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FUEL BURNER

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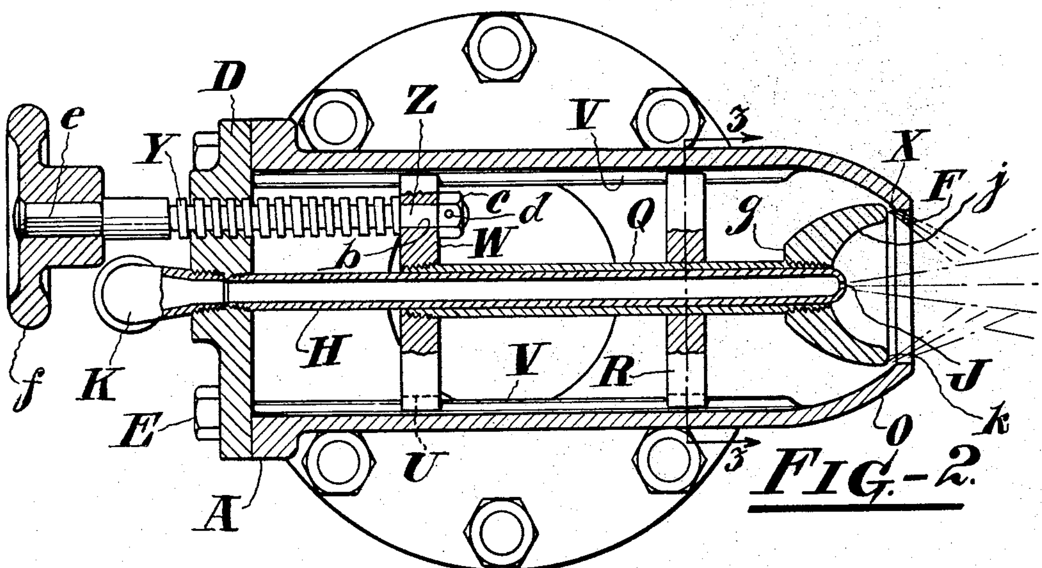

FIG-2.

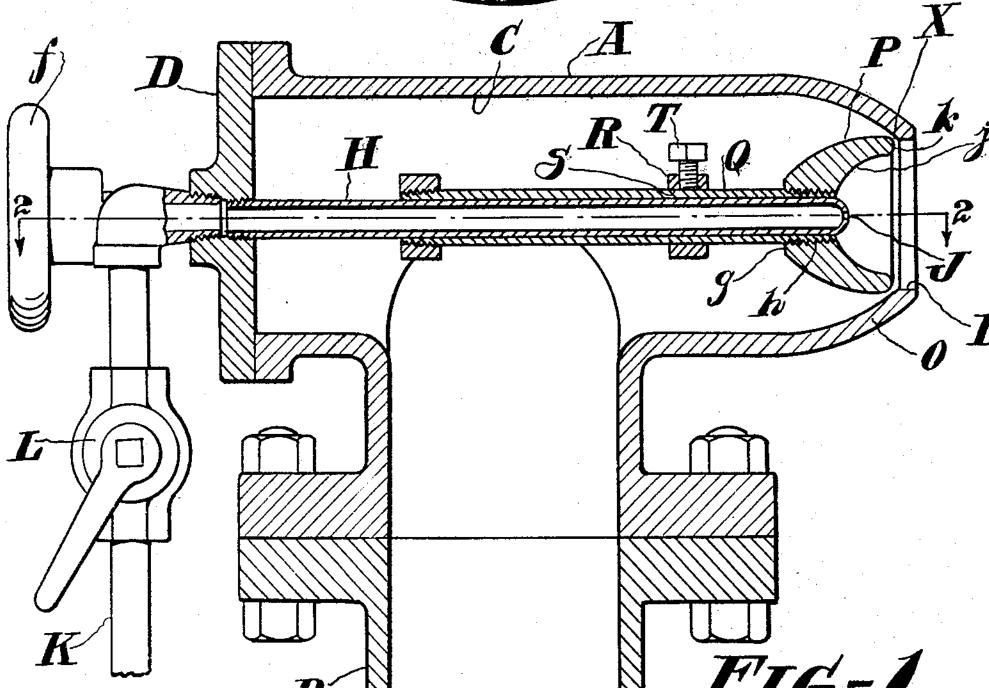

FIG-1.

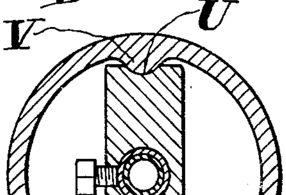

FIG-3.

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FUEL BURNER

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1 Claim. (Cl. 299—140)

This invention relates to burners, but more particularly to burners adapted to properly proportion and mix the constituent elements, such as fuel and air which, when combined form the fuel charge for furnaces and the like.

One object of the invention is to effectively oxygenize and atomize the fuel.

Another object is to effect such mixture of elements forming the fuel charge at a point exteriorly of the burner. Oil burners in common use convey oil through a tube and discharge it through a small opening intended to break the stream of fuel up into a fine spray. It is customary to arrange for a current of air to envelop the spray and mix with it to make complete combustion possible. Such devices invariably introduce the air stream to the fuel stream at the instant the latter emerges from its nozzle, and the air current is conducted to the opening of the fuel nozzle by a stream lined nozzle cover or equivalent means. This form of construction has a serious disadvantage for the stream of liquid and the stream of air make such gentle contact that the latter simply surrounds the former and prevents its proper atomization.

To overcome this disadvantage the present invention arranges the fuel jet somewhat to the rear of the annular air jet, so that the movement of fuel and the movement of air exert an ejector action upon the space between the two jets, thereby creating an area of low pressure adapted to assist diffusion of the oil spray. The two jets actively intersect each other at a distance from the nozzles in an annulus of mingled air and oil spray which insures thorough mixing of the elements resulting in rapid and complete combustion of the oil.

Still another object is to enable the burner to be readily adjusted to vary the proportions of the elements forming the fuel charge.

Other objects will be in part obvious and in part pointed out hereinafter.

In the accompanying drawing forming part of the specification and in which similar reference characters refer to similar parts,

Figure 1 is a sectional elevation of a fuel burner constructed in accordance with the practice of the invention,

Figure 2 is a sectional plan view taken through Figure 1 on the line 2—2 looking in the direction indicated by the arrows, and

Figure 3 is a transverse view taken through Figure 2 on the line 3—3 looking in the direction indicated by the arrows.

Referring more particularly to the drawing, the burner, which is designated generally by A, is shown secured to a hollow pedestal or supply pipe B through which pressure fluid, such as air, may flow from a source into a chamber C within the casing A.

A closure is provided for one end of the casing A in the form of a head D which may be secured to the casing by bolts E or other suitable means, and at the opposite end of the casing A is an outlet opening F through which the fuel charge may flow into a furnace or other device (not shown) wherewith burners of this character are usually employed.

Disposed within the chamber C and preferably coaxial with the outlet opening F is a tubular nozzle H in the form of a tube of substantially uniform diameter throughout its length and having one end secured to the head D, as for instance, by a threaded connection and the opposite or free end is rolled or piened over or otherwise restricted and has a port J in the restricted end from which fuel is projected through the outlet opening F. The nozzle H is of such length that the restricted or outlet end terminates at a point within the chamber C so that, in effect, the fuel issuing therefrom is also projected through a portion of the chamber C adjacent the outlet opening F.

The fuel supply for the nozzle H is conveyed thereto by a suitable conduit K which may lead from a source of fuel supply under pressure and may be provided with suitable valve means, such as that designated by L, for controlling the flow of fuel to the nozzle H.

In accordance with the practice of the invention, means are provided for effecting the oxygenation of the fuel at a point or region exteriorly of the burner or casing A. To this end that portion of the casing A wherein the outlet opening F is located is in the form of a wall O which converges toward the outlet opening F. Within the chamber C is a valve P having a sleeve Q threaded thereto, and said sleeve Q is in engagement with the exterior surface of the nozzle H to prevent leakage of pressure fluid through the sleeve.

At a point intermediate the ends of the sleeve Q is a bearing member R, shown in this instance as being in the form of a bar, having an aperture S to receive the sleeve Q, and a set screw T is threaded into the bar R to seat against the sleeve Q for securing the said bar fixedly to the sleeve.

The bar R extends transversely of the chamber C and is provided in its ends with notches U for engagement with guide ribs V which are disposed on opposite sides of the chamber C and may, as illustrated, form integral portions of the casing A. Similarly, on that end of the sleeve Q opposite to the end to which the valve P is affixed is threaded a bar W which, like the bar R, is also provided with suitable notches U to receive the ribs V. The bars R and W and the sleeve Q thus form an adequate bearing for the free end or portion of the nozzle H.

Means are provided for conveniently actuating the valve P to determine the area of a space or annular passage X which may exist between the valve and the adjacent surface of the converging wall O and through which passage pressure fluid from the chamber C is adapted to flow through the outlet opening F. To this end a screw Y is threaded into the head D and is provided at one end with a plain cylindrical stem Z which is journalled in a bore *b* in the bar W. The free end of the stem Z preferably extends beyond the bar W and has secured thereon a collar or nut *c* which may be held against accidental displacement by a pin *d*. On the projecting end *e* of the screw Y is arranged a knob or hand wheel *f* whereby the screw Y may be rotated for shifting the valve P with respect to the wall O.

Posteriorly, the valve P is of parabolic shape and is truncated to form a flat surface *g* at that end of the valve for convenience in forming the threaded aperture *h* into which the sleeve Q is threaded. In the anterior side of the valve P is a concavity *j* through which fuel issuing from the nozzle H flows to and through the outlet opening F. The rim or outer edge *k* of the base thus remaining is preferably rounded and is adapted to seat against the adjacent surface of the converging wall O to seal the chamber C at will and thus prevent the flow of pressure fluid from the chamber through the outlet opening F. The ejector action of the streams of air and fuel create an area of low pressure within the concavity *j* thereby assisting in the diffusion of spray from the fuel nozzle H.

In practice the fuel flowing through the conduit K and the nozzle H under pressure issues from the port J and is projected as spray through the outlet opening F. With the valve P adjusted so that an annular passage X of suitable area may exist between the rim *k* of the valve and the adjacent wall O to assure an adequate amount of pressure fluid for oxygenizing the fuel, such pressure fluid will, due to the shape of the wall O and the curvature of the rim *k*, flow through the outlet opening F in the form of a hollow converging jet.

With the passage X and the port J in coaxial relationship the point of convergence of the air jet is substantially coincident with the axis of the fuel projected from the nozzle H and lies exteriorly of the casing A. Although the hollow jet of air issuing from the passage X encircles the fuel flowing from the port J there is no free commingling of fuel and pressure fluid within the casing A. The process of mixing of these elements takes place outside of the burner as does also that of thoroughly atomizing the fuel due to the cross currents of the pressure fluid through the fuel stream, thus assuring a readily combustible mixture.

Whenever it is desired to vary the quantitative relation of pressure fluid and fuel the valve P may be readily adjusted by means of the screw Y, either to increase or decrease the width of the annular passage X. By adjusting the valve P in this manner the conoid jet of pressure fluid directed into the fuel will, of course, be either elongated or shortened but, irrespective of its length, the vertex of such jet will be directed into the fuel stream.

In order to discontinue the operation of the burner the screw Y may be manipulated to seat the rim *k* of the valve P against the wall O. In this way the flow of pressure fluid from the chamber C may be cut off. At the same time the valve P may be closed to cut off the flow of fuel from the nozzle H. With the valve P closed any fuel, such as oil, which may leak or dribble from the port J will merely flow along the wall of the recess *j* and through the outlet opening F to the exterior of the burner, thus assuring against leakage of fuel into the chamber C and the possible formation of a combustible mixture within the casing.

We claim:

A fuel burner comprising a casing having a chamber, a converging wall on the casing having an outlet opening, a fuel nozzle affixed at one end to the casing and extending longitudinally into the chamber, a sleeve slidable upon the fuel nozzle and in fluid tight engagement therewith, guide ribs upon the inner side of the casing wall, bearing members slidable upon said guide ribs and affixed in spaced relationship to the sleeve, a valve member on the sleeve adapted to coact with the outlet opening of the casing, and means acting upon one of the bearing members to control the pressure fluid outlet by movement of the valve carrying sleeve.

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