Nov. 22, 1932. W. B. CHAPMAN 1,888,585

FURNACE CONSTRUCTION

Filed May 10, 1928 2 Sheets-Sheet 1

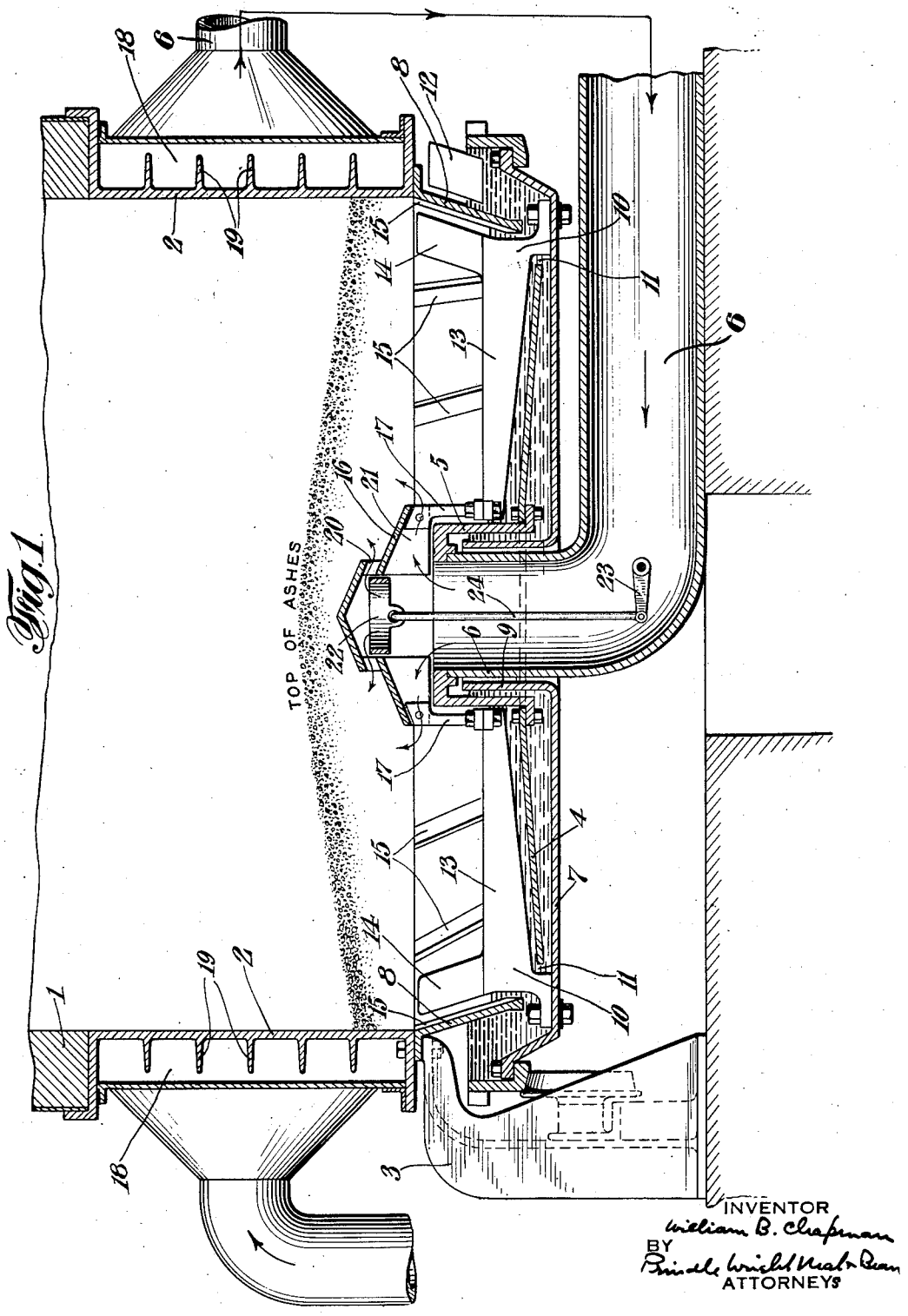


Fig. 1.

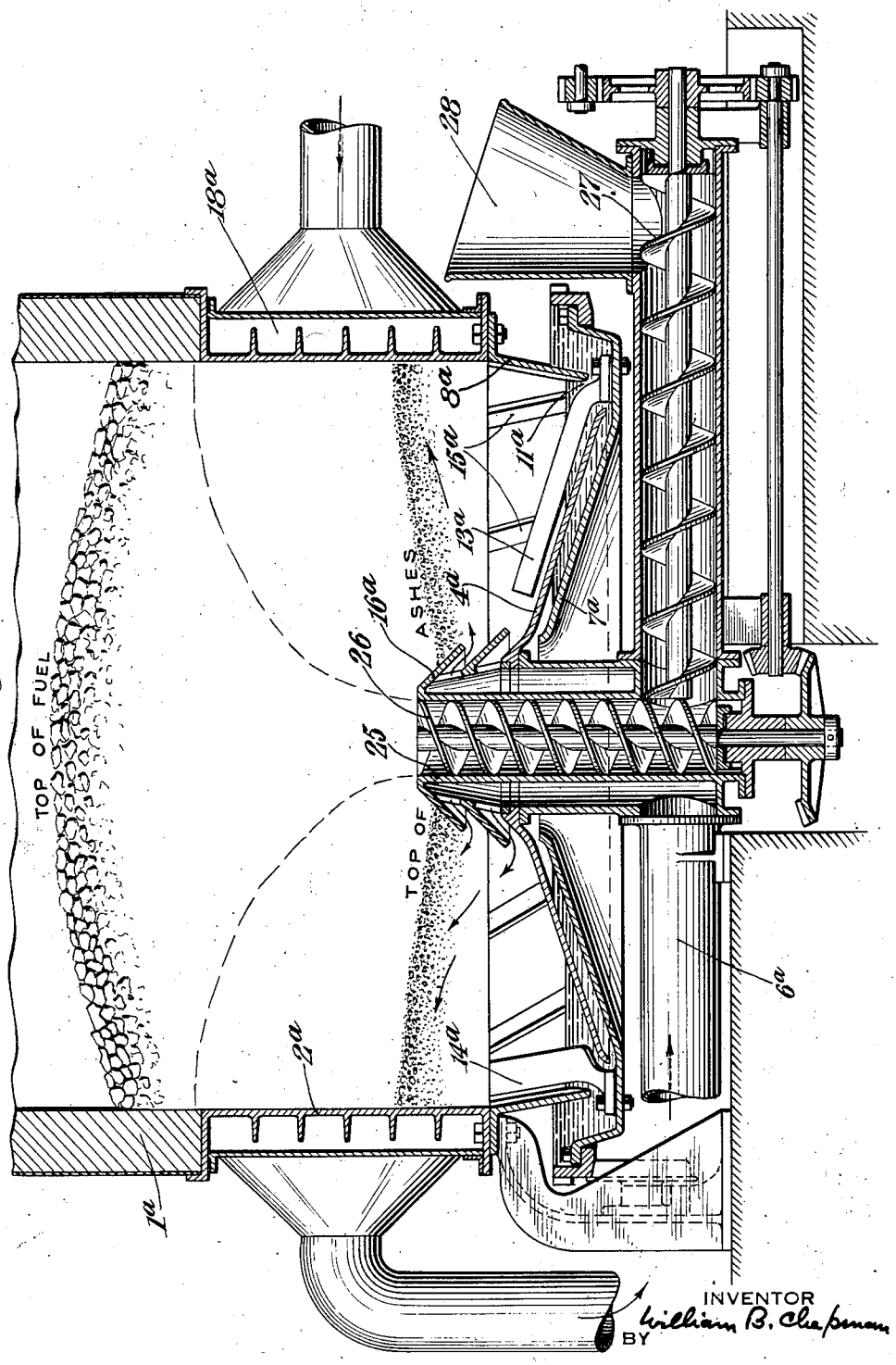
INVENTOR
William B. Chapman
BY
Brindle Wright Mahon Dean
ATTORNEYS

Nov. 22, 1932. W. B. CHAPMAN 1,888,585

FURNACE CONSTRUCTION

Filed May 10, 1928 2 Sheets-Sheet 2

Fig. 2.



INVENTOR
William B. Chapman
BY
Brindle, Wright & Mabee
ATTORNEYS

Patented Nov. 22, 1932 1,888,585

UNITED STATES PATENT OFFICE

WILLIAM B. CHAPMAN, OF JACKSON HEIGHTS, NEW YORK

FURNACE CONSTRUCTION

Application filed May 10, 1928. Serial No. 276,582.

The invention relates to a furnace construction adapted for use in either making producer gas or in connection with the complete combustion of fuel where a fairly thick firebed is employed, that is, for example, firebeds of a thickness of about eighteen inches or more.

The invention aims to provide a furnace construction of the above nature wherein the firebed will be held stationary by fixed side and bottom walls, and an agitating mechanism employed in connection with a rotary pan underlying but not supporting the bottom of the firebed and forming a support and driving means from which an agitating member may project into the ash bed to properly condition the firebed through the medium of the ash, break up the clinkers and assist in the removal of the ash.

Heretofore when rotary pans have been used in similar locations the firebeds have rested directly upon them and been caused to rotate to a certain extent thereby; the present invention avoids any rotation of the firebed and the rotary pan forms a simple and convenient point of support and driving means for the agitating members which condition the firebed and assist in removal of the ash as above referred to.

The invention also includes certain features of construction of the sidewall, cooperating with the agitator to force clinkers downwardly where they may be acted upon by the agitator, instead of permitting them to be pushed upwardly out of the effective range of action of the agitator.

Where a tuyère hood is employed in connection with the invention, another object is to avoid the undue building up of ash directly above the tuyère hood.

Further objects and advantages of the invention will be in part obvious and in part specifically pointed out in the description hereinafter contained which, taken in conjunction with the accompanying drawings, discloses certain preferred embodiments of the invention; such embodiments, however, are to be considered as merely illustrative of its principles. In the drawings—

Fig. 1 is a central vertical section through the bottom portion of a furnace constructed to operate in accordance with the invention.

Fig. 2 is a view similar to Fig. 1 but showing the invention combined with a mechanism adapted to feed fuel into the firebed from underneath.

The invention is shown in Fig. 1 as applied to a furnace which may be of the gas producer type or for the complete combustion of fuel using a relatively thick firebed as above described, the furnace having a stationary sidewall 1 which in the present instance is provided with a lower annular metallic ring 2, and may be supported by a suitable number of pedestals 3 beneath the ring.

The firebed for the most part is held up by means of a stationary supporting member 4, illustrated as resting upon a central collar 5 which in turn is attached to and supported from a central blast pipe 6. The stationary sidewall and bottom supporting member 4, cooperate to hold the firebed as a whole against rotation, notwithstanding the rotary agitating mechanism which is employed as hereinafter described.

An annular rotary pan 7 underlies the stationary supporting member 4 to receive the ash ejected from the firebed as hereinafter described, the pan being shown as cooperating with an annular skirt 8 on the bottom of the sidewall to form a water seal for the interior of the furnace. As shown, the central portion of the pan 7 is provided with a neck 9 enclosed by collar 5 above mentioned to complete the water seal above mentioned.

In order to agitate the firebed from underneath through the medium of the ash, break up clinkers and assist in the removal of the ash, I provide a suitable number of agitating members 10 which are supported upon rotary pan 7 above mentioned and which project through the annular opening 11 into the interior of the furnace and rotate with the pan to undulate the firebeds as they turn. These agitating members produce a radial wave motion which extends well up into the firebed and tends to maintain uniform conditions of combustion therein, and are also outstroking in their action so as to push a certain amount of ash outwardly through the

annular opening 11 into the outer part of pan 7, from which the ash may be removed in any suitable manner, for example, by an adjustable plow 12 as is known to the art.

Preferably the agitating members 10 are provided with arms 13 which extend inwardly over the supporting member 4 to produce the wave motion and stroke out the ash as above mentioned, and also with further arms 14 which project forwardly and up along the sidewall to finger down and break the clinkers.

I also prefer to employ in connection with the sidewall or the annular skirt 8 depending therefrom, inclined ribs 15 which are downstroking in their action, so that any clinkers engaged between the arms 14 and ribs 15 will tend to be forced downwardly into the direct range of action of the agitating members and ground up, instead of being pushed upwardly out of the effective range of action of the agitating members.

The blast is supplied to the firebed through a centrally located tuyère hood 16, and as another feature of the invention I rotate the tuyère hood to produce an outstroking effect which prevents the undue building up of ash in the space directly above it. As shown, the tuyère hood is connected to and supported from the inner ends of the agitator arms 13 by means of links 17, the tuyère hood being thus driven from the agitating mechanism.

The blast supply is shown as preheated by passing through a jacket 18 surrounding the metallic ring 2 of the sidewall, the ring being preferably provided with fins 19 to augment the heat interchange, after which the blast is led through pipe 6 to the tuyère hood. The distribution of the blast between the upper tuyère hood openings 20 and the lower tuyère hood openings 21 may be regulated by means of a non-rotatable collar 22 which is slidable up and down inside of the tuyère hood, and the height of which may be adjusted by crank 23 connected to the collar by means of a rod 24.

In the form of the invention illustrated in Fig. 2, the furnace is provided with a sidewall 1*a*, having a metallic ring 2*a*, annular skirt 8*a* with downstroking ribs 15*a*, and stationary bottom supporting member 4*a*, extending out from the tuyère hood 16*a*, all as described above in connection with Fig. 1. In the form of the invention shown in Fig. 2, however, the fuel is fed up from underneath into the central portion of the firebed through an upstanding column 25 enclosed by the tuyère hood. As shown, the feeding mechanism comprises a rotatable feed screw 26 within column 25 and receiving fuel forced in from a horizontal feed screw 27 into which the fuel is fed from a hopper 28.

A rotary pan 7ª underlies the stationary supporting member 4ª to provide a water seal as above described in connection with Fig. 1, and in this instance agitating members of different types are shown as projecting through the annular opening 11ª between the pan 7ª and skirt 8ª, one of such agitating members being in the form of an arm 14ª which projects up along the sidewall and reaches forward to finger down clinkers, while the other agitating member is in the form of an arm 13ª which projects upwardly over the firebed supporting member 4ª.

The blast may be supplied to the tuyère hood through a pipe 6ª, after being preheated in a jacket 18ª surrounding the ring 2ª, if desired.

While certain specific embodiments of the invention have been described, it should be understood that many changes may be made therein without departing from its principles as set forth in the appended claims.

I claim:

1. A furnace construction comprising a stationary sidewall enclosing the firebed, a stationary supporting member underlying the firebed to hold the firebed against rotation and separated from the sidewall by a narrow annular opening, a rotary pan underlying the sidewall and supporting member beneath said opening and an agitating member supported by said pan which agitating member projects through said opening into the interior of the furnace.

2. A furnace construction comprising a stationary sidewall enclosing the firebed, a stationary supporting member underlying the firebed to hold the firebed against rotation and separated from the sidewall by a narrow annular opening, a rotary pan underlying the sidewall and supporting member beneath said opening and an agitating member supported by said pan which agitating member projects through said opening into the interior of the furnace, said rotary pan forming a water seal for the interior of the furnace.

3. A furnace construction comprising a stationary sidewall enclosing the firebed, a stationary supporting member underlying the firebed to hold the firebed against rotation and separated from the sidewall by a narrow annular opening, a rotary pan underlying the sidewall and supporting member beneath said opening, an agitating member supported by said pan which agitating member projects through said opening into the interior of the furnace and a tuyère hood connected to said agitating member to rotate therewith.

4. A furnace construction comprising a stationary sidewall enclosing the firebed, a stationary supporting member underlying the firebed to hold the firebed against rotation and separated from the sidewall by a narrow annular opening, a rotary pan underlying the sidewall and supporting member beneath said opening, an agitating mem-

ber supported by said pan which agitating member projects through said opening into the interior of the furnace and a rotary tuyère hood supported from and driven by said agitating member.

5. A furnace construction comprising a stationary sidewall enclosing the firebed, a stationary supporting member underlying the firebed to hold the firebed against rotation and separated from the sidewall by a narrow annular opening, a rotary pan underlying the sidewall and supporting member beneath said opening and an agitating member supported by said pan and projecting through said opening into the interior of the furnace, said agitating member having an arm projecting up along the sidewall to finger down the clinkers.

6. A furnace construction comprising a stationary sidewall enclosing the firebed, a stationary supporting member underlying the firebed to hold the firebed against rotation and separated from the sidewall by a narrow annular opening, a rotary pan underlying the sidewall and supporting member beneath said opening and an agitating member supported by said pan which agitating member projects through said opening into the interior of the furnace, said agitating member having an arm projecting inwardly over the firebed supporting member.

7. A furnace construction comprising a stationary sidewall enclosing the firebed, a stationary supporting member underlying the firebed to hold the firebed against rotation and separated from the sidewall by a narrow annular opening, a rotary pan underlying the sidewall and supporting member beneath said opening and an agitating member supported by said pan which agitating member projects through said opening into the interior of the furnace, said agitating member having one arm projecting up along the sidewall to finger down the clinkers and another arm projecting inwardly over the stationary firebed supporting member.

8. A furnace construction comprising a stationary sidewall enclosing the firebed, an agitating member rotating adjacent the bottom of said sidewall, downstroking ribs being provided on the sidewall to cooperate with said agitating member to break up clinkers and force ash downwardly.

9. A furnace construction having a stationary sidewall enclosing the firebed and a stationary bottom firebed supporting member, a rotary pan underneath the bottom of the supporting member and forming a water seal for the interior of the furnace, said furnace construction having a narrow annular opening adjacent said bottom supporting member, and an agitating member supported by said pan which agitating member projects through said opening into the interior of the furnace.

10. A furnace construction comprising a stationary sidewall enclosing the firebed, a firebed supporting member underlying the firebed, an agitating member operating in the bottom of the firebed, the bottom part of said sidewall being provided with interior downstroking projections adapted to cooperate with said agitating member to hold the ash against upward movement while being crushed.

In testimony that I claim the foregoing, I have hereunto set my hand this 24 day of April, 1928.

WILLIAM B. CHAPMAN.