

G. W. PARKER.  
 APPARATUS FOR REGULATING COMBUSTION.  
 APPLICATION FILED MAR. 10, 1909.

949,596.

Patented Feb. 15, 1910.

2 SHEETS—SHEET 1.

FIG. 2.

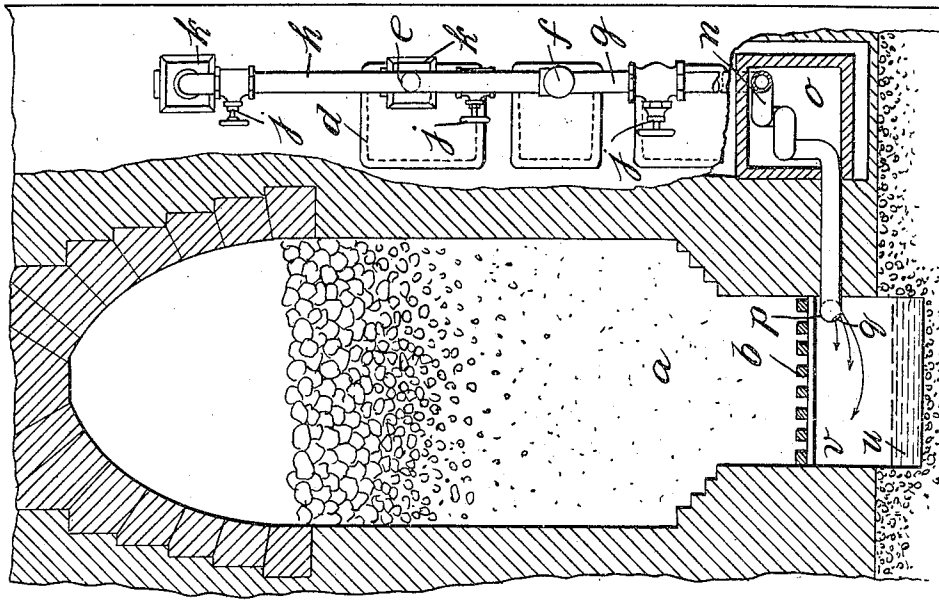
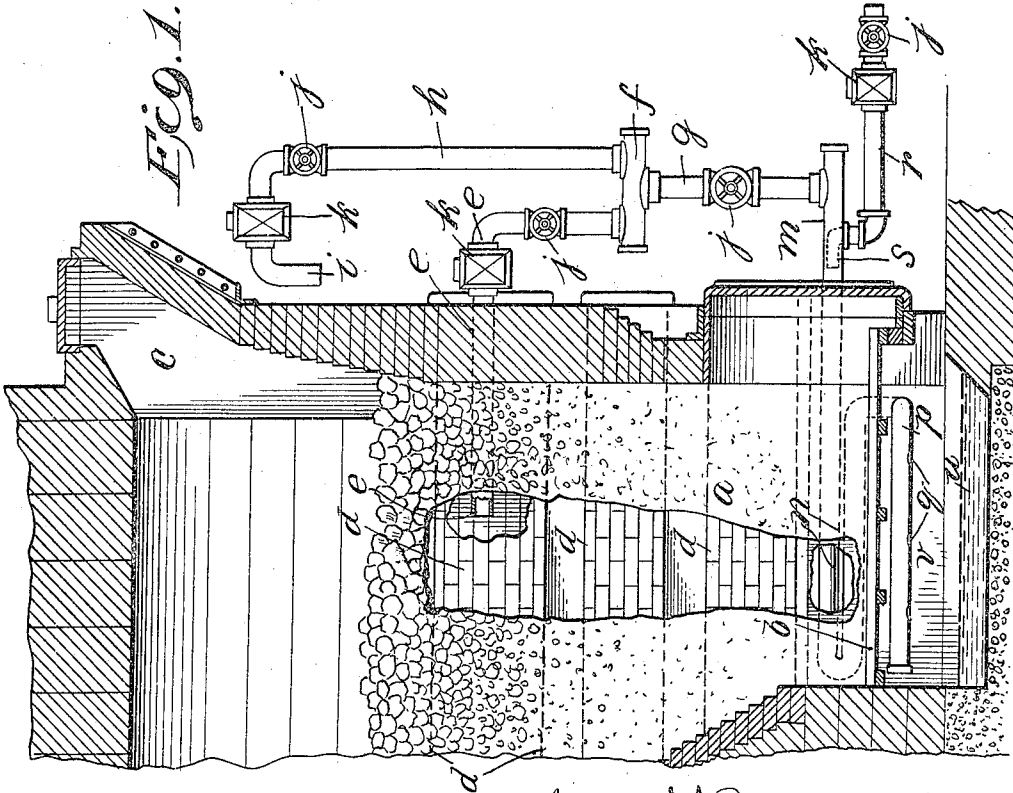


FIG. 1.



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George W. Parker Inventor  
 By his Attorney  
*James Hamilton*

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2 SHEETS—SHEET 2.

FIG. 4.

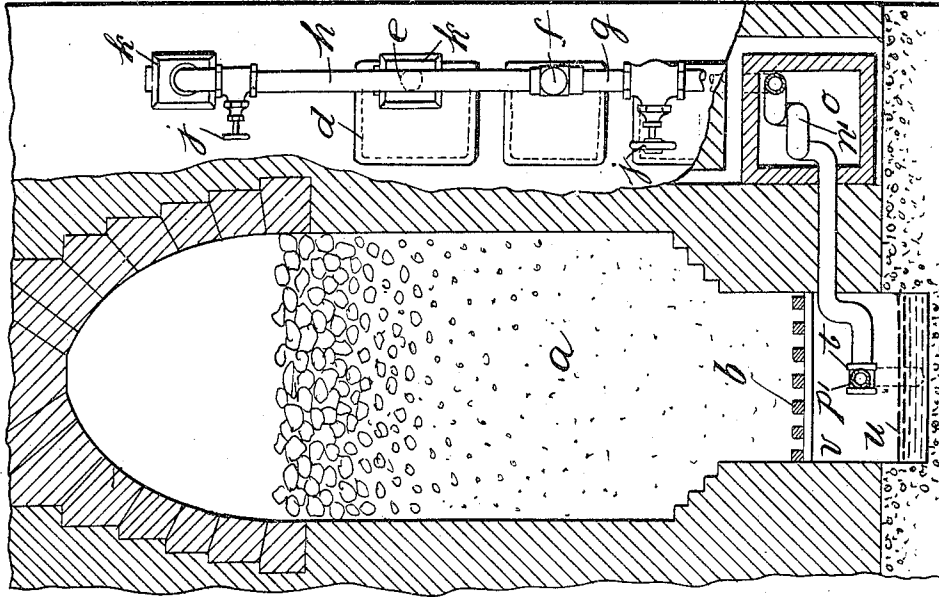
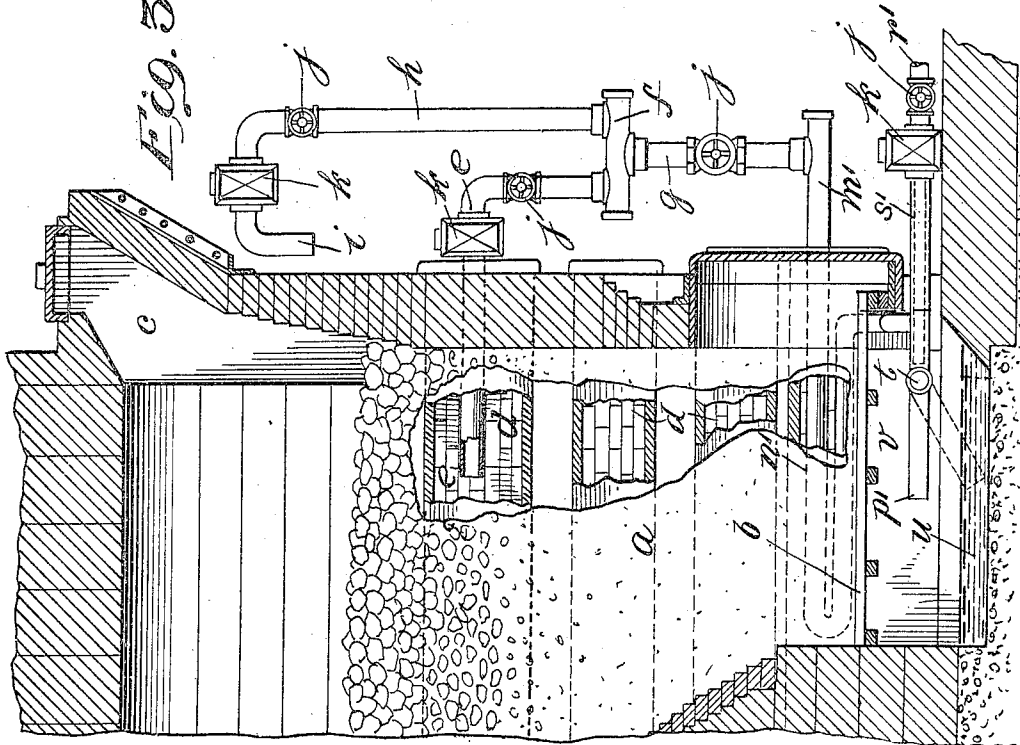


FIG. 5.



Witnesses:  
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M. E. Cameron

George M. Parker Inventor  
By his Attorney  
*James Hamilton*

# UNITED STATES PATENT OFFICE.

GEORGE W. PARKER, OF NEW YORK, N. Y., ASSIGNOR TO THE PARKER-RUSSELL MINING & MANUFACTURING COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

APPARATUS FOR REGULATING COMBUSTION.

949,596.

Specification of Letters Patent. Patented Feb. 15, 1910.

Application filed March 10, 1909. Serial No. 482,551.

To all whom it may concern:

Be it known that I, GEORGE W. PARKER, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus for Regulating Combustion, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to improvements in apparatus for regulating the combustion of fuel in a furnace; and particularly to the regulation of the combustion of fuel in gas producers; and an object of my invention is to provide an apparatus of the character described which will be simple and exceedingly efficient in the accomplishment of the purpose for which it is intended.

Heretofore it has been common to introduce wet steam under the grate-bars of gas producer furnaces; but the use of wet steam results in the saturation of the fuel on the grate-bars, particularly at the front part thereof; and this saturated fuel falls into the ash pit and is wasted.

In carrying out my process, I provide means for introducing superheated steam or steam gas in conjunction with carbon dioxide. Free oxygen may also be introduced with the two gases just named, practically in the form of air. The carbon dioxide will in practice be obtained in the form of waste gases from the recuperator flues of the gas-producer furnace. The amount of air, waste-gas and steam or steam gas will be regulated and measured; and the supply of any one or more of these gases may be entirely cut off at will. By introducing superheated steam the saturation of the fuel upon or near the grate-bars is avoided; for, the steam is so highly superheated that it will remain in the form of steam-gas, even after it comes in contact with the relatively cold surface presented by the grate-bars and the bottom of the fuel bed resting thereon. Hence, by the use of superheated steam, the fire will be kept alive down to even the grate-bars.

In carrying out my invention, the current of superheated steam is introduced below the grate bars and flows up through the fuel-bed, by the heat of which it is dissociated or resolved into its component gases, hydrogen and oxygen, whereby heat is drawn from the bed of fuel, the temperature of which

is thereby kept under control. The current of steam gas may be used to inject a quantity of carbon dioxide gas in the form of waste gases. The waste gases may, if desired, be mixed with free oxygen in the form of air. The carbon dioxide gas in passing through the bed of fuel will be reduced to carbon monoxide; and this endothermic reaction will result in reducing the temperature of the bed of fuel, just as the same result is obtained by the endothermic reaction which results in the dissociation of the steam gas.

In the drawings illustrating the principle of my invention and the best mode now known to me of applying that principle, Figure 1 is a longitudinal vertical section of so much of a gas-producer furnace as is necessary to illustrate my invention; Figure 2 is a transverse vertical section of the gas producer furnace shown in Fig. 1; and Figs. 3 and 4 are views similar to Figs. 1 and 2, respectively, but illustrating a modified form of my invention.

The fuel-bed *a* is supported upon the grate-bars *b* and coal is introduced through the throat *c*. Into one of the waste-gas flues *d* extends the open inner end of a gas-pipe *e*, the lower end of which is joined by the T-connection *f* with the mixing-pipe *g* and through which flows a part of the waste gases. The air-pipe *h* curves downwardly at its upper end *i* and at its lower end is joined by the T-connection *f* to the mixing-pipe *g*. In each of the pipes *e*, *g*, *h*, there is mounted a valve *j* which serves to control the flow of the air and gas through the pipe in which it is mounted. In each of the pipes *e*, *h*, there is fitted a meter *k* which controls and regulates the amount of air and gas which may pass through the pipe; and the meter *k* may be of the form shown and described in the patent granted Charles E. Sargent, No. 729,511, May 26, 1903. The mixing-pipe *g* connects at its lower end with the outer end *m* of the heating coil *n*, which lies in one of the waste gas flues *o* near the bottom of the furnace. The inner end of the heating coil *n* is in the form of a nozzle *p*, having perforations *q* for the egress of the gas. A steam-pipe *r* is fitted with a valve *j* and a meter *k* and is provided with a nozzle *s* which extends into the outer end *m* of the heating coil *n*. Through the pipe *r* flows steam or steam gas which serves as

an injector to carry the mixture of waste gas and air from the mixing pipe *g* through the heating coil *n* and the nozzle *p*.

In Figs. 3 and 4, the mixing pipe *g* is connected with the outer end *m'* of the heating coil *n'*; but the nozzle *s'* of the steam pipe *n'* extends into and connects with the inner end of the heating coil *n'*. The nozzle *p'* of the latter is mounted free to swing upon the hinge-joint *t*, whereby the end of the nozzle *p'* may be dipped into the water *u* in the ash-pit *v*, if it be desired at any time to condense the steam and to cool the gases passing through the nozzle *p'* before their entrance into the furnace through the grate.

The depth of the fuel-bed *a* is so great as to insure that the endothermic reactions referred to above shall take place; that is, it is what is commonly known as a deep fuel-bed. By means of the meters *b*, the flow of the steam, waste-gas and air may be separately regulated and controlled so as to regulate the combustion of the fuel.

I claim:

1. An apparatus of the character described consisting of a gas-producer formed with a chamber constructed to contain a deep fuel-bed; a waste-gas flue which is in communication with said chamber and through which flow waste gases therefrom; a pipe which conducts waste gases from said flue to below said fuel-bed, the inner end of said pipe being open and arranged in said flue to receive waste gases therefrom and the other end of said pipe leading to below said fuel-bed and an intermediate portion of said pipe lying in said flue exposed to the heat of the waste gases flowing therethrough; and a steam-pipe which discharges steam into said intermediate portion.

2. An apparatus of the character described consisting of a gas-producer formed with a chamber constructed to contain a deep fuel bed; a waste-gas flue which is in communication with said chamber and through which flow waste gases therefrom; a pipe which conducts waste gases from said flue to below said fuel-bed, the inner end of said pipe being open and arranged in said flue to receive waste gases therefrom and the other end of said pipe leading to below said fuel-bed and an intermediate portion of said pipe lying in the form of a coil in said flue exposed to the heat of the waste gases flowing therethrough; and a steam-pipe which discharges steam into said coil.

3. An apparatus of the character described consisting of a gas-producer formed with a chamber constructed to contain a deep fuel-bed; a waste-gas flue which is in communication with said chamber and through which flow waste gases therefrom;

a pipe which conducts waste gases from said flue to below said fuel-bed, the inner end of said pipe being open and arranged in said flue to receive waste gases therefrom and the other end of said pipe leading to below said fuel-bed and an intermediate portion of said pipe lying in said flue exposed to the heat of the waste gases flowing therethrough; and an air-pipe which discharges air into the intermediate portion of said pipe.

4. An apparatus of the character described consisting of a gas-producer chamber constructed to contain a deep fuel-bed; a waste gas flue in communication with said gas-producer chamber and through which flow the products of combustion therefrom; a conduit arranged in said flue and formed with an opening through which waste gases pass from said flue into said conduit; and an injector connected with said conduit; the latter being provided with a swinging nozzle which is constructed to discharge into the gas producer.

5. An apparatus of the character described consisting of a gas-producer formed with a chamber constructed to contain a deep fuel-bed; a waste-gas flue which is in communication with said chamber and through which flow waste gases therefrom; a pipe which conducts waste gases from said flue to below said fuel-bed, the inner end of said pipe being open and arranged in said flue to receive waste gases therefrom and the other end of said pipe leading to below said fuel-bed and an intermediate portion of said pipe lying in said flue exposed to the heat of the waste gases flowing therethrough; an air-pipe which discharges air into the intermediate portion of said pipe; and a steam-pipe which discharges steam into said pipe.

6. An apparatus of the character described consisting of a gas-producer formed with a chamber constructed to contain a deep fuel-bed; a waste-gas flue which is in communication with said chamber and through which flow waste gases therefrom; a pipe which conducts waste gases from said flue to below said fuel-bed, the inner end of said pipe being open and arranged in said flue to receive waste gases therefrom and the other end of said pipe leading to below said fuel-bed and an intermediate portion of said pipe lying in said flue exposed to the heat of the waste gases flowing therethrough; an air-pipe which discharges air into said pipe; and a steam-pipe which discharges steam into said pipe.

7. An apparatus of the character described consisting of a gas-producer formed with a chamber constructed to contain a deep fuel-bed; a waste-gas flue which is in communication with said chamber and through which flow waste gases therefrom; a pipe which conducts waste gases from said

flue to below said fuel-bed, the inner end of  
 said pipe being open and arranged in said  
 flue to receive waste gases therefrom and the  
 other end of said pipe leading to below said  
 5 fuel-bed and an intermediate portion of said  
 pipe lying in said flue exposed to the heat  
 of the waste gases flowing therethrough;  
 a meter which is mounted in said pipe and  
 controls the amount of the waste gases  
 10 which flows therethrough; and a steam-pipe  
 which discharges steam into said pipe.

8. An apparatus of the character de-  
 scribed consisting of a gas-producer formed  
 with a chamber constructed to contain a  
 15 deep fuel-bed; a waste-gas flue which is in  
 communication with said chamber and  
 through which flow waste gases therefrom;  
 a pipe which conducts waste gases from said  
 flue to below said fuel-bed, the inner end of

said pipe being open and arranged in said 20  
 flue to receive waste gases therefrom and  
 the other end of said pipe leading to below  
 said fuel-bed and an intermediate portion  
 of said pipe lying in said flue exposed to the  
 heat of the waste gases flowing there- 25  
 through; a steam-pipe which discharges  
 steam into said pipe; and a meter which is  
 mounted in said steam-pipe and which con-  
 trols the amount of steam flowing there-  
 through. 30

In testimony whereof I hereunto set my  
 hand this ninth day of March, A. D. 1909,  
 at said New York, in the presence of the  
 two undersigned witnesses.

G. W. PARKER.

Witnesses:

EMMA I. MCCARTHY,  
 JAMES HAMILTON.