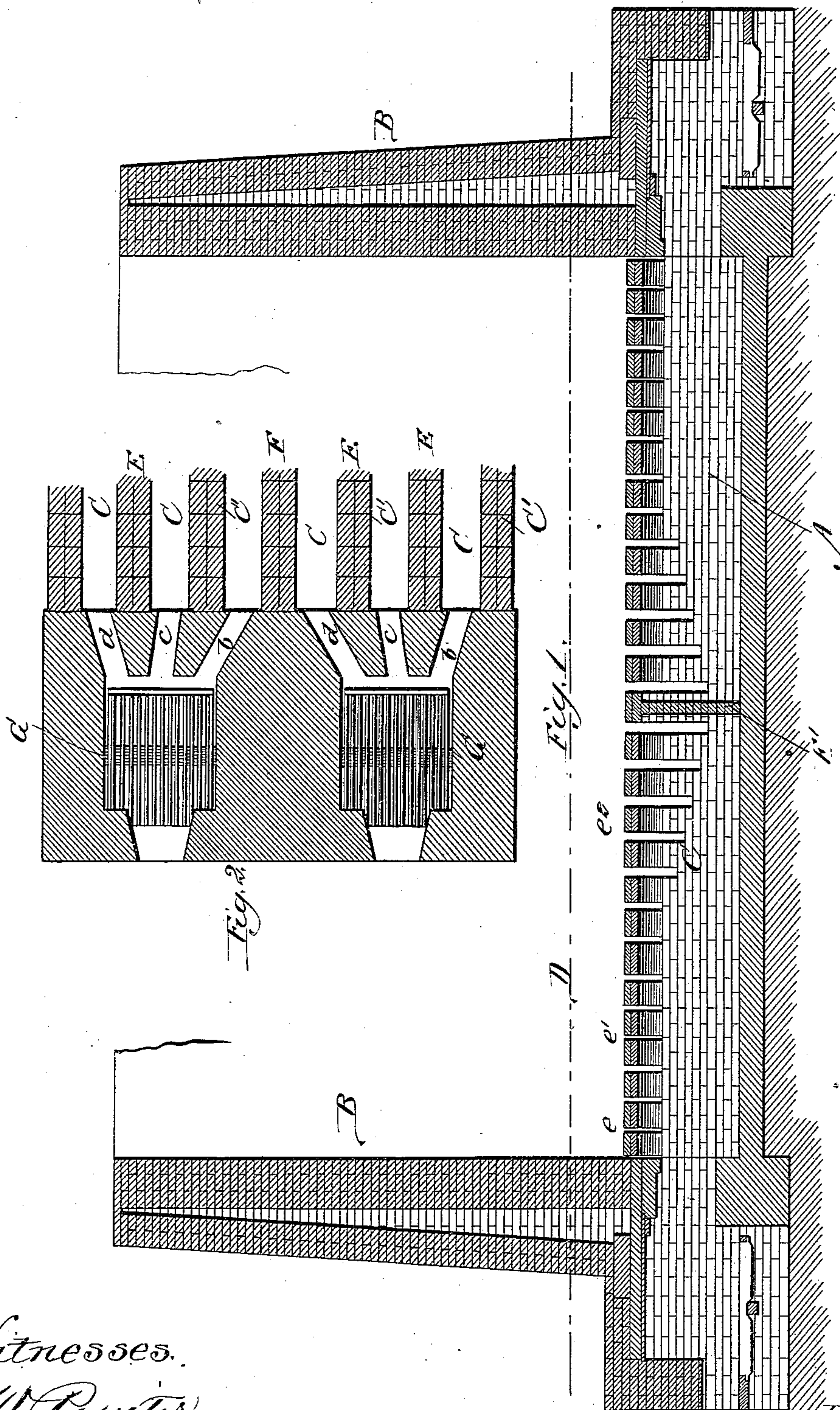


2 Sheets—Sheet 1.

No. 356,536.

Patented Jan. 25, 1887.



Witnesses.
W. Foster,
Chas B. Quahundro

Wm and Wm E. Hinckliff
By Jno. G. Ellsworth
Atty.

(No Model.)

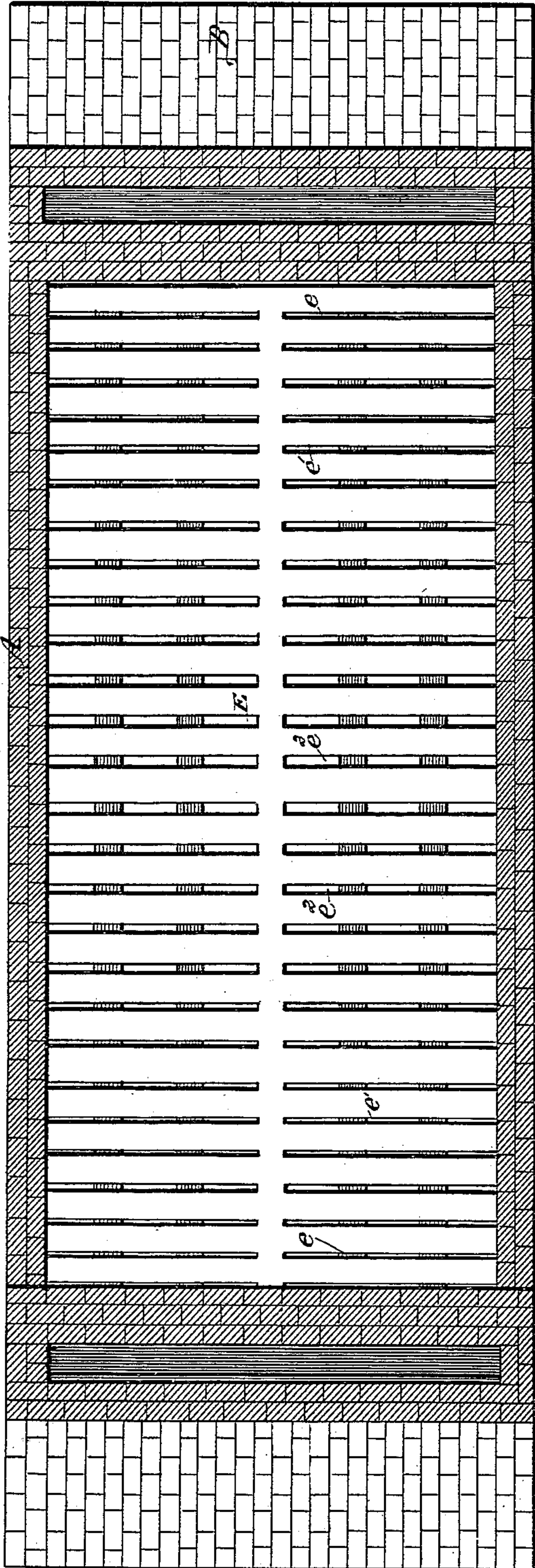
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W. E. & W. HINCHLIFF.

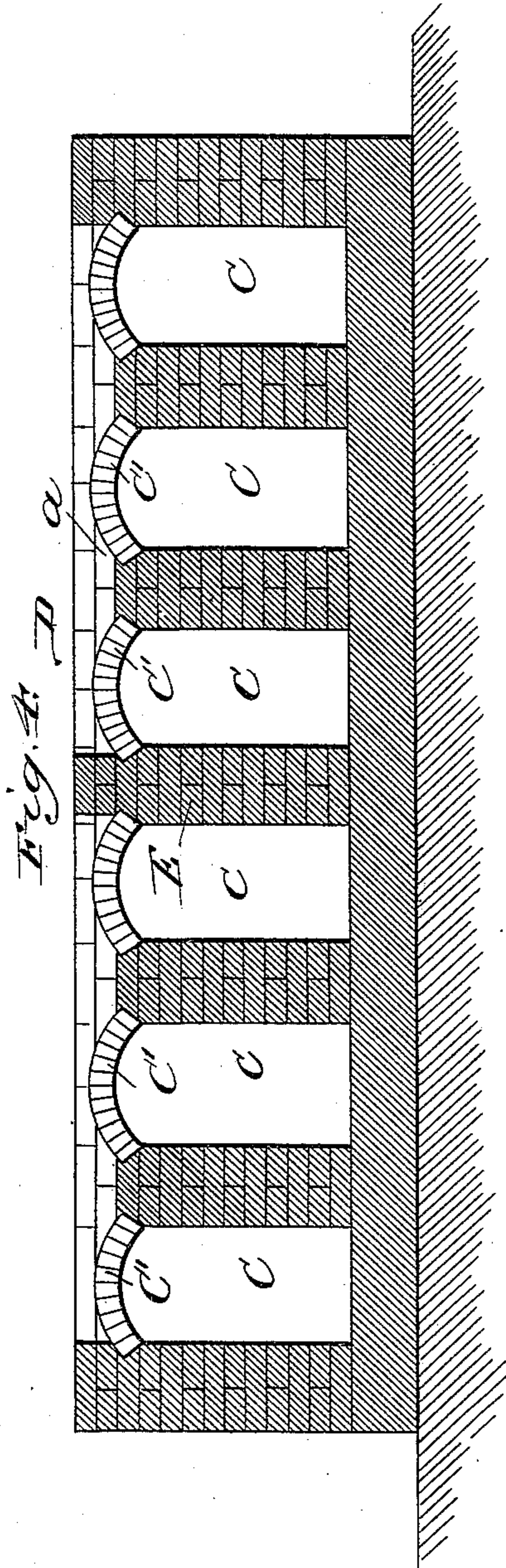
BRICK KILN.

No. 356,536.

Patented Jan. 25, 1887.



Witnesses,
W. Rositer.
Thos R. Quohandro.



Inventor: S.
Wm & Wm E Hinchliff
BY Jno. S. Elliott
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM E. HINCHLIFF AND WILLIAM HINCHLIFF, OF CHICAGO, ILLINOIS.

BRICK-KILN.

SPECIFICATION forming part of Letters Patent No. 356,536, dated January 25, 1887.

Application filed April 23, 1886. Serial No. 199,899. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM E. HINCHLIFF and WILLIAM HINCHLIFF, both citizens of the United States, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Brick-Kilns, of which the following is a specification.

This invention relates to improvements in kilns especially designed for burning brick, and in which a combustion-chamber between the brick-burning chamber and the fire chamber or chambers is separated from the brick-burning chamber by a slotted or perforated floor supported upon a series of arches. In such prior constructions a single or continuous combustion-chamber having a surface area corresponding with that of the kiln of brick has been employed and supplied with heat-units from opposing fire-chambers at the ends or sides, or both, of the combustion-chamber, while at the same time all of the arches of the chamber are of uniform size and the slots or perforations in the floor of uniform heat-discharging area, the fire-chambers being connected with the arched and continuous chamber by a single passage common to all.

Among the objections to such construction are the impossibilities of a uniform distribution of heat to the kiln of brick or of varying the discharge of heat at any one or more points in the kiln, as is frequently desirable for promoting a uniformity in burning the brick, for it will be understood that when several fire-chambers are employed for supplying heat to the kiln there is unavoidably a variation in the heat discharged by each, which may be due to differences in firing, variations in draft, and other causes well understood and not necessary to be specified.

The objects of our invention are therefore to cure these defects, first, by having a series of combustion-chambers which, with their respective fire-chamber, are independent of each other, so that by increasing or diminishing their heat-supply the temperature of the kiln at desired points may be varied and the overburning or underburning of the brick at any one point in the kiln may be avoided; second, by having such a connection between the fire-chamber and its respective combustion-chamber as to promote a rapid and forcible dis-

charge of the heat from the fire-chamber to the combustion-chamber, and at the same time provide for regulating the discharge of heat from the fire-chamber and varying the supply of heat-units at different points in the combustion-chamber; third, by having such a variation in the discharge orifices of the floor of such a character that the heat-units shall be equalized throughout the area of said floor in their discharge to the brick-kiln; and, finally, to have certain details of construction for promoting these ends, all as described and illustrated in the accompanying drawings, in which—

Figure 1 represents a vertical longitudinal section through the kiln and one of the fire-boxes; Fig. 2, a horizontal section through two of the fire-boxes; Fig. 3, a horizontal section on line *x x* of Fig. 1, and Fig. 4 a transverse vertical section of the kiln between two of the arches.

Similar letters of reference indicate the same parts in the several figures of the drawings.

A A indicate the side walls, and B B the end or surrounding walls, of the kiln, within which are the combustion-chambers C and the brick-burning chamber D, which combustion-chamber consists of a series of arched flues, C', and is separated from the brick-burning chamber by a floor extending horizontally across the kiln from wall to wall and composed of one or more layers of brick, but preferably a single layer of brick, *a*, supported by arches.

The arches C' extend longitudinally of the kiln, and therefore lengthwise of the combustion-chamber, and each combustion-chamber contains a set of three of these arches separated from each other by blind walls E, so that there are three distinct flues or passages, which together form the combustion-chamber proper. Each arch may be said to be composed of a series of narrow arches of the length of a brick, and separated from each other, so that a series of passages are formed in each arch for the escape through the arches of the heat.

The set of arches upon one side of the kiln are separated from those upon the opposite side of the kiln by a solid wall, F, extending lengthwise with the arches, and said sets are isolated from each other at their ends by a solid transverse wall or partition, F', so that in effect each set occupies one-fourth of the area of the

brick-burning chamber, to which these combustion-chambers afford a common supply of heat.

Each combustion-chamber is provided with
 5 a fire-chamber, G, between which and the arched passages of each set are short passages *b c d*, respectively, which, together with the separate arches, constitute in effect flues promoting combustion and an increased discharge
 10 of volume of heat into the brick-burning chamber, and to an extent not possible were each of the four combustion-chambers constructed of a single arch, or were a single combustion-chamber employed in lieu of the four.

15 In this connection it is proper to observe that the area of brick-kilns cannot be contracted within certain limits for practical purposes, that the combustion chamber or chambers must singly or in the aggregate conform to the area
 20 of the kiln, and that a single combustion-chamber with any number of fire-chambers cannot be operated so as to uniformly distribute the heat through the kiln, or to vary the heat at different points, so as to insure a uniform burning
 25 of the brick throughout the kiln. These objections are overcome to a limited extent by the employment of four separate combustion-chambers with as many fire-chambers; but we
 30 have found in practice that a much better result is obtained by employing the arches, which not only separate the combustion-chamber into three parts, but by their flue-like operation promote a rapid and forcible discharge of the
 35 heated products into the kiln to such an extent that the brick in the upper part of the kiln are quite thoroughly burned without overburning those in closer proximity to the burning-chamber. Besides this, the passages between the fire-chamber and the combustion-chamber afford
 40 a convenient means for cutting off or varying the heat in any one or two of the arched chambers, to the exclusion of the other or others of the same set, and this result, in addition to that obtained by reason of the employment of
 45 the four combustion-chambers, is important, because enabling us to vary the heat at such a number of points in the kiln that a perfection in burning the brick is materially promoted, and to an extent not possible in furnaces of
 50 the class to which this relates.

In all furnaces in which there is a bridge-wall between the fire and combustion chambers, as is usually the case, or in which, from any cause, the flame either rises or descends in
 55 its escape from the fire-chamber to the combustion-chamber, the hottest point in the combustion-chamber is at a point between the fire-chamber and the center of length of the combustion-chamber, and the coolest point is
 60 at the rear end of the combustion-chamber, and any such variation in heat escaping from a combustion-chamber to a brick-kiln is seriously objectionable. No effort has, before our
 65 invention, been made to overcome this objection, although prior thereto escape orifices or slots between or in the arches of the combustion-chamber have been employed; but invari-

riably they have had no variation intended for or capable of promoting a uniform discharge of the heat-units from the combustion-chamber into the brick-burning chamber.
 70 This uniform discharge of the heat-units from the combustion-chamber is an important object of our invention, and is attained, as will be seen by reference to Figs. 1 and 3, by increasing the area of the escape-passages proportionately as the heat diminishes at various
 75 points in the combustion-chamber—as, for instance, the greatest degree of heat is at *e e'*, Fig. 1—that is to say, next the fire-chamber, and also at a point about half-way between the fire-chamber and the center of length of the combustion-chamber—and hence the passages between these two points are larger than at such
 80 points, and from the point *e'* the slots between the arches are not only gradually increased in width as they approach the rear end of the furnace, but toward that end are increased in depth, as shown at *e''*, Fig. 1, the difference in
 85 area of the slots at any one point approximately corresponding with the difference of heat escaping at that point. In other words, a greater number of heat-units may escape through the passages *e''*; but their heating effect is not designed to be any greater than the less number
 90 escaping at *e'*, and by this means there is an even diffusion of heat in the brick-burning chamber at all points of and above the combustion-chamber. Our invention in this respect is not limited to graduated escape-passages in arches or in brick-kilns, for they may
 95 as well be used in any kind of a floor separating a combustion-chamber from a drying or burning chamber of any apparatus for that purpose; nor do we limit ourselves to the
 100 number of arched flues connected with a single fire-chamber or the number of fire-chambers to a kiln, such as herein shown and described, for it is obvious that these parts may be varied in number at will, or according to
 105 the dimensions of the kiln, without a material departure from the invention as herein disclosed.

By the construction described the heat is discharged uniformly from the combustion-chambers, or from any one of the arched passages or flues thereof, and said heat may not
 110 only be varied at the quarters or other sections of the kiln, but at one or more of several different parts of a combustion-chamber constituting a quarter or other sectional heating-surface, while at the same time the draft of the fire-chamber and the force of the heat discharged into the kiln are promoted.

Having described our invention, what we
 115 claim, and desire to secure by Letters Patent, is—

1. In a brick-kiln, the brick-burning chamber and the combustion-chamber, in combination with an uninterrupted arched floor between said chambers, having a graduated series of openings therein, substantially as described.

2. In a brick-kiln, the brick-burning cham-

ber and a continuous arched floor therefor having a series of graduated passages, in combination with a series of independent and disconnected combustion - chambers underlying said floor, and a fire-box connected with each of said chambers, substantially as described.

3. In a brick-kiln, a continuous arched floor having a graduated series of passages therein, in combination with a series of combustion-chambers underlying said floor, formed by the arches thereof, a fire-box connected with two or more of said arches or arched flues, and passages through the walls between said arches separating the said flues, substantially as described.

4. In a brick-kiln, two or more combustion-chambers, each composed of two or more flues, in combination with a fire - chamber and a number of passages between said combustion-chamber corresponding with the number of flues and connecting said flues with fire-chamber, substantially as and for the purpose described.

WILLIAM E. HINCHLIFF.
WILLIAM HINCHLIFF.

Witnesses:

WILL R. OMOHUNDRO,
JNO. G. ELLIOTT.