

(No Model.)

G. A. MACE.
LIMEKILN.

No. 509,439.

Patented Nov. 28, 1893.

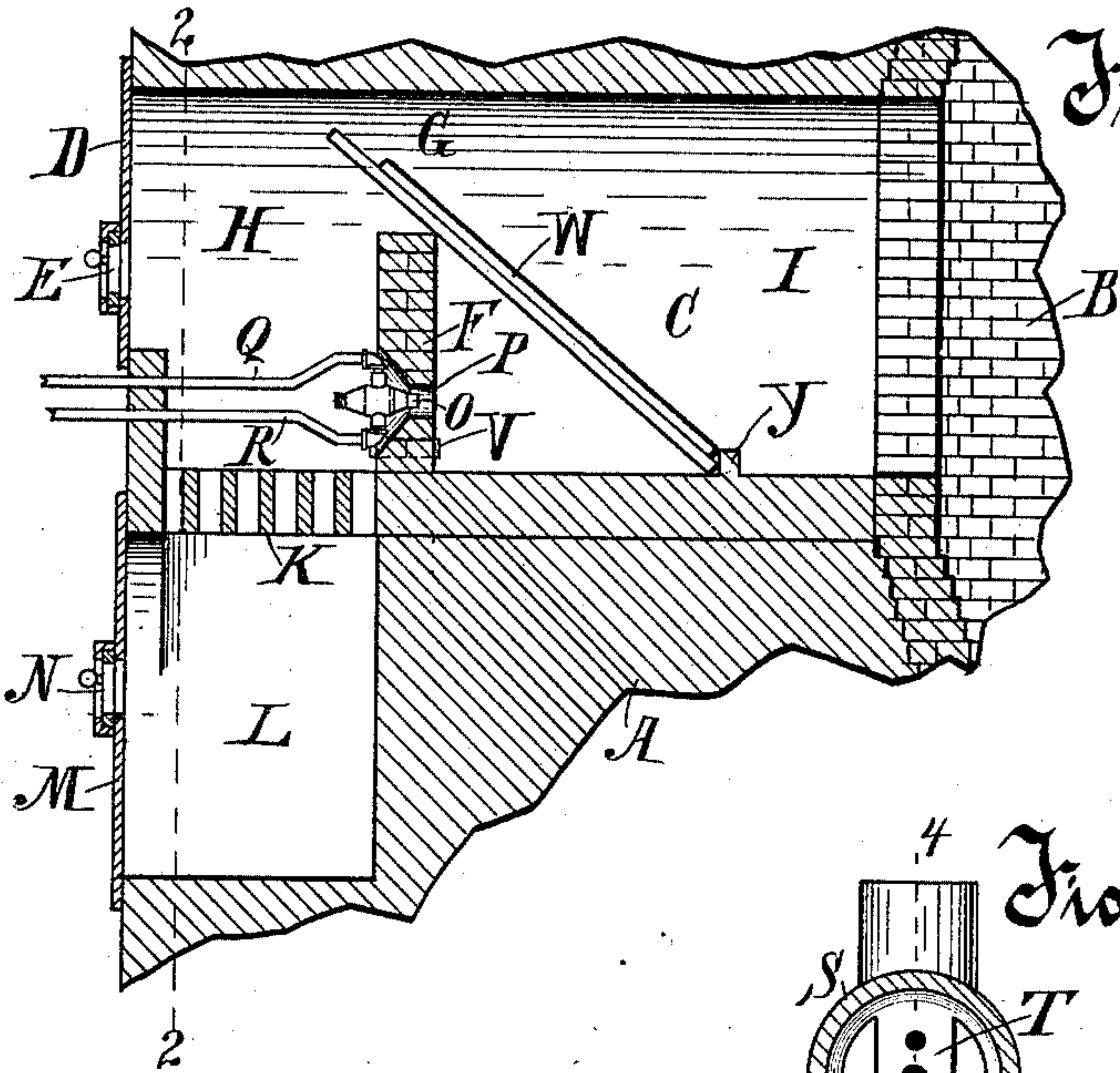


Fig. 1.

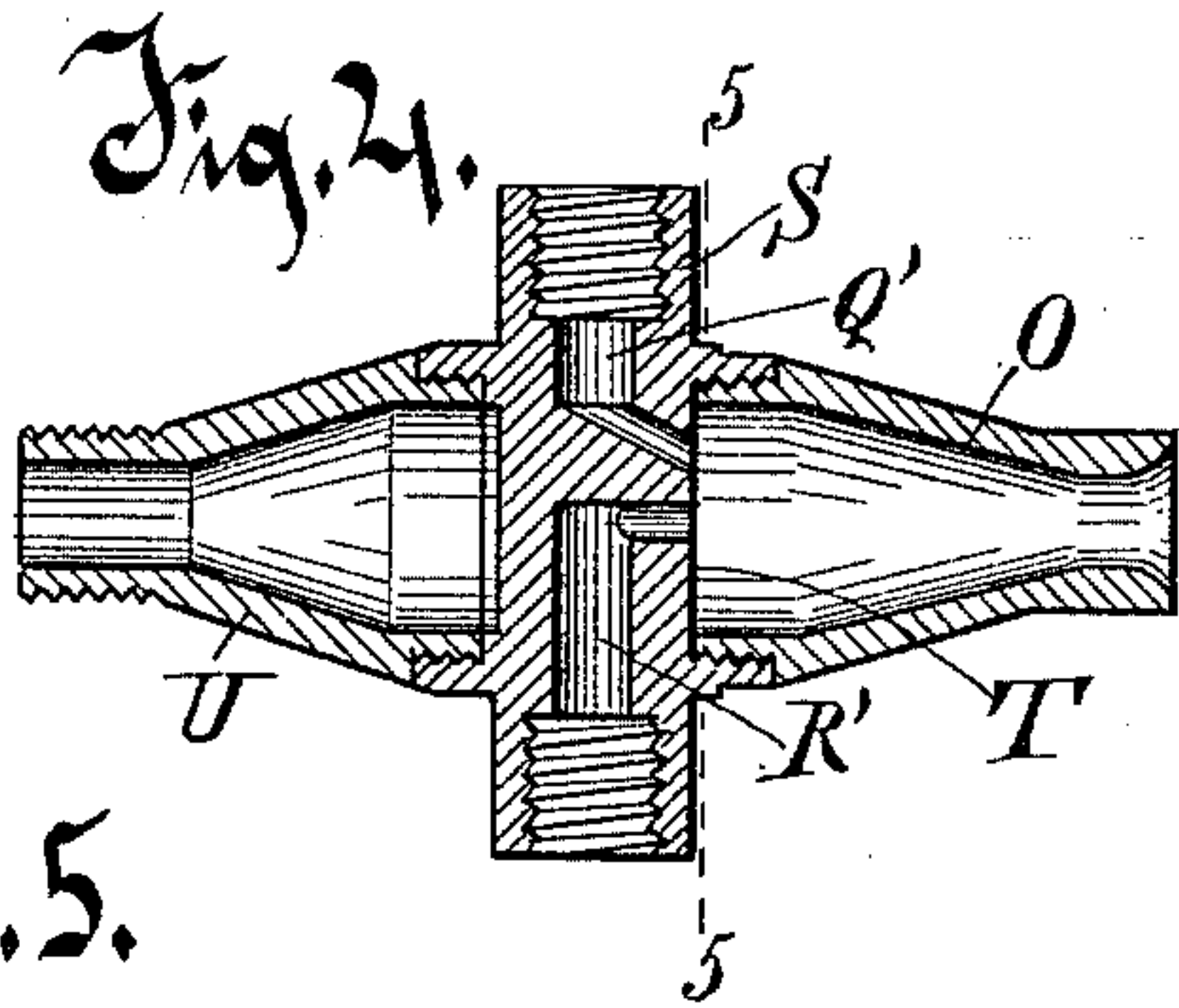


Fig. 4.

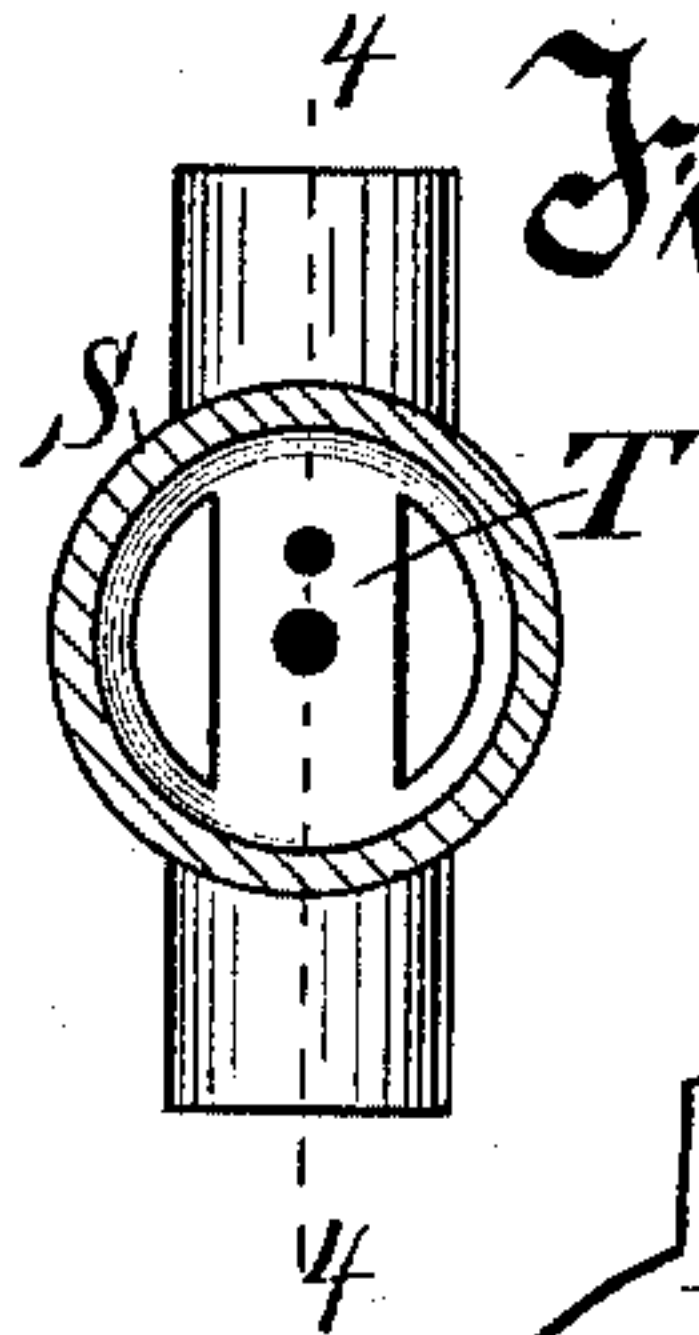


Fig. 5.

Fig. 2.

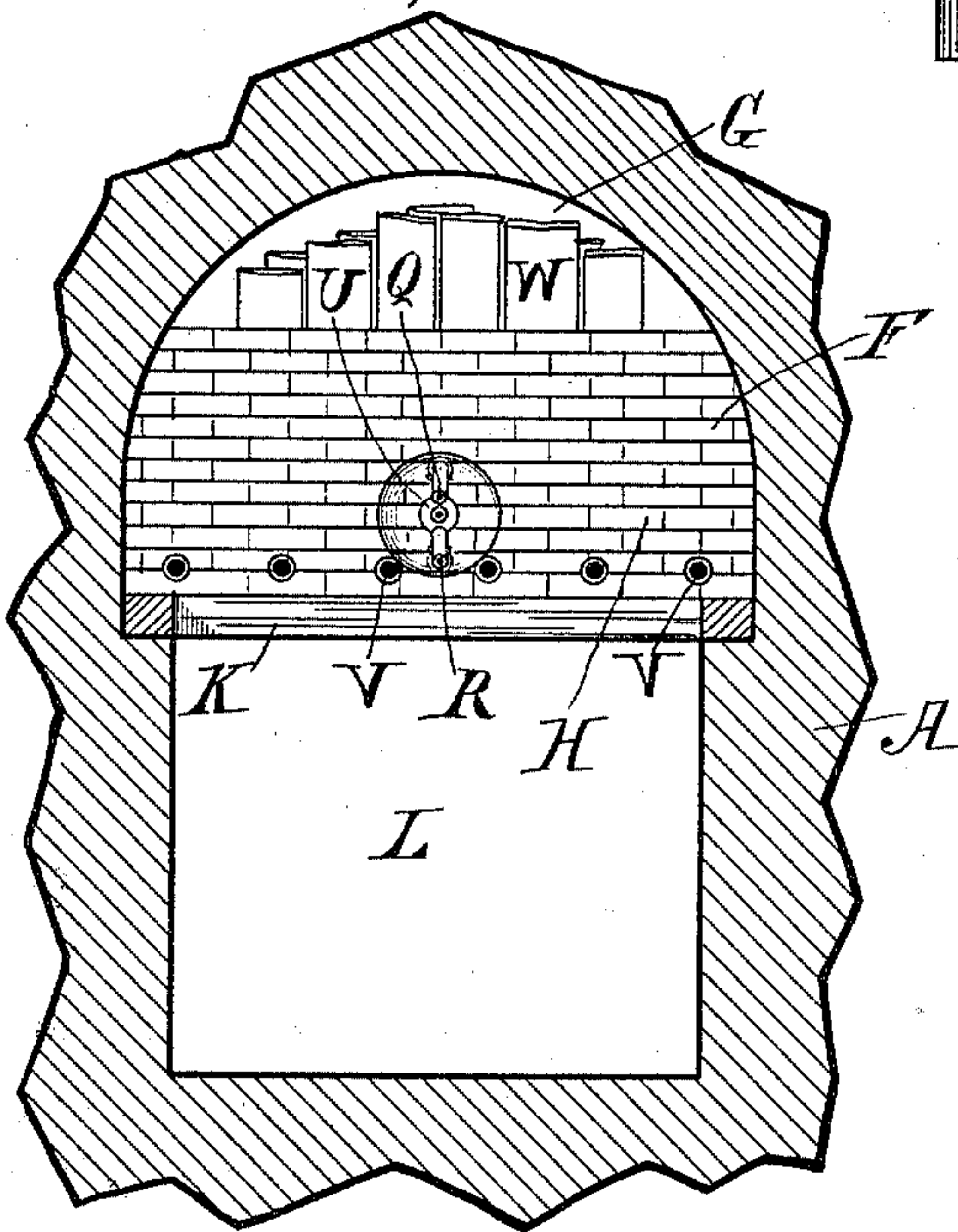
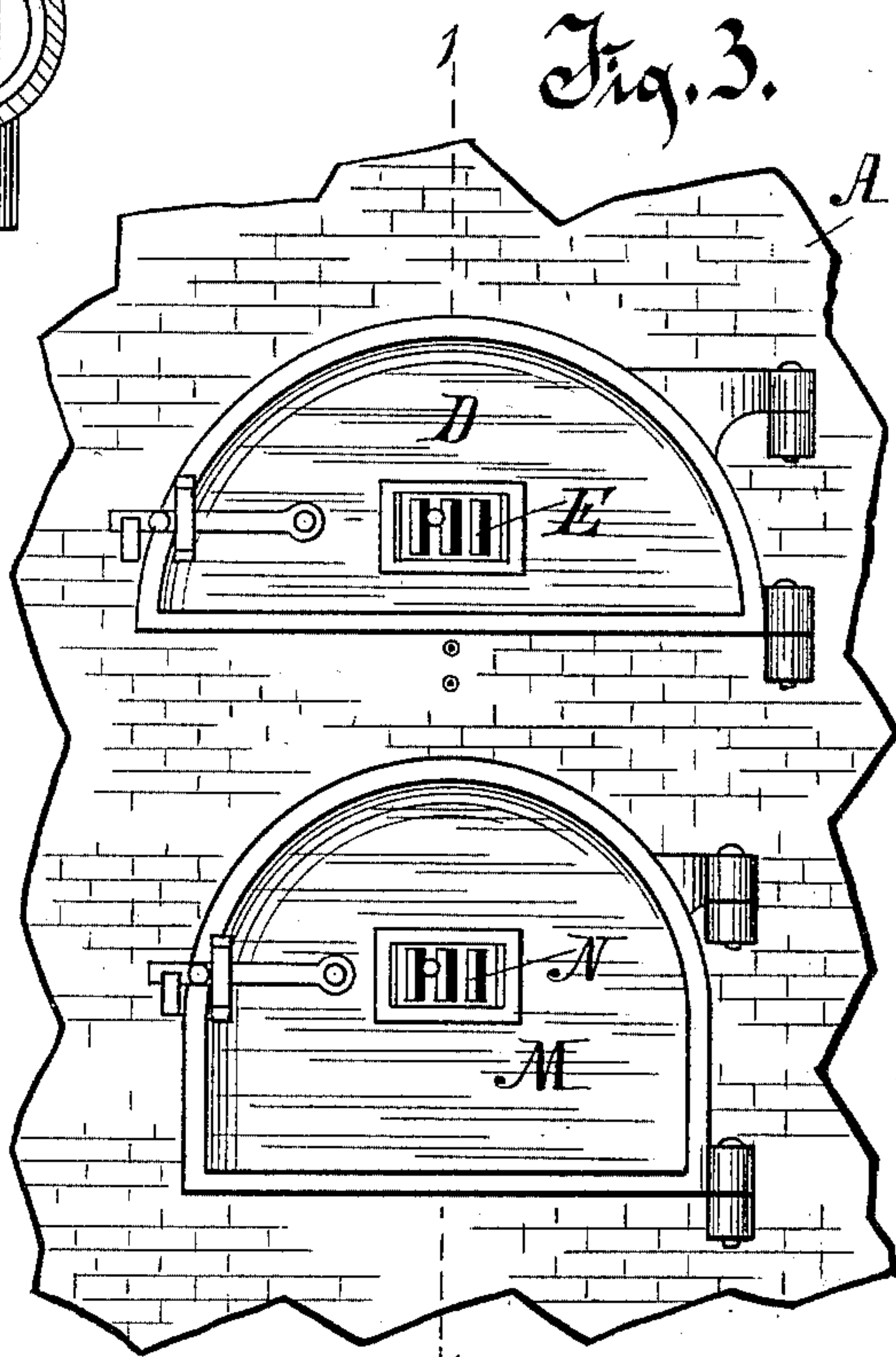


Fig. 3.



Witnesses.

W. H. Keeney,
Anna V. Faust.

Inventor.

Garvin D. Mace
By Benedict Morell
Attorneys.

UNITED STATES PATENT OFFICE.

GARWIN A. MACE, OF MENOMONEE FALLS, WISCONSIN.

LIMEKILN.

SPECIFICATION forming part of Letters Patent No. 509,439, dated November 28, 1893.

Application filed November 19, 1892. Serial No. 452,481. (No model.)

To all whom it may concern:

Be it known that I, GARWIN A. MACE, of Menomonee Falls, in the county of Waukesha and State of Wisconsin, have invented a new and useful Improvement in Limekilns, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention consists of the improved lime kiln and parts thereof as hereinafter described and claimed, or their equivalents.

In the drawings, Figure 1, is a vertical section of a fragment of the wall of a kiln in which my improved devices are shown. The section is on line 1—1 of Fig. 3. Fig. 2, is a vertical section taken on line 2—2 of Fig. 1, looking toward the right. Fig. 3, is a front elevation of the fragment of a wall of a lime kiln shown in section in Fig. 1. Fig. 4, is a central, longitudinal section of the nozzle and device for supplying liquid or gaseous combustible material and air, compressed and in normal condition, to the furnace. The section is on line 4—4 of Fig. 5. Fig. 5, is an elevation and section on line 5—5 of Fig. 4, looking toward the left.

A is the wall of a lime kiln constructed about and forming the chamber B in which the stone or other form of carbonate of lime is placed for calcining it. The chamber B is usually of considerable size and is adapted to receive a large supply of material usually from the top, it being renewed from time to time as the material is reduced to lime and removed from the chamber at or near the bottom of the kiln.

The fire place or furnace C is formed in the wall A and extends from the outside of the wall to the chamber B into which it opens, whereby the combustion that is initiated in the furnace is continued and carried on in the chamber B, among and acting on the material therein. Usually there are several furnaces substantially duplicates of the furnace C, located in the wall A radiating from and opening into the chamber B. The outer end of the furnace is closed by a hinged door D usually provided with apertures and a regulating closing slide E. A wall forming a screen F extends entirely across the chamber C and projects upwardly from its floor preferably somewhat more than half the height

of the furnace chamber separating the furnace into an outer compartment H and an inner compartment I communicating with each other by the open passage G above the screen F. An air chamber L in the wall A below the compartment H communicates therewith through the grate K which forms the floor of the compartment H. The chamber L is closed by the hinged door M provided with apertures regulated and closed by the slide N.

In my improved lime kiln I use a liquid or gaseous fuel in connection with compressed air and air in normal condition, and for this purpose I preferably employ the following devices. A tubular nozzle O is located in and so as to discharge through an aperture P in the screen F into the compartment I of the furnace. This nozzle is fed with oil or other liquid or gaseous fuel through the pipe Q which leads from a supply thereof into the nozzle near its discharging orifice, and the nozzle is also fed with compressed air through the pipe R leading from a supply thereof and discharging into the nozzle in such manner that the oil or other liquid or gaseous fuel will be commingled with the compressed air and discharged therewith from the nozzle into the combustion chamber or compartment of the furnace. To accomplish this concurrent and commingling discharge of the liquid or gaseous fuel and the compressed air into the nozzle O, I provide the collar or union coupling S turning on to the nozzle O and having ducts Q' and R', formed in the coupling and in the transverse bar T therein. The pipes Q and R are respectively joined to the coupling S in such manner as to be continuous with the ducts Q' and R'. For satisfactorily discharging a liquid fuel into the nozzle O the duct Q' is arranged to discharge into the nozzle directly above the discharge of the duct R' so that the stream or supply of oil will by gravity fall in the chamber of the nozzle into the stream of compressed air being discharged therein, and will be thereby more thoroughly and effectually diffused and commingled with the compressed air. For venting and giving the nozzle O the maximum freedom of action, the nozzle is preferably provided with an aperture at the rear, conveniently formed by a reduced or funnel shaped partial cap U. The air admitted to

this cap at its rear extremity can pass through the collar S at the sides of the bar T into the chamber of the nozzle O. This partial or ventilating cap U may be closed entirely by a
 5 tight cap or cover turned on its end which is screw threaded for that purpose, should it be found desirable to do so in using gaseous fuel.

Draft flues V V are provided through the screen F to permit of the passage of air from the
 10 compartment H to the compartment I near its floor to such extent as is necessary to insure perfect combustion. The supply of air in normal condition to the combustion chamber I is regulated by the slides N and E or even
 15 by opening the door M for that purpose if found necessary or desirable.

Where unseasoned wood in slabs or any other form is available for fuel, it can be used with great advantage to increase the combustion in the furnaces. In the drawings green
 20 slabs W are shown in the furnace for this purpose. They are inserted through the door D over the screen F on which they rest at one end into the compartment I. A foot or stop
 25 Y raised transversely of the furnace on its floor is adapted to receive the lower extremities of the slabs and prevent their sliding off the screen F and falling flat on the floor of the furnace. In this manner the slabs are
 30 supported in position to burn freely in connection with the liquid or gaseous fuel and compressed air discharged below them, and in full combustion in the chamber. The sources of supplies of liquid or gaseous fuel and compressed air are not shown but may be arranged at any convenient place for properly
 35 supplying them through the pipes Q and R respectively.

No detailed description of the process or
 40 result of the combustion in the furnace of the liquid or gaseous fuel commingled with compressed air and air in normal condition, will be necessary in view of the foregoing description of the devices for accomplishing it, but
 45 it is proper to add that an intense heat is required in a lime kiln and it is exceedingly desirable to obtain the requisite combustion therefor with the minimum of labor, expense and care, and this it is believed is secured by
 50 these devices in the manner described.

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

1. In a lime kiln furnace, the combination with a furnace chamber in the wall of the
 55 kiln, and a transverse screen wall dividing the furnace chamber partially into an outer or hot air compartment and an inner or combustion compartment, of a nozzle having a chamber, which nozzle is located in and dis-
 60 charges through the screen wall into the com-

bustion compartment and is provided with an opening rearwardly into the hot air compartment, a pipe for liquid or gaseous fuel leading to and discharging into the chamber
 65 of the nozzle, and a pipe for compressed air leading to and discharging into the chamber of the nozzle near to the liquid or gaseous fuel-supply discharge and so that the fuel-supply and the compressed air will mingle in
 70 the air chamber of the nozzle and be discharged therefrom into the combustion compartment, substantially as described.

2. In a lime kiln furnace, the combination with a furnace chamber in the wall of the kiln, and a transverse screen wall dividing
 75 the furnace chamber partially into an outer or hot air compartment, and an inner or combustion compartment which wall has transverse apertures near its bottom from the outer to the inner compartment, of a nozzle having
 80 an air chamber, which nozzle is located in the screen wall above the transverse apertures and discharges through the screen wall into the combustion compartment and is provided with an opening rearwardly into the hot air
 85 compartment, a pipe for liquid or gaseous fuel leading to and discharging into the chamber of the nozzle and a pipe for compressed air leading and discharging into the chamber of the nozzle near to the liquid or gaseous fuel-
 90 supply discharge so that the fuel-supply mingles with the compressed air in the chamber and is discharged therefrom into the combustion compartment, substantially as described.

3. In a lime kiln furnace the combination
 95 with a furnace chamber in the wall of the kiln, a transverse screen wall dividing the furnace chamber partially into an outer or hot air compartment and an inner or combustion compartment which wall has transverse
 100 apertures near its bottom from the outer to the inner compartment, and an air chamber below having ducts or apertures to the hot air compartment, of a nozzle, which nozzle is located in the screen wall above the trans-
 105 verse apertures and discharges through the screen wall into the combustion compartment and is provided with an opening rearwardly into the hot air compartment, a pipe for liquid or gaseous fuel leading and discharging into
 110 the nozzle, and a pipe for compressed air leading and discharging into the nozzle near the liquid or gaseous fuel supply discharge, substantially as described.

In testimony whereof I affix my signature in
 115 presence of two witnesses.

GARWIN A. MACE.

Witnesses:

IRA B. ROWELL,
 W. T. CAMP.