J. ARGALL.
Feed-Water Heater.

No. 220,563. Patented Oct. 14, 1879.

Fig. 1.

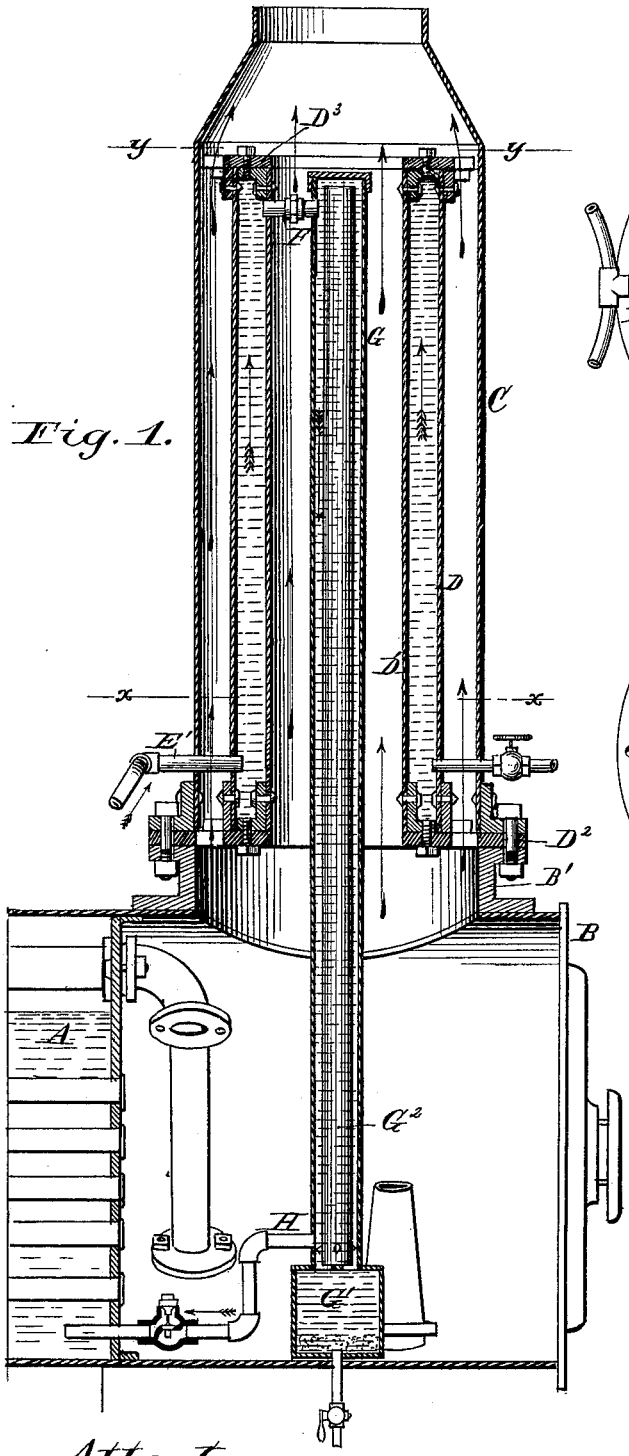


Fig. 2.

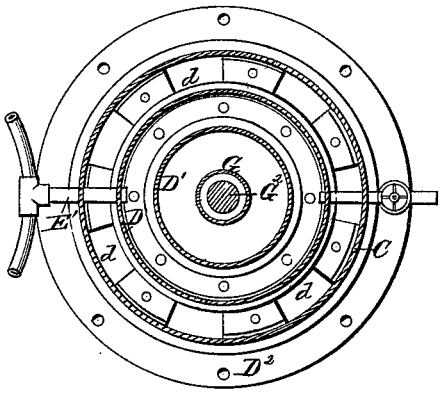


Fig. 3.

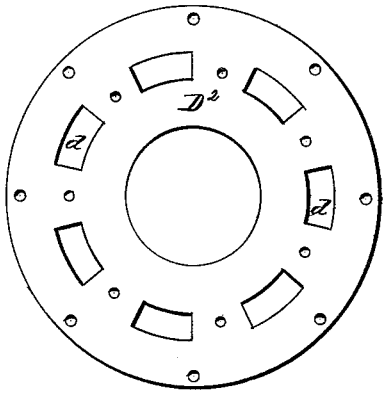
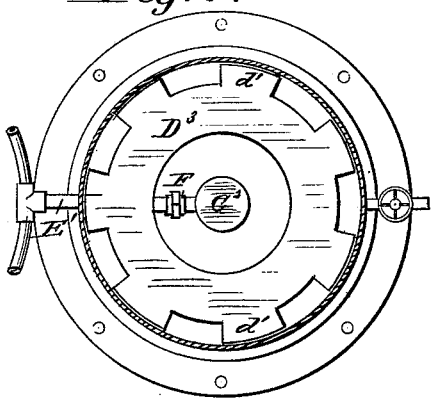


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES ARGALL, OF MINERAL POINT, WISCONSIN.

IMPROVEMENT IN FEED-WATER HEATERS.

Specification forming part of Letters Patent No. **220,563**, dated October 14, 1879; application filed August 9, 1879.

To all whom it may concern:

Be it known that I, JAMES ARGALL, of Mineral Point, in the county of Iowa and State of Wisconsin, have invented certain new and useful Improvements in Feed-Water Heaters; and do hereby declare the following to be a full, clear, and exact description of the invention, such as 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 letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of feed-water heaters for locomotive-boilers, and other portable or stationary boilers of similar character, which are arranged within the smoke-stack of such boilers for the purpose of utilizing heat from the hot gases escaping through the stack as well as heat from the exhaust-steam.

My improvement consists in delivering the water from the heater, or main body of the same, through a centrally-arranged pipe, in a thin stream, in order to highly heat it before it reaches the boiler.

It further consists in the use of a leaky check-valve between the boiler and the delivery-pipe of the heater, in order that said delivery-pipe may be kept supplied with water from the boiler at times when the pumps are not at work, and thereby the burning of said pipe prevented.

In the annexed drawings, Figure 1 is a longitudinal vertical section of the rear end of a locomotive-boiler embodying my invention. Fig. 2 is a horizontal section through the smoke-stack, in a plane indicated by the broken line *x x* of Fig. 1. Fig. 3 is a plan view of the lower head of the heater. Fig. 4 is a horizontal section through the smoke-stack, in a plane indicated by the broken line *y y* of Fig. 1.

The same letters of reference are used in all the figures in the designation of identical parts.

The smoke-stack C is mounted upon a tubular cast base, B′, on the smoke-box B of the boiler A, in order to afford a more convenient means for securing the feed-water heater, the lower head or bottom plate, D^2, of which rests upon the base B′, and is clamped between the top flange of said base and the bottom flange of the stack.

The main body of the heater consists of two cylinders, D and D^1, one arranged within the other, with an annular water-chamber between them. These cylinders are fastened together at the lower end by plate D^2, and the top by plate D^3. These heads or plates D^2 and D^3 are solid where they cover the annular water-space between the cylinders D and D^1, but each has a central aperture equal in diameter to the inner diameter of cylinder D^1, so as to afford a free escape or passage for the hot gases and exhaust-steam through the inner cylinder of the heater. The outer cylinder of the heater is of considerably less size in diameter than the smoke-stack, so that there is an annular space between the stack and the heater. In order that a portion of the hot gases and exhaust-steam may pass through this annular space between the stack and the heater, that portion of plate D^2 which spans this space has numerous large openings, *d*, in it, as clearly shown in Fig. 3. It may be desirable to steady the upper end of the heater, which can be easily effected by casting a few projections, *d′*, on the top plate, D^3, thereof, to touch the stack, as best seen in Fig. 4.

The heater is supplied with water by the pumps, through a common pipe, E′, which enters the water-space between the cylinders D and D^1 of the heater near the bottom. The branches uniting in the common pipe E′ should be provided with suitable check-valves.

From near the top of the annular water-space, between the cylinders D and D^1 of the heater, the water passes through a short pipe, F, into the pipe G, which is arranged centrally within the heater, so that it will be surrounded by the hot gases and exhaust-steam passing up the inner cylinder or flue-space of the heater. This pipe conveys the water to the boiler through a branch-pipe, H, issuing from near the lower end, which reaches to the bottom of the smoke-box and terminates in a mud-drum, G^1. In this instance pipe G is of cylindrical form and of considerable size. In order to allow the water from the heater to pass in a thin sheet only through this delivery-pipe G, a core, G^2, is inserted in it, as shown.

The branch pipe H, leading from the delivery-pipe of the heater to the boiler, is provided with a leaky check-valve, made leaky by bor-

ing a small hole through it, or in some other appropriate way. The leak is to be of such a character as not to interfere seriously with the operation of the valve as a check-valve when the pumps are at work. When the pumps stop, the leak will permit enough water to pass from the boiler to pipe G to prevent any overheating and burning of the same.

Suitable blow-off cocks lead from the annular water-space between the cylinders D and D^1 of the heater, and from the mud-drum G^1 of the delivery-pipe G, to afford the means for blowing off sediments that may collect there.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, substantially as before set forth, of the annular feed-water heater and the central pipe for conveying the water from the heater to the boiler.

2. The combination, substantially as before set forth, of the annular feed-water heater, the surrounding smoke-stack, and the central pipe for conveying the water from the heater to the boiler.

3. The combination, substantially as before set forth, of the annular feed-water heater, the central pipe for conveying the water from the heater to the boiler, and the leaky check-valve.

In testimony that I claim the foregoing I have hereunto set my hand this 28th day of July, 1879.

JAMES ARGALL.

Witnesses:
ARCHIBALD MCARTHUR,
JOHN ALLEN.