Jan. 23, 1951 H. MUEHLEISEN 2,539,153

AIR HEATING GAS BURNER

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Fig. 1.

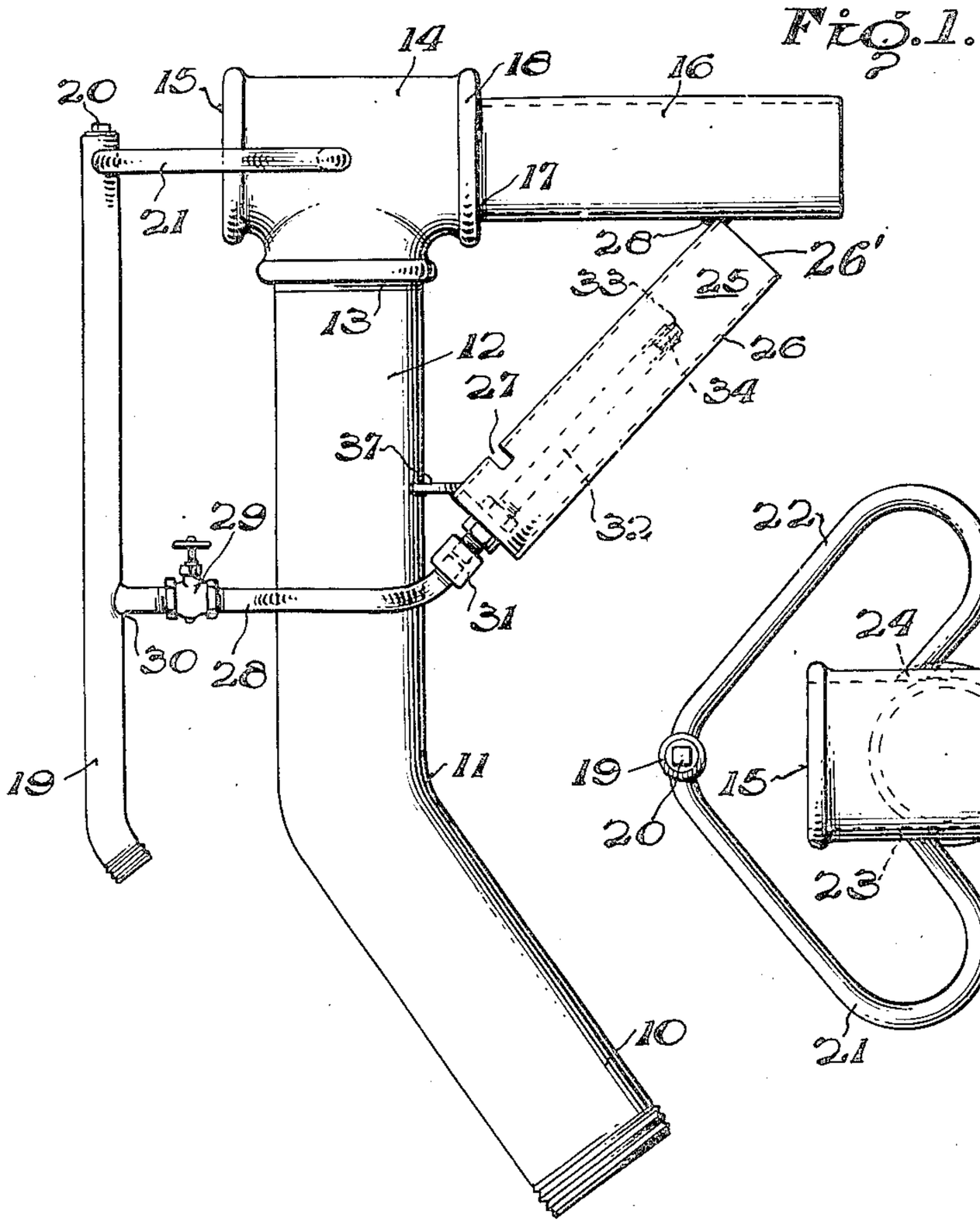

Fig. 2.

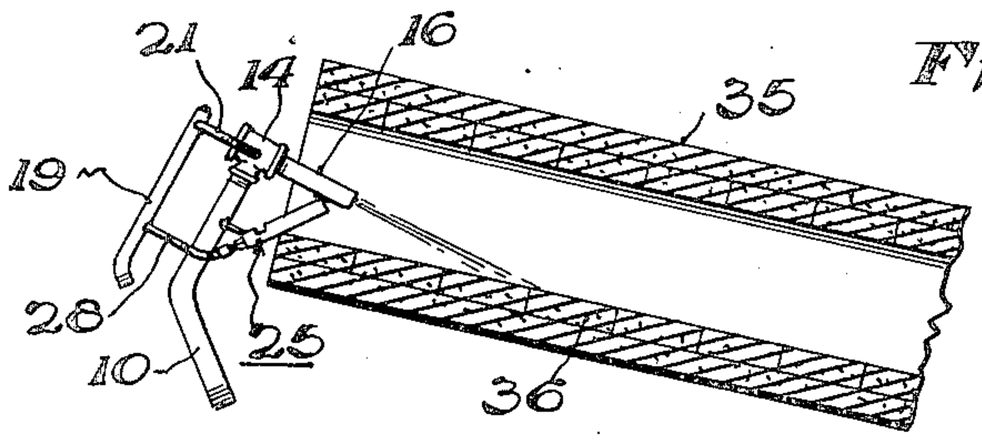

Fig. 3.

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AIR HEATING GAS BURNER

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5 Claims. (Cl. 158—109)

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This invention relates to burners and more particularly to burners for the combustion of mixtures of gaseous fuels and air. Still further, this invention relates to burners for producing large volumes of heated gases at controlled high velocities.

Certain glass-like ores of obsidian character, including Perlite, if subjected to heat under controlled conditions will undergo a cellular expansion and become light and fluffy. Such intumesced Perlite is a very useful commercial product used as a filler in plasters and for other purposes. The degree of cellular expansion of the Perlite is controlled by the temperature to which the Perlite is subjected and by the length of time during which the Perlite is heated. If exposed for a relatively short time to a relatively high temperature, the Perlite is intumesced but is still somewhat dense. If the Perlite is exposed to relatively higher temperatures for somewhat longer periods of time the Perlite is further intumesced and is lighter and fluffier. Intumescing of Perlite is well known and is usually practiced in temperatures ranging from 1600 to 2300° F.

In intumescing Perlite I prefer to employ temperatures at the upper end of this temperature range and at such temperature it is necessary that the Perlite be transported through the heating zone as rapidly as possible so that the intumesced Perlite will not be remelted into a fused clinker. I have described a novel process for intumescing Perlite in my copending application Serial No. 4,367, filed January 26, 1948. In this application I disclose a process in which a flame and a large volume of highly heated gases at high velocity are impinged upon a surface of a treating chamber or furnace and the Perlite is dropped into the zone of turbulence created by impingement on the surface of the furnace of this large volume of burning fuel and air. The Perlite ore is immediately intumesced upon falling into this turbulent zone and then, because of the large volume of heated gases and its high velocity is immediately carried from the turbulent heating zone in the air stream without coming into contact with the walls of the furnace. By employing large volumes of gases at high velocity I prevent the intumesced Perlite from remaining in the heating zone of the furnace for too long a period and I have found that by so doing I not only increase the volume of production of the furnace but that I have also measurably improved the quality of the Perlite produced.

In carrying out the process of this application

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I discovered that known burners could not deliver the high volumes of air at constant high velocities required to create the desired degree of turbulence in the furnace and to transport the intumesced Perlite rapidly out of the heating zone. My novel burner of the present invention, on the other hand, meets all of the desired requirements for intumescing Perlite and provides a burner which will discharge a high volume of gases at constant high velocity heated in a range from 1600 to 2400° F. and which may be controlled to give the desired length of the heating zone in the furnace to control the degree of intumescence of the Perlite.

It is accordingly an object of the present invention to provide a novel burner suitable for use in intumescing Perlite.

Another object is to provide such a burner which delivers a constant volume of heated gases at high velocity.

Another object is to provide such a burner in which gaseous fuel is intimately intermixed with more air than is required for combustion and is then ignited to provide a blast of hot gases in large volumes at high temperatures and high velocity.

Another object is to provide such a burner in which an auxiliary burner is employed to control the temperature of the blast of gases discharged by the burner; to control the length of the heating zone in the furnace; and to continuously ignite the combustible mixture discharged by the burner.

Another object is to provide such a burner which may be readily fabricated from standard pipe fittings without the employment of skilled labor and which will be cheap and easy to manufacture.

Other and further objects of the present invention will appear from the following description.

The novel burner of my invention is capable of various mechanical embodiments one of which is shown in the accompanying drawings and is described hereinafter for the purposes of illustration. This illustrative embodiment of my invention should in no way be construed in defining or limiting the same and reference should be had to the appended claims for this purpose.

In the accompanying drawings, in which like reference characters indicate like parts—

Fig. 1 is a side view of an illustrative embodiment of my novel burner showing the relative position of the several parts and the position

of the auxiliary burner with respect to the main burner;

Fig. 2 is a view from above of the embodiment of Fig. 1; and

Fig. 3 is a schematic showing of the use of the burner of Fig. 1 with a cylindrical furnace for the intumescing of Perlite.

Referring now more particularly to Figs. 1 and 2, 10 is a pipe of relatively large diameter connected to a suitable source of air under pressure (not shown) which may be provided with a slight bend at 11 to give an upstanding portion 12. Portion 12 is threaded at 13 to receive a T 14. T 14 is closed at 15. Burner nozzle 16 is threaded at 17 and is screwed into T 14 at 18.

A pipe 19, of smaller diameter than pipe 10, is connected to a suitable source of gaseous fuel such as propane, butane and the like and is closed at its upper end by a suitable plug 20. Pipes 21 and 22 are connected into the upper end of pipe 19 and discharge into T 14 at 23 and 24 respectively. Pipes 21 and 22 are so arranged that they discharge into T 14 at approximately a 45° angle to the long axis thereof and discharge toward the closed end 15. This arrangement insures the complete mixing of the fuel with the large volume of air employed.

An auxiliary burner shown generally at 25 comprises an outer chamber or housing 26 of pipe of somewhat smaller diameter than pipe 10 secured at 37 to pipe portion 12 and secured at 28 behind the open end of nozzle 16. The open end of housing 26 forms a mouth 26'. The angularity of the axis of housing 26 with respect to the axis of nozzle 16 is preferably approximately 45° so that the flame emitted from mouth 26' will completely surround nozzle 16 and discharge across the end of nozzle 16 and will have a maximum effect upon the heated gaseous flame discharge from nozzle 16. Housing 26 is slotted at 27 to admit air to support combustion of the gaseous fuel. Gaseous fuel is provided burner 25 by pipe 28, which includes a suitable manually operable valve 29, and which is connected at 30 to fuel supply pipe 19. Pipe 28 is connected at 31 to jet pipe 32 which is closed at 33. Closure 33 is provided with a small diameter orifice 34.

Referring now more particularly to Fig. 3, the novel burner of my invention is there shown in position in one end of an open ended downwardly inclined cylindrical furnace 35 which is provided with a suitable refractory lining 36. The burner is so arranged that the axis of nozzle 16 and of T 14 is downwardly inclined with respect to the axis of the furnace 35 so that the high velocity large volume flame discharge from nozzle 16 will impinge upon the bottom of the furnace to create a zone of turbulence in the furnace. As described above, the Perlite ore is then dropped into this zone of turbulence and is immediately intumesced and then is instantaneously transported from the heating zone before the intumesced Perlite can be damaged by overheating. Because of the relatively large volume of furnace 36 it is necessary that the volume of the heated gaseous discharge from nozzle 16 be large and at high velocity to create the desired turbulence in furnace 35 and to rapidly transport the intumesced Perlite from the heating zone in furnace 35.

It is also necessary that the length of the heating zone in furnace 35 be adjustable to control the degree of intumescence of the Perlite. Burner 25 is provided for this purpose. Suitable adjustment of valve 29 regulates the amount of fuel admitted to burner 25 and regulates the temperature of the blast discharge from nozzle 16. The higher the temperature of this blast the longer the heating zone in furnace 35 and, conversely, the lower the temperature of this blast the shorter the heating zone in furnace 35 if the pressure of the air provided for the main burner remains constant. Thus by adjusting valve 29 the intumescence of the Perlite can be controlled to any desired degree.

As noted above, a high velocity large volume air draft must be provided through nozzle 16 to create the necessary degree of turbulence in furnace 35 and to remove the intumesced Perlite rapidly from the furnace 35. The velocity of the gaseous mixture emitted from nozzle 16 and the proportions of combustible material therein are not sufficient to independently support combustion without auxiliary burned 25. Auxiliary burner 25 is therefore more than a mere pilot burner. Burner 25 not only continuously ignites the mixture emitted from nozzle 16 but controls the temperature of the ignited air blast and the length of the combustion zone in the furnace. The positioning of auxiliary burner 25 is critical. If it is placed in the conventional position for pilot lights it will be extinguished by the air blast from nozzle 16. Burner 25 must therefore be placed behind the mouth of nozzle 16 so as to be out of the air blast therefrom but must be so placed as to place its flame around nozzle 16 and across its open end. As illustrated in Fig. 1, this is accomplished by securing burner 25 beneath nozzle 16 with its axis at a 45° angle to the axis of nozzle 16 and positioned back of the open end of nozzle 16 sufficiently to permit a line of extension of the lowest points of burner 25 to fall adjacent to the lowest point of the open end of nozzle 16. Thus burner 25 is enabled to function without danger of extinguishment.

It will now be apparent that by the present invention I have provided a novel burner, particularly useful for the intumescence of Perlite, which provides a blast of heated gases of large volume at high velocities; which permits adjustment of the temperature of the blast to control the length of the heating zone in the furnace and thus control the degree of intumescence of the Perlite; and which in every respect fulfills the requirements of the several objects defined above.

Changes in or modifications to the illustrative embodiment of my invention described above may now be suggested to those skilled in the art without departing from my inventive concept and reference should be had to the appended claims to determine the scope of this invention.

What is claimed is:

1. In a burner for the combustion of a mixture of air and a gaseous fuel, a supply pipe for the air under pressure, a T closing the end of said pipe, a plug closing one end of said T, a nozzle mounted on the other end of said T, a pipe for the gaseous fuel under pressure, means for closing the open end of said pipe, fuel supply pipes leading from said fuel pipe and opening at opposite sides into said T toward the closed end thereof at an approximate 45° angle to the long axis of said T and of said nozzle, an auxiliary burner, a mouth for said auxiliary burner, means for securing said auxiliary burner beneath said nozzle and behind the open end thereof at an approximate 45° angle to the axis of said nozzle so that the flame discharged from said auxiliary burner surrounds the open end of said nozzle and is discharged at an approximate 45° angle to the axis of said nozzle,

and a pipe connecting said auxiliary burner to said fuel pipe.

2. In a burner, a pipe for supplying air under pressure to the burner, a mixing chamber mounted on the open end of said air pipe, a nozzle connected into said mixing chamber and extending at an approximate right angle to the axis of said air pipe, a supply pipe for gaseous fuel under pressure, fuel supply pipes connected to said gaseous fuel supply pipe and discharging into said mixing chamber at an approximate 45° angle to the long axis thereof and away from said nozzle, and an auxiliary burner supplied with fuel from said fuel supply pipe and arranged beneath and behind the open end of said nozzle to discharge a flame about the open end of said nozzle and at an approximate 45° angle to the axis thereof.

3. In a burner for discharging a large volume blast at constant velocity and at controlled temperatures ranging from 1600–2400° F., a pipe for supplying air under pressure, a T-shaped mixing chamber mounted on the open end of said pipe, means for closing one end of said T, an elongated nozzle mounted in the other hand of said T, means for admitting fuel into said combustion chamber at approximately a 45° angle to the axis thereof toward the closed end of the T, and an auxiliary burner secured behind the open end of said nozzle to discharge a flame about the open end thereof, said auxiliary burner including a tubular housing, air vents in the base of said housing, and a jet pipe mounted axially in said housing and connected to the source of gasous fuel through a manually operable valve.

4. In a burner for burning a combustible mixture of air and a gaseous fuel, a pipe connected to a source of air under pressure, a mixing chamber mounted on the open end of said pipe, a nozzle extending from said mixing chamber, means for admitting gaseous fuel to said mixing chamber at an approximately 45° angle to the axis of said nozzle and away from said nozzle and an auxiliary burner connected to the source of gaseous fuel and arranged to discharge a flame angularly with respect to the axis of said nozzle behind and around the open end of said nozzle.

5. In a burner, a mixing chamber, a discharge nozzle for said mixing chamber, means for admitting air under presseure to said mixing chamber at approximately a right angle to the axis of said nozzle, means for admitting gaseous fuel to said mixing chamber at approximately a 45° angle to the axis of said nozzle and away from said nozzle and an auxiliary burner for maintaining the ignition of the flame discharged from said nozzle mounted behind and adjacent the open end of said nozzle to impinge a flame around said nozzle and across the open end thereof at approximately a 45° angle to the axis of said nozzle.

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