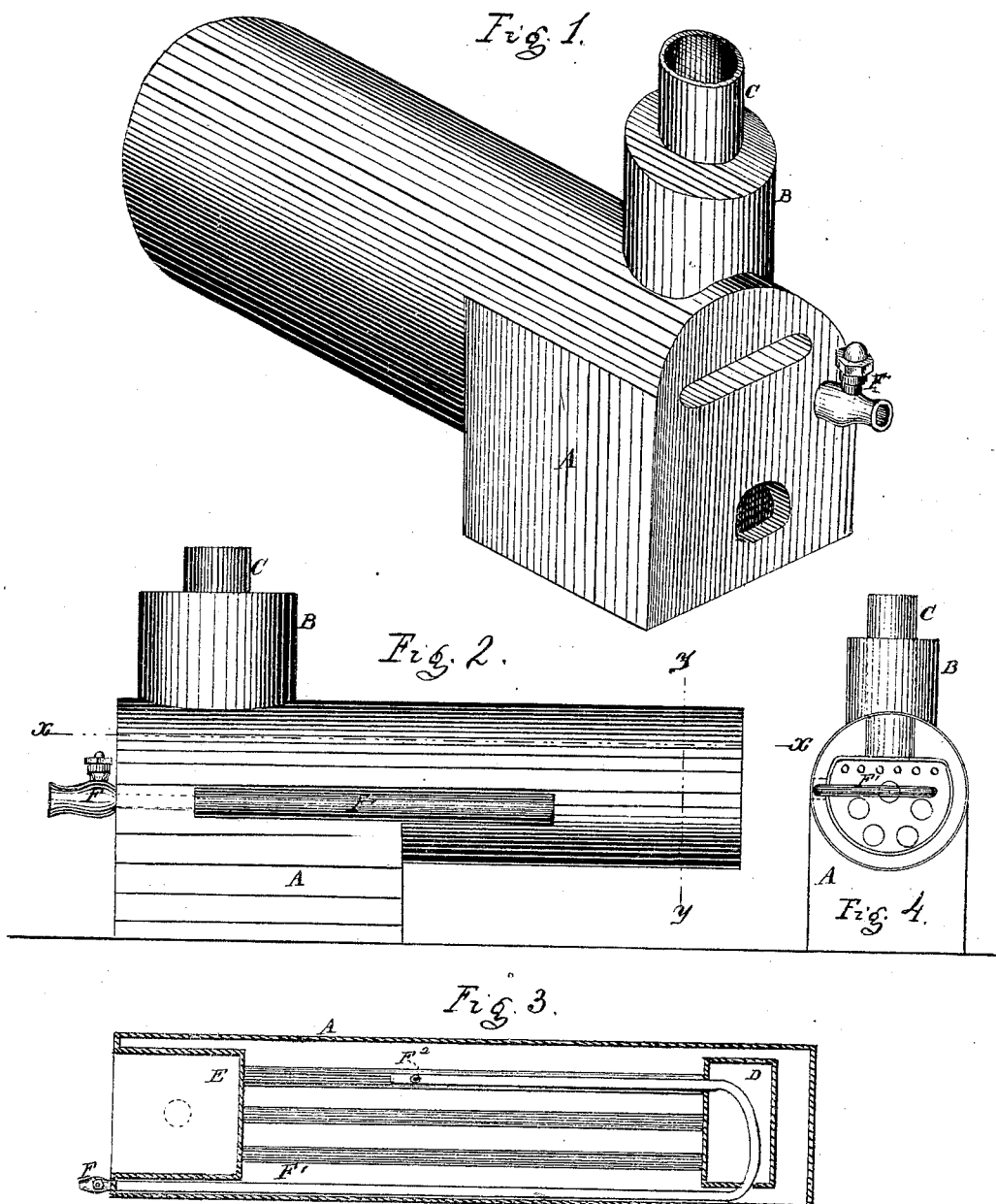


THOMAS ROBERTS.

Improvement in Admission of Feed-Water to Steam-Boilers.

No. 114,202.

Patented April 25, 1871.



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UNITED STATES PATENT OFFICE.

THOMAS ROBERTS, OF BALTIMORE, MARYLAND, ASSIGNOR TO HIMSELF
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IMPROVEMENT IN ADMISSION OF FEED-WATER TO STEAM-BOILERS.

Specification forming part of Letters Patent No. **114,202**, dated April 25, 1871.

To all whom it may concern:

Be it known that I, THOMAS ROBERTS, of the city and county of Baltimore, and State of Maryland, have invented certain Improvements in Feed-Water Heaters for Steam-Generators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawing, making part of this specification, in which—

Figure 1 is a perspective view of a steam-generator having my improvement attached thereto. Fig. 2 is an elevation of a generator, a portion of its shell being broken away so as to show the location of the heating-pipe. Fig. 3 is a horizontal section on line *x x* of Fig. 2, showing the location of the heating-pipe within the generator and the check-valve upon its inner end. Fig. 4 is a vertical transverse section on line *y y* of Fig. 2, showing that portion of the pipe which is exposed to the action of the heated products of combustion within the smoke-box.

Corresponding letters refer to corresponding parts in the several figures.

In attaching to steam-generators any device for heating the water with which they are to be supplied it is important that the arrangement of the parts shall be such as to introduce the water to the water-space in the generator at a temperature as near that of boiling water as is practicable, in order that the generator may not be injured by the sudden contraction of any of its parts consequent upon the introduction of a mass of cold water at any one point; and, further, that the pressure of the steam in such generator may not be suddenly reduced from the same cause.

The object of my improvement is the accomplishment of the above-named results; and to this end my invention consists in supplying a steam-generator with an interior feed pipe or pipes and check-valves, so arranged that in passing the water through them a portion of the heat from that portion of the generator where such heat is most intense shall be absorbed by it, and thus carried to that portion of said generator which is more remote from the combustion-chamber, and consequently where the heat is less intense; and the invention further consists in the combination and

arrangement of the parts of which it is composed, as will be more fully set forth hereinafter.

A in the drawing refers to a steam-generator, which may be of any approved form of construction, such as are usually employed for marine purposes, or such as are employed for locomotives, the only special requirement being that the space between the fire-box and the outer shell of the generator shall be wide enough to permit the heating-pipe to pass through it and leave room for the circulation of the water around such pipe. In all other respects the generator may be like those in common use, it being supplied with a steam-dome, B, uptake C, smoke-box D, and combustion-chamber E.

F refers to a check-valve, which is attached to the outer end of the heating pipe or pipes F'. To the outer end of this check-valve the pipe which conducts the water from the pump to the generator is to be attached, the valve being arranged in the usual manner, so as to prevent any water which has once passed it from being forced back toward the pump by the pressure of the steam within the generator.

F¹ refers to a pipe, of which there may be one, two, or more, according to the requirements of the generator to which they are attached. When more than one is used, there will be one or more upon each side of the combustion-chamber. The front ends of this pipe or of these pipes are to be attached to the front sheet of the generator, as shown, or in any suitable manner, they projecting through such sheet far enough to admit of having the check-valve attached. From this point the pipe extends through the water-space between the combustion-chamber and the outer shell of the generator, as shown in Fig. 3, and so along within the water-space by the side of or above the tubes, until it comes opposite the smoke-box, when it is turned or bent so as to pass through the said box, where additional heat is imparted to it, when it is still further bent so as to pass through the front flue-sheet and back within the generator to any desired point, where it terminates in another check-valve, as shown in Fig. 3.

In generators which have no separate

smoke-box, for return-flues, but which allow the products of combustion to escape directly from the front ends to the uptake, the feed or heating pipes will pass through the front tube-sheet into the flue or uptake, and then be bent so as to return into the water-space of the generator.

The check-valve upon the inner end of this pipe is of great service when it becomes necessary to remove the outer one, while there is a pressure of steam upon the generator, for the purpose of repairing the same, or for the purpose of removing any sediment which may collect in or around it and prevent its working.

It will be observed that as a consequence of the arrangement of these pipes a considerable portion of the heat generated in the combustion-chamber, where it is always more intense than at any other point of the generator, will thus be carried through or to the cooler portions, and thus tend to equalize the temperature throughout the entire structure.

I have described my heating-pipes as applicable only to the marine or locomotive type; but it is apparent that they are applicable to

generators which have no combustion-chamber formed within them, and where such chamber is entirely without the generator. In such cases the pipe or pipes would be passed through such combustion-chamber before entering the generator.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The feed-water pipe or pipes F^1 , passing through the water-space of the steam-generator into the smoke box or flue and returning into the water-space, substantially as and for the purpose set forth.

2. The combination of the generator A, the check-valve F, pipe F^1 , and check-valve F^2 , substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS ROBERTS.

Witnesses:

EDWD. F. FOLGER,
CHAS. H. ALFORD.