Aug. 20, 1935. E. H. PEABODY 2,012,139

ATOMIZER

Filed July 24, 1933

Fig. 1.

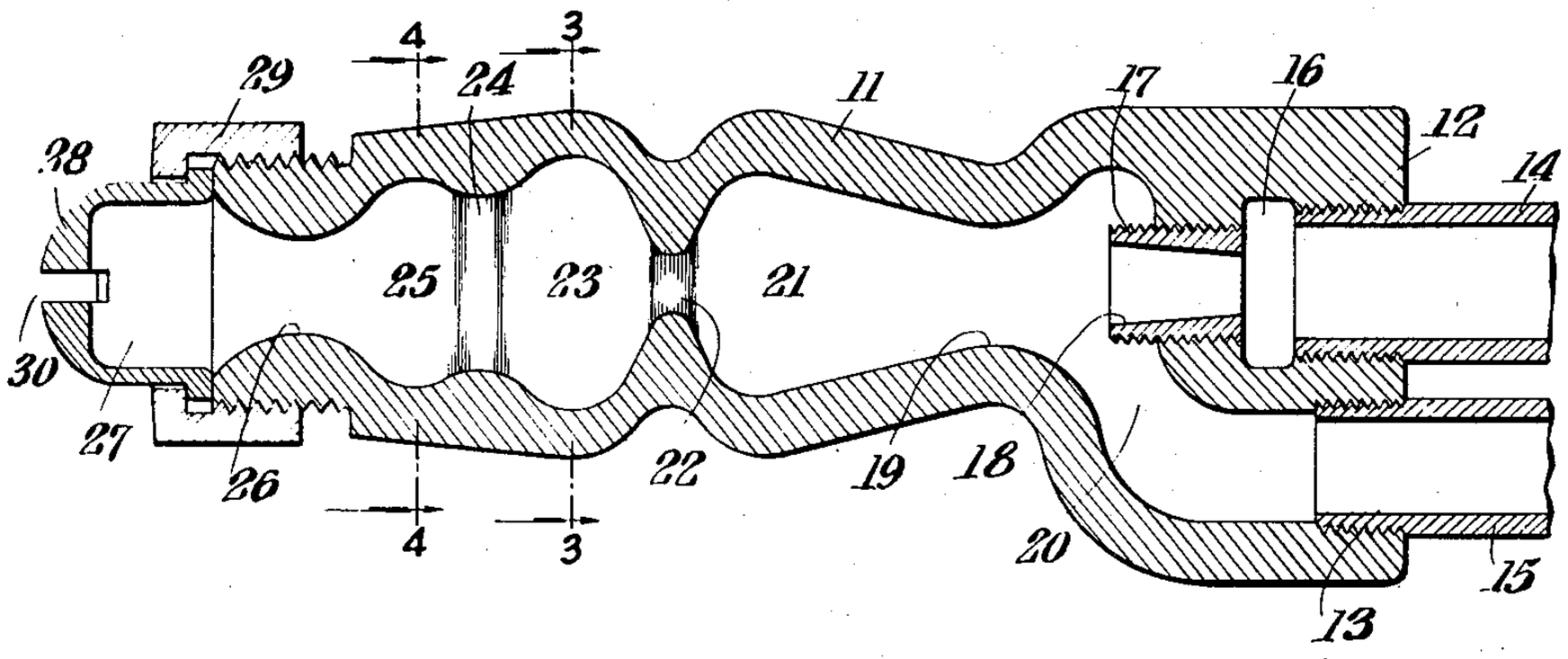


Fig. 2.

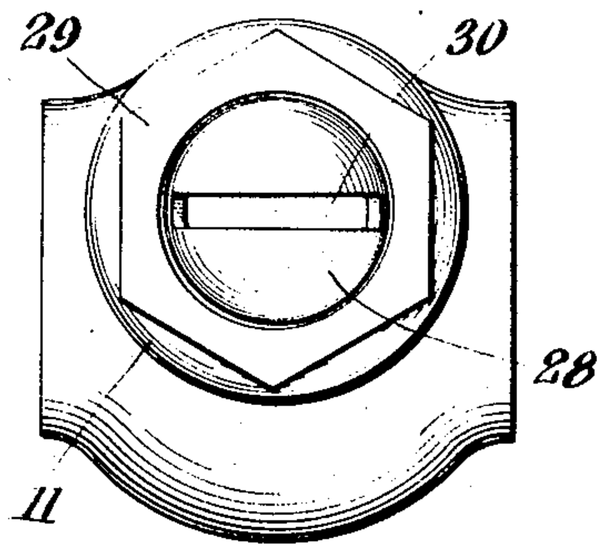


Fig. 4.

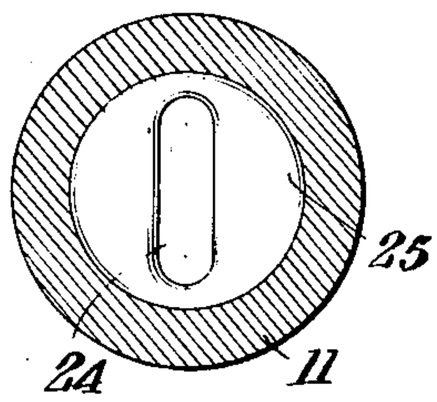
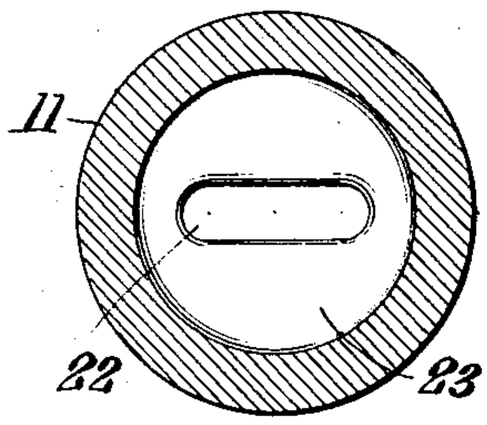


Fig. 3.



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2,012,139

ATOMIZER

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5 Claims. (Cl. 299—140)

This invention relates to atomizers, such as used for oil burners and other purposes, where a truly homogeneous mixture is necessary.

Further, the invention pertains to the "inside mixer" type of atomizer, wherein the liquid is mixed with the atomizing medium inside the nozzle and atomization results at the point of issuance from the nozzle, as distinguished from the "outside mixer" type, in which the mixture and atomization are both effected at the point of issuance from the nozzle.

The relative uniformity of the spray produced with the inside mixer type of atomizer depends on the intimacy or degree of combination of atomizing agent and fluid effected prior to atomization. Special objects of this invention are to accomplish thorough, intimate and even mixing of liquid and atomizing medium inside the nozzle and in a simple, effective and economical way.

Other objects of the invention are to provide an atomizer of inexpensive form and of a structure which may be connected interchangeably with the liquid and atomizing medium sources.

Further objects of the invention are to provide a structure by which, in the case of a burner, the character of the flame may be quickly and easily altered to suit different requirements.

Other objects of the invention are set forth or will be apparent in the accompanying specification, claims and drawing.

Fig. 1 is a longitudinal sectional view of an oil burner form of atomizer; Fig. 2 is a view of the nozzle end of the burner; Figs. 3 and 4 are cross-sectional views as on substantially the planes of lines **3—3** and **4—4** of Fig. 1.

Like reference characters refer to like parts throughout the several views.

In the form of the invention illustrated, the atomizer body **11**, is a single casting having at one end of the same inlets **12**, **13**, for piping **14**, **15**, for the atomizing medium, such as steam, and the liquid to be atomized, such as oil. Mounted in the wall of the steam inlet chamber **16**, is a jet nozzle **17**, having an expanding passage **18**, discharging into the Venturi passage **19**, so as to act as an inspirator for the oil entering concentrically, to the chamber **20**, about the base of this nozzle. By means of the screw mounting shown, this nozzle may be advanced or retracted in respect to the throat of the Venturi passage by simply turning it one way or the other.

The Venturi passage is shown as expanded or opening into a preliminary mixing chamber **21**. This chamber is narrowed down at its end to a discharge slot **22**, extending, in the illustration, horizontally of the structure.

The mixture is discharged through slot **22**, into a generally spherical enlargement or chamber **23**, and from this, discharge is through a narrowed throat or slot **24**, located at right angles to the first slot, that is, vertically in the illustration, into a spherical enlargement or chamber **25**, communicating by contracted throat **26**, with the nozzle chamber **27**.

The nozzle chamber is provided in the illustration by a separate nozzle piece **28**, detachably secured to the end of the body structure by the nut **29**. A special advantage of this structure is the ready attachability and detachability of the nozzle tips and the quick interchangeability of different forms of nozzle tips, particularly to provide, in a burner, for different flame formations.

In the nozzle tip shown in Figs. 1 and 2, the discharge is through a flaring horizontally disposed narrow slot **30**, to produce a generally horizontal fan-shaped spread of flame. This horizontal disposition of the slot furthermore gives an additional 90° twist to the mixture before issuance from the atomizer. By setting the nozzle tip in different angular relations, the extent of such twist may be varied at will and the flame be located accordingly.

By other forms of tips and shapes and arrangements of discharge outlets, practically any desired flame formation may be produced, for example, flat, oval, rounded and long or short, as may be required.

Operation

In the illustrated embodiment of the invention, the liquid and the atomizing medium are brought together under pressure in a chamber where they mingle in a primary form of mixture. This mixture is then confined to give it increased velocity and to flatten it out in passage from the first chamber into a second chamber, where it first expands and is then contracted to flow in a plane substantially at 90° to the first plane into a third mixing chamber. The "twist" thus given the mixture between chambers, creates turbulence and sets up a whirling mixing action in the generally spherical mixing chambers, producing the desired intimacy of mixture of the atomizing agent and oil or other fluid.

Thorough, uniform mixing is therefore effected by the time the mixture reaches and passes out of the third chamber in a homogeneous condition into the discharge nozzle from whence it is-

sues as a thoroughly atomized even spray. With elongated slot type of nozzle discharge such as shown in Fig. 1, the issuing mixture may be given any desired additional twist for further mixing purposes or for desired flame location, or the like. The structure is such that the atomizing agent and the oil or other medium may be interchangeably connected at the base of the nozzle and the interchangeability of the nozzle tips enables quick adaptation of the device to any desired or required flame conditions. The constructing directional passes between the chambers for flattening and twisting the mixture flow preferably are relatively short, so as to add to the turbulence, may be located centrally or eccentrically of the nozzle axis, be straight through or inclined with respect to the axis, convergent or diverging and may have rounded edges merging into the surfaces of the chambers, for facilitating the flow, or may have more or less abrupt edges, these variations depending to some extent upon desired characteristics, manufacturing requirements, etc. The mixing chambers may be of other than spherical form, for example, be of cubical or other such shapes for promoting turbulence.

While a preferred embodiment incorporating the principles of the invention has been herein illustrated, it should be understood that other embodiments employing the same or equivalent principles may be used and structural changes made as desired by those skilled in the art, without departure from the present invention and within the spirit and intent of the patent claims.

What is claimed is:

1. An atomizer, comprising a nozzle structure having fluid and atomizing medium entrances at one end, a mixing chamber in communication therewith, a flow flattening discharge outlet from said chamber, a second mixing chamber in communication with said flow flattening discharge outlet, a flow flattening discharge outlet opening out of said second mixing chamber and disposed in a plane at an angle approximately 90° to the plane of said first flow flattening passage, a nozzle chamber in communication with said second passage and an atomizing nozzle in communication with said nozzle chamber.

2. An atomizer, comprising a nozzle structure having fluid and atomizing medium entrances at one end, a mixing chamber in communication therewith, a flow flattening discharge outlet from said chamber, a second mixing chamber in communication with said flow flattening discharge outlet, a flow flattening discharge outlet opening out of said second mixing chamber and disposed in a plane at an angle approximately 90° to the plane of said first flow flattening passage, a nozzle chamber in communication with said second passage and an atomizing nozzle in communication with said nozzle chamber, said atomizing nozzle having a discharge slot disposed with its longitudinal extent at an angle to the longitudinal extent of the second flow flattening passage.

3. An atomizer, comprising a nozzle structure having fluid and atomizing medium entrances at one end, a mixing chamber in communication therewith, a flow flattening discharge outlet from said chamber, a second mixing chamber in communication with said flow flattening discharge outlet, a flow flattening discharge outlet opening out of said second mixing chamber and disposed in a plane at an angle approximately 90° to the plane of said first flattening passage, a nozzle chamber in communication with said second passage, an atomizing nozzle in communication with said nozzle chamber, said passages comprising slots disposed transversely of the nozzle axis and substantially at right angles to each other.

4. An atomizer of the inside mixer type and comprising a nozzle structure having a first generally spherical mixing chamber with means for admitting atomizing medium and fluid thereto, said chamber having an outlet slot arranged with its longitudinal extent transversely of the nozzle axis, a second generally spherical mixing chamber into which said slot discharges and provided with an outlet slot arranged with its longitudinal extent transversely of a nozzle axis, but at approximately a 90° angle to the first outlet slot, a chamber in communication with said second angularly arranged outlet slot and an atomizing nozzle in communication with said last mentioned slot.

5. An atomizer of the inside mixer type and comprising a nozzle structure having a first generally spherical mixing chamber with means for admitting atomizing medium and fluid thereto, said chamber having an outlet slot arranged with its longitudinal extent transversely of the nozzle axis, a second generally spherical mixing chamber into which said slot discharges and provided with an outlet slot arranged with its longitudinal extent transversely of the nozzle axis, but at approximately a 90° angle to the first outlet slot, a chamber in communication with said second angularly arranged outlet slot, a flow restricting passage from said generally spherical chamber and an atomizing nozzle in communication with said last mentioned flow restricting passage.

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