W. A. LIGHTHALL.

FEED WATER HEATER FOR STEAM BOILERS.

No. 46,252. Patented Feb. 7, 1865.

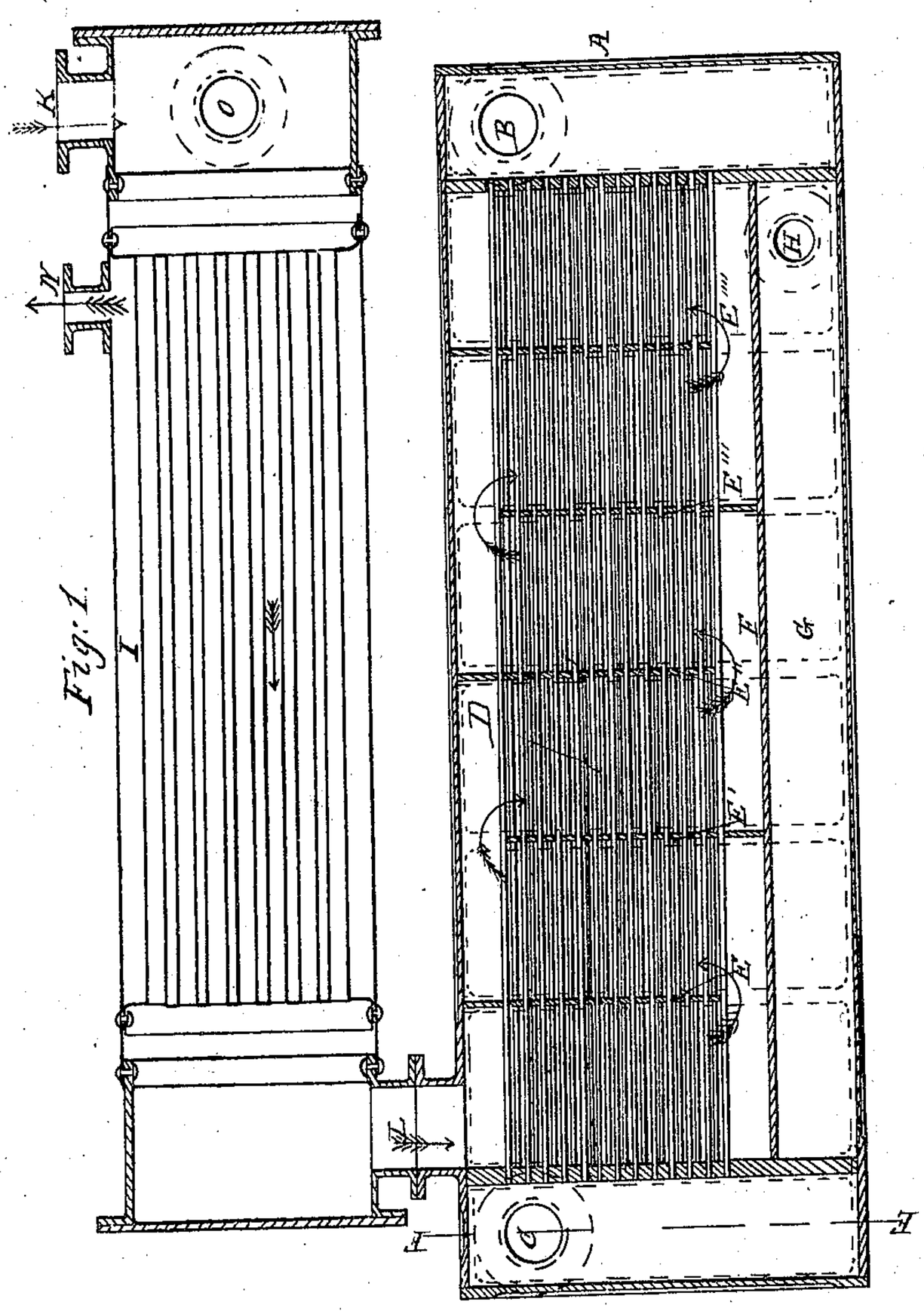

Fig. 1.

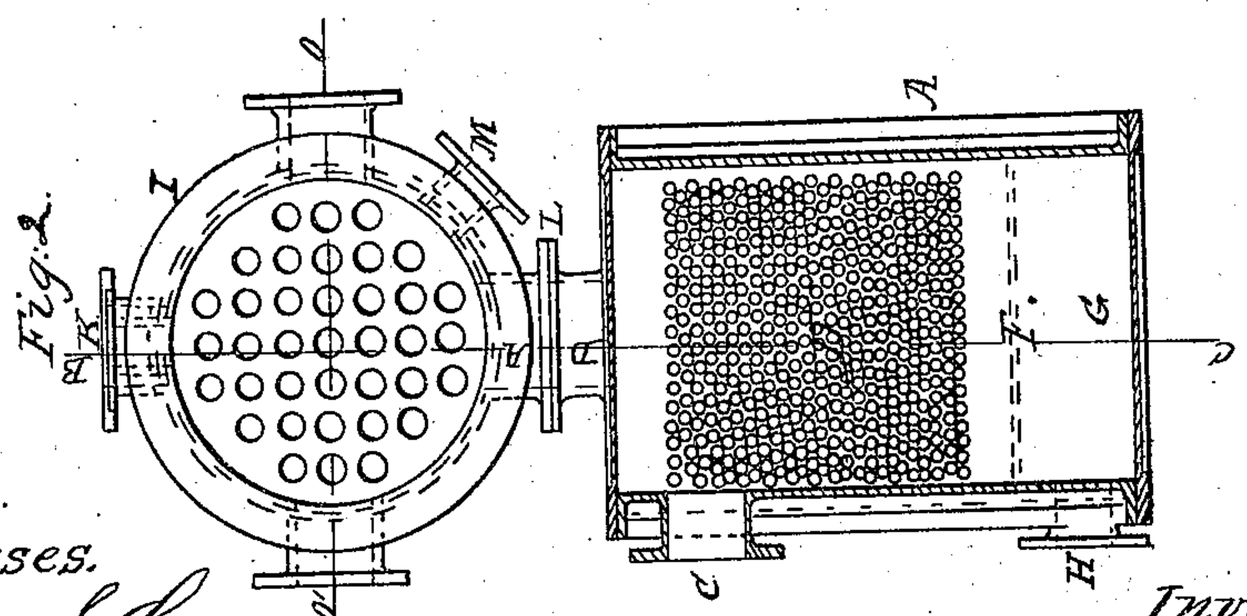

Fig. 2.

Witnesses.

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WILLIAM A. LIGHTHALL, OF NEW YORK, N. Y.

IMPROVEMENT IN FEED-WATER HEATERS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **46,252**, dated February 7, 1865.

To all whom it may concern:

Be it known that I, WILLIAM A. LIGHTHALL, of the city, county, and State of New York, have invented a certain new and useful improved combination of a feed-water heater, with a condenser for use in and with non-condensing or high-pressure steam-engines; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, in which—

Figure 1 is a vertical and longitudinal section taken through the line A B C D, Fig. 2; and Fig. 2 is a vertical transverse section taken through the line E F, Fig. 1, the head-plate of the heater being removed to show more clearly the location of the tubes in the heater.

The object and purpose of my invention is to interpose between the engine and the condenser, into which the steam from the engine is ultimately to be condensed, a heater into which the steam from the engine is first exhausted, and into and through which the feed-water is passed from the feed-pump to the boiler, for the double purpose of first heating the said feed-water to a high degree of temperature by its being heated by the passage through the heater of the first influx of steam exhausted from the engine, (so as to be restored to the boiler at a higher temperature than could be attained if the water was heated prior to its being received into the feed-pump;) and, second, of abstracting from the exhaust steam a large percentage of its contained heat (so as to relieve the condenser from such percentage of its duty) that would be contained in it were the steam from the engine exhausted directly into the condenser without the interposition of the heater.

My invention therefore consists in placing and interposing between the exhaust of a non-condensing (or high-pressure) engine a heater, into which the steam from the engine is exhausted prior to its entering the condenser, and into which heater the feed-water from the feed-pump is passed, to be heated on its way to the boiler.

A is the condenser, into which the requisite supply of cooling-water is taken through the nozzle B and taken out through the nozzle C. This supply of cooling-water is furnished by a steam-supply pump of required capacity, or by any other desired means.

D is a series of tubes through which the cooling-water above named is passed to produce the condensation of the steam exhausted from the engine (after the said exhaust-steam is passed through the heater, as hereinafter mentioned) by the steam coming in contact with the exterior of the tubes, as hereinafter described.

E E′ E″ E‴ E⁗ are division-plates which divide the condenser into six sections, as shown in Fig. 1, their purpose being to force the exhausted steam received through and from the heater to travel an extended distance over, across, and by the exterior of the tubes in the condenser, as compared with the length of the travel of the cooling-water through the tubes, for the more effectual and thorough condensation of the same in a limited length of apparatus, it being apparent that if the division-plates were dispensed with the apparatus would require to be so greatly extended in length to produce the same effect as to be practically valueless.

F is a "dripplate," having apertures in it at properly located intervals, through which the condensed water falls into the reservoir G, from whence the said water is taken through the nozzle H by a pipe to the feed-pump and from thence by another pipe to the heater, as hereinafter described.

I is the heater, located (for convenience of arrangement) on top of the condenser A. It is fitted with tubes, as shown, through which the steam exhausted into it from the engine through the nozzle K passes to the opposite end of it, and is from there passed into the condenser through the pipe L to pass across, around, and by the tubes D, and around and by the division-plates of the condenser, as is shown by the darts in Fig. 1.

M is the nozzle to the heater, to which the pipe from the feed-pump is attached, and through which the condensed water from the reservoir G, after passing through the feed-pump, enters the heater to pass across and among the tubes in the heater, and is from thence taken off to the boiler through the nozzle N, and through the pipe connecting that nozzle to the boiler. This feed-water is subjected to the first effect of the steam exhausted

from the engine into the heater, and is, of course, heated thereby to a higher degree of temperature than if it were pumped directly to the boiler from the reservoir G; in fact, it is proved by experience and practice that said feed-water can be restored to the boiler at or very nearly at its boiling-point, and therefore too hot to be pumped by a force-pump in the ordinary manner.

O O′ are supernumerary nozzles, to enable the heater to be attached conveniently in place in the vessel or other location where it is to be placed, either one subserving the purpose of the nozzle K. In case of one of these three nozzles being used, the others are to be closed and shut off by being covered by a bonnet in a well-known manner.

As before mentioned, the first introduction of the steam exhausted from the engine into the heater not only heats the feed-water passed into and through the heater to a high temperature to be returned back to the boiler, but it also relieves, by such abstraction of the heat of the exhausted steam, the work to be performed by the condenser after the steam passes into the latter.

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

The heater I, arranged as described, and placed between the exhaust of a steam-engine and the condenser A, as and for the purpose set forth.

WM. A. LIGHTHALL.

Witnesses:
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