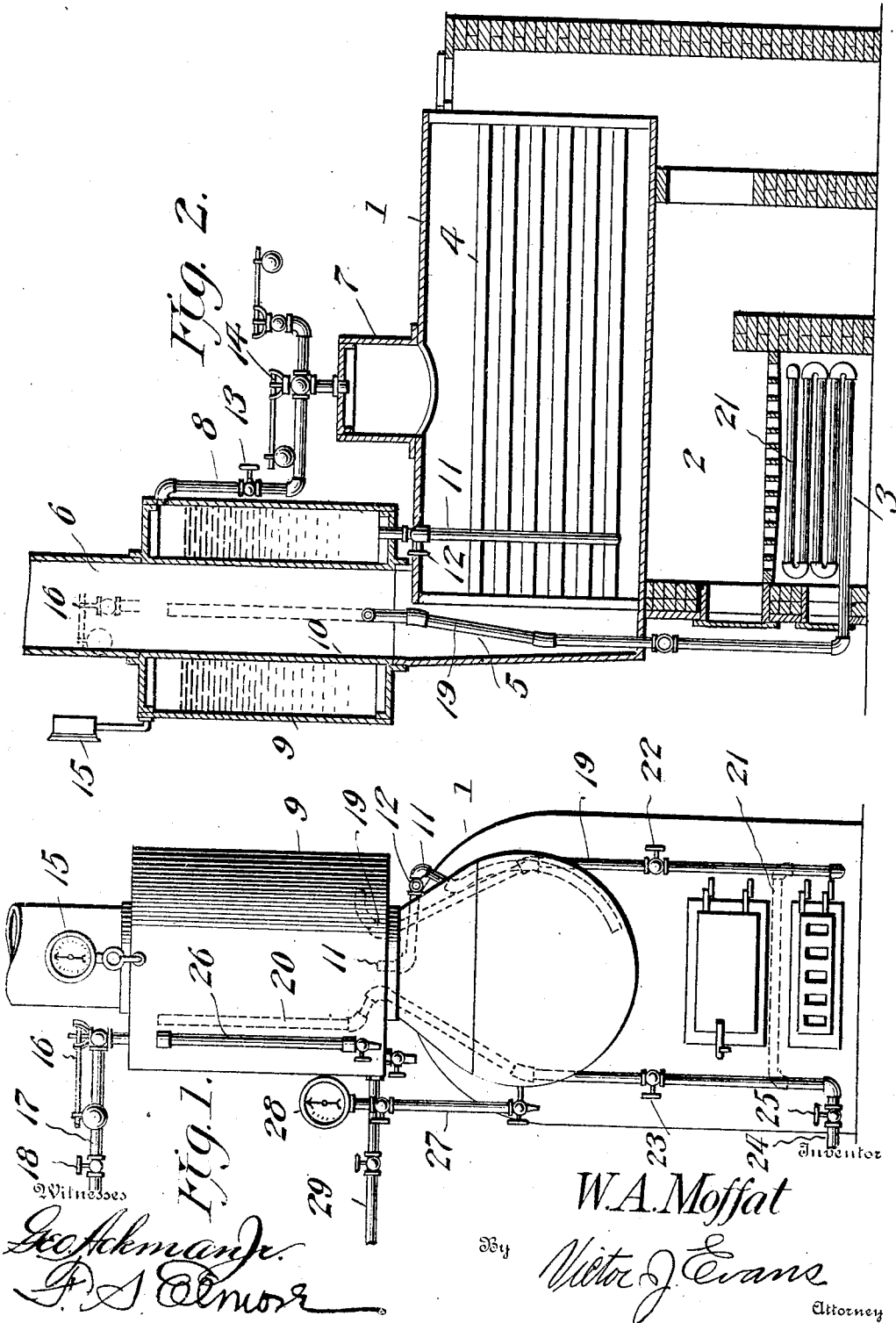


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PATENTED JUNE 12, 1906.

W. A. MOFFAT.
FEED WATER HEATER.
APPLICATION FILED JUNE 16, 1905.



UNITED STATES PATENT OFFICE.

WALTER ANDREW MOFFAT, OF DENVER, COLORADO.

FEED-WATER HEATER.

No. 822,972.

Specification of Letters Patent.

Patented June 12, 1906.

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To all whom it may concern.

Be it known that I, WALTER ANDREW MOFFAT, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented new and useful Improvements in Feed-Water Heaters for Stationary Boilers, of which the following is a specification.

This invention relates to feed-water heaters for boilers, being especially adapted for use in connection with stationary boilers, and has for its objects to produce a comparatively simple inexpensive device of this character in which the feed-water will be thoroughly heated prior to entrance into the boiler and forced into the boiler by its own pressure, also one wherein steam will be conducted from the boiler to the heater for creating a pressure in the latter to properly feed the water, one wherein the smoke and other products of combustion will be utilized in heating the water, and one in which the water will be circulated through the smoke-box, fire-box, and ash-pit, or one or more of them.

With these and other objects in view the invention comprises the novel features of construction and combination of parts more fully hereinafter described.

In the accompanying drawings, Figure 1 is a front elevation of a boiler equipped with a feed-water apparatus embodying the invention. Fig. 2 is a vertical longitudinal section centrally through the same.

Referring to the drawings, 1 designates a stationary boiler provided with a combustion-chamber 2, including an ash-pit 3, and adapted for communication through the medium of tubes or flues 4 with a smoke-chamber 5, communicating with a smoke-stack 6, the boiler being provided with a steam-dome 7. These parts, except as hereinafter explained, are all of the usual or any appropriate construction and material and perform the ordinary functions.

Communicating with and leading from the dome 7 is a steam pipe or duct 8, opening into and communicating with a water-heating receptacle or tank 9, preferably of the form herein shown, and having a central tubular portion or flue 10, centered within and constituting, in effect, a part or continuation of the stack 6, there being connected with the bottom of the tank 9 and communicating therewith a feed pipe or duct 11, extended into and discharging at its lower end at a

point adjacent the bottom of the boiler 1. The pipe 11 is equipped with a check-valve (not shown) and a cut-off valve 12, while the pipe 8 has a cut-off valve 13 and an exhaust-valve 14 of the usual construction and actuated by steam-pressure within the dome 7, there being provided on the tank 9 a pressure-gage 15 and an exhaust-valve 16, both performing their usual functions, the latter being connected with a pipe 17, leading from the heating-tank 9 to an ordinary exhaust-heater or supply-tank and equipped with a check-valve 18.

Connected at one end to the bottom of the tank 9, and having said end projected slightly into the latter, is a water circulating and heating pipe or duct 19, the other end of which enters and extends upward through the tank, as at 20, for discharging at a point above the normal water-level, the pipe 19 being provided between its ends with suitable coils 21, disposed within the ash-pit 3, fire-box, or combustion-chamber. Disposed in the pipe 19 at points between the tank 9 and coils 21 is a pair of cut-off valves 22 and 23, through the medium of which communication between the tank and coils may be cut off or established as circumstances require, said coils having suitable valve or valves for cleaning the same, while the tank 9 has connected therewith a supply-pipe 24, leading from an ordinary exhaust-heater or supply-tank adapted for replenishing the tank 9, said supply being controlled by a valve 25. The tank and boiler are equipped, respectively, with water-gages 26 and 27, which latter also communicate with a steam-gage 28 for the boiler, while communicating with the tank 9 is a pipe 29 for drawing off the contents of the tank 9.

In practice, the tank having been suitably filled with water and the valves 22 and 23 opened, the water will circulate through the pipe 19 and coils 21 through the smoke and fire box, whereby it will be heated, the temperature of the water within the tank being further maintained by the action of the heated smoke and other products of combustion passing through the tubular section 10. Steam drawn, if needed, from the dome 7 through the pipe 8 is admitted into the steam-space at the top of the tank 9, thereby equalizing the pressure in the boiler and tank and permitting water to flow from the latter into the boiler by gravity, it being apparent that

undue pressure in the tank will be relieved by the safety-valve 16. It is also obvious that the quantity of water supplied to the boiler 1 from the tank may be controlled through the medium of valve 12.

From the foregoing it is apparent that I produce a simple device admirably adapted for the attainment of the ends in view, and one wherein the feed-water will be thoroughly heated and properly supplied to the boiler, and one wherein the surplus steam within the boiler will be utilized, if required, for creating the requisite pressure within the tank 9, it being understood that in attaining these ends minor changes in the details herein set forth may be resorted to without departing from the spirit of the invention.

Having thus fully described the invention, what is claimed as new is—

1. In a device of the class described a boiler having a steam-space and a combustion-chamber, a feed-water receptacle having a steam-space operatively connected with the steam-space of the boiler, connections between the receptacle and boiler for supplying water to the latter, and a circulating pipe communicating at its ends with the receptacle and extended between its ends through the combustion-chamber.

2. In a device of the class described a boiler provided with a combustion and smoke chamber and having a steam-space, a feed-water receptacle communicating with the boiler for supplying water thereto and also having a steam-space, a duct communicating with the steam-spaces of the boiler and receptacle, and a circulating-pipe communicating at its ends with the receptacle and having intermediate coils disposed in the combustion-chamber, said pipe being extended between its ends through the smoke-chamber.

3. In a device of the class described, a boiler provided with a combustion-chamber and a smoke-chamber and having a steam-space, a feed-water receptacle having a steam-space, and provided with an inner flue communicating with said smoke-chamber, a duct connecting the steam-spaces of the boiler and receptacle, connections between the latter and the boiler for supplying water thereto, and a circulating-pipe communicating at its ends with the receptacle and extended between its ends through the combustion and smoke chambers.

4. In a device of the class described a boiler provided with a fire-box and smoke-chamber, and having a steam-space, a feed-water receptacle having a steam-space, and provided with an inner flue communicating with said smoke-chamber, a duct connecting the steam-spaces of the boiler and receptacle, connections between the latter and the boiler for supplying water to the boiler, and a pipe connected at both ends with the receptacle and extended through the smoke-chamber, and

provided between its ends with coils disposed in the fire-box, for heating the water in the receptacle, said pipe having the usual valves for operating and cleaning the same.

5. In a device of the class described a boiler provided with a fire-box, smoke-chamber and ash-pit, and having a steam-space, a feed-water receptacle having a steam-space, and provided with an inner flue communicating with said smoke-chamber, a duct connecting the steam-spaces of the boiler and receptacle, connections between the latter and the boiler for supplying water to boiler, and a circulating-pipe connecting at both ends with the receptacle and extended through the smoke-chamber, and provided between its ends with coils disposed in the fire-box and ash-pit, for heating the water in the receptacle, said pipe having the usual valves for operating and cleaning the same.

6. In a device of the character described, a boiler with a fire-box and smoke-chamber, a feed-water receptacle having a steam-space and provided with an inner flue communicating with said smoke-chamber, a duct connecting the steam-space of the boiler with the steam-space of said receptacle, a valve for controlling said duct under the control of the steam-pressure, connections between said receptacle and boiler for supplying water to the boiler, and a circulating-pipe for said receptacle having a heating coil or coils disposed in said fire-box.

7. In a device of the character described, a boiler with a fire-box and smoke-chamber, a feed-water receptacle having a steam-space and provided with an inner flue communicating with said smoke-chamber, a duct connecting the steam-space of the boiler with the steam-space of said receptacle, a valve for controlling said duct under the control of the steam-pressure, a valve for the feed-water receptacle adapted to be controlled by the pressure of steam therein, connections between said receptacle and the boiler for supplying water to the boiler, and a circulating-pipe for said receptacle having heating coil or coils disposed in said fire-box.

8. In a device of the character described, a boiler with a fire-box and smoke-chamber, a feed-water receptacle having a steam-space and provided with an inner flue communicating with said smoke-chamber, a duct connecting the steam-space of the boiler with the steam-space of said receptacle, a valve for controlling said duct under the control of the steam-pressure, connections between said receptacle and boiler for supplying water to the boiler, and a circulating pipe having heating-coils disposed in said fire-box below the grate thereof.

9. In a device of the character described, a boiler with a fire-box and smoke-chamber, a feed-water receptacle having a steam-space and provided with an inner flue communicat-

ing with said smoke-chamber, a duct connecting the steam-space of the boiler with the steam of said receptacle, a valve for controlling said duct under the control of the
5 steam-pressure, connections between said receptacle and boiler for supplying water to the boiler, and a circulating-pipe for said receptacle, the same extending from the smoke-

chamber and having heating-coils disposed within said fire-box.

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

WALTER ANDREW MOFFAT.

Witnesses:

DAVID B. GRAHAM,

JOHN W. GRAHAM, Jr.