

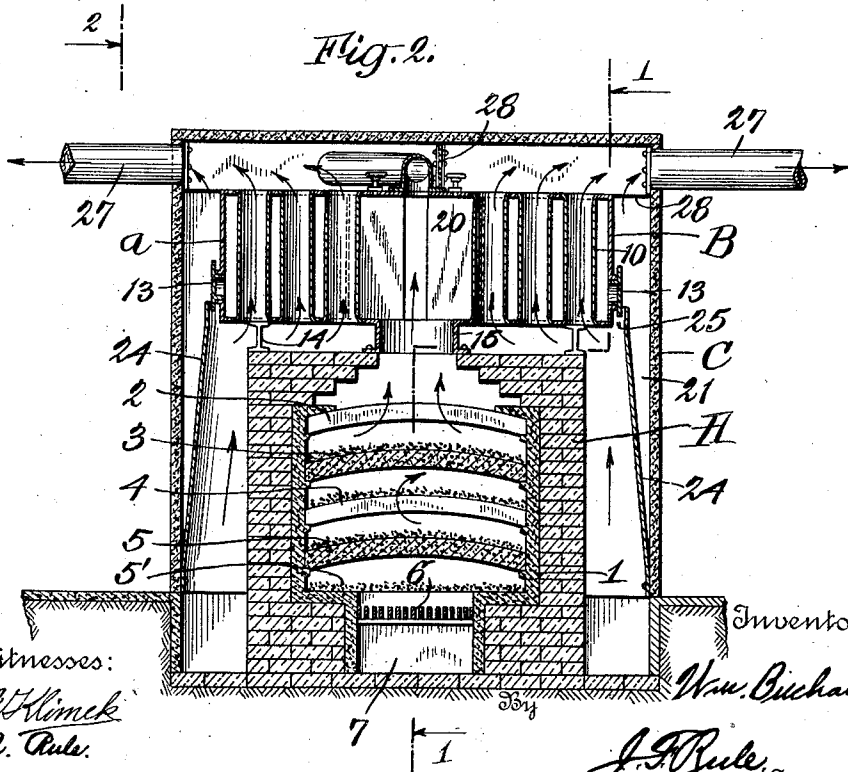
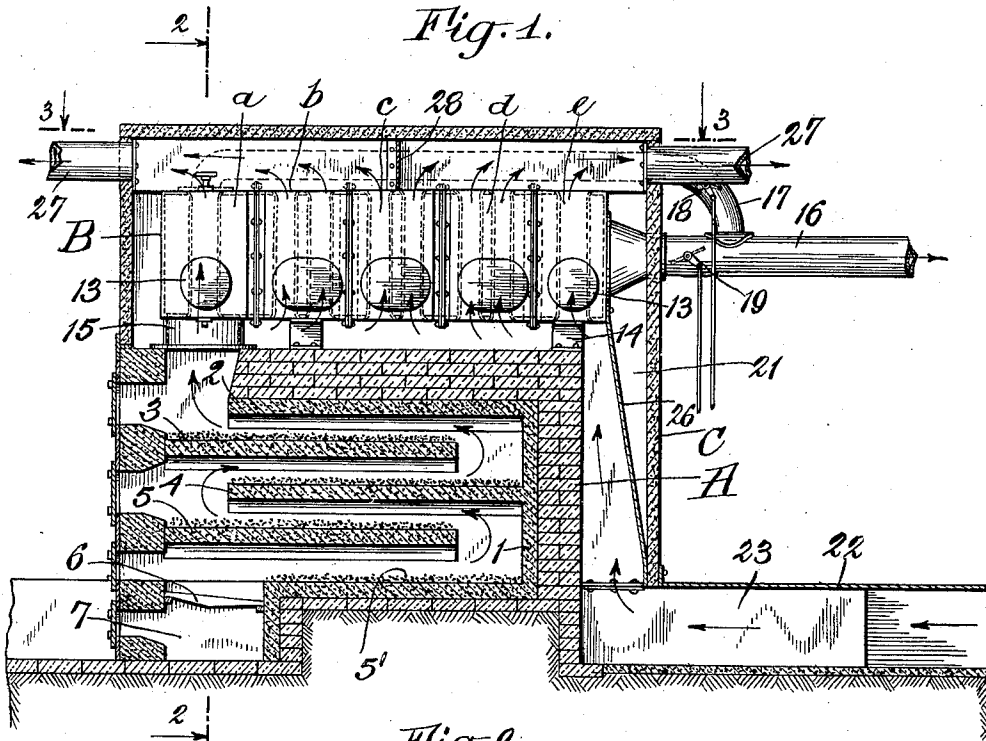
W. BUCHANAN.
FURNACE.

APPLICATION FILED OCT. 14, 1909.

991,269.

Patented May 2, 1911.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 3.

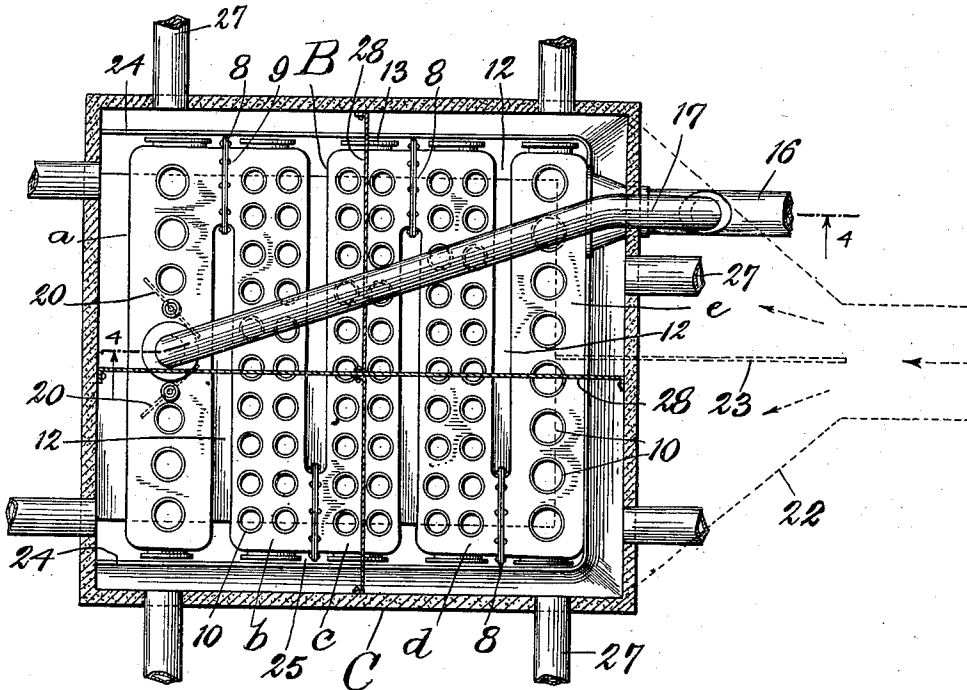
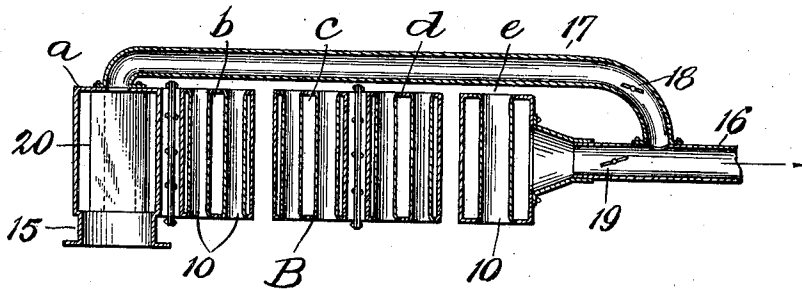


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM BUCHANAN, OF BROOKLYN, NEW YORK.

FURNACE.

991,269.

Specification of Letters Patent.

Patented May 2, 1911.

Application filed October 14, 1909. Serial No. 522,581.

To all whom it may concern:

Be it known that I, WILLIAM BUCHANAN, residing at Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Furnaces, of which the following is a specification.

My invention relates to hot air furnaces and particularly to means for radiating and transmitting the heat generated in the furnace to the air which is to be used for heating purposes.

An object of the invention is to provide means to secure a good circulation of the air and at the same time utilize a large proportion of the heat produced in the furnace.

Other objects of the invention and the exact nature thereof will appear hereinafter, the scope of the invention being defined in the appended claims in which are set forth the novel combinations of elements.

Referring to the accompanying drawings, Figure 1 is a sectional side elevation of a furnace embodying my invention, the view being taken substantially as indicated by the line 1—1 of Fig. 2; Fig. 2 is a front sectional elevation taken on the plan indicated by the line 2—2 of Fig. 1; Fig. 3 is a sectional plan view as indicated by the section line 3—3 of Fig. 1; Fig. 4 is a sectional view of my improved radiator or "drum", substantially as indicated by the line 4—4 of Fig. 3.

The invention as herein shown is combined with and forms part of a furnace which is adapted for burning culm or other comminuted material. The body portion or combustion chamber is similar to that shown in the patent to Kriebel, No. 820,931, for furnace for burning comminuted material, May 15, 1906.

The body A may be built of fire brick, and has an inner lining 1 of fire clay. Within the combustion chamber are shelves or trays 2, 3, 4, 5, and a floor 5' also made of fire clay. Below these shelves is a fire grate 6 and an ash pit 7.

Located above the combustion chamber is my improved form of "drum" or radiator B through which the smoke and other gaseous products of combustion are adapted to circulate. This radiator is made of sheet metal and comprises a series of sections a, b, c, d and e connected so as to form a zig-zag passage through the radiator for the gases of combustion. The sections are preferably removably connected together by joints 8

which may be ordinary lap joints. Bolts or rivets 9 may be used to secure the sections together.

Each section of the radiator is provided with a number of vertical tubes or pipes 10 extending therethrough. The number, size, and arrangement of these tubes may be varied as desired, or as may be necessary to secure the best results with the particular furnace with which they are used. These tubes are for the purpose of transmitting the heat from the furnace gases to the fresh air which is circulated through the tubes. Air spaces 12 are provided between the sections of the radiator to increase the heat radiating surface. Each section of the radiator is provided with clean-out openings having removable caps 13.

The radiator is mounted on supports 14 so as to leave a space between the body of the furnace A and the radiator sufficient to permit a free circulation of air beneath the radiator. The combustion chamber is in communication with the interior of the radiator through a short pipe section 15 in the front section a of the radiator. The furnace gases after passing through the radiator are carried away through the pipe 16. A direct draft pipe 17 extends from the section a to the pipe 16 and is closed during the normal operation of the furnace by a damper 18. This damper is opened in starting the fire or when the fire is low and it is desired to bring it up quickly. A damper 19 is placed in the pipe 16 which may be closed when the direct draft is open. Dampers 20 may also be placed in the section a in position to form a direct passage from the combustion chamber to the pipe 17, and prevent a local circulation of the gases in the radiator when these dampers are closed.

The parts A and B are inclosed in an outer casing or housing C which may be made of asbestos, fire brick, or other suitable heat insulating material. This casing is of sufficient size to leave an air space 21 between the furnace and the rear and side walls of the casing. The cold air box 22 opens into this space at the rear of the furnace, and a partition 23 is extended rearwardly from the furnace through the center of the cold air box. This partition may be extended upward within the casing C to the radiator.

The radiator B is preferably somewhat wider than the body A of the furnace so

that some of the tubes 10 may extend over the air space 21. Inclined deflector plates 24 extend from the side walls of the casing C upwardly toward the radiator. Narrow spaces 25 are left between the radiator and these plates to permit a portion of the cold air to come in direct contact with the end surfaces of the radiator sections. These spaces may be made narrower than shown, or omitted if desired. The air spaces 21 may also be made much narrower where it is desired to reduce the size of the casing C. A deflector plate 26 similar to the side plates 24 is placed at the rear of the furnace but is preferably in direct contact at its upper end with the radiator.

Hot air pipes 27 lead from any convenient points in the upper portion of the casing C to the rooms or compartments to be heated. The space between the upper surface of the radiator and the top of the casing C may be divided into sections by means of partitions 28, so that all the heated air passing upward through the portion of the radiator directly below any given section will be directed to the pipe or pipes leading from said section. In this way an even distribution of the heated air is insured, and the tendency usually found in hot air furnaces for all the hot air to flow through the pipes leading to the nearest rooms, is overcome. If desired, the hottest air may be directed to the most distant rooms. The position and number of partitions used may be widely varied to suit the various conditions found in practice. In many cases satisfactory results will be obtained without the use of these partitions.

When the furnace is in use, there is a layer of ignited fuel on each of the trays 2, 3, 4, 5 and the floor 5'. That on the floor 5' has been in the furnace the longest and when it is practically burned out is pulled forward into the ash pit. The fuel on the tray 5 is now pushed back and distributed on the floor 5'. The fuel on the trays 4, 3 and 2 is in like manner transferred to the trays 5, 4 and 3 respectively, and a fresh charge of fuel is placed on the uppermost tray 2. A fresh supply of fuel is introduced in this manner once a day or at longer or shorter intervals as may be necessary. The heated gases of combustion enter the radiator R through the pipe 15, and as they circulate through the radiator impart their heat to the walls of the radiator and the tubes 10 so that when the gases enter the pipe 16 they are comparatively cool. The fresh air enters through the cold air box 22 and passes freely to the back and sides of the furnace, and is directed to the radiator by the deflector plates 24 and 26. The partition 23 divides the air substantially equally between the two sides of the furnace. The air circulates beneath the radiator and passes upward through the tubes 10 and the spaces 12

between the sections of the radiator, a small portion also of the air passing directly upward through the narrow spaces 25 and past the end walls of the radiator sections.

My improved form of radiator permits a large volume of fresh air to circulate freely through the furnace, and at the same time presents a large radiating surface with which the air is brought in contact. There is but little draft required through the combustion chamber, and the heat of the gases of combustion as they enter the radiator is intense. As these gases pass through the radiator they are brought into contact with a large area of the metal forming the radiator, so that there is ample opportunity for the heat to be transmitted to the fresh air, and only a small percentage of the heat is lost through the smoke pipe 16.

The radiator may be of sheet iron, copper, cast iron, or other suitable heat conducting material. If desired, corrugated cast iron or sheet metal may be used to increase the heat radiating surface.

The number of sections comprising the radiator, and their shape and size, as well as the number of tubes 10, may be varied within wide limits. In some cases it may also be found desirable to use a plurality of these radiators placed one above another.

Although the radiator as shown is located above the combustion chamber, it will be understood that it could be used at the sides, front or back of the combustion chamber.

Various other changes in the details of construction and arrangements of parts might be made without departing from the spirit and scope of my invention, and I wish therefore not to be limited to the particular construction disclosed.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a furnace, the combination of a combustion chamber, a heat radiator located over said chamber and separated therefrom by a narrow horizontal space, said radiator comprising a plurality of rectangular sections arranged substantially in the same horizontal plane and forming a continuous, tortuous, horizontal passage for the products of combustion extending substantially throughout the radiator, one end of the radiator communicating with the combustion chamber, said sections being separated by narrow spaces and also provided with a plurality of vertical passages for the outside air.

2. In a furnace, the combination with a combustion chamber, of a horizontally disposed radiator located over and spaced from said chamber, said radiator comprising a series of horizontal rectangular sections connected to form a continuous, horizontal, zig-zag passage for the products of combustion extending substantially throughout the ra-

diator, said passage being in communication at one end with the combustion chamber, the sections being separated by narrow spaces, said radiator also being formed with tubes extending upwardly therethrough, and an outer casing inclosing said parts and forming a means for directing the fresh air to the space between the said chamber and radiator and upwardly through said tubes and narrow spaces.

3. In a furnace, the combination with a body portion forming a combustion chamber, of a heat radiator located over said body portion, an outer casing inclosing said parts and providing spaces between the rear and side walls of the casing and combustion chamber, a vertical partition separating the spaces on opposite sides of the combustion chamber, a cold air box opening into said spaces at the rear of the furnace, and a partition forming an extension of said vertical partition and extending into the cold air box and beyond the said outer casing.

4. In a furnace, the combination of a com-

bustion chamber, a heat radiator located over said chamber and separated therefrom by an unobstructed horizontal space for the free circulation of air, said radiator being formed with numerous vertical passages for the upward circulation of the air, an outer casing inclosing the combustion chamber and radiator and forming a space between the top of the casing and the radiator, partitions in said space separating it into a plurality of compartments, and hot air pipes leading from said compartments, a cold-air box and a partition separating the space between the combustion chamber and casing on opposite sides of the furnace, said partition extending into said cold-air box.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM BUCHANAN.

Witnesses:

EDWARD F. DALEY,
MARY PHILLIPS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
