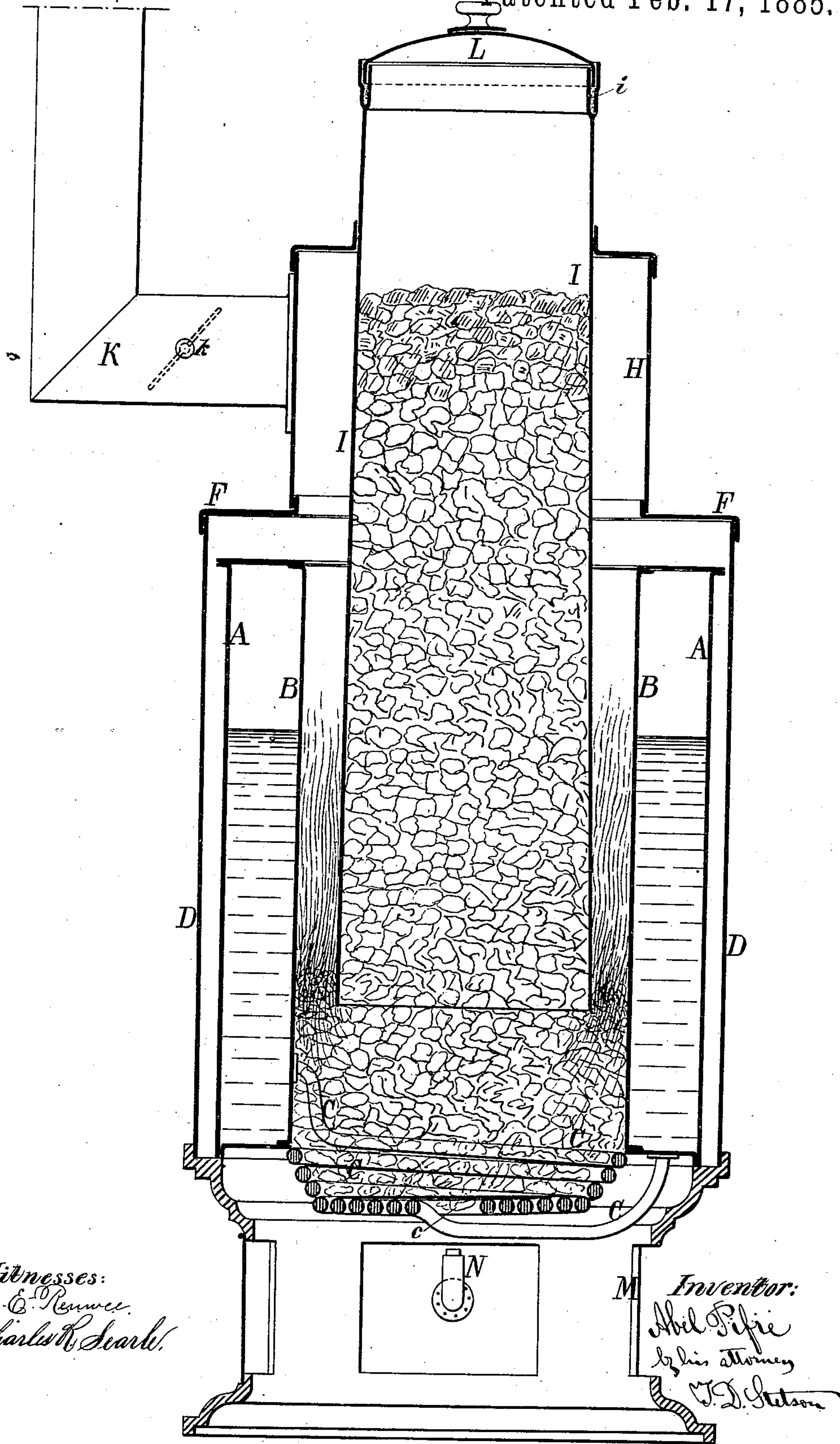


(No Model.)

A. PIFRE.  
STEAM BOILER.

No. 312,379.

Patented Feb. 17, 1885.





# UNITED STATES PATENT OFFICE.

ABEL PIFRE, OF PARIS, FRANCE.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 312,379, dated February 17, 1885.

Application filed April 21, 1884. (No model.) Patented in France October 13, 1883, No. 158,021.

*To all whom it may concern:*

Be it known that I, ABEL PIFRE, of Paris, France, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

The invention is intended more particularly for boilers of small and medium powers; but I believe it may be used with some advantage in the large powers. I provide for an equal supply of fuel, maintaining an equal heat under uniform or variable conditions for a long period. A spiral water-grate is connected at both ends to the boiler, below the water-line, with an aperture in the center. Wind from a blower is directed through this aperture whenever it is desired to quicken the fire.

The accompanying drawing forms a part of this specification, and is a central vertical section through a specimen of my improved boiler.

Referring to the same and to the letters of reference marked thereon, M is a stand of cast-iron or other suitable material, which may be provided with an ash-pan and with doors or registers to control the flow of air, &c. This forms a support for the other portions, to be presently described.

The main body of the boiler is composed of two cylindrical shells, A B, joined by annular portions at the upper and lower edges, and provided with pipes (not shown) through which feed-water is supplied; and the steam generated is conducted away to the steam-engine, the heating system, or whatever apparatus is to be supplied. These two shells may be connected by stay-bolts or not, as may be preferred.

C is an iron or steel pipe of considerable length, coiled in the form of a basket, as shown, and connected by its two ends to the boiler. The end connected with the outer and upper edge of the spiral grate thus formed is led up in the interior of the boiler, and connected at such height that there will be a circulation through the pipe whenever there is an active fire on the grate, the water being led from the bottom of the boiler into the innermost coil of the spiral grate, and discharged from the outermost coil thereof into the boiler at a higher point.

I is a slightly-tapering case of iron or steel,

mounted concentrically, with its larger end downward, within the boiler, and with its lower edge sufficiently above the grate, with its upper edge formed to present an annular cup-like space, *i*, partially filled with sand or other suitable material to form a tight joint with a hanging lip at the edge of a close-fitting cover, L. This forms a reservoir for the fuel. The cover L being removed at long intervals, and the interior of the case I supplied with anthracite coal or other suitable fuel and the cover replaced, the fuel moves downward within the reservoir, and escapes at the bottom in proportion as it is required by the consumption of the fuel previously discharged.

D is a casing of wrought-iron or other suitable material, concentric to the exterior of the plate A, the considerable space between A and D being in free communication with the hot gases ascending from the fire, which is maintained upon and within the spiral water-grate C.

F is an annular plate of cast-iron or other suitable material, which connects the upper edge of D with a smaller casing, H, mounted concentrically around the reservoir I, and having its upper edge joined thereto.

K is a smoke-pipe leading to a chimney (not shown) and controlled by a damper, *k*.

The fire being kindled and the reservoir I filled, the air to support combustion flows upward and inward through the openings between the several coils of the spiral grate C, and, avoiding the central reservoir, I, flows upward through the space between it and the inner plate, B, of the boiler. The hot gases may circulate freely in the space between the exterior A of the boiler proper and the concentric casing D. Deflectors may be introduced, if desired in any case, to compel an active circulation of the gases in such space. However they may be thus directed, they flow with more or less freedom up into the space between I and H, and thence away through the smoke-pipe K.

By providing automatic means for maintaining the proper quantity of water in the boiler—as, for example, pumping the water into a sufficiently-elevated tank to allow its gravity to overcome the boiler-pressure—and con-



trolling its introduction by a float resting on the water-surface in the boiler, I am able by this invention to secure a uniform action of the boiler without skilled attention and with  
 5 very little labor, the only attention required being to fill the coal-reservoir I once a day or at other considerable intervals.

The fuel-reservoir I and the concentric casing H, with the annular plate connecting it to  
 10 I, and the annular plate F, are all riveted or otherwise permanently attached together. The plate F is conveniently separable from the casing D, being connected thereto either by gravity, or, if preferred in any case, by a re-  
 15 liable bayonet-joint or other strong attachment. This allows the fuel-reservoir, with the attached upper portion of the structure, to be easily removed at will to facilitate cleaning or repairs. A removable plate, held with any  
 20 convenient means, may be employed, if desired, to close the considerable aperture *c* in the center of the spiral water-grate C; or the aperture may be left open constantly, as may be found expedient. This should depend on  
 25 the size and character of the fuel employed. Whenever it is desired to quicken the fire, a blower (not represented) forces in a current of air through the pipe N, which is driven up through the aperture *c* into the fuel. The  
 30 blower may be driven by hand or by any other convenient means. When the steam from the boiler is employed to give motion to an engine, the engine may work the feed apparatus for the water and the blowing means, and im-  
 35 pel air through the nozzle N.

It will be understood that my boiler is furnished with all the necessary attachments, such as stop-cocks, water-gages, and safety-  
 40 valve.

Modifications may be made in the forms and

proportions. Instead of being cylindrical, all the parts may be quadrangular or in any other desired form. I prefer the quadrangular form for boilers which are of more than one-horse  
 power.

I claim as my invention—

1. In a steam-boiler, the annular water and steam vessel A B and spiral water-grate C, having a central aperture, *c*, and blower-nozzle N, combined and arranged for joint opera-  
 50 tion as herein specified.

2. In combination with annular steam and water vessel, an interior combustion-chamber formed by the walls of said vessel, a water-grate arranged spirally across the bottom of  
 55 said combustion-chamber and having both ends connected with the interior of the vessel and with a fuel-magazine, as I, having a downwardly-increasing diameter arranged to form  
 60 an annular draft-flue, as shown, an annular gas-space formed by the walls A B, concentric with and outside of the water-vessel, and an annular chamber formed by the walls H I, having controlled discharge K, as and for the  
 65 purpose set forth.

3. In combination with the boiler A B, grate C *c*, and magazine I, the walls D, arranged concentric with the boiler, to leave a space between, the walls H, arranged concentric with  
 70 the magazine, to leave gas chamber between, and the annular plate F, connecting the walls D H, and the whole adapted to serve with a blower, as N, as and for the purposes set forth.

In testimony whereof I have signed this specification in the presence of two subscrib-  
 75 ing witnesses.

ABEL PIFRE.

Witnesses:

ROBT. M. HOOPER,  
 EUG. DUBOIS.