

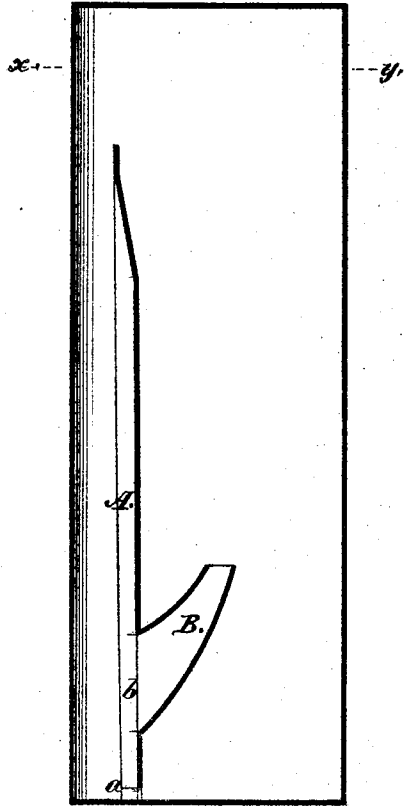
G. M. ELDRIDGE.

Improvement in Steam-Boilers.

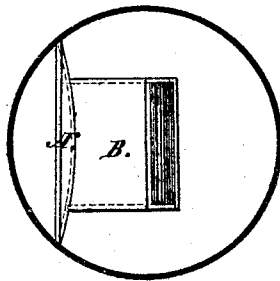
No. 130,985.

Patented Sep. 3, 1872.

*Fig. 1.*



*Fig. 2.*



*Witnesses.*

*Wm. P. Shattuck,  
Geo. S. Selden.*

*Inventor.*

*G. Morgan Eldridge.*

# UNITED STATES PATENT OFFICE.

G. MORGAN ELDRIDGE, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. 130,985, dated September 3, 1872.

### SPECIFICATION.

*To all whom it may concern:*

Be it known that I, G. MORGAN ELDRIDGE, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain Improvements in Steam-Boilers, (circulation of water,) of which the following is a specification, reference being had to the accompanying drawing, in which—

Like letters represent like parts.

My invention relates to the construction and arrangement, in boilers for the generation of steam, of a combination of devices, hereinafter more fully described, to produce a rapid current in the water throughout the whole body of the boiler, so that, however extensive the area of the bottom of the boiler may be, although it be many times greater than the heating-surface of the furnace, the water heated by that surface shall pass over every part of it, and, therefore, the boiler shall have the greatest possible capacity for the rapid generation of steam. This thorough circulation is not only produced in fact, but it is produced in a manner and by means that are in the highest degree conducive of rapid evaporation. The agents of this circulation are steam and hot water, an aeriform body, and a liquid, which, together, unrestrained, produce turbulent ebullition, but with the aid of my devices are so controlled and guided as to produce a regular and uniform current in the direction and manner desired.

In the accompanying drawing, Figure 1 represents a longitudinal section of a boiler provided with my improvements; Fig. 2, a transverse section of the same taken through it where it is in contact with the furnace.

One of my said devices is a diaphragm, A, of peculiar form. It extends from the head of the boiler, or from a point near thereto, back toward the other end about four-fifths of the distance. It is arched, as shown, from the head (which is the end just over the furnace) to a point near its rear end, where it is curved downward, as shown. Its side edges are attached to the inner side of the boiler at or just above the fire-lines. It is furnished with a funnel-shaped spout or nozzle just over the portion of the furnace where the heat is most intense, and its point is bent downward to a parallel with the diaphragm. Two or more such spouts

may be provided where the diaphragm is very wide. The object of this peculiar form and construction is to take advantage of the well-known impulse of steam to travel directly upward and seek the surface just as fast as it is generated. In obedience to this impulse it seeks to escape through the nozzle B, and is accompanied by some water, which is driven with great force in lines nearly parallel with, and near to or just under, the surface of the water in the boiler, and causes a current of the surface-water to run rapidly to the rear end, as the nozzle is so bent as to point in that direction. When it has passed the rear end of the diaphragm it sinks below it and passes under it, over the whole heating-surface again, and thus a constant and rapid circulation of the whole body of the water in the boiler is produced and maintained. The forward end of the diaphragm may be either joined to the head of the boiler or else extend not quite up to it, and in that case be provided with an apron, a, extending downward, as shown in Fig. 1, to prevent the escape of steam.

Now, I am aware that in coffee-pots and wash-boilers advantage has been taken of the impulse of steam in a body of water to seek the surface, and that, by preventing the heated water or steam from rising directly upward, by means of plates or false bottoms, they are compelled to seek other channels of escape, which are provided for them, and then the water pours out through openings above the water-level and thence passes back through the coffee or the clothes, by other channels, to the heating-surfaces again, and, therefore, I do not claim these devices.

The production of currents by the discharge of steam and water through the nozzle B, as above described, is the core of my invention. In a cylinder-boiler as now constructed the water is turbulent and is apt to prime as a kettle boils over, and the cause is the same in both cases. The steam in such cases is going up and the water downward again in the same place, at the same time, and they become mixed and confused together. But in the use of my devices each has its separate course—the steam and hot water up through the spout, and the chilled water down at the rear of the boiler, along the bottom, to the front, forming a clear current, without interference. This is not only

true in theory, but in point of fact also, as I have proved with a small boiler with glass heads. Without my attachment the water bubbled like that in a boiling-pot, but with it the surface seemed as flat as when there was no fire in the furnace, and the evaporation was increased under precisely the same conditions.

It is obvious that these my improvements may be applied with equal advantage to boilers of other forms and constructions than these shown and described.

What I claim, therefore, as my invention is—  
In combination with a suitable vessel for the generation of steam, the diaphragm A, provided with the discharge pipe or nozzle B, so directed as to discharge at or near the surface of the water, constructed substantially as shown and described, for the purposes set forth.

G. MORGAN ELDRIDGE.

Witnesses:

WM. P. SHATTUCK,  
GEO. S. SELDEN.