J. L. LIVINGSTON.

Lime Kiln.

No. 52,061. Patented Jan'y 16, 1866.

Fig. 1

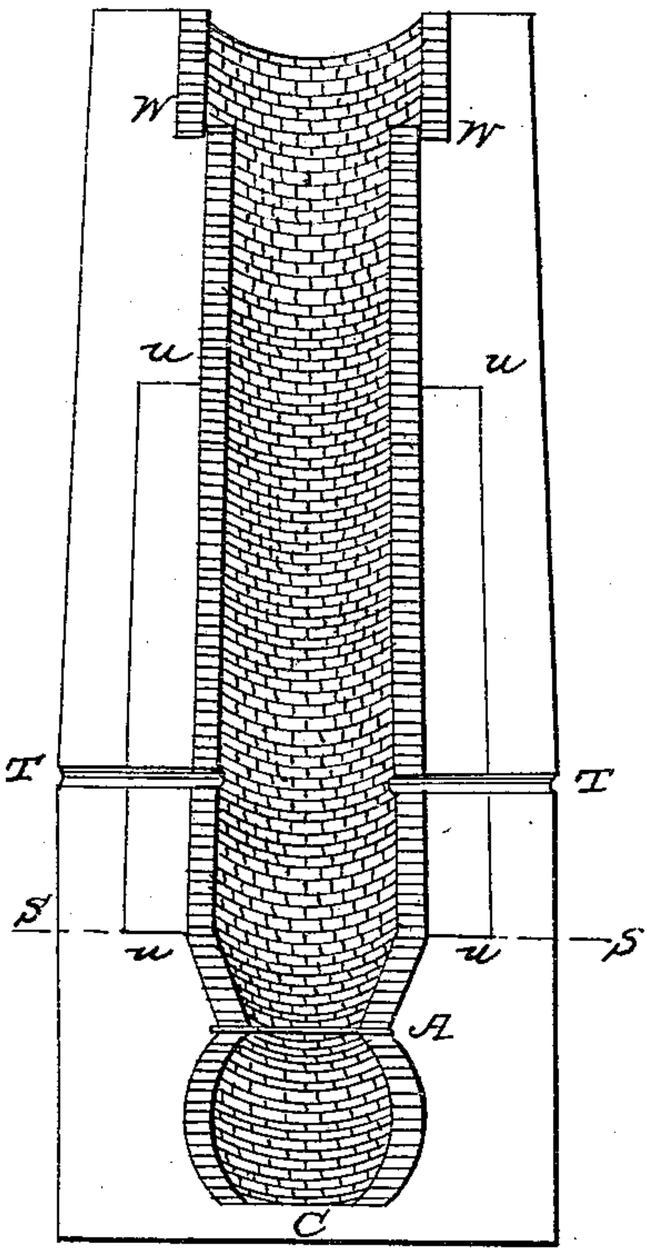


Fig. 2

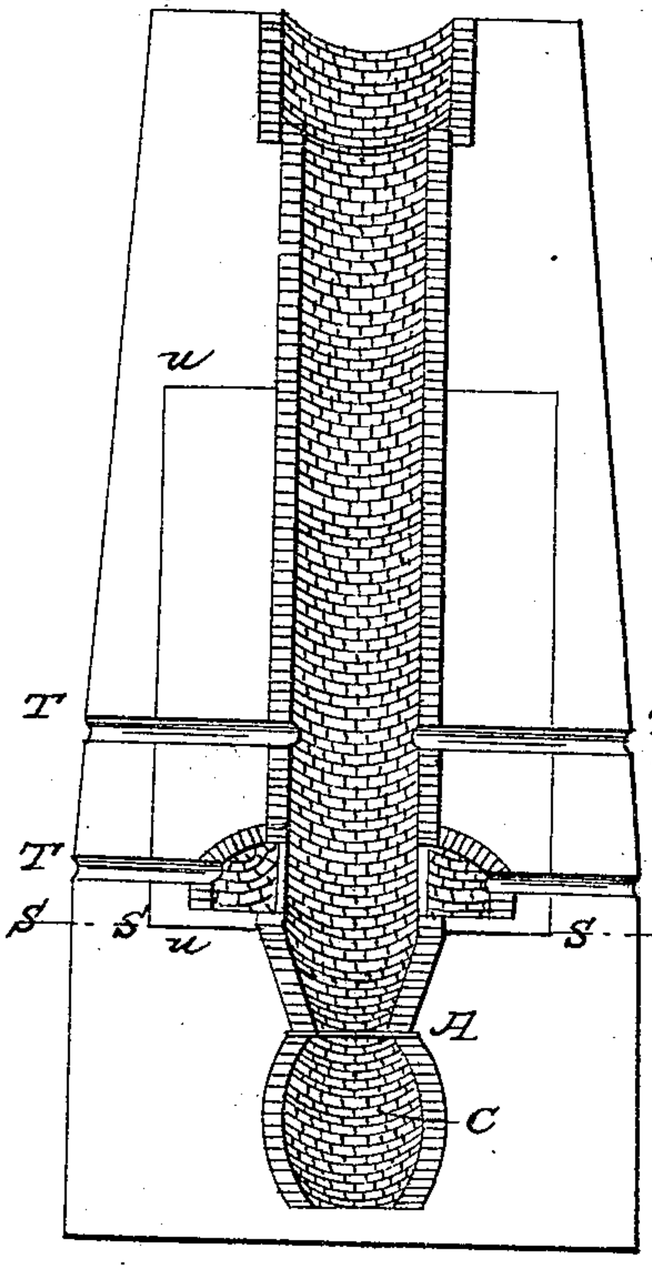


Fig. 11

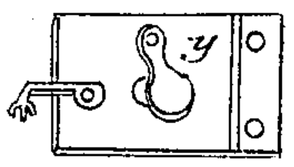


Fig. 7

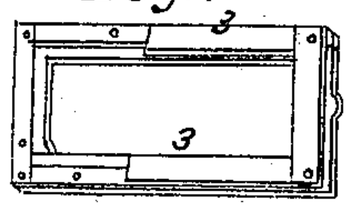


Fig. 8

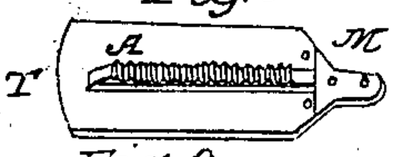


Fig. 9

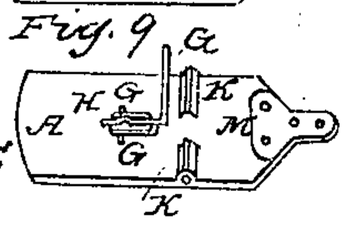


Fig. 10

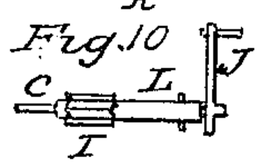


Fig. 3

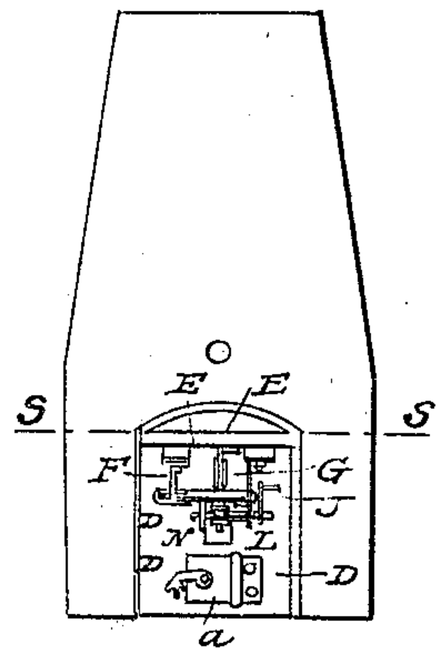


Fig. 5

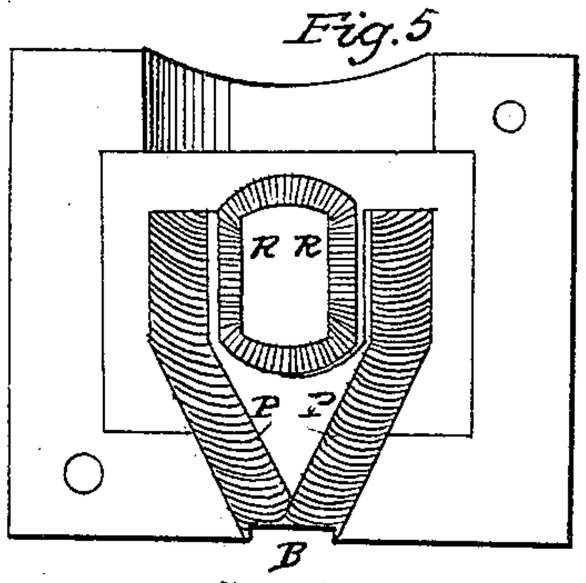


Fig. 6.

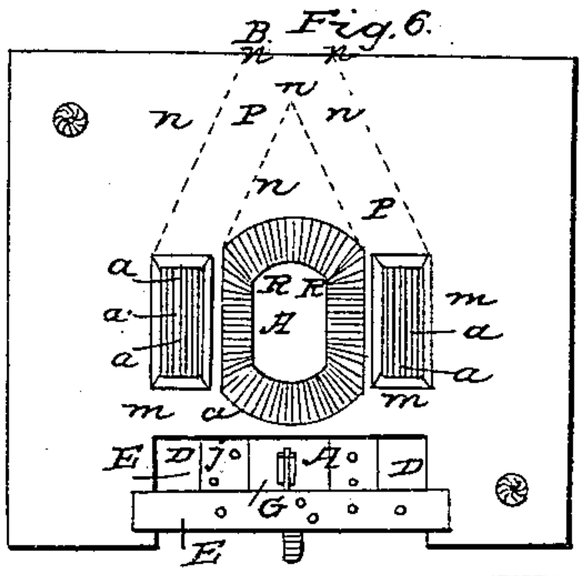
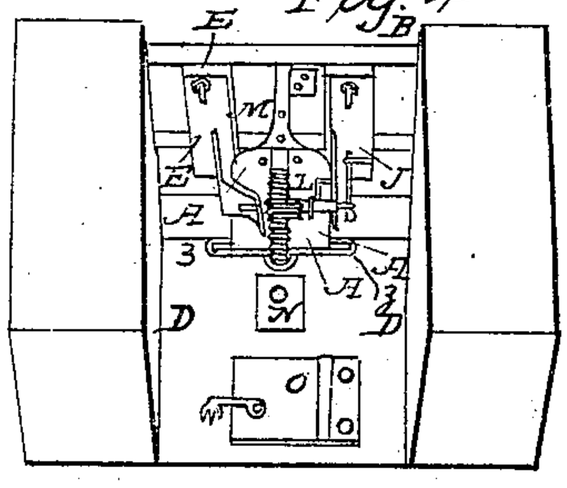


Fig. 4



WITNESSES

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JOHN L. LIVINGSTON, OF MOUNT CARROLL, ILLINOIS.

IMPROVED LIMEKILN.

Specification forming part of Letters Patent No. **52,061**, dated January 16, 1866.

To all whom it may concern:

Be it known that I, JOHN L. LIVINGSTON, of Mount Carroll, in the county of Carroll, in the State of Illinois, have invented a new and Improved Limekiln; and I do hereby declare that the following is a full, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in providing my limekiln with a cast-iron plate or slide sustained in the kiln by a cast-iron frame, which slide I work with a crank and pinion. When the slide is drawn out the lime falls into the cooler beneath the slide. The slide is then run back to its place, in order to retain the heat in the furnace while the lime in the cooler is being cooled. My kiln is also provided with tubes of iron, passing from the surface of the kiln to the interior, by which the progress of the heat can be ascertained; and should the lime, in its downward course, stick to the sides of the interior of the kiln, iron rods can be inserted to loosen it. I also feed the two furnaces with fuel from one door, at the opposite or rear side of the kiln from the recess.

I construct my limekiln of the form shown at Figure 3, which is a perspective view of the same. Fig. 1 is an internal vertical section, showing the inclined sides of the cupola. Fig. 2 is also an internal section, showing the narrow sides of the cupola, a portion of the furnace, and cooler. Fig. 4 is an external view of the slide, crank, pinion, and its connections. Fig. 5 is a section of the cupola just above the platform, showing the double feedway from the single entrance at B. Fig. 6 is a section of the platform, showing the furnaces, slide, and feedway at the dotted lines.

I construct the lower portion of my kiln nearly square—fourteen feet by sixteen feet—up to the platform, as indicated by the dotted lines at S S, Fig. 3, and on the platform I construct two grates of iron, sunk about six inches below the level of the platform, as shown at *m m*, Fig. 6, so as to allow the first layer of wood to drop low enough to have the next layer pass over it easily. Between and below the grates I form an oval opening for the cooler C, (shown at Figs. 1 and 2,) five feet by three feet ten inches in diameter, which can receive about twenty bushels of lime when filled, which is done by withdrawing the slide A, as shown at Figs. 4 and 6, hereinafter explained, and the slide's place at the bottom of the cupola is also shown at A, Figs. 1 and 2. In the front of the platform I leave a space for a recess. (Shown at D D, Figs. 3, 4, and 6.) Across the upper part, on a level with the platform, I place the frame E E, for the purpose of sustaining the braces F F for the pinion and crank. (Shown at Fig. 10.) The brace G, which holds the friction-roller H, Figs. 3, 4, 6, and 9, is also attached to this frame.

The plate or slide A, Figs. 4, 6, and 9, I make of iron, of sufficient length and breadth to fill up the space in the interior of the kiln, as shown at A, at the bottom of the cupola and near the top of the platform, Figs. 1, 2, and 6. On the lower side of the slide, running lengthwise, I place a row of cogs, as shown at Fig. 8, into which the pinion-head I, Fig. 10, works when the crank J is turned for the purpose of withdrawing the slide to let down the lime into the cooler. The shaft and pinion can be pushed to one side when the slide is driven in through the lime, when the cooler is filled, which closes the connection between the cooler and the heated lime above it in the cupola. On the opposite side of the slide I make an elevation with an opening, through which the friction-roller passes in withdrawing the slide, as shown at K, Fig. 9, and which prevents the slide from entering the frame too far, as in that case the front end, which is beveled down to a sharp edge, would be damaged against the end of the frame, which frame I will now describe.

I construct a frame (shown at Fig. 7) having grooves in the inside like a slate-frame, to admit the slide A at least one inch around its edges when driven in. The right-hand end of the frame is in perspective and the other end in section. This frame is made of iron and placed across the upper end of the cooler C, as shown at A, Figs. 1 and 2.

I construct the shaft and pinion, Fig. 10, of steel or iron, and at L, I insert a pin for the purpose of governing the distance it is to be unshipped, to allow the cogs to pass by the side of the pinion-head while the slide is being driven back through the lime into its place in the frame. At the outer end of the slide I attach

a piece of tough metal, M, that will bear the blows of a hammer when driven back through the lime.

I make a small door at N, Figs. 3 and 4, for the purpose of a cooling-draft, and also a door at O in the recess, for the purpose of drawing the lime one foot from the bottom of kiln, leading into the cooler or draw-pit. I then construct two passages, P P, converging from the interior of the kiln to the entrance at B, Fig. 5, at which point the fuel for both furnaces is fed in. These passages are cased with fire-brick, and are both started from the same point, B, first, because it is more convenient and requires less labor than to have them on opposite sides; second, when the doors are on opposite sides, while one door is open for the purpose of putting in fuel the draft is so strong as to prevent the fire from doing much good while the furnace is being filled. These passages are about nine feet from the bottom of the kiln. The inside of the kiln at this point, at the top of the platform, is about three feet ten inches by five feet in diameter, the sides being straight and the edges rounding. The object of having the inside next to the furnaces straight, as shown at R, is this: having the sides straight next the furnaces will admit the wood to come closer to the stone to be burned to lime, and it is also easier to build the cupola smooth, and when smooth and even the lime will pass down with greater ease and be less liable to catch upon the angles that would exist than if the inside walls were built in a circular form. I use six iron tubes, (shown at T T.) One of them passes into each furnace, and the other four are placed about five feet above the level of the furnaces, one on each side of the kiln, extending through the wall into the fire-brick lining. They are kept stopped up at the outer end, except when it is necessary to see the height of the heat or to punch the lime loose if it should stick fast to the sides of the walls of the cupola by being burned too much.

I build up the cupola nearly perpendicular, the broad sides to be drawn in three inches each at the height of fifteen feet from the level of the furnaces. That will make the cupola at this point three and a half feet and four and a half feet in diameter at U U, which is as far as the fire-brick extend upward, this being as far as the rock will burn to lime, and is as far as it is necessary to taper the side walls of the greatest diameter, so as to allow the lime to pass down easily. The cupola is then carried up seven feet more perpendicular to within three feet of the top of the kiln, where there is an offset of eight inches upon all sides, (shown at W W, Figs. 1 and 2.) It is then carried up perpendicular to the top of the kiln, measuring four feet ten inches by five feet ten inches, inside diameter, at the top. The other two sides (shown at Fig. 2) are carried or built up perpendicular from the arch over the furnace to the point W W, and from the arch down to the platform they taper two inches on each side, as shown at X X, Fig. 2, at which point I have horizontal bars, composed of fire-brick, to prevent the lime from coming into the arch over the grates. (Shown at P P, Fig. 5.) I have all the advantage of a funnel-shaped top without its disadvantages, which are these: the rocks, as they pass down from a large opening to a smaller one, wedge together and tighten in the neck of the funnel, so much so as sometimes to tear out the brick lining in a very short time.

The lines at *u u u u* show the extent of the fire-brick walls. At the rear of the kiln, at B, I have a door with an opening near the middle of it, which can be closed by a slide, *y*, shown at Fig. 11, to close the entrance to the feed-way after supplying the furnaces with fuel. I fill the kiln with stone down to the slide A. I then fire about twenty-four hours before drawing lime. After that I draw as often as once in three to four hours, about twenty bushels at a time. As soon as the lime is drawn I fill in stone above, and so on for any length of time. In this kiln it requires only about five minutes to let the lime down in the cooler, and in consequence of its being cut off from the heated lime in the cupola it will cool in half the time that is required for Page's or other kilns, assisted also by the openings for a cooling-draft. On each side of my kiln I have a door, (not shown in the drawings of the kiln, but similar to the one shown at Fig. 11.)

I do not claim the doors nor the outside form of this kiln; but

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

1. The double passage or feed way P P from the one entrance B to the two furnaces *m m*, substantially as and for the purpose specified and delineated.

2. The combination of the two sunken grates *a a* with the straight-sided walls R R of the furnaces, the whole so arranged that one or more layers of wood will fall in the furnaces before full, and so that the wood comes in contact with the walls of the furnaces their whole length, and therefore heat equally, substantially as described.

3. As a separative between the shaft and cooler of a lime-kiln, the cut-off slide A, having a cog-rack on its bottom and a gage-flange, K, on its top, when employed in combination with the frame Z, shaft and pinion I, and friction roller or bearing H, substantially as specified.

JOHN L. LIVINGSTON.

Witnesses:

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WM. B. REA.