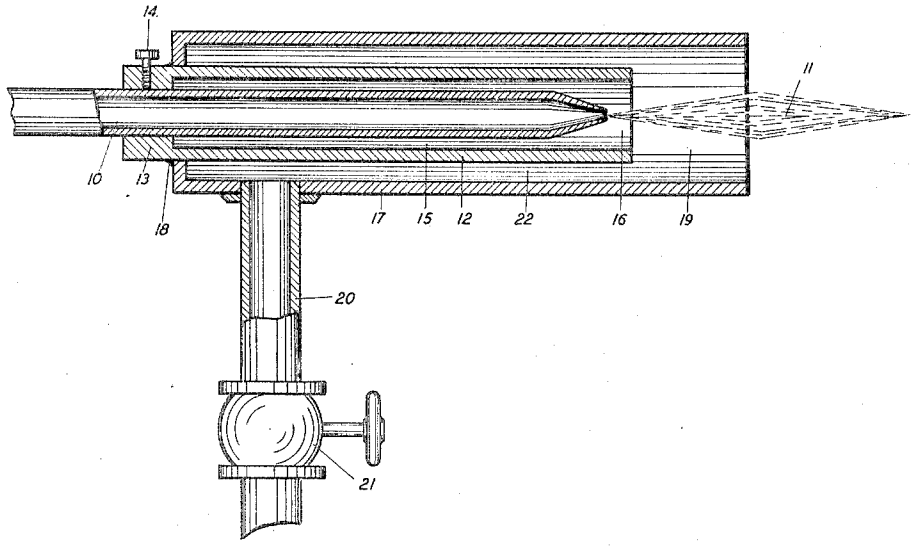
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LOW TEMPERATURE BURNER

Filed March 24, 1930

FIG. 1



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LOW-TEMPERATURE BURNER

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The object of my invention is to provide a gas burner adapted to give either a large flame or a very small flame, or a furnace temperature controllable over a range from room temperature to 2,000° F.

In the art of heat treating metals it is often requisite to rapidly heat a furnace and its contents to the desired temperature of treatment by means of a large flame and, this temperature once attained, to maintain it by means of a relatively small flame supplying only such heat as is lost by radiation. It is also desirable in a furnace used to heat metal at temperatures ranging from 1,300° F. to 2,000° F. for the purpose of quenching or hardening and to reheat such metal, for the purpose of drawing or tempering, to a temperature somewhere between room temperature and 1,250° F. and to maintain such temperature evenly for a sustained period.

For this purpose the gas burners heretofore used are unsuitable as, when they are made of sufficient size to heat the furnace at the desired speed or to the desired temperature, they are unreliable when turned down to such a degree as to maintain furnace temperature constant, the flame tending to blow off the tip of the burner. It is therefore common practice to use two burners, a large size for heating up and a small size for maintaining temperature, or to use a single large burner intermittently.

By the use of my improved device it is easy to maintain a temperature of 200° to 2,000° F. indefinitely, with a single burner, while with the burners now in use for temperatures say from 1,400° to 1,800° F. it is difficult to maintain a temperature below 1,000° F. without encountering serious trouble in adjustment and in keeping the flame alight.

Attention is directed to the attached drawing, Fig. 1, showing an illustrative embodiment of my invention in longitudinal section, and to the following description thereof.

Referring to Fig. 1, 10 is a gas burner of any known or preferred type, supplied with the usual mixture of air and gas by means of pipes and valves not shown, and producing a flame as at 11.

A tubular inner casing 12 surrounding the burner is provided with a closed end 13 bored to fit over the burner proper and held thereon by a set screw or similar means 14, so that the burner may be withdrawn from and adjusted in position within the surrounding elements. This casing has a relatively slight clearance 15, say an inch or a fraction thereof, around the burner, and is arranged to project for a short distance beyond the burner tip as indicated at 16. This projection is much to be preferred as it enables the inner casing to withdraw heat from the flame for a purpose which will appear, and as it prevents the flame from being blown off the burner tip by following air currents set up by the flame.

The inner casing is surrounded by an outer casing 17 which is preferably permanently attached to the inner casing as by the weld indicated at 18. A narrow annular channel 22 is left between the two casings. The manner of making this joint is immaterial so long as it is rigid and substantially free from air leakage. The open end of the outer casing preferably projects beyond the end of the inner casing as indicated at 19. This end of the outer casing is sealed into the furnace wall in such manner as to project the flame into the furnace. A pipe 20 controlled by a valve 21 communicates with the closed end of the casing for the purpose of admitting a controlled supply of air, though this air may be admitted through holes in the casing or in any other preferred manner.

Gas burners are not novel and casings similar to the outer casing 17 have heretofore been used as a means of introducing the burner into the furnace wall. I do not claim either of these elements as such, the merit of my invention residing in so shielding the burner within the outer casing (as by means of the inner casing 12) that secondary or cooling air encounters the flame only at a right or an obtuse angle, thus preventing the formation of the air currents parallel to the flame which, in prior forms, have tended to draw the flame from the burner tip and thus extinguish it.

This inner casing serves several objects. First, it shields the burner tip from gas cur-

rents arising in the furnace and from air currents due to the introduction of secondary air into the outer casing. Second, and most important, it permits the burner proper to be so adjusted as to carry a very small flame, this flame meeting the secondary air entering through pipe 20 in the space indicated at 16 in the drawing. The jet of mixture issuing from the tip of the burner is thus reduced in velocity by eddying and counterflow in the space 16 and the liability to blow off the tip is correspondingly reduced.

Third, the two casings withdraw a material amount of heat from the flame and transfer this heat to the air passing through the annular channel 22, thus materially tending to equalize temperatures in the combustion zone and aiding greatly in keeping a small flame alive.

Fourth, the relatively cool air when mixed with the heated products of combustion permits the temperature to be adjusted to any point lower than that of the flame in proportion to the amount of air admitted.

I claim as my invention:

1. Apparatus for maintaining a flame of low volume and intensity, comprising: a tubular gas burner having a tip pointed in the direction of the gas flow; an unobstructed inner casing surrounding said burner leaving an annular space therebetween, said casing being open at the end adjacent the tip of said burner and projecting beyond said tip; a closure for the opposite end of said inner casing, said closure slidably engaging the exterior of said burner; means for adjusting the extent of said projection; an outer casing substantially concentric with and spaced from said inner casing, said outer casing being open at the end adjacent said burner tip and nonleakably and integrally attached to said inner casing at the opposite end, and means for controllably introducing an air supply into the space between said casings.

2. Apparatus for maintaining a flame of low volume and intensity, comprising: an inner casing surrounding a gas burner, the end of said casing adjacent the tip of said burner being open and the opposite end of said casing being closed; an outer casing open at one end and sealed over said inner casing adjacent the closed end thereof so as to make the relation between the inner and outer casings a fixed one and means for controllably introducing an air supply into the space between said casings, and means for varying the longitudinal position of the gas burner within the inner and outer casings.

3. Apparatus for maintaining a flame of low volume and intensity, comprising: an inner casing surrounding and spaced from a gas burner having a forward pointing conical tip and projecting beyond the tip of said burner, the end of said casing adjacent said tip being open and the opposite end of said casing being closed; an outer casing surrounding and spaced from said inner casing in fixed relation thereto; means for admitting a supply of air into said outer casing, and means for varying and fixing the position of the gas burner within the two casings.

In witness that I claim the foregoing I have hereunto subscribed my name this 17th day of March, 1930.

FRANKLIN C. CARTER.