

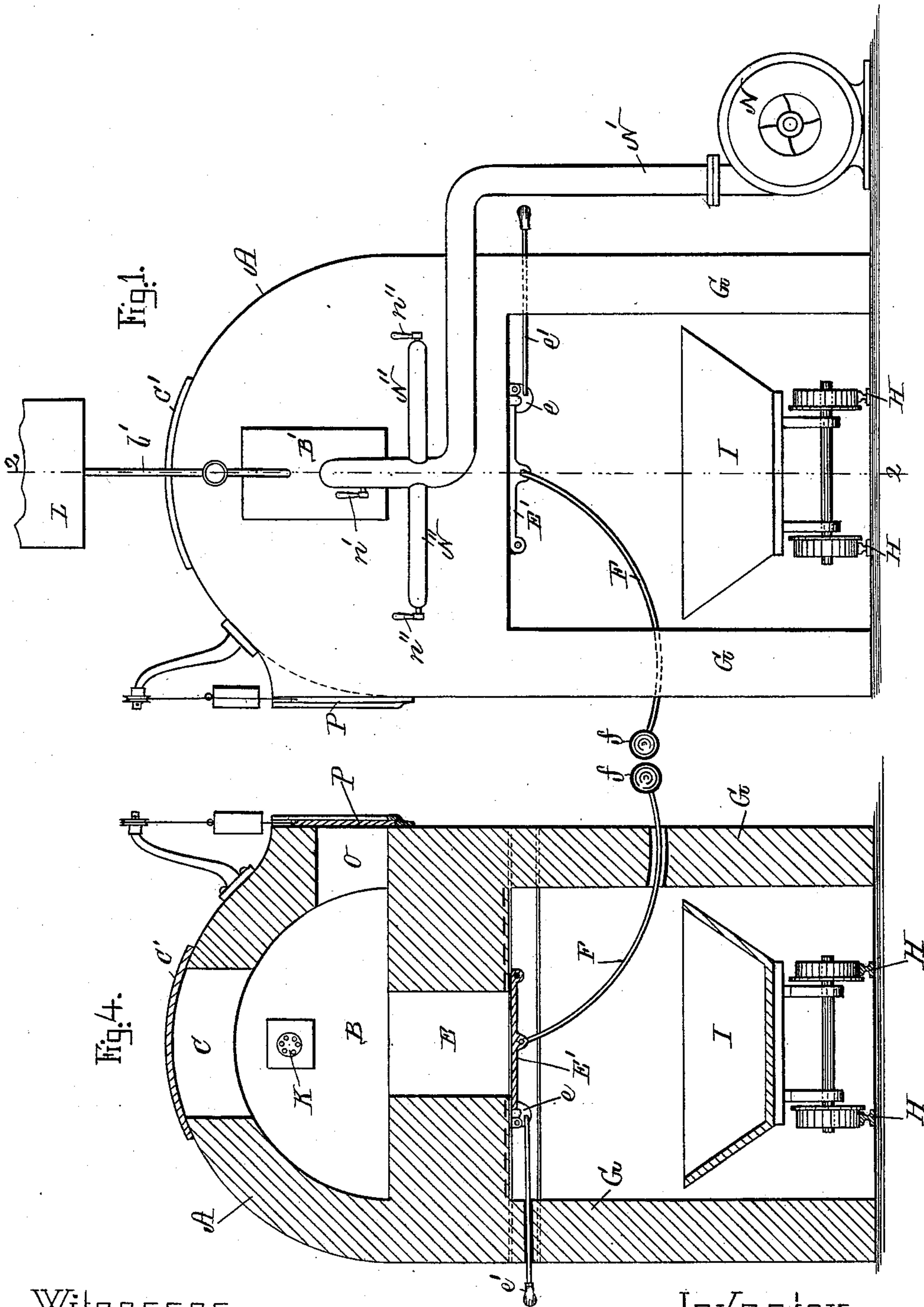
(No Model.)

5 Sheets—Sheet 1.

I. W. DEERING.
LIME BURNING FURNACE.

No. 594,332.

Patented Nov. 23, 1897



Witnesses.

Lamont, N. Holler.
Charles A. Harris.

Inventor.

Isaac W. Deering.
by Abraham J. Deering his atty

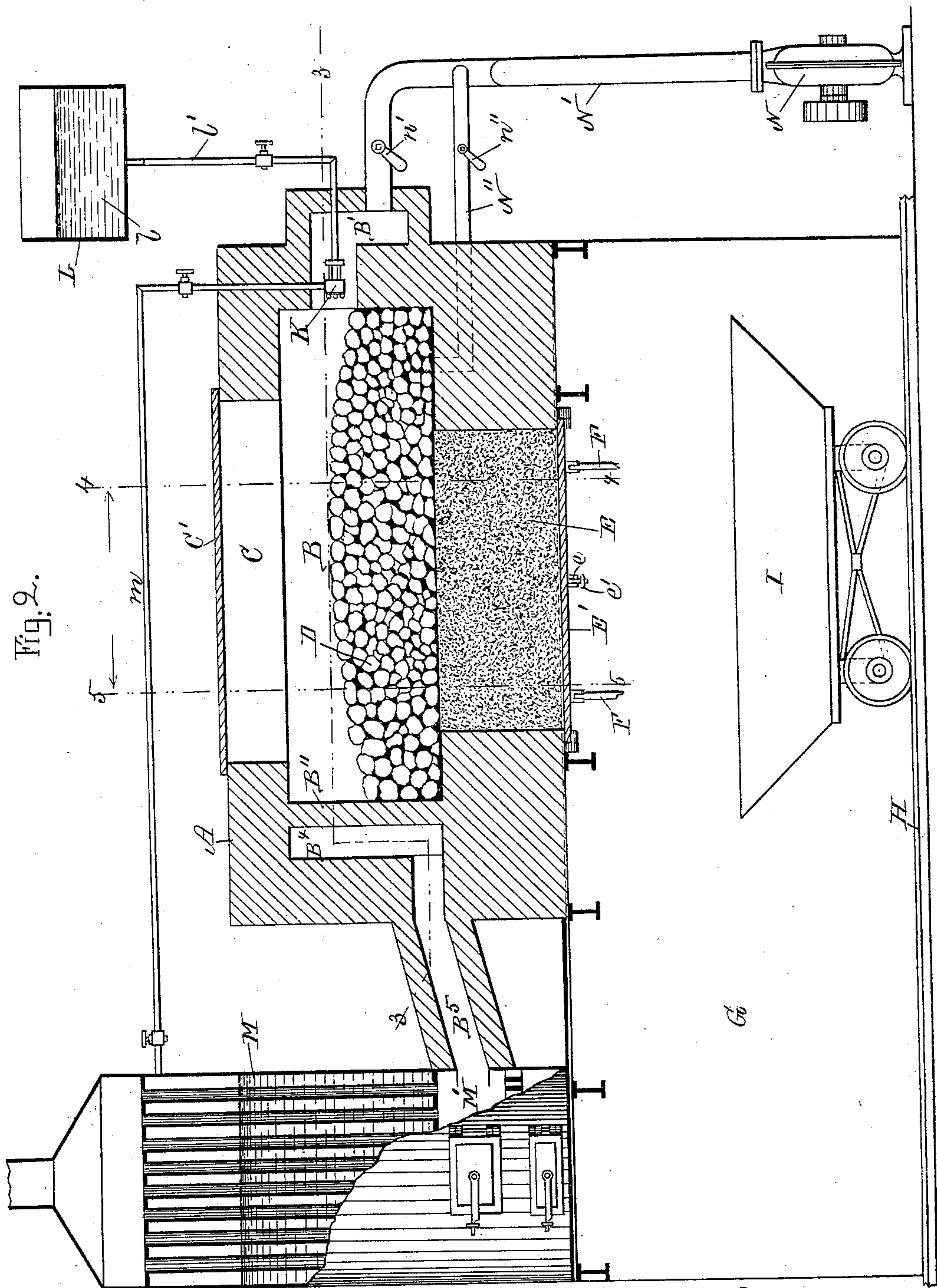
(No Model.)

5. Sheets—Sheet 2.

I. W. DEERING.
LIME BURNING FURNACE.

No. 594,332.

Patented Nov. 23, 1897.



Witnesses.

Lauritz A. Høller,
Charles A Harris

Inventor:

Isaac W. Deering.
by Alban Andrieu his atty.

(No Model.)

5 Sheets—Sheet 3.

I. W. DEERING.
LIME BURNING FURNACE.

No. 594,332.

Patented Nov. 23, 1897.

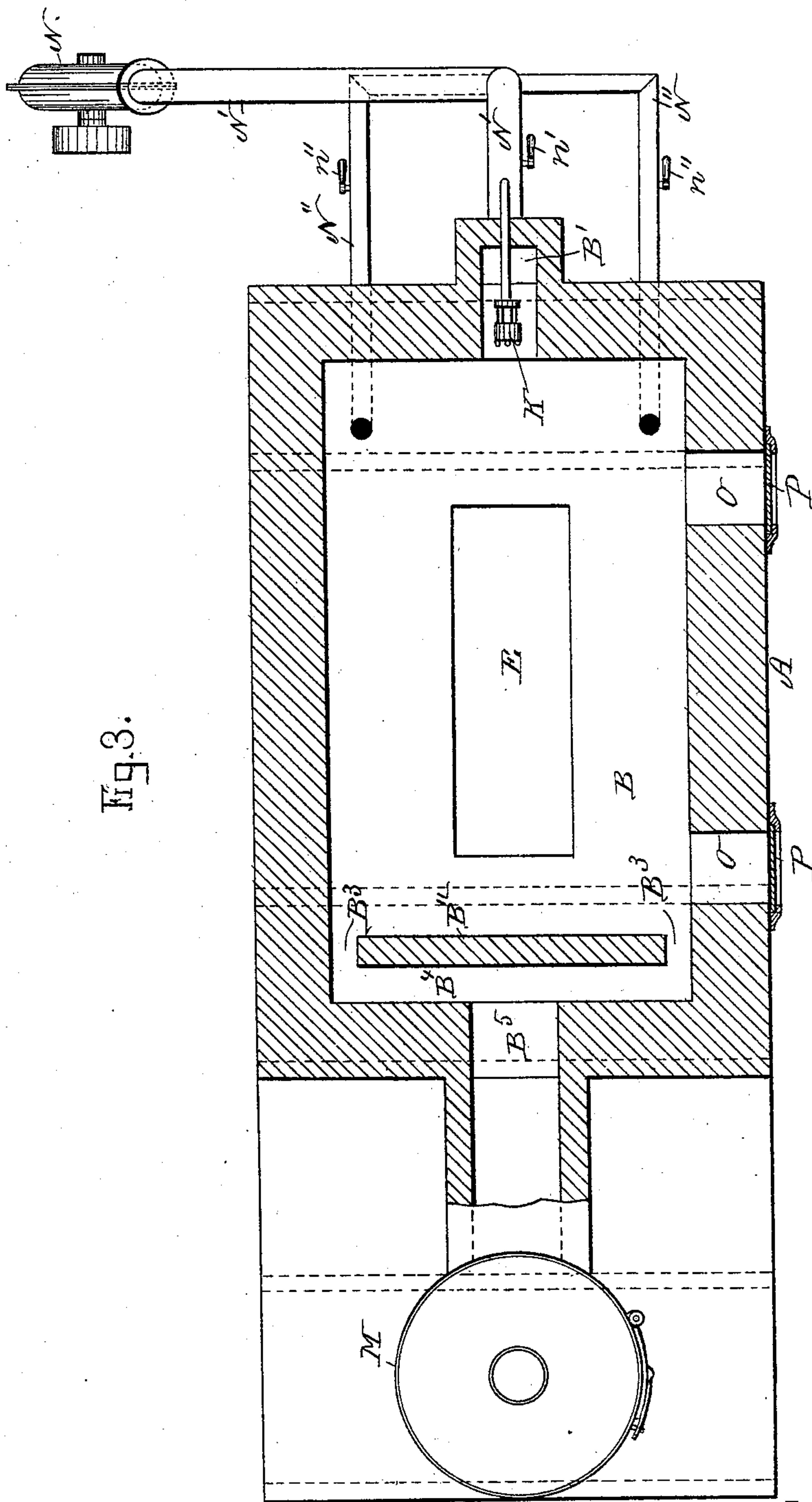


Fig. 3.

Witnesses.

Lairitz, N. Moller
Charles A. Harris

Inventor.

Isaac W. Deering.
by *Alban Andrew* his atty.

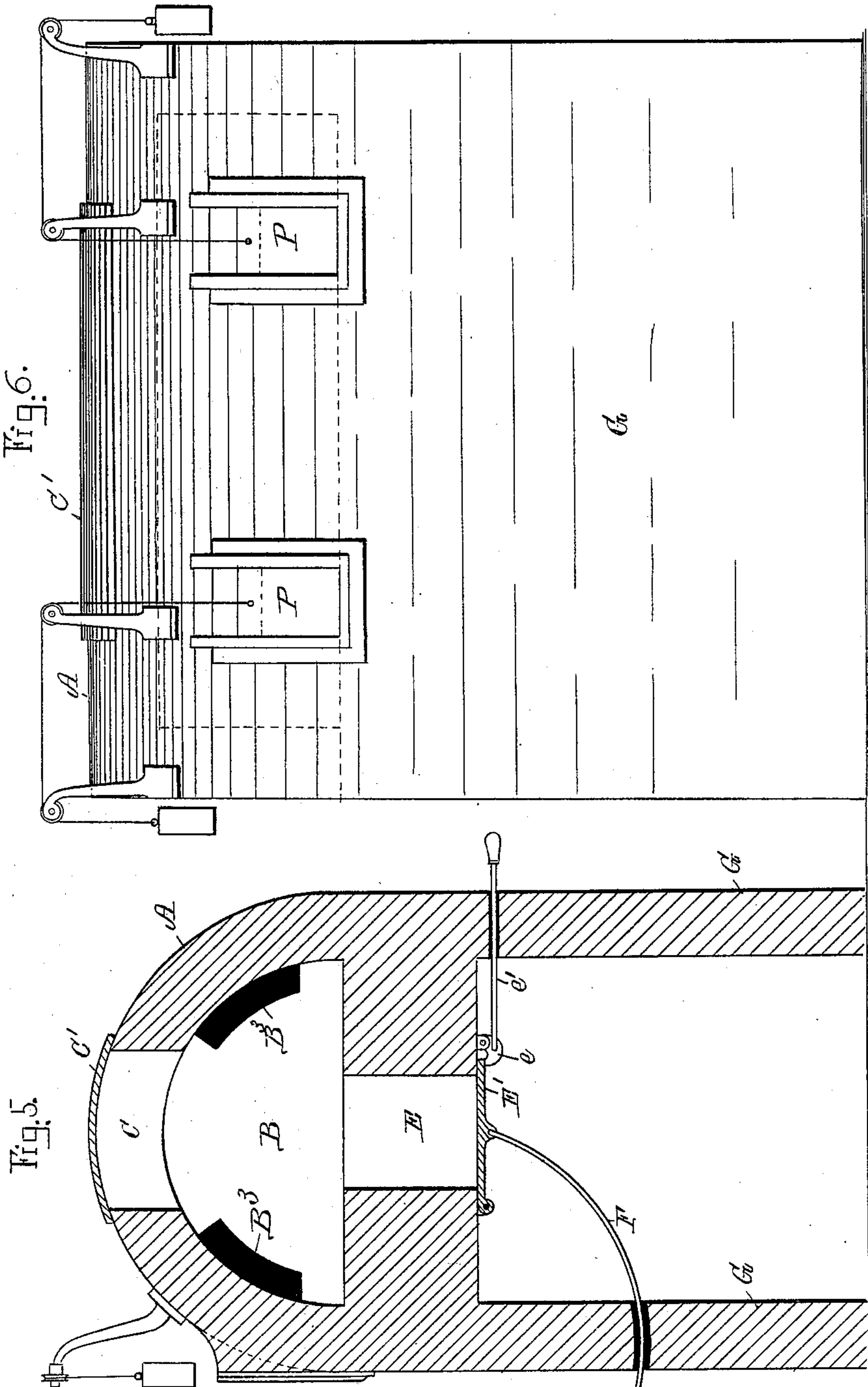
(No Model.)

5 Sheets—Sheet 4.

I. W. DEERING.
LIME BURNING FURNACE.

No. 594,332.

Patented Nov. 23, 1897.



Witnesses.

Lauritz N. Halle
Charles A. Harris

Inventor.
Isaac W. Deering
by *Alban Audien*
his atty.

(No Model.)

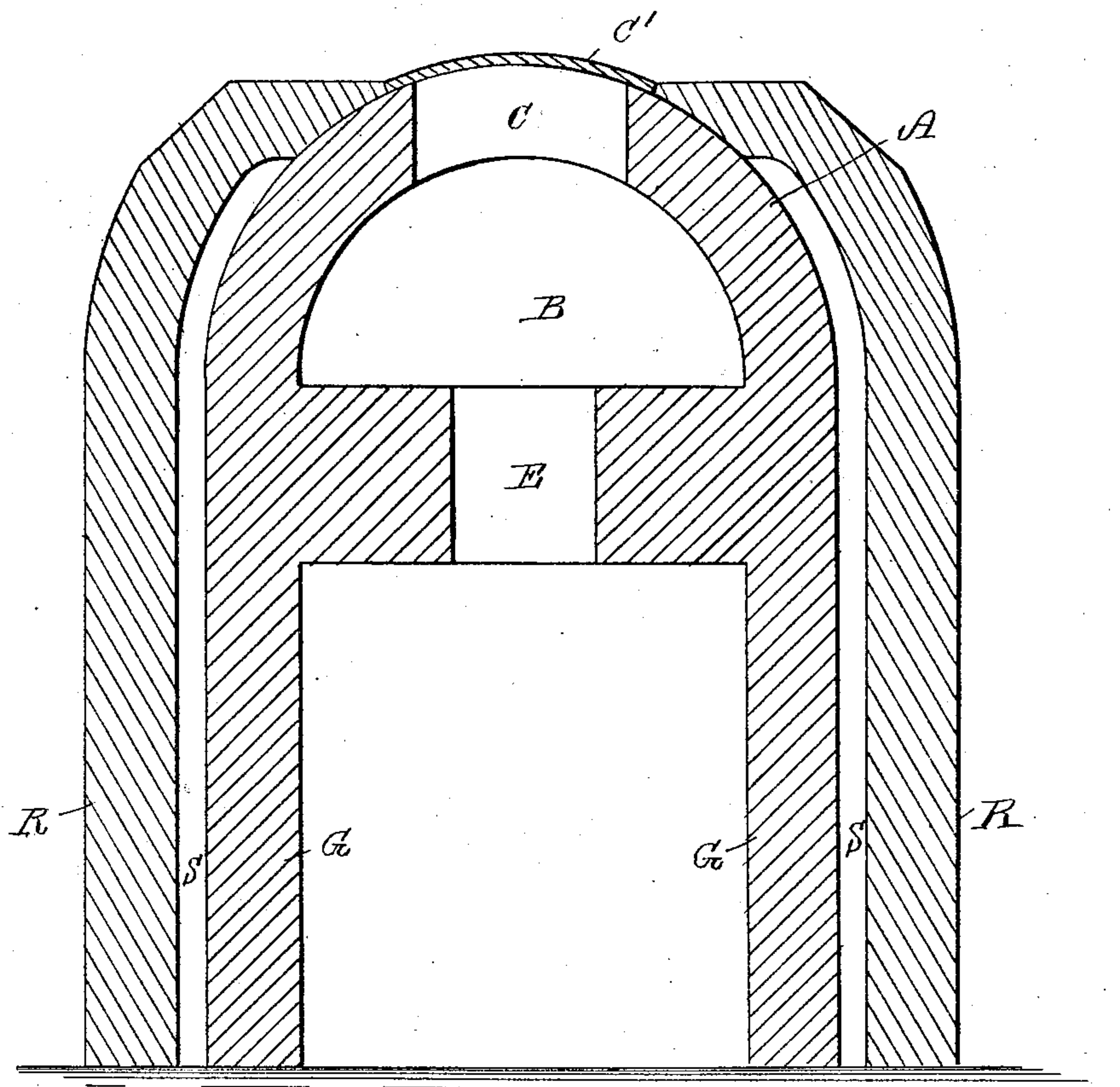
5 Sheets—Sheet 5.

I. W. DEERING.
LIME BURNING FURNACE.

No. 594,332.

Patented Nov. 23, 1897.

Fig. 7.



Witnesses.

Lauritz N. Möller.
Charles A. Harris

Inventor.

Isaac W. Deering
by *Wm. Andrew*
his atty.

UNITED STATES PATENT OFFICE.

ISAAC W. DEERING, OF GLOUCESTER, MASSACHUSETTS.

LIME-BURNING FURNACE.

SPECIFICATION forming part of Letters Patent No. 594,332, dated November 23, 1897.

Application filed May 23, 1895. Renewed September 11, 1897. Serial No. 651,324. (No model.)

To all whom it may concern:

Be it known that I, ISAAC W. DEERING, a citizen of the United States, and a resident of Gloucester, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Lime-Burning Furnaces, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to improvements in lime-burning furnaces for producing quicklime from lime-rock; and it is carried out as follows, reference being had to the accompanying drawings, wherein—

Figure 1 represents an end elevation of the improved furnace. Fig. 2 represents a longitudinal section on the line 2 2, shown in Fig. 1. Fig. 3 represents a horizontal section on the broken line 3 3, shown in Fig. 2. Fig. 4 represents a cross-section on the line 4 4, shown in Fig. 2. Fig. 5 represents a cross-section on the line 5 5, shown in Fig. 2. Fig. 6 represents a detail front elevation of the furnace, and Fig. 7 represents a cross-section of the furnace provided with an inclosing jacket.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

In the drawings, A represents the brick furnace, within which is contained the combustion-chamber B, having a feed-opening C at its upper end, through which the lime-rock D is introduced into the combustion-chamber. Said feed-opening C is normally closed by means of a removable cover C', as shown.

E is a sunken discharge pot or opening at the bottom of the chamber B, which is normally closed by means of a hinged door or cover E', as shown. The said cover E' is normally held in a closed position, as shown, preferably by means of a hinged catch e, to which is connected a rod e', which extends outside of the brick wall to enable the operator to release said catch from the door E' when it is desired to discharge the contents of the combustion-chamber.

In practice I prefer to partially counter-balance the pivoted door E' by means of curved rods F F', connected to the said door

E' and passing freely through perforations in the brickwork and provided on the outside with handles or weighted balls ff, as shown, to enable the operator to close said door E' after the contents of the combustion-chamber have been discharged.

The furnace A is supported at a proper distance from the ground upon side walls G G, between which is laid a rail-track H H, on which is movable the car I, into which the quicklime is dumped from the combustion-chamber B when the door E' is opened.

In one end of the combustion-chamber B is a chamber or recess B', in which is located the gas-producing burner K, to which is fed a carbon liquid, the flame of which is forced over and through the lime-rock D in the combustion-chamber.

In the drawings, Fig. 2, I have shown for this purpose a tank L, containing a carbon liquid l, which is conducted to the burner K by means of a pipe l'. Such carbon liquid is mixed with live steam by means of a steam-pipe m, leading to said burner or gas-producing machine K from the steam-space of a steam-boiler M, as shown in Fig. 2. By this means an intense heat is produced by which the lime-rock in the combustion-chamber is decomposed and its carbonic-acid gas expelled and passed off with the products of the combustion to the fire-pot M' of the steam-boiler.

For the purpose of partially arresting the draft from the combustion-chamber to the boiler M, I locate at the rear end of said combustion-chamber a transverse division-wall B'', through which are made perforations or conduits B³ B³, (shown in Figs. 3 and 5,) leading into a chamber B⁴, from which leads a conduit B⁵ to the fire-pot M' of the steam-boiler M, as shown in Fig. 2.

In connection with the gas-producing device or burner K, I use an air-forcing device N, from which leads a pipe N' to the chamber B', with branches N'' N'' entering the lower forward end of the combustion-chamber B, as fully shown in Figs. 1, 2, and 3, by means of which a draft of air is conducted into the combustion-chamber to aid the combustion of the inflammable gas expelled from the burner K.

$n' n'' n'''$ are valves or cut-offs on the respective air-forcing pipes $N' N'' N'''$, by means of which the amount of air forced through said respective pipes may be regulated.

5 By the arrangement as above described I utilize a great amount of the waste heat from the combustion-chamber to generate steam in the boiler, thereby cheapening materially the process of burning the lime-rock.

10 In the side of the inclosing wall of the combustion-chamber B are made openings O O, adapted to be normally closed by suitable gates or doors P P, as shown in Figs. 1, 3, 4, and 6, to enable the operator to rake a portion of the contents of the combustion-chamber B into the pot or recess E after the main contents of said chamber B have been discharged by the opening of the hinged door E'.

The operation of burning the lime-rock for producing quicklime is as follows: In starting steam may at first be generated in the boiler M by fire in the fire-pot M', as is common in firing steam-boilers. The combustion-chamber B is then partially filled with the lime-rock by removing the cover C' and charging the combustion-chamber through the opening C, after which the cover C' is closed. Steam and carbon liquid are then forced out through the gas producer or burner K, by which inflammable gas of great intensity is produced, which, after being ignited by any suitable means, is forced through and above the contents of the combustion-chamber B and the combustion of the gases augmented by the admission of air from the pipes $N' N'' N'''$, as described. By this arrangement the lime-rock is decomposed and its carbonic-acid gas expelled and passed off with the products from the combustion-chamber to and through the steam-boiler M, causing steam to be generated in such boiler and conducted to the gas producer or burner K, as hereinabove set forth. After the lime-rock has been exposed to such intense heat in the combustion-chamber it is changed into quicklime and discharged through bottom opening E, when the door E' is opened, into the car I below, from which it may be transported to any suitable place for storage, packing, or consumption, as the case may be. After the main contents of said combustion-chamber have been discharged the door E' is closed and the quicklime remaining in the bottom of chamber B around the bottom opening E is raked into the latter by means of tools introduced through the side openings O after their gates P have been opened, thus filling the pot E with quicklime, which during the repetition of the process serves as a non-conducting material to prevent the door E' from being overheated.

65 In practice I prefer to inclose the furnace with a brick jacket R, (shown in Fig. 7,) between which and the furnace-wall there is left a dead-air space S for the purpose of preventing undue radiation of heat from the furnace

during the operation of producing quicklime from the lime-rocks.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent and claim—

1. The combination of a horizontal lime-burning furnace having a charge-opening in its top and a sunken well in its bottom for the reception of the decomposed lime, a hinged, counterbalanced door for closing the bottom of said well, means for holding said door closed, openings in the sides of the furnace formed flush with the level of the furnace-chamber, balanced doors for closing said openings, a chamber communicating with the front end of the furnace-chamber, a gas-generating burner arranged in said chamber, means for supplying air to the burner-chamber, an escape-flue arranged at the rear end of the furnace-chamber, a transverse partition arranged in front of said escape-flue and having openings in its sides only for the escape of the gases and products of combustion, a steam-generator connected with said escape-flue, a pipe leading from the steam-space of said generator to the gas-generating burner, and a reservoir for supplying carbon liquid to the burner, substantially as described.

2. The combination of a horizontal lime-burning furnace having a charge-opening in its top and a sunken well in its bottom for the reception of the decomposed lime, a door hinged at one side of the furnace beneath said well, a catch for engaging the other side of the door to hold it closed, curved rods pivotally connected to said doors and extending through apertures formed in the side walls of the furnace, weights arranged on the free ends of said rods, openings formed in the sides of the furnace, doors for closing said openings, a chamber communicating with the front end of the furnace, an escape-flue at the other end thereof, a gas-generating burner arranged in said chamber, a reservoir for holding carbon liquid connected with said burner, an air-forcing device, a pipe leading from said air-forcing device to said chamber, branch pipes leading from said pipe to the furnace, valves arranged in said pipes for controlling the admission of air to said chamber and furnace, a steam-generator connected with the said escape-flue of the furnace, means for checking the escape of the products of combustion from the furnace to said flue, and a pipe leading from the steam-space of said steam-generator to the gas-generating burner, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 7th day of May, A. D. 1895.

ISAAC W. DEERING.

Witnesses:

ALBAN ANDRÉN,
LAÛRITZ N. MÖLLER.