

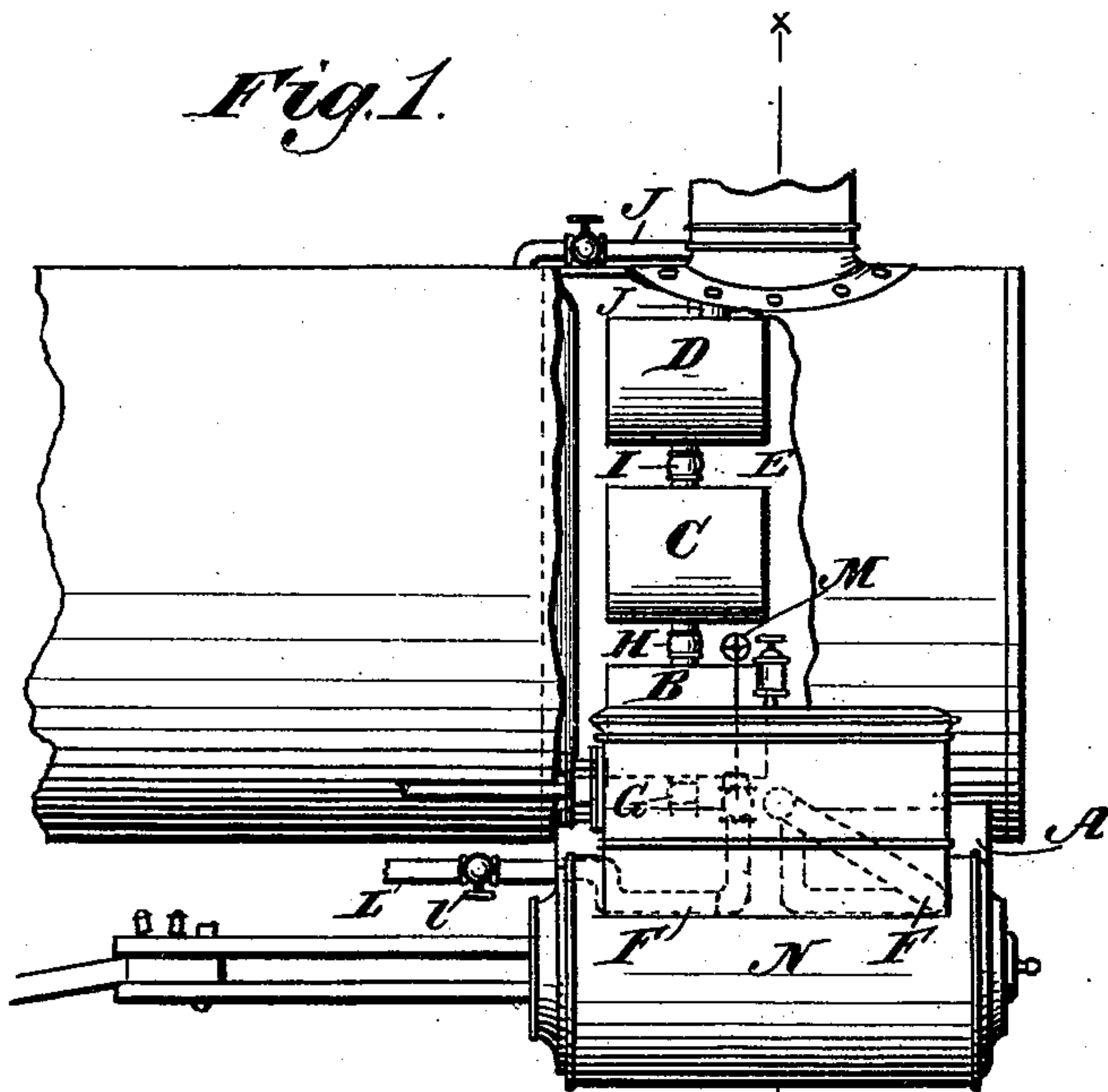
(No Model.)

D. W. McCALLUM.  
FEED WATER HEATING AND PURIFYING APPARATUS.

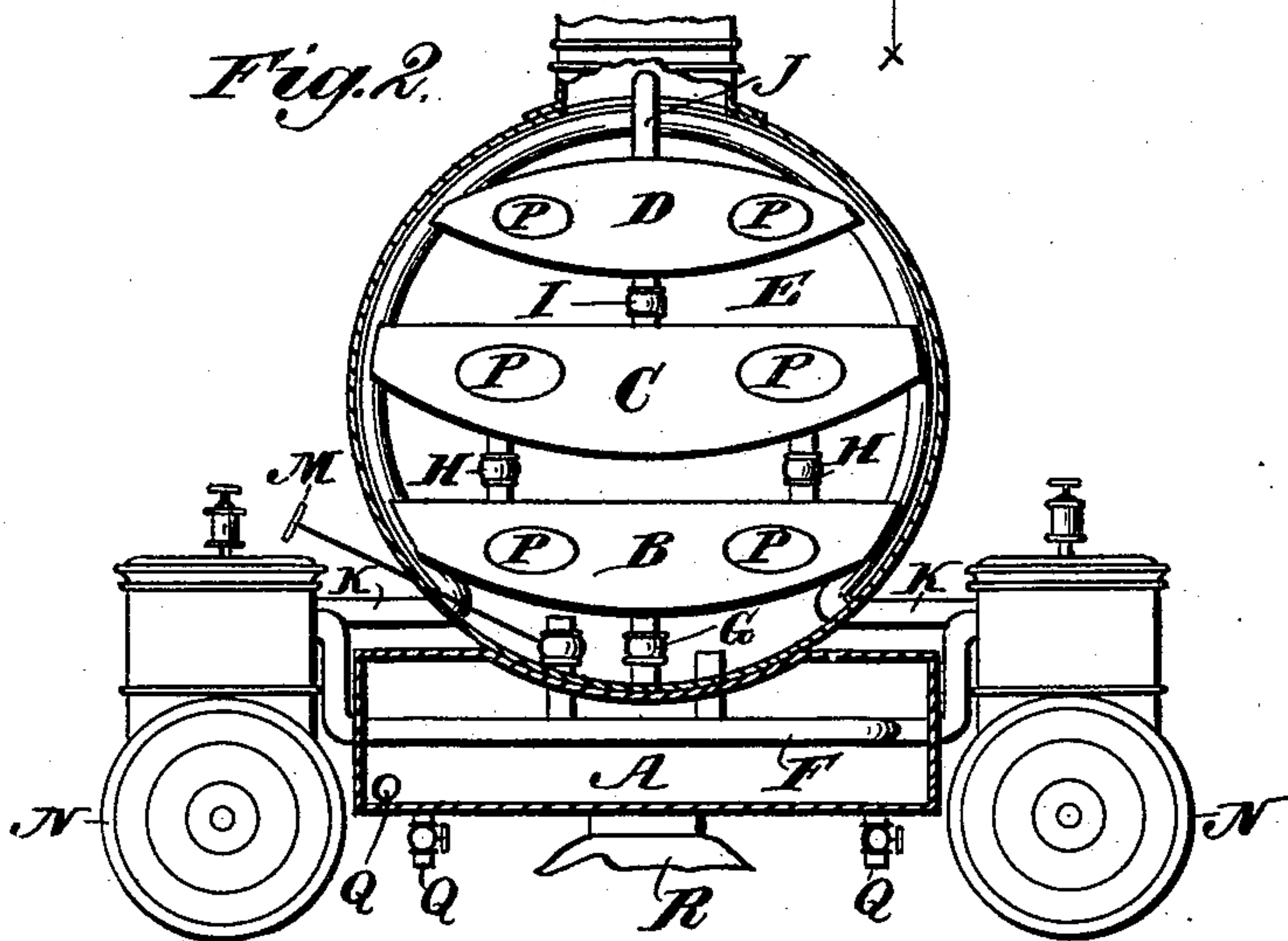
No. 471,521.

Patented Mar. 22, 1892.

*Fig. 1.*



*Fig. 2.*



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# UNITED STATES PATENT OFFICE.

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## FEED-WATER HEATING AND PURIFYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 471,521, dated March 22, 1892.

Application filed December 12, 1891. Serial No. 414,900. (No model.)

*To all whom it may concern:*

Be it known that I, DANIEL W. McCALLUM, a citizen of the United States, residing at Fort Worth, in the county of Tarrant and State of Texas, have invented certain new and useful Improvements in Feed-Water Heating and Purifying Apparatus, of which the following is a full, clear, and exact specification.

This invention has for its object to provide novel, simple, efficient, and economical means for utilizing the heat of exhaust-steam from locomotive-cylinders and the waste heat from the products of combustion in the combustion-chamber or smoke-arch for heating and purifying the feed-water in transit to the locomotive-boiler.

To accomplish this object my invention involves the features of construction and the combination or arrangement of devices hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a sectional side elevation showing sufficient of a locomotive-boiler to illustrate my invention. Fig. 2 is a vertical sectional view taken on the line  $x x$ , Fig. 1.

In order to enable those skilled in the art to make and use my invention, I will now describe the same in detail, referring to the drawings, wherein—

The letter A indicates a water-tank composed of boiler metal and resting on a saddle or other suitable support R between the two locomotive-cylinders N, which are supplied with live steam from the boiler through the medium of pipes K. The top wall of the water-tank is formed with a concaved seat which constitutes a solid bearing for the forward portion of the boiler, which portion is constructed with the usual combustion-chamber or smoke-arch E.

The exhaust-steam pipes F of the locomotive-cylinders extend through the water-tank and communicate with the lower portion of the combustion-chamber or smoke-arch, and from one exhaust-pipe extends a branch L, adapted to connect with the tender and provided with a valve  $l$ , so that by opening such

valve and closing the valve M of the exhaust-pipe, located in the combustion-chamber or smoke-arch E, a supply of exhaust-steam will flow to the tender for warming the water therein.

The water-tank is provided at its rear with a pipe O for introducing the feed-water, and the front portion of the water-tank is in practice provided with man-holes for cleaning the tank when necessary. It is not deemed essential to illustrate the man-holes, as they may be constructed and arranged in any manner suitable for the conditions required.

In the combustion-chamber or smoke-arch is located a series of water-tanks, preferably three in number, B, C, and D, which are arranged one above the other. The lower water-tank B communicates with the water-tank A through the medium of a suitable pipe G, while the tank B communicates with the tank C through the medium of a pair of pipes H, and the tank C connects with the upper tank D by means of a pipe I. The upper tank connects with the boiler by a pipe J, having a suitable valve for controlling the passage of the feed-water therethrough.

The water-heating tanks B, C, and D are composed of boiler metal and are constructed with rounded bottoms, while their front sides are provided with man-holes P, for the purpose of readily cleansing these tanks.

By passing the exhaust-steam pipes F through the water-tank the water in the latter is heated to a certain degree, and sediment settles in such tank. The heated feed-water rises through the pipe G into the lower water-heating tank B, and thence to the upper water-heating tanks C and D, as will be obvious. The water as it passes from tank to tank is gradually heated to a higher temperature and sediments and impurities settle at the bottom of each tank, so that the feed-water finally passes to the boiler, through the pipe J, in a comparatively pure condition at a temperature of 212 degrees Fahrenheit.

The invention provides a simple, efficient, and economical apparatus for heating and purifying the feed-water of a locomotive-



boiler, and the parts are so constructed and arranged as to utilize the heat of the exhaust-steam as well as the waste heat of the products of combustion in the combustion-chamber or smoke-arch of the boiler.

Having thus described my invention, what I claim is—

1. The combination, with a locomotive-boiler having at one end a combustion-chamber or smoke-arch, of a water-heating tank having a top wall bearing against and supporting the combustion-chamber or smoke-arch, a feed-water pipe opening into the tank, and exhaust-steam pipes leading from the locomotive-cylinders, extending through the water-tank, and opening into the combustion-chamber or smoke-arch, substantially as described.

2. The combination, with a locomotive-boiler having at one end a combustion-chamber or smoke-arch containing a water-heating tank, of a feed-water-receiving tank located in juxtaposition to the combustion-chamber or smoke-arch, a pipe connecting the said feed-water-receiving tank with the water-heating tank in the combustion-chamber or smoke-arch, and exhaust-steam pipes leading from the locomotive-cylinders, extending through the feed-water-receiving tank, and opening

into the combustion-chamber or smoke-arch, substantially as described.

3. The combination, with a boiler having at one end a combustion-chamber or smoke-arch, of a series of water-heating tanks arranged in the combustion-chamber or smoke-arch and having pipe connections with each other, a feed-water-receiving tank located in juxtaposition to the combustion-chamber or smoke-arch and provided with a feed-water pipe, a pipe connection between the feed-water-receiving tank and one of the water-heating tanks, and exhaust-steam pipes leading from the locomotive-cylinders into the feed-water-receiving tank and communicating with the combustion-chamber or smoke-arch, substantially as described.

4. The three water-tanks B C D of boiler-metal, constructed with rounded bottoms, man-holes at the front side and arranged in the combustion-chamber or smoke-arch one above the other and connected each with the other by means of pipes, the upper tank D being connected with the boiler, substantially as described.

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