(No Model.)

G. CUMMING.

AUTOMATIC DAMPER FOR STEAM BOILERS.

No. 431,162. Patented July 1, 1890.

FIG. 1.

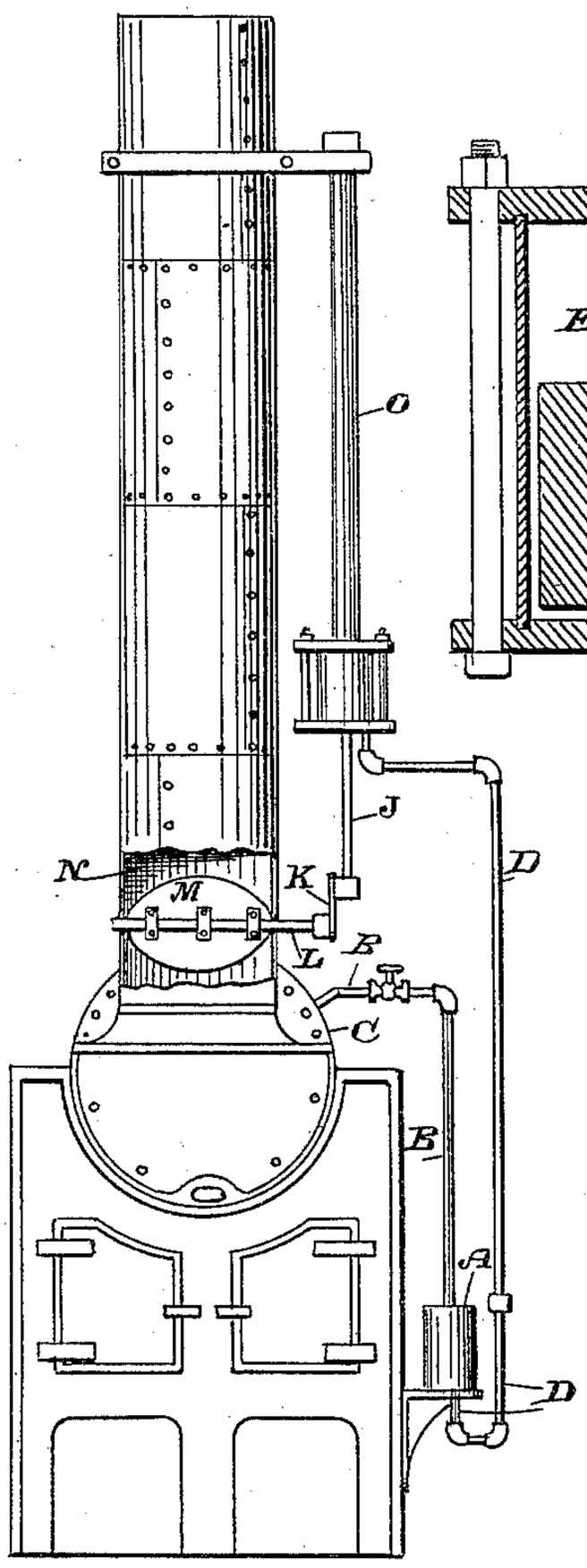
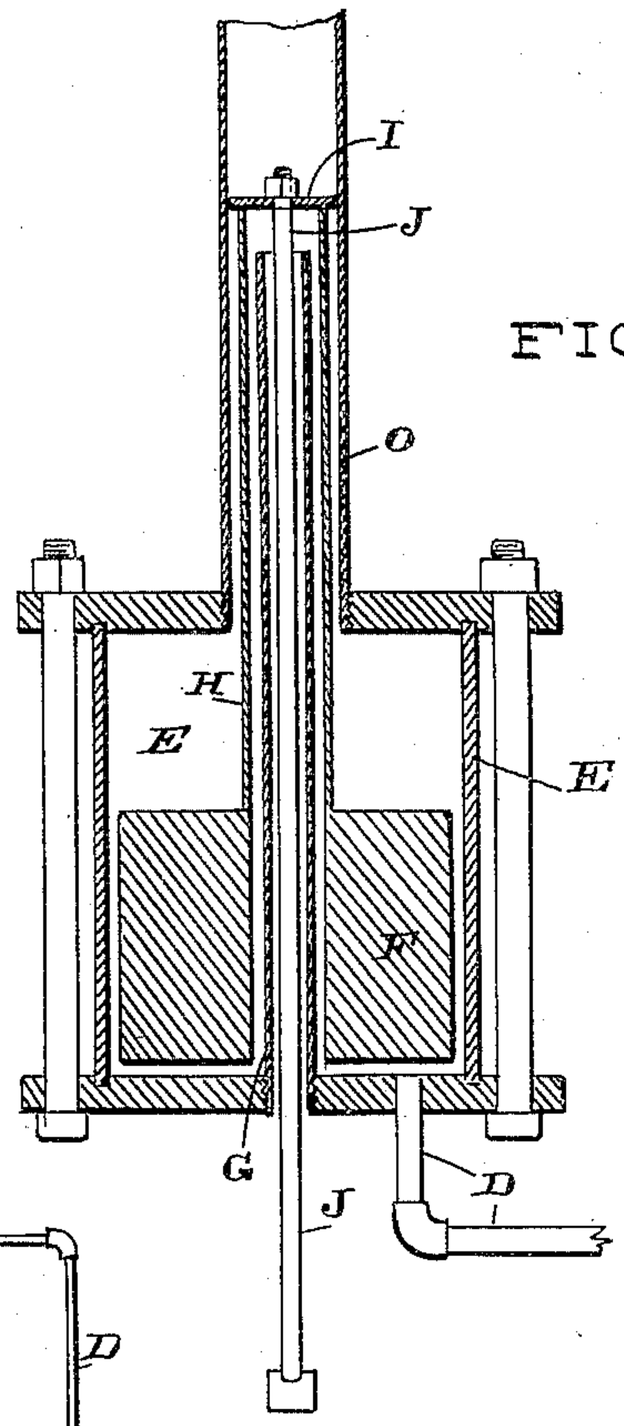


FIG. 2.



Witnesses,
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UNITED STATES PATENT OFFICE.

GEORGE CUMMING, OF SAN FRANCISCO, CALIFORNIA.

AUTOMATIC DAMPER FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 431,162, dated July 1, 1890.

Application filed July 19, 1889. Serial No. 318,057. (No model.)

To all whom it may concern:

Be it known that I, GEORGE CUMMING, of the city and county of San Francisco, State of California, have invented an Improvement in Automatic Dampers for Steam-Boilers; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an automatically-operated damper for steam-boilers; and it consists in the construction and combination of parts which I shall hereinafter fully describe and claim.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a view of the boiler and stack with my device connected with the damper. Fig. 2 is an enlarged vertical section taken through the plunger and its cylinder.

A is a chamber or vessel, of any suitable size, form, and material, adapted to contain a liquid which shall serve to transmit pressure from the boiler to operate the damper. I have found that mercury is a very satisfactory medium for the transmission of this power, but other liquids may be used.

A pipe B extends from the boiler C into the upper part of the containing chamber or vessel A, and is provided with a cock by which communication may be opened or closed at will. This cock being opened the pressure of the steam acts directly upon the surface of the mercury in the vessel and forces it out through the pipe D, which is fitted into the bottom of the vessel A. This pipe may be made of any suitable or desirable length, and may have a height above the chamber A sufficient to serve as a register of the pressure in the boiler, the increasing pressure forcing the mercury up in this pipe. The upper end of this pipe connects with the bottom of the cylinder E, which contains a plunger F. A hole is made through the center of the plunger, so that it fits around the tube G, which screws into the bottom of the cylinder and extends up through its top or cover to a considerable distance. A second tube H, of larger diameter than the tube G, has its lower end attached to the top of the plunger and extends up above the top of the inner tube G, having a cap I upon its upper end. Through this cap the rod J passes, extending downward through the inner tube G and through a hole in the bottom of the cylinder, the lower end of this rod being connected with the crank-arm K, which is fixed upon the shaft L of the damper M. This damper is fitted into the smoke-stack N of the boiler-furnace, and when it is turned serves to open or close the draft to any desired extent. Into the top of the cylinder-cover is fixed another pipe O, which is exterior to those previously described and extends up to any desired height.

The operation will then be as follows: When the pressure of steam in the boiler reaches any desired degree, and it is desirable to close the damper and either wholly or partially shut off the draft, the pressure of the steam acting upon the liquid in the chamber A forces it out through the pipe B and into the bottom of the cylinder E, where it acts to raise the plunger F within this cylinder. This plunger carries with it the tube H, and as it rises it also raises the rod J and acts upon the crank-arm of the damper-shaft, turning the damper so as to close it more or less according to the height to which the plunger is raised. The inner tube G, which is screwed into the bottom of the cylinder, prevents any leakage or escape of the liquid which enters the cylinder beneath the plunger, and the outer tube, which is screwed into the top of the cylinder, allows the liquid to be forced up within it in case the pressure is sufficient to raise the plunger to the top of the cylinder, and to still force the mercury up higher, when this liquid is used, the space around the plunger being sufficient to allow the thin film of mercury to be forced up into this exterior tube, and between it and the tube which carries the valve-rod and which is attached to the piston. The damper being closed to any desired extent, which is determined by previous experiment, the fire will be correspondingly checked, and as the steam-pressure decreases the plunger will descend and the valve will be opened, the operation thus being entirely automatic.

When mercury is used as the intervening medium, the plunger F fits loosely in its cylinder and is floated upon the surface; but if water or other liquid of a less specific gravity is employed the plunger is fitted to move snugly and the opening from the pipe D into

the bottom of the cylinder E is contracted, so that the movement of liquid induced by the varying pressure will be gradual and not sudden.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

A draft-regulating device consisting of a damper and a crank-arm, a plunger adapted to move within a vertical cylinder, a chamber situated below the cylinder, containing mercury and connected by a pipe with the bottom of said cylinder, and a pipe connecting the top of the mercury-chamber with the boiler, as shown, a central tube fixed in the bottom of the cylinder and extending up through a hole in the plunger and through the top of the cylinder, a second tube fixed to the top of the plunger concentric with the first tube and having a cap upon its upper end, a rod connected with the damper-crank extending up through the piston and inner tube, having its upper end secured to the cap of the piston-tube, and a third tube centrally fixed in the top of the cylinder and extending upward so as to inclose the two inner tubes, substantially as described.

In witness whereof I have hereunto set my hand.

GEORGE CUMMING.

Witnesses:
GEO. H. STRONG,
S. H. NOURSE.