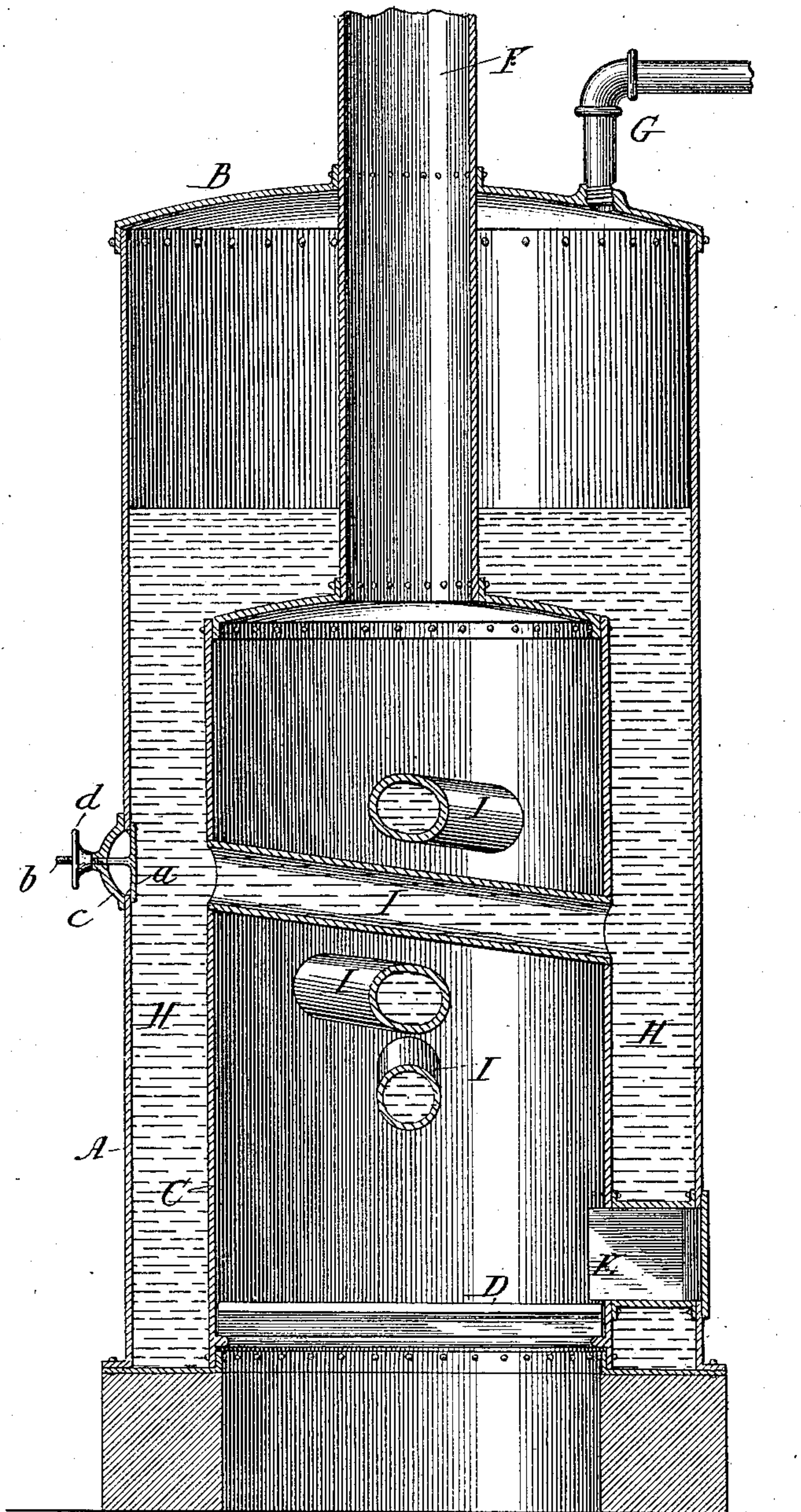


(No Model.)

A. HORN.  
STEAM GENERATOR.

No. 336,114.

Patented Feb. 16, 1886.



Witnesses:  
Frank J. Blanchard  
Richard Reinbold

Inventor:  
Adolph Horn  
By Wm. H. Lotz  
Attorney.

# UNITED STATES PATENT OFFICE.

ADOLPH HORN, OF CHICAGO, ILLINOIS.

## STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 336,114, dated February 16, 1886.

Application filed December 8, 1885. Serial No. 185,033. (No model.)

*To all whom it may concern:*

Be it known that I, ADOLPH HORN, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam - Generators, of which the following is a specification, reference being had therein to the accompanying drawing.

10 This invention relates to steam-boilers, and more particularly to upright boilers; and the object I have in view is to increase the heating-surface and to accelerate the circulation of the water for the purpose of rendering the parts exposed to the fire less liable to be overheated, to obviate the incrustation of sediments, and thereby to make the boiler more durable and effective and less liable to explode.

20 My invention therefore consists of the novel devices and combinations of devices herein-after described and specifically claimed.

The accompanying drawing represents a vertical section through the center of the boiler, in which A denotes the outside shell; B, the crown sheet; C, the fire-box; D, the grate; E, the fuel-door; F, the smoke-flue, and G the steam-pipe.

30 Between the outside shell, A, and the fire-box D is an annular water-space, H; and my improvement consists in placing diametrically through such fire-box a series of flues, I, one above the other, and occupying the space in the upper portion of such fire-box. These flues I form communicating channels between the water-spaces from opposite sides of the boiler, and each flue is placed on an inclination, for the purpose that the steam generated therein will rise through the higher end, to be replaced by water entering through the

lower end of such flue, thereby producing a strong circulation of the water through such flues, and for the purpose that such circulation may be uniform on all sides of the boiler I arrange the several flues I to be in all directions of the compass, or so that each flue stands on an angle relative to any other flue. 45

Opposite each flue I, I provide an opening in shell A, that is closed in the usual manner by means of a plate, a, having screw-stud b, that passes through yoke c, and is drawn to its seat by a screw-nut, d. These openings are for inspecting, cleaning, or replacing a flue whenever it becomes necessary. 50

I am aware that in steam-generators of this class flues have been passed through the fire-box to communicate at each end with a water-space surrounding the said fire-box, such flues being arranged in layers, all the flues of one layer opening on the same side of the fire-box, and the flues of the second layer being at right angle to those of the first; but I am not aware that flues have been passed through the fire-box so that each one is placed at angle to all the others; and therefore, 60

What I claim is— 65

In a steam-generator, the combination, with the fire-box and with an annular water-space surrounding the same, of a series of flues passing through the fire-box and communicating with the water-space, each flue passing diagonally through the fire-box, and at a different angle to all the remaining flues, as set forth. 70

In testimony whereof I affix my signature in presence of two witnesses.

ADOLPH HORN.

Witnesses:

RICHARD REINBOLD,  
HARRIS W. HUEHL.