

(No Model.)

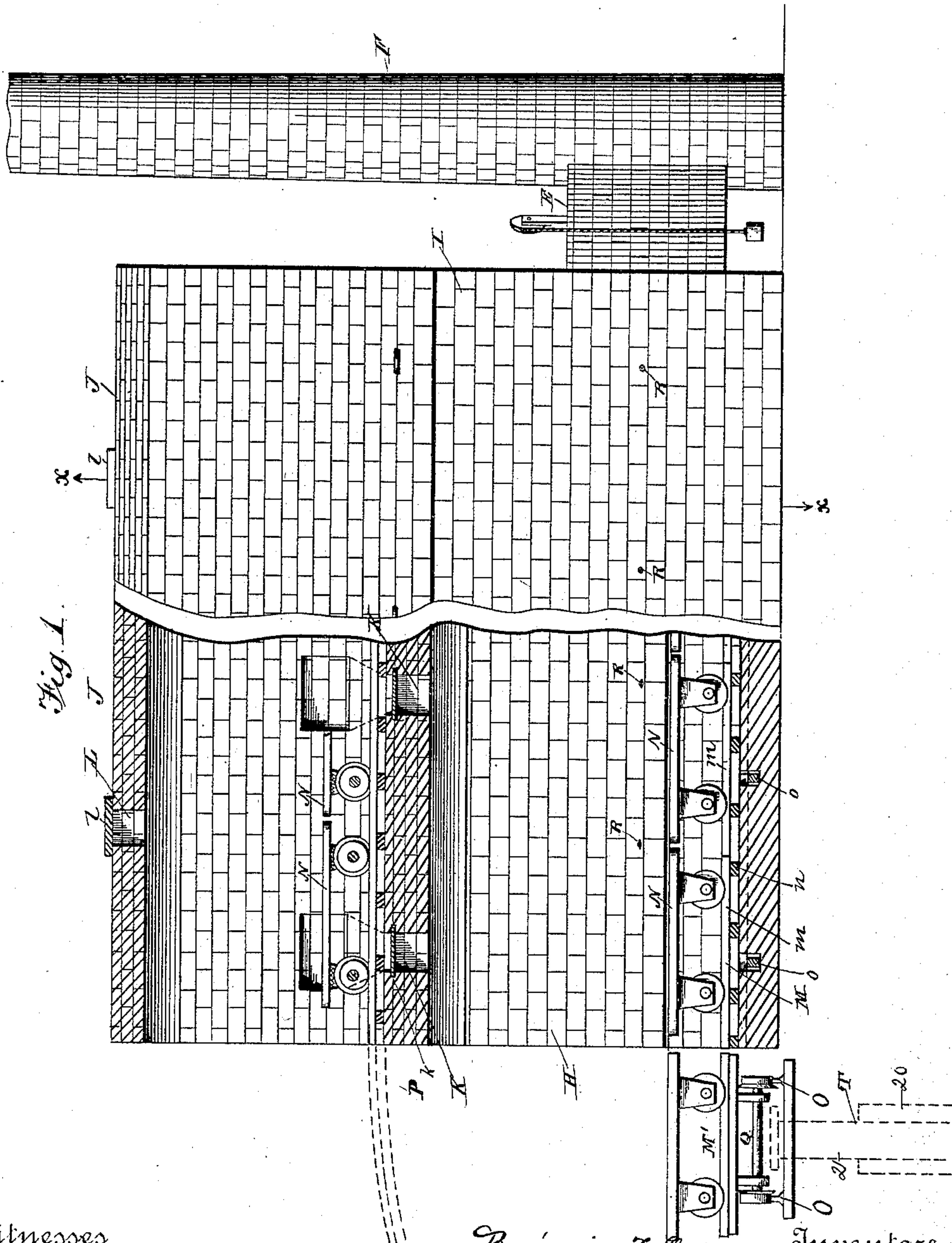
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B. F. SHAKESPEARE & S. J. ROSE.

BRICK KILN.

No. 397,665.

Patented Feb. 12, 1889.



Witnesses

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Fig. 3

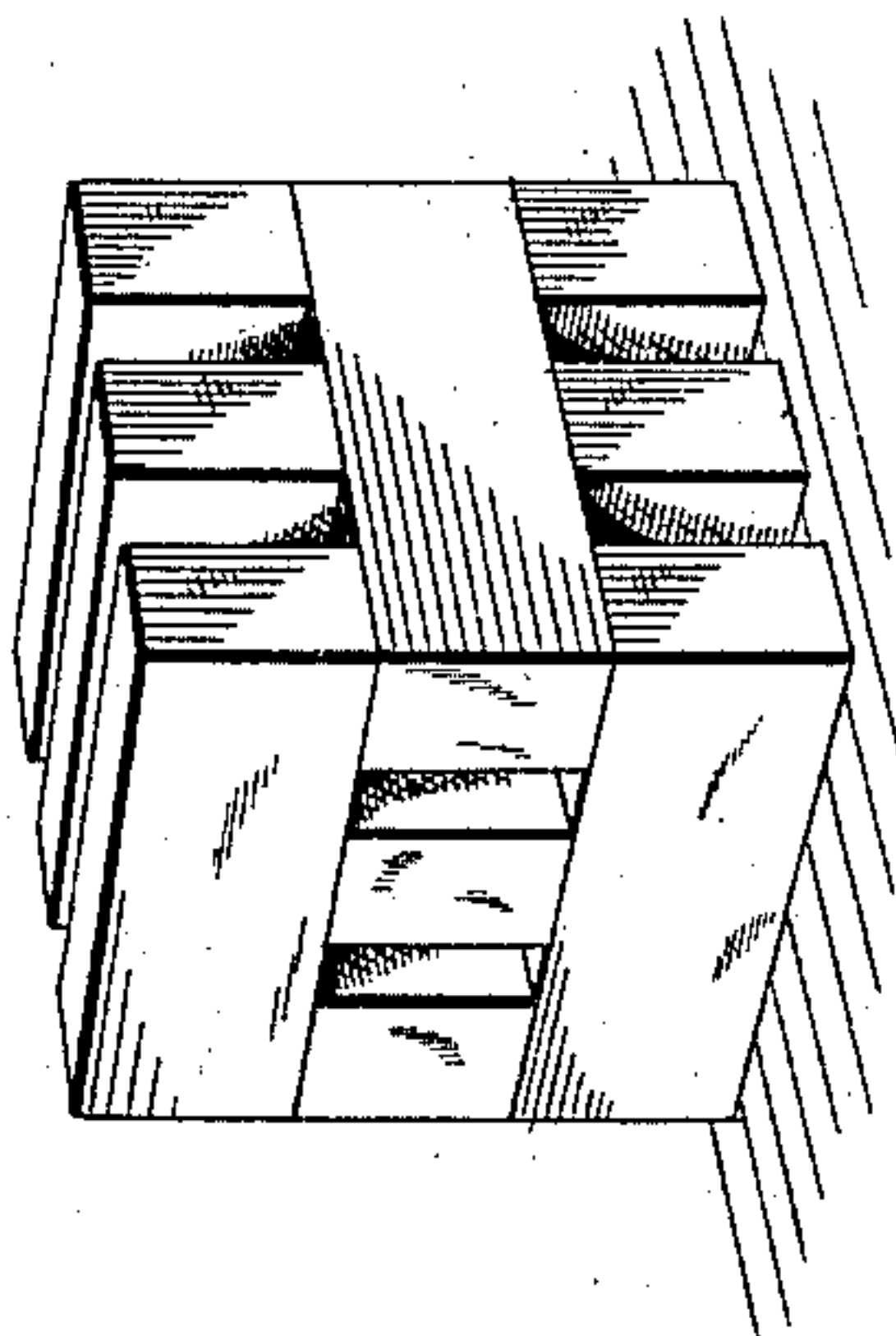


Fig. 4.

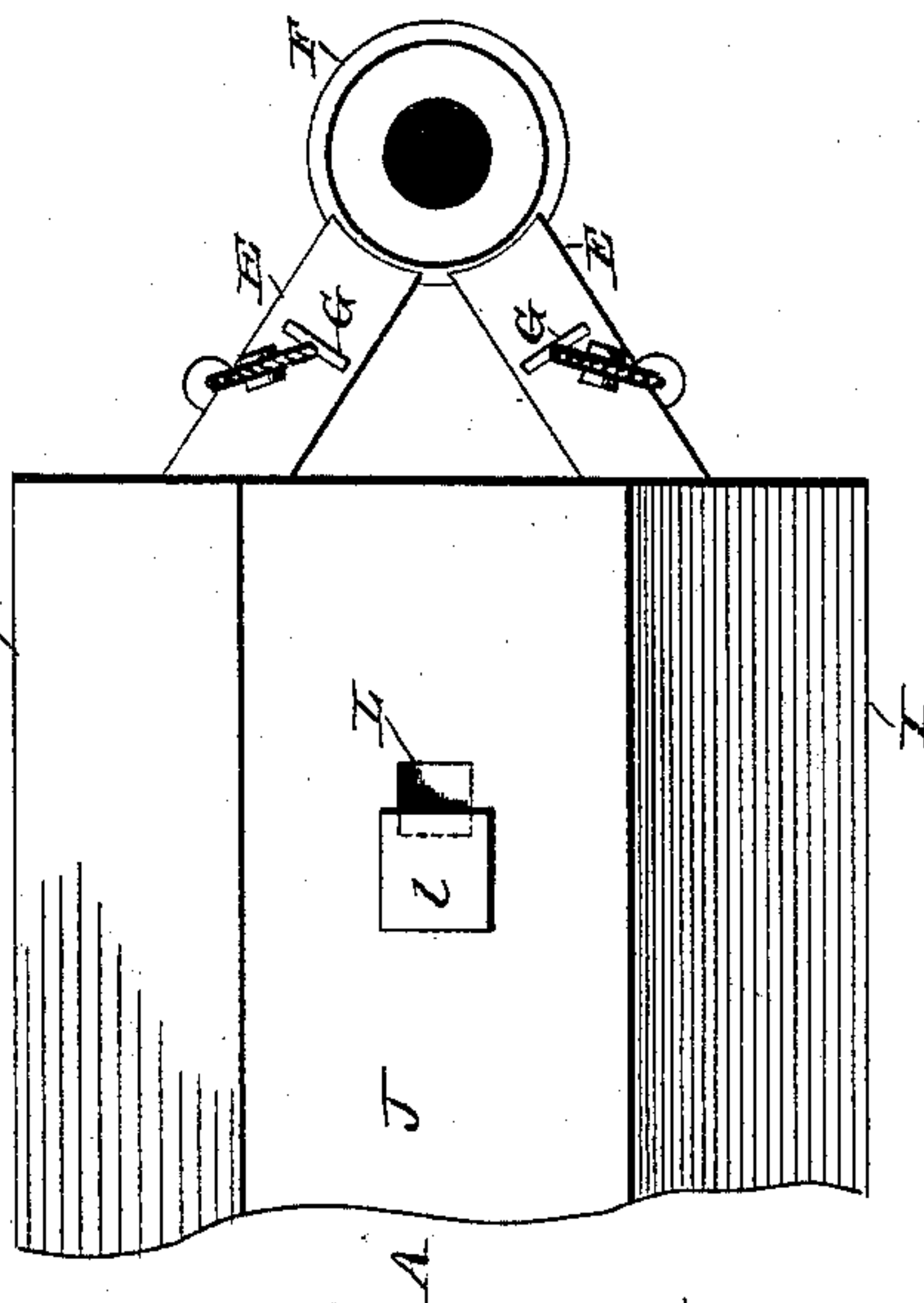
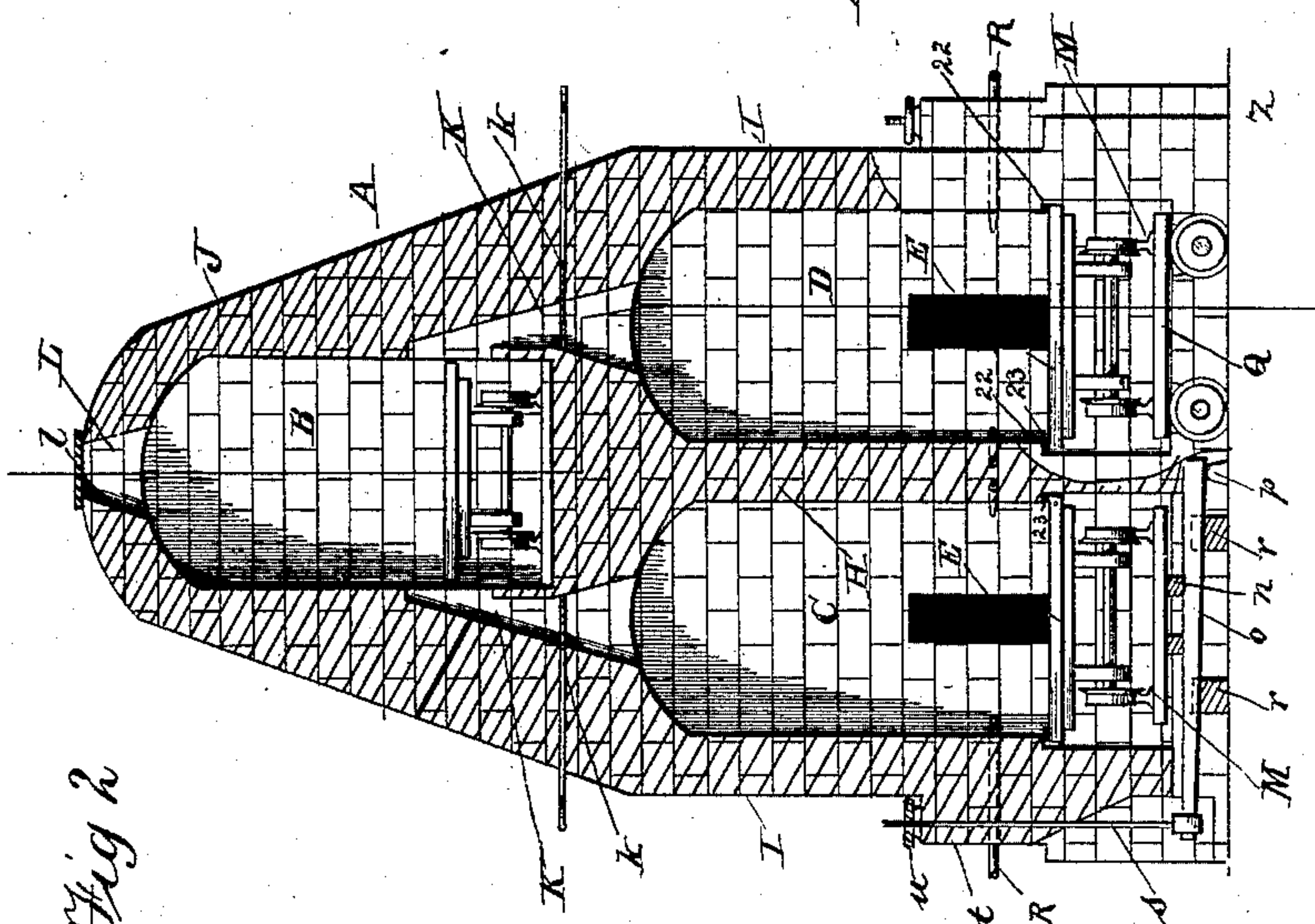


Fig. 2



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UNITED STATES PATENT OFFICE.

BENJAMIN F. SHAKESPEARE AND SAMUEL J. ROSE, OF CHESTER, PENNSYLVANIA; SAID ROSE ASSIGNOR TO SAID SHAKESPEARE.

BRICK-KILN.

SPECIFICATION forming part of Letters Patent No. 397,665, dated February 12, 1889.

Application filed April 19, 1887. Serial No. 235,395. (No model.)

To all whom it may concern:

Be it known that we, BENJAMIN F. SHAKESPEARE and SAMUEL J. ROSE, citizens of the United States, and residents of Chester, Delaware county, Pennsylvania, have invented certain new and useful Improvements in Brick-Kilns and the Process of Drying and Burning Brick, of which the following is a specification.

10 This invention relates to an improved method of and furnaces for drying and burning brick, otherwise commonly known as "brick-kilns," its object being, among other things, to provide a kiln that will greatly facilitate the burning of the brick, that will
15 burn all the brick equally, so that they will be of uniform color, and to provide a kiln wherein provision is made by which a continuous and economical process of drying and burning brick may be practiced, and in
20 which the heat from the burned brick may be employed for expelling the moisture from or drying green brick.

As a more ready understanding of the present improvements may be had by a description of the improved method and a brick-kiln in which the method may be practiced, all preliminary reference thereto will be omitted, and such description will now be
30 given in connection with the accompanying drawings, in which—

Figure 1 is an elevation of the brick-kiln, partly in section. Fig. 2 is a vertical cross-section of the same, taken on the line *xx* of
35 Fig. 1. Fig. 3 is a perspective view of a pile of bricks, hereinafter referred to; and Fig. 4 is a plan view of one end of the kiln.

Referring to said drawings, it is to be understood that the improved kiln A consists of
40 a brick structure having side walls, I, resting upon a suitable foundation, Z, and a roof, J, that provides a drying-chamber, B, and two burning-chambers, C D. These chambers are of substantially the same size and of such dimensions as to capacitate the kiln to dry,
45 burn, and cool a large quantity of brick at one and the same time. One end of each of the burning-chambers C D terminates in a flue, E, that communicates with a smoke-stack, F, common to both flues, each of which
50 is provided with a damper, G, for controlling

the draft through said chambers into the stack. The other end of these chambers, and preferably one end of the drying-chamber B, are each provided with suitable doors, (not shown,) through which the chambers are charged and discharged of the brick being dried and burned. As herein shown, these burning-chambers are arranged side by side in the same horizontal plane and separated
60 from each other by a vertical wall, H, that also rests upon a suitable foundation, Z, and which extends the entire length of the kiln, and forms a convenient support for the bottom of the drying-chamber B. This drying-chamber is preferably arranged over the
65 burning-chambers C D, so that the heat from said burning-chambers may be economically utilized for expelling the moisture from or drying the green or freshly-molded brick with
70 which this chamber is charged preparatory to being burned, as will hereinafter fully appear.

The roof of each of the burning-chambers C D is provided at suitable intervals with passages K, that open into the drying-chamber B
75 in its opposite sides in such manner that the heat from said burning-chambers is properly directed upon the green brick placed therein. These heat-passages are each provided with
80 suitable dampers, *k*, that are operated by handles projecting to the exterior of the kiln structure. The roof J of the kiln is also provided with passages L, extending from the
85 drying-chamber to the open air, so as to permit the escape of the moisture from the green brick, which passages are also controlled by suitable dampers or valves, *l*.

The process of burning brick from what has thus far been said with relation to the arrangement of the chambers of the kiln will be as follows: One of the burning-chambers, as C, will be charged in any suitable manner with a quantity of brick which have previously been dried, so that all the moisture of
90 the green brick has been evaporated. The dried brick will preferably be arranged within the chamber in such manner as to leave a space between adjacent bricks and expose as much of the surface of each brick to the heated
100 air as is commensurate with economy of space. An arrangement such as we have found de-

sirable is best shown in Fig. 3, wherein the pile of brick is composed of layers of three bricks separated a distance apart and arranged in alternate directions. The drying-chamber B is similarly charged with green or fresh-molded brick and the charging-doors of the chambers B and C are closed. Heat will then be generated in the chamber C in any suitable manner, but preferably so that all the brick therein will be equally burned, the damper G being regulated according as it is requisite to obtain more or less draft. After the brick in the burning-chamber have been sufficiently burned the generation of heat therein will be stopped and the brick and chamber allowed to cool. The heat in this burning-chamber C and that radiating from the burned brick, instead, however, of being allowed to escape by the stack F, will at such time as the judgment of the attendant may dictate be allowed to pass into the drying-chamber B through either or all of the passages K, leading from said chamber C, by opening the corresponding dampers k, and allowed to escape from said chamber when desired by opening either or all of the dampers l, controlling the roof-passages L. Thus the heat which would otherwise pass from the burning-chamber C by its damper G into the stack and escape into the open air is utilized to dry the green brick instead of sun-drying them, so as to prepare them for burning.

The brick dried in the drying-chamber are transferred therefrom to the other burning-chamber, D, and said drying-chamber is then recharged with another quantity of green or freshly-molded brick. Heat will then be generated in the burning-chamber D and the brick therein be burned and the green brick in the drying-chamber dried in the manner before described. Thus it will be seen that the arrangement of chambers is such that a continuous process of drying, burning, and cooling bricks may be practiced in a single structure without the necessity of waiting longer between each burning than is necessary to remove the cooled brick from one chamber and recharge it with dried brick from the drying-chamber and recharging said drying-chamber with green brick, while the burned brick in the other burning-chamber is allowed to remain to cool during the burning operation in the first-named burning-chamber.

In order to expedite the charging of the several chambers of the kiln, the transfer of the dried brick from the drying-chamber to one of the burning-chambers, and the removal of the burned brick therefrom, we have provided simple and effective means by which the necessary labor in performing these operations is reduced to the minimum. To this end there are provided flat platform-trucks N, adapted to be run into either of the chambers. These trucks will be loaded with bricks in the manner shown before they are run into the chambers. For instance, one or more trucks, according to the length of the kiln, will be loaded

at the molding-machine with green or freshly-molded bricks, and be from thence run directly into the drying-chamber B. After these bricks have been dried sufficiently the trucks with their load may be run out of said chamber and transferred to one of the burning-chambers C D to be burned without disturbing the load in any manner, and from thence, after the bricks have been sufficiently burned, the trucks with their load will be removed to the storing-yard or place of shipment. The moving of the trucks N with their load will be facilitated by providing each of the chambers B, C, and D with a track or railway, M, that extends the entire length of the chambers from end to end, upon which the trucks N are adapted to run. These trucks N, with their load of bricks, may be run to the entrance of the burning-chambers and onto the tracks therein in any suitable manner. As herein shown, we have provided a transfer-truck, Q, upon which is mounted a short line of track, M'. This truck Q will preferably be run on a railway, O, extending parallel with the front of the kiln, but depressed sufficiently below the level of the railways M to permit the track M' on the transfer-truck, when in proper position in front of either of the entrances to the chambers C D, to form a continuation thereof, whereby the trucks N and their load may be run onto or from said transfer-truck Q from or into said chambers.

The tracks or railway O may of course extend to any point desired, as the necessities of transfer, shipment, or storage may require. The trucks N, with their load, may also be run to the drying-chamber B in any suitable manner, either by means of an inclined and elevated track, P, (shown in dotted lines, Fig. 1,) as is obvious, or the transfer-truck Q, with loaded truck N, may be elevated from the railway O, when in proper position, by a suitable elevating device, T, herein represented in dotted lines in said figure as consisting of the ordinary hydraulic cylinder, 20, and piston 21, the action of which is too well known to need further description. Such an arrangement will greatly facilitate the transfer of the truck N and its load of dried bricks from the drying-chamber B to either of the burning-chambers C D.

In order to confine the heat within the burning-chambers C D, as well as to prevent the extreme heat from affecting the running-gear of the trucks N, they are provided with open bottoms and the side walls are slightly overhung from the foundation Z, so as to form projecting ledges 22, extending the length of the chambers.

The platforms of the trucks that are run into or under the bottoms of the chambers are wide enough to extend under these ledges 22 and entirely across the under side of the chambers, so that when the trucks are in position their platforms will practically close the bottom of the chambers, as seen in Fig. 2.

In order that the bottom of the chambers

C D may be closed more effectually than the free running of the trucks N in and out of said chambers under the ledges 22 will permit, the trucks or their platforms may be lifted 5 vertically, so as to cause the longitudinal edges of the platforms to bear against the under side of the ledges. For this purpose the track or railway M, as herein shown, is made in sections *m*, long enough to support a truck, 10 and which sections are mounted upon sleepers *n*, adapted to be raised or lowered by a lever, *o*, guided in suitable ways, *r*, which also form stops upon which the sleepers rest before the track-sections are raised. One end 15 of the lever *o* is mounted on a fulcrum, *p*, and the other end engaged by a vertical rod, *s*, passing at the outside of the kiln through a guide, *t*, that projects from the side walls, I, over which guide the screw-threaded end of 20 the rod *s* is provided with a nut, *u*, by which the rod is raised or lowered to cause the lever *o* to lift or lower the track-sections, as is obvious.

A single lever may be arranged to lift each 25 section of track, as shown; or two or more may be provided for the purpose. The longitudinal edge of the platforms of the trucks N will also preferably be provided with a seat to hold a roll, 23, of fire-proof material, by which, 30 when the truck is raised to close the bottom of the chamber C or D, the joint between the ledges 22 and the platform will be rendered air-tight.

No description has been given herein to the 35 mode of generating heat in the burning-chambers, as any mode found desirable may be employed. We prefer, however, to employ liquid hydrocarbons as fuel for generating heat within these chambers. Thus we may arrange at 40 suitable distances apart a series of hydrocarbon-burners, R, projecting through the side walls, I, of the kiln into the burning-chambers. These burners may be of any of the known forms and operating in accordance with any 45 of the methods thought best suited to the purpose of burning brick. By the use of these burners we are enabled to regulate to a nicety the color of the brick, and also to burn them uniformly.

50 By the use of liquid fuel we avoid the chemical action of the impure gases arising from coal during burning, and by which we avoid or prevent the staining or whitening of the brick after having been exposed to the air.

While only one drying-chamber has been 55 described, it is obvious that two or more may be employed. So, too, there may be any number of burning-chambers, these changes obviously not affecting the herein-described process of drying and burning brick. 60

We claim—

1. The herein-described kiln, consisting of a single structure providing an upper horizontal chamber and two lower horizontal 65 chambers, having flues connecting the lower chambers with the upper chamber, flues connecting each of said lower chambers with a stack or chimney, and a valve for alternating the connection with said chimney, heating 70 means for heating the lower chambers alternately, and means for removing the brick from the upper chamber to either of the lower chambers, substantially as described.

2. The combination, with a horizontally-extending kiln having an open bottom and an 75 end opening, tracks below the bottom extending the length of the kiln, trucks with platforms for supporting the brick to be burned, adapted to be moved into and out of the kiln with the brick through the end opening and 80 to be lifted to close the bottom of the kiln, and a lever for lifting said platforms against the bottom, substantially as described.

3. The herein-described kiln, consisting of a drying-chamber and two burning-chambers, 85 each having flues communicating with the drying-chamber and provided with open bottoms, platform-cars for closing the bottoms of said chambers, rail-sections supporting said cars, and means for raising the sections and 90 cars, substantially as described.

4. The combination, with a chamber of a kiln having side ledges, 22, of platform-cars supporting the bricks, adapted to be raised 95 against said ledges to close the bottom of the chambers, track-sections supporting said cars, and levers for raising the cars and track-sections, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of 100 two subscribing witnesses.

BENJAMIN F. SHAKESPEARE.
SAMUEL J. ROSE.

Witnesses:

SAM. LYONS,
DAVID F. ROSE.