

No. 635,647.

Patented Oct. 24, 1899.

L. O. BOEING.

KILN FOR BURNING FIRE BRICK, &c.

(Application filed July 2, 1897.)

(No Model.)

2 Sheets—Sheet 1.

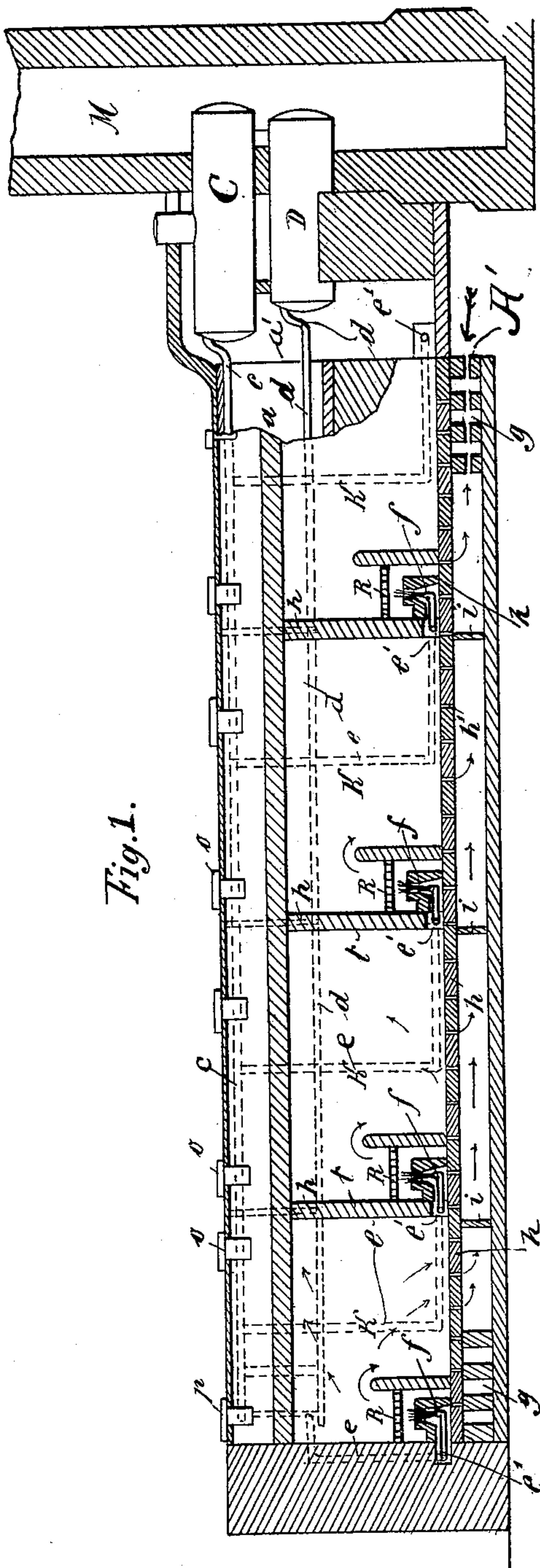


Fig. 1.

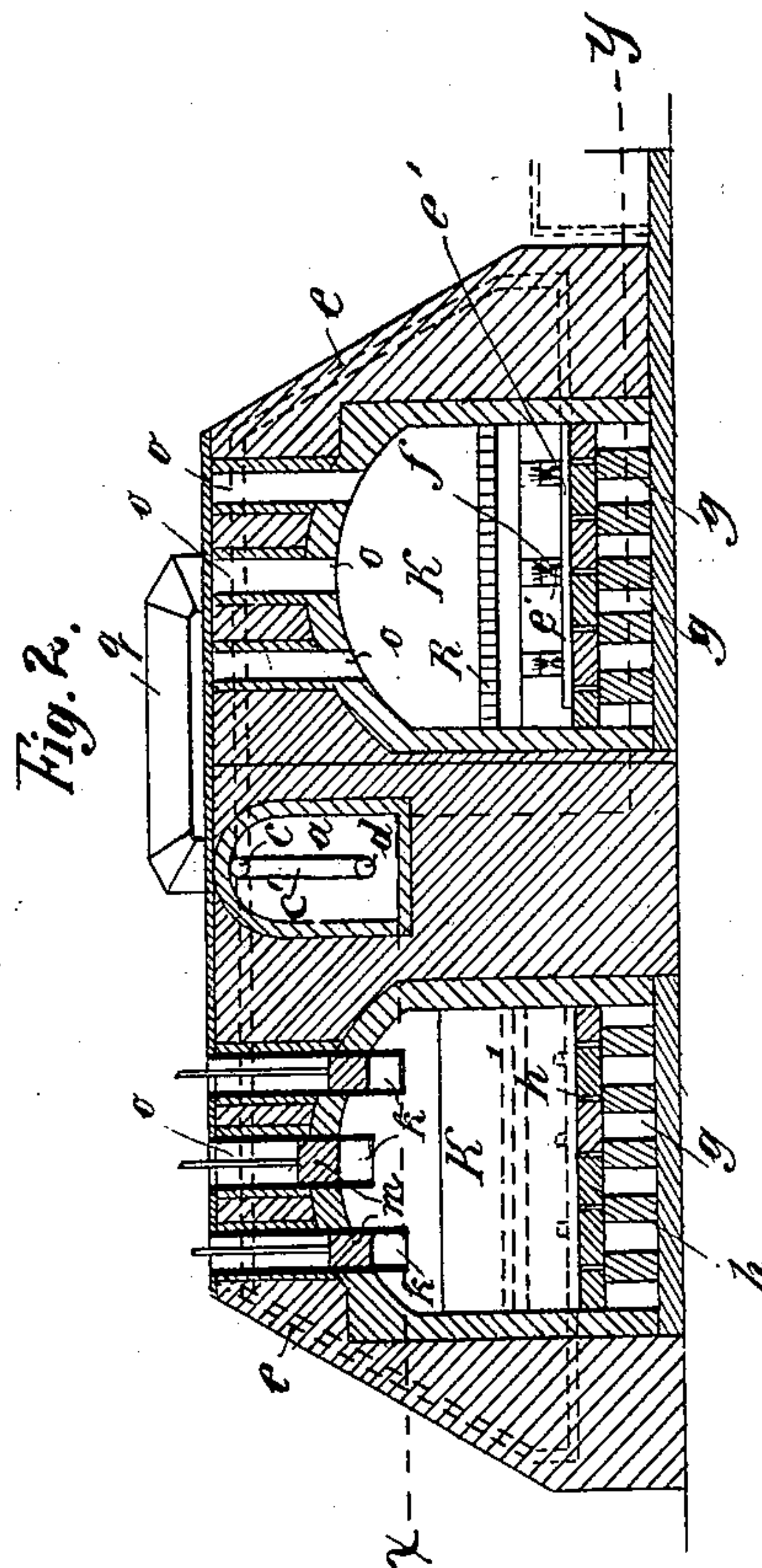


Fig. 2.

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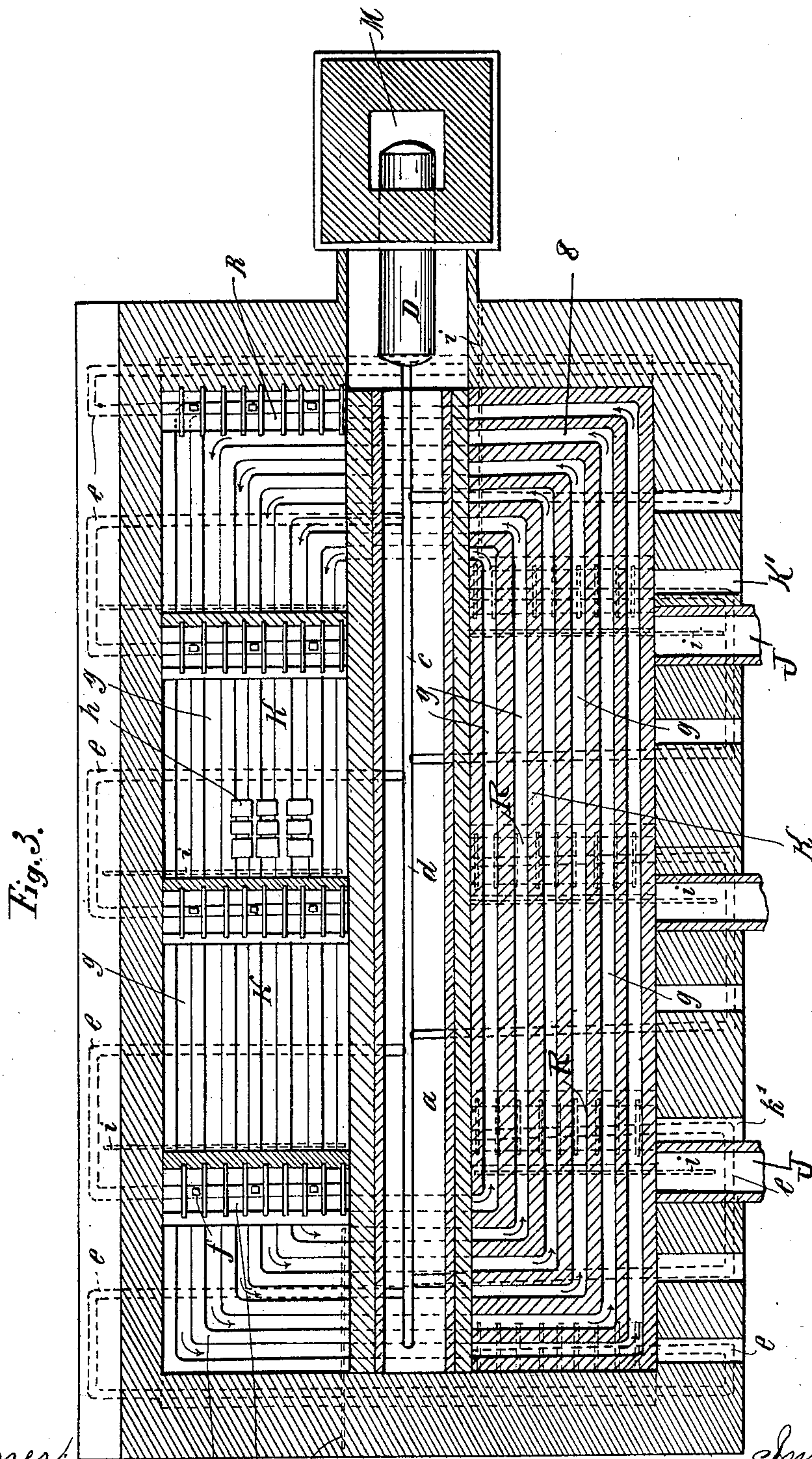
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Witnesses!

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Wm. Charles Sullivan.

Inventor:

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UNITED STATES PATENT OFFICE.

LEO OTTO BOEING, OF BAD NAUHEIM, GERMANY.

KILN FOR BURNING FIRE-BRICK, &c.

SPECIFICATION forming part of Letters Patent No. 635,647, dated October 24, 1899.

Application filed July 2, 1897. Serial No. 643,249. (No model.)

To all whom it may concern:

Be it known that I, LEO OTTO BOEING, of Bad Nauheim, in the Grand Duchy of Hesse and German Empire, have invented Improvements in Ring-Shaped Stoves or Stoves with Chambers for the Burning of Fire-Brick, Mosaic Plates, Cement, Chalk, Bricks, and the Like, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention is an improved oven or kiln of the type known in Germany as "*ring und kammer ofen*;" and it consists in the novel construction and combination of parts hereinafter described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 represents a longitudinal vertical section through the kiln to one side of the longitudinal center thereof. Fig. 2 is a transverse section thereof. Fig. 3 is a longitudinal horizontal section upon the line *x y* of Fig. 2.

As shown in the drawings, the kiln contains eight chambers or ovens *K*, arranged four on each side of an intermediate longitudinal smoke-flue *a*, which communicates at one end with an enlarged chamber *a'*, which in turn opens into the uptake *M*, and arranged within chamber *a* and the uptake are steam-boilers *C* and *D*, to which are respectively connected the steam-pipes *c* and *d*, which extend along the flue *a* and are connected at their rear end by pipes *c'*.

In each chamber *K* is a grate *R*, below which is a steam-jet *f*, that is supplied with steam through pipes *e*, which are connected to pipes *c* or *d*, and these pipes *e* are led through the walls of the kiln in such manner that the steam will be superheated before it escapes at the jets *f*. The superheating of the steam is effected by leading the tube *e*, with nozzle *f*, through the space through which the hottest gases of the finished chamber pass on the way to the under side of the grate of the next chamber.

Each chamber *K* communicates with adjoining chambers *K* by means of passages *e'* in the bottom of the division-walls *t* between the chambers, so that the heated gases in one chamber may be sucked into the next chamber beneath the grate and forced upward through the grates therein by means of the

jets *f*. In the top of the division-walls *t* between the chambers are passages *k*, which can be closed by valves *m*. (Indicated in Fig. 2.) When these passages are open, obviously, the products of combustion can pass from one chamber into another above the grates.

Extending under the series of chambers *K* are the air-channels *g*. These channels extend in the direction of the normal draft and may receive air at any suitable point, but preferably under the chamber *a'*, as indicated by the arrow *A'* in Fig. 1. These open channels *g* are covered, however, by a layer of fire-bricks *h*, which form the bottoms of the several chambers, and the bricks are so arranged that small passages *h'* are left between them to permit the hot air and gases to circulate into and through the passages from and to the several chambers, and thus assist in supporting combustion in the kiln.

Below each partition-wall *t* is a slide-valve *i*, by which the air-channels can be closed under and at any chamber desired. These valves are of any suitable construction, so that the entire series of channels can be closed or opened by simply moving the valve the width of one channel. The channels *g* preferably communicate at each end of the kiln, as indicated in the drawings, so that the air and gases can circulate therethrough under the entire series of chambers.

It will be obvious from the foregoing description that, if desired, each chamber may be fired separately, or the products of combustion can be passed successively through two or more of the chambers, and thus the greatest heating effect realized, and by closing the passages *k* the products of combustion can be compelled to descend and pass through openings *e* or through passages *h'* into channels *g*, or by openings in passages *k* the products of combustion can pass along from one chamber to the next above the grate.

Access can be had to the several chambers through the openings *J* and to the ash-pits through openings *K'*, if desired. In practice these openings are usually bricked up when the kiln-chambers are fired.

Fuel can be fed through the openings *o* above the grate.

It will be observed that the grates extend entirely across the width of the chambers,

and the superheated air and steam produced by the heat of the waste gases or products of combustion can be introduced beneath the grate, where they commingle and pass through the fuel thereon. A mixture of hydrogen and carbonic oxid is thereby produced, which burns with extreme heat and results in a great saving of fuel. Because of the numerous divisions of the gases of combustion and by means of strong drafts of air great heat is economically developed.

While, if desired, the several chambers K might each have a direct communication with the flue α , yet when in operation such communication should be closed and only the last chamber (indicated by 8, Fig. 3) communicate with the flue α by means of a pipe q , Fig. 2. This causes the products of combustion to circulate successively from the chamber 1 through all of the chambers successively to chamber 8.

The channels g are not intended solely for heating air, but are also utilized to conduct the products of combustion from one chamber to the other when the passages k are closed. Some of the heated gases generated in the chambers will then pass into and through the channels g , mixing with the air therein and rise through the openings h' into the succeeding chambers, thus successively heating them. If the channels are closed at the end of any chamber by means of valves i , the gases are compelled to rise up in the said chamber and escape thence through the openings k in the top of the partition t . By this arrangement of passages and valves hot gases can be caused to circulate through the chambers in the most advantageous manner to insure the proper treatment of the articles contained therein.

In Fig. 3 only a few of the bricks h are indicated, so as to avoid obscuring the channels.

A "ring and chamber oven" is a closed kiln having a number of separate chambers which are, however, connected together by channels and passages, so that the products of combustion can be made to circulate through all the chambers successively. One of the corner chambers k can, for example, be first put into action. The articles to be treated are placed on the bottom of this chamber, fuel placed upon the grate and ignited, after which the chamber is closed. The fire receives the necessary air from the neighboring chamber, which is connected with the grate by the channels e' . The grate covers the entire width of the chamber, so that the articles in the same are evenly treated by the hot gases. The channels g in the bottom of the chamber draw off the gases, which escape through the slots h' between the plates h . In the side walls t of the chambers openings are provided at the top, which can be closed by means of slides k . The channels in the bottom can be shut off by means of the slides i . According as the slides are opened or closed at the top or bottom the gases are con-

ducted in the one direction or the other from the grate R through the chamber and over the entire width of the same.

When one chamber has burned out and the next chamber, filled with articles to be treated, is to be put into action, the fire of said chamber is ignited and the chamber closed, the necessary air for the fire being taken from the previous already-burned-out chamber. This air is of course very hot and the steam issuing from the nozzle beneath the grate which produces the sucking action increases the heat still further, so that a mixture of hot air and steam is ejected from beneath the grate. The steam is produced in boilers heated by the gases of combustion of the kiln. The slides k and i between the burned-out chamber and that in action are closed, whereas the outlets k or i of the chamber itself are opened, which assures a regular passage either direct through the channels g or through the next chamber and by means of the tube q into the channel α , and finally into the flue. The action of the kiln is continued in this manner.

Having thus described my invention, what I therefore claim as new, and desire to secure by Letters Patent, is—

1. In a kiln, the combination of a series of separate chambers, grates in each chamber, a steam-jet below each grate, a boiler in the outlet of the kiln, for producing steam by waste products of combustion, and pipes for conducting steam from said boilers to the jets, and valved passages whereby communication between the successive chambers can be regulated, substantially as described.

2. In a kiln, the combination of a series of chambers and the channels underlying all of the chambers, but communicating therewith through openings in the floor of the chambers, with a grate in each chamber, a passage below the grate for connecting the chambers, and the steam-jet below the grate, for the purpose and substantially as described.

3. In a kiln, the combination of the opposite series of chambers, the continuous channels underlying all of said chambers, said channels being covered by layers of fire-bricks forming the bottoms of the chambers and leaving passages between the edges of the bricks whereby communication is had between the channels and several chambers, and a valve below each chamber whereby the air-passages may be closed at and under any one of the chambers, substantially as described.

4. In a kiln, the combination of a series of chambers separated by partitions having valved passages at their tops, and channels underlying all of the chambers, but communicating therewith through openings in the floors of the chambers; with a grate in each chamber, a passage below the grate for connecting the chambers, and a steam-jet below the grate, for the purpose and substantially as described.

5. In a kiln, the combination of the opposite series of chambers, the channels under said chambers, said channels being covered by layers of fire-bricks forming the bottoms of the chambers and leaving passages between the edges of the bricks whereby communication is had between the channels and the several chambers; with the grates in said chambers, and the valves below each chamber for closing said channels, simultaneously at and beneath any one of the chambers as desired, substantially as described.

6. In a kiln, the combination of the series of chambers, the grates therein, the steam-jets below the grates, the passages connecting one chamber with the space below the grate of the next chamber, and the valved passages in the partition-walls between the chambers; with pipes for conducting steam to the jets below the grates, the series of air-channels underlying the chambers, the fire-brick flooring above said channels, and the valves in said channels below the respective chambers, substantially as described.

7. In a kiln, the combination of the series of chambers, the grates therein extending across the width thereof, the steam-jets below the grates, the passages connecting one chamber with the space below the grate of the next chamber, the valved passages in the partition-walls between the chambers, the steam-boiler in the outlet-flue of the kiln heated by the products of combustion therein, and pipes for conducting steam from said boiler to the jets below the grates, said pipes being so arranged within the walls of the kiln as to be superheated, the series of parallel air-channels underlying all the chambers, and the fire-brick flooring above said channels, and the valves in said channels below the respective chambers, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

LEO OTTO BOEING.

Witnesses:

JEAN GRUND,
ADOLF ALTMANN.