

No. 843,924.

PATENTED FEB. 12, 1907.

A. BERGMAN.  
FURNACE.

APPLICATION FILED OCT. 3, 1906.

2 SHEETS—SHEET 1.

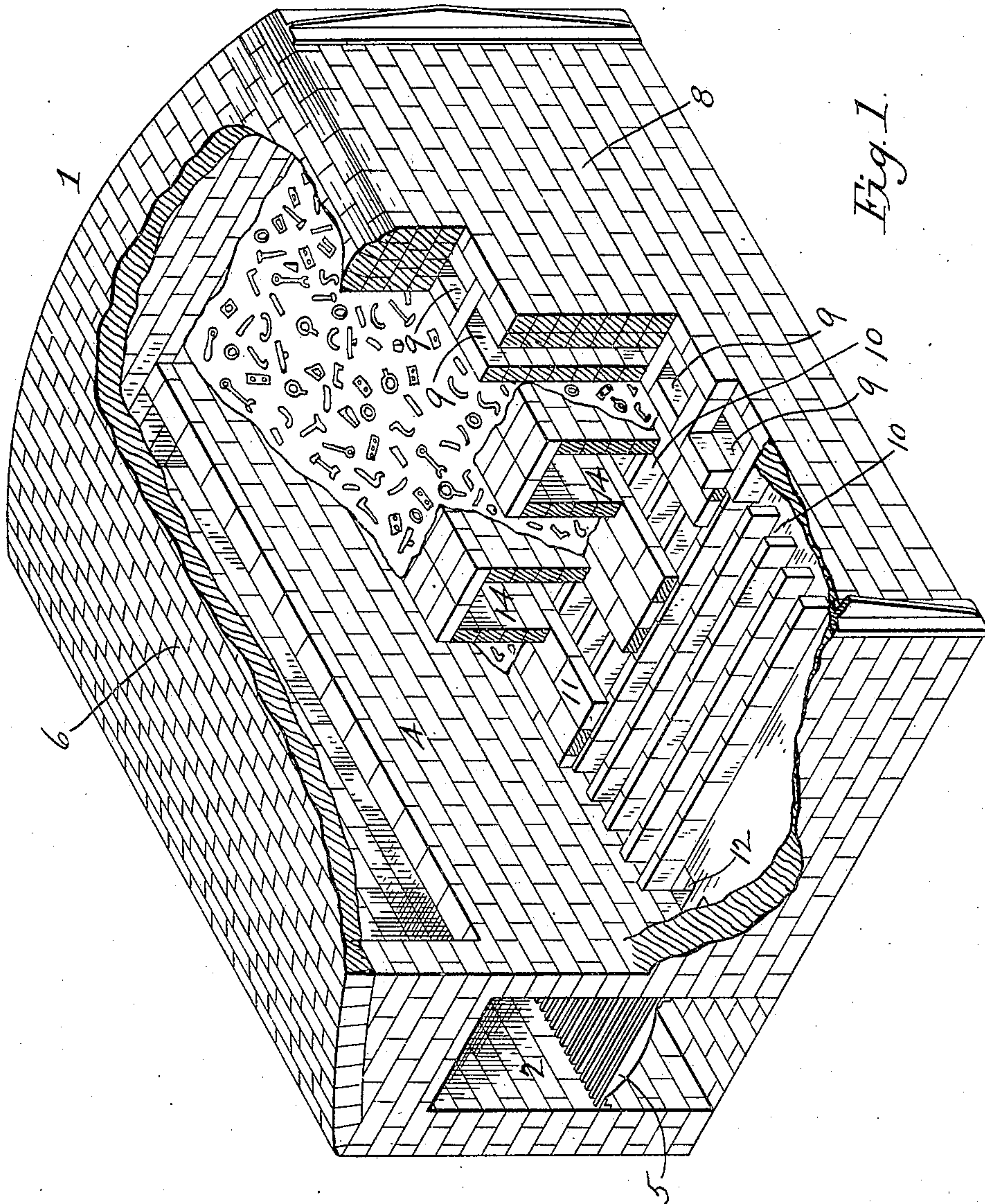


Fig. 1.

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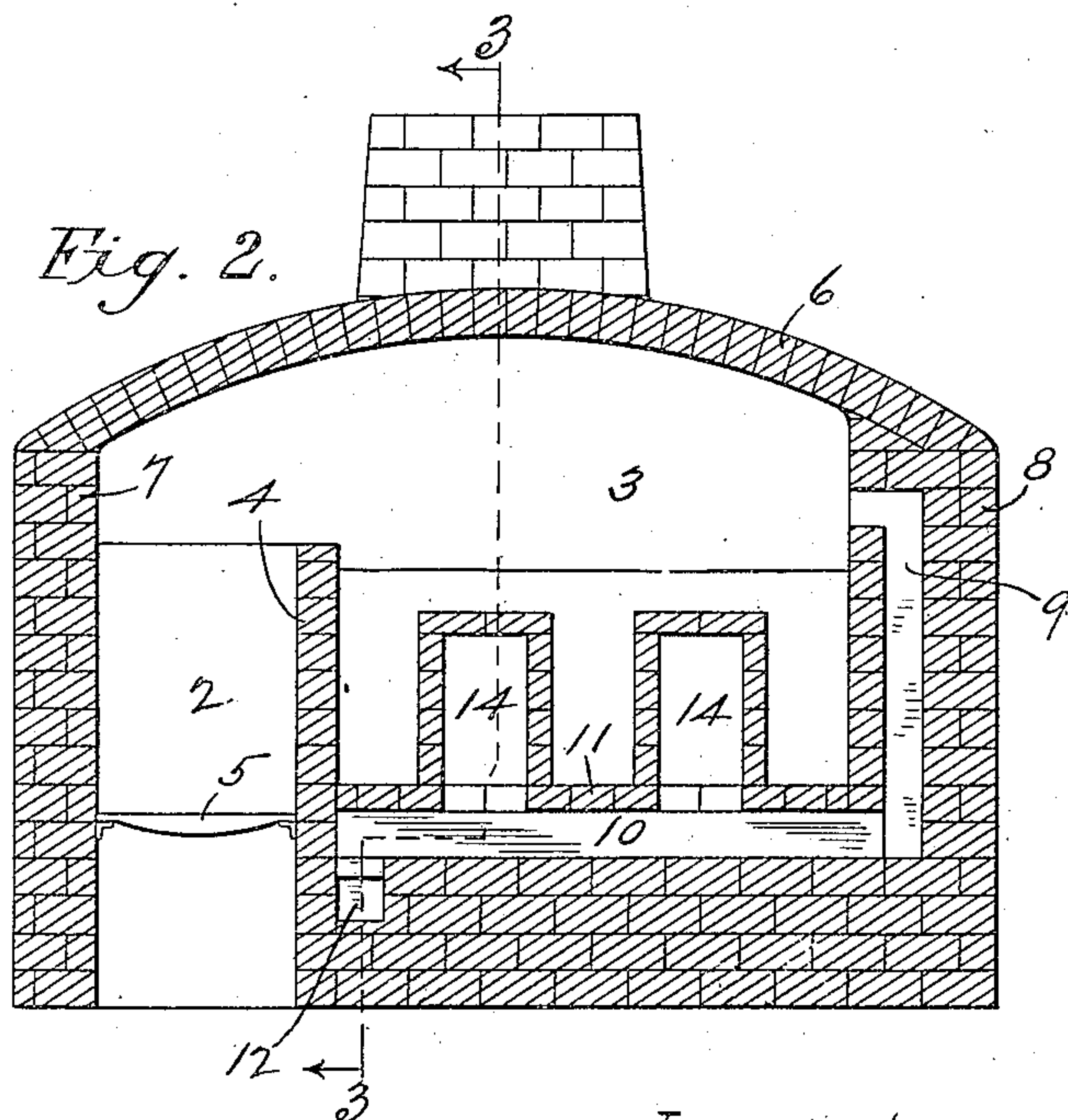
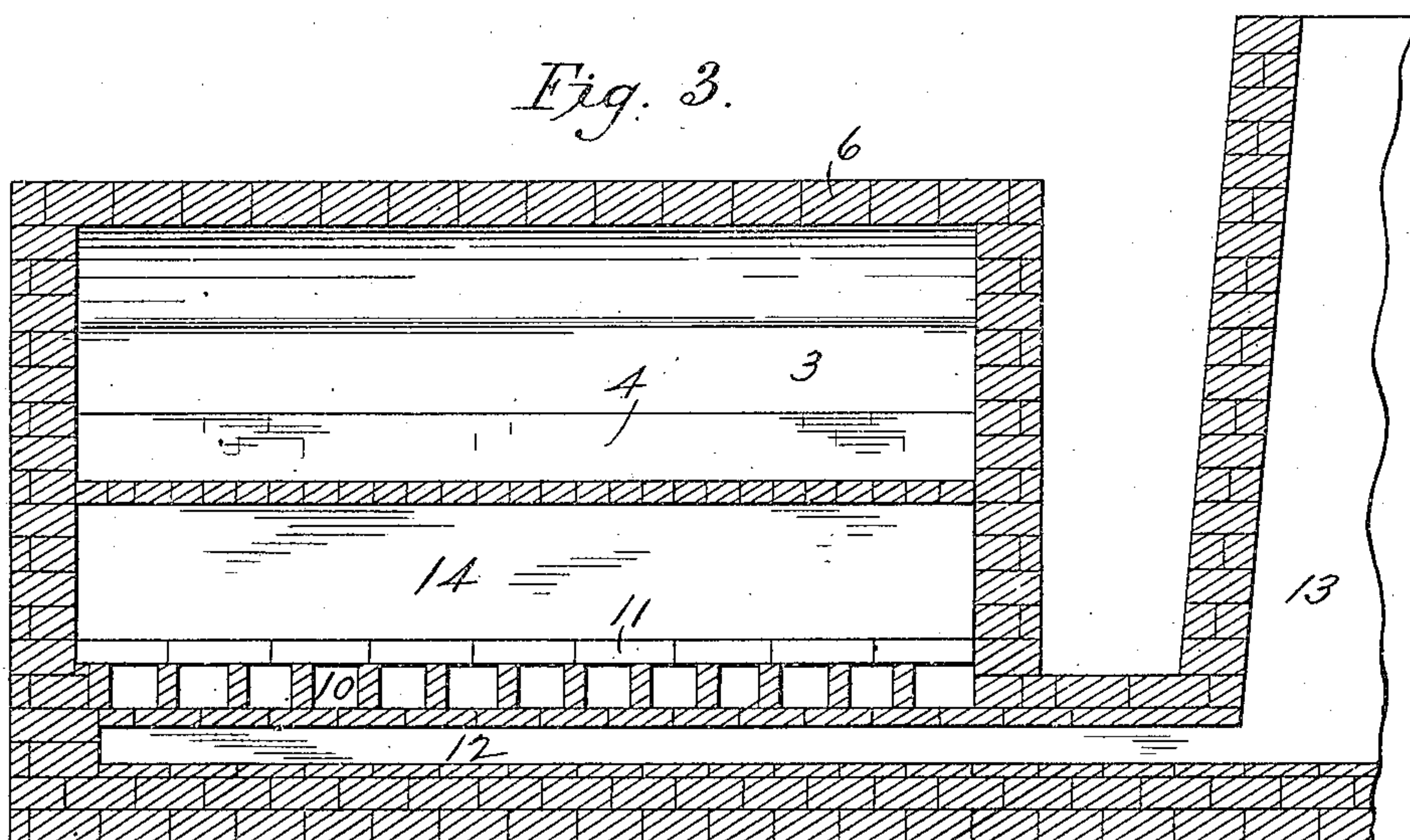
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# UNITED STATES PATENT OFFICE.

AUGUST BERGMAN, OF BELLEVUE, OHIO.

## FURNACE.

No. 843,924.

Specification of Letters Patent.

Patented Feb. 12, 1907.

Application filed October 3, 1906. Serial No. 337,175.

*To all whom it may concern:*

Be it known that I, AUGUST BERGMAN, residing at Bellevue, in the county of Huron and State of Ohio, have invented a certain  
5 new and useful Improvement in Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates to furnaces, and has  
10 for its object to improve the operation and simplify the construction of the same.

While the invention is particularly adaptable to annealing or malleableizing furnaces it will be understood that certain features  
15 thereof are applicable to furnaces which are designed for other purposes.

It has been proposed in malleableizing-furnaces to distribute the heat to the castings and malleableizing materials by circulating  
20 the products of combustion through temporary flues built into the ovens proper of such furnaces, the lower flues resting on the oven-bottoms and the upper flues being built into the ovens and resting on and being supported  
25 by the castings and malleableizing materials. This mode of construction is liable to several disadvantages which it is the object of my invention to overcome. In the first place the heat is not uniformly distributed through the  
30 mass of castings, owing to the tendency for the inlet ends of the flues to be heated to a higher temperature than the outlet ends thereof. Furthermore, the weight of the upper flues warps and distorts the castings,  
35 causing considerable loss of castings thereby. A further objection resides in the liability of the bodies of the upper flues to get out of line with the inlet and outlet connections, said flues being built of fire-brick and being supported only by the castings and malleableizing materials. A still further objection resides in the fact that the upper flues have to be taken down when the contents of the oven are removed and have to be rebuilt when the  
45 succeeding charge of castings and malleableizing material is placed therein. By my construction I am able to overcome the disadvantages noted and to accomplish better results with a cheaper and less complicated construction than has been heretofore employed  
50 for this purpose.

While my invention is particularly useful in connection with ovens for malleableizing purposes, certain features thereof are equally  
55 advantageous in furnaces for other purposes.

Generally speaking, the invention may be described as consisting of the combinations of elements embodied in the claims hereto annexed.

Referring to the drawings, Figure 1 represents a perspective view, with parts broken  
60 away, of a furnace constructed in accordance with my invention, showing the materials packed therein. Fig. 2 represents a transverse sectional view of such furnace, and Fig. 65 3 represents a longitudinal sectional view taken on the line 3 3 of Fig. 2.

In the drawings, 1 represents the furnace, the same being shown as provided with a fire-box 2, located at one side thereof and separated from the oven proper, 3, by means of a  
70 fire-wall 4. The fire-pot is shown as extending continuously from end to end of the furnace and is provided with the grates 5 of ordinary construction. The furnace is provided with an arched roof 6, resting on the  
75 side walls 7 and 8. The side wall 8 is thicker than side wall 7 to accommodate therein a series of flues 9, the upper ends of which communicate with the oven proper, 3, slightly  
80 above the level of the bridge-wall 4, and the lower ends of which communicate with corresponding transverse flues 10, extending beneath the floor 11 of the oven.

The series of communicating flues 9 and 10  
85 occupy the full internal length of the oven and constitute, in effect, a continuous flue-space surrounding two sides of the oven. Below the oven-bottom and at the side thereof adjacent the bridge-wall there is provided a longitudinal flue 12, communicating  
90 with the stack 13. Each of the transverse flues 10 discharges into this flue 12, and the products of combustion from the fire-box pass up over the bridge-wall 4, down the flues  
95 9, through transverse flues 10 and along the longitudinal flue 12 to the stack. The space in the oven between the bridge-wall 4 and side wall 8 is thus surrounded by a heating agent. The purpose of providing a plurality  
100 of flues 9 and 10 rather than a single continuous flue in the side wall 8, extending the length of the oven and communicating with a corresponding continuous flue extending beneath the oven for the length thereof, is to  
105 strengthen the construction of the inner side wall of flues 9 and of the bottom of the oven by means of the partitions between the individual flues.

14 denotes a pair of chambers or pockets 110



which extend longitudinally of the furnace from front to rear thereof. These chambers or pockets are preferably built up of fire-brick and are inclosed on all sides except the bottom, the bottom being open and communicating with the transverse flues 10. Two such pockets or chambers are shown in the drawings, and these pockets or chambers extend upwardly to within a short distance of the top of the fire-wall 4. It will be understood that the number and dimensions of these pockets or chambers are dependent upon the size of the oven in which they are to be used. The castings and malleableizing material are packed in between and on top of the pockets or chambers and between the same and the adjacent walls 4 and 8.

In operation the products of combustion from the fire-box pass over the wall 4, beneath the roof 6, and over the castings that are packed around and on top of the chambers 14, downwardly through flues 9, transversely beneath the oven-bottom, through flues 10, and longitudinally of the furnace through the uptake-flue 12. Owing to the fact that the flue-space in the wall 8 and beneath the oven-bottom is of the same width as the length of the fire-pot the products are divided between the individual flues 10 and flow substantially uniformly through the same. Owing to their inferior gravity the products of combustion rise freely into the pockets or chambers 14, the cool air dropping into the flues 10 and passing into flue 12 and stack 13. The pockets or chambers are constantly filled with the hottest products of combustion, and the fact that they communicate freely with the entire flue-provided space beneath the floor 11 insures an even distribution of heat to them from end to end thereof. In cases where flues are built into the oven and the products of combustion are circulated longitudinally through the same the inlet ends of the flues are heated to a higher temperature than any other portion of the flues, and particularly than the outlet portions of said flues. This is especially the case at and for a considerable period of time after the operation of firing has been instituted.

As will appear from the drawings, the pockets form a permanent part of the oven construction and need not be removed when the malleableizing or annealing operation has been completed. By making the pockets of fire-brick it will be very easy to repair the same should repairs be necessary. Furthermore, the castings are not subjected to the weight of the fire-brick, and hence do not distort or bend out of true shape during the malleableizing operation.

While for the purpose of clearness I have described my invention as employed for the purpose of malleableizing castings, I do not propose to limit its application to this art, as

it is evident that it is equally adaptable to furnaces which may be employed for other purposes, wherever uniform distribution of heat is necessary with the provision of a large heating-surface.

Having described my invention, what I claim is—

1. In a furnace, the combination of the side and end walls and roof, of a fire-box adjacent one of said side walls, an oven, a bridge-wall extending between said fire-pot and the oven, one or more downwardly-extending flues in the other side wall of the furnace, one or more transverse flues beneath the oven-bottom and communicating with the flue or flues in the side wall, one or more longitudinal chambers or pockets in said oven and communicating through the bottoms thereof directly with the said transverse flue or flues, and an offtake-flue communicating with the transverse flue or flues, substantially as specified.

2. In a furnace, the combination of a fire-box, an oven adjacent thereto, one or more downwardly-extending flues in a side wall of the furnace, one or more transverse flues beneath the oven-bottom and communicating with the flue or flues in the side wall, one or more longitudinal chambers or pockets in said oven and communicating through the bottoms thereof directly with the said transverse flue or flues, and an offtake-flue communicating with the transverse flue or flues, substantially as specified.

3. In a furnace, the combination of the side and end walls, of a fire-box adjacent one of said side walls and having a bridge-wall, a plurality of downwardly-extending flues in the other side wall, a plurality of transverse flues beneath the oven-bottom communicating with the first-mentioned flues, a common offtake-flue communicating with the discharge ends of said transverse flues, and a plurality of longitudinal chambers or pockets extending from end wall to end wall of the furnace and provided with open bottoms communicating with the transverse flues, substantially as specified.

4. In a furnace, the combination of the side and end walls, of a fire-box adjacent one of said side walls and having a bridge-wall, a downwardly-extending flue in the other side wall, a transverse flue beneath the oven-bottom communicating with the first-mentioned flue, an offtake-flue communicating with the discharge end of said transverse flue and a longitudinal chamber or pocket in the oven provided with an open bottom of substantially the full length thereof and communicating directly with the transverse flue, substantially as specified.

5. In a furnace, the combination of the side and end walls and roof, of a bridge-wall adjacent one of said side walls and extending from end wall to end wall, a fire-box between



said bridge-wall and the adjacent side wall, one or more downwardly-extending flues in the other side wall, one or more transverse flues communicating with the lower ends of the first-mentioned flue or flues and extending transversely of the oven beneath the floor thereof as far as said bridge-wall, an offtake-flue beneath the transverse flue or flues and communicating with the discharge end or ends thereof, and one or more pockets or chambers projecting upwardly into the oven to a point a short distance below the top of the bridge-wall, the bottom of the oven being open or removed beneath said chamber or chambers to provide a free communication between the latter and the transverse flue or flues, substantially as specified.

6. In a furnace, the combination of a fire-box, an oven adjacent thereto, said oven having beneath the bottom wall thereof a flue-space, and a pocket or chamber projecting upwardly from the bottom of the oven and having means establishing communication throughout substantially the length thereof with the flue-space, substantially as specified.

7. In a furnace, the combination of a fire-box, an oven adjacent thereto, one or more flues extending beneath the bottom of said oven, and a pocket projecting upwardly into the oven, extending transversely of said flue or flues and being closed at the ends and communicating through the bottom thereof for

substantially its full length with said flue or flues, substantially as specified.

8. In a furnace, the combination of a fire-box, an oven having a flue-space in one of the walls thereof the width of which is substantially equal to the length of the oven, said oven also having beneath the same a flue-space communicating with the former flue-space, the width of the latter flue-space being also substantially equal to the length of the oven, and a pocket projecting upwardly into said oven, extending substantially the length thereof and communicating freely through the bottom thereof with the latter flue-space, substantially as specified.

9. In a furnace, the combination of a fire-box, an oven having beneath the bottom wall thereof a flue-space the width of which is substantially equal to the length of said oven, and a chamber or pocket projecting from the bottom wall of the oven upwardly into the oven and extending substantially the length thereof, said pocket or chamber having closed ends and an opening in the bottom communicating with the flue-space, substantially as specified.

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

AUGUST BERGMAN

Witnesses:

JOHN D. KOSHT,  
J. B. HULL