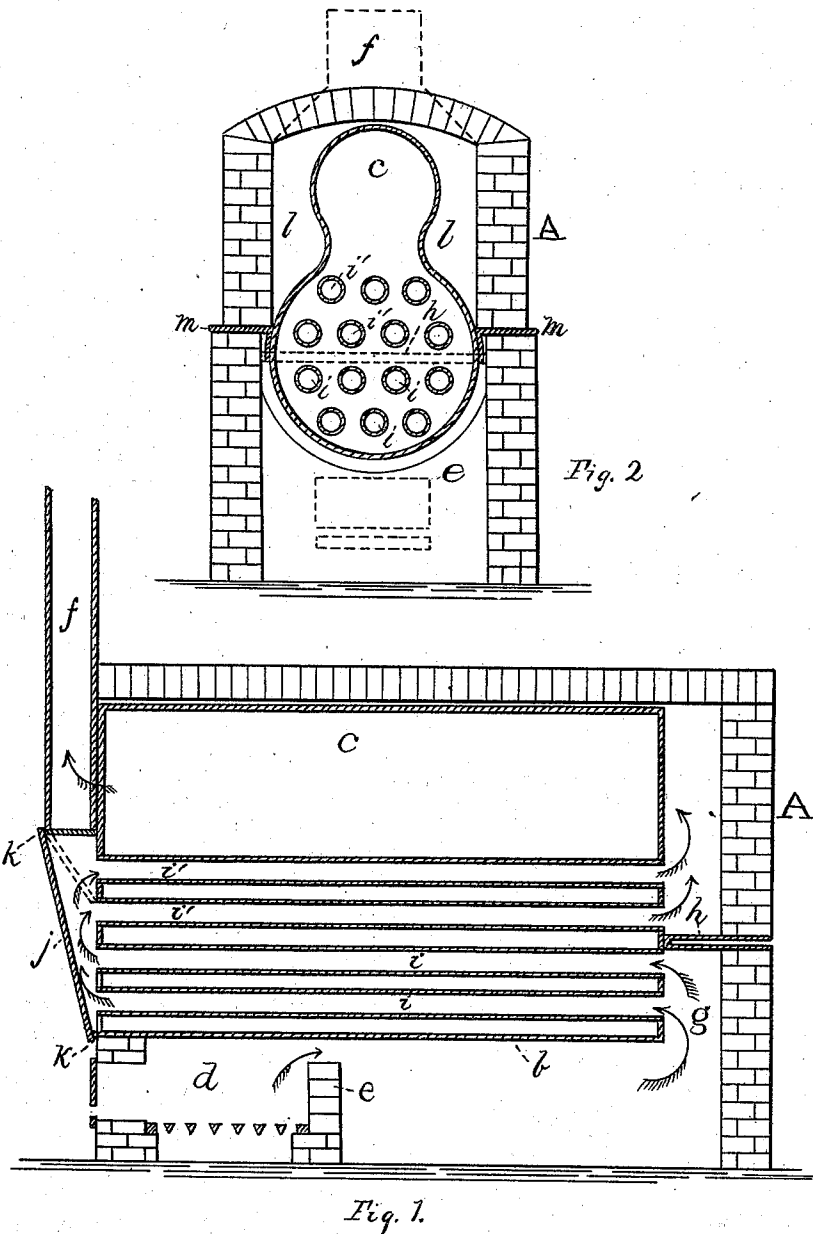


D. SULLIVAN.
Steam-Boilers.

No. 149,616.

Patented April 14, 1874.



Witness
W. E. Brown
H. N. Fairbanks

Inventor
Daniel Sullivan
Per Osborn
Franklin Leary Atty.

UNITED STATES PATENT OFFICE.

DANIEL SULLIVAN, OF BANGOR, MAINE.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **149,616**, dated April 14, 1874; application filed February 17, 1874.

To all whom it may concern:

Be it known that I, DANIEL SULLIVAN, of Bangor, in the county of Penobscot and State of Maine, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, that will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings and to the letters of reference marked thereon, which form a part of this specification, in which—

Figure 1 shows a longitudinal section, and Fig. 2 a transverse section, of my boiler.

Same letters show like parts.

My invention relates to that class of tubular boilers in which the fire enters and passes through the tubes.

It is designed both to increase the heating-surface, and to condense it within a small compass, so that the water may be acted upon by the intense heat.

My device will be understood by reference to the drawings.

A shows the casing of the boiler, which may be either iron or brick-work. Within it is the boiler *b*, somewhat shorter than the casing, and having the steam dome or cylinder *c* thereon. At *d* is the fire-box. *e* shows the bridge, and *f* the smoke-stack. As the smoke and flame leave the fire-box, they pass over the bridge and around the end of the boiler, into the space *g*, between it and the casing. About half-way up this space is a stop, *h*, extending across it so as to prevent the further rise of the smoke. By this it is forced to escape by passing through the lower set of tubes *i*. At the front of the boiler is a supplemental head, *j*, secured to a rim, *k*, which project farther from the boiler at the top than at the bottom.

This serves as a conductor for the tubes leading the smoke from the lower set *i*, below the stop *h*, to the upper set *i'* above it. Passing through these upper tubes, it again reaches the space *g* at the rear of the boiler, this time above the stop *h*; thence it escapes to the flue through passages *l*, at the sides of the steam-cylinder *c*, formed by it and the casing, thus serving to superheat the steam in said cylinder in its passage.

It will be seen that the products of combustion "return" twice in their passage to the flue. This enables the greater part of the heat to be utilized, while the construction of the boiler allows an increased number of tubes to be used, so that the same amount of heating-surface can be obtained in a much smaller boiler than by the old method.

The stop *h* may, if desired, be made double, as shown, instead of making it of a single plate, and by admitting air between the plates from the outside of the casing, it will be less liable to burn out. Flanges *m m* may also be secured to the sides of the boiler to serve as a support for it, they resting on, or being built into, the brick-work of the casing.

What I claim as my invention, and desire to secure by Letters Patent, is—

In combination with the casing A and boiler *b*, having the space *g* between them at one end, the tubes *i* and *i'*, stop *h*, supplemental head *j*, and passages *l*, all constructed and operating substantially as set forth and shown.

In testimony that I claim the foregoing I have hereunto set my hand this 13th day of February, 1874.

DANIEL SULLIVAN.

Witnesses:

WM. FRANKLIN SEAVEY,
C. H. CLARKE.