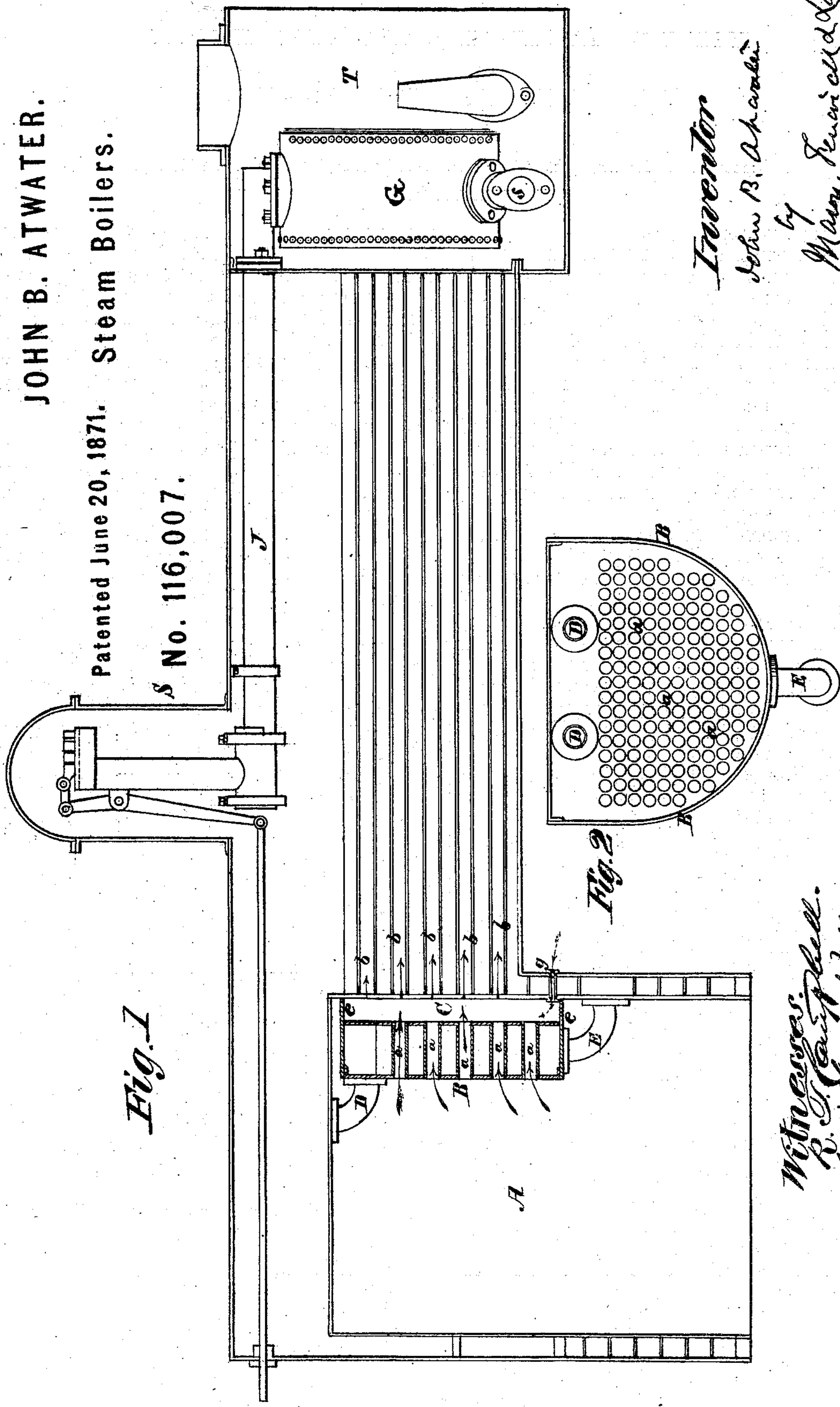


JOHN B. ATWATER.

Patented June 20, 1871. Steam Boilers.

No. 116,007.



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by
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UNITED STATES PATENT OFFICE.

JOHN BOWMAN ATWATER, OF GENEVA, ILLINOIS.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. 116,007, dated June 20, 1871.

To all whom it may concern:

Be it known that I, JOHN BOWMAN ATWATER, of Geneva, in the county of Kane and State of Illinois, have invented an Improvement relating to Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1 is a section taken vertically and longitudinally through a flue-boiler having my improvement applied to it. Fig. 2 is a section taken vertically and transversely through the auxiliary steam-generator.

Similar letters of reference indicate corresponding parts in the two figures.

This invention relates to flue-boilers, and has for its object the arrangement within the fire-chamber of such a boiler of an auxiliary flue-generator, interposed between which latter and the front end of the primary boiler is a combustion-chamber, which is supplied with air through apertures made through one of the water-legs surrounding the fire-chamber, as will be hereinafter explained.

To enable others skilled in the art to understand my invention, I will explain its construction and operation.

In the accompanying drawing I have represented my invention applied in the fire-chamber of a locomotive flue-boiler; but it will be obvious from the following description that it can be applied to other varieties of flue-boilers.

A represents the fire-chamber of a boiler, which is surrounded with a water-jacket communicating with the body of the boiler in the well-known manner. B represents my improved auxiliary steam-generator, which is arranged in the fire-chamber A, and separated from the posterior head of the primary boiler by means of a combustion-chamber, C, into which air is introduced through one or more hollow bolts, *g*, as indicated by the arrow in dotted lines. The separation of the auxiliary generator B from the head of the primary boiler and its attachment thereto are effected by means of extensions *e* of the plates which surround this generator, as shown in Fig. 1. The generator B is composed of front and rear

heads, a surrounding shell, and short flue-tubes *a a*, which latter are secured by their extremities to the two heads of the generator, and may or may not be coincident with the tubes *b* through the boiler proper. E represents a tubular communication between the primary boiler and the auxiliary boiler or generator; and D D represent communications between the generator and the steam-space above the water in the primary boiler. S is the steam-dome; J, the steam-pipe leading into a superheater, G, which is arranged in the smoke-box T. The branch pipes *s*, which lead out of the superheater, communicate with the engine.

It will be seen from the above description that the flame and products of combustion are all conducted from the fire-chamber A through the auxiliary generator B into a combustion-chamber, C, before they enter the tubes *b* of the boiler proper; that these highly-heated products are supplied with air in the combustion-chamber C, and thus thoroughly burned; that the upper surfaces of the flues *b* are not exposed to the impingement of cinders against them, and for this reason they will not be readily destroyed; that the generator B, which is in communication with the water-space of the primary boiler below and with the steam-space of the boiler above, is subjected to intense heat at both ends, and consequently there will be produced a rapid and free circulation of the water from the main boiler into and through the auxiliary generator and back again into the main boiler. It will also be seen that the auxiliary generator can be readily introduced into the fire-chamber after the grate is taken out, and with the same facility removed from this chamber.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The auxiliary-flue steam-generator B and the combustion-chamber C, arranged in front of a flue-boiler in the fire-chamber thereof, substantially as described.

JOHN BOWMAN ATWATER.

Witnesses:

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