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J. MOFFAT.
BOILER ATTACHMENT.
APPLICATION FILED SEPT. 16, 1905.

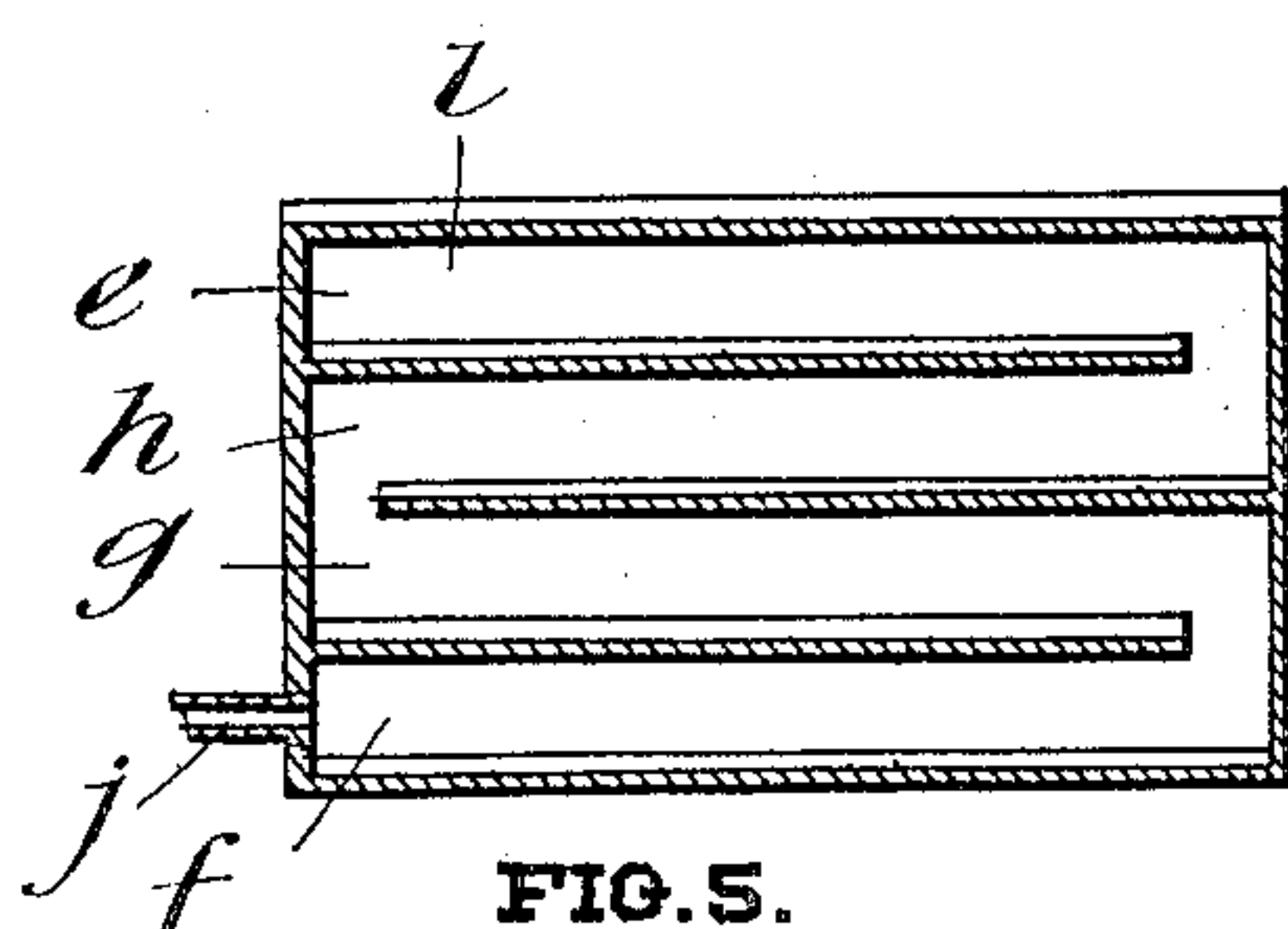


FIG. 5.

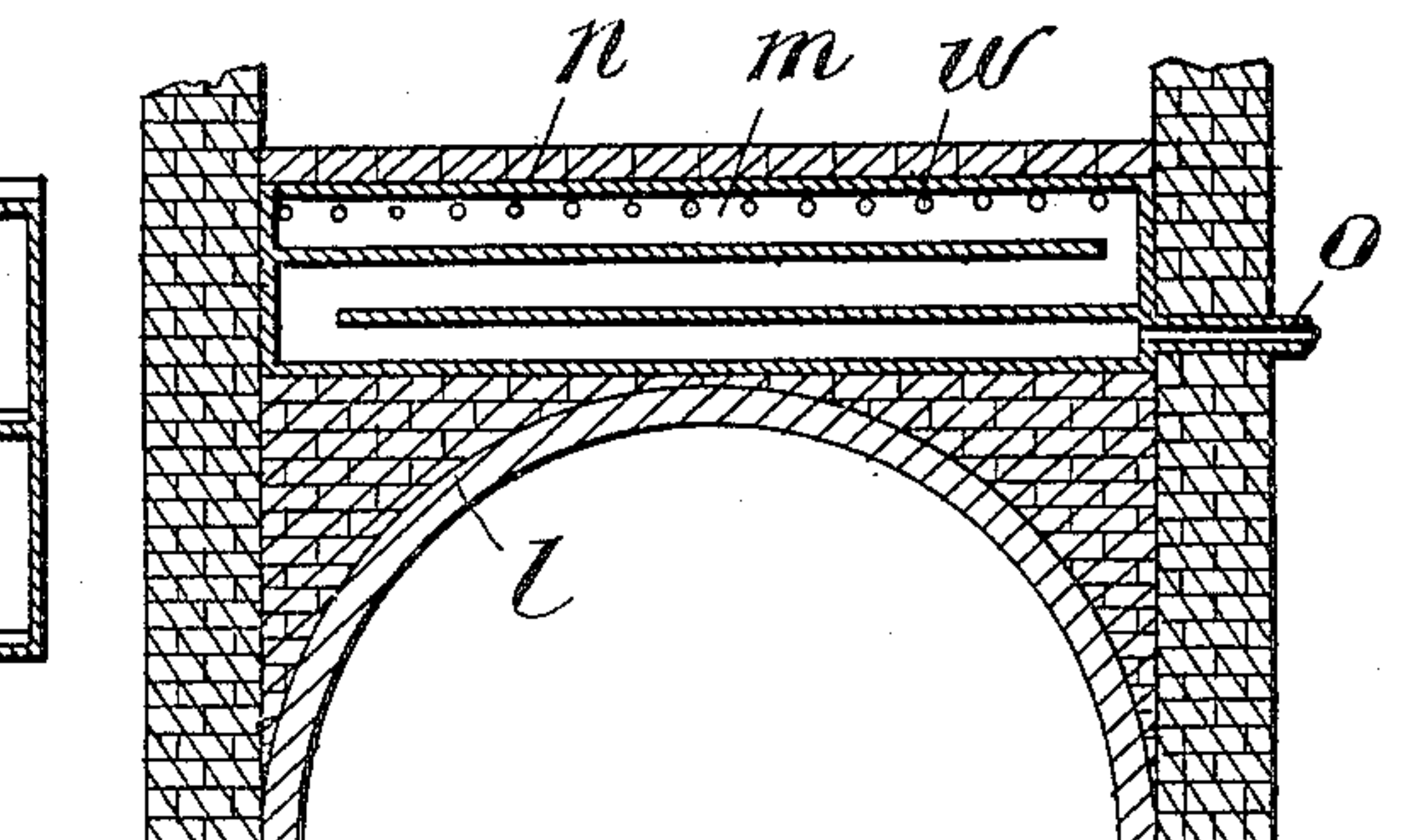


FIG. 4.

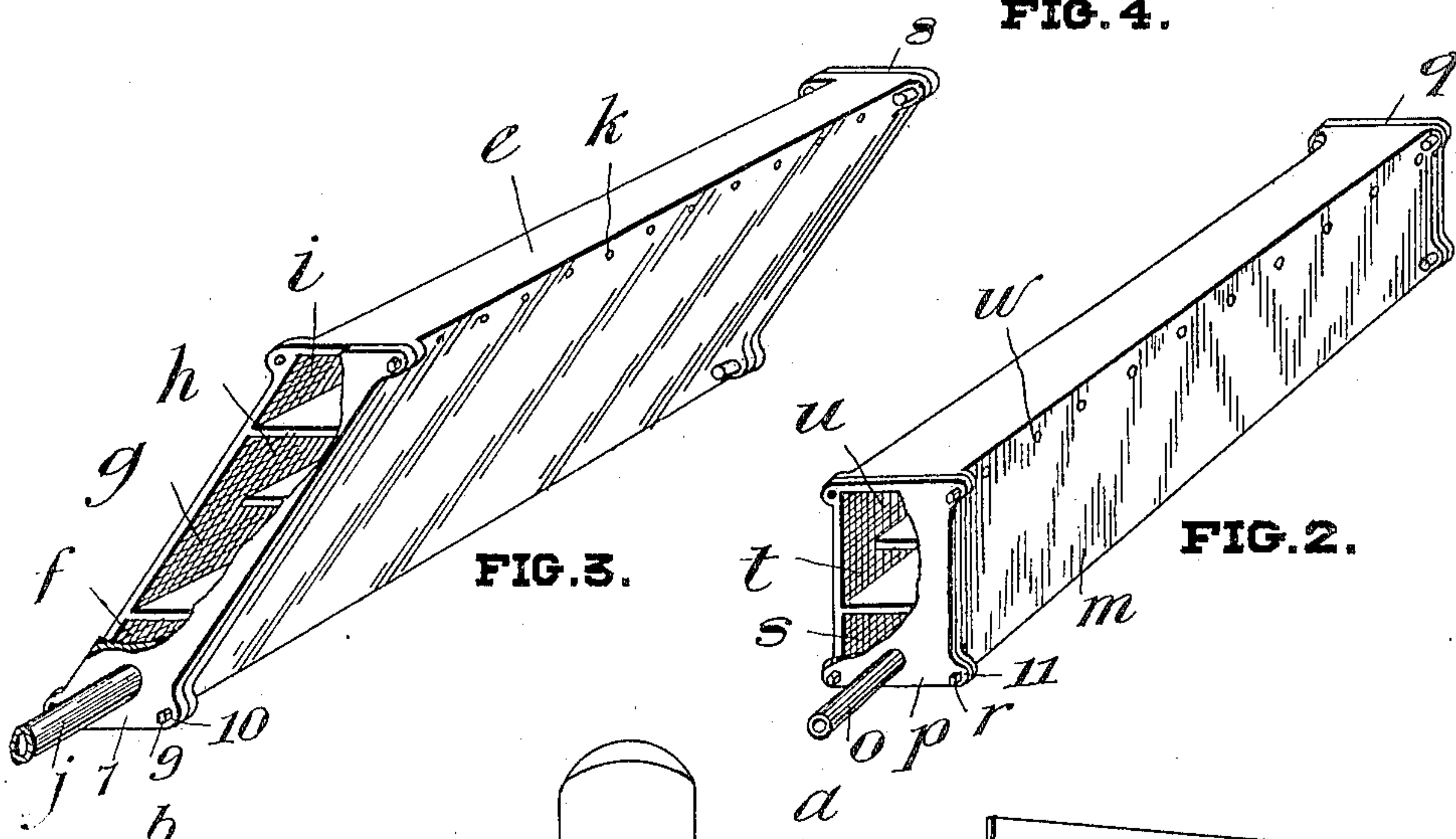


FIG. 3.

FIG. 2.

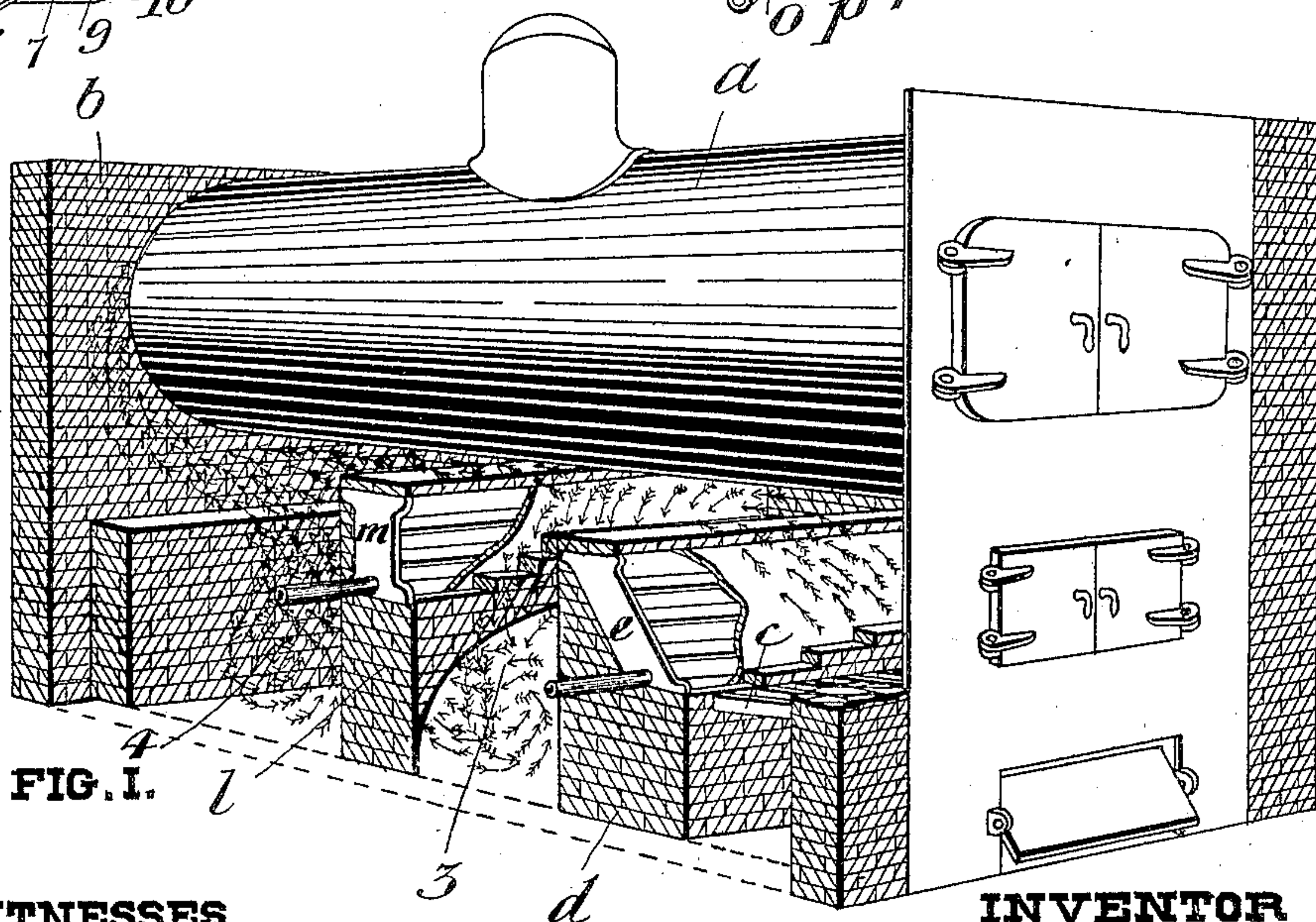


FIG. 1.

WITNESSES

Wm. A. Wymann
J. H. Glen

INVENTOR

J. MOFFAT

BY

Frederick Salustianovich
ATTY

UNITED STATES PATENT OFFICE.

JOHN MOFFAT, OF BERLIN, CANADA.

BOILER ATTACHMENT.

No. 818,459.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN MOFFAT, manufacturer, residing at the city of Berlin, in the county of Waterloo, Province of Ontario, Canada, have invented certain new and useful Improvements in Boiler Attachments; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to improvements in attachments for boilers; and the objects of my invention are to provide means within the boiler for consuming the smoke and using up the heat which would otherwise go in waste up the chimney, further objects being to provide a support for the bridge-wall; and it consists, essentially, of a prismatic box constructed of cast-iron or other suitable material adapted to be situated in the bridge-wall and to strengthen the same, a plurality of compartments contained in the same through which air circulates, a plurality of holes at one end of the box allowing for the exit of the air so circulated, an auxiliary arched bridge-wall, a prismatic box constructed of cast-iron or other suitable material contained in the top thereof, a plurality of compartments in the said box, and a plurality of openings at the rear side thereof allowing for the exit of the circulated air, the various parts of the device being constructed and arranged in detail as hereinafter more particularly described.

Figure 1 is a perspective view, partly in section, showing a boiler having my attachment therein. Fig. 2 shows a perspective detail of the box situated in the auxiliary bridge-wall, a portion being broken away to more clearly show the construction thereof. Fig. 3 shows a perspective view of the box situated in the bridge-wall, a portion being broken away to more clearly show the construction thereof. Fig. 4 is a vertical section of the auxiliary bridge-wall. Fig. 5 is a vertical section through the center of the box used in the bridge-wall.

In the drawings like characters of reference indicate corresponding parts in each figure.

a is the boiler proper, suitably situated in a suitable support of masonry *b*.

c is the grate-bar of the same, and *d* the bridge-wall.

e is a box constructed of cast-iron or other suitable material, which is situated with one of its faces parallel to the face of the bridge-wall, as shown. This box is preferably cast and made with a plurality of compartments

f, *g*, *h*, and *i*. Each of these compartments has an opening at the end thereof into the next compartment, and a pipe *j* is provided in the bottom compartment. This pipe is led through masonry to the outside air. The end pieces of the box 7 and 8 may be secured to the central portion by bolts 9, passing through lugs 10, or may be made integral with the main portion. It will thus be seen that air entering the bottom compartment will proceed gradually through all the various compartments to the top one. The top compartment has a plurality of poles *k* provided therein on the rear side of the box when situated in the boiler. In placing the box in the bridge-wall a space is left in the masonry in front of each of these holes, so that fresh air may enter the box through the pipe *j* and go out through the holes *k* in the top toward the rear of the boiler.

l is the auxiliary arched bridge-wall. This wall is suitably constructed of masonry or other material in the form of an arch and has a space *n* provided at the top thereof, wherein the box *m* may be placed. The box *m* is constructed of cast-iron or other suitable material, preferably cast in one piece and provided with end pieces *p* and *q*, adapted to be screwed onto the main portion by means of bolts *r*, passing through lugs 11, or other suitable means. The inside of the box *m* is constructed with a plurality of compartments *s* *t* *u*. A pipe *o* is secured to the cover, preferably screwed therein near the bottom of the box. This pipe is led through the masonry to the outside air. Openings are provided at the end of each compartment into the next compartment, so that air entering into the bottom compartment will proceed from this to the compartment *t*, thence to *u*. The compartment *u* has a plurality of holes *w* provided therein, and in placing the box in the masonry a clear space is left in front of each of these holes. It will thus be seen that air admitted through the pipe *o* will be drawn through the various compartments and out through the holes *w* by means of the natural draft of the boiler.

An additional manhole is provided in the boiler to permit of the entering of a man to clean the second bridge-wall.

The operation of my attachment for furnaces is as follows: The ordinary combustion takes place on the grate-bars *c*, the flame, smoke, heat, &c., flowing over the bridge-wall *d* into the chamber 3. Here they strike

against the auxiliary bridge-wall *l*. At the same time air has been entering through the pipe *j*, coming gradually through all the compartments of the box *e* and out of the holes *k*.
 5 It will thus be seen that the air being forced through the various compartments and so remaining in contact with the heated flame has become heated. This superheated air then mixes with the smoke, inflammable
 10 gases, &c., which have come over the bridge-wall *d*. This mixture is very thorough, as the gases and fresh air both strike the wall *l* and rebound therefrom, intermingling together. The hot gas, smoke, &c., having
 15 mixed with the fresh air, the gas is burned and the carbonaceous particles consumed. Also another advantage is that the heated air is mixed with the carbon contained in the gas before the latter is reduced by the igni-
 20 tion. The portion of the gas and smoke not consumed flows over the wall *l* or through the arch into the chamber 4. Continuing on its journey it strikes against the wall *l*, situated at the end of the furnace, and is thrown
 25 back again. In the meantime fresh air has been introduced through the pipe *o* through the various compartments of the box *m* and out through the holes *w* into the chamber 4. This fresh air in passing through the box *m*
 30 has become superheated. This superheated air, mixing with the gas, smoke, &c., now contained in the chamber 4, burns away any further gases which may be contained therein and consumes the carbon particles, thus
 35 insuring a more perfect combustion of the gas and consuming of the carbonaceous particles. The arrows in Fig. 1 indicate the mixing of the air and hot gases in the heating-chambers.
 40 It will thus be seen that I have invented an attachment which will greatly aid in the economy of any boiler-furnace. Where the boilers are situated in crowded localities, the

absence of the carbon particles from the furnaces will greatly assist in the health of the 45 community.

It is to be understood that in carrying out my invention certain changes may be made in the details thereof without materially departing from the spirit of my invention. 50

What I claim as my invention is—

1. A furnace having a number of bridge-walls therein spaced apart so as to form a number of combustion-chambers, air-heating chambers, situated in the tops of said 55 bridge-walls and having discharge-openings leading to the rear of said walls and means for introducing fresh air to said chambers, one of said walls having an opening in its lower part so that the products of combustion may flow through said opening as well 60 as over said bridge-wall.

2. A furnace having a bridge-wall therein having an inclined top, an inclined air-heating chamber in said top, said chamber having 65 an air-inlet and discharge-openings leading to the rear of said bridge-wall, an auxiliary bridge-wall located in the rear of the first bridge-wall and forming with said first wall a combustion-chamber, said auxiliary 70 bridge-wall having an arched opening in its lower part for the passage of the products of combustion therethrough, and an air-heating chamber in the top of said bridge-wall heated by the products of combustion flowing 75 over the wall, said chamber having an air-inlet and discharge-openings, said openings leading to the rear of the bridge-wall.

Signed at the city of Ottawa, in the county of Carleton, and Province of Ontario, this 80 14th day of September, 1905.

JOHN MOFFAT.

Witnesses:

RUSSEL S. SMART,
 J. H. GLEN.