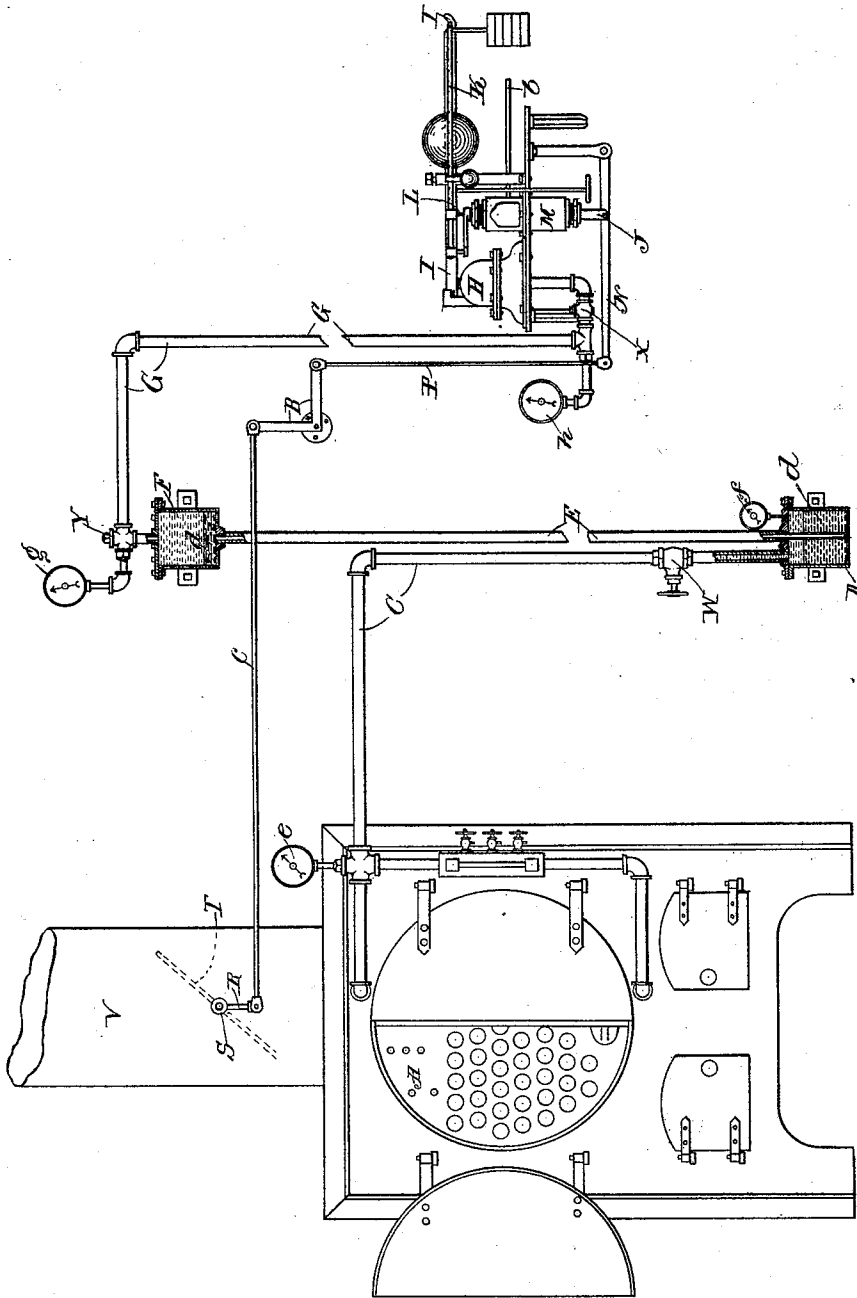


(No Model.)

J. E. SPENCER.
DAMPER REGULATOR.

No. 479,854.

Patented Aug. 2, 1892.



Witnesses

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JOHN E. SPENCER, OF SALEM, MASSACHUSETTS.

DAMPER-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 479,854, dated August 2, 1892.

Application filed February 20, 1890. Serial No. 341,158. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. SPENCER, of Salem, in the county of Essex and State of Massachusetts, have invented a new and useful Improvement in Damper - Regulators, which will, in connection with the accompanying drawing, be hereinafter fully described, and specifically defined in the appended claims.

10 In said drawing are shown in elevation a boiler with its setting, having one door open, a damper-regulator, the connections between the same and the boiler and smoke-flue and damper, and the interposed mercurial resistant to boiler-pressure.

15 The object of my invention is to render it feasible to employ, in connection with boilers carrying high or very high pressure, a damper-regulator having a diaphragm motor embodying a diaphragm sufficiently thin, yielding, and sensitive to permit the regulator to respond to but slight changes of boiler-pressure and to change the draft by moving the damper in accordance with such slight changes of pressure; and the invention consists in interposing in the line of conduit connections, between the boiler and damper-regulator, a column of mercury, so combined and arranged that the desired percentage of boiler-pressure shall be received and resisted by said column, while the balance of the boiler-pressure acts upon the elastic diaphragm of the damper-regulator, thereby causing the regulator to control and move the damper, thereby regulating the draft in accordance with slight changes in boiler pressure and so as to maintain said pressure at a practically uniform standard or degree.

20 Referring again to the drawing, A represents the boiler, to the steam-space of which is connected the pipe C, which at its opposite end is connected with the cover of mercury-pot D, as shown.

25 E is a pipe secured at its lower end to the cover of pot D and at its upper end secured to the bottom of and communicating with the interior of a pot F, like or similar to pot D. A pipe G communicates with the interior of pot F and also with the diaphragm-motor H of the damper-regulator.

30 I have shown in the drawing a damper-regulator embodying the essential features of

the regulator embodied in United States Letters Patent No. 325,337, issued to me September 29, 1885, and No. 338,686, issued to me March 23, 1886; but any kind of damper-regulator may be employed, but with varying degrees of closeness of control of the boiler-pressure at the intended point or degree of pressure. Hence I do not limit myself in my invention to the damper-regulator shown.

35 In the regulator shown the weighted lever I of the diaphragm-motor is at its outer end connected with the outer end of the lever K of the damper-motor M, which latter lever actuates the valve of the damper-motor through the stem L thereof, the piston-rod J projecting from the piston of motor M below the cylinder of the motor being pivotally connected with the pivotal lever N, through which the damper T may be actuated, the fluid that actuates the motor M being admitted thereto through pipe b, said several parts being combined and arranged as the same are found in my said patents. In the present drawing a rod P is connected at its lower end with lever N and at its upper end with a bell-crank B, duly pivoted, to which is pivoted the rod c, that is pivotally connected to arm R, rigidly secured on shaft S of damper T, arranged in smoke-flue V. For convenience in use I arrange a suitable stop-valve W in pipe C between the boiler and pot D, and I arrange a stop-valve X in pipe G, preferably at the lowest point therein. I may also arrange a pressure-gage e at or near where pipe C leaves the boiler, (which gage in the drawing indicates two hundred pounds pressure.) I may also arrange a pressure-gage f in communication with the interior of pot D, (which gage in the drawing indicates two hundred and five pounds pressure.) I may also arrange a like gage g in communication with the interior of pot F or with pipe G, adjacent to said pot, (which gage in the drawing indicates seventy-five pounds pressure,) and I may arrange a like gage h at the lower portion of pipe G, (which gage in the drawing indicates eighty pounds pressure,) the reading on the said several gages being intended only to illustrate approximately the various degrees of pressure at their respective localities in the pressure-conduit, thus indicating the resistance of the mercurial column.

I do not confine my invention to the details as shown, as the same may be varied in many respects without departing from the essential principle thereof.

5 In preparing my invention for use the mercury (indicated at *d* by the shading lines) will be first placed in pot D, which may be effected by removing the cover of the pot F and pouring the mercury therein, it falling
10 of course at once into pot D. Then steam is raised in the boiler, and passing over into pot D there condenses, filling the space therein above the mercury, as also a portion of pipe C, with water of condensation. When
15 the steam-pressure raises the mercury to sight in pot F, the valve W should be closed. Then secure the cover of pot F in place, and removing plug Y, pour water into the resulting opening in pipe G till pot F, pipe G, and,
20 that portion of motor H which is below its diaphragm are filled. Then replace plug Y, open valve W, and the apparatus is in working order. The stop-valve X should be always open unless some exigency required
25 that it be closed. As the lower pot D has a slightly greater internal capacity than the entire bulk of the mercury employed and as pipe E extends to near the bottom of D, therefore the action of boiler-pressure upon
30 the mercury in D has no tendency to force the mercury out through any joint that exists in connection with said pot or the cover thereof, and the only joint to which the mercury has access is where pipe E enters pot F, and
35 if properly made no difficulty whatever arises therefrom. When steam is shut off, as for the night, the apparatus may be left as when in use without possibility of derangement; or, if preferred, valve W may be closed and the
40 column of mercury be thereby supported in pipe E without tendency to create a vacuum in pipe G.

45 I have shown my apparatus as arranged for practical use as I have already used it; but, as before suggested, it may be so arranged that the relative degrees of pressure at the different points therein may be varied as desired, and various of the details may be varied without departing from the essential nature of

my invention, and by my invention I avoid the 50 heretofore-experienced difficulty of employing a damper-regulator in connection with boilers carrying high pressure and yet having the regulator sensitive to slight changes of such pressure, for when the full boiler-pressure 55 is exerted upon the diaphragm in the regulator the diaphragm must, to resist the pressure, be of such thickness and strength as to render it insensible to the desired slight changes of pressure. While by dividing said 60 force and assigning one portion thereof to the act of raising the column of mercury and the balance to controlling the damper through the regulator, the diaphragm may be as sensitive as if but a portion of the actual boiler- 65 pressure existed.

I claim as my invention—

1. The combination, with a boiler, a damper, and a damper-regulator connected with the boiler and arranged to control the damper, of a 70 body of mercury interposed in the conduit between the boiler and said regulator and arranged to receive and resist a portion of the boiler-pressure and to transmit to the damper-regulator the balance of the boiler-pressure, 75 substantially as specified.

2. The combination of a boiler, as A, a damper-regulator having a conduit connection with said boiler, a receptacle, as D, with a body of mercury arranged therein and interposed 80 in said conduit, and a second receptacle, as F, arranged above said receptacle D and in the line of said conduit, substantially as specified.

3. In a damper-regulator, the combination 85 of a boiler, a damper-regulator connected by conduit with the boiler, a receptacle, as D, arranged in said conduit with a body of mercury therein, and a second receptacle, as F, arranged in said conduit above receptacle D and 90 connected therewith by a pipe whose lower orifice is near the bottom of the latter receptacle, substantially as specified.

JOHN E. SPENCER.

Witnesses:

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