

M. KELLY.

FURNACE.

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943,194.

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Fig. 1.

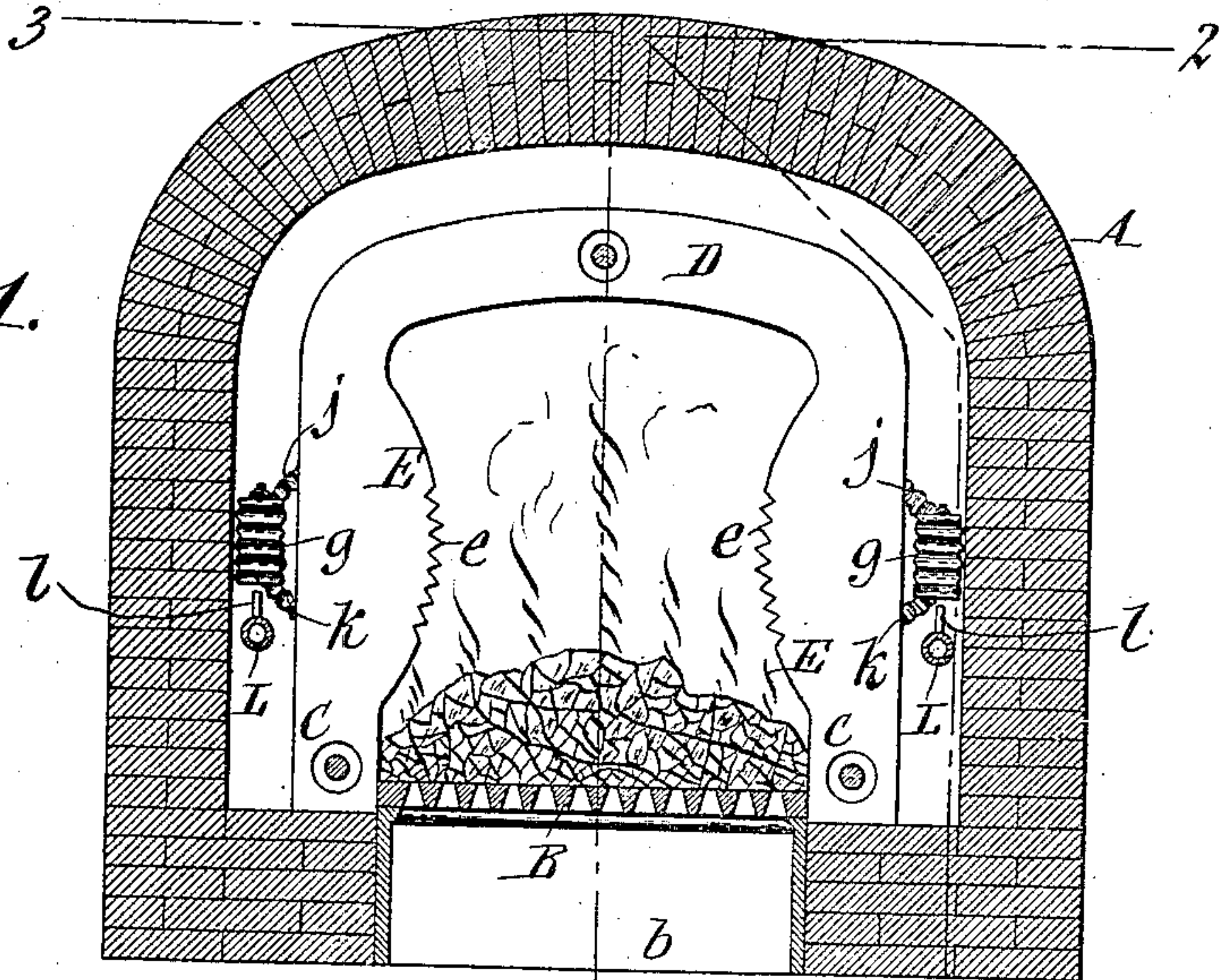


Fig. 2.

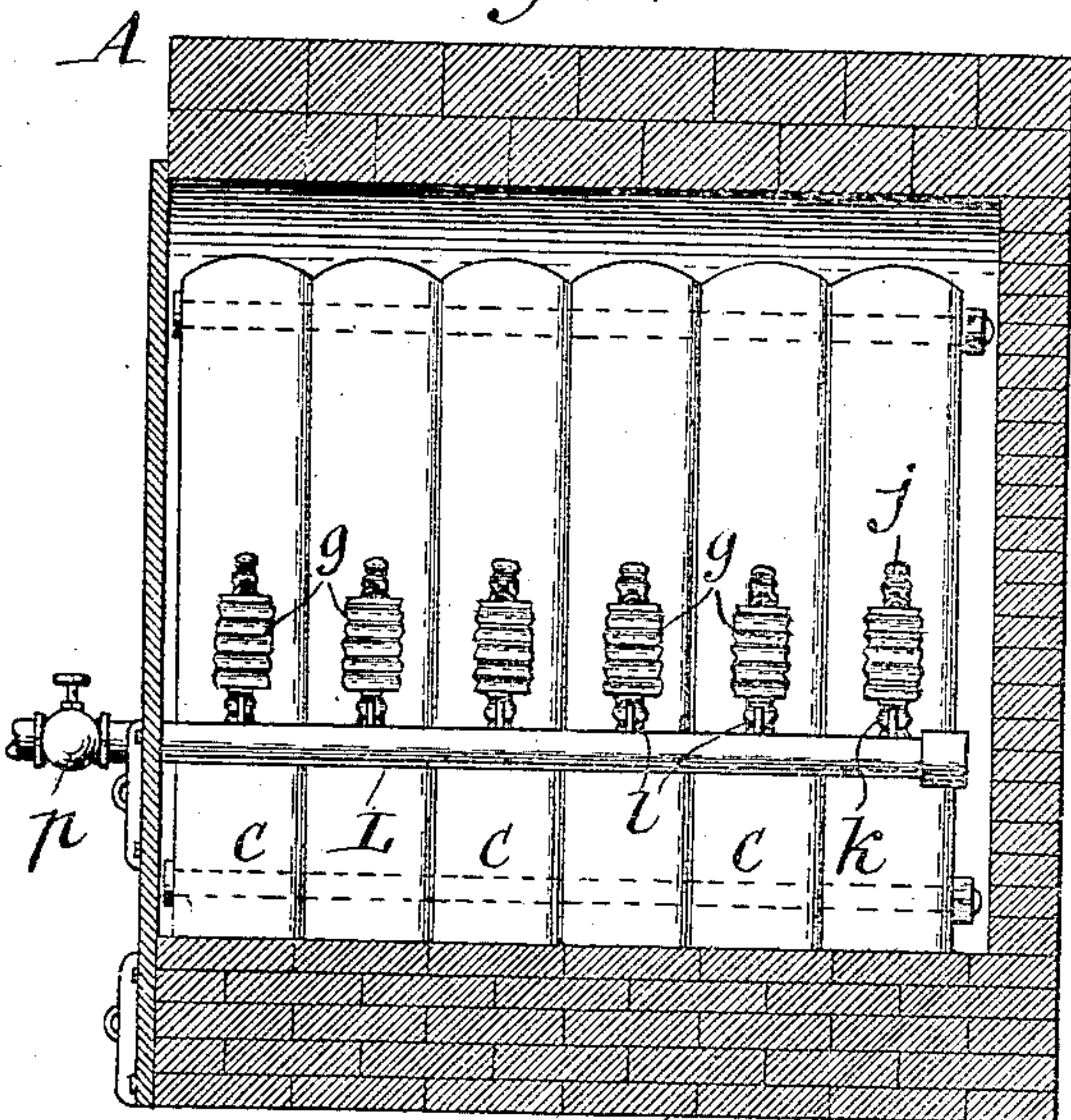


Fig. 3.

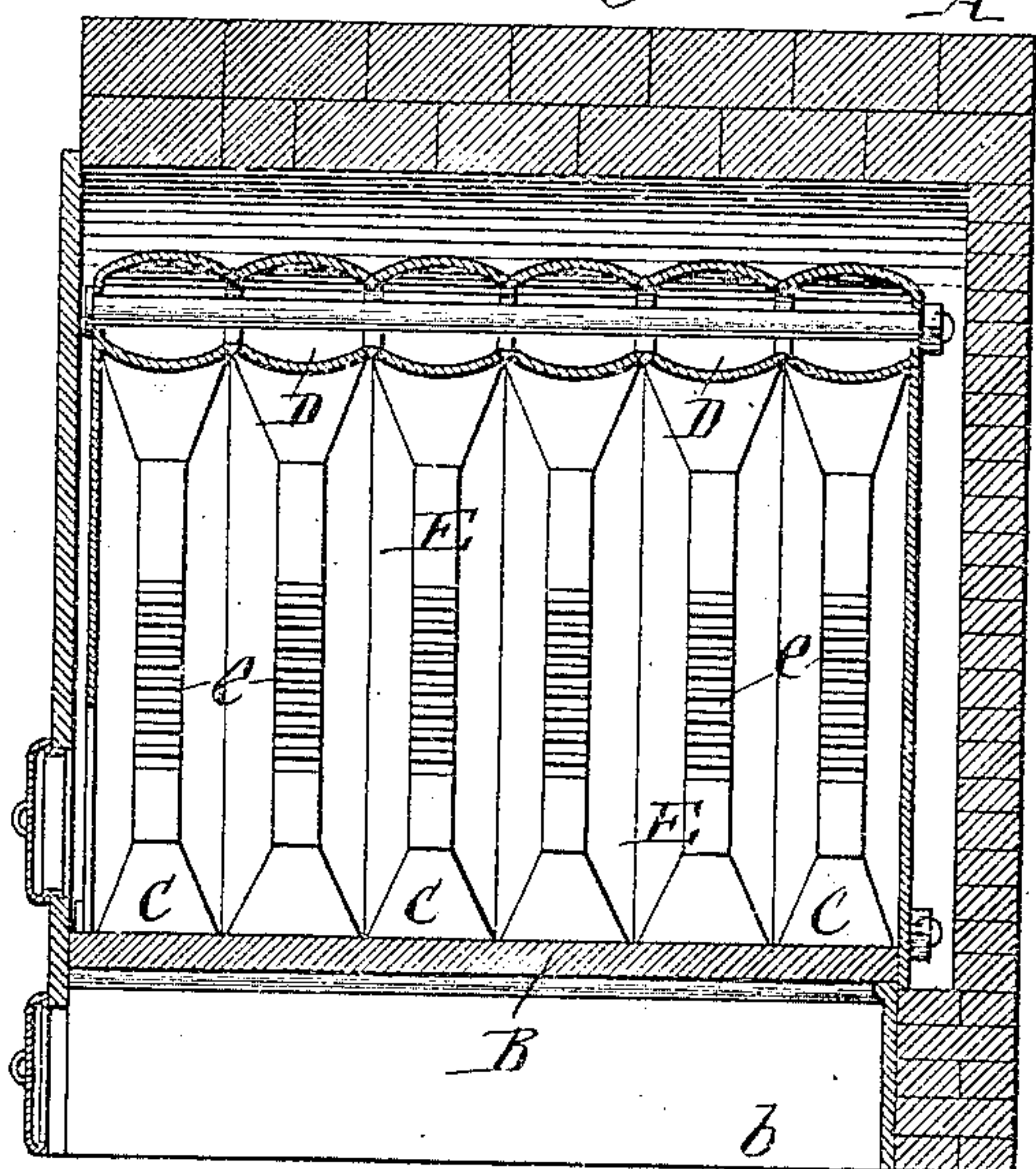


Fig. 4.

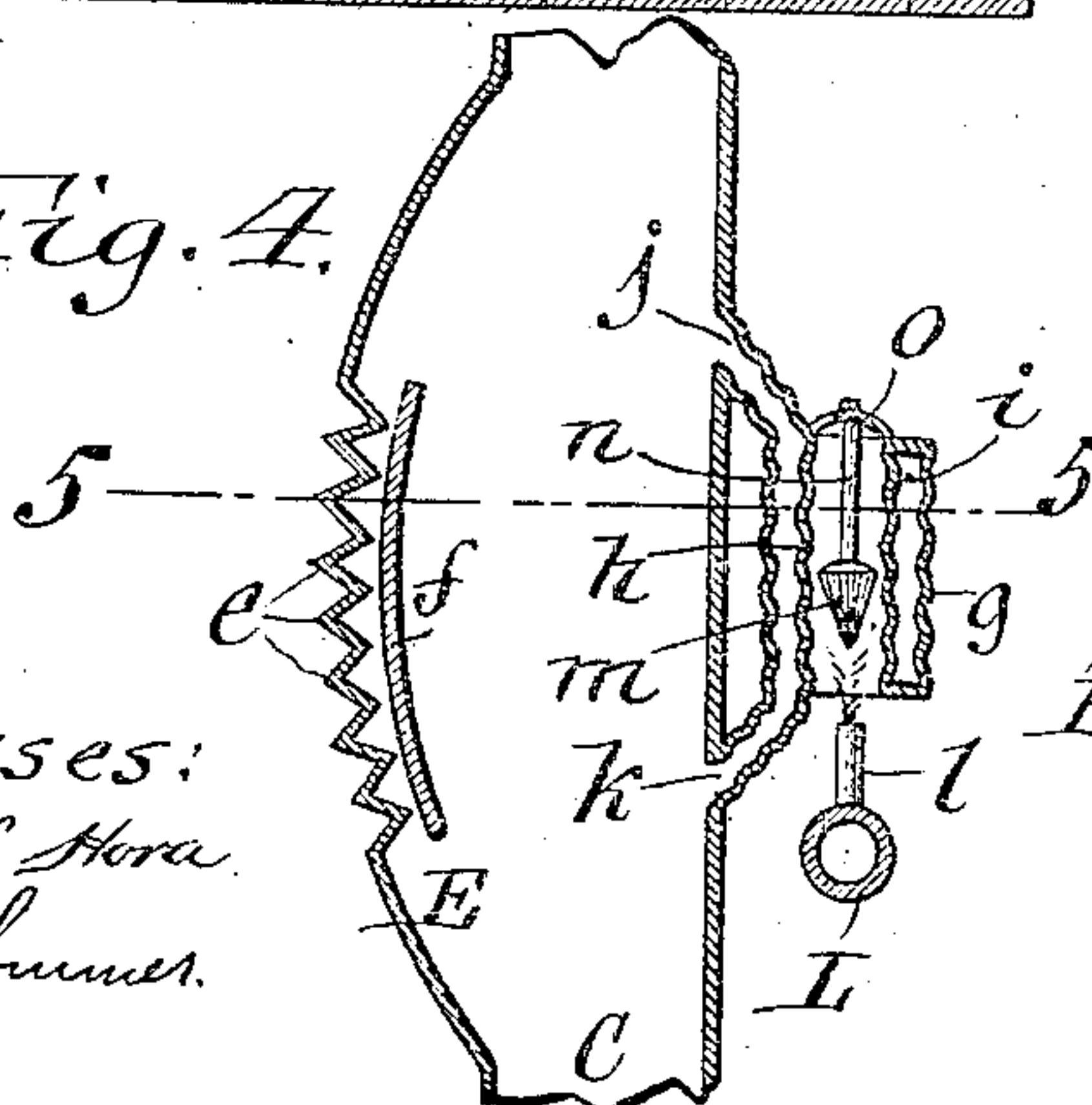
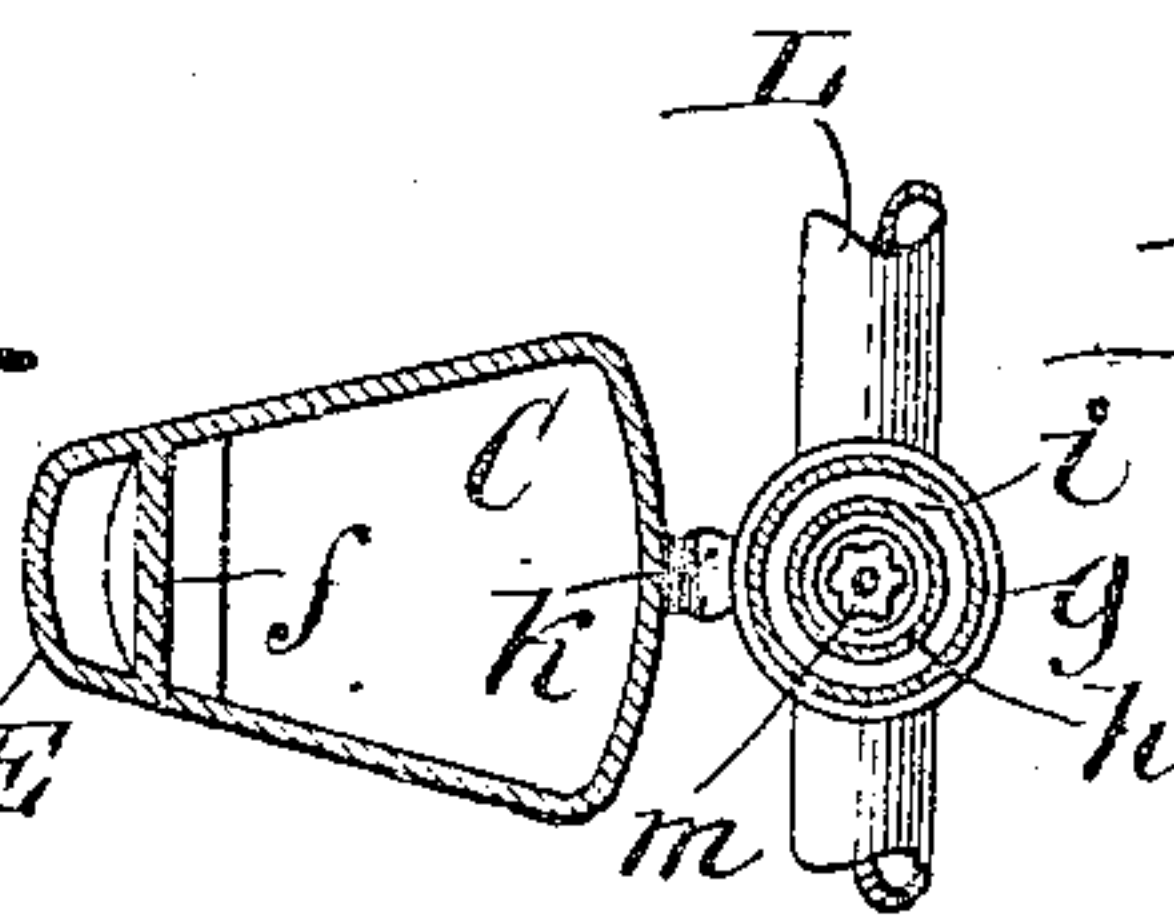


Fig. 5.



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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, MICHAEL KELLY, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Furnaces, of which the following is a specification.

This invention relates to a hot water or steam boiler in which the water may be heated either by a fire place in which coal, wood or other fuel is burned or by a heater which burns gaseous fuel.

The object of this invention is to provide a boiler of this character which permits the full heating effect of the fuel to be obtained and which will permit of heating the water and producing steam very rapidly.

In the accompanying drawings: Figure 1 is a vertical transverse section of a boiler embodying my invention. Figs. 2 and 3 are vertical longitudinal sections in the correspondingly numbered lines in Fig. 1. Fig. 4 is a vertical transverse section, on an enlarged scale, of the leg of one of the water sections of the boiler. Fig. 5 is a horizontal section thereof in line 5—5, Fig. 4.

Similar letters of reference indicate corresponding parts throughout the several views.

The general construction of my improved boiler may be varied, that shown in the drawings, as an example, consisting of a brick housing or setting A, a grate B, arranged in the lower part of this setting above an ash pit *b* therein and a plurality of hollow arch-shaped water sections arranged in a longitudinal row within the upper part of the setting and each having a pair of upright legs C arranged on opposite sides of the grate and a head D connecting the upper ends of the legs. The several sections together form the furnace or fire place of the boiler above the grate and the same are in communication, so that the water can pass from one to the other.

On the inner side of each leg the same is provided with an inwardly bulging curved bay E the central part of which is provided with a vertical row of corrugations *e* each of which extends in a horizontal direction. These bays on the legs of the water sections project inwardly into the furnace or fire place and over the grate, whereby the heat rising from the burning fuel on the latter acts more effectively on the water in the boiler sections. Inasmuch as the salient

portions of the bays on the sections are exposed more directly to the heat of the furnace than its receding portions, the same are liable to expand and contract unevenly but this is permitted by reason of the corrugations on the salient parts thereof.

In addition to allowing for expansion and contraction on the inner side of the bay the corrugations also increase the area of the heating surface of the same, thereby enabling the water to be heated and the steam to be generated more rapidly.

f represents an upright diaphragm or partition arranged in each bay and extending from side to side thereof, as shown in Fig. 5, and terminating at its upper and lower ends adjacent to the upper and lower ends of the corrugated portion of the bay. The partition is also curved substantially concentric with inner side of the bay, as shown in Fig. 4, and confines a thin film or sheet of water immediately adjacent to the inner side of the bay which becomes quickly heated and is caused to rise, thereby producing a rapid circulation of the water. By this means steam can be generated much more quickly than when the heat is applied to a large body of water at one time.

At the same time that the inner sides of the water sections are being heated by the grate furnace, the outer sides of the same may be heated by a gas furnace which is constructed as follows:—*g* represents an outer tubular shell and *h* an inner tubular flue arranged upright and concentrically one within the other and separated so as to form an intervening annular water chamber or space *i*. The upper and lower ends of this water chamber are closed but the space within the flue is open at its upper and lower ends. The annular water space is connected by upper and lower branch pipes *j*, *k*, the lower branch pipe *k* extending upwardly and outwardly from the outer side of the adjacent water leg to the lower end of the water chamber *i* and the upper branch pipe *j* extending inwardly and upwardly from the upper end of this chamber to the outer side of the adjacent water leg, whereby this chamber is in communication both at the top and bottom with said water leg.

L represents a horizontal pipe which supplies gas or like fuel and which is provided with a plurality of burners *l* one of which is arranged at the lower end of each flue *h*, as shown in Figs. 2 and 4. The flame of the

burning gas from each of these burners passes upwardly through the flue of the gas heater and thereby heats the water in the surrounding annular chamber. As this chamber is comparatively narrow and only a small quantity or thin film of water is exposed at any one time to the flame, the same is heated very rapidly, thereby causing a quick circulation of the water from the leg upwardly through the gas heating chamber and into the upper part of the leg.

In order to increase the heating surfaces of the gas heater and also to prevent fracture of the same, the shell, flue and branch pipes are corrugated so as to permit them to expand and contract and adapt themselves freely to the variations in temperature.

For the purpose of preventing the flame of the burner from passing upwardly through the center of the flue without engaging the inner side of the same, a spreader, deflector or baffle *m* is provided which is preferably constructed in the form of a downwardly tapering cone. The latter is suspended on its upper side by means of a rod *n* which is supported on the upper end of the gas heater by means of a bridge *o*. The conical surface of the cone is preferably corrugated vertically or lengthwise, as shown in Figs. 4 and 5, whereby the flame of the gas burner upon striking the same is divided and caused to spread uniformly laterally outward in all directions against the bore of the flue and thereby expend its heating effect fully on the water within the heating chamber before it can escape through the upper end of the flue.

When the greatest heating effect of the boiler is desired the coal furnace and the gas heater may be used simultaneously but when less heat is required the gas may be turned off by means of a valve *p* in a supply pipe in which case only the coal furnace

would be used. In the case of mild weather only the gas heater may be used as the same can be regulated nicely to suit the conditions. The gas heater may also be used exclusively when the furnace is shut down for cleaning or repairs, thereby avoiding chilling the house under such circumstances.

I claim as my invention:

1. A boiler comprising a water leg, and a heater having an outer tubular shell and an inner tubular flue forming a water space between the same, connections between the upper and lower ends of said space and the water leg, and a burner arranged below the flue and a deflector arranged in the flue and having the form of a downwardly tapering cone.

2. A boiler comprising a water leg, and a heater having an outer tubular shell and an inner tubular flue forming a water space between the same, connections between the upper and lower ends of said space and the water leg, and a burner arranged below the flue and a deflector arranged in the flue and having the form of a cone which tapers downwardly and which is corrugated vertically.

3. A boiler comprising a water leg, and a heater having an outer tubular shell and an inner tubular flue forming a water space between the same, connections between the upper and lower ends of said space and the water leg, and a burner arranged below the flue, a downwardly tapering deflector arranged in the flue, a bridge arranged on top of said shell and flue, and a rod supporting the deflector from said bridge.

Witness my hand this 20th day of March, 1908.

MICHAEL KELLY.

Witnesses:

THEO. L. POPP,
ANNA HEIGIS.