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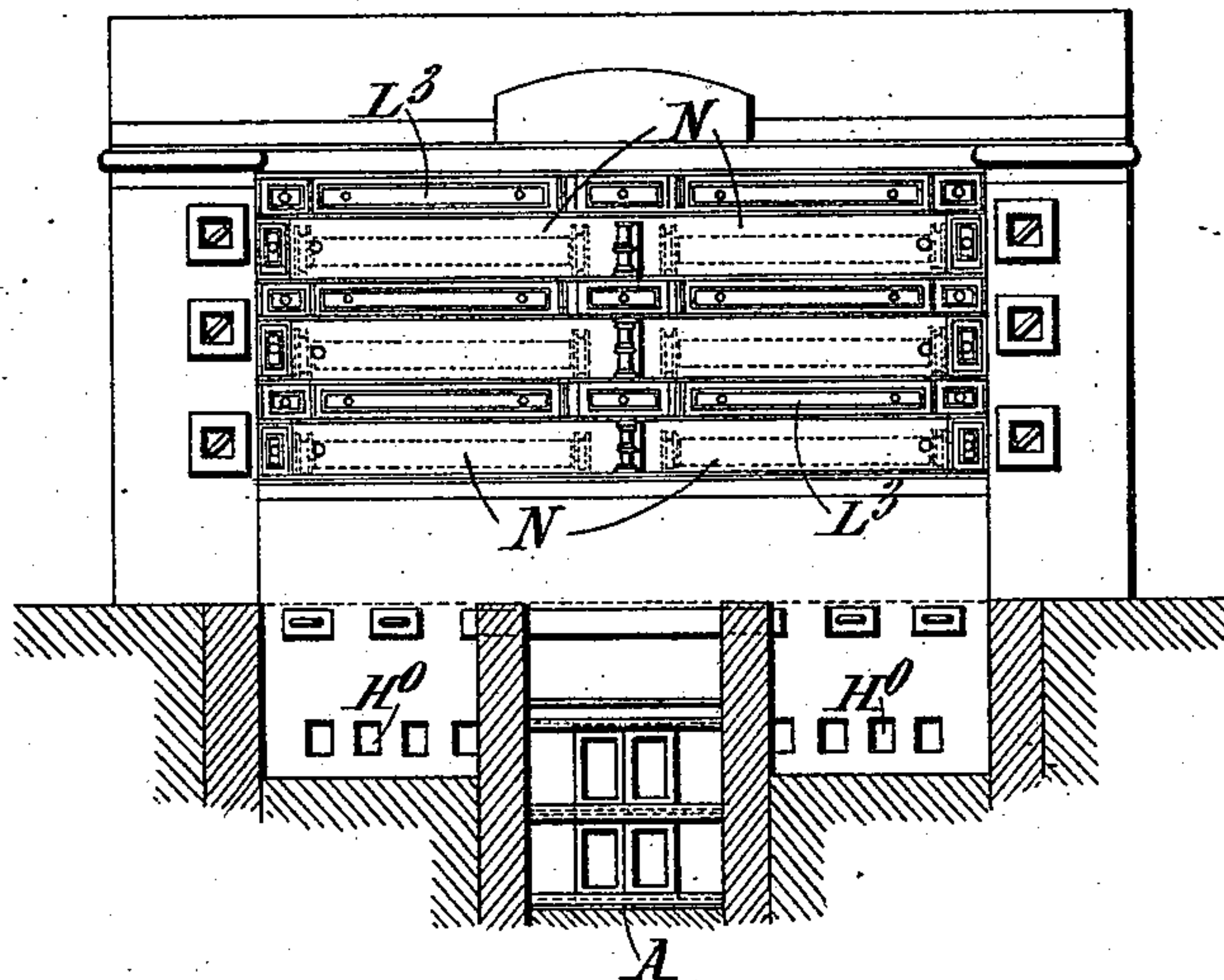
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J. ADAIR.  
BAKER'S OVEN.

No. 528,456.

Patented Oct. 30, 1894.

*Fig. 1.*



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(No Model.)

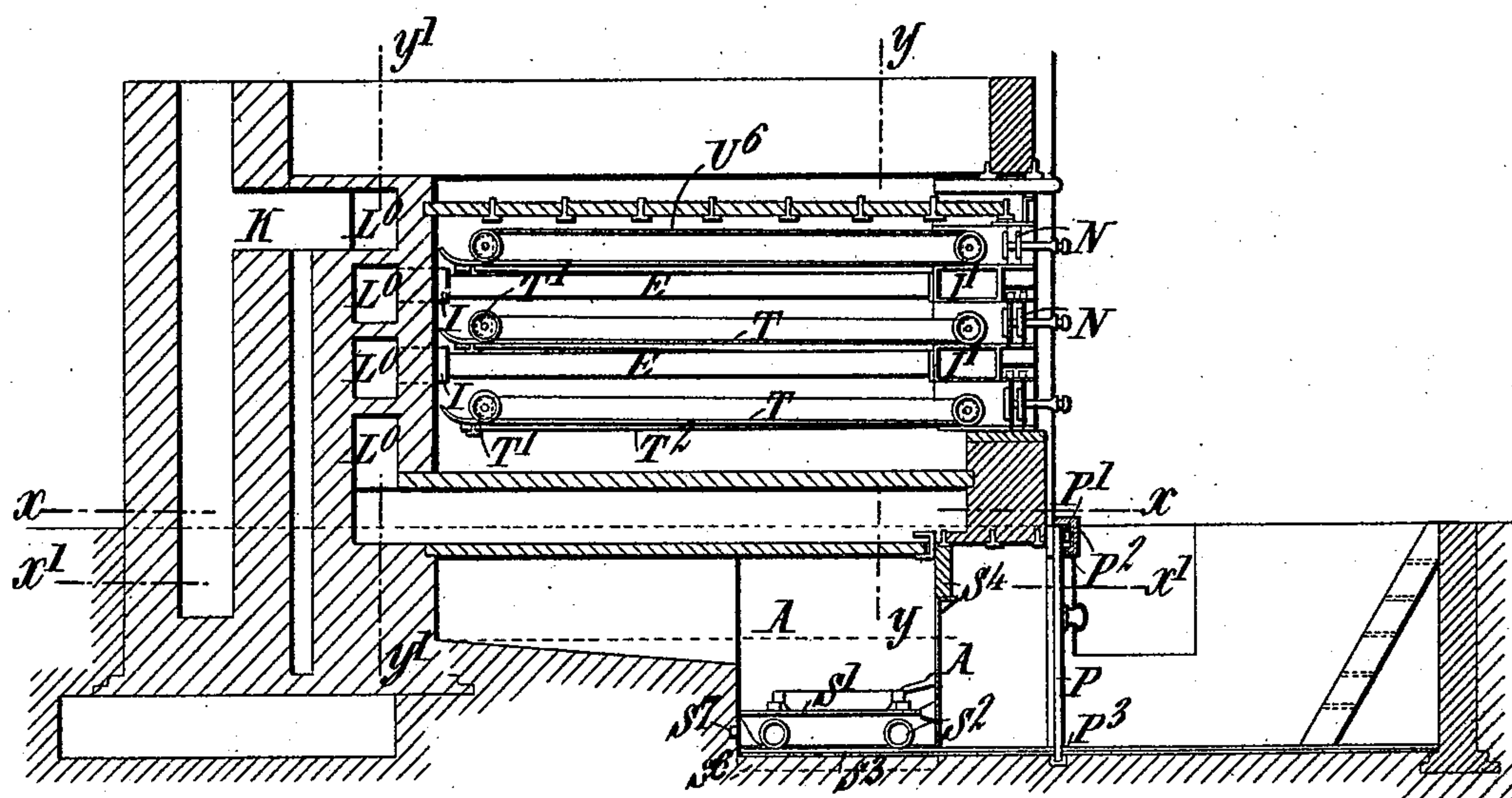
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**J. ADAIR.  
BAKER'S OVEN.**

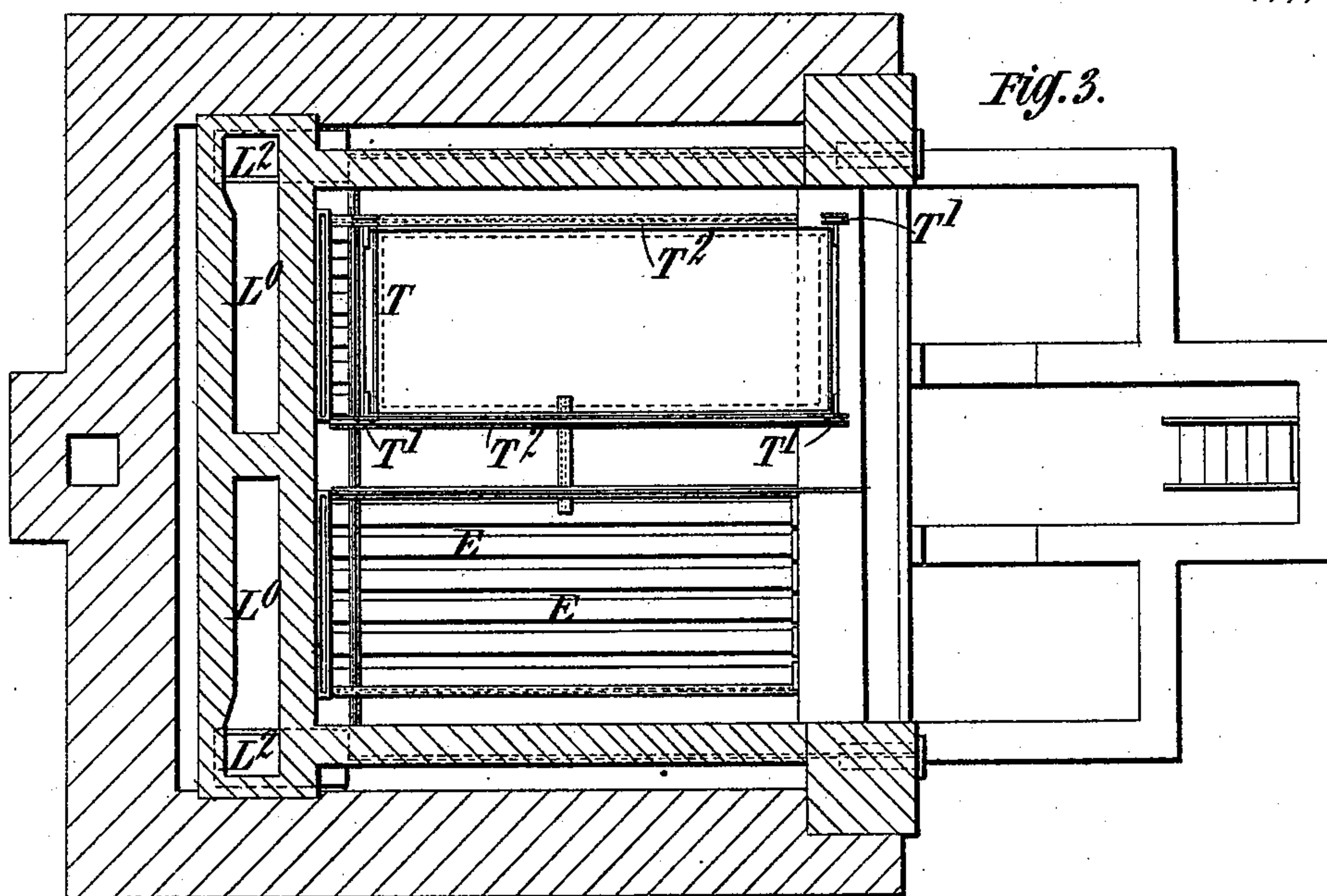
No. 528,456.

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*Fig. 2.*



*Fig. 3.*



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Fig. 5.

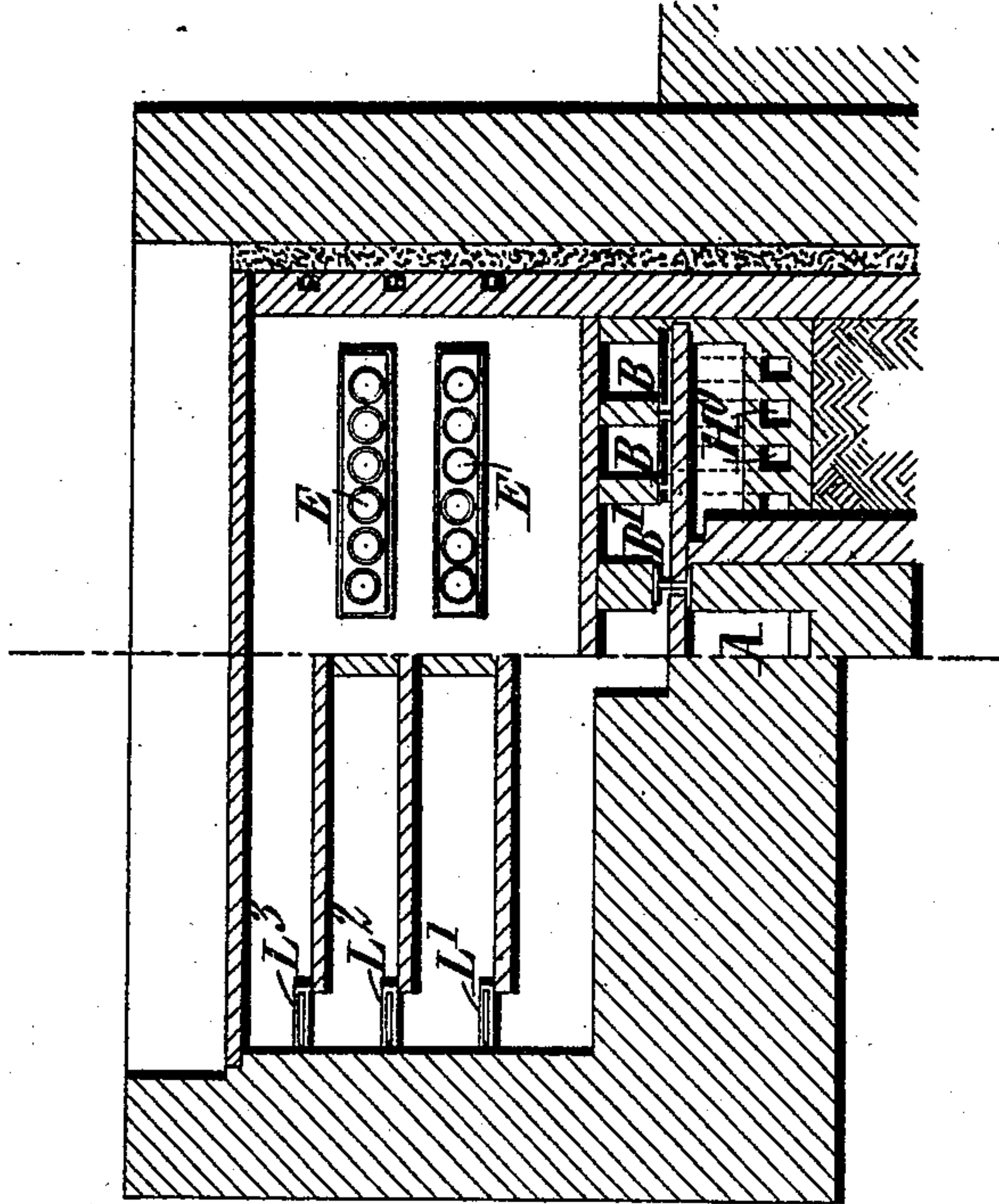
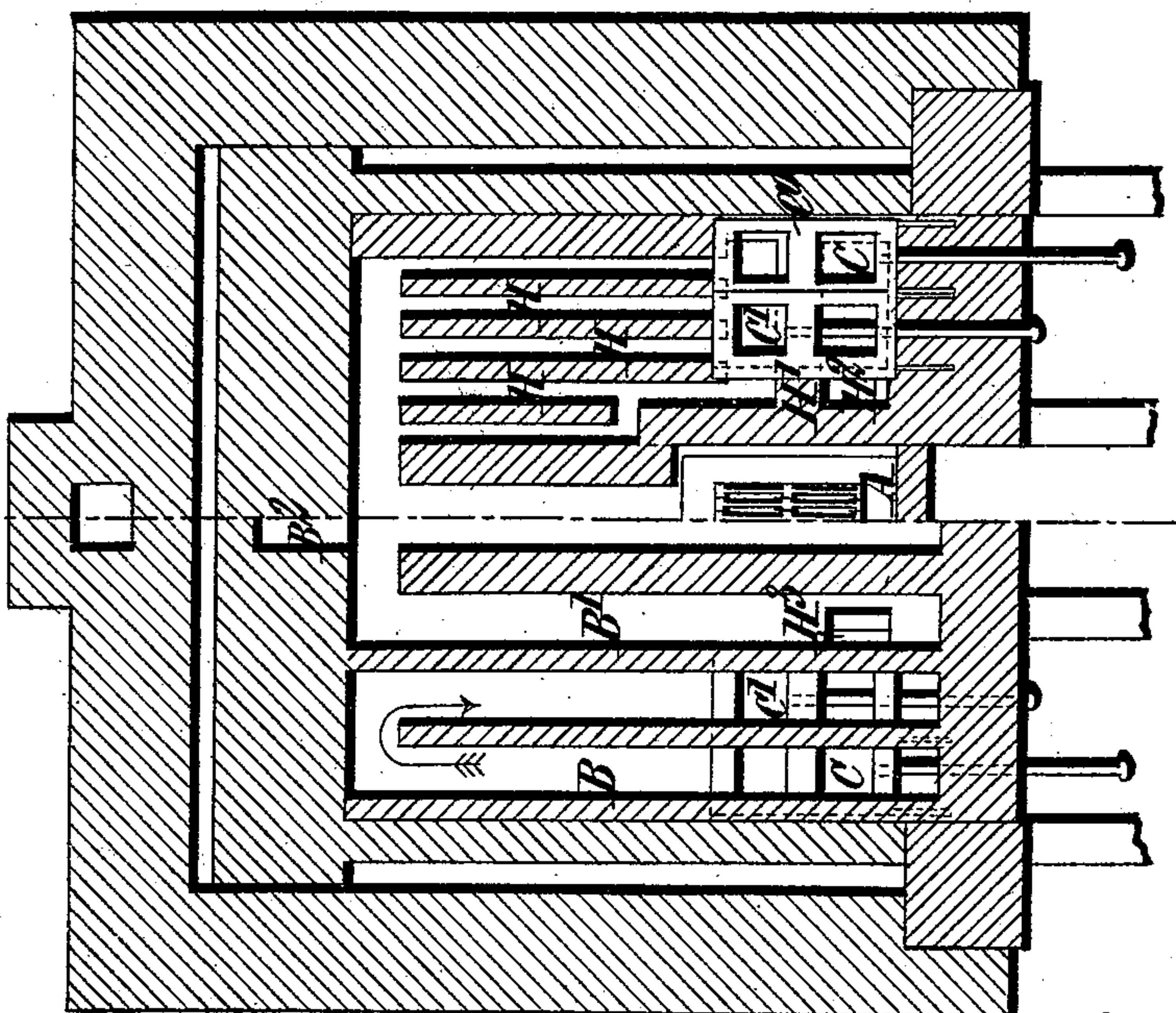


Fig. 4.



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(No Model.)

5 Sheets—Sheet 4.

J. ADAIR.  
BAKER'S OVEN.

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Patented Oct. 30, 1894.

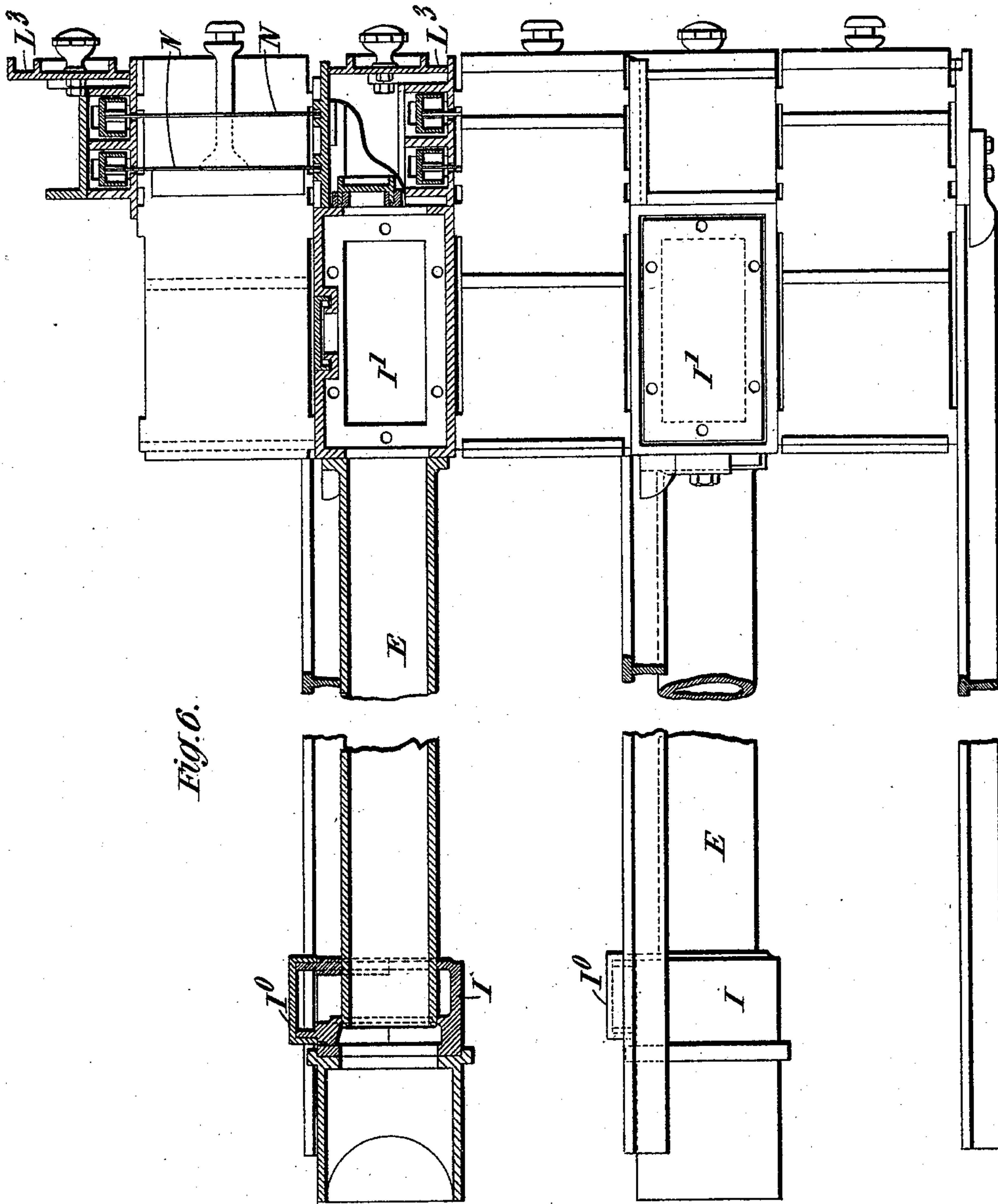


Fig. 6.

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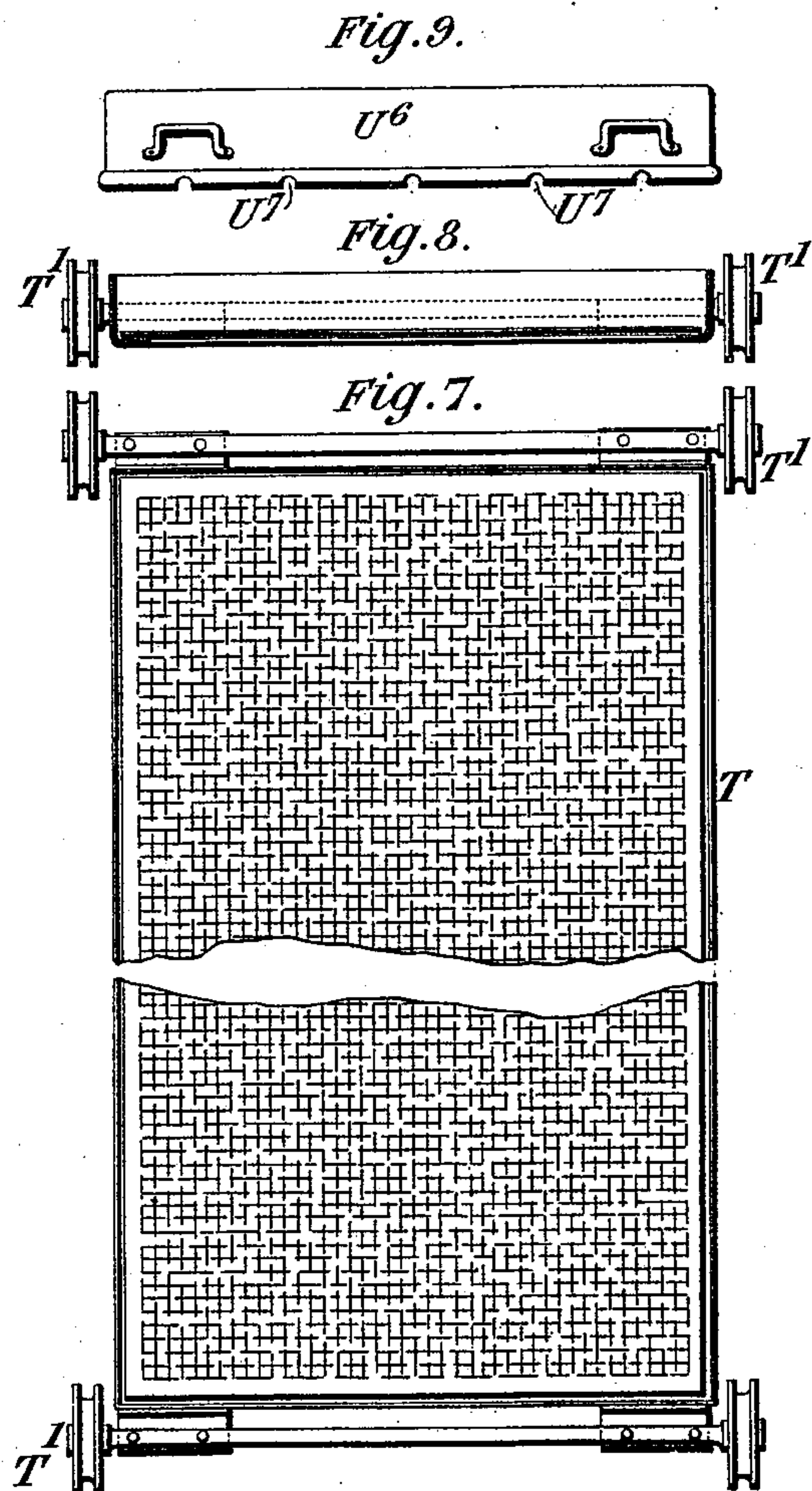
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J. ADAIR.  
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# UNITED STATES PATENT OFFICE.

JOHN ADAIR, OF WATERFORD, IRELAND, ASSIGNOR TO THE ADAIR SYNDICATE, LIMITED, OF LONDON, ENGLAND.

## BAKER'S OVEN.

SPECIFICATION forming part of Letters Patent No. 528,456, dated October 30, 1894.

Application filed March 3, 1894. Serial No. 502,270. (No model.) Patented in England February 24, 1888, No. 2,750, July 30, 1888, No. 10,965, August 24, 1888, No. 12,234, November 23, 1889, No. 18,771, February 15, 1890, No. 2,482, July 17, 1890, No. 11,140, and July 26, 1890, No. 11,707, and in Canada October 7, 1892, No. 40,607.

*To all whom it may concern:*

Be it known that I, JOHN ADAIR, commission agent, a subject of the Queen of Great Britain, residing at Waterford, in the county of Waterford, Ireland, have invented certain new and useful Improvements in Bakers' and Confectioners' Ovens, (for which I have obtained patents in Great Britain, No. 2,750, dated February 24, 1888; No. 10,965, dated July 30, 1888; No. 12,234, dated August 24, 1888; No. 18,771, dated November 23, 1889; No. 2,482, dated February 15, 1890; No. 11,140, dated July 17, 1890; and No. 11,707, dated July 26, 1890, and in Canada, No. 40,607, dated October 7, 1892,) of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to bakers' and confectioners' ovens.

An important feature of the said invention relates to the mode of heating ovens by means of pipes or flues arranged in the oven and through which the products of combustion or hot gases from the furnace are conveyed. Dampers are provided whereby the flow of gases through the pipes can be controlled or reversed at will. This construction is particularly adapted for application to decker ovens and is very advantageous in that it enables the temperature of the various parts of the oven to be controlled very effectively. The pipes may be round, square, oblong, rectangular, or other shape, in transverse section.

The said invention also comprises improvements in the floors of said oven, in the provision of heat collecting chambers, and in the construction of the furnace proper.

An important feature of this invention consists in constructing a decker oven with heating pipes arranged in horizontal layers disposed beneath removable floors. All these pipes are contained in one chamber and it is therefore obvious that the air can circulate freely between them. Preferably at the sides and center of each tier, that is to say, between the two center pipes, and also between the two outside pipes of each tier and the walls of the chamber, greater space is provided than between the other pipes so as to

allow of better circulation while baking, as during this operation the baking floors extend over the pipes and would to some extent interfere with the circulation. The circulation however would only be interfered with, that is to say, it would not be entirely checked, as the baking floors being a distance above the pipes would always allow room for circulation.

Another important feature of my improved decker oven relates to the provision at each floor level, front and back of such ovens what may be termed flats, by which is meant flues that extend on a level with the pipes and by which the said pipes are fed with the products of combustion from the furnace at either front or back of the oven. By means of such flats or flues, in combination with dampers, the products of combustion from the furnace are carried to any or all of the several rows of pipes and the temperature of the various parts of the oven can be thereby readily controlled.

The said invention also comprises other improvements in various details as hereinafter described.

Figure 1 is a front elevation of an oven constructed according to my invention. Fig. 2 is a vertical longitudinal central section of the same. Fig. 3 is a sectional plan, one of the baking floors being removed. Fig. 4 is a half section on the line  $x, x$ , and a half section on the line  $x', x'$ , Fig. 2. Fig. 5 is a half section on the line  $y, y$ , and a half section on the line  $y', y'$ , Fig. 2. Fig. 6 is a view of the pipe flues and their connections, one of said flues being shown in section. This figure is drawn on a larger scale. Fig. 7 is a plan of a removable floor constructed as hereinafter described. Fig. 8 is an end view of same. Fig. 9 is an end view of the cover therefor.

A is the furnace.

B, B' are flues situated beneath the floor of the oven.

H, H are heat-collecting chambers built of fire-brick and situated symmetrically on each side of the fire place A, beneath the flues B, B'. Said chambers communicate with each other at their ends. Opposite the front ends



of the said chambers is a transverse wall H' Fig. 4 between which and the outer wall of the oven is formed a flue or passage H<sup>2</sup>. Said flue communicates by an outlet H<sup>3</sup> with the flue B' which latter communicates with the flue tubes in the oven through an ascending flue B<sup>2</sup> at the back end.

Dampers C C' are provided as shown for opening and closing the communication between the flues B and the chambers H and between the flues B' and the passage H<sup>2</sup>. Said dampers slide in frame C<sup>0</sup>, C<sup>0</sup> and each damper is adapted to close either of two openings in the frame one of which openings communicates with the chambers H, and the other with the corresponding passage H<sup>2</sup>. When the dampers are drawn out communication is thereby made between the flues B and the chambers H, and when the dampers are pushed in, the aforesaid communications are closed and others are opened between the flues B' and the passages H<sup>2</sup>. The dampers on the same side of the oven are however not intended to be either both out or both in at the same time, but when one is out, the other must be in, unless it is desired to damp down the fire.

The chambers H are very advantageous where hot coke fires are used as they serve to keep the temperature very uniform. Openings H<sup>0</sup> furnished with suitable soot doors are provided in the front of the oven to admit of cleaning out the chambers H.

The several decks of the oven are formed by flues or pipes E which extend from front to back of the oven and communicate with flues or flats at the front and back in such manner as hereinafter explained that the products of combustion from the fire can be passed through the pipes in either direction, and moreover without bringing the gases into contact with the bread and without emitting smoke. The pipes E are supported at the back end by boxes I that are filled with sand. The pipes pass through the said boxes from front to back thereof and are retained in place by means of caps I<sup>0</sup> secured on the boxes after the pipes are placed in position. This arrangement allows of free expansion and contraction of the pipes during changes of temperature without putting pressure on the walls of the oven, and at the same time the sand preserves a perfect joint. The front ends of the pipes are secured to, and open into, hollow transverse girders or boxes I'. The transverse flues or flats L<sup>0</sup> at the back are formed in the brickwork of the oven. Each of said flats L<sup>0</sup> except the lowermost one is divided centrally, one side communicating with half the pipes E at that floor level, and the other half communicating with the remaining half of said pipes. The uppermost flue or flat at the back connects with the chimney at the point marked K.

L', L<sup>2</sup> L<sup>3</sup> are dampers placed at each floor level between each flat or flue L<sup>0</sup> and the one above it.

It will be obvious from the above description and drawings that the furnace gases or products of combustion will on leaving the furnace first circulate among the heat storing chambers H which will become very hot.

Assuming now that the damper C, on each side of the fireplace is drawn out and the damper C' is pushed in, the gases will ascend from the chambers H on each side into the flue B above and will circulate in the direction indicated by the arrow round that flue which it will be observed is U-shaped in plan, and will then descend into the passage H<sup>2</sup> and rise again through the opening H<sup>3</sup> into the flue B' along which they will now proceed and enter the lowermost flue or flat at the back end of the oven, and thence into the pipes E. If the damper C be pushed in, and the damper C' drawn out the effect will be to change the direction of the circulation in the flue B. The gases will now ascend from the lowermost flat L<sup>0</sup> into the one next above it through whichever of the dampers at the ends thereof is open and then will pass through one half of the pipes E to the front end of the oven, then through the hollow girders or boxes I' and back through the remaining pipes at that floor level to the flue or flat at the back whence they rise into the next flat above and so in the same manner through the next tier of pipes and are finally discharged into the chimney. It will be observed that the two dampers on the same level at the back must not be both open or both shut at the same time, but one must be open and the other shut, and also each damper is in contrary phase to the one immediately above it and to the one immediately below it. It is further obvious that by reversing all the dampers, the direction of the currents through each row of pipes will be reversed. By this construction a perfect control is insured over the heat of the oven. It will be further observed that there is ample room for free circulation of air between the pipes. Thus the hot air will ascend from the first deck which may be the hottest to the second or third decks which may be colder owing to some cold work in that part of the oven or possibly owing to less heat passing through the pipes, but be it as it may, the cold air descends, and the hot air ascends, thus equalizing the temperature.

On comparing this system with decker ovens where each deck is a complete and separate chamber having no internal connection whatever between one deck and another it is very obvious that the herein described oven which is one chamber and virtually one oven, has many points of advantages.

The oven is provided with sliding doors N at each deck level. Each door extends half way across the oven, and there are two such at each level one sliding behind the other.

L<sup>3</sup>, L<sup>3</sup> are soot doors in front of the boxes I' each of which doors is constructed to cover the fronts of a whole range of pipes. Inside each door I provide a plate which holds be-



tween it and the door, ashes or some other non-conducting material.

The heat radiated from the furnace doors is very great and is disagreeable to any person working at the mouth of the oven. In order to minimize this and also to economize the heat I use in front of the furnace a non-conducting door P Fig. 2 which is carried by wheels P' which travel on rails P<sup>2</sup>, the bottom of the door being steadied by traveling in a grooved rail P<sup>3</sup>. These furnaces are placed beneath the floor level. The non-conducting door will run back into a prepared space between the oven furnace wall on one side and the earth on the other. Steps descend to the furnace from the floor line. The door is preferably made hollow or box-shaped and filled with ashes, asbestos or other suitable non-conducting material.

I provide the oven with a movable furnace mounted on wheels adapted to run on rails so that the furnace can be easily and rapidly removed for repairs when required.

Referring to Fig. 2, A is the movable furnace, which is built on a strong frame S' which is carried by wheels S<sup>2</sup> that run on fixed rails S<sup>3</sup>. The furnace can be run in and out on the said rails without disturbing the oven. The door of the furnace may be carried by the furnace frame or it may be separate therefrom. The fire bars are supported by cross bars which rest in recesses in the frame S'. Beneath the frame S' and inside the wheels and rails are arranged downwardly projecting longitudinal ribs or webs S<sup>6</sup> which project below the level of the rails and form the ash-pit and serve also to protect the wheels and rails from the ashes and from the excessive heat of the furnace. The said ribs or webs are arranged moreover to dip into grooves or channels say about two inches deep and about two inches wide. These grooves are filled with sand to prevent air leakage which would check the draft. At the back of the oven I form a ledge or shelf S<sup>7</sup> say two inches wide upon which when the furnace is about to be run in, soft mortar is placed, for the purpose of making a joint between the back of the furnace and the rear wall of the furnace pit. A groove is preferably made in the said rear wall for this shelf to fit into and thus permit of a good joint being made.

Those conversant with the trade know well how necessary it is that the dough should be of a certain stiffness to stand upon the peel, and this being so there is no attempt made to work light doughs; but by the apparatus which is now to be described the lightest dough can be baked, and outside loaves will be almost done away with, as they can be set in such a manner as to be perfectly straight and not over-crust. For this purpose the

floors of the oven are made removable, and the same are withdrawn, when it is required to set the loaves thereon. When the loaves are set, the floors are replaced in the oven and retained until the baking is complete. It will be obvious that all the loaves will by this method receive the same amount of baking and thus great regularity will be obtained.

Each floor consists of a rectangular frame T made of angle iron and having a bed formed of wire netting or the like of close mesh. Said frame is furnished with wheels T' which run on rails T<sup>2</sup> provided in the furnace. Said floor can thus be very readily run in and out of the oven.

The bread may be left on the movable floor as long as desirable, and being together in one mass it will stand a long time fresh. As these movable floors are comparatively cheap, several of them may be provided for the same oven.

Over the batch of bread I place a light tin or iron cover U<sup>6</sup> which is fairly tight and serves to retain the steam given off by the bread when baking. Vent holes U<sup>7</sup> may be provided to prevent accumulation of steam pressure which would interfere with the proper rising of the bread. By means of the said cover I maintain the top crust soft and more evenly cook the loaf.

What I claim is—

1. In a baker's and confectioner's oven, the combination with the heating tubes, of hollow cross girders with which the tubes are connected by means of a sliding joint, a box surrounding each said joint and containing sand to keep the same tight, and soot doors in the cross girders to admit of cleaning the tubes, substantially as described.

2. In a baker's and confectioner's oven, the combination with the heating tubes and connecting-hollow cross girders, of the removable floors provided with wheels and supported on tracks above and in proximity to said heating pipes and girders, substantially as described.

3. In a baker's and confectioner's oven, the combination with the decks or tiers of heating pipes and flues provided with dampers, of the removable floors located above and in proximity to said pipes and provided with removable covers, substantially as described.

In witness whereof I have hereunto set my hand this 25th day of January, 1894.

JOHN ADAIR.

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