No. 886,205. PATENTED APR. 28, 1908.

F. GOLD.

FURNACE.

APPLICATION FILED SEPT. 30, 1907.

2 SHEETS—SHEET 1.

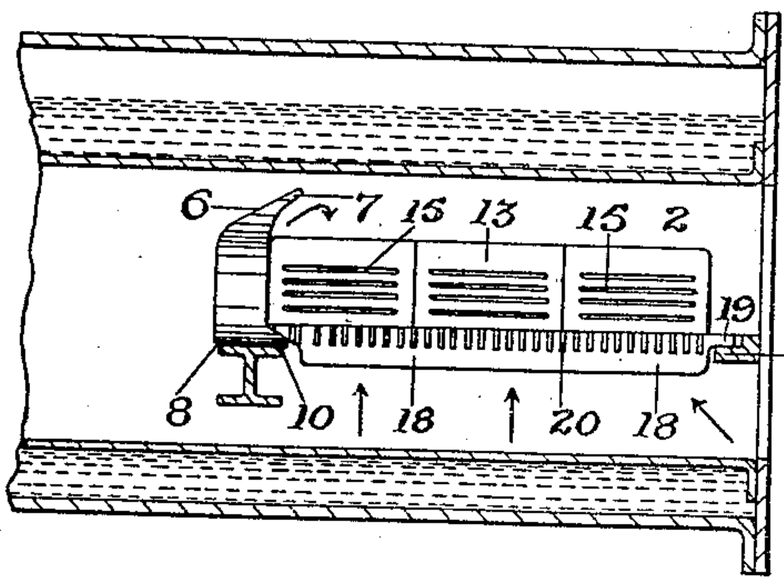

Fig. 1.

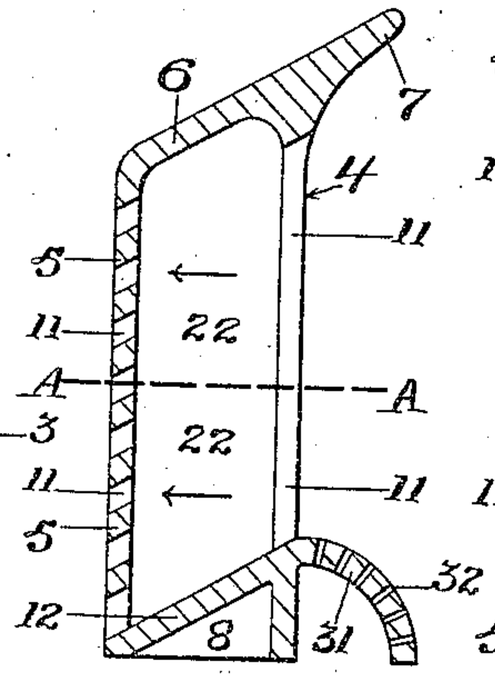

Fig. 2.

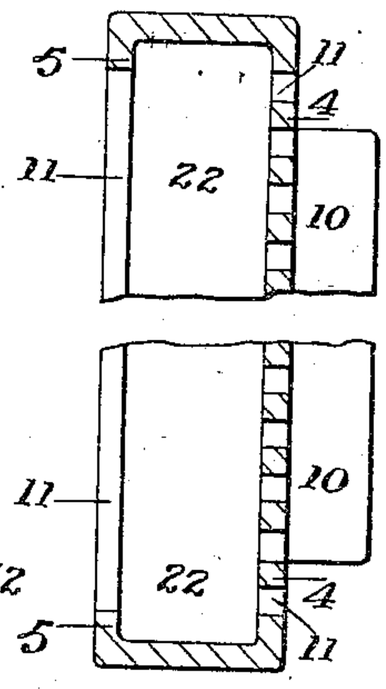

Fig. 3.

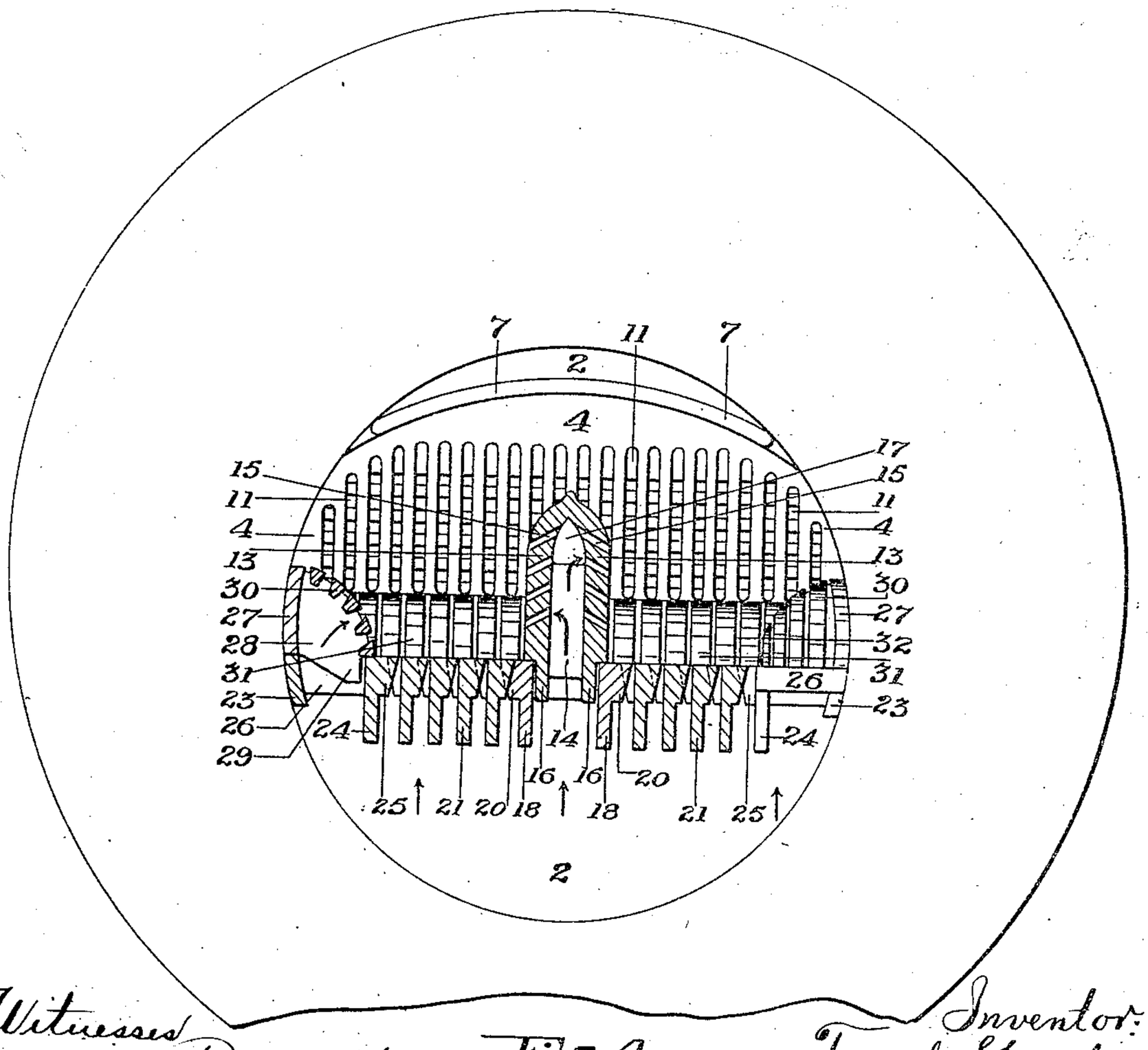

Fig. 4.

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2 SHEETS—SHEET 2.

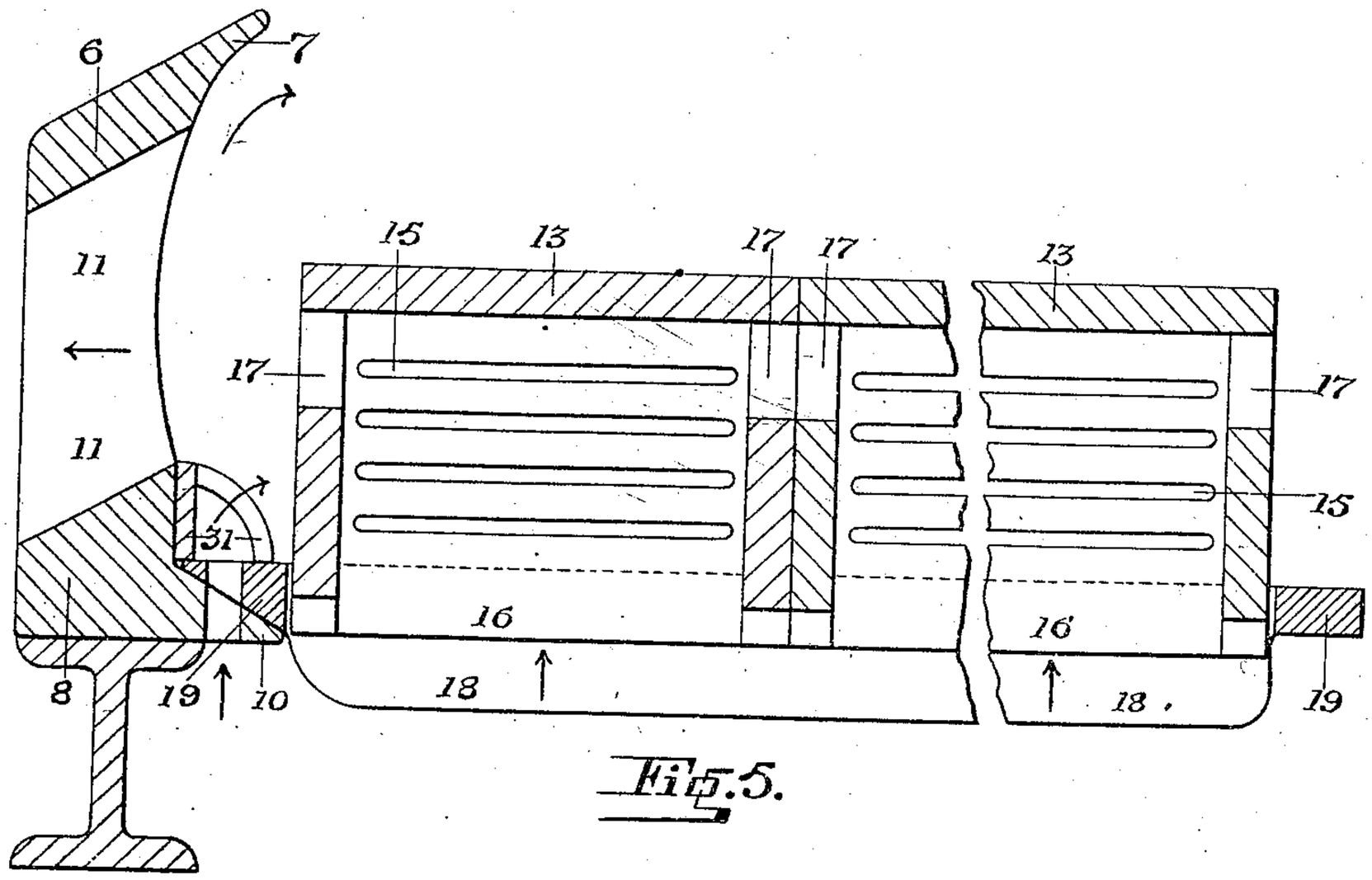

Fig. 5.

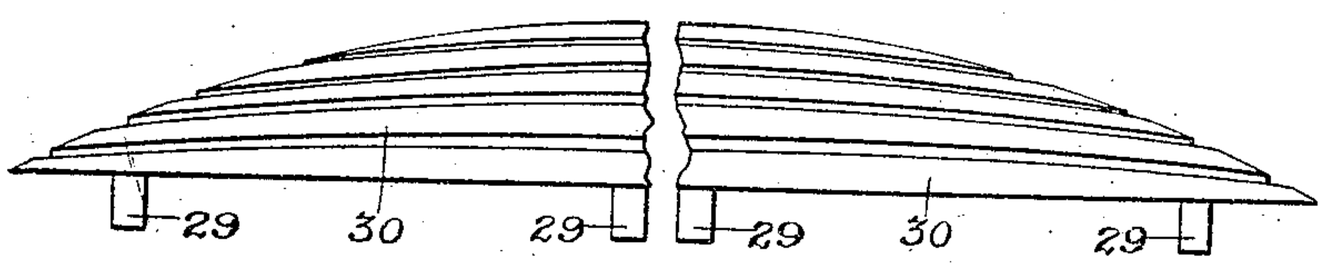

Fig. 6.

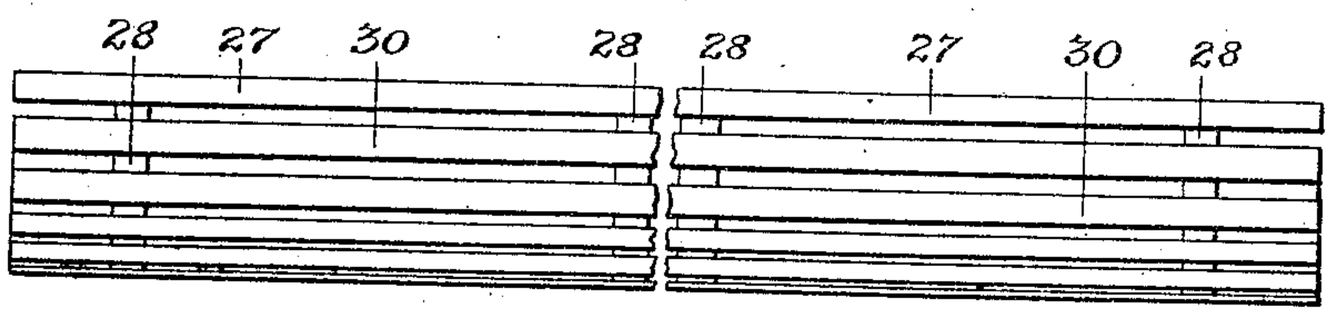

Fig. 7.

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UNITED STATES PATENT OFFICE.

FRANK GOLD, OF RICHMOND, VICTORIA, AUSTRALIA.

FURNACE.

No. 886,205. Specification of Letters Patent. Patented April 28, 1908.

Application filed September 30, 1907. Serial No. 395,240.

To all whom it may concern:

Be it known that I, FRANK GOLD, a subject of the King of Great Britain and Ireland, residing at 95 Palmer street, Richmond, in the county of Bourke, State of Victoria, Commonwealth of Australia, manufacturer, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

My invention relates to steam boiler or other furnaces or heat generators. Its object is to effect a more perfect combustion of the fuel and to prevent the emission of smoke from the smoke stack top. In the past a variety of devices have been used to this end, but with my invention the parts involved are few, are not liable to derangement, can be easily replaced, are not expensive to purchase, call for little labor in their installation, and insure the complete burning before it reaches the chimney, of all the unconsumed carbon which escapes from the fire top.

Referring to the drawings which form a part of this specification Figure 1 is a vertical longitudinal sectional view of part of a boiler furnace having the grate in section and the bridge wall and central longitudinal elevated air supplier in side elevation. Fig. 2 is a sectional elevation, on an enlarged scale, of the bridge or diaphragm shown in Fig. 1, with the addition of an end elevated air supplier formed integral therewith. Fig. 3 is a sectional view of my bridge or diaphragm as if taken through A—A Fig. 2. A part has been broken away for convenience of illustration. An end elevated air supplier is not shown but in its place the fire bar rest. Fig. 4 is a front elevation, on an enlarged scale and partly in section, of a furnace showing my bridge or diaphragm, and central longitudinal elevated air suppliers and their bearers, my side elevated air suppliers and their bearers, my end elevated air suppliers and the fire bars all in position. Fig. 5 is an enlarged sectional view of a modified bridge or diaphragm in conjunction with my central longitudinal elevated air suppliers and their bearer. An end elevated air supplier is also shown in position. Fig. 6 is a side elevation on an enlarged scale of one of my side elevated air suppliers. When an end elevated air supplier is used the abutting end of each side elevated air supplier may be of any suitable conformation to agree with the outer conformation of the end elevated air supplier. Fig. 7 is a plan on an enlarged scale of one of my side elevated air suppliers.

Similar numerals of reference indicate similar or corresponding parts where they occur in the several views.

My invention includes a furnace such as 2 (Figs. 1 and 4). This can be of any character. Near the front of this is a dead plate 3. At or near the back of the said furnace is situated a bridge or diaphragm (see also Figs. 2, 3, 4, and 5). The said diaphragm can be made of metal or of fire brick or of any other material or materials or combination of materials and consists of a diaphragm front 4 and a diaphragm back 5, assisting to form a hot chamber 22 (Figs. 2 and 3). The upper portion of the said diaphragm has an inclined top as 6 which descends downwardly towards the back of the said diaphragm, and is below the furnace crown. The said top has an overhanging portion 7. This is so shaped that a whirling action is set up in front and beneath it causing any smoke that rises to the furnace crown to whirl back upon itself before it passes over the rounded top 6. The amount of roundness or curvature of the top 6 and the amount of the overhanging portion 7 will depend upon circumstances. The diaphragm bottom 8 may have a back flange protruding therefrom. From the diaphragm front protrudes a fire bar rest 10 (Figs. 1, 3 and 5). The said diaphragm may be supported by any suitable means.

In a modification of the foregoing the hot chamber 22 may be dispensed with as shown in Fig. 5. The diaphragm may also have its front 4 concave to accelerate the whirling action as indicated in the said Fig. 5. If the diaphragm be formed of fire brick the fire bar rest 10 and the hot chamber 22 may or may not be dispensed with. When formed of such material the diaphragm may rest upon an H or other sectioned girder extending across the furnace upon which girder also preferably rest the fire bars.

Through the diaphragm front and back are situated draft holes 11. The number of these, their area, conformation and relationship to each other will depend upon circumstances. Preferably if the holes in the diaphragm front are vertical those in the back

are horizontal. The front and back draft holes in any case are preferably out of alinement with each other. The draft currents and their constituents are thereby more effectually split up or divided.

Inside the diaphragm and between the front and the back of the same and extending from side to side is an ash chute 12. This is inclined downwardly at its back end. All ashes that are carried by the draft through the holes of the diaphragm front which fall upon this chute descend downwardly into the ash pit at the furnace bottom.

If the hot chamber 22 be dispensed with and the diaphragm be solid as indicated in Fig. 5 (which may or may not be the case when formed of fire brick) the draft holes 11 extend right through the same, but are not necessarily of the conformation or size shown in the drawings. They may be circular or be inclined diagonally across the diaphragm. The said diaphragm may also be outstanding at the bottom with air passageways through said outstanding portion. Or end elevated air suppliers 31 (hereinafter described) may be used.

In combination with the foregoing I place in the center of the furnace 2 and of the fire bars 21 central longitudinal elevated air suppliers 13 (Figs. 1, 4 and 5). These can be made of metal or of fire brick or of any other material or materials or combination of materials and are upstanding above the said fire bars. These air suppliers are preferably divided into sections. These sections may be connected together in any well known way. Each section is hollow and has therein an open bottomed air chamber 14. Between the inside and the outside of the air chamber are air outlet passageways 15. The number of the said air outlet passageways, their distance from each other, their conformation and also their area, will depend upon circumstances. End air passageways 17 may or may not be provided in each section. Beneath each section is a dropper 16. Each of the said sections may be divided into two or more horizontal layers. One layer of one section may be of one material and the adjoining layers of another. This enables a worn or burned out portion to be removed or replaced with a minimum of labor and expense. The central elevated air suppliers may not touch the diaphragm but be any distance away from the same as illustrated in Fig. 5 and as will be hereinafter more fully understood.

Beneath the elevated air suppliers before referred to is situated a bearer. This bearer consists of two side members 18 and two end members and supports 19. Or there may be an end member with a suitable support integral therewith or attached thereto. From each side member may protrude spurs 20. One of the end members and supports rests upon the dead plate 3 and the other upon the fire bar rest 10, or upon a girder extending across the furnace.

In combination with the foregoing I use side bearers (Fig. 4). Each side bearer has an outer longitudinal member 23 and an inner longitudinal member 24. The outer member 23 which is placed against the furnace wall is shallower than the inner member 24, against which is placed a fire bar. The side bearers are, in conformation, somewhat similar to the bearer beneath the central longitudinal elevated air suppliers; having spurs 25 on the inner member 24 and having two end members and supports 26. One of the end members and supports rests upon the dead plate 3 and the other upon the fire bar rest 10 or upon a girder extending across the furnace.

Above each side bearer is situated a side elevated air supplier. This can be made of metal or of fire brick or of any other material or materials or combination of materials and consists essentially of a side piece 27. Protruding inwardly towards the fuel and integral with or attached to the side piece are ribs 28. These may have lugs 29 thereon. By the lugs the side elevated air supplier is maintained in its correct relative position upon its bearer. Integral with or attached to the ribs 28 are longitudinal ribs 30. These preferably are higher in their center than at their ends. Or they may be higher at one end than at the other. The said ribs may be of the conformation shown in Figs. 6 and 7 or of the conformation shown in Fig. 4. The number, area, conformation and relationship to each other of these ribs depends on circumstances.

The side elevated air suppliers may be in sections. When formed of fire brick the ribs are dispensed with and longitudinal, circular or air passageways of other conformation and any area or size are made therein.

In combination with the foregoing I may use an end elevated air supplier or suppliers 31. This can be made of metal or of fire brick or of any other material or materials or combination of materials and may be integral with or attached to the diaphragm front 4, as shown in Fig. 2 or separate therefrom as shown in Fig. 5. The said end elevated air supplier has air outlet passageways 32 therein which may be of any conformation or area, depending upon circumstances. Their number and distance from each other also depends upon circumstances.

The end elevated air supplier or suppliers may be in sections. When formed of metal they may have ribs of any character as indicated in Figs. 4 and 5, the spaces between which ribs form air passageways. Suitable air passageways may also be formed in the

fire bar rest, the bearers and the fire bars if such be necessary to allow air to pass into the said end elevated air supplier (Fig. 5).

As can be well understood in constructing my invention different materials are used to suit different circumstances. Details in construction must be made to suit the material. For instance various details may be included when my invention is formed of metal which would require to be excluded when formed of fire brick. Also when my central longitudinal elevated air suppliers are touching the diaphragm front there would be an end elevated air supplier each side of and between said central elevated air suppliers and the side elevated air suppliers. Whereas when the central elevated air suppliers are some distance from the diaphragm front only one end elevated air supplier extending across the furnace would be used. Therefore I do not wish to be understood as limiting myself to the exact details of construction and arrangement described since various slight and immaterial modifications may be made therein without departing from the spirit and the scope of my invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is.—

1. In combination with a furnace grate, a hollow bridge wall having front and rear walls and its upper portion overhanging toward the grate and provided with draft apertures for the products of combustion in its front and rear walls, and a hollow air supplier at the lower edge and front side of the bridge wall.

2. In combination, a furnace grate, a bridge or diaphragm having its upper portion projecting inwardly toward and partially overhanging the fire, and having draft apertures for the products of combustion below said overhanging portion, and a hollow air supplier at the lower edge and front side of said bridge.

3. The combination of a grate, a bridge at the inner end thereof provided with draft apertures for the products of combustion, and having its upper portion projecting toward the fire, a hollow air supplier above the grate at the base of said bridge, air suppliers at each side of the grate, and a central air supplier open at the bottom and having apertures in its sides for the escape of air.

4. In combination, a grate, a hollow bridge wall at the inner end of said grate having front and rear walls, and an overhanging portion projecting toward the grate, and provided with draft holes for the products of combustion in its front and rear walls below the overhanging portion; a hollow end air supplier mounted at the lower side and in front of the bridge, hollow side air suppliers and a hollow central air supplier.

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

FRANK GOLD.

Witnesses:
EDWIN PHILLIPS,
CECIL W. LE PLASTRIER