

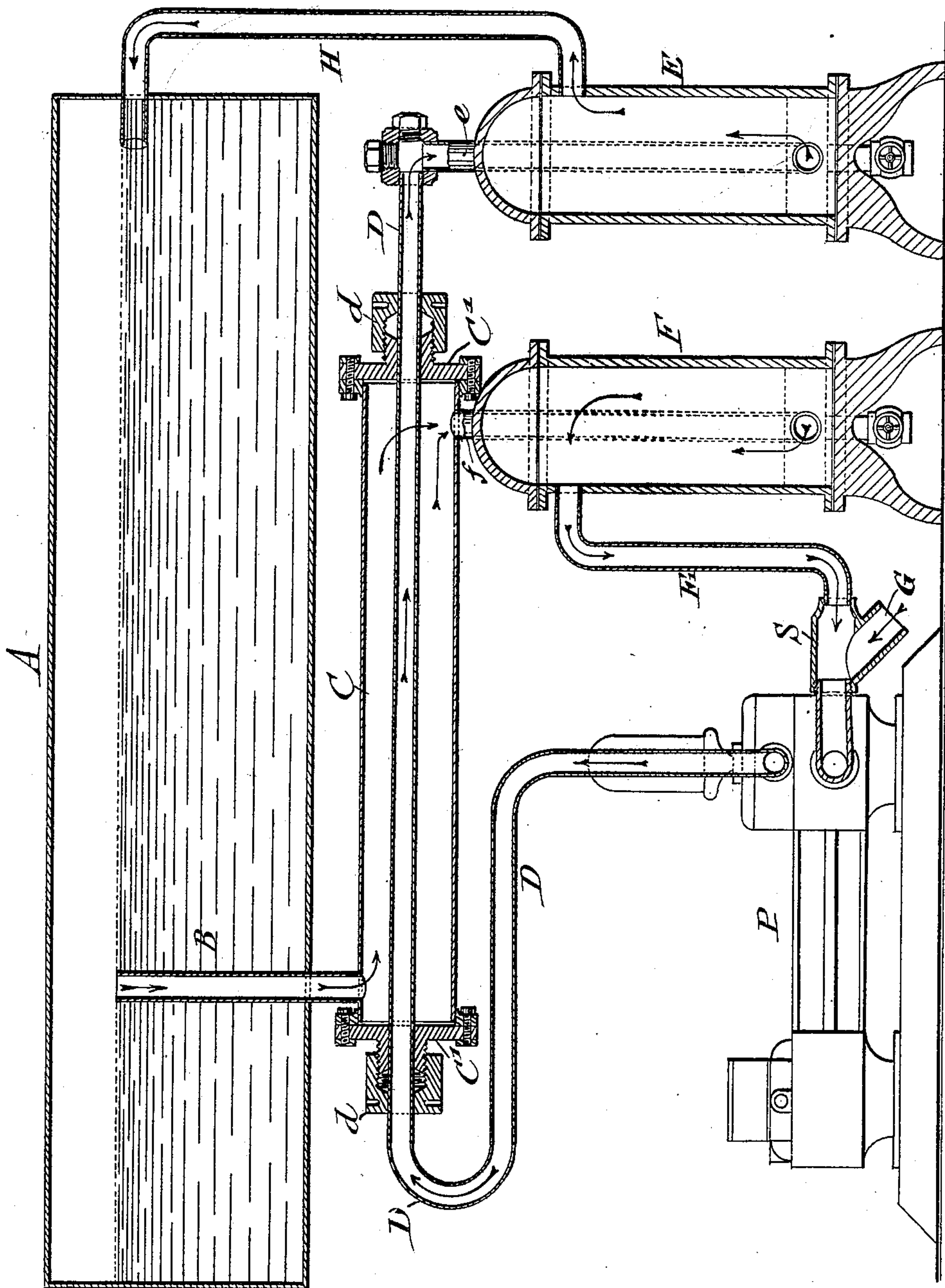
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Patented July 25, 1899.

G. W. LAUGHTON.  
FEED WATER HEATER AND PURIFIER.

(Application filed Oct. 31, 1898.)

(No Model.)



WITNESSES:

*Karl Kailb*  
*M. Henry Wurtzel*

INVENTOR

*George W. Laughton*  
BY *George H. Rogers*  
ATTORNEYS.



# UNITED STATES PATENT OFFICE.

GEORGE W. LAUGHTON, OF NEW YORK, N. Y.

## FEED-WATER HEATER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 629,723, dated July 25, 1899.

Application filed October 31, 1898. Serial No. 694,989. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. LAUGHTON, a citizen of the United States, residing in the city of New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Feed-Water Heaters and Purifiers, of which the following is a specification.

The object of this invention is to furnish an improved feed-water heater and purifier to be used in connection with an ordinary steam-boiler in which the well-known "surface-blow" is made use of to remove the grease and other impurities accumulated as a scum on the surface of the water in the boiler and the surface steam-blow conducted through a system of tubes through which the feed-water is also passed on its way to the boiler, so that the heat of the surface-blow raises the temperature of the feed-water to nearly boiler temperature, while suitable filtering-chambers are interposed at suitable points to remove the grease in the surface-blow and the impurities and scale-forming matter in the feed-water before the water is fed into the boiler. For this purpose the invention consists of an improved feed-water heater and purifier which comprises, in combination with a steam-boiler and feed-pump, a blow-off pipe terminating at the mean water-level in the boiler, a heating-chamber connected with the outer end of said blow-off pipe, a grease-extractor connected with said heating-chamber, a pipe connecting said grease-extractor with the supply-pipe at the suction side of the feed-pump for the preliminary heating of the feed-water, a feed-water pipe connected with the force side of the feed-pump and passing through the heating-chamber, a filtering-chamber connected with the feed-water pipe, and a pipe leading from the filtering-chamber to the steam-boiler, as will be more fully described hereinafter.

The accompanying drawing represents a vertical longitudinal section of my improved feed-water heater and purifier, showing the steam-boiler likewise in vertical longitudinal section and the feed-pump in side elevation.

Referring to the drawing, A represents a steam-boiler of any approved construction. In the steam-boiler is arranged a vertical blow-

off pipe B, which passes through the shell of the steam-boiler and the upper end of which is on a level with the mean water-level of the boiler. Below the steam-boiler is arranged a cylindrical chamber C, which is connected with the lower end of the blow-off pipe B, said chamber being provided with tightly-packed heads C', having stuffing-boxes *d d*, through which extends a feed-water pipe D, one end of which is connected with the supply-port or force side of the feed-pump P, while the opposite end is connected by a pipe *e* with the lower part of a filtering-chamber E. The blow-off pipe is connected with the cylindrical heating-chamber C near one head, while a grease-extractor F is connected at its lower part by a pipe *f* with the chamber C near its opposite head. The upper part of the grease-extractor F is connected by a pipe F' with the feed-water supply-pipe G at the suction side of the feed-pump P, while the upper part of the filtering-chamber E is connected by a pipe H with the steam-boiler A.

The filtering-chamber and grease-extractor are charged with suitable filtering material, the filtering-chamber with filtering material by which the scale-forming substances are removed, while the grease-extractor F, which is connected with the cylindrical chamber C, is charged with material by which the oil and grease that is removed from the surface of the water in the boiler is collected.

The pressure of the steam on the surface of the water in the boiler forces a certain quantity of water, with the grease that is formed in the nature of a scum or film on its surface, through the blow-off pipe B into the heating-chamber C, from which the water passes through the grease-extractor F, which separates the grease and oil from the same. The water passes then to the pipe F' and mingles with the feed-water that is drawn in through the supply-pipe G and suction-pipe S at the suction-port of the feed-pump P. The feed-water which is thus mixed with the hot boiler-water is heated to some extent thereby and then passes through the pipe D and is heated therein as it passes through that part of the pipe D which is located within the heating-chamber C. This highly-heated water passes then through the filter E, which



removes the scale-forming substances, the purified water being then conducted by the supply-pipe H into the boiler.

The heat of the water forced through the  
 5 blow-off pipe under the pressure of the steam in the boiler serves to raise the temperature of the feed-water in the pipe D to nearly boiling temperature. It mixes with the feed-water in the suction-pipe S and feed-pump,  
 10 the feed-water entering the suction-pipe in the form of an injector-jet, and after the preliminary heating in the suction-pipe and pump the feed-water is finally heated in the heating-chamber C. The grease blown off from the  
 15 boiler is collected in the grease-extractor F, while the scale-forming matter and impurities in the feed-water are collected in the filtering-chamber E, so that the feed-water is supplied in highly heated and purified form to the  
 20 boiler.

My improved system of feed-water heating and purifying has the following advantages:

First. By employing the surface-blow the boiler is kept free from grease and other im-  
 25 purities.

Second. By interposing the feed-water heater between the boiler and the feed-pump the live steam which would otherwise be lost in blowing off the grease from the surface of  
 30 the water in the boiler is utilized for heating the feed-water.

Third. By interposing the filtering-chamber and the grease-extractor the boiler is kept free from incrustation for the reason that the  
 35 scale-forming substances are separated, while the oil is also separated and collected for use.

Fourth. The feed-water heater and purifier forms a simple and inexpensive addition to the boiler-plant, while it produces a consid-  
 40 erable saving in fuel not only by supplying feed-water at nearly the temperature of the water in the boiler, but by removing the scale-forming substances from the feed-water before the same enters the boiler.

45 Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with a steam-boiler, of a feed-water heater, consisting of a blow-off

pipe terminating in the boiler, a heating-  
 50 chamber connected with the outer end of said blow-off pipe, a heating-pipe passing through said chamber to the boiler, a grease-extractor connected with said heating-chamber, a pump,  
 55 a pipe connecting the grease-extractor with the feed-water pipe at the suction side of the pump, and a pipe connecting the force side of the pump with said heating-pipe, substantially as set forth.

2. The combination, with a steam-boiler and  
 60 feed-pump, of a feed-water heater and purifier, consisting of a blow-off pipe terminating in the boiler, a heating-chamber connected with the outer end of said blow-off pipe, a  
 65 grease-extractor connected with said heating-chamber, a pipe connecting said grease-extractor with the supply-pipe at the suction side of the feed-pump for the preliminary heating of the feed-water, a feed-water pipe  
 70 connected with the force side of the feed-pump and passing through the heating-chamber, a filtering-chamber connected with the feed-water pipe, and a pipe leading from the filter-  
 75 ing-chamber to the steam-boiler, substantially as set forth.

3. The combination, with a steam-boiler and  
 80 a feed-pump for the same, of a feed-water heating-chamber below said steam-boiler, said chamber being provided with heads and stuffing-boxes on said heads, a feed-water pipe con-  
 85 nected with the force side of the feed-pump and passing through the heating-chamber, a blow-off pipe connecting the heating-chamber with the interior of the boiler, a grease-extractor connected with said heating-chamber,  
 90 a pipe connecting the grease-extractor with the supply-pipe on the suction side of the pump, a filtering-chamber connected with the end of the feed-water pipe, and a pipe connecting said filtering-chamber with said  
 95 steam-boiler, substantially as set forth.

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

GEORGE W. LAUGHTON.

Witnesses:

PAUL GOEPEL,

M. HENRY WURTZEL.