(No Model.)

A. KRIEGER & J. COYLE.

FUEL GAS MIXER.

No. 604,116. Patented May 17, 1898.

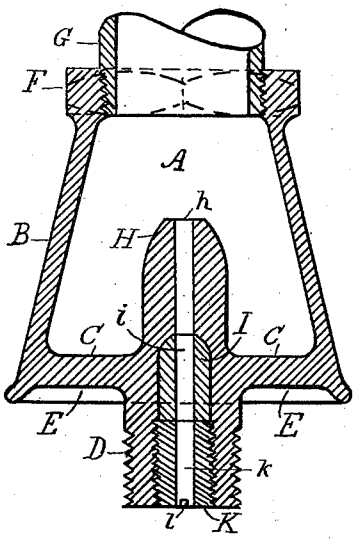


Fig. 1.

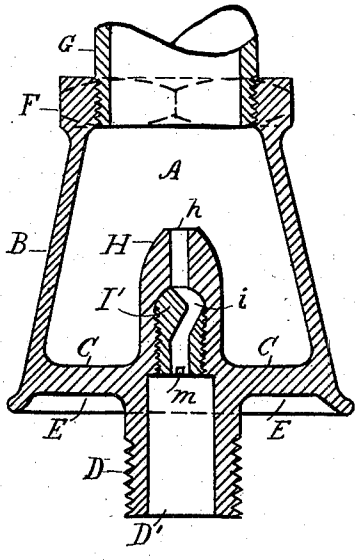


Fig. 2.

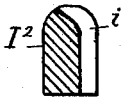


Fig. 5.

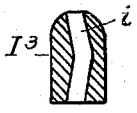


Fig. 6.

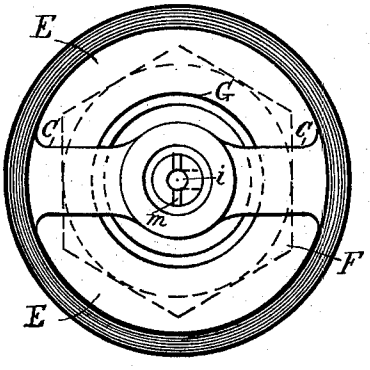


Fig. 3.

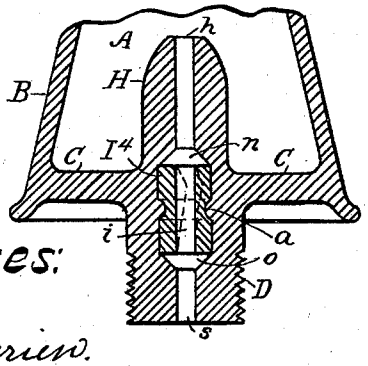


Fig. 4.

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UNITED STATES PATENT OFFICE.

ANDREW KRIEGER AND JOHN COYLE, OF INDIANAPOLIS, INDIANA, ASSIGNORS TO WILLIAM LANGSENKAMP, JR., OF SAME PLACE.

FUEL-GAS MIXER.

SPECIFICATION forming part of Letters Patent No. 604,116, dated May 17, 1898.

Application filed December 30, 1895. Serial No. 573,776. (No model.)

To all whom it may concern:

Be it known that we, ANDREW KRIEGER and JOHN COYLE, citizens of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Fuel-Gas Mixers; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Our invention relates to that class of mixers which are designed and used for the purpose of mixing or combining air with gas and delivering it to a burner or other suitable appliance where combustion takes place; and it consists of certain new and novel features in the details of construction whereby the aperture through which the gas must pass from the supply-pipe into the mixing-chamber is protected, so as to prevent its enlargement, as will be more fully described hereinafter and pointed out in the claims.

In order that a clear understanding may be had of the utility of our invention and its advantages recognized, we refer, briefly, to the present state of the art in this connection. Natural gas being in certain localities largely used as fuel for both manufacturing and domestic purposes it is conducted through systems of pipe-lines and delivered therefrom to consumers. Before the gas enters a burner at which combustion takes place it passes through a device in which it is mixed or combined with a suitable quantity of atmospheric air, which is drawn into the mixing-chamber by the action of the jet of gas passing through the chamber and creating a partial vacuum. In designing the mixer the gas-passage is made of such size as may be previously determined as being proper in relation to the other dimensions of the mixer. The size of the gas-passage having been established and the mixer applied to the purpose for which it is designed it is specially desirable that its size should not be altered. In mixers of the kind in general use it has been found that unauthorized persons have surreptitiously bored out and enlarged the gas-passage, with the result that a waste of gas occurs and the efficiency of the mixer is impaired.

Our object is to provide a mixer embodying improvements which shall effectually prevent boring out or filing the gas-passage or accomplishing the enlargement of it illegally or by unauthorized persons and so constructed that in the event of a persistent attempt to do so evidences of such attempt would remain, and in some cases the destruction of the mixer would result, necessitating the procuring of a new one and a consequent exposure of the illegal act. This end is attained in a simple and inexpensive manner in our invention, which is of few parts and is durable and economical in use, being especially adapted to prevent the enormous waste of gas that is now a serious loss both to gas companies and to the public who use natural gas by reducing the natural reserve-supply, which unless carefully guarded will soon become exhausted.

Referring to the drawings, Figure 1 is a vertical sectional view through the center, showing one form of arranging the essential part I, which for convenience we term the "bushing," within the jet-nozzle H. Fig. 2 is a like view showing a modified form of constructing and fixing the bushing. Fig. 3 is a plan of the larger end, known as the "back" or "bottom" of a mixer. Fig. 4 is a view similar to Figs. 1 and 2, but with the front or discharge end broken away, and shows a modified form in which the bushing is constructed and secured within the nozzle. Figs. 5 and 6 show two modifications of the gas-passage way in the bushing.

In the drawings, B represents a conical case or the body of mixer, preferably made of cast-brass, which is open at its smaller or front end, the opening being provided with screw-threads for connecting the mixer with a burner by means of a nipple G. The outer part of this end is usually made hexagonal, so that it may be held or turned by applying a wrench. The opposite larger or back end is open to the atmosphere, except where slightly ob-

structed by the arms C, which connect the case with the central part, comprising the threaded shank D, nozzle H, and bushing.

The vital features of our invention consist in constructing a bushing having an aperture or passage-way through which the gas must flow in going from the supply-pipe to the nozzle and mixing-chamber and in the novel way in which the bushings are secured within the body of the central portion of the mixer. These bushings are of several forms or modifications of the same device, the functions of all being identical, and are included in the broad claim of providing a bushing having a gas passage and orifice which cannot by ordinary means be successfully enlarged for the purpose of securing an increased flow of gas.

In Fig. 1 is shown inclosed in the mixer the bushing I, having a cylindrical aperture *i* through its center of suitable size. The outside of the bushing is turned off true and straight, with one end preferably rounded. The bushings are preferably made of steel and hardened, or they may be made of wrought-iron case-hardened or of chilled cast-iron. A round hole is bored from the end of the shank D to a suitable depth and of such a diameter as will receive the bushing in a close fit, but permit of its rotation. The portion of the hole in the end of the shank is threaded, and into this is inserted a threaded plug K, having through its center a round opening *k* and across one end a slot *l* to receive a screw-driver. The plug bottoms against a slight shoulder which prevents its pressing against the bushing, so that the latter is slightly loose in its chamber. Should a drill or reamer be used and the hole *h* of the nozzle or hole *k* of the plug be enlarged, when the tool comes in contact with the bushing the latter will rotate and prevent the boring out of its aperture *i*.

In Figs. 2, 5, and 6 the aperture *i* is deflected from a straight line in its passage through the bushing, in either of which a drill or reamer could not be inserted. The various styles of bushings are designated as I, I′, I^2, I^3, and I^4. These may be made of any suitable metal or of glass.

In Fig. 2 the shank D of the mixer has an enlarged cylindrical recess D′, at the bottom of which is a smaller recess extending into the body of the nozzle H. The latter recess is of a diameter to correspond to the outside of the bushing I′ and has screw-threads at its sides in the straight portion. The bushing has screw-threads on its outside to correspond, and across its back end is a slot *m*, into which may be inserted a special tool for turning it when screwing it to its seat in the recess provided for it.

In Fig. 4 is shown the bushing I^4, which has around its outside, preferably in the center of its length, a groove *a*. This bushing is introduced into the mold, in which are also cores for forming the cavities *n* and *o* at either end of the bushing, and the metal forming the mixer is cast around the bushing. The holes *h* and *s* may be either cored or drilled out. The hole or opening *s* may be of any desired diameter, as if as large as the outside of the bushing the latter is prevented from being driven out by the metal which is cast into the groove *a*. It should be understood that in casting metal around this bushing it is so designed that when complete the bushing will be slightly loose in its inclosure, so that it may rotate when a tool is inserted into its orifice in an attempt to enlarge it.

Although the bushing is shown in Fig. 1 as being rotatably supported, we do not confine ourselves to that particular manner of supporting it, as in some cases where the bushing has a crooked or angular passage-way for gas we may forcibly press the bushing into its recess, the two parts being designed to fit tightly and dispense with the use of the plug behind the bushing, the obstruction of a drill being fully accomplished in this simple manner.

In practical use the shank D is connected to the gas-supply pipe and a nipple or pipe G, connecting the burner, is screwed into the opposite end F. Gas being admitted to the orifice in the shank D, it passes through the opening in same, through the aperture or passage-way *i* in the bushing, and thence through the orifice *h* of the nozzle into the mixing-chamber A, where it mixes with a quantity of air admitted through the openings E at each side of the arms C. From this chamber the combined gas and air passes through the pipe G to the burner or combustion-chamber.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The combination with a gas-supplying device having a duct therethrough, of a drill-obstructer, situated within said duct, the said obstructer provided with a gas-passage, as set forth.

2. The combination with a gas-supplying device having a duct therethrough, and one part of the said duct of greater diameter than the balance thereof, a drill-obstructer adapted to fit within the enlarged portion of the duct, the said obstructer provided with a gas-passage, substantially as set forth.

3. The combination with a gas-supplying device having a duct therethrough, one part of said duct somewhat enlarged, and provided with a screw-thread for a part of its length, a drill-obstructer situated within the enlarged part of the duct, and a screw-plug to fit the threaded part of the duct, the obstructer and plug, each provided with a gas-passage, as set forth.

4. In a gas-mixing device, the combination with a gas-supplying device having a duct therethrough for the passage of a combustible

fluid, of a drill-obstructer situated in line with said duct, said obstructer provided with a crooked bore.

5. In a gas-mixing device, the combination with a gas-supplying device having a duct therethrough for the passage of a combustible fluid, and a cylindrical drill-obstructer provided with a crooked bore, said drill-obstructer being rotatably supported within said duct and having its bore arranged to communicate with the duct of said mixer.

In testimony whereof we affix our signatures in presence of two witnesses.

ANDREW KRIEGER.
JOHN COYLE.

Witnesses:
JNO. S. THURMAN,
E. T. SILVIUS.