H. J. CARPENTER.

AUTOMATIC DAMPER REGULATOR.

APPLICATION FILED MAY 16, 1911.

1,044,988.

Patented Nov. 19, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

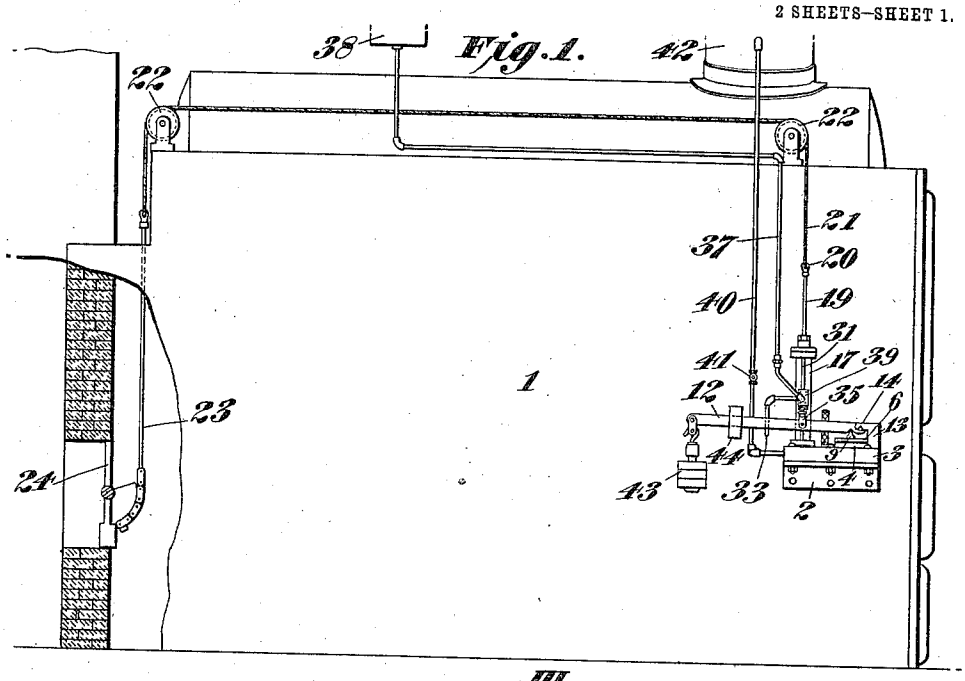
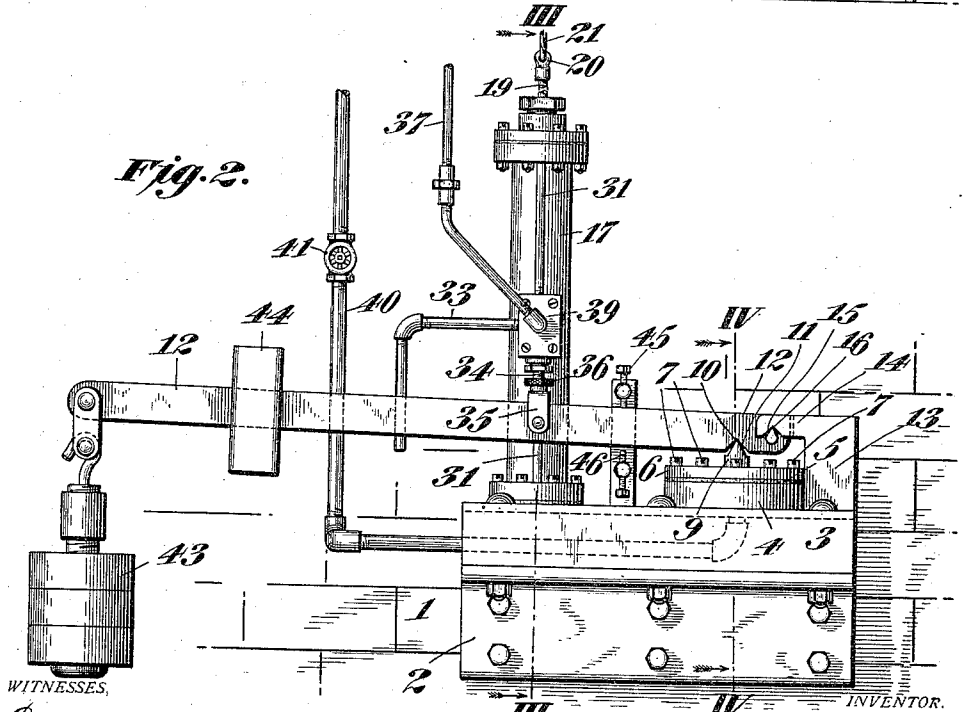


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

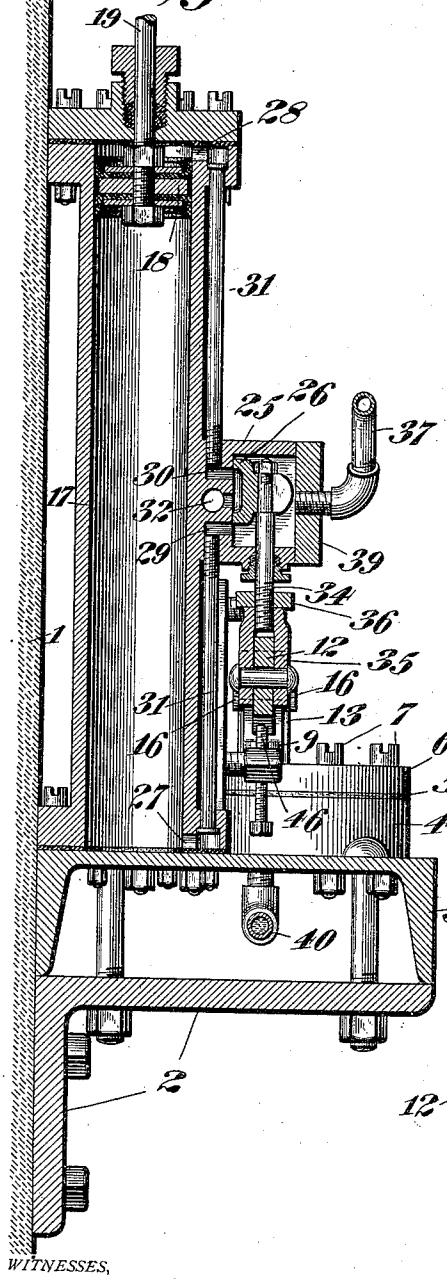


Fig. 4.

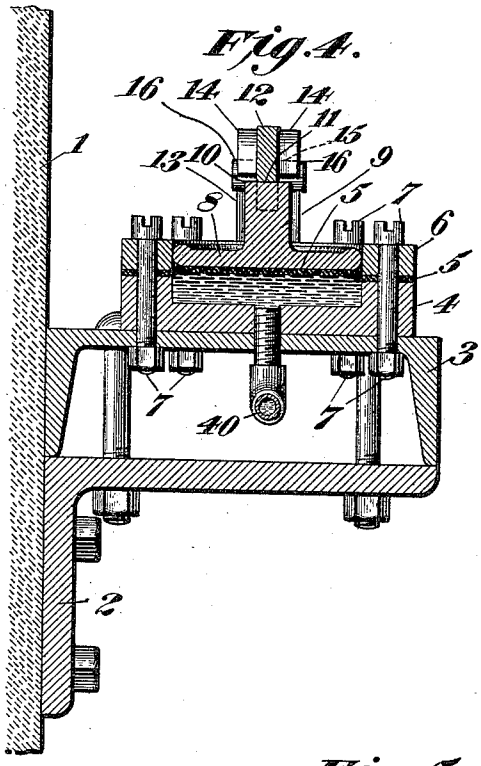
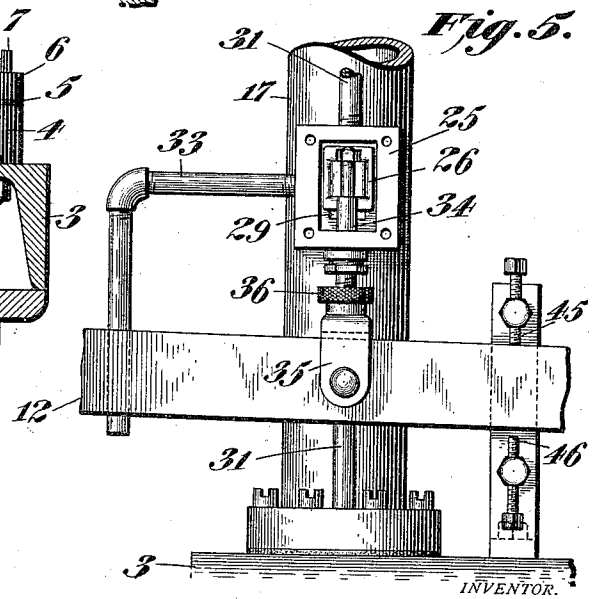


Fig. 5.



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AUTOMATIC DAMPER-REGULATOR.

1,044,988. Specification of Letters Patent. Patented Nov. 19, 1912.

Application filed May 16, 1911. Serial No. 627,469.

To all whom it may concern:

Be it known that I, HARVEY J. CARPENTER, a citizen of the United States, residing in the city of Johnstown, in the county of Cambria and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Damper-Regulators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the control of furnace fires by means of an automatically operated damper for regulating the draft of same.

The object of my invention is to provide an improved means for automatically opening and closing the dampers of the furnace by variable fluid pressure in order to give greater or less draft as required.

In operating furnaces used with steam boilers where the demand for steam from the boilers is variable, as in elevator systems, rolling mills, etc., and in case the boilers and appurtenances have comparatively little steam room, the steam pressure is subjected to sudden changes, which occasions difficulty, delay and expense in operation, as will be readily understood.

With my invention, the above mentioned difficulties are obviated and it is possible to obtain steam of substantially uniform pressure, and at the same time, with a minimum cost for fuel.

The objects of my invention and means for attaining the same will be further pointed out in the following specification and claim, reference being had to the accompanying two sheets of drawings, in which:—

Figure 1 is a diagrammatic view showing my improved damper regulator attached to the side of a furnace wall, parts of which are broken away to more clearly show the operation of the damper. Fig. 2 is a front elevation of my device on an enlarged scale. Fig. 3 is a vertical section taken on the line III—III of Fig. 2 looking in the direction of the arrows. Fig. 4 is a vertical section taken on the line IV—IV of Fig. 2. Fig. 5 is a detail view of the lower portion of my operating cylinder with the cover of the slide-valve casing removed.

In the drawings 1 represents the furnace or boiler setting, to the wall of which, I attach an angular bracket 2, one of its legs extending horizontally outward to form a shelf. A channel member 3 is bolted to this shelf with its flanges projecting downwardly and resting on the same with its web forming the seat or platform on which is mounted my improved device. A short pressure cylinder 4 is mounted on one end of this platform, having a flexible diaphragm 5 constructed of rubber or other suitable material. An annular ring 6 clamps the edges of said diaphragm to the mouth of the pressure cylinder by means of bolts 7 which pass through the annular ring 6, the edges of the diaphragm 5, the walls of the pressure cylinder 4 and thence through the web of the channel member 3; the lower ends of the bolts 7 being provided with nuts as shown, which thus secure the construction together. A piston 8 with rounded edges rests upon the diaphragm 5, and is provided with an upwardly projecting stud 9 having a knife-edge 10 at its upper end which extends into a notch 11 in the controlling lever 12. A short post 13, which may be formed integral with the pressure cylinder 4, extends outwardly and upwardly therefrom and carries a bifurcated projection 14. A notch 15 in said bifurcated projection forms a bearing for the knife-edged trunnions 16 at the end of the controlling lever 12 on which it turns. 17 is the operating cylinder, mounted rigidly in a vertical position on the platform, in which is mounted a piston 18 having a piston rod 19 which extends upwardly through a gland in the cylinder head. An eye 20 is attached to the top end of the piston rod 19 to which a flexible cable 21 is fastened. This cable extends over the pulleys 22 to an eye on the upper end of the damper rod 23. The lower end of the damper rod is flexible and is attached to a sector on a weighted damper 24 which controls the passage of gases from the furnace to the chimney.

A slide-valve casing 25 formed integral with the operating cylinder 17, contains a D-slide-valve 26 which controls the ports 27 and 28 of the operating cylinder, said ports being connected to similar ports 29 and 30 in the slide-valve casing by means of pipes

31. 32 is the exhaust port which extends outwardly through the side of the slide-valve casing to which is connected an L-shaped pipe 33 for directing the flow of the exhaust. The slide-valve-rod 34 may be attached to the D-slide-valve 26 as shown in Figs. 3 and 5 or in any other suitable manner, and extends outwardly through a gland in the side of the casing, having its outer end screw-threaded to receive a clevis 35 which is pivoted to the controlling lever 12; the lock nut 36 providing for adjustment. A pipe 37 extends from an air-compressor 38, or other suitable source of fluid pressure supply, to a removable cover on the slide-valve casing as at 39 and furnishes the power for operating the damper. A steam pipe 40, having a cut-off-valve 41 is connected at one end to the steam dome 42 of the boiler and the opposite end is attached to the base of the pressure cylinder 4. The steam when admitted to the pressure cylinder soon condenses on account of its distance from the steam dome, and lack of circulation, so that the said pressure cylinder is ordinarily filled with cool water under pressure, corresponding to the steam pressure.

The controlling lever 12 carries at its outer end, a weight 43 for depressing the diaphragm, when the pressure in the cylinder 4 is reduced, while 44 is a weight slidably mounted on the controlling lever and adapted to be set at any point thereon, whereby it serves to regulate the steam pressure to any desired intensity. In order to limit the vibrating movement of the controlling lever, adjustable stops 45 and 46 are used, mounted between the operating cylinder 17 and the pressure cylinder 4.

Having thus described my invention, I will now explain the operation of my device, as follows:—Assuming that the parts are in the position shown in the drawings with the damper closed, the draft is thus cut off from the chimney or stack which will reduce the consumption of fuel and cause less heat in the furnace. As the steam pressure in the boiler becomes lessened from this cause, and by reason of miscellaneous purposes for which it may be used, and thereby falls below a certain predetermined intensity, the diaphragm 5, on account of insufficient pressure to sustain it, will be forced downward by the weight exerted on the projecting stud 9 of the piston 8 by the weights 43 and 44 on the controlling lever 12 and will be drawn downward until the lower stop 46 is reached. At the same time the D-slide-valve 26 attached to the valve-rod 34, which is pivoted to the controlling lever, is thereby automatically operated, thus opening the ports 30 and 28, thus admitting pressure fluid which forces the piston 18 to the opposite end of the cylinder. This movement opens the damper and at the same time exhausts the air through the ports 27, 29 and 32 from the head of the piston 18 in the operating cylinder 17. After the damper has been opened, the consumption of fuel within the furnace will be increased, causing a substantially additional amount of heat to be generated, which in turn will soon raise the pressure within the boiler, beyond the upper limit required. The pressure within the cylinder 4 will be sufficient to lift the weight on the controlling lever 12 and will force it upward until it reaches the upper stop 45 which will reverse the D-slide-valve 26 and the parts will then again assume the positions shown on the drawings. By this means the steam pressure is automatically regulated within very close limits.

One of the particular features of my apparatus resides in the fact that the operating cylinder is double-acting in that its movements in both directions are positively caused by fluid pressure automatically admitted, as may be required. This construction is thus more complete, positive and delicate in action and capable of controlling the steam pressure within narrower limits than other devices which do not possess the features stated.

It will be obvious to one skilled in the art that other modifications could be made without departing from the spirit of my invention, as for instance, the pipe 37 might run to the steam dome 42 of the boiler, or it could be made to operate by water pressure, instead of by air pressure, as described, but the latter is preferred as it is free from condensation and other difficulties. The damper could also be raised and lowered vertically, instead of being partially revolved, or, I may operate several dampers at the same time.

I do not wish to limit myself to the exact details of the construction herein shown and described, but may make such other substitutions, alterations or modifications as come within the scope of my invention set forth in the claim.

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

A damper regulator comprising in combination, an operating cylinder provided with ports in the opposite ends thereof, a piston adapted to reciprocate within said operating cylinder and connected to a damper, a slide-valve casing formed integral with said operating cylinder and connected to a source of fluid under pressure, said slide-valve casing being provided with ports connecting with the interior thereof and adapted to communicate with said cylinder, external pipes connecting the ports within the casing with the end ports aforesaid, a D-slide-valve mounted within said casing and adapted to

control the fluid pressure to and from said ports, a pressure cylinder provided with a flexible diaphragm, a disk piston with rounded edges mounted on said diaphragm, means connecting said pressure cylinder with the steam supply to be regulated, a weighted controlling lever coöperating with said diaphragm and with said D-slide-valve, and stops for limiting the movement of said lever, substantially as set forth.

In testimony whereof I hereto affix my signature in the presence of two witnesses.

HARVEY J. CARPENTER.

Witnesses:
ELMER SEAVEY,
ROBERT A. BEERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."