No. 675,471. Patented June 4, 1901.

J. F. DORNFELD.

FURNACE FOR MALT KILNS.

(Application filed Sept. 20, 1900.)

(No Model.)

Fig. 1.

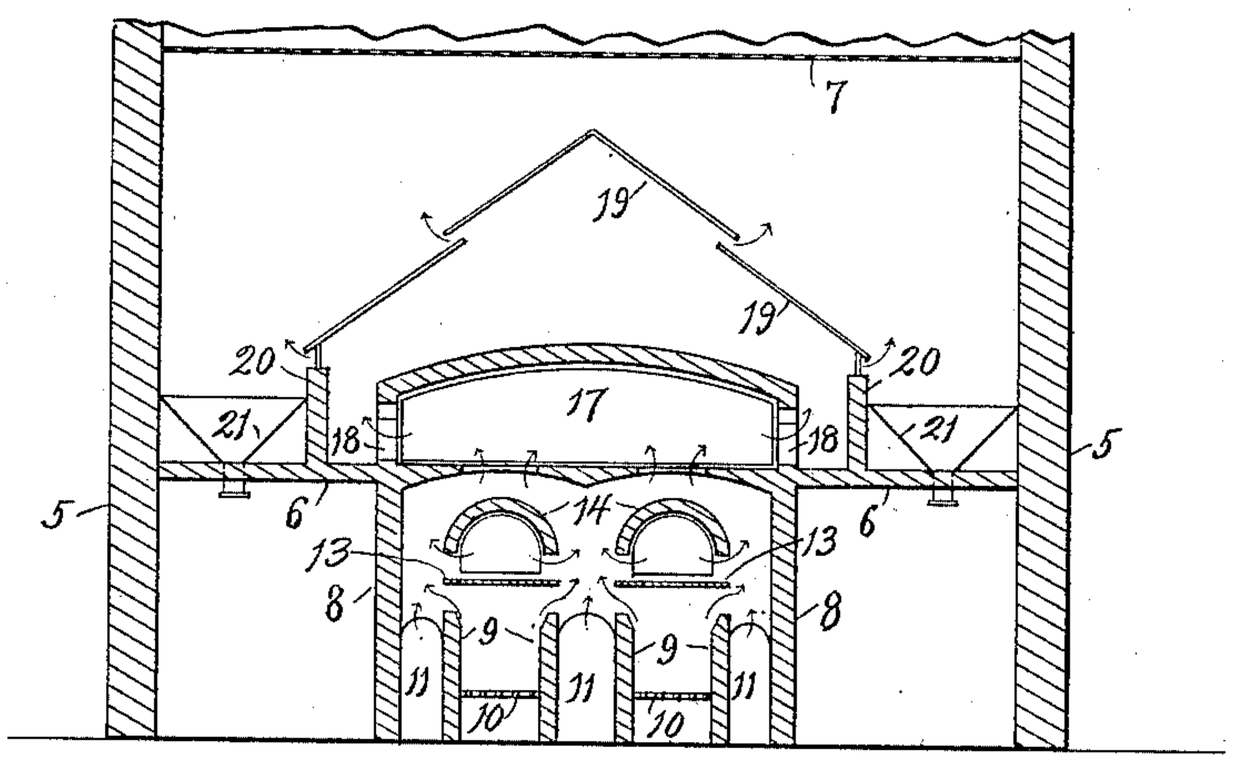


Fig. 2.

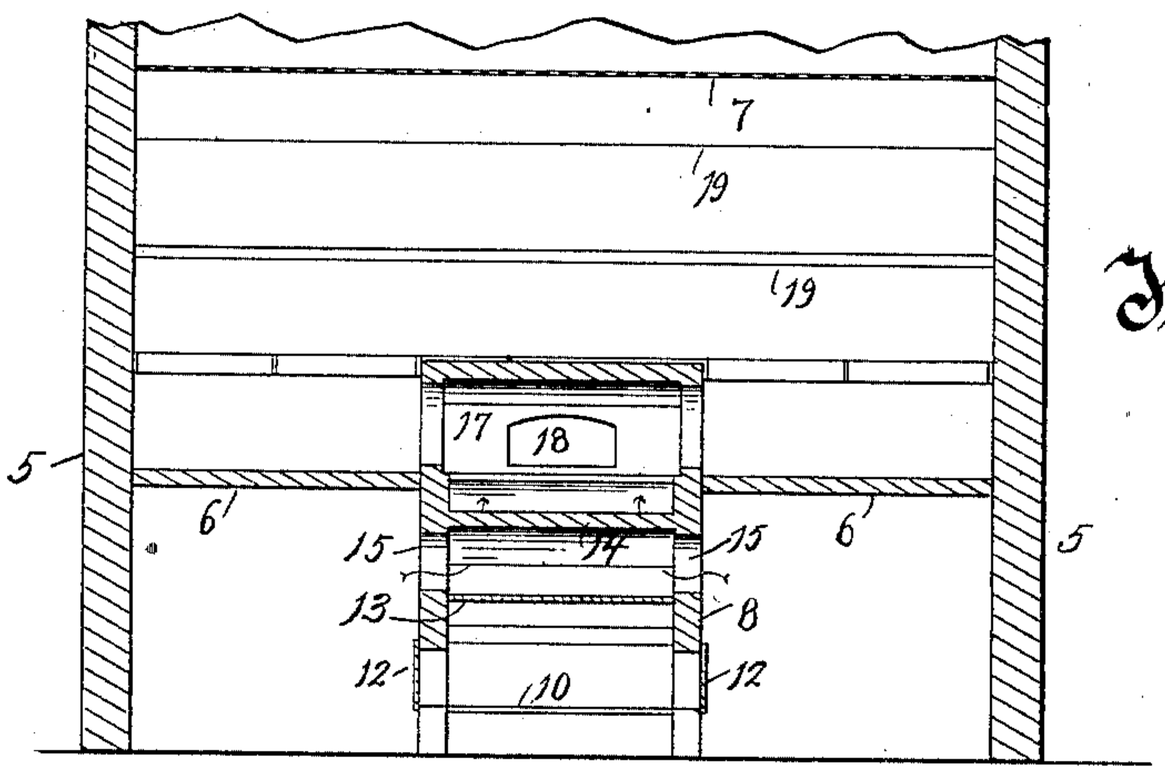
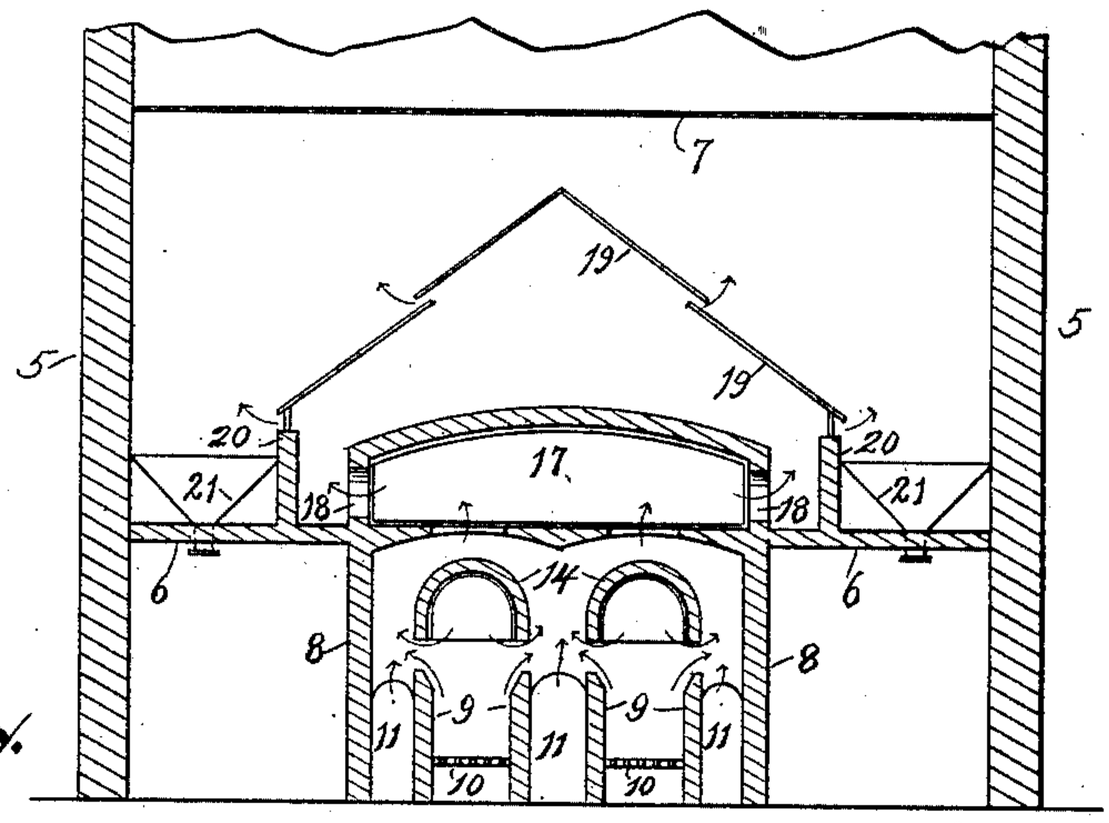


Fig. 3.



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UNITED STATES PATENT OFFICE.

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FURNACE FOR MALT-KILNS.

SPECIFICATION forming part of Letters Patent No. 675,471, dated June 4, 1901.

Application filed September 20, 1900. Serial No. 30,560. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. DORNFELD, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Furnaces for Malt-Kilns, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention relates to improvements in kiln-furnaces for properly mingling hot and cold air in large quantities to secure uniform temperature, as required for drying malt.

The invention consists of the devices and their combinations as herein described and claimed or the equivalents thereof.

In the drawings, Figure 1 is a vertical section through a fragment of a malt-drying kiln made transversely of the furnace devices therein. Fig. 2 is a section through a fragment of a malt-drying kiln made longitudinally of the furnace devices therein. Fig. 3 is a section through a fragment of a malt-drying kiln made transversely through furnace devices of a modified construction.

In the drawings, 5 5 are side walls inclosing a furnace-room in the lower part of a malt-kiln and a hot-air room immediately above the furnace-room and below the malt-drying room of the kiln. The floor 6 of the hot-air room is the ceiling of the furnace-room below. A perforated floor 7 is the ceiling of the hot-air room and the floor of the malt-drying room, on which malt is placed for drying. 8 8 are the vertical walls of a furnace located in the furnace-room of the malt-kiln and extending from the floor to the ceiling of the furnace-room. The floor 6 is provided with apertures directly over the furnace for the passage of air upwardly into the hot-air room.

Within the furnace-walls 8 8 there are dividing fire-walls 9 9, extending from the front to the rear of the furnace-chamber. Between two sets of these fire-walls 9 9 there are grates 10 10, forming fire-boxes, at a little distance above the furnace-floor, in which fires are built with coke, coal, or other suitable fuel for heating a portion of the air that is to be supplied to the drying-room. The fire-boxes are provided with door-openings closed by doors 12 12 for the supply of fuel.

At a little distance above the fire-boxes there are flat plate deflectors 13 13, extending from end to end of the furnace-chamber, which are adapted to divide and deflect the hot air and gases right and left, as indicated by the arrows, forcing them laterally into the cool and fresh air coming in through passages 11 11.

Directly above the flat deflectors 13 and at a little distance therefrom hoods or conduits 14 14 are provided, preferably semicircular in cross-section and opening downwardly and that extend across the furnace-chamber from wall to wall thereof. Apertures 15 15 are provided in the furnace-walls at the ends of the conduits 14 for the admission of cool fresh air from the furnace-room into the conduits.

Between the furnace-walls 8 8 and the adjacent fire-walls 9 9, as also between two of the interior fire-walls 9 9, there are provided cool fresh air supply passages 11 11 at both sides of the fire-boxes. These passages are open at their ends into the furnace-room for the admission of cool fresh air therefrom and are open for the discharge of the air upwardly.

The air passed through the burning fuel in the fire-boxes and the gases therewith from the fire are of a high temperature and must be mingled with a large volume of cool fresh air to reduce them to a lower temperature suitable for drying malt. It is important that the mixture of hot air with the large volume of cool fresh air should be of even temperature throughout, (and this cannot be done with furnaces thus far known to the trade.) Otherwise the imperfectly-attempered air has the bad effect of scorching the malt in some places and chilling it at other portions of the kiln. In this improved furnace, however, such irregularities are obviated. The hot air and gases rising vertically from the fire strike the plates 13, by which they are deflected and separated into two streams or currents, moving right and left toward and into the passages 11 11, as indicated by the arrows. These divided hot-air currents are now of smaller volume and in thin sheets or currents, which are supplied at one side by a sheet or current of cool fresh air rising from below in the passage 11 and another sheet or current of cool fresh air at the other side passing onto and against it from the conduits over the deflecting-plate. Thus the hot air and gases from the fire-box

are passed into and between two sheets or currents of cool fresh air at each side of the fire-box, by which means a perfect mingling of hot and cold air is secured, with the result of even temperature throughout. The supply of air thus reduced to a proper temperature by the mingling together of the hot air and gases from the fires and the fresh cool air from the furnace-room passes upwardly through the top of the furnace-chamber into a hot-air distributer 17, consisting of a chamber formed over the furnace-chamber, which distributing-chamber is provided with side apertures 18, through which the air therein escapes into the hot-air chamber beneath the inclined overlapping and ventilating floor 19, which rests at its side edges on the partial walls 20 20 on the floor 6. The heated air escaping through the openings through the ventilating-floor 19 goes upwardly to and through the perforated kiln-floor 7 for drying the malt thereon. 21 21 indicate hoppers adapted to receive malt therein discharged from the perforated and dumping malting-floor, which falls on the ventilating-floor 19 and slides therefrom into the hoppers, substantially as described in Patent No. 610,580, issued to me on September 13, 1898, for a malt-kiln, and covering the construction of an inclined ventilating-floor as therein shown.

In the modified form of construction shown in Fig. 3 the flat deflectors 13 13 of Figs. 1 and 2 are omitted and the hood-like conduits 14 14 are carried down at their longitudinal edges somewhat farther than as shown in Figs. 1 and 2, thus making the conduits deeper vertically. Otherwise the construction in Fig. 3 is the same as that in Figs. 1 and 2. This improved construction of a furnace is especially adapted for use in malt-kilns where the floors are low, as they are usually in small kilns and may be in large kilns. The construction is especially adapted for a thorough mingling and modification of the air and gases heated excessively by furnace-fires with an ample supply of fresh air and to such extent that the entire supply of air when it reaches the drying-floor is evenly and suitably moderately heated for kiln-drying purposes.

With devices substantially such as shown and described in this application kiln drying-floors may be lowered to one story in height and the furnaces may be placed at one side of the building and such construction may be used for the drying of other materials than malt.

What I claim as my invention is—

1. In a kiln, a furnace, comprising inclosing walls, one or more fire-boxes provided with grates, fresh-air passages alongside the fire-boxes opening into the furnace-chamber, and a hood above each fire-box having openings at its ends through the walls of the furnace-chamber permitting the inflow of air and the escape of the air below the edges of the hood into the furnace-chamber.

2. In a kiln, a furnace, comprising inclosing walls, one or more fire-boxes provided with grates, fresh-air passages alongside each fire-box opening upwardly into the furnace-chamber, a deflector above each fire-box, a hood substantially semicircular in cross-section above the deflector, said hood being provided with apertures at its ends through the walls of the furnace whereby air can enter and escape into the furnace-chamber from beneath the hood.

3. In a kiln, a furnace-chamber having inclosing side and top walls the top wall having air-discharging apertures, longitudinally-disposed fire-boxes in the chamber having end doors and draft-apertures through the walls of the furnace-chamber, hoods in the furnace-chamber above the fire-boxes, the hoods having ends open through the walls of the furnace-chamber, and a heat-distributing chamber 17 above the furnace adapted to receive heated air and gases through the apertures therefor in the top of the furnace-chamber and discharge it through apertures therefor in its ends into an inclosing hot-air chamber.

4. In combination in a kiln, a furnace-chamber having fire-boxes, hoods in the furnace-chamber over the fire-boxes, means for introducing a supply of fresh air into the furnace-chamber so as to be mingled in the furnace-chamber with the hot air and gases from the fire-boxes, an air-distributing chamber above the furnace-chamber, and a ventilating inclined malt-floor above the air-distributing chamber.

5. In an air-heating furnace, the combination of a fire-box, a deflecting-hood over the fire-box, fresh-air passages leading into the hood, air-passages between the hood and fire-box for the escape of heated air from the furnace and cool fresh air from the hoods.

6. In an air-heating furnace, the combination of a fire-box, a deflecting-plate over the fire-box, a hood over the deflecting-plate, openings for fresh cool air inlet, air-discharge passages between the hood and the deflecting-plate, and air-discharge passages between the deflecting-plate and the top of fire-box walls.

7. In an air-heating furnace, one or more fire-boxes, fresh cool air passages at the sides of the fire-boxes, a deflecting-plate at a distance from and over each fire-box forming a discharge-opening for hot air and gases between the top of the fire-walls and the deflecting-plate into the fresh cool air passages 11, a hood having openings for fresh cool air intake and located at a distance over the deflecting-plate forming a discharge-opening for fresh cool air into the air-passage 11.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN F. DORNFELD.

Witnesses:
A. L. MORSELL,
ANNA V. FAUST.