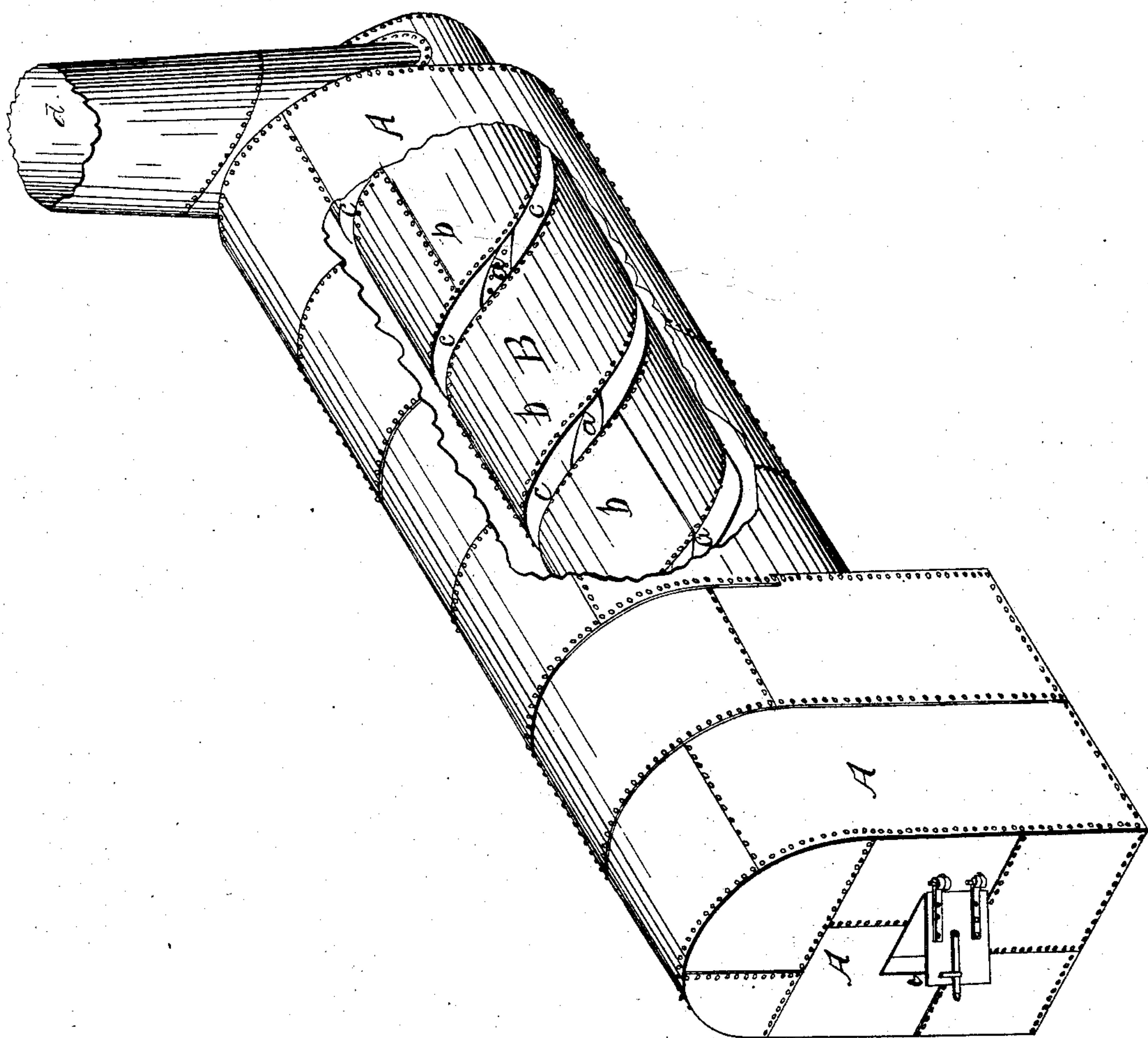


*B. J. Miller,*  
*Steam-Boiler Fire-Tube.*  
*N<sup>o</sup> 675.                      Patented Apr. 5, 1838.*



*Witnesses:*  
*Wm. J. Cummings*  
*Franklin W. Sullivan*

*Inventor:*  
*Benjamin J. Miller*

# UNITED STATES PATENT OFFICE.

BENJAMIN J. MILLER, OF NEW YORK, N. Y.

## MODE OF FORMING A SPIRAL FLUE FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. 675, dated April 5, 1838.

*To all whom it may concern:*

Be it known that I, BENJAMIN J. MILLER, of the city and State of New York, have invented a new and useful Improvement in Flues for Steam-Boilers; and I do hereby declare that the following is an exact and full description.

The nature of my improvement consists in the application to ordinary low-pressure boilers flues of a spiral form, as hereinafter described, for the purpose of obtaining more compactness and strength than in the common method.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation, reference being had to the drawing herewith deposited in the Patent Office.

A represents the exterior or shell of a steam-boiler and furnace of common construction, with an opening in one side, through which may be seen the spiral flue. The flue B is composed of a small cylinder or core *a* and a larger cylinder *b*, forming the exterior circumference of the flue, the cylinder being

concentric. A spiral slot or opening *c*, corresponding in each, extends from one end of the flue to the other, and the slot or opening thus made is preserved and the flue made complete by closing or joining the corresponding spiral edges of both cylinders, so that water may flow from the inside of the inner cylinder to the outside of the outer one, and the flame or heated air pass through the inclosed channel between the outside surface of the inner cylinder and the inside surface of the outer one until it reaches the chimney *d*. I make use of brace or socket bolts to give stability to such parts of the flue as may from its size or circumstances require support or strength.

What I claim as my invention, and desire to secure by Letters Patent, is—

The construction and application of one or more spiral flues to steam-boilers, as above substantially described.

BENJAMIN J. MILLER.

Witnesses:

WM. A. CUMMINGS,

FRANKLIN W. STILLMAN.