

(Model.)

F. S. ZWICKL.  
FEED WATER HEATER.

No. 324,910.

Patented Aug. 25, 1885.

Fig. 2.

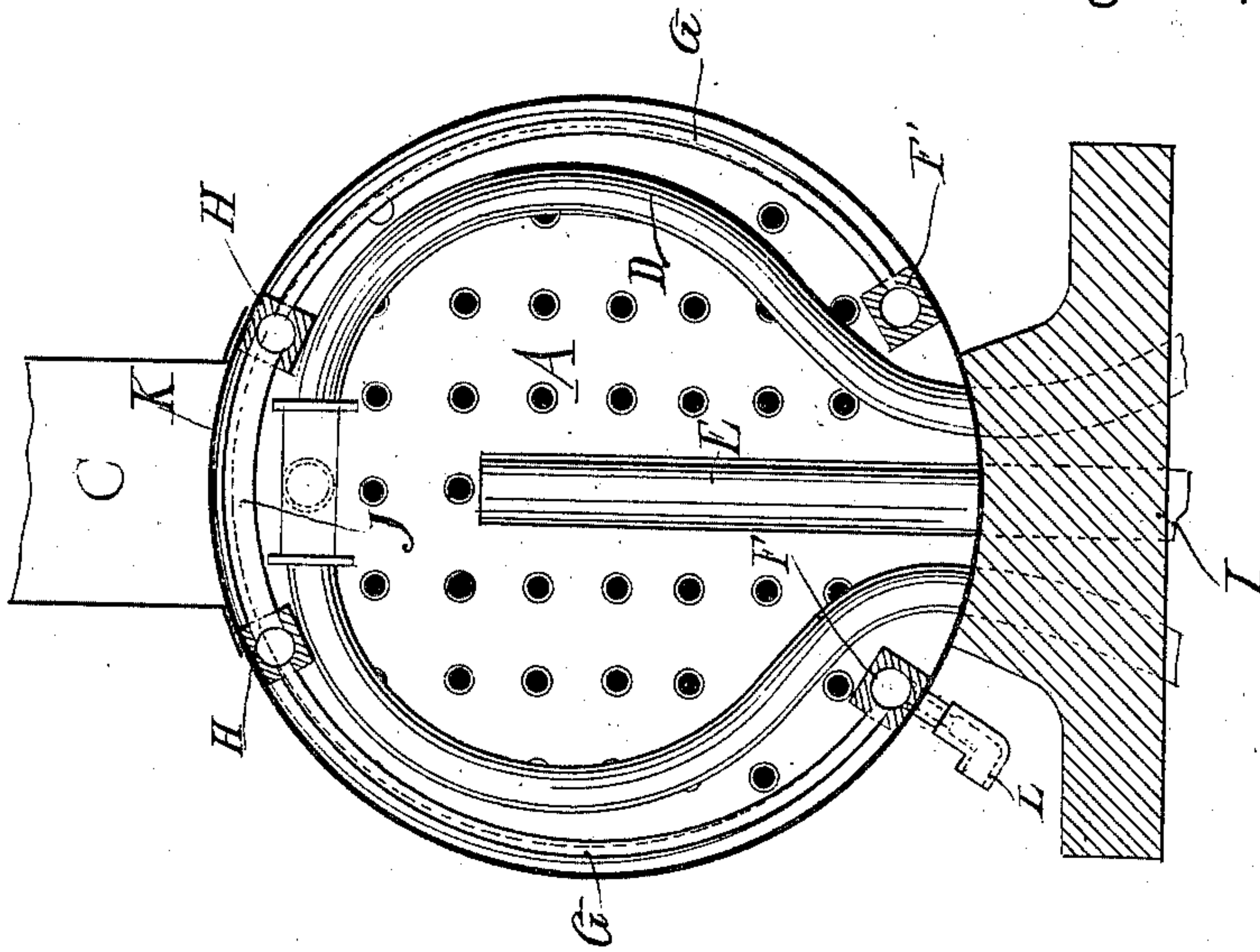


Fig. 1.

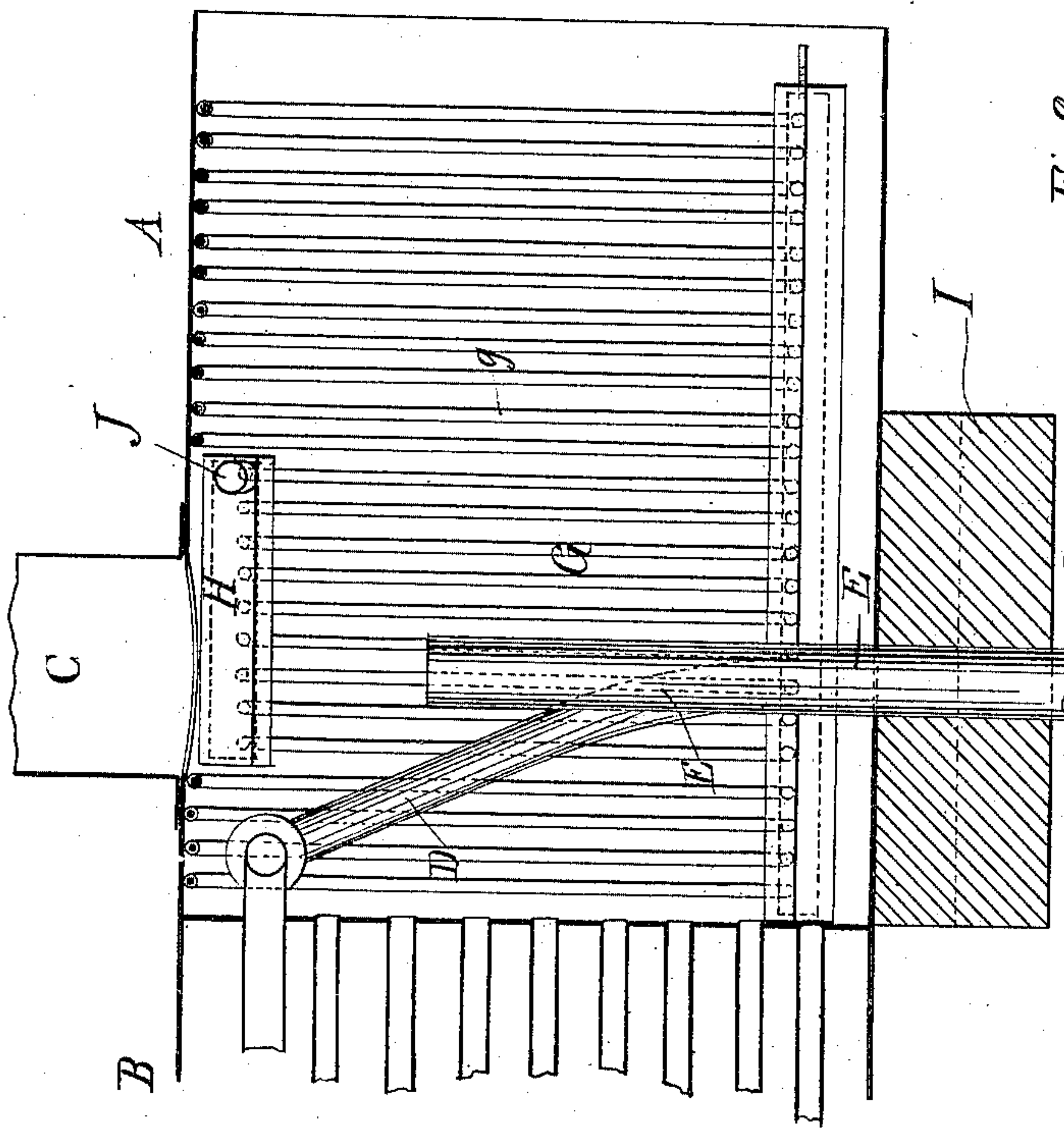
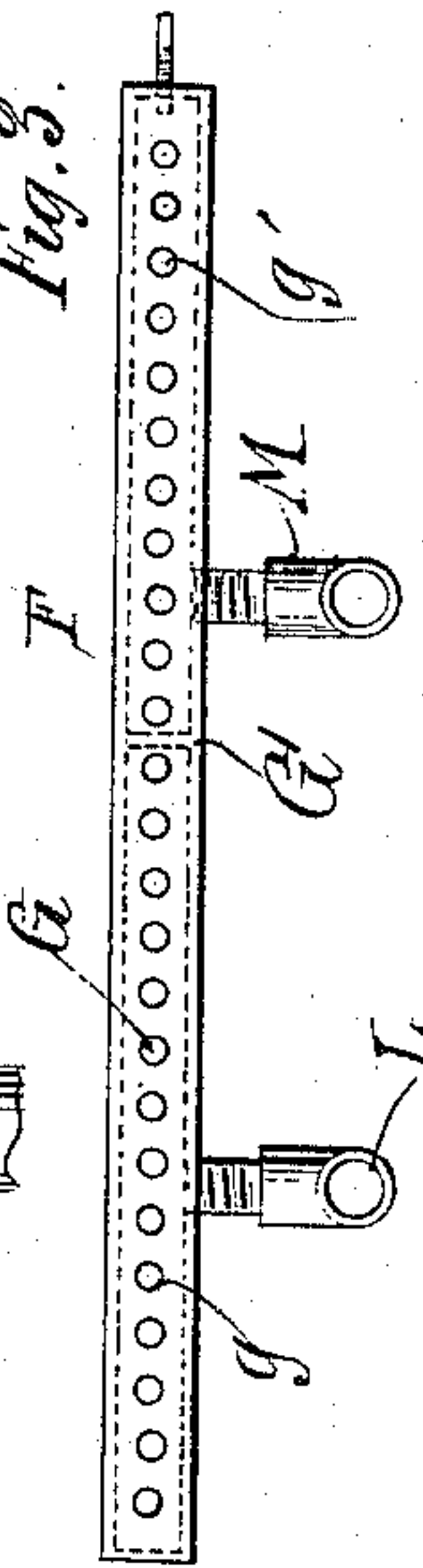


Fig. 3.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

FRANCIS S. ZWICKL, OF GREENVILLE, NEW JERSEY.

## FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 324,910, dated August 25, 1885.

Application filed July 11, 1884. (Model.)

*To all whom it may concern:*

Be it known that I, FRANCIS S. ZWICKL, of Greenville, in the county of Hudson and State of New Jersey, have invented a new and Improved Feed-Water Heater for Locomotives, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved feed-water heater for locomotives, by means of which the feed-water can be heated by the gases and products of combustion that pass from the boiler-flues through the smoke-box into the smoke-stack.

The invention consists in the construction and arrangement of parts, as will be hereinafter fully described and claimed.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal sectional elevation of my improved feed-water heater. Fig. 2 is a cross sectional elevation of the same. Fig. 3 is a plan view of one of the boxes forming the foundation of the heater.

The smoke box A, formed in the front part of the locomotive-boiler B, is provided with the usual smoke-stack, C. The pipes D, for conducting the live steam to the cylinders, pass through the box A, and the pipe E, for the exhaust-steam, projects upward from the bottom of the box A. In the lower part of the smoke-box A two longitudinal boxes, F and F', are arranged parallel with each other, one at each side, and above the side edges of the saddle I, supporting the boiler. The box F is divided into two compartments, *g g'*, by a transverse partition, G'. Circularly-bent pipes G have their ends secured in the boxes F F', and are held short distances from the walls of the smoke-box A. The pipes G, extending from the compartment *g'* to the box F', are formed of single pieces, and are not interrupted; but some of the pipes G, connecting the compartment *g* with the box F', are connected with two hollow bridge-pieces, H, connected with each other by a pipe, J, and forming an opening or well, K, through which the smoke and products of combustion can pass from the smoke-box into the smoke-stack. An elbow, L, screwed through the wall of the smoke-box and into the compartment *g*, is connected with the pipe for conducting the heated feed-water into the boiler, and an elbow, M, screwed through the wall of the smoke-box into the

compartment *g'*, is connected with the pipe for conducting the feed-water from the tank to the pipes G.

The feed-water passes from the tank, through suitable pipes and the elbow M into the compartment *g'* of the box F, through the pipes G into the box F', and then through the other pipes G, the hollow bridge-pieces H, and the tube J into the compartment *g* of the box F, and through the elbow L and suitable pipes into the boiler.

As all the hot gases and products of combustion must pass through the box A, they heat the water-pipes in the same, and thus heat the water circulating in the said pipes.

The water-heating pipes G being connected with the boxes F F', the heater can easily be removed from the smoke-box after unscrewing the elbows L M, thus facilitating the cleaning of the smoke-box, as well as of the water-heating device.

My improved water-heating device can also be applied on old locomotives.

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

1. The combination, with a locomotive-boiler, of a feed-water heater formed of circularly-curved pipes having their ends held in boxes in the smoke-box, the said pipes being arranged along the sides of the smoke-box, substantially as herein shown and described.

2. The combination, with a locomotive-boiler, of the boxes F F', the circularly-curved pipes G, uniting them, and the bridge-pieces H and the tube J, forming an opening in the heater to permit the smoke, &c., to pass into the smoke-stack, substantially as herein shown and described.

3. The combination, with a locomotive-boiler, of the boxes F F', of which the former is divided into two compartments, *g g'*, by a transverse partition, G', of the curved pipes G, uniting the boxes F F', and of the elbows L and M, substantially as herein shown and described.

4. The combination, with a locomotive-boiler, of a feed-water heater formed of circularly-curved pipes arranged transversely in the smoke-box along the inner surface of the same, substantially as herein shown and described.

FRANCIS S. ZWICKL.

Witnesses:

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