

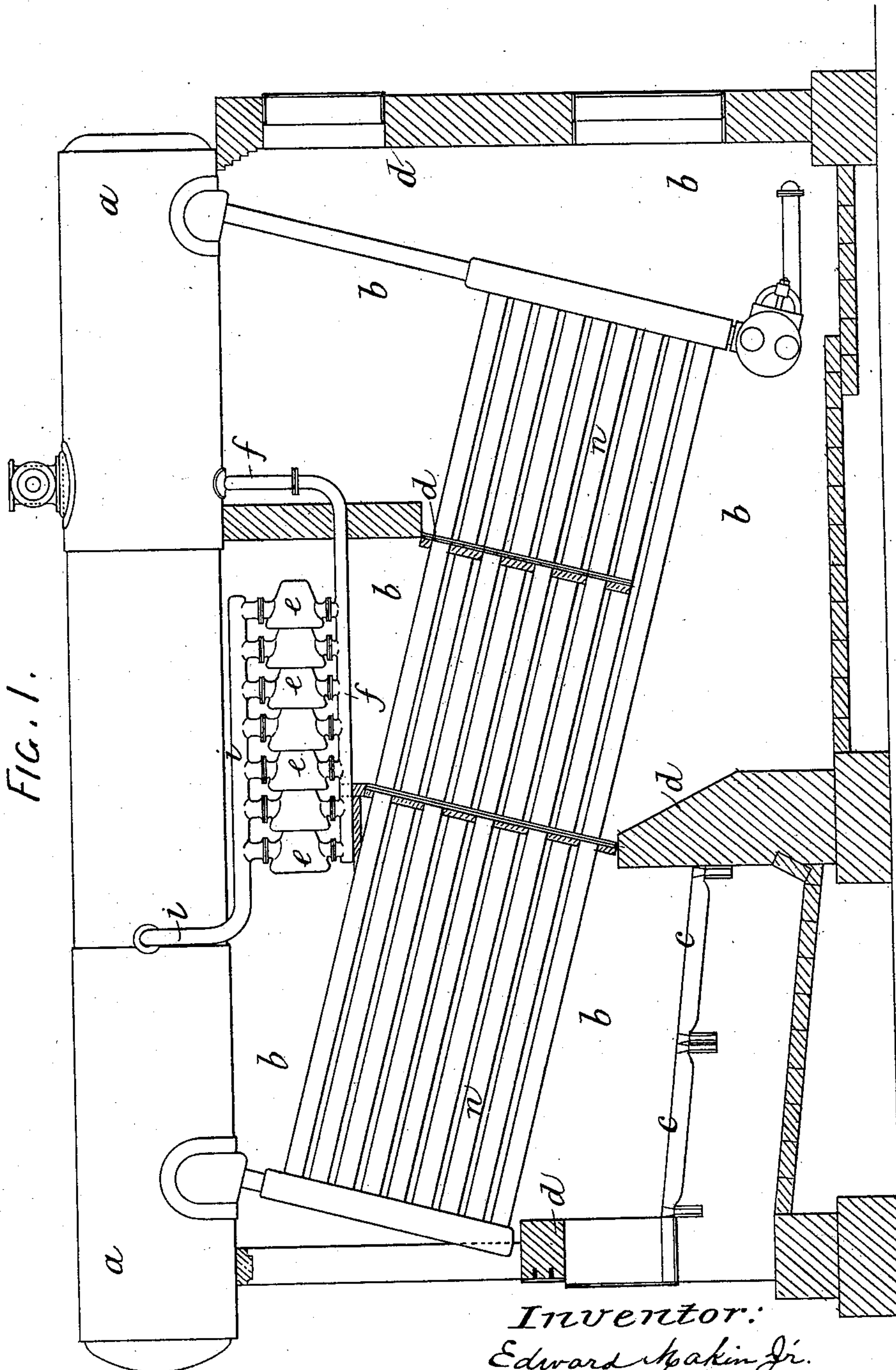
(No Model.)

2 Sheets—Sheet 1.

E. MAKIN, Jr.
STEAM BOILER.

No. 599,853.

Patented Mar. 1, 1898.



Witnesses:
E. B. Kolton
O. W. Munro

Inventor:
Edward Makin Jr.

By *Richard R. [Signature]*
his Attorneys.

(No Model.)

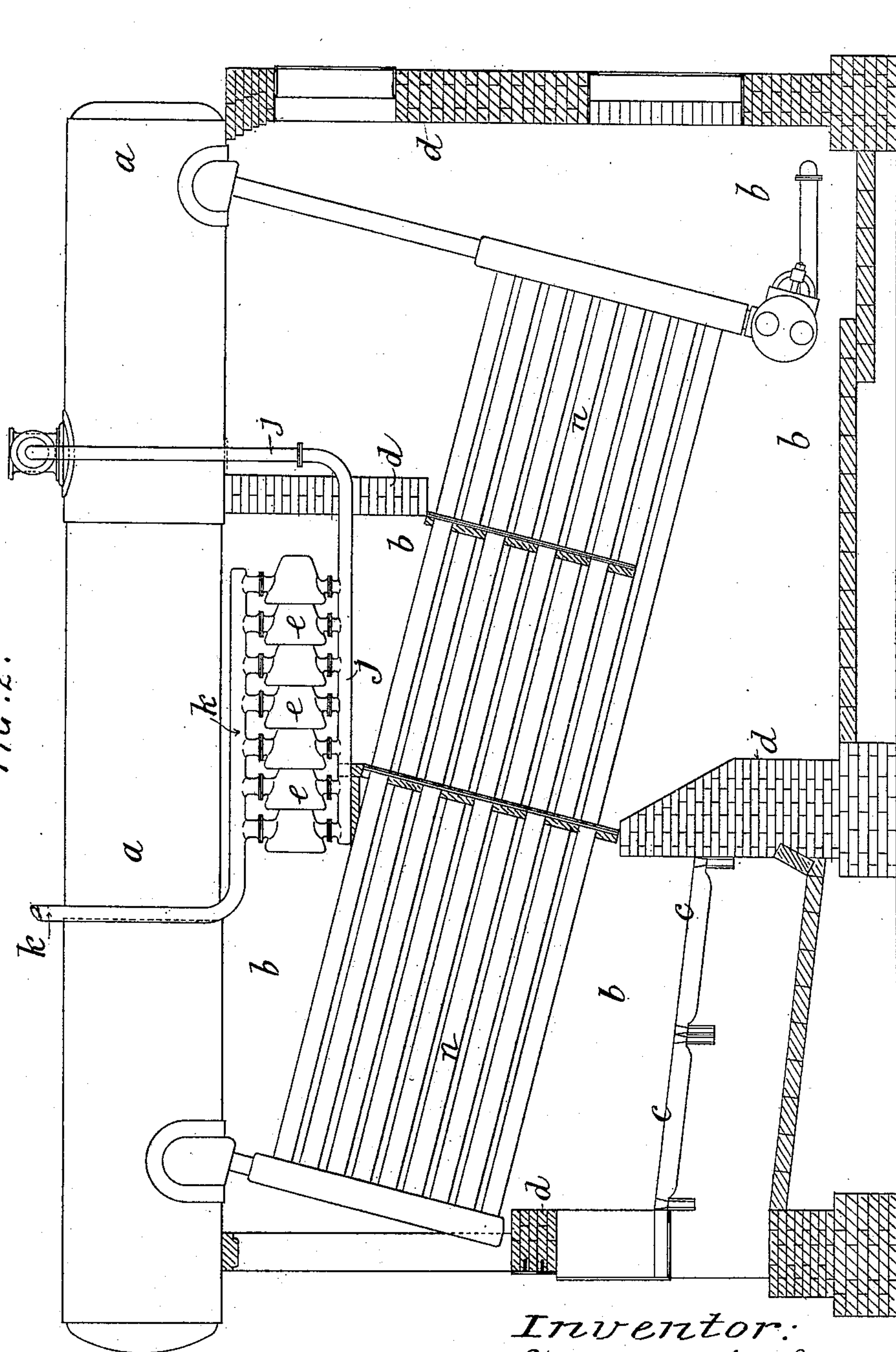
2 Sheets—Sheet 2.

E. MAKIN, Jr.
STEAM BOILER.

No. 599,853.

Patented Mar. 1, 1898.

FIG. 2.



Witnesses:

E. R. Bolton
O. H. Munro

Inventor:

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UNITED STATES PATENT OFFICE.

EDWARD MAKIN, JR., OF MANCHESTER, ENGLAND.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 599,853, dated March 1, 1898.

Application filed May 20, 1897. Serial No. 637,392. (No model.) Patented in England August 6, 1896, No. 17,358.

To all whom it may concern:

Be it known that I, EDWARD MAKIN, JR., a subject of the Queen of Great Britain, and a resident of 40 New Brown street, Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in Steam-Boilers, (for which I have obtained Letters Patent in Great Britain, No. 17,358, bearing date August 6, 1896,) of which the following is a specification.

My invention relates to improvements in steam-boilers of the tubular type—such, for example, as the well-known Babcock & Wilcox and Belleville boilers; and my improvements consist chiefly in the arrangement, use, and application of a novel apparatus for superheating the steam generated in the usual arrangement of tubes, or, alternatively, partly in the tubes and partly in a similar apparatus to that which I employ for superheating.

The apparatus which I employ as a steam superheater or generator or for both purposes consists of a series of hollow-walled steam or water circulating vessels, preferably in the form of conical shells placed in a convenient part of the flue and arranged, preferably, so that the large end of one cone overlaps the small end of the preceding cone, but without touching it, thus leaving spaces between, around, and through the cones for the passage of the furnace-gases in order to expose as large a surface as possible to the action of the heated gases.

In the accompanying two sheets of drawings I illustrate my improvements as applied to a boiler of the Babcock & Wilcox type, Figure 1 being a side sectional elevation of the boiler, showing one apparatus connected for steam-generating; and Fig. 2 is a similar view showing a similar apparatus connected for steam-superheating.

In the views, *a* designates the steam and water drum or separating vessel; *b*, the furnace-flue; *c*, the fire-bars; *d*, the furnace-walls, and *e* the series of hollow-walled cones. The series of cones *e* (shown in Fig. 1) are for the purpose of steam generation and are therefore supplied with water through a pipe *f* from the bottom of the drum *a* or from any

other convenient source of supply. Each of the cones *e* is connected by branches to the feed-pipe *f* and also to a discharge or delivery pipe *i*, which is connected to the drum *a*, preferably at or about the water-level. The heated gases from the furnace circulate through, between, and around the hollow-walled cones *e*, the construction and arrangement of which, as shown and described, gives a very large heating-surface, whereby water is heated and steam is rapidly generated in addition to the steam generated in the usual nests of inclined tubes *n*. In like manner the steam is superheated in a similar arrangement of hollow-walled cones *e*, placed in the flue *b* beside the steam-generating cones *e*, or in substitution for such cones.

Each of the cones *e* is connected, as shown in Fig. 2, by branches to a steam-supply pipe *j*, connected to the steam-space of the drum *a* and also to a steam-delivery pipe *k*, by which the steam is conveyed to the engine (not shown in the drawings) or elsewhere, as required.

Any number of the hollow-walled vessels may be employed and their form and arrangement may be varied without departing from the nature of my invention.

I do not wish to limit myself to the application of the invention to any particular form of boiler nor to any particular location of the invention in the boiler, and it will be obvious that the invention may be adapted as a steam-superheater without departing from the spirit of the invention.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a steam-generating boiler, the combination with the boiler of the steam-generator comprising a series of hollow-walled cones each having a passage through its interior, the small end of one cone projecting into the large end of the adjacent cone leaving a space for the passage of the heat products between and through the cones and the connection be-

tween the hollow-walled cones and the boiler, substantially as described.

2. In combination with the steam-boiler, a generator comprising the series of hollow-walled cones arranged end to end, a pipe extending along one side of the series, a second pipe extending along the other side of the series and the branch connections between said

pipes and the hollow-walled cones, substantially as described.

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

EDWARD MAKIN, JUNIOR.

Witnesses:

S. D. GILLET,
HERBERT R. ABBEY.