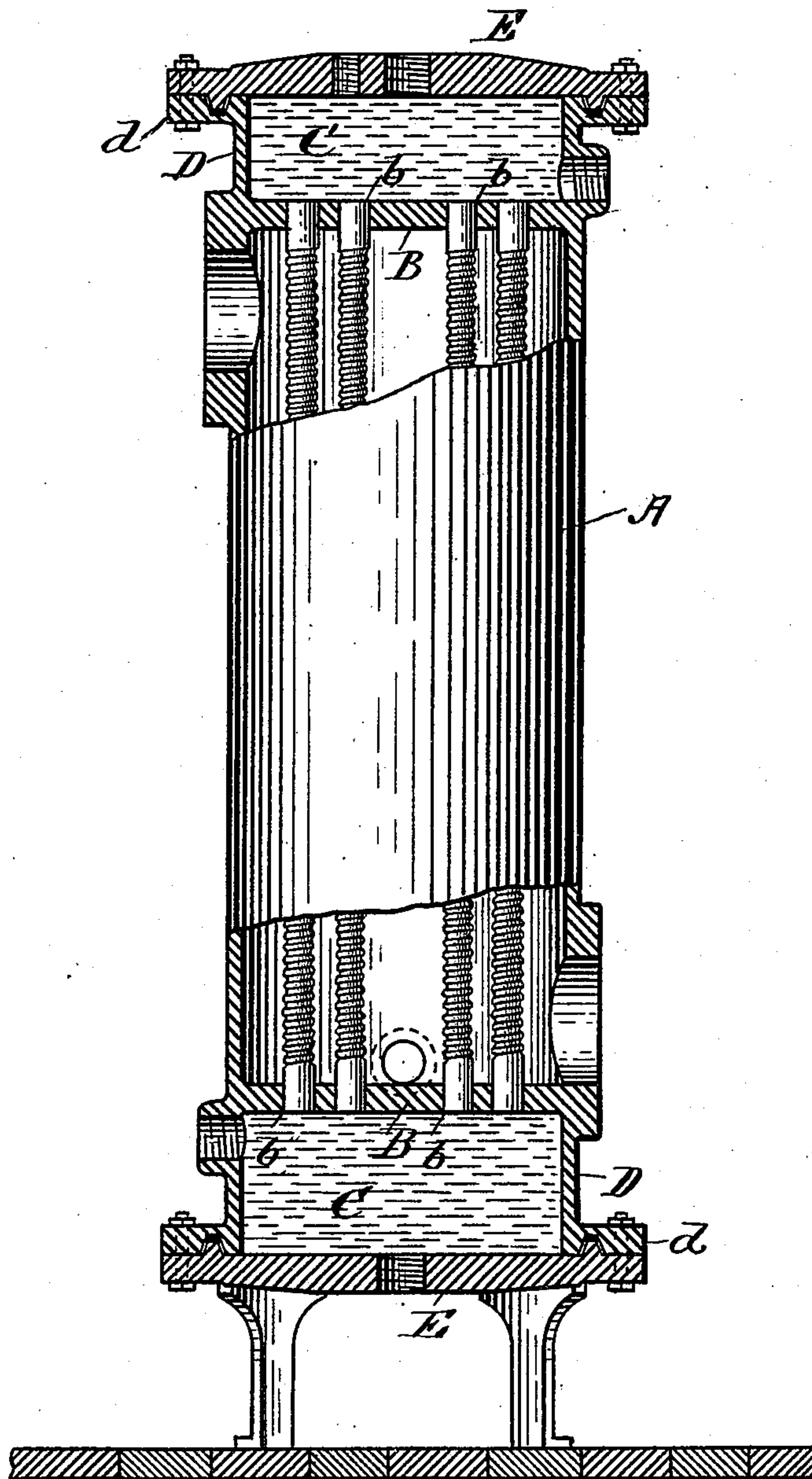


(No Model.)

B. HALL.
FEED WATER HEATER.

No. 516,349.

Patented Mar. 13, 1894.



WITNESSES

Eva A. Guild
Frank G. Parker.

INVENTOR

Bickner Hall
by Chas. O. G. Brown
his atty.

UNITED STATES PATENT OFFICE.

BICKNELL HALL, OF TAUNTON, ASSIGNOR TO THE WAINWRIGHT MANUFACTURING COMPANY OF MASSACHUSETTS, OF BOSTON, MASSACHUSETTS.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 516,349, dated March 13, 1894.

Application filed November 27, 1893. Serial No. 492,179. (No model.)

To all whom it may concern:

Be it known that I, BICKNELL HALL, of Taunton, in the county of Bristol and State of Massachusetts, have invented a new and useful Improvement in Feed-Water Heaters, of which the following is a specification.

My invention relates to the construction of a heater which shall be in all respects as effective as others in use and shall in addition, be much more economical in construction, requiring less finish and taking less trouble to build.

In heaters and condensers as heretofore built, so far as I know, the tube plates have been made separate from the cylinder which forms the shell of the heater, and hence have required careful packing where they join the heater so as to form a steam or water tight joint therewith. Moreover they have either been so arranged in the heater as to allow for the necessary expansion and contraction of the tubes, which take place in the ordinary use of the heater, or have been provided with stuffing boxes to hold one end of each tube, so that each tube may expand and contract freely without buckling or springing a leak.

My invention consists in a heater in which the cylinder and tube plates are cast in one piece and the tubes are expanded into place so as to be steam tight and immovable, and in order to allow for the necessary expansion and contraction, I make my tubes of corrugated tubing so that the difference in expansion between the tubes and the outside casing may be taken up in the tubes themselves.

In the drawing is shown a heater constructed to embody my invention. It is shown partly in section.

A is the shell, which is cylindrical and made in one casting, having tube plates B, B integral therewith, which close each end to form a solid steam chamber, and are provided with holes *b*, into which the ends of the tubes are expanded. This shell A is also provided with a suitable inlet and outlet.

At each end of the heater is a small chamber C as shown, which may be made in a variety of ways. I prefer to make it by extending the walls of the cylinder as shown at

D so as to form the walls of such a chamber. Each chamber C is provided with suitable inlets. A flange *d* is provided at each end of the cylinder, to which is bolted a head E to close the end of the heater. Each flange has a suitable groove cast in it and each head is provided with a corresponding tongue which fits into the groove and rests on a washer of rubber or other like material, which may be depended upon to counteract any irregularities in the casting of the tongue and groove.

I constructing my heater as above shown, I make three castings, one for the shell and one for each head. The tubes are put in and expanded into place in the tube plates at each end and the heads are then bolted on.

It will be seen that my heater is a great improvement over heaters heretofore made, for in the heater itself, instead of six or seven joints, there are but two joints to be packed when there is any liability for leakage, viz: where the heads and the heater join, and these joints are not where there is usually the greatest pressure.

My heater is simple of construction and needs practically no repairs, owing to the peculiarities of construction above referred to. Its main chamber being made in one piece, leakage, a trouble often found with heaters, is almost impossible.

What I claim as my invention is—

A feed water heater consisting of a cylindrical tube chamber provided with a suitable inlet and outlet, and two small chambers, one at each end of said tube chamber, each small chamber being separated from said tube chamber by a tube plate cast integral with the cylindrical walls of said tube chamber, in combination with a series of corrugated tubes lying in said tube chamber and made fast at each end to one of said tube plates, all as and for the purposes set forth.

In testimony whereof I have hereunto set my hand this 2d day of November, 1893.

BICKNELL HALL.

Witnesses:

GEORGE O. G. COALE,
FRANK G. PARKER.