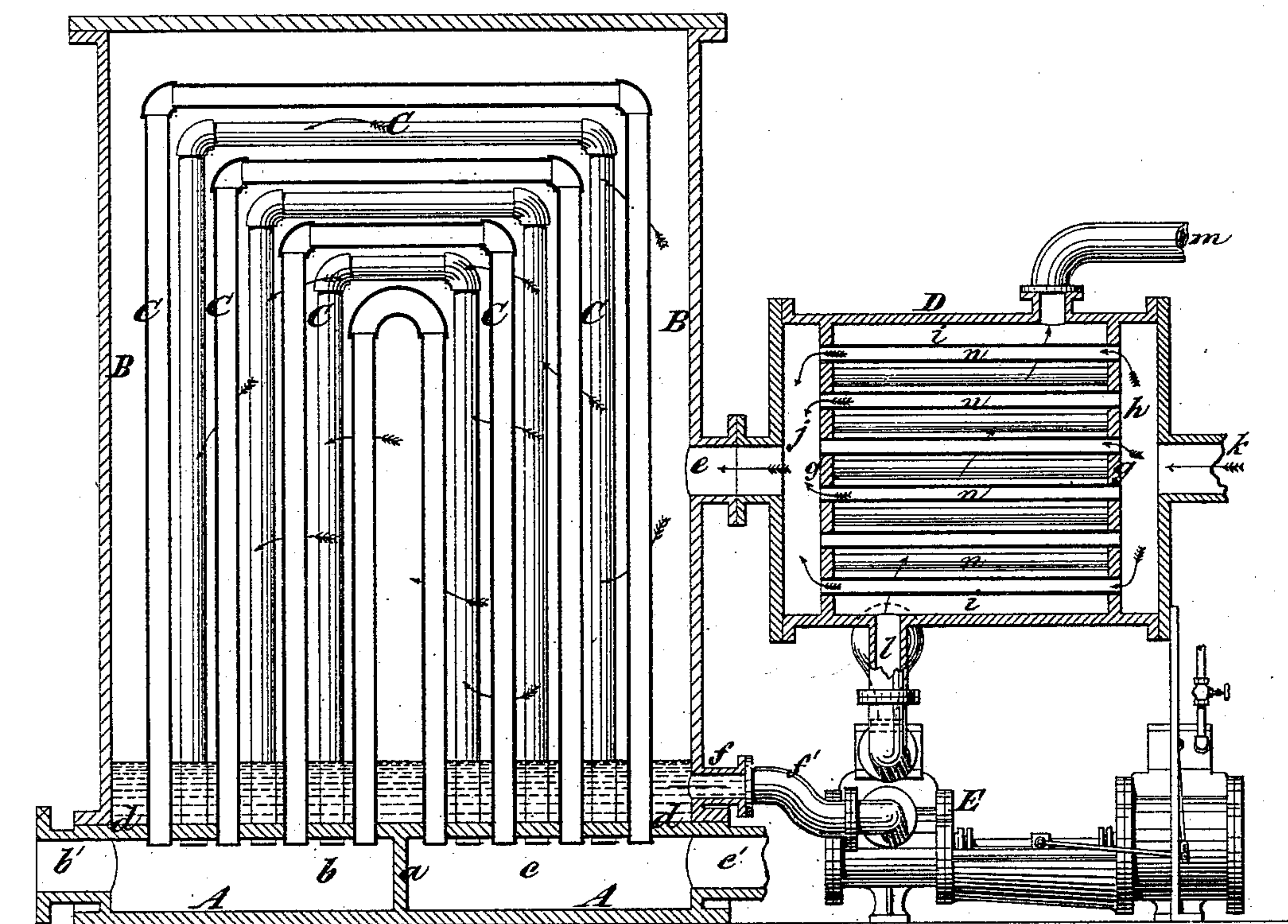


B. T. BABBITT.
Steam-Condensing and Feed-Water Heating Apparatus.

No. 212,169.

Patented Feb. 11, 1879.

Fig. 1.



WITNESSES.
Fred. Haynes
John Becker

INVENTOR.
B. T. Babbitt
by his Attorneys
Brown & Allen

UNITED STATES PATENT OFFICE.

BENJAMIN T. BABBITT, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM-CONDENSING AND FEED-WATER-HEATING APPARATUS.

Specification forming part of Letters Patent No. 212,169, dated February 11, 1879; application filed June 29, 1878.

To all whom it may concern:

Be it known that I, BENJAMIN T. BABBITT, of the city, county, and State of New York, have invented certain new and useful Improvements in Steam-Condensing and Feed-Water-Heating Apparatus for Steam-Engines; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention consists in the novel combination, with a condenser and feed-water pump, of a feed-water heater adapted to receive and heat the water of condensation flowing from the condenser by means of the heat of the exhaust-steam being conducted to said condenser, as will be hereinafter more particularly described and explained.

The drawing represents a vertical section of a surface-condenser and feed-water heater illustrating my invention, showing also the elevation of a steam-pump for taking the water of condensation from the condenser and forcing it through the heater.

The condenser has a hollow base, A, of cast-iron or other material, of circular or other form, upon which is placed a hollow cylinder, B, or a chamber or vessel of other form corresponding with the base, the said cylinder, chamber, or vessel being bolted to the base through flanges on each. The base is divided into two compartments by an upright partition, *a*, on one side of which partition, communicating with its compartment *b*, there is a water-inlet pipe, *b'*, and on the other side of which partition, communicating with the compartment *c*, there is a water-escape pipe, *c'*.

Inside of the cylinder or chamber B are numerous arched or elbowed pipes C C, each of which is inserted tightly at both ends into holes in the top plate, *d*, of the base A, so that one end of each communicates with the compartment *b*, and the other end with the compartment *c*.

The cooling-water, entering by *b'* into the compartment *b* of the base, passes thence through all the pipes C C into the compartment *c*, passing out through the outlet *c'*, while steam entering the cylinder or chamber B by a pipe, *e*, circulates in the said chamber around and between the cool surfaces of the pipes C C and is rapidly condensed, its water of condensation falling to the bottom of the said cylinder or chamber, and passing out through a pipe, *f*.

The arched or double-elbowed construction or form of the pipes C C permits them to expand and contract without straining or loosening their connections with the top plate, *d*, of the base, or any elbow connections or couplings used in the pipes themselves.

The feed-water heater is composed of a cylinder, D, having at a short distance from its ends two tube sheets or diaphragms, *g g*, which divide it into three chambers, *h*, *i*, and *j*. Numerous tubes *n n* are inserted tightly into holes in the tube-sheets, to form communication between the chambers *h j*.

The chamber *h* has connected with it the exhaust-steam pipe *k* of a steam-engine. The chamber *j* is connected by the pipe *e* with the cylinder or chamber B of the condenser. The chamber *i* is connected with the discharge-pipe *l* of a feed-pump, E, and the feed-pipe *m* of the boiler is also connected with the said chamber.

The suction-pipe *f'* of the feed-pump is connected with the outlet-pipe *f* of the cylinder or chamber B of the condenser.

The water of condensation passing out from the chamber B of the condenser by the pipe *f*, as hereinbefore described, is taken by the feed-pump and forced through the chamber *i* of the heater, and through the feed-pipe *m* to the boiler, and the said water, passing over, between, and around the exterior surfaces of the pipes *n n* and interior surfaces of the diaphragms or tube-sheets *g g*, is heated to a high temperature by the heat imparted to said pipes and diaphragms by the exhaust-steam, which passes through the said pipes, and through the chambers *h j* or steam-spaces of the boiler.

What I claim as my invention is—

The combination, with a condenser, of a feed-water heater consisting of the cylinder D, connected with the condenser by a suitable pipe, tube-sheets, or diaphragms *g g*, and tubes *n*, dividing said cylinder into the chambers *h i j*, the feed-pump having its suction-pipe connected with the condenser, and its discharge-pipe connected with chamber *i* of the heater, and suitable pipes for connecting the heater with a boiler and with the exhaust of a steam-engine, substantially as set forth.

B. T. BABBITT.

Witnesses:

B. A. McDONALD,
EDWARD R. BARTON.