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AIR FEEDING AND COOLED FURNACE FRONT STRUCTURE

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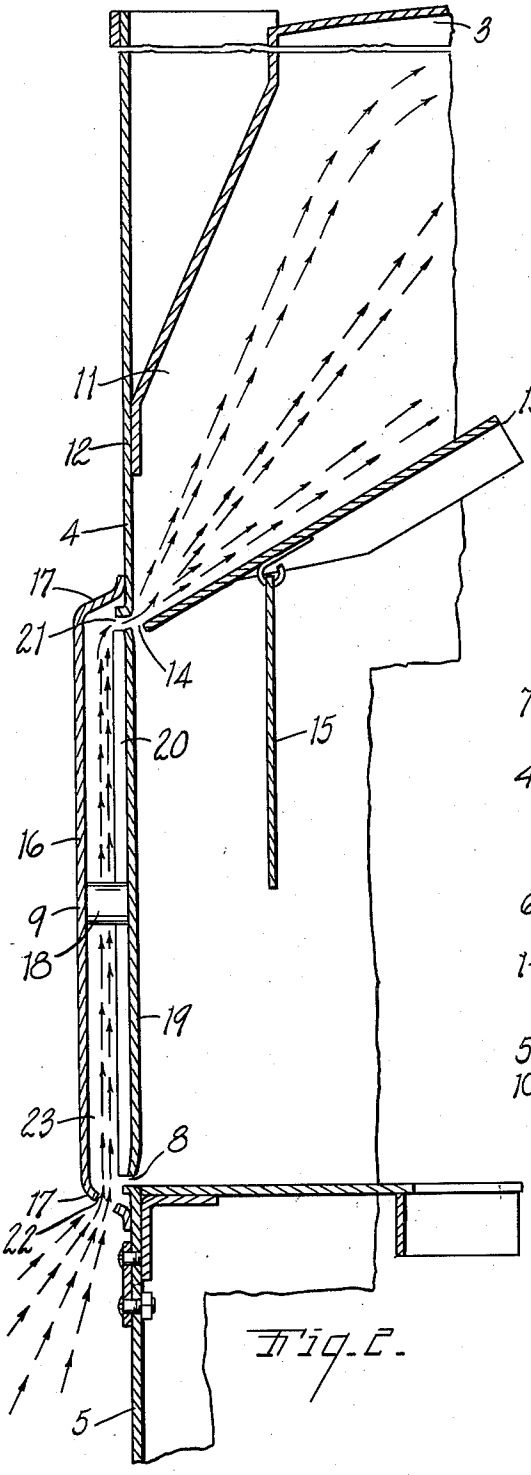

Fig. 2.

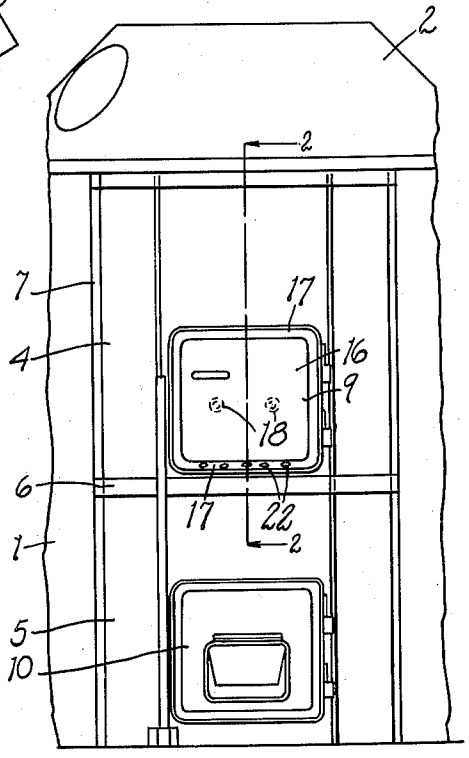

Fig. 1.

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AIR FEEDING AND COOLED FURNACE FRONT STRUCTURE

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6 Claims. (Cl. 110—180)

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This invention relates to improvements in furnace structure.

The principal objects of this invention are:

First, to provide means for cooling the door and front plate of a hot air furnace.

Second, to provide a furnace having air ducts therein for the admission of cooling air through the door and pouch extension to the top of the combustion chamber.

Third, to reduce the temperature of the door, front plate and pouch extension of a hot air furnace to render the use of steel plates for the furnace practical.

Other objects and advantages relating to details and economies of the invention will be apparent from the following description and claims.

The drawings, of which there is one sheet, illustrate a preferred form of my furnace structure.

Fig. 1 is a fragmentary front elevational view of a hot air furnace embodying my invention.

Fig. 2 is a fragmentary vertical cross sectional view along the line 2—2 in Fig. 1.

Most hot air furnaces are constructed with an inner combustion chamber and an outer casing which is spaced from the combustion chamber to provide for the passage of air to be heated around the combustion chamber. The casing is provided with a front plate defining charging door and ash door openings and the combustion chamber is provided with an extension sometimes called a "pouch" extension which is sealed to the front plate around the ash and charging doors to prevent the products of combustion from mixing with the air being heated. Since the front plate is open to the interior of the combustion chamber along the pouch extension, it is subject to the intense heat of the fire in the combustion chamber and in the past has been made of cast iron due to the low coefficient of expansion of iron and its resistance to heat.

It is my invention to provide a chambered charging door through which secondary air is admitted from outside the furnace casing and directed upwardly through the door and into the front of the pouch extension toward the top or dome of the combustion chamber. Air thus admitted to the furnace functions to cool the charging door and the front plate and also to act as secondary air for combustion in the top of the combustion chamber. I have found that the temperature of a furnace door and front plate may be reduced between 250 and 300 degrees under normal operation of the furnace and the combustion within the furnace improved by means of my air directing passages. The reduced

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temperature of the furnace door and front plate renders it practical to make the front plate of sheet steel rather than cast iron by reducing the tendency of the steel to buckle and deteriorate under high temperature.

The furnace illustrated in the drawings comprises a casing 1 having a conventional head 2 and enclosing a fire pot or combustion chamber 3. The casing is provided with a front plate of sheet steel having an upper panel 4 and lower panel 5 joined by a band 6. The edges of the front plate panels are connected to the sides of the casing by sealing strips 7.

The upper panel 4 defines a charging opening 8 closed by my charging door 9 and the lower panel 5 defines an ash opening closed by the ash door 10. The opening 8 in the top panel opens into the pouch extension 11 of the combustion chamber, the front wall of which is welded to the upper panel 4 as at 12. Adjacent to the top of the opening 8 I provide a pouch shield 13 which extends between the sides of the pouch extension and slopes upwardly and inwardly to within the combustion chamber. It will be noted that the front edge of the pouch shield is spaced slightly downwardly and inwardly from the upper edge of the opening 8 to provide a passage or flue 14 into the pouch extension. A familiar type of smoke curtain 15 is provided on the underside of the pouch shield.

The charging door 9 for closing the opening 8 consists of an outer panel 16 having rearwardly turned flanges 17 arranged to seat against the top panel 4 around the opening 8. The outer panel 16 is provided with a pair of sleeves or spacer members 18 which are welded thereto and project toward the interior of the furnace and serve to support the center of the inner panel 19 in spaced relationship with the outer panel. The sides of the inner panel are flanged forwardly as at 20 and welded to the side flanges of the outer panel 18. The inner panel is arranged to lie substantially in the same plane as the upper panel 4 of the casing when the charging door is closed. The upper edge of the inner panel is spaced downwardly below the upper edge of the opening 8 to provide an opening or flue 21 registering with the flue 14 at the front edge of the pouch shield.

The lower flange 17 of the outer door panel defines a series of apertures 22 arranged to admit outside air to the chamber 23 formed between the inner and outer panels of the charging door. The inner panel 19 being subjected to the heat of the fire in the combustion chamber will heat

the air in the chamber 23 causing it to rise and be directed through the flues 14 and 21 to the pouch extension from where it will pass through the pouch extension to the top of the combustion chamber.

The flow of secondary air as just described will cool both panels of the charging door and in passing through the pouch extension will cool the top panel 4 of the furnace front and the front of the pouch extension so that these members will not be heated to the high temperature of the combustion chamber. The secondary air will mix with the products of combustion in the top of the combustion chamber to assure complete combustion and in so doing will prevent the temperature of the top wall of the combustion chamber from rising above a desirable level.

I have thus described a highly practical commercial embodiment of my furnace and have not attempted to illustrate other possible forms or arrangements of my structure as it is felt that such modifications as may appear practical or desirable in certain instances may be made without further description.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In combination with a hot air furnace having a steel front plate and a combustion chamber closed at the top by a dome and joined to said front plate by a pouch extension, said pouch extension including a top wall extending generally in an upward direction from said front plate toward the dome of the combustion chamber, said front plate defining a charging opening, a pouch shield positioned in said pouch extension and sloping upwardly and inwardly from adjacent the upper edge of said opening and defining a flue opening into said pouch extension, said pouch shield being spaced from the pouch top wall to provide a passageway extending generally upwardly from said flue opening toward the dome of the combustion chamber to direct relatively cool air entering said flue opening towards the dome of the combustion chamber, a charging door for closing said charging opening, said door having spaced inner and outer panels, the outer panel being rearwardly flanged to engage the front surface of said front panel around said charging opening and defining a series of apertures through the lower flange thereof opening to the space between said door panels, said inner panel having side flanges welded to the side flanges of said outer panel and terminating in spaced relationship with the upper edge of said charging opening when in closed position to define a second flue opening opposite said first flue.

2. In combination with a hot air furnace having a front plate and a combustion chamber closed at the top by a dome and joined to said front plate by a pouch extension, said pouch extension including a top wall extending generally in an upward direction from said front plate toward the dome of the combustion chamber, said front plate defining a charging opening, a pouch shield positioned in said pouch extension and sloping upwardly and inwardly from the upper edge of said opening and defining a flue opening to said pouch extension, said pouch shield being spaced from the pouch top wall to provide a passageway extending generally upwardly from said flue opening toward the dome of the combustion chamber to direct relatively cool air entering said flue opening towards the dome of the combustion chamber, a charging door for closing said charging opening, said door having spaced inner and outer panels, the outer panel being rearwardly flanged to engage the front surface of said front panel around said charging opening and defining an aperture through the lower flange thereof opening to the space between said door panels, said inner panel terminating in spaced relationship with the upper edge of said charging opening when in closed position to define a second flue opening opposite said first flue.

3. In combination with a hot air furnace having a front plate and a combustion chamber closed at the top by a dome and joined to said front plate by a pouch extension, said pouch extension including a top wall extending generally in an upward direction from said front plate toward the dome of the combustion chamber, said front plate defining a charging opening, a pouch shield positioned in said pouch extension and sloping upwardly and inwardly from the upper edge of said opening and defining a flue along the front edge thereof, said pouch shield being spaced from the pouch top wall to provide a passageway extending generally upwardly from said flue opening toward the dome of the combustion chamber to direct relatively cool air entering said flue opening towards the dome of the combustion chamber, a charging door for closing said charging opening, said door having spaced inner and outer panels, said outer panel being rearwardly flanged to engage the front surface of said front panel around said charging opening and defining a passageway through the lower flange thereof opening from the outside of said door to the space between said door panels, said inner panel defining a second flue along the upper edge of said door opening opposite said first flue.

4. In combination with a hot air furnace having a front plate defining a charging opening and a combustion chamber closed at the top by a dome and joined to said front plate by a pouch extension, said pouch extension including a top wall extending generally in an upward direction from said front plate toward the dome of the combustion chamber, a pouch shield having its front edge spaced from the upper edge of said charging opening, said pouch shield being spaced from the pouch top wall to provide a passageway extending generally upwardly from said flue opening toward the dome of the combustion chamber to direct relatively cool air entering said flue opening towards the dome of the combustion chamber, a chambered door for closing said charging opening, the upper edge of said door defining an opening adjacent to the space along the front edge of said pouch shield, the lower edge of said door defining another opening for the admission of secondary air from outside said furnace to the chamber within said door.

5. In combination with a furnace comprising a combustion chamber closed at the top by a dome and provided with a front wall having a charging door opening, of a door for said opening comprising outer and inner panels spaced to provide a vertical flue coextensive with the width of the door, the door having air inlet openings from the exterior of the door to said flue at the bottom thereof and an air discharge opening at the top of the inner panel thereof delivering to the interior of said combustion

chamber, and a downwardly and forwardly inclined baffle spaced from the dome of the combustion chamber and disposed with its front edge adjacent but below the air discharge opening of said door so that the air is discharged from the door flue above said baffle, said baffle and said front wall of the combustion chamber being spaced and forming a passageway disposed to direct air leaving said discharge opening towards the dome of the combustion chamber.

6. In combination with a furnace comprising a combustion chamber closed at the top by a dome and provided with a front wall having a charging door opening, of a door for said opening comprising outer and inner panels spaced to provide a flue, the door having an air inlet opening from the exterior of the door to said flue at the bottom thereof and an air discharge opening at the top of the inner panel thereof delivering to the interior of said combustion chamber, and a downwardly and forwardly inclined baffle spaced from the dome of the combustion chamber and disposed with its front edge adjacent the air discharge opening of said door so that the air is discharged from the door flue above said baffle.

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