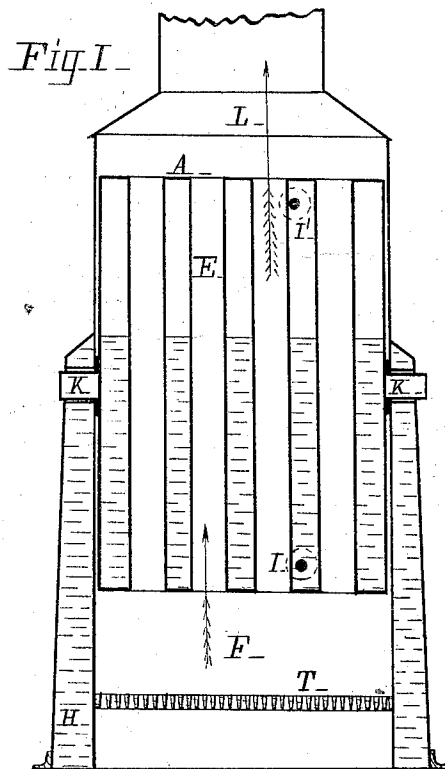


S. S. VAIL.
REVERSIBLE STEAM-BOILER.

No. 170,032.

Patented Nov. 16, 1875.



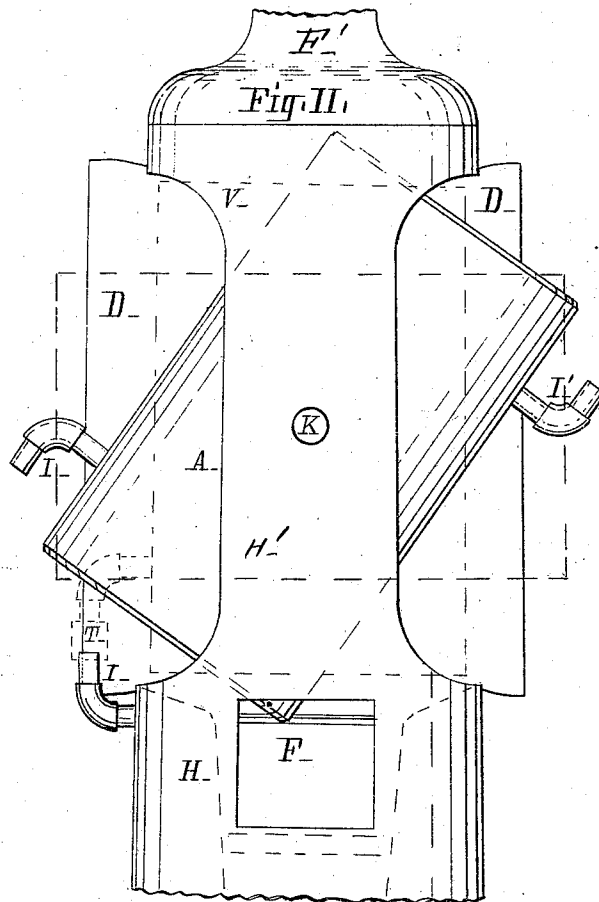
Witness.
Joseph H. Medmar
S. M. Pool

Inventor:
Samuel S. Vail—
By Saml. J. Wallace—
Attorney—

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Witness:
W. E. Chaffee
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Inventor:
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UNITED STATES PATENT OFFICE.

SAMUEL S. VAIL, OF KEOKUK, IOWA.

IMPROVEMENT IN REVERSIBLE STEAM-BOILERS.

Specification forming part of Letters Patent No. **170,032**, dated November 16, 1875; application filed May 1, 1875.

To all whom it may concern:

Be it known that I, SAMUEL S. VAIL, of Keokuk, Lee county, Iowa, have invented a new and useful Improvement in Steam-Boilers, made substantially as set forth hereinafter, referring to the accompanying drawings, in which—

Figure I shows a vertical section of boiler, and Fig. II, Sheet 2, is an elevation of same.

The boiler A has upright tubes E, with fire-box F below, and an auxiliary water-heating chamber, H, in its furnace-frame H'. The invention consists in hanging the boiler on trunnions K in its center, so that it can be reversed, and connecting this with the stationary frame, H', and water-heating chamber H, by pipes I, made so as to be readily detachable for reversing, and which hold the boiler rigid with its supporting-frame H' when in use. This is to reverse the boiler when the lower end becomes encrusted with scale, to bring down clean surfaces from the steam-space, and to turn the encrusted parts up to the action of the steam to loosen the crust. Also, for turning the boiler down on its side to clean the flues, and to repair them, and calk their joints, and for washing out the boiler by swinging it back and forth. The two ends of the boiler are alike, and the trunnions K are in the center, so the boiler may be reversed without changing its relations by removing the connections. The connecting-pipe I is for the ingress of water, and the pipe I', egress of steam. They are attached directly to the boiler A at the ends, though I may connect through the trunnions in the ordinary way, if desired. These connecting-pipes I I' serve for holding the boiler rigid to its supporting-frame H' when in use. There may be a pipe-connection on each side at each

end, or only on one side, as desired. And additional means may be used to strengthen the rigidity while in use, the boiler being reversible on its trunnions.

The water enters first the auxiliary heating-chamber H, and then passes into the boiler A by pipe I. The upper part of the boiler forms the steam-space; but an additional steam-space may be formed in frame H' above the boiler at L, to further heat the steam by means of the waste smoke escaping, which chamber may be connected by steam-pipe I'.

The trunnions K are supported by bearings in frame H'. This frame has fire-box F below the boiler, with stationary water-heating chamber H surrounding it, and its upper part forms the boiler-cover, and smoke-outlet F' suitably supporting and inclosing the whole. It is cut away at the two sides to let the boiler ends pass in reversing it on its trunnions, as shown in position by full and dotted lines in Fig. II. These openings have shutters D D hinged at the sides and opening in the center, so as readily to be opened or closed.

I claim—

1. The upright boiler with upright flues, hung on bearings to reverse ends, substantially as set forth.

2. The reversible boiler A, hung on trunnions K, and fixed firmly in position to its supporting-frame H' when in use, by detachable connections, substantially as set forth.

3. The combination of the reversible boiler A, hung on trunnions K in frame H', with feed-water heating-chamber H, and detachable pipes I I', substantially as set forth.

SAMUEL S. VAIL.

Witnesses:

SAML. J. WALLACE,
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