J. H. WILKINSON.

Steam-Boiler.

No. 167,595. Patented Sept. 7, 1875.

Fig 1

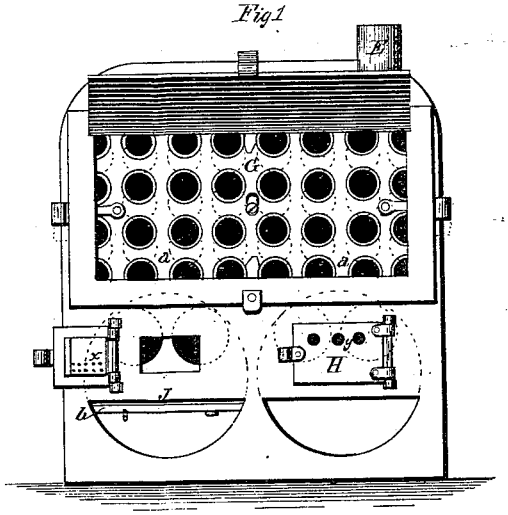


Fig 2.

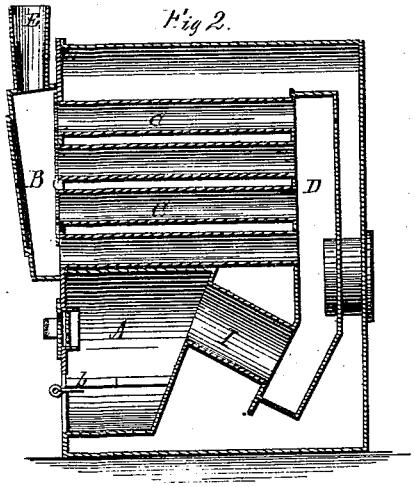
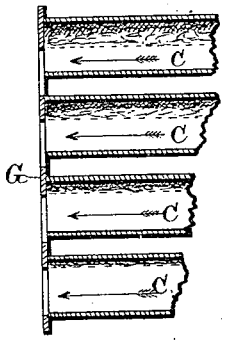


Fig 3.



WITNESSES.

J. William Garner

C. W. Lemmon.

INVENTOR.

Joseph H. Wilkinson

per F. A. Lehmann Atty.

UNITED STATES PATENT OFFICE.

JOSEPH H. WILKINSON, OF SOUTH NEW MARKET, NEW HAMPSHIRE.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **167,595**, dated September 7, 1875; application filed April 12, 1875.

To all whom it may concern:

Be it known that I, JOS. H. WILKINSON, of South New Market, in the county of Rockingham and State of New Hampshire, have invented certain new and useful Improvements in Marine and other Steam Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates, mainly, to marine boilers, but may be applied with great advantage to other boilers also.

The nature of my invention consists in preventing the heated products of combustion from leaving the boiler proper too freely, and in causing a uniform flow of the same through the tubes.

The annexed drawings fully illustrate my invention, and represent a single marine boiler provided with two fires.

A A are the fire-chambers; B, the front uptake or connection; C C, the tubes; and D the back connection. E is the smoke-stack, placed near the end of the front uptake or connection B, as is the usual custom.

When this plan is followed it will be seen that a large area is formed between the outlet of the tubes C and the damper in the smoke-stack, into which the heated gases can flow when the damper is closed, and there exhaust by radiation through a surface that is not utilized for the generation of steam.

It will further be seen that, when the smoke-stack is placed at the end of the uptake, the most positive action of the draft is on those tubes nearest to the stack or chimney, while little or no heat passes through those farthest from the chimney.

To equalize the flow of heat through the tubes, I construct and adjust to the front tube-sheet *a*, or the exit end, a sliding damper, G, having holes corresponding with the tube area.

By lowering this damper more at the end nearest to the chimney E, the power of the draft is reduced on the near tubes by the exit of the tubes being more effectually closed. When, however, the exit from the front uptake or connection B is uniform—as, for instance, it would be if applied to a locomotive-boiler—the damper would be lowered uniformly.

The damper G does not close or cover up the lower rows of tubes as effectually as the upper ones, experience showing in all cases that the lower tubes do not control the flow of the heated products of combustion to the extent that the upper ones do, so I apply my device vertically, as well as horizontally, for the purpose of equalizing this flow.

The damper does not entirely close the tube-outlet, nor do I deem this necessary. If, however, this should be required, the tubes could be set farther apart; or a second damper could be used over the first one that would accomplish this.

Another advantage of the damper is, that it does not allow the heated products of combustion to flow along the upper surface of the tube, but converts the upper surface into a reservoir for the heated gases, and forces a a more positive action of the same on the lower surface. Again, the action of the draft being on the lower part of the tube—that part on which foreign matter mostly collects—this foreign matter is more effectually sucked out by the action of the draft.

Heated air naturally rises under all circumstances, and the consequence is that, as the heated products of combustion pass through the tubes, their upper portions are intensely heated, while their lower parts are not, thus causing an unequal expansion and contraction that is very injurious to both tubes and boiler-heads.

My invention is designed to remedy this defect, and to cause all parts of the tubes to be heated equally, and especially to cause the draft through all the tubes to be equalized. Where the damper slides down from above, so as to close only the upper ends of the tubes, a portion of the heated air fills the upper part of the tubes, while the balance is compelled to flow along the lower part, and thus heat the whole of each tube alike. Where a damper in the shape of a perforated plate is used, that is raised from below, the damper only serves to intensify all these evils—to heat the upper parts of the tubes to an intense degree, and leave the lower parts comparatively cool, and

to force a still greater quantity of the hot air through the upper tubes above the water-line.

My invention consists in sliding the perforated plate from above, so as to equalize the flow of the heat through all the tubes, and to heat their lower portions as thoroughly as their upper parts.

The damper may be operated by any suitable mechanical means.

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

1. In combination with the exit end of the tube-sheet of a tubular boiler, a perforated sliding plate, G, that closes over the ends of the tubes from above, so as to retain a volume of hot air in the upper parts of the tubes, and to cause the heated products of combustion to flow along the lower portions of the tubes, as described.

2. The sliding damper G, in combination with the exit end of the tube-sheet of a tubular boiler, the damper having its opening so as to close the upper tubes more than the lower ones, and thus equalize the flow of heated air through all of the tubes, as specified.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 29th day of March, 1875.

JOS. H. WILKINSON. [L. S.]

Witnesses:

DANIEL G. LUCE,

R. S. CARROLL.