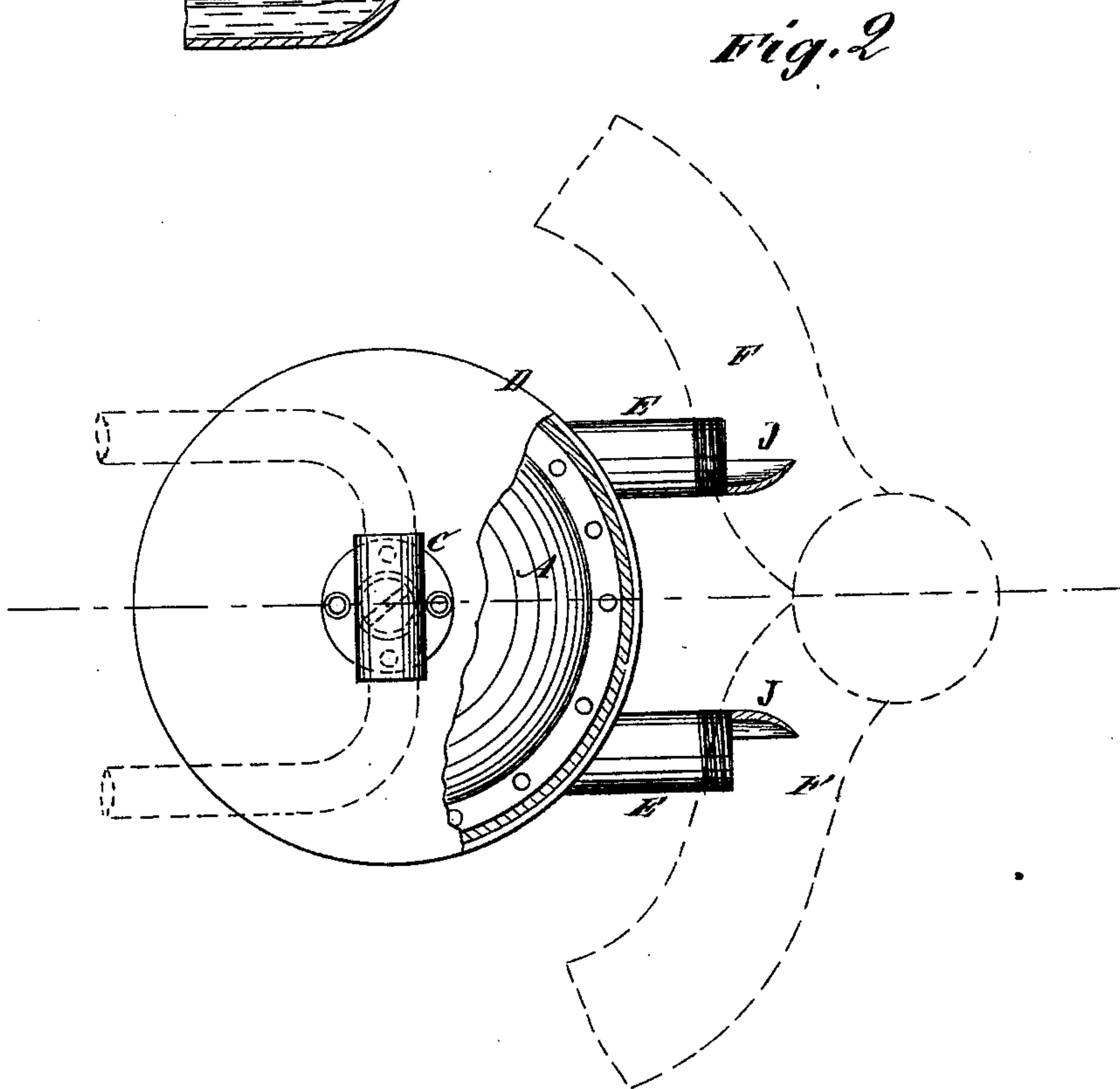
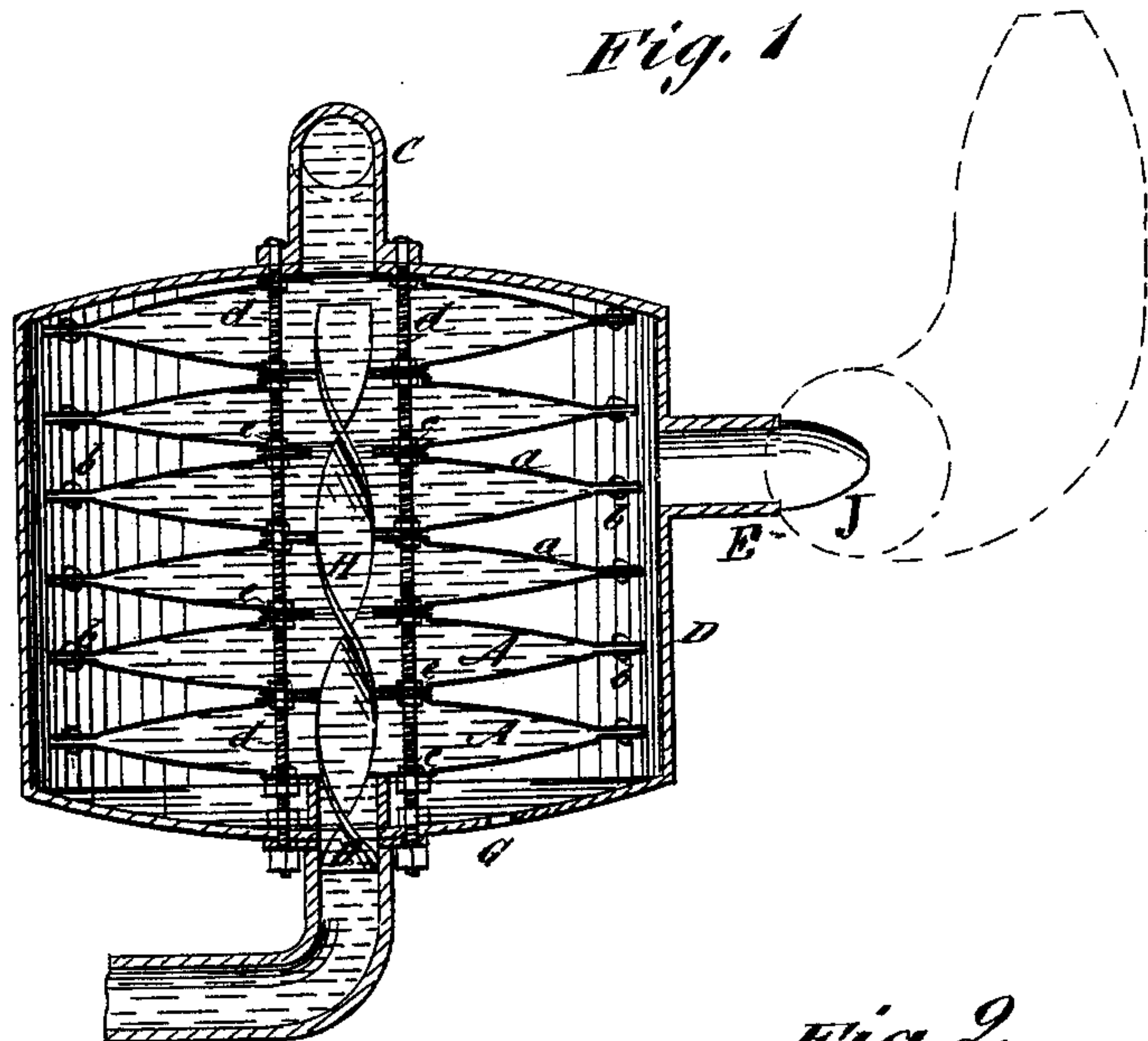


H. N. WATERS, M. W. HAZELTON & J. K. TAYLOR.

LOCOMOTIVE FEED-WATER HEATER.

No. 176,254.

Patented April 18, 1876



**WITNESSES:**

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# UNITED STATES PATENT OFFICE.

HORATIO N. WATERS, OF WEST MERIDEN, CONNECTICUT, MILTON W. HAZELTON, OF CHICAGO, ILLINOIS, AND JAMES K. TAYLOR, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN LOCOMOTIVE FEED-WATER HEATERS.

Specification forming part of Letters Patent No. **176,254**, dated April 18, 1876; application filed April 4, 1876.

*To all whom it may concern:*

Be it known that we, HORATIO N. WATERS, of West Meriden, in the county of New Haven and State of Connecticut, MILTON W. HAZELTON, of Chicago, in the county of Cook and State of Illinois, and JAMES K. TAYLOR, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and Improved Locomotive Feed-Water Heater, of which the following is a specification:

The invention consists of a corrugated tube, through which the feed-water passes from the pump into the boiler, which is surrounded by a steam-jacket, into which the exhaust-steam is forced by the back pressure of the nozzle, by means of pipes connecting it with the exhaust-pipes, and having a spoon-shaped projection adapted to catch a portion of the steam and direct it into the jacket. The invention also consists of the method of constructing the corrugated tube for the water; and it also consists of a spiral deflecting-core in the axis of the corrugated tube, in which the water enters to divert it into the interior portions of the corrugations to facilitate the heating of it.

Figure 1 is a sectional elevation of my improved heater; and Fig. 2 is a top view, with a part in section.

Similar letters of reference indicate corresponding parts.

A is the corrugated tube, into which the feed-water passes from the pump through the pipe B, and passes on to the boiler through pipe C. D represents the inclosing case for the steam-jacket, and E the pipes connecting it with the exhaust-pipes F of the locomotive, said pipes having a spoon-shaped extension, J, into the exhaust-pipes, to scoop in a portion of the steam, to fill the jacket by the back pressure of the nozzle of the exhaust. No provision is made for the escape of the steam from the jacket, it being intended merely to

keep it full; but a little opening, G, is made in the bottom for the escape of the water of condensation. The corrugated tube is made of concave disks *a*, of steel or other suitable sheet metal, riveted together in pairs at the outer edges *b*, and having a large center opening, where the two adjacent disks of two pairs are bolted together by the long bolts *d* passing through the tube from end to end, and having the inside nuts *e*, which clamp the sheets together. H represents the spiral deflecting-core in the axis of the corrugated tube and of the inlet-pipe, for causing the water to flow out to the extremities of the corrugations.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. The feed-water heater, connected with the exhaust-pipes of a locomotive by pipes E, having a spoon-shaped extension, J, into the exhaust-pipes, substantially as specified.

2. The corrugated water-pipe A, composed of metal disks *a*, riveted together in pairs at the outer edge *b*, and connected together around the center opening by bolts *d*, extending through the tube and nuts *e* to each pair, substantially as specified.

3. The combination of the spiral deflecting-core H with the corrugated water-tube, substantially as specified.

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