(No Model.)

J. P. WARNER.

FEED WATER PURIFIER AND HEATER.

No. 346,247. Patented July 27, 1886.

Fig. 1.

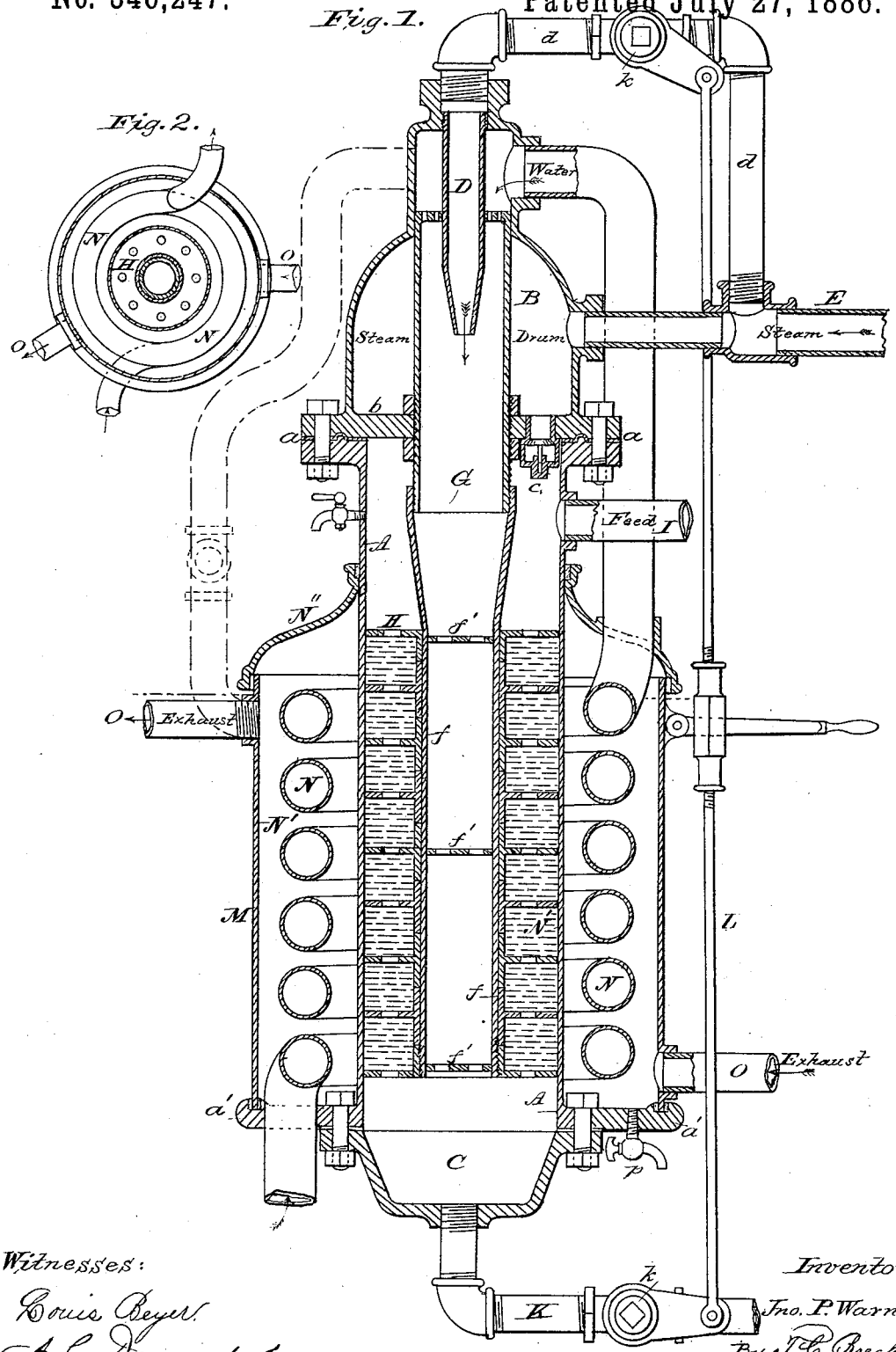

Fig. 2.

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UNITED STATES PATENT OFFICE.

JOHN P. WARNER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF PART OF HIS RIGHT TO JOHN F. DEZENDORF, OF NORFOLK, VIRGINIA, AND E. A. ADAMS AND T. E. JACOBS, BOTH OF WASHINGTON, D. C.

FEED-WATER PURIFIER AND HEATER.

SPECIFICATION forming part of Letters Patent No. 346,247, dated July 27, 1886.

Application filed October 21, 1885. Serial No. 180,534. (No model.)

To all whom it may concern:

Be it known that I, JOHN P. WARNER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Feed-Water Heaters and Purifiers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled the art to which it appertains to make and use the same.

My invention relates to heaters and purifiers of feed-water for boilers; and the object is to improve the construction of the heater and purifier patented to me the 21st day of July, 1885, and numbered 322,767; also, to produce a means by which the water coming from the pump can be heated before entering the purifier; also, to provide a removable casing, to be applied to the main purifier at will, and containing within such casing a coil by which the water from the pump is heated; also, to arrange a means by which the exhaust-steam used for heating the coil containing the pump-water, can be employed for heating a building, or can be carried into the upper part of the purifier to be condensed and utilized with the feed-water.

The invention consists in the construction of certain parts and arrangement of details, as will be more fully described hereinafter, reference being had to the accompanying drawings, and the letters of reference marked thereon.

The same letters indicate similar parts in the figures of the drawings, in which—

Figure 1 represents a vertical section of my improved heater and purifier, and its casing and coil. Fig. 2 is a horizontal section on line *x x* of Fig. 1.

In the accompanying drawings, a vessel of suitable dimensions and material is represented, according to the size of the boiler, to which it is connected by the steam and water pipes hereinafter referred to. This vessel, as in my former patent, consists of the main part A, having the flanges *a* and *a'*, to which the steam-drum B is bolted at the upper end, and the mud-drum C to the lower part by suitable bolts, and between the flanges is preferably placed my packing to form steam-tight joints. The steam-drum is provided with the diaphragm *b*, and in this is secured the check-valve *c*, and the interior pipe, G, is secured at the upper end. To this pipe, the pipe *f* is attached and extends to near the bottom of part A, and around the pipe *f* are arranged the perforated diaphragms or screens H, while the interior of said pipe *f* is provided with the perforated diaphragms *f'*. Into the upper part of the steam-drum B is extended the jet-nozzle D, connected by a branch pipe, *d*, with the steam-pipe E, communicating with the steam-space in the boiler. The blow-off pipe K is connected with the mud-drum, and in the branch pipe *d* and said blow-off pipe K are arranged the valves *k*, connected by the rod L to operate said valves. Between the diaphragms H is arranged a quantity of fine wire-gauze, preferably in sheets, or some other filtering material. The feed-pipe I communicates with the boiler, and conveys the purified water to it. All these parts are of similar construction and operation as those in my former patent, and are therefore not described more definitely.

The main part of my present invention is constructed as follows: A casing, M, of proper dimensions, is placed around the shell A, and in it is arranged a coil, N, which communicates at its lower end with the feed-pump or other source of supply and at its upper end with the upper part of the steam-drum. The lower flange, *a'*, of the shell A is extended circumferentially, and forms a bell-mouth to receive lead or other suitable packing when the cylinder N' is inserted therein. The upper part, N'', of the casing forms a head, and receives at its outer end the upper end of said cylinder with a packing, and its inner end embraces the shell, having also a recess, *n*, for receiving a suitable packing, so as to form a steam-tight joint. This entire casing can be easily removed by the removal of the bolts *a''*, which hold it in place. The exhaust-pipe O enters the casing at its lower end and passes out at its upper end, and the exhaust-steam may be conveyed either into suitable pipes to heat the

building, or it may be conducted into the upper part of the steam-drum to be condensed, and to assist in heating the feed-water, as shown in dotted lines in Fig. 1. The coil N communicates with the upper part of the steam-drum B, and the water therein contained having been properly heated enters into the steam-drum and passes through the inner pipe, up through the diaphragms H and filtering material, out through the pipe I into the boiler in a purified and heated state. This casing can be very easily and readily applied to old as well as new heaters and purifiers, with its coil, at a very small expense, and will be found to be of great advantage, as the feed-water will enter the boiler at a much higher degree of heat than when the purifier is used without it. Furthermore, the purified water passing up through the diaphragms and filtering material will receive an additional amount of heat from the exhaust-steam coming in contact with the shell A. It will be seen that it is also of great advantage to utilize the exhaust-steam, first, to heat the water in the coil N, and then either for heating the building or condensing it and using it with the feed-water. A suitable drip-cock, *p*, in the bottom of the casing serves to withdraw any condensed water that may have accumulated in the casing.

The operation of the apparatus will be readily understood by those skilled in the art, and will require no further elucidation here.

I aware that coils arranged in a casing and serving to heat the water before entering the feed-water heater proper are old, and do not claim such, broadly; but,

Having thus described my invention, what I claim is—

1. The combination of a heater provided with steam-jet D, interior pipe, G *f*, steam-drum B, and mud-drum C, and the diaphragms H, for supporting the filtering material, with the removable casing M and coil N, all arranged and adapted for operation as shown and specified.

2. The feed-water heater herein described, consisting of a shell, A, steam-drum B, partition *b*, steam-jet D, interior pipe, G *f*, diaphragms H, and filtering material, in combination with a coil, N, and removable casing M, and the pipes with their connections, all constructed and arranged as shown and specified.

3. The combination of a feed-water heater, constructed as shown, with a removable casing, M, supported at its lower end on an extended flange, *a'*, and connected at its upper end to the heater by a bell-mouth head, N″, having a packing-joint at both ends, and applied as shown and specified.

In testimony whereof I hereby affix my signature in presence of two witnesses.

JOHN P. WARNER.

Witnesses:
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