

(No Model.)

2 Sheets—Sheet 1.

F. LUDWIG.
BOILER FURNACE.

No. 372,422.

Patented Nov. 1, 1887.

Fig. 1.

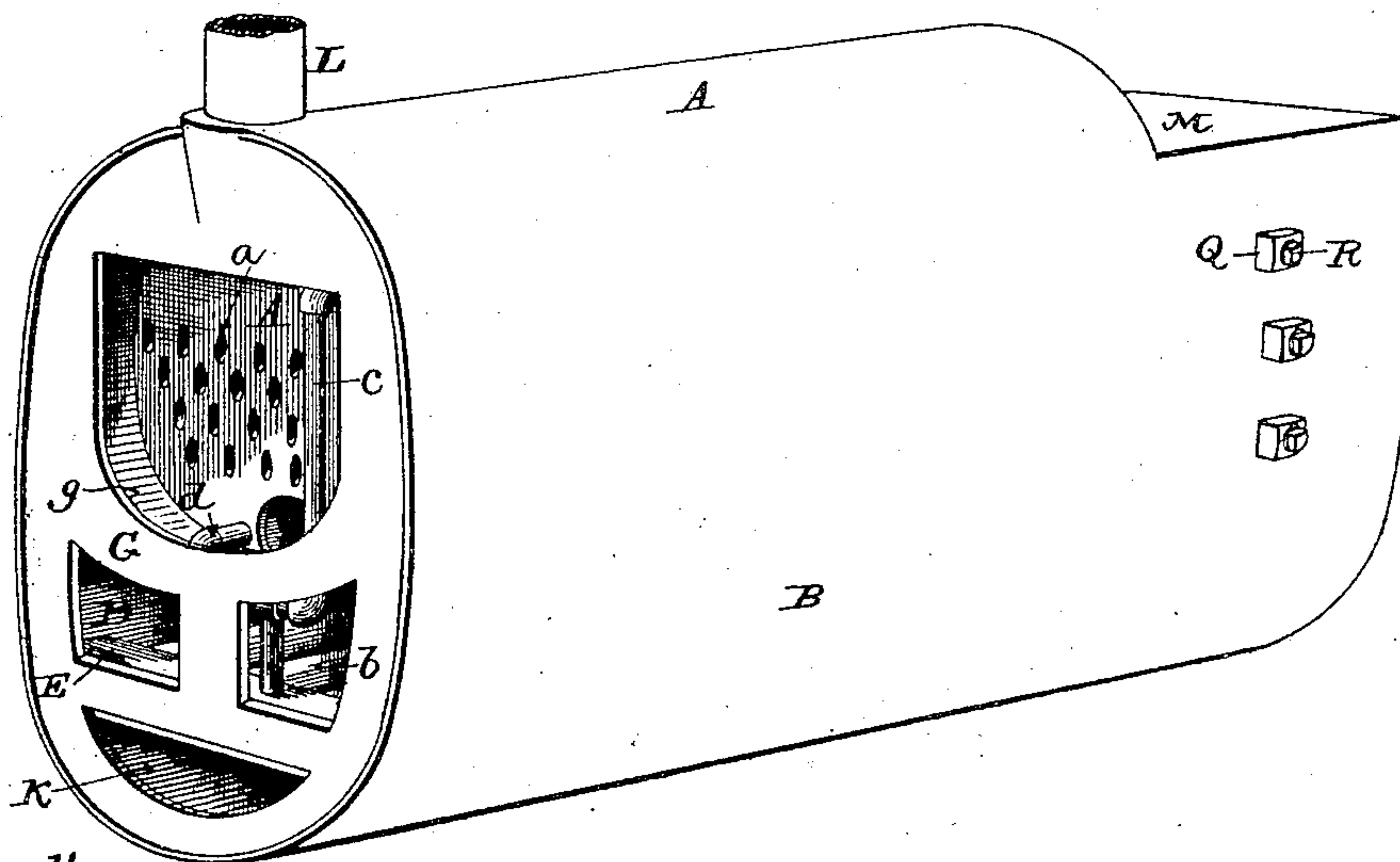
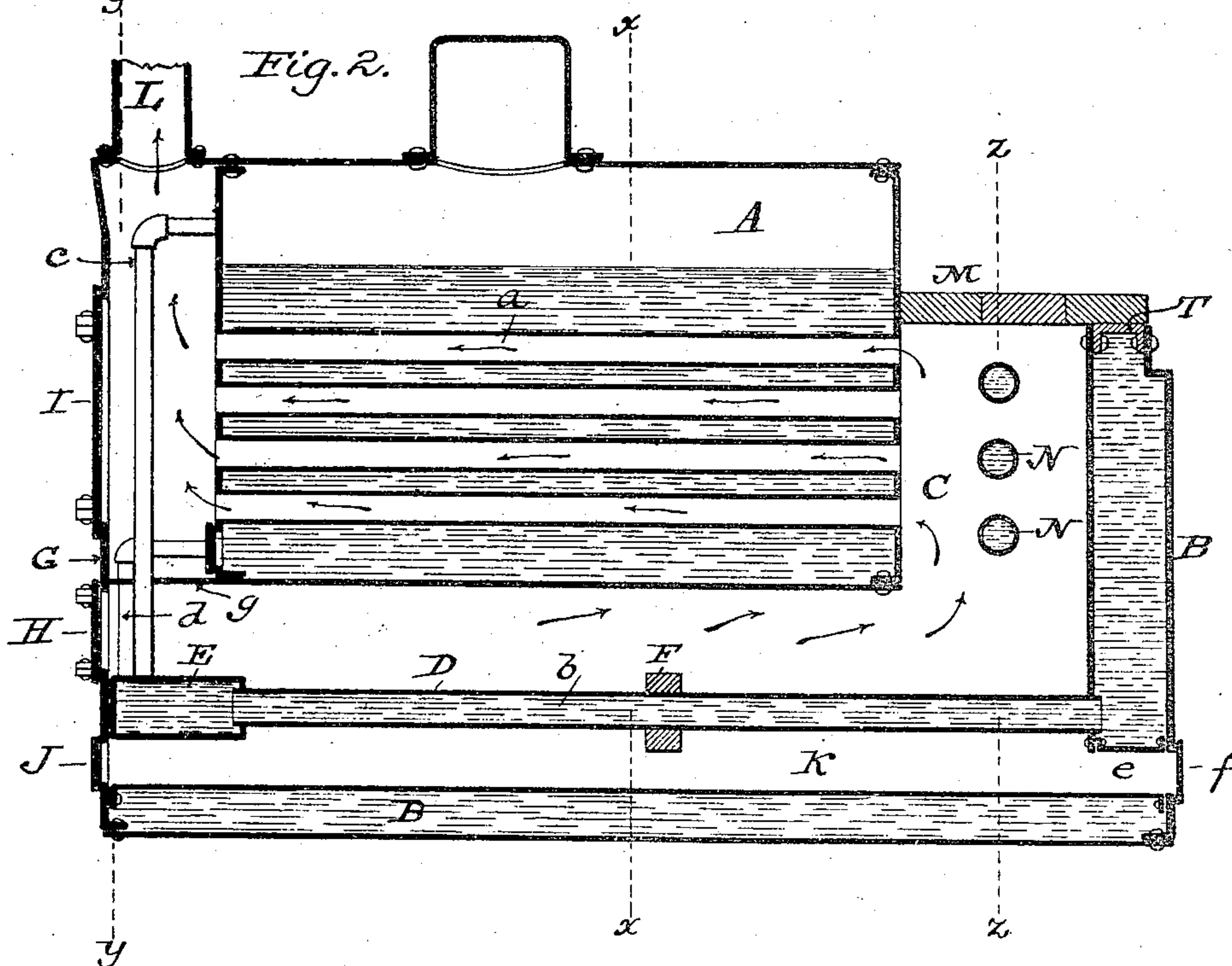


Fig. 2.



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(No Model.)

2 Sheets—Sheet 2..

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Fig. 3.
on x-x.

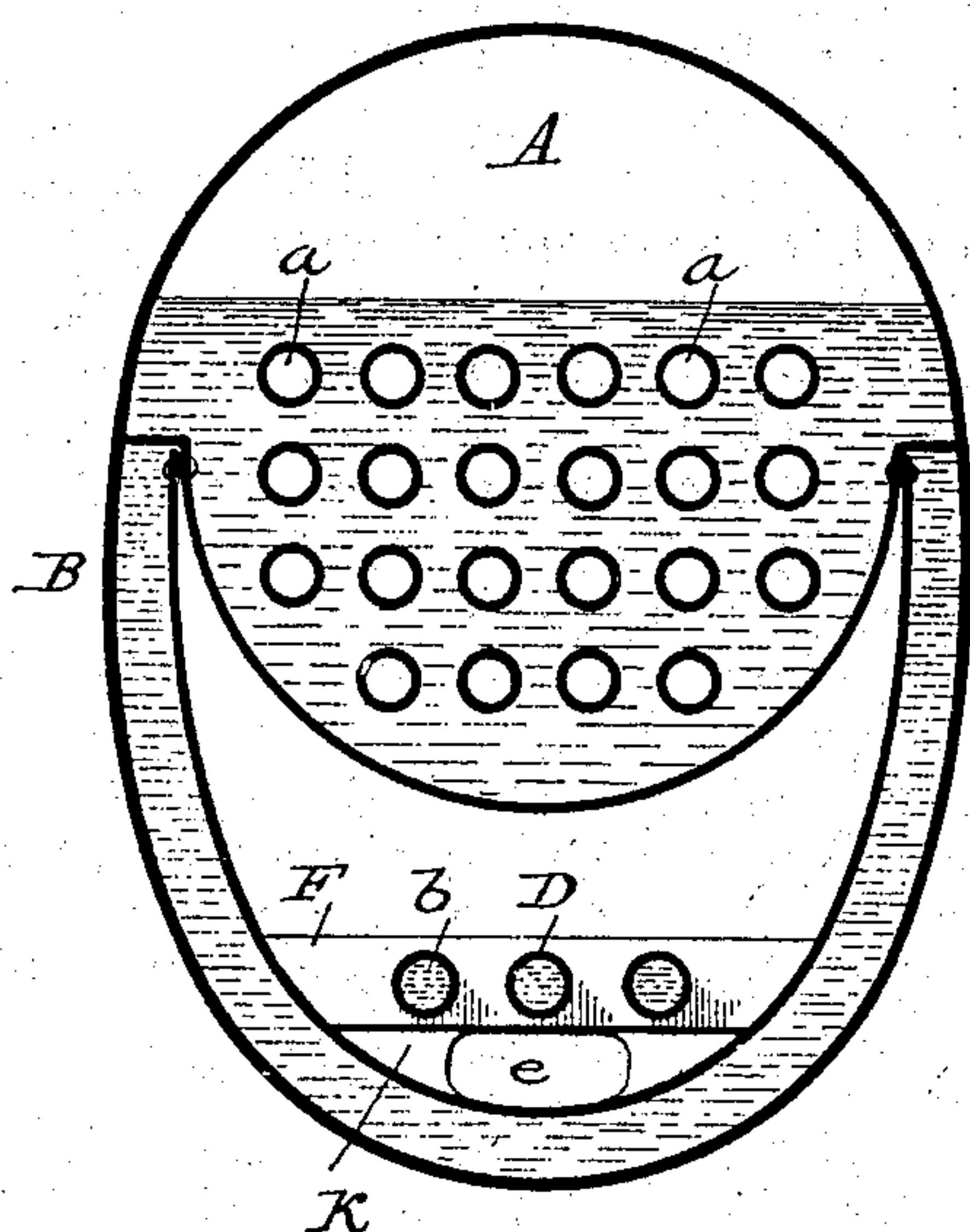


Fig. 4.
on y-y.

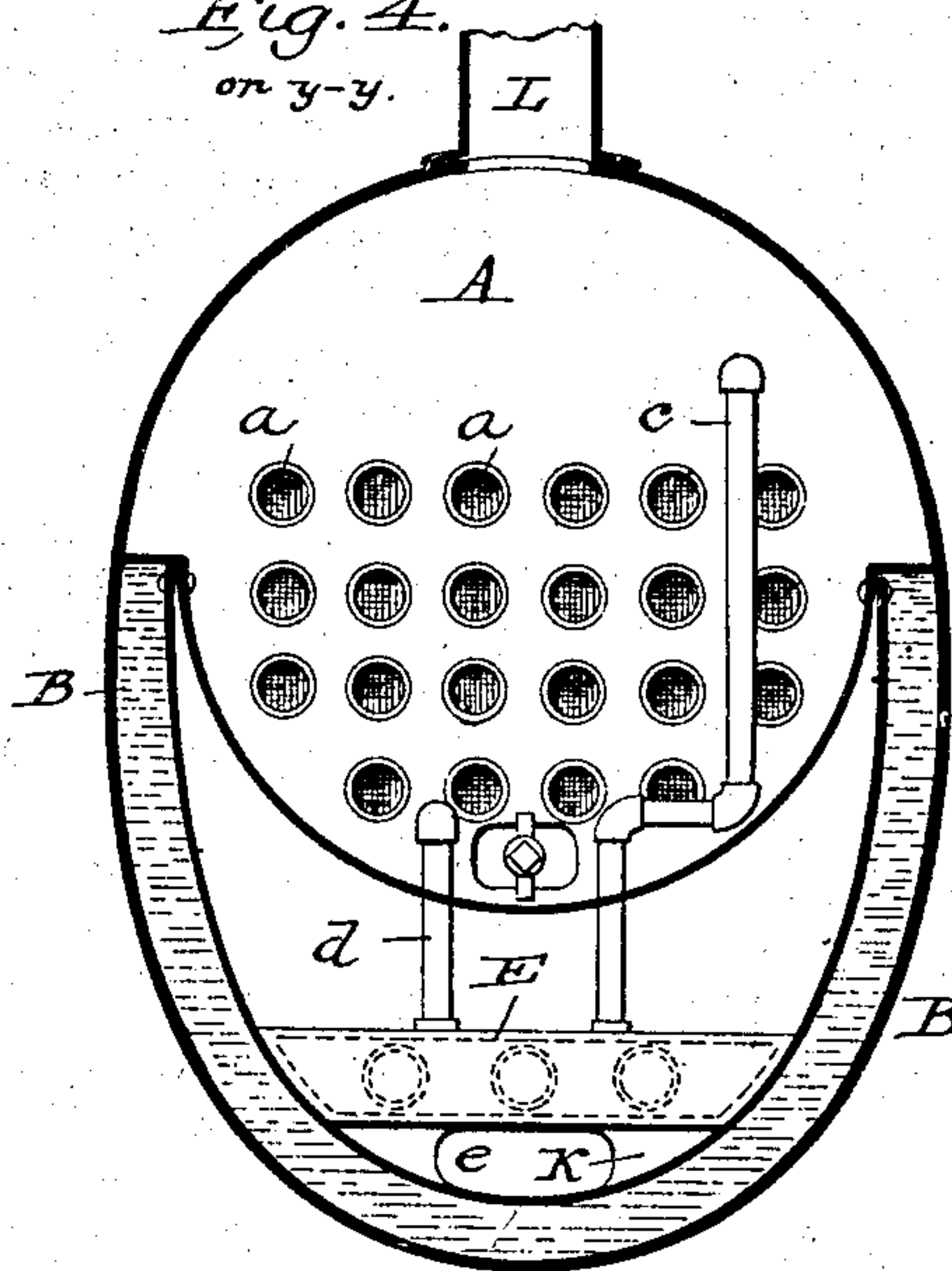


Fig. 5.
on z-z.

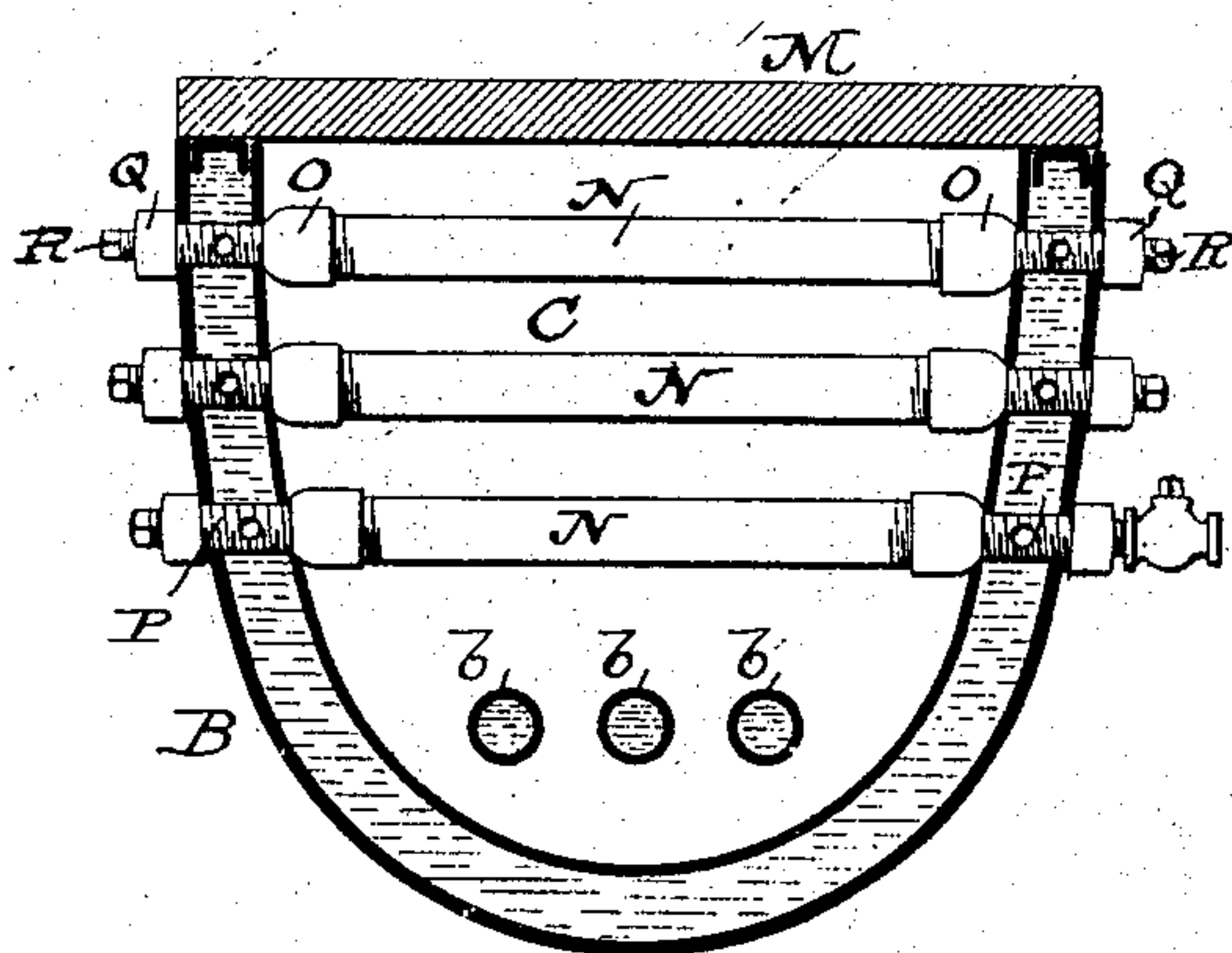
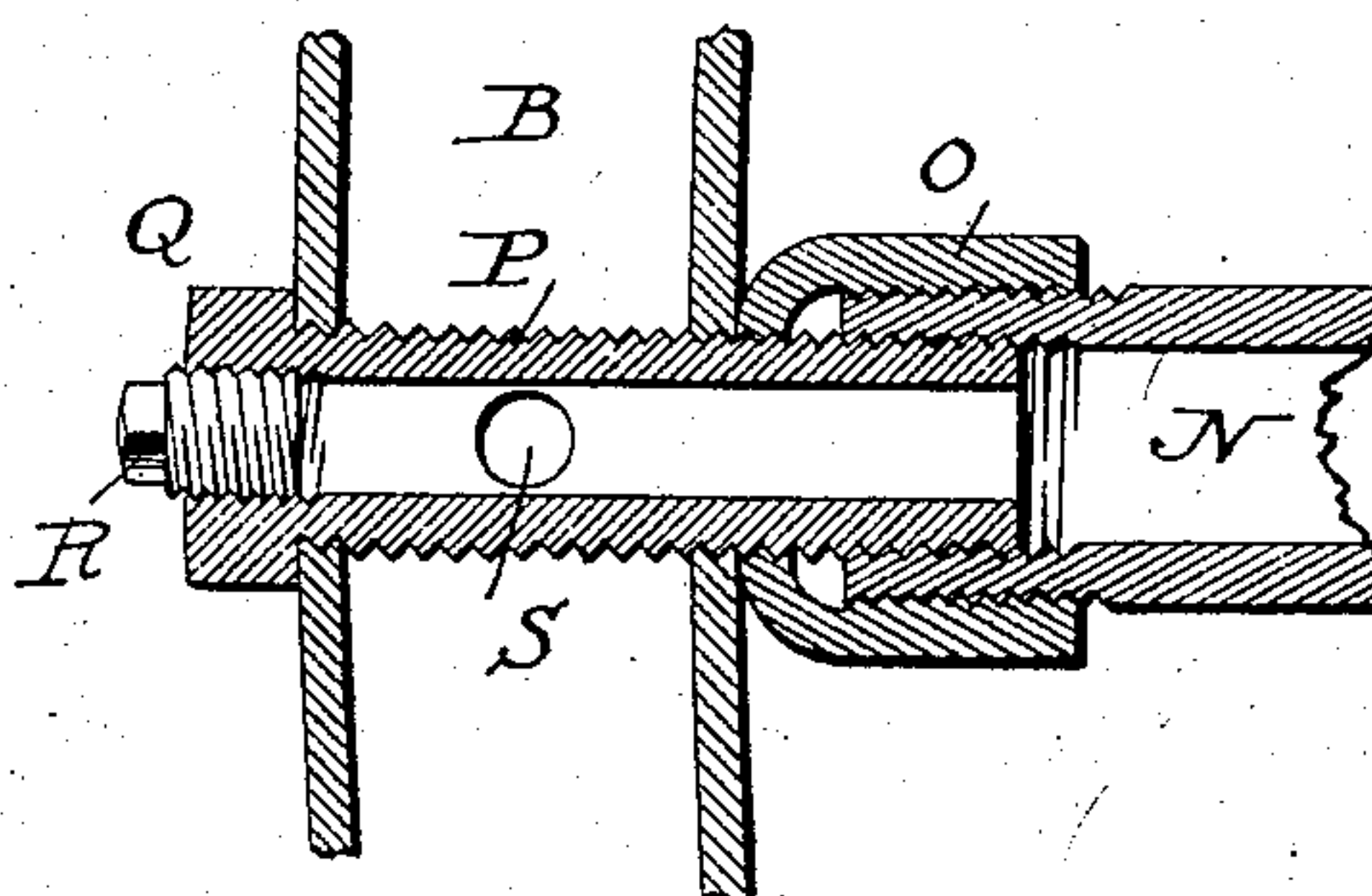


Fig. 6.



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UNITED STATES PATENT OFFICE.

FREDERICK LUDWIG, OF GLENCOE, MINNESOTA.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 372,422, dated November 1, 1887.

Application filed July 22, 1887. Serial No. 241,985. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK LUDWIG, of Glencoe, in the county of McLeod and State of Minnesota, have invented certain new and useful Improvements in Boiler-Furnaces, of which the following is a specification.

My invention relates to steam-boiler furnaces, and has reference more particularly to that class which are employed in connection with portable engines, though applicable to other uses.

In the accompanying drawings, Figure 1 is a perspective view of my improved boiler-furnace; Fig. 2, a vertical longitudinal central sectional view of the same; Fig. 3, a transverse section on the line *xx* of Fig. 2; Fig. 4, a transverse section on the line *yy*. Fig. 5 is a similar view on the line *zz*, and Fig. 6 an enlarged detail view.

A indicates the boiler proper, provided with a series of fire-tubes, *a*, substantially as in ordinary fire-tube boilers.

B indicates a hollow or double-walled U-shaped body, which is firmly riveted or otherwise secured to the overhanging sides of the boiler proper, as clearly shown in Fig. 3, the body B extending rearwardly behind the rear end of the boiler, as shown in Fig. 2, in order to form a smoke chamber, C, which will allow the products of combustion to pass into the rear ends of the fire-tubes *a*. The chamber C extends beneath the boiler, as shown in Figs. 2, 3, and 4, and in the space between the lower side of the boiler proper and the body B, I place the grate D, which consists, preferably, of three or more tubular bars or pipes, *b*, as shown in Figs. 2 and 3. At its rear end the body B is turned or extends upward to receive the rear ends of the pipes *b*, as shown in Fig. 2, the front ends of the pipes screwing into the hollow box or chamber E, as clearly shown in Figs. 2 and 4. Into the upper side of the box or chamber E enter two pipes, *c* and *d*, the former communicating with the upper portion of the boiler A, while the other, *d*, enters the boiler A near its bottom, as indicated in Figs. 2 and 4.

The grate-bars *b* will preferably be supported at a point between their ends by means of a bridge-piece or support, F, which rests at opposite ends upon the inner walls of cham-

ber or body B, as clearly indicated in Fig. 3, thereby preventing the bars from sagging. The front plate, G, of the furnace is provided with doors H for feeding fuel to the furnace, with a large door, I, directly opposite the front end of the boiler, to permit the cleaning of its flues, and with door or damper J, which regulates the admission of air beneath the grate, as clearly shown in Figs. 1 and 2.

In the rear end or upright portion of chamber or body B is an opening, *e*, immediately beneath the grate D, which permits the cinders, &c., to be removed from the rear end of the ash-pit K, the opening *e* being closed by a valve or damper, *f*, as clearly indicated in Fig. 2.

Extending forwardly from the lower edge of the boiler A is a diaphragm, *g*, which prevents the products of combustion from passing upward in front of the boiler, but causes them to pass rearwardly beneath the latter through the chamber C, thence forward through the fire-tubes *a* to the front end of the furnace, and finally out through the smoke-stack L, as shown in Fig. 2.

From the foregoing construction it will be seen that the hollow-wall chamber B and the tubular grate-bars *b* communicate by means of the pipes *c* and *d* with the water-space of the boiler, and of course, as fire is built upon the grate, the water in the grate-bars and in the chamber B becomes highly heated, thereby utilizing to the fullest possible extent all the available heat.

The furnace is designed particularly for burning straw; but it is apparent that coal or other suitable fuel may be used.

The upper portion of chamber C in rear of the boiler is covered by a roofing, M, of fire-brick or other suitable material, as shown in Fig. 2.

Extending horizontally across the chamber C are three or more pipes, N, which, as shown in Figs. 5 and 6, connect at each end with the water-space of the U-shaped chamber B. The manner of connecting the pipes N with the U-shaped body is clearly illustrated in Fig. 6, upon reference to which it will be noticed that the pipes are provided at each end with a cap, O, which latter, as well as the pipe N, is tapped or threaded to receive the threaded

tube or hollow bolt P. The bolt P is provided with an enlarged angular head, Q, and is threaded throughout its entire length, so that it may screw not only into the pipe N and its cap O, but also engage with both walls or plates that make up the U-shaped body. As shown in Fig. 6, this bolt is hollow from end to end, and is threaded at its outer end to receive a plug, R, which prevents the escape of water; and it will also be noticed that at a point between the walls of the chamber B it is provided with a hole, S, by which communication is established between the pipes M and the water-space B.

When it is desired to clean out the pipes N, the plug R will be removed and a cock or faucet inserted and steam forced through the pipes from end to end; or, in lieu of the plugs R, the faucets or cocks may be employed to close the ends of the hollow bolts P, as shown in Fig. 5, this plan being preferable to the former, as the cocks will always be ready for use. The products of combustion passing up around the pipes N heat to a greater or less extent the water therein, from which it will be seen that the heat is distributed over a great amount of surface.

The pipes c d may enter the box or chamber E at the sides instead of from the top, if desired.

A bar or beam, T, extends transversely across the upper portion of the upturned end of the water-chamber B, as clearly shown in Fig. 2, thereby stiffening and strengthening the furnace.

Having thus described my invention, what I claim is--

1. In combination with the boiler A, provided with fire-tubes a, the U-shaped hollow-walled chamber B, secured to the under side of said boiler and extending in rear thereof to form a closed chamber, C, a grate, D, beneath the boiler, a chimney, L, at the forward end of the boiler, and a diaphragm or flange, g, projecting forwardly from the front edge of the boiler, substantially as described.

2. In a furnace substantially such as shown, the combination, with the boiler A and the U-shaped body or chamber B, secured to the under face thereof and separated a suitable distance therefrom, of the hollow grate-bars b, communicating with the chamber B at their rear ends, a hollow box or chamber, E, at the forward end of the grate-bars, and a pipe or pipes communicating with the boiler A and the box or chamber E, all substantially as shown.

3. In combination with boiler A, the U-shaped body B secured thereto, separated a

distance therefrom, and having the upwardly-turned rear end, forming a chamber, C, at the rear end of the boiler, a covering, M, for said chamber C, tubular grate-bars b communicating with the rear end of chamber or body B, a hollow box, E, at the forward end of and communicating with the grate-bars, pipes c and d, communicating with the boiler and with the chamber E, a flange or diaphragm, g, extending from the lower edge of the boiler to the front wall or plate of the furnace, and a chimney, L, all substantially as shown.

4. In combination with the boiler A, provided with the laterally-extending or overhanging portions, the U-shaped body or chamber B, secured to said overhanging portion, and a grate, D, located within the space between the boiler and the inner wall of body B, said body B and grate-bars communicating with the water-space of the boiler, all substantially as shown.

5. In combination with a boiler, A, and a U-shaped body, B, secured thereto, substantially as shown, the pipes N, connecting the opposite walls of body B and communicating with the water-space of the latter.

6. In combination with boiler A, the U-shaped body B, extending beneath and in rear of said boiler, thereby forming a chamber, C, and a series of pipes, N, extending horizontally across the chamber C and communicating at opposite ends with the water-space of the body B.

7. In combination with the hollow U-shaped body B, pipe N, a hollow bolt, P, screwing through the walls of the body B and into the end of the pipe, a plug, R, closing the outer end of the hollow bolt, and an opening, S, in the hollow bolt communicating with the water-space of the chamber B.

8. In combination with the hollow body B, pipes N, provided at opposite ends with caps O, bolts P, screwing through the walls of the body B and into the ends of the pipes N, said bolts being provided with hole S, plug R, and angular head Q, all substantially as shown.

9. In a boiler-furnace substantially such as shown, the combination, with the boiler and the U-shaped chamber B, of hollow grate D, box or chamber E, and pipes c, d, and N, all arranged for operation substantially in the manner shown.

In witness whereof I hereunto set my hand in the presence of two witnesses.

FREDERICK LUDWIG.

Witnesses:

JOHN LUITEN,
HERMANN LUITEN.