

UNITED STATES PATENT OFFICE.

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DAMPER-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 682,791, dated September 17, 1901.

Application filed August 24, 1900. Serial No. 27,886. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS E. COLLINS, a citizen of the United States, residing at Conshohocken, county of Montgomery, and State of Pennsylvania, have invented a certain new and useful Improvement in Damper-Regulators, of which the following is a specification.

My invention relates to a new and useful improvement in damper-regulators, and has for its object to provide for a more delicate regulation of the damper.

My improvement consists in closing the damper by means of steam introduced underneath the piston and opening the damper by means of steam introduced above the piston, thus giving a more delicate regulation to the damper.

Another feature of my invention is to provide a valve for permitting the steam to enter above or below the piston.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claim.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a vertical section of the cylinder and diaphragm, the rest of the apparatus being left in elevation; and Fig. 2, an enlarged vertical section of the valve with the arm H omitted.

In carrying out my invention, A represents the base-plate of the regulator, upon which is secured the rings B and B', between which is clamped a diaphragm C. This diaphragm has secured to it the upwardly-projecting stud D, upon which rests the lever E. This lever is fulcrumed at the point F and extends out and is connected at its outer end by the pin e with the second lever G. This lever G is pivoted at the point g to an arm H. This arm is secured upon a portion of the valve I. The valve-stem of the valve I is connected to the lever G at the point i. At the outer end of the levers is secured a rod j, and upon this rod are placed weights J. These weights are

for the purpose of holding the diaphragm down against any predetermined pressure that may be desired in the boiler. If desired to reduce the pressure, some weights are removed, and if the pressure is to be increased more weights are added.

Secured upon the upper face of the housing K is a cylinder L. Working in this cylinder is the piston M. The piston-rod m, extending up through suitable stuffing-boxes, is connected to the lever N, and this lever N is pivoted at the point n to an arm which is secured upon the cylinder L. At the outer end of this lever is connected a rod O, which goes directly to the damper, of any ordinary construction. (Not shown.)

In operation the steam from the boiler is admitted under the diaphragm through the pipe P, and as long as the steam does not exceed the predetermined pressure, regulated, as aforesaid, by the weights J, the mechanism will remain in its normal position—that is, with the damper open; but as soon as the pressure exceeds the limit the diaphragm C will be raised slightly, which will communicate the motion to the lever E, which will in turn impart the movement through the pin e to the lever G, and this lever will raise the valve-stem of the valve I, and by the arrangement of the ports in the valve, which will be hereinafter described, the steam which enters through the pipe Q will pass through the valve into the pipe R, which enters the cylinder underneath the piston M. This will raise the piston, and thereby the lever N and the rod O, and will close the damper when the steam has been reduced below its normal pressure by reason of the reduced draft caused by the closing of the damper. The weights J will then cause the lever G to descend, and thereby the valve-stem, which will cause the steam to pass from the pipe Q through the valve into the pipe S. These pipes enter the cylinder above the piston M. This will force the piston downward, and thereby open the damper. The steam which is above or below the piston, whichever direction it is traveling, will escape through either the small petcocks S' or R'. This escape will be so small that it will not allow the damper to be opened or closed suddenly. The petcocks S' and R' just men-

tioned are preferably of the construction shown, which consists of a T-shape valve-casing having a conical seat therein and a conical-pointed screw threaded into the casing, so as to be turned tightly against this valve-seat or backed off to permit the proper flow of steam or water. Small pipes *a* and *b* lead from the petcocks *S'* and *R'*, respectively, to a suitable drain, so as to carry off the steam or waters of condensation.

In Fig. 2 I have shown the valve in the position it would assume when the steam would be below the predetermined pressure—that is, the steam would enter at the pipe *Q* and pass out at the pipe *S*. *T* is the valve-stem, which is surrounded by the plug *U*. This plug *U* has packing upon its lower end at the point *u*, so as to prevent the passage of steam therearound. At the point *U'* it is cut away slightly, so as to form an annular chamber, and from this annular chamber small holes *U²* extend through to the valve-stem *T*. The valve-stem *T* has upon its lower end the valve *T'*, the lower face *T²* of which is adapted to seat over the port *R²*, which the pipe *R* communicates with. The valve-stem *T* for a distance above the valve *T'* is smaller than the main portion of the stem, thus providing an annular chamber *T³* around the valve-stem. This annular chamber when the valve is seated over the port *R²* extends high enough to communicate with the holes *U²*. Thus when the valve is in the position shown in Fig. 2 the steam may enter through the pipe *Q* into the chamber *I'* and pass upward through the annular chamber *T³*, through the holes *U²*, into the annular chamber *U'*, and then through the port *S²* to the pipe *S*. When the valve-stem is raised, the upper face *T⁴* of the valve *T'* will close the annular chamber *T³*, and thus the steam will pass from the pipe *Q* into the chamber *I'* and then to the port *R²* and pipe *R*. The advantage of this apparatus is that the steam-pressure in the boiler can be kept at very nearly the predetermined point and

variations of the pressure one way or the other being corrected almost immediately.

Of course I do not wish to be limited to the exact construction here shown, as slight modifications might be made without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and useful is—

In a device of the character described, a valve-casing, a plug threaded in the casing and having packing at its lower end fitting against the inner wall of the casing, said plug being cut away above the packing to form an annular chamber, said plug having a central opening and small holes connecting the central opening and the annular chamber, a plug having a port *R²*, threaded in the lower end of the valve-casing, a valve-stem *T*, reduced in diameter near its lower end, a valve on the lower end of the stem, the reduced end of the valve-stem forming with the inner wall of the plug, an annular chamber *T³*, the said annular chamber extending slightly above the lower holes *U²*, when the valve is seated to close the lower part, the parts being so arranged as to cause the valve to close the annular chamber *T³*, in its ascent and in combination therewith, a cylinder, a pipe in communication with the chamber *U'*, leading to the interior of the cylinder near the top, a pipe communicating with the interior of the cylinder at the bottom and connected to the bottom of the valve-casing, a pressure-supply pipe for the casing, a piston in the cylinder, means connected with the piston for operating a damper, and means whereby excessive pressure in a boiler actuates the valve-stem, substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

FRANCIS E. COLLINS.

Witnesses:

MARY E. HAMER,
L. W. MORRISON.