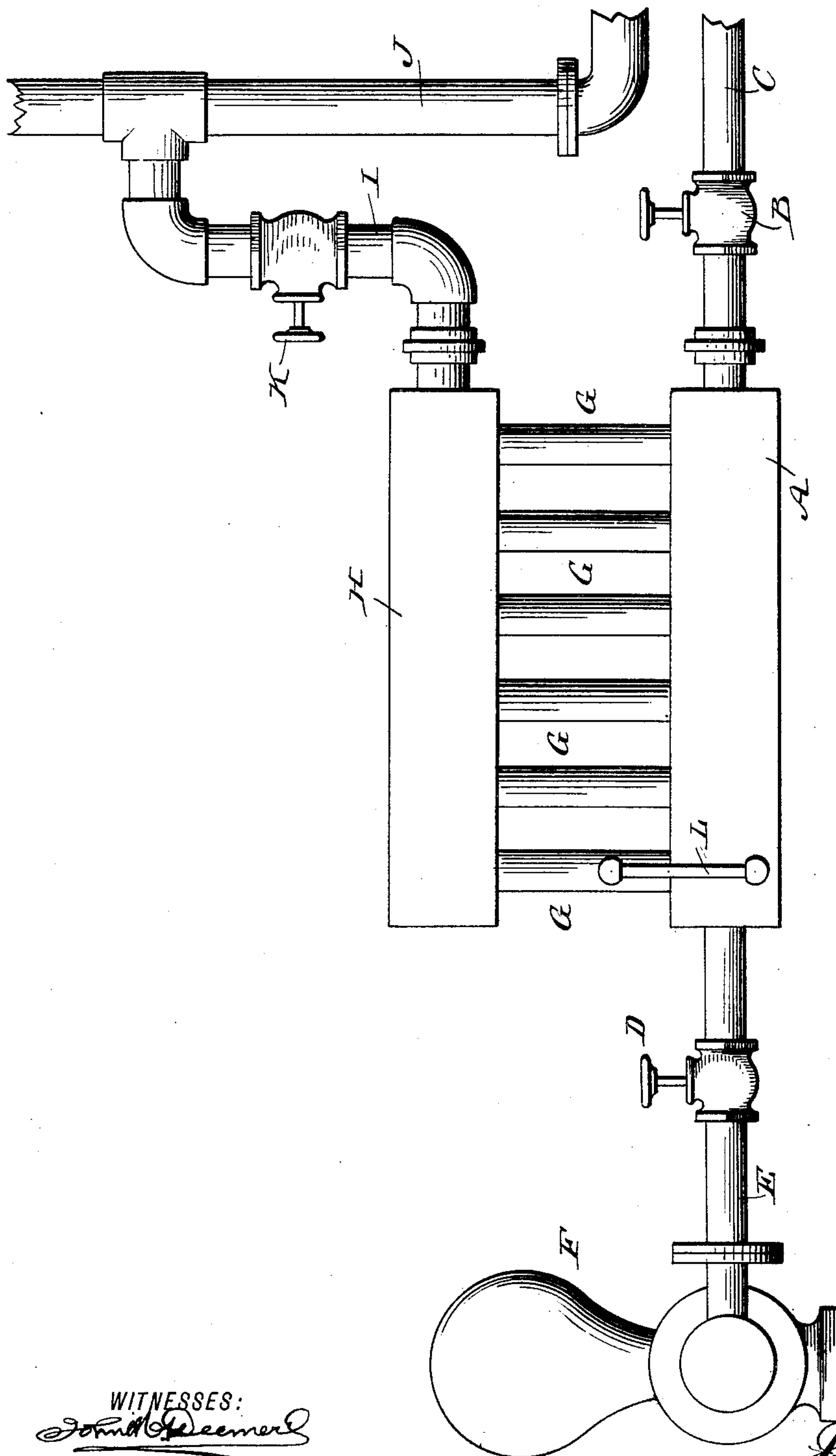


(No Model.)

J. WILLENBRINK.  
FEED WATER HEATER AND CONDENSER.

No. 407,141.

Patented July 16, 1889.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

JOHN WILLENBRINK, OF NEW RICHMOND, OHIO.

## FEED-WATER HEATER AND CONDENSER.

SPECIFICATION forming part of Letters Patent No. 407,141, dated July 16, 1889.

Application filed April 10, 1889. Serial No. 306,715. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN WILLENBRINK, of New Richmond, in the county of Clermont and State of Ohio, have invented a new and  
5 Improved Feed-Water Heater and Condenser, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved feed-water heater for steam-  
10 boilers, which is very simple in construction and effective in operation, utilizing the exhaust-steam of the engine for heating the water.

The invention consists of a water-supply  
15 pipe connecting with the pump discharging into the boiler and a number of vertical pipes opening into the said water-pipe and connecting with the exhaust-pipe of the steam-engine.

The invention also consists of certain parts  
20 and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawing, forming a part of this specification,  
25 in which the figure represents a side elevation of the improvement, with parts in section.

The water-supply pipe A is provided on one end with a valve B, connected with a pipe C, leading to the tank or other source of water-  
30 supply. On the other end of the supply-pipe A is held a second valve D, connected by a pipe E with a pump F, of any approved construction, and serving to discharge water into the boiler to be converted into steam.

From the supply-pipe A extends upward a number of pipes C, connecting at their upper ends with a horizontally-extending pipe H, closed at one end and connected at its other end by an upwardly-extending branch pipe I  
40 with the exhaust-pipe J, through which passes the exhaust from the engine. On the branch pipe I is held a valve K for regulating the amount of exhaust-steam admitted from the exhaust-pipe J to the pipe H. On the supply-pipe A, and on one of the vertical pipes  
45 G, is held a glass gage L, to indicate the amount of water in the pipes A and G.

The operation is as follows: When the engine is in motion, the exhaust-steam passes into  
50 the exhaust-pipe J, and part of the exhaust-

steam passes from the latter through the branch pipe I into the pipes H and G. When the valves B and D are opened and the pump F is in operation, then the pump sucks the water from the tank or other water-supply so  
55 as to pass through the supply-pipes C, A, and E. As the water passes through the water-supply pipe A it comes in contact with the exhaust-steam contained in the pipes G, so that part of the exhaust-steam heats the wa-  
60 ter in its forward motion and part of the steam mingles with the water and is carried to the pump and from the latter back to the boiler. It will be seen that when the pump is stopped and the valves B and D are closed the water  
65 remaining in the supply-pipes A is heated by the exhaust-steam contained in the pipes G. When the water in the boiler sinks below its normal level, the valves B and D are opened again, the pump F is started, and the heated  
70 feed-water in the pipe A between the valves B and D is forced back to the boiler. The new supply of water passing through the pipe C and the valve B is heated again, as above described, when passing through the supply-  
75 pipe A.

In case the pump F gets out of order the operator closes the valve K, so that the exhaust-air in the pipe J passes freely into the open air. The glass gage L enables the engineer to  
80 set the several valves to regulate the admission of exhaust-steam and water to the pipe A. Thus it will be seen that I provide a very simple and convenient means for heating the feed-water from the exhaust-steam of the en-  
85 gine.

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

1. A feed-water heater comprising a water-  
90 supply pipe connecting with the pump discharging into the boiler, and a number of vertical pipes opening into the said water-supply pipe and connecting with the exhaust-pipe of the steam-engine, substantially as shown and  
95 described.

2. A feed-water heater comprising a supply-pipe having a valve near each end, a pump connected with one end of the said supply-  
100 pipe and discharging into the boiler, a num-



ber of vertical pipes opening into the said water-supply pipe, and an exhaust-pipe into which discharges the exhaust-steam of the engine and which is disconnected from the 5 said vertical pipes, substantially as shown and described.

3. In a water-heater, the combination, with a water-supply pipe provided with valves near each end, of a number of pipes extending from 10 the said water-supply pipe, a horizontally-extending pipe connected with the upper ends of the said number of pipes, and an exhaust-pipe connected with the said horizontally-extending pipe, substantially as shown and de- 15 scribed.

4. In a water-heater, the combination, with a water-supply pipe provided with valves near each end, of a number of pipes extending from the said water-supply pipe, a horizontally-ex- 20 tending pipe connected with the upper ends

of the said number of pipes, an exhaust-pipe connected with the said horizontally-extending pipe, and a branch pipe connecting the said exhaust-pipe with the said horizontally-extending pipe, substantially as shown and 25 described.

5. In a feed-water heater, the combination, with a water-supply pipe, of a pump connected with one end of the said water-supply pipe and discharging into the boiler, a number of 30 vertical pipes opening into the said water-supply pipe, a horizontal pipe extending from the upper ends of the said number of pipes, and an exhaust-pipe discharging into the said horizontally-extending pipe, substantially as 35 shown and described.

JOHN WILLENBRINK.

Witnesses:

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H. A. MENKE.