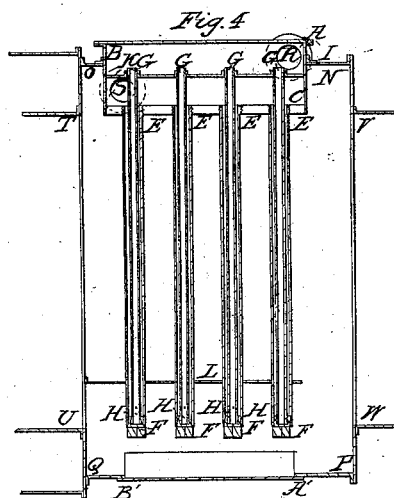
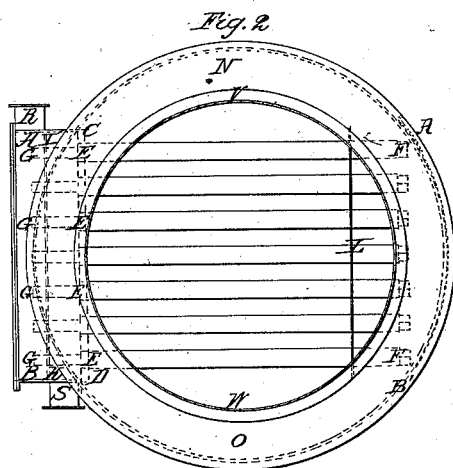
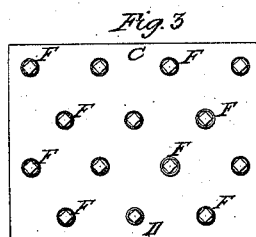
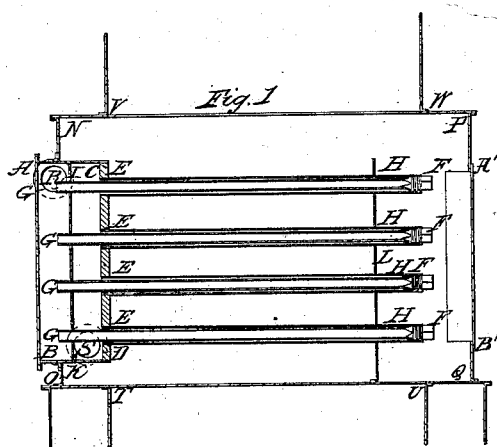


I. Newton,
Steam-Boiler Superheater.

N^o 54,757.

Patented May 15, 1866.



Witnesses:

J. H. Corbly
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Inventor:

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UNITED STATES PATENT OFFICE.

ISAAC NEWTON, OF NEW YORK, N. Y.

IMPROVEMENT IN SUPERHEATING APPARATUS.

Specification forming part of Letters Patent No. 54,757, dated May 15, 1866.

To all whom it may concern:

Be it known that I, ISAAC NEWTON, of the city, county, and State of New York, have invented a new and useful Improvement in Superheating Apparatus for Steam Engines; and I do 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, in which—

Figure 1 is a vertical section of a superheating apparatus constructed and applied according to my invention. Fig. 2 is a plan of the same. Fig. 3 is an end view of the apparatus. Fig. 4 is a vertical section, as in Fig. 1, showing the manner of bracing the circulating-chamber.

Similar letters of reference indicate corresponding parts in the several figures.

The prime conditions essential to the success of a superheating apparatus are that it shall not interfere with the draft of the boiler-furnace, either by contracting the calorimeter or by otherwise obstructing the passage of the heated gases of combustion, and that it will permit the easy detection of any defects in its tubes or joints and the removal and replacement of its tubes even while steam is in the boiler. The belief that these conditions have not been fulfilled by any of the superheating apparatus heretofore employed has led to this invention, which consists in an apparatus which, while it does not interfere with the draft, may be made to present any desirable amount of heated surface, over which the steam may pass on its way to the engine, is very simple and easy to construct and repair, particularly so far as replacing defective tubes is considered, and can be applied to existing steam-boilers without making alterations.

To enable others skilled in the art to make and apply my invention, I will proceed to describe it with reference to the drawings.

A B C D is a circulating steam chamber having a vertical partition, I K, and in the inner head, C D, of which one end of each of the nearly-horizontal circulating-tubes E F are screwed or otherwise firmly secured. Within these superheating-tubes internal circulating-tubes, G H G H, are inserted, the said circulating-tubes passing tightly through holes in the partition I K. The superheating-tubes

E F E F are only fastened at one end, as above mentioned, but are supported near the other end by an upright steady-plate, L, which is perforated so that the said tubes may pass easily through it.

The apparatus thus described is inserted through a suitable opening in one side of and surrounded by a casing, N O P Q, which is placed between the exit T U in the boiler for the products of combustion and the base V W of the chimney. This casing is so proportioned that the superheating-tubes cannot impair the draft either by contracting the calorimeter, presenting obstructions to the passage of the gases or by reducing the temperature. This very important condition I fulfill by enlarging the area of the casing N O P Q around the superheater, above the exit or outlet in the boiler, and again contracting the size of the smoke-pipe above the superheater; and I place the superheating-tubes at a suitable distance above the exit or outlet T U, so that the products of combustion have ample space to pass unimpeded to the chimney by passing not only among but around the tubes to the smoke-pipe V W, which is attached to the top of this casing.

I construct the outer ends, E F, of the superheating-tube E F E F either solid or closed by a cap or screw-plug, as shown in the drawings, and the circulating-tubes G H G H, I make either with the outer ends, H H, split and swelled out, as shown in the drawings, or perforated and supported on an extension of the screw plugs or caps. By securing one or more of the ends H H to the screw plugs or caps or closed ends of their respective tubes E F E F, and securing the other end or ends, G G, in the plate I K, the circulating-tubes may be made to brace the circulating-chamber.

It will be seen that this arrangement of tubes prevents any injury to the joints which might otherwise occur on account of unequal expansion and contraction by different temperatures in various parts of the apparatus.

In order to guard against the evil of water lodging in the tubes by the foaming of the boiler or other cause, I so fix the superheater within the casing N O P Q, already described, that the tubes will incline from a horizontal position with ends secured in the head C D the lowest. In order, also, that the greatest

quantity of steam may circulate over the hottest parts of the superheating-tubes, which is the lower side, and thus transfer the greatest quantity of caloric from the products of combustion to the steam, I prefer to so insert the circulating-tubes G H and support them by the division-plate I K and within the superheating-tubes E F, that the internal annular space between the circulating and superheating tubes will be the greatest on the side next the outlet or exit from the boiler. Again, in order to accomplish the same end, I prefer to make the lower superheating and circulating tubes larger than those above, so that the greatest portion of the steam will pass through those tubes which are exposed to the highest temperature. And, again, to effect the same end, I propose in some cases to place two superheaters, as above described, one above the other, the steam from the boiler to enter the higher one—the one exposed to the lowest temperature—and then pass through the lower and hotter one before entering the engine. I propose to employ either one or all of these devices in combination to obtain a superheater of maximum efficiency under the conditions.

In the casing N O P Q, opposite the head into which the superheating-tubes are secured, and opening directly on the outer end of these tubes, I place a door, A' B', hinged or otherwise applied so that it may be easily opened, and of such dimensions as to admit of the tubes being examined at any time, and through which defective tubes, after being unscrewed, may be withdrawn and replaced with new ones.

By this arrangement it will be seen that the fundamental difficulty in existing superheaters is obviated, for by merely opening this door A' B' a faulty tube can not only be promptly discovered but removed and replaced in a very few moments.

In order that repairs or examinations may be effected without even stopping the engine, I apply suitable stop-valves and connections, so that the steam may be taken direct from the boiler without passing through the superheater.

The operation of this apparatus is as follows: The steam from the boiler enters the outer compartment of the circulating-chamber A B C D by means of the nozzle R, which is connected by means of a pipe with the highest part of the steam-space of the boiler. The steam thus entering fills the outer compartment of the circulating-chamber, and from thence enters the circulating-tubes G H G H, from which it passes through apertures in the ends H H into the superheating-tubes E F E F, which are exposed to the hot gaseous products of combustion from the boiler-furnaces on their way to the chimney. The steam, now

superheated, enters the inner compartment of the circulating-chamber, to which is attached a nozzle, S, with which the steam-pipe leading to the engine is connected. The steam therefore entering the nozzle R from the boiler is forced to circulate over the hot surface of the superheating-tubes E F, and thus, before passing to the engine through nozzle S, is superheated.

The apparatus thus described appears to me to be suited to obviate the difficulties heretofore existing in the use of superheated steam so far as the means employed for heating it by the heated gases generated in a steam-boiler furnace is involved. Not only does it permit of the exposure of an adequate amount of superheating-surface to the hot gases leaving the boiler without impairing the draft, but it also provides for the perfect circulation of the steam over those surfaces, without which provision even the extensive surface would not be sufficient for the efficient transfer of the caloric from the hot gases to the steam before it enters the engine. At the same time these indispensable conditions are fulfilled there are no complicated parts, or, in fact, any difficult of access. By simply raising a latch and opening the door A' B' the entire fixture is exposed to view, and any of the tubes—the parts most liable to decay—can be readily inspected and replaced if necessary. Neither does it involve a boiler of peculiar construction or differing in any way from those usually built. By merely introducing a casing or box between the exit in any boiler on the base of the pipe or chimney the superheater can be readily applied.

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

1. The arrangement of a superheating apparatus composed of a system of tubes and a circulating-chamber within an enlarged casing or box, N O P Q, in relation to the outlet of the boiler and the base of the chimney, substantially as and for the purposes specified.

2. Bracing the circulating-chamber A B C D by securing one or more of the inner tubes to their corresponding outer ones at their ends H F, and their reverse ends respectively to the side C D and dividing-plate I K of the circulating-chamber, substantially as described.

3. The arrangement of the superheating-tubes within the casing N O P Q in relation to the circulating-chamber and to a door, A' B', in the said casing, substantially as herein specified, to provide for the removal and replacement of any of the said tubes.

ISAAC NEWTON.

Witnesses:

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J. W. COOMBS.