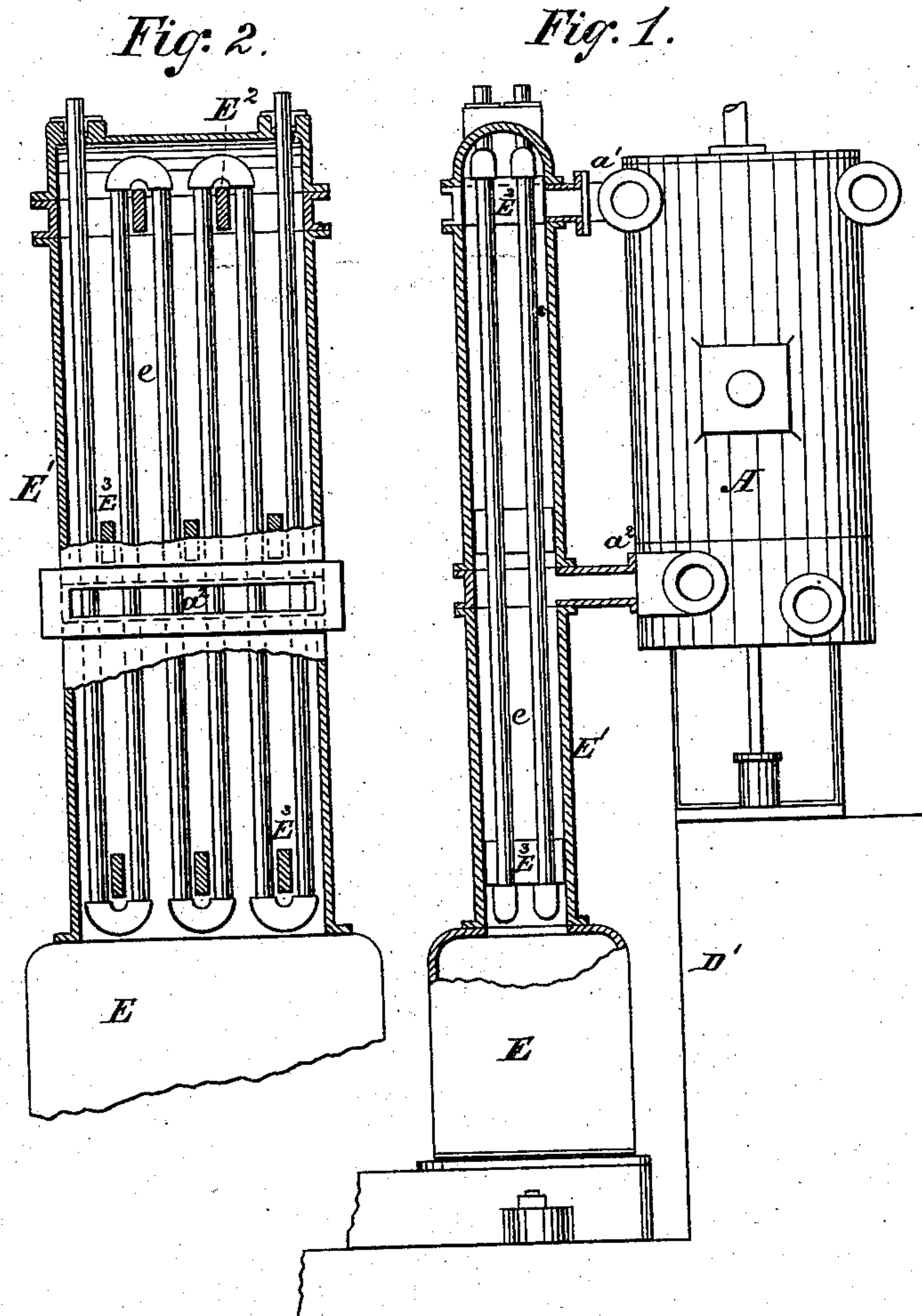


(No Model.)

G. H. CORLISS.
Condenser and Feed Heater.

No. 235,746.

Patented Dec. 21, 1880.



Witnesses.

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UNITED STATES PATENT OFFICE.

GEORGE H. CORLISS, OF PROVIDENCE, RHODE ISLAND.

CONDENSER AND FEED-HEATER.

SPECIFICATION forming part of Letters Patent No. 235,746, dated December 21, 1880.

Application filed June 14, 1880. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HENRY CORLISS, a citizen of the United States, residing in Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements relating to Condensers and Feed-Heaters for Steam-Engines, of which the following is a specification.

It is important in the economical working of steam-engines to introduce the feed-water into the boiler at as high a temperature as possible. The water from the condenser is usually at a temperature of 100° to 120° Fahrenheit, (equal to 35° centigrade.) Feeding with such water saves much fuel as compared with feeding the water cold; but in a large class of cases the condensing-water is, by reason of saltiness or other quality, not suitable to be fed into the boiler.

My invention is an improvement on the means for heating a separate supply of water.

I construct a condenser of more than usual height, preferably by adding a tall chamber on the top of the ordinary condenser-body. A liberal space is provided in the upper portion, where the cold condensing-water never comes, and in this space I arrange a series of pipes, with provisions for expansion and contraction, due to variations of temperature. The fresh water for feeding the boiler is caused to circulate through these pipes, and can thus attain a temperature considerably above that of the hot salt-water pumped out from the condenser.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a vertical section of the feed-heater, partly in elevation. Fig. 2 is a corresponding section at right angles to that in Fig. 1. Fig. 2 also shows an outline of the cylinder from which the steam is received.

Similar letters of reference indicate like parts in both the figures.

Referring to the figures, E is the main body of the condenser, and E' is a tall chamber bolted on the top thereof, with stuffing-boxes in the upper end, through which are passed water-pipes e. The pipes are made in several pieces and united, so as to cause the water to traverse up and

down several times in passing from the entrance to the exit. The steam is received alternately through the two nozzles a' a^2 of the cylinder A, and fills the entire chamber with the weak steam, which bathes the feed-pipes e, and imparts its heat thereto without exposing the feed-pipes to any contact with the cold injection-water. The pipes e are suspended on cross-pieces E² at the upper end, and are steadied by corresponding or smaller cross-pieces E³ below. It is important that the cross-pieces E³ be so arranged as to efficiently steady the pipes and prevent their being moved by the blasts of exhaust-steam, which are received intermittently, while they at the same time allow the pipes e to freely move up and down to the small extent required to accommodate the expansions and contractions with variations of temperature. The stuffing-boxes e' allow the pipe to move in and out with sufficient freedom to avoid mischief.

The chamber E' performs the double functions, first, of a liberal passage for the easy flow of the steam from the receiving ports or nozzles a' a^2 to the main body E of the condenser, where it is exposed to contact with cold water and condensed in the long-approved manner, and, second, as a heating-chamber for the feed-water circulating in the pipes e, where it is freely exposed to the heat of the steam flowing past it to the condenser, and is not touched by the cold water injected.

I have shown two sets of pipes, e. The invention may be made to succeed with only one set, or more than two sets may be employed, if preferred. The chamber E² is adapted for ready separation, to allow access to the pipes for repairing or exchanging, when required.

Modifications may be made in the forms and proportions. I can make the pipes e, a continuous pipe of iron, copper, or other material, either extending several times up and down, or extending transversely or coiled, or variously convoluted. I esteem it important to provide that the steam may circulate freely through the spaces and obtain access to the exterior of all parts of the pipe e, that the passage may be liberal for the free descent of the steam among the pipes, and that the pipe or pipes be allowed to expand and con-

tract freely, but confined against any rattling motion when subjected to the violent impact of the exhaust-steam.

I claim as my invention—

- 5 1. The condenser described, formed in two parts, E E', the lower part, E, receiving the condensing-water to condense the steam, and the upper part, E', receiving the first rush of the steam, in combination with a device, e,
10 exposing a large surface in the upper part, E', properly connected for the passage of feed-water, as herein specified.

2. In a steam-engine, the cylinder A, connections $a' a^2$, condenser E E', feed-pipe e, and supports E² E³ for the latter, arranged to serve as and for the purposes herein specified.

In testimony whereof I have hereunto set my hand, at Providence, Rhode Island, this 9th day of June, 1880, in the presence of two subscribing witnesses.

GEO. H. CORLISS.

Witnesses:

EDGAR PENNEY,
ED. W. RAYNSFORD.