

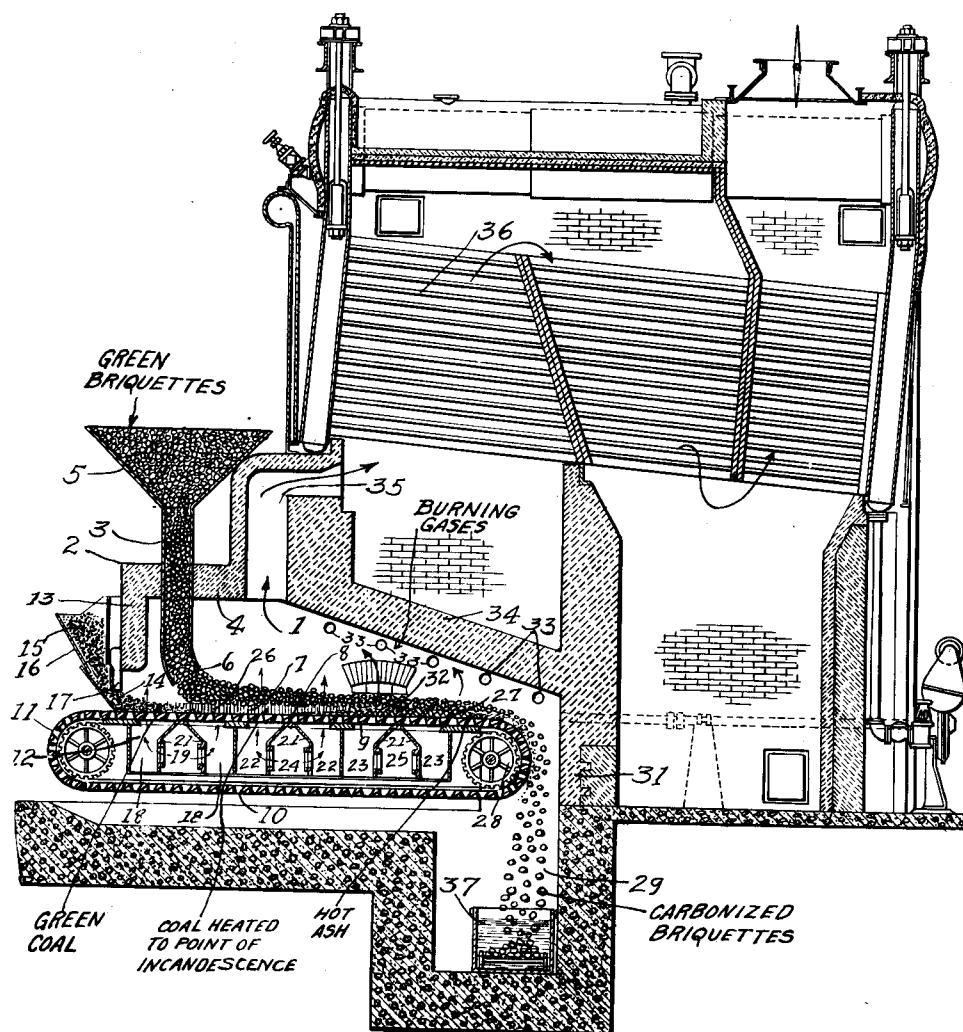
July 11, 1933.

E. L. WILLSON

1,918,162

METHOD OF CARBONIZING BRIQUETTES

Filed Nov. 1, 1928



Inventor:-
Edwin L. Willson
by his Attorneys
Houson & Houson

UNITED STATES PATENT OFFICE

EDWIN L. WILLSON, OF GLENSIDE, PENNSYLVANIA, ASSIGNOR TO THE LEHIGH COAL AND NAVIGATION COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

METHOD OF CARBONIZING BRIQUETTES

Application filed November 1, 1928. Serial No. 316,596.

My invention relates to a method of carbonizing briquettes.

Heretofore, considerable difficulty and much annoyance have been experienced with the usual solid-hearth plates used in connection with carbonizing processes. Such plates deteriorate very rapidly in service and, by reason of their relatively large expense, greatly increase the cost of the carbonizing operation. Moreover, when the hearth is replaced, the furnace as a whole must be shut down, with the result that a further loss occurs. One object of my invention, therefore, is to provide a hearth which overcomes the above-noted difficulties,—my invention contemplating the use of an automatically-renewable porous bed of hot material as a hearth. A bed of this character may be formed of mine refuse having a very low market value.

Other objects and applications of my invention, as well as details of construction and operation, whereby my invention may be practiced, will be apparent more fully hereinafter, when taken in connection with the accompanying drawing, wherein

The single figure of the drawing is a view partially in section and partially in side elevation of a structure embodying my invention.

Referring to the drawing, a chamber 1 of a furnace 2 is provided with a passage 3 which extends therefrom through an upper, horizontal side wall 4 to an exteriorly-positioned hopper 5 containing the fuel to be carbonized. This material, in one installation, took the form of briquettes, which were first pressed into shape by means not shown and then deposited in the hopper 5.

In accordance with my invention, the briquette passage 3 terminates in an open end 6 which is positioned just above a fuel bed 7 constituting an automatically removable hearth. The fuel bed 7 is supported on a movable grate surface 8 afforded by an upper side 9 of a traveling grate stoker 10. A front end 11 of the stoker 10 extends through an opening 12 in the front portion of the furnace. A front wall 13 of the carbonizing chamber 1 is provided with a fuel-

passage opening 14, whereby a solid carbonizable fuel 15 such as coke breeze or small size of anthracite, may pass from an exteriorly-positioned hopper 16 through the opening 14 onto the movable grate surface 8, as shown in the single figure of the drawing. A door 17 serves to control the rate of fuel supply.

The green coal 15, upon entering the chamber 1, is preferably heated to the point of incandescence, the air necessary to support combustion at this point being at least partly supplied by means of air passages 18, 18 positioned directly under the grate surface 8. These passages may be supplied with air through ducts 19 which are connected to the passages 18, 18 by tuyères 21. Additional air passages 22, 22 and 23, 23 are positioned under the grate surface 8 and supplied with air through ducts 24 and 25, respectively, so that the fuel bed 7 may assume the general form shown in the drawing, wherein it is noted that an intermediate portion 26 is formed of incandescent coal, while a rear end portion 27 is formed of hot ashes. These ashes are dropped from an inner end 28 of the stoker 10 into an ash-pocket 29 which is formed between the stoker 10 and a rear wall 31 of the chamber 1.

As shown on the drawing, the inner open end 6 of the passage 3 is spaced from the front wall portion 13, so that the briquettes are deposited on the front portion of the incandescent part of the fuel bed 7. The forward movement of the stoker 10 causes the superimposing of a layer 32 of briquettes on the fuel bed 7. While the fuel bed 7, and the superimposed layer 32 of briquettes are moving rearwardly through the chamber 1, the briquettes are heated as a result of direct contact with the fuel bed 7 and the air which passes upwardly through the porous fuel bed 7 and the layer of briquettes 32. As a result, carbonization of the briquettes occurs and certain of the gases in the briquettes 32 are driven off, mingling with the hot gases passing from the fuel bed 7.

In order that the gases from the heated briquettes may be caused to burn, and thus afford an additional supply of heat to that

furnished by the fuel bed 7, a plurality of air openings 33 may be formed in the carbonizing chamber 1 immediately adjacent to an upper rear wall portion 34 thereof. The burning of the fixed carbon in the layer of briquettes is prevented by the control of the amount of air supplied to the underside of the fuel bed 7, and to the air openings 33, as well as the control of the rate of operation of the stoker 10. In one installation the rate of stoker operated was such that a coking period of only thirteen minutes was required. The hot gases formed in the carbonizing chamber 1 may be passed upwardly therefrom through a passage 35 to a boiler system 36, which serves as energy-translating means, converting the heat of the gases to steam.

In operation, assuming the presence of the porous fuel bed 7 on the grate surface 8, as shown in the drawing, movement of the stoker 10 results in the formation of the layer 32 of briquettes. These briquettes, upon being deposited on the fuel bed 7, are heated by conduction due to direct contact with the fuel bed 7, by convection due to the air passing through the stoker 10 and the bed 7 thereon, and by radiation from the heat incident to the burning of the gases in the chamber 1. As a result, the briquettes are heated and evolve a gas which mingles with that passing through the fuel bed 7 and burns in the upper portions of the carbonizing chamber 1. When the briquettes finally reach the rear end 28 of the stoker 10, carbonization to the desired extent has occurred and the briquettes, as well as the ashes, are passed into the pocket 29 which is provided with a quenching tank 37 in the bottom thereof. The fuel bed 7 thus serves as an automatic renewable hearth which is formed of fuel having an exceedingly low market value. Experience has shown that such type of hearth permits an increase in the thickness of the layer of briquettes without sacrificing the uniformity of carbonization, as compared with the solid type of hearth heretofore used. Should it be desirable to interrupt the briquetting operation, the energy developed by the boiler 36 may be maintained substantially constant by merely increasing the amount of refuse fuel feed to the stoker 10 from the hopper 16.

While I have shown only one form of embodiment of my invention, for the purpose of describing the same and illustrating its principles of construction and operation, it is apparent that various changes and modifications may be made therein, without departing from the spirit of my invention. For example, the porous bed of hot material constituting the hearth may be formed of a non-carbonaceous material, as, for example, sand, and satisfactory operation still obtained. I desire, therefore, that only such limitations shall be imposed thereon, as are

indicated in the appended claims or as are demanded by the prior art.

I claim:

1. The method of carbonizing which comprises the positioning of a layer of solid carbonizable material on a porous bed of relatively fine fuel of which at least a part is of a combustible nature, heating the bed material to a temperature sufficient to effect carbonization of the superposed layer of material by burning the combustible material contained in the bed, transferring the heat from the bed material to the superposed material and supporting combustion of the combustible material contained in the bed by passing a current of air upwardly through the porous bed and the superposed carbonizable material, thereby driving off combustible gases from said carbonizable material, injecting air into said combustible gases above said layer of carbonizable material to support combustion of said gases, and burning said combustible mixture above said layer of carbonizable material to increase the temperature of said carbonizable material.

2. The method of carbonizing which comprises the positioning of a layer of solid carbonizable material on a porous bed of relatively fine fuel of which at least a part is of a combustible nature, heating the bed material to a temperature sufficient to effect carbonization of the superposed layer of material by burning the combustible material contained in the bed, transferring the heat from the bed material to the superposed material and supporting combustion of the combustible material contained in the bed by passing a current of air upwardly through the porous bed and the superposed carbonizable material, thereby driving off combustible gases from said carbonizable material, injecting air into said combustible gases above said layer of carbonizable material to support combustion of said gases, burning said combustible mixture above said layer of carbonizable material to increase the temperature of said carbonizable material, and quenching the resulting carbonized fuel.

3. The method of carbonizing which comprises the positioning of a layer of solid carbonizable material on an independent porous bed comprising relatively fine particles of solid carbonaceous combustible material, burning the said bed material under the carbonizable material, and passing a current of air through said bed material to drive off combustible gases from the bed material and the superposed layer of carbonizable material and to support combustion of the bed material under the layer of carbonizable material and the combustible gases above said layer of carbonizable material to heat said layer of carbonizable material to a temperature sufficient to effect carbonization thereof.

4. The method of carbonizing which com-

prises the positioning of a layer of solid carbonizable material on a porous bed composed of relatively fine solid carbonaceous combustible material, burning the said bed material under the carbonizable material, and passing a current of air through said bed material to drive off combustible gases from the bed material and the superposed layer of carbonizable material and to support combustion of the bed material under the layer of carbonizable material and the combustible gases above said layer of carbonizable material, and injecting supplementary air into the burning combustible gases above the layer of carbonizable material to increase the temperature of said gases to heat said layer of carbonizable material to a temperature sufficient to effect carbonization thereof.

5. The method of carbonizing which comprises the provision of a continuously moving porous bed of solid relatively fine particles of carbonaceous combustible material forming continuously on the moving bed a layer of relatively coarse carbonizable material, burning in transit a portion of the bed material under the superposed layer of carbonizable material, and passing currents of air through the burning bed to support combustion thereof, and to heat the superposed layer of carbonizable material to a temperature sufficient to effect carbonization thereof.

6. The method of carbonizing which comprises the provision of a continuously moving porous bed of solid relatively fine particles of carbonaceous combustible material forming continuously on the moving bed a layer of relatively coarse carbonizable material, burning in transit a portion of the bed material under the superposed layer of carbonizable material, passing currents of air through the burning bed to support combustion thereof, and to heat the superposed layer of carbonizable material to a temperature sufficient to effect carbonization thereof, and continuously renewing the moving bed in advance of the positioning of the layer of carbonizable material on the moving bed.

7. The method of carbonizing which com-

prises the provision of a continuously moving porous bed of solid relatively fine particles of carbonaceous combustible material forming continuously on the moving bed a layer of relatively coarse carbonizable material, burning in transit a portion of the bed material under the superposed layer of carbonizable material, passing currents of air through the burning bed to support combustion thereof, and to heat the superposed layer of carbonizable material to a temperature sufficient to effect carbonization thereof, continuously renewing the moving bed in advance of the positioning of the layer of carbonizable material on the moving bed, and quenching the bed material and the superposed layer of carbonizable material after a predetermined state of carbonization has been attained.

8. In the manufacture of fuel briquettes, the process which comprises the placing of a layer of green briquettes on a porous bed of relatively fine carbonaceous combustible material, burning the bed material under the layer of green briquettes, and passing currents of air upwardly through the bed and the layer of briquettes to support combustion of the bed material to heat the superposed briquettes to a temperature sufficient to effect carbonization thereof.

9. In the manufacture of fuel briquettes, the process which comprises the placing of a layer of green briquettes on a porous bed of relatively fine carbonaceous combustible material, burning the bed material under the layer of green briquettes, and passing currents of air upwardly through the bed and the layer of briquettes to support combustion of the bed material and combustible gases emanating from the briquettes due to the burning of the underlying bed to heat the superposed briquettes, and injecting supplementary air into the combustible gases above the layer of briquettes to increase said heating to a temperature sufficient to effect carbonization thereof.

EDWIN L. WILLSON.