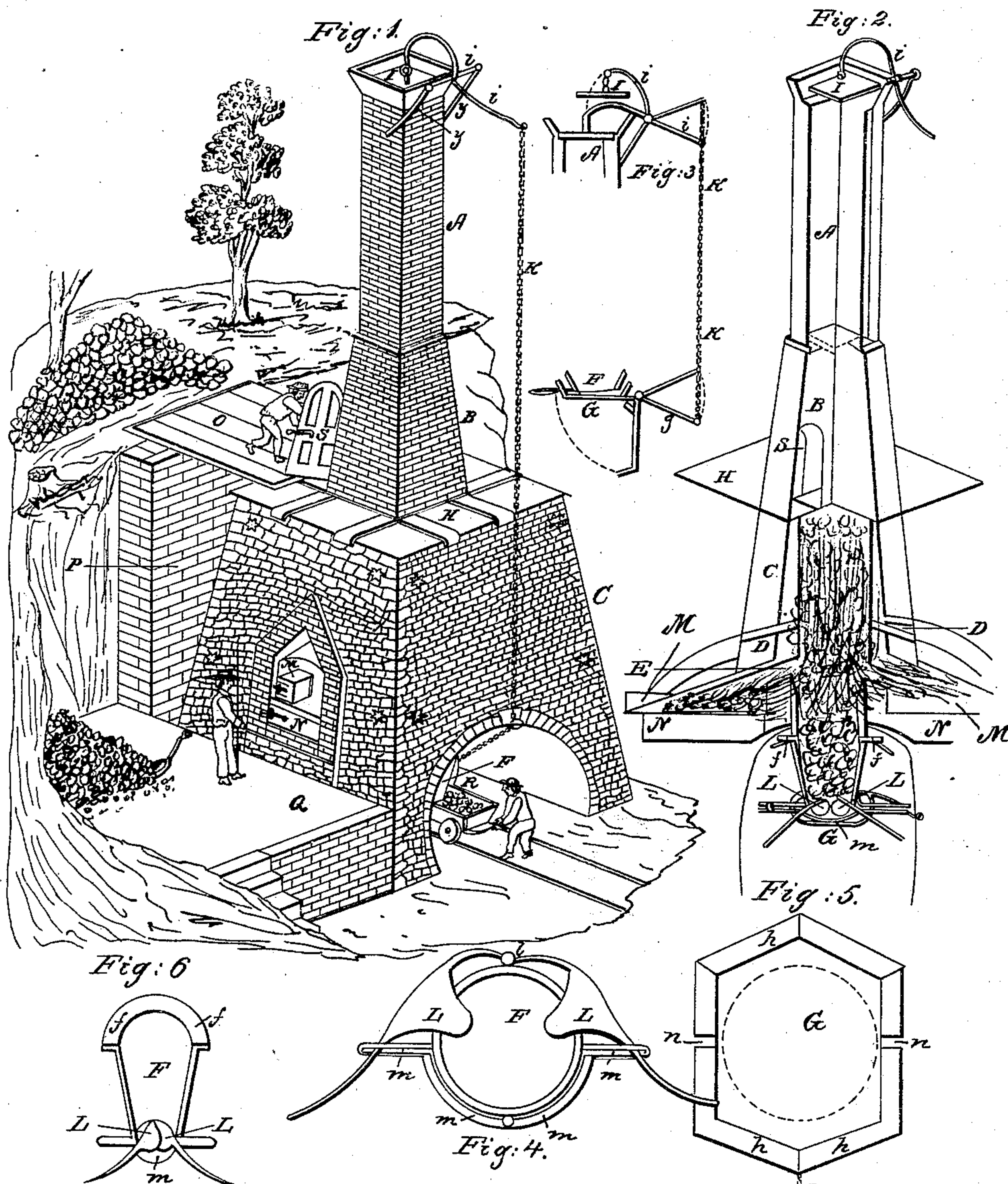


R. DONALSON.

Lime Kiln.

No. 31,445.

Patented Feb. 19, 1861.



Witnesses:
J. S. Allusser
Jacob Stauffer.

Inventor:
Richard X. Donaldson.
mark

UNITED STATES PATENT OFFICE.

RICHARD DONALDSON, OF MOUNT NEBO, PENNSYLVANIA.

IMPROVEMENT IN LIMEKILNS.

Specification forming part of Letters Patent No. 31,445, dated February 19, 1861.

To all whom it may concern:

Be it known that I, RICHARD DONALDSON, of Mount Nebo, in the county of Lancaster and State of Pennsylvania, have invented certain Improvements in the Construction of Limekilns for Burning Lime; 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, making a part of this specification, in which—

Figure 1 is a perspective view of the kiln, as built against a hillside dug down with a back wall P, bridge O, and side banks Q; Fig. 2, a section of the interior of the same laid open. Fig. 3 illustrates the connection and operation of the damper I with the lid G of the cooler F and connecting-chain K as it may be made. Fig. 4 is a plan of the mouth of the cooler and the attachment of the bladed levers L; Fig. 5, the lid G with a raised rim *h* and side slots *n*, and Fig. 6 a section of the cooler with its flange or rim *f*.

The structure of the kiln in itself is no part of my claim, but may be set forth as follows:

On a base twelve feet square, C, Fig. 1, built up to the height of twenty-four feet with a batter reduced to ten feet square at H, its terminus, an archway—say, seven to eight feet high and about five feet below the furnaces—is made to give access to the cooler F. The basement structure C is firmly bound with headed iron cross-bars and the top secured by cross-bands, as shown on H, from whence a stack B is raised eight feet high, gradually narrowed above, and lined with fire-brick extending down onto the flange or rim *f* of the conic cooler F, open on two opposite sides to admit the flame and heat of the furnaces M. This stack has a feeding-door S on its rear side, as shown. On the top of the stack a draft-chimney A is built up plumb—say, twenty-two to twenty-five feet in height—having a funnel-shaped or widened mouth on the top, a damper I with a bent rod hinged to it attached to a revolving shaft *z* on the supports *y*, and a lever-arm *i*, connecting it by means of a chain K to the arm of the lid G of the conic cooler F. A pulley for the chain may be affixed over the center of the archway.

The furnaces M are built into the basement C on opposite sides—say, twelve feet above the

foundation—and an arch-liked space is left over each furnace, having a tube D inserted partially through the inside stack and opened through the fire-brick lining, through which the calcination of the stone may be inspected and the orifice closed externally, when desired. N shows the ash-pit under each furnace.

The cooler F is open at both ends, the upper and wider end having a flat ring or flange around it, by which it is held in the wall of the superstructure suspended into the open archway to within four feet or so of the ground. Its lower and narrower end or mouth is provided with an iron rod *m*, attached on opposite sides, carried out, doubled back, and curved around the mouth of the cooler, as shown by Fig. 4, thus forming side slots and a support for the lever-handles with their blade L to each. These rods are affixed on a pivot to the rear of the cooler. A lid G, with a raised edge, either furnished with links in front and rear for being suspended to hooks on the cooler or hinged thereto by prolonging the hinge of the levers L on the rear of the cooler, with a lever-arm *g* to be attached to the chain K, and thereby connected with the damper I, as shown by Fig. 3, somewhat larger than the mouth of the cooler, is used. This lid has a raised rim (tray like) with slots *n* cut out to admit the rod *m*. As said lever attachment prevents the mouth of the cooler from being air-tight, the dish-like lid is used, and by filling it up around the mouth of the cooler with powdered or waste lime the object is wholly (or if a draft is desired partially) accomplished. The blades L of the levers operate shears fashion, and both sustain and overcome the pressure of the calcined stone or lime, and afford great facility for opening and closing the mouth of the cooler by means of the long and strong handles or levers connected with them. The cooler F may be made of boiler-iron.

In order to start the kiln, it is necessary to fill the cooler with clay or other refuse material to keep the stone in place until thoroughly calcined, when it may be withdrawn and replaced by the calcined stone or lime. The cold air around the outside of the cooler in the archway below the furnaces will greatly facilitate the cooling of the lime, and it may

be withdrawn as soon as the next charge will be calcined, which takes place speedily, as the moisture and gases become expelled before the stone settles down so as to be brought into close contact with the fire from the furnaces, forming a perpetual kiln, from which a charge can be drawn every hour.

The kiln can be charged and so closed up on Saturday night and reopened on Monday morning without material loss of fuel by means of the dampers and doors to the same, thereby allowing the operator to rest during the Sabbath day without loss or hinderance.

The peculiar features of this kiln is the cooler with its tray-like lid and levered blades. This arrangement altogether of the parts produces some valuable results, such as regulating the amount of draft by elevating the valve more or less, as well as securing the mouth of the cooler from all draft. The high chimney causes a strong draft through the furnaces, requiring no fan or blower.

The object of the connection made by the chain K between the damper I and the lid G to their lever-arms, respectively, is to produce a reciprocal action, so that when the lid is thrown open the damper closes simultaneously (the red and black lines illustrate this action in Fig. 3) and effectually prevents a rush of cold air, that might check or chill the fire. The damper, however, can be dropped and closed by hand, and regulated or held

open at any desired elevation at pleasure by means of the chain and by its links being adapted to a hook affixed at the most convenient point.

I am aware that the increased height of the chimney above the stack for the purpose of giving an increased amount of draft is not new nor are the side furnaces and valve, separately considered, deemed patentable. However improved my structure may be in these particulars, I lay no claim to them as such. Nevertheless the several improvements are the result of many years experience in burning lime and from a thorough knowledge of the necessary conditions required, so that the proof has confirmed the theory, and altogether cannot fail to be duly appreciated by those engaged in the business.

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

The arrangement of the conic cooler F with its rim or flange *f*, guide-rods *m*, bladed levers L, and lid G, in combination with the kiln, the whole constructed and operating in the manner and for the purpose substantially as herein described.

RICHARD ^{his} × DONALDSON.
mark

Witnesses:

S. G. MUSSER,

JACOB STAUFFER.