April 28, 1931. F. M. SIMONDS 1,802,960

HEARTH

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Fig. 1.

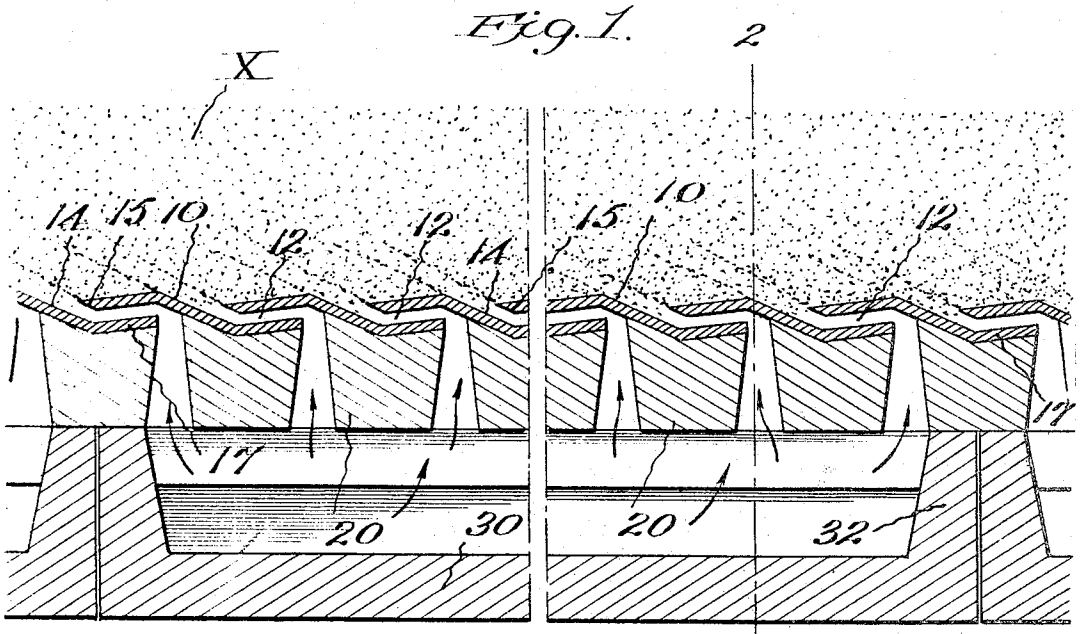


Fig. 2.

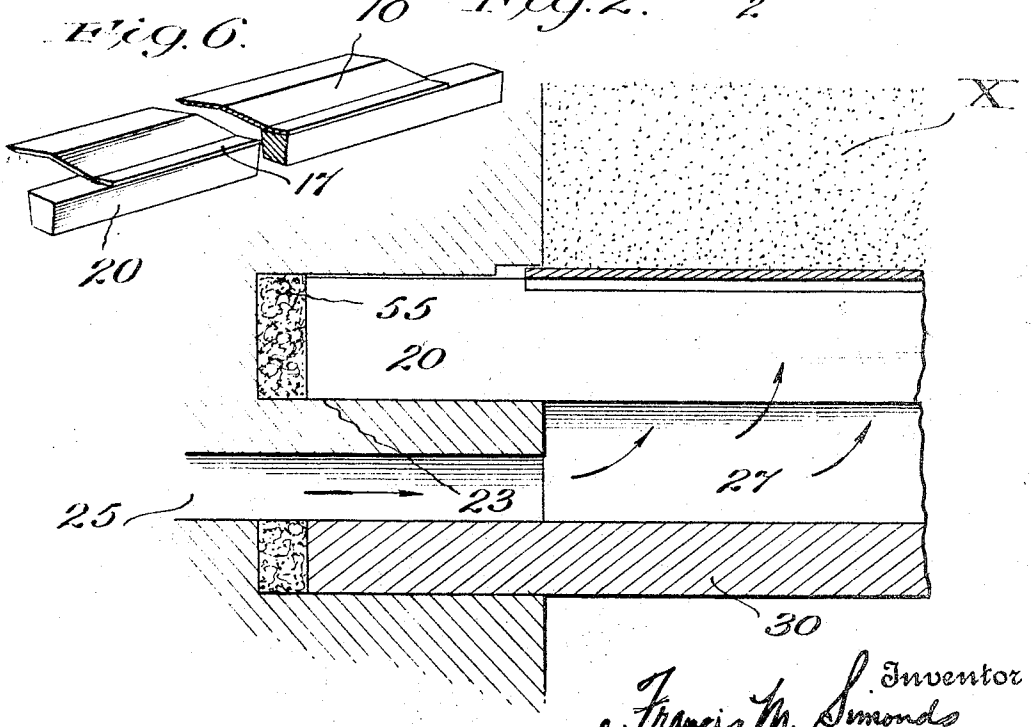


Fig. 6.

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Fig. 3.

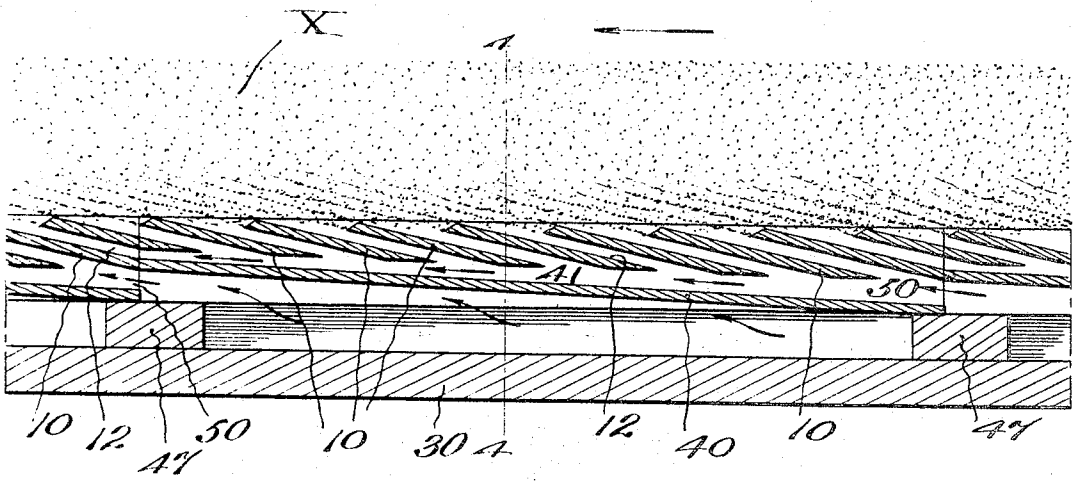


Fig. 4.

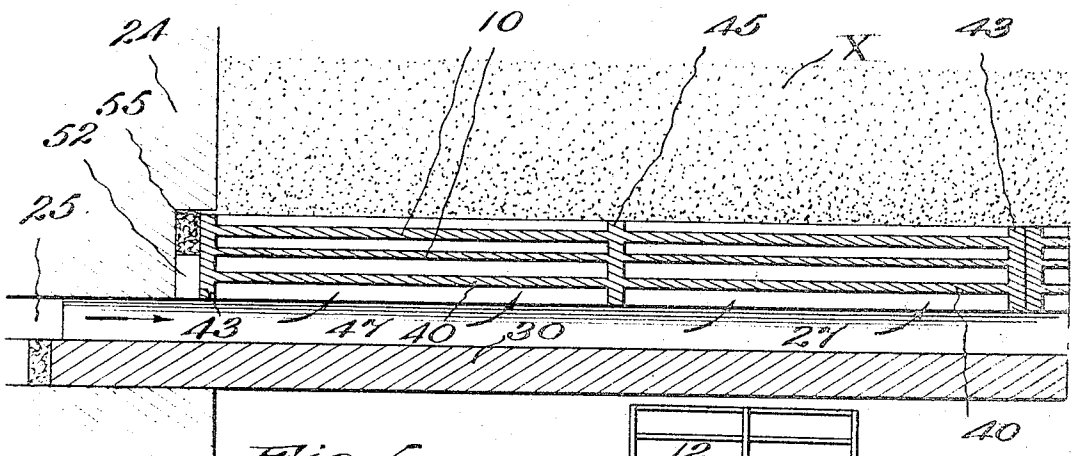


Fig. 5.

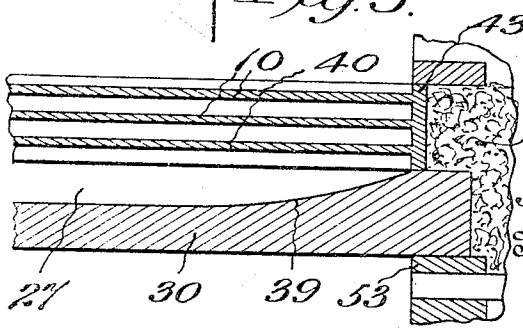
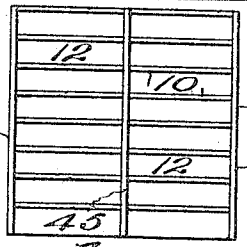


Fig. 7.



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UNITED STATES PATENT OFFICE

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HEARTH

Application filed March 22, 1929. Serial No. 349,163.

This invention relates to hearths for furnaces, and provides improvements therein.

In my application Serial No. 348,632, filed March 20, 1929, I have disclosed and claimed a method and apparatus for the gaseous treatment of finely divided material wherein a layer of said material is moved along a hearth by impacts of gas against the underside of the said layer.

The present invention provides an improved hearth construction wherein gas-passages are provided for directing the impacts of gas in the desired manner, against the underside of a layer of finely divided material lying on said hearth.

The invention further provides a hearth provided with gas-passages, as described, and in which running of the finely divided material through the said passages is avoided.

The invention further provides means for scavenging or driving out through said gas passages such particles of finely divided material as may inadvertently fall through the said gas-passages.

The invention further provides a construction well adapted for incorporation in furnaces of various sizes, and well adapted for replacement, especially replacement of localized portions of the hearth.

Two embodiments of the invention are illustrated in the accompanying drawing, wherein:

Figure 1 is a longitudinal vertical section through a hearth illustrating one embodiment of the invention.

Fig. 2 is a transverse section on the line 2—2, Fig. 1.

Fig. 3 is a longitudinal vertical section, similar to Fig. 1, of a second embodiment,

Fig. 4 is a transverse vertical section on the line 4—4, Fig. 3.

Fig. 5 is a similar section to Fig. 4, showing the parts at the opposite or right-hand side of the furnace.

Fig. 6 is a perspective view of a complete unit of the hearth construction, according to the embodiment of Figs. 1 and 2; and

Fig. 7 is a top plan view of a complete unit according to the embodiment of Figs. 3, 4 and 5.

Referring to said drawings, numerals 10 designate a plurality of relatively thin plates, extending crosswise of a furnace, and forming the hearth, on which is adapted to rest a layer X of finely divided material of any kind which is to be subjected to gaseous treatment by gas passing through the layer of material from its underside. For example, the layer of finely divided material X may consist of ground ore which is to be roasted, or reduced, or both roasted and reduced, during its passage over the hearth.

The layer of material X is intended to be moved or fed along the hearth by means of impacts of gas delivered against its underside. For this purpose, the said plates 10 are adapted to overlap one another, to provide gas-passages 12 in the hearth. These gas-passages may be, for example, about one-eighth of an inch in width, and extend across the hearth.

The plates 10 are, in whole or in part, inclined upwardly at a slight angle, whereby to provide a gas-passage which meets the underside of the layer of material X at a small angle. The angularity is such that there will be little or no tendency of the finely divided material to run down the said plates 10 and run off through the gas-passages 12. The angularity furthermore is such that the impacts of gas against the lower side of the layer of material X will not produce stratification of the fine and coarser particles constituting the said layer X. Angles from 10° to 30° I have found most suitable for accomplishing the above purposes, and up to about 45° fair results may be obtained. As shown in Fig. 1, the plates 10 have portions 14 and 15 having a relatively small upward inclination, the inclination in this instance being about 23°.

A portion of each of the plates, as for example the portion 17, may have a lesser slope than the portions 14 and 15, or even a reverse slope as here shown. These portions 17 inhibit the rolling of small rounded particles which are sometimes found amongst the material X on the hearth.

Bars 20 are preferably provided in connection with each plate 10, for supporting and

strengthening the same and the plate 10 and bar 20 may in fact be formed integral with the upward portion of the plate 10 projecting from the said bar 20. The bars 20 preferably extend across the furnace and may be supported on ledges 23 in recesses in the side-wall 24 of the furnace (Fig. 2). Gas is admitted to the underside of the hearth through a passage 25 in the side-wall, and a chamber 27 beneath the said bars. The chamber 27 may be formed in any suitable manner. However, as shown in my aforesaid application this chamber is conveniently formed by a plate 30 extending across the furnace and having upward transverse flanges 32, the upper side of which is flush with the lower side of one of the bars 20.

Referring now more particularly to Figs. 3 and 4, the plates 10 are inclined upwardly at a small angle, and slightly spaced apart, as heretofore described, to provide narrow gas-passages 12 between the plates. As here shown, each of the plates 10 may be inclined uniformly throughout its length. The angularity of the plates here shown is about 10°.

Beneath the plates 10 there is preferably also arranged a floor plate 40, which floor plate is preferably inclined upwardly slightly, the inclination, however, being less than that of the plates 10.

The floor plate 40 extends the width of a plurality of the plates 10, and at its upper end preferably abuts against one of the plates 10, whereby the space 41 above the floor plate communicates with a passage 12. By this arrangement any small or rounded particles of material from the layer X which may run down the plates 10 will be caught upon the floor plate 40, and the inclination of the floor 40 is so small that very few if any particles will continue thereafter to roll, but will come to rest upon the said plate 40. These particles upon the plate 40 will be scavenged or driven out by the gas which is used for delivering the impacts through the passages 12 against the underside of the layer of material X.

The plates 10 may be supported at their ends in any suitable manner, as for example by side-pieces 43, and as shown in Figs. 3 and 4 the side-pieces and plates 10 are conveniently molded together as a single unit.

Numeral 45 designates a web which may be placed intermediate the ends of the plates 10, to aid in supporting the same. Gas may be admitted, to the underside of the hearth through a gas-passage 25 in the side-wall 24 of the furnace, as heretofore described. The passage 25 communicates with the chamber 27. As here shown, the chamber 27 is formed by a plate 30 extending across the furnace, and on top of each plate are placed at suitable intervals partition strips 47 likewise running across the furnace. The spacing of the strips 47 preferably corresponds to the length of the floor-plate 40, the floor-plate 40 being so arranged that its lower side rests on one of the strips 47, and its upper side is raised above the partition strip 47 below it, whereby an opening 50 is provided for the entrance of gases to the various passages 12 above the floor-plate.

Furthermore, the floor of the plate 30 may be inclined upwardly at its end opposite the passage 25 as indicated at 39, Fig. 5, whereby any particles of material from the layer X which perchance may roll off of the floor 40, will be swept up the inclined floor-plate 30 and through the opening 50, and thence up the floor 40 and out through one of the gas-passages 12.

As shown in Figs. 4 and 5, a plurality of plates 10 may be arranged in units extending less than the full distance across the furnace, the said plates midway of the distance across the furnace being supported by the partition strips 47 and side-pieces 43. The said plates 10 may be supported at one side of the furnace in recesses 52 in the side-wall 24 of the furnace, and at the opposite side on ledges 53 in the side-wall 54.

Numeral 55 designates packing material, for example asbestos, for making a tight joint between the ends of the plates and the furnace walls.

The invention may receive other embodiments than those specifically illustrated and described.

What is claimed is:—

1. A stationary hearth for the progression and gaseous treatment of finely divided material, comprising a plurality of strips extending transversely of the hearth and in a substantially horizontal plane, and spaced slightly apart to leave narrow passages between said strips, said strips being inclined, and the upper portions of successive strips overlying portions of adjacent strips.

2. A stationary hearth for the progression and gaseous treatment of finely divided material, comprising a plurality of strips extending transversely of the hearth and in a substantially horizontal plane, and spaced slightly apart to leave narrow passages between said strips, said strips being inclined, and the upper portions of successive strips overlying portions of adjacent strips, said strips having an inclination up to and including 30°.

3. A stationary hearth for the progression and gaseous treatment of finely divided material, comprising a plurality of strips extending transversely of the hearth and in a substantially horizontal plane, and spaced slightly apart to leave narrow passages between said strips, said strips being inclined, and the upper portions of successive strips overlying portions of adjacent strips, and transverse bars supporting said strips.

4. A hearth for the gaseous treatment of

finely divided material, comprising a plurality of strips extending transversely of the hearth, and spaced slightly apart to leave narrow passages between said strips, said strips being inclined, and the upper portions of successive strips overlying portions of adjacent strips, a floor below said strips, said floor being in sections extending the width of a plurality of said overlapping strips, said floor being inclined to a degree less than that of said strips, a floor section at its upper end abutting a strip, whereby particles on said floor section may be blown over the floor and out through a passage between strips.

5. A hearth for the gaseous treatment of finely divided material, comprising a plurality of strips extending transversely of the hearth, and spaced slightly apart to leave narrow passages between said strips, said strips being inclined, and the upper portions of successive strips overlying portions of adjacent strips, a floor below said strips, said floor being in sections extending the width of a plurality of said overlapping strips, said floor being inclined to a degree less than that of said strips, a floor section at its upper end abutting a strip, whereby particles on said floor section may be blown over the floor and out through a passage between strips, a gas duct below said floor-section, said duct having its bottom inclined upwardly to the level of the lower end of said floor plate, whereby particles in said duct may be blown upwardly upon said floor section and outwardly through an opening between said strips.

In witness whereof, I have hereunto signed my name.

FRANCIS M. SIMONDS.