

G. A. WEDEKIND & H. DUEBERG.

Improvement in Kilns.

No. 114,499.

Patented May 2, 1871.

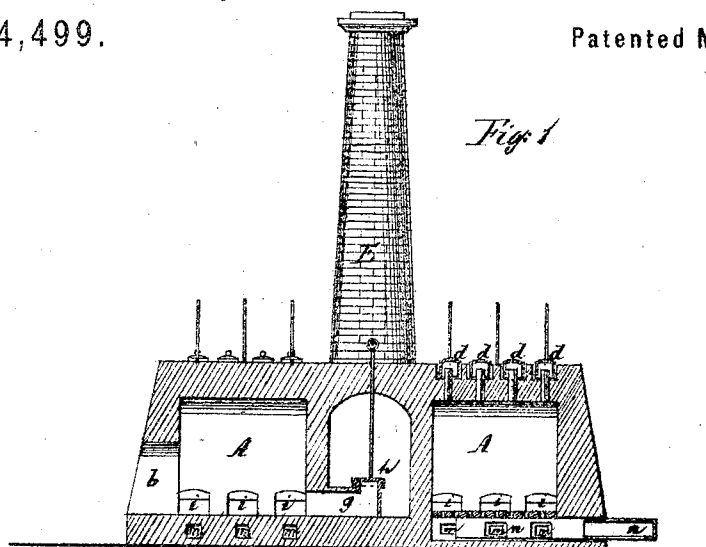


Fig. 1

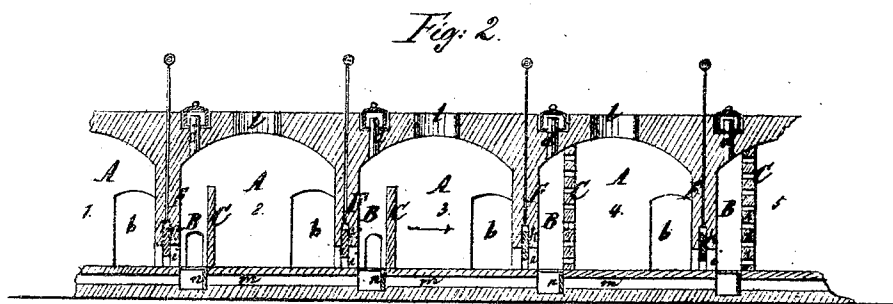


Fig. 2

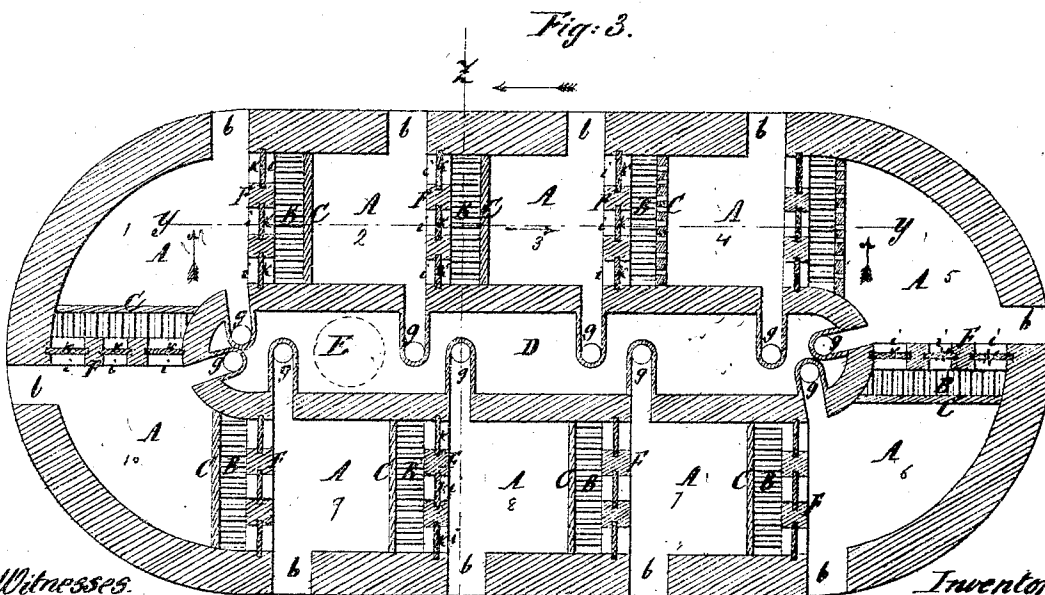


Fig. 3.

Witnesses.  
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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN KILNS.

Specification forming part of Letters Patent No. 114,499, dated May 2, 1871.

*To all whom it may concern:*

Be it known that we, GUSTAVUS A. WEDEKIND and HELMUTH DUEBERG, both of the city and county of Baltimore and State of Maryland, have invented a new and useful Improvement in Burning-Kilns; and we do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which drawing—

Figure 1 is a horizontal section of our invention. Fig. 2 is a longitudinal vertical section of a portion of the same, the plane of section being indicated by the line *y y*, Fig. 1. Fig. 3 is a transverse section of the same, taken in the plane indicated by the line *z z*, Fig. 1.

Similar letters indicate corresponding parts.

This invention relates to certain improvements on that class of kilns which are known by the term "progressive kilns;" and consists in a certain arrangement, within a series of down-draft kiln-chambers, of furnaces, partition-walls, bridge-walls, and flues, which, when said chambers are arranged in an endless circuit, allow the kiln to be worked continuously.

The fire progresses from one of said chambers to the succeeding ones in the series, and the waste heat passes off from that chamber which is under fire into the next following chambers, while the air supporting the combustion in the former has either wholly or partially been heated by passing through preceding chambers filled with already-burned goods in the process of being cooled off.

For some purposes—for instance, for the glazing of stoneware—it is necessary not to expose the goods immediately after burning to a draft of air, for which purpose we have provided air-channels running under the floor or in the side walls of the kiln-chambers, and communicating with the latter through suitable openings provided with dampers, in such a manner that the air, after having been heated by passing through a chamber full of newly-burned goods, can be made to pass under or by one or more of the next succeeding cham-

bers, and allowed to enter any of the other chambers in the series not circulating through that chamber the contents of which were burned last, thus allowing the ware to remain glowing for some time without being exposed to a draft of air.

The kiln, as represented in Figs. 1, 2, and 3, consists of a series of burning-chambers, A, which resemble those which are known by the name of "down-draft kilns." Each of them is provided with a doorway, *b*, and with a furnace, B, which latter may be provided with an ash-pit and grate, as shown in the drawing. The grates, however, may also be placed outside the kiln-chambers, in the outer wall of the same, so that only the flames enter the chambers, and the arrangement may be made thus: that there are two grates, one on each side of the fire-chamber, instead of one grate inside the same.

The grates when placed outside the kiln become more durable, since the same in this case are not exposed to such excessive heat as when placed inside. In case the grates are placed inside the kiln the fuel may be dropped through apertures *d* in the arch of the kiln. Usually, however, fuel is introduced through the fire-doors *b*.

A wall, C, separates the fire-chambers from the burning-chambers. This wall may be carried clear up to the top of the kiln, and perforated with a large number of holes to allow the flames to enter the burning-chamber; or one large opening may be left between the top of the wall and the arch of the kiln, thus compelling the flames first to ascend from the furnace to the top of the burning-chamber, whence they will descend again through the goods contained in the same.

Each chamber communicates with the next succeeding one by openings *i* in the bottom of the partition-walls F, and thereby the fire, after having ascended to the top of the chamber, is drawn down through the goods to the floor of the kiln. The floor may be perforated, (not shown in the drawing,) the perforations communicating with flues underneath leading into openings *i*, whereby a more uniform distribution of the heat throughout the chambers is obtained.

The openings *i* can be closed by slides *k*, which, when closed, shut all communication between two adjoining chambers.

Each kiln-chamber communicates, by a flue, *g*, and damper *h*, Fig. 1, with a smoke-chamber, *D*, and chimney *E*.

In order to render the operation of our kiln intelligible, we have numbered the chambers 1, 2, 3, to 10. Now, suppose the burning-chambers 1, 2, 3, 4, and 5 are filled with green goods, chamber 5 is separated from 6 by the slide *k*; the slides between all other chambers are raised. The doors *b* of 1, 2, 3, 4, and 5 are closed, and the damper *h*, Fig. 1, of chamber 5 is opened, all others being closed, and the ash-pit of chamber 1 is opened. When a fire is lighted in the furnace of chamber 1 a draft of air passes through the several chambers 1, 2, 3, 4, and 5 to the smoke-chamber *D* and chimney *E*, as indicated by the arrows in Fig. 2. The fire ascends between the walls *F* and *C* to the top of chamber 1, and thence passes down through the goods contained in the same. The waste heat from chamber 1 escapes through the openings *i* and passes through the succeeding chambers, thereby heating the material contained in them.

When the material in chamber 1 is sufficiently burned, fuel is fed into the furnace of chamber 2, which fuel is instantly ignited by the waste heat of chamber 1, and the combustion is either supported only by the hot air coming from chamber 1, or by the latter mixing with cold air from outside entering the furnace through the grate. By this time chamber 6 has been filled with fresh material, and the slides *k* between 5 and 6 are opened, and those between 6 and 7 are closed. Then the damper *h* of chamber 5 is closed and that of chamber 6 opened, allowing the waste heat to pass also through chamber 6, so as to heat the material contained therein. The material contained in chamber 1, being now exposed to a draft of cold air, is gradually cooled, while the air in passing through this glowing material in said chamber becomes heated before it enters chamber 2. When the material in chamber 2 is burned fuel is introduced into the furnace of chamber 3, and chamber 7 having been filled with fresh material is annexed to the preceding chambers by changing the position of the slides *k*, and by opening the damper *h* of chamber 6.

When the material in chamber 3 is burned fuel is introduced into the furnace of chamber 4, and chamber 8 is annexed, and then the fire is lighted in chamber 5, and chamber 9 is filled. By that time the burned material contained in chamber 1 is sufficiently cooled to be taken out, while fresh material is introduced into chamber 10, and the draft of air passing through the burned material in the previous chambers serves to cool the previously-burned material and takes up the heat, so that it reaches the furnace of chamber 5 in a red-hot state.

While chamber 1 has been emptied the chamber 10 has been filled, and is then added to the foregoing chambers, and the burning of the material in chamber 5 has been completed, the fire is lighted in chamber 6, chamber 2 is emptied, chamber 1 is refilled, and the fire advanced from 6 to 7.

In this way the process of burning, the taking out of the burned goods, and the filling in of fresh material goes on without interruption. All the chambers of the kiln, except one or two, are always filled, one part with fresh material to be burned, which is gradually heated, another part with burned material that is gradually cooling off, and in one chamber the process of burning is just progressing, this chamber being situated between those containing burned material and those containing fresh material.

In using our kiln for burning pottery or glazed ware, it is necessary that when the burning has just been finished the draft of air be prevented from traveling through such goods, as the same would be liable to be injured by rapid cooling and coming in contact with loose ashes.

We therefore provide flues *m*, with dampers *n*, (see Figs. 2 and 3,) either under or on the sides of the chambers, for the purpose of enabling the draft of air to avoid that chamber containing the newly-burned goods, causing it, for instance, to enter chamber 10, and passing under chamber 1 (which in this case is supposed to contain the newly-burned goods) into chamber 2. This purpose can be readily effected by properly adjusting the slides *k* and dampers *n*. For instance, if the goods in chamber 3 have been burned last, the damper *k* between 3 and 4 is closed, and the damper *n* between 2 and 3 is opened. The current of air passes through chambers 1 and 2, but it cannot circulate through chamber 3. It turns down into the bottom flue *m* under said chamber, and up into chamber 4.

In the drawing a kiln is shown containing ten burning-chambers; but it is obvious that their number can be increased or diminished. If the number of burning-chambers is very large, fire may be kept up in two or more chambers simultaneously, the series of chambers being interrupted as often by the slides *k*.

The series of burning-chambers may also be limited, or arranged in a straight or curved line of limited length. The operation of such limited kilns, of course, cannot be continuous. After all the chambers of the series have been filled with fresh material a fire is started in the first chamber, and successively made to progress through the succeeding chambers until it reaches the last one, where it is left to go out. When the burned goods have been taken out, and the chambers have been filled with fresh material, a new fire is to be started in the first chamber of the series.

What we claim as new, and desire to secure by Letters Patent, is—

The arrangement, within a progressive kiln, of the permanent walls F C, one on each side of the fire-chamber, the walls C being open at the top, while the walls F are provided with apertures near their bottoms, said apertures being capable of being opened or closed by slides, thereby compelling the heated air to pass through the several burning-chambers

in a zigzag course, passing up from the fire-place and down through the material to be burned, as herein set forth.

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