B. T. BABBITT.

Steam-Boiler.

No. 203,987. Patented May 21, 1878.

Fig. 1.

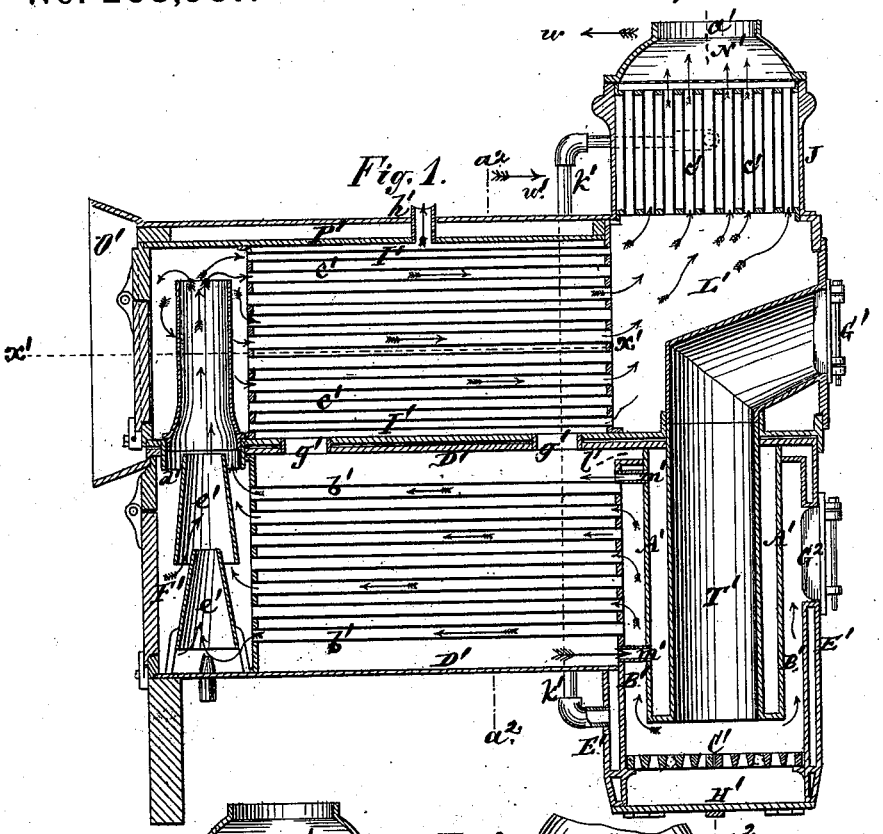


Fig. 2.

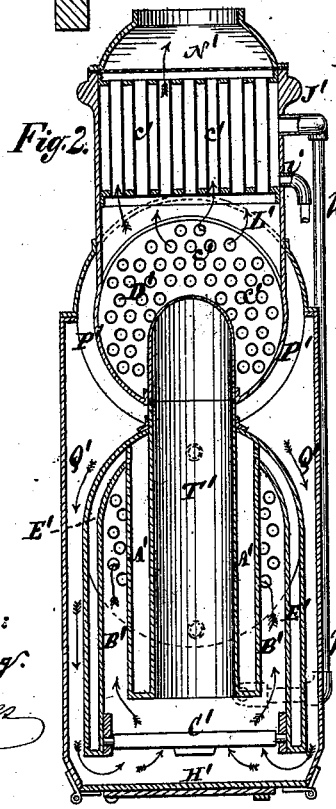
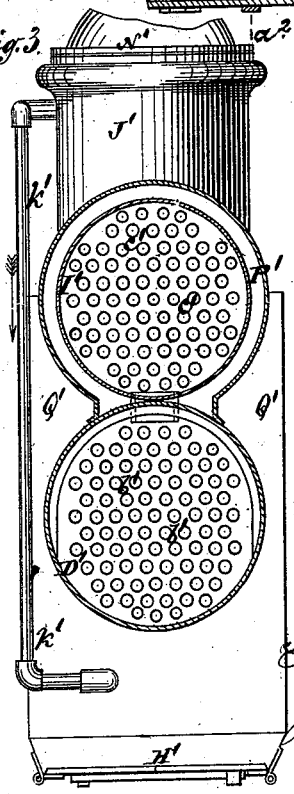


Fig. 3.



Witnesses:

Henry Eichling.

Fred. Haynes

Inventor:

B. T. Babbitt

by his Attorneys

Brown & Allen

UNITED STATES PATENT OFFICE.

BENJAMIN T. BABBITT, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **203,987**, dated May 21, 1878; application filed March 9, 1878.

To all whom it may concern:

Be it known that I, BENJAMIN T. BABBITT, of the city and State of New York, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a description, reference being had to the accompanying drawing, forming part of this specification.

This invention relates to boilers of the locomotive type, to be used either for stationary or locomotive purposes, including its application, if desired, to sea-going and other vessels.

The principal objects of the invention are to economize fuel by utilizing to an enlarged extent the heat derived from the escaping gaseous products of combustion, to superheat the steam and to produce a rapid generation thereof, and, while obtaining a more extended circulation of the gaseous products of combustion, to maintain an active draft.

The invention consists in a combination, with the fire-box and horizontal, or approximately horizontal, multitubular barrel or cylindrical body of the boiler, of a horizontal, or approximately horizontal, multitubular steam-superheater, arranged over the body of the boiler and in communication with the water-space thereof, and an upright multitubular feed-water heater, arranged between the steam-superheater and the chimney, and serving to pass the products of combustion in a direct manner to the chimney after the same have been circulated in opposite directions through the barrel or body of the boiler and steam-superheater.

The invention also consists in a combination of the fire-box, multitubular barrel of the boiler, smoke-boxes at the end of the latter farthest removed from the fire, a multitubular steam-superheater in communication with the water-space of the barrel, a smoke-box at the fire end of the boiler, and a multitubular feed-water heater mounted on said smoke-box and detached from the steam-superheater.

Figure 1 in the drawing represents a longitudinal sectional elevation of a steam-boiler constructed in accordance with the invention. Fig. 2 is a transverse section of the same on the line a^1 a^1, looking in direction of the arrow w; and Fig. 3, a transverse section thereof on the line a^2 a^2, looking in direction of the arrow w'.

D′ is the multitubular barrel or cylindrical body of the boiler, and B′ its fire-box. E′ is the external shell of the fire-box or water-jacket thereof, in communication above at l' with the upper portion of the body D′, which latter is designed to form a water-chamber throughout its entire depth. C′ is the grate of the fire-box; and b' b', the tubes, which extend longitudinally through the barrel D′, and connect the fire-box B′ with the smoke-box F′ at the opposite end of the boiler.

Arranged longitudinally over the barrel or body D′ of the boiler is a horizontal, or approximately horizontal, cylindrical multitubular steam-superheater, I′, which is in communication at its bottom, by one or more apertures, g', with the interior of the barrel or body D′, to provide for a free circulation of water between the barrel and superheater, and for the escape of steam generated within the barrel.

The dotted line x' x' in Fig. 1 may represent the level at which the water should stand in the boiler or within the superheater I′, the upper space of which is reserved for steam, that may be taken from it as required by a pipe, h'. This steam-superheater is of like construction with the barrel D′, being provided with longitudinal tubes c', extending through it. These tubes connect a smoke-box, K′, arranged over the smoke-box F′, with a smoke-box, L′, at the opposite or fire-box end of the boiler, and serve to conduct the escaping gaseous products of combustion in a reverse direction to their passage through the tubes b' of the barrel or body D′. Said tubes c' not only pass through the water-space of the superheater I′, but also through the steam-space thereof, for the purpose of superheating the steam. The smoke-boxes F′ and K′ are virtually one, being connected by a duct, d', below which, in the smoke-box F′, may be a series of blast-cones, e', to promote the draft by the action of exhaust-steam from an engine or other source entering the smoke-box F′ at or near its bottom.

G′ is the fire-door, through which the fuel is supplied; and H′ represents one or more doors at the base of the ash-pit, which are kept closed, except when it is desired to discharge the ashes. The furnace or fire-box may also be supplied with a lower fire-door, G.

The fire-box B′ is not only protected externally by the water-jacket or outer fire-box shell E′, but also internally by a water-casing, A′, which is in communication above and below, by ducts *m′ m′*, with the barrel D′ of the boiler, to keep up a circulation within said casing. This water-casing A′ is stopped short some distance above the fire-grate C′, and is constructed to form internally a fuel-chamber, T′, open at its bottom and extending upward within the smoke-box L′, and so as to form a close connection with the fuel-supply opening, to which the fire-door G′ is fitted.

Mounted on the smoke-box L′ is a multitubular feed-water heater, J′, having its tubes *c′* running in upright directions through it, and so that the escaping gaseous products of combustion which pass through said tubes from the smoke-box L′, and serve to impart heat to the water in the heater J′, travel in the same course or line with the chimney N′, and thereby quicken the draft. In this way the feed-water heater J′ forms an uptake for the products of combustion.

The boiler is kept supplied with water by a feed-pipe, *i′*, connected with the lower portion of the heater J′, and is conveyed from the latter above the feed-pipe by a pipe, *k′*, which connects below with the outer shell or water-jacket E′ of the fire-box.

The air to feed the fire is introduced through a funnel, O′, at the smoke-box K′ end of the boiler, and, passing through or along an air-heating jacket, P′, surrounding the steam-superheater I′, is conducted by passages Q′, forming extensions of the jacket P′ on opposite sides of the fire-box end of the boiler, to the ash-pit of the furnace, thus supplying the fire with heated air, and thereby promoting combustion.

A boiler constructed as described not only largely economizes the consumption of fuel and utilizes the escaping gaseous products of combustion both to the heating of the feed-water and the air supplied to the furnace, but also insures a rapid generation of the steam, as well as superheating the latter.

I claim—

1. The combination, with the fire-box B′ and horizontal, or approximately horizontal, multitubular barrel or body D′, of a horizontal, or approximately horizontal, multitubular steam-superheater, I′, arranged over the body D′, and in connection with the water-space of the latter, and an upright multitubular feed-water heater, J′, arranged between the steam-superheater and the chimney, and forming an uptake for products of combustion after they have been in circulation in opposite directions through the barrel D′ and superheater I′, substantially as specified.

2. The combination of the fire-box B′, the multitubular barrel or body D′, the smoke-boxes F′ K′, the multitubular steam-superheater I′, in communication with the water-space of the barrel, the smoke-box L′, and the multitubular feed-water heater J′, mounted on the latter, essentially as described.

B. T. BABBITT.

Witnesses:
R. BABBITT,
D. J. NEWLAND.