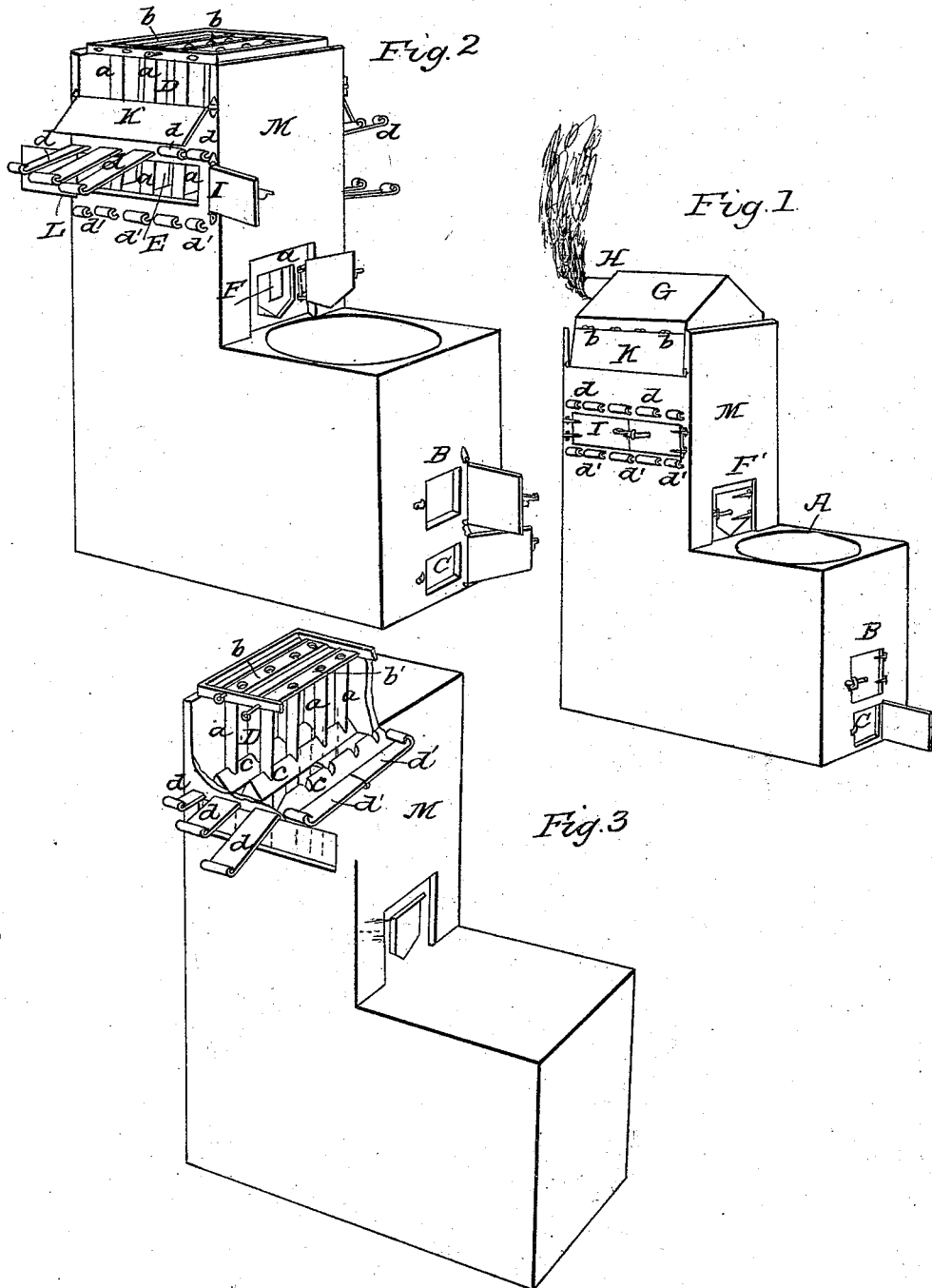


B. FOWLER.  
Calcining Gypsum.

No. 7,439.

Patented June 18, 1850.



# UNITED STATES PATENT OFFICE.

BENJAMIN FOWLER, OF LUBEC, MAINE.

## FURNACE FOR CALCINING GYPSUM.

Specification of Letters Patent No. 7,439, dated June 18, 1850.

*To all whom it may concern:*

Be it known that I, BENJAMIN FOWLER, of the town of Lubec, in the county of Washington and State of Maine, have invented a new and useful Improvement in Apparatus for Calcining Gypsum; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, which make a part of this specification, in which—

Figure 1 is a perspective view of the external parts of apparatus showing the doors which open into the several apartments, the handles of the dampers, or slides, and the pan, or boiler, in which the calcining is finished. Fig. 2, is a perspective view of the apparatus with the top, or roof, removed, and the doors swung open, showing the tubes through which the heat passes, the dampers which close the upper orifices of the tubes to equalize the heat, the form of the beams, or bars, and slides which form the bottom, or flooring, of the two upper chambers, and the inclined planes, in the lower chamber, on which the gypsum slides down into the pan, or boiler. Fig. 3, is a perspective view of a section of the apparatus, showing more distinctly the internal structure of the upper chamber, (which is essentially the same as the middle chamber).

My improvement consists in constructing the apparatus with three chambers, (in addition to the pan, or boiler commonly used,) so that each chamber may contain a charge, and all be heated at the same time by the fire in the furnace under the pan by means of tubes, or pipes passing from the furnace upward through all the chambers. And in forming the bottoms, or floors, of the two upper chambers of beams, or bars, brought to an edge at the top, and filling the intervening spaces with slides, or movable valves, so that the charge may be readily let fall into the chamber next below. And in making the sides and bottom of the lower chamber in the form of inclined planes, (descending toward the door,) so that on opening the door the charge will readily run into the pan, or boiler, where it is to be finished in the common way.

I make the apparatus with a pan, or boiler, A, Figs. 1, and 2, in the common form, and set it in an arch with a furnace

B, and an ash-pit C, Figs. 1, and 2, made and located in the common form, (the furnace extending back beyond the pan, about the same distance as the diameter of the pan). Back of the pan, A, and above the level of its top, I construct an elevation M, Figs. 1, 2, and 3, of sufficient capacity to contain three chambers, one above the other, as seen at F, E, and D, Fig. 2, and the upper one, D, in Fig. 3. These chambers are to be heated by the heat of the furnace by means of a series, or collection of tubes or pipes, as seen at *a, a, &c.*, Figs. 2, and 3, passing from the top, or roof, of the back part of the furnace, upward, through the three chambers, as seen in Fig. 2, and discharging the smoke &c. at the top, (through the upper ceiling of the upper chamber, D,) into the attic, or space, under the main roof, G, Fig. 1, as seen at *b, b, &c.*, Figs. 2, and 3, whence it is carried off through the main smoke pipe, H, Fig. 1.

I make the lower chamber F in such a form that the sides and bottom are inclined planes, of which the lowest point is slightly above the edge of the pan, as seen at F, Fig. 2, so that the charge of gypsum, (on opening the door F, Fig. 1,) will, by its own weight, slide down into the pan, A, where it is to be finished.

I make the bottom or floor of the upper chamber, D, and also of the middle chamber, E, with bars, or beams, running across, from side to side, of a triangular shape, or brought to an edge on the top as seen at *c, c, c*, Fig. 3, and sufficiently broad at the bottom to allow the tubes, *a, a, &c.*, Figs. 2, and 3, to pass through them; and with grooves, or projections, near the bottom for the slides, *d, d, &c.*, to meet on. These slides are inserted from both sides and meet in the center, as seen at *d', d'*, in Fig. 3, and thus, with the beams, form a perfect floor to hold the charge, when they are pushed clear in, as seen at *d', d', &c.*, Figs. 1, 2, and 3, and when they are drawn out, as seen at *d, d, &c.*, Figs. 2, and 3, they allow the charge to fall into the chamber next below. I make each of the chambers of the proper capacity to heat as large a charge as can be finished in the pan, A.

To equalize the heat in the different parts of the chambers, I fit dampers in *b, b, &c.*, Fig. 3, to slide over the upper orifice of the tubes, which dampers when pushed in, as

seen at *b*, Fig. 3, close the tubes, and when drawn out, as seen at *b'*, Fig. 3, open the orifice of the tubes, and allow a free draft.

I make a door *F'*, Fig. 1, by opening  
 5 which I let out the charge from the lower chamber, *F*, into the pan, *A*, and a door in the back end, (as at *L*,) not seen in the drawings, to let off heat when necessary, and to stir the charge in the lower chamber if  
 10 needed; a door, *I*, opening into the middle chamber; and a door *K*, (on each side, the back one not seen in the drawings,) through which I put the charge into the upper chamber.  
 15 I make the pan, or boiler, tubes, slides, dampers, doors, &c., of iron, or any other suitable metal; and the furnace, &c., of brick, stone, or any other suitable material.  
 Having constructed and arranged all the  
 20 parts of the apparatus, as before described, (and the doors being shut, as seen in Fig. 1,) I fill the pan, *A*, with gypsum, to be calcined in the common way. I also fill all three of the chambers, by putting the charge  
 25 of gypsum into the upper chamber, *D*, through the doors, *K*, and by drawing out the slides let it pass into the other chambers below, so that they will each contain a charge. I then kindle a fire in the furnace,  
 30 *B*, which will heat and calcine the gypsum in the pan, while the heat passing through the tubes, *a*, *a*, &c., will heat, and essentially bring forward the charges in the chambers through which the tubes pass. When the  
 35 charge in the pan is finished, and dipped out, I open the door, *F'*, Fig. 1, when the charge in the lower chamber, *F*, Fig. 2, will immediately run down into the pan, *A*, to be finished. And by drawing out the slides  
 40 *d'*, *d'*, &c., the charge in the middle chamber, *E*, will fall into the lower chamber, *F*, and, (after closing those slides,) by drawing out the slides *d*, *d*, &c., the charge in the upper chamber *D*, will fall into the middle chamber, *E*, and then, (after closing those slides,) I put a new charge into the upper chamber,  
 45 *D*, and thus continue, putting all the new charges into the upper chamber, *D*, and, (after passing through all the chambers, in succession,) finishing all in the pan or boiler,  
 50 *A*, so that each charge is being heated and brought forward, in the several chambers, all the time that three charges are being finishing in the pan.

55 The advantages of my improvement over

all methods heretofore used, consist in constructing the apparatus with three chambers, (in addition to the pan, commonly used,) one above the other, so that the gypsum may be heated gradually in its passage through  
 60 the several chambers, and thus be in a situation to be finished with ease and dispatch when it reaches the pan, as not more than one fourth part of the time usually occupied will be required, and therefore much labor  
 65 will be saved. And in having the chambers one above the other, and the beams so shaped, and the slides so arranged, that the charge of gypsum may be readily transferred by its own weight, from one chamber to the other,  
 70 and from the lower chamber to the finishing pan. And in the arrangement of the tubes so that the gypsum will be heated and brought forward in the chambers by the heat from the furnace which would otherwise be  
 75 wasted, so that, (after the first charge,) four charges, at least, may be finished in the time occupied to finish one by any of the methods heretofore used.

By all of which, at least, three fourths of  
 80 the expense for fuel and more than one half of the labor is saved, as at least, four times the quantity of gypsum may be calcined in the same time without any increase of fuel, and but little increase of labor, as compared  
 85 with the time, so that the expense of calcining, by my improvement, will probably not be more than one sixth of what it costs by the usual method.

I am aware that apparatus, for various  
 90 other purpose, has been divided into several chambers with various arrangements, and that beams and slides of various forms, have been used, and that tubes have been used for conducting, and economizing heat. I  
 95 therefore do not claim either of these, as such, as my invention, but

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

The combination of the pan, or boiler,  
 100 with the three chambers, when they are combined with the beams, slides, and dampers, when the whole is constructed, arranged, and combined, so as to operate substantially according to the method, and to effect the  
 105 purpose, substantially as herein described.

BENJ. FOWLER.

Witnesses:

WINCKWORTH ALLAN,  
 HENRY P. DEWEY.