E. COPE.

WATER TUBE BOILER.

No. 191,225. Patented May 29, 1877.

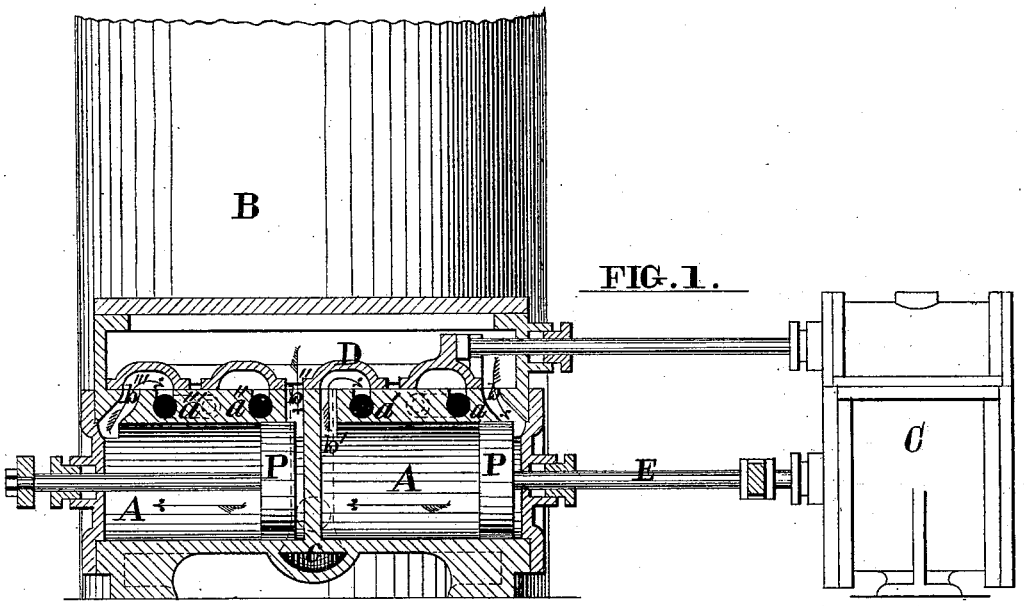

FIG. 1.

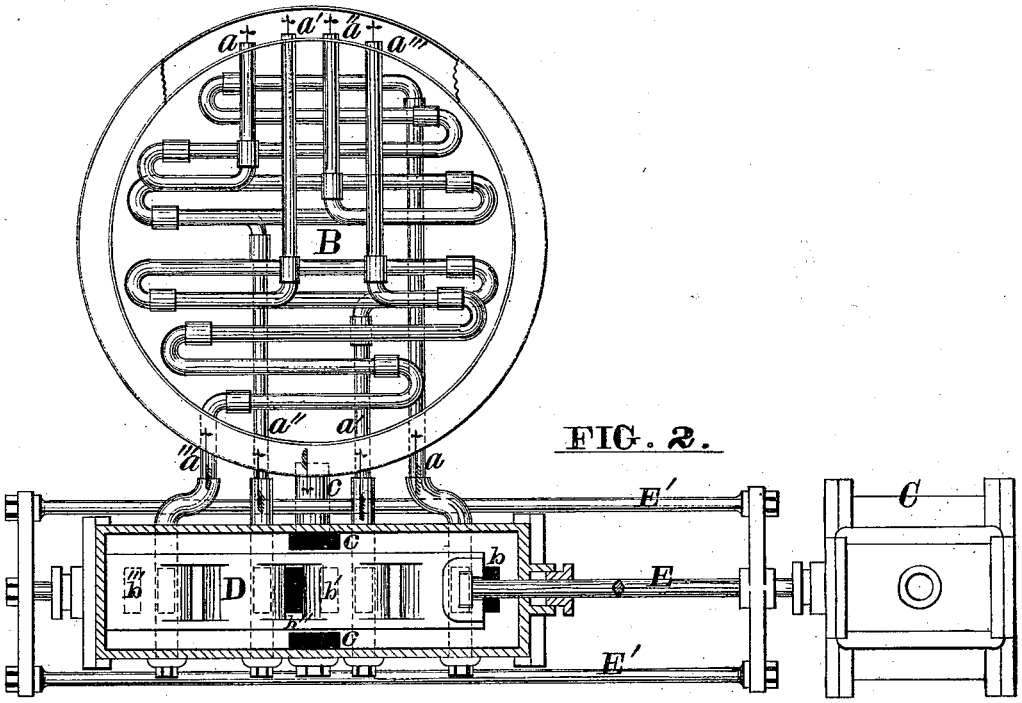

FIG. 2.

WITNESSES.

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EZRA COPE, OF HAMILTON, OHIO.

IMPROVEMENT IN WATER-TUBE BOILERS.

Specification forming part of Letters Patent No. **191,225**, dated May 29, 1877; application filed January 5, 1876.

To all whom it may concern:

Be it known that I, EZRA COPE, of the city of Hamilton, county of Butler, and State of Ohio, have invented certain new and useful Improvements in Steam-Generators; and I declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to certain improvements in steam-generators patented by A. B. Latta, June 6, 1854, April 10, 1855, and October 20, 1857, having a series of coiled pipes in the fire-chamber, through which water is forcibly circulated, being received from and discharged into a water-jacket exposed on its inner side to the fire.

My invention consists in the combination of a circulating-pump and a coiled-tube boiler, by means of which water is forced through each coiled pipe separately, securing a constant supply to each, preventing the destruction of the pipes by burning, and, also, the blowing through of the water without being converted into steam, requiring less time to raise steam, and dispensing with the necessity of gage-cocks or exterior overflow-pipes for ascertaining the flow of water or the generation of steam.

Figure 1 is a sectional elevation of the circulating-pump, and Fig. 2 a plan of the boiler and pump, clearly showing the connection between them.

The boiler consists of a water-jacket surrounding a chamber in which are a series of coiled pipes, and which forms, also, the fire-chamber.

Water is supplied to the jacket by any ordinary boiler-feeder, and is carried in it up to a point a little above where the coils commence, the remainder of the space in the jacket being reserved for steam.

The coiled pipes may be disposed in any manner most convenient, and may vary in length. The arrangement shown in the drawing is a very convenient one. The circulating-pump receives water from the jacket, forces it at any desired speed through the coils, and discharges it again into the jacket in the form of steam or highly-heated water.

In commencing the generation of steam there should be no water in the coils. As they become heated water is slowly forced through them, in its passage being wholly converted into steam, and in that form is discharged into the upper part of the jacket. Any water discharged into the upper part of the jacket when commencing operations would condense the steam in it, and greatly retard the generation.

Frequently one of the coils becomes heated to a greater degree than the others, causing increased resistance to the flow of water through it. In boilers—as in Latta's—where the coils branch out from a single pipe, this additional resistance would cause all the water to circulate through the less obstructed coils, and hence the first coil would be burnt out.

If discovered in time, the coil might be saved by increasing the speed of the circulating-pump, so as to increase the water-pressure; but in so doing the water is forced through the other coils too rapidly, delaying the generation of steam.

By forcing water through each pipe separately I remedy both the evils in the simplest manner possible. The supply to each coil is positive, and cannot be diverted. It can also be exactly regulated as necessity may demand.

The circulating-pump consists of a water-cylinder, divided by a central partition into two cylinders, in each of which a piston, P, operates, thus forming, in effect, two double-acting pumps, each discharging into two separate pipes.

The water is supplied through the pipe C into a common receiving-chamber, and from thence to the water-cylinders through the passages b b' b'' b''', and is discharged through the passages a a' a'' a''' into the independent circulating-pipes. The pump-valves are flat slide-valves, joined together, and operated from the rod to which the steam-valve is attached.

The steam-cylinder C may be of any approved form, or the pump may be operated directly from the main engine.

The main feature of my invention is the process of forcing water through each pipe of a coiled-tube boiler separately. Each pipe thus

receiving a regular and positive supply of water, gage-cocks, for determining whether water or steam is issuing from each, or exterior overflow-pipes, as heretofore used in this class of boilers, are rendered unnecessary.

I claim as my invention and desire to secure by Letters Patent—

1. The combination of a circulating-pump and a coiled-tube boiler with the series of independent circulating-pipes *a a' a'' a'''*, having no connection whatever, whereby water is circulated through each pipe separately, substantially as shown and described.

2. The combination of a circulating-pump, divided into two double-acting cylinders, with a coiled-tube boiler for supplying water to each coil of the boiler separately, substantially as shown and described.

EZRA COPE.

Witnesses:
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