

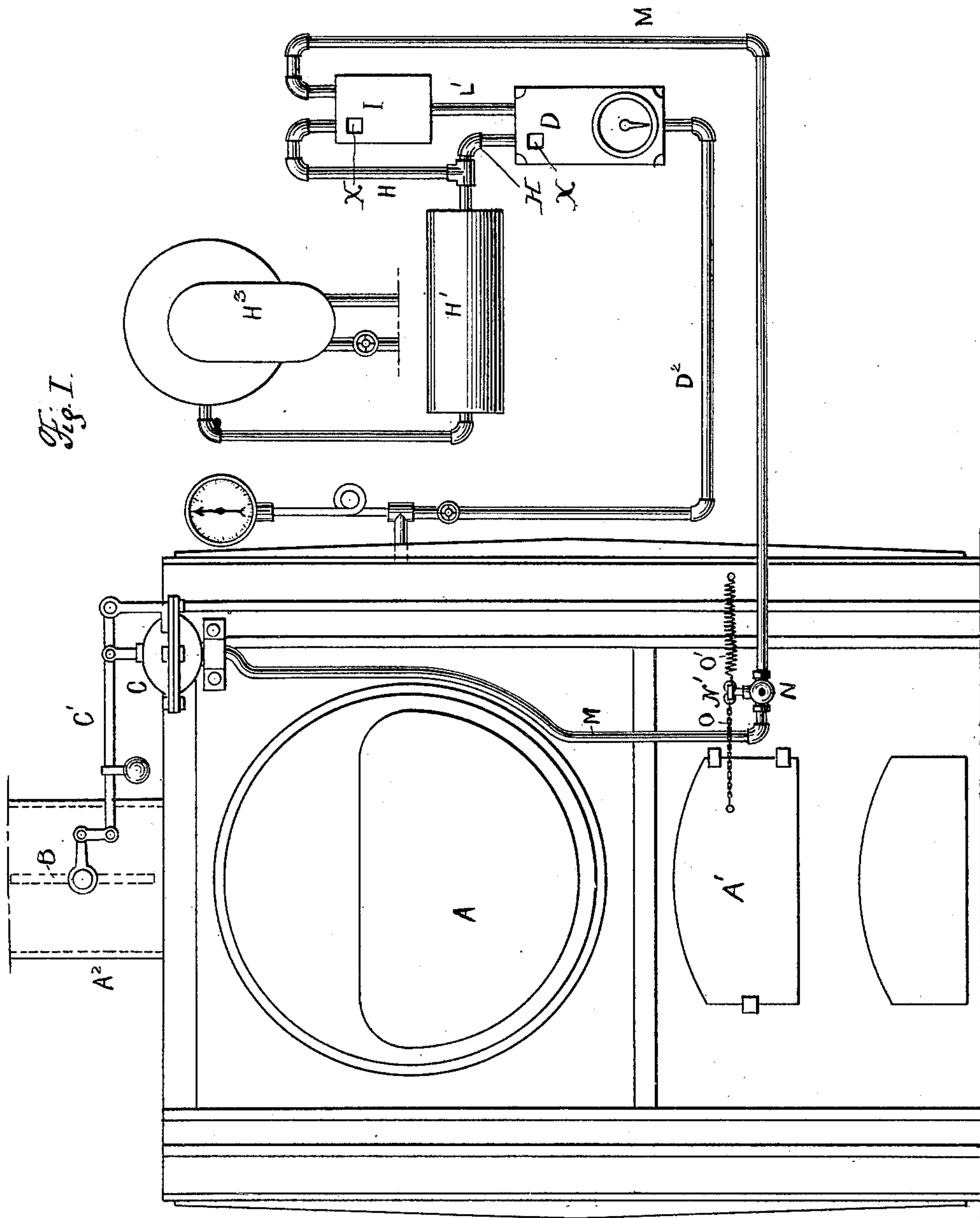
No. 697,705.

Patented Apr. 15, 1902.

D. H. DARRIN.  
DAMPER CONTROLLER.  
(Application filed Jan. 12, 1898.)

(No Model.)

3 Sheets—Sheet 1.



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**No. 697,705.**

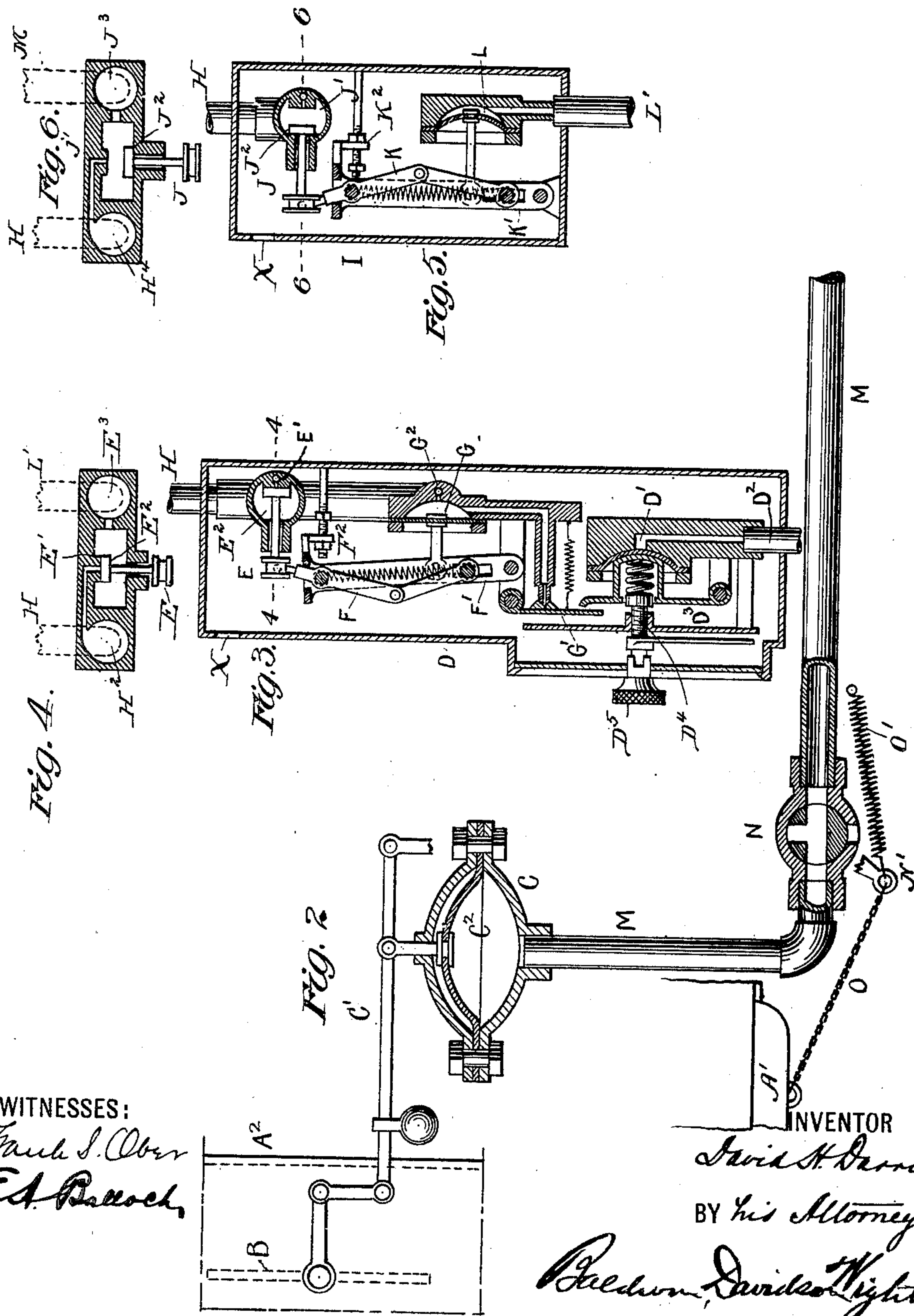
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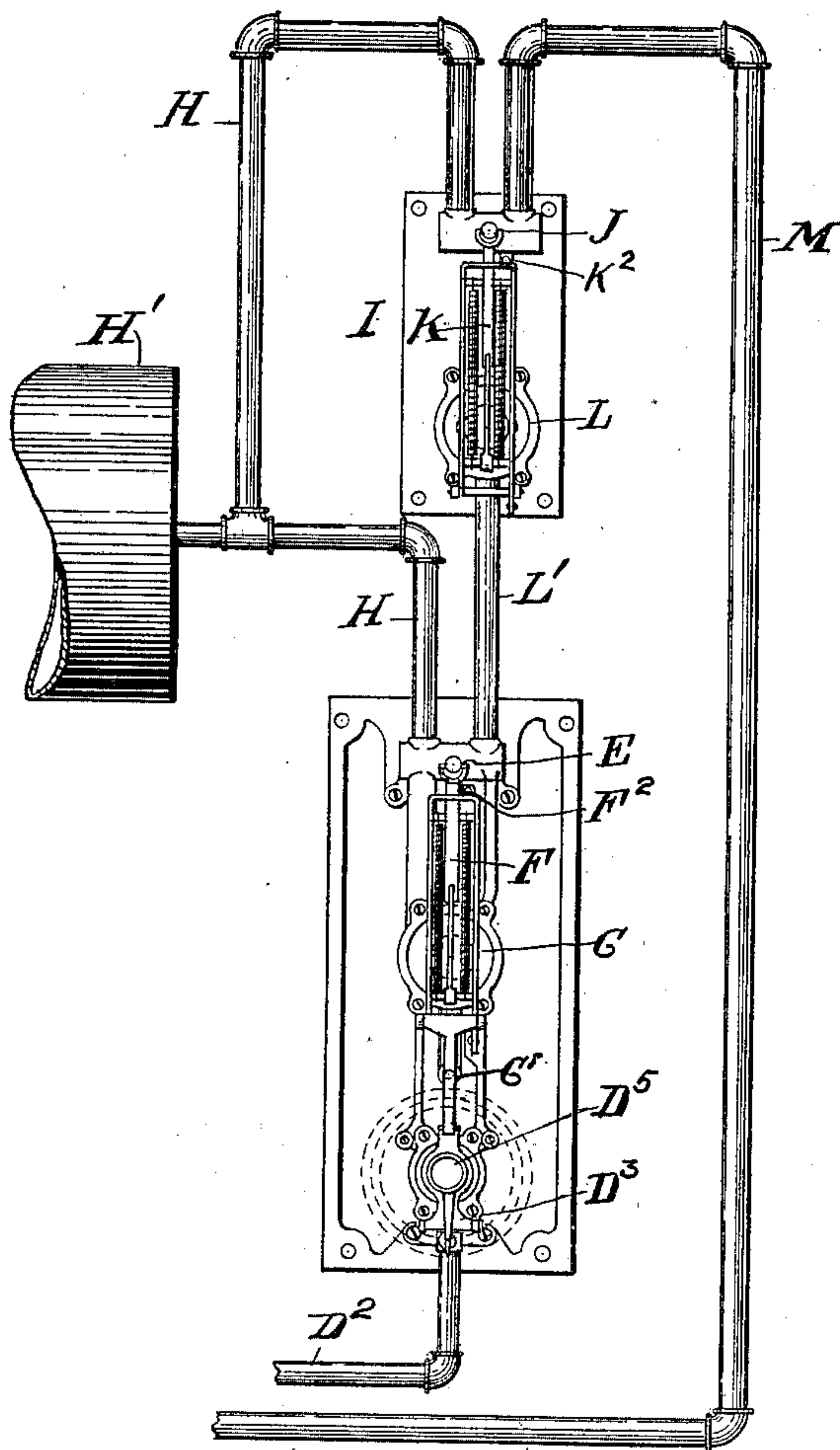
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3 Sheets—Sheet 3.

Fig. 7



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# UNITED STATES PATENT OFFICE.

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## DAMPER-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 697,705, dated April 15, 1902.

Application filed January 12, 1898. Serial No. 666,472. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID H. DARRIN, a citizen of the United States, residing at Cranford, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Damper-Controllers, of which the following is a specification.

This invention consists of an improved apparatus for controlling or regulating the damper of a steam-boiler actuated by a fluid medium derived from an independent source of supply and governed by the steam in the boiler, combined with means connected to the door of the furnace to cause the damper-motor to fully close the damper when the furnace-door is opened, thus preventing at such times air entering the furnace or being drawn therein and through the flues of the boiler by the draft of the stack.

An apparatus suitable for the purpose of this invention to control the damper, so as to close it to a fixed extent and to open it within narrow pressure limits at or about the desired normal working pressure of the steam in the boiler, comprises a fluid-pressure motor connected to the damper, so as to hold it open when the motor is influenced by a fluid under pressure and to close the damper when it is relieved of the pressure, an independent source of fluid-pressure supply, a relay device for directing the fluid to and from the damper-motor, and a governor actuated by steam from the boiler to set the relay in action by means of the fluid-controlling medium. The means for causing the damper to be closed when the furnace-door is open consists of a three-way valve in the supply-pipe from the relay to the damper-motor so connected to the furnace-door that the supply-pipe is unobstructed when the door is closed and is closed to cut off the supply of fluid from the relay and the vent opened to allow the fluid to discharge from the damper-motor when the door is open, the connection being of such a character that this three-way valve is operated to its full extent to allow the damper to be fully closed during a small movement of the door at the commencement of its opening, thus quickly cutting off all draft effects of the stack on the furnace, and to close the vent and open communica-

tion between the relay and the damper-motor to cause the damper to be fully opened during the last portion of the closing movement of the furnace-door.

The accompanying drawings, forming part of this specification, illustrate my invention, and to them I will now refer to more fully describe the same.

Figure 1 represents the front of a steam-boiler, showing my damper apparatus applied thereto, the parts being conventionally arranged for perspicuity of description. Fig. 2 shows the damper, its motor, the door-actuated valve, and some of the pipe connections in sections. Fig. 3 is a vertical section of the governor. Fig. 4 is a cross-section of the upper part of the same, taken on line 4 4. Fig. 5 is a vertical section of the relay. Fig. 6 is a cross-section of the same, taken on line 6 6; and Fig. 7, a general view, on an enlarged scale, of the regulating apparatus with the covers of the casings removed.

The drawing Fig. 1 shows the front A of a boiler, its furnace-door A', and smoke-stack A<sup>2</sup>. In the stack is located a damper B, an arm from which is connected to the lever C' of the motor C, the diaphragm C<sup>2</sup> of which is joined to and acts on the lever C'. These parts are of ordinary construction.

The governor D here shown comprises a diaphragm-covered chamber D', placed in communication with the steam-space of the boiler by the pipe D<sup>2</sup>, a spring-actuated lever D<sup>3</sup>, resting against the diaphragm, a supply and vent valve E, the moving part of which seats against the opening E' when in one position and against a seat E<sup>2</sup> to close the space which forms the vent around the free-fitting stem of the valve when in the other position, a spring-controlled lever F, operating the valve E and carried by the pivoted arm F', which is connected to the diaphragm of the chamber G. This chamber has an outlet-orifice closed by a seat on the spring-actuated lever G'. A branch from the supply-pipe H of the air-reservoir H' connects with the supply end H<sup>2</sup> of the case of the valve E and is also in communication with the chamber G through the small orifice G<sup>2</sup>, which is considerably smaller than the outlet of this chamber, which is covered by the



valve-seat on the lever G'. The reservoir H' is supplied with compressed air from the compressor H<sup>3</sup>, which may be actuated from any suitable source of power. The relay I is also provided with a supply and vent valve J, having two seats J' and J<sup>2</sup> and a vent similar to the valve E. It is operated by the lever K and arm K', which in turn is connected to and operated by the diaphragm of the chamber L in like manner to the lever F, arm F', and chamber G. This chamber L of the relay has one opening only, by which the chamber and said outlet part E<sup>3</sup> of the case of the supply and vent valve E are connected through the pipe L'. The pivoted arm F' of the governor and the pivoted arm K' of the relay are provided with adjustable stop devices F<sup>2</sup> and K<sup>2</sup>, respectively, to provide means for the limitation of their forward and backward movement. The fluid-pressure-supply pipe H connects with the inlet end H<sup>4</sup> of the case of the valve J of the relay, and from the outlet end J<sup>3</sup> of this case extends the pipe M to the motor C of the damper B. A part of this pipe M is arranged in front of the boiler, and in this part of the pipe, in proximity to the furnace-door A', is located the cut-off and vent valve N. This is shown as a three-way plug-valve with a vent-hole in its side, the plug being provided with an arm or lever N', between the end of which and the furnace-door A' is fastened a chain O, and to the arm on its opposite side is attached the spring O', which by its resilience when the door A' is opened turns the plug to close the passage of the pipe M and open the chamber C<sup>2</sup> of the damper-motor C to the atmosphere through the vent-opening in the side of the valve N. The movement of the end of the arm N' of this valve is much less than that part of the door A' to which the chain O is attached, so upon opening the door the valve is actuated to its fullest extent by the spring O' when the door is only partly opened, a full swing of the door causing the chain to hang in a slack loop. This vents the damper-motor quickly and allows the damper B to close the stack-opening before the furnace-door is fully opened. The reverse of the actions and movements occur when the furnace-door is closed. The spring acting on the lever D<sup>3</sup> of the diaphragm of the chamber D' is provided with means for its adjustment, by which the opposition to the movement of the diaphragm may be regulated to accord with the desired steam-pressure to be maintained, and this means consists of a screw D<sup>4</sup>, arranged to operate the follower of the spring and is actuated by the handle D<sup>5</sup>.

In the operation of the device the pipe H has a constant supply of compressed air or other fluid under pressure, and in the normal condition of affairs the various parts of the apparatus occupy the positions shown in Figs. 1, 2, 3, 5, and 6 of the drawings. The motor C is now under pressure, communication between pipes H and M being through the

parts H<sup>4</sup> and J<sup>3</sup> of the case of the valve J of the relay, the chamber G of the governor also being charged with compressed air through the small opening G<sup>2</sup>. Now when the pressure of steam in the boiler is sufficient to force out the diaphragm of the chamber D' of the governor against the resistance of the adjustable spring of the lever D<sup>3</sup> said lever presses against the lever G', which exposes the outlet-orifice of the chamber G and allows the air to escape therefrom, so that the diaphragm collapses, and the valve E is moved away from the seat E' and against the seat E<sup>3</sup>, as shown in Fig. 4. Air now flows from the pipe H through the parts H<sup>2</sup> and E<sup>3</sup> of the case of the valve E and the pipe L' to the chamber L of the relay I, thereby forcing out its diaphragm, which acts through the medium of the arm K' and lever K to close the valve J against the seat J', thus cutting off the air-supply from the pipe M and allowing the air that is in the chamber C<sup>2</sup> of the damper-motor C to escape from the vent around the stem of the valve J. The diaphragm of said motor C now collapses, and the damper B is moved to close the flue or smoke-stack A<sup>2</sup>, thus reducing the intensity of the fire in the furnace. Upon a slight reduction of steam-pressure the diaphragm of the chamber D' is collapsed by the action of the spring of the lever D<sup>3</sup>, and the parts of the governor again assume the positions they occupy in Fig. 3. The air-supply is thus cut off from the chamber L, allowing the parts of the relay to again resume the positions shown at Figs. 5 and 6 and air to again flow from the pipe H to the damper-motor C through the parts H<sup>4</sup> and J<sup>3</sup> of the case of the valve J and the pipe M, thus causing the damper B to be again opened. Now, as before described, every time that the furnace-door A' is opened the chamber of the damper-motor C is by the action of the valve N cut off from the source of fluid-pressure, the fluid in the chamber allowed to escape, and the damper B to be closed. Thus by the addition of a simple device to a damper-regulator which is actuated by a controlling fluid medium the discharge of heated gases from or the entrance of air to the furnace when the furnace-door is open is entirely avoided, and it is evident that such advantageous effects will be produced by this device whether other means than steam-pressure be employed to govern the fluid-medium-controlling devices of the damper-regulator. The boxes or casings of the two members D and I are provided with apertures x to relieve the internal pressure due to such compressed air as may escape or be discharged into them.

I claim as my invention—

1. The combination with a damper-regulator for boiler-furnaces controlled by variations of pressure of the steam in the boiler, through the medium of a damper-motor, actuated by a fluid under pressure to hold the damper open, of the furnace-door and a cut-off and vent device so connected to and op-



erated by the furnace-door as to cut off the  
controlling fluid medium from the damper-  
motor and relieve said motor of pressure and  
so allow the damper to be closed when the  
5 furnace-door is opened.

2. A combined steam-pressure and furnace-  
door - damper controller, consisting of a  
damper-motor connected to the damper and  
actuated by a fluid under pressure, a con-  
10 trolling device actuated by changes in the  
material being heated by the furnace to allow  
the fluid under pressure to pass to the damper-  
motor and to vent the same, a reservoir for  
such fluid under pressure, pipes connecting  
15 the source of fluid-supply the controlling de-  
vice and the damper-motor, a cut-off and vent  
valve in the supply-pipe to the damper-mo-  
tor, and means connecting the cut-off and  
valve and the furnace-door whereby the fluid  
20 is cut off from and the damper-motor vented  
when the furnace-door is open and when the  
boiler-pressure is above the normal.

3. A combined steam-boiler pressure and  
furnace-door-damper controller, comprising  
25 a damper-motor, a source of fluid-pressure  
supply for actuating the damper-motor to  
hold the damper open, a controlling device,  
comprising a governor and a relay, said gov-  
ernor being actuated by steam from the boiler  
30 to allow the fluid under pressure to actuate  
the relay to cause it to allow the fluid under  
pressure to pass to the damper-motor and to  
allow the fluid to escape from the damper-  
motor when the pressure of the steam rises,  
35 pipes connecting the source of fluid-supply,  
the controlling device and the damper-motor,

a cut-off and vent device located in the sup-  
ply-pipe to the damper-motor, and a connec-  
tion between the furnace-door and the cut-  
off and vent-valve whereby said valve is 40  
closed and its vent opened during the initial  
opening of the door.

4. In a steam-boiler furnace, the combina-  
tion of the smoke-stack damper, a motor con-  
trolling the damper, means for controlling 45  
the motor operated by the boiler-pressure and  
means for controlling the motor operated by  
the furnace-door to cause the closing of the  
damper when the steam-pressure rises above  
a predetermined point or when the furnace- 50  
door is opened, and to cause the opening of  
the damper when the boiler-pressure is nor-  
mal or less than normal and the furnace-door  
is closed.

5. In a steam-boiler furnace, the combina- 55  
tion of the smoke-stack damper, a motor for  
closing the same when the steam-pressure  
rises above a predetermined point or when  
the furnace-door is opened, and for opening  
the damper when the steam-pressure falls be- 60  
low the predetermined point and the furnace-  
door is closed, means for controlling said mo-  
tor actuated by the boiler-pressure, and  
means for controlling the motor actuated by  
the furnace-door. 65

In testimony whereof I have hereunto sub-  
scribed my name.

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