

W. H. PALMER.
 FORCED DRAFT HOLLOW GRATE BAR.
 APPLICATION FILED FEB. 15, 1910

997,507.

Patented July 11, 1911.

3 SHEETS-SHEET 1.

Fig. 1.

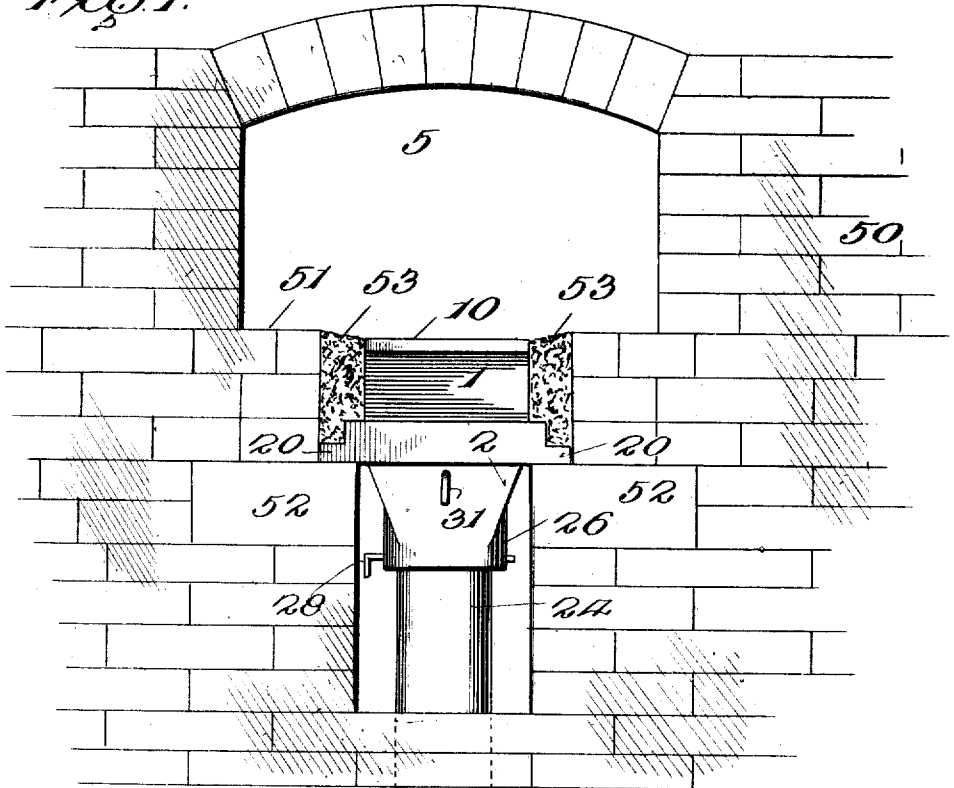
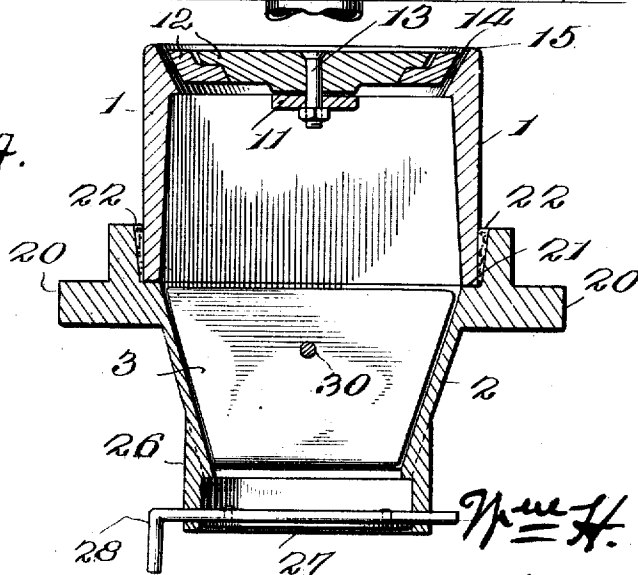


Fig. 4.



Witnesses
 W. Williams
 E. R. Peck

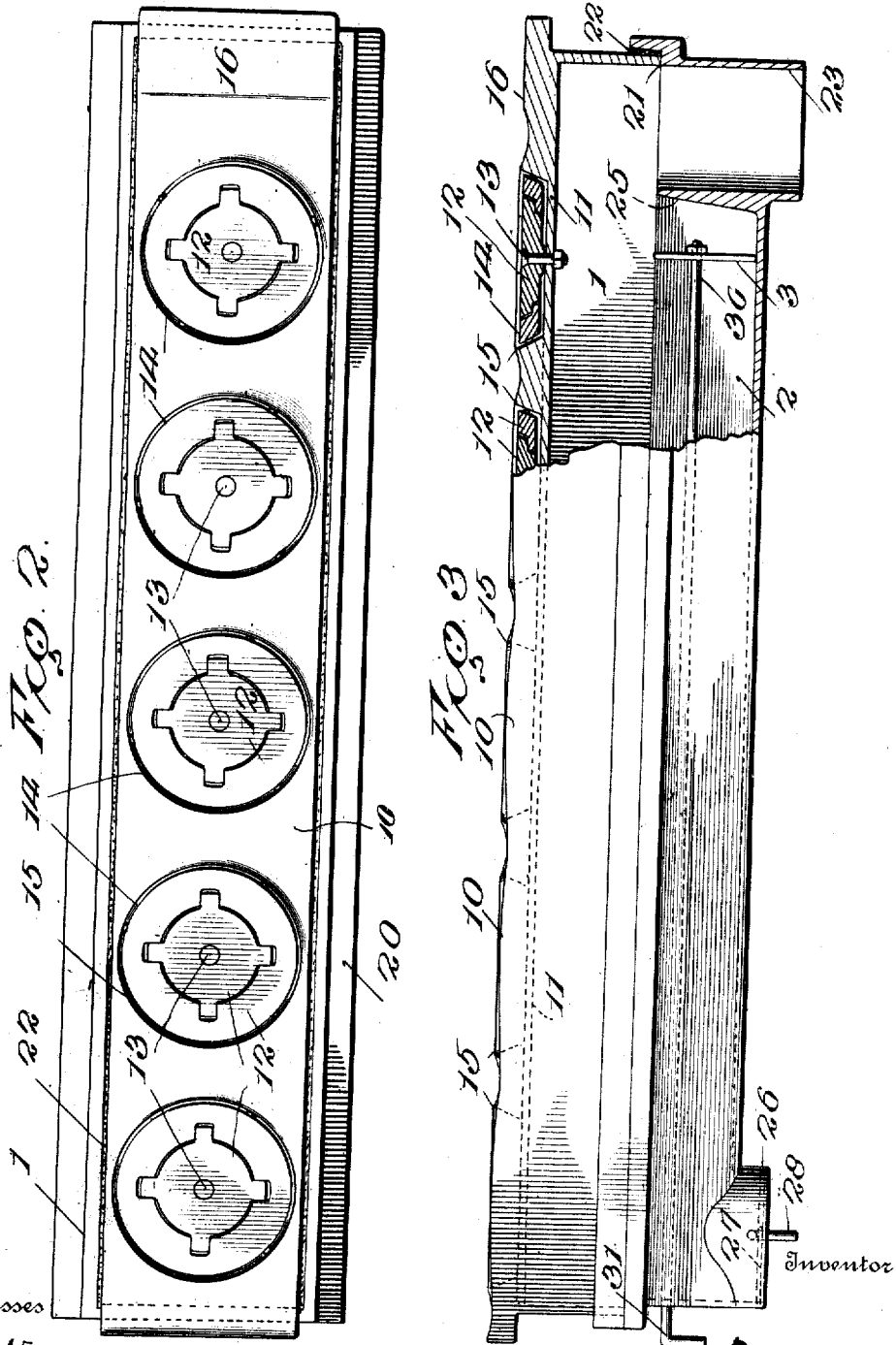
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2 SHEETS—SHEET 2.

997,507.



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UNITED STATES PATENT OFFICE.

WILLIAM H. PALMER, OF FORT SCOTT, KANSAS.

FORCED-DRAFT HOLLOW GRATE-BAR.

997,507.

Specification of Letters Patent. Patented July 11, 1911.

Application filed February 15, 1910. Serial No. 543,998.

To all whom it may concern:

Be it known that I, WILLIAM H. PALMER, a citizen of the United States, residing at Fort Scott, Bourbon county, Kansas, have invented certain new and useful Improvements in Forced-Draft Hollow Grate-Bars; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain improvements in hollow grate bars or air boxes for closed forced draft furnace beds or floors; and the objects and nature of the invention will be readily understood by those skilled in the art in the light of the following description of the accompanying drawings showing what I now consider my preferred embodiment from among other formations within the spirit and scope of my invention.

An object of the invention is to provide certain improvements in details and arrangements whereby an improved and highly efficient air box or grate bar will be produced.

Another object of the invention is to provide an improved air box having efficient means whereby the interior of the box can be cleaned of sand, ashes or other refuse that may collect therein.

The invention consists in certain novel features in construction and in combinations and arrangements as more fully and particularly set forth hereinafter.

Referring to the accompanying drawings:—Figure 1, is a front elevation of a portion of a brick kiln showing the front of a furnace or arch thereof to which my air box or grate bar is applied to form a part of the floor or fire bed thereof. Fig. 2, is a detail top plan of the bar. Fig. 3, is a longitudinal elevation of the bar, parts being broken away. Fig. 4, is a cross section.

The force draft grate or air box of my invention is in the form of an elongated hollow box adapted to receive air under pressure and having an approximately flat fuel supporting horizontal top wall closed or imperforate except for certain upwardly directed air discharge slits or the equivalent thereof. This box is cast or otherwise formed in two longitudinal trough-like sections fitted together to form the complete box. The upper section 1, forms the fuel

supporting portion of the box and the bottom section 2, carries the top section and forms an ash or refuse trough. The upper section is in the form of an inverted hollow trough open at the bottom (except as closed by the bottom section) and preferably having imperforate vertical depending side and end walls and an approximately flat horizontal top fuel supporting wall 10, formed with a series of upwardly flaring spaced openings, each diametrically bridged by a narrow depressed rib or web 11, usually cast on the under surface of the top wall and continued across the openings to form means for attaching the beveled-edge flat plates or caps 12, which are arranged down in said openings and confined against upward movement therefrom by short or stove bolts 13, extending from the plates through said web and terminating above the bottom section of the box. The caps or plates 12, are of any suitable construction and formation to form narrow upwardly flaring air discharge slits 14, in connection with the flared edges of the top wall around the plates. The top wall 10, is preferably formed with a slightly raised edge or bead 15, completely around each plate or cap receiving opening and extending above the level of the top faces of said plates and designed to act as guards to prevent the tools or implements used to clean or scrape off the fire bed or grate from catching or engaging the edges of the caps or plates and dislodging them, and also to cause ashes to settle on the surface of the top wall 10, between adjacent beads and prevent clinkers adhering to said wall and from closing or clogging the air slits 14.

The bottom section or ash trough 2, is cast with an open top, a floor and side and end walls rising therefrom. The trough is formed with exterior longitudinal side supporting flanges 20, arranged near the upper end of the trough. The trough is also formed with an internal horizontal seat or shoulder 21, arranged along the sides and ends thereof a short distance below the top edge of the trough and the vertical inner faces of the trough can be flared or inclined upwardly and outwardly above said seat. The lower end of the top section 1, is formed to enter the open top of the trough and seat on said shoulder 21, while the inclined inner faces of the trough walls in connection with the lower portions of the top walls within

the trough, form a cement receiving space 22, for the formation of a cement joint to seal the two sections together against escape of air. However, I do not wish to limit myself to the specific formation of the sections, nor to this particular joint between the same. At its rear end, the trough is provided with an air blast inlet opening vertically and upwardly through the floor of the trough and at this point the trough floor is preferably formed with a vertical depending nipple 23, for the attachment of air blast pipe 24, in communication with any suitable blower or other source of compressed air supply. This vertical compressed air inlet is usually arranged at the extreme rear end of the air box directly beneath the solid or imperforate rear end portion 16 of the top wall 10, so that the air blast enters the air box vertically and is directed against said solid or blank rear end 16, of the top wall and is thereby deflected so that the air pressure is evenly distributed throughout the interior of the box for the purpose of maintaining uniform air pressure at all of the air discharge slits and approximate uniform discharge of air at all the slits. Furthermore, the heat in the furnace or arch is greatest at the rear end of the air box and this arrangement of air blast is particularly designed to keep down the temperature of the rear end of the box top and prevent burning thereof or serious damage thereto.

I preferably form the trough with a vertical transverse partition or wall 25, across the interior thereof immediately in front of the air blast opening or so as to form the front wall thereof, to prevent sand, ashes or refuse entering the air blast pipe, and this partition can also act as a guard or deflector to aid in directing the blast vertically directly against the closed or blank rear end of the box top wall. Inasmuch as sand and ashes drop through the air discharge slits and unless removed would cause the air box to rapidly burn out or would so clog the same as to prevent proper distribution of air pressure therein, I provide means whereby the boxes can be easily cleaned by removal of refuse from the interiors thereof and also preferably form the boxes with their interiors unobstructed for the uniform distribution of air pressure therein and for the free operation of refuse removing devices.

In the particular example illustrated, I show the extreme front end of the floor of the ash trough formed with a vertical refuse discharge port or opening provided with a depending open nipple 26, forming a downward continuation of the refuse discharge. This discharge is normally closed by any suitable valve or other closure. For instance, I show a rocking damper or valve 27, arranged in and normally closing the

nipple and so balanced as to normally return to or maintain its horizontal discharge closing position. The valve consists of a disk provided with a shaft mounted to rock in the nipple walls and at one end extended to form a handle 28, whereby the valve can be held in opened position to open the discharge for passage of refuse from the trough.

I provide means within the trough for forcing the sand, ashes, etc., therein forwardly thereof to the ash discharge outlet through which it drops on opening the valve. I preferably employ positive forcing or cleaning means because in the operation of brick kilns, sand is employed on the floors of the arches or furnaces to prevent adherence of clinkers thereto and this heavy sand drops into the air boxes with the ashes and the sand is ordinarily too heavy to be discharged from the trough solely by air pressure.

In the specific example illustrated, I show a scraper or imperforate rake head 3, arranged transversely of the trough and at its edges generally conforming to the internal cross sectional formation and normally located at the rear end of the trough and provided with an operating rod 30, arranged longitudinally of the trough and projecting slidably through a perforation in the front wall of the trough and at its front end in front of the air box formed with an accessible exposed handle 31, by which the ash remover can be drawn forwardly to the ash discharge and can then be forced back to its normal position at the rear end of the trough.

The air box of this invention is peculiarly adapted for use in brick and other kiln arches or furnaces, rendering it possible to burn unexpensive coal dust or slack therein with a resulting high efficiency.

In the drawings I show the air box applied to the arch or furnace 5, of a brick kiln 50. The box is arranged longitudinally and centrally in the floor or furnace bed 51, of the arch so that the top of the box forms a portion of the fuel supporting floor of the furnace. The brick work or floor of the kiln is formed with an opening to receive the air box and with brick ledges 52 on which the side supporting flanges of the air box rest, and the space above said flanges and between the side walls of the box and the adjacent brick work can be filled in or packed with sand or other material 53. The brick work of the floor or base of the furnace is formed to receive the blast pipe to the rear end of the air box and to leave a space or opening below the front end of the box to receive the refuse from the box front end ash discharge, and also to leave the front end of the box exposed for access to the valve and scraper handles.

I do not herein claim certain features

common to this case and to my co-pending application Se. No. 473,404, filed Jan. 22, 1909 (now Patent No. 958,971, dated May 24, 1910) inasmuch as claim is made to such features in said co-pending application.

It is evident that various changes and modifications might be resorted to, that elements might be omitted or features added, without departing from the spirit and scope of my invention, and hence I do not wish to limit myself to the particular or exact constructions illustrated.

What I claim is:—

1. A furnace floor having a forced draft air box set down therein intermediate the width thereof and arranged longitudinally thereof and having a flat top fuel supporting wall formed with upwardly directed air openings, said floor having depressed ledges, said box having supporting side flanges resting on said ledges, packing means filling the spaces above said flanges about to the level of said floor and top wall, and an air blast pipe opening vertically into said box through the floor thereof.

2. In combination, a furnace floor formed with depressed ledges, a forced draft air box arranged longitudinally of said floor and having side flanges resting on said ledges, said box having an approximately flat top surface approximately level with said floor and forming a portion thereof and having upwardly directed air openings, the rear end portion of said top wall being blank and imperforate, the lower portion of said box forming a longitudinal ash receiving trough formed at its front end with an ash discharge opening, means normally closing said opening and having an exterior operating handle accessible from the front end of the box, said box having a vertical air blast opening at its rear end directly below said blank portion of the top wall to direct the air blast up against said portion, said box formed with an internal transverse partition separating the ash receiving trough from said air blast opening, and means operative longitudinally of said ash receiving trough between said partition and said discharge opening for drawing the ashes forwardly in said trough to said discharge opening and having an operating portion extending to the exterior of said box and operative from the front end thereof.

3. In combination, a furnace floor, a forced draft air box arranged longitudinally thereof and supported therein and having an approximately flat top surface forming a portion of the fuel supporting surface of said floor and having upwardly directed air discharge openings, said box at its rear end formed with a vertical air blast opening through the bottom thereof and having a transverse vertical partition to

prevent discharge of ashes into said vertical air blast opening and at its front portion formed with a bottom normally closed vertical ash discharge opening, the longitudinal lower portion of said box forming an ash receiving trough of uniform cross sectional form and depth throughout, and means within the trough movable longitudinally thereof to draw the ashes forwardly therein to said ash discharge opening, said means being operative from the exterior of the front end of the air box, the interior of said box being unobstructed for the uniform distribution of air pressure to said air discharge openings.

4. In combination, a furnace floor, a forced draft air box arranged longitudinally thereof and having side supporting flanges set in the walls of said floor a distance below the fuel supporting surface thereof, said box provided with an approximately flat horizontal top fuel supporting wall forming a portion of said floor and formed with series of upwardly directed air discharge openings, said box at its rear end having a vertical air blast opening through the bottom thereof to direct the air blast upwardly in the box against its top wall and a transverse partition separating said air blast opening from the ash receiving portion of said box, the longitudinal lower portion of said box forming an ash receiving trough of uniform depth throughout its length and unobstructed for the uniform distribution of air pressure therein and having a normally closed bottom ash discharge opening, and movable ash forcing means arranged entirely within said trough for drawing the ashes therein to said opening and provided with an operating member extending to the exterior of the front end of said box.

5. In combination, a kiln floor, a forced draft air box arranged longitudinally thereof and provided with projecting side flanges intermediate its height and set therein, the top approximately flat fuel supporting wall of said box forming a portion of the fuel supporting surface of said floor and having upwardly directed air blast openings, said flanges being arranged a distance below said surface and protected from the fire thereon, said box having a vertical air blast opening through its bottom, the lower portion of said box forming an unobstructed ash receiving trough having a normally closed ash discharge opening.

6. In combination, a kiln floor having depressed ledges arranged below the fuel supporting surface of said floor, a forced draft air box arranged longitudinally of said floor and having an approximately flat top fuel supporting surface forming a portion of the fuel supporting surface of said floor and having upwardly directed air blast

openings, said box having depressed side flanges below said fuel supporting surfaces and resting on said ledges and provided with an air blast inlet protecting means 5 covering said flanges and the box sides above the same, and a normally closed bottom ash discharge outlet.

7. A kiln floor formed with depressed ledges and provided with a forced draft air 10 box arranged longitudinally therein and having depressed side supports set on said ledges, said box having a flat top fuel supporting wall arranged a distance above said supports and forming a portion of the fuel 15 supporting surface of said floor and having series of upwardly and outwardly directed air blast slits, said ledges and supports being spaced a substantial distance from the fuel supporting surfaces of said floor and 20 box and being covered by protecting material, substantially as described.

8. A kiln floor of brick work having a longitudinal recess and depressed supporting ledges, in combination with a forced draft air 25 box arranged in said recess and supported by said ledges, and packing material in said recess between the walls of said box and the adjacent brick work walls extending to the fuel supporting surface of said floor, said 30 box having a horizontal longitudinal top fuel supporting wall forming a portion of the fuel supporting surface of said floor and having upwardly directed air blast openings.

9. A furnace floor having depressed supporting ledges, and a forced draft air box having depressed supports set on said ledges and having a horizontal fuel supporting wall forming a portion of the fuel 40 supporting surface of said floor and formed with upwardly directed air blast openings, said ledges and supports being depressed a distance below said fuel supporting surfaces of the floor and box, interposed protecting 45 means isolating said ledges and supports from said surfaces, the lower portion of said box forming a longitudinal ash receiving trough depending below said supports and having a normally closed bottom ash 50 discharge outlet and a vertical air blast supply opening through the bottom thereof.

10. A forced draft air box having an approximately flat horizontal top fuel supporting wall formed with upwardly directed air 55 blast openings, the rear end portion of said wall being blank, the lower portion of said box forming a longitudinal ash receiving trough having a normally closed ash discharge opening and at its rear end having a 60 bottom vertical air blast opening directly below said blank portion of the top wall, and an internal transverse partition separating the ash receiving trough from said opening and directing the air blast upwardly directly 65 against said blank portion.

11. A forced draft air box having a horizontal top fuel supporting surface formed with air blast discharge openings, the longitudinal bottom portion of said box forming an ash receiving trough having a bottom 70 vertical air blast supply opening, the interior of the box being unobstructed for the uniform distribution of air pressure within the box, a vertical transverse partition spanning the trough immediately in front of said 75 supply opening, said trough having an ash discharge opening at its front portion, means normally closing said discharge opening and operative from the front end of the box, and an ash drawing slide within said trough and 80 movable longitudinally thereof between said partition and said discharge opening and operative from the exterior of the front end of said box.

12. A forced draft air box having a top 85 fuel supporting wall with air blast discharge openings, the longitudinal lower portion of the box forming an ash receiving trough provided with a vertical air blast supply opening and depending nipple, said 90 trough having at its front portion a bottom ash discharge opening and depending nipple, a valve mounted in said nipple and normally closing said ash discharge opening, and provided with an exterior handle, and 95 an ash drawing slide movable longitudinally of said trough between said air blast and ash discharge openings and provided with a front end operating handle, said trough provided with means guarding said air blast 100 opening against discharge of ash thereinto.

13. A forced draft air box having a horizontal top fuel supporting wall with air blast outlets, the lower longitudinal portion of said box forming an ash receiving trough 105 having a bottom air blast supply opening and a normally closed ash discharge opening, an ash drawing slide longitudinally movable in said trough and arranged transversely thereof and generally conforming to the internal transverse dimensions of said 110 trough and provided with an operating handle extending to the exterior of the front end of the trough, and a transverse partition in advance of said supply opening and limiting the rearward movement of said 115 slide.

14. An air box for a forced draft furnace having a horizontal top fuel supporting wall formed with upwardly directed air discharge 120 openings, said box being internally unobstructed for the uniform distribution of air pressure to said openings and composed of a pair of longitudinal sections, the upper section comprising said horizontal wall and 125 depending vertical walls and the lower section receiving said vertical walls and composed of an ash receiving trough of uniform depth and cross sectional form throughout and having an air blast inlet opening and a 130

transverse vertical partition guarding said opening, and a bottom ash discharge opening and depending nipple, said nipple provided with means normally closing the same, and an ash drawing slide longitudinally movable in said trough between said partition and ash discharge opening and arranged transversely thereof and generally conforming to the internal transverse dimensions of said trough and provided with an operating handle extending to the exterior of the trough.

15. An air box for a forced draft furnace formed with a top fuel supporting wall having upwardly directed air blast openings, said box composed of upper and lower longitudinal sections, the upper section comprising said wall, the rear end portion of said wall being blank, the lower section composed of an ash receiving trough at its front end having a normally closed ash discharge opening and at its rear end having a bottom vertical air blast opening directly below said blank portion and an internal transverse partition immediately in front of said air blast opening and forming the rear end of the ash receiving portion of said trough, and ash drawing means operative longitudinally from said partition to said ash discharge opening and provided with an operating portion extending to the exterior of the front end of the box.

16. An air box for a forced draft furnace having a top fuel supporting wall formed with upwardly directed air discharge openings, said box formed in longitudinal sections, the upper section comprising said wall, and the lower section forming an ash receiving trough at its rear end having a vertical air blast inlet through its floor and a transverse partition arranged within the trough in front of said inlet, and

forming the rear end wall of the ash receiving portion of the trough.

17. An air box for a forced draft furnace having a horizontal top fuel supporting wall with upwardly directed air discharge openings, said box having an air blast inlet and formed of upper and lower longitudinal sections, the upper section comprising said wall, and the lower section composed of an unobstructed longitudinal ash receiving trough having at its front portion a normally closed ash discharge opening and at its rear portion a transverse partition guarding said air blast inlet, and an ash drawing slide longitudinally movable in said trough and arranged transversely thereof and generally conforming to the internal transverse dimensions of said trough and provided with an operating handle arranged longitudinally of the trough and extending through the front end of the trough to the exterior thereof.

18. An air box for forced draft furnaces having an air blast inlet and a horizontal longitudinal top fuel supporting wall having an approximately flat top fuel supporting surface and a series of spaced openings, each opening having a bead therearound raised above the general level of said top fuel supporting surface, and flat plates set down in said openings and in connection with the walls of the openings forming upwardly directed air discharge slits, said beads guarding the edges of said plates, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

WILLIAM H. PALMER.

Witnesses:

J. M. HUMPHREY,
B. HUDSON.