

(No Model.)

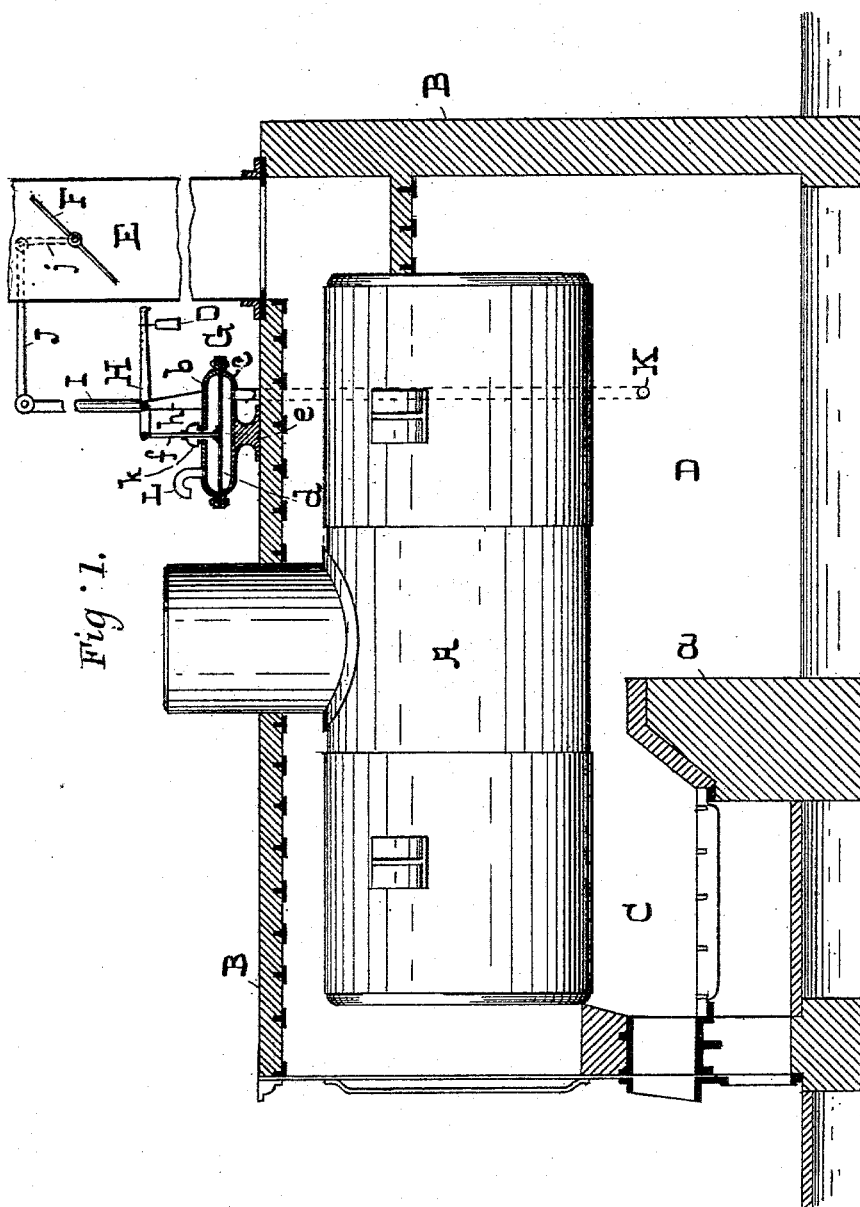
2 Sheets—Sheet 1.

G. L. THIELL.

## APPARATUS FOR CONTROLLING THE DRAFT IN BOILER CHIMNEYS.

No. 490,177.

Patented Jan. 17, 1893.



-WITNESSES-

Dan'l Fisher  
Thomas Courroy

- INVENTOR -

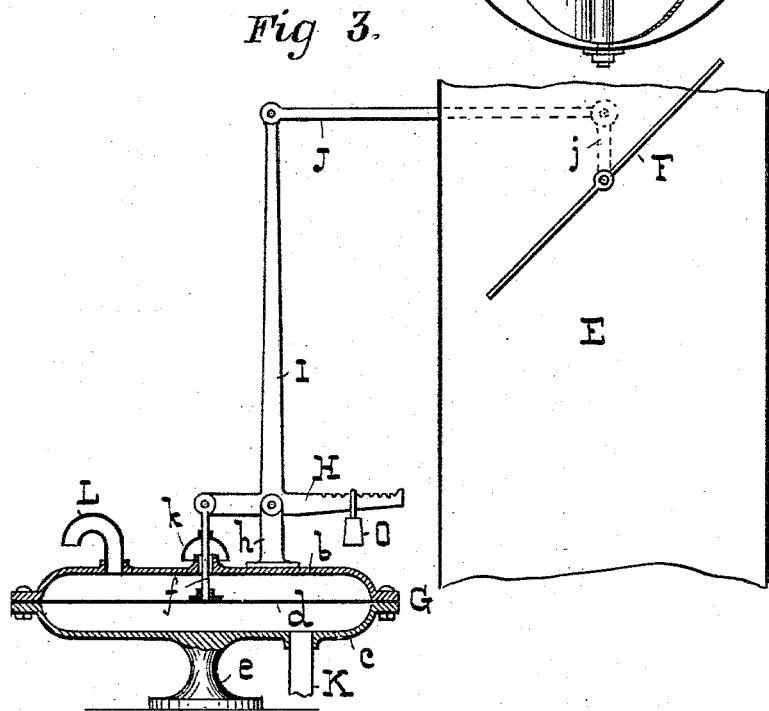
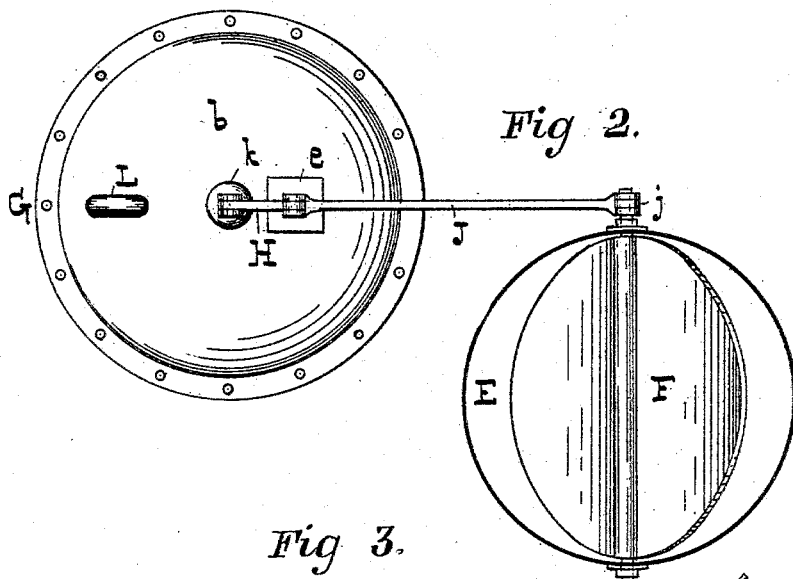
George S. Thell,  
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attys.

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# UNITED STATES PATENT OFFICE.

GEORGE L. THIELL, OF BALTIMORE, MARYLAND.

APPARATUS FOR CONTROLLING THE DRAFT IN BOILER-CHIMNEYS.

SPECIFICATION forming part of Letters Patent No. 490,177, dated January 17, 1893.

Application filed September 22, 1892. Serial No. 446,516. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE L. THIELL, of the city of Baltimore and State of Maryland, have invented certain Improvements in an Apparatus for Controlling the Draft in Boiler-Chimneys, of which the following is a specification.

In all furnaces and the combustion chambers of boilers, there is a certain pressure, below that of the atmosphere, which effects the greatest economy in the combustion of fuel in the said furnace; and the object of the present invention is to automatically maintain that pressure by means of the chimney damper, using primarily as a force or means of effecting the necessary movement of the damper, any excess in pressure of the gases or the atmosphere caused by disturbance of or change in the relative pressures of the gases and the atmosphere which is sought to be maintained.

In carrying out this invention, I employ a diaphragm one side of which is open to the atmosphere, and the other in communication with the combustion chamber of the boiler. With this diaphragm I use a combination of devices whereby its movement, effected by the relative pressures of the air and gases, is communicated to the damper in the chimney, as will hereinafter fully appear.

In the further description of the said invention which follows, reference is made to the accompanying drawings forming a part hereof and in which,—

Figure 1 is a side view of a land or stationary boiler provided with the present invention, the brick setting of the boiler, and certain parts of the invention, being shown in section. Figs. 2 and 3 are enlarged details of the invention.

Referring to the drawings, A is the boiler, and B the brickwork setting.

C is the furnace and D the combustion chamber or smoke box, separated from the furnace by the bridge wall *a*.

E is the stack or chimney in which is swung the damper F.

G is the circular box consisting of the upper and lower sections, represented respectively by *b* and *c*. The sections *b* and *c* are flanged where they are united, and between the flanges is secured a flexible diaphragm *d* im-

pervious to air, and preferably formed of rubber, or thin sheet metal which may be corrugated if desired. The lower section *c* is provided with a stand *e* whereby it is supported from the top of the boiler setting, or from any other fixed body which is at a convenient distance from the chimney E. To the upper face of the diaphragm and centrally thereof, is attached a stem *f* which leads through an opening in the upper section *b*, of the box, and is jointed to a horizontal arm H having its fulcrum in a stand *h*. From the horizontal arm H leads a vertical arm I, and its end is connected by a link J to the damper lever *j*. The lower section *c* of the box G is connected with the interior of the combustion chamber D by a pipe K, and the upper section *b* is in communication with the outer air by means of a pipe L which, to prevent the entrance of dust thereto, is turned down. Air may, however, be admitted around the stem *f* and the annular opening guarded against the entrance of dirt by a hood *k*, or both air passages may be used, as shown in the drawings.

The horizontal arm H is provided with a weight O to counter-balance the gravity of the stem *f*, and counteract the tendency of the diaphragm to sag in the center by its own weight. Supposing the damper to be in the position which at the time gives the proper draft to secure the greatest economy in fuel, and that by either opening the furnace doors, or by the admission of too much air through the bed of coal to the furnace, the pressure in the combustion chamber is raised above that stated, the differential pressure on the diaphragm is changed and the diaphragm elevated by the increased pressure below it, which movement, through the medium of the levers and arms described, is communicated to the damper and that device is somewhat closed. The closing of the damper checks the draft, or in other words retards the entrance of air to the furnace, until by the combination of the oxygen of the air with the gases in the furnace the pressure in the combustion chamber is again reduced, when a reverse action of the diaphragm and damper takes place. Supposing however, that the pressure in the combustion chamber should become too low to effect thorough combustion of the gases, there not being sufficient air or oxygen to properly com-

bine with them, the diaphragm is depressed by the practically increased pressure of the atmosphere, and the damper opened which increases the draft and more air is drawn through the fire.

From the foregoing it will be seen that the draft to produce proper combustion is regulated entirely by the relative pressures of the gases in the combustion chamber, and the atmosphere.

It is evident that a piston working in a cylinder could be used in some cases instead of a diaphragm confined in a box, and I desire it to be understood that wherever the word diaphragm occurs in the description of my invention, it is used as a term synonymous with a piston operating in a cylinder.

I claim as my invention:—

1. As means for operating a damper in a chimney, a movable body subjected at one side to the pressure of the gases in the furnace or combustion chamber, and at the other side to the atmosphere, substantially as specified.

2. In combination with the combustion chamber of a furnace, and a chimney in communication therewith, a movable tight body having one side thereof subjected to the products of combustion from, or in communication with the said furnace, and the other side open to the exterior air, a damper situated in the chimney, and means to connect the said movable body to the said damper, substantially as, and for the purpose specified.

3. In combination with a furnace and a chimney, a damper in the chimney, a box containing a diaphragm one side of which is in communication with the outer air, and the other with the interior of the furnace, and means substantially as described, whereby the movement of the diaphragm is communicated to the said damper, substantially as specified.

GEORGE L. THIELL.

Witnesses:

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