A. N. DIEHL.

HOT BLAST STOVE.

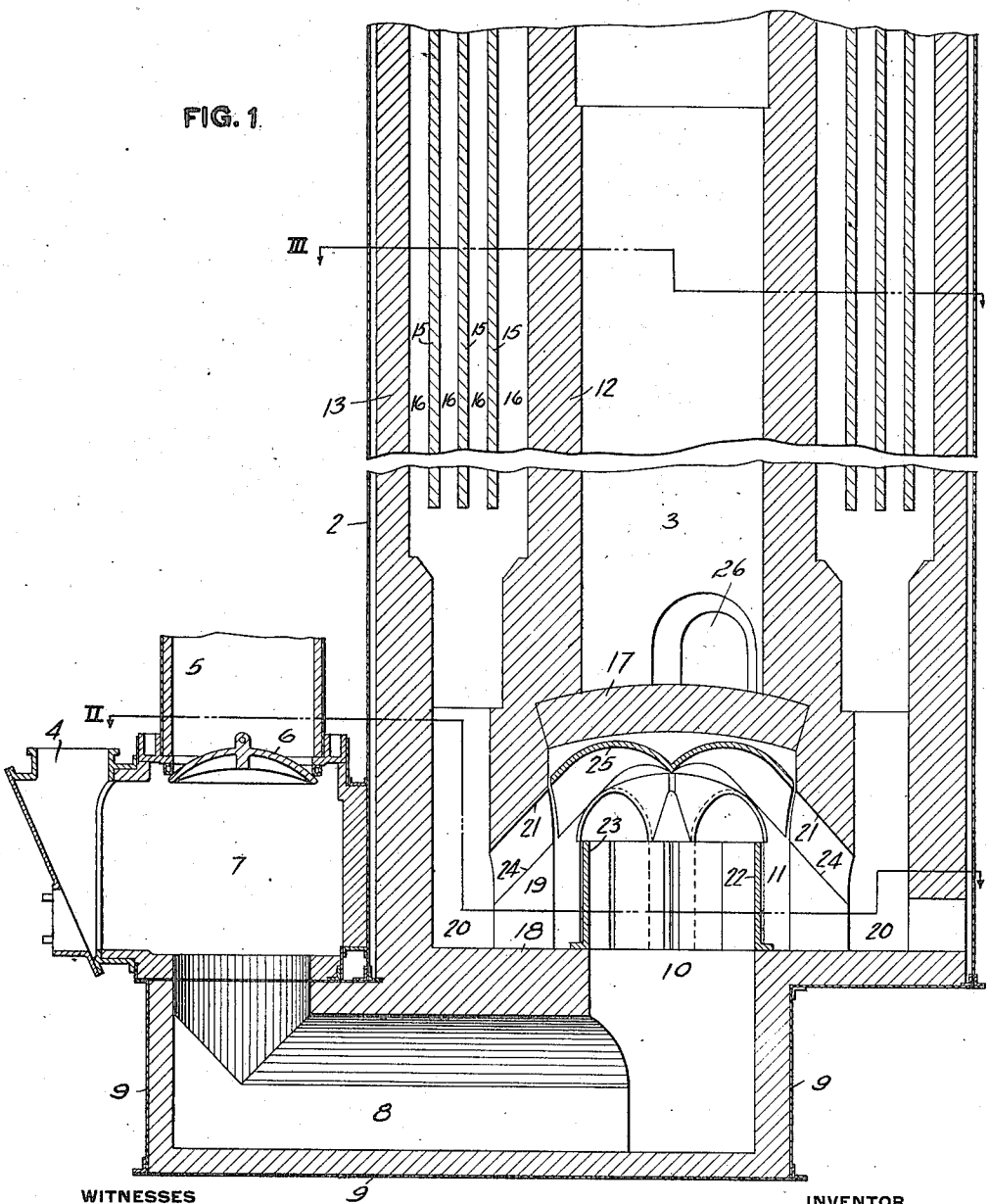
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1,141,108.

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2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

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2 SHEETS—SHEET 2.

FIG. 3

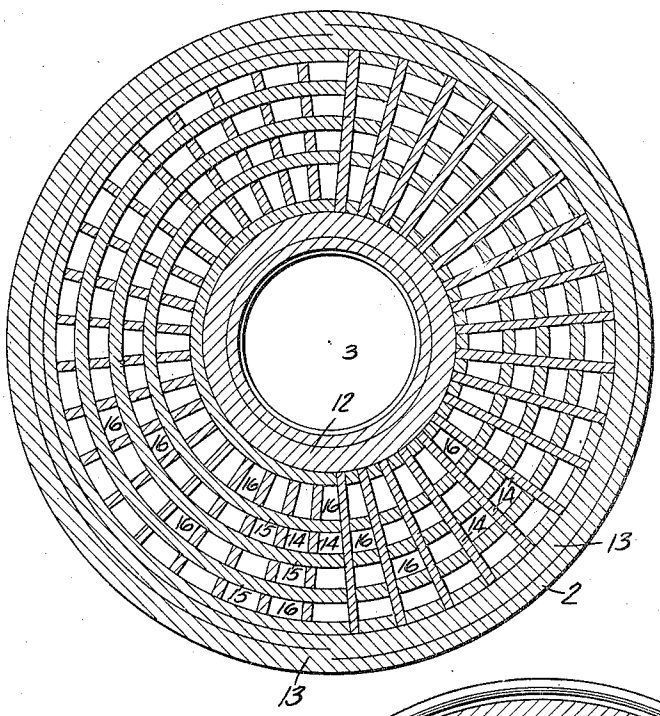
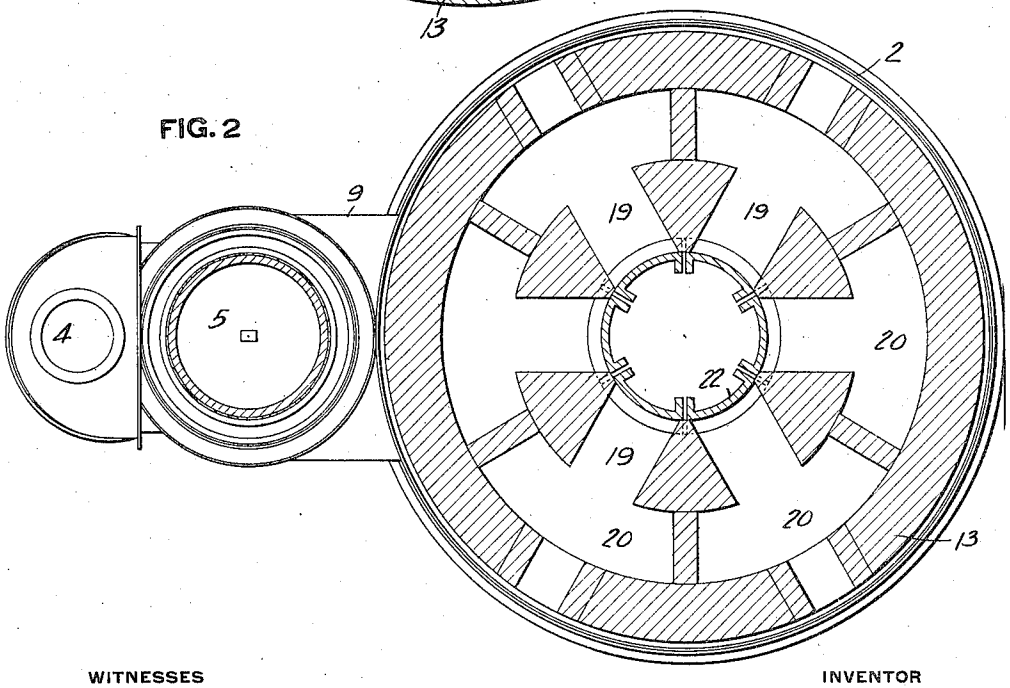


FIG. 2



WITNESSES

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UNITED STATES PATENT OFFICE.

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HOT-BLAST STOVE.

1,141,108. Specification of Letters Patent. Patented June 1, 1915.

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To all whom it may concern:

Be it known that I, AMBROSE N. DIEHL, a citizen of the United States, and resident of Duquesne, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Hot-Blast Stoves, of which the following is a specification.

My invention relates to the construction of hot blast stoves employed in heating the air used in blast furnace and the invention more particularly relates to the construction of the inlet and outlet openings of two-pass central-combustion-chamber stoves, through which the cold blast enters and the burned gases pass out of the stoves.

In such hot blast stoves the plate metal stove shell is lined with refractory material and is filled with checker-work formed of fire brick or similar refractory material. In using the stove the refractory walls of the checker-work forming the channels in the checkerwork are heated to a high temperature when gas is burned in the stove.

After each heating operation, cold blast, or air under considerable pressure, is passed through the stove and heat is absorbed by the cold blast from the highly heated checker-work, so that the air blast in traversing the channels in the checker-work is heated to substantially the temperature of the checker-work.

In stoves of the two-pass type shown, as constructed heretofore, the cold blast inlet and the stack outlet have been connected to the checker-work on the interior of the stove by a single radial passage extending from one side of the stove shell and opening directly into the checker-work from one side of the stove. With such construction the burned gases or products of combustion in passing through the checker-work will follow the line of least resistance, and, in like manner, the air blast in passing through the checker-work follows a similar course, but in the reverse direction. This results in an unequal distribution of the air or the gases within the multiplicity of passages in the checker-work, some of the passages or channels in the stove not receiving their proportionate share of the products of combustion in heating the stove, or an equal share of the cold blast caused to pass through the stove to become heated, and as a consequence a large amount of the heating surface of the stove is not used, and the maximum capacity of the stove is not utilized.

One object of my invention is to provide a hot blast stove having novel means whereby a substantially equal draft is created throughout all of the series of vertical passages in the annular flue containing the checker-work of the stove, and the checker-work is thereby evenly or uniformly heated in all of the passages thereof without reference to the relative positions of the passages in the checker-work.

Another object of my invention is to provide a hot blast stove wherein the air blast is more uniformly distributed throughout the series of vertical passages in the checker-work of the stove and the heating capacity of the checker-work is thereby used to the fullest extent in the air blast heating operations.

Still further objects of my invention consist in the novel arrangement of the passages connecting the interior of the stove with the cold blast inlet and stack outlet of the stove.

Referring now to the drawings forming part of this specification, Figure 1 is a sectional elevation of the lower portion of a two-pass, central combustion chamber, hot blast stove, constructed and arranged in accordance with my invention. Fig. 2 is a sectional plan of the hot blast stove shown in Fig. 1, the section being taken on the irregular line II—II of Fig. 1. Fig. 3 is a similar sectional plan, taken on the irregular line III—III of Fig. 1, showing the arrangement and relative location of the series of annular rows of vertical passages in the checker-work of the stove.

In the accompanying drawings, the numeral 2 designates the metal shell of a hot blast stove, having a central combustion chamber 3, cold blast inlet 4, stack 5, and stack valve 6, the stack and cold blast inlet 4 opening into the passage 7 which in turn opens into the upper end of the horizontal flue 8 which is incased in the metal shell 9 below the metal bottom 10 of the stove. The

inner end of the passage 8 connects with the vertical flue 10 which extends upwardly into the distributing chamber 11 in the bottom of the stove on the diametrical center thereof.

Between the wall 12 of the combustion chamber and the wall 13 of the stove is an annular lengthwise vertical flue containing the checker-work for the stove, which, as shown, consists of a series of radial walls 14 which are intersected by a series of three annular walls 15 so as to form a large number of vertical lengthwise passages 16. These passages are connected to the upper end of the combustion chamber 3 in any convenient known manner so that the products of combustion pass from the combustion chamber 3 at the top of the stove into the vertical passages and after traversing the radial passages 16 pass out of the stove at the bottom thereof into the distributing chamber 11 leading to the transverse flue 8.

The refractory bottom 17 of the combustion chamber 3 is located at some distance above the bottom 18 of the stove and forms the roof or top of the distributing chamber 11. A series of radial passages 19 connect the annular space 20 at the bottom of the stove, below the checker-work, with the distributing chamber 11, the tops of these passages being arched and the arches 21 being inclined inwardly and upwardly.

Located within the distributing chamber above the conduit or opening 10, and registering therewith, is an annular wall 22. The wall 22, which as shown is formed of a series of cast metal sections bolted together, extends upwardly within the chamber 11, the upper edge 23 of the wall being preferably at or somewhat above the lower face 24 of the arches 21 in the radial openings 19. A cast metal deflector 25 is provided in the distributing chamber on the lower side of the bottom 17 for the combustion chamber. When desired the metal wall 22 may be replaced by a wall formed of brick or similar refractory material.

The combustion chamber 3 is provided with the usual gas burners and air inlets, and the stove has the usual equipment of relief valves and other necessary valves which not forming part of this invention are neither shown nor further described.

In the operation of stoves constructed in accordance with my invention, as is shown and has been described, the hot blast valve and cold blast valve are closed and the stack valve 6 is opened. Gas is then burned in the combustion chamber 3 and the highly heated products of combustion pass upwardly and out of the top of the combustion chamber into the checker-work, and then pass downwardly through the series of passages 16 in the checker-work into the radial passages 19, and into the distributing chamber 11 at the bottom of the stove. The burned gases pass from the distributing chamber into the open upper end of the extension to the flue 10 formed by the annular wall 22, and then through the flue 8 into the passage 7 and stack 5, and upwardly through the stack to the top thereof from which the gases escape into the atmosphere. When sufficient time has elapsed the gases will heat the checker-work uniformly to a high temperature, and by reason of the radial passages 19 at the bottom of the stove the draft created by the stack 5 is made uniform at all points in the cross section of the stove so that the checker-work is uniformly heated throughout. When the stove becomes heated in this manner the gas is shut off, the air inlets and the stack valve 6 are closed, and the cold blast valve and hot blast valve are opened. The cold blast, which is under a pressure of from 15 to 30 pounds, passes through the inlet 4 into the passage 7, flue 8, and flue 9, and rising through the passage formed by the annular wall 22 is deflected by the deflector 25 and caused to travel out through the radial passages 19 in the bottom of the stove. In passing upwardly through the passages 16 of the checker-work the blast absorbs heat from the refractory checker-work. The air passes from the checker-work at the top of the stove into the combustion chamber 3, and passing downwardly therethrough passes out of the stove from the hot blast outlet 26 into the hot blast main connected therewith and leading to the blast furnace. The cold blast in passing into the stove is distributed uniformly to the series of passages 16 by the radial passages 19 so that all parts of the checker work are supplied with their proportionate part of the air passed through the stove, and in this way the volume of air heated is increased and the capacity of the stove is utilized to the fullest extent. The products of combustion, in passing from the passages 16, are caused to enter through the radial passages 19 into the distributing chamber 11 and after rising vertically therein to pass vertically downward over the top edge of the extension to the flue 10 formed by the annular wall 22. The cold blast in entering the stove to be heated passes upwardly through the flue 10 and extension 22 and is deflected downwardly within the distributing chamber 11 by the deflector 25, passing outwardly through the radial flues 19 and then rising upwardly through the vertical passages 16 enters the combustion chamber at the top of the stove.

The provision of the annular wall 22 within the distributing chamber 11 and the radial flues 19 to connect the distributing chamber 11 with the annular flue 20 surrounding the combustion and distributing chambers affords means whereby the gaseous

fluids are equally distributed within the checkerwork of the stove and by which the efficiency of the stove is materially increased.

The novel arrangement of radial passages and the provision of the distributing chamber in the bottom of the stove enables a more uniform draft to be secured at all points of the heated stove. The burned gases, and in like manner the cold blast, will be uniformly distributed at all points in the cross section of the stove.

The advantages of my invention will be appreciated by those skilled in the art.

Modifications in the construction and arrangement of the parts may be made without departing from my invention as defined in the appended claims.

I claim:

1. In a hot blast stove, the combination of a central combustion chamber, an annular flue surrounding the combustion chamber, said flue containing checkerwork forming a series of lengthwise vertical passages connected with the combustion chamber at the top of the stove, a distributing chamber below the bottom of the combustion chamber having a plurality of radial passages opening into the annular flue, a flue opening into the distributing chamber through the bottom of the stove, and an annular wall within said distributing chamber having an open upper end opening into the distributing chamber.

2. In a hot blast stove, the combination of a central combustion chamber, an annular flue surrounding the combustion chamber, said flue containing checkerwork forming a series of lengthwise vertical passages connected with the combustion chamber at the top of the stove, a distributing chamber below the bottom of the combustion chamber having a plurality of radial passages opening into the annular flue, a flue opening into the distributing chamber through the bottom of the stove, and an annular wall within said distributing chamber having an open upper end opening into the distributing chamber, the upper end of said annular wall extending upwardly to at least the level of the lowest point of the top of the radial passages connecting the annular flue with the distributing chamber.

In testimony whereof, I have hereunto set my hand.

AMBROSE N. DIEHL.

Witnesses:
T. E. McDOWELL,
GEO. L. NEFF.

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