other end of branch 13, adjacent to branch 11, is bored out to receive a spindle 15. This spindle is of hollow construction being provided with a central duct 16. 17 is an enlarged end of spindle 15, projecting slightly over the end of branch 13 of casing 10, and is threaded internally at 18. The extreme other end of oil spindle 15 which projects outside of the casing 10, is threaded externally at 19 to receive a regulating valve (not shown).

20 is a spray nozzle or nebulizer screwed into threaded part 18 of spindle 15, and is provided in its center with a hollow cord 21 cylindrical in shape, called the centrifugal chamber. On the top of the chamber 21 and in its center is a circular outlet opening 22. The outside of the top of the spray nozzle is chamfered at 23, so as to give the liquid passing through the outlet, the shape of an inverted cone, its apex being the outlet 22, 24 and 25 are ducts or inlet orifices, affording means of communication between, respectively, ducts 26 and 27 drilled substantially parallel to the axis of the spray nozzle 20. Ducts or inlet orifices 24 and 25 are positioned so as to impinge the circumference of the centrifugal chamber 21 tangentially as shown in Fig. 3. They are further slightly inclined towards the outlet end.

Surrounding the spray nozzle 20, in spaced relation thereto, but forming an integral part of the same, is an outer housing 28, substantially cup shaped. Its large end 29, being cylindrical in shape, is threaded so as to screw onto the terminal 14 of casing 10. Housing 28 has a conically shaped top 29^a, provided with a circular opening 30 which is concentric with, but of larger diameter than the outlet 22 of spray nozzle 20. 31 is an annular passage formed by the inner wall of housing 28 and the top of spray nozzle 20. Within the passage 31 and integrally cast with housing 28 and spray nozzle 20 is a series of ribs or partitions 32. These ribs 32 in cross section are so positioned as to be tangential to a circle slightly greater in diameter than outlet opening 30, as shown in Fig. 2.

The operation of this device is as follows:

The liquid or oil is admitted into passage 16 under pressure, and is forced through ports 26 and 27 and orifices 24 and 25 into the centrifugal chamber 21. By means of the tangential direction of inlet orifices 24 and 25 a high velocity swirl is given to the liquid which is forced through the nozzle outlet 22 where it breaks up into a hollow conical mist or spray.

The gas or air is admitted under pressure into the casing 10 through supply pipe 12, then is forced through passage 31 into the hollow conical spray of liquid issuing from outlet 22. The air is deflected into this hollow spray in a tangential direction being guided in such direction by the ribs 31.

It is obvious that by using this method in an oil burner, the air is injected not directly into the center of the cone shaped spray of oil issuing from the spray nozzle, but tangentially to the same, that is toward a circle, the circumference of which is located at a small distance from the spray center. In devices which deflect the air directly into the center of the spray, the spray is compressed towards the center and only a partial mixture of the oil particles and the air is obtained, a large part of the oil forming a core at the center of the spray. This core is, of course, slow burning while the highest combustion temperatures are obtained only by instantaneous combustion. When injecting the air tangentially into the conical spray of oil, a perfect mixture is obtained of high explosive characteristics resulting in higher temperature of combustion and corresponding greater efficiency of operation.

While I have shown and described the application of my invention in connection with an oil burner, it is understood that the invention may be used in connection with any device in which a mixture of a gas or liquid is desired. It is further 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.

What I claim as new, is:

1. In a liquid and gas mixer having a central outlet, orifices for directing a liquid tangentially into a centrifugal chamber, an outlet from the said chamber, a gas passage concentric with the said outlet and adjacent thereto, and means interposed within the said gas passage to deflect at substantially right angles with respect to the longitudinal axis of the mixer a gas tangentially towards a circle, the circumference of which is at a small distance from the center line of the said outlet and said chamber and concentric therewith.

2. In a liquid and gas mixer having a central outlet, a centrifugal chamber, an opening for directing a liquid tangentially into the said chamber, an outlet from the said chamber centrally disposed with the chamber, a final outlet of the said mixer in central alignment with the outlet of the said chamber, a gas passage concentric with the said outlets and adjacent thereto, and means, within the said gas passage, for deflecting at substantially right angles with respect to the longitudinal axis of the mixer a gas towards the outlet of said mixer tangentially to a circle concentric with and larger than the outlet of the said chamber.

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

ALBERT W. MORSE.

Witnesses:
E. SHIELD, Jr.,
M. CHURCHILL.