(No Model.) 2 Sheets—Sheet 1.

J. MYERSCOUGH.

SMOKELESS BOILER FURNACE.

No. 522,380. Patented July 3, 1894.

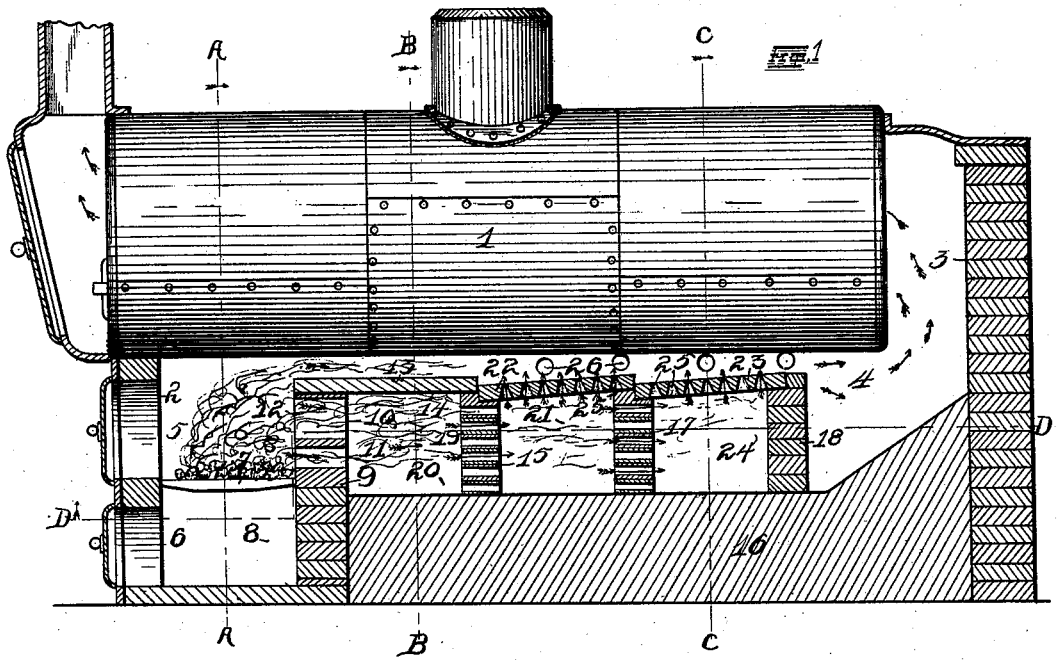

FIG. 1

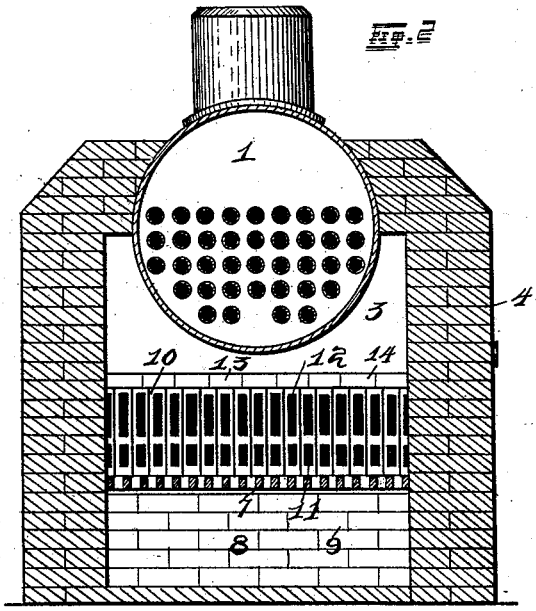

FIG. 2

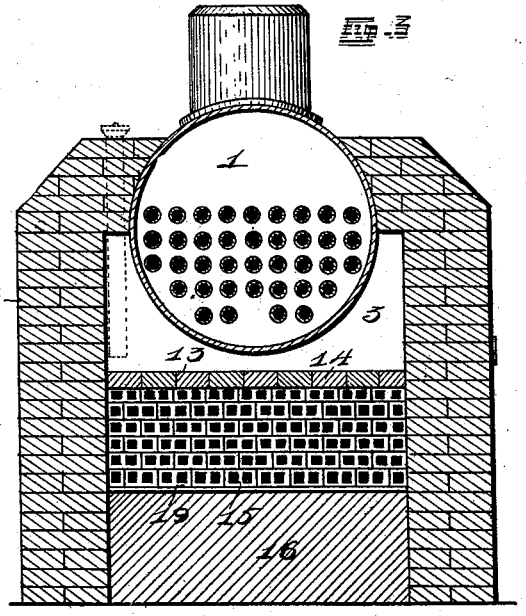

FIG. 3

WITNESSES

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Fig. 4

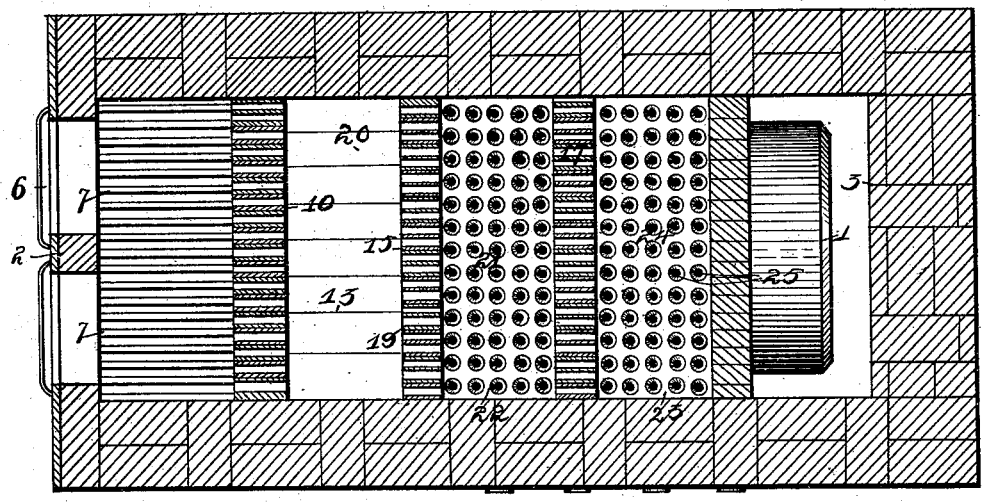


Fig. 5

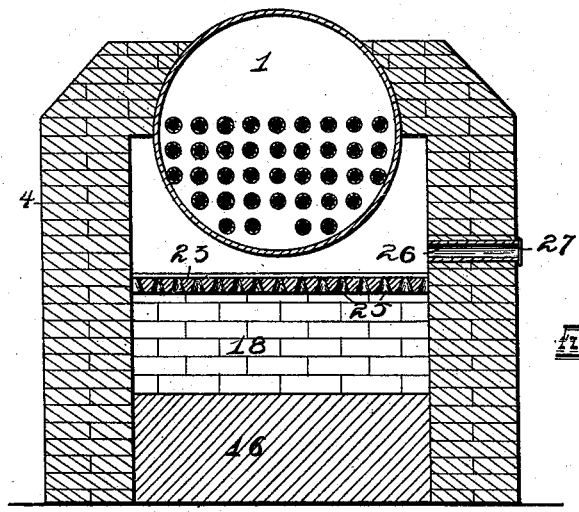


Fig. 6

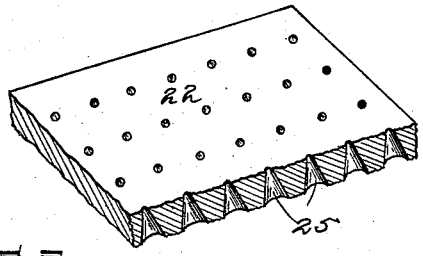


Fig. 7

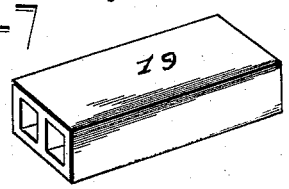
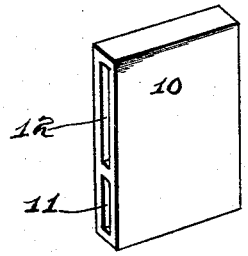


Fig. 8



WITNESSES

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JOHN MYERSCOUGH, OF ST. LOUIS, MISSOURI.

SMOKELESS BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 522,380, dated July 3, 1894.

Application filed July 17, 1893. Serial No. 480,728. (No model.)

To all whom it may concern:

Be it known that I, JOHN MYERSCOUGH, of St. Louis and State of Missouri, have invented certain new and useful Improvements in Smokeless Boiler-Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to an improvement in a "smokeless boiler-furnace" and consists in the new and novel construction and combination of parts as will be more fully hereinafter described and set forth in the claims.

The object of my invention is to combine certain applied principles, the result of which produces a smokeless furnace, at the same time providing means for bringing about this result.

I am aware of the large number of so called smokeless furnaces which are in use, but find that they are not successful from many points of view. The principal objection seems to lie in the cost of installation which is followed by a continuous expense in order that the plant will be operative. Other smoke-consuming furnaces require an increased amount of fuel in order that their function will be successfully fulfilled; therefore an increased amount of labor is necessary to handle the fuel and the refuse therefrom. It will therefore be seen that in order to produce a furnace of this class which will be a success in every respect, the above objections must be taken into consideration and overcome in order to produce the desired results.

Having been engaged in the setting of boilers for a long term of years, I believe that my experience has enabled me to construct a smoke-consuming furnace which is in all respects superior to the present style.

It is well known that soft bituminous coal contains a large percentage of gas, which is extracted when the coal is subjected to a high degree of heat. This gas if properly retorted is under a pressure which causes it to pass through certain openings provided under the boiler, become ignited and assist in the function of the furnace as well as consume the smoke which passes on its way to the rear end of the boiler.

I propose to show that a large percentage of fuel is saved, that a diminished amount of labor for handling fuel and its refuse is necessary, and that the furnace as constructed after the method of my invention will bring about better results than others heretofore tried.

Practical experiments with furnaces set up as per my invention, prove all of the claims which I make for it in operation and the statements herein are all based upon the results of careful examinations made while the furnace is in operation.

In the drawings: Figure 1 is a longitudinal vertical sectional view taken through the boiler furnace and showing the relative location of all parts. Fig. 2 is a vertical transverse sectional view of the boiler and setting as seen on the line A—A in Fig. 1. Fig. 3 is a vertical transverse sectional view taken on a line B—B in Fig. 1. Fig. 4 is a longitudinal cross-section taken on the line D—D in Fig. 1. Fig. 5 is a vertical transverse sectional view as taken on the line C—C in Fig. 1. Fig. 6 is an enlarged perspective view of a portion of the burner-plate. Fig. 7 is an enlarged perspective view of one of the hollow, partitioned tiles used in the construction of the retort walls. Fig. 8 is an enlarged perspective view of one of the tiles made use of in the construction of the fire-wall.

Referring to the drawings: 1 indicates a boiler of the ordinary tubular pattern, which is mounted in the usual manner upon brick work, the majority of which is constructed after the method peculiar to my invention. The front wall 2, the rear wall 3 and side walls 4 are provided as is usual in boiler setting. The front wall is provided with a fire-door 5 and ash-door 6 and the grate bars 7 are supported in the usual manner above the ash pit 8, by the front wall 2 and the fire-wall 9 which extends from side to side between the walls 4. The fire-wall 9 above the grate-bars 7, is constructed of a peculiarly formed tile 10, said tiles having their longest dimension in a vertical plane and provided with two rectilinear openings 11 and 12 which extend through said tile from front to rear. The opening 11 is one half the height of the opening 12 which is located above said opening 11, or to be more exact, I have found that the opening 11

should be about three and the opening 12 about six inches in height. As these tiles are of considerable length, it is only necessary that they be laid in one course across the furnace, and upon the upper extremity of the wall thus formed is laid a dead-wall 13, which lies in a horizontal plane and is composed of a number of long fire bricks 14. The top of this wall or plate is about four inches under the shell of the boiler 1 and its inner end is laid upon a retort wall 15 which extends the width of the furnace and substantially about two feet in the rear of the fire-wall 9. Said wall 15 is built upon the foundation 16 of the furnace.

Located substantially about two feet in the rear of the retort wall 15 is another similarly constructed wall 17, adapted to serve the same function and built of the same material which I will now proceed to describe. Said tiles consist of rectangular shaped blocks about the size of an ordinary fire brick and are provided with two rectangular openings running throughout their length. These tiles are preferably laid upon their flat sides, with the length extending from front to rear. Located back of the wall 17 is a dead-wall 18 made of ordinary fire brick. The above measurements are the approximate ones taken from the setting of a sixty inch boiler, and it will therefore be seen that the lengths of the chambers formed by the walls 9, 15, 17 and 18 are between five and a half and six feet in length between the two side walls 4 of the construction.

The tiles 19 of which the walls 15 and 17 are made, as well as the tiles 10 and the fire brick must be made from the best tempered material and baked especially to withstand the effects of high temperature.

It has been said that the dead-wall 13 covers the chamber 20 formed between the fire-walls 9 and the retort wall 15 located back of the same and to provide a cover for the middle retort chamber 21 I have made use of a plate 22 which is canted from rear to front, that is its rear end is higher where it sets upon the wall 17 than the front end which sets upon the wall 15. A similar plate 23 forms the top of the chamber 24 between the retort wall 17 and the dead-wall 18, this plate being located similarly to the plate 22 which forms the top of the chamber 21. Both of said plates 22 and 23 are provided with conical shaped openings 25 which are regularly outlined throughout the plates, their centers being about three inches distant from each other. The small ends of these openings terminate in the upper surface of the plates, their lower extremities being open and flaring. The centers of the openings 25 are in a perpendicular line, if the plate were lying in a horizontal position, but as they are slightly tilted up at their rear extremities, said openings are consequently inclined in such a manner that the flame coming from the same points toward the forward end of the boiler at a slight angle thereby engaging the smoke before it reaches the starting point of the flame or in a line therewith.

In Figs. 1 and 5 it will be noticed that I have provided a number of horizontal flue openings 26 which are provided upon their outer extremities with dampers 27 which are used to increase, diminish or totally shut off the draft and is used in connection with the stack-damper.

It is a well known fact that about 800° of heat are required to form the coal gas, but in my improved furnace I have found that the heat oftentimes reaches an approximate heat of 1,600°, with an average something a little below this figure. This heat is reached in the chamber 20 by the passage of the heat from the fire upon the grate-bars 7 through the openings 11 and 12 in the tiles 10. The heat generating the gas, causes it to act under pressure in the chamber 20 and pass through the openings in the tiles of which the wall 15 is made, into the chamber 21 and then pass upward through the openings 25 in the plate 22. The travel of the gas is continuous from the chamber 20 into the chamber 21 and through the wall 17 into the chamber 24. The chambers form what I term retorts for the reason that the gas is continuously under process of extraction from the smoke.

The openings 11 in the tiles 10 are as above stated, smaller than the openings 12 which are located above the same and I find that the majority of the heat passes through the smaller openings as they are in a more direct line with the fire. Part of the smoke passes through the openings 12 and into the chamber 20, but that part of it which does not, passes over the plate 13 and is consumed by the ignited jets of gas escaping through the openings 25. I have found that within one hour after the fire is started, the gas is under full pressure and as soon as the flame leaping over the plate 13 comes in contact with the gas from the burners, the furnace is in full operation. I have also found that for a period of twenty-four hours, approximately, the gas remains in the retorts and that for this length of time a slow and steady heat can be maintained even after the fire has been taken off the bars. With this invention it will therefore be seen that a steady heat can be kept up under the boiler even if the fire should become run down and it therefore requires no expert fireman to handle the furnace. It will now be seen that as the ignited gas assists in the heating of the boiler the amount of coal necessary is only about one half of what would be required in case the boiler were fired direct. This means a diminished amount of labor necessary to handle the fuel, the refuse therefrom and as the even pressure of the steam does not depend upon the fire alone, it is not necessary to have expensive labor to attend to the boiler and fire.

Take for example a "steam jet" consumer we find that it takes an experienced fireman

to keep the fire in a certain condition in order that the pressure of the boiler will not decrease and if such should happen, the entire working of the furnace and boiler would become demoralized. The cold air circulating through the flues 26 and under the boiler assists in carrying the gas into the retort chambers and also aids in its combustion. If it is found that too much gas is being generated, the supply can be diminished by partially closing the dampers 27, so it will be seen that the operation of the furnace is always under perfect control.

In Fig. 3 I have shown by means of dotted lines, the manner in which I would place the draft openings or passages in case my improvement were being used with a battery of boilers, said flue leading from a point above the boiler down along the partition wall to the heating chamber under the boiler.

The fire wall 9, dead-plate 13, retort walls 15 and 17, dead-wall 18, and burner-plates 22 and 23 become so thoroughly heated in a short while after the furnace is in operation that they alone would keep up the steam in case the fire were to get low.

It is now believed that I have given a careful and thorough description of my invention, its principles and operation and have demonstrated my claims for improvement.

Having fully described my invention, what I claim as new is—

1. An improved smokeless boiler furnace having a fire-wall provided with openings through which the majority of heat and smoke is adapted to pass, the heat adapted to extract the gas from the fire and smoke, said gas retorted in a plurality of chambers divided by walls having aligned openings therein, plates surmounting said chambers, said plates provided with forwardly projecting burner-openings from which the ignited gas issues in jets, said jets projecting forwardly and adapted to consume the escaping smoke and assist in heating the boiler, substantially as set forth.

2. An improved smokeless boiler furnace having a fire wall which above the grate bars, is constructed of tiles, each of which has two rectilinear openings extending throughout its length, the upper of said openings substantially about double the height of the lower opening, a chamber formed in the rear of said fire wall, the rear wall of said chamber constructed of tiles having a number of rectilinear openings throughout their length, a retort chamber located in the rear of the perforated wall and having a rear wall similarly constructed, an additional retort chamber in the rear of the central chamber, a dead wall forming the back of same, and the two retort chambers provided with top plates having a number of conical shaped openings through which the gas issues and ignites to consume the escaping smoke and assist in heating the boiler, substantially as set forth.

3. An improved smokeless boiler furnace having a plurality of retort chambers located in the rear of the fire wall, canted plates forming the top of said chambers except the one adjacent said fire wall, said canted plates provided with a number of conical shaped openings the apexes of which extend through the upper surfaces of the said plates, the jets of ignited gas issuing from said openings projecting at an angle toward the boiler and the front of the furnace to consume the smoke which escapes above said plates, and draft openings provided with suitable dampers, to control the inlet of cold air into the furnace, substantially as set forth.

4. An improved smokeless boiler furnace having a fire-wall in which a plurality of openings which are located to allow the passage of heat and smoke into a chamber located in the rear of said fire-wall, said chamber covered by an imperforate plate, retort chambers located in the rear of said chamber, numerous passages through the walls separating said chambers, burner-plates surmounting said chambers, and the heat passing into the chamber in the rear of the fire-wall adapted to remove the gases from the smoke and fire, pass the same under pressure into the retort chambers and burn the same through the burner-plates, to heat the boiler and to consume the escaping smoke, substantially as set forth.

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

JOHN MYERSCOUGH.

Witnesses:
HERBERT S. ROBINSON,
ALFRED A. EICKS.