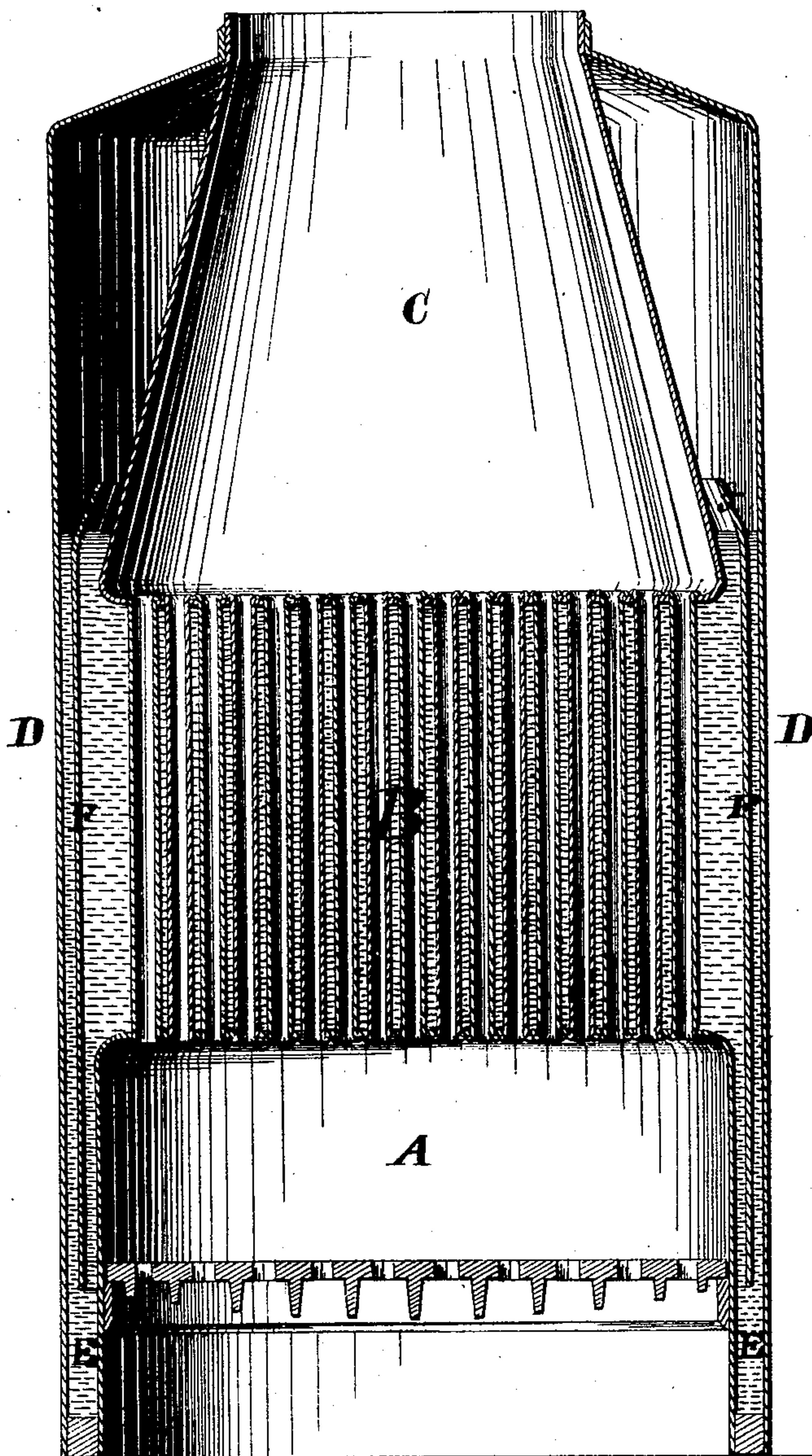


J. L. KNOWLTON.  
Steam-Boilers.

No. 155,093.

Patented Sept. 15, 1874.



WITNESSES

*Geo L. Ewin*

*Walter Allen*

INVENTOR

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# UNITED STATES PATENT OFFICE.

JOHN L. KNOWLTON, OF SHARON HILL, PENNSYLVANIA.

## IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **155,093**, dated September 15, 1874; application filed May 2, 1874.

*To all whom it may concern:*

Be it known that I, JOHN L. KNOWLTON, of Sharon Hill, in the county of Delaware and State of Pennsylvania, have invented a new and useful Improvement in Steam-Boilers, of which the following is a specification:

My invention relates especially to vertical tubular boilers and to such as are constructed with an inner shell or partition interposed between the outer shell and the fire-surface, to induce a constant and active circulation of water. My improvement consists in constructing such an interposed annular partition or inner shell, with an inwardly-inclined upper margin serving to deflect the ascending current of water into close contact with the crown of the furnace, and forming, in connection with the vertical outer shell which extends above the said inturned margin, a funnel-shaped conductor, by which the disturbed surface-water is delivered to the descending water-passage, as hereinafter described.

I have found, in practical operation, that this improvement, throwing the hottest water into contact with the hottest fire-surface, causes the most rapid evolution of steam at the upper surface of the water and constitutes an effectual preventive against priming.

The accompanying drawing is a vertical section of a boiler illustrating my invention.

The furnace A, flue-tubes B, and crown C forming the upper combustion-chamber may be of common construction. The outer shell D of the boiler is prolonged downward around the furnace in a usual way to form water-legs E. F represents the inner partition placed concentrically within the outer shell D, being interposed between the said shell and the flue-tubes and extending down into the water-legs E. This partition may reach upward nearly or quite to the mean water-line, and at its up-

per edge is deflected inward, as shown at *f*, over the lower part of the inclined crown C, so as to deflect the ascending current of heated water into direct and forcible contact with the heated fire-surface.

The effect of this device with the inturned upper margin is to produce an active and forcible circulation of water upward between the partition F and tubes B, and down between the said partition and the outer shell, not differing materially in this respect from what has existed before, but effecting a new and peculiar result in the manner of deflecting the ascending current into contact with the crown at its hottest part, thereby causing a rapid evolution of the steam at the very surface of the water without ebullition.

My improvement thus affords an effectual preventive of priming, and has been found in practice to obviate the carrying of water over into the cylinder with the steam, even though the water may be considerably above its proper level in the boiler.

The inturned margin *f* of the partition-plate further promotes an efficient and active circulation by its funnel action in catching the descending water in the dome and conducting it into the descending passage.

My improved boiler is found to be exceedingly effective and valuable in its application to steam fire-engines.

I claim as new—

The combination, in a boiler, of the annular vertical partition F, having an inturned marginal flange, *f*, flues B, vertical shell D, and the conical crown-chamber C, substantially as described.

JOHN L. KNOWLTON.

Witnesses:

OCTAVIUS KNIGHT,  
JAS. L. EWIN.