

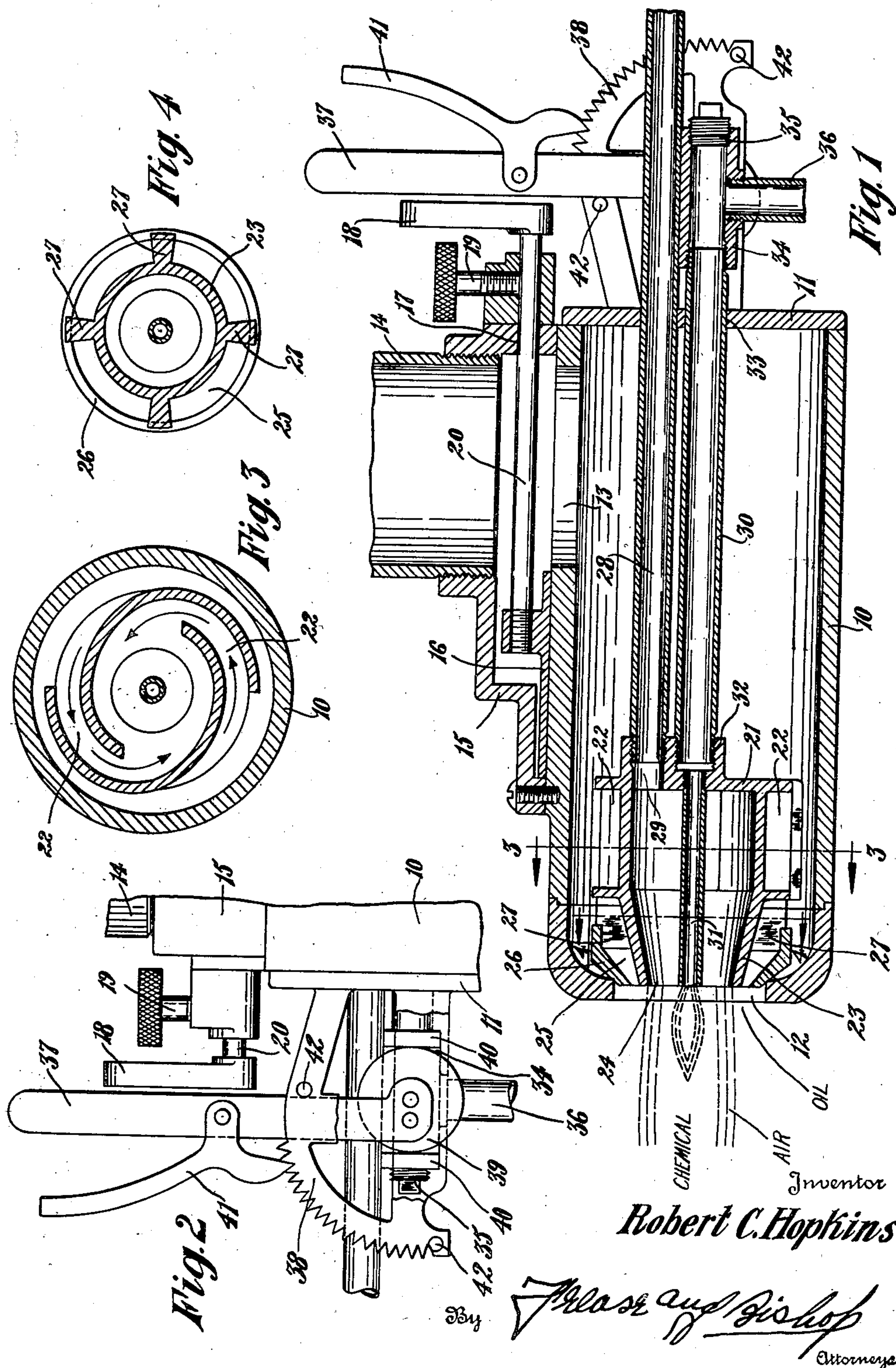
Dec. 23, 1941.

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2,267,154

METHOD OF PRODUCING A SPECIAL ATMOSPHERE

Filed Dec. 20, 1938



UNITED STATES PATENT OFFICE

2,267,154

METHOD OF PRODUCING A SPECIAL
ATMOSPHERE

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Application December 20, 1938, Serial No. 246,821

4 Claims. (Cl. 252—372)

The invention relates to burners and more particularly to a gas, tar or oil burner of the low pressure type.

An object of the invention is to provide a burner and method in which the fuel is atomized and mixed with air under pressure in whirling motion within an atomizing barrel at the nozzle portion of the burner.

A further object is to provide a burner of this character in which a stream of powdered substance such as lithium, a white and light metal and its alkaline oxide is admitted to the center of the fire stream.

An object of the invention is to provide an improved method of introducing lithium into a furnace in which metals are undergoing heat treatment.

The above objects together with others which will be apparent from the drawing and following description or which may be later referred to may be attained by constructing the improved burner in the manner illustrated in the accompanying drawing in which;

Figure 1 is a longitudinal sectional view of the burner embodying the new invention;

Figure 2, a fragmentary elevation of the regulating mechanism for the atomizing barrel;

Fig. 3, a transverse section taken as on the line 3—3, Fig. 1; and

Fig. 4, a transverse section taken as on the line 4—4, Fig. 1.

Similar numerals refer to similar parts throughout the drawing.

The burner casing indicated generally at 10 may be substantially cylindric being closed at its rear end as by the end plate 11 and provided with the reduced nozzle opening 12 at its forward end.

One side wall of the casing may be provided, near the rear end thereof with the air inlet opening 13 for receiving an air blast from the air line 14 which may be connected to the casing as by means of the casting 15 which forms a housing for the blast gate 16 which is slidably mounted within said housing and arranged to control and regulate the air blast entering the housing.

For this purpose a rod 20 may be fixed to the blast gate 16 and slidably mounted through a suitable bore 17 in the housing 15, a handle 18 being mounted upon the outer end of the rod for adjusting the blast gate and a set screw 19 being provided for holding the same in adjusted position.

The atomizing barrel indicated generally at 21 is adapted to be longitudinally adjusted within the casing 10 as will later be described. This

barrel has spiral passages 22 opening from opposite sides so as to permit the air blast to enter and whirl therein. The forward end of the atomizing barrel is tapered as at 23 toward the opening 24.

The outer orifice 25 is formed around the reduced end of the atomizing barrel by means of the hollow cone 26 supported upon the radial ribs 27 formed on the outer side of the tapered end 23 of the atomizing barrel.

Fuel in the form of oil, tar or gas may be admitted through the pipe 28 connected to its forward end to the tapped inlet opening 29 at one side of the center of the atomizing barrel, said pipe being slidable through the back plate 11 of the casing and connected by any suitable flexible connection to a fuel supply.

A pipe 30 for the admission of powdered substance such as metals, alkali earth and the like, preferably lithium, extends longitudinally through the casing 10 and communicates at its inner end with the pipe 13 preferably of smaller diameter which is axially located through the atomizing barrel.

The pipe 30 may be attached to the atomizing barrel as by the screw threads 32 so that as the pipe is slidably moved through the opening 33 in the end plate of the casing the atomizing barrel is moved therewith.

The outer end of the pipe 30 is connected to a T 34 in the outer end of which may be located a clean-out plug 35. A chemical supply pipe 36 is connected to the T and may be attached by suitable connections to a source of supply of the powdered chemical substance which may be admitted to the pipe 30 under pressure.

For the purpose of longitudinally moving the pipe 30 in order to adjust the atomizing barrel relative to the casing, a lever 37 may be pivoted upon a rack quadrant 38 and provided with an eccentric 39 operating between lugs 40 on the T 34, a pawl 41 being provided upon the lever to hold the parts in adjusted position, and stop pins 42 being located at proper positions upon the quadrant to limit the movement of the lever.

Assuming the parts to be in the position shown in Figure 1 with oil or other suitable fluid admitted through the pipe 28, lithium or other powdered chemical admitted through the pipe 30 and an air blast admitted through the pipe 14, it will be seen that the air as it seeks an outlet is guided into the atomizing barrel through the spiral passages 22 setting up a spinning motion within the atomizing barrel.

The oil, or other fuel, as it is discharged from

the pipe 28 into the atomizing barrel is caught by the whirling air and thrown outwardly by centrifugal force against the inner surface of the tapered end portion 23 of the atomizing barrel, and the air and fuel will be moved forward in a spiral motion until the mixture issues from the end of the atomizing barrel in a hollow stream, the centrifugal force of the whirling motion fracturing the film of oil as it is driven off at an angle of about 75° from the center line of the burner, the oil film being at the outside of the whirling air stream. At this point the oil in the form of minute drops is met with a blast of air from the orifice 25 which collides with the oil at an approximate angle of 90°.

The lithium or other powdered chemical substance is discharged axially through the center of the fire stream and is enveloped by the whirling air issuing from the tapered nozzle portion 23 of the atomizing barrel. Around this air stream is the fuel and air mixture as developed by the atomizing process of the burner around which is the excess air issuing from the orifice 25. In other words, it will be evident that the fire stream is made up of the central stream of lithium or other powdered chemical substance surrounded by a layer of air around which is the mixture of fuel and air, and lastly the condition of excess air which completes the combustion atmosphere.

Although there is bound to be some oxidation of the lithium or other powdered substance, the principal reaction to the heat will be a conversion of the solid powder into a gas or vapor which is deposited as a coating on the articles being treated, somewhat after the manner of salt glazing of clay products. Naturally, at the proper temperatures there will be some oxidation, but the oxides are not depended upon for the covering or coating, but rather the vaporized lithium or other substance which condenses on the steel and forms a coating preventing oxidizing. There is an affinity between the lithium gas thus deposited as a coating, and the steel on which it is deposited.

It will be seen that it is very important to use lithium or other chemical for producing a desired furnace atmosphere generated and diffused from within a fire stream, and to admit the lithium or other chemical where it will combine with the

oxygen of the air, the tube 31 is brought to the end of the atomizing barrel.

As above pointed out the air flows from the atomizing barrel inside of the oil film and forms a shield around the lithium or other chemical flow, and since these materials associate freely with oxygen the contact is direct and the reaction takes place within the actual fire stream.

The position of the parts shown in Fig. 1 is of the minimum capacity. By operating the lever 37 to move the atomizing barrel away from the burner tip, air will flow through the annular space thus created between the outside of the hollow cone 26 and the burner opening 12 having the effect of lengthening the flame and increasing its volume.

I claim:

1. The method of producing a special atmosphere which consists in producing a central stream of an alkaline substance, surrounding said central stream with a layer of air, surrounding said layer of air with a mixture of hydro-carbon fuel and air, burning said mixture and admitting additional air around said mixture of fuel and air to complete the combustion.

2. The method of producing a special atmosphere which consists in producing a central stream of an alkaline oxide of lithium, surrounding said central stream with a layer of air, surrounding said layer of air with a mixture of hydro-carbon fuel and air, burning said mixture and admitting additional air around said mixture of fuel and air to complete the combustion.

3. The method of producing a special atmosphere which consists in producing a central stream of lithium, surrounding said central stream with a layer of air, surrounding said layer of air with a mixture of hydro-carbon fuel and air, burning said mixture and admitting additional air around said mixture of fuel and air to complete the combustion.

4. The method of producing a special atmosphere which consists in producing a central stream of lithium, surrounding said central stream with a whirling sheath of air, surrounding said sheath of air with a whirling mixture of atomized oil and air, burning said mixture, and impinging a blast of additional air around said mixture of oil and air at an angle thereto.

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