Aug. 30, 1949. B. ELSTER 2,480,230

GAS IGNITER FOR BLAST FURNACE BLEEDER STACKS AND THE LIKE

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FIG. 1.

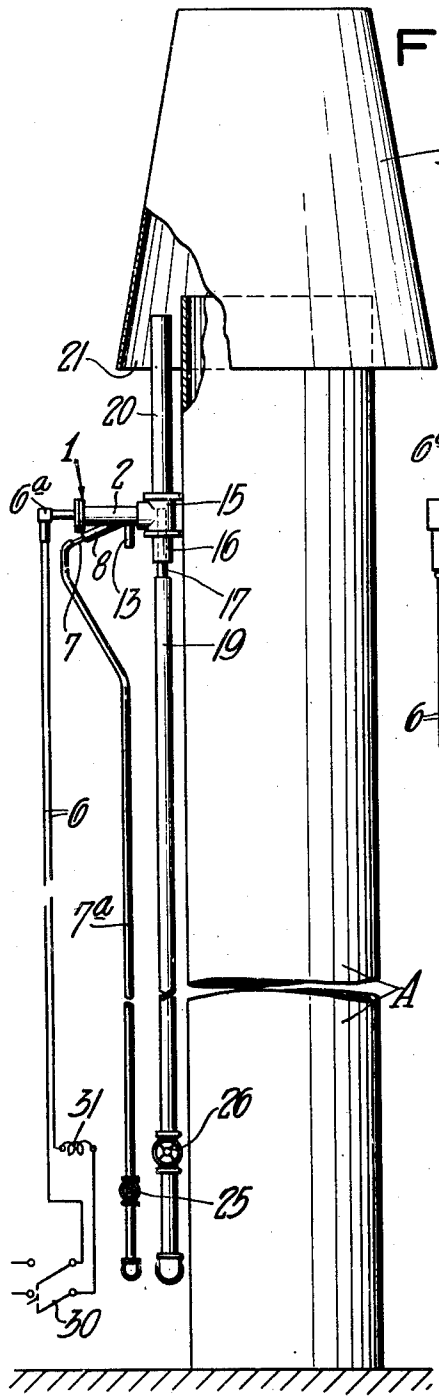


FIG. 2.

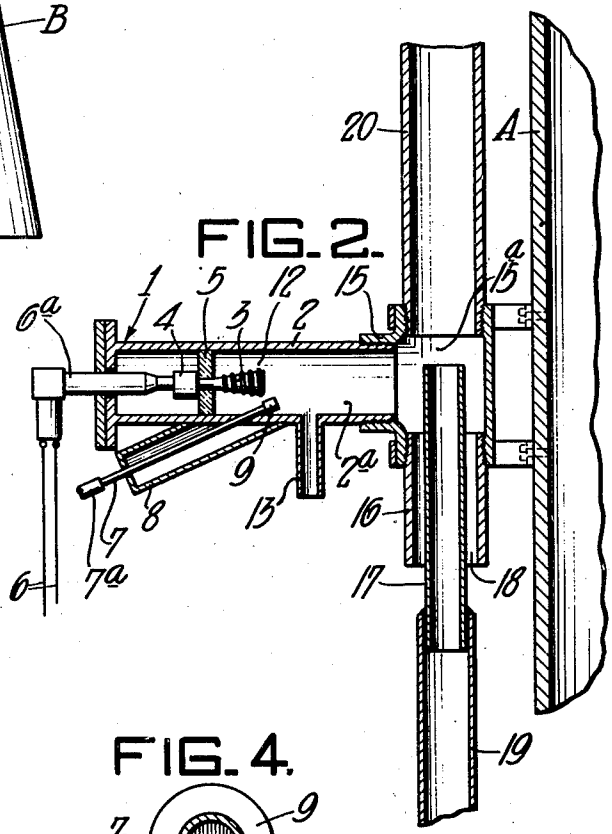


FIG. 4.

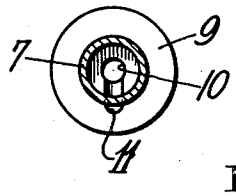
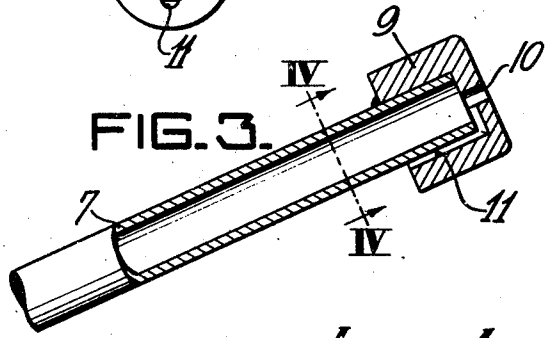


FIG. 3.



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GAS IGNITER FOR BLAST FURNACE BLEEDER STACKS AND THE LIKE

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6 Claims. (Cl. 158—115)

1

This invention relates to improvements in gas igniters, and more particularly to gas igniters for blast furnace bleeder stacks.

It is customary to dispose of the surplus gas resulting from blast furnace operations by allowing it to escape into the atmosphere through a bleeder stack. One such bleeder stack is ordinarily sufficient to accommodate three or four blast furnaces. Inasmuch as this escaping gas is combustible and of a toxic nature, containing about 8% carbon monoxide gas, it is imperative that it be burned before releasing it into the atmosphere. Usually this gas has been ignited by an electric spark from a spark coil placed in a conical hood member at the top of such bleeder stacks. Since a coil in such position is in contact with the gases emitting from the stack which are corrosive and also because the gases carry a large amount of dust which coats a coil in contact therewith, such coils quickly become inefficient and inoperative necessitating frequent replacement thereof.

Accordingly, it is among the objects of the present invention to provide a pilot or igniter for blast furnace bleeder stacks which is simple in design and efficient and economical in operation.

The foregoing and further objects will be apparent from the specification and drawings, wherein:

Figure 1 is an elevation, partly in section, of a blast furnace bleeder stack embodying my improved igniter;

Figure 2 is a vertical section of the igniter of Figure 1;

Figure 3 is an enlarged longitudinal section of the pilot gas admission tube showing the nozzle thereon; and

Figure 4 is a section on lines IV—IV of Figure 3.

Referring more particularly to the drawings, the numeral 1 indicates a pilot lighter which comprises a tube 2 having an ignition chamber 2^a at the outer end of which an electrical resistance heating element 3, which acts as an igniter, is suitably mounted in a socket 4 which is thermally shielded from the heating element by an asbestos ring 5 and connected to a source of electrical energy by lines 6 carried in a conduit 6^a. A small diameter pipe 7 connected to a source of by-product or natural gas projects into the chamber 2^a at a point adjacent the outer end of the igniter 3 and is inclined towards the inner end of the chamber and away from the igniter. This angular disposition of the gas pipe 7 obviates the possibility of heat generated by the burning gas plus the heat generated by the resistor 3 from consuming the metallic parts thereof. A protector or supporting tube 8 may be disposed around the gas tube 7. A cap or nozzle 9 having a restricted orifice 10 is provided on the inner

2

end of the tube 7. A channel 11 is provided in the cap 9 to permit part of the gas delivered through tube 7 to be shunted backwardly into the recess or pocket 12 around the outer end of the igniter 3 and the ring 5. Provision of the channel 11 eliminates the possibility of a dead pocket or vacuum preventing ignition being formed in the recess 12 by providing complete circulation of the gas in this zone and thereby tends to aid ignition of the gas. To effect proper combustion of the gas there is provided an air breather pipe 13 which opens into the tube 2 a short distance beyond the gas tube 7. Air flows through the pipe 13 into the chamber 2^a by reason of suction set up therein when gas is admitted thereto.

A vertically disposed T-shaped member 15 is affixed to the inner end of the tube 2 and burning gas from the chamber 2^a flows into the horizontal leg thereof. An extension tube 16 is secured to the lower arm of the T-shaped member 15 and a section of tubing 17 having a smaller diameter is mounted therein so that there is an annular space 18 therebetween. The upper end of the tubing 17 extends above the center line or axis of the pipe 2. A gas line 19 is secured to the lower end of the insert tube 17 so that air can be drawn through the annular space 18. A pipe 20 connects the upper leg of the T-shaped member 15 to a frusto-conical hood B mounted over the upper end of a blast furnace bleeder stack A. An annular space 21 is provided between the hood B and the stack A.

Line 7 is connected to a suitable source of by-product or natural gas by a larger tube 7^a having a valve 25 therein. Gas line 19 is similarly connected to a source of suitable gas through a valve 26.

A switch 30 is provided for connecting or disconnecting the resistor 3 to a supply of electric current and a second resistor 31 may be connected in series therewith to act as a tell-tale. Thus, the current used may be from a 240 volt current and the resistors may have equivalent rating. Accordingly, the lower element 31 will glow if the upper element 3 is functioning, but if it has burned out, the lower element will remain cold.

In operation when it is desired to ignite waste gases being exhausted through the stack A and hood B into the atmosphere, the switch 30 is operated to close the circuit in wires 6 connecting the heater elements 3 and 31. Concurrently, the valves 25 and 26 are opened to admit gas to the burner chambers 2^a and 15^a through the pipes 7^a, 7 and 19. As soon as the heating elements have become sufficiently heated, the gas in chamber 2^a is ignited and flows into the chamber 15^a thereby igniting the gas flowing upwardly therethrough. This burning gas is carried upwardly into the hood B through pipe 20 and ignites the gases flowing into the hood B from stack A. Thus,

the primary and auxiliary igniter are shielded from the corrosive waste gases and the dust carried thereby. Moreover, due to the high temperature which the heaters attain, i. e. 2000° to 2200° F., any foreign matter falling thereon will be burned away so that the efficiency of the heaters will not be impaired.

While I have shown and described one specific embodiment of my invention, it will be understood that this embodiment is merely for the purpose of illustration and description and that various other forms may be devised within the scope of my invention, as defined in the appended claims.

I claim:

1. A pilot lighter for blast furnace bleeder stacks comprising a chamber having a closed outer end and an open inner end, an igniter in said chamber adjacent the outer end thereof, means for admitting gas to said chamber adjacent the inner end thereof, the axis of said means being inclined with respect to the axis of said chamber and extending towards the inner end of said chamber, means for directing part of said gas rearwardly of said igniter toward the closed outer end of said chamber, means for admitting air to said chamber forwardly of said igniter, a second chamber in communication with said first named member, means for admitting gas and air thereto, the gas and air in said second named chamber being adapted to be ignited by burning gases discharged from said first named chamber and means for conveying the burning gases from said second named chamber to a blast furnace bleeder stack.

2. A pilot lighter for blast furnace bleeder stacks comprising a tubular chamber having a closed outer end and an open inner end, an electrical resistance element in said chamber adjacent the outer end thereof, means for admitting gas to said chamber adjacent the inner end thereof, the axis of said means being inclined with respect to the axis of said chamber and extending towards the inner end thereof, means for directing part of said gas toward the closed outer end of said chamber, means for admitting air to said chamber between said resistance element and the inner end of said chamber, a second chamber in communication with said first mentioned chamber so that gases ignited in said first chamber will be discharged into said second mentioned chamber, means for admitting air and gas to said second chamber, the gas and air in said second chamber adapted to be ignited by burning gases discharged therein from said first named chamber, means for conveying burning gases from said second named chamber to a blast furnace bleeder stack and a second resistance element connected in series with said first named element at a distance therefrom.

3. A pilot lighter for ignition chambers comprising a tubular chamber having a closed outer end and an open inner end, an igniter in said chamber adjacent the outer end thereof, a nozzle extending into said chamber forwardly of said igniter for admitting gas to said chamber, a rearwardly directed jet in communication with said nozzle for directing part of the gas admitted to said chamber rearwardly around said igniter, means for admitting air to said chamber between said igniter and the inner end of said chamber, a second chamber connected to the inner end of said first mentioned chamber whereby gases ignited in said first mentioned chamber are discharged into said second mentioned chamber, means for admitting air and gas to said second mentioned chamber into contact with the igniter gases discharged from said first mentioned chamber whereby said air and gas is ignited and means for conveying burning gases from said second mentioned chamber.

4. A pilot lighter for blast furnace bleeder stacks comprising a tubular chamber having a closed outer end and an open inner end, an electrical resistance element in said chamber adjacent the outer end thereof, a nozzle for admitting gas to said chamber extending into said chamber forwardly of said resistance element, the axis of said nozzle being inclined with respect to the axis of said chamber and extending towards the inner end of said chamber, a rearwardly directed jet in communication with said nozzle for directing part of the gas admitted to said chamber rearwardly around said igniter, means for admitting air to said chamber between said nozzle and the inner end of said chamber, a second chamber connected to the inner end of said first mentioned chamber whereby gases ignited in said first mentioned chamber are discharged into said second mentioned chamber, means for admitting air and gas to said second mentioned chamber into contact with the ignited gases discharged from said first mentioned chamber whereby said air and gas is ignited and means for conveying burning gases from said second mentioned chamber to a blast furnace bleeder stack.

5. A pilot lighter for igniting dust-containing gases comprising a tubular chamber having a closed outer end and an open inner end, an electrical resistance heating element in said chamber adjacent the closed outer end thereof, a nozzle extending into said chamber forwardly of said resistance element, the axis of said nozzle being inclined with respect to the axis of said chamber and extending toward the inner end of said chamber, a rearwardly directed jet in communication with said nozzle for directing a part of the gas passed therethrough rearwardly around said resistance element and an opening forwardly of said resistance element for admitting air to said chamber.

6. A pilot lighter for igniting dust-containing gases comprising a tubular chamber having a closed outer end and an open inner end, an electrical resistance heating element in said chamber adjacent the closed outer end thereof, a nozzle extending into said chamber forwardly of said resistance element, the axis of said nozzle being inclined with respect to the axis of said chamber and extending toward the inner end of said chamber, a rearwardly directed jet in communication with said nozzle for directing a part of the gas passed therethrough rearwardly around said resistance air and an opening between said nozzle and the inner end of said chamber for admitting air to said chamber.

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