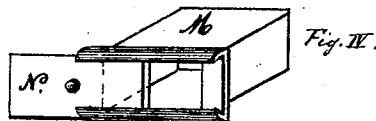
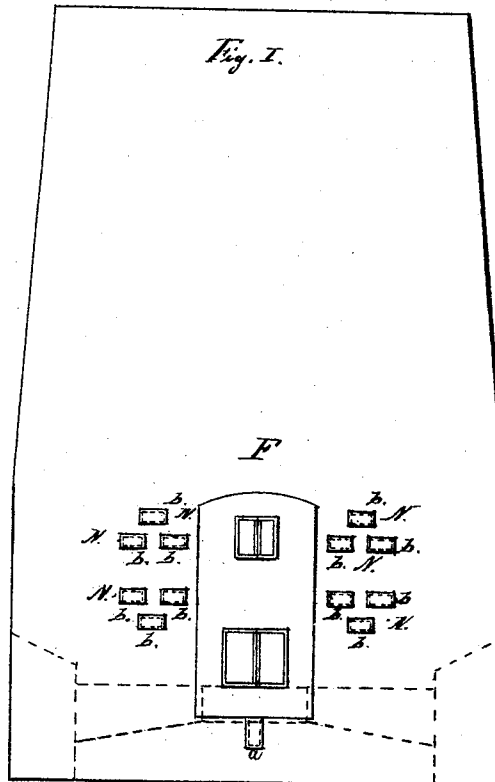


F. W. RAEDER.
Lime-Kilns.

No. 135,045.

Patented Jan. 21, 1873.



Witnesses:

David Lewis
A. Dunning

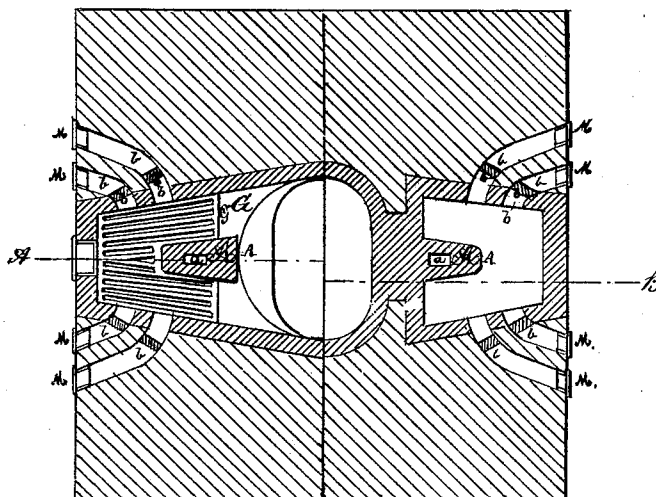
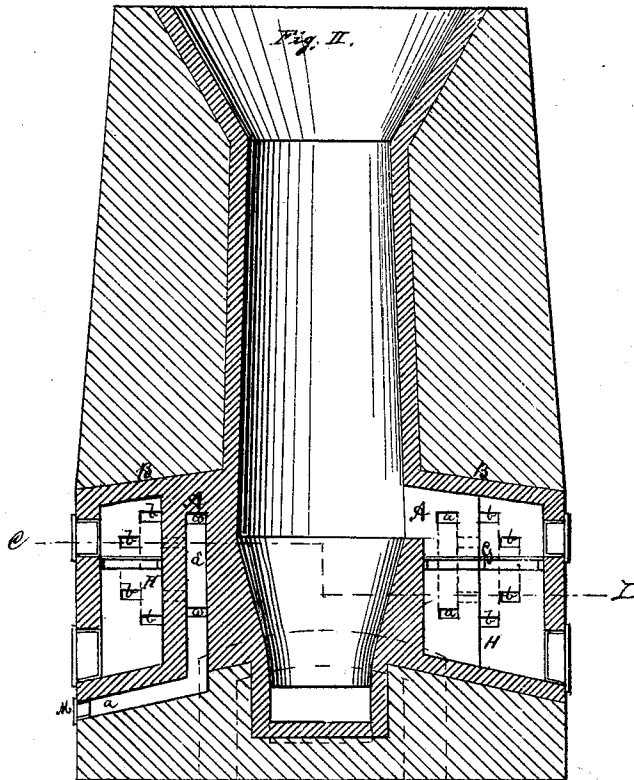
Inventor.

F. W. Raeder

F. W. RAEDER.
Lime-Kilns.

No. 135,045.

Patented Jan. 21, 1873.



Witnesses.
David Lewis
A. Davidson

Inventor.
F. W. Raeder

UNITED STATES PATENT OFFICE

F. WILLIAM RAEDER, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN LIMEKILNS.

Specification forming part of Letters Patent No. 135,045, dated January 21, 1873.

To all whom it may concern:

Be it known that I, F. WM. RAEDER, of the city and county of St. Louis, State of Missouri, have invented a new and useful Improvement in Limekilns, of which the following is an exact description:

The drawing annexed, consisting of Plates I and II, represents, in—

Figure I, a front elevation of kiln; Fig. II, a vertical section of same at line A B of Fig. III; Fig. III, a horizontal section of same at line C D of Fig. II; Fig. IV, mouth-piece and regulating-slide.

The leading parts of the kiln are the same as those of the kilns in common use. The kiln is fired from either one side or both sides. The grate-surface G widens gradually toward the inside; it is entirely covered by an arch, B, Fig. II, which is supported at its inner end by piers A, Figs. II and III, in the middle, built in form of a wedge in its horizontal cross-section, Fig. III, for the easier flow of the flame. It contains air-channels *a a* to conduct the fresh air from the outside and to discharge the same through inner apertures *a' a'* below the grate and also above the same. A vertical channel, *a''*, connects the lower and upper apertures *a' a'*, enabling the supply of air to adjust itself automatically to the amount required above and below the grates, since it is evident that, whether the air is allowed to enter the upper or lower series of horizontal channels whenever it is in excess above the grates, the current will at once set downward through the vertical passage and pass beneath the grate where it is most needed, and vice versa when it is in excess below, so that should the dampers to one of the sets of horizontal ducts be closed when the necessities of proper combustion would require them to be open, this adjusting power will prevent the injury and loss which might otherwise occur from the imperfect combustion. Similar air-channels *b b b*, either built into the masonry or formed by metallic tubes, are also provided between the outer face F, Fig. I, of the masonry and the inner walls of ash-pit H and the inner walls and arch of fire-place above the fuel or grate G. All these air-channels have, at their outer extremity, a simple and suitable slide or register, N, Fig. IV, by which to regulate the volume of air

admitted into the different air-channels. The upper and lower sets of these channels are also connected vertically by air-ducts like the channels of the pier A.

Now, the effect of these improvements in the working of limekilns is, that while in the ordinary kiln the air requisite for the combustion of the fuel enters in too large a quantity through the ash-pit and the grates to the fuel without having been heated previously, and thus causes a very imperfect combustion, in this case, on the contrary, the ash-pit door is kept closed during the firing of the kiln, and the air is admitted, by the slides N N, into the air-ducts *a a* and *b b b*, and discharged partially into the ash-pit and partially above the fuel after it has been heated to a high temperature by being conveyed in a number of small streams through the above-named air-channels, the walls of which are always very highly heated. While thus the fuel is supplied from underneath with heated air, and its combustion is more perfect, the unconsumed gases above the fuel are again met by streams of heated air through channels *a a b b b*, ignited and consumed, and the enlarged volume of blaze produced thereby is accommodated by enlarged size of the arch B covering the enlarged breadth of the grate. The vertical channels *b b b*, Figs. II and III, finally serve to equalize the supply of air between the upper and lower air-ducts in this manner, that a greater draft under the grates would cause some air to flow even from the upper air-ducts through the lower discharge under the grate, and vice versa, a greater draft above the fuel would cause some air entering the lower ducts to discharge through the upper ones to supply the greater requirement for air of the flame; the result of all of which is a much more economical consumption of fuel; a more uniform and higher degree of heat in the lime to be burnt; and a consequently enhanced quality and quantity of the same compared with the ordinary kilns. Now,

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the limekiln with grates gradually enlarging toward the interior and the insertion of a wedge-shaped pier, A, for each grate, for the purposes above described.

2. The combination, in a limekiln, of horizontal and vertical air-passages, acting automatically to regulate the supply of air above and below the grates, substantially in the manner shown and specified.

3. The combination, in a limekiln, of grates enlarging toward the interior, wedge-shaped supporting-pier, and horizontal and vertical

air-passages, the latter acting automatically to adjust and regulate the supply of air above and below the grate, substantially in the manner and for the purpose shown and specified.

F. WM. RAEDER.

Witnesses:

DAVID LEWIS,
A. DRUIDING.