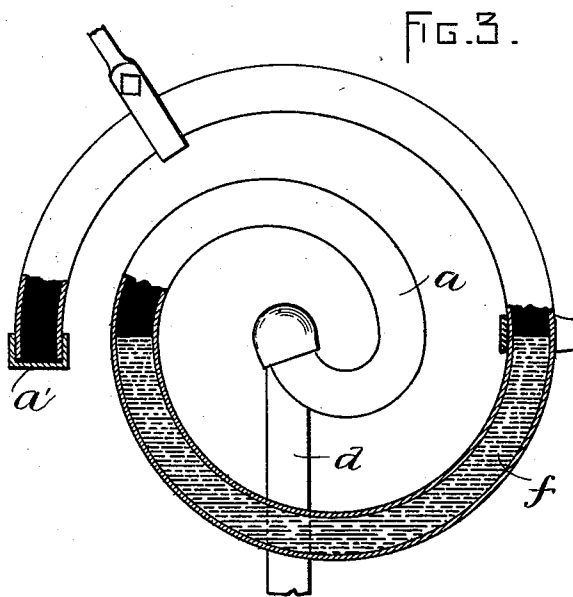
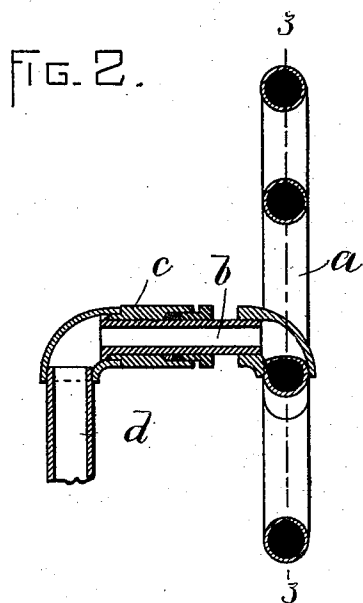
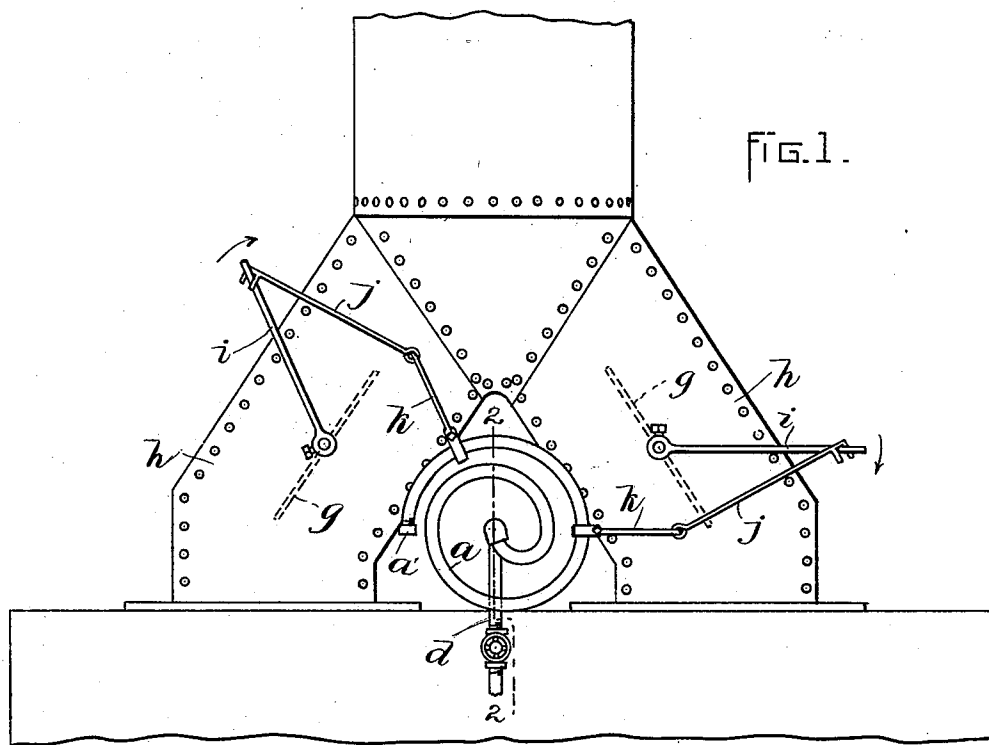


(No Model.)

G. C. HICKS.
DAMPER GOVERNOR.

No. 508,709.

Patented Nov. 14, 1893.



WITNESSES:

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UNITED STATES PATENT OFFICE.

GEORGE CLEVELAND HICKS, OF BOSTON, MASSACHUSETTS.

DAMPER-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 508,709, dated November 14, 1893.

Application filed December 27, 1892. Serial No. 456,317. (No model.)

To all whom it may concern:

Be it known that I, GEORGE CLEVELAND HICKS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Damper-Governors, of which the following is a specification.

This invention relates particularly to furnaces used for generating steam, and has for its object to provide a simple and effective means for operating a damper or device for regulating the draft of a boiler furnace, by variations of pressure in the steam generated by the heat thereof, in such manner that the draft will be checked and the heat reduced by a predetermined increase in the steam pressure, and will be promoted and the heat increased when the pressure is reduced.

The invention consists in a damper governor comprising in its construction a hollow spiral tube communicating at its generating point with a source of steam pressure and adapted to revolve on a horizontal axis at the said generating point, its outer end being hermetically closed, and a movable weight such as a body of mercury located in said spiral tube and separated from the outer end thereof by an air cushion. The weight acts through the spiral tube and other intermediate devices to control the position of a damper or heat regulating device, the said weight being caused by the form of the spiral tube to move outwardly and upwardly when acted on by an increase of pressure, and thus move the damper to or toward its heat reducing position. The weight is forced inwardly by the expansion of the air cushion when the steam pressure is reduced, and is thus caused to act on the damper in such manner as to open the same, the arrangement being such that when the weight is moved by an increase of pressure, the resulting movement of the tube will check the draft and, when the weight is moved in the opposite direction by the air cushion upon a reduction of pressure, the draft regulating device will be moved to its draft increasing or promoting position, all of which I will now proceed to describe and claim.

Of the accompanying drawings forming a part of this specification, Figure 1 represents a side elevation of my improved governor

connected with two dampers. Fig. 2 represents a section on line 2, 2, Fig. 1. Fig. 3 represents a section on line 3, 3, Fig. 2.

The same letters of reference indicate the same parts in all of the figures.

In the drawings—*a* represents a spiral-shaped tube having one or more convolutions, and hermetically closed at its outer end by a cap *a'*. The generating end of the spiral is affixed to a substantially horizontal tubular journal *b*, which is fitted to rotate in a fixed bearing *c*.

To one end of the bearing *c* is affixed a pipe *d* communicating with a source of steam or other pressure which is increased or decreased by variations in the heat of a furnace, the pipe *d* being connected with the steam space of a boiler when the governor constituting my invention is used with a boiler furnace.

The spiral tube *a* is arranged in a substantially vertical plane about at right angles with the axis or journal *b*, and is adapted to revolve with said journal.

In the spiral tube *a*, I place a movable weight *f* which is separated from the outer end of the tube by a cushion of air, the weight being of such nature that it confines the air so that it cannot pass by the weight to the inner end of the tube. I find that a body of metallic mercury constitutes a suitable weight, and I use a suitable quantity of mercury to fill the lower portion of one convolution of the tube. *g g* represents dampers which control the draft of flues *h h* leading from the furnace which supplies heat to the boiler with which the pipe *d* is connected. Said dampers are provided on their pivots with arms or cranks *i i*, which are connected by rods *j j* with arms *k k* affixed to the hollow arm *a*.

The arrangement of the described parts is such that when there is no steam pressure, or when the steam is below a given pressure, the dampers will be held in the open position shown in Fig. 1, by the weight, the latter occupying such position relatively to the generating point of the spiral tube that it will act through the tube and the intermediate connections to hold the dampers open. When the steam pressure increases, it acts to force the weight outwardly and upwardly toward the outer end of the tube, thus causing the weight to assume such position relatively to

the generating point of the tube that it will act through the described connecting devices to close, or partially close, the dampers, and thus check the draft, this movement of the weight compressing the air cushion at the outer end of the tube. When the steam pressure is reduced, the air cushion asserts itself by expanding and forces the weight toward the generating point of the tube, so that the weight acts to open the dampers. It will be seen therefore that the draft is automatically regulated by the steam pressure, an increase of said pressure changing the position of the weight and causing it to close the damper, and at the same time storing up power in the air cushion to restore the weight to its damper closing position when the pressure shall have been reduced.

I do not limit myself to the details of mechanism here described. The spiral tube may be connected in any suitable way with any suitable draft regulating device or devices.

A valve *d'* should be provided to shut off the steam from the arm *a*, when desired.

The weight may be operated by variations in the pressure of water instead of steam.

I claim—

1. A damper governor, comprising in its construction a revoluble spiral tube having its axis at its generating point, and communicating at said generating point with a source of pressure supply, its outer end being closed, and a movable weight in said tube confining an air cushion at the outer end of the tube, as set forth.

2. In a damper governor, the combination of a revoluble spiral tube or lever, having its generating point journaled in a fixed bearing and its outer end hermetically closed, a pressure supply pipe communicating with the inner end of said tube, a movable weight in said tube separated by an air cushion from the

outer end of the tube and adapted to be forced outwardly against said cushion by pressure on its inner end, and means for communicating motion from said tube to a draft regulating device, as set forth.

3. In a damper regulator, the combination of a fixed hollow bearing communicating with a source of pressure supply, a hollow journal fitted in said bearing, a spiral tube affixed at its generating point to said journal and hermetically closed at its outer end, a movable weight such as a mass of mercury contained in said tube and confining an air cushion at the outer end thereof, and means for communicating motion from said tube to a draft regulating device, as set forth.

4. In a damper regulator, the combination of a fixed hollow bearing communicating with a source of pressure supply, a hollow journal fitted in said bearing, a spiral tube affixed at its generating end to said journal and hermetically closed at its outer end, a movable weight such as a mass of mercury contained in said tube and confining an air cushion at the outer end thereof, a damper or draft regulator and connections between the same and the tube, whereby the said regulator is moved to decrease the draft by a change of position of the weight due to an increase of pressure on its inner end, and to increase the draft by a change of position of the weight due to a decrease of said pressure and the expansion of the air cushion, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 19th day of December, A. D. 1892.

GEORGE CLEVELAND HICKS.

Witnesses:

C. F. BROWN,
ARTHUR W. CROSSLEY.