P. STIPP.

FURNACE.

APPLICATION FILED SEPT. 5, 1908.

971,416.

Patented Sept. 27, 1910.

3 SHEETS—SHEET 1.

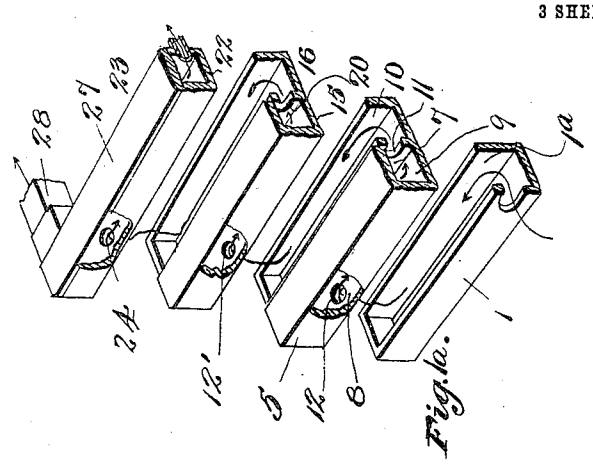

Fig. 1a.

Fig. 1.

WITNESSES

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3 SHEETS—SHEET 2.

Fig. 2.

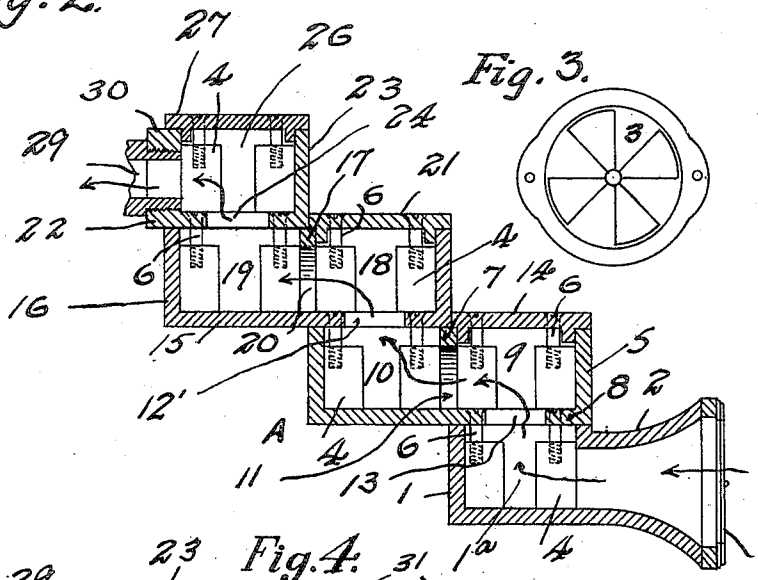


Fig. 3.

Fig. 4.

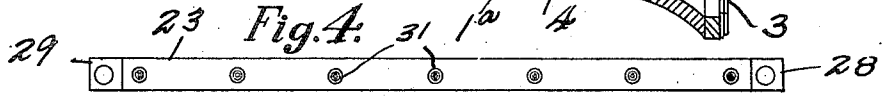


Fig. 5

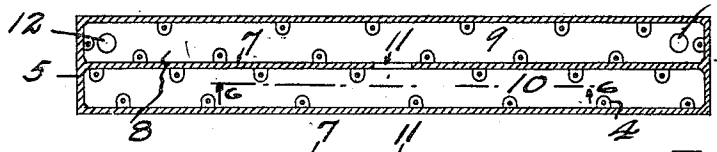


Fig. 6.

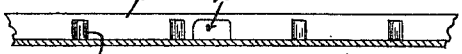


Fig. 7.

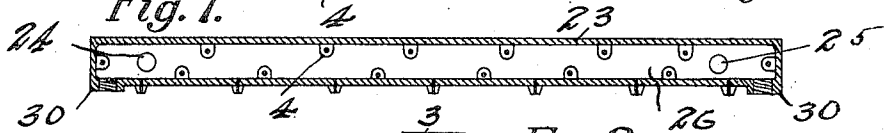
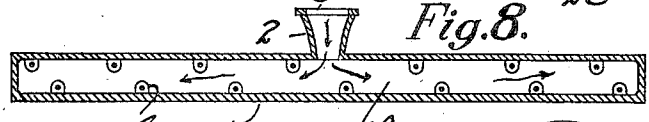


Fig. 8.



WITNESSES:

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3 SHEETS—SHEET 3.

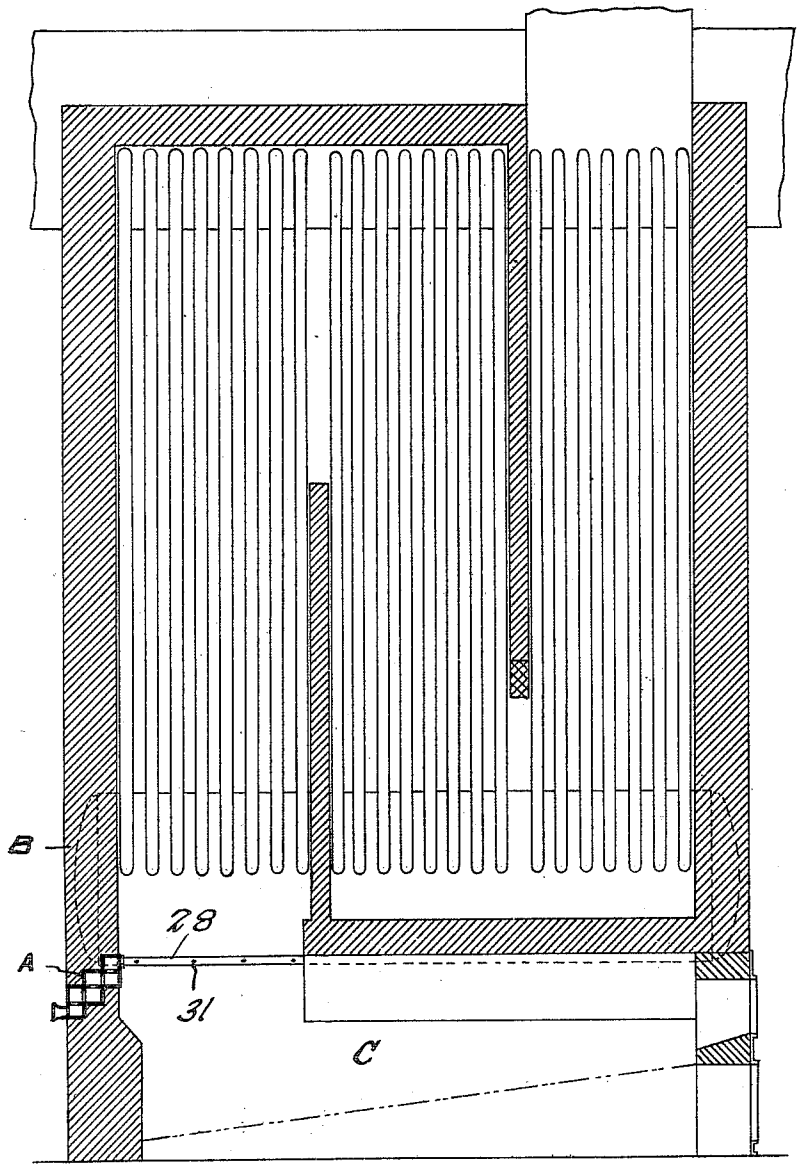

Fig. 9.

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UNITED STATES PATENT OFFICE.

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FURNACE.

971,416. Specification of Letters Patent. Patented Sept. 27, 1910.

Application filed September 5, 1908. Serial No. 451,886.

To all whom it may concern:

Be it known that I, PETER STIPP, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

The present invention relates to improvements in furnaces and applies particularly to a device for consuming the escaping gases and other products of combustion in a boiler furnace.

In the practical application of my invention to a furnace, I provide means for introducing oxygen, from the atmosphere, to the combustion chamber of the furnace, in a superheated condition. The superheated air is drawn into the combustion chamber, above the fire, where it is mixed with the gases of combustion, and the commingling of the contained oxygen and carbonaceous gases, produces a highly inflammable mixture which is ignited by the fire and completely consumed. In this manner the gases of combustion are disposed of before leaving the combustion chamber, and the resultant heat from the consumption of the same is utilized, thereby increasing the heating capacity of the furnace to that extent, and at the same time economizing in the consumption of fuel.

The invention consists mainly in an air superheater suitably located in the fire wall or covering of a boiler furnace, provided with an air inlet from the atmosphere and suitable outlets opening into the combustion chamber of the furnace, and an essential feature of the device is the construction of heating chambers whereby the air is drawn into the superheater and heated in currents and travels through these several chambers before reaching the combustion chamber thus preventing the admission of the cold air to the furnace, and insuring a flow of heated air to the combustion chamber.

The invention further consists in certain novel features of construction and combinations and arrangements of parts as will be hereinafter described and more clearly pointed out in the claims.

In the accompanying drawings I have illustrated one example of the physical embodiment of the invention constructed according to the best mode I have so far devised for practical application of the principles.

Figure 1 is a plan view of the superheater and connections. Fig. 1ª is a view showing portions of the air superheater in section, detached, to illustrate the general arrangement of parts. Fig. 2 is a sectional view of Fig. 1. Fig. 3 is a face view of the regulator or damper for the admission of air to the superheater. Fig. 4 shows the ends of two legs and a face of the casting forming the upper chamber of the superheater. Fig. 5 is a horizontal section of one of the castings of the superheater embodying two chambers. Fig. 6 is a section taken at line 6 6 Fig. 5. Fig. 7 is a horizontal sectional view of the uppermost or inner casting. Fig. 8 is a similar view of the lowermost or outer casting forming chambers of the superheater, and Fig. 9 is a vertical sectional view of a boiler and furnace, illustrating the application of my improvements thereto.

The views represented by the above figures of drawings are on different scales to more conveniently illustrate the invention. The sectional view disclosed in Fig. 2 is taken on an irregular line in order to more clearly bring out the travel of air from the exterior to the interior of the furnace.

The superheater A is located in the fire-wall or covering B of the furnace C and consists of a series of hollow metallic castings forming chambers, arranged preferably in a step-like formation or a diagonal course, one superimposed above the other, and each in communication with the other. The lower, outermost casting 1 is open at its top and provided with a nozzle 2, which is equipped with a suitable damper or regulator 3 for the admission of air to the chamber 1ª. The casting 1ª is provided with threaded lugs 4 by means of which it is secured to the adjoining casting 5 by bolts or screws 6. These connecting lugs and bolts are identical throughout the construction of the superheater and will not require further description.

The casting 5 is imposed upon casting 1, the outer half forming a cover or top for the chamber 1ª. A partition or baffle wall 7 divides the casting into two longitudinal chambers 9 and 10, and these chambers have communication with each other through the opening 11 in the partition 7. The portion 8 of the bottom which forms the cover for the chamber 1ª has an orifice or opening 12 and 13 located near its ends and these openings provide communication between cham-

bers 1^a and 9. The chamber 9 is provided with a top or cover 14, and the open chamber 10 is closed by the outer half of the bottom 15 of the casting 16. The casting 16 is similar in construction to the casting 5, being provided with orifices 12′ and 13′ and a partition 17 forming chambers 18 and 19, and the partition or baffle wall has a central orifice 20 establishing communication between the two chambers. The chamber 18 is closed by top 21 and the chamber 19 is closed by the bottom 22 of the casting 23. Two orifices 24 and 25 are present in the bottom 22, similar to the orifice in castings 5 and 6 and the chamber 26 is closed by top 27.

With reference to the drawings (Fig. 9) it will be observed that the inner wall or face of casting 23 is flush with the face of fire wall or covering at the back of the furnace. This casting is provided with a leg 28 and 29 each located at the ends of the casting and communicating with the chamber 26. These legs extend along the sides of the fire wall bounding the combustion chamber of the furnace and are preferably flush with the faces thereof. It will thus be seen that the superheater is disposed about the three sides of the combustion chamber. The two legs or extensions 28 and 29, which are preferably pipes, threaded into lugs 30 on the casting 23, and the casting itself, are each formed with integral nipples, nozzles, or short pipes 31, which project slightly beyond the fire wall, toward the combustion chamber. The number and diameter of these nozzles may be varied to suit different conditions, but in all cases they are intended to discharge superheated air into the gases of combustion in the combustion chamber.

In operation the air from the atmosphere is drawn through the regulator or damper by the draft of the heat generated from the fire, or if the draft is not sufficient the air may be forced into the nozzle 2. The currents of air travel in the general direction indicated by the arrows in Fig. 2, but the actual distance of travel is greatly increased by the interposition of the partitions, and orifices in the bottoms of the heating chambers. Thus the currents of air enter chamber 1^a as indicated in Fig. 8 and traveling toward the ends of the chamber pass through the orifices 13 and 14 in bottom 8 at the ends of the chamber 9; thence toward the center of said chamber and through the central orifice 11 in chamber 10, where they again spread toward the ends of said chamber and rise through orifices 12′ and 13′ into chamber 18, traveling back toward the central opening 20 into chamber 19, and spreading toward the ends of said chamber up through opening 24 and 25 into chamber 26; thence into extensions 28 and 29, and out through the nozzles 31 into the combustion chamber.

Through the medium of the superheater the air enters the combustion chamber at approximately the degree of temperature of the fire itself, and such introduction of heated air has not the dampening effect on the fire as would cold air.

By distributing the heated air through small nozzles 31 the oxygen is forced into the mass of gases above the fire from all sides of the combustion chamber of the furnace with the result that the whole mixture is rendered inflammable and none of the gases escape combustion, thus disposing of the gases before they leave the combustion chamber.

What I claim as new and desire to secure by Letters Patent is:—

1. The combination in a furnace with the combustion chamber and a firewall thereof, of a series of unitary, hollow, structures forming chambers arranged in step-like formation, the lowermost chamber having an inlet from the atmosphere and the uppermost chamber opening into the combustion chamber, and the lower walls of the upper and intermediate chambers forming perforated closures for a portion of the chamber beneath.

2. An air superheater comprising a series of hollow unitary, structures superposed in step-like formation and forming chambers located in a firewall and combined with the combustion chamber of a furnace, the lower walls of the upper and intermediate chambers forming perforated closures for a portion of the chamber beneath, hollow angular extensions connected to the uppermost chamber, the lowermost chamber being open to the atmosphere, and the uppermost chamber and said extensions open to the combustion chamber.

3. The combination in a furnace with the combustion chamber and a firewall thereof, of a series of unitary, hollow, structures forming chambers arranged in step-like formation, the lower chamber having an inlet from the atmosphere and the uppermost chamber opening into the combustion chamber, the lower walls of the upper and intermediate chambers forming perforated closures for a portion of the chamber beneath, and vertically arranged longitudinally extending walls formed in the intermediate chambers and perforated near their centers.

4. An air superheater comprising a series of superposed chambers in step like formation, the upper walls of the lowest and the intermediate chambers being perforated near their ends, vertically arranged longitudinally-extending partitions formed in the intermediate chambers and perforated midway their lengths to permit passage of air currents through said upper walls and partitions, an air inlet to the lowest chamber, and outlets from the uppermost chamber.

5. An air superheater comprising a series of chambers located on ascending levels, the upper walls of the lowest and intermediate chambers being perforated near their ends, and vertically arranged longitudinally-extending partitions dividing the intermediate chambers and perforated midway their length to permit passage of air currents through said perforated walls and partitions, an air inlet to the lowest chamber, outlets from the uppermost chamber, and angular extensions connected to said uppermost chamber and provided with outlets.

6. An air superheater comprising a series of superposed chambers in step like formation, an inlet to the lowest chamber and outlets from the uppermost chamber, a perforated vertically arranged longitudinally-extending wall separating each intermediate chamber into compartments, and openings in the upper walls of the lowest and intermediate chambers, to create an upward draft throughout the superheater.

7. An air superheater comprising a series of hollow, unitary structures, superposed in step-like formation and forming chambers, of which the lowermost has an inlet opening and the uppermost is provided with outlet openings, a perforated wall separating each intermediate chamber into compartments, and openings through the upper walls of the lowermost and intermediate chambers, and hollow angular extensions connected to said uppermost chamber and provided with outlets.

8. The combination in a furnace with the combustion chamber and a firewall thereof, of a series of unitary, hollow, structures forming chambers arranged in step-like formation, the lower walls of the upper and intermediate chambers forming perforated closures for a portion of the chamber beneath, vertically arranged longitudinally extending walls formed in the intermediate chambers and perforated near their centers, hollow angular extensions connected to the uppermost chamber, a suitable inlet and outlets being provided for the passage of air currents.

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

PETER STIPP.

Witnesses:
CHAS. K. DAVIES,
H. P. HOWARD, Jr.