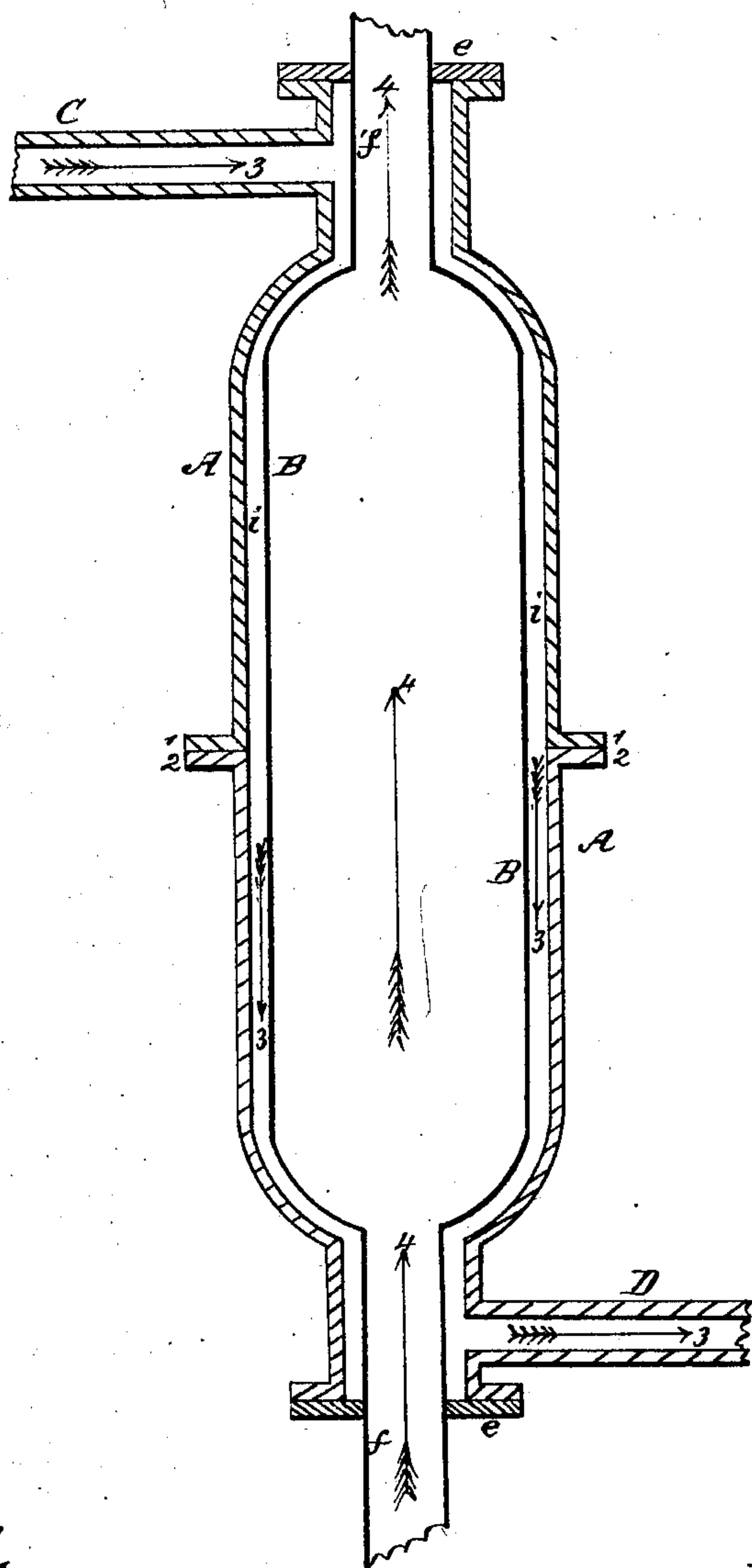


*J. Nicholson,*  
*Steam-Boiler Condenser.*  
*N<sup>o</sup> 69,576.                      Patented Oct. 8, 1867.*



*Witnesses.*

*John Johnston.*  
*A. C. Johnston.*

*Inventor.*

*John Nicholson*  
*By his attorney James Johnston.*

# UNITED STATES PATENT OFFICE.

JOHN NICHOLSON, OF ALLEGHENY CITY, PENNSYLVANIA.

## IMPROVEMENT IN FEED-WATER HEATERS.

Specification forming part of Letters Patent No. 69,576, dated October 8, 1867.

*To all whom it may concern:*

Be it known that I, JOHN NICHOLSON, of the city and county of Allegheny, in the State of Pennsylvania, have invented a new and useful Improvement in Heaters for Heating Water for Steam-Boilers, the same being an improvement of the heater for which I did obtain Letters Patent of the United States, bearing date May 22, 1866; and I do hereby declare that the following is a full and exact description of my present invention, reference being had to the accompanying drawing, and to the letters of reference marked thereon.

The nature of my invention consists in the use of a water and steam chamber provided with pipes which are connected with the ordinary "injector" and the steam-boiler, so constructed and arranged with relation to the injector and boiler that the steam which operates the injector passes through the heater to the injector, and heats the water in its passage from the injector to the boiler.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

In the accompanying drawing, which forms part of my specification, A represents a strong metal case, which is made in two parts, which are secured together by the flanges marked 1 and 2. The case A is provided with pipes or branches C and D and caps *e*. The steam-chamber B is placed inside of the case A, and is so arranged with relation to the case A as to leave a very narrow space (marked *i*) between the outside of the steam-chamber B and the inside of the case A. The steam-chamber is provided with pipes *f* and *f'*, which pass through the caps *e* of the case A.

As the construction and arrangement of my improved heater will be readily understood by the skillful mechanic by reference to the accompanying drawing, I will therefore proceed to describe its application and operation, which are as follows: The pipe C of the case

A is attached to the injector, and the pipe D is connected to the steam-boiler, and the pipe *f'* of the steam-chamber B is attached to the injector, and the pipe *f* is connected to the steam-boiler. Having the pipes C, D, *f'*, and *f* properly connected to the boiler and injector, and suitably provided with valves, steam is let into the chamber B, from which it passes to the injector for operating it. The water passes from the injector through the pipe C into the space *i*, and down this narrow space *i* into the pipe D, and through it into the boiler. The water is heated in its passage down through the narrow space marked *i*. The arrows marked 3 indicate the course of the water from the injector through the heater to the boiler, and the arrows marked 4 indicate the course of the steam from the steam-boiler through the heater to the injector.

It will be observed that the water is heated after it leaves the injector, and that it is heated by the steam which passes through the steam-chamber B, and that the steam which passes from the steam-boiler through the steam-chamber B operates the injector.

The advantage of my improvement consists in supplying heated water to the steam-boiler and obtaining an even, steady, and uniform action of the injector, all of which result from a combination of the action of the ordinary injector with the action of my improved water-heater.

Having thus described the nature, construction, application, operation, and advantages of my improvement, what I claim as of my invention is—

A water-heater for steam-boilers, when constructed, arranged, and operating substantially in the manner herein described, and for the purpose set forth.

JOHN NICHOLSON.

Witnesses:

JAMES J. JOHNSTON,  
ALEXANDER HAYS.