C. W. Siemens,

Kilns for Calcining Ores.

No. 104,655. Patented June 21. 1870.

Fig. 1.

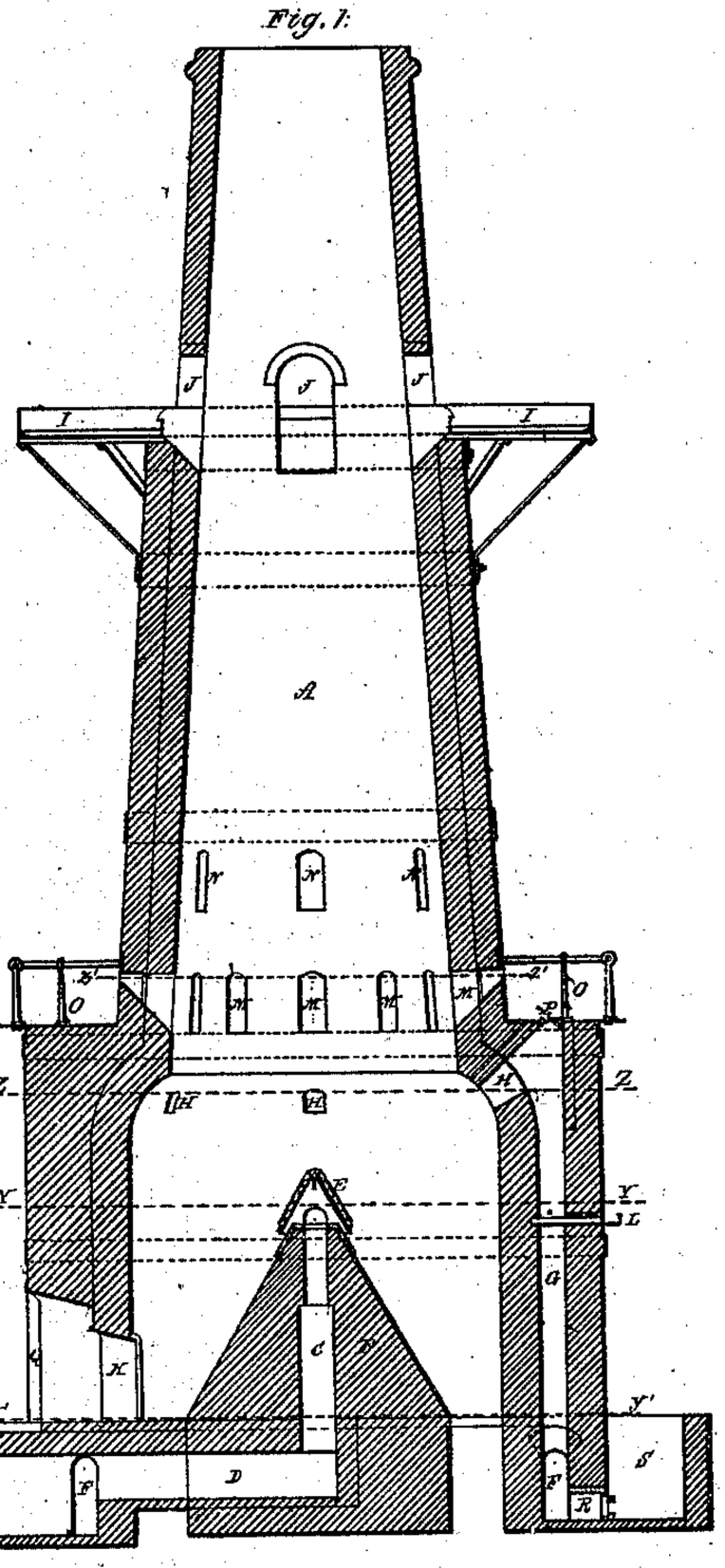


Fig. 3.

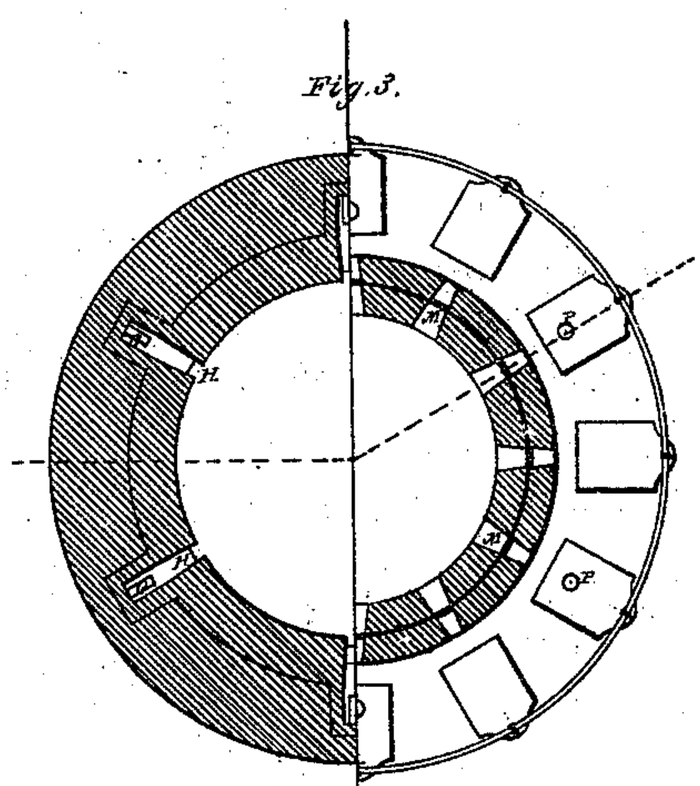
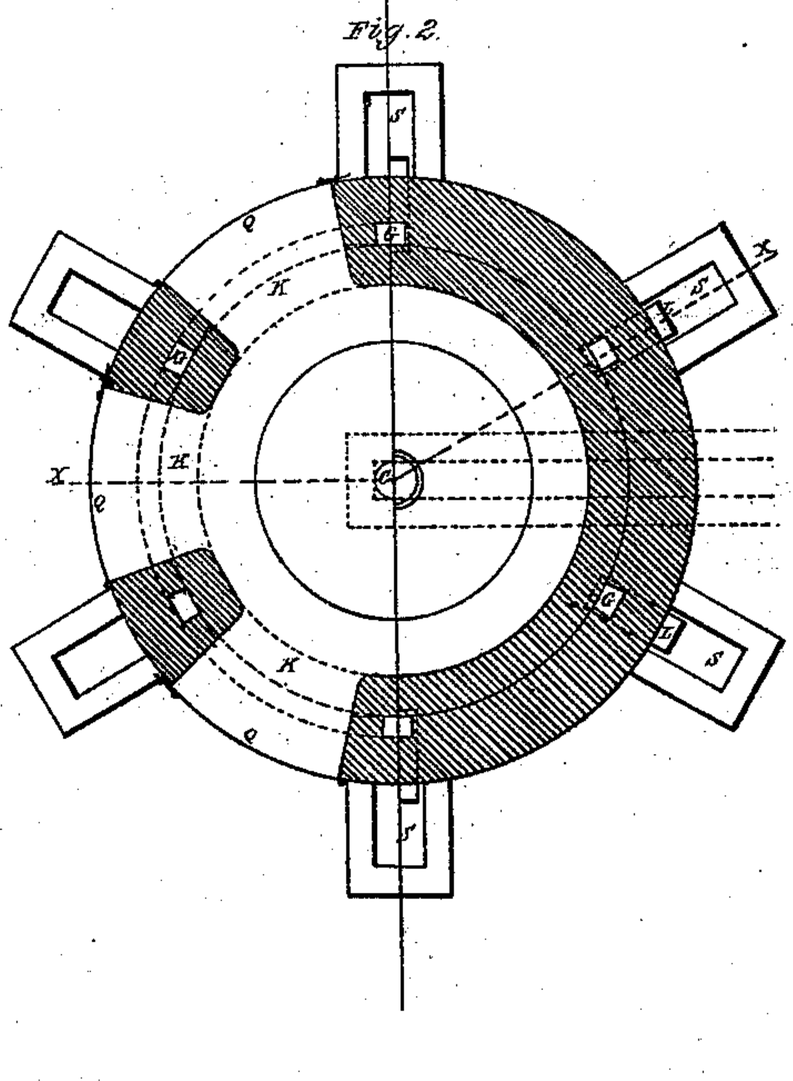


Fig. 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

CHARLES WILLIAM SIEMENS, OF WESTMINSTER, ENGLAND.

IMPROVEMENT IN KILNS FOR CALCINING ORES, LIMESTONE, &c.

Specification forming part of Letters Patent No. **104,655,** dated June 21, 1870.

To all whom it may concern:

Be it known that I, CHARLES WILLIAM SIEMENS, of Westminster, of the county of Middlesex, England, have invented an Improvement in Kilns for Calcining Ores, Limestone, or other Matters; and I do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 denotes a vertical section of it, such section being taken on the line X X of Fig. 3. Fig. 2 is a sectional plan on lines Y Y and *y y* of Fig. 1. Fig. 3 is a sectional plan on lines Z Z and *z' z'* of Fig. 1.

The kiln I employ for calcining the spathic ore or lime to be used is not dissimilar in general form and arrangement from an ordinary limekiln; but the material to be calcined is charged at the top without the admixture of solid fuel. Gaseous fuel is to be admitted at the circumference of the kiln at some elevation from the base, and also in the center of the kiln, through an ascending channel and under a covering-hood. Atmospheric air enters among the calcined and heated mass through the discharge-openings at the bottom of the kiln, and, after having become heated itself, meets with the divided currents of gaseous fuel, with which it enters into complete combustion, producing intense heat. The products of combustion, together with the liberated carbonic acid and aqueous vapor, rising through the superincumbent mass of materials, heat the same, preparatory to its being acted upon by the calcining-heat, and escape at the top comparatively cool from the freshly-charged materials.

One advantage of this calcining-kiln is that the products of combustion escape from it in the form of carbonic acid instead of carbonic oxide, with their admixture of nitrogen, resulting in a great saving of fuel. Another advantage consists in the absence of ashes of the combustible matter employed, and another in the regular and intensified action which can be obtained in regulating the supply of gas to the continuous action of the kiln. A gallery or galleries are erected on the outside of the kiln, and stoppered apertures are provided through its side walls for the purpose of introducing tools for prizing the material in case it should hold together and not descend freely. The current of air and gas through the calcining mass may be accelerated by placing a hood or chimney upon the kiln, and by introducing a steam-jet into the same. Kilns of this description may be used generally with advantage in calcining ores and for burning lime, cement, and plaster-of-paris.

The kiln A is provided with a lining of fire-brick, as shown, and at its base a conical projection, B, through the center of which is formed the passage C for combustible gas, which is to be supposed to be supplied from one or more gas-generators, and to pass through the flue D and issue into the kiln from beneath an iron hood, E, arranged over the cone B. At the same time combustible gas is also to be caused to pass from the flue D through a circular passage, F, and thence up through the vertical passage G, whence it issues into the kiln-chamber through openings H at the circumference of the kiln, and leading into such chamber. Assuming the kiln to be charged with ore or limestone from the platform I and through the apertures J leading therefrom, and the lower part of the charge being at a calcining-heat, air entering through the discharge-apertures K at bottom will, in rising up through the heated calcined masses, take up heat therefrom, and, in coming into contact with the combustible gas issuing from the hood E and through the opening H, will enter into combustion with the gas, so as to effect a considerable and equable heating of the entire charge without any admixture of solid fuel being requisite. The supply of gas through the apertures H at the circumference may be regulated by means of a damper, L, in the conduit G. The hot gaseous products of combustion, in passing up through the kiln, impart their heat to the charge in the upper part before escaping from the top.

To prevent the clogging of the charge of the kiln stoppered apertures M M N N are formed around the kiln, so as to be accessible from a gallery, O, arranged as shown in Fig. 3. Through these apertures tools may be introduced for prizing the charge and causing it to descend freely. Access may be had to the passages G from the gallery O, (through apertures P, provided with covers,) for the purpose of clearing them out when necessary. Other apertures, R, provided with doors, may also be formed at the bottom of these gas-passages, they being accessible from a pit, S. The dis-

charge-openings K should be provided with doors Q, to regulate the draft of air and the discharge of the calcined materials.

I claim—

The arrangement and combination of the cone B, its hood E, and the system of air and gas flues C D F G, with the kiln, constructed substantially as specified, the whole being to operate as and for the purpose as explained.

Witnesses: C. WM. SIEMENS.

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