

No. 621,463.

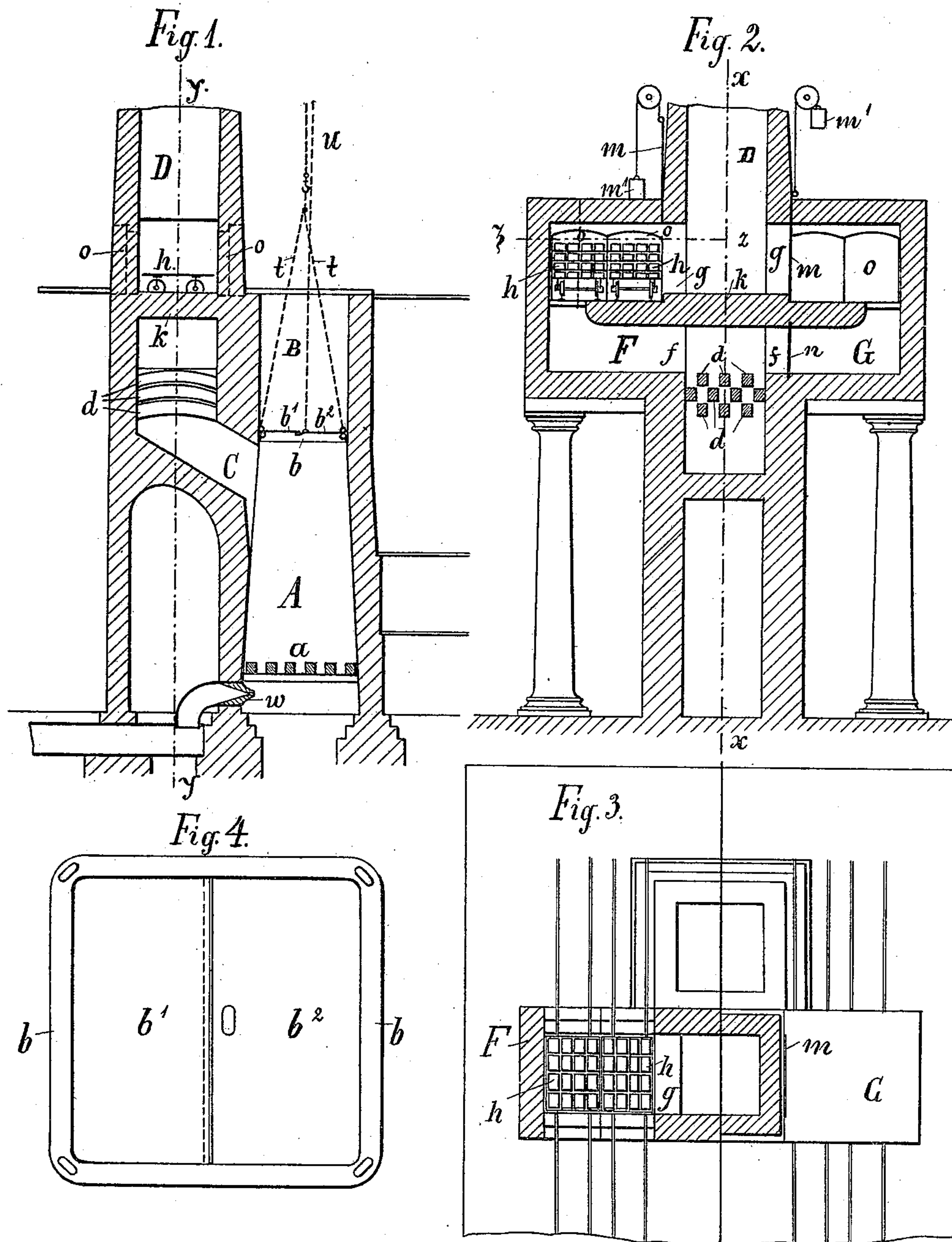
Patented Mar. 21, 1899.

F. RUPPEL.

KILN FOR CEMENT, LIME, &c.

(Application filed Sept. 16, 1898.)

(No Model.)



Witnesses:  
William Schuh  
William Miller.

Inventor:  
Friedrich Ruppel  
per Roeder & Briesen  
Attorneys.



# UNITED STATES PATENT OFFICE.

FRIEDRICH RUPPEL, OF LÄGERDORF, GERMANY.

## KILN FOR CEMENT, LIME, &c.

SPECIFICATION forming part of Letters Patent No. 621,463, dated March 21, 1899.

Application filed September 16, 1898. Serial No. 691,078. (No model.)

*To all whom it may concern:*

Be it known that I, FRIEDRICH RUPPEL, a citizen of the German Empire, and a resident of Lägerdorf, (Holstein,) Germany, have invented certain new and useful Improvements in Kilns for Cement, Lime, and the Like, of which the following is a specification.

This invention relates to improvements in continuous shaft-kilns employed in the manufacture of cement, lime, and the like, whereby the efficiency of the said kilns is doubled with a given consumption of coal, the working is rendered more regular, and the work is made easier and cheaper than heretofore.

A kiln provided with these improvements is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section on the line  $xx$  of Fig. 2. Fig. 2 is a vertical section on the line  $yy$  of Fig. 1; and Fig. 3 is a plan, partly in section, on the line  $zz$ , Fig. 2. Fig. 4 is a plan illustrating the frame which constitutes the charging device for the kiln.

The kiln consists of a combustion-chamber A, charge-shaft B, flue C, chimney D, and drying-chambers F and G. The combustion-chamber A is bounded at its lower part by the grate  $a$ , under which there is indicated, by way of example, the nozzle  $w$  of a blower. The charging-shaft B forms a vertical extension of the combustion-chamber A, while the flue C branches off laterally and to the rear. In the charging-shaft there is arranged the charging device, which, in combination with the charge for the time being, serves also as a means of closing the charging-shaft. The charging device, Figs. 1 and 4, consists of a frame  $b$ , which is suspended by chains  $t$  and in which there are arranged trap-doors  $b'$   $b''$ , which open downwardly and which can be kept closed by the pull of the chain  $u$ . The frame  $b$  is adapted to rise and fall readily with a sufficient amount of play in the charging-shaft.

The dry raw material is piled up, together with the fuel, in suitable proportions upon the closed frame, and for the purpose of facilitating the operation the frame can be raised and gradually lowered. The frame forms, together with the piled-up charge, the closure of the kiln, which may, however, be effected by other means. The discharge is effected in

an extremely-simple manner by slacking the chain  $u$ , so that the trap-doors will open automatically by their own weight and by the weight of the charge resting thereon, so as to allow the charge to fall down into the chamber A. As soon as this is done the trap-doors are again instantly closed by pulling the chain  $u$ , and the charging device is raised for the purpose of introducing the next charge.

In the lower portion of the chimney connected to the flue C there are arranged draft-baffles, Figs. 1 and 2, in the form of built-in arches  $d$ , which present a restricted area of passage to the fire-gases and are intended to keep the heat of said gases as long as possible in the kiln. After passing these baffles the heating-gases are led to the right or to the left laterally through one of the drying-chambers F or G, Fig. 2. These drying-chambers are arranged on two opposite sides of the chimney at such a height that the drying-hurdles  $h$  can be rolled directly to the charging-place. For the purpose of forming the drying-chambers the chimney D is closed at about the height of the upper story by means of a strong roof  $k$ , which may be reached, having lateral extensions in the form of tongues which project into the chambers F and G to such an extent as to compel the fire-gases to traverse the drying-chambers throughout their entire extent. Below the roof  $k$  there are provided in the masonry of the chimney openings  $f$   $g$ , by means of which the drying-chambers communicate with the interior of the chimney. The openings  $f$   $g$  are adapted to be closed by means of registers  $m$   $n$ , of which the upper ones  $m$  are balanced by weights  $m'$ , while the lower registers  $n$  are simply moved from the side. In the drying-chambers, which are accessible from the outside by means of doors  $o$ , there are provided rails or other devices for facilitating the transport of the drying-hurdles. The arrangement of two drying-chambers is advantageous, because preventing interruption in the working, so that when one drying-chamber is being emptied and recharged the fire-gases can be led through the other chamber, while this last chamber is protected against the entrance of gases by means of the closed dampers.

The operation of the kiln is as follows:



While heretofore the wet raw material which has been formed into bricks by a brick-making press had to be properly dried in separate apparatus, the said raw material can now, in the case of the kiln herein described, be raised in the wet state onto the upper platform and be rolled on the hurdles *h* into the corresponding drying-chamber. The raw material when properly dried and heated is brought out of the drying-chamber directly into the kiln, being piled, together with the fuel, upon the trap-doors of the frame *b*, so as to be allowed to fall at a given moment into the burning-chamber A. The finished product fills the interstices of the grate *a* and is drawn out therefrom.

The use of air delivered from a blower which can be introduced, according to the nature of the raw material, at different places in the burning-chamber is advisable, especially for the purpose of artificially increasing the draft in the case of easily-crumbling material.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a kiln, the combination of a combustion-chamber with a charging-shaft communicating therewith, a charging device verti-

cally movable within the shaft, a flue also communicating with the combustion-chamber, baffles contained therein, a pair of drying-chambers, a roof within the flue which projects into each of the drying-chambers, and dampers between such chambers and the flue, substantially as specified.

2. In a kiln, the combination of a combustion-chamber with a charging-shaft communicating therewith, and a charging device vertically movable within the shaft and composed of a frame, a pair of trap-doors hinged thereto, and chains for operating said trap-doors, substantially as specified.

3. In a kiln, the combination of a combustion-chamber with a charging-shaft communicating therewith, a charging device provided with trap-doors and movable within the shaft, a flue, a pair of drying-chambers communicating therewith, and dampers between said chambers and the flue, substantially as specified.

Signed by me, at Hamburg, this 27th day of August, 1898.

FRIEDRICH RUPPEL.

Witnesses:

W. T. E. KOCH,  
T. GOTHs.