

M. BITTRICH.

FURNACE.

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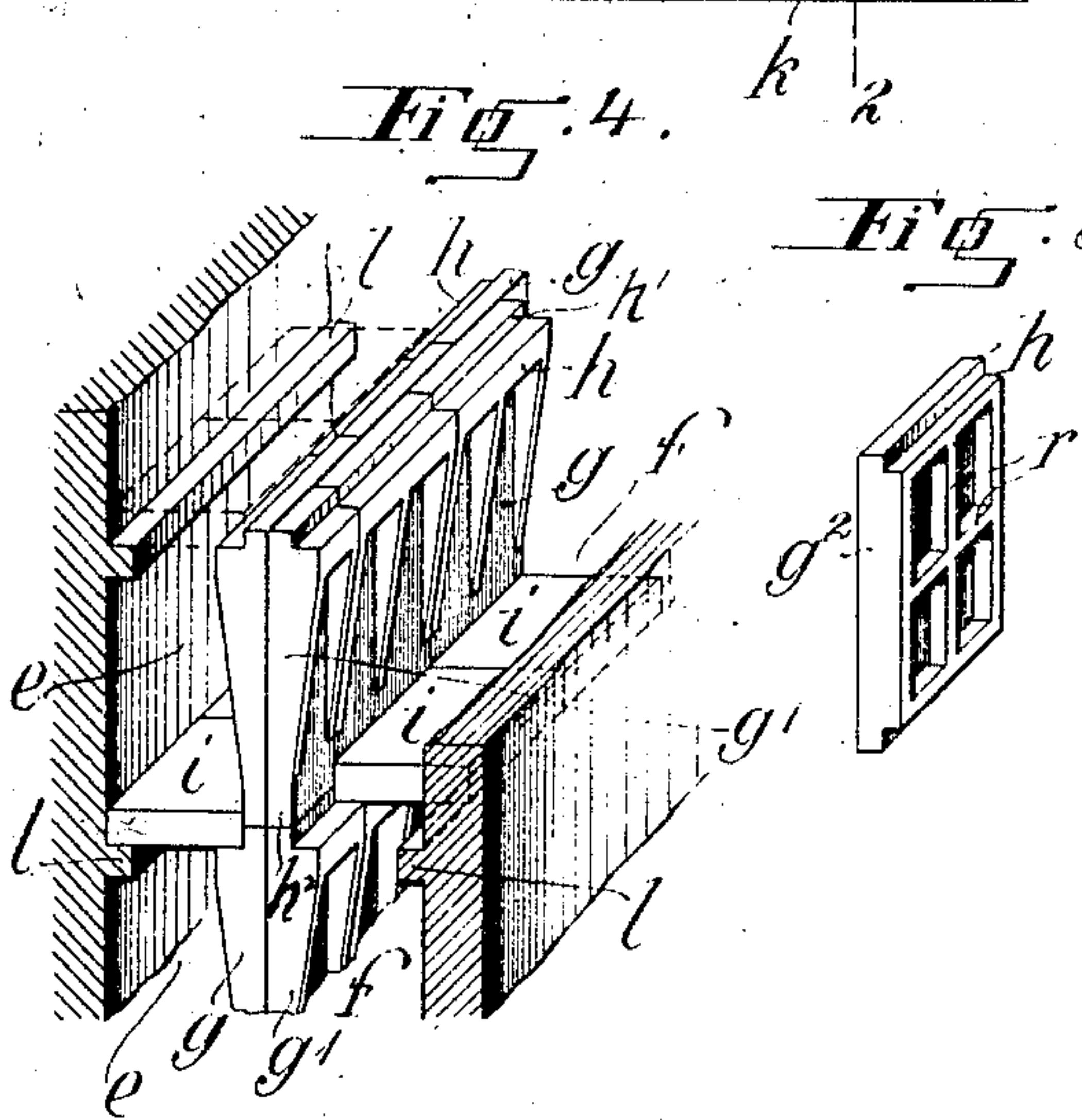
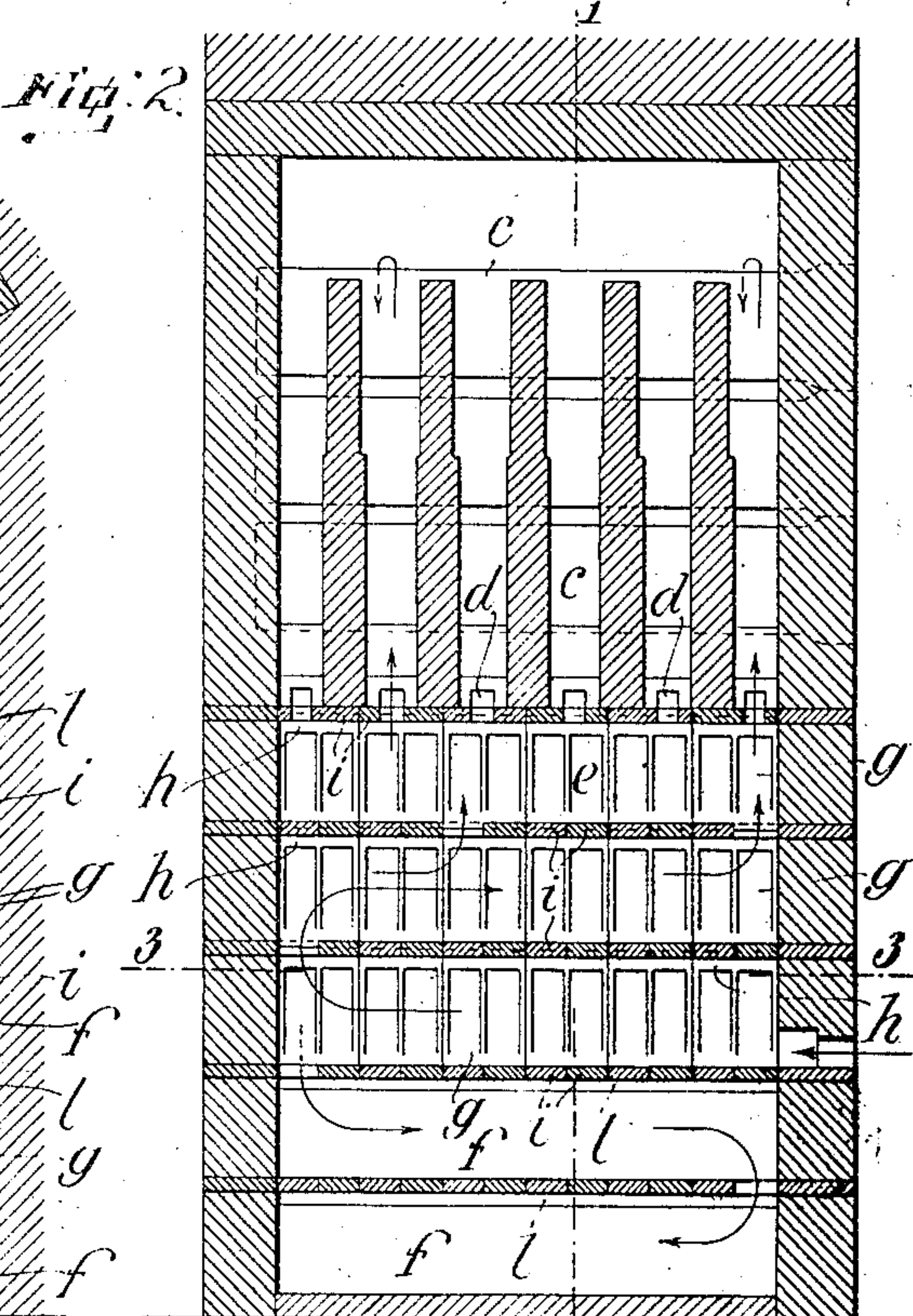
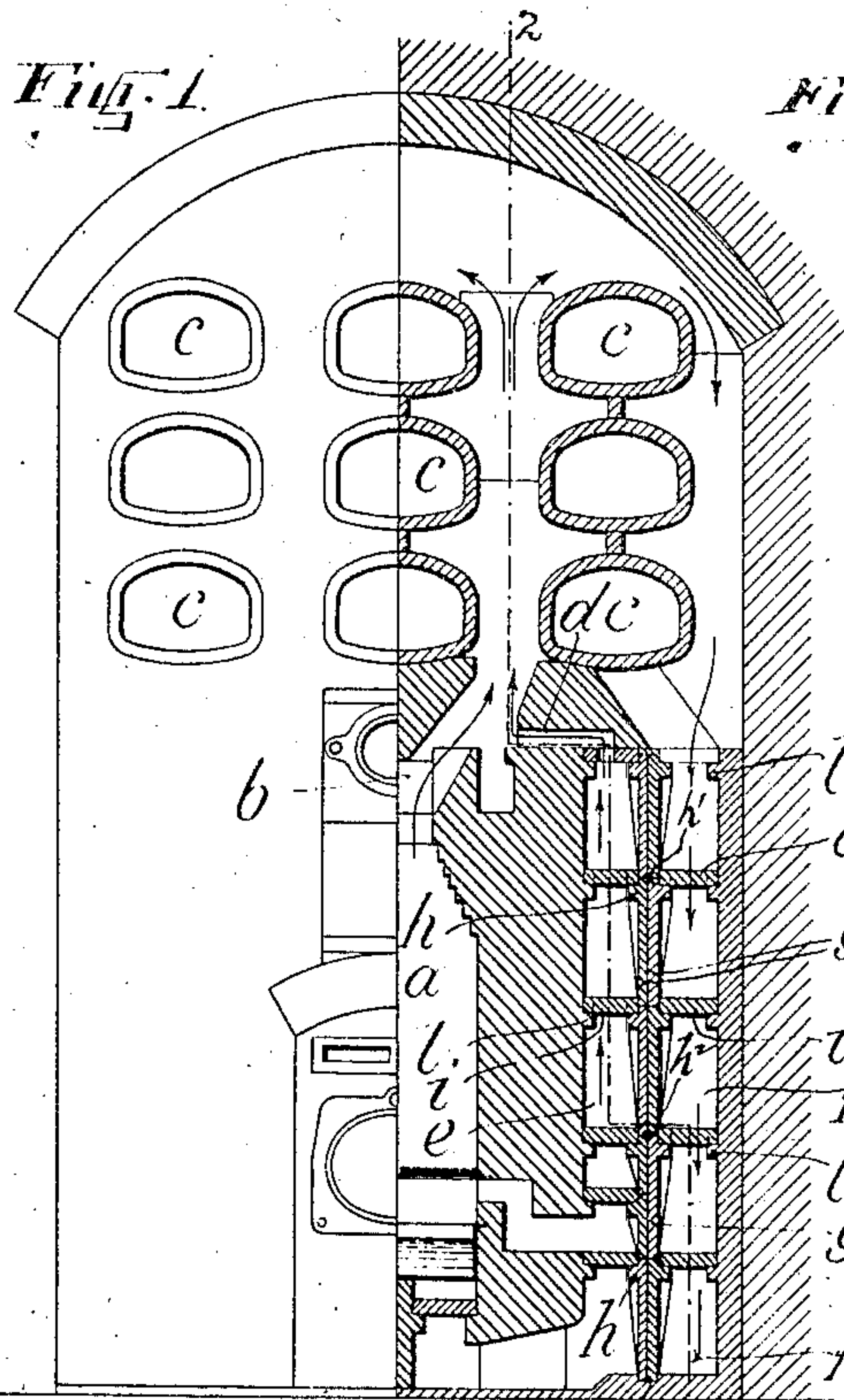
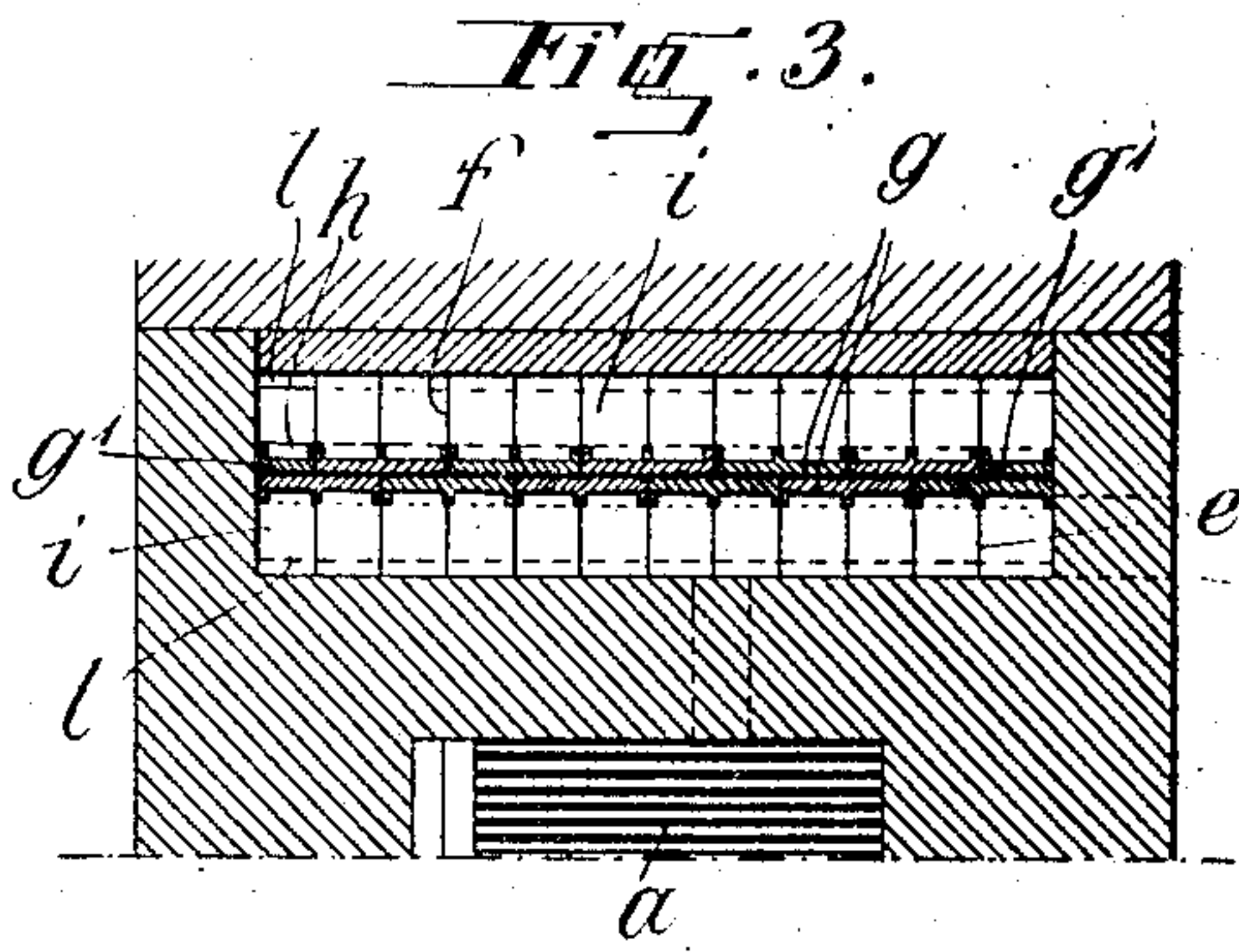


Fig. 5.



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UNITED STATES PATENT OFFICE.

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FURNACE.

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To all whom it may concern:

Be it known that I, MAX BITTRICH, citizen of the German Empire, residing at present at Milan, Italy, have invented certain new and useful Improvements in Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a regenerator for retort-ovens and other furnace systems with regenerative firing, and has for its object to transmit the load pressure, produced by the retorts or other parts of the oven located in the upper portion of the regenerator chamber, to the foundations, partly through the vertical division walls between the air and gas flues of the regenerator, which walls act as supporting pillars. For this purpose the division walls of the flues are built of plates set directly one upon the other edgewise. At the same time, in this way the building of the regenerator is made easier.

In the drawing is shown, as an example of the manner of carrying out the invention, a retort oven with a regenerator, in which drawing—

Figure 1 shows a retort oven one-half in elevation and the other half in vertical section on the line 1—1 of Fig. 2. Fig. 2 shows a vertical section on the line 2—2 of Fig. 1; Fig. 3, a cross section on the line 3—3 of Fig. 2; Fig. 4, a detail perspective view of a part of the regenerator on an enlarged scale; and Fig. 5 a similar view of a modified form of the plates from which the flues of the regenerator may be built.

The retort oven shown is provided in the known manner with a middle generator *a* from which the generator gas flows through the flues or ducts *b* into the upper chamber of the oven which contains the retorts *c*, the gas mixing with the air of combustion entering through the passage or flue *d*, and heated in the regenerator.

The oven is built symmetrically and has a regenerator at each side, each of which consists of two groups of flues, each group comprising a series of flues lying one above the other, one group serving for the introduction of the air of combustion, the other for drawing off the fire gases, that is, the gaseous products of combustion.

The flues *e* for the air of combustion are located upon the inner side, next to the gen-

erator *a*, while the flues *f*, for the escaping gaseous products of combustion lie upon the outer side of the retort ovens, as is shown in Fig. 1. The air of combustion and the gaseous products of combustion move in opposite directions in a well known manner.

The separation of the air-flues *e*, from the draft flues *f*, which carry off the gaseous products of combustion, is done by means of vertical pillar-like division walls, while the individual flues, lying one above the other, are separated from one another by horizontal cover plates.

The vertical division walls consist of plates *g*, which are placed edgewise directly upon one another, and each wall is formed of two strata of plates laid closely against each other. The individual plates, as best shown in Fig. 4, are provided on the outer sides with bracket-like bearings *h*, upon which rest horizontal flue cover-plates *i*. The upper supporting surfaces of the bearings, *h*, are of such a height that tongues, *h'*, are left on the plates above the bearings, *h*, which tongues form a shoulder or stop against which the edges of the cover-plates *i* rest. The lowest plates *g* stand in grooves *k* formed in the oven bottom, and the heights of the bearings *h* are such in proportion to the thickness of the plates *i*, that the said cover-plates *i* when in place will lie with their upper surfaces above the upper edge of the corresponding vertical plate *g*, whereby the cover-plates *i* support the vertical plates *g*, laterally the said plates having lower vertical surfaces at *h²*, as shown. Upon the oven wall of the regenerator opposite the bearings *h*, are located fixed bearings *l* for the cover plates *i*. The plates or tiles of which the vertical division walls are built up thus have the following characteristics: They have a flat surface extending the whole length of the plate, along which surface the plates of two adjacent vertical strata are placed into contact with one another. The side of the plate opposite the flat surface is provided with a bracket-like or wedge-shaped bearing, *h*, forming a shelf at its top, which bearing occupies a position intermediate the ends of the plate or tile and leaves a tongue, *h'*, at the upper end and a portion, *h²*, at the lower end whose surface is substantially parallel to the opposite flat surface. The shelf, tongue *h'* and surface *h²* extend entirely across the plate. The vertical plates *g* are banded together

by arranging the two strata of plates to break joints vertically, thus preventing leakage through the walls. For this purpose it is advisable to make end plates g' (Fig. 4) of one-third the width of the main plates, these end plates being placed in the respective horizontal series of plates in such a manner that one such plate g' , is located at one end of one row in one stratum of plates and another end plate g' at the opposite end of the corresponding row of the other stratum of plates. In this way the plates of the two strata have their joints displaced to an extent equal to the width of one end plate. The packing of the horizontal joints between the vertical plates is done by the cover-plates i , as will be clear from the drawings, since these plates cover said joints. No especial means is requisite for packing the joints between the respective cover-plates, as the air of combustion and the burned gases flow side by side and are perfectly separated by the vertical division wall. Obviously any number of air flues and draft may be arranged side by side in the same manner, whereby the number of vertical division walls are correspondingly increased. Also, the division walls may be made of more than two strata of plates.

In Fig. 5 is shown another form of plate g^2 , which may be employed in forming the vertical division walls, this plate being shown as provided with ribs r , which cross each other and serve to strengthen the plate. In other respects this plate or tile is the same in substance as that shown in the preceding figures, that is, it has an intermediate bearing h , forming a shelf and leaving a tongue, h' extending above the bearing to a height less than the thickness of the cover plates, i , and a lower surface h^2 substantially parallel to the flat back surface. In this case again the shelf, tongue h' and lower surface h^2 extend entirely across the plate or tile.

Having thus fully described my invention, what I claim is:

1. In a furnace, a vertical division wall comprising a vertically arranged series of rows of plates, the plates of all rows except the top and bottom rows having their edges at all points in direct contact with the edges of the adjacent plates, the plates being provided at their fronts with projecting bearings, located below the upper edges of the plates, in combination with continuous lines of cover plates, each resting on a bearing of one vertical plate and engaging the side wall at the bottom of the vertical plate above it, and a support for the other ends of the cover plates.
2. In a furnace, a vertical division wall comprising a series of superposed rows of rectangular plates provided with bearings projecting from the fronts of said plates, in combination with cover plates resting on

said bearings and having ends abutting against the side walls of the rectangular plates in two superposed rows, and means for supporting the other ends of the cover plates.

3. A plate for furnace walls having a flat back surface and provided at its front surface with a bearing projecting beyond said front surface and forming a supporting ledge below the upper edge of the plate and leaving a lower surface, substantially parallel to the back surface.

4. A plate for furnace walls having a flat back surface and provided on its front surface with wedge-shaped bearing forming a shelf extending entirely across the plate said bearing arranged on an intermediate portion of the plate, said plate having a tongue above said bearing and a surface substantially parallel to the back surface, the tongue and the parallel surface extending entirely across the plate.

5. In a furnace, a vertical division wall comprising a vertically arranged series of rows of plates arranged back to back, and edge to edge in a vertical and horizontal direction, each plate having a flat back surface and provided at its front with a bearing projecting beyond said front surface and forming a supporting ledge below the upper edge of the plate and leaving a lower surface, substantially parallel to the back surface, in combination with a continuous line of cover plates resting with one end on the ledges and of a thickness exceeding the height of the upper edge of the plate above the ledge, and a support for the other ends of the cover plates.

6. In a furnace, a vertical division wall comprising a vertically arranged series of rows of plates arranged back to back, and edge to edge in a vertical and horizontal direction, each plate having a flat back surface and provided at its front face with a horizontal shelf and a lower portion substantially parallel to the back surface, and at its upper portion with a tongue, the shelf, parallel portion and tongue extending entirely across the plate, in combination with a continuous line of cover plates resting with one end on the shelves and of a thickness greater than the height of the tongues, and a support for the other ends of the cover plates.

7. In a furnace, a vertical division wall comprising a vertically arranged series of rows of plates arranged back to back, and edge to edge in a vertical and horizontal direction, each plate having a flat back surface and provided at its front face with a horizontal shelf formed by a wedge-like bearing or bracket and with a lower surface substantially parallel to the back surface, and at its upper portion with a tongue, said shelf, parallel portion and tongue extending entirely across the plate, in combination with a continuous line of cover plates resting with one

end on the shelves and of a thickness greater than the height of the tongues, and a support for the other ends of the cover plates.

8. In a furnace, a foundation provided with a horizontal upper groove, and a vertical division wall engaged at its lower edge by said groove, said division wall comprising a vertically arranged series of rows of plates arranged back to back, and edge to edge in a vertical and horizontal direction, each plate having a flat back surface and provided at its front with a bearing projecting beyond said front surface and forming a supporting ledge below the upper edge of the plate and leaving a lower surface, substantially parallel to the back surface, in combination with a continuous line of cover plates resting with one end on the ledges and of a thickness exceeding the height of the upper edge of the plate above the ledge, and a support for the other ends of the cover plates.

9. In a furnace, a foundation provided with a groove, and a vertical division wall engaged at its lower edge by said groove, said division wall comprising a vertically arranged series of rows of plates arranged back to back, and edge to edge in a vertical and horizontal direction, each plate having a flat back surface and provided at its front face with a horizontal shelf and a lower portion substantially parallel to the back surface, and at its upper portion with a tongue, the shelf, parallel portion and tongue extending entirely across the plate, in combination with a continuous line of cover plates resting with one end on the shelves and of a thickness greater than the height of the tongues, and a support for the other ends of the cover plates.

10. In a furnace, a foundation provided with a groove, and a vertical division wall engaged with its lower edge by said groove, said division wall comprising a vertically arranged series of rows of plates arranged back to back, and edge to edge in a vertical and horizontal direction, each plate having a flat back surface and provided at its front face with a horizontal shelf formed by a wedge-like bearing or bracket and with a lower surface substantially parallel to the back surface, and at its upper portion with a tongue, said shelf, parallel portion and tongue extending entirely across the plate, in combination with a continuous line of cover plates resting with one end on the shelves and of a thickness greater than the height of the tongues, and a support for the other ends of the cover plates.

11. In a furnace, a vertical division wall comprising a vertically arranged series of horizontal double rows of plates arranged back to back, and edge to edge in a vertical and a horizontal direction, the vertical edges in one stratum of each horizontal row breaking joints with the vertical edges of the adjacent stratum thereof, each plate having a

flat back surface and provided at its front with a bearing projecting beyond said front surface and forming a supporting ledge below the upper edge of the plate and leaving a lower surface substantially parallel to the back surface, in combination with a continuous line of cover plates resting with one end on the ledges and of a thickness exceeding the height of the upper edge of the plate above the ledge, and a support for the other ends of the cover plates.

12. In a furnace, a vertical division wall comprising a vertically arranged series of horizontal double rows of plates arranged back to back, and edge to edge in a vertical and a horizontal direction, the vertical edges of the plates in one stratum of each horizontal row breaking joint with the vertical edges of the adjacent stratum thereof, each plate having a flat back surface and provided at its front face with a horizontal shelf and a lower portion substantially parallel to the back surface, and at its upper portion with a tongue, the shelf, parallel portion and tongue extending entirely across the plate, in combination with a continuous line of cover plates resting with one end on the shelves and of a thickness greater than the height of the tongues, and a support for the other ends of the cover plates.

13. In a furnace, a vertical division wall comprising a vertically arranged series of horizontal double rows of plates arranged back to back and edge to edge in a vertical and a horizontal direction, the vertical edges of the plates in one stratum of a horizontal row breaking joint with the edges of the adjacent stratum thereof, each plate having a flat back surface and provided at its front face with a horizontal shelf formed by a wedge-like bearing or bracket and with a lower surface substantially parallel to the back surface, and at its upper portion with a tongue, said shelf, parallel portion and tongue extending entirely across the plate, in combination with a continuous line of cover plates resting with one end on the shelves and of a thickness greater than the height of the tongues, and a support for the other ends of the cover plates.

14. In a furnace, a foundation wall provided with an upper horizontal groove, and a vertical division-wall engaged at its lower edge by said groove, said division wall comprising a vertically arranged series of horizontal double rows of plates arranged back to back, and edge to edge in a vertical and a horizontal direction, the vertical edges in one stratum of each horizontal row breaking joint with the vertical edges of the adjacent stratum thereof, each plate having a flat back surface and provided at its front with a bearing projecting beyond said front surface and forming a supporting ledge below the upper edge of the plate and leaving a lower surface,

substantially parallel to the back surface, in combination with a continuous line of cover plates resting with one end on the ledges and of a thickness exceeding the height of the upper edge of the plate above the ledge, and a support for the other ends of the cover plates.

15. In a furnace, a foundation provided with a groove, and a vertical division wall engaged at its lower edge by said groove, said division wall comprising a vertically arranged series of horizontal double rows of plates arranged back to back, and edge to edge in a vertical and a horizontal direction, the vertical edges of the plates in one stratum of each horizontal row breaking joint with the vertical edges of the adjacent stratum thereof, each plate having a flat back surface and provided at its front face with a horizontal shelf and a lower portion substantially parallel to the back surface, and at its upper portion with a tongue, the shelf, parallel portion and tongue extending entirely across the plate, in combination with a continuous line of cover plates resting with one end on the shelves and of a thickness greater than the height of the tongues, and a support for the other ends of the cover plates.

16. In a furnace, a foundation provided with a groove, and a vertical division wall engaged at its lower edge by said groove, said division wall comprising a vertically arranged series of horizontal double rows of plates arranged back to back and edge to edge in a vertical and a horizontal direction, the vertical edges of the plates in one stratum of a horizontal row breaking joint with the edges of the adjacent stratum thereof, each plate having a flat back surface and provided at its front face with a horizontal shelf formed by a wedge-like bearing or bracket and with a lower surface substantially parallel to the back surface, and at its upper portion with a tongue, said shelf, parallel portion and tongue extending entirely across the plate, in combination with a continuous line of cover plates resting with one end on the shelves and of a thickness greater than the height of the tongues, and a support for the other ends of the cover plates.

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

MAX BITTRICH.

Witnesses:

E. PFAEUOLER,
C. LANDS.