(No Model.) 3 Sheets—Sheet 1.

A. MILLER.

FEED WATER HEATER.

No. 492,411. Patented Feb. 28, 1893.

FIG. 2.

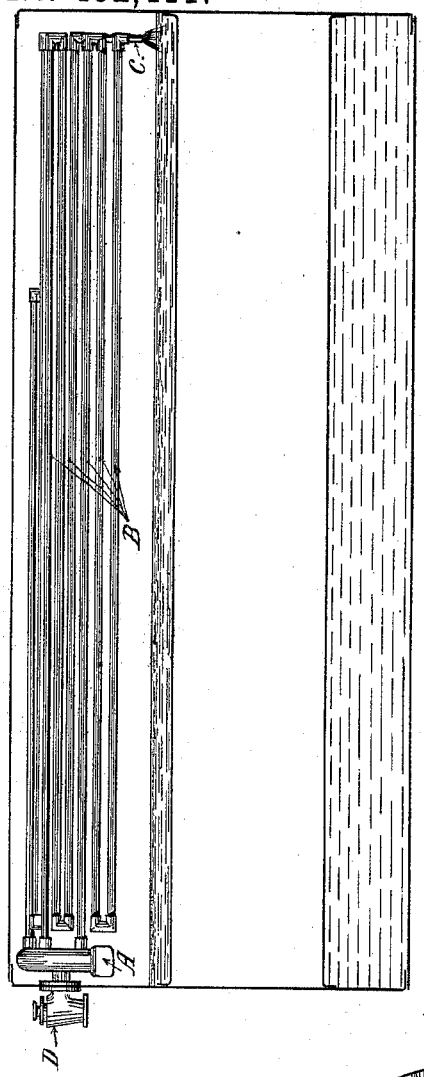


FIG. 3.

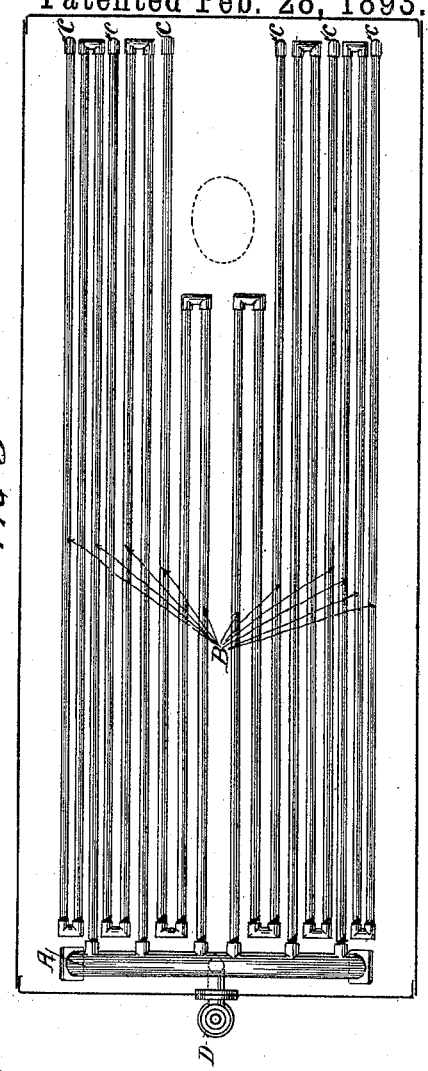
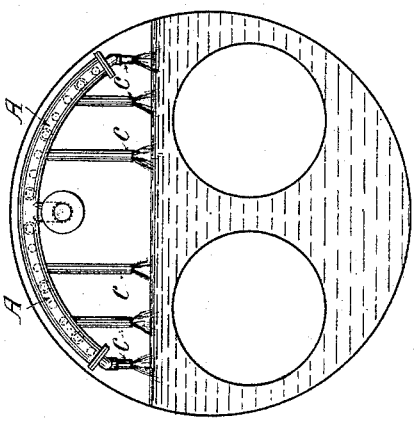


FIG. 1.



Witnesses
William Laird.
Francis John Morley.

Inventor
Adam Miller

(No Model.) 3 Sheets—Sheet 2.

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FEED WATER HEATER.

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FIG. 5.

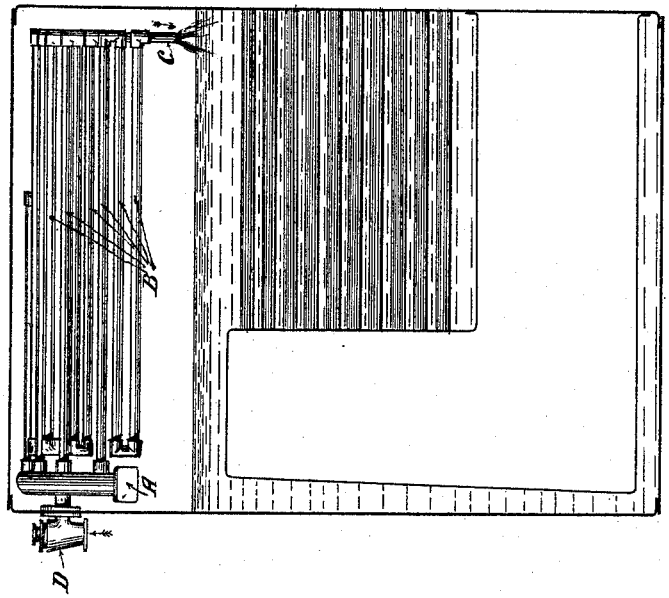
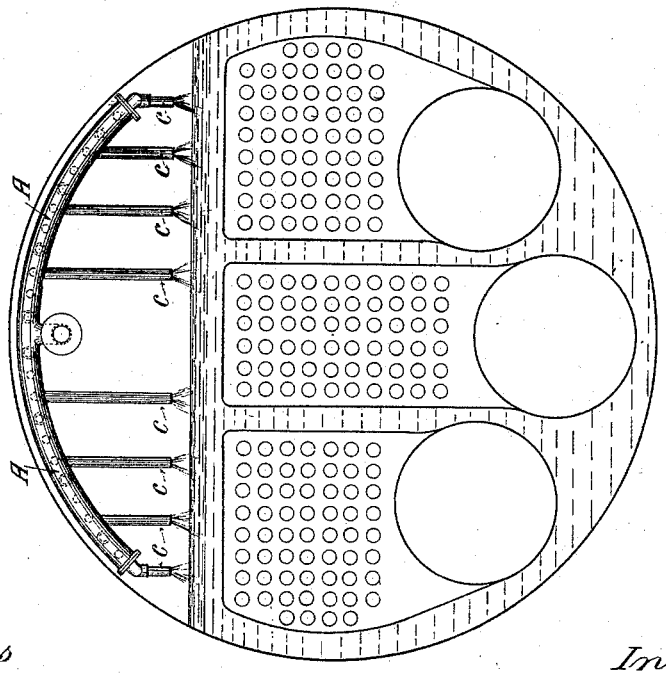


FIG 4.



Witnesses
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(No Model.)

3 Sheets—Sheet 3.

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FEED WATER HEATER.

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FIG. 7.

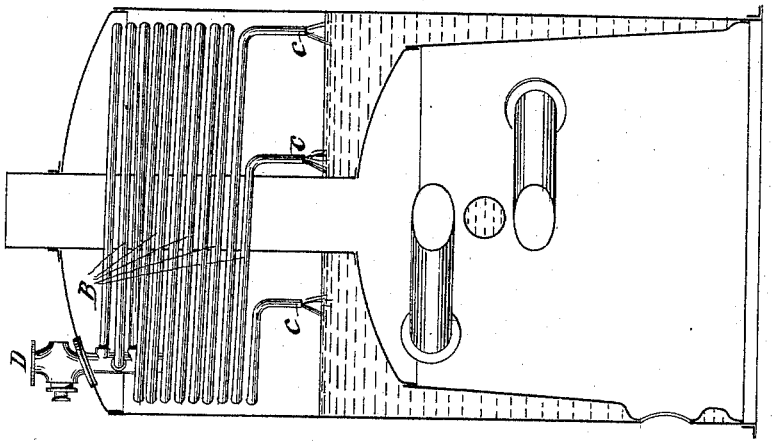
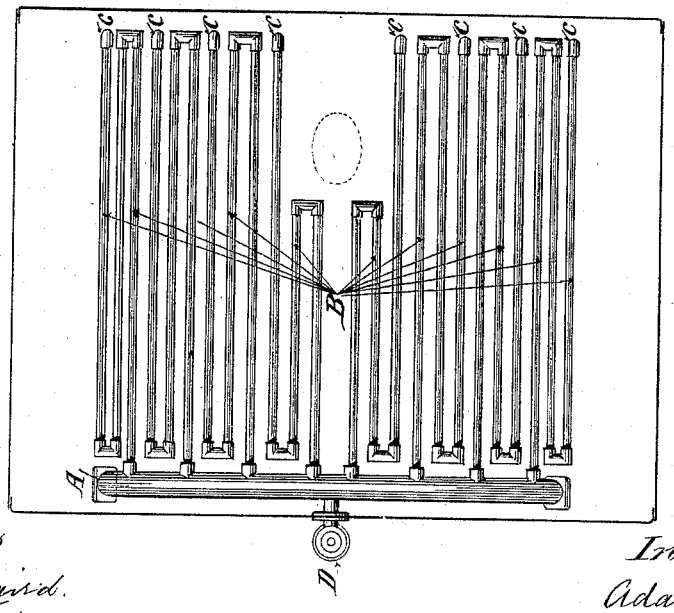


FIG 6



Witnesses
William Laird.
Francis John Morley.

Inventor
Adam Miller

UNITED STATES PATENT OFFICE.

ADAM MILLER, OF LONDON, ENGLAND.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 492,411, dated February 28, 1893.

Application filed July 20, 1891. Serial No. 400,183. (No model.) Patented in England May 1, 1891, No. 7,530.

To all whom it may concern:

Be it known that I, ADAM MILLER, a subject of the Queen of England, residing at No. 11 Queen Victoria Street, in the city of London, in the county of Middlesex, England, have invented a Feed-Water Heater, (for which I have obtained a patent in England, dated May 1, 1891, No. 7,530,) of which the following is a specification.

I place or fix the check or entrance valve D through which the feed water is to be pumped or forced into a boiler on the outside either on the shell plating which incloses the steam space or I fix it lower down on the plating which incloses the water in a boiler. I carry the feed water after it enters the boiler by the check valve D by an internal pipe to the roof of the boiler and fix it at one end &c. I carry this pipe circumferentially for some length. I connect smaller pipes at right angles to the circumferential pipe. These small pipes are more than sufficient in number and capacity to contain all the feed water required. These small pipes are carried backward and forward throughout a boiler and made to discharge the feed water above the water in a boiler.

In the drawings Figure 1 shows a fluid boiler in cross section with the circumferential pipe in position. Fig. 2 shows a fluid boiler in longitudinal section with feed pipes in position. Fig. 3 shows the plan of the feed piping in a fluid boiler. Fig. 4 shows a marine or tubular boiler in cross section with the circumferential feed pipe in position. Fig. 5 shows a marine boiler in longitudinal section with feed pipes in position. Fig. 6 shows the plan of the feed piping in a marine boiler. Fig. 7 shows an upright boiler in section with coils of feed piping in the steam space.

A is a circumferential feed pipe; B, dividing or reducing feed pipes; C, feed water drain pipes from pipes B; D, feed check or entrance valve.

The operations in heating the feed water are as follows: The pipes A. B. C are filled with steam and are common to the steam space in a boiler, as the ends of pipes C are open. Assuming that the feed water is supplied to a boiler in the ordinary way by a feed pump. it would be forced through the valve D into the boiler. when it comes into contact with steam. The feed water is now delivered and it is now pushed up to the circumferential pipe A by more feed water forced in. This pipe A is made larger in diameter than the entrance valve D so that steam may always be in it with water. It is not made with perforations or punctures. Sufficient steam finds its way to pipe A from the pipes C. The feed water divides or separates into small streams by being pushed through the pipes B. The force or power required to push the water through the small pipes B is simply the amount that would overcome the friction of the small pipes. The feed water is regulated as to the quantity for pipes B by the opening in the pipe A where it connects with the pipes B. The pipes B are made larger in diameter than the opening in pipe A. so as to admit of steam being always in them when at work. The feed water is delivered into the water in the boiler by the pipes C at the ends of pipes B. In the upright boiler Fig. 7 the feed water enters at D and passes on downward until it drops into the water in the steam space, there may be several coils of piping all connected with D—dividing the feed water into small streams.

Having now particularly described and ascertained the nature of the said invention, I declare what I claim is—

1. For heating feed water for a steam boiler,—pipes placed in the upper part of the steam space of the boiler, and comprising a primary pipe. receiving the water from the external supply pipe, and a plurality of secondary pipes, connected to, but smaller than the primary pipe, and separating the water into small streams; the said pipes being sufficiently large to be only partly filled, or occupied with water, and partly occupied by steam, substantially as herein set forth.

2. For heating feed water for a steam boiler,—a system of pipes placed in the steam space of the boiler. and comprising a primary pipe, receiving the water from the external supply pipe, a plurality of secondary smaller pipes, connected to the primary pipe, and

separating the water into small streams, the said primary and secondary smaller pipes being in the upper part of the steam space, and the secondary pipes being horizontal or nearly so; and downwardly directed draining pipes at the ends of the secondary pipes, all the said pipes being sufficiently large to be only partly filled or occupied with the water, and partly occupied by steam, substantially as herein set forth.

June 15, 1891.

ADAM MILLER.

Witnesses:
WM. LAIRD,
THOMAS WILLIAM IDLE.