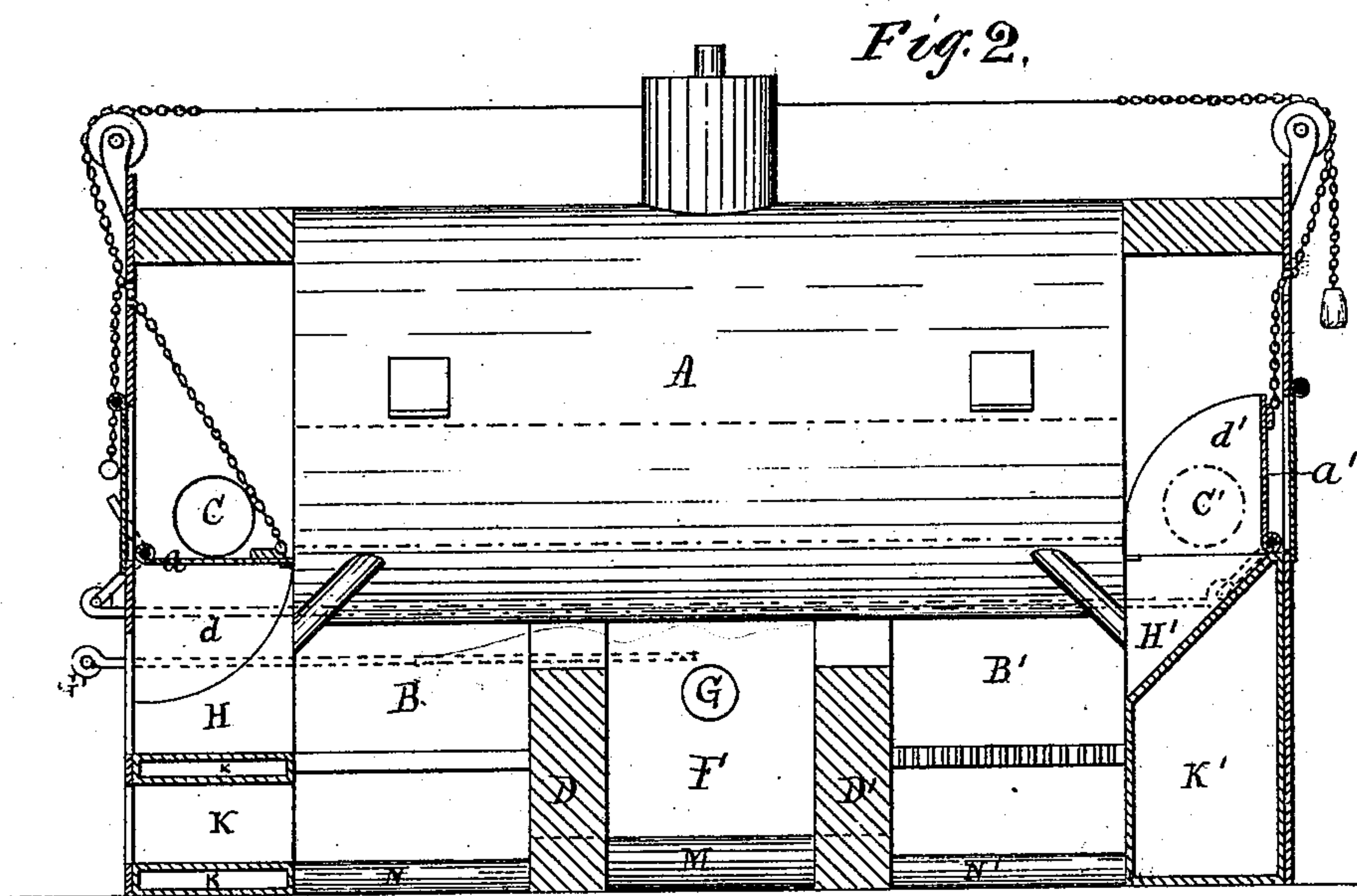
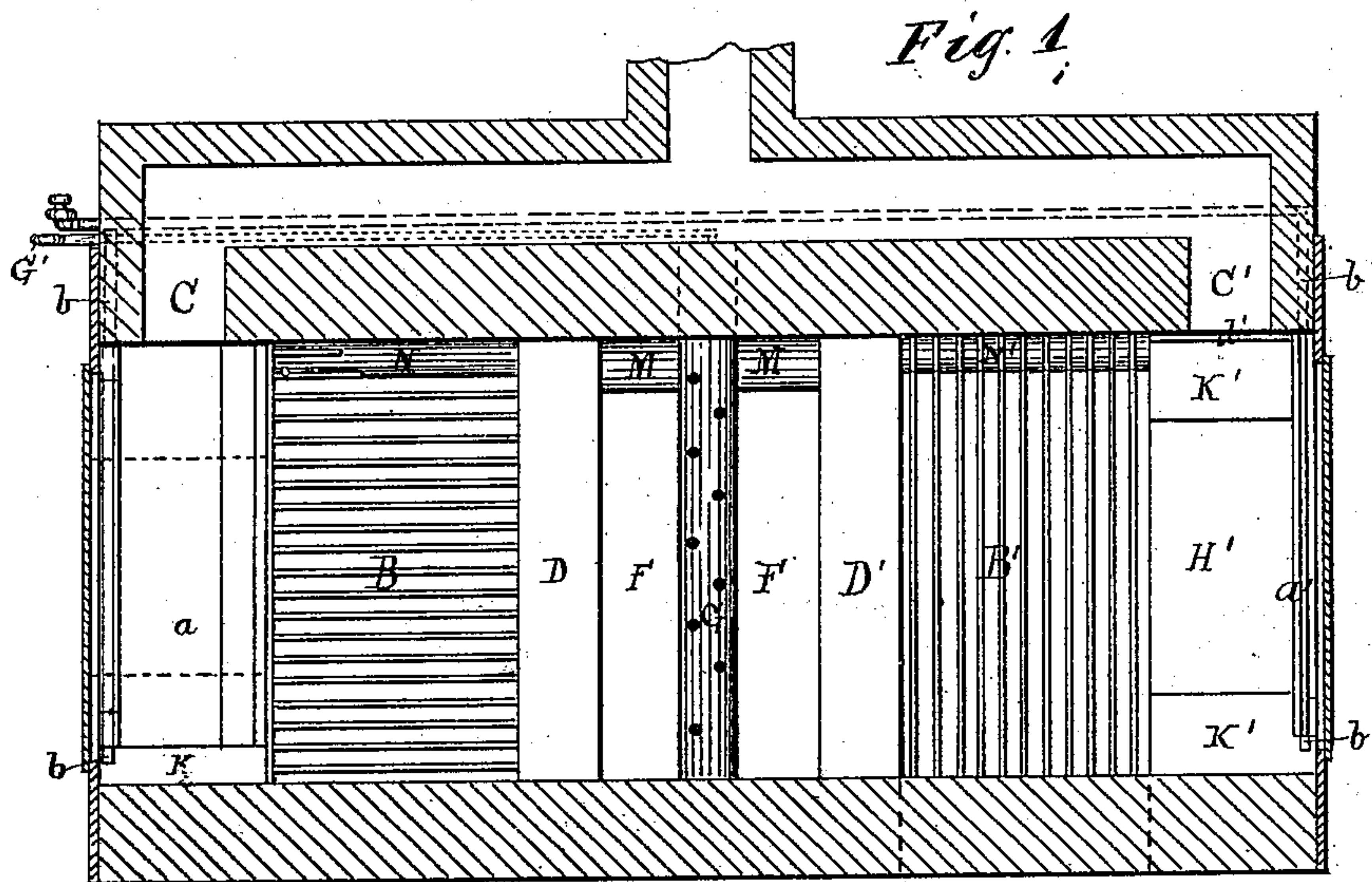


R. L. WALKER.

FURNACES FOR THE COMBUSTION OF FUEL.

No. 180,178.

Patented July 25, 1876.



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# UNITED STATES PATENT OFFICE.

ROBERT L. WALKER, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN FURNACES FOR THE COMBUSTION OF FUEL.

Specification forming part of Letters Patent No. 180,178, dated July 25, 1876; application filed March 16, 1876.

*To all whom it may concern:*

Be it known that I, ROBERT L. WALKER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Combustion of Fuel, of which the following is a specification, taken in connection with the accompanying drawings, making a part hereof.

The main feature of my invention consists in the use of two separate and distinct fire-boxes, in combination with flues and dampers, so arranged that the products of combustion from either fire-box may be compelled to pass through the other fire-box in a reverse direction, all as hereinafter more particularly described; and the main object of my invention is to more thoroughly consume, when soft or bituminous coal is used.

It is well known that when such coal is used much of the fuel is dissipated and wasted in the form of smoke and soot, and also of gases fit for fuel, but which are not consumed; but I have discovered that if these products of imperfect combustion be caused to pass through a fire-box containing a mass of glowing fuel, they will be perfectly consumed, a proper supply of air being, of course, provided.

The best mode known to me for carrying my invention into practice is that illustrated by the drawings, where—

A represents the boiler usually used—namely, a cylindrical boiler, with two or more tubes extending through it. B B' are two fire-boxes, one at each end of the boiler A. C and C' are the mouths of two flues, which lead to the chimney.

When the flue C' is closed, the products of combustion from the fire-box B pass over the bridge-wall D, (as usual in the common fire-box of a steam-generator,) through the chamber F, which contains a pipe, G, for the supply of air, and thence over the bridge-wall D', but from rear to front instead of in the usual way, and into the fire-box B', and there mingle with the products of combustion of the fuel in the fire-box B', and these commingled products of combustion then pass out of the fire-box B'—not over its bridge-wall D', as usual, but through the mouth H'; and this working backward of the fire in one of the two fire-boxes is an essential feature of my invention and its

distinguishing characteristic, being, so far as I know, new with me. After thus passing through the mouth H', these commingled products of combustion pass through the tubes of the boiler A, and thence through the flue C to the chimney. When the flue C' is opened, and the flue C is closed, the products of combustion from the fire-box B' pass over the bridge-wall D', in the usual way, through the chamber F, over the high wall D in the reverse direction, and mingle with the products of combustion of the fuel in the fire-box B, and these commingled products of combustion pass through the mouth H of the fire-box B—that fire working backward in this case—into and through the tubes of the boiler A, and out through the flue C'.

It will be obvious from the above description that if a bright fire be burning in one of the fire-boxes—say B'—and fresh coal be added to the fire in the fire-box B, the unconsumed products of combustion, which are given off largely by the fresh fuel in fire-box B, will be thoroughly consumed in their passage over the bright fire in the fire-box B'; and the same is true when the draft is reversed, and fresh fuel fed into the fire-box B'.

This mode of burning fuel is, so far as I am aware, of my invention.

The dampers *a a'*, which control the flues C C', are mounted upon the shafts *b b'*. These same shafts also carry the dampers *d d'*, which control the mouths H H' of the fire-boxes B B'; and these dampers should all be so connected together that moving one set will simultaneously move the other set. Two ways for effecting this are shown in the drawings, one consisting in connecting the two shafts *b b'* by levers and rods, and the other consisting in connecting the two dampers *d d'* by a chain on pulleys, the dampers being heavy enough to fall when the chain is slacked.

The fire-boxes may be fed from the front or from the side. B is shown as fed from the front, and B' from the side.

The side walls of the fire boxes may be made of, or provided with, auxiliary heaters, properly connected to the boiler; but this forms no part of my present invention. But I have contrived the hollow cast-iron heaters K K', suitably connected to the boiler, and so placed



as to form the mouths  $H H'$ , and give a firm support for the dampers  $d d'$ . The heat in the mouths  $H H'$ , when the draft is from the fire through the mouth, will be so intense as to require a frequent renewal of the brick, if fire-brick be used to form this mouth; and fire-brick subjected to such intense heat will not answer well as a support for the dampers  $d d'$ .

The feed-water pipe  $M$  should connect by the pipes  $N N'$  with the heater  $K K'$ . The pipe  $G$  should be perforated, and its outer end controlled by a damper,  $G'$ , to regulate the supply of air to the chamber  $F$ . The dampers  $a a'$  and  $d d'$  should be made of fire-brick,

properly supported, or be otherwise constructed to resist intense heat.

What I claim as my invention is—

The combination of the furnaces and the dampers  $a a' d d'$  with the boiler, constructed and operating together to produce a current or draft through the furnace and the flues of the boiler, first in one direction, and then in the opposite direction, all substantially as described.

ROBERT L. WALKER.

Witnesses:

J. E. MAYNADIER,  
J. E. KNOX.