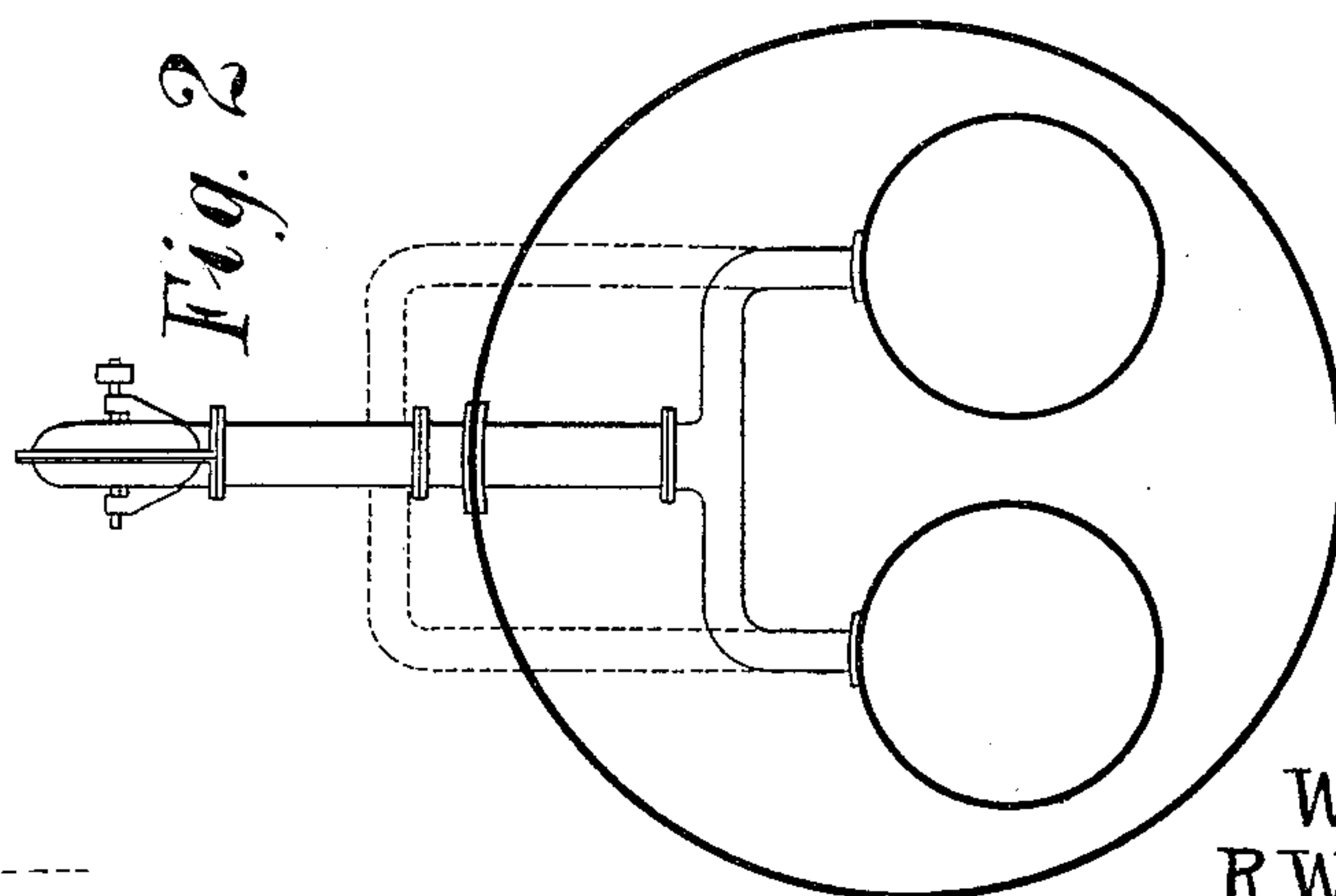
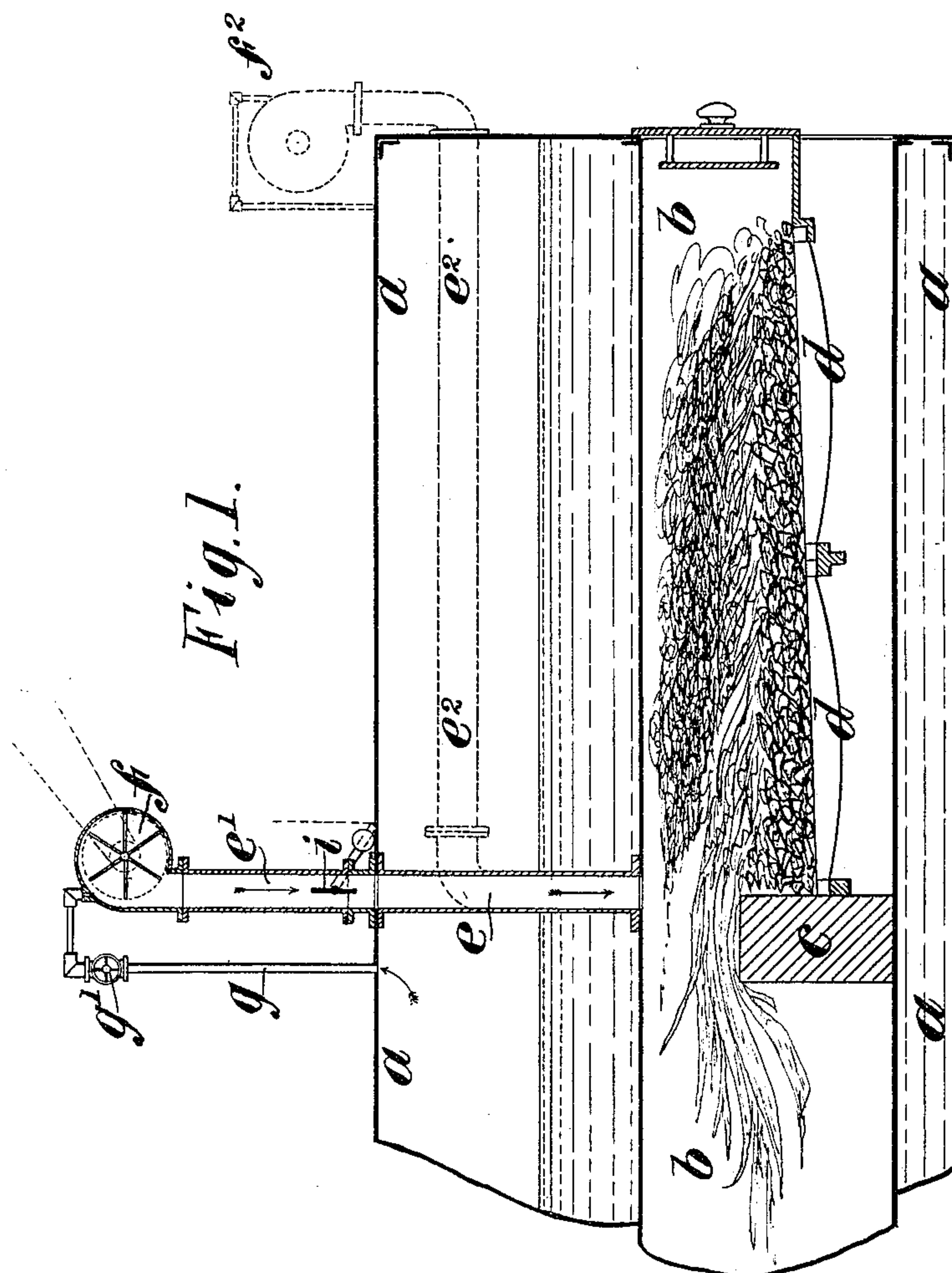


(No Model.)

W. P. WHITE & R. WALLBANK.
PROMOTING COMBUSTION IN FURNACES.

No. 405,817.

Patented June 25, 1889.



Witnesses.

H. de Vos.

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INVENTORS.

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UNITED STATES PATENT OFFICE.

WILLIAM P. WHITE, OF MANCHESTER, AND ROBERT WALLBANK, OF BOLTON-LE-MOORS, COUNTY OF LANCASTER, ASSIGNORS TO JAMES HENRY HEAP, OF ACCRINGTON, ENGLAND.

PROMOTING COMBUSTION IN FURNACES.

SPECIFICATION forming part of Letters Patent No. 405,817, dated June 25, 1889.

Application filed December 20, 1888. Serial No. 294,221. (No model.) Patented in England April 5, 1888, No. 5,053.

To all whom it may concern:

Be it known that we, WILLIAM PAYNE WHITE, of Manchester, county of Lancaster, England, agent, and ROBERT WALLBANK, of 42 Back Commission Street, Bolton-le-Moors, also in the county of Lancaster, England, operative, have invented certain Improvements in Means for Promoting the Combustion of Gases in Steam-Generator and other Furnaces, (for which we have obtained a patent in Great Britain, No. 5,053, dated April 5, 1888,) of which the following is a specification.

Our invention relates, principally, to the furnaces of steam-generators, and has for its object to lessen the production of smoke by promoting the more perfect combustion of the gases which are developed from the burning fuel in the furnaces, as is well understood. To this end we deliver air into the restricted space above the bridge, or into a part of the flue near this point, the current of air being induced by the action of a fan or blower which is operated by a wheel or steam-turbine which is acted upon by a jet or by jets of steam, or the fan or blower is directly acted upon by the steam. The air becomes heated on its way from the fan to the point of delivery. The heated air mingling with the gases or products of combustion of the fuel effects the more complete combustion of the carbon, and thereby prevents or lessens the production of smoke and effects an economy in the consumption of fuel.

Our invention, although designed principally for use in connection with steam-generator furnaces, may be applied to other furnaces for which it may be suitable.

In order that our said invention may be properly understood, we will now proceed more particularly to describe the same with reference to the annexed drawings, in which—

Figure 1 is a sectional view of a portion of the shell and flue of a steam-boiler to which our invention is shown applied.

In the said figure, *a* is the shell of the boiler, *b* is the flue, *c* is the bridge, and *d* is the furnace-grate. The pipe whereby the air is led to the furnace is marked *e*. The said pipe is situated above the bridge and over the

front thereof, so as to command the smoke and products of combustion as they are passing or about to pass over the bridge *c*. We at present consider the position of the pipe as indicated in the drawings to be most favorable to the purposes of our invention; but we do not confine ourselves to this position, as it might be placed farther back or farther forward. The pipe *e* extends through the boiler-space to the outside of the boiler, where it is connected with another pipe *e'*, which is surmounted by or placed in communication with a fan *f* or other air forcing or blowing apparatus suitable for creating a current of air downward into the flue. The fan *f* is preferably driven by a jet of steam led by the pipe *g* from the boiler or from another source of pressure, which jet of steam impinges upon the tips of the vanes and rotates the fan *f*, so as to draw a supply of atmospheric air and force it through the pipes *e e'* into the flue. The steam-jet may be governed or cut off by a valve *g'*. In its passage through the pipe *e* the air becomes heated and is discharged above the bridge upon the smoke and heated products of combustion, causing them to burst into flame. The emission of smoke is thereby prevented, and the fuel burned in the furnace is more completely utilized.

Instead of leading the air-pipe *e* directly through to the flue and bridge, as shown in the drawings, we might lead it from the front or back or from another part of the boiler. For example, in the drawings we have indicated in dotted lines the position of the pipe when extended to the front of the boiler, the said dotted lines being marked *e²*. The air-forcing apparatus would in that case be fixed at or near the point where the pipe *e²* enters the shell and as indicated by the dotted lines *f²*. We do not, however, restrict ourselves to the position or direction of the air-pipe, as it might be introduced into the boiler at any suitable point and led in any desired direction, so long as it is caused to discharge into the flue and above the bridge in the manner indicated. To regulate or to cut off the supply of air to the furnace, we place a throttle-valve *i* in the pipe *e'*, which is opened and

closed by a weighted lever and chain or by any other suitable means.

In the cases of boilers having more than one furnace each furnace may be supplied by
5 a separate fan, or one fan may supply air to two or more furnaces.

The diagram Fig. 2 indicates how a single fan may supply air to two furnace-flues by means of a breeches-pipe fixed either inside
10 or outside of the boiler, as preferred. More than one air-pipe may be used for each flue.

The invention is applicable to furnaces other than those of steam-generators.

We are aware that air and air and steam
15 combined have been heretofore fed to the flues or furnaces of steam-boilers in various manners, and we do not wish to be understood as claiming, broadly, such application of air or air and steam to promote combustion.

We claim as our invention—

The combination, with the furnace and boiler, of the air-pipe leading through the boiler and delivering into the furnace-flue, as described, the fan *f* and its casing situated at the outer end of said pipe, and the steam-pipe
25 *g*, extending from the boiler and delivering a steam-jet for actuating said fan, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of
30 two subscribing witnesses.

W. P. WHITE.
ROBERT WALLBANK.

Witnesses:

DAVID FULTON,
FREDK. DILLON.