

W. R. MARSHALL & T. HARGREAVES.  
SMOKE CONSUMING APPARATUS.  
APPLICATION FILED JULY 5, 1906.

966,109.

Patented Aug. 2, 1910.

Fig. 1

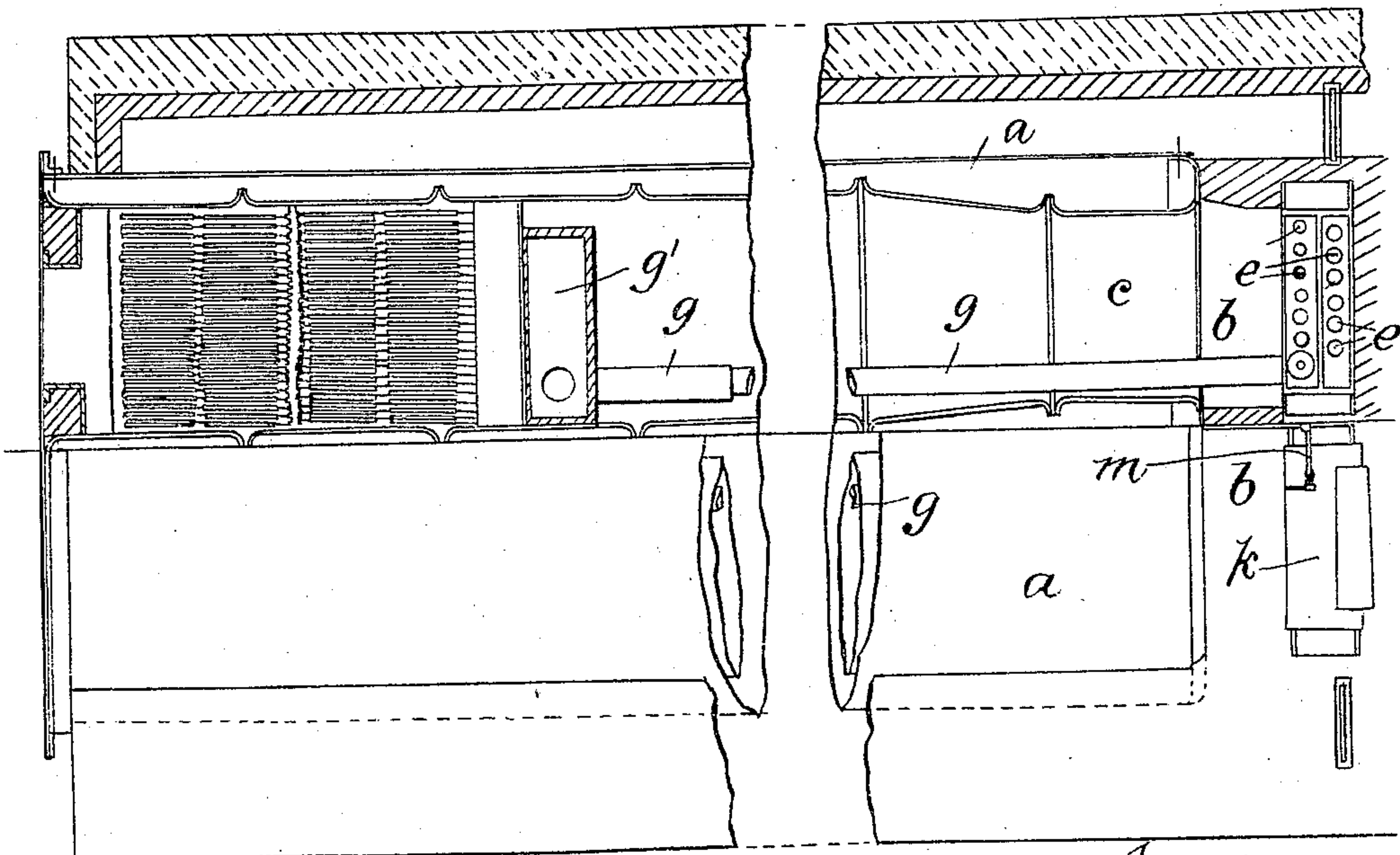
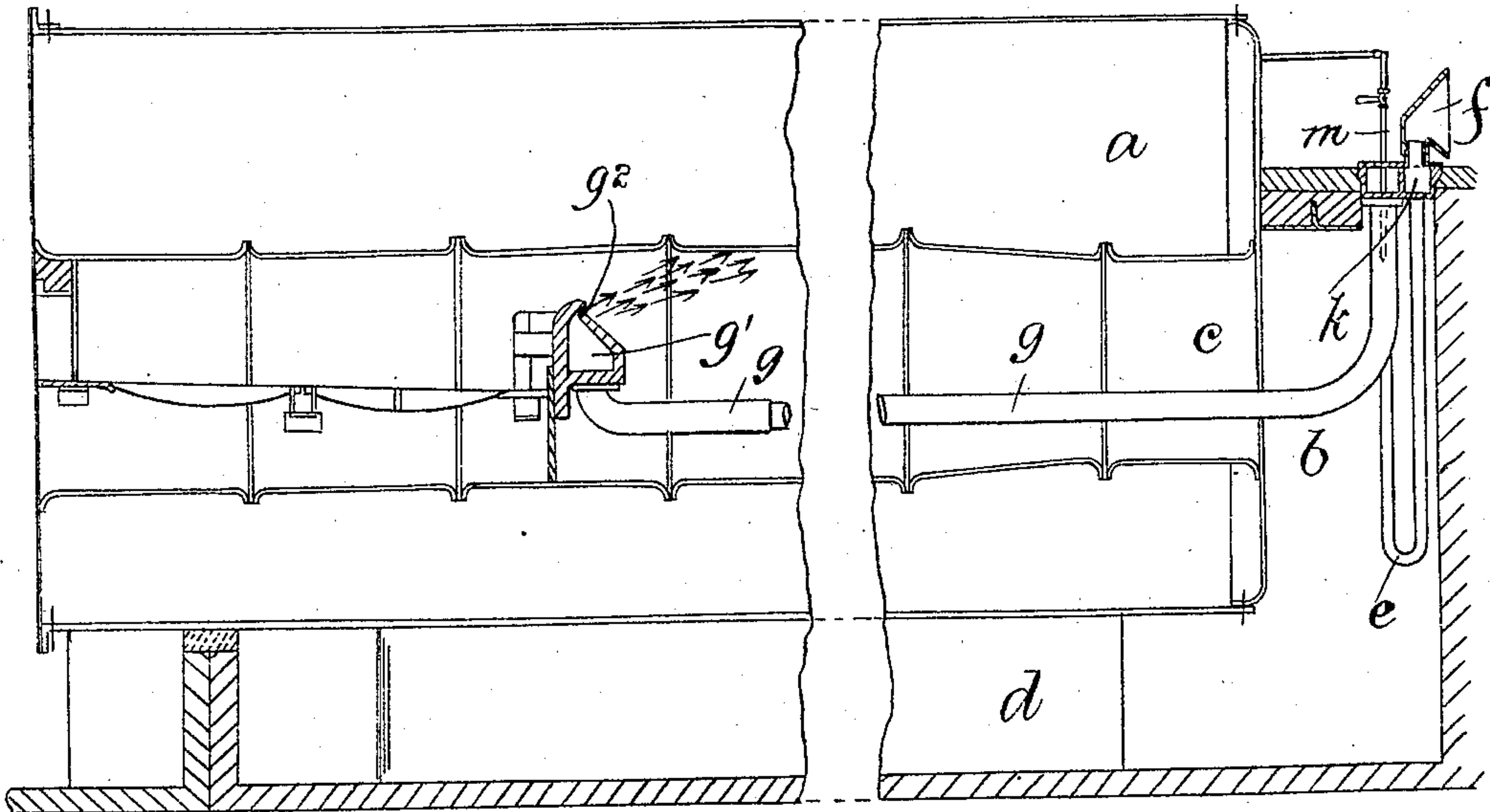


Fig. 2

Witnesses  
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# UNITED STATES PATENT OFFICE.

WILLIAM RAMSAY MARSHALL, OF OLDHAM, AND THOMAS HARGREAVES, OF ASHTON-UNDER-LYNE, ENGLAND, ASSIGNORS TO VICTORY SMOKE CONSUMER AND FUEL ECONOMISER COMPANY LIMITED, OF OLDHAM, ENGLAND.

## SMOKE-CONSUMING APPARATUS.

966,109.

Specification of Letters Patent.

Patented Aug. 2, 1910.

Application filed July 5, 1906. Serial No. 324,710.

*To all whom it may concern:*

Be it known that we, WILLIAM RAMSAY MARSHALL and THOMAS HARGREAVES, residents, respectively, of Birchdene, Frederick street, Werneth, Oldham, in the county of Lancaster, England, and 20 Blandford street, Ashton-under-Lyne, in the said county of Lancaster, England, have invented certain new and useful Improvements in Smoke-Consuming Apparatus, of which the following description, together with the appended sheets of drawings, is a specification.

For the purpose of consuming the smoke escaping from the furnaces of steam generators it has been found that by supplying a current of heated air to a proper part of the furnace or the flue leading therefrom this could be effected. To supply this heated air to the desired part and in sufficient volume many devices have been made use of among which are those having heating devices at the rear of the boilers with pipes or conduits leading therefrom to that part within the flue styled "the bridge" while others have had the heating devices beneath the fire bars with connections leading therefrom to same parts, however in all cases where such apparatus has heretofore been employed some disadvantage or inefficiency has been found in connection with its use, either by reason of its interference with the draft through the grate bars of the furnace or with the actions of the operative when performing his duties. Or when the parts have been arranged at the back of the furnace with connecting tubes leading therefrom to the "bridge" without approaching the fire bars then in connection with such devices no use has been made of the proportioning of the pipes so as to induce the heated air to flow in the right direction although such proportioning of the pipes has been made use of in connection with other arrangements of the heating devices than those situated at the rear of the boilers, while when a jet of steam has been heretofore employed to induce the flow of the heated air such steam has not been admitted at the proper part of the current's course to attain the best results.

Our invention consists in re-arranging the several parts of the devices in combination so that by their relative positions and di-

mensions all the best features of each part are brought into use and allowed freedom of action thus attaining results which are not attainable by any of the many arrangements or combinations of parts heretofore employed.

In the accompanying sheets of drawings, which are illustrative of our said invention:—Figure 1 is sectional side elevation of a steam generator showing the application thereto of our improvements. Fig. 2 is part sectional plan thereof.

Similar letters and figures of reference indicate similar parts in both of the views.

In accordance with our said invention, we arrange within the space *b* at the rear of the boiler *a* and in proximity to the furnace flue *c* and the flue or "flame bed" *d* a suitably formed series or coils of pipes or tubes *e* to which air is admitted through the inlet *f* at the rear of the boiler *a*. A pipe *g* leads from the pipes *e* through the flue *c* to connect them with the hollow bridge or chambered casing *g'* which is provided with an elongated opening or slit *g''* at the part most suitable for directing the current of heated air which it conducts in a thin stream to the furnace or flue *c* and in a rearward direction as shown by the arrows.

The pipes or tubes *e* have header connections such as boxes *h*, all of the pipes terminating at one end in one box and at the other end in another box, the inlet *f* connecting with one box and the pipe *g* leading from the other box.

The pipes *e* are heated by the hot gases or products of combustion passing through the chamber or cavity *b* and the flue or "flame bed" *d* to the uptake or chimney, thus the air drawn through them will be heated thereby to a considerable temperature, so that after passing therethrough and through the pipe or tube *g* connecting the coil heater *e* with the hollow bridge or chambered casing *g'* where it is further heated, said air will be admitted to the furnace or flue at the temperature desired, and that without greatly diminishing or detracting from the efficient heat of the furnace.

The opening or passage through the inlet *f* to admit fresh air to the pipes *e* as well as those through said pipes *e* are of less area in cross section than the pipe which leads therefrom to conduct the heated air to the cham-



ber  $g'$ , for the reason that as is well known, the air on being heated expands and by thus affording extra space in the pipe to allow such expansion, the traveling of the air in  
5 this direction is effected or secured and that in ordinary cases in sufficient quantities or with sufficient force to pass out through the opening or slit  $g^2$  to support the combustion of the escaping inflammable gases at this  
10 part.

A steam pipe  $m$  leads through one of the boxes  $k$  and into the end of pipe  $g$ , to aid in causing a flow of air in the proper quantity and in the right direction.

15 Such being the nature and object of our said invention what we claim is:—

The combination with a furnace and boiler, said furnace having a hollow bridge and a passage for the products of combustion, and a pair of headers, of a series of  
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pipes or tubes at one end of the boiler and located in said passage, said tubes at one end being connected by one of said headers and at the other end by the other header, an air inlet leading to one header, a pipe connect- 25 ing the other header with said hollow bridge, the capacity of said series of pipes and the inlet thereto being less than the capacity of the pipe which connects with the hollow bridge, and a steam pipe leading 30 through one header and into the pipe which connects that header with the hollow bridge.

In testimony whereof we have affixed our signatures in presence of two witnesses.

WILLIAM RAMSAY MARSHALL.  
THOMAS HARGREAVES.

Witnesses:

SAMUEL HEY,  
JOHN WHITEHEAD.