

(No Model.)

E. REYNOLDS.
Feed-Water Heater.

No. 227,925.

Patented May 25, 1880.

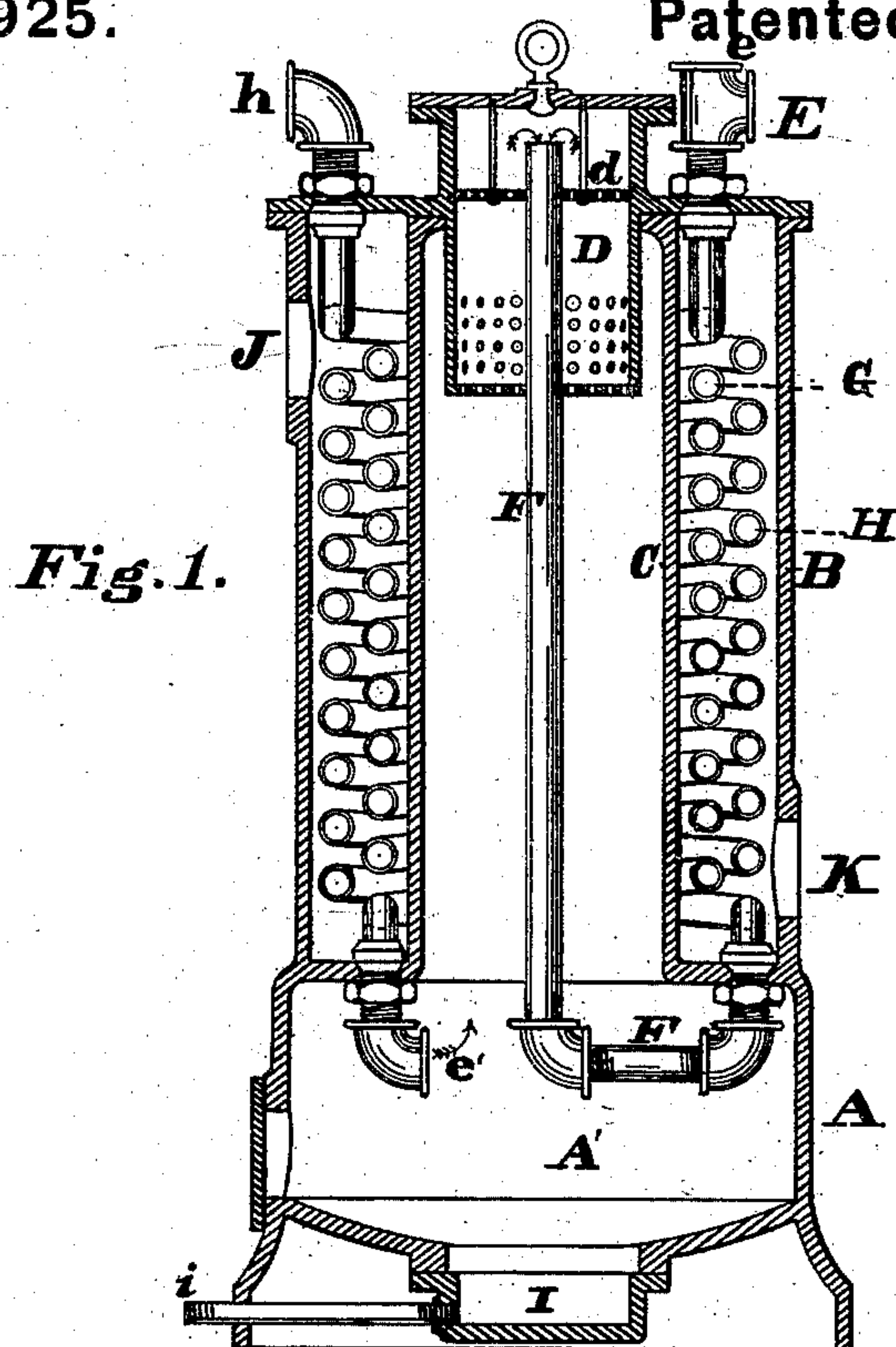
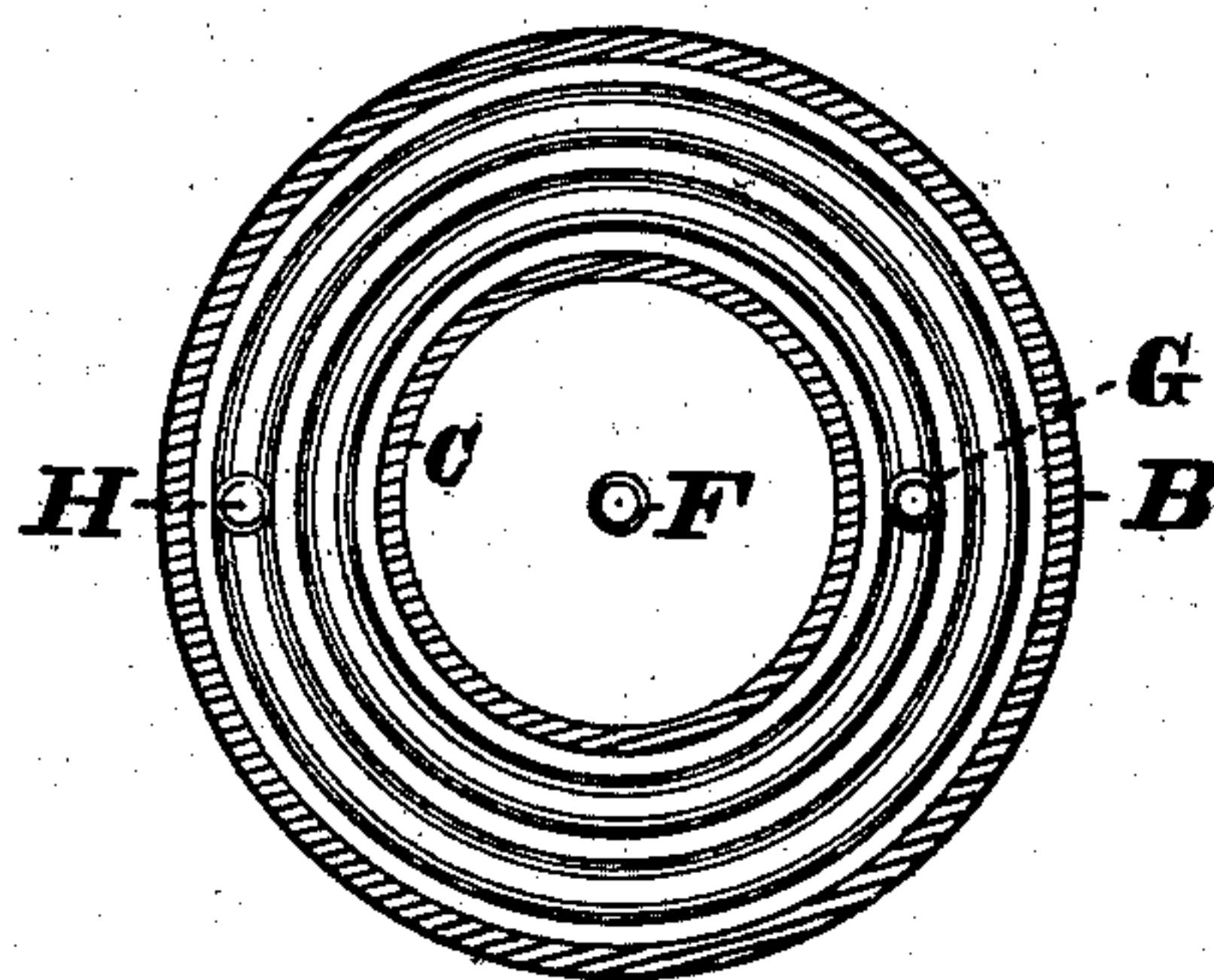


Fig. 2.



Attest

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EDWIN REYNOLDS, OF MILWAUKEE, WISCONSIN.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 227,925, dated May 25, 1880.

Application filed April 13, 1880. (No model.)

To all whom it may concern:

Be it known that I, EDWIN REYNOLDS, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Feed-Water Heaters, of which the following is a specification.

My invention is in the nature of an improvement upon a certain feed-water heater for which I have filed an application for Letters Patent; and it has for its object the more thorough heating of the feed-water after it has been purified, in the manner clearly set forth in my former application.

In my former specification I described a feed-water heater containing a single heating-coil, through which the feed-water was passed either from above downward or from below upward, accordingly as the water contained more or less impurities in solution. Thus when the water contained considerable impurities in solution I passed the water from above downward, and when the water contained only a slight amount of impurities in solution I then passed it through the coil from below upward.

Having discovered that the best purifying effect was had by passing the feed-water from above downward through the coil, and that the best heating effect was had by passing the feed-water from below upward through the coil, I have made such changes in the construction and arrangement of the heater as will enable me to obtain the best purifying effect and the best heating effect at one and the same time.

My invention consists in providing two concentric heating-coils, placed in the annular space through which the exhaust-steam circulates in the heater, through one of which coils the feed-water is passed from above downward for the best purifying effect, and through the other of which coils the water, after purification has taken place, is passed from below upward to obtain the best heating effect, as will be fully described hereinafter.

In the accompanying drawings, Figure 1 is a sectional elevation of my improved feed-water heater; and Fig. 2 is a sectional plan, showing the position of the two heating-coils.

Similar letters of reference indicate similar parts.

A is the base-casting of the heater, containing the settling-chamber A'. B is the outer shell, and C the inner shell, between which is an annular space containing the coils G and H. D is the filter-chamber. E is the cold feed-water connection, through which the water is passed to the coil G. F is a down-pipe, the upper end of which debouches in the filter-chamber D, and the lower end of which is connected to the coil H. I is the mud-well at the base of the heater, and *i* is a blow-out pipe. *e* is a steam-connection for blowing out the coil G, and *h* is the feed-water connection to the boiler.

The exhaust-steam enters the heater at the opening J, and leaves the heater at the opening K, after circulating through the annular space between the shells B and C.

The operation of the heater is as follows: The cold feed-water enters the upper end of the coil G through the connection E, and, passing downward, leaves the coil through the elbow *e'*. The water, in passing downward through the coil G, is thoroughly heated by the exhaust-steam circulating through the annular space between the shells B and C. When the water leaves the outlet *e'* of the coil G it passes into the settling-chamber A', where a rapid deposition of the matter held in solution by the water, and separable only by the application of heat, takes place. The water thus relieved of the impurities in solution rises into the central chamber surrounded by the shell C, and finally passes through the perforations in the bottom and sides of the filter-chamber D. The filter-chamber, being provided with the usual filtering materials, such as hay, straw, or shavings, intercepts all impurities held in suspension by the water; and the water, thus relieved of its salts and organic matter, passes upward in the filter-chamber through the perforated diaphragm or plate *d*. From the space in the upper part of the filter-chamber the water passes down the pipe F and into the lower end of the coil H, at the bottom of the annular space between the shells B and C. The water then passes upward through the coil H, and leaves the heater in a highly-heated and purified condition through the connection *h*. Owing to the large heating-surface and relatively small quantity of water in the coil G, the feed-

water, in passing downward through this coil, is heated nearly to the temperature of the steam surrounding it, and the precipitation of the matter held in solution by the water quickly occurs after circulation has ceased. Directly the water leaves the heated coil and enters the cooler settling-chamber the circulation ceases. The water, in passing successively through the settling-chamber, the central chamber, and the filter-chamber, parts with considerable of its heat, which heat is restored, by means of the coil H, before the feed-water leaves the heater, to the boiler.

The coil G is used to heat the water as it enters the heater and produce a rapid and complete precipitation of the matter held in solution, and the coil H is used to bring the purified water to the highest possible temperature before it leaves the heater.

I am aware that a double-coil feed-water pipe has been arranged in the smoke-chamber of a locomotive, but these coils were both arranged to carry the water upward; and I do not claim such invention. It does not involve the novel principle of carrying the water upward for heating and downward for purification, as in my apparatus.

Having described my invention, what I claim is—

1. In a feed-water heater for utilizing the heat in the exhaust-steam from an engine, the combination, with an annular steam-chamber arranged for connection with the exhaust-pipe of a steam-engine and provided with a steam-education port, of the heating-coils G and H, for the purpose and substantially as described.

2. In a feed-water heater for utilizing the heat in the exhaust-steam from an engine, the combination, with the annular steam-chamber and settling-chamber, constructed essentially as set forth, of a coil, G, through which the water is first passed downward, and a coil, H, through which the purified feed-water is finally passed upward, for the purpose and substantially as described.

3. In feed-water heaters for utilizing the heat in the exhaust-steam from an engine, the combination of the coils G and H with the settling-chamber A' and the filter-chamber D, for the purpose and substantially as described.

In testimony whereof I have signed my name to the foregoing specification in the presence of two subscribing witnesses.

EDWIN REYNOLDS.

Witnesses:

WILLIAM S. CHASE,
WM. W. ALLIS.