(No Model.) 2 Sheets—Sheet 1.

F. GRATHWOHL.

MALT DRIER.

No. 324,469. Patented Aug. 18, 1885.

Fig. 1.

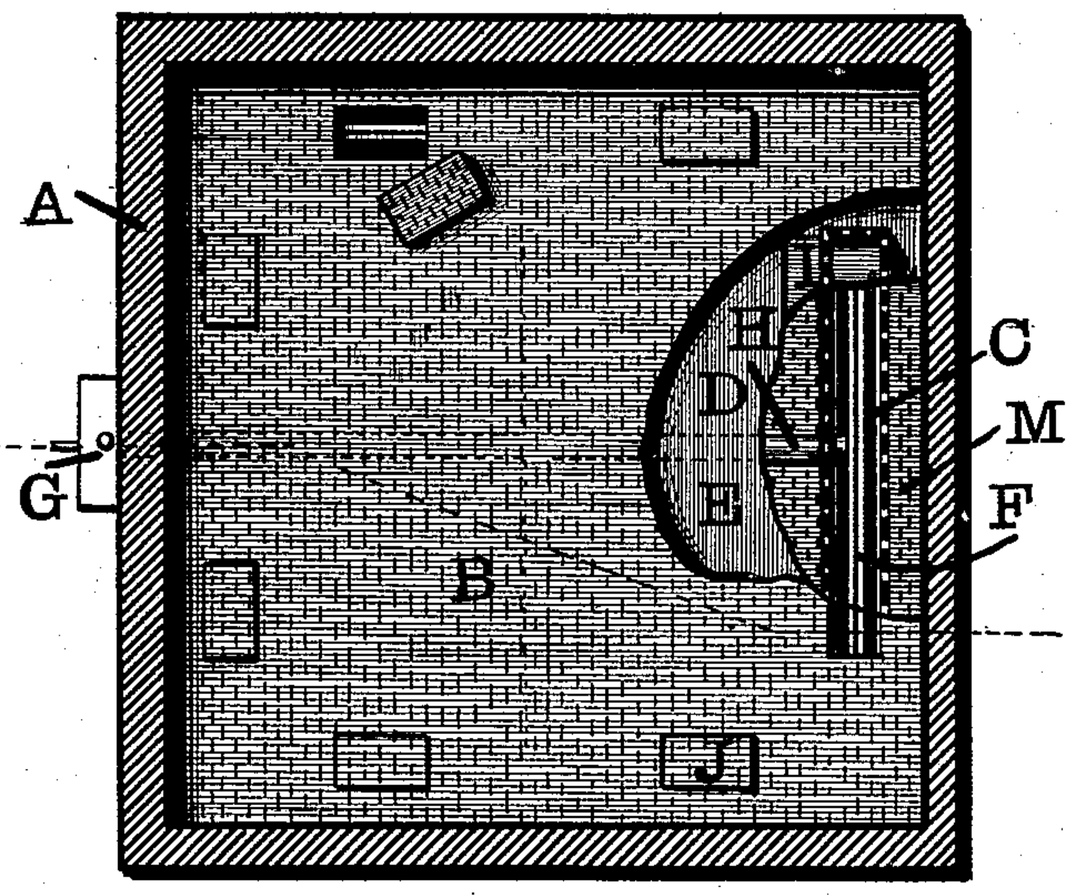


Fig. 2.

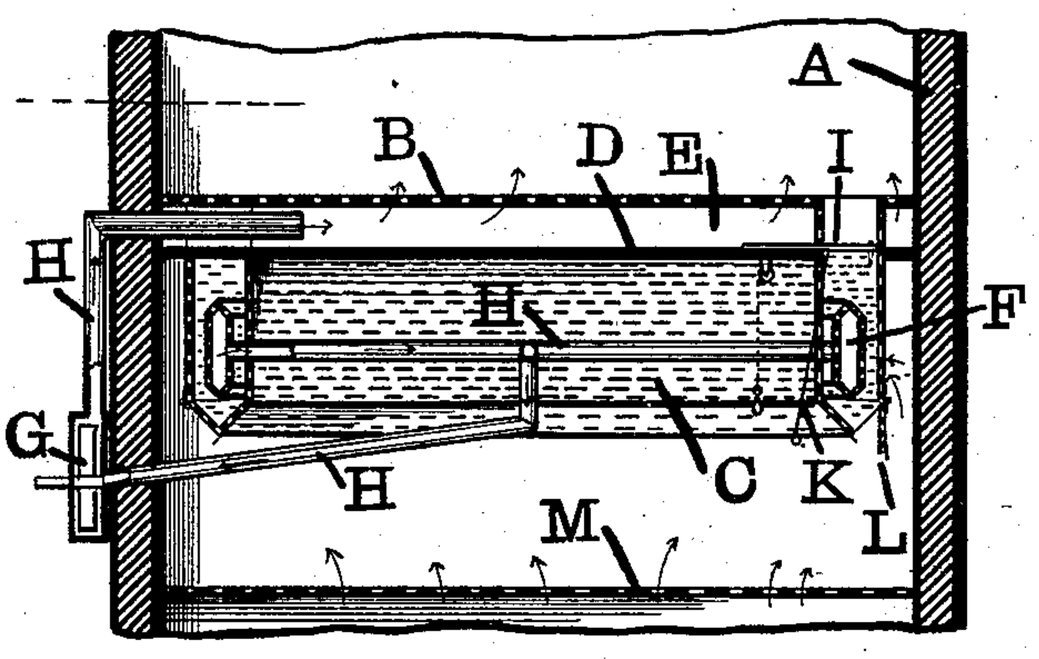
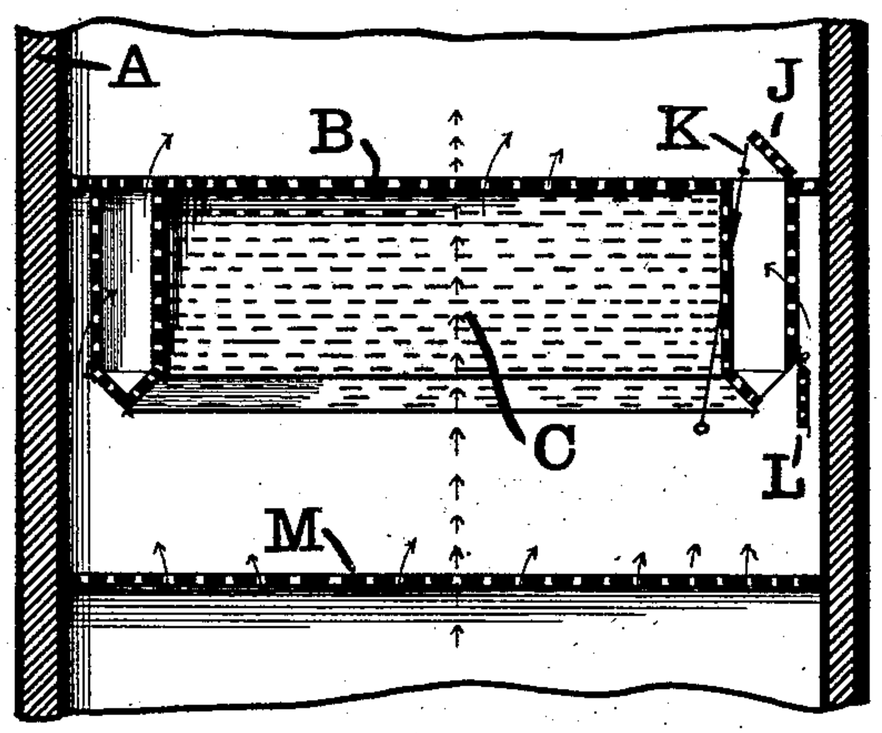


Fig. 3.



Witnesses:
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G. P. Langsdale

Fritz Grathwohl
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(No Model.) 2 Sheets—Sheet 2.

F. GRATHWOHL.

MALT DRIER.

No. 324,469. Patented Aug. 18, 1885.

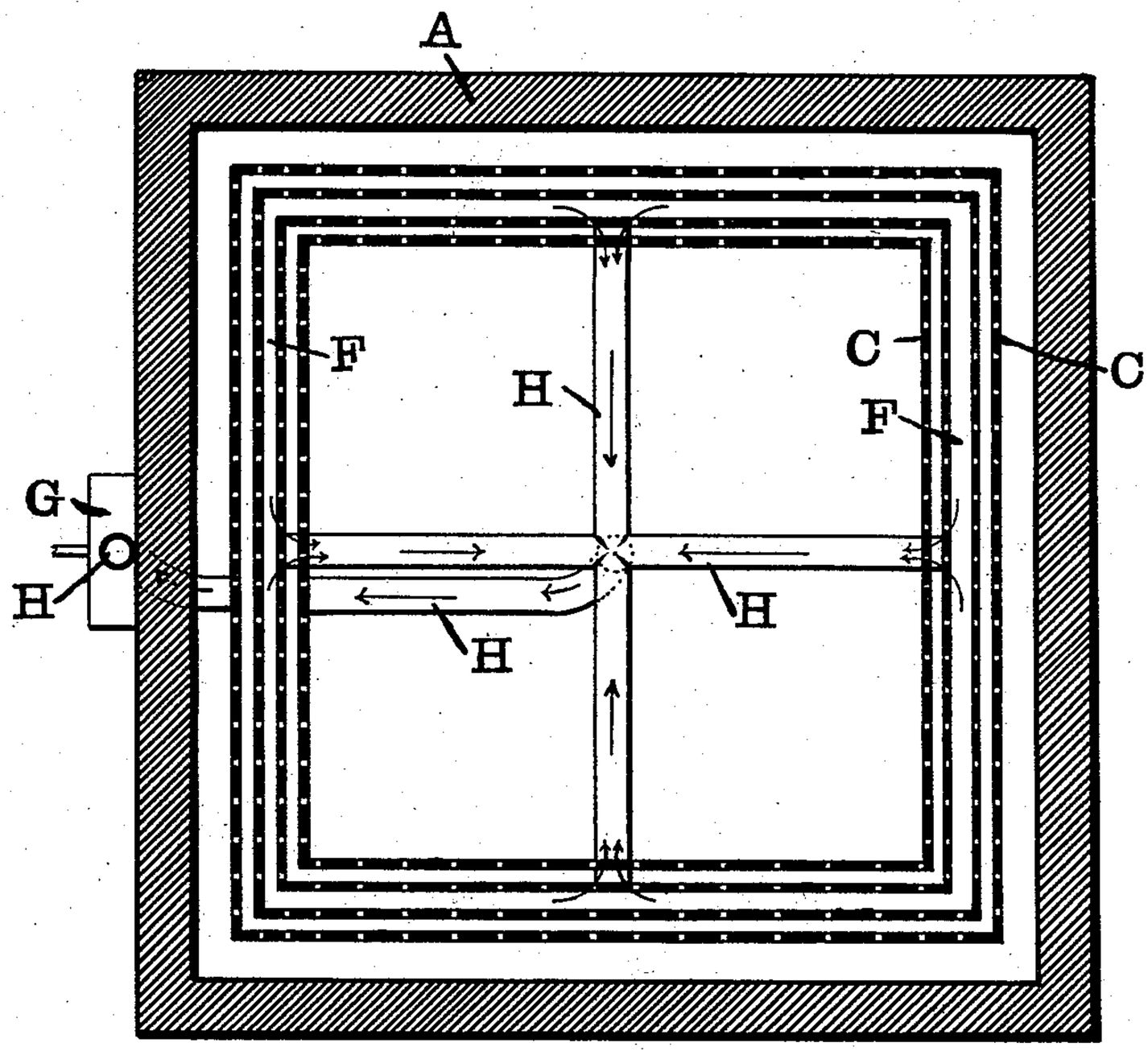

Fig. 4.

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UNITED STATES PATENT OFFICE.

FRITZ GRATHWOHL, OF COVINGTON, KENTUCKY.

MALT-DRIER.

SPECIFICATION forming part of Letters Patent No. 324,469, dated August 18, 1885.

Application filed March 6, 1885. (No model.)

To all whom it may concern:

Be it known that I, FRITZ GRATHWOHL, a former subject of the Emperor of Germany, who has declared his intention of becoming a citizen of the United States, and a resident of Covington, Kenton county, Kentucky, have invented certain new and useful Improvements in Malt-Kilns, of which the following is a specification.

This invention pertains to improvements in kilns for drying malt; and it relates to the arrangement of floors, chambers, &c., intended to hasten the process of drying, to reduce the amount of labor required, to economize in the fuel employed, and to improve the product.

My improvement is readily applicable to malt-kilns of ordinary construction and already constructed.

My improvements will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a plan of a malt-kiln embodying my improvements, portions of the upper floor-work being broken away to expose to view the malting-chamber and floor below; Fig. 2, a vertical section of the same, and Fig. 3 a section similar to Fig. 2, except that the construction is simpler, many of the features of Fig. 2 being omitted, and Fig. 4 a horizontal sectional plan of the kiln below the malt-floor and through the receiver, showing arrangement of the pipe-system.

In the drawings, A represents the walls of a malt-kiln; B, one of the usual perforated malt-floors of the same; C, a continuous box-like receiver arranged below the floor B, around near the walls of the kiln, and constructed of perforated metal like the malt-floor; D, a tight sub-floor disposed just below the floor B, and constructed of metal; E, the air-chamber formed between the malt-floor and this sub-floor; F, a pipe formed of perforated metal, and disposed along within the receiver C; G, a circulating-fan of any ordinary construction adapted to produce a current of air; H, a pipe-system leading from various points in the perforated pipe F, through the circulating-fan to the chamber E; I, slide-dampers at openings in the top of the receiver, and provided with operating devices, as sheave and chain, for opening them from the malting-chamber below the receiver; J, removable trap-doors at openings in the malt-floor B leading down through the chamber E into the receiver, these openings being arranged in series over the receiver; K, rods reaching from below upward through the receiver and adapted, when the slide dampers are open, for pushing open the trap-doors J; L, trap-doors in the bottom of the receiver, and M, the usual malting-floor below the malt-floor B.

The malt-kiln is to be supplied with the usual heating-furnace below, with the usual chimneys or moisture-flues at the top, and with the usual doors, windows, &c., those doors and windows in the walls of the drying-rooms being made as air-tight as practicable.

In the operations of this kiln malt is spread, as usual, upon the malt-floor B. The heat passing, as usual, up through the floor M cannot pass through the floor B, Fig. 2, being prevented by the tight floor D. The heated air, however, enters the receiver through its perforated sides, and the circulating-fan draws this air through the sides of the inner pipe, F, and through the pipes H, discharges it into the chamber E and up through the malt. The air rising from the malt passes out as usual.

With the usual form of kiln it would be in order after the grain had been for some time subjected to the drying process, to turn it, shovel it, and redistribute it upon its floor, in order that new portions of the grain may be further treated, the grain being subsequently removed from the floor. In my device, instead of this turning of the grain, I open the slide-dampers I from below, and push the trap-doors J, which are of course hidden under the malt, upward from below, thus permitting the malt near them to flow freely downward into the receiver, the bottom trap-doors of which are to be closed. The receiver is to have a capacity for holding all the malt which has been spread upon the floor B, and all that malt is to be passed from the floor B through the openings into the receiver. This operation leaves the receiver full of partially-dried grain, and leaves the floor B clean. The slide-dampers are now closed from above, and the trap-doors J replaced, and a new charge of grain is spread upon the floor. The drying process now continues, as follows: The

heated air rising through the floor M passes through the perforated sides of the receiver, as before, but on its way to the inner pipe, F, it is compelled to pass through the layers of malt within the receiver surrounding the inner pipe. This malt is partially dried, and now receives a further drying by the action of this heated air. The circulating-fan draws this air off, as before, and discharges it into the chamber E, whence it passes upward through the malt-floor and acts upon the green malt thereon. When the green malt upon the floor B has received the same treatment as was given that previously there, the trap-doors L are opened and the malt in the receiver is allowed to fall to the malt-floor M below, after which these trap-doors are closed and the malt from the floor B passed into the receiver, as before, and a new charge of green malt placed upon the floor B. The heat passing upward through the floor M now goes first through the malt thereon, which thus receives its third subjection to heat, then through the malt in the receiver, which now receives its second subjection, and then through the green malt on the floor B. Finally, the dried malt is removed from the floor M, which is again supplied from the receiver. In this way the malt receives three successive treatments with very little handling, and the heat employed is utilized to the fullest extent.

In the drawings I have shown the malt-floor B as being provided with a receiver, &c., between it and the malt-floor below, and this arrangement may, if desired, be carried out with each malt-floor—that is, the floor M as well as any malt-floors which may be below it, may be provided with a receiver, &c., as shown in connection with the floor B. The circulating-fan G has but light duty imposed upon it, and may in some cases be omitted entirely, it being obvious that if the usual chimneys or flues, which finally take the heated air from the chamber above the floor B, have sufficient draft, the air will be thus drawn up through the pipe-system F and H. The circulating-fan simply serves to furnish a circulation in case the draft is sluggish.

In Fig. 3 I show the system very much simplified. In this construction there is no tight sub-floor, the heated air rising freely from the floor M through the floor B, and the malt upon it, a portion of the air going through the malt in the receiver and out through the inner pipe, F, such inner pipe being omitted from this figure. In such a case as this the air passing outward through the pipe system from the inner pipe, F, may be discharged under the floor B or elsewhere, as desired. The floor of the receiver is in gutter form, as shown, and in practice I form one entire face of this gutter into hinged sections forming continuous trap-doors. The rod K passes angularly through the side wall of the receiver and terminates above, just below the slide-damper, and it is prevented from falling out of place by a stop-collar. The openings of the trap-doors J in the malt-floor B are boxed down to the sub-floor and communicate with the receiver. These box portions, and also the trap-doors J, are perforated, but the slide dampers are tight. By this construction the entire surface of the floor B is utilized as a perforated malt-floor.

In practice I prefer to arrange the receiver around near the wall of the kiln, as shown in the drawings, but such arrangement is not at all essential, it being sufficient that the receiver, or a series of them, be arranged below the floor B and in communication with it through suitable openings.

I claim as my invention—

1. In a malt-kiln, a perforated malt-floor, a chamber below such floor having a perforated floor, a perforated receiver suspended from the first-mentioned floor, openings with doors through the upper malt-floor into the receiver, and openings at the bottom of the receiver, combined substantially as and for the purpose set forth.

2. In a malt-kiln, a perforated malt-floor, a receiver with perforated walls disposed beneath said floor continuously near its margin, openings with doors through said floor, in communication with the receiver, doors at the bottom of the receiver, and a perforated floor below the receiver, combined substantially as and for the purpose set forth.

3. In a malt-kiln, a perforated floor, a receiver with perforated walls disposed below said floor, openings with doors through said floor, in communication with the receiver, doors at the bottom of the receiver, a perforated pipe disposed within the receiver, and an outlet-pipe system connected with said perforated pipe, combined substantially as and for the purpose set forth.

4. In a malt-kiln, a perforated malt-floor, a receiver with perforated walls disposed below said floor, openings with doors in said malt-floor, in communication with the receiver, doors at the bottom of the receiver, a perforated inner pipe disposed within the receiver, and a pipe-system leading from said perforated pipe and discharging immediately below said malt-floor, combined substantially as set forth.

5. In a malt-kiln, a perforated malt-floor, a tight sub-floor below the same, a receiver with perforated walls disposed below said floors, openings with doors in said malt-floor, in communication with the receiver, doors at the bottom of the receiver, a perforated pipe disposed within the receiver, and a pipe system leading from said perforated pipe and discharging into the chamber between the malt-floor and the tight floor, combined substantially as and for the purpose set forth.

6. In a malt-kiln, the combination of perforated floor B, tight floor D, below the same, receiver C, below said two floors, openings and doors J, placing the receiver in communication with the malt-chamber above the perforated floor, sliding dampers I, serving to

cut off such communication at a point level with the tight floor, doors L, at the bottom of the receiver, perforated pipes F, within the receiver, and outlet-pipe system H, connected with said perforated pipes, substantially as and for the purpose set forth.

7. The combination of receiver C, provided with passages upward through the floors D and E, doors J in floor B at such passages, slide-dampers I in floor D at such passages, and rods K, reaching upward through the receiver and adapted to engage the doors J, substantially as and for the purpose set forth.

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Witnesses:
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W. A. SEWARD.