

(No Model.)

J. ELLIOTT.
BOILER FURNACE.

No. 248,925.

Patented Nov. 1, 1881.

Fig. 1.

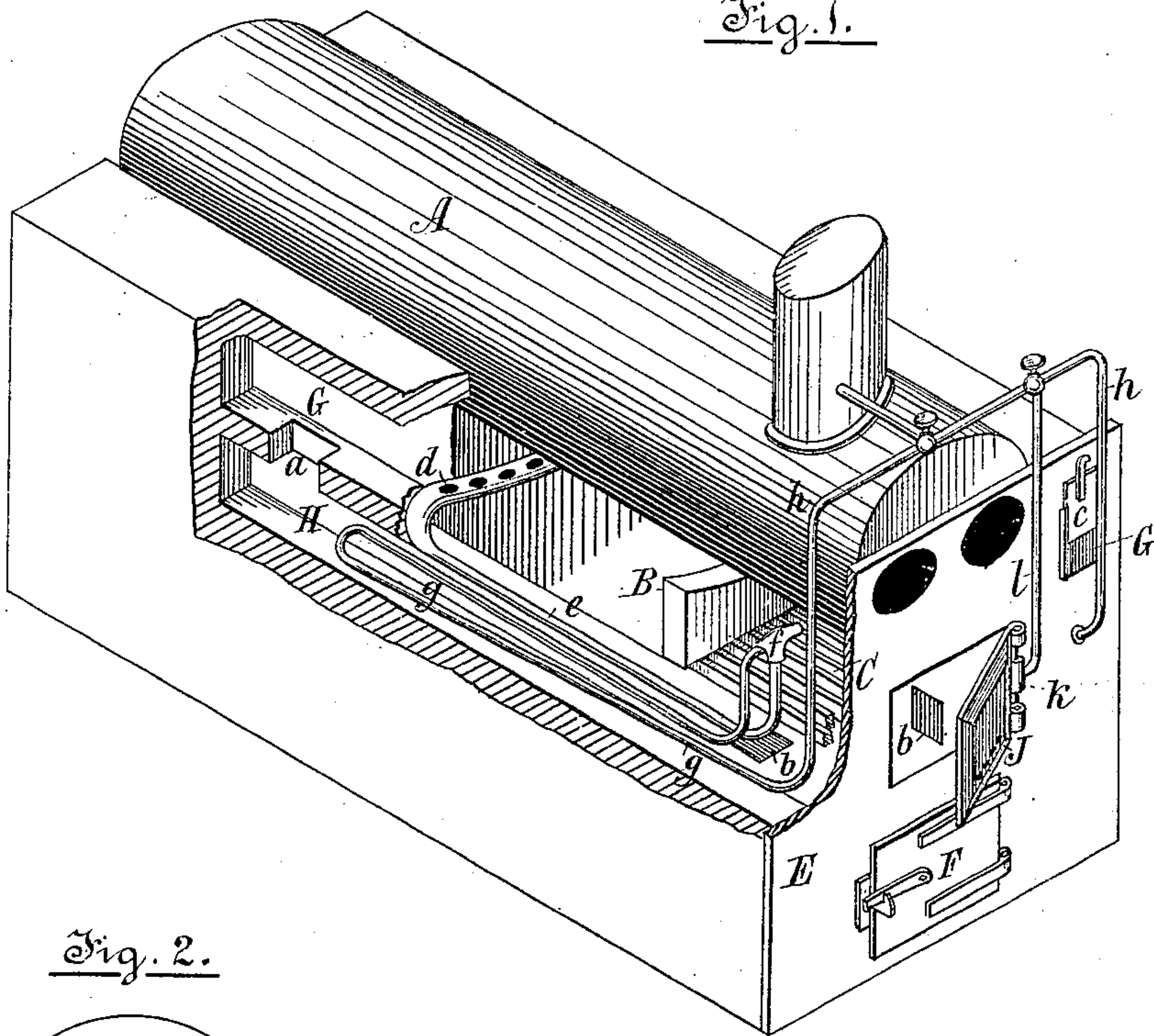


Fig. 2.

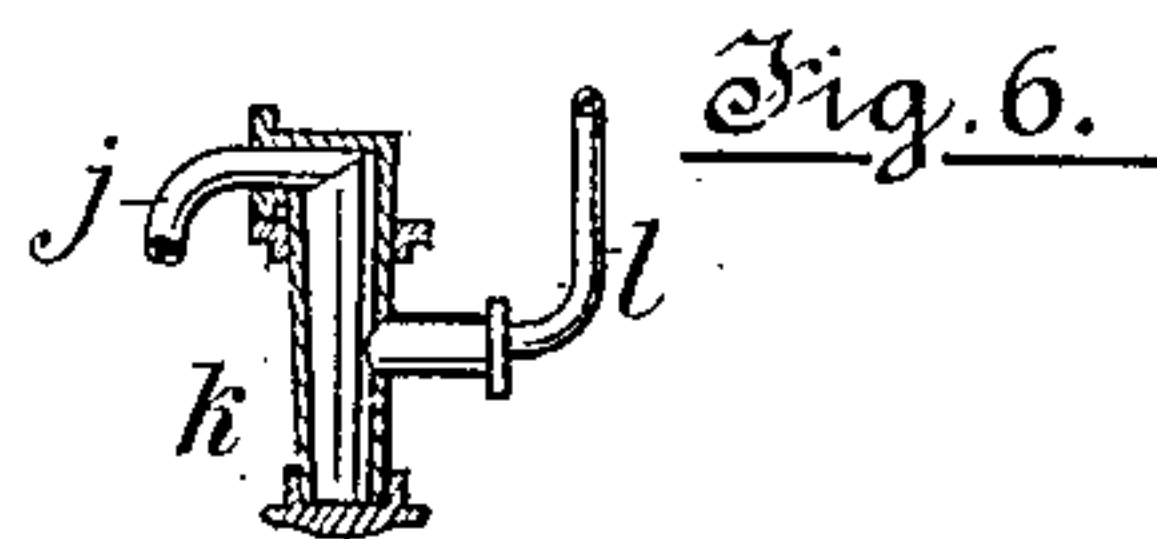
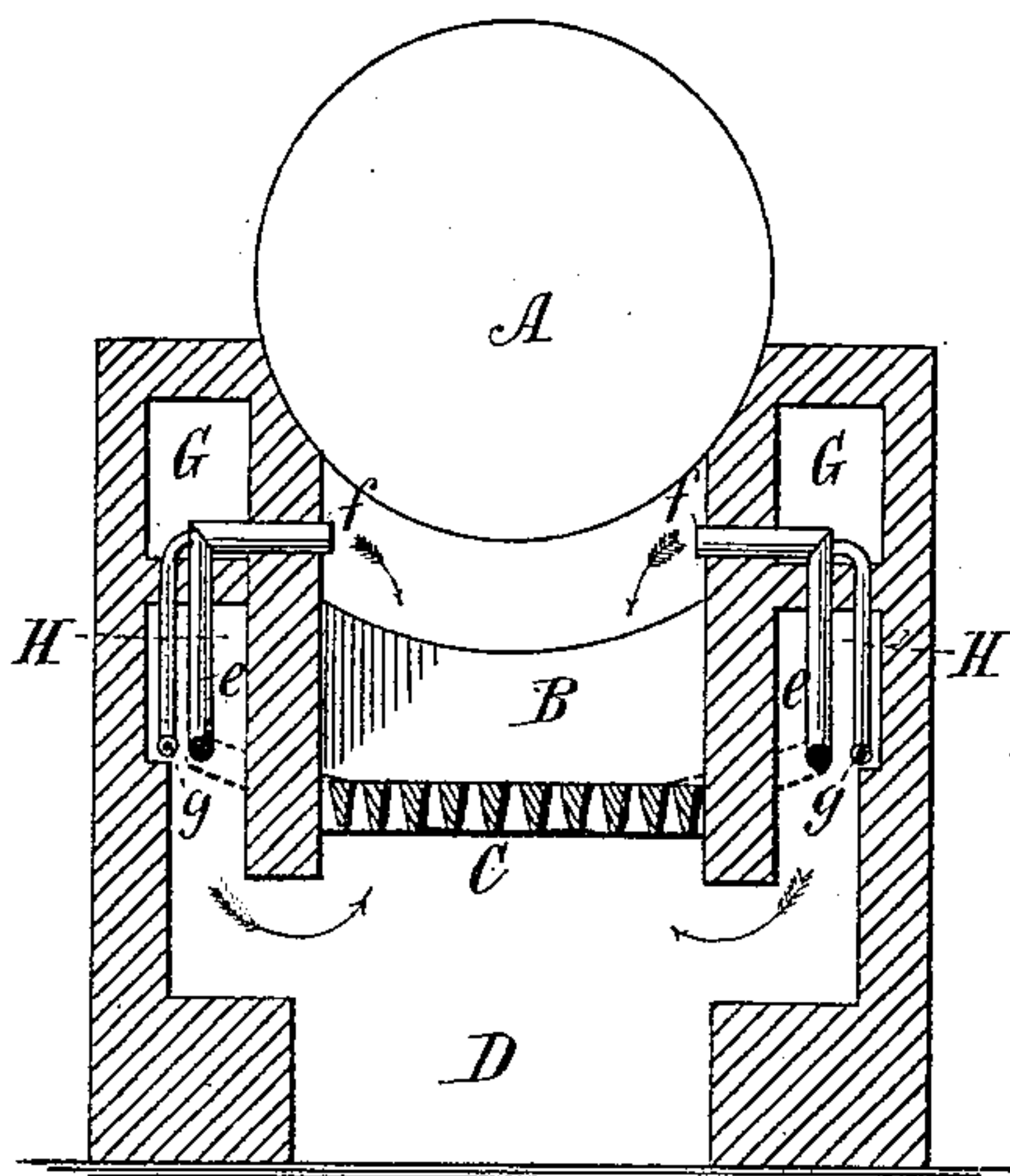


Fig. 3.

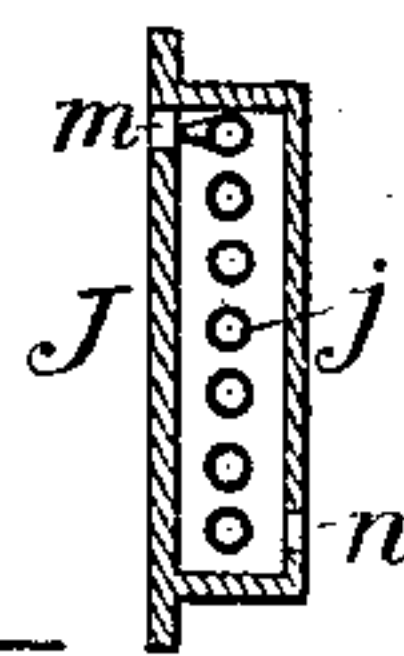


Fig. 4.

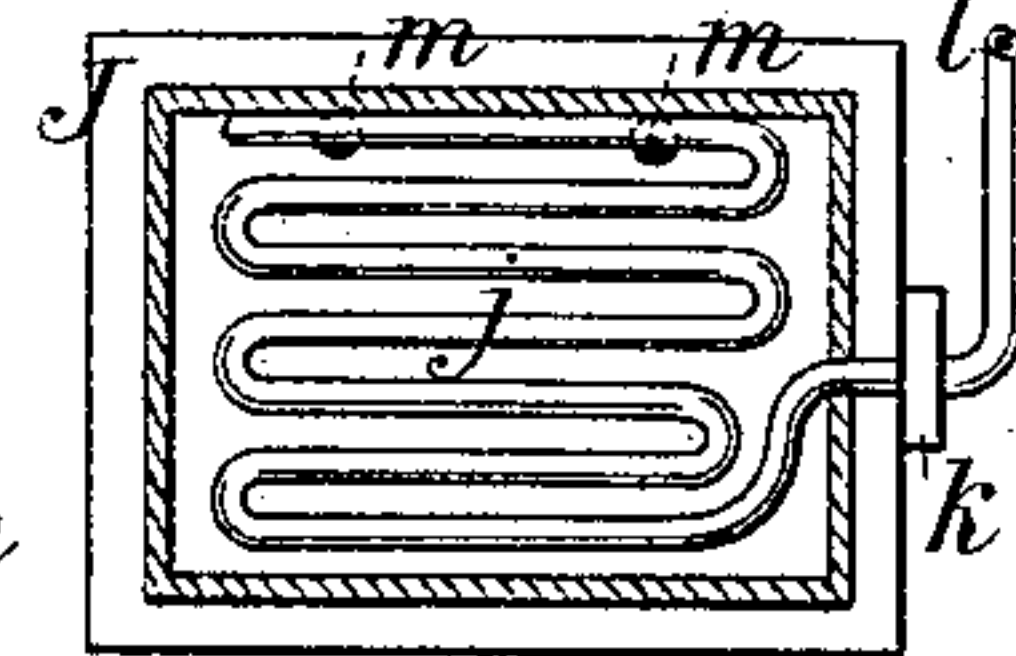
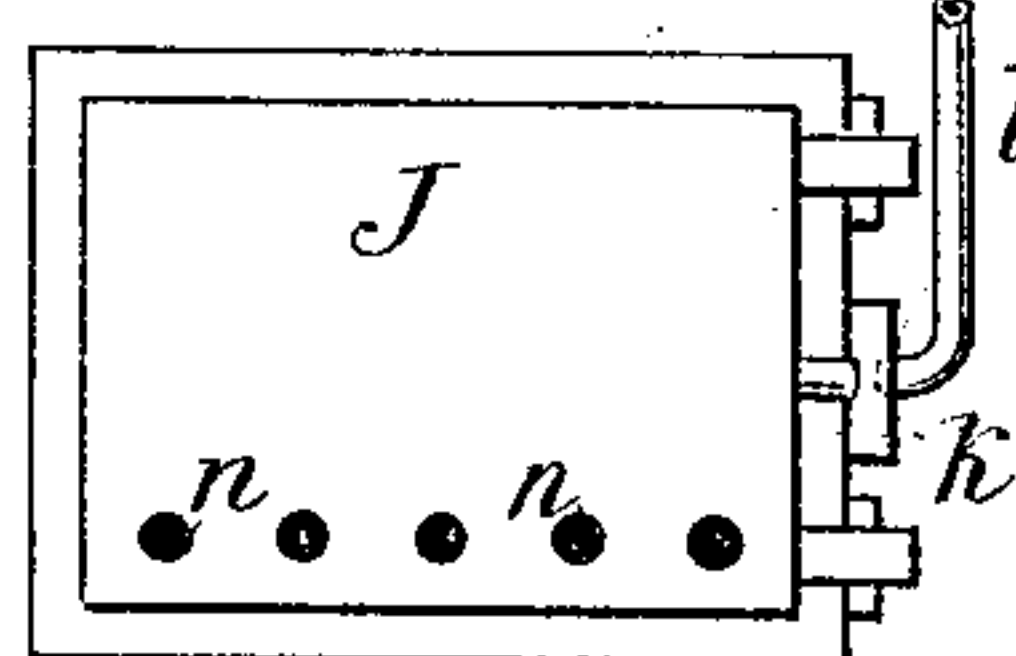


Fig. 5.



Witnesses:

E. P. Smith
W. Arthur Kellogg

Inventor.

James Elliott
Per Atty. Charles R. R. R.

UNITED STATES PATENT OFFICE.

JAMES ELLIOTT, OF MONTREAL, QUEBEC, CANADA, ASSIGNOR OF TWO-THIRDS TO ROBERT ARTHUR KELLOND, OF SAME PLACE, AND HASCAL ALFRED HOGEL, OF YONKERS, NEW YORK.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 248,925, dated November 1, 1881.

Application filed April 15, 1881. (No model.)

To all whom it may concern:

Be it known that I, JAMES ELLIOTT, of the city and district of Montreal, in the Province of Quebec and Dominion of Canada, engineer, have invented a certain improvement which I believe to be new and useful in boiler-furnaces for the generation of steam and for other purposes. This improvement is fully set forth in the following specification and accompanying drawings.

The object of my invention is to save fuel in the working of steam-boilers, and at the same time and by the same apparatus to obviate the nuisance of smoke issuing from the chimney. This I claim to have accomplished in a more simple, economical, and efficient manner than heretofore by my improved apparatus, which consists in an arrangement whereby the air supplied to the furnace is heated previously to being introduced under the grate-bars, and at the same time the unconsumed gases are drawn by means of a jet or jets of superheated steam and hot air (over the fire-bars,) the ordinary opening for the admission of external air under the grate being tightly closed. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is an isometrical perspective sectional view as applied to an ordinary cylindrical boiler, in which certain parts are supposed to be removed in order to show more clearly the entire improved arrangement. Fig. 2 is a transverse section through the fire-box. Figs. 3, 4, and 5 are external and sectional views of my improved furnace-door, and Fig. 6 the self-regulating tap.

The same letters refer to similar parts throughout the several views.

Letter A represents the boiler; B, the bridge at back of furnace; C, the grate-bars; D, the ash-pit; E, end plate of boiler-furnace, all which parts are constructed in the ordinary manner.

The mouth of the ash-pit is provided with a door, F, which can be opened or closed at pleasure, but during the operation of my improved apparatus is kept tightly closed.

G G are flues or, rather, air-passages built in the brick-work of the furnace-walls or running along the same, one on each side, toward the

top and close alongside of the fire-chamber, extending toward the back end of the boiler, where they are connected by the outlets or openings *a a* with two similar return-flues or air-passages, H H, extending toward the front end, and having their outlets at *b b*, underneath the grate-bars. The outer ends of the passages G G are protected by adjustable sliding doors or dampers *c*, mounted on the front plate of the furnace-wall E, for the proper regulation of the amount of air admitted for the hot-air draft. This draft is further assisted by placing a perforated pipe or channel, *d*, transversely in the passage leading from the furnace to the back of the boiler, and connecting the same by two lateral pipes, *e e*, running along the passages H H to the nozzles *f f*, which deliver the heated air, together with the unconsumed gases, from the rear end of the boiler into the furnace over the grate-bars. I also introduce into the flues or passages H H the steam-pipes *g g*, connecting at *h h* with the steam from the boiler, passing throughout the entire length of the passages H H, returning to the front, and connecting at the nozzles *f f* with the pipes *e e*. By this means jets of highly-superheated steam are introduced over the fire, not only drawing and injecting the hot air and gases from the back of the boiler, but at the same time consuming the smoke before it leaves the furnace.

Another part of my improvement consists in the employment of a hollow steam-heated furnace-door, J, which may be constructed as shown in Figs. 3, 4, 5, and 6. It is formed of iron plates, with sufficient space between to admit of an internal steam-pipe, *j*, made into a coil, so as to expose the greatest possible surface to the action of the heat from the furnace. It is connected at the hinge by a self-regulating tap or cock, *k*, to a pipe, *l*, from the boiler, so that when the furnace-door J is closed steam is admitted into the coil *j*, and when partially or fully opened it is cut off. The upper end of the coil *j* is provided with one or more openings, *m m*, admitting the steam, after being superheated, into the furnace over the fire. The outer shell of the furnace-door J, toward its lower side, is perforated with a number of holes, *n n*, admitting the external air, which is thus

highly heated, both by the furnace and steam-coil *j*, and introduced, in combination with the jets of superheated steam, through the openings *n n* into the furnace over the fire, thus assisting in the saving of fuel and consumption of smoke effected by the other parts of my apparatus.

It will be seen that the flues *H H* serve a very useful purpose in protecting the pipes *e* and *g* from the burning action of the fire, besides effecting their primary object of holding said pipes in such a position that the smoke in the pipes *e* and the steam passing through the pipes *g* may both become highly heated before being discharged into the fire-chamber.

My object in introducing the double flues *G G* and *H H* into my apparatus is to combine in the most feasible way means for covering and carrying the pipes *e* and *g*, as above mentioned, and at the same time heating the cold air brought in from the front of the furnace to a high temperature before discharging same under the grate-bars, and I lay no claim to any other arrangement.

I do not claim, broadly, the use of heated air or of superheated steam, either singly or in combination, for the economy of fuel or consumption of smoke in boiler-furnaces; nor do I herein claim, broadly, the method of drawing and injecting the waste products of combustion into the furnace for the some purposes; or of heating the air and superheating steam by the waste heat of a furnace, because I am aware that all these features of invention have been previously in use in various forms; nor do I intend to limit the scope of my invention to the precise details herein described, and shown in the drawings, so long as the peculiar

character of any part of my invention is retained; but,

Having thus fully described the nature of my invention, what I claim as new, and desire to secure by Letters Patent, is as follows, viz:

1. In a furnace for generating steam or other purposes, a flue or passage made in two divisions, one above the other, and connected by passages near the back, the upper flue or division receiving cold air from outside the furnace, and the lower flue discharging same in a heated condition underneath the grate, in combination with and serving to hold pipes conducting smoke and steam to a point over the grate, substantially as described.

2. A furnace-door inclosing a pipe or coil of pipes to which steam is admitted from the boiler, and from which jets are directed over the fire.

3. A furnace-door made hollow, receiving a coil of steam-pipes, and provided with openings on its outer face for the admission of cold air, and similar openings on its inner side for the discharge of said air in a heated condition over the fire.

4. In combination with a hollow furnace-door receiving air from outside and discharging same over the fire, a jet or jets of steam discharged simultaneously in the same direction, the supply being controlled by a self-acting cock or tap placed at the hinge of the door, all substantially as and for the purpose described.

JAMES ELLIOTT.

Witnesses:

CHARLES ROBB,
R. ARTHUR KELLOND.