

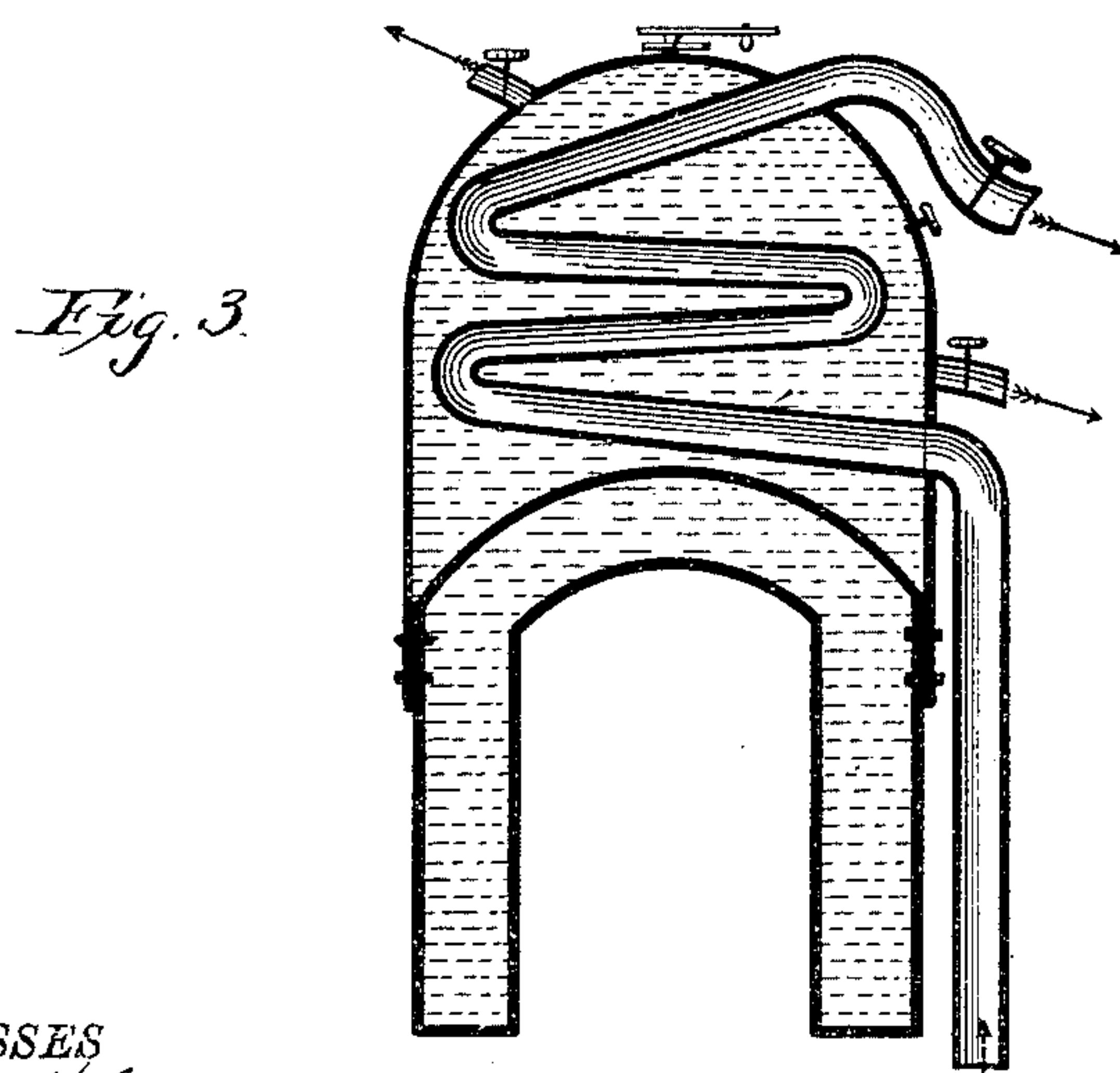
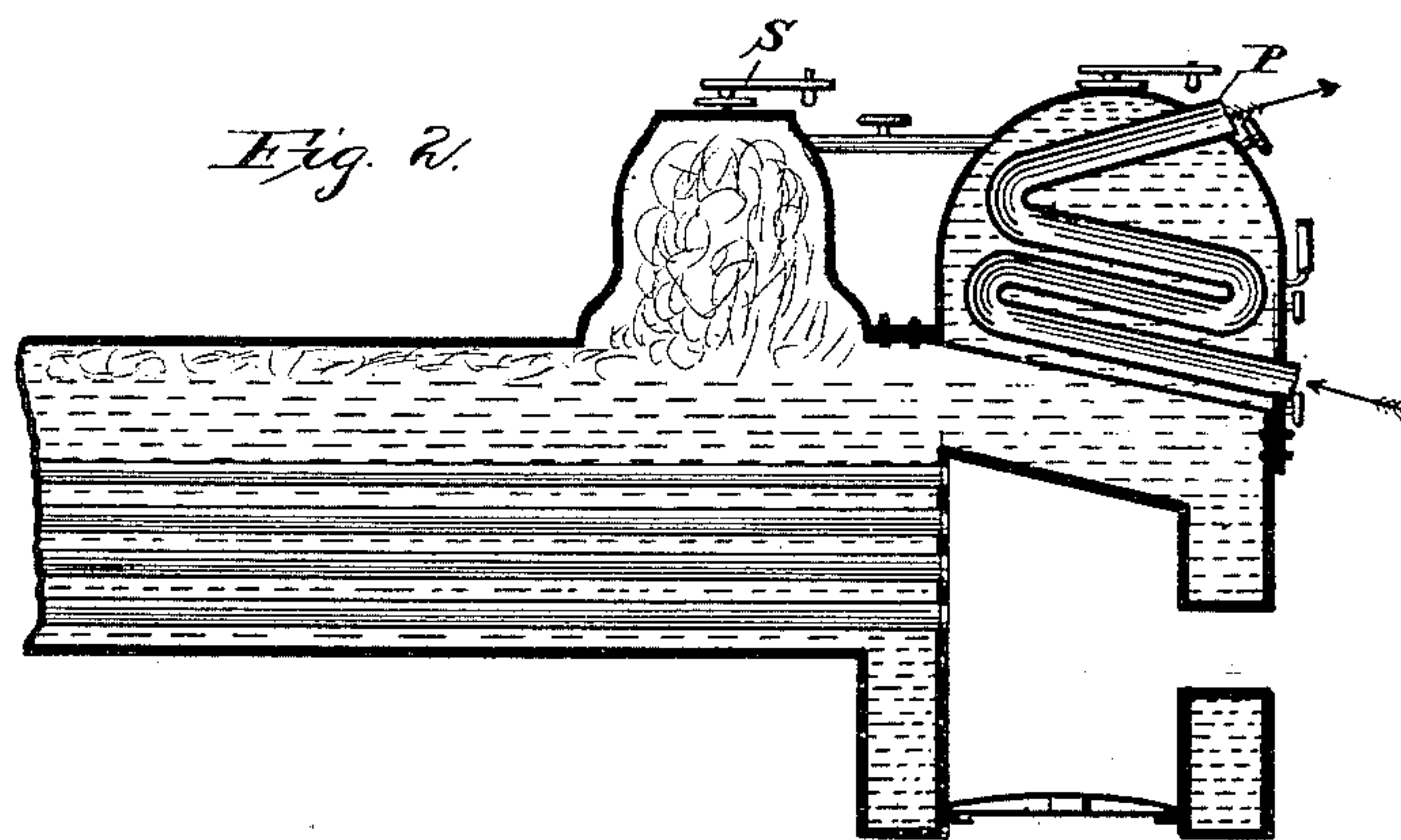
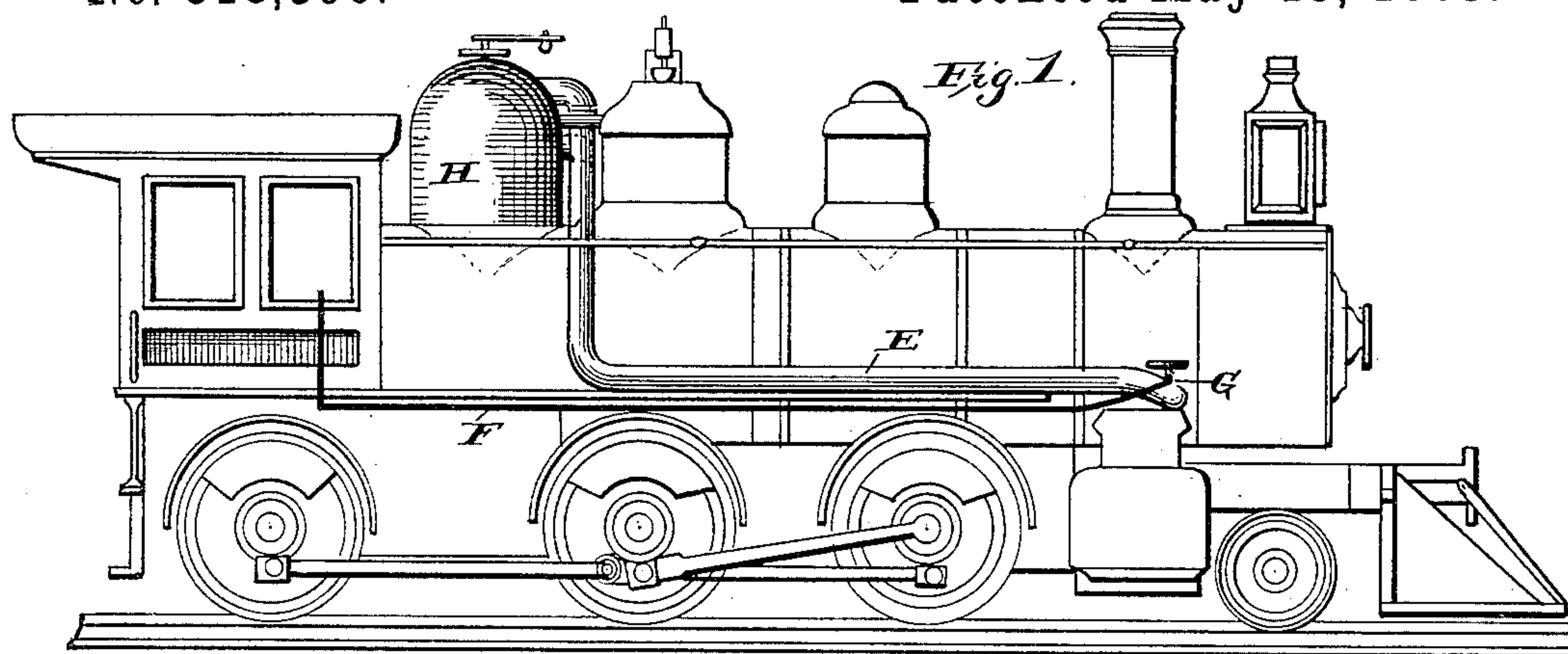
(No Model.)

2 Sheets—Sheet 1.

O. ROTHROCK.  
FEED WATER HEATER.

No. 318,396.

Patented May 19, 1885.



WITNESSES

*J. Frank White.*  
*John Enders Jr.*

INVENTOR

*Oscar Rothrock.*  
*O. E. Duffy*  
Attorney

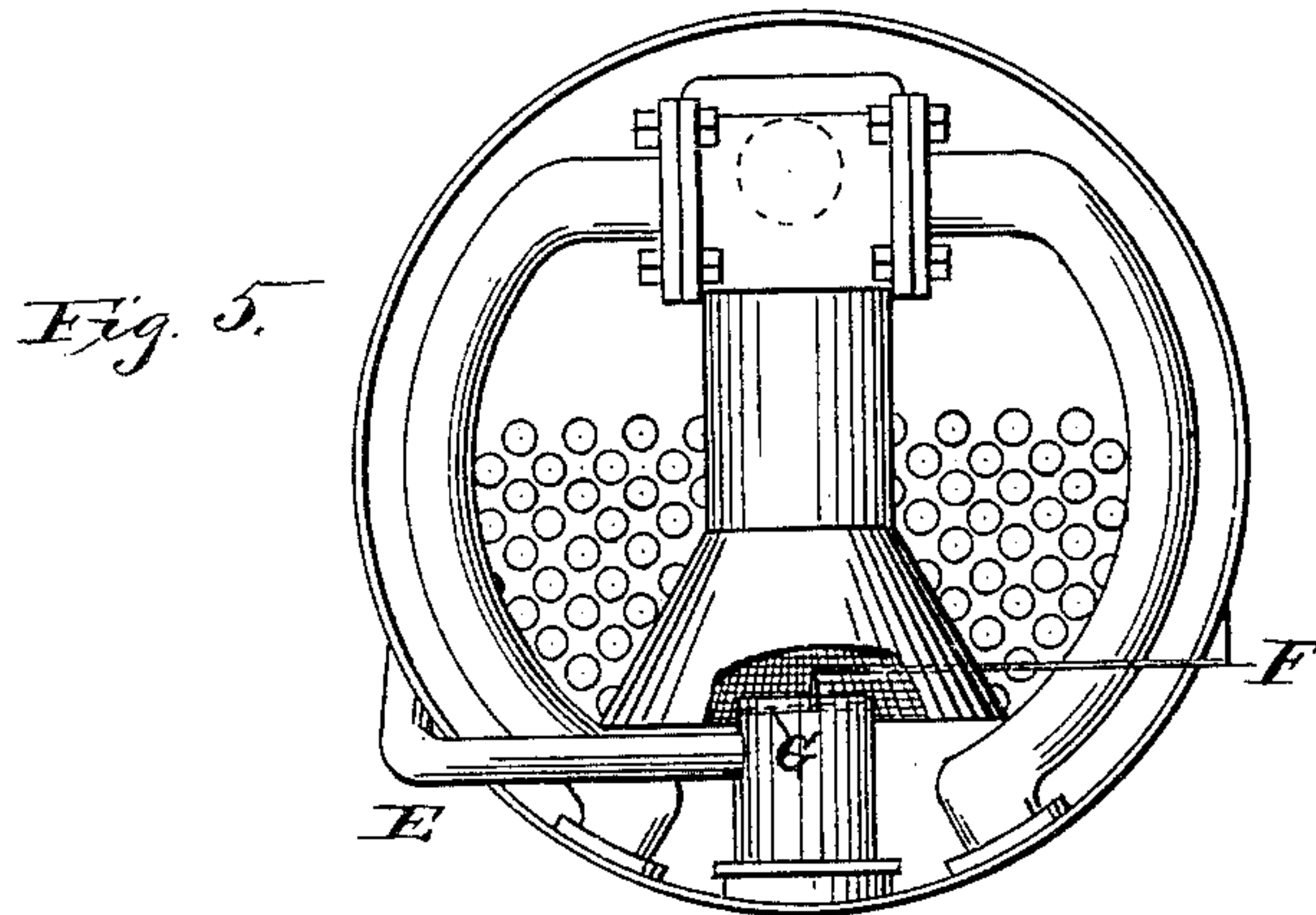
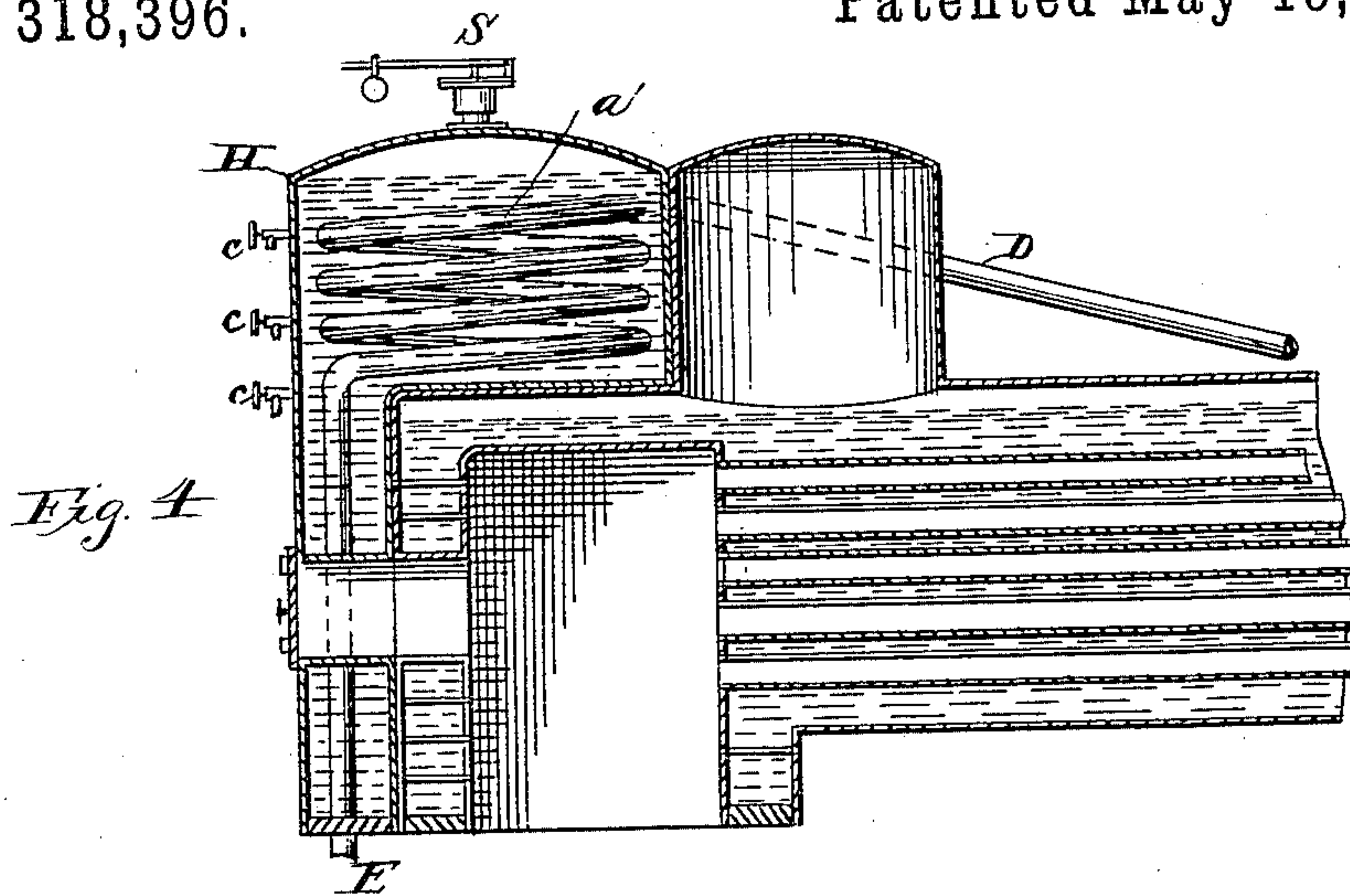
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# UNITED STATES PATENT OFFICE.

OSCAR ROTHROCK, OF NEW YORK, N. Y.

## FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 318,396, dated May 19, 1885.

Application filed April 13, 1885. (No model.)

*To all whom it may concern:*

Be it known that I, OSCAR ROTHROCK, of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Feed-Water Heaters for Locomotive, Stationary, and Marine Boilers: and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

This invention relates to feed-water heaters for locomotive, stationary, and marine boilers, its object being to supply steam-boilers with feed-water of a high temperature, thereby greatly reducing the expense for fuel. It is especially applicable to locomotives and portable boilers generally, and can be used to advantage on many forms of marine and stationary boilers.

It consists of a tank, reservoir, or dome and jacket secured to the outside of the boiler, forming either a separate and independent structure with walls of solid sheet metal on all sides, or a jacket-dome surrounding the fire-box or a part of the boiler, and having a connection at the fire, directly or indirectly, with a pipe carrying the exhaust-steam from the exhaust-ports into the reservoir and from the reservoir back to the smoke-box or to a suitable receptacle, from which it is allowed to escape into the air. The tank is provided with a safety-valve, gage, cocks, steam and water gages, and suitable connecting-pipes for the passage of the hot water from it to the boiler or boilers, and for supplying the heater. The tank or reservoir is riveted to the outside shell of the boiler or constructed separately and secured by the tap-bolts or lugs and bolts or expansion-joint connections when necessary in special cases; and where water of a very high temperature is desired, and thereby the greatest economy of fuel, I make the heater a part of the walls of the fire-chamber, in certain cases placing the heater in front of the boiler, or both on top and in front of the boiler, and building the fire under both heater and boiler. When it is desired to control the heating directly at the fire, I place this

reservoir in front of the ordinary fire-door opening in a boiler, and supply both the boiler or furnace and the heater with doors. The inner door or doors may then be lowered into a receptacle or swung out of the way and the outer door opened.

On small portable and agricultural engines, &c., I make the heater the front or face of the fire-box, placing the fire-door and its connections out on the heater. For all of these different boilers I connect an amply-large pipe to one or both, usually both exhaust pots or ports, and for a locomotive carry this pipe back under the lagging and covering of the boiler, or cover the pipe with felt or other suitable material and secure it to the face of the boiler, securing it in position by clamps, usually along the foot-board to the cab, and run it up to the top of the heater, where it should enter in ordinary cases, give it any number of coils within the heater, and run it out at or near the bottom.

That portion of the pipe within the heater is usually made of very large proportions, can be half the thickness of the outer extensions, and is usually made with the heater-tank securing it at entrance and exit by the ordinary steam and water tight joints. The pipe may, however, pass in and out of the heater in suitable steam-tight packing-boxes. The pipe at exit may be secured to the outer shell by tap-bolts, and may be in communication with a receptacle for transferring the water and steam to the cold-water tank into the air or back to the smoke-box. I supply this pipe with a stop-cock or valve of ample proportions in an enlarged section of the pipe near its entrance to the heater. I also supply it with a large pipe or valve at or near its connection with the exhaust-pots, or in the stack, which may be opened and closed by the engineer from his seat by a rod, lever, or thumb-screw. This rod is connected to the cock or valve in the smoke-box, carried forward or upward to the engine-room, securing it in position along the foot-board in ordinary cases, or otherwise as the special circumstances require. This arrangement enables the engine-man to blow up the fire with the exhaust, if necessary, throw it into the heater at will, let it escape into the air, or go back to the smoke-box. The heater has a connecting-pipe at the top of the steam-



dome or steam-space of the boiler, which is supplied with a valve or stop-cock to be closed when pumping water from heater into the boiler of lower temperature than the water in the boiler, with one or two connecting-pipes for the passage of the water from the heater to the boiler—usually two pipes, the one being supplied with a stop-cock or valve, and the usual hot-water pump placed in the other, supply being arranged above the pump, so that the hot water may run into it. This pipe may also be supplied with stop-cocks, and so arranged that the water may either flow or be pumped through it, or the pump used to supply the heater. It has a pipe connecting it to the cold-water tank or supply, and an ordinary injector or pump in this pipe to supply the heater with cold water.

In the drawings, Figure 1 is a side elevation of a locomotive, showing the heater with the exhaust-pipe leading thereto and the rod for operating the valve in the exhaust-nozzle. Fig. 2 is a cross-section of the heater and boiler, showing the heater when made separate from the boiler. Fig. 3 is a sectional view showing the heater applied to the ordinary jack or forward extension fire-box locomotive. Fig. 4 is a sectional view showing the heater and in which it forms a jacket down the face of the fire-box. Fig. 5 is an end view of the smoke-box, showing the valve and its rod for controlling the exhaust.

H is the heater on an ordinary locomotive, E being the pipe to exhaust; D, the pipe or extension of same carrying the exhaust from the heater back to the stack into a receptacle or into the air; F, the rod running from the cab to the cock in the smoke-box; G, the cock or valve in the pipe or in the exhaust-pots, to be opened and closed by the engine-man as circumstances require; C, cocks or valves in the pipe and in the exhaust pots or pipe. The heater may be a separate dome secured to the fire-box by ears and tap-bolts, in this case having a bottom sheet.

a is the pipe to exhaust; K, pipe to boiler, which may be duplicated, and S the safety-valve; C, cocks in all pipes; L, pipe from heater to the steam-dome; a', pipe within the heater, &c., as shown by Fig. 3. The heater is applied to the ordinary jacket or extension forward fire-box locomotive and to the other forms, the heater forming a dome and jacket on top and being either riveted to the shell of the boiler or constructed separately therefrom

and secured thereto. G is the steam-gage of the heater; C, water-cocks; S, safety-valve; I, connection between the two domes, &c., as shown by Fig. 4, a section for the heater forming a jacket or tank down the face of the fire-box over the door. In this case it is understood that we supply all usual stays and braces, that portion of the heater below the fire-door being a part of the fire-box, if desired, the extension down the front forming, usually, a jacket of twelve to twenty-four inches in thickness, the water-cocks, gages, &c., being either in the front or side of the heater-dome, and when applied to locomotives the throttle-valve, rod, &c., being placed to one side of the heater, or run through it in ordinary packing-boxes, which are duplicated. The heater in this instance may also form an independent structure secured with walls on all sides, so that it can be quickly removed.

Fig. 5 shows the pipe in the smoke-box, G being the cock or valve to which I attach the rod or lever running into cab, or which can be otherwise turned by an attendant to permit the engine to exhaust into stack.

The water can be arranged to be fed at intervals from the heater to the boiler, or can go constantly, can be pumped, injected, or be permitted to enter the boiler or boilers by gravity.

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

1. In a feed-water heater, the combination of a boiler with a tank located on the boiler over the fire-box and an exhaust-steam pipe passing through the tank, substantially as described and shown.

2. In a feed-water heater, the combination of a boiler with a tank located on the boiler, an exhaust-steam pipe passing through the tank, and a valve for directing the exhaust through the pipe or up the stack.

3. In a feed-water heater, the combination of the tank provided with the gage-cocks and safety-valve with the exhaust-pipe passing through it, said tank being located upon the boiler, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

OSCAR ROTHROCK.

Witnesses:

SAMUEL D. LEVY,  
JOHN A. BELL.