

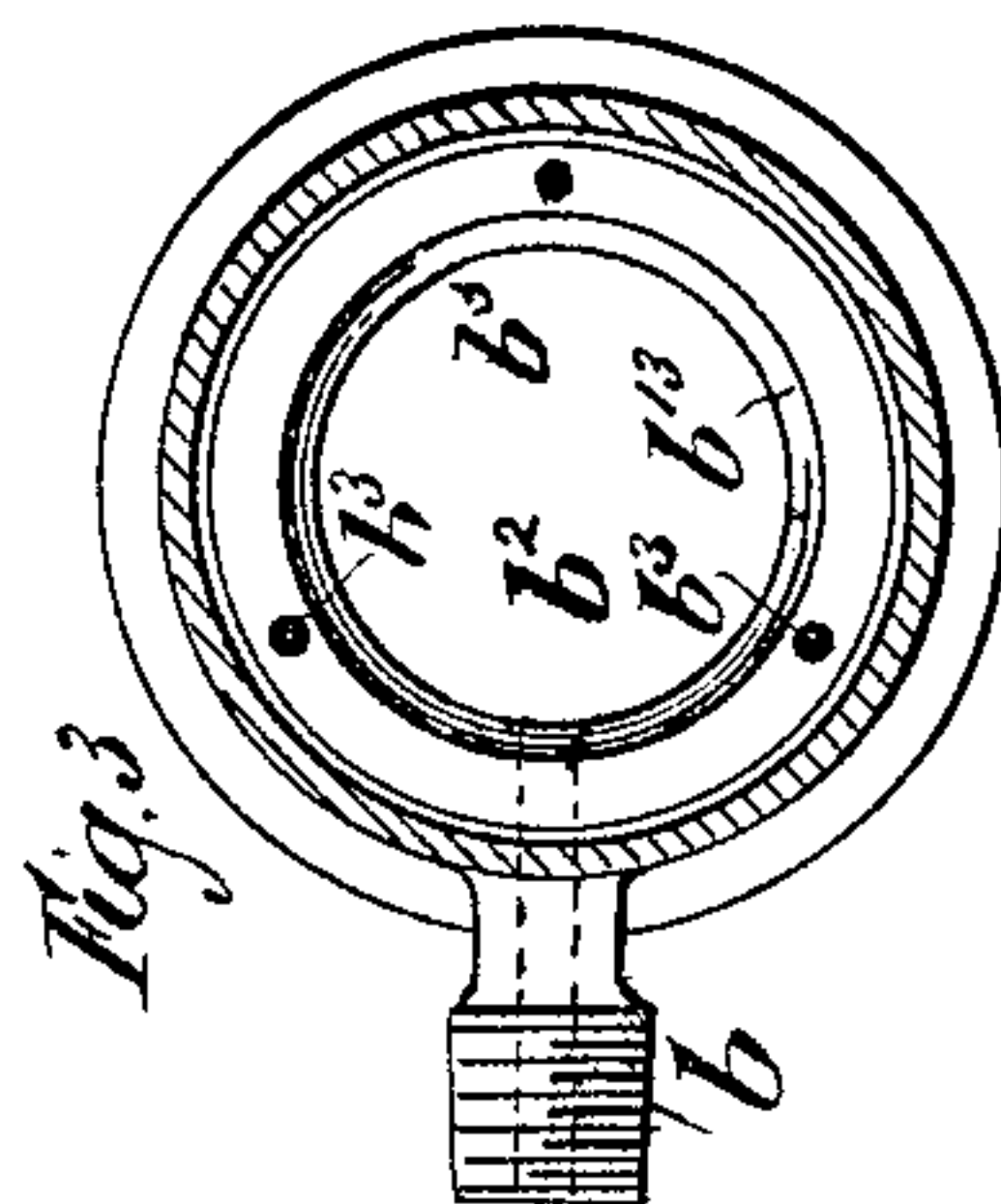
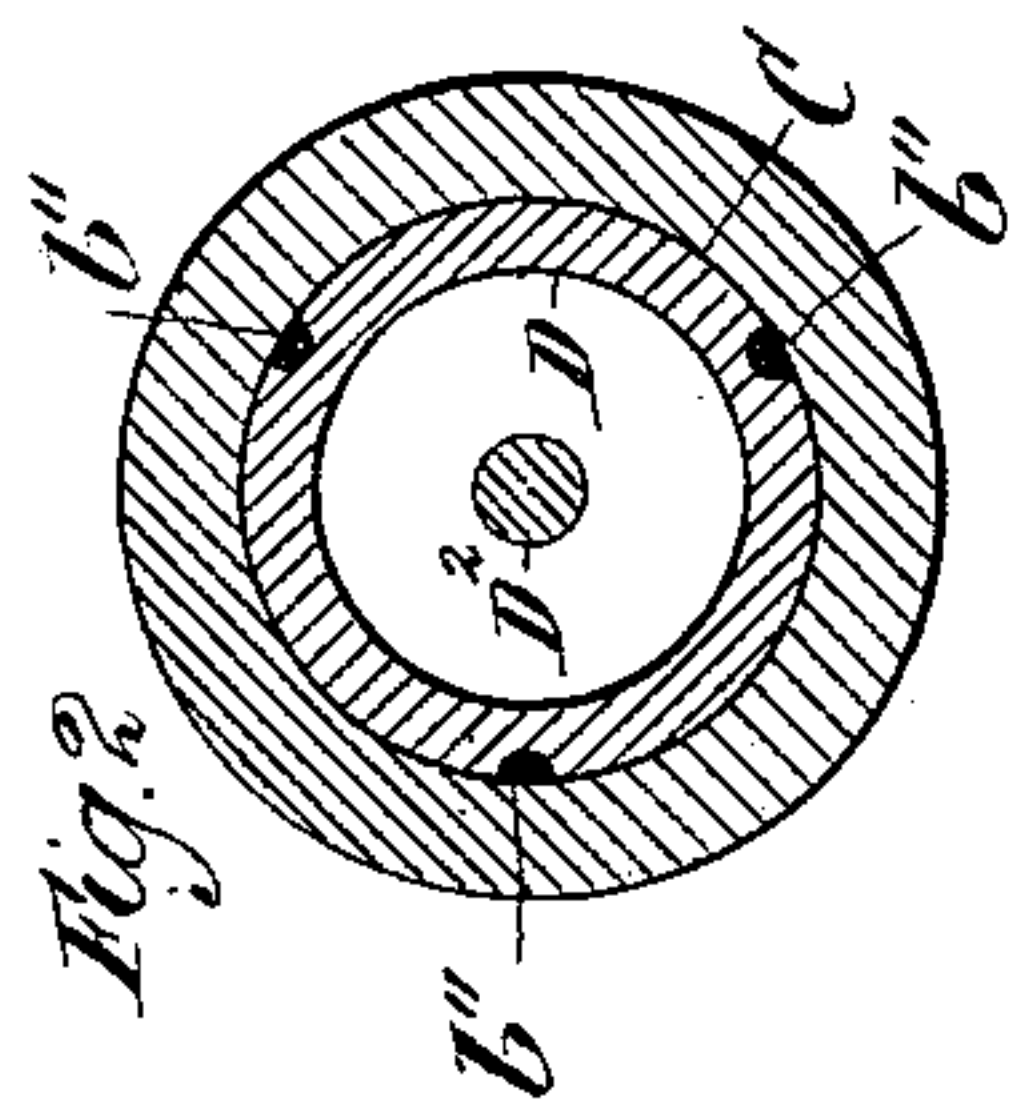
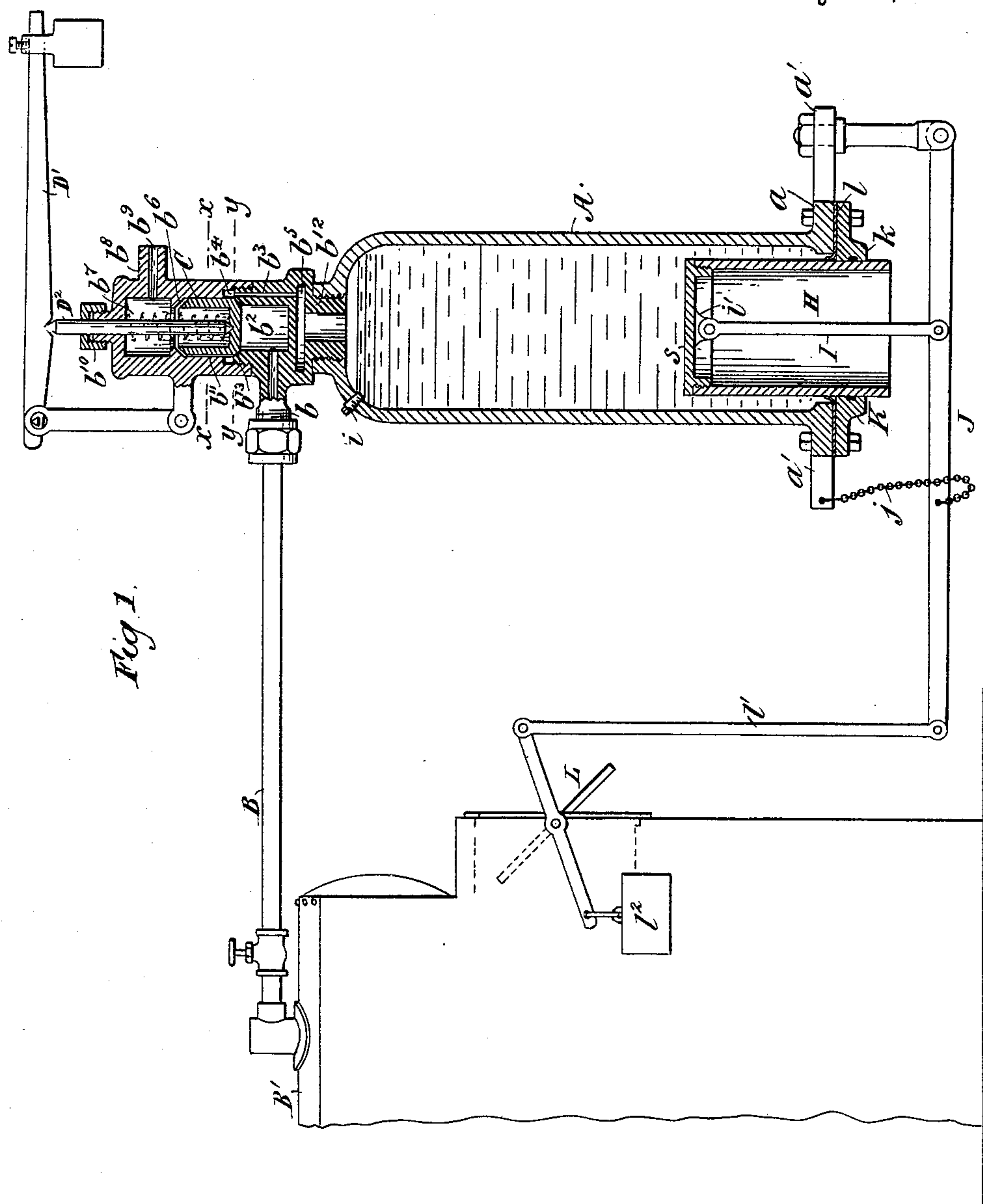
(No Model.)

G. A. GOODENOUGH.

# DAMPER REGULATOR FOR FURNACES.

No. 386,811.

Patented July 31, 1888.



Witnesses  
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# UNITED STATES PATENT OFFICE.

GEORGE A. GOODENOUGH, OF GREEN POINT, NEW YORK.

## DAMPER-REGULATOR FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 386,811, dated July 31, 1888.

Application filed January 25, 1888. Serial No. 261,856. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE A. GOODENOUGH, of Green Point, Kings county, and State of New York, have invented a certain  
5 new and useful Improvement in Damper-Regulators for Furnaces, of which the following is a specification.

The present invention is an improvement upon that shown and described in my former  
10 Patent No. 377,557, dated February 7, 1888.

I will describe in detail a furnace regulator embodying my improvement, and then point out the novel features in the claim.

In the accompanying drawings, Figure 1  
15 illustrates a vertical section of a damper-regulator embodying my improvement, a portion of a steam-boiler with which said damper-regulator communicates, and a portion of a flue for the escaping products of combustion from  
20 the furnace, showing a damper arranged therein. Fig. 2 is a transverse section of certain valve mechanism, taken at the plane of the dotted line  $xx$ , Fig. 1. Fig. 3 is a similar view taken on the plane of the dotted line  $yy$ ,  
25 Fig. 1.

Similar letters of reference designate corresponding parts in all the figures.

A designates a cylinder of metal. This cylinder is open at the bottom and is provided  
30 with an outwardly-extending flange,  $a$ . From the flange  $a$  extend projecting portions  $a'$ . The upper end of this cylinder is closed, except as hereinafter described.

B designates a pipe leading from and communicating with a steam-boiler,  $B'$ , which latter may be of any desired construction. The pipe B communicates by a suitable coupling with a valve-chest, C. Within the valve-chest C is arranged a valve, D, adapted to be slid  
40 to and fro in the valve-chest. As shown, the valve-chest is arranged vertically. The pipe B has a screw-threaded connection with a nozzle,  $b$ , on the steam-chest. Steam passing through the nozzle enters a steam-space,  $b^2$ ,  
45 having an open top and closed lower end. The valve D is above the steam-space  $b^2$ . As shown, this valve is cylindrical and hollow, having a closed lower end. The upper portion of the metal surrounding the steam-space  $b^2$  constitutes a valve-seat,  $b^{13}$ , for the valve D at the  
50 lower end of the latter. Arranged vertically in the metal surrounding the steam-space  $b^2$

are passages  $b^3$  for steam. I have shown three such passages. The valve D is raised from its seat by the pressure of steam entering the  
55 steam-space  $b^2$  from the boiler  $B'$ . When the valve is so raised, steam passes from the steam-space  $b^2$  into an annular space,  $b^4$ , surrounding the lower portion of the valve D, and from thence passes downwardly through the pas-  
60 sages  $b^3$  and into a space,  $b^5$ , in the lower portion of the valve-chest C. The valve D when thus raised will be seated at its upper end against an annular valve-seat,  $b^6$ , formed upon the interior of the chest C. Above the valve-  
65 seat  $b^6$  is a steam space,  $b^7$ , from which leads a nozzle,  $b^8$ , communicating with an exhaust,  $b^9$ . The valve D is raised against the resistance of a weighted lever,  $D'$ , fulcrumed upon the upper end of a pin or rod,  $D^2$ . This pin or rod  
70 passes through a suitable stuffing-box,  $b^{10}$ , in the valve-chest, and bears centrally at its lower end against the valve D.

Instead of using the weighted lever  $D'$  and pin or rod  $D^2$ , I may use a spring arranged  
75 within the valve-chest and abutting at one end against the upper portion of the valve-chest and at the lower end against the valve D. I have shown such an arrangement in dotted outline in Fig. 1. In the circumference of the  
80 valve D are formed vertically-extending grooves  $b^{11}$ , (shown more clearly in Fig. 2,) the object of which will be more fully explained hereinafter.

The valve-chest is provided upon its lower  
85 end with an externally-screw-threaded nozzle,  $b^{12}$ , which engages with a screw-threaded aperture in the upper end of the cylinder A.

It will be seen that when the valve D is raised from its seat  $b^{13}$  and against its seat  $b^6$   
90 steam may pass freely into the cylinder A. When the action of the weighted lever  $D'$  is sufficient to overcome steam-pressure against the valve D, the latter will be returned to its seat  $b^{13}$  and moved away from its seat  $b^6$ .  
95 Steam within the cylinder A may then pass upwardly through the passages  $b^3$  and grooves  $b^{11}$  in the valve into the space  $b^7$  and out at the exhaust  $b^8$ .

The cylinder A is filled or nearly filled with  
100 water. I have shown a plug,  $i$ , near the upper end of the cylinder for admitting water to the same.

H designates a piston or plunger extending



into the cylinder A, near the lower extremity thereof. This piston is hollow, as shown, and its upper end is closed by a plug, s, having a screw-threaded connection with the cylinder.

5 I designates a rod extending upwardly through the hollow piston H and having a pivotal connection with a lug, i', upon the under side of the plug s. The other end of the rod I is pivotally connected to a lever, J. The lever J is pivotally connected near one end to a rod or post extending from one of the projections a' on the flange a.

10 I have shown a chain, j, secured to and depending from the other of the projections a' on the flange a and connected near its other end with the lever J. This chain prevents a too extended downward movement of the lever J.

15 The piston H works in a stuffing-box, K, formed in a metal plate, k, secured to the flange a of the cylinder A by bolts or otherwise. Between the plate k and the flange a of the cylinder a packing-ring, l, may be placed, which acts in conjunction with the stuffing-box to render the lower end of the cylinder water-tight.

20 L designates a damper arranged, as shown, in the flue by which products of combustion are carried off from the furnace. This damper may be of the usual or any desired construction. It is shown as provided with a crank on one side, to which crank is connected a rod, l', the other end of which rod is connected to the lever J. The damper is normally open and is held in such position by a weight, l'', connected with the damper and operating to maintain it in such position in a well-known manner.

25 When steam-pressure in the boiler increases beyond a desired point, the valve D is forced upwardly, as previously explained, and the steam-pressure is then caused to operate upon the column of water contained in the cylinder A, by which means the piston H will be forced downwardly. The rod I, in connection with the piston, is thereby caused to move the lever J downwardly, causing the rod l' to move the damper to close it. When steam-pressure in the boiler has decreased sufficiently, the valve

D will return to its normal position, as previously explained, or, in other words, into a position to admit of the escape of the steam, so as to destroy steam-pressure in the cylinder A. The weight l'' on the damper will rock the damper into an open position, and also elevate the lever J and the piston H into a position to be again operated upon when steam-pressure shall be unduly increased.

55 This damper-regulator may be supported by brackets or otherwise upon a wall or other suitable support adjacent to the boiler.

60 By arranging the cylinder vertically, so that the column of water therein is above the piston and steam-pressure is admitted above the column of water, the regulator is caused to operate more delicately than would be the case if the column of water were below the piston and the latter elevated, because in the former case steam-pressure is assisted by gravity.

65 What I claim as my invention, and desire to secure by Letters Patent, is—

70 The combination, with a steam-boiler and a flue for carrying off products of combustion from a furnace, of a damper arranged in said flue, a lever connected with said damper, a cylinder containing a column of water, a piston in said cylinder connected with said lever, a valve-chest connected with said cylinder above the column of water, a valve in said valve chest, a steam-space at one end of said valve, a passage leading from said steam-space to the cylinder when the valve is moved in one direction, a steam-space communicating with an exhaust at the other end of the valve, a passage communicating with the passage first named and said last-named steam-space when the valve is moved to prevent admission of steam from the boiler to the cylinder, and two seats for the valve arranged at opposite ends of the latter, said valve being held with a yielding pressure against one of its seats by a weight or spring, substantially as specified.

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