

No. 724,936.

PATENTED APR. 7, 1903.

H. RAGOT.  
LIMEKILN.

APPLICATION FILED JUNE 30, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

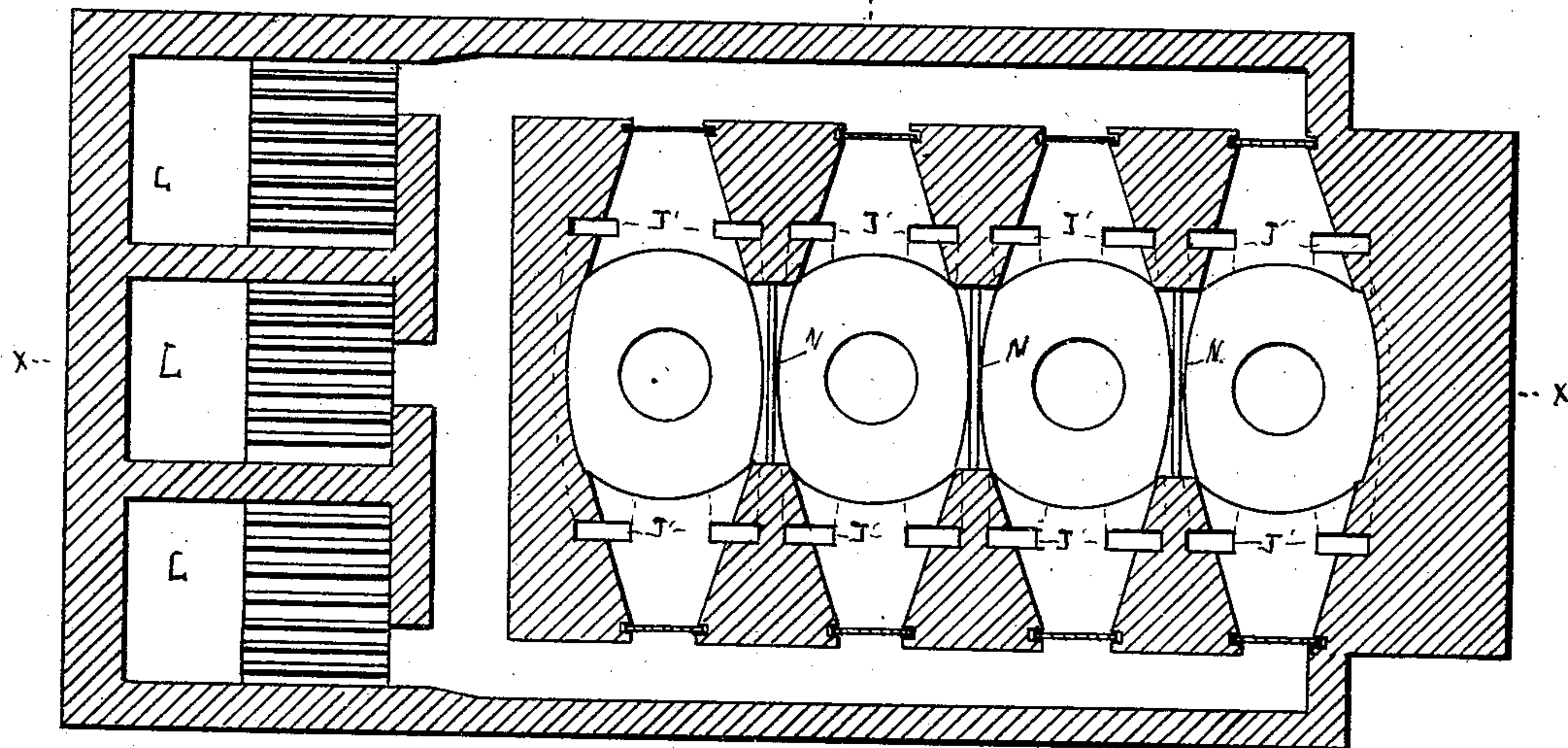


Fig. 1.

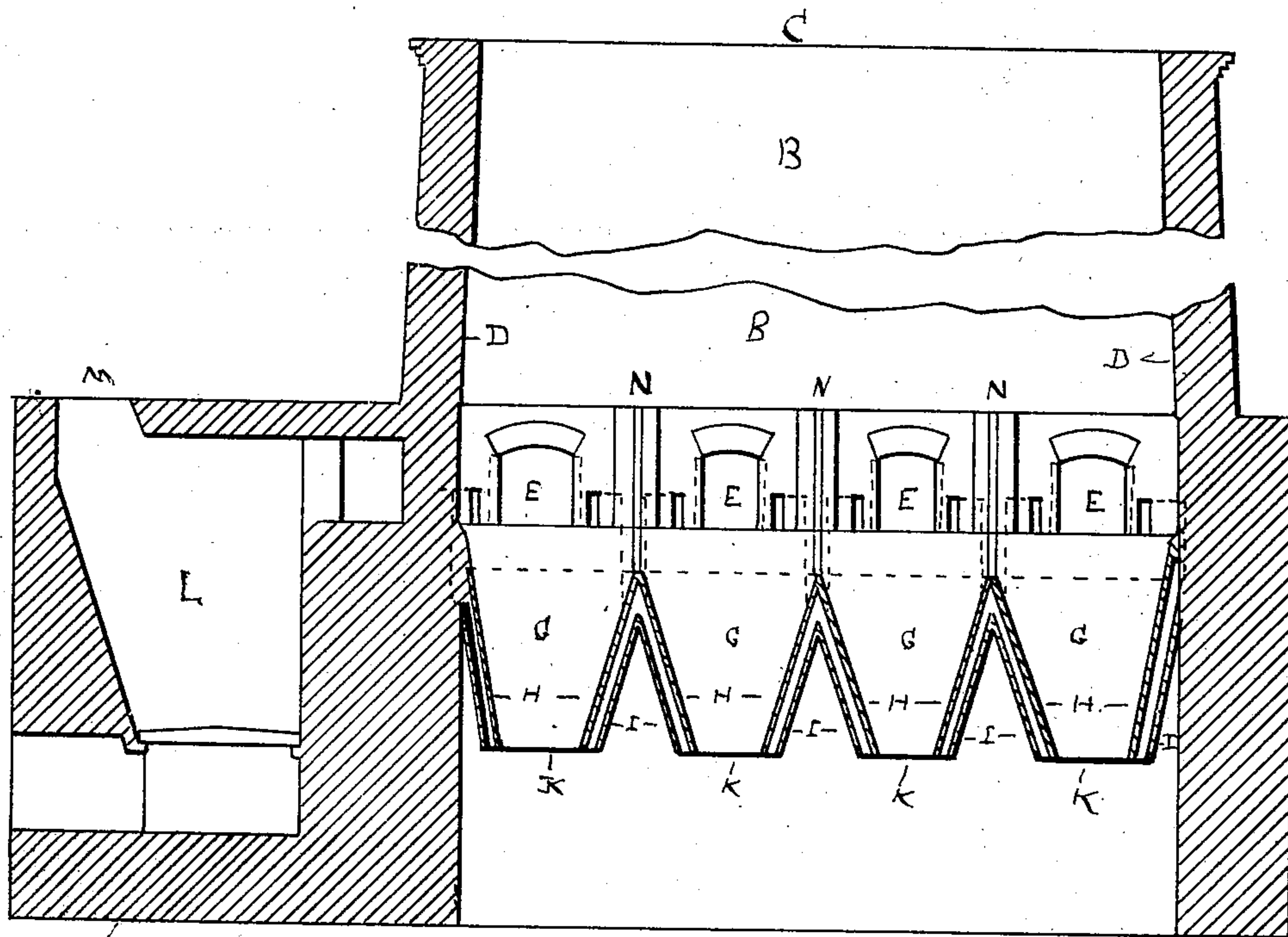


Fig. 2.

Witnesses.

Marion Richards.

Anna M. Cole.

Inventor.

Henry Ragot.

By Verree + Clifford.

Attorneys.

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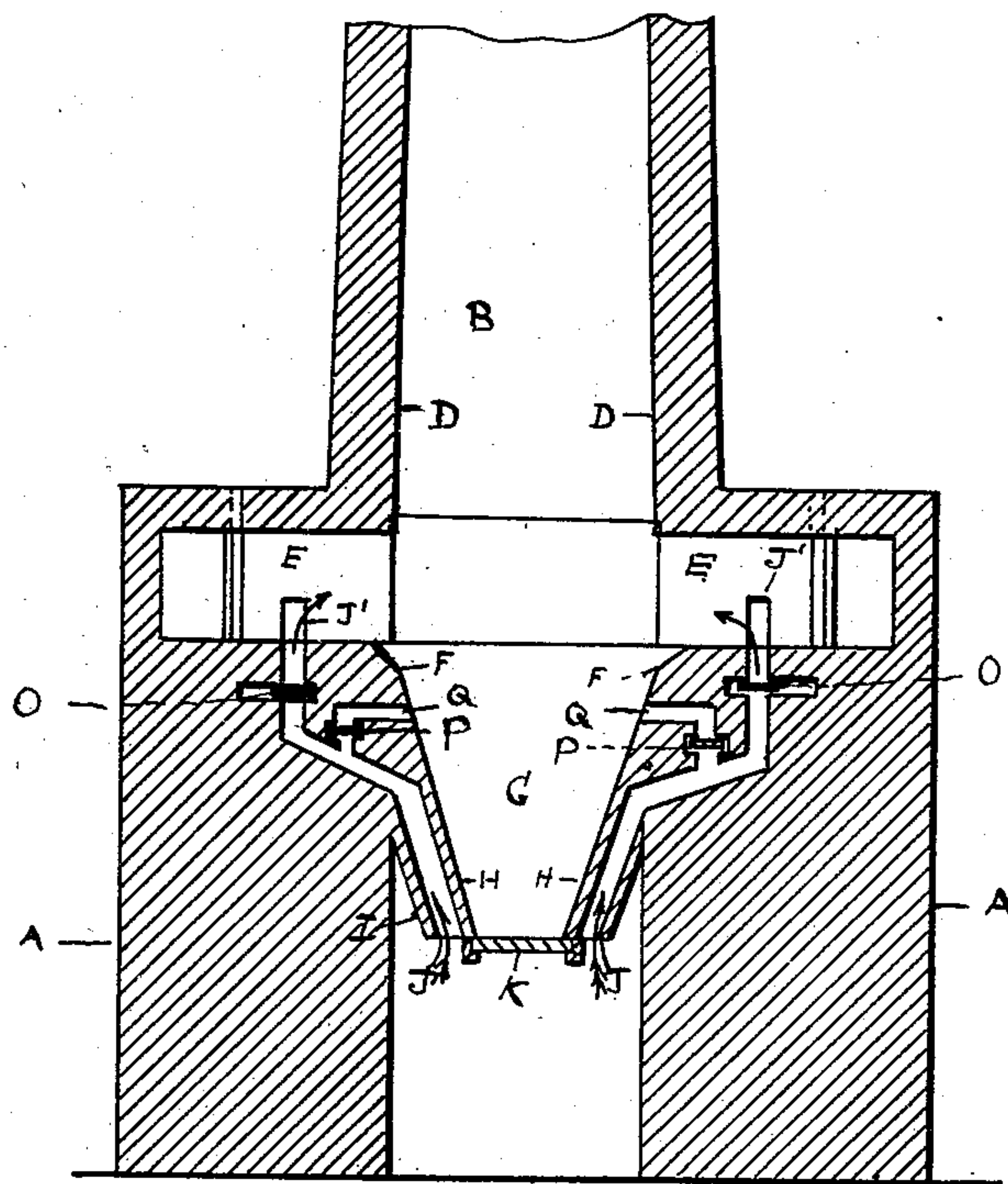


Fig. 3.

Witnesses.

Marion Richards.

Anna M. Cole.

Inventor.

Henry Ragot.

By Vernee + Clifford.

Attorneys.



# UNITED STATES PATENT OFFICE.

HENRY RAGOT, OF BRUNSWICK, MAINE, ASSIGNOR OF FIFTY-ONE ONE-HUNDREDTHS TO HERBERT L. SHEPHERD, OF ROCKPORT, MAINE.

## LIMEKILN.

SPECIFICATION forming part of Letters Patent No. 724,936, dated April 7, 1903.

Application filed June 30, 1902. Serial No. 113,698. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY RAGOT, a citizen of the United States, residing at Brunswick, in the county of Cumberland and State of  
5 Maine, have invented certain new and useful Improvements in Limekilns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which  
10 it appertains to make and use the same.

My invention relates to improvements in kilns for burning or roasting minerals and ores, and is especially adapted for the burning of lime-rock, cement-rock, barium, or  
15 roasting feldspar, fluor-spar, or smelting iron, copper, or other similar ores. Its object is to provide a long continuous heat, which when applied especially to lime-rock or cement-rock gives a better product and a greater  
20 quantity at a less expense than kilns that are now in use.

The invention consists of a suitable generator in which coal, sawdust, or other material can be used as a fuel for generating the gas,  
25 which is admitted by suitable passage-ways to an ignition-chamber, where the gas is ignited, and thence up through the stack of the kiln in which is placed lime-rock, cement-rock, or other material to be burned or roasted.

30 This invention also consists of a hopper or series of hoppers, as necessity requires, said hoppers consisting of an inner wall, an air-space, and an outer wall, said air-space extending into the ignition-chamber for the purpose of supplying warm air to aid in the ignition of the gases therein. The stack of the  
35 kiln is arranged in such a manner that the diameter at the top is less than the diameter just above the ignition-chamber, the object of this being to prevent the lime-rock or other material from arching in the stack. The portion of the stack below the ignition-chamber and immediately above the double-walled  
40 hopper is cut away, so as to absolutely insure the delivery and discharge of the burned lime-rock into the discharge-hopper without causing the same to work its way into the ignition-chamber, and therefore interfere with the complete ignition of the gases therein.

50 It also consists of certain other details of

construction, which will be hereinafter more fully described.

In the drawings herewith accompanying and forming a part of this application, Figure 1 is a plan view through the ignition-chamber. Fig. 2 is a horizontal section taken on  
55 lines X X of Fig. 1; and Fig. 3 is a horizontal vertical section taken on lines Y Y, Fig. 1.

Same letters of reference refer to like parts in all the figures.

In said drawings, A represents the base of the kiln, and B the stack; C, the opening for charging the kiln, the interior walls D of the kiln increasing in diameter downwardly to the ignition-chamber E.

E is the ignition-chamber, cut away at the bottom and provided with sloping sides F. The walls of the stack above the ignition-chamber overhang the said chamber, so as to assure the delivery of the burned material  
65 into the discharge-hopper without allowing the said material to lodge or spread out into the ignition-chamber and interfere with the complete ignition of the gases therein.

G is a discharge-hopper, which consists of an inner wall H and an outer wall I, with an air-space J between. Said air-space J is provided with a plurality of openings, one of said openings, J', opening direct into the ignition-chamber, the other one, Q, extending at  
75 an angle from said air-vent and opening into the hopper just below the ignition-chamber, the purposes of which will hereinafter be more fully described. Said discharge-hopper is also provided with a bottom piece K for the  
85 purpose of removing the burned lime or cement-rock when discharged, the bottom K being less in diameter than the whole diameter of the hopper, so as not to cover the space between the outer and inner linings of said  
90 hopper, the purpose of this being not to close the air-passages, which serve the double purpose of supplying air both to the ignition-chamber and to the stack and as a conveyer for the dust, which is a necessary attendant  
95 whenever the quicklime is drawn from the kiln.

L is the generator, provided with an opening M in the top for the purpose of charging the same.



N represents valves or partitions for separating the different ignition-chambers, it sometimes being necessary to use a less number of said chambers than are contained in the whole kiln.

O is a valve operated in any suitable manner for regulating the amount of air that may be allowed to go into the ignition-chamber. P is another valve to regulate the amount of air that may be discharged through the burned lime up into the stack of the kiln.

The operation of my improved device is as follows: The stack is filled from the top with the material to be burned or roasted as far down as the roof of the ignition-chamber, the space from the roof of the ignition-chamber to the hopper being filled with waste materials of sufficient quantity to keep the material to be burned or roasted in position just above the roof of the said ignition-chamber. It will be evident that this placing of waste material is only done when the kiln is first started, for after the kiln has been in operation the burned product takes the place thereof, the waste material being put in at first simply to keep the material to be burned in its proper position in the stack. A fire is started in the generator and continued until the walls thereof become exceedingly hot. Then coal or other gas-producing material is admitted thereto through the opening M in the top thereof, and the generation of gas is commenced. From the fact that the walls of the generator are exceedingly warm the gas is ignited as it passes therefrom into the ignition-chamber. In order that the ignition therein may be perfect and that a long-continued blaze may be the result and that all the products of combustion may be consumed rather than pass off through the stack of the kiln in the shape of smoke, air is admitted to said ignition-chamber through the air-space J from the bottom of the hopper. It has also been found necessary from experience that lime-rock, especially when being burned, requires a long continuous blaze rather than an intense heat—a blaze somewhat the same as is caused by the burning of wood. In order to accomplish this and to produce such a blaze, the air is conducted through the angular pipe Q and is allowed to go up through the mass of either the burned lime or the lime-rock and add additional oxygen to the flame, giving thereto more perfect combustion and a more perfect blaze. After the kiln has been started and the burned lime has reached the discharge-hopper it is evident that the surface of said hopper then becomes quite hot from the heat given off by the lime. This surface, therefore, is a means for warming the current of air which goes up through the space between the inner and outer wall of said hopper into the ignition-chamber, and consequently serves to make the ignition more perfect in the chamber. The air-space surrounding said hopper also serves the purpose of cooling the quicklime and making it

more convenient and easier to handle by the men when said hopper is about to be emptied into the cars for transportation and packing. The amount of air required to give proper ignition to the generated gases in the ignition-chamber is not always a constant quantity, and for that reason I provide the air-vents J with valves, which can be operated in any suitable manner so as to allow of the proper admission of air. Also the air-vents Q are provided with valves in order that the proper amount of heated air may be allowed to pass up into the stack and assist in the more perfect burning of the lime-rock or other material in the kiln.

In many kilns as now constructed the opening in the kiln is not continuous. This interferes materially with the working of the kiln and causes the lime-rock to arch and cling to the sides, destroying the efficacy of the kiln and at the same time necessitating the frequent cleaning thereof, with the attendant loss of the use of the kiln necessitated by the stoppage of work until the defect is removed. This kiln is a continuous one, for the material to be burned can be continually put in the charging-opening and the finished product removed from the discharge-hopper without interfering at all with its working. It also possesses this additional advantage—namely, that the material can be burned without mixing the same with combustible materials. This results in a cleaner product and obviates the loss of much combustible material which in kilns as usually constructed goes off in the form of smoke.

Having thus described my invention and its use, I claim—

1. In a kiln, a generator, an ignition-chamber connected therewith, a stack leading from said ignition-chamber, the interior diameter of said stack increasing from the top to the roof of the ignition-chamber, and a discharge-hopper with a removable bottom situated beneath said ignition-chamber with an air-space completely surrounding said hopper and in constant communication with the outer air and conduits leading from said air-space into the top of said hopper and also into said ignition-chamber.

2. In a kiln, a generator, an ignition-chamber connected therewith, a stack leading from said ignition-chamber, the lower end of said stack overhanging the ignition-chamber, and a discharge-hopper situated below said ignition-chamber, said hopper consisting of two walls, an air-space therebetween, a removable closure at the bottom, said closure being of sufficient size to close the opening in the lower end of the hopper but not of sufficient size to cover the air-spaces between the walls thereof.

3. In a limekiln, generators, ignition-chambers and a stack, the interior diameter of said stack increasing from the top thereof to the roof of the ignition-chamber, a plurality of double-jacketed hoppers beneath



said ignition-chamber and having air-spaces between the jackets thereof, means for conducting air from said spaces into the ignition-chamber and body of the kiln, means for regulating the amount of air going through said spaces and means for separating the various ignition-chambers.

4. In a kiln, in combination, a series of generators, a series of ignition-chambers connecting with a stack, the interior diameter of which increases from the top to the roof of the ignition-chambers, means for cutting out one or more of said ignition-chambers, a series of hoppers beneath said ignition-chambers, said hoppers consisting of double walls

with an air-space between, a closure for the bottom of said hopper, said closure being of less diameter than the hopper, conduits connecting said air-space with the ignition-chamber and body of the kiln and means for regulating the quantity of air passing through said conduits.

In testimony whereof I affix my signature, in presence of two witnesses, this 21st day of June, 1902.

HENRY RAGOT.

In presence of—

LOUIS THIBAUT,  
J. AUGUSTE MARTIN.