Sept. 3, 1957 D. L. RAYMOND ET AL 2,804,918

RETORT BURNER AND BLOWTORCH INCORPORATING THE SAME

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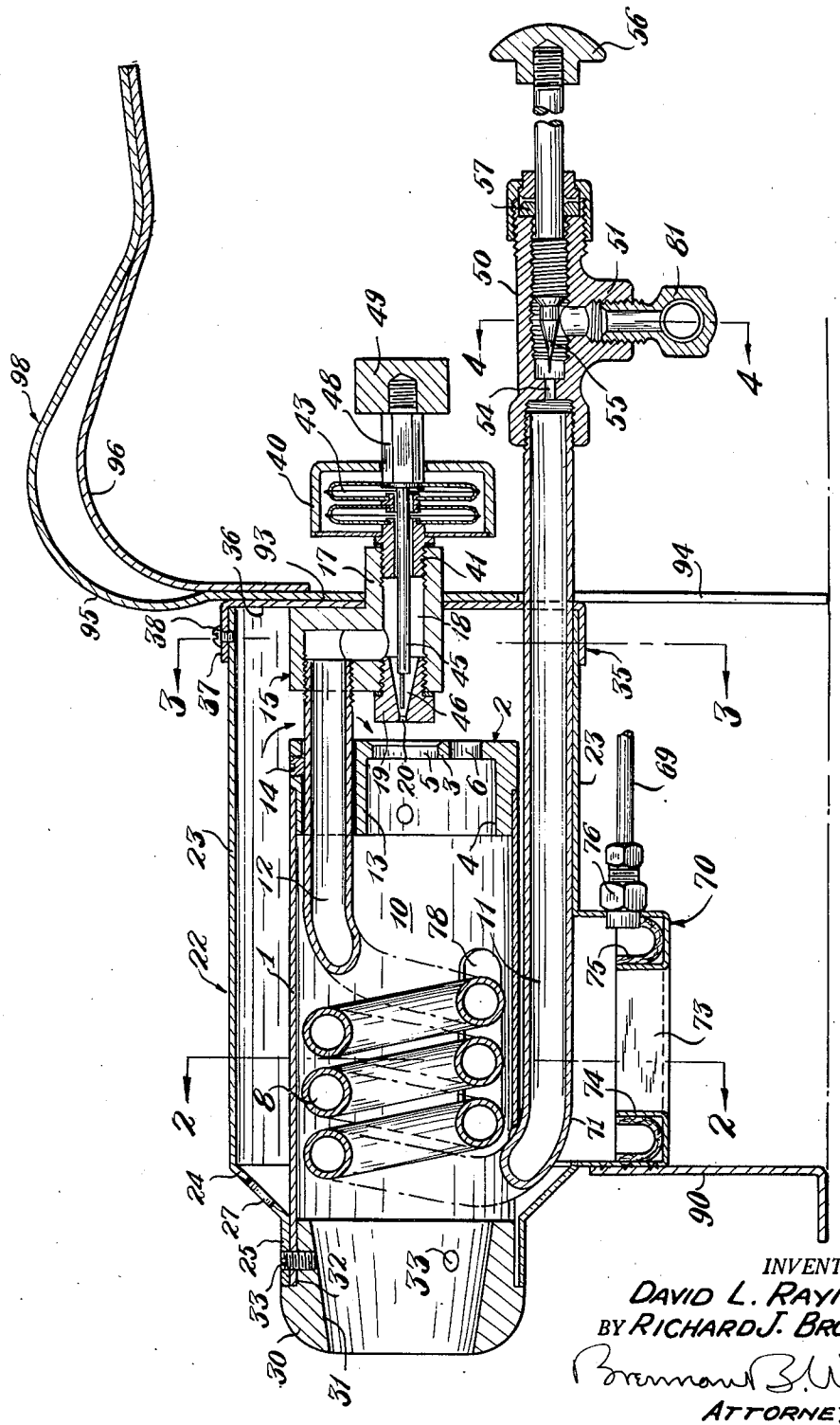


FIG. 1

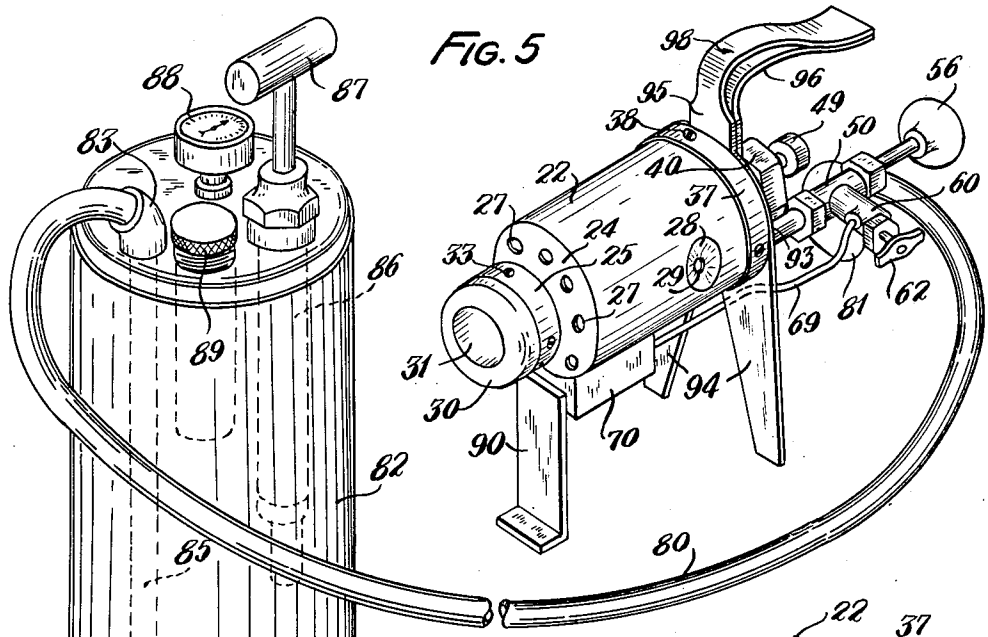
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FIG. 5



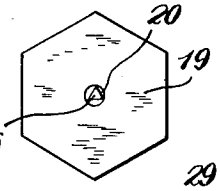


FIG. 6

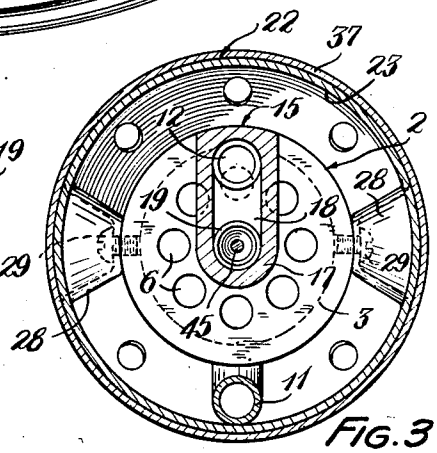


FIG. 3

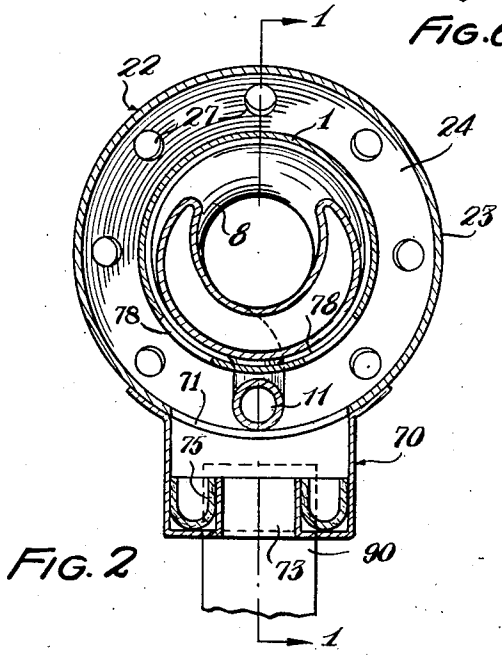


FIG. 2

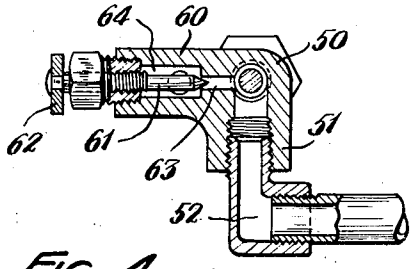


FIG. 4

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RETORT BURNER AND BLOWTORCH INCORPORATING THE SAME

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Application February 4, 1954, Serial No. 408,246

2 Claims. (Cl. 158—83)

This invention resides in improvements in liquid fuel burners of the retort class, and in a blowtorch construction embodying a burner possessing said improvements.

The burner is suited to various uses aside from that as a part of a blowtorch. For example, it may be employed as the combustion device of apparatus for preheating internal combustion engines and their appurtenances in order to make starting easier in extremely cold weather. Also, a blowtorch incorporating the burner may be used for many purposes, among them that of thawing out the running gear of vehicles, such as heavy trucks and tractors, that have been left inactive and exposed to snow or freezing rains.

While our improved burner may be rigidly mounted upon and have direct communication with a portable pressurized fuel reservoir in the production of a self-contained blowtorch of conventional type, we prefer to apply to the burner structure, supporting means or legs and a handle, and to connect the blowtorch thus devised with a remote source of fuel under pressure, thereby to facilitate the handling of the torch and, at the same time, make practical a source of fuel of considerable amount.

In view of the above mentioned uses to which our invention is especially adapted, it becomes our fundamental object to provide a retort burner that may be readily started, and that will operate satisfactorily, in the presence of extremely low ambient temperatures—for instance, 60 to 70 degrees F. below zero—and the flame of which will not be extinguished by high winds.

A more specific object of our invention is to provide a retort burner that will, while operating, induce a flow of air for the support of combustion inwardly about the combustion chamber casing so as to heat the air, thereby to enhance vaporization of the fuel and at the same time shield the combustion casing from the chilling effect of low atmospheric temperatures.

Further objects and advantages will appear as this description proceeds, including among the more general ones simplicity and durability of the burner and blowtorch constructions; ease of assembly and disassembly and replacement of parts; economy of manufacture; high efficiency, and convenience of use.

An embodiment of the invention is illustrated in the accompanying drawings wherein like reference characters designate like parts in the several views, and in which

Fig. 1 is a central longitudinal section through a blowtorch embodying our improvements, the plane of section being indicated by the line 1—1 of Fig. 2;

Figs. 2, 3 and 4 are transverse sections on the respective lines 2—2, 3—3 and 4—4 of Fig. 1;

Fig. 5 is a perspective view of the blowtorch, and a reservoir with which it has communicative connection, the reservoir providing a source of liquid fuel supply under pressure, and

Fig. 6 is an enlarged front elevation of the burner tip and cleanout needle.

Our improved retort burner that constitutes the major

part of the blowtorch, and which, as hereinbefore stated, has other uses, includes a combustion tube 1 that is open at its forward end and has applied to its opposite end a ring like member or so-called air ring 2. This member is composed of a circular wall 3 and a relatively deep edge flange 4, the latter being shown as reduced in diameter at its forward end and inserted in the casing or tube 1 and fastened thereto in a manner later to be described. The member or ring 2 has a relatively large central aperture 5, surrounded by a series of air admitting openings 6.

A retort or vapor generator 8, in the form of a coil of tubing, is located in the forward end of the combustion chamber 10 defined by the tube 1 and air ring 2. The retort is provided with an inlet extension 11 and an outlet extension 12 which, in the present instance, consist of the terminal portions of the piece of tubing from which the coil that constitutes the retort is formed. The member 2 is shown as formed with a hollow boss 13 through which the outlet extension 12 of the retort projects, and wherein it is held by a screw 14.

15 designates, generally, a burner head that is spaced slightly rearwardly of the combustion chamber casing composed of the tube 1 and member 2. The burner head is in the form of a fitting and includes a cylindrical barrel 17 that is horizontally disposed, and a vertical branch to which is connected the outlet extension 12 of the retort. The burner head is hollow to provide therein a vapor space 18 wherewith said outlet extension communicates, and the lower portion of which consists of an axial bore of the barrel 17. Shown as threadedly engaged in the front end of said bore is a burner tip 19 having an orifice 20 that is substantially axially aligned with the aperture 5 of the air ring or member 2.

Surrounding and radially spaced from the combustion tube 1 is a housing designated, generally, by the reference numeral 22. This housing comprises a cylindrical wall 23 and a convergent or frusto conical front wall 24 that merges into a cylindrical portion 25 within which is received the front end of the combustion tube 1. The wall 24 is provided with a plurality of air admitting openings 27. Diametrically opposed bosses 28 are pressed inwardly from the wall 23 of the housing and are apertured at their inner ends. These bosses are shown as located in the region of the interengaging portions of the air ring 2 and combustion tube 1, and said portions have aligned apertures that register with those of said bosses. Screws 29 extend inwardly through the apertures and are threadedly connected with the flange 4 of the air ring. Thus the housing is secured to and spaced from the combustion chamber casing adjacent the rear end of the latter, and also the constituents of said casing are fastened together.

30 designates a nozzle of suitable material, such as stainless steel or iron. The opening or bore of the nozzle is defined by a forwardly convergent wall 31. The rear half of the nozzle is reduced in diameter to fit within the front end of the combustion tube 1, while the outer surface of its forward half merges with the corresponding surface of the cylindrical portion 25 of the housing 22. The interengaged parts of the housing and combustion tube and the underlying portion of the nozzle are secured together by a suitable number of fastening means or screws 33.

A cap 35, composed of a circular wall 36 and a peripheral flange 37, is applied to the rear end of the housing 22, and it is shown as secured to the housing by screws 38. Extending rearwardly through a central aperture of the wall 36 is the adjacent end portion of the barrel 17 of the burner head 15.

While it is old to provide means for dislodging particles

of carbon, scale, or other foreign matter, from the orifices of burners, we have provided means for automatically accomplishing this end that is highly effective in operation. Applied to the rear end of the barrel **17** of the burner head **15** is a casing **40**. A hollow threaded boss **41** of the casing is screwed into the internally threaded rear end of the bore of said barrel. The casing **40** encloses a diaphragm or bellows **43**, and its body portion is desirably hexagonal in shape, to aid in screwing the boss **41** tightly within the barrel **17**. Loosely guided for reciprocation in the bore of the boss **41** is a rod **45** that carries a needle **46** at its forward end for clearing the orifice **20** of any solid matter that may lodge therein. As will appear from Fig. 6, the needle **46** is triangular in cross-section, although it may be fluted, or of any suitable cross-sectional shape other than circular, so as to insure against undue shutting down of the flow of vapor through the orifice **20** when the needle is moved forwardly.

The front wall of the bellows **43** is secured and sealed to the boss **41**, while the rear wall thereof is similarly joined to the enlarged rear end portion of the rod **45**. Thus it will be seen that the vapor space **18** of the burner head is in constant communication, through the bore of the boss **41** about the rod **45**, with the interior of the bellows **43**. The portion of the rod **45** rearwardly of the bellows **43** constitutes a neck **48** that carries a button **49** at its rear end. The neck **48** is other than circular in cross section—hexagonal, for example—and it extends loosely through an opening of corresponding shape in the rear wall of the casing **40** so as to hold the neck against rotation with respect to the casing and thereby protect the bellows **43** from injury in case an attempt were made to rotate the neck **48**, as by means of the button **49**.

The inlet extension **11** of the retort **8** projects rearwardly through a hole in the wall **36** and has applied to its outer end a valve fitting **50** that is provided with a depending branch **51**. Controlling the flow of liquid fuel to the burner, through an aperture **54**, is a needle valve **55** that has threaded connection with the valve fitting and is provided at its rear end with a knob **56**, the joint about the stem of the valve being sealed by a conventional packing gland **57**.

The valve fitting **50** has a lateral branch **60** (Figs. 4 and 5) within which operates a needle valve **61** having a head **62** by means of which it may be turned to open and close a port **63** that controls the flow of fuel from the main passage of the valve to the branch **60**. A tube **69** leads from the branch **60** to a preheating burner, designated, generally, by the reference numeral **70**, that is situated beneath the front end of the housing **22**. Said preheating burner, as presently constructed, consists of a box-like enclosure that is open at its upper end where it is shaped to fit the contour of the cylindrical wall of the housing, said wall having an opening **71** registering with the open top of said enclosure. At its lower end the enclosure has a relatively large opening **73** surrounded by a trough **74** within which is laid a wick **75**, the latter assuming, when placed in the trough, a formation that is U-shaped in cross section. The fuel supply tube **69** is joined to the preheating burner by means of a fitting **76** in a position to discharge the fuel into the trough **74**. The combustion tube **1** is provided with slots **78** though which the products from the preheating burner have access to the retort or vaporizing coil **8**.

As will be seen by reference to Fig. 5, communication is established between the burner and a source of pressurized liquid fuel through a flexible tube or hose **80**, one end of which is connected, through an elbow **81**, to the branch **51** of the valve fitting **50**. The source of fuel is provided, in the present instance, by a conventional tank or reservoir **82** wherewith the opposite end of the aforesaid tube or hose is connected through the medium of an elbow **83** and a pipe **85** that extends down inside the reservoir to near the bottom thereof. The fuel is adapted

to be placed under pressure by a pump **86**, the operating handle of which is designated **87**, and the reservoir is shown as equipped with a pressure gauge **88** from which the value of the pressure within the tank may be ascertained at any time. The tank or reservoir is provided with the usual filling cap **89**.

Shown as attached to the front end of the burner—or, more specifically, to the front wall of the preheating burner **70**, as by welding—is a leg **90**; and similarly secured to the rear end of the burner—or, more particularly, to the wall **36** of the cap **35**—is a plate **93** that is bifurcated at its lower end to provide legs **94**. A tongue **95**, shown as formed integral with the plate **93**, curves generally upwardly and rearwardly therefrom, and a member **96**, of substantially the same profile as the tongue **95**, is disposed beneath the tongue and has its end portions welded or otherwise fastened to the corresponding portions of the tongue. Intermediate the regions of their joined end portions the tongue and member are spaced apart. This construction provides a ventilated handle, designated generally by the reference numeral **98**, by means of which the blowtorch may conveniently be handled.

To start the burner in operation, the valve **61** is opened to admit fuel to the preheating burner. After said valve is closed, the fuel is lighted and the flame rises through the opening **71** in the bottom wall of the housing **22** and through the openings **78** in the combustion tube **1** and plays upon the retort **8**. When the retort has been heated to a vaporizing temperature, the main valve **55** is opened to allow fuel under pressure to be delivered to the retort. Here the fuel is vaporized and the vapors flow through the outlet extension **12** into the burner head **15**. As the parts become more highly heated and the fuel present in the retort flashes into vapor, it creates a pressure considerably higher than that prevailing in the reservoir **82** which operates in both directions, momentarily retarding the flow of the incoming fuel, and the portion thereof that enters the burner head is communicated to the interior of the bellows **43**, whereupon the bellows expands and draws the needle **46** rearwardly and further away from the orifice **20**. This period of maximum pressure is of relatively short duration, and at its conclusion there is a drop in pressure due to the cooling influence of the incoming fuel. As a result, the bellows contracts and moves the needle forwardly beyond its normal position of repose thereby to dislodge any solid matter that may have lodged in the orifice **20**. Thus it will be seen that, during initial operation, the cleanout needle is reciprocated. At any time, if he so desires, the operator may actuate the needle by pressing the button **49**.

As the vapor is ejected from the orifice **20** of the burner tip through the central aperture **5** of the member **2**, air is drawn in through said aperture immediately about the jet of vapor to provide primary air to support combustion initiated by the flame of the preheating burner and, at the same time, secondary air enters through the openings **6** of said member to commingle with the products and further promote combustion. The flame, which starts well back in the combustion chamber and is projected a considerable distance forwardly of the nozzle **30**, will be held in stable condition against extinguishment from relatively high winds by reason of the character of the nozzle opening.

It will be understood that the air for combustion purposes enters the front of the housing **22** through the openings **27** and wipes along the combustion tube **1**, becoming highly heated in its passage to the rear of the combustion chamber so that by the time it enters through the aperture **5** and openings **6**, it will be of a sufficiently high temperature to enhance vaporization of the fuel and increase the efficiency of the burner. The housing **22**, and the body of heated air between it and the combustion tube **1**, protects the latter from the chilling effects of very low atmospheric temperatures.

Having thus described our invention, what we claim is:

1. In combination, a combustion chamber casing that is open at its forward end, a housing surrounding said casing in spaced relation thereto and including a wall joined to the casing about the open end of the latter, the housing having air admitting means in the region of said wall, a burner head in the housing adjacent the rear end of the combustion chamber casing, said head enclosing a vapor space and including a burner tip having an orifice through which fuel vapor is discharged from said space into the combustion chamber casing, said casing having means in the region of the burner tip for admitting combustion air from the housing, a retort in the combustion chamber adjacent the forward end thereof, the same having an inlet and an outlet, the outlet communicating with the vapor space of the burner head, said inlet comprising a fuel supply conduit that extends inwardly through the rear of the housing toward the front thereof where it communicates with the forward end of the retort, a source of liquid fuel supply, communicative connections between said source and said fuel supply conduit, a valve fitting at the junction of said connections and the conduit, a main valve therein for controlling the flow of fuel to the retort, the housing having an opening in its under side in substantially vertical alignment with the retort, a preheating burner including a peripheral wall joined to the bottom of the housing about said opening therein, the combustion chamber casing having openings in laterally spaced relation to the vertical axis of the opening in the housing and through which the products from the preheating burner have access to the retort, fuel conveying means leading from the valve fitting to the preheating burner, and a second valve in said fitting for controlling the flow of fuel through said conveying means, the preheating burner having a relatively large bottom opening and comprising a trough that surrounds said opening.

2. The combination and arrangement of parts defined by claim 1, and, in addition thereto, a wick of generally U-shaped cross section lying in said trough.

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