J. M. LIVELY.

STEAM GENERATOR.

APPLICATION FILED MAY 11, 1909.

951,480. Patented Mar. 8, 1910.

Fig. 1.

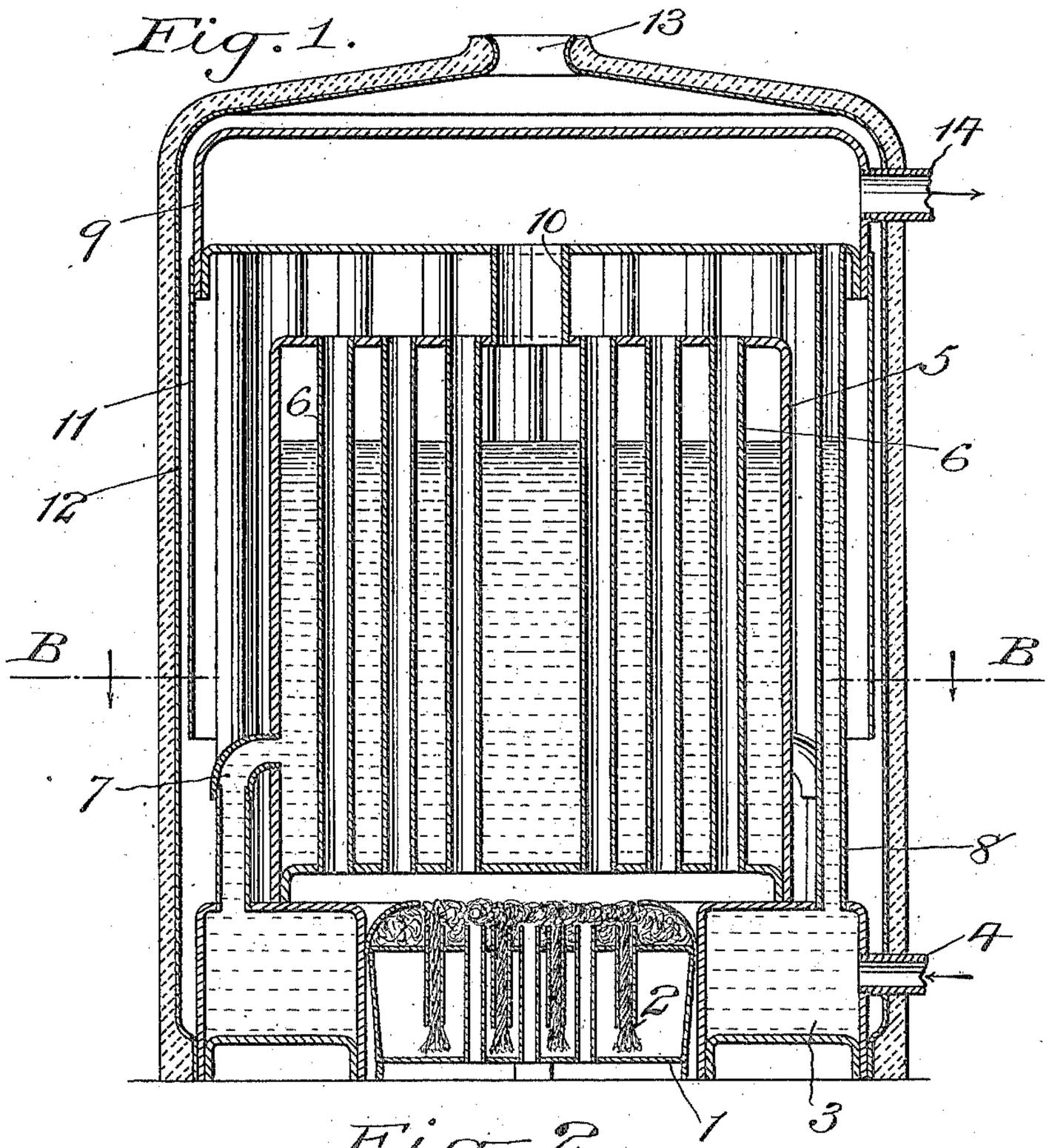
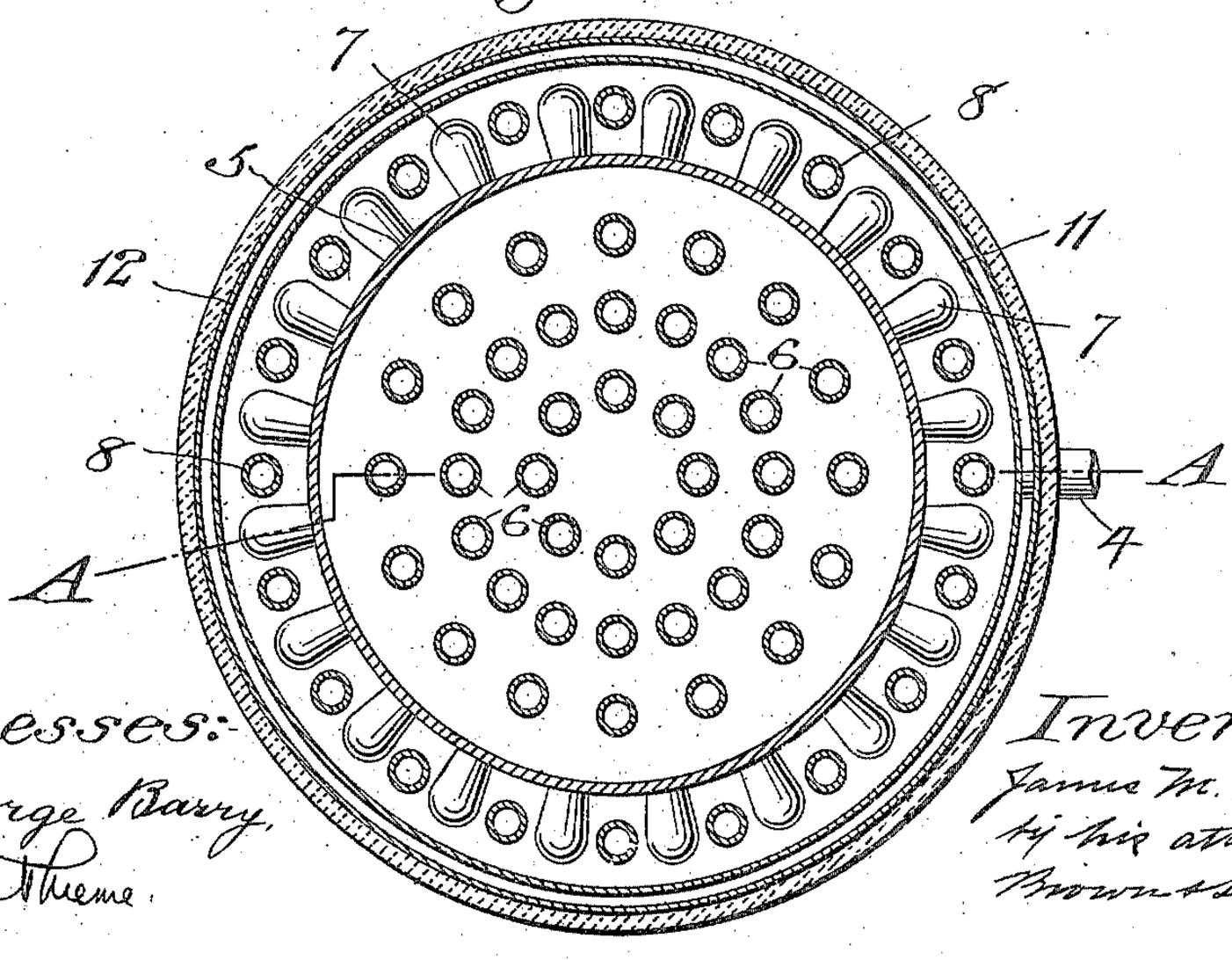


Fig. 2.



Witnesses:-
F. George Barry,
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UNITED STATES PATENT OFFICE.

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STEAM-GENERATOR.

951,480. Specification of Letters Patent. Patented Mar. 8, 1910.

Application filed May 11, 1909. Serial No. 495,260.

To all whom it may concern:

Be it known that I, JAMES M. LIVELY, a citizen of the United States, and resident of the borough of Brooklyn, in the city and State of New York, have invented a new and useful Improvement in Steam-Generators, of which the following is a specification.

This invention relates to steam generators and has for its object to provide a device having a great area of heating surface included within a very small space.

Another object is to provide a device of this character in which the radiating surface is reduced to a minimum.

A further object is to provide a device containing the advantages of both a vertical flue boiler and water tube boiler, together with an arrangement for giving initial heat to the supply water.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 represents a vertical section through the steam generator, taken in the plane of the line A—A of Fig. 2, showing one of the water inlet pipes in section on the left, and one of the water boiler tubes in section on the right, and Fig. 2 represents a horizontal section taken in the plane of the line B—B of Fig. 1, looking in the direction of the arrows.

The fire-box is denoted by 1, and may be of any well known or approved form; the one I have chosen to illustrate being provided with wicks 2 for burning liquid fuel.

The water chamber is indicated by 3, and water may be admitted thereto, through the pipe 4, from a source of supply not shown. This chamber is preferably annular and surrounds the fire-box 1.

A vertical flue boiler 5 is located over the fire-box and is provided with the tubular flues 6 through which the products of combustion pass for heating the water in the boiler around the flues.

An annular series of water inlet pipes 7, lead from the chamber 3 to the flue boiler 5, exterior to the latter; while an annular series of water boiler tubes 8 lead from the chamber 3 to a steam dome 9 located directly above the flue boiler 5. These water boiler tubes are arranged so as to alternate with the water inlet pipes 7 around the flue boiler, and of themselves constitute a vertical water tube boiler. The flue boiler 5 communicates with the steam dome through the conduit 10.

Depending from the steam dome, and exterior to the annular series of pipes 7 and tubes 8, I provide an annular heat deflector 11, which extends downwardly to a point about opposite the juncture of the pipe 7 with the flue boiler 5.

A jacket 12 composed of any suitable heat insulating material, incloses the entire structure and is provided at its top with an up-take 13 for the products of combustion.

A suitable outlet 14 serves to carry the live steam from the dome to the desired point of use.

In operation, water is admitted from a suitable source of supply through the pipe 4. It fills the chamber 3, and passes thence into the vertical flue boiler 5 through the pipe 7, until the boiler is filled to the desired height. The tubes 8 also fill to the same height as the flue boiler, by reason of the fact that they are connected with the chamber 3. The fire is started in the fire-box 1, and the products of combustion impinge upon the bottom of the vertical flue boiler and then pass upwardly through the flues 6, heating the water in the flue boiler; then impinge against the bottom of the steam dome, heating it; are then deflected downwardly by the deflector 11 in contact with the water boiler tubes 8 and the water inlet pipes 7; thence pass upwardly between the deflector 11 and jacket 12 and out the up-take 13 to atmosphere. The steam rises from the flue boiler 5 and the tubes 8 into the dome 9, from which it may be taken to an engine or other point of use.

It will thus be seen that I obtain a combination of a vertical flue boiler and vertical water tube boiler, both heated by the same products of combustion, which also superheat the live steam in the dome and give an initial heat to the water in the inlet pipes 7. Furthermore, the device is very compact as well as economical; and, the jacket 12 being of heat insulating material, permits of only a slight loss of heat through radiation.

It is obvious that various changes might be resorted to in the form, construction and arrangement of the different parts of my device, without departing from the spirit and scope of the invention; hence I do not wish

to limit myself strictly to the form herein shown and described, but

What I claim is:—

1. A steam generator comprising a fire-box, a vertical flue boiler thereabove, a water chamber surrounding the fire-box, a steam dome above the boiler and in connection therewith, and pipes leading from the chamber directly to the steam dome.

2. A steam generator comprising a fire-box, a vertical flue boiler thereabove, a water chamber surrounding the fire-box, a steam dome above the boiler and in connection therewith, and pipes leading from the chamber to the boiler and from the chamber directly to the dome.

3. A steam generator comprising a fire-box, a vertical flue boiler thereabove, a water chamber surrounding the fire-box, a steam dome above the boiler and in connection therewith, pipes leading from the chamber to the boiler and from the chamber directly to the dome, and means for causing the products of combustion to pass upwardly through the boiler and downwardly outside the same and in contact with the said pipes.

4. A steam generator comprising a fire-box, a vertical flue boiler thereabove, a water chamber surrounding the fire-box, a steam dome above the boiler and in connection therewith, an annular series of pipes leading from the chamber directly to the dome, and another annular series of pipes leading from the chamber to the boiler.

5. A steam generator comprising a fire-box, a vertical flue boiler thereabove, a water chamber surrounding the fire-box, a steam dome above the boiler and in connection therewith, an annular series of pipes leading from the chamber directly to the dome, another annular series of pipes leading from the chamber to the boiler, and means for causing the products of combustion to pass upwardly through the boiler and downwardly outside the same and in contact with the said pipes.

6. A steam generator comprising a fire-box, a water chamber surrounding the fire-box, a vertical flue boiler above the fire-box, a steam dome above the boiler and in connection therewith, an annular series of pipes exterior to the boiler leading from the water chamber directly to the dome, another annular series of pipes exterior to the boiler leading from the chamber to the boiler, and an annular heating medium deflector depending from the dome and surrounding the said pipes, whereby the products of combustion will pass upwardly through the boiler, impinge against the steam dome, and thence pass downwardly outside the boiler and in contact with the pipes.

7. A steam generator comprising a fire-box, a water chamber surrounding the fire-box, a vertical flue boiler above the fire-box, a steam dome above the boiler and in connection therewith, an annular series of pipes exterior to the boiler leading from the water chamber to the dome, another annular series of pipes exterior to the boiler leading from the chamber to the boiler, an annular heating medium deflector depending from the dome and surrounding the said pipes, whereby the products of combustion will pass upwardly through the boiler, impinge against the steam dome, and thence pass downwardly outside the boiler and in contact with the pipes, and a jacket surrounding the whole and provided with an uptake for the products of combustion.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this twenty-fourth day of April 1909.

JAMES M. LIVELY.

Witnesses:

F. GEORGE BARRY,

HENRY THIEME.