

Aug. 18, 1925.

H. B. CANNON

OVEN OR FURNACE

Filed May 14, 1924

1,550,340

3 Sheets-Sheet 1

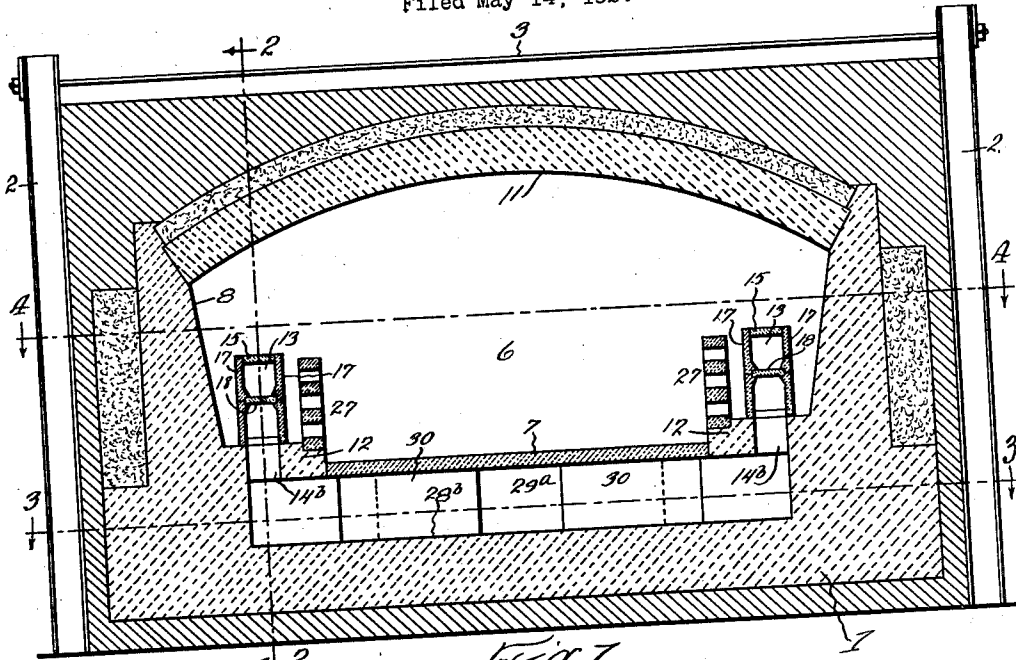


Fig. 1

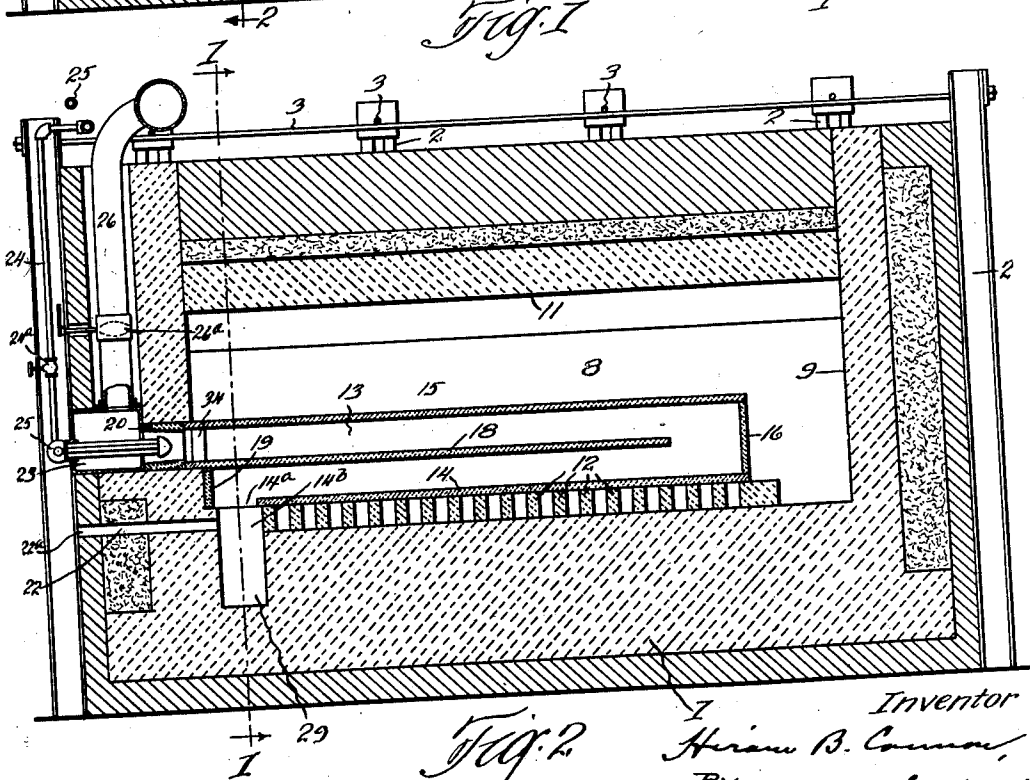


Fig. 2

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3 Sheets-Sheet 2

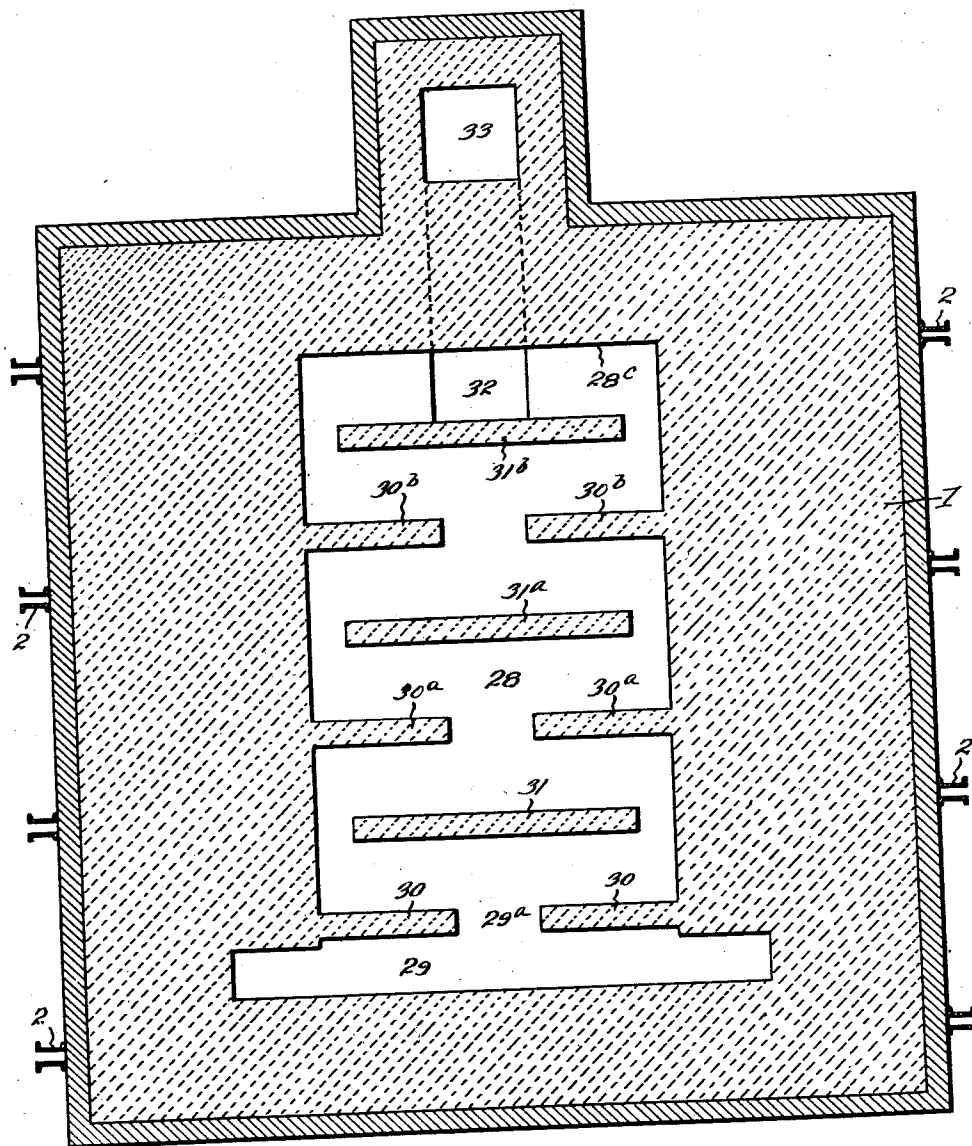


Fig. 3

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3 Sheets-Sheet 3

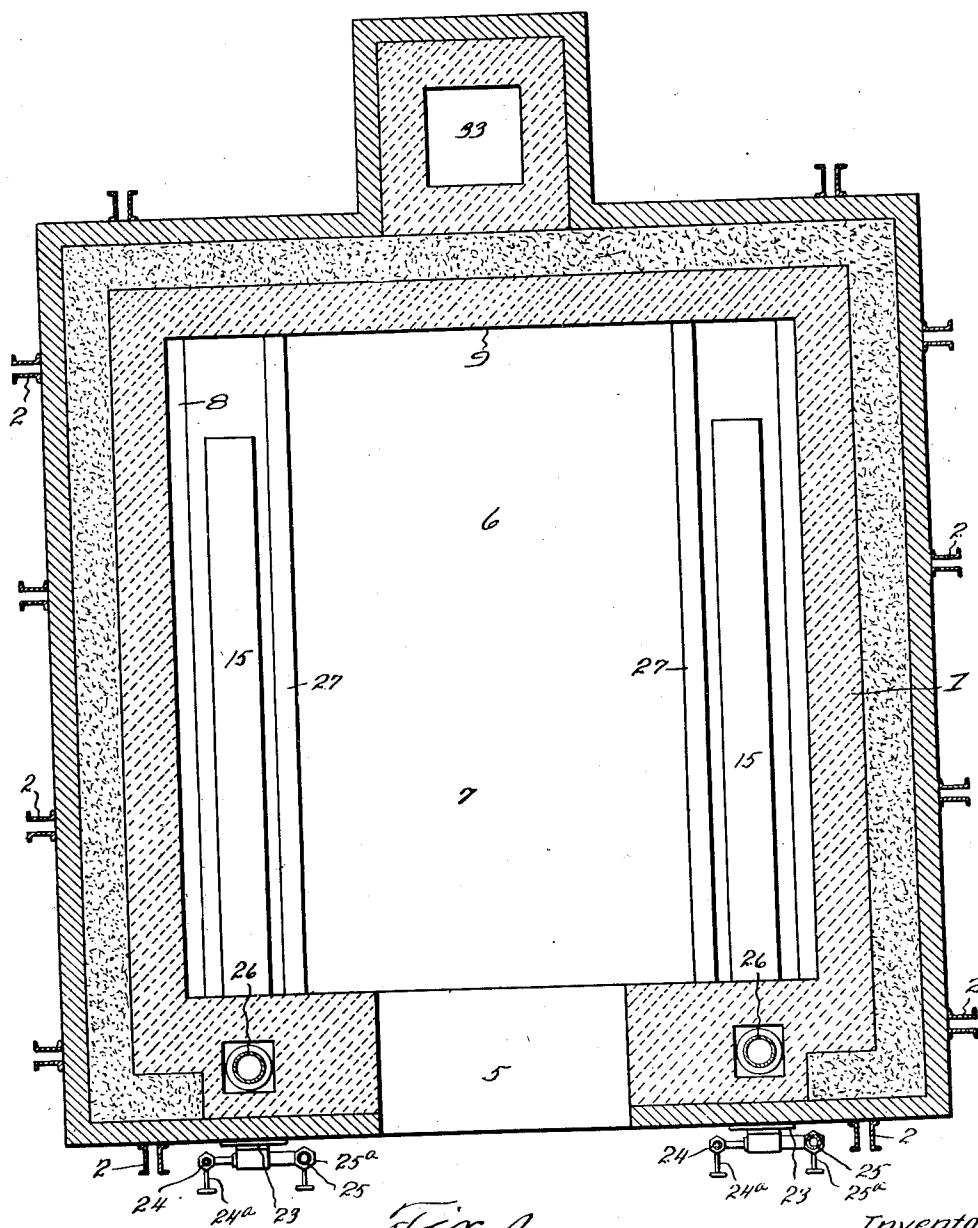


Fig. 4

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Patented Aug. 18, 1925.

1,550,340

UNITED STATES PATENT OFFICE.

HIRAM B. CANNON, OF METUCHEN, NEW JERSEY, ASSIGNOR OF ONE-HALF TO JOHN W. CANNON, OF BROOKLINE, MASSACHUSETTS.

OVEN OR FURNACE.

Application filed May 14, 1924. Serial No. 713,189.

To all whom it may concern:

Be it known that I, HIRAM B. CANNON, a citizen of the United States, residing at Metuchen, in the county of Middlesex and State of New Jersey, have invented a certain new and useful Improvement in Ovens or Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to furnaces or ovens which are designed for the heating of articles out of direct contact with products of combustion; and, in the form disclosed herein, is particularly well suited for the heating of enameled articles.

It is the general purpose and object of the invention to provide a furnace or oven of this character which is so constructed and the parts of which are so arranged as to secure uniform heating of the interior thereof, at any temperature desired, within a wide range. A further object of the invention is to enable the heating of a furnace or oven of this character to be accomplished in a most efficient manner, in conjunction with radiant heat. A further and more limited object of the invention is to provide a furnace or oven of this character wherein the heating is accomplished by and in conjunction with one or more interiorly heated combustion chambers formed principally of material of high heat-conducting and heat-radiating qualities (such as silicon carbide) and wherein the radiant heat from such chamber or chambers is utilized not only to heat uniformly the interior of the furnace or oven, but also to heat the hearth or floor thereof, which is also formed of material of high heat-conducting and heat-radiating qualities, such as silicon carbide.

Further and still more limited objects of the invention will appear hereinafter and will be realized in and through the construction and arrangement of parts illustrated in the drawings, wherein Fig. 1 is a transverse sectional view through a furnace or oven constructed in accordance with my invention, the said view corresponding substantially to the line 1—1 of Fig. 2; Fig. 2 a longitudinal sectional view through the furnace or oven shown in Fig. 1, the view corresponding to the line 2—2 of Fig. 1; Fig. 3 a horizontal sectional view corresponding to the line 3—3 of Fig. 1; and Fig. 4 a sec-

tional view corresponding to the line 4—4 55 of Fig. 1.

Describing the various parts by reference characters, 1 denotes generally the furnace setting, which may be of any ordinary or standard material, the walls of the setting 60 being shown as strengthened by the vertical structural beams 2 connected in pairs by tie rods 3 extending through the furnace structure and connecting opposed pairs of such beams. The furnace or oven disclosed 65 herein is one which is suited for the baking of porcelain enameled ware and one whereinto the work may be inserted and wherefrom it may be removed by means of a fork, the oven in this case being semi-continuous. 70 The front or charging opening of the oven is indicated at 4 and is provided with a door 5 communicating with the heating chamber 6.

The heating chamber is comprised generally between a hearth 7, side walls, 8, a 75 rear wall 9, a front wall 10, and an arched roof 11.

The walls 8 incline upwardly and outwardly from refractory brick-work piers 12 which extend above the hearth 7, at each 80 side thereof, and form each a support for a combustion chamber, the chambers being indicated generally at 13.

Each combustion chamber comprises a bottom wall 14 which is supported upon a 85 pier 12, the bricks whereof are spaced apart, as shown in Fig. 2, to provide for the circulation of air and to assist in producing a uniform temperature within the working space of the furnace or oven. The bottom 90 wall 14 of each combustion chamber is provided with an outlet 14^a at the front thereof through which the products of combustion are discharged into a downwardly extending flue 14^b which communicates with the 95 space forming a flue beneath the hearth 7, the details of which flue will be described hereinafter. Each combustion chamber comprises, in addition to the bottom wall 14 and the outlet 14^a, a top wall 15 extending forwardly beyond the bottom wall, both the top and the bottom wall extending rearwardly to a point adjacent to but spaced from the rear wall 9 of the oven. 16 denotes the rear wall of each combustion chamber 105 and 17 the side walls. These side walls are provided, at approximately midheight thereof, with grooved seats for a horizontal par-

tion 18, which extends from the front of the combustion chamber rearwardly toward, but spaced from, the rear wall 16, thereby providing passages above, around and below the said partition. In front of the opening 5 14^a a slab 19, preferably of silicon carbide, closes the front end of the lower passage. The upper passage projects forwardly beyond the lower passageway and registers with a neck or extension, such neck or extension being indicated at 20 and within 10 which and arranged axially thereof, is the front or delivery end of a burner 21.

Extending from the flue 14^b forwardly 15 through the furnace wall is a sight opening 22, the outer end of which will be closed or sealed by a disk 22^a of suitable material, such as mica.

The combustion chambers described herein 20 in are of the same general type as set forth in Patent No. 1,371,774 granted to Hiram B. Cannon March 15, 1921, and, as is the case with the combustion chamber of said patent, each is composed principally of 25 silicon carbide, because of the high heat-radiating and heat-conducting qualities of such material.

The combustion chambers shown herein 30 are arranged to be heated by oil, or other suitable fluid fuel, through the burners 21, the said burners being mounted each in a wind box 23 each inserted within the front wall of the furnace structure. Each burner 35 is provided with a supply pipe 24 for oil, or other similar combustible fluid, and a supply pipe 25 for air or other fluid under pressure for the purpose of atomizing such oil. In addition, each wind box has connected thereto a pipe 26 supplying a secondary 40 supply of air for the purpose of completing the combustion of the fuel thus atomized. The pipes 24, 25 and 26 are provided with valves 24^a, 25^a and 26^a for controlling the flow of their respective fluids 45 therethrough.

Each of the combustion chambers 13 is supported by its pier 12 adjacent to but spaced from the inclined side wall 8 of the furnace or oven. In order to prevent 50 uneven, excessive, and inefficient heating of the articles within the space between the said combustion chambers, a screen or baffle 27 is interposed between each such combustion chamber and the central portion of the 55 furnace, the screens or baffles being located in fairly close proximity to their respective combustion chambers and extending parallel therewith and from the front to the rear of the oven or furnace chamber. 60 The hearth 7 extends across the space between the screens or baffles 27 and is preferably made of material having high heat-radiating and high heat-conducting qualities, such as silicon carbide.

Reference has been made heretofore to

the downtake flues 14^b and to the space or flue beneath the hearth with which these flues communicate. This space or flue will now be described, with particular reference 70 to Figs. 2 and 3.

The hearth 7 covers a chamber therebeneath, indicated generally at 28 and having side walls 28^a, a bottom wall 28^b and a rear wall 28^c, the hearth constituting a 75 top or cover for said chamber. The chamber 28 comprises also a front transverse passage 29 with the opposite ends whereof the flues 14^b communicate. The passage 29 is formed between the front wall of the furnace and a pair of piers 30 projecting toward each other from the side walls 28^a 80 and providing a short passage 29^a therebetween. 30^a and 30^b denote additional pairs of piers, arranged similarly to the piers 30 and interposed between said piers 30 and the rear wall 28^c and being spaced preferably equidistantly between the piers 30 85 and from the said wall. Piers 31 are located midway between the piers 30, 30 and the adjacent piers 30^a, 30^a; piers 31^a midway between the last mentioned piers and the piers 30^b, 30^b; and piers 31^b midway 90 between these piers and the rear wall 28^c. Each of the piers 31 extends transversely of the chamber 28, with its ends spaced 95 from the side walls 28^a thereof to provide lateral passages around such ends.

With this construction and arrangement of piers 30-30^b, it will be evident that 100 products of combustion delivered from the flues 14^b will flow inwardly through the passage 29, then rearwardly through the passage 29^a, around the ends of the pier 31 and through the passage between the piers 30^a, around the end of the pier 31^a, through 105 the passage between the piers 30^b, around the ends of the pier 31^b, and thence from the flue formed by said passages, through the central flue 32 to the stack 33.

Where oil is used as fuel, it is preferred 110 to place a wedge shaped baffle 34 adjacent to the delivery end of the burner—about six inches therefrom, as such baffle serves to secure the early ignition of the incoming fuel and modifies the gas pulsations 115 resulting from combustion.

Reference has been made hereinbefore to the upward and outward inclination of the side walls 8 and to the arched construction of the roof 11. These parts are designed 120 with special reference to securing a maximum and uniform heating efficiency from the radiating combustion chambers 13. This particular slope of the side walls, with the particular rise and curvature of the arch, 125 permits of a high degree of transfer of heat by radiation from the tops of the combustion chambers and from the sides thereof of which face the walls 8. The heat thus 130 radiated is reflected from the sloping walls

8 to the arch, and the arch in turn reflects to the hearth the heat thus reflected to it as well as that which is radiated directly thereto from the combustion chambers.

The hearth, being made of refractory material having high heat conductivity (such as silicon carbide) permits of the rapid flow of radiant heat from the arch and in turn radiates the heat received by it to the material of which the piers 30—31^b and the bottom lining of the flue passages beneath the hearth are composed, such material being preferably a refractory material having low heat-conductivity and high heat-storing properties. Furthermore, each combustion chamber is spaced at the proper distance from the sloping side wall 8 adjacent thereto to insure the proper exposure of such side wall to the adjacent radiating side of the combustion chamber, thereby to secure a maximum transfer of radiant heat from such chamber side wall.

The baffles or screens 27 are made of refractory material and are preferably perforated, as indicated at 27^a, below the top, it being preferable that at least the bottom portions of the baffles or screens shall be provided with openings or perforations in order to permit of the equalization of the temperature of the atmosphere within the furnace or oven. The material of which these baffles or screens is composed will vary in accordance with the work to be done. It is their purpose to screen or shield the articles above the hearth 7 from a too concentrated radiant heat emanating from the side walls of the combustion chambers. For the majority of purposes at present in view, the baffles or screens will be made of a refractory material having high heat conductivity (such as silicon carbide); and their height will be such as to prevent a direct exposure of the work to the radiant heat from the combustion chambers. In porcelain enamel work, where the temperature may range from 1600° to 1900° F. and where uniform temperature conditions are required within the working space of the oven or furnace, it has been found that the baffles or screens 27 should be made of silicon carbide brick and that the height of said baffles or screens should be such that the surfaces of the combustion chambers will not be exposed to the work within the oven. In this case, the baffles or screens act each as a reducing valve for the radiating surfaces of the combustion chambers exposed respectively thereto, the baffle walls transferring to the work a reduced amount of radiant heat (as compared with the radiant heat from the respective combustion chambers), with the result that the working space within the oven is brought to a very uniform temperature.

When desirable, the transfer of radiant

heat from the baffles or screens 27 may be increased by making the said baffles or screens higher, which will also result in reducing the transfer of radiant heat from the tops of the combustion chambers to the arch and even from the outer sides of the combustion chambers, through the sloping walls 8 (depending upon the height of the baffles or screens). To the extent to which the height of the baffles or screens is increased, the surface temperatures of the combustion chambers will be increased, with a correspondingly increased transfer of radiant heat to the baffles or screens and from the latter to the working space therebetween.

Where the baffles or screens are made of refractory material of low heat-conductivity and of a height sufficient to prevent direct exposure of the work to the radiating surfaces of the combustion chambers, the heat which is radiated to the work from the baffles or screens will be diminished, with the result that more heat will be radiated from the outer sides and the tops of the combustion chambers to the walls 8 and the arch, and from the arch to the work, to the hearth 7 and to the linings of the flue passages beneath the latter.

Should the baffles or screens of low heat-conductivity be built to a sufficient height to reach the arch, then the greater portion of the heat due to combustion would be delivered as sensible heat to the exhaust gases under the hearth, the baffles or screens receiving and radiating a definite amount of heat. In this case, however, the radiant heat transferred to the working space would be entirely from the hearth and from the baffles or screens.

For most purposes, it is preferable to use material of high heat-conductivity for the baffles or screens and to make them of a height which will intercept radiant heat from the sides of the combustion chambers adjacent thereto. Under these conditions, when the flame from each combustion chamber just reaches the outlet D (which may be accomplished by a suitable regulation of the fuel and air, in conjunction with the peep-holes 22), the hearth will receive only a limited amount of heat by convection from the exhaust gases. In this case, when no work is within the oven, the radiant heat from the outer side of each combustion chamber will be reflected by the adjacent sloping side walls to the arch. This reflected heat, together with the heat radiated to the arch from the tops of the combustion chambers, will be reflected by the arch to the hearth and will be radiated from the latter to and stored in the supporting piers and in the bottoms of the flue passages thereunder. When work is inserted into the chamber, it is heated, not only by the baffles or screens and the heat reflected from the

arch, but also by means of radiant heat from the hearth which has been previously reflected thereto from the arch and stored thereunder.

5 Having thus described my invention, what I claim is:—

1. A furnace or oven comprising in combination a hearth with a heating chamber thereabove, a combustion chamber within
10 the first-mentioned chamber, means for supplying a combustible mixture to the combustion chamber for heating the latter interiorly, there being a flue below said hearth, and means for discharging the products of
15 combustion from said chamber into said flue and beneath said hearth, the said hearth being composed of material having high heat-radiating qualities.

2. A furnace or oven comprising in combination a hearth with a heating chamber thereabove, a combustion chamber within the first-mentioned chamber, the said combustion chamber being provided with upper and lower passages communicating at the inner
20 or rear end of such chamber, there being a discharge outlet from the lower passage adjacent to the front of said chamber, and means for delivering a combustible mixture to the front of the upper passage, there
25 being a flue or chamber beneath said hearth with which the said outlet communicates, the combustion chamber and the hearth being formed of material having high heat-radiating qualities.

3. A furnace or oven comprising in combination a hearth with a heating chamber thereabove, there being a flue beneath said hearth and supports for said hearth, a combustion chamber within the first-mentioned
40 chamber, the said combustion chamber comprising top, bottom, side and rear walls, with a partition extending from the front wall, between the top and bottom walls, toward and spaced from the rear wall, the front of
45 the passage formed below the said partition communicating with the said flue, and means for delivering a combustible mixture to the front of said combustion chamber, above the partition, the said combustion chamber and
50 the said hearth being composed of material having high heat-radiating qualities.

4. A furnace or oven comprising in combination a hearth with a chamber thereabove, there being a flue beneath said hearth and supports for said hearth, a combustion chamber within the first mentioned chamber, the said combustion chamber comprising top, bottom, side and rear walls, with a partition
55 extending from the front wall, between the top and bottom walls, toward and spaced from the rear wall, the front of the passage formed below the said partition communicating with the said flue, and means for delivering a combustible mixture to the front
60 of said combustion chamber, above the parti-

tion, the said combustion chamber and the said hearth being composed of material having high heat-radiating qualities and the said supports and the bottom of the flue being composed of material having high
70 heat-absorbing qualities.

5. A furnace or oven comprising a hearth of material of high heat-radiating qualities with a heating chamber thereabove, a combustion chamber of material of high heat-radiating qualities in the chamber above said
75 hearth, the said combustion chamber being arranged to heat the space adjacent the hearth by radiant heat, and means for conducting the products of combustion from the
80 said combustion chamber beneath the said hearth thereby to heat the latter by means of the sensible heat in such products.

6. A furnace or oven comprising in combination a heating chamber, a combustion
85 chamber of high heat-radiating qualities within the heating chamber, means for heating the combustion chamber interiorly, means for heating the first mentioned chamber by heat radiated from a portion of the
90 said combustion chamber, and means for heating the first mentioned chamber by reflected radiant heat from other portions of said combustion chamber.

7. A furnace or oven comprising in combination a hearth of high heat-radiating
95 qualities with a flue therebeneath and a heating chamber above the said hearth, a combustion chamber of high heat-radiating qualities above said hearth and having an outlet communicating with said flue, means
100 for heating the combustion chamber interiorly, means for heating the said hearth and the space thereabove by radiant heat from a part of said combustion chamber, and
105 means for heating the said hearth and the said space by reflected radiant heat from other portions of said combustion chamber.

8. A furnace or oven comprising in combination a heating chamber, a combustion
110 chamber of high heat-radiating qualities within the heating chamber, means for heating the combustion chamber interiorly, a heat-radiating screen interposed between said combustion chamber and a part of the
115 first mentioned chamber and shielding such part from direct radiant heat from the portion of the combustion chamber adjacent thereto, and means for reflecting the radiant heat from other portions of said combustion
120 chamber to such part of the first-mentioned chamber.

9. A furnace or oven comprising in combination a heating chamber, a combustion
125 chamber of high heat-radiating qualities within the heating chamber, means for heating the combustion chamber interiorly, a heat-radiating screen interposed between said combustion chamber and a part of the first mentioned chamber and shielding such part
130

from direct radiant heat from the portion of the combustion chamber adjacent thereto, a hearth of high heat radiating material at the bottom of the aforesaid part of the first mentioned chamber and having a flue thereunder with which the outlet from said combustion chamber communicating and means for reflecting the radiant heat from other portions of said combustion chamber to such part of the first mentioned chamber and to the hearth.

10. A furnace or oven comprising in combination a heating chamber, a pair of combustion chambers of high heat-radiating qualities and spaced apart within the first mentioned chamber; means for heating the said combustion chambers interiorly, means for heating the space between such combustion chambers by radiant heat from the portions of the combustion chambers adjacent thereto; and means for heating such space by heat reflected from other portions of said combustion chambers.

11. A furnace or oven comprising in combination a heating chamber, a pair of combustion chambers of high heat-radiating qualities and spaced apart within the first mentioned chamber; means for heating the said combustion chambers interiorly, a hearth of high heat-radiating qualities at the bottom of the space between said combustion chambers and having a flue or chamber therebeneath, means for heating the space between such combustion chambers and the hearth by radiant heat from the portions of the combustion chambers adjacent thereto; means for heating such space and hearth by heat reflected from the other portions of said combustion chambers; and means for discharging products of combustion from the said combustion chambers into the said flue or chamber beneath said hearth.

12. A furnace or oven comprising in combination a heating chamber, a pair of combustion chambers of high heat-radiating qualities spaced apart within the first mentioned chambers; means for heating the said combustion chambers interiorly, a screen of heat-radiating material interposed between each combustion chamber and the space therebetween, and means for heating such space by reflected radiant heat from portions of said combustion chambers which are not adjacent to said screens.

13. A furnace or oven comprising in combination a heating chamber, a pair of combustion chambers of high heat-radiating qualities spaced apart within said heating chamber; means for burning a combustible mixture within the said combustion chambers; a hearth of high heat-radiating qualities at the bottom of the space between said combustion chambers; means for discharging products of combustion from the

combustion chambers into the flue or chamber beneath said hearth, a screen of radiating material interposed between each combustion chamber and the space and the hearth therebetween, and means for heating such space and hearth by reflected radiant heat from the portions of the combustion chambers which are not adjacent to said screens.

14. A furnace or oven comprising in combination a hearth with a chamber thereabove, there being a flue and supporting piers for said hearth beneath the latter, a combustion chamber on each side of the first-mentioned chamber; above said hearth, and each having an outlet communicating with the flue beneath the hearth, means for reflecting toward the hearth heat radiated from the outer walls and the tops of said combustion chambers, the said combustion chambers and the said hearth being composed of material having high heat-radiating qualities and the piers and the material constituting the bottom of the flue possessing high heat-absorbing qualities.

15. A furnace or oven comprising in combination a hearth with a chamber thereabove, there being a flue and supports for said hearth beneath the latter, a combustion chamber on each side of the first-mentioned chamber, above said hearth, and each having an outlet communicating with the flue beneath the hearth, means for reflecting toward the hearth heat radiated from the outer walls and the tops of said combustion chambers, the said combustion chambers and the said hearth being composed of material of high heat-radiating qualities and the supports and the material constituting the bottom of the flue possessing high heat-absorbing qualities, and a screen interposed between each combustion chamber and the space above said hearth.

16. A furnace or oven comprising in combination a hearth with a chamber thereabove, there being a flue and supporting piers for said hearth beneath the latter, a combustion chamber on each side of the first-mentioned chamber, above said hearth, and each having an outlet communicating with the flue beneath the hearth, means for reflecting toward the hearth heat radiated from the outer walls and the tops of said combustion chambers, the said combustion chambers and the said hearth being composed of material possessing high heat-radiating qualities and the piers and the material constituting the bottom of the flue possessing high heat-absorbing qualities, and a baffle or screen interposed between each combustion chamber and the space above said hearth, the said screen being composed of material possessing heat-radiating qualities.

17. A furnace or oven comprising in com-

bination a hearth of heat-radiating material having a flue therebeneath and piers for supporting the said hearth, with a chamber above said hearth, a combustion chamber
5 of material having heat-radiating qualities arranged in the said chamber, on each side of the said hearth, means for heating the said combustion chambers interiorly, means for circulating the products of combustion
10 from said chambers through the said flue, means for shielding the space above said hearth and between the said combustion chambers from the portions of the combustion chambers which are adjacent to such
15 space, and means for reflecting to such space the heat radiated by the other portions of such combustion chambers.

18. A furnace or oven comprising a hearth of high heat-radiating material, with
20 a chamber above said hearth, a combustion chamber in the first mentioned chamber and located at each side of said hearth, the said combustion chambers being composed of material of high heat-radiating qualities, means
25 for heating the said combustion chambers interiorly and for circulating the products of combustion therefrom beneath the said hearth, a heat-radiating screen interposed between each combustion chamber and the
30 space above the hearth, each of said screens being arranged to be heated by radiant heat from the combustion chamber adjacent thereto, and means for reflecting into the space above said hearth heat radiated from
35 the parts of the combustion chambers which are not immediately adjacent to the said screens.

19. A furnace or oven comprising in combination an arched roof, upwardly and outwardly sloping sides, and a bottom provided
40 with a hearth, there being a flue beneath the said hearth and supporting piers for said hearth, a combustion chamber on each side of said furnace, extending longitudinally thereof and adjacent to the cooperating
45 side wall, each of said chambers being composed principally of material having high heat-radiating qualities and each having an outlet communicating with the flue
50 beneath the hearth, a screen extending longitudinally of the said furnace adjacent to each combustion chamber and between the same and the central portion of the furnace chamber, and means for supplying a combustible mixture to each combustion chamber,
55 the said hearth being composed of material having high heat-radiating qualities.

20. A furnace or oven comprising in combination a roof, sides, and a bottom provided
60 with a hearth, there being a flue beneath the said hearth and supports for said hearth, a combustion chamber on each side of said furnace, extending longitudinally thereof and adjacent to the cooperating side
65 wall, each of said chambers being composed

of material having high heat-radiating qualities and each having an outlet communicating with the flue beneath the hearth, a screen extending longitudinally of the said
70 furnace adjacent to each combustion chamber and between the same and the central portion of the furnace chamber, and means for supplying a combustible mixture to each combustion chamber, the said hearth being
75 composed of material having high heat-radiating qualities and the sides and roof of the furnace or oven being arranged to reflect radiant heat from the combustion chambers toward the hearth.

21. A furnace or oven comprising in combination an arched roof, upwardly and outwardly sloping sides, and a bottom provided
80 with a hearth, there being a flue beneath the said hearth and supporting piers for said hearth, a combustion chamber on each side of said furnace, extending longitudinally thereof and adjacent to the cooperating
85 side wall, each of said chambers having an outlet communicating with the flue beneath the hearth, a screen extending longitudinally of the said furnace adjacent to each combustion chamber and between the same and the central portion of the furnace chamber,
90 means for supplying a combustible mixture to each combustion chamber, the said combustion chambers and the said hearth being composed of material of high heat-radiating qualities and the said piers and the material constituting the bottom of the flue
95 being material possessing high heat-absorbing qualities.

22. A furnace or oven comprising in combination an arched roof, upwardly and outwardly sloping sides, and a bottom, a combustion chamber on each side of said furnace,
105 extending longitudinally thereof and adjacent to the cooperating side wall, each of said chambers being composed of material having high heat-radiating qualities, a screen extending longitudinally of the
110 said furnace adjacent to each combustion chamber and between the same and the central portion of the furnace chamber, and means for heating each combustion chamber interiorly.

23. A furnace or oven comprising in combination an arched roof, upwardly and outwardly sloping sides, and a bottom provided
115 with a hearth, there being a flue beneath the said hearth and supports for said hearth, a combustion chamber on each side of said furnace, extending longitudinally thereof and adjacent to the cooperating side wall,
120 each of said chambers being composed of material having high heat-radiating qualities and each having an outlet communicating with the flue beneath the hearth, a screen extending longitudinally of the said furnace adjacent to each combustion chamber
125 and between the same and the central portion

tion of the furnace chamber, means for supplying a combustible mixture to each combustion chamber, the said hearth and the said screen being composed of material having high heat-radiating qualities and the said supports and the material constituting the bottom of the flue being material possessing high heat-absorbing qualities.

24. A furnace or oven comprising in combination an arched roof, upwardly and outwardly sloping sides, and a bottom, a combustion chamber on each side of said furnace, extending longitudinally thereof and adjacent to the cooperating side wall, each of said chambers being composed of material of high heat-radiating qualities, means for heating each combustion chamber interiorly, a screen extending longitudinally of the said furnace adjacent to each combustion chamber and between the same and the central portion of the furnace chamber, the said screens being composed of material of high heat-radiating qualities.

25. A furnace, comprising a heating chamber, a combustion chamber having a silicon carbide partitioning wall between it and the heating chamber, and a baffle wall between said combustion chamber and the space occupied by the material being heated, substantially as described.

26. A furnace, comprising a heating chamber, a combustion chamber having a silicon carbide partitioning wall between it and the heating chamber, and a silicon carbide baffle wall between said combustion chamber and the space occupied by the material being heated, substantially as described.

27. A furnace, comprising a heating chamber, a combustion chamber having a silicon carbide partitioning wall between it and the heating chamber, and a baffle wall

between said combustion chamber and the space occupied by the material being heated, said baffle wall being formed with open spaces permitting direct radiation from the combustion chamber to said material, substantially as described.

28. A furnace, comprising a heating chamber, a combustion chamber having a silicon carbide partitioning wall between it and the heating chamber, and a silicon carbide baffle wall between said combustion chamber and the space occupied by the material being heated, said baffle wall being formed with open spaces permitting direct radiation from the combustion chamber to said material, substantially as described.

29. A furnace, comprising a heating chamber, a combustion chamber having a silicon carbide partitioning wall between it and the heating chamber, a silicon carbide baffle wall between said combustion chamber and the space occupied by the material being heated, and a waste heat flue beneath the floor of said heating chamber and having its top wall formed thereby, said top wall being constructed of silicon carbide, substantially as described.

30. A furnace, comprising a heating chamber, a combustion chamber having a silicon carbide partitioning wall between it and the heating chamber, a baffle wall between said combustion chamber and the space occupied by the material being heated, and a waste heat flue beneath the floor of said heating chamber and in heating relation therewith, substantially as described.

In testimony whereof, I hereunto affix my signature.

HIRAM B. CANNON.