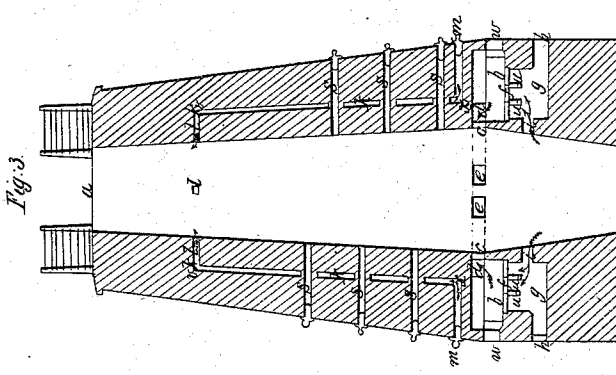
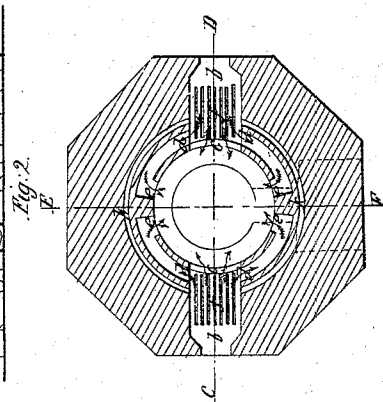
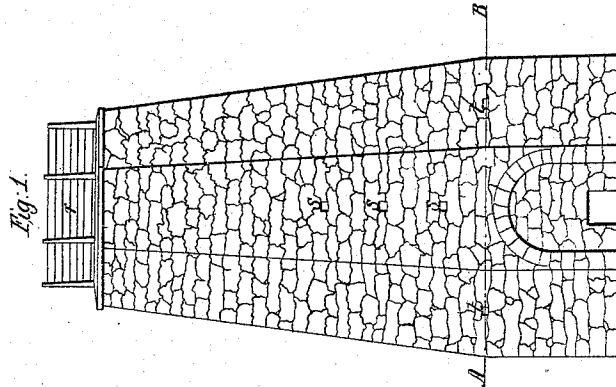
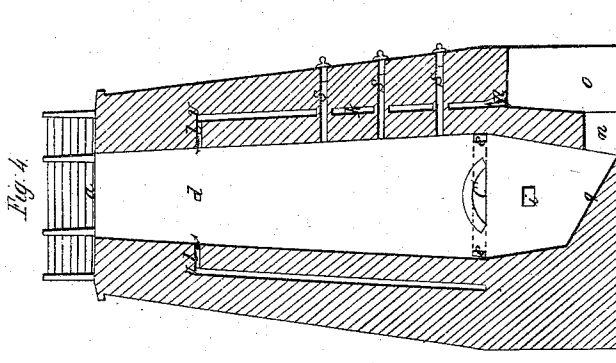


R. SCHROEDER.
LIMEKILN.

No. 8,079.

Patented May 6, 1851.



UNITED STATES PATENT OFFICE.

RICHARD E. SCHROEDER, OF ROCHESTER, NEW YORK.

LIMEKILN.

Specification of Letters Patent No. 8,079, dated May 6, 1851.

To all whom it may concern:

Be it known that I, RICHARD E. SCHROEDER, of the city of Rochester, in the county of Monroe and State of New York, have invented a new and Improved Mode of Burning Lime or Reducing Limestone into 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 annexed drawings, making a part of this specification.

My invention has in view a more perfect and general diffusion of heat in the inside of the cupola or kiln, and consists in an improved arrangement of the fire places or furnaces, flues, &c., whereby a great saving of heat is attained, producing a given amount of lime with less fuel, in less time, and with much greater facility than by any former or existing mode.

The main feature of my invention consists in so placing the fire places or furnaces at an elevation of several feet in the cupola or kiln, so that the heated and manufactured lime falling to the bottom, its heat is retained and made available, and providing said furnaces in addition to the main flue, with flues or conductors encircling the cupola, so that the heat and flame from said flues act upon the lime stone from six or more different points, whereby a more perfect and rapid conversion of stone into lime takes place, than if the fire was applied from the bottom or from one side or point only; and as before stated, the fires being elevated, leaves a space in the lower part of the kiln, which is occupied by the manufactured lime, the heat of which assists in converting the stone into lime, both by its own heat, and imparting heat to the air that passes through it to feed the fires. Further improvements taken in connection or as accessories to the foregoing, are—the air chamber encircling the entire cupola extending from just above the furnaces to nearly the top of the cupola, and provided with apertures for the admission of air; the aperture opening from the rooms under the grates into the lower part of the cupola, for the admission of hot air after passing through the lime, for feeding the fires; the inclined plane for facilitating the removal of the manufactured lime; and the aperture or conductor leading into the air chamber through the bottom of the arch, which re-

ceives the heated air arising from the lime which it is being removed from the kiln.

In the accompanying drawing Figure 1, is a side elevation of my cupola or kiln; Fig. 2, a transverse section through the line A, B, showing the furnaces, flues, air chambers, &c.; Fig. 3, a vertical section through the line C D; and Fig. 4, a vertical section through the line E F. In each of these figures where the same parts are shown they are designated by the same letters of reference.

There are two fire places or arches to my kiln as seen at *b, b*, into which the fuel and fire are introduced through *w, w*. These fire-places are arched and are three feet wide at bottom and one and one half feet high. By the apertures *c, c*, the larger part of the flame passes directly into the cupola or inside of the kiln. A portion of the flame, however, is taken up by the conductors *d, d*, drawn around the cupola and discharged at *e, e*; thus communicating heat to those parts of the lime stone which are not directly struck by the flame through *c, c*.

The air chamber K K is a space about three inches wide encircling the entire cupola or inside of the kiln and extending from *x x* to *v v*. The thickness between the inner surface of the cupola and the air chamber is about fifteen inches, constructed with fire-proof brick or any other fire-proof material. This air chamber is supplied with cold air at *m m*. It has two objects: First, it intercepts the heat generated in the cupola and protects the outer walls of the kiln from heating, expanding and falling. Second, the cold air received into this air chamber at *m m* becomes highly heated and is discharged into the cupola at the four orifices *l l l l*, and thus aids in heating the lime stone in the upper part of the kiln or cupola.

At *n* the lime or lava is drawn from the cupola into the large entrance. The heated air passing through or arising from said lava is conveyed through the conductor *p* into the air chamber and also discharged at *l l l l* and thereby imparting additional heat to the upper section of the cupola; thus using to the best possible advantage all the heat, the fuel creates, and thereby saving from one half to three quarters of the amount of wood or coal ordinarily used.

(*f f*) are grates made from fire-proof

brick or other fire-proof material sustained by four structures, made of same material, each about four inches wide, through which grates the ashes from (*b b*) fall into rooms 5 (*g, g,*) which are about three feet wide and two and one half feet high.

h h are openings to rooms (*g, g,*), through which the ashes are removed.

At *h h* and at *w, w,* there are iron-doors. 10 There is also an iron door at *n* in the principal eye of the kiln through which sufficient air (with the steam which is generated in the lower section of the cupola) is drawn to feed the fire at *b b*. This air, becoming 15 highly impregnated with heat, in its passage through the hot lava, produces more flame and caloric than if the fire were fed by cold air.

The door at *n* should be kept partially 20 closed as a general rule. The doors however at *h h* and *w, w,* are not always to be kept closed, nor that at *n* partially so. They should be kept open or nearly so when the current of air at *n* is insufficient to supply 25 the fires. The regulation of these doors, in this respect, must be left to the discretion of the operator.

(*t t*) are "peek-holes" to discover the state of the flame in conductors *d d*. If the 30 flame in said conductors is not sufficient the fire should be regulated accordingly. *s s s s s s* are also "peek-holes" or tubes passing from the outer surface of the kiln, through the air-chamber to the cupola to enable the 35 operator to see the condition of the lime and inform him what quantity of lime he can at any time remove and in case the lime on one side of the cupola is nearer the manufactured state than that on the other the fires 40 are to be regulated with reference to it.

The lime may be drawn as often as once in each hour after the kiln is in full operation and the kiln may be continued in operation through any length of time at the pleasure 45 of the operator. All these "peek-holes" are to be kept closely covered with valves on the outside of the kiln so as to exclude all air from entering them.

"*a*" is the top of the cupola where the 50 lime-stone is introduced. This cupola is

ordinarily about thirty feet in height. It may vary either way from that height, but it will be better to build it higher than below that point. The distance from the bottom of the kiln to the fire-place at *b b*, is about 55 five feet. The cupola at the top is about four feet in diameter and enlarges about one inch to the foot until it reaches the fire-places, where it gradually diminishes till it reaches the foot or bottom of the kiln at 60 the rate of about three inches to the foot. The cupola should be constructed round or oval and smooth inside so as that neither the lime stone or lime should meet with any obstructions in their descent. 65

Should a kiln of larger dimensions be necessary, having a cupola of from eight to ten feet in diameter, there may be three or more fire-places in the kiln and two or more principal eyes and in such parts of the kiln 70 as will be most convenient, from each of which the same kind of conductors, *d d* and *n*, should be used as above described. "*r*" is a railing around the top of the cupola, within which the stone may be deposited and 75 ready to be thrown into the cupola. "*q*" is an inclined plane by which the lime is drawn from the kiln with more facility than by any former mode.

Having thus fully described the construction and operation of my improved lime kiln, what I claim therein as new and desire to secure by Letters Patent is— 80

1. The flues *d, d*, encircling the cupola and provided with apertures or flues *e e e e* 85 *e*, for admitting the heat and flame to the action upon the lime stone from various points substantially as described, in combination with the air chamber *h*, encircling the cupola as described. 90

2. And I claim also the aperture *p* and passage therefrom for saving the heat arising from the manufactured lime while being removed, all operating conjointly in the manner and for the purpose herein fully 95 set forth.

RICHARD E. SCHROEDER.

Witnesses:

WM. S. BROWN,
N. E. PAINE.