

No. 814,074.

PATENTED MAR. 6, 1906.

S. F. PIERCE.  
BOILER FLUE.

APPLICATION FILED APR. 21, 1905.

Fig. 2.

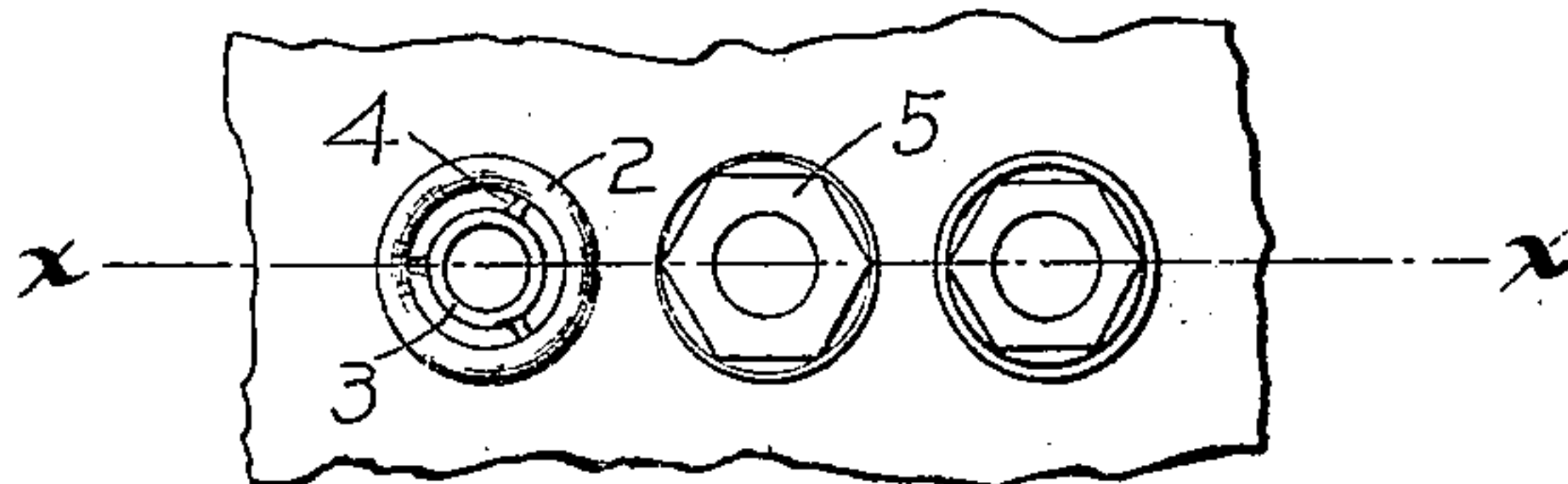


Fig. 3.

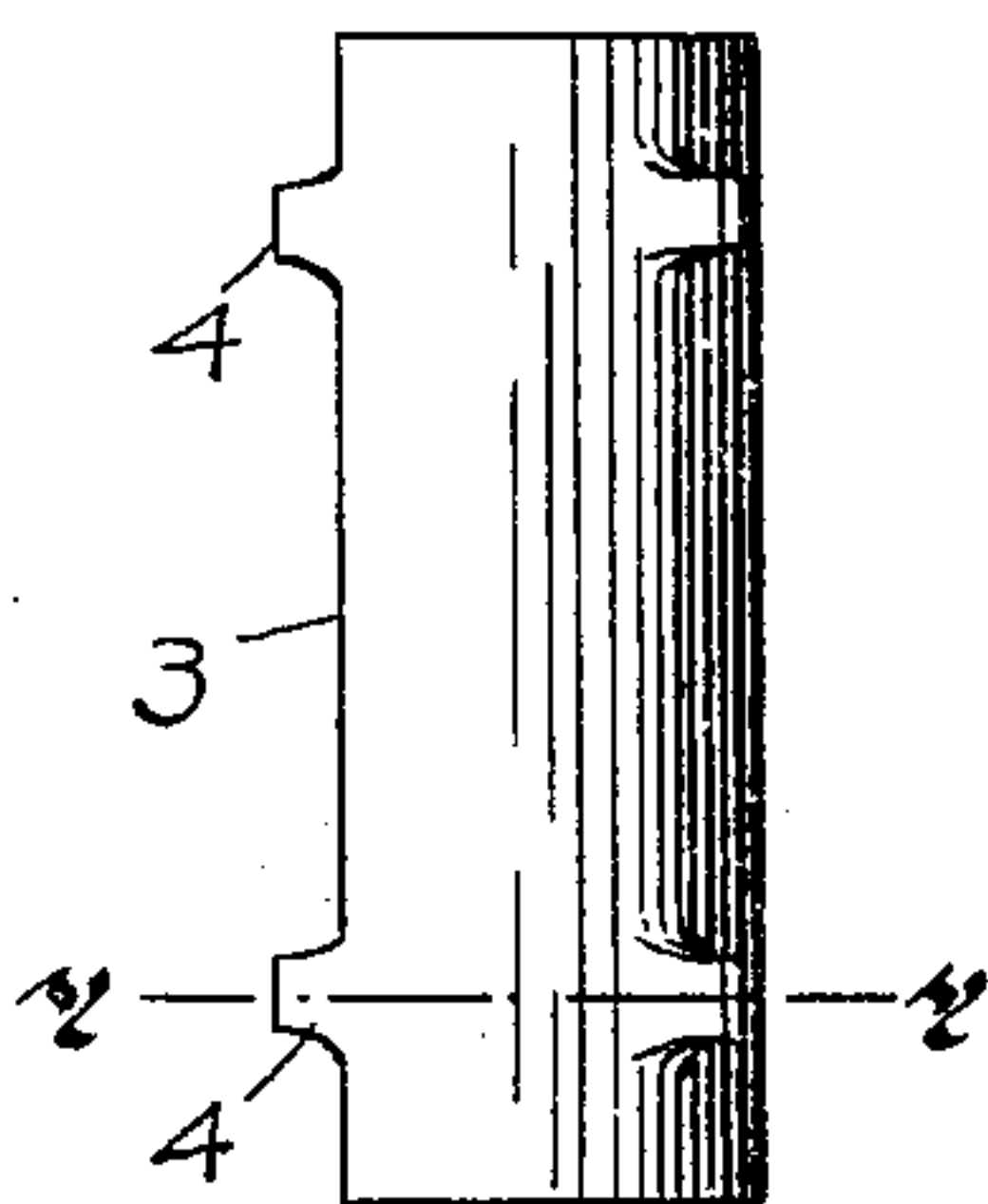


Fig. 1.

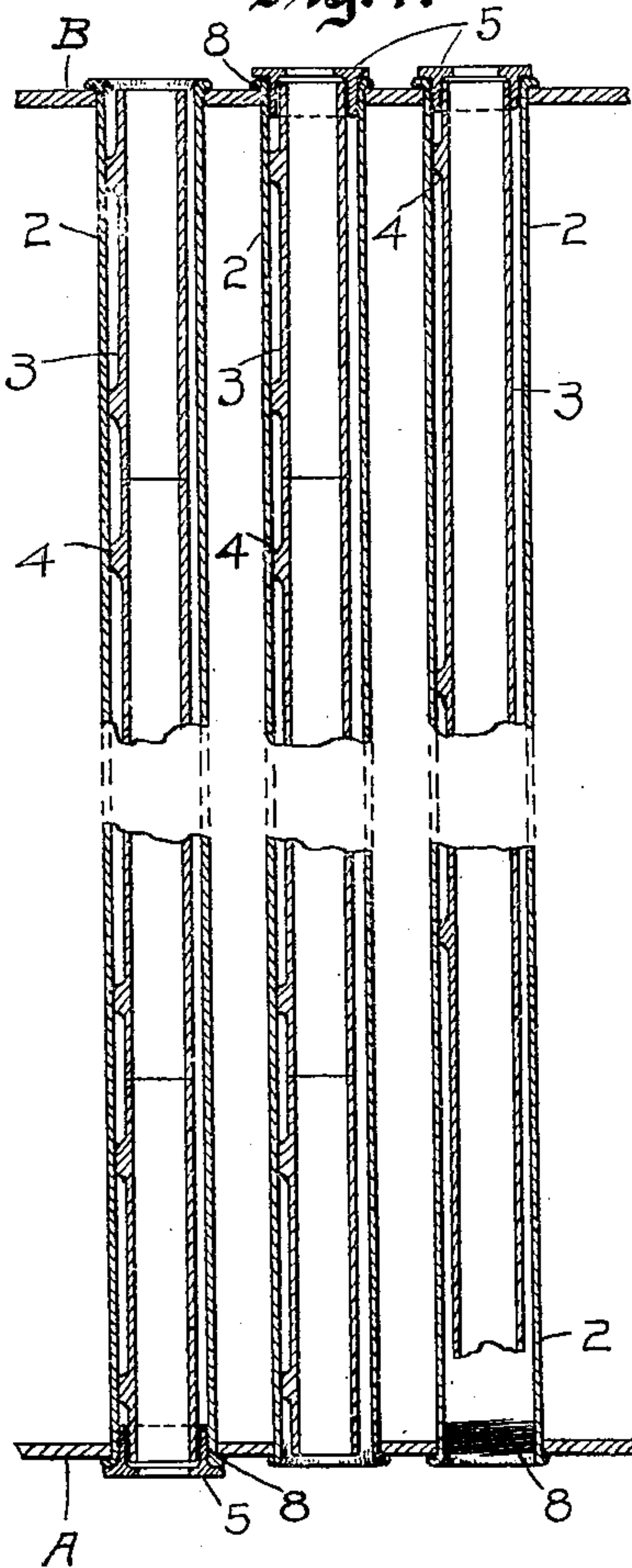


Fig. 5.

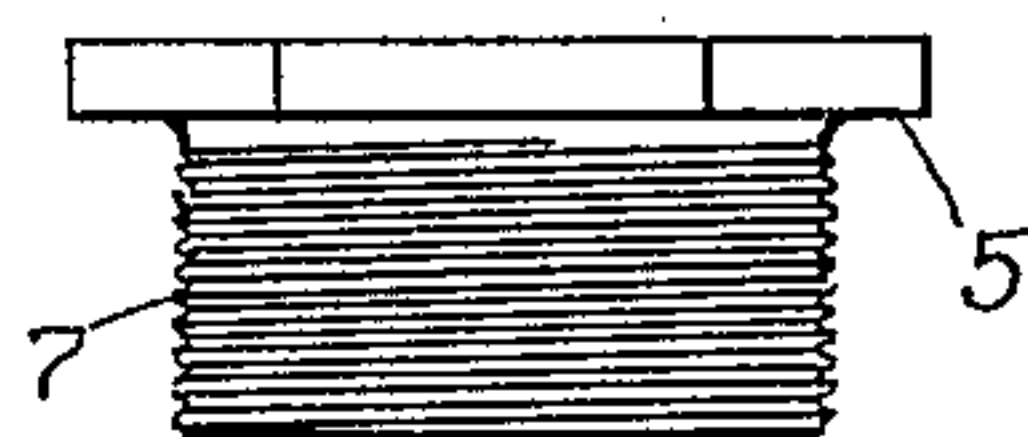


Fig. 6.

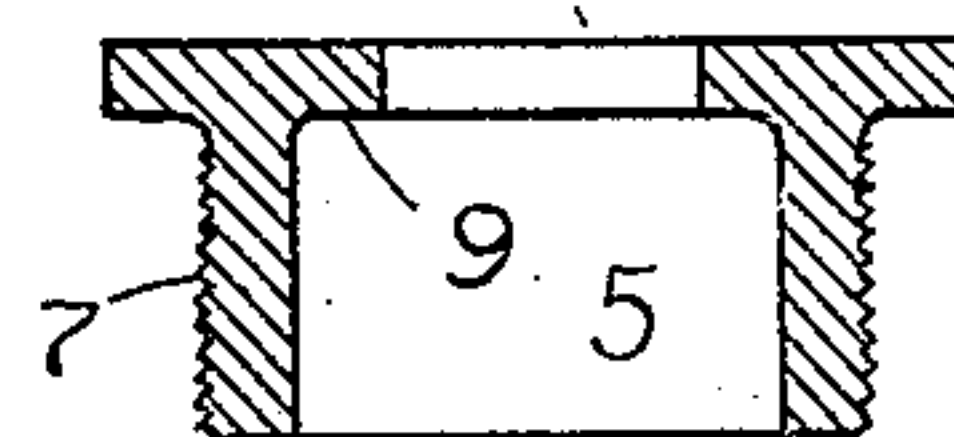


Fig. 7.

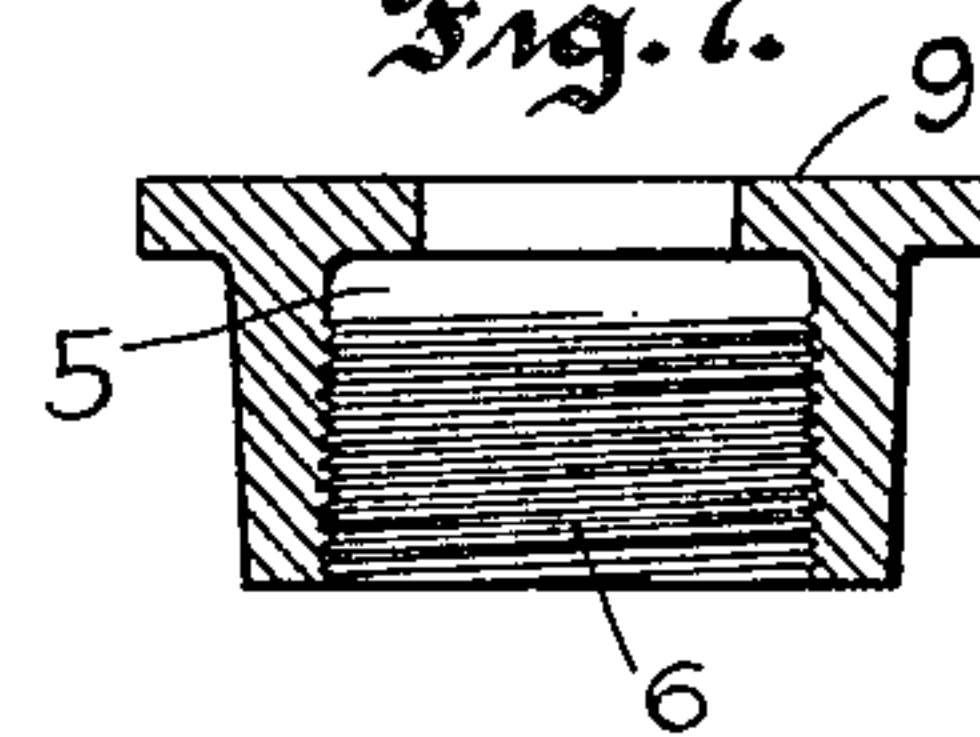
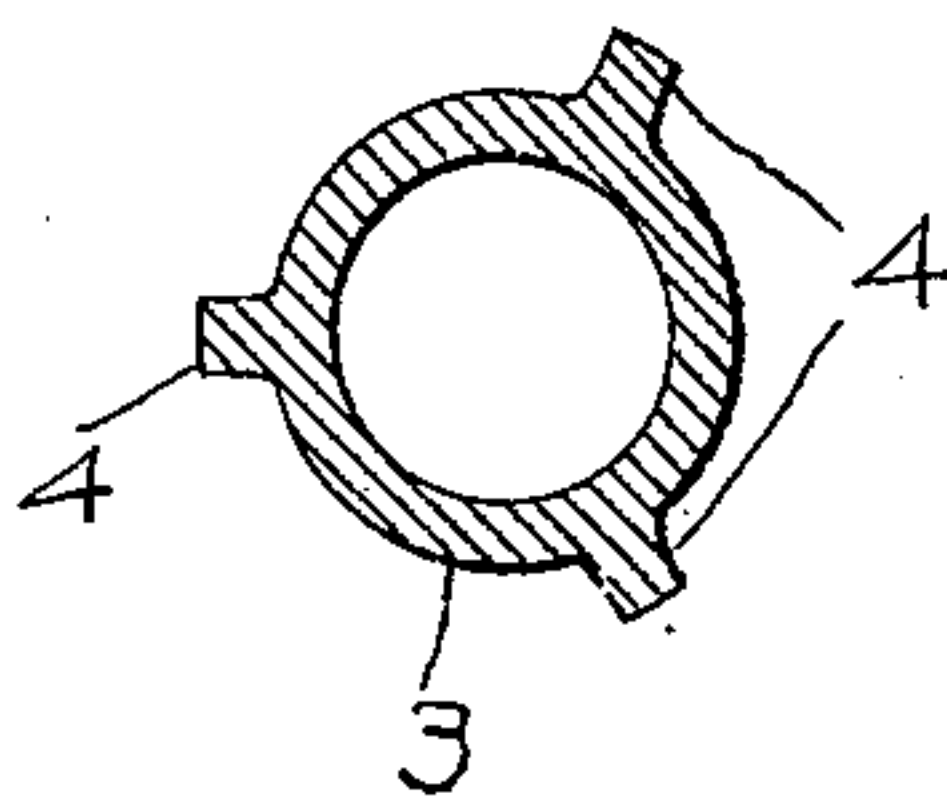


Fig. 4.



Witnesses,  
R. K. Fuller  
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Inventor,  
Simeon F. Pierce.  
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his Attorneys.



# UNITED STATES PATENT OFFICE.

SIMEON F. PIERCE, OF ST. PAUL, MINNESOTA.

## BOILER-FLUE.

No. 814,074.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed April 21, 1905. Serial No. 256,763.

*To all whom it may concern:*

Be it known that I, SIMEON F. PIERCE, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Boiler-Flues, of which the following is a specification.

My invention relates to improvements in boiler-flues, and has for its object a flue so constructed as to retard the cooling of the entering gases, and thereby promote combustion throughout the length of the flue.

To this end the invention consists in the construction, combination, and arrangement of parts hereinafter described and claimed.

In the accompanying drawings, forming part of this specification, Figure 1 is a longitudinal section through part of a boiler fitted with my improved flues, taken on line *x x* of Fig. 2, the flues being shown in section. Fig. 2 is an end view of so much of the boiler as is necessary to illustrate the invention. Fig. 3 is a side view of the inner pipe or tube of the flue. Fig. 4 is a cross-section of the inner tube on line *y y* of Fig. 3. Fig. 5 is a side view of an exteriorly-threaded flue-plug. Fig. 6 is a central longitudinal section of the same, and Fig. 7 is a longitudinal section of an interiorly-threaded flue-plug.

In the drawings, A and B represent the forward and rear flue-sheets, respectively, of a tubular boiler. Extending longitudinally through the boiler and supported in the flue-sheets are my improved flues, each flue comprising two interspaced tubes, an outer tube 2 passing through the flue-sheets and having its ends upset and expanded in the usual way, and an inner tube 3, of less diameter than the outer tube and formed at intervals with exteriorly-projecting bosses 4, of sufficient height nearly or quite to contact with the inner sides of the outer tube, so as to support the inner tube centrally in the outer tube, whereby an annular space of uniform depth is left between the tubes. If desired, this space may be left open at one end, as shown in the left-hand flue at the rear flue-sheet B; but I prefer to close the space at each end and by an annular flanged bushing or plug 5, driven or screwed between the tubes, as illustrated in the central and right-hand flues at the rear flue-sheet B. When the inner tube is of metal, the plug is formed, preferably, with interior threads 6, as shown in Fig. 7, to engage the threaded ends of the in-

ner tube. When the inner tube is of tile or other material not adapted for thread engagement with the plug, the plug may be formed with exterior threads 7, as shown in Figs. 5 and 6, to engage the threads 8 upon the interior of the outer tube 2.

The annular portion of the plug is of sufficient thickness to fill the space between the two tubes, and thus support the inner tube centrally in the outer tube. When the inner tube is made in a single piece, the bosses 4 may be dispensed with, as the annular plug will support the inner tube in the outer tube, although even in this case, it is preferable to retain the bosses.

When made of tile, the inner tube will be conveniently made in sections, as illustrated in the left-hand flue in Fig. 1, and in this case the bosses are necessary in order to support the sections centrally in the outer tube.

It will be observed that the flanges 9 of the plugs extend inwardly toward the center of the plug, so as to overlap and form an abutment for the ends of the inner tubes, thus preventing longitudinal movement of the inner tubes within the outer tubes when they are exteriorly threaded. When the plug is interiorly threaded for engagement with the inner tube, the outwardly-extending portion of the flanges will overlap the ends of the outer tubes and be held from longitudinal movement, the same being also prevented by the frictional contact between the annular portion of the plug and the inner sides of the outer tube. This effect may be increased by making the annular portion slightly tapered, as shown in Fig. 7.

In a boiler having ordinary flues the gases from the fire will be rapidly cooled as they enter the flues by reason of the colder surrounding water. The result is that the gases will be cooled below the point of combustion before they have traversed the length of the flue and the volume of smoke and gases in the flue will have a heated central core surrounded by a cooler mass near the periphery of the flue. The benefit of combustion throughout the flue will thus be lost and much of the fuel will escape unconsumed. With my improved flues the gases entering the inner tube will not come in contact with the cooler wall of the outer tube, but will be insulated therefrom and from the surrounding water by the air-space between the tubes. This prevents the gases from the fire from be-

ing at once robbed of their heat upon entering the inner tube, and promotes combustion throughout a much greater length of tube, thereby distributing the heat into the water  
5 more uniformly the full length of the flue, and the temperature will be maintained sufficiently high to consume a large proportion of the gases before they reach the outlet end of the flues.

10 It will be evident that modifications may be made in the details of the construction without departing from the principle of the invention, the scope of which is defined in the claim.

15 Having now described my invention, what

I claim as new, and desire to secure by Letters Patent, is—

A boiler-flue comprising an outer tube and an inner tube of less diameter than the outer tube, the inner tube being formed with isolated radially-projecting bosses arranged at intervals along its length, whereby the inner tube is supported centrally in the outer tube. 20

In testimony whereof I affix my signature in presence of two witnesses.

SIMEON F. PIERCE.

Witnesses:

ARTHUR P. LOTHROP,  
EMILY F. OTIS.