J. W. H. HAMILTON.

CHANNEL FURNACE.

APPLICATION FILED MAR. 30, 1912.

1,035,699.

Patented Aug. 13, 1912.

3 SHEETS SHEET 1.

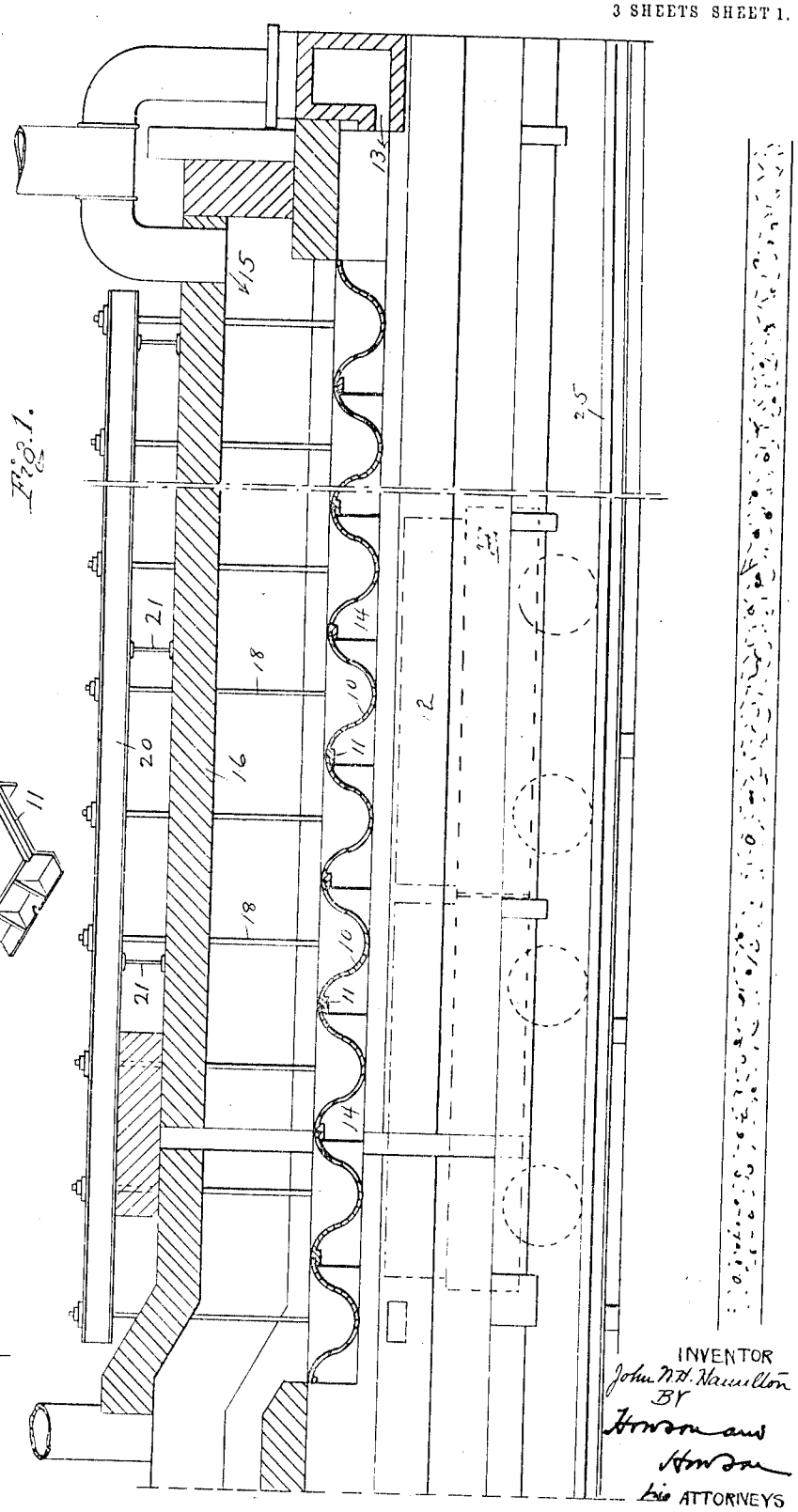

Fig. 1.

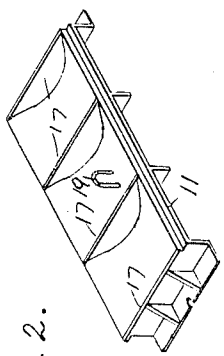

Fig. 2.

WITNESSES

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3 SHEETS-SHEET 2.

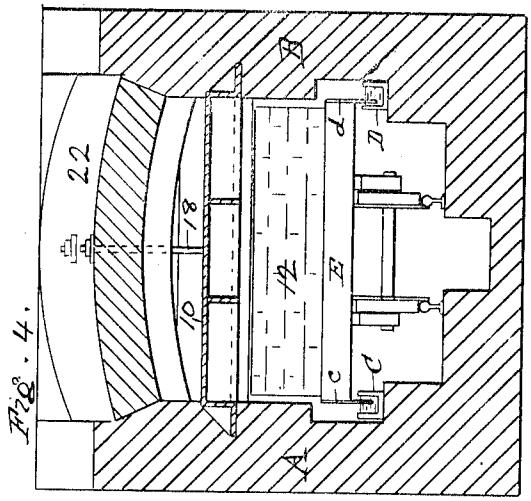

Fig. 4.

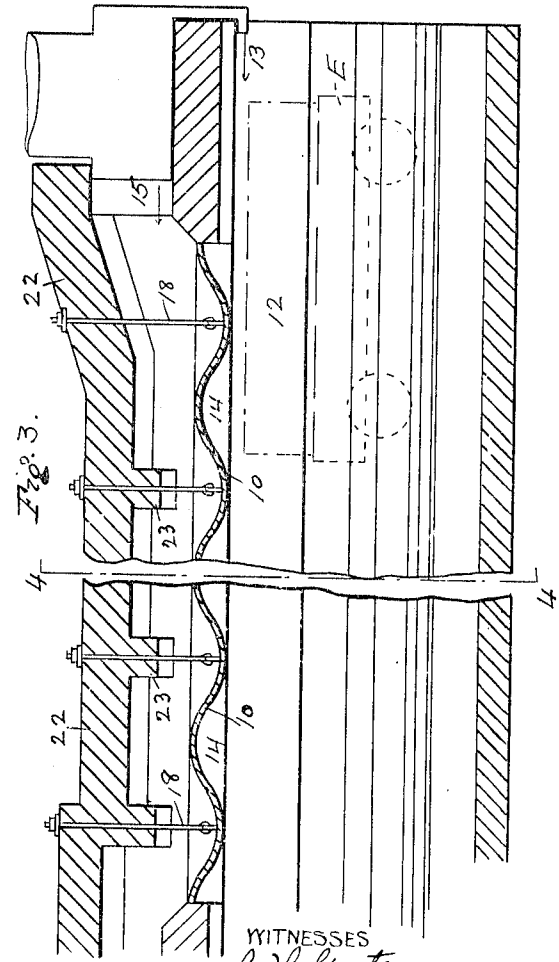

Fig. 3.

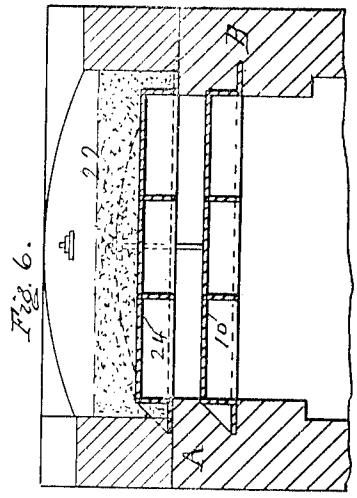

Fig. 6.

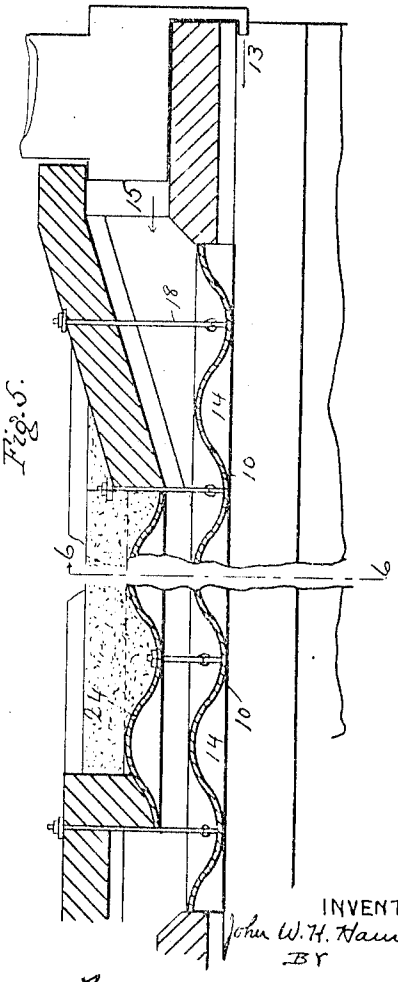

Fig. 5.

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3 SHEETS SHEET 3.

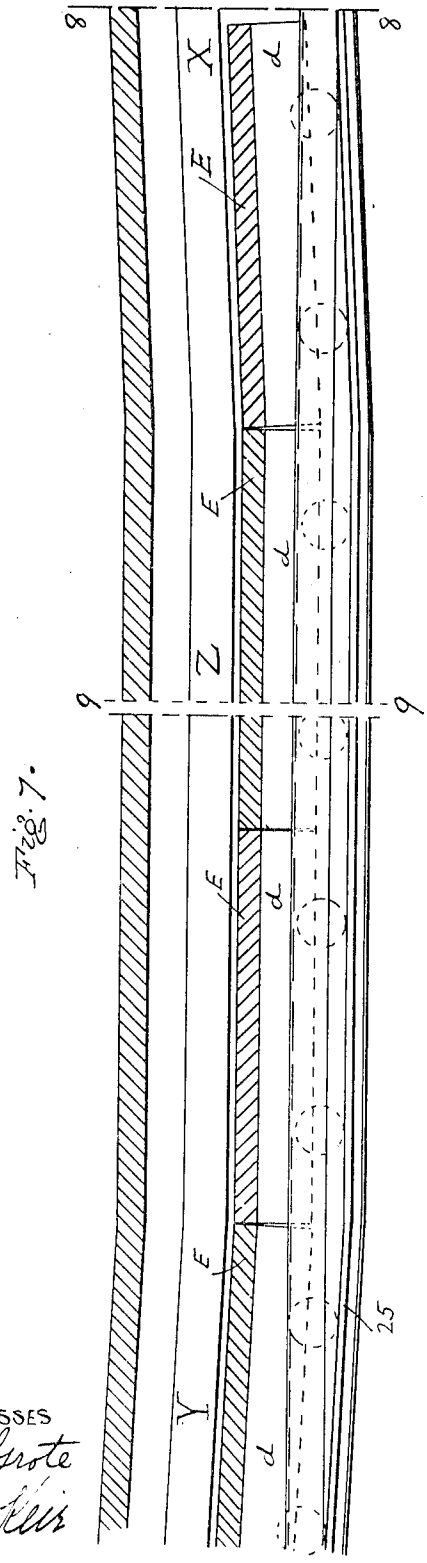

Fig. 7.

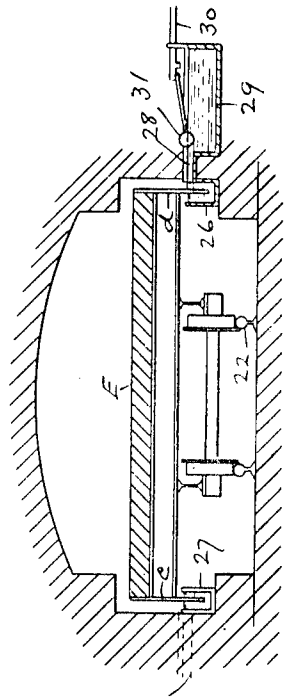

Fig. 9.

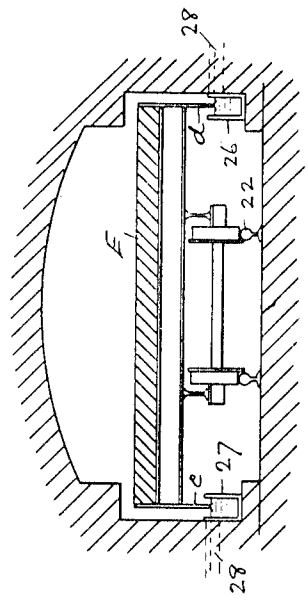

Fig. 8.

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UNITED STATES PATENT OFFICE.

JOHN W. H. HAMILTON, OF ST. GEORGE, NEW YORK, ASSIGNOR TO AMERICAN GRONDAL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

CHANNEL-FURNACE.

1,035,699. Specification of Letters Patent. Patented Aug. 13, 1912.

Application filed March 30, 1912. Serial No. 687,347.

To all whom it may concern:

Be it known that I, JOHN W. H. HAMILTON, a subject of the King of Sweden, and residing at St. George, in the county of Richmond and in the State of New York, have invented a certain new and Improved Channel-Furnace, of which the following is a specification.

My invention relates to a channel furnace and particularly to furnaces of the Grondal type in which the combustion chamber proper adjoins a cooling chamber through which the trucks pass to the discharge end of the furnace.

My invention relates to the cooling chamber and the preheating air passage above the same and also to a novel sealing means for maintaining the space above the trucks separated from the air space below the same.

In the accompanying drawings, Figure 1 is a broken longitudinal section through a cooling chamber of a channel furnace of the Grondal type in which my improved air heating passage is embodied in one form; Fig. 2 is a perspective of a single roof plate; Fig. 3 is a longitudinal section through a cooling chamber showing my invention in another form; Fig. 4 is a cross section on line 4—4, Fig. 3; Figs. 5 and 6 are views corresponding to Figs. 3 and 4 but showing another embodiment of my invention; Fig. 7 is a broken longitudinal section through a furnace showing my improved sealing device; Fig. 8 is a cross section on the line 8—8, Fig. 7; and Fig. 9 is a cross section on the line 9—9, Fig. 7.

In channel furnaces of the Grondal type, it is common practice to preheat the blast of air that is fed to the burner by passing it through a passage arranged in the crown of the cooling chamber as illustrated, for example, in Ohrn 948,243. The heat from the glowing briquets which have just left the combustion chamber is radiated to the walls of the furnace and that in the crown is taken up in large part by the air blast forced through the air passage leading to the burner. A supplemental air blast is blown directly over the briquets to the burner and this serves to take up still more heat. The present construction has proven much more efficient not only in bringing the air blast to a high temperature, but also in cooling the briquets to a lower temperature than has heretofore been accomplished.

The furnace shown is for the most part of usual construction, the side walls A and B (Fig. 3) being recessed to accommodate side seals C and D which the side fins *c* and *d* on the trucks E enter in well known manner during the travel of the trucks through the furnace. Instead of the usual crown arch of brick, between the walls A and B, I now substitute in the cooling chamber a metallic roof plate or series of roof plates 10, extending substantially the entire length of the cooling chamber. These plates are here shown as castings of uniform shape resting at opposite ends upon the sides of the furnace and having one edge offset to form an engaging lip 11 which underlies and forms a joint with the edge of the adjacent plate. The series of plates thus forms an undulating metallic ceiling that is not only a good conductor of heat, but also presents a radiation surface materially greater than that afforded by the plain arched roof now in general use.

The undulating surface has a mechanical function in addition to the value of its increased radiation surface. The blast of air that flows from the port 13 directly over the briquets 12 on the truck E enters the recesses 14 of the undulatory surface and is deflected down upon the briquets, thus forming a series of downwardly directed eddies that enter the spaces between the briquets more completely and thus take up the heat of the briquets more effectively than hitherto, so that the latter are discharged more thoroughly cooled than hitherto, while this portion of the air blast reaches the burner at a higher temperature and thus in an improved condition to aid combustion.

The branch of the air blast entering at port 15, passing above the roof plates 10, is here confined by the usual roof arch 16. The air is forced to spread and move in a thin layer over the hot roof plates, from which it absorbs a great amount of heat, and reaches the burners at a higher temperature than has been commonly attained under the same furnace conditions.

In order to strengthen the plates 10, I preferably provide them with longitudinal ribs or fins 17. In addition to their end sup-

port upon the side walls of the furnace, I provide suspension rods 18, hooked in eyes 19 on the plates 10 and hung from a longitudinal beam 20 resting on cross beams 21. Any tendency to sag under the heat to which the plates are subjected is prevented by these suspension rods.

In Figs. 3 and 4, I have shown the lower surface of the outer brickwork arch 22 conforming as nearly as is practicable in that class of work with the undulating surface of the roof plates 10, thereby forcing the blast entering at 15 to spread and move in close contact with the roof plates 10 in an undulating path, which insures good mixing and even and high heating of the air current. Here the suspension rods 18 are carried by the arch 22 instead of by a longitudinal beam, as in Fig. 1.

In Figs. 5 and 6 the outer brickwork arch is replaced by a superposed series of plates 24, corresponding to those forming the roof and arranged so that the trough of the one overlies the trough of the other, thus forming an undulating path which offers less resistance to the air current than is the case with the brick structure. In this case, the suspension rods may be carried by the upper plates 24, which, not being so highly heated as the lower plates 10, are constantly in condition to afford any needed support to the latter.

In order to prevent an excessive radiation of heat through the upper plates, they are covered with sand, loam, or some other material that is a poor conductor of heat.

A second feature of the present furnace is the means for sealing the spaces above from the spaces below the trucks. This is ordinarily accomplished by sand troughs on the sides of the furnace, into which side fins on the trucks dip. The water seal has also been used, but has generally required too complicated mechanisms for the regulation of the water to be practical. To obviate the necessity for valve devices at the opposite ends of the troughs to permit the entrance and exit of the side fins on the trucks, I propose to incline the track at each end of the furnace so that the fins *c* and *d* on the tracks automatically dip down into and rise from the troughs at the opposite ends of the furnace as they travel through. This is shown in Fig. 7; the track at the opposite ends X and Y of the furnace is inclined down toward the central portion Z at such a grade (exaggerated in the illustrations) that while the fins *c* and *d* clear the ends of the water seal troughs 26—27, they dip into them at the entrance and exit and are at their deepest point during the travel of the trucks through the combustion chamber, where the need of the seal is greatest. Water may be automatically supplied to the troughs by pipes 28 passing through the furnace wall from a tank 29, the flow to which through pipe 30 is controlled by a float valve 31. As many pipes 28 may be opened through to the troughs 26—27 as may be necessary to maintain the requisite height of the water therein during the operation of the furnace.

I claim as my invention:—

1. A channel furnace having a cooling chamber and a ceiling therefor comprising metallic plates arranged transversely of said chamber, together with means for bringing an air blast into contact with said plates to preheat the blast for the purpose described.

2. A channel furnace having a cooling chamber and a metallic corrugated ceiling therefor, together with means for leading an air blast in contact with said ceiling to preheat the blast for the purpose described.

3. A channel furnace having a cooling chamber and a metallic corrugated ceiling therefor, together with means for leading an air blast in contact with both the upper and the lower surfaces of said ceiling to preheat the blast, for the purpose described.

4. A channel furnace having a cooling chamber and a metallic corrugated ceiling therefor, together with means for leading an air blast in contact with said ceiling and for spreading and guiding the blast in a thin layer conforming to the undulating shape of said ceiling to preheat the blast for the purpose described.

5. A channel furnace having a cooling chamber and a metallic ceiling therefor having a radiation surface of greater than the normal ceiling area for the chamber.

6. A channel furnace having a cooling chamber through which the trucks from the combustion chamber pass, and means for directing a counter-blast therethrough, the ceiling of said chamber having its surface shaped to force said blast down upon the briquets on the trucks in a series of downwardly directed eddies.

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

JOHN W. H. HAMILTON.

Witnesses:

WALTER ABBE,

L. H. GROTE.