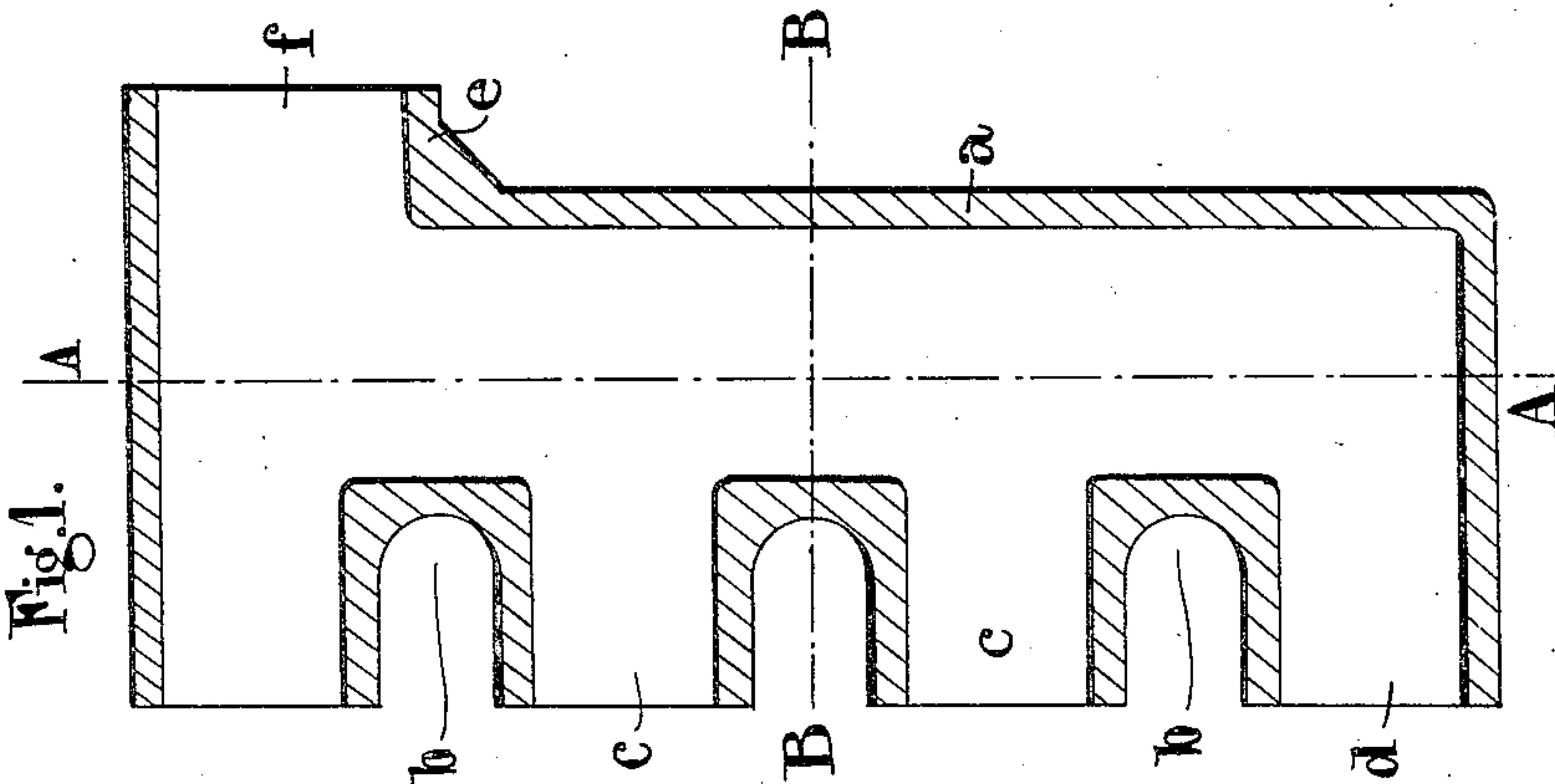
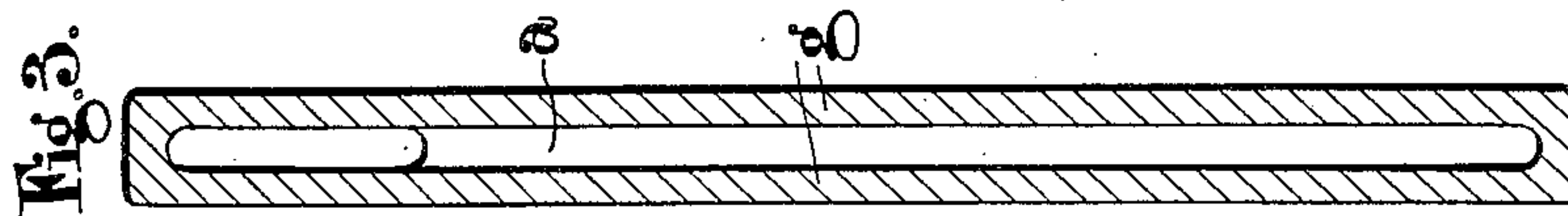
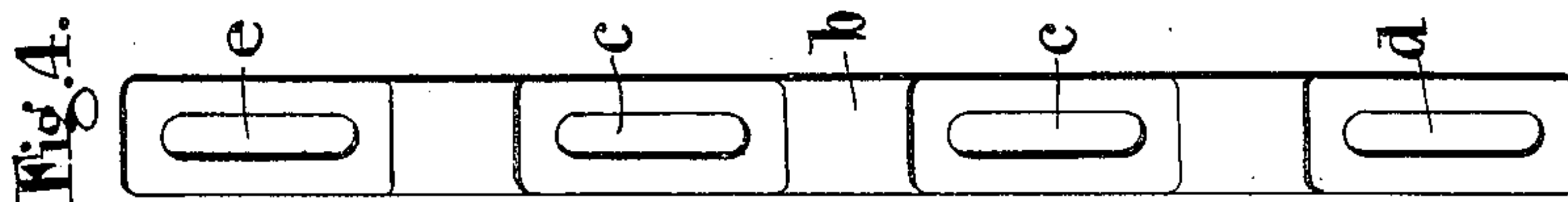
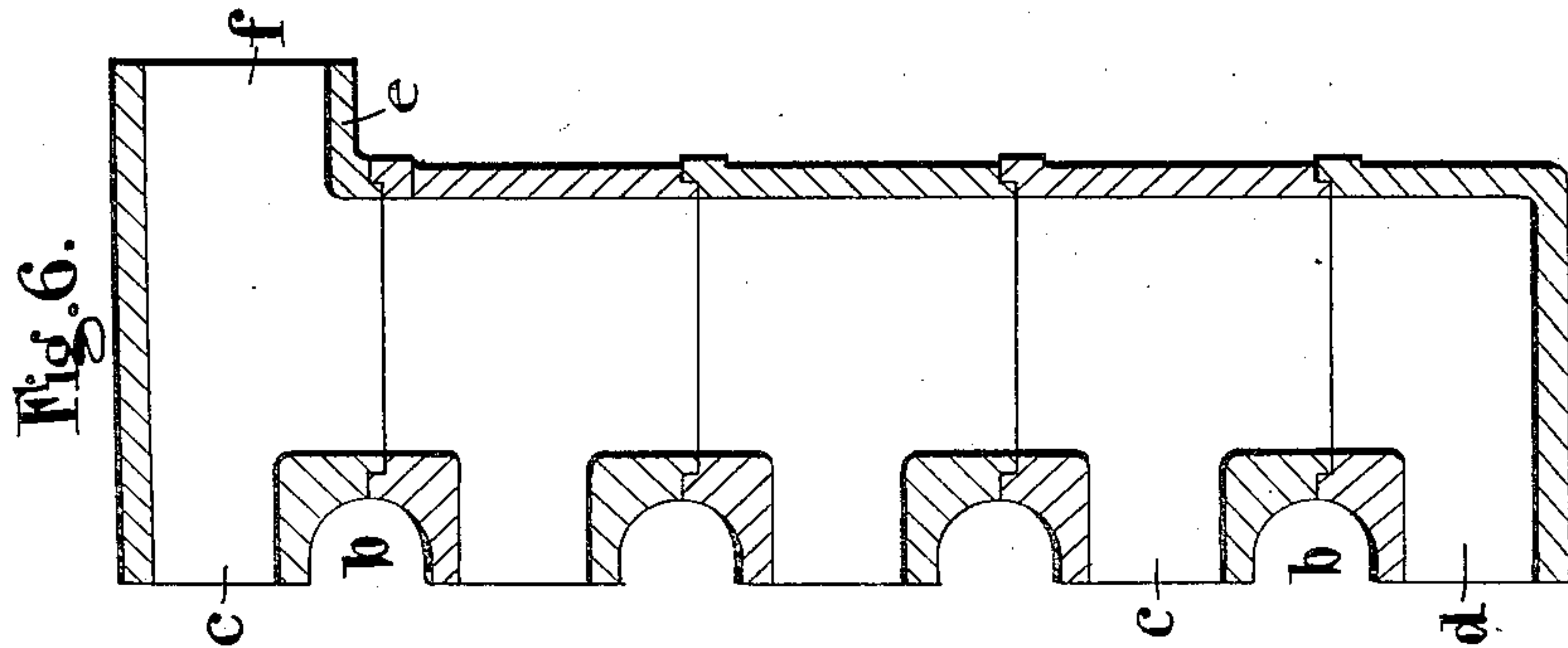
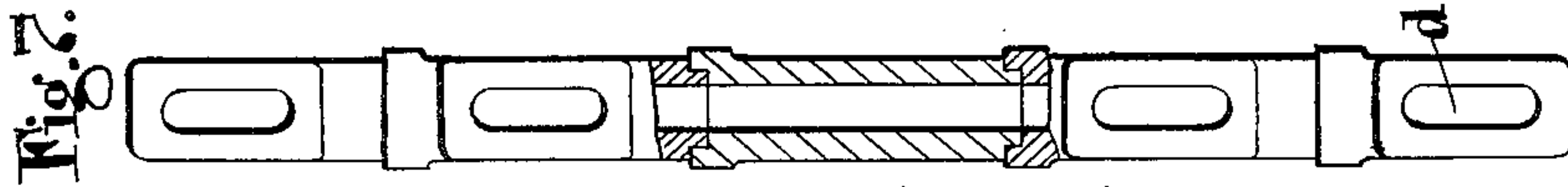
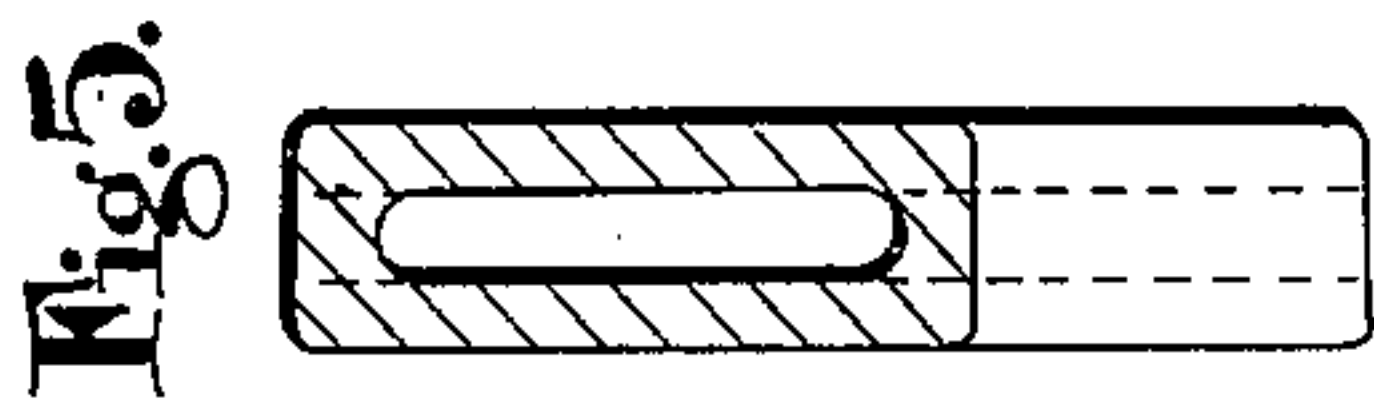


W. B. McLUSKY.
AIR OR GAS PREHEATING DEVICE FOR FURNACES AND THE LIKE.
APPLICATION FILED FEB. 13, 1909.

925,215.

Patented June 15, 1909.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2

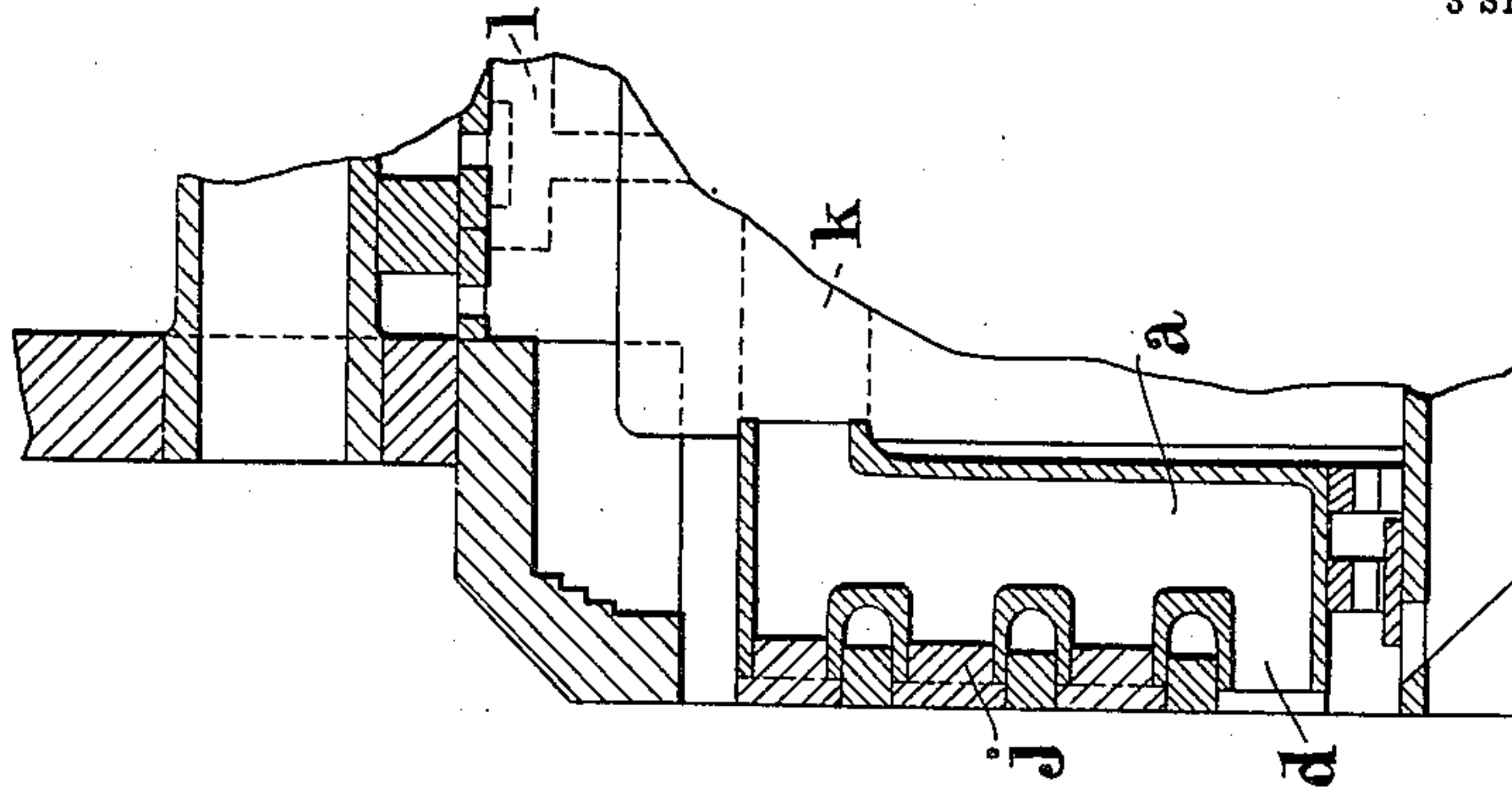


Fig. 8.

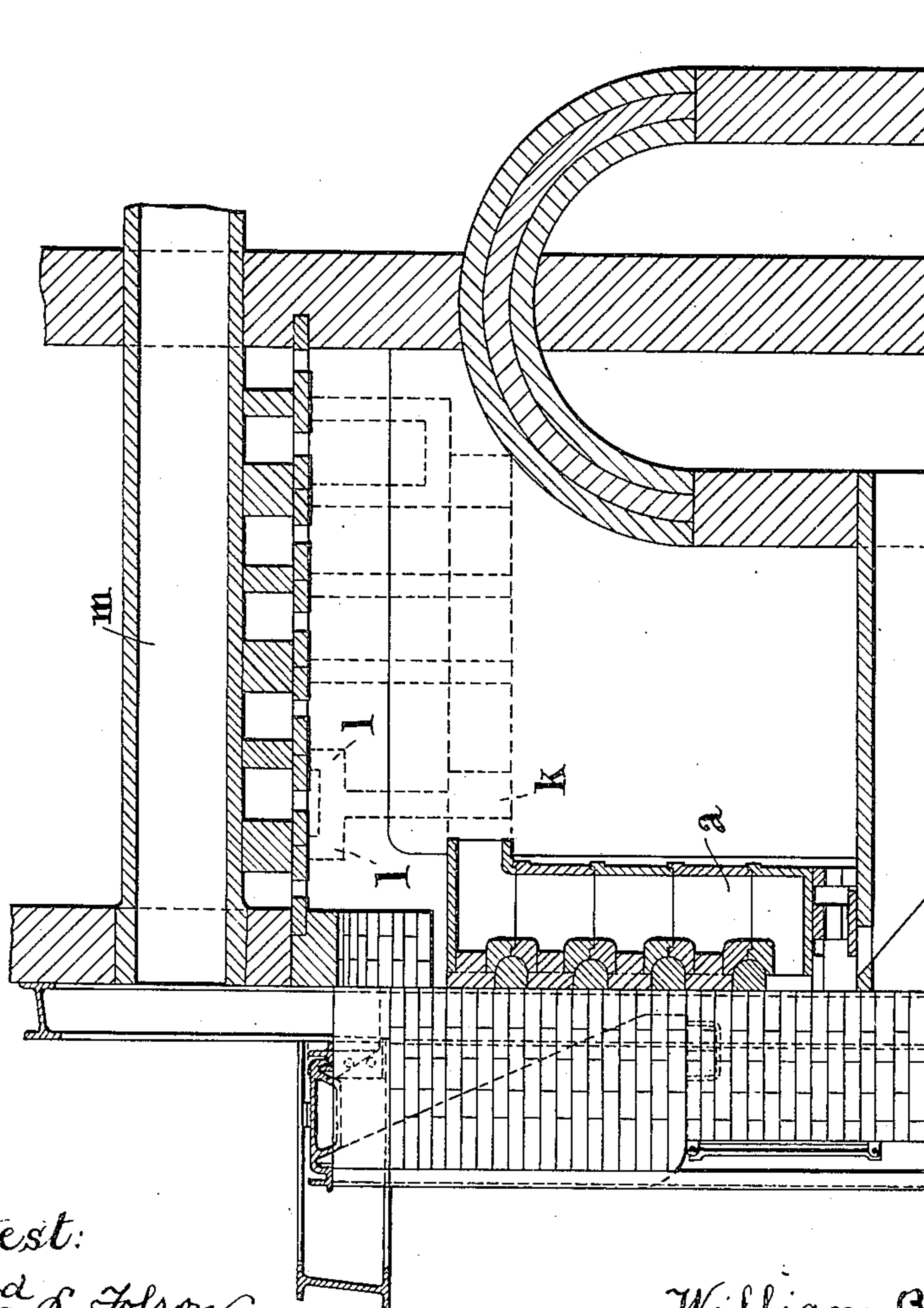


Fig. 9.

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3 SHEETS—SHEET 3.

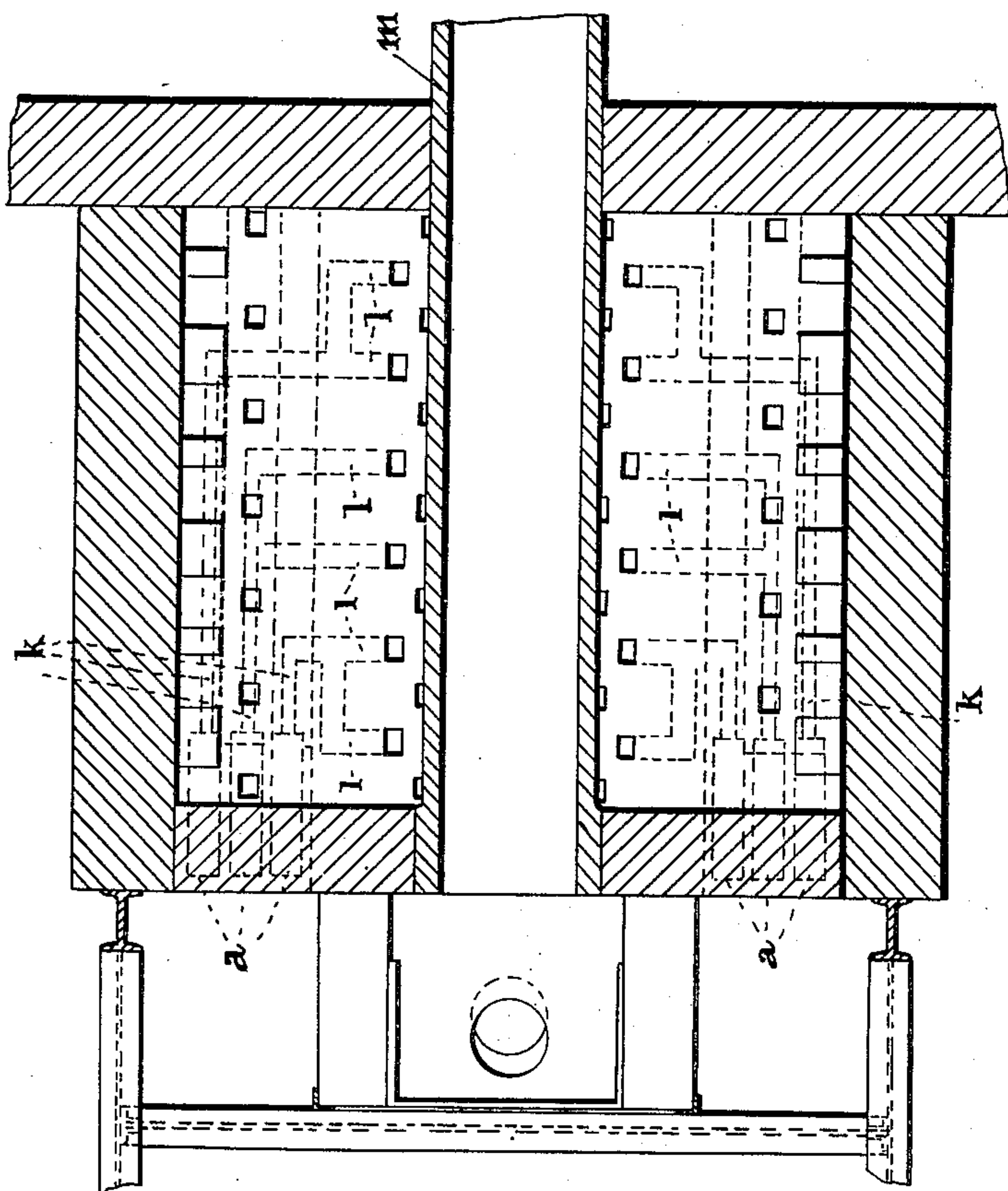


Fig. 11.

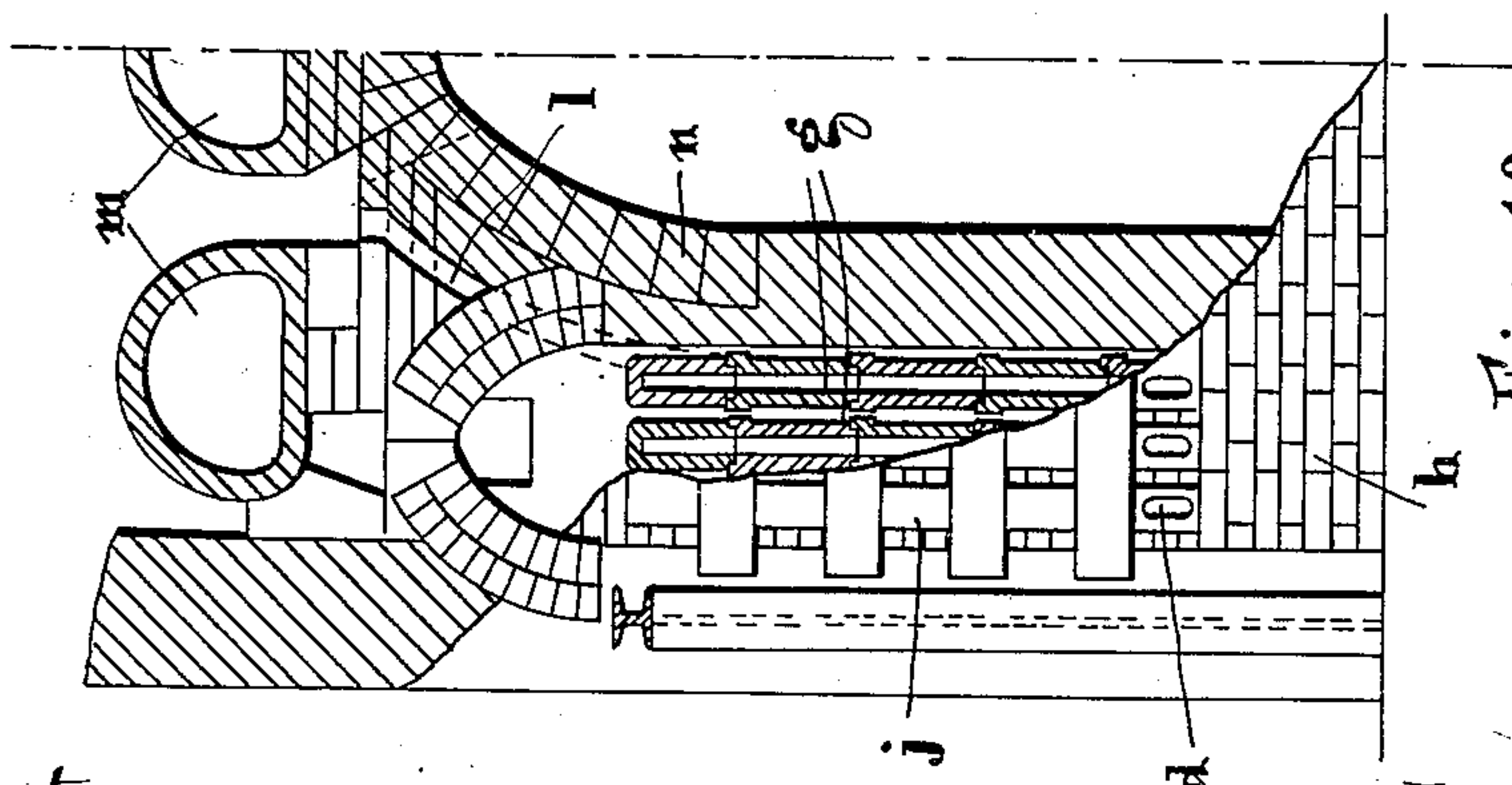


Fig. 10.

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UNITED STATES PATENT OFFICE.

WILLIAM BOUVARD McLUSKY, OF PERTH, SCOTLAND.

AIR OR GAS PREHEATING DEVICE FOR FURNACES AND THE LIKE.

No. 925,215.

Specification of Letters Patent.

Patented June 15, 1909.

Application filed February 13, 1909. Serial No. 477,791.

To all whom it may concern:

Be it known that I, WILLIAM BOUVARD McLUSKY, a subject of the King of Great Britain and Ireland, and residing at The Gas Works, Perth, Scotland, have invented certain new and useful Improvements in and Relating to Air or Gas Preheating Devices for Furnaces and the Like, of which the following is a specification.

This invention relates to air or gas preheating arrangements for utilizing the heat of the waste gases of furnaces, ovens and the like and has for its object to provide an improved air or gas heating device which shall be easily accessible in all its parts and adapted to be readily incorporated in the furnace or the like in such a manner as to be relieved of all structural stresses due to weight and in which a large air or gas heating surface is afforded in a compact form.

The invention consists in an air or gas heating device comprising one or a plurality of hollow narrow vertical elements arranged to be heated externally by waste, furnace or oven gases and constructed of refractory material or metal and provided with inlet, outlet and inspection openings, the air or gas to be heated passing when more than one element is used in parallel or in series through the elements.

The invention also consists in the improved air or gas heating device, hereinafter indicated.

Referring now to the accompanying drawings which form part of the specification; Figures 1, 2 and 4 show a sectional elevation and two side views of a gas or air heating device according to the present invention, while Fig. 3 is a side sectional elevation on the lines A—A of Fig. 1. Fig. 5 is a sectional plan on the line B—B of Fig. 1. Figs. 6 and 7 illustrate a modification in which the device is built up of separate pieces. Fig. 8 is a part sectional side view showing the device applied to a setting the lower part of which projects beyond the face of the main setting. Fig. 9 is a part sectional side view showing the device applied to a setting flush with the main setting, and Fig. 10 is a part sectional front elevation of Fig. 9. Fig. 11 is a plan showing two sets of the heating devices in position.

In carrying this invention into effect according to one construction, I provide narrow hollow elements, *a*, constructed of re-

fractory material or metal. These elements are relatively long as compared with their breadth and are formed with their walls as thin as possible consistent with the requisite strength. The elements, *a*, are adapted to stand upright, that is, with their longest sides vertical. On one of the long narrow vertical sides the elements, *a*, are dented in for a considerable portion of their width, say for instance, at three points, as shown at *b*, Fig. 1. The portions of the side between these indentations are formed as openings, *c d*, which in the case of three indentations, will be four in number. The lowermost of these openings, *d*, acts as an inlet for the air or gas to be heated and the other three openings, *c c c*, act as inspection holes; of course the inlet aperture, *d*, also may be used as an inspection opening. Upon the opposite vertical side of the element, *a*, and at its upper end is provided a projecting portion, *e*, having a passage, *f*, passing through it. The dented in parts, *b*, before referred to are arranged so as to afford supporting means between the two flat wide vertical sides, *g g*, of the elements.

In a further modification according to Figs. 6 and 7, the hollow elements are constructed of a number of parts which are arranged to fit together with a spigot and socket arrangement. This form of the device is particularly applicable when the elements are constructed of fire clay as it enables the molding and "firing" of the fire clay elements to be effected with greater ease.

Figs. 6 and 7 also illustrate the employment of five instead of four inspection openings. Of course this sectional construction of element may be applied to the case when cast iron is used.

In applying this improved device to a gas fired retort furnace, one or a plurality of the hollow elements, *a*, are arranged vertically in the flue or duct conveying the waste gases from the furnace to the chimney. The elements are arranged with their broad sides *g g*, adjacent to one another and with the inspection and inlet apertures, *c d*, adjacent to one of the side walls, *h*, of the furnace or other structure and are built into this wall in such a manner that the inlet and inspection openings are readily accessible from the outside. The incorporation of the aperture side of these elements, *a*, with the side wall, *h*, of the furnace structure is effected in such a manner that the elements

are free from all stresses due to the superimposed weight of the rest of the structure, it being necessary to form a relatively air tight connection around the sides, *g*, of the elements adjacent to the furnace wall, *h*.

It will be seen that owing to the flat surfaces of the elements and their rectangular outline, their setting and the incorporation of their aperture sides with the furnace side can be effected with ordinary stock bricks and without the need for specially shaped bricks.

All the inspection apertures, *c*, except the lowest one, *d*, which is also the inlet aperture, are provided with plugs, *j*, of any suitable material and form so arranged that they may be readily removed for purposes of inspection.

The air or gas to be heated is passed into the inside of each tube through its lowest inspection aperture, *d*, and after passing through the element escapes by the aperture, *f*, near the top of the element on the side opposite to the inspection apertures. The air or gas on leaving this outlet, *f*, passes into a separate duct or channel, *k*, in the solid wall of the furnace between the gas producer and the main pier of the arch (when a gas producer is used) and thence by channels, *l*, spaced off in the packing of the producer arch, *n*, direct to the combustion chamber where it meets the gases issuing from the producer.

From the foregoing it will be understood that each separate supply of air after passing through the element and absorbing the heat transmitted to its walls by the waste heat of the furnace gases is kept separate and away from the air passing through the adjacent elements. Owing to this feature it is possible in the event of damage to any one of the elements to shut it off by plugging its inlet aperture, *d*, and thus the furnace may continue in operation until a suitable occasion occurs for repairing the damaged element.

The elements, *a*, may be used separately or in batteries and may in some cases be arranged in series with each other the contents of one element passing through as many other elements as may be required all such elements being connected to one of the ducts, *K*. When used in batteries the elements are so arranged that the waste heat envelops or surrounds them on the three exposed sides.

It will be seen that a great advantage of the invention is its accessibility, any and every part of the elements being accessible from the front for inspection or repair without interruption of the working of the furnace.

The invention is applicable to furnaces generally and particularly to retort furnaces employed to heat gas or other retorts, *m*,

built vertically, horizontally or at any angle, in the figures the retorts are shown horizontal. Further the improved device can be fitted to old settings without disturbing the existing retorts.

By the invention what is known as short circuiting or cross cutting, that is leakage of air to the gas flue is effectually overcome and the predetermined quantity of air admitted at the inlet of each tube is delivered at the combustion chamber with absolute certainty.

It will be seen that various modifications may be made in the methods of carrying out this invention without departing from the spirit of the same.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. An air or gas preheating device comprising a hollow narrow vertical element having on one narrow side inlet and inspection openings and an outlet opening on the opposite narrow side, indentations between the openings acting as supporting means between the wide sides of the element.

2. An air or gas preheating device comprising a hollow narrow vertical element having in one side thereof inspection openings one of which acts as an inlet opening and an outlet opening in the side opposite to the inspection openings.

3. An air or gas preheating device comprising a hollow narrow vertical element having on one narrow side inlet and inspection openings and an outlet opening on the opposite narrow side, indentations between the openings acting as supporting means between the wide sides of the element, said element being divided between the openings into a plurality of portions, these portions being socketed together.

4. An air or gas preheating device comprising a hollow narrow vertical element having in one side thereof inspection openings, one of which acts as an inlet opening, and an outlet opening in the side opposite to the inspection openings, said element being constructed in a plurality of portions socketed together.

5. A heating furnace comprising a heating flue a wall therefor, an air or gas preheating device comprising a hollow narrow vertical element having air inlet and outlet openings and inspection means, said element being built into the wall and projecting into the flue.

6. A heating furnace comprising a heating flue, a wall therefor, an air or gas preheating device comprising a hollow narrow vertical element having air inlet and outlet openings and inspection means, said element being built into the wall and projecting into the flue, and a duct leading hot air from the outlet of said preheating element.

7. A heating furnace comprising a heating flue; a wall therefor; a plurality of air or gas preheating devices, each comprising a hollow narrow vertical element having air
5 inlet and outlet openings and inspection means; a plurality of ducts for said preheating devices, said ducts opening to various points in the heating furnace.

8. A heating furnace comprising a heating
10 flue; a wall therefor; a plurality of air or gas preheating devices built into said wall and extending into the heating flue, said preheating devices each comprising a hollow

narrow vertical element having air inlet and outlet openings and inspection means; all
15 of said preheating devices being in parallel; a plurality of ducts—one for each preheating device—and channels acting to lead heated air from said ducts to the point of combustion.

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

WILLIAM BOUVARD McLUSKY.

Witnesses:

THOMAS McLAGAN MOIR,
ANDREW ROBIN WILSON.