

(No Model.)

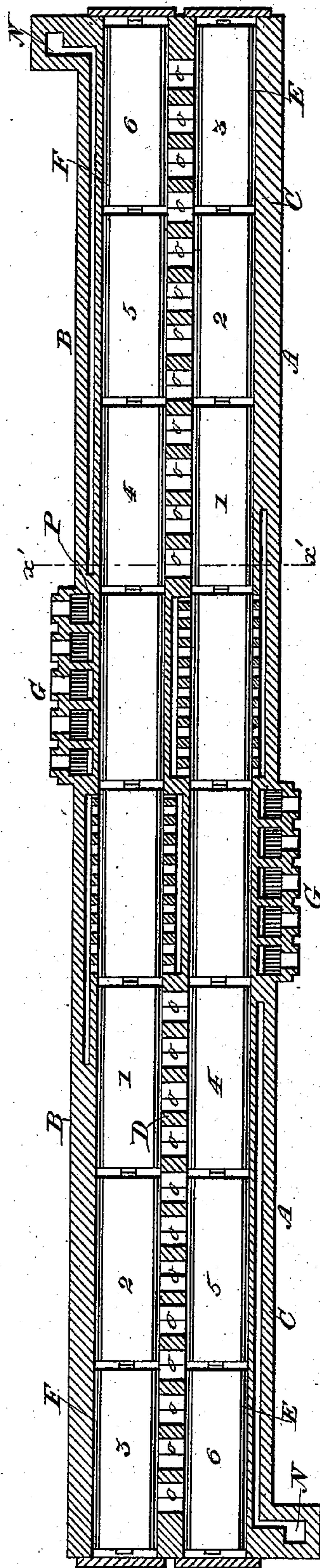
7 Sheets—Sheet 1.

J. C. ANDERSON.  
BRICK KILN.

No. 379,927.

Patented Mar. 27, 1888.

Fig. 1.



Witnesses:

J. C. Grecht,  
Alex. Mahan.

Inventor:

J. C. Anderson,  
By E. W. Ginsburgh  
Attorney.



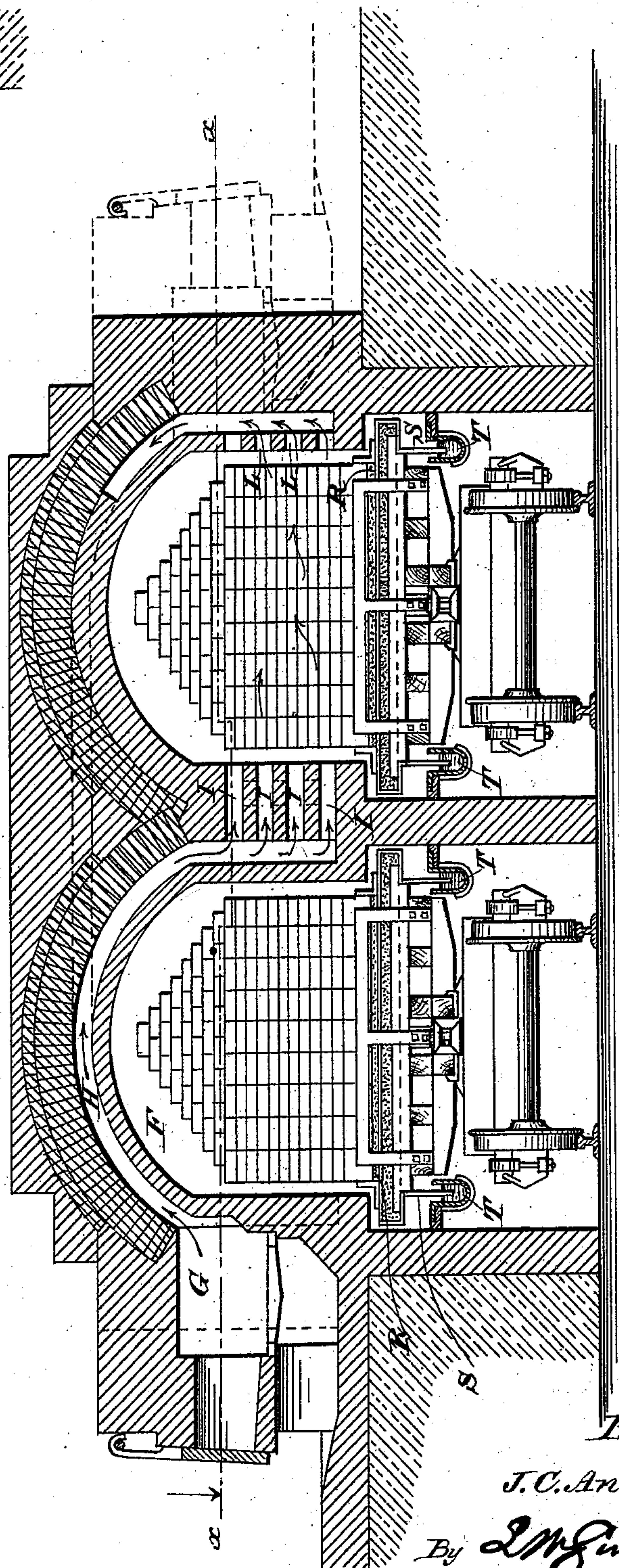
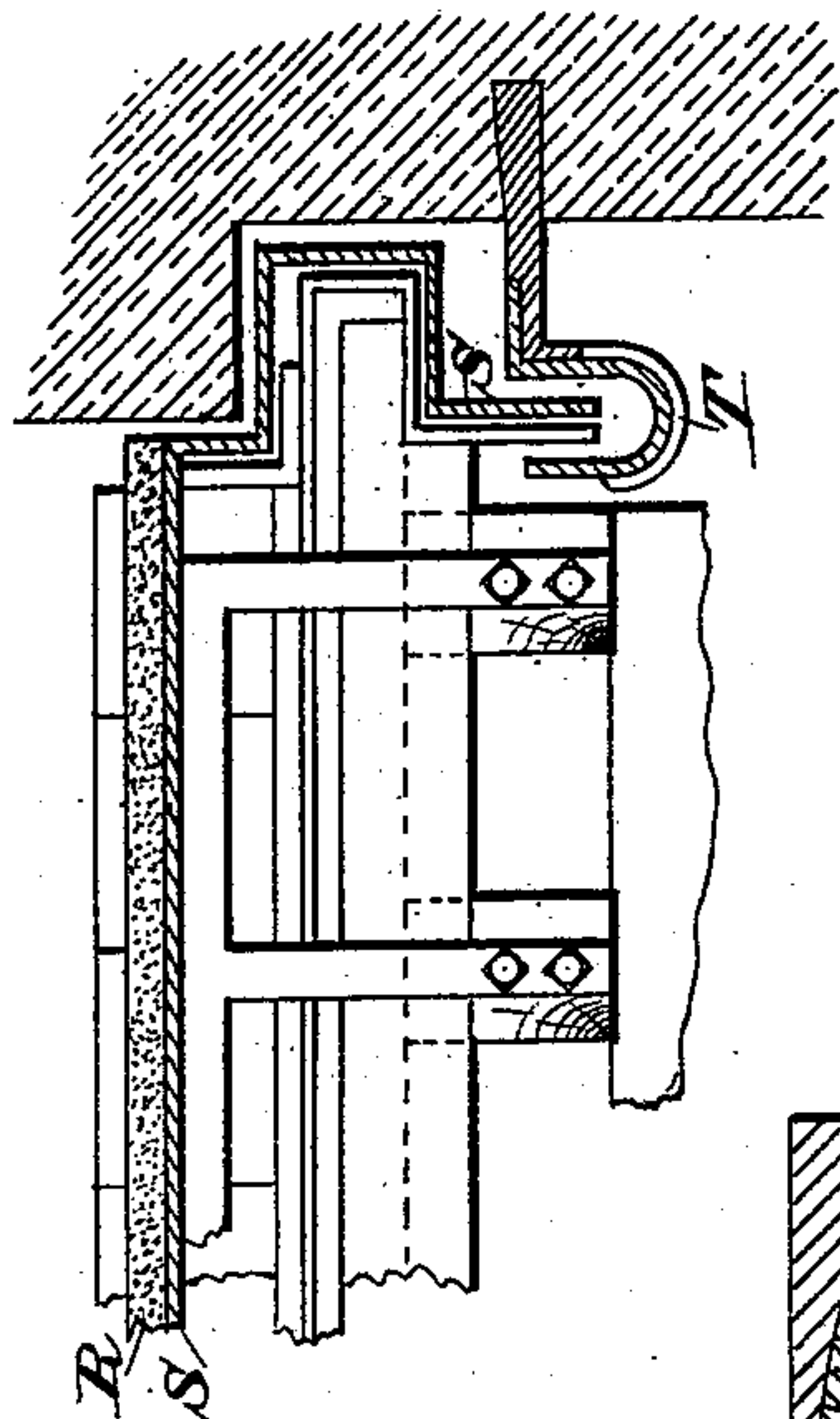
(No Model.)

7 Sheets—Sheet 2.

J. C. ANDERSON.  
BRICK KILN.

No. 379,927.

Patented Mar. 27, 1888.



*Witnesses:*

J. C. Brecht,

Step Mahon.

*Inventor:*

*J. C. Anderson,*

By *L M Ginsburgh*

*Attorney.*



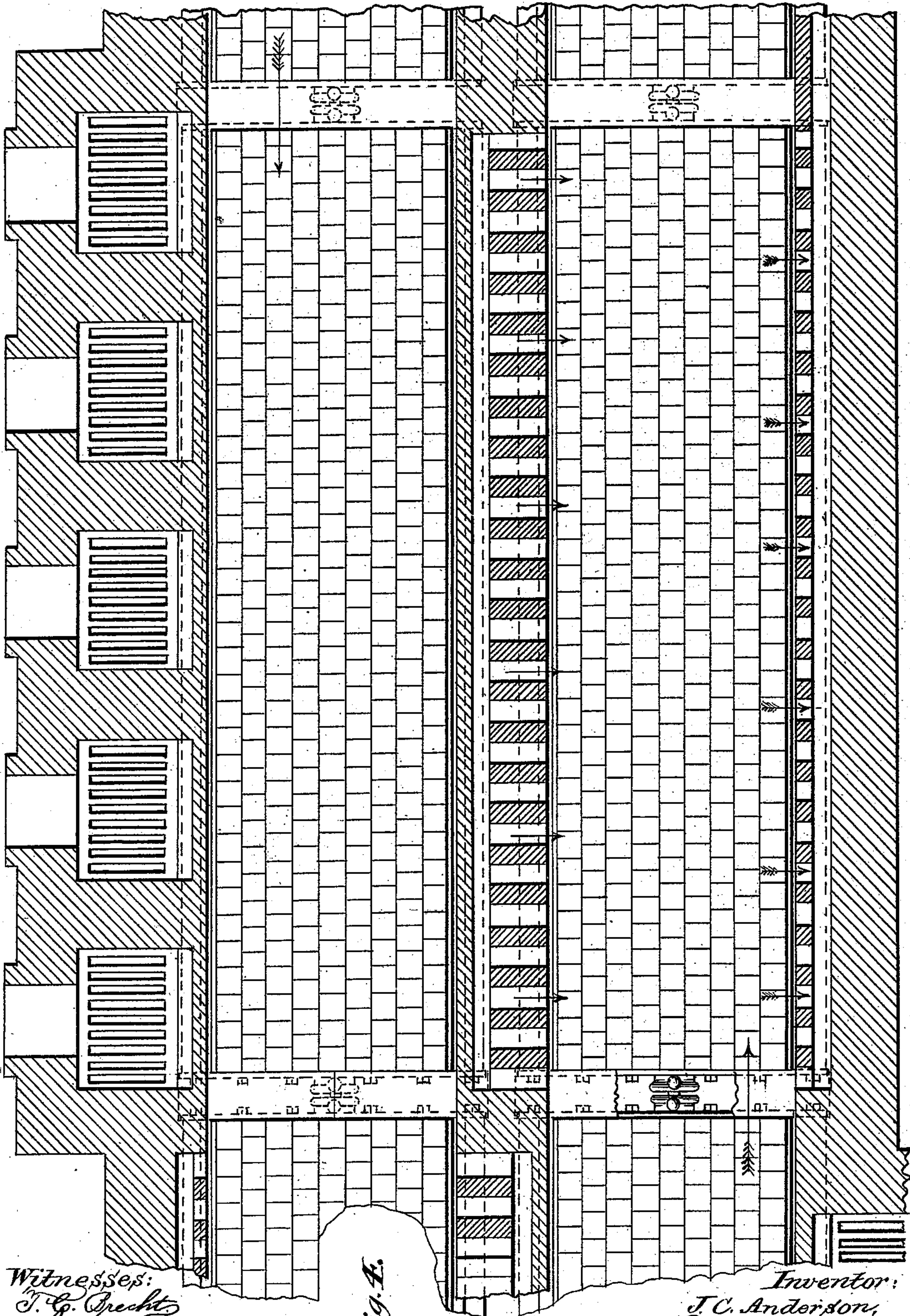
(No Model.)

7 Sheets—Sheet 3.

J. C. ANDERSON.  
BRICK KILN.

No. 379,927.

Patented Mar. 27, 1888.



Witnesses:  
T. G. Brecht  
Alex. Mahan.

Fig. 4.

Inventor:  
J. C. Anderson,  
By *E. J. Gussabank*  
Attorney.



(No Model.)

7 Sheets—Sheet 4.

J. C. ANDERSON.  
BRICK KILN.

No. 379,927.

Patented Mar. 27, 1888.

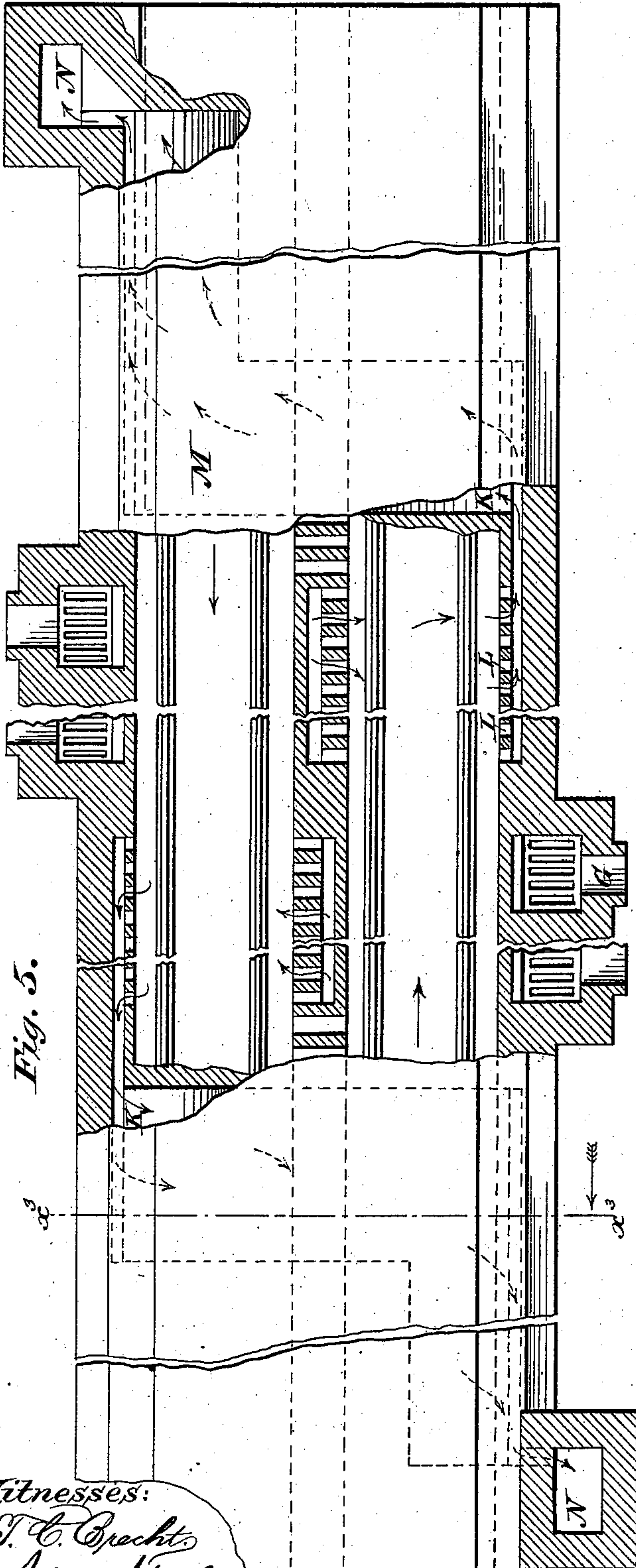


Fig. 5.

Witnesses:  
J. C. Orecht,  
Alyellahon.

Fig. 9.

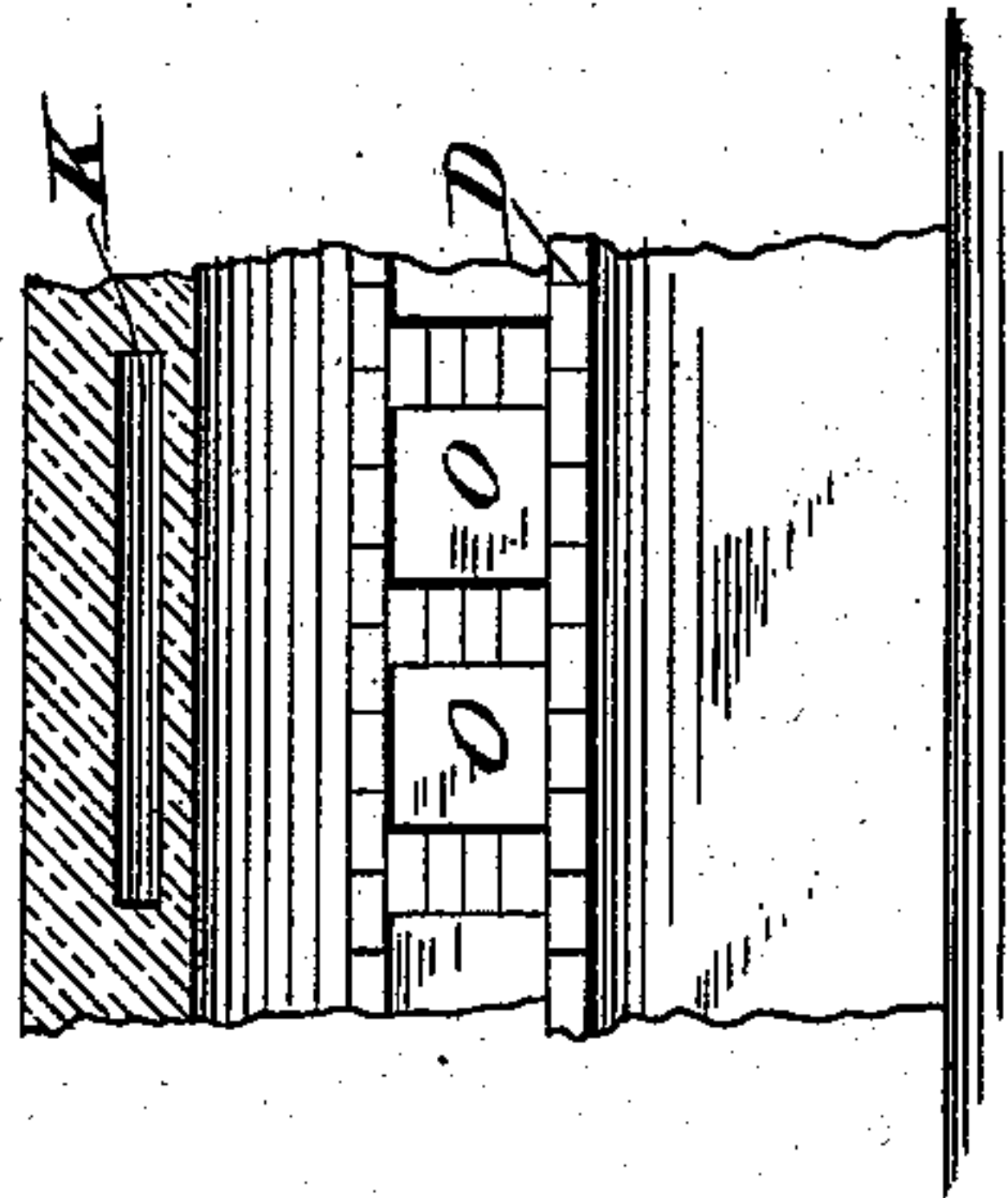
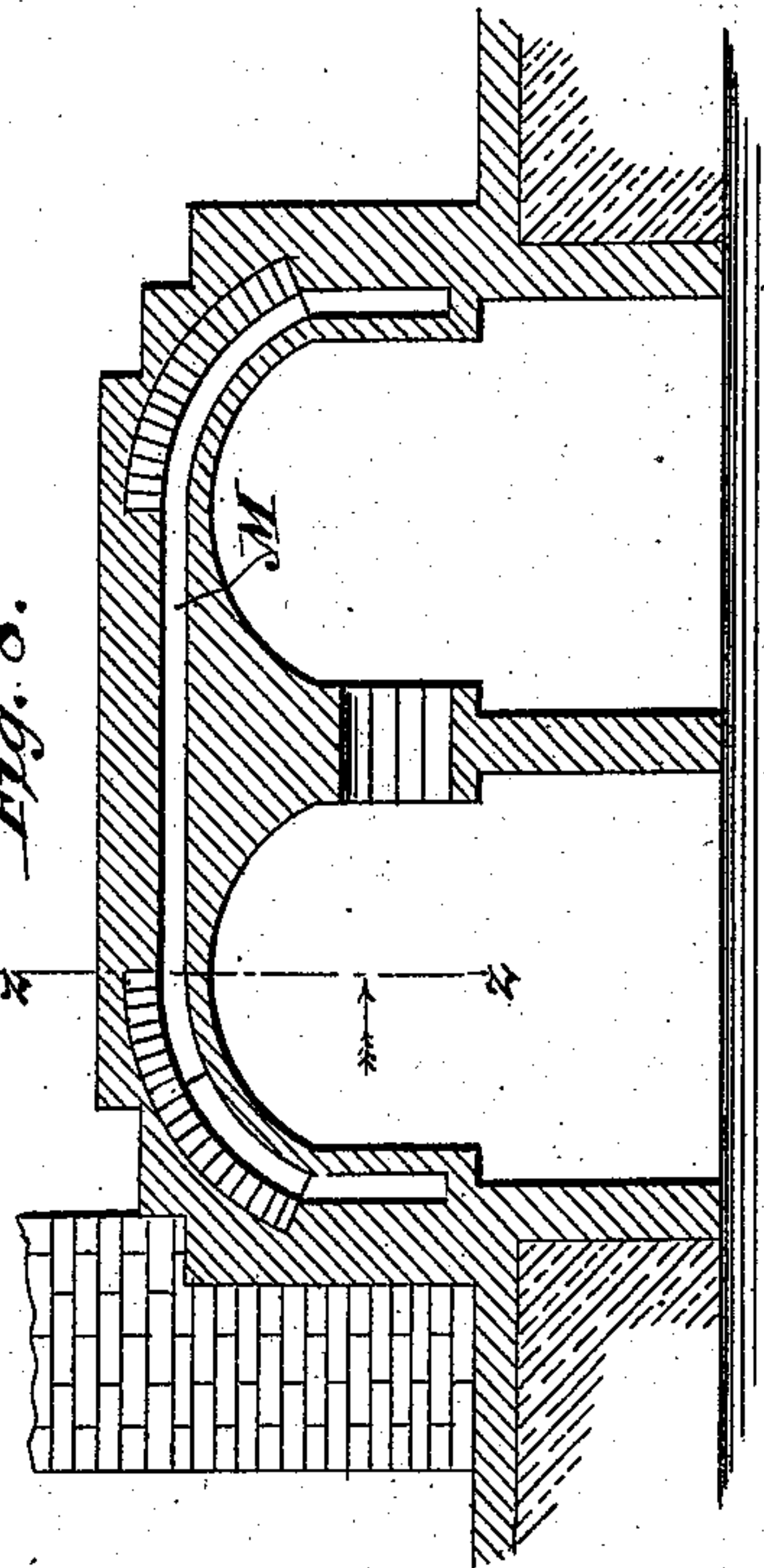


Fig. 8.



Inventor:

J. C. Anderson,

By E. M. Jinsabaugh  
Attorney.

(No Model.)

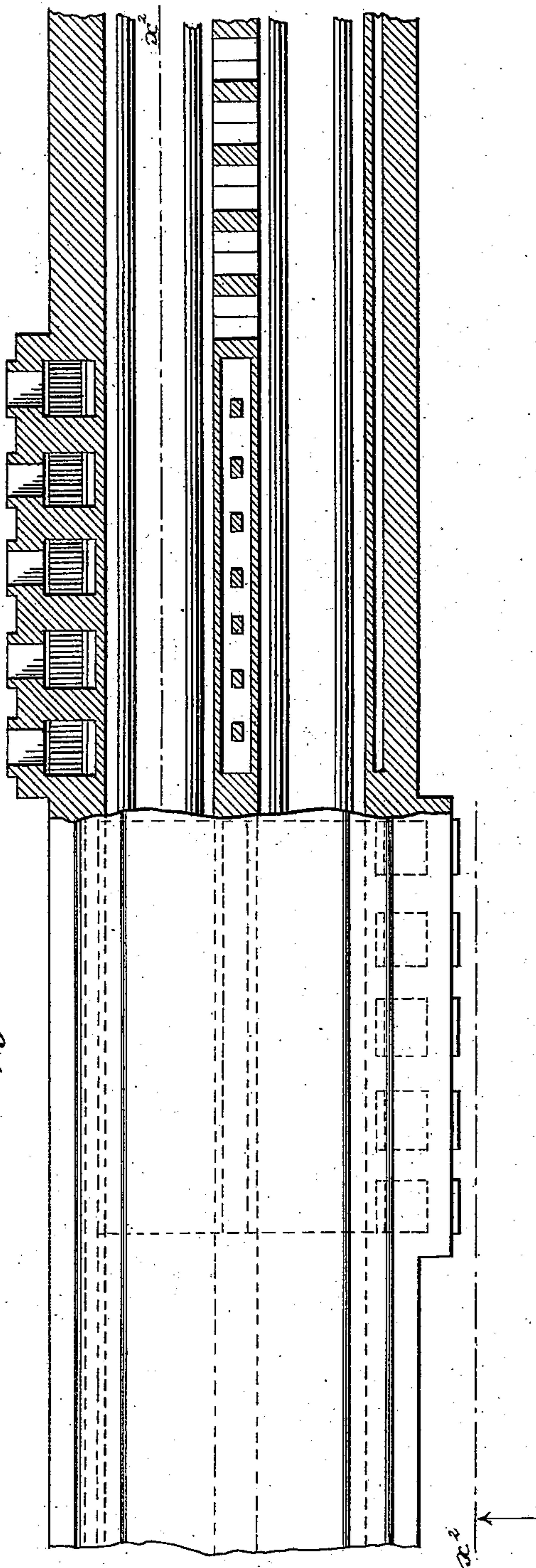
7 Sheets—Sheet 5.

J. C. ANDERSON.  
BRICK KILN.

No. 379,927.

Patented Mar. 27, 1888.

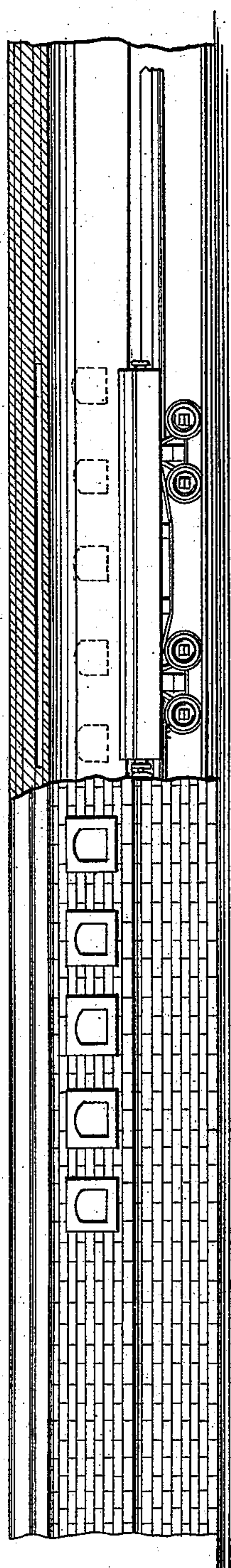
Fig. 6.



Witnesses:

*T. C. Brecht*  
*Alex. Mahon.*

Fig. 7.



Inventor:

*J. C. Anderson,*  
By *E. W. Ginsburgh,*  
Attorney.



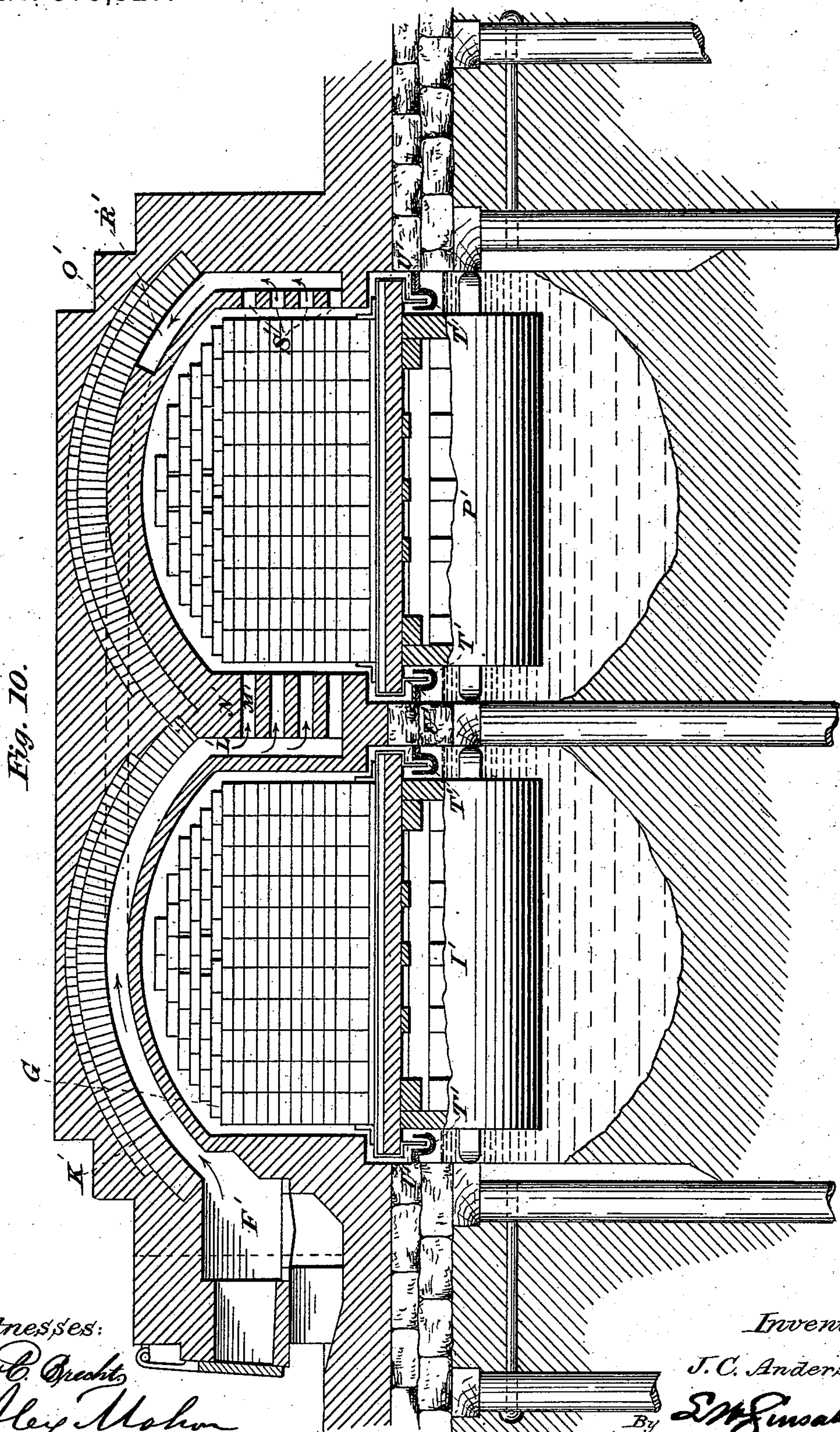
(No Model.)

7 Sheets—Sheet 6.

J. C. ANDERSON.  
BRICK KILN.

No. 379,927.

Patented Mar. 27, 1888.



*Witnesses:*

T. C. Bright.

Key-Mohr

*Inventor:*

*J. C. Anderson,*

*E. W. Finsbaugh*

*Attorney.*



(No Model.)

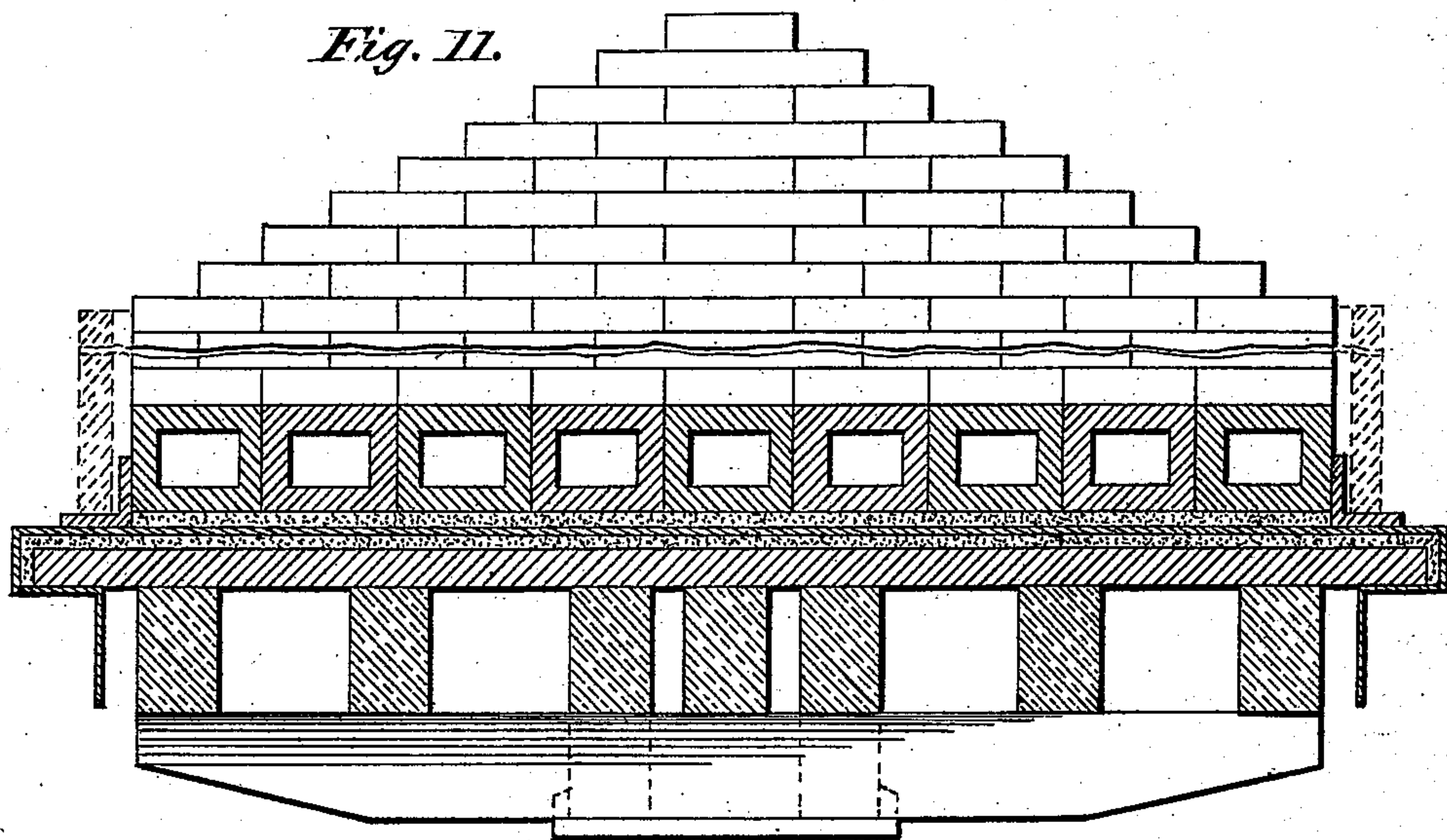
7 Sheets—Sheet 7.

J. C. ANDERSON.  
BRICK KILN.

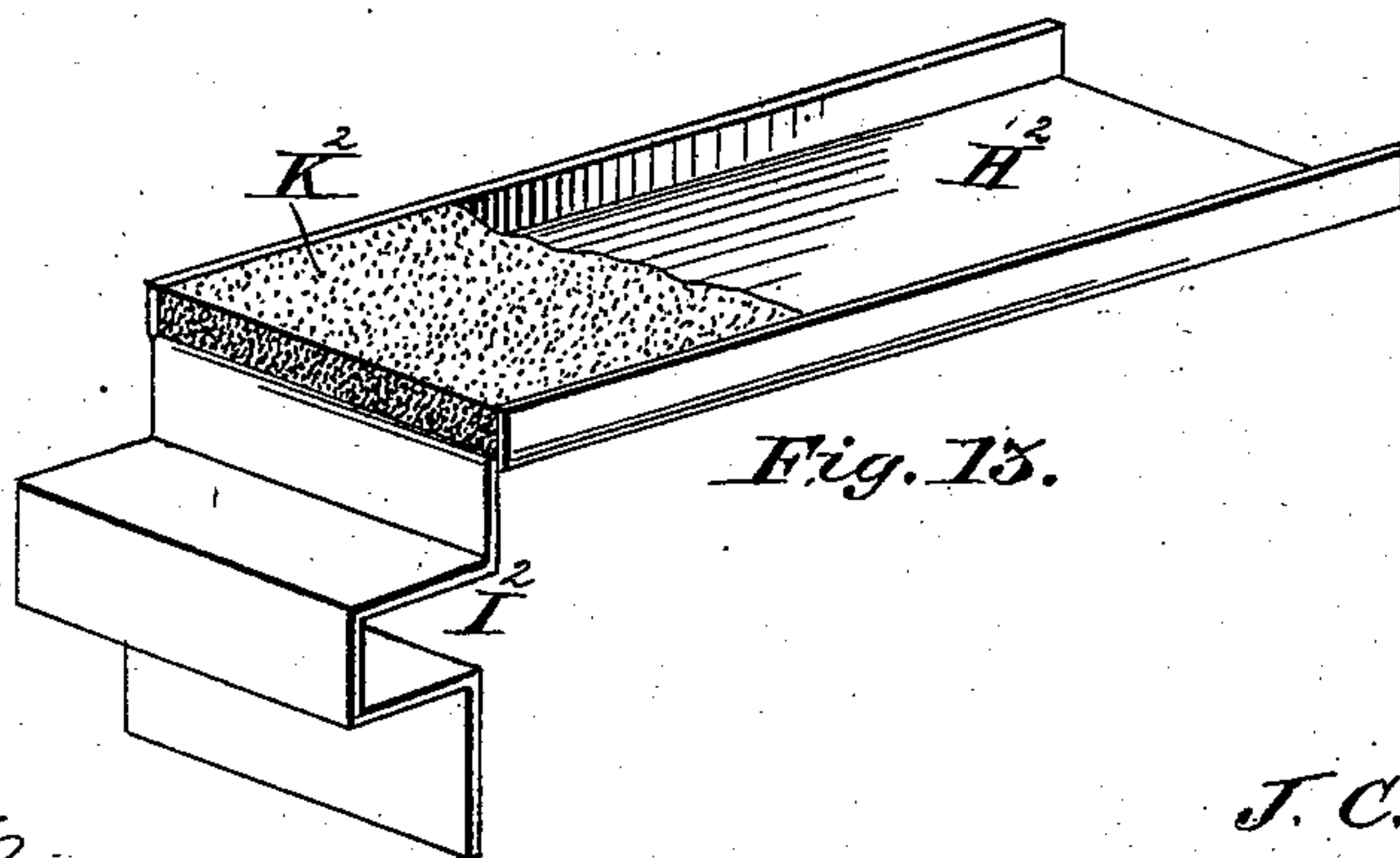
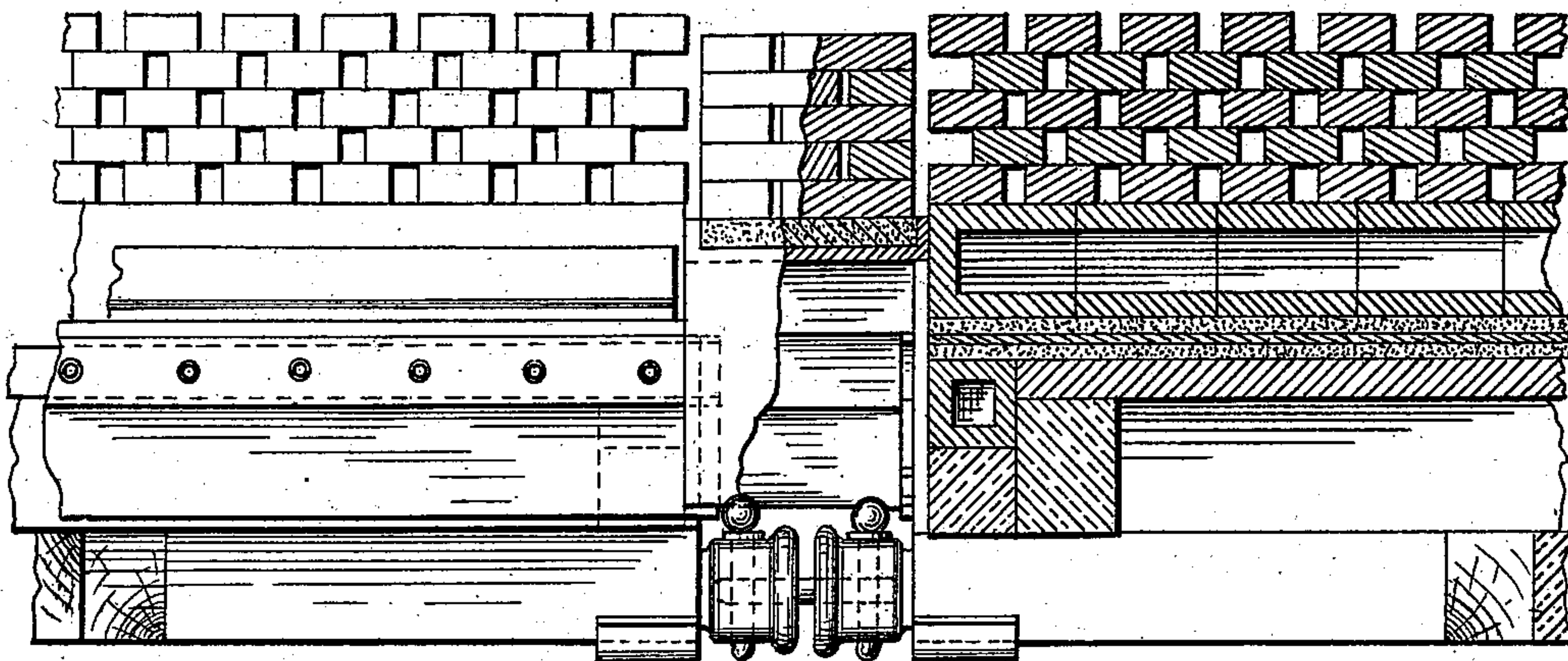
No. 379,927.

Patented Mar. 27, 1888.

*Fig. 11.*



*Fig. 12.*



*Fig. 13.*

Witnesses:

*J. C. Precht,*  
*Alex. Holm*

Inventor:

*J. C. Anderson,*

By *S. W. Finubaugh,*

*Attorney.*



# UNITED STATES PATENT OFFICE.

JAMES C. ANDERSON, OF HIGHLAND PARK, ILLINOIS.

## BRICK-KILN.

SPECIFICATION forming part of Letters Patent No. 379,927, dated March 27, 1888.

Application filed January 13, 1888. Serial No. 260,657. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES C. ANDERSON, a citizen of the United States of America, residing at Highland Park, in the county of Lake and State of Illinois, have invented certain new and useful Improvements in Kilns for Burning Brick, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to improvements in kilns for burning bricks and other clay products, the apparatus belonging more particularly to that class known as "continuous-burning" kilns.

15 Kilns of various forms have been constructed, having a number of cells or separate apartments in which a portion of the waste heat which escapes in cooling brick is transferred from department to department and made to  
20 do duty in drying and gradually heating the brick to be burned, a good type of which is the well-known Hoffman kiln; but in all such kilns the brick to be burned must be set in the various departments of the kiln in units and  
25 removed from the same department, after the drying and burning have taken place, by the same slow process.

Attempts have been made to load the bricks upon small movable platforms, where they  
30 have been gradually moved through a single channel-way, much like a smoke-stack laid upon its side, allowing the brick to come in the top or smoke end through the tail of the flame gradually to the hotter part and source  
35 thereof, such attempts being non-productive of practical results. In all cases where motion was imparted to the body to be burned, the object sought after was the moving forward of the body through a single channel-way, during the burning operation alone, and no tangible  
40 advance had been conceived or means afforded for transporting the brick beyond this point upon suitable vehicles to the point of delivery in the different cities of the country in  
45 the original package upon which they were placed directly from the molding mechanism.

My invention relates, broadly, in providing a kiln in which a procession of the green brick will pass side by side in intimate conjunction  
50 with a like procession of hot burned brick, which in the operation of cooling are made to give up their heat to the loaded procession

or cars of green brick for drying, water-smoking, and heating the same, and, further, in the raising of the heat to the burning-point of the brick, and finally projecting a heat heretofore  
55 unattainable in the art of brick-burning for shrinking the same by causing the water-smoke and gaseous products of combustion to unite and burst into flame at the point  
60 where the intense heat is necessary to make the operation practicable, thus utilizing the water-smoke, which has been the chief factor heretofore in the retarding of the firing of  
65 kilns, and converting the same into a fuel.

The object of my invention is to produce a kiln which will burn common brick more quickly and uniformly than has heretofore been done.

My invention consists of a double tunnel  
70 provided with tracks or canals for the reception of cars or boats, said tunnels being parallel to each other and inclosed by the same roof, each tunnel being provided with furnaces in their external walls, by which they are heated,  
75 and a system of flues in the ashes thereof, which divert the flame to the brick to be burned and the waste products of combustion toward the incoming cars or boats to dry and clear the newly-made bricks placed thereon of the  
80 water-smoke, while at the same time the heat from the burned bricks on the outgoing cars or boats is brought into contact with the green brick on the incoming cars in the opposite tunnel to raise the same to a red heat before  
85 they are brought opposite the furnaces. Other novel and important features of my invention and modes of operation will be fully described hereinafter, and pointed out in the claims.

In order that a complete understanding of  
90 my invention may be had, I will say in this connection that the time occupied in burning the brick in this kiln may be divided into three stages—viz., one in which the water-smoke is eliminated and the bricks raised gradually to  
95 a red heat; second, a period in which the bricks are raised to a white heat; and, third, a period in which the bricks are subjected to a regenerator-flame from the furnace, combined with the hydrogen gas formed from the water-  
100 smoke, which I term the period of "shrinking," or point in which the highest heat is reached to convert the brick into pottery.

Referring to the drawings, Figure 1 is a



longitudinal horizontal sectional view of the double tunnels with the cars therein. Fig. 2 is a vertical sectional view taken on the line  $x'x'$  of Fig. 1. Fig. 3 is a detached view of a portion of the car body, showing the devices for forming the air-seal. Fig. 4 is a plan view of a central portion of the kiln through the furnaces on the line  $xx$ , Fig. 2. Fig. 5 is a top or plan view, partly in section, of the kiln, the ends being contracted, so as to show the direction of the products of combustion. Fig. 6 is a top or plan view of a portion of the kiln, partly in section. Fig. 7 is a side view, partly in section, taken on the line  $x^2x^2$  of Fig. 6. Fig. 8 is a vertical sectional view of the kiln, with the cars removed, and taken on the line  $x^3x^3$  of Fig. 5. Fig. 9 is a vertical sectional view of a portion of one of the arches, taken on the line  $zz$  of Fig. 8. Fig. 10 is a vertical sectional view of a kiln having canals instead of tracks adapted to receive boats loaded with the bricks to be burned. Fig. 11 is an end view, partly in section, of the platform of a car partly loaded with brick. Fig. 12 is a side view, partly in section, of the ends of two cars, showing the setting of the brick and the filling between the cars to protect the couplings from the heat of the furnaces. Fig. 13 is a view, in perspective, of the platform used between the cars on which the bricks are piled.

A indicates the kiln, which is composed of two parallel walls, B and C, and a central or partition wall, D, dividing the kiln into two longitudinal chambers or tunnels, E and F, each covered by separate arches, which rest upon and are supported by the partition-wall D and the outer walls, B and C.

The kiln is by preference about two hundred feet in length, in order to receive eight cars twenty-five feet long in each tunnel, and about fifteen or sixteen feet wide, the tunnels being wide enough to receive the cars or boats adapted to travel on tracks or float in canals located in each tunnel. The inner walls or linings of the kiln at the furnaces, together with the central or partition wall, are composed of fire-brick or other fire-resisting material, while the outer walls are built of ordinary brick.

G are the furnaces located in the outer walls of and occupy a position near the center of each tunnel, said furnaces being of the ordinary kind, having the usual grate-bars, ash-pits, doors, and draft-regulators. That portion of each tunnel adjacent each furnace is double-rolled, so as to form a chamber or flue, H, leading from the furnace over the top and down one side of the tunnel, as shown in Fig. 2, where it opens, through numerous perforations, I, into the adjacent tunnel, exposing the brick on the car in this portion of the kiln to the direct action of the regenerative flame, while the brick on the car adjacent to the furnace receives the heat transmitted through the arch or lining of the tunnel. The products of combustion, after passing through the bricks in the tunnel, as above described, enter a

chamber or flue, K, Fig. 5, through perforations L, and are carried over the top of the tunnel to the other side of the kiln to the space or flue M left in the walls or lining of the tunnel along the entire side of the incoming brick to the stack N at this end of the kiln, for the purpose of heating that side of the tunnel and utilizing the tail of the flame throughout its entire length, the object in carrying the flame along this side of the kiln being to gradually heat the sides of the brick on the loaded car farthest from the outgoing hot brick and thus equalize the drying and heating process and prevent the brick from becoming warped, which would be the case in this portion of the kiln.

Thus far I have described the operation of one furnace only, but the same operation takes place in the other furnace, its action serving to burn the brick in the adjacent tunnel, and the waste products of combustion being utilized in like manner to heat the entrance end of its particular tunnel to water-smoke the bricks.

The central or partition wall, D, from the furnaces to each end of the kiln is provided with numerous openings, O, Fig. 1, which virtually make these portions of the kiln one chamber, and through which the heat given off from the burned brick is transmitted to the adjacent tunnel to raise the temperature of the brick in this portion of the tunnel to a red heat before they are pushed forward to receive the more intense heat direct from the furnaces or which may be transmitted through their respective arches.

In giving a more complete description of the operation of the kiln I will state that the cars containing the green or newly-made brick are admitted to the tunnels from the opposite ends of the kiln two at a time, one at each end, and are moved in the direction of the arrows, as shown in Fig. 1, and that the heat from the burned brick on the outgoing cars in one tunnel, after they pass the furnaces, is utilized to water-smoke and heat to a red heat the bricks in the adjacent tunnel. For example, the bricks on the cars 1 2 3 in the tunnel E have been burned, and, in cooling, the heat passes through the opening O into tunnel F and heats the green brick on the cars 4 5 6, eliminating the water-smoke from the brick on cars 5 and 6 and heating the brick on car No. 4 to a red heat prior to being pushed into the furnace-chamber P, where the transmitted heat from the furnace raises the temperature of the bricks to a white heat, where, after remaining the proper length of time, until another shift of cars is made, car No. 4 takes its position in front of the furnace in the opposite tunnel, where it meets with the reverberating flame from said furnace, and the temperature of the bricks is still further raised until the shrinking or pottery point is reached. At this point I also utilize the water-smoke which has passed from the brick on cars Nos. 5 and 6, the same having passed forward in the tunnel and been raised to the proper temperature to ignite



when brought into contact and mingled with the gases of the fuel used in the furnace, thereby producing a most intense heat and reducing the actual cost of fuel.

5 It will be noticed that by this construction of kiln the fires in the furnace are constantly kept at the same degree of intensity, as the work of burning and drying is always the same, and, furthermore, the bricks being sub-  
10 jected to gradually-increasing temperature, there is no danger of loss by cracking.

The bottoms of the cars are protected from the effect of the heat by means of layers of as-  
15 bestus, R, felt, or other suitable material, and sheet-iron, S, the sheet-iron being extended down the side of the car a short distance, so as to project into metallic troughs, T, se-  
20 cured to the sides of the tunnel, said troughs being adapted to hold water, so as to form a seal, which not only prevents the escape of the heat from the kiln, but also prevents the ingress of cold air.

In Fig. 13 I have shown a sheet-iron pan or trough, H<sup>2</sup>, adapted to fit between the cars and  
25 extend from one side of the cars to the other, and provided with downwardly-projecting flanges I<sup>2</sup>, which project below the fire-line of the arches. These pans or troughs are designed to hold a fire-proof filling, K<sup>2</sup>, of asbestos or  
30 other suitable fire-resisting material, and on which, when placed in position between the cars, the bricks are piled. This arrangement not only increases the holding capacity of the kiln, but protects the ends of the cars and the  
35 couplings from the direct action of the heat.

In Figs. 11 and 12 I have shown the manner in which the bricks are set on the cars for burn-  
ing, the object of which is to leave openings through which the heat can readily pass, so as  
40 to more rapidly burn the brick.

In Fig. 10 I have shown a canal or water-  
way through the kiln, for the reception of boats or scows on which the bricks to be burned are piled, the arrangement of tunnels, flues,  
45 furnaces, &c., being the same as those already

described, the only point of difference being the substitution of canals for the boats instead of the tracks for the cars.

Having now described my invention, what I claim, and desire to secure by Letters Patent, 50 is—

1. A kiln for burning brick, consisting of double tunnels, each tunnel being provided with a furnace, which projects its flame over the tunnel nearest to it and into and through 55 the brick on the car in the opposite tunnel, as set forth.

2. A double-tunneled kiln of the character described, the furnaces of which project their flames over their respective tunnels and into 60 the adjacent tunnel and into flues, which conduct the waste heat back into chambers in the outer walls and arches of their respective tunnels and to the stacks, whereby the heat which would be otherwise wasted is utilized to heat 65 the entrance or front end of the tunnel, as set forth.

3. In double-tunneled kilns in which trains of cars carrying brick to be burned travel in opposite directions, the partition-walls D, pro- 70 vided with the openings o, on a level with the bottoms of the cars and on each side of the furnaces, whereby the heat from the burned brick is utilized to water-smoke and raise the tem-  
75 perature of the brick on the cars nearest the furnace to a red heat, as set forth.

4. The combination of the flues H, leading from the furnaces, through the openings I, into the opposite tunnel, with the openings L, flues K, and spaces M, located in the outer wall and 80 arch of the entrance end of the tunnel, whereby the portions of the tunnels most remote from the furnaces are heated, as set forth.

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

J. C. ANDERSON.

Witnesses:

L. W. SINSABAUGH,  
ALEX. MAHON.