Oct. 23, 1945. J. J. URSUTZ 2,387,420

FUEL BURNER

Filed June 8, 1942

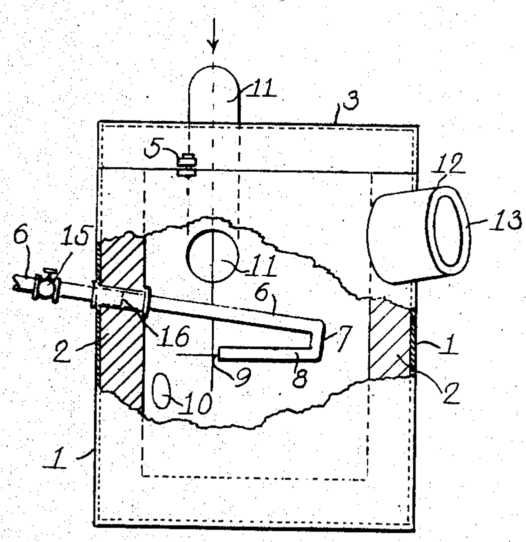

Fig I

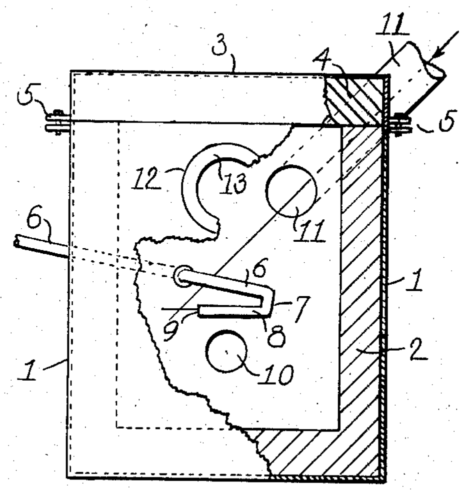

Fig II

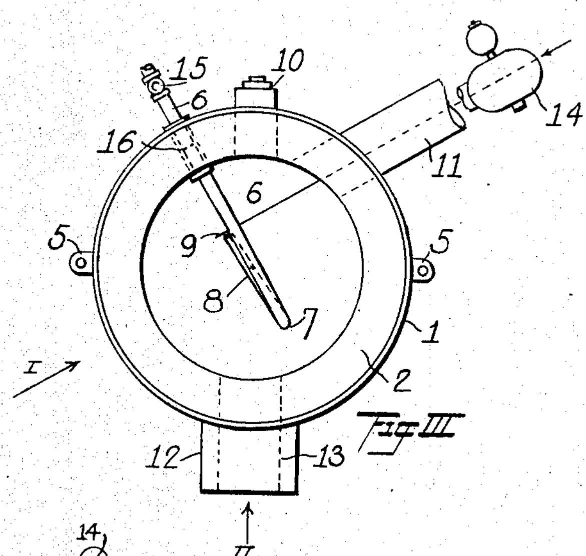

Fig III

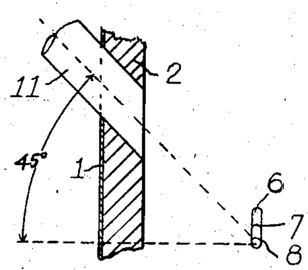

Fig IV

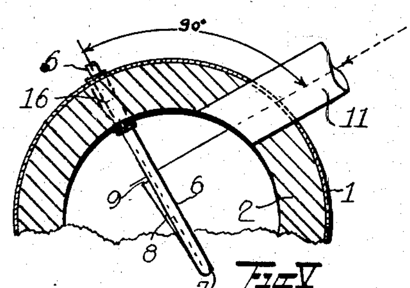

Fig V

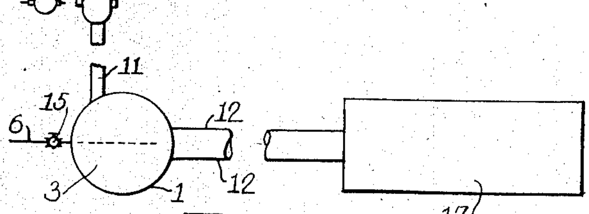

Fig VI

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2,387,420

UNITED STATES PATENT OFFICE

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FUEL BURNER

Joseph J. Ursutz, Chesterton, Ind., assignor of one-third to George T. Bush, Chesterton, Ind.

Application June 8, 1942, Serial No. 446,186

2 Claims. (Cl. 158—5)

My invention relates to improvements in fuel burners and it more especially consists of the special features pointed out in the annexed claims.

The purpose of my invention is to provide a unitary fuel burner of vertical tubular form that may be semi-portable or large enough to warrant a permanent installation; that is adaptable to the use of different kinds of fuels; that delivers the intense heat outside of the heater to a furnace or where it is most required; that combines air under pressure with the fuel and delivers the air tangentially at approximately right angles to the fuel inlet; that preheats the fuel pipe in the combustion chamber; and that variably controls the admission of air and the intake of fuel, either manually or automatically as desired.

With these and other ends in view I illustrate on the accompanying drawing such instances of adaptation as will disclose the broad underlying features without limiting myself to the specific details shown thereon and described herein.

Fig. I is a side elevation of my burner, showing parts of the casing broken away, seen in the direction of the arrow I in Fig. III.

Fig. II is a partial section and side elevation seen in the direction of the arrow II on Fig. III.

Fig. III is a top plan view with the cover removed.

Fig. IV is a detached diagrammatic view showing the vertical angular relation of the air current to the fuel delivery.

Fig. V is a detached diagrammatic view showing the horizontal angular relation of the fuel and air intakes.

Fig. VI shows the diagrammatic relation of a burner to an associated furnace.

In adapting my invention to various industrial uses I may employ whatever modifications the exigencies of specific requirements may demand without departing from the broad spirit of the invention.

In the adaptation shown in the drawing the burner unit is enclosed in a suitable sheet metal casing 1, including a closed bottom and an open top. The top is closed by a sheet metal cover 3 that is held in place by side clamp plates 5 on the cover and similar clamping plates on the body in line with the cover plates. Bolts pass through both plates.

The inside of the body walls and its floor is covered with a layer of fire brick 2. Likewise the underside 4 of the cover is similarly protected against the intense heat that is generated within the lined casing. On some units I may place hand grips on the casing to make the shifting of the unit from place to place an easy matter.

When liquid or gaseous fuel is used from a standard source of supply or a portable source it is led into the burner radially by means of a pipe 6 having a shut-off valve 15 on the outside of the casing. This pipe and coupling 16 passes slightly downwardly across the center toward the opposite wall, where at 7 it drops down to a short return portion 8 that terminates at 9 approximately midway between the center and the entry wall. This pipe contrary to conventional practice is not perforated. The intense heat of combustion keeps it red hot so that any fuel passing into the pipe becomes vaporized instantly and is delivered from the exit end 9 as a highly heated gas, into the path of the incoming supply of air.

The air intake 11 is approximately at 45° to the vertical and horizontal and it is tangential to the center of the fire brick lining 2 at a descending angle to the vertical surface of the wall but at approximately 90° to the incoming fuel. The tangential downwardly directed combined air and fuel creates a swirling movement of great turbulence above the bottom and around the inside of the casing. The carbon of the fuel is entirely consumed and the liberated hot gases fill the entire inner volume of the burner through the thorough vaporization of the fuel. The hot gases pass out through the conventionally lined opening 13 of the large delivery pipe 12 (Fig. 1) to wherever the heat is to be applied for metal smelting or other purposes.

In foundry practice my burners are specially valuable as small quantities of iron can be quickly melted. The supplying of heat to a small furnace is a rapid process, as it requires only about 20 to 30 minutes to produce the required heat after the burner has been lit. This saves a lot of time and makes small furnaces ready for operation for regular or emergency jobs. The burner is operated under a pressure system (the blower 14—power or handpump). With a hand pump the outfit is quite portable. The heat of the burner may be forced into any connected and associated furnace under pressure. This obviates the use of a stack and a draft or vacuum system to bring in oxygen for the heating or melting of metals.

As stated, the burner is available for field use in heating rivets on constructing jobs or for melting purposes. For this service it becomes a portable unit.

I am not limited to the use of so called fuel oil as I may use the heavy hydrocarbons, sludges, etc. When using powdered fuels the intake pipe **6** and control is not used but the airpipe also serves as the fuel intake. I have successfully used saw dust but, basically, because of lowered B. t. u. the ultimate heat produced is not so great as when the more concentrated hydrocarbons are used. As a matter of fact I am not limited to any one specific kind of fuel.

As illustrative of the fuel value of different substances high grade bituminous coal has a B. t. u. value of 14,134 per pound; high grade anthracite—13,351 B. t. u. per pound; gasoline—20,250 B. t. u. per pound; kerosene—19,980 B. t. u. per pound; and fuel oils, heavy petroleum or refinery residue, 18,630 B. t. u. per pound. 2000 pounds of average pine saw dust is about equal to 800 pounds of coal—14,134 B. t. u. per pound×800=11,307,200 B. t. u. per ton in comparison with 28,268,000 B. t. u. per ton of coal.

My fuel burner is specially efficient in burning carbon out of steel. It is also available for foundry use, for heating metals and in very small sizes may take the place of conventional gasoline torches.

The operation of the burner is simple. A lighter plug **10** is removed and just inside of the plug opening oil-soaked waste is placed. The blower **14** that supplies the air is turned on very lightly to admit only a small quantity of air. After lighting the waste the lighter plug is replaced. The oil valve **15** is turned on cautiously, to not flood the burner, until it is hot enough to vaporize all of the oil (about 1800° F.). Then the air and oil are slowly increased.

When the burner is used to remove the carbon from cast iron or steel in melted form, the fuel is shut off at **6** and the air from intake **11** is blown through the furnace which holds the melted metal. Should it be found necessary to further heat the melted metal it is only necessary to again turn on the fuel and continue the heating as long as required. This removal of the carbon can also be done by simply burning fuel and air together in cooperating proportions. By following this procedure the carbon can be removed to the desired extent without the use of iron ore or oxides to consume it.

My fuel burner lends itself to the heating of metals in an associated furnace **17** without excess of oxygen because only enough oxygen is admitted to the burner to consume the fuel or produce a reducing flame that will not oxidize the metal.

No extraneous oxygen can enter the cooperating furnace because it is working under pressure, and any small openings in the furnace will only let some of the pressure escape instead of drawing air inward. An unusual evenness of heat is secured by my pressure system, far superior to that obtained by a vacuum or draft system because the heat supplied by the burner, independently of the furnace is spread out into every portion of the furnace uniformly. Any desired form of furnace may be used, either of the round or cupola type or that known as a horizontal type **17**.

In using a heavy oil, under the control of valve **15**, if not fully vaporized in the return pipe **8** it will be projected against the hot lining **2** to complete the vaporization.

What I claim is:

1. A fuel burner provided with a combustion chamber enclosed by a refractory lined vertical cylinder, a fuel pipe passing through the wall of the chamber, a vaporizer connected to said pipe comprising a tube extending across the major portion of the chamber diameter, said tube having a reverse bend, and an approximately parallel portion connected to the bend and terminating below the tube within the combustion chamber to constitute a vaporizing unit, an air inlet tube above the fuel pipe placed at a tangent to a circle that is concentric with the axis of the chamber and at approximately 90 degrees horizontally and approximately 45 degrees vertically to and across the delivery end of the fuel vaporizer, and a hot gas exit above the vaporizer.

2. A fuel burner unit provided with a combustion chamber enclosed by a refractory lined vertical cylinder, a fuel pipe passing through the wall of the chamber, a vaporizer connected to said pipe and extending across the major portion of the chamber diameter and inclined downward, a reverse bend, an approximately parallel imperforate portion connected to the bend and terminating below the tube in spaced apart relation to the wall of the chamber, an air inlet tube above the fuel pipe near the upper portion of the chamber and inclined on a vertical and a horizontal plane to the axis of the cylinder and positioned in alignment with the delivery end of the vaporizer, whereby the vaporized fuel is directed toward the turbulent area of the chamber at its bottom resulting in an intense concentration of heat, and a hot gas exit above the vaporizer.

JOSEPH J. URSUTZ.