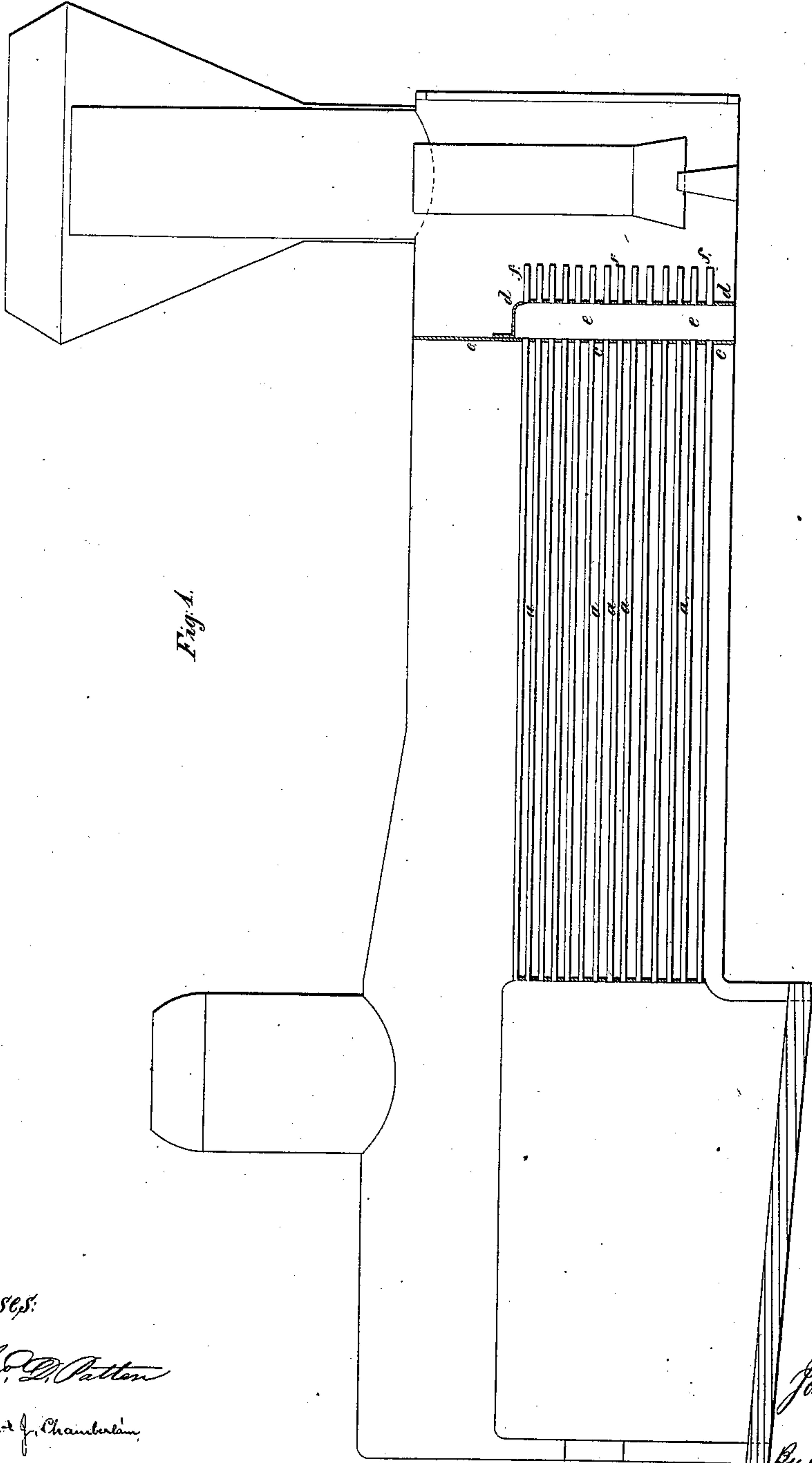


*J. M. Coale,*

*Flue and Tubular Boiler.*

*N<sup>o</sup> 64,842.*

*Patented May 21, 1867.*



*Witnesses:*

*J. D. Patton*

*Thos. J. Chamberlain*

*Inventor:*

*Joseph M. Coales,*

*By atty. A. B. Doughton,*

# United States Patent Office.

JOSEPH M. COALE, OF BALTIMORE, MARYLAND.

*Letters Patent No. 64,842, dated May 21, 1867.*

## IMPROVEMENT IN LOCOMOTIVE ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, JOSEPH M. COALE, of the city and county of Baltimore, and State of Maryland, have invented certain new and useful improvements in Locomotive and other similar Steam Boilers; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing, making a part of this specification, and which represents a longitudinal vertical section through a locomotive steam boiler, and which fully illustrates my invention.

In locomotive boilers the exhaust steam influences the draught to such an extent that after every exhaust cold air rushes in to take the place of that so suddenly driven out, and this air entering into the ends of the flues chills them, and thus detracts from the making of steam.

My invention consists in providing a chamber or space behind the extreme ends of the flues, into which chamber the cold air may rush, but where it will be allowed to expand and be heated enough to prevent its further cooling the flues, and particularly where the flues are surrounded by or in contact with the water in the boiler, as will be explained.

*a a* represent a series of flues in a locomotive boiler, which may be surrounded by water in the usual way. As heretofore constructed these flues *a* terminated in the flue-sheet *c*, or in the flue-chamber. The exhaust steam driving out the air, smoke, and gases from the flue-chamber makes a partial vacuum which instantly fills with the cold external air, and this cold air rushes in with such force as to enter the ends of the flues or flue pipes and chill them, and thus chill or prevent them from generating steam in the water surrounding these ends. To avoid the cold air from thus entering the ends of the flues I attach to the flue-sheet *c* a second sheet, *d*, so as to form a space or chamber, *e*, between the two sheets, and in the second sheet *e* I arrange a series of short flue pipes or tubes, *f*, which extend into the spark-chamber. The water in the boiler extends no further than the flue-sheet *c*, and the intruding cold air will enter the pipes or flues *f* and be partially heated therein, and then expanding and spreading through the chamber *e*, in which there is a high degree of heat, will become so heated and have been so checked as not to enter the ends of the flues *a a* at all, but particularly not in its cold condition. The chilling of the pipes or flues *f* in nowise affects the generation of steam, as they are not in contact with the water, and then the air becoming again heated in the chamber *e* it has lost all of its injurious effects upon the flues *a*, if even it should reach them. By this contrivance, which may be readily attached to any locomotive boiler, a great saving of fuel is attained. If the flues *f* be of considerable length the chamber may be contracted.

Having thus fully described my invention, what I claim, is—

In combination with locomotive and other similar boilers the additional sheet *d* and flues *f*, for the purpose of preventing the cold air from chilling the ends of the flues proper, substantially as and for the purpose set forth.

JOSEPH M. COALE.

Witnesses:

H. R. LINTHICUM,  
W. McCORMIC.