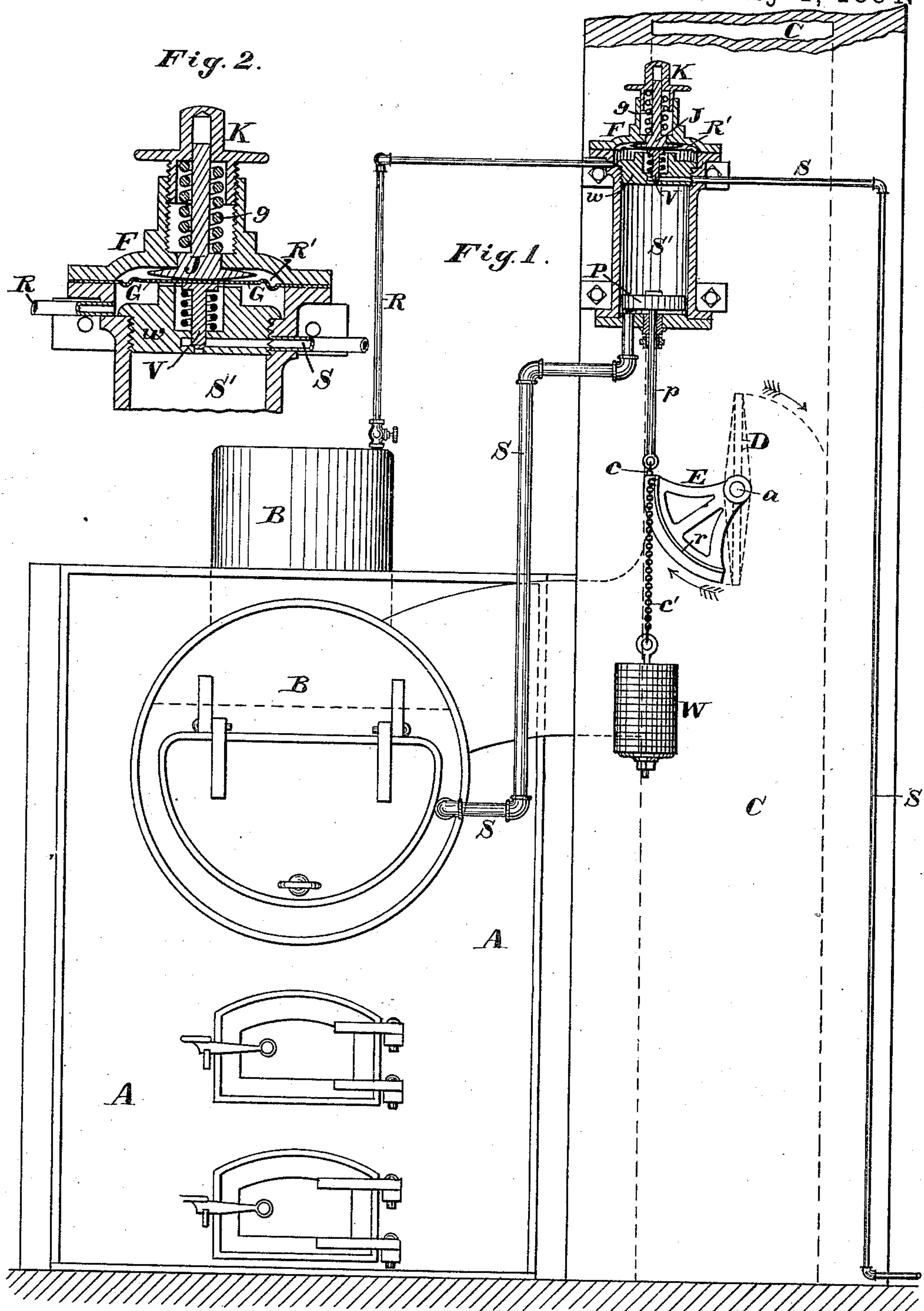


(No Model.)

N. CURTIS.
DAMPER REGULATOR.

No. 301,099.

Patented July 1, 1884.



Witnesses:

Wm. J. Rogers
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UNITED STATES PATENT OFFICE.

NELSON CURTIS, OF NEWTON, MASSACHUSETTS.

DAMPER-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 301,099, dated July 1, 1884.

Application filed October 10, 1883. (No model.)

To all whom it may concern:

Be it known that I, NELSON CURTIS, of Newton, in the State of Massachusetts, have invented a new and useful Improvement in Damper-Regulators for Flues of Steam-Boiler Furnaces, of which the following is a specification.

In the old and usual construction a weighted piston closely fitting in a steam-passage leading from a boiler is mechanically so connected with a damper in the flue of a furnace that the damper is open when the piston is down under the force of the weight and closed when the piston is up under the force of steam, and accordingly in the old and usual construction the piston is required to carry and at times lift a weight sufficient to overcome the pressure of steam upon the piston-surface at the working pressure of the boiler. By my invention I relieve the piston of this heavy weight, no greater weight or load being required for the piston in practicing my invention than is sufficient to overcome the equipoise of the damper upon its axis. The piston mechanically connected with the damper fits loosely in an enlarged portion of the steam-passage normally closed above the piston, so that normally the steam-pressure upon the two sides of the piston is equal, thereby causing the piston normally to remain at the lower end of the said enlarged portion of its steam-passage and the damper normally to remain open. To this apparatus is added a second steam-passage leading from the boiler whose furnace-flue is to be controlled; and in this second steam-passage is placed a piston or diaphragm loaded or moved in one direction by a strong spring, and in the other by steam acting upon the diaphragm, the stem of which diaphragm works across the said first-mentioned steam-passage, beyond the enlarged portion thereof, as a valve. The weight or spring of the diaphragm causes the valve normally to close the steam-passage containing the damper's piston beyond the enlarged portion thereof, as above mentioned; but when the steam in the second steam-passage overcomes the weight or spring of the diaphragm therein the valve opens and takes off the pressure above the damper's piston, allowing it to rise and the

damper to close. The reverse operation is obvious, the damper's piston slowly dropping to its normal place as the steam leaking by fills the space above it.

In the drawings, Figure 1 is a representation, partly in elevation and partly in section, of apparatus embodying my invention. Fig. 2 is a sectional view, upon an enlarged scale, of a portion of the apparatus, and represents more particularly the construction and arrangement of the diaphragm-valve working across the steam-passage of the damper's piston.

A is the furnace, the casing of which alone is seen.

B is the boiler, only the dome of which is seen.

C is the flue of the furnace, and D the damper therein, swinging on a shaft, *a*, having bearings in the sides of the flue.

S is a steam-passage leading from the boiler to a cistern (not shown) or to the open air, and S' is the above-mentioned enlarged portion therein.

P is the piston therein; *p*, a piston-rod.

E is a segment rigidly secured to the damper-shaft *a*. It has a groove in its periphery, in which lies a chain, *c*, but two links of which are seen, and one end of which is secured to the piston-rod *p*, while the other end is secured to the lower end of the segment. A second chain, *c'*, is attached to the upper end of the segment E, and rests against or is supported by a rib, *r*, on said segment when said segment is moved from the normal position shown. The second chain, *c'*, carries a weight, W, which, as is obvious, is the weight or load of the damper's piston P. As above stated, it should be sufficient to overcome the equipoise of the damper, and need not be heavier.

R is a second steam-passage leading from the boiler, and R' an enlarged portion or chamber at the end of said second passage, which, in the construction shown, is formed by the upper end or wall, *w*, of the enlarged portion S' of the other steam-passage and a cap, F.

G is a diaphragm secured in said enlargement or chamber R, as shown, its lower surface being exposed to the force of steam flow-

ing through the passage R into the chamber R'.

V is the valve working across the passage S beyond the enlargement or chamber S'. It is located, as shown, in a recess in the wall or head of the chamber S', and is normally held in contact with the diaphragm G by a spring, *f*, coiled about it or its stem, and pressing against a shoulder, as shown.

J is a plunger normally held down in contact with the diaphragm by a spring, *g*, coiled around its stem in a recess in the cap F, in which it is confined by a second cap, K, as shown. When the force of the spring *g* is overcome by steam flowing through the passage R, the valve V opens and the damper opens, as before described. When, again, the steam-pressure in the passage R is insufficient to overcome the force of the spring *g*, it follows that the damper closes.

The passages S and R, leading from the boiler, are herein termed "steam-passages," since the apparatus is operative only when steam-pressure is exerted in or through them; but, as is obvious and as is the case with one of the passages in the construction shown, both passages might connect with the boiler at a portion thereof under the water-line, and

the pressure of the steam be exerted only through water in the passages. It is also obvious that without departing from my invention the two passages might connect with the boiler at the same level, or that one might branch from the other. It is also obvious that a weighted piston-valve might be substituted for the diaphragm apparatus above described; also, that the piston P might be otherwise loaded and otherwise mechanically connected with the damper without departing from my invention.

I claim—

The combination, with a steam-boiler, a furnace, and a flue having a damper therein, of two steam-passages, a loosely-fitting piston in one of said steam-passages, a suitable connection between said damper and said piston, and a valve working across said steam-passage containing said piston, but adapted to be actuated by steam in the other steam-passage, substantially as described.

NELSON CURTIS.

Witnesses:

WM. S. ROGERS,
STEPHEN MOONEY.