Sept. 15, 1931. W. A. HAVEN 1,823,358

BURNER SYSTEM

Filed Dec. 29, 1928 2 Sheets-Sheet 1

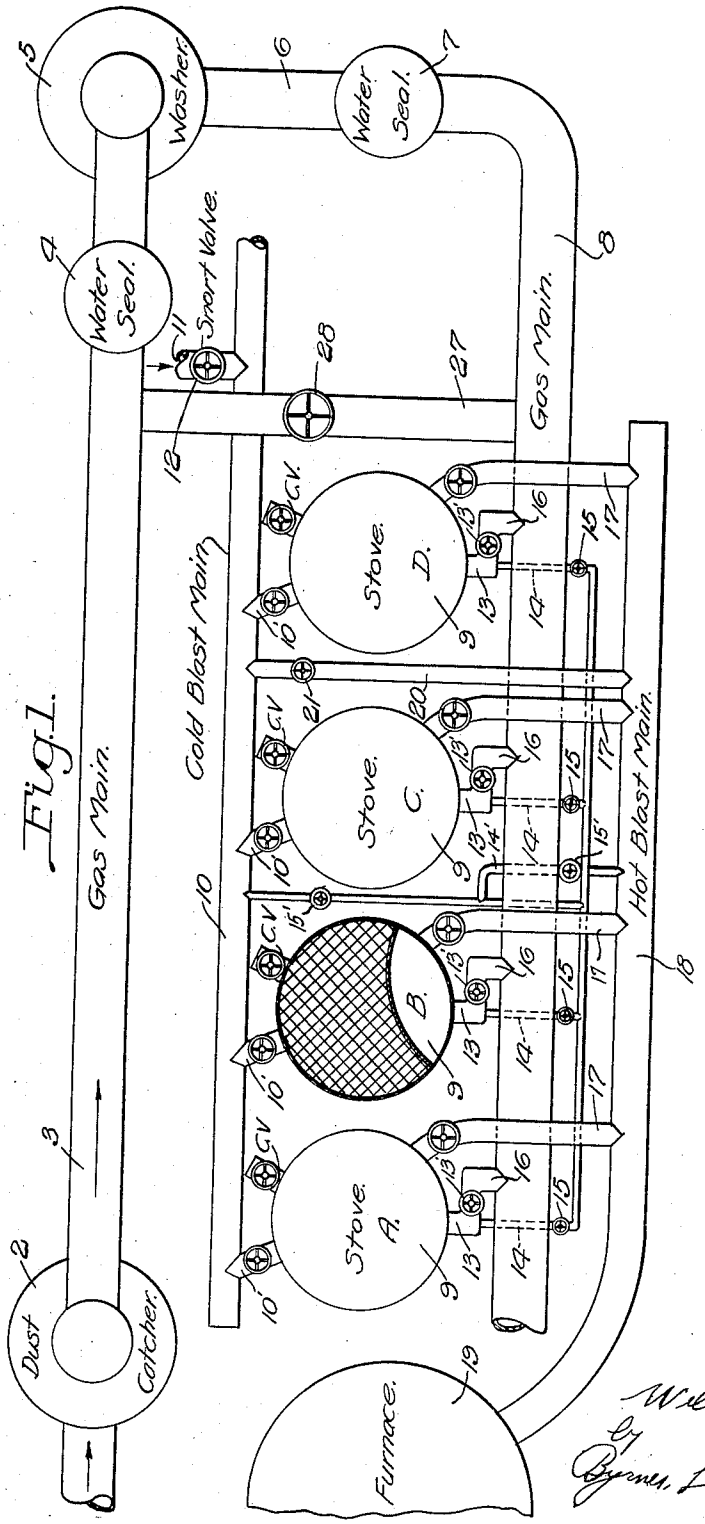

Fig. 1.

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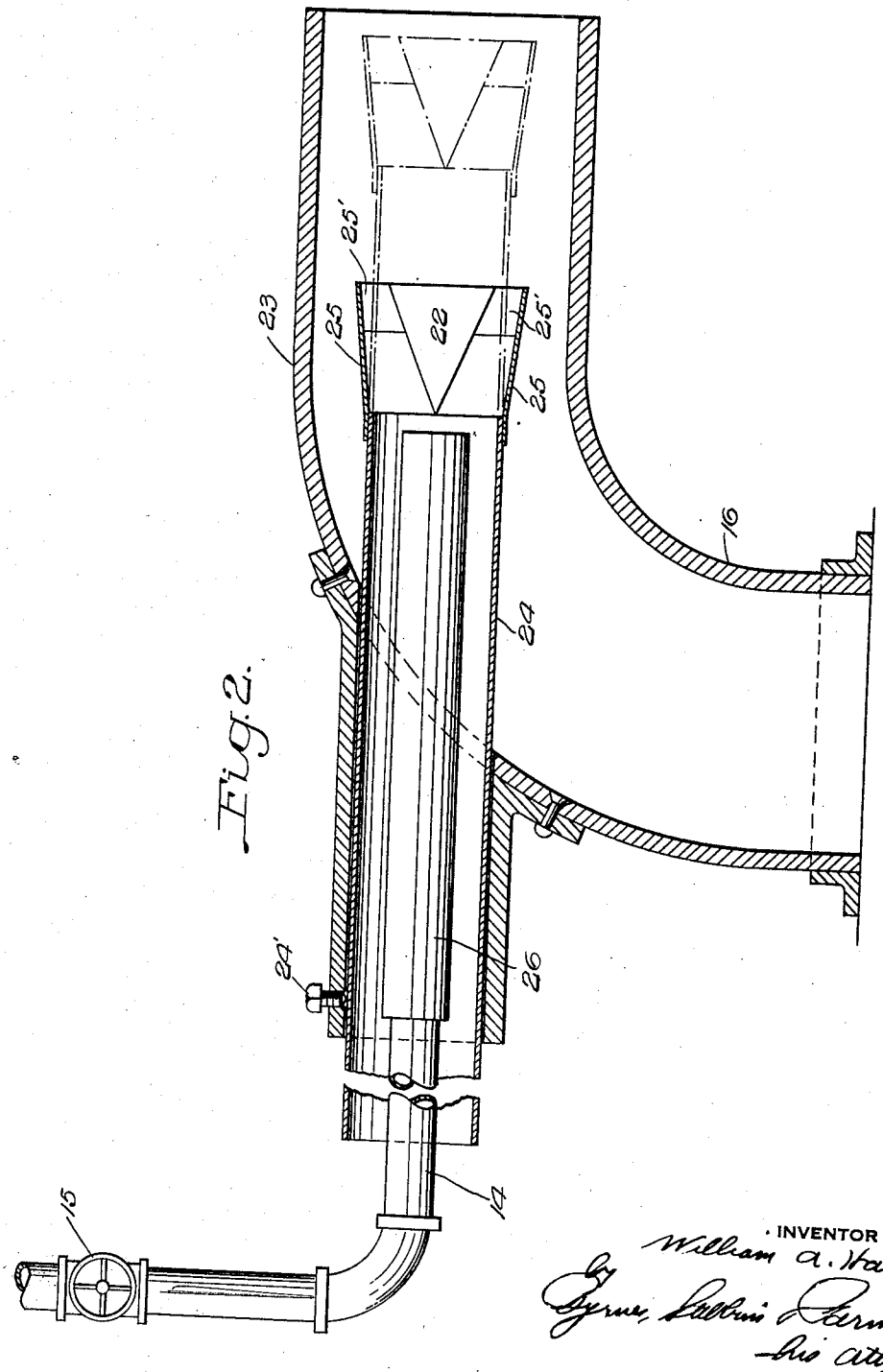

Fig. 2.

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UNITED STATES PATENT OFFICE

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BURNER SYSTEM

Application filed December 29, 1928. Serial No. 329,135.

The present invention relates broadly to the art of pressure burners, and more particularly to an improved pressure burner system especially adapted for use in connection with the operation of stoves provided for heating the blast.

One of the objects of the present invention is to provide a burner system which is operated under normal conditions in predetermined definite relation both to the stoves and to the furnace to which the stoves supply the heated air.

Another object of the present invention is to provide a burner system so interconnected to the supply lines for the stoves as to be automatically operated under normal conditions in accordance with variations of conditions existing therein.

Still another object of the invention is to so interconnect a pressure burner for a stove with one of the pressure lines supplying the stove as to insure subjecting both the stove and burner to similar variations of pressure conditions, the system further including connections whereby pressure conditions in the furnace and in the stove are properly correlated.

At the present time it is customary in the art to which the present invention relates to supply gas from a suitable dust catcher and washer to a plurality of stoves and to supply air to such stoves from a suitable cold blast main and hot blast main. In accordance with the present invention, I preferably utilize the pressure conditions existing in one of said mains for controlling the operation of the burner system for the stoves. In this manner variations in the pressure conditions in the main so utilized are automatically reflected in the burner system.

In the accompanying drawings I have shown for purpose of illustration only a preferred embodiment of the present invention.

In the drawings, Figure 1 is a diagrammatic plan view illustrating a burner system in accordance with the present invention, and

Figure 2 is a longitudinal sectional view through one form of burner.

In accordance with conditions customarily existing in the operation of stoves of the character herein contemplated, there may be provided a dust catcher 2 having a gas main 3 leading therefrom to one or more auxiliary water seals 4, which in turn discharge into a washer 5. A main 6 leads from such washer through one or more water seals 7 into a gas main 8 extending in proximity to a series of stoves 9, any desired number of which may be provided at will.

Extending in any desired relation to the gas main 8 is a cold blast main 10 adapted to receive a supply of cold air under pressure from any desired sourse, as indicated at 11, controlled by a snort valve 12. This main has a connection 10′ to each of the stoves 9.

Cooperating with each of the stoves is a burner 13 having air under pressure supplied thereto either through a connection 14 from the cold blast main 10, or a connection 14′ from the hot blast main hereinafter described, each of these connections being provided with an individual burner controlling valve 15, and cut off valves 15′. Each of the burners 13 is further provided with a connection 16 with the gas main 8, there being a controlling valve 13′ for each burner. By reason of these connections, it will be apparent that the supply of gas and air to the burners 13 bears under normal conditions a definite and predetermined relation to the pressure conditions existing respectively in the gas main and the cold blast main.

Each of the stoves has a valve controlled outlet connection 17 with a hot blast main 18 leading to a furnace 19, and a chimney valve C. V. as customary. A mixer pipe 20 extending between the cold blast main 10 and the hot blast main 18 may be provided for controlling the temperature conditions in the hot blast main. To facilitate this control the mixer pipe may be provided with a regulating valve 21.

As illustrated in detail in Figure 2 of the drawings, each of the burners 13 may be of the quasi-aspirating and mixing type, using a diffuser 22 suitably positioned within the burner casing 23. The gas connection 16 communicates with the casing rearwardly of the diffuser. Each of the burners also has

a main air inlet 24 extending rearwardly through the casing and carrying a sleeve 25 surrounding a portion of the diffuser and carrying the same through the medium of a spider 25'. Extending into this air inlet is the pressure connection 14, preferably provided with an adjusting sleeve 26, by means of which its point of termination relative to the diffuser 22 may be varied at will. The main air inlet is likewise preferably adjustable lengthwise of the casing as indicated in broken lines, it being held in adjusted position by means of a suitable set screw 24'.

In operation, the supply of air under pressure through each of the connections 14 will tend to draw into its casing 23 a certain quantity of secondary air through the inlet 24 and a certain quantity of gas through the inlet 16, these quantities varying in accordance with the position of the adjusting sleeve 26, and with the pressure conditions in the connections 14, it being apparent that the greater the pressure the more effective will be the aspirating action produced on both the air and gas. In this manner, a supply of air and gas to each of the burners is maintained in exact accordance with the pressure conditions existing in the main from which the aspirating pressure is taken. While I have herein indicated this pressure as being taken from the cold blast main, it will be apparent that I may, if desired, utilize the pressure conditions within the hot blast main 18, for this purpose.

The air and gas in passing over the diffuser 22 are thoroughly intermingled and pre-mixed to prevent their passage into the stove in the form of parallel streams. In this manner more efficient combustion conditions without danger of detonation are insured, thereby enabling use of full head of gas. By the use of the adjusting sleeve the point of termination of the high pressure air may be varied, it being desirable that this sleeve terminate at such a point within the casing that the air is driven forcibly into the gas stream to effect, in combination with the diffusing structure illustrated, a more effective intermingling of the combustion ingredients.

As is customary in the art, I may provide a by-pass connection 27 extending from the gas main 3 to the gas main 8 and controlled by a valve 28. This by-pass may be utilized for delivering gas directly from the main 3 to the main 8 in case of necessary shutdown of the washer 5.

In the use of a system of the character herein disclosed, the usual practice will be followed with respect to the reversal of the stoves. It may be assumed, for example, that the stove A is supplying heated air to the hot blast main 18, and that the stoves B, C and D are being heated preparatory to the passage of air therethrough. In such case, the valve in the connection 10' to the stove A will be opened as will also the valve in the connection 17 to the hot blast main, thereby permitting air from the cooling blast main to pass through the previously heated checkerwork in the stove into the combustion zone and thence through the connection 17 to the hot blast main. The valves 13' and 15 for the stove A will, at this time, be closed, inasmuch as the burner which was previously utilized to heat the stove will now be out of operation.

Exactly the opposite condition will exist relative to the stoves B, C and D. The respective valves in the connections 10' and 17 will be closed, while the valves 13' and 15 to each of these stoves will be open so that the stoves may be heated by the burners preparatory to the passage of air therethrough.

The stove B is shown broken away to illustrate diagrammatically the larger portion thereof provided with checkerwork, with the combustion zone laterally disposed with respect thereto. The connections 10' from the cold blast main in each instance lead into the checkerwork chamber as it is desired to pass cold air first through the checkerwork and then through the combustion zone into the hot blast main. The burners 13, of course, are so disposed as to be effective directively and initially in the combustion chambers of the stoves.

After a predetermined period of time, the connections may be changed so that the stove A will be heated along with the stoves C and D, while the previously heated stove B will receive a supply of cold air and heat the same preparatory to its discharge into the hot blast main. By proper control of the connections, each stove may be heated for any desired period preparatory to its utilization in turn as a heating means for the air to the hot blast main.

To those skilled in the art it will be apparent that a system of the character described is effective for maintaining under normal conditions a burner operation which is correlated as to efficiency with the rest of the system, and insuring a supply of combustion ingredients to each of the stoves in accordance with variations in pressure in the mains with which these stoves are connected. It will also be apparent that in case of operation of the snort valve 12, as desirable at predetermined intervals for reducing pressure conditions within the furnace, or for any other purpose, the burners and the stoves are simultaneously subjected to decreased pressure conditions, thereby keeping their operation in step with the desired conditions in the furnace.

While I have herein illustrated certain preferred embodiments of my invention, it will be apparent that the drawings do not limit the invention, either with respect to the sys-

tem with which it is used or the type of burner employed, inasmuch as changes in the construction, relationship and operation of the parts may be made without departing either from the spirit of the invention or the scope of my broader claims.

I claim:

1. In a burner system, a stove, a burner therefor, a cold blast main connected with said stove, a second main connected with said stove, and a fuel controlling connection between one of said mains and said burner.

2. In a burner system, a stove, a burner therefor, a cold blast main connected with said stove, a hot blast main connected with said stove, and a fuel controlling connection between one of said mains and said burner.

3. In a burner system, a stove, a burner therefor, a cold blast main connected with said stove, a gas main connected with said stove, and a fuel controlling connection between said cold blast main and said burner.

4. In a burner system, a furnace, a stove for delivering a heated blast to said furnace, a burner for said stove, a cold blast main for said stove, and connections for varying the fuel supply to said burner in accordance with variations in the pressure of said cold blast main.

5. In a burner system, a stove, a furnace receiving a heated blast therefrom, a mixing burner for heating said stove, a cold blast main for delivering air to said stove, and connections between said main and said burner for varying the fuel supply to the burner in accordance with the pressure in the main.

6. In a burner system, a stove, an aspirating burner cooperating therewith and having a gas supply connection and an air supply connection, a cold blast main, and means interconnecting said main and burner for producing an air and gas flow to said burner in accordance with pressure conditions in the main.

7. In a burner system, a furnace, a plurality of stoves operatively connected thereto, a burner for each of said stoves, a cold blast main, and a fuel controlling connection between said main and each of said burners.

8. In a burner system, a furnace, a plurality of stoves for supplying a hot blast thereto, a burner for each of said stoves, a hot blast main for receiving heated air from said stoves, a cold blast main for delivering air to said stoves, and a fuel controlling connection between one of said mains and each of said burners.

9. In a burner system, a furnace, a plurality of stoves operatively connected thereto, for individually or collectively delivering a heated blast to the furnace, a burner for each of said stoves, a cold blast main cooperating with all of said stoves, and a fuel controlling connection between said main and each of said burners, each of said burners being of the mixing type.

10. In a burner system, a furnace, a hot blast main, a cold blast main including a snort valve, a stove connected to said hot blast main and said cold blast main, a burner for said stove, and a fuel controlling connection for said burner intermediate said snort valve and said furnace.

11. In a burner system, a furnace, a plurality of stoves for supplying hot blast thereto, a burner for each of said stoves, a hot blast main connected to each of said stoves to receive heated air therefrom and deliver the same to the furnace, a cold blast main connected to each of said stoves for delivering cold air thereto, and a fuel controlling connection between one of said mains and each of said burners.

In testimony wherof I have hereunto set my hand.

WILLIAM A. HAVEN.