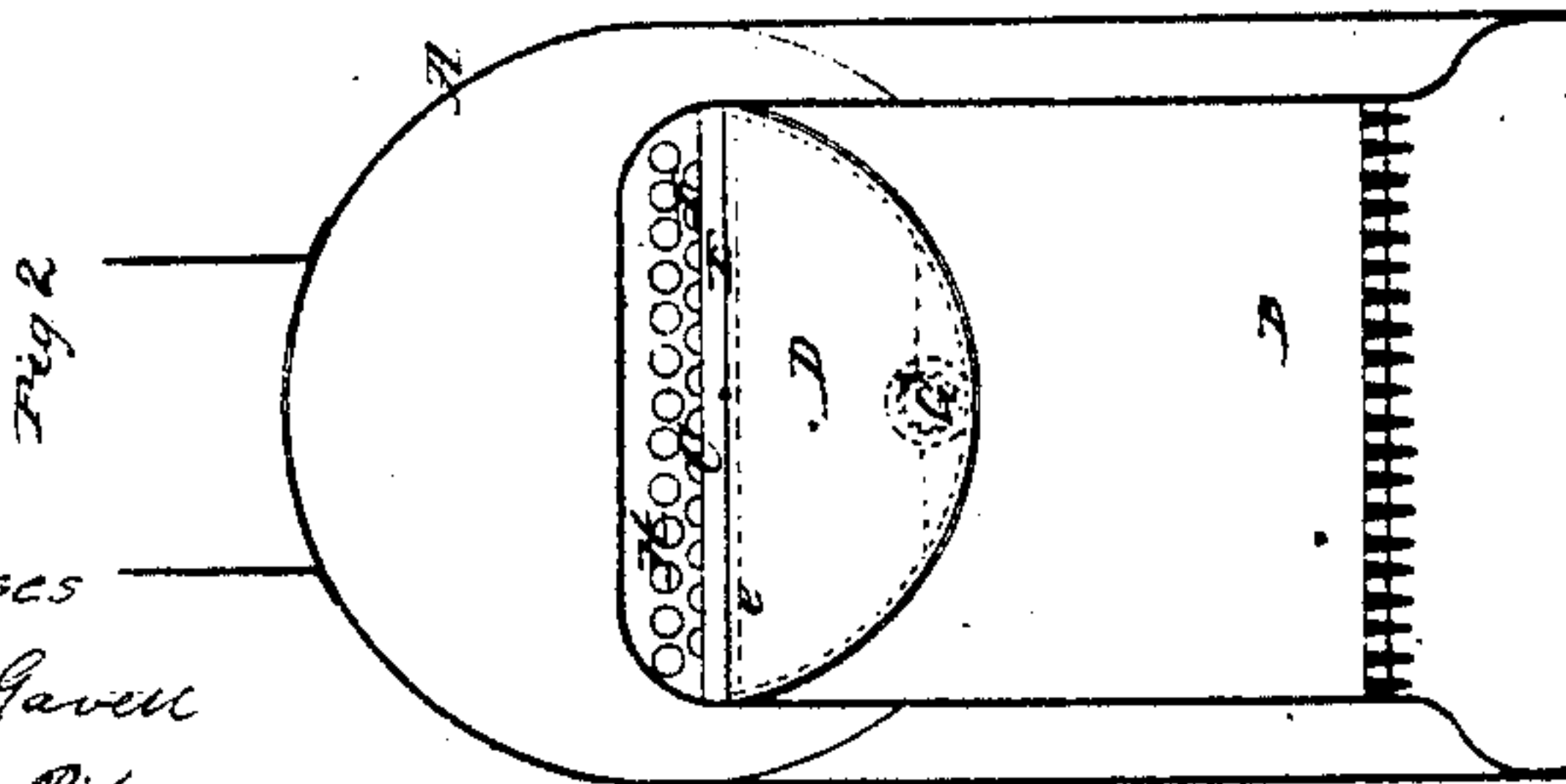
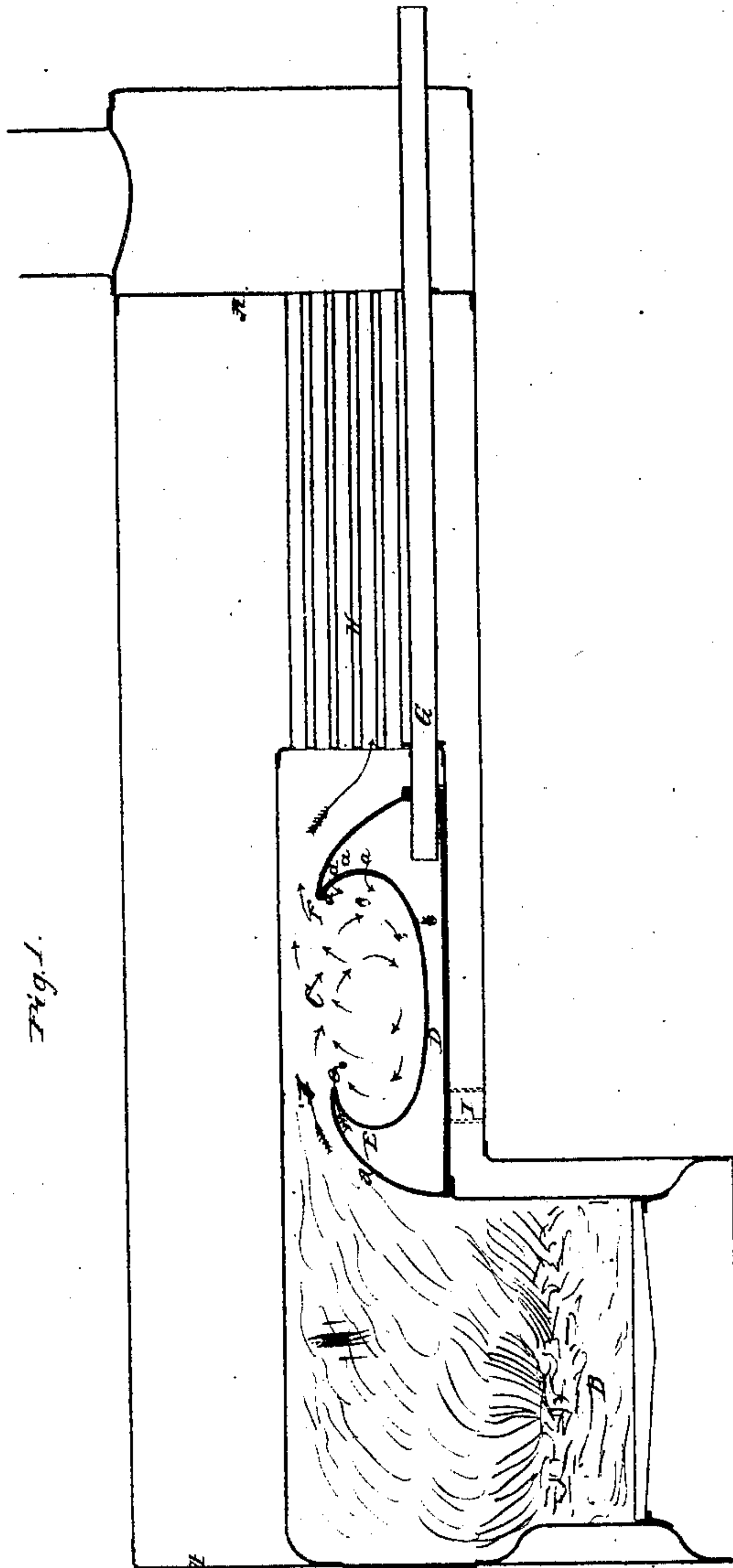


No. 23,650.

PATENTED APR. 19, 1859.

J. AMORY.
STEAM BOILER FURNACE.



Witnesses
Joseph Gavett
Samuel A. Piper

Inventor
Jonathan Amory

UNITED STATES PATENT OFFICE.

JONATHAN AMORY, OF BOSTON, MASSACHUSETTS.

STEAM-BOILER FURNACE.

Specification forming part of Letters Patent No. 23,650, dated April 19, 1859; Reissued August 29, 1865, Nos. 2,057 and 2,058.

To all whom it may concern:

Be it known that I, JONATHAN AMORY, of West Roxbury, Boston, in the county of Norfolk and State of Massachusetts, have
5 invented certain new and useful Improvements in the Construction of Furnaces for Steam-Boilers and other Similar Purposes; and I do hereby declare that the following is a full, clear, and exact description of the
10 construction and operation thereof, taken in connection with the accompanying drawings, making a part of this specification, in which—

Figure 1 is a longitudinal sectional elevation of a locomotive boiler with the improvements applied thereto; Fig. 2 a transverse section through the fire-box showing the fire curves in elevation.

The letters of reference indicate like parts
20 in all the figures.

My invention consists in certain modifications of what is known as Baker's furnace; for which Letters Patent were granted to Henry F. Baker May 30th 1846; by means
25 of which the combustion of the fuel therein is better effected, and the invention is better adapted to be used in locomotive and other boilers having internal fire places, and to other similar conditions of use.

30 The first part of my invention relates to the manner of constructing the "curves" so called which inclose the combustion chambers and consists in constructing that part of the curve toward the fire place by continuing the curve upward and forward so as
35 to make the curve terminate in a thin overhanging projection; which, in connection with the other parts of the "curves" serves to insure a more perfect rotation or eddying
40 of the gases from the fire place, in said chamber; so that in connection with the orifices for the admission of air in said curves, a more intimate mixing of the air with the
45 gases is effected, and being thus mixed, they are so presented to the incoming current of flame as to insure their complete combustion.

The second part of my invention relates to the constructing of the "curves" of
50 metal, and the employment of them for heating the air to be thrown in to the combustion chamber as before explained. In the construction of the curves of locomotive boilers as shown in the drawings they must
55 necessarily be made of metal, both from the

less space occupied than would be if bricks were used and for security against being destroyed by the jostling of the locomotive in running over the inequalities of the road, and also for the reason that they can be
60 more conveniently connected with the boiler. But unless the metal "curves" were in some way protected from the fierce heat of the flame from the fire place or more especially on that side next to the fire place they would
65 be destroyed in a few hours. To prevent this result, and at the same time to heat the air to be thrown in the combustion chamber; I make the space or chamber behind the
70 curves the heater; and by so bringing in the current of air as to throw the current against the most heated side of the chamber which by rapidly absorbing the heat, keeps the
75 metal so cool as to preserve it while the air is heated to a degree proper to be injected in to the combustion chamber and there combined with the unconsumed gases.

The drawing represents a locomotive boiler as disconnected from all accessory
80 parts.

A is the boiler; B the fire chamber; C the combustion chamber; and D the metallic
85 "curves" which inclose the combustion chamber as shown and also serve as a heating chamber for the air before it passes in to the combustion chamber. The more
90 remote extremity of the curve F is formed much like the corresponding part of the "curves" described in Baker's patent before mentioned, excepting as to the admission
95 of the air which is here admitted through the holes *a, a*, &c as shown, but at the opposite extremity E it is made with an external curve *d* uniting with the internal curve in
100 a horizontal position forming an overhanging projection as shown in the drawing at *e*, over which, externally, the products of combustion from the fire place, are guided
105 so as to insure the formation of an eddy or vortex within the combustion chamber for the purpose to be hereafter described. Between the interior and exterior "curves" at *e* is a long narrow aperture extending the
110 whole breadth of the "curves" through which the air passes into the combustion chamber. This serves both to protect the thin extremities of the curves from the intense heat of the flame as it comes from the fire chamber, and also distributes the air evenly to the volume of gases passing over

it. The air is supplied to the outer part of the volume through the holes *a, a,* &c in the other extremity of the curve which also protects that part of the curve from the extreme heat. In the curves of the Baker furnace before mentioned, they are shown in the patent of such form as to cause the rotation of the eddies formed in the chamber to be in a backward direction or with the returning stratum uppermost; but it is found by experiment that the natural tendency of the eddy is to revolve in the opposite direction. My improvement in the form of the curve is designed to carry out that principle, and insure the more perfect formation of the eddy, by the action of which, the intimate mixture of the air with the gases is effected to adapt them to complete combustion. The air is admitted into the heating chamber through the pipe G extending forward of the boiler being forced in by the draft and also by the progressive movement of the engine; but it may be admitted at any other part as at I, provided the currents are thrown upon the more heated parts to protect them. Have the tubes constructed in the usual way

except that they are shorter and extend only to the recess in which the curves are placed, which occupies the space usually occupied by the tubes.

The operation of the improvements are believed to be sufficiently obvious from the drawing and description, and may be considerably modified in form without changing the principles. The two things intended to be accomplished by the improvements are first, to give such a direction to the current passing through the furnace as shall insure the formation of a strong eddy, as the means by which the air is mechanically mixed with the gases; and, second, to be able to use metal "curves" by protecting them by the current of cool air substantially as described.

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

The method of increasing the combustion and protecting the combustion curves, substantially as described.

Boston, March 5th, 1857.

JONATHAN AMORY.

Witnesses:

C. HUBBARD,

THOMAS A. DEXTER.