

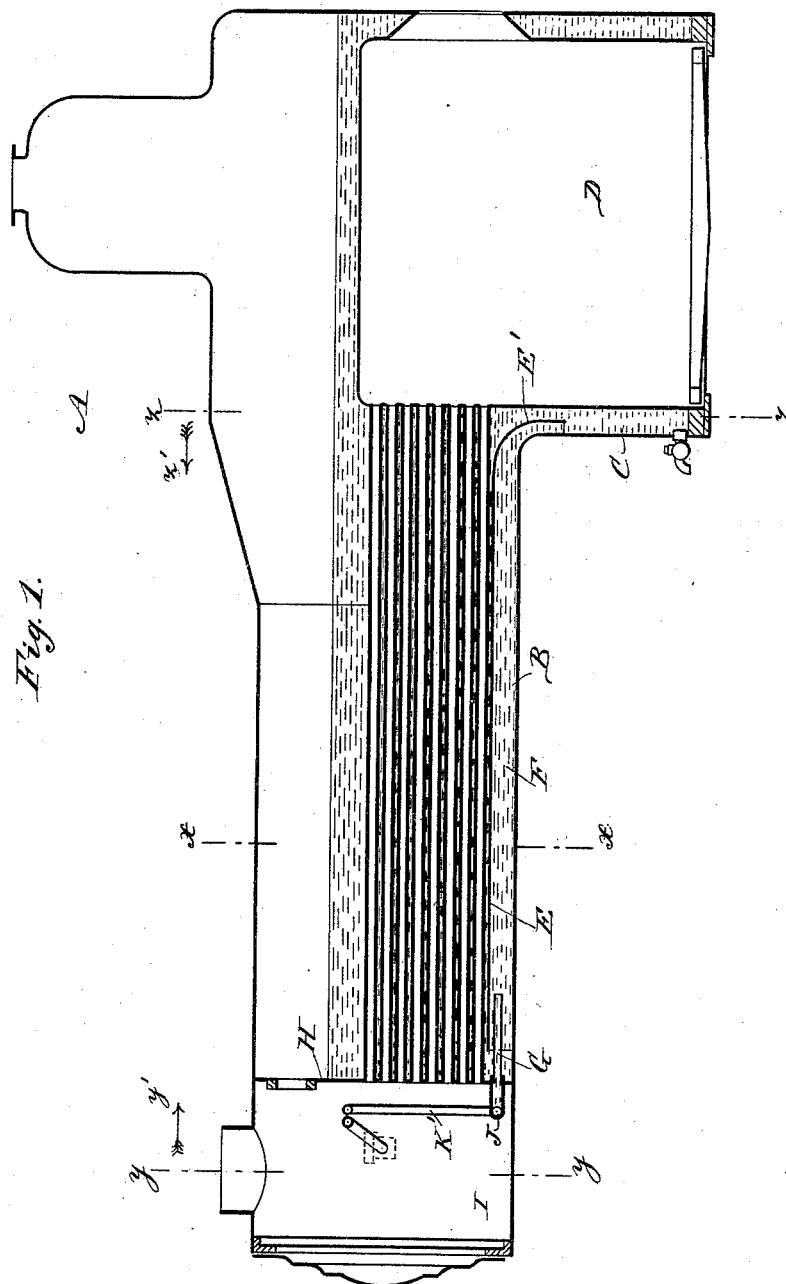
(No Model.)

2 Sheets—Sheet 1.

E. C. JORDAN.  
CIRCULATOR AND FEED WATER HEATER.

No. 422,793.

Patented Mar. 4, 1890.



WITNESSES.

*D. C. Reusch*  
*& Sedgwick*

INVENTOR:

*E. C. Jordan*

BY

*Munn & Co*

ATTORNEYS.

(No Model.)

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Fig. 4.

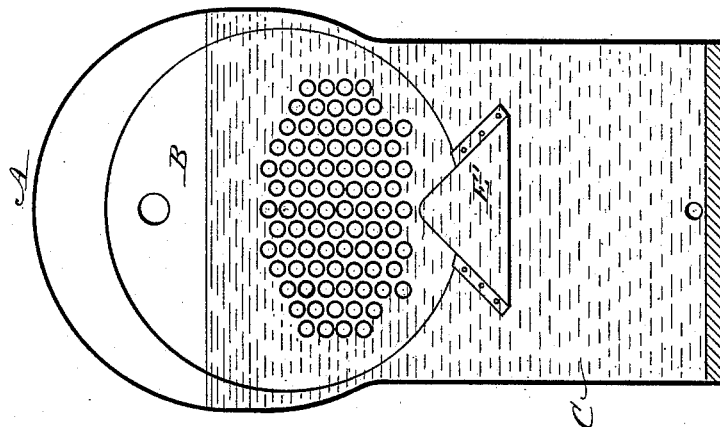


Fig. 3.

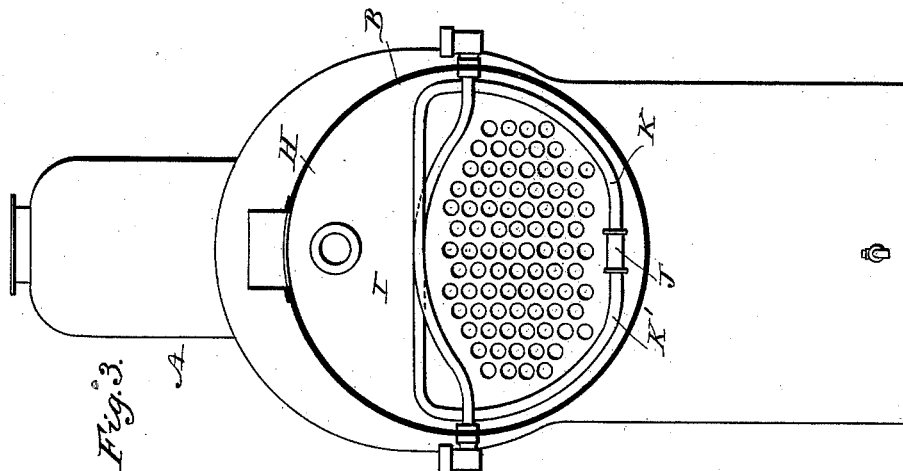
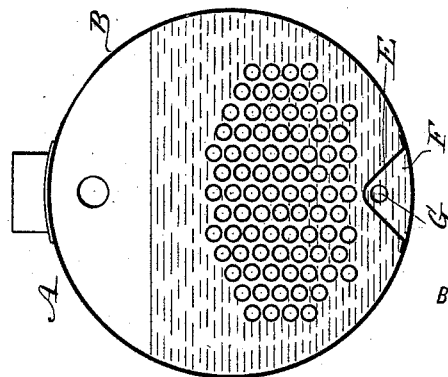


Fig. 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

ELMER C. JORDAN, OF SACRAMENTO, CALIFORNIA.

## CIRCULATOR AND FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 422,793, dated March 4, 1890.

Application filed July 9, 1889. Serial No. 316,956. (No model.)

*To all whom it may concern:*

Be it known that I, ELMER C. JORDAN, of Sacramento, in the county of Sacramento and State of California, have invented a new and Improved Circulator and Feed-Water Heater for Boilers, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved device principally adapted for locomotive and other boilers and serving to create a complete circulation of the water in the boiler, at the same time heating the feed-water.

The invention consists of a channel formed in the bottom of the boiler and extending from near the rear end into the leg of the boiler and a feed-water pipe passing through the smoke-box and discharging into the said channel at its rear end.

The invention also consists of certain parts and details and combinations of the same, as will be hereinafter fully described, and then pointed out in the claims.

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

Figure 1 is a longitudinal section of the improvement as applied to a locomotive-boiler. Fig. 2 is a transverse section of the same on the line *xx* of Fig. 1. Fig. 3 is a similar view of the same on the line *yy* of Fig. 1, looking in the direction of the arrow *y'*; and Fig. 4 is a similar view of the same on the line *zz* of Fig. 1, looking in the direction of the arrow *z'*.

The improved locomotive-boiler A is provided with the usual horizontally-extending shell B and the leg C, in which is held the fire-box D. In the bottom of the shell B is secured a V-shaped plate E, extending longitudinally from near the head H to the front end of the shell, and then having its end E' bent downward into the rear part of the leg C. The end E' is enlarged, the wider part being at its lower edge, as is plainly shown in Fig. 4. The plate E thus forms with the bottom of the shell B a channel F, commencing near the flue-head H and terminating in the leg C.

Into the end of the channel F, near the rear

end of the shell B, opens a pipe G, passing rearward through the flue-head H into the smoke-box I. The pipe G connects with a T J, from one side of which leads the feed-water pipe K, extending near the inner surface of the smoke-box I at one side, then passing over to the other side of the smoke-box and out of the same to connect with the usual injector for forcing the water from the tender into the boiler. The other side of the T J connects with a similar feed-water pipe K', extending upward on one side of the smoke-box, and then passing diagonally across to the other side and out of the same, and also connecting with an injector.

The operation is as follows: When one of the injectors is in motion, water is pumped from the water-tank into the respective feed-water pipe K or K', so that the water passes into the T J, and from the latter through the pipe G into the end of the channel F near the rear end of the shell B. The water thus injected flows along the channel F into the end E', and is directed downward by the latter into the leg C of the boiler. The force of the water injected by the pipe G causes a flow of water in the boiler from the head H through the channel F to the leg C, and from the latter around the fire-box D, along the usual boiler-flues connecting the fire-box with the smoke-box I, and then down again to the rear end of the channel F. Thus it will be seen that a complete circulation of the water is established in the boiler, the water passing around the fire-box flues to the head H, and from the same downward through the channel F, and through the same to the leg of the boiler. It will further be seen that the water passes through the pipe K or K' in the smoke-box, so that the feed-water is heated as the said pipes K and K' are exposed to the heat passing through the fire-box to the smoke-box.

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

1. The combination, with a boiler having a channel in its bottom leading from near the flue-head to the leg of the boiler, of a pipe G, extending from the smoke-box through the flue-head into said channel, and the feed-

water pipes within the smoke-box, and both connected with the outer end of said pipe G, substantially as set forth.

- 5 2. A circulator and feed-water heater for boilers, comprising a channel formed in the bottom of the boiler-shell and extending from near the rear end of the boiler-shell along the same toward the front, then bending downward into the leg of the boiler, and a feed-

water pipe coiled in the smoke-box and dis- 10 charging into the end of the said channel near the flue-head, substantially as shown and described.

ELMER C. JORDAN.

Witnesses:

L. P. SCOTT,

R. A. ROBINSON.