

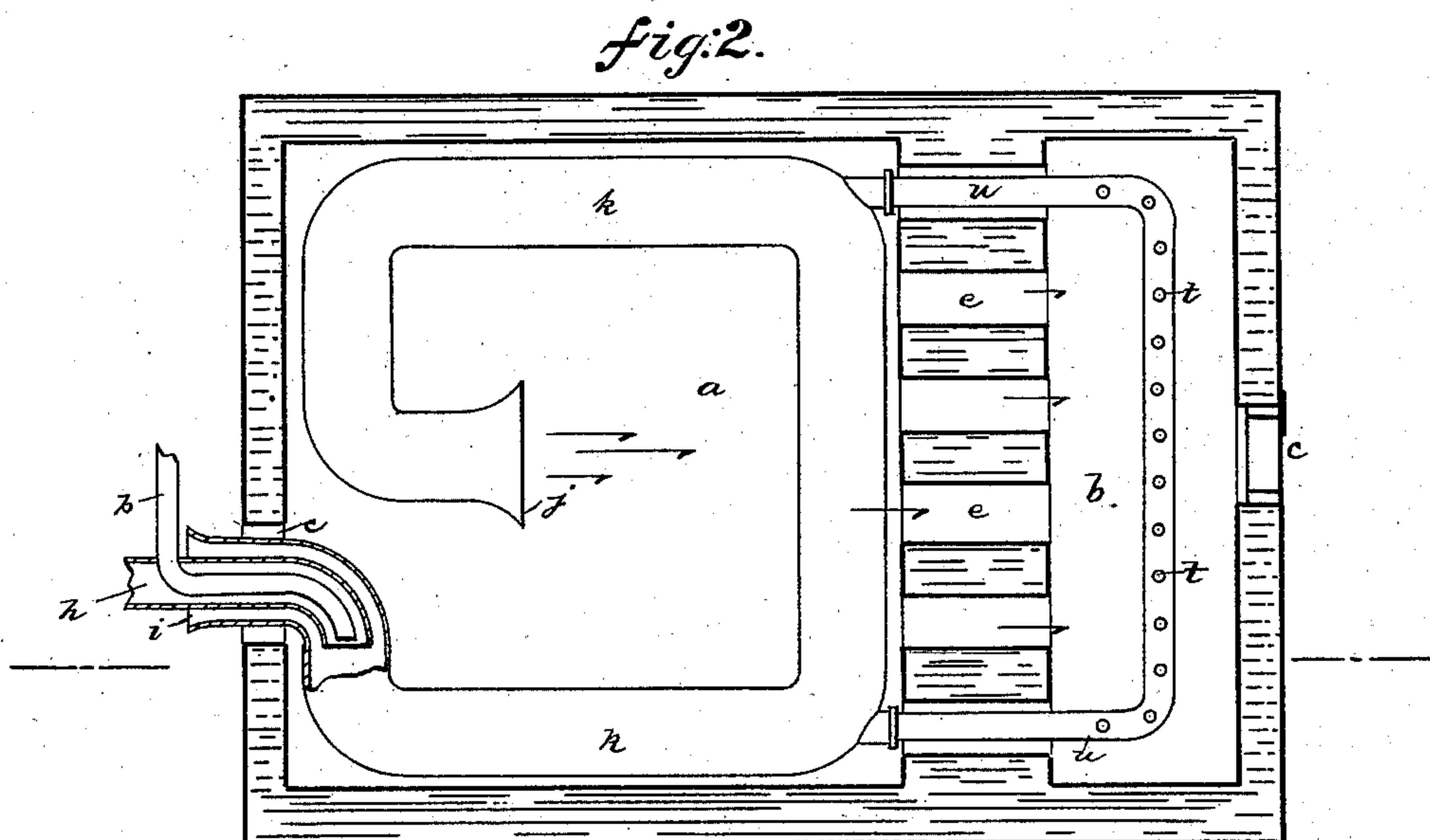
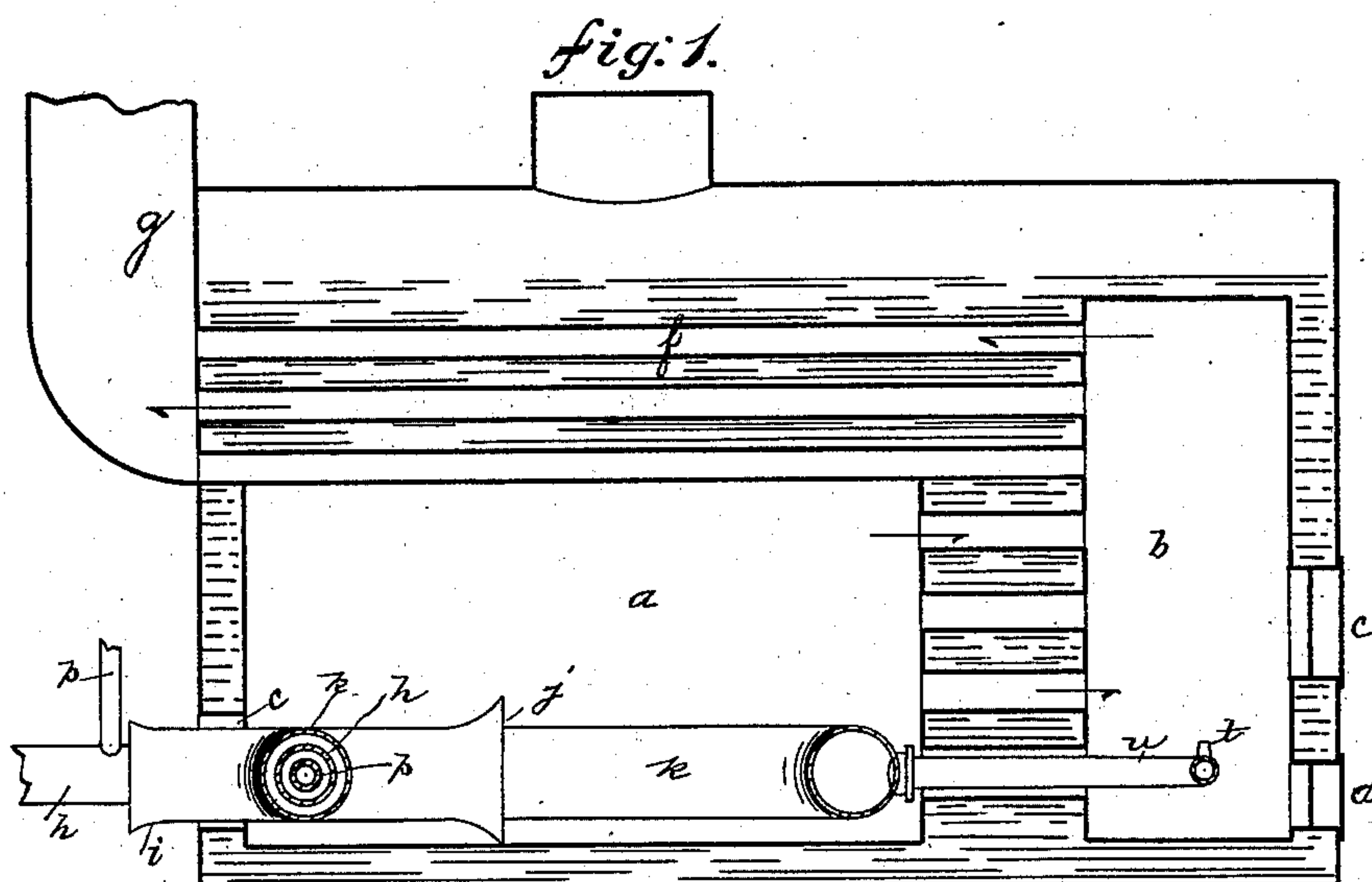
(No Model.)

J. WILSON & A. MASON.

APPARATUS FOR MAINTAINING COMBUSTION IN SECONDARY
CHAMBERS OF BOILER OR OTHER FURNACES.

No. 406,684.

Patented July 9, 1889.



WITNESSES:

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INVENTORS

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MAINTAINING COMBUSTION IN SECONDARY CHAMBERS OF BOILER OR OTHER FURNACES.

SPECIFICATION forming part of Letters Patent No. 406,684, dated July 9, 1889.

Application filed March 8, 1888. Serial No. 266,567. (No model.)

To all whom it may concern:

Be it known that we, JOHN WILSON and ALLAN MASON, citizens of the United States, residing at New York city, in the county and State of New York, and Brooklyn, Kings county, New York, respectively, have invented certain new and useful Improvements in Apparatus for Maintaining Combustion in Secondary Chambers of Boiler or other Furnaces; and we do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

Our invention relates to boiler and other furnaces in which one or more secondary combustion-chambers are employed, with the objects of securing more effectual combustion of the gaseous portions of the fuel and more effective application of the heat than are obtained with a single combustion-chamber, and is especially designed for the greater and more economical generation of steam in marine and other boilers through the instrumentality of a secondary combustion-chamber at the rear or opposite end from the primary furnace-chamber, and communicating with it to receive and consume the unconsumed gases and return the heat products through the upper portion of the boiler; but our invention is also designed generally for all similar or other furnaces in which secondary combustion may be advantageously utilized, as hereinafter fully described, reference being made to the accompanying drawings, in which—

Figure 1 is a horizontal section of a boiler-furnace, showing the auxiliary fire in the secondary furnace maintained with the vapor or gas of hydrocarbon and air, or air and steam, if desired, generated and combined in a retort in the primary furnace, and which also supplies the combustibles burned in it; but coal or other fuel may be used therewith. Fig. 2 is a longitudinal sectional elevation on line *x x*, Fig. 1.

We are aware that it has been attempted to consume in secondary chambers such gases

as fail of complete combustion in the first chamber, it being supposed that sufficient room being provided the heat of the primary chamber would be sufficient for effecting such combustion; but we find such method is a failure practically, although it may work at times and under some circumstances; but generally the gases are too much chilled to insure continuous combustion, and when extinguished by fall of temperature or other causes fail to relight, even when considerable increase of temperature takes place; hence we find an auxiliary fire in the secondary chamber an imperative necessity for practical efficiency; but such a fire as is commonly made by intermittent supplies of fuel through the ordinary fire-door will not do, because when the door is opened it stops the draft in both fires, besides admitting cold air in great excess, and therefore materially interferes with both fires, and if a fan-blower is used to urge the main fire, as is commonly the case with marine boilers, the door cannot be opened without first stopping the fan, and the fan also interferes with magazine-feeders and other automatic stokers for the auxiliary fire by forcing more or less gas out through them. To overcome these difficulties and to secure a reliable and uniform auxiliary fire adapted to insure effectual combustion of the unconsumed gases from the main fire, we have contrived a system which comprises the continuous and unobstructed forced supply of the elements of combustion alike to the primary chamber and to the continually-closed secondary chamber, in addition to the gases entering it from the main furnace, and in such manner as to accelerate the natural draft of the main furnace and to be alike available with a forced draft thereto, the arrangement being such that the same is controllable at the front, where the main fire is tended, and so that the apparatus is applicable to and detachable from ordinary furnaces constructed with a secondary chamber without change or permanent attachment.

The apparatus which we prefer to use is substantially as follows, the process being claimed in a prior application.

In the boiler-furnace represented in the

drawings, *a* indicates the main or primary combustion-chamber, and *b* the secondary chamber, both having the customary fire-door *c* and ash-pit door *d*, with the usual system
5 of fire-tubes *e* communicating between them, and also the return system of tubes *f* connecting the secondary chamber with the smoke-flue *g*. We represent in this example a retort *k* located in the first combustion-chamber, with
10 oil, steam, and air inlets *j*, *h*, and *i* to more effectually vaporize and gasify the several elements by causing them to traverse the retort, which is a pipe suitably coiled and made to discharge rearwardly from the furnace-door,
15 or thereabout. With this retort *k* for gasifying the elements to be employed in the main furnace we will employ gas-burners *t* in the secondary furnace, with a branch or branches *u* of the retort extending through one or more
20 of the fire-tubes into it and supplying the burners *t* with gas generated in said retort, which also, preferably, supplies the main chamber *a* with its fuel through the issue *j*, and thus enables both fires to be fed by one

set of injector apparatus for a simple con- 25
trivance of the same.

What we claim, and desire to secure by Letters Patent, is—

The combination, in a boiler-furnace having primary and secondary combustion-cham- 30
bers, of the pipe-retort entering and extending around the sides, back, and front of the primary combustion-chamber and terminating therein in a lateral discharge, the branch pipe of said retort, said branch pipe extend- 35
ing into said secondary combustion-chamber and provided with a series of burners, and the injector-feeder extending within the retort for supplying said retort with the fuel elements, substantially as described. 40

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN WILSON.
ALLAN MASON.

Witnesses:

W. J. MORGAN,
A. P. THAYER.