Jan. 2, 1923. 1,440,614

L. B. METTLER.
GAS BURNER.
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Fig. 1.

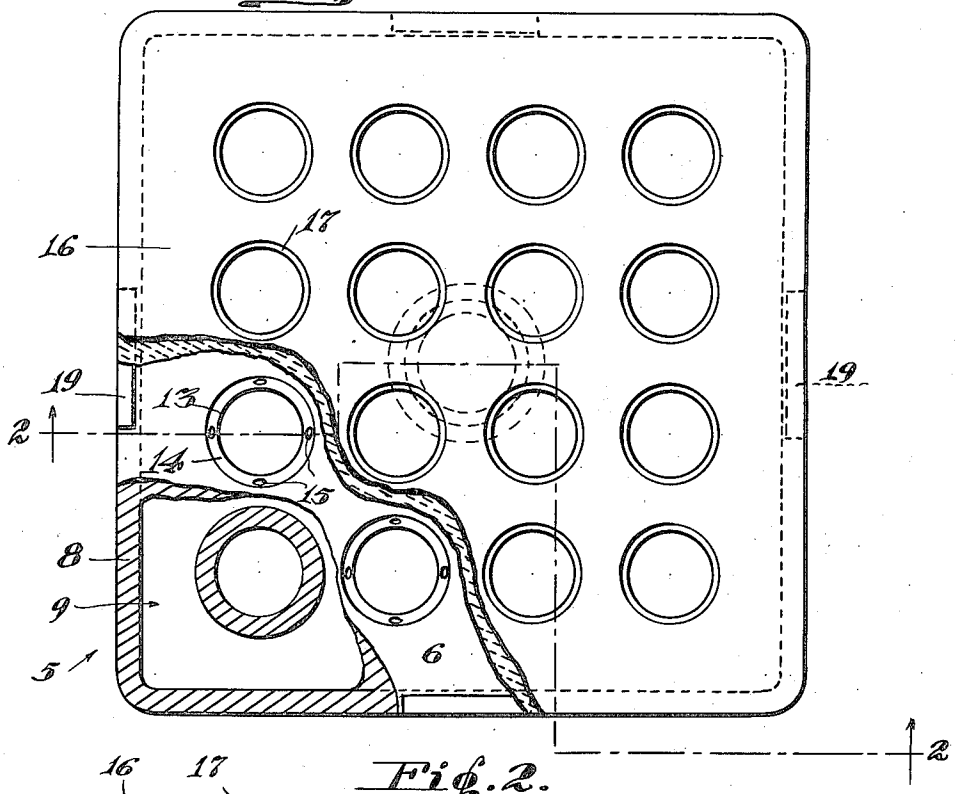



Fig. 2.

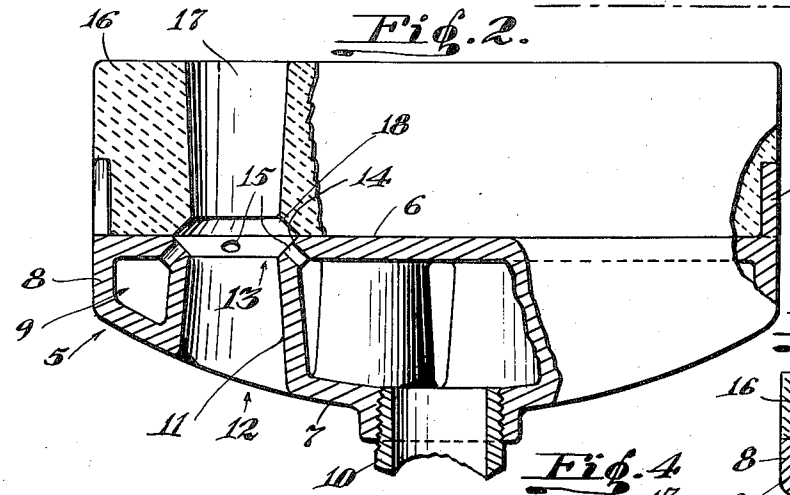



Fig. 5.

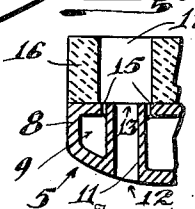



Fig. 4.

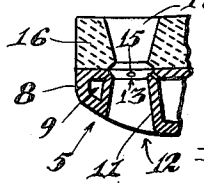
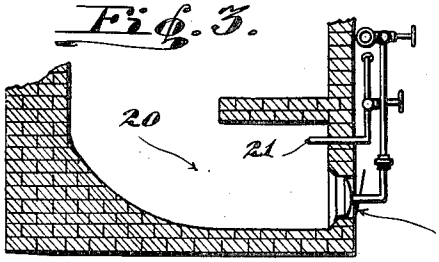



Fig. 3.

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# UNITED STATES PATENT OFFICE.

LEE B. METTLER, OF LOS ANGELES, CALIFORNIA.

## GAS BURNER.

Application filed December 31, 1921. Serial No. 526,319.

*To all whom it may concern:*

Be it known that I, LEE B. METTLER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in a Gas Burner, of which the following is a specification.

My invention relates to a combination unit or gas burner of the low pressure type.

The primary object of my invention is to provide a construction in a gas burner of the type employing a metal gas box or manifold having a series of gas outlets, whereby the metal of the gas box and particularly that portion thereof adjacent to the gas outlets will be protected against burning out by the action of the heat formed by the combustion of gas discharged thru the gas outlets, and which obviates the employment of nozzles or tubes projecting from the gas box.

Another object is to provide a gas burner with a facing of refractory material, formed with apertures to register with gas outlets of the burner, adapted to form mixing throats for effecting a mixture of gas and air within the aperture of the facing and to so construct the burner body that the air supplied to said apertures will be delivered thru the burner body so that the refractory facing may be arranged to contact the burner surface between the gas outlets.

Another object is to provide a combustion unit embodying a gas box provided with a series of air tubes extending therethru, and a facing block formed of refractory material seating on the burner box and formed with apertures forming continuations of the air tubes, in which gas will be delivered from the gas box at the intersection of the tubes and the apertures in the block in such manner as to break up the column of air passing thru the tubes and insure a thorough mixture of the gas and air, whereby practically complete combustion may be obtained with a steady flame so as to eliminate the vibration and surging ordinarily incident to the use of low pressure burners.

Another object is to provide a protective facing for a gas burner whereby the gas burner may be employed in a combustion chamber provided with an oil burner so that the gas burner will not be burned out when the oil burner is in operation and in which the burner and its protective facing are so constructed that the air supplied to the combustion chamber will be delivered thru air ducts in the gas burner so as to have a cooling effect on the latter.

With the foregoing objects in view together with such other objects as may subsequently appear, my invention resides in the parts and combination, arrangement and construction of parts, as hereinafter more fully described and claimed and illustrated by way of example in the accompanying drawings in which:

Fig. 1 is a view in side elevation partly in vertical section of the combustion unit as seen on the line 1—1 of Fig. 2.

Fig. 2 is an end elevation of the combustion unit with parts broken away to show the parts in section as seen on the line 2—2 of Fig. 1.

Fig. 3 is a detail illustrating the application of the burner to a combustion chamber.

Figs. 4 and 5 are details in section illustrating modified forms of the burner orifices and air ducts.

Referring to the drawings more specifically, 5 indicates a gas box, which may be of any suitable outline but is here shown as circular in plan and comprising spaced front and rear walls 6 and 7 respectively connected together by a side wall 8 forming a gas chamber 9 to which gas is admitted thru a feed pipe 10 here shown as connected to the wall 7 and which leads from any suitable source of gas supply.

In carrying out my invention I provide the gas box 5 with a series of air tubes 11 which extend across the gas chamber 9 and connect with the front and rear walls 6 and 7 with their ends opening thru the walls; the open ends of the tubes in the wall 7 constituting air inlet openings 12 and the open ends of the tubes in the wall 6 constituting air outlet openings 13.

The margins of the outlet openings are formed with beveled faces 14 and leading from each beveled face is a series of gas outlets or orifices 15 which extend thru the wall formed by the juncture of the tube 11 with the wall 6 and are preferably inclined relative to the longitudinal center of the tube, and extend on planes that intersect each other a short distance from the outer face of the wall 6 at a point opposite the center of the air discharge opening.

An important feature of my invention resides in providing a facing block 16 adapted to extend over the outer surface of the wall 6 preferably in contact therewith; the facing block being formed of a suitable refractory material. A series of apertures 17 are formed in the facing block and arranged to register with the discharge ends 13 of the air tubes to form a continuation of the latter; the apertures being of such length that the point of intersection of the planes of the gas orifices will be located intermediate to the ends of the apertures. The inner margin of each aperture adjacent the wall 6 is formed with a beveled face 18 extending opposite the beveled face 14 adjacent the discharge ends of the gas orifices 15 and serves to direct gas discharged from the orifices toward the center of the apertures so as to break up the column of air delivered from the air tubes thru the aperture. The apertures thus form mixing throats for insuring a thorough mixture of the gas and air before it passes from the aperture and whereby combustion may be caused to take place contiguous to the outer face of the refractory facing block. The facing block may be mounted on the burner box in any desired manner being here shown as supported on lugs 19 formed on the latter.

The facing block constitutes a protective body to prevent burning out of the burner box wall 6; the block 16 being formed of refractory material while the wall 6 is ordinarily composed of cast iron. This permits of the burner being employed as a combustion unit in a combustion chamber 20 fitted with an oil burner 21, as the gas burner will be protected by the facing block 16 against the action of the heat generated by the oil burner when the latter is employed in lieu of the gas burner; the gas burner being further protected in this instance by reason of the cooling action of the air flowing thru the air tubes 12 in supplying air to the combustion chamber.

The operation of the invention is apparent from the foregoing, it being seen that as gas is admitted to the gas box under the usual pressure the gas will be discharged thru the orifices 15 and directed inwardly toward the center of the aperture 17 where it thoroughly intermixes with air in the apertures 17 and flows from the latter. This flow of gas will act to draw air thru the air tubes for supplying the air to effect proper gas and air mixture. Combustion of the mixture will occur ordinarily close to the outer face of the facing block.

By providing the combustion unit with a series of discharge apertures arranged close together an intermingling of the mixture flowing from adjacent apertures may occur before combustion takes place. By providing a series of gas orifices for each discharge aperture a thorough mixture of the gas and air will be insured before a discharge from the apertures takes place which serves to insure steady combustion and eliminates the vibration common in low pressure gas burners due to improper mixture of gas and air. The burner box will be protected against becoming excessively heated during operation of the burner by reason of the protection afforded by the refractory facing block and also by the flow of air thru the tubes which absorbes heat radiated by the walls of the tubes and while thus acting to cool the tubes is itself heated so as to facilitate its mixture with the gas.

The air tubes 11 are preferably slightly tapered to converge from the inlet opening 12 to the discharge opening 13 and the apertures 17 slightly diverge from their intersection with the air tubes, but in some instances it may be desirable to form the tubes and apertures with a decided taper as shown in Fig. 4 to give a Venturi tube effect.

In some instances the apertures 17 may be formed of a larger diameter than the outlet opening 13 and the gas orifices 15 arranged to open thru the end wall 6 as shown in Fig. 5.

Various other forms and arrangements of the air passages, apertures and gas outlets may be employed as occasion may require and I therefore do not limit myself to the exact details of construction and arrangement shown, but may employ such changes and modifications as come within the scope of the appended claims, without departure from the spirit of my invention.

I claim:

1. In a combustion unit, a gas box having spaced front and back walls connected by side and end walls forming a gas chamber, a series of tubes extending between the front and back walls and opening therethru forming air passages from one side of the gas box to the other, and a facing block of refractory material seated on and extending over the front wall of the box and having aperture opening to the tubes, said tubes being formed with a series of gas discharge orifices opening to the aperture in the facing block.

2. In a combustion unit, a gas box having spaced front and back walls connected by side and end walls forming a gas chamber, a series of tubes extending between the front and back walls and opening therethru forming air passages from one side of the gas box to the other, and a facing block of refractory material seated on and extending over the front wall of the box and having apertures opening to the tubes, said tubes being formed with a series of gas discharge orifices opening to the aperture in the facing block, said orifices being inclined relative to the longitudinal center of the tube with their bores

extending on a plane intersecting the center line of the aperture intermediate the inner and outer faces of the block.

3. In a combustion unit, an open ended air tube, a gas chamber surrounding the walls of the tube, and a block of refractory material abutting against one end of the tube and having an aperture opposite the open end of the tube, the wall of the tube being formed with a series of gas discharge orifices adjacent the block and opening to the aperture in the latter at an inclination to the center line thereof.

4. In a combustion unit, a gas box having a series of open ended air tubes passing therethru and formed with a series of gas outlets arranged around the margin of each air tube, and a facing block of refractory material seating on said gas box and having a series of apertures registering with the air tubes forming a continuation thereof and into which the gas outlets discharge.

5. In a combustion unit, a gas box having a series of open ended air tubes passing therethru, each tube being formed with a beveled face on the margin of its discharge end and provided with a series of gas outlets opening on the beveled face and leading at an incline into the interior of the gas box, and a facing block formed of refractory material seating on and covering the side of the gas box to which the gas outlets open, said block formed with a series of apertures registering with the tubes, each of said apertures being formed with a beveled face at its inner margin extending over the gas outlets whereby gas discharged from the outlets will be directed toward the center of the aperture to break up the column of air flowing thru the air tube and effect a mixture of gas and air in the space bounded by the wall of the aperture.

LEE B. METTLER.