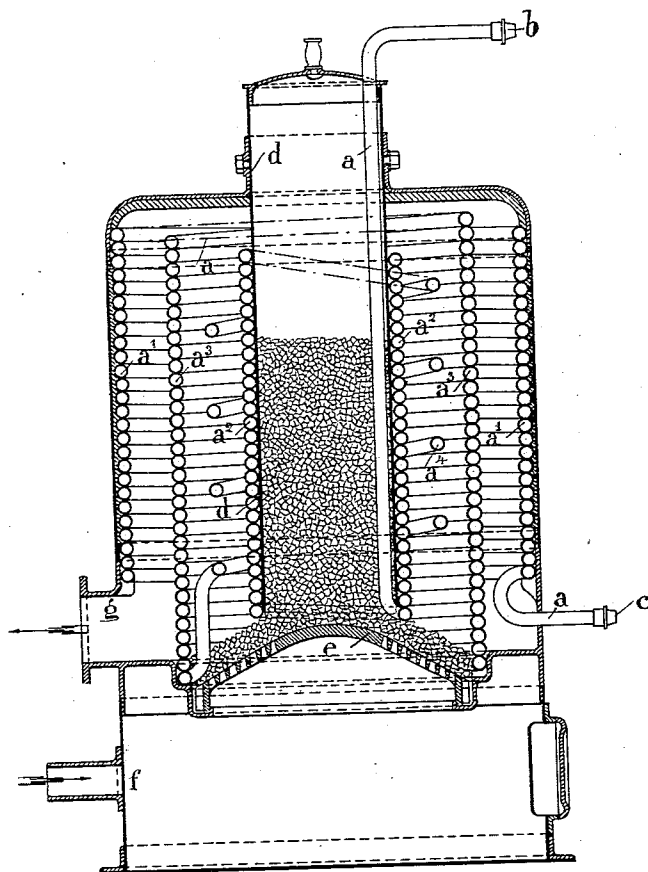


(No Model.)

C. G. P. DE LAVAL.
WATER TUBE BOILER.

No. 557,838.

Patented Apr. 7, 1896.



WITNESSES:
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CARL GUSTAF PATRIK DE LAVAL, OF STOCKHOLM, SWEDEN.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 557,838, dated April 7, 1896.

Application filed September 9, 1895. Serial No. 561,904. (No model.)

To all whom it may concern:

Be it known that I, CARL GUSTAF PATRIK DE LAVAL, a citizen of Sweden, residing at Stockholm, Sweden, have invented certain new and useful Improvements in Water-Tube Boilers, of which the following is a specification.

The present invention refers to an improvement in water-tube boilers of that kind which consists of a single continuous tube in one end of which water is pumped in, while steam issues from the other end, and which, moreover, is provided with magazine-firing. In such boilers the magazine-tube must be surrounded by a part of the boiler water-tube in order to obtain that cooling of the magazine-tube which is necessary to avoid its burning.

Now the purpose of the invention is to admit of the raising and lowering of the magazine-tube, and thus to control the thickness of the coal-layer upon the grate. To this end I provide a spirally or helically wound tube as the connection between the inner coils or section wound upon the magazine and the remaining part of the boiler water-tube, said spirally or helically wound tube having its few coils so separated by wide spaces and with so large a diameter in relation to the diameter of the water-tube itself that it acts as a torsion-spring during the raising or lowering of the magazine-tube.

In the accompanying drawing a steam-boiler with the improvement in question is shown in vertical section.

a is the continuous boiler water-tube, with the water-supply at b and the steam-outlet at c . In the example shown said boiler-tube consists of three cylindrical sections or spirals—namely, one external spiral section a' at the shell of the boiler, one internal spiral section a^2 , surrounding the coal-magazine d for cooling it, and one spiral section a^3 , situated about in the middle between the two spiral sections a' and a^2 .

In order to enable the varying of the thickness of the coal-layer upon the grate e , the coal-magazine d is movable in vertical direction up and down by means of any convenient arrangement. (Not necessary to be shown on the drawing.) The connection between the spiral section a^2 , which is fixed on the magazine d so as to follow its movements, and the spiral section a^3 , (or a'), which is immovable, consists of a spirally or helically wound tube

a^4 , having its few coils so separated by wide spaces or interstices and with so large diameter in relation to the diameter of the tube itself that this tube acts as a torsion-spring when moving the magazine up and down. Thus a constant connection is provided between the several parts of the boiler water-tube.

The blast-air flows into the space beneath the grate through opening f , and the products of combustion leave the boiler through opening g .

Having now particularly described my invention and in what manner the same is to be performed, what I claim is—

1. In water-tube boilers, the combination of a movable coal-magazine for controlling the height of the coal-layer on the grate, and a cooling spiral section fixed to and surrounding the magazine and forming a part of the water-tube of the boiler, substantially as set forth.

2. In water-tube boilers, the combination of a movable coal-magazine for controlling the height of the coal-layer on the grate, a cooling spiral section fixed to and surrounding the magazine and forming a part of the water-tube of the boiler, and a spiral or screw-wound water-tube composed of coils separated by spaces or interstices and connected at one end with said cooling spiral section and at the other end with the fixed boiler water-tube, and adapted to act as a torsion-spring during the movements of the magazine, substantially as and for the purpose set forth.

3. In water-tube boilers, the combination of the fixed water-tube section a^3 , the movable water-tube section a^2 surrounding the coal-magazine d for cooling it, and the spiral or screw-wound water-tube a^4 composed of coils separated by spaces or interstices and connected at one end with said cooling water-tube a^2 and at the other end with the fixed boiler water-tube section a^3 and adapted to act as a torsion-spring during the movements of the magazine, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

CARL GUSTAF PATRIK DE LAVAL.

Witnesses:

TYRKO ROBSAHM,
WALDEMAR BOMAN.