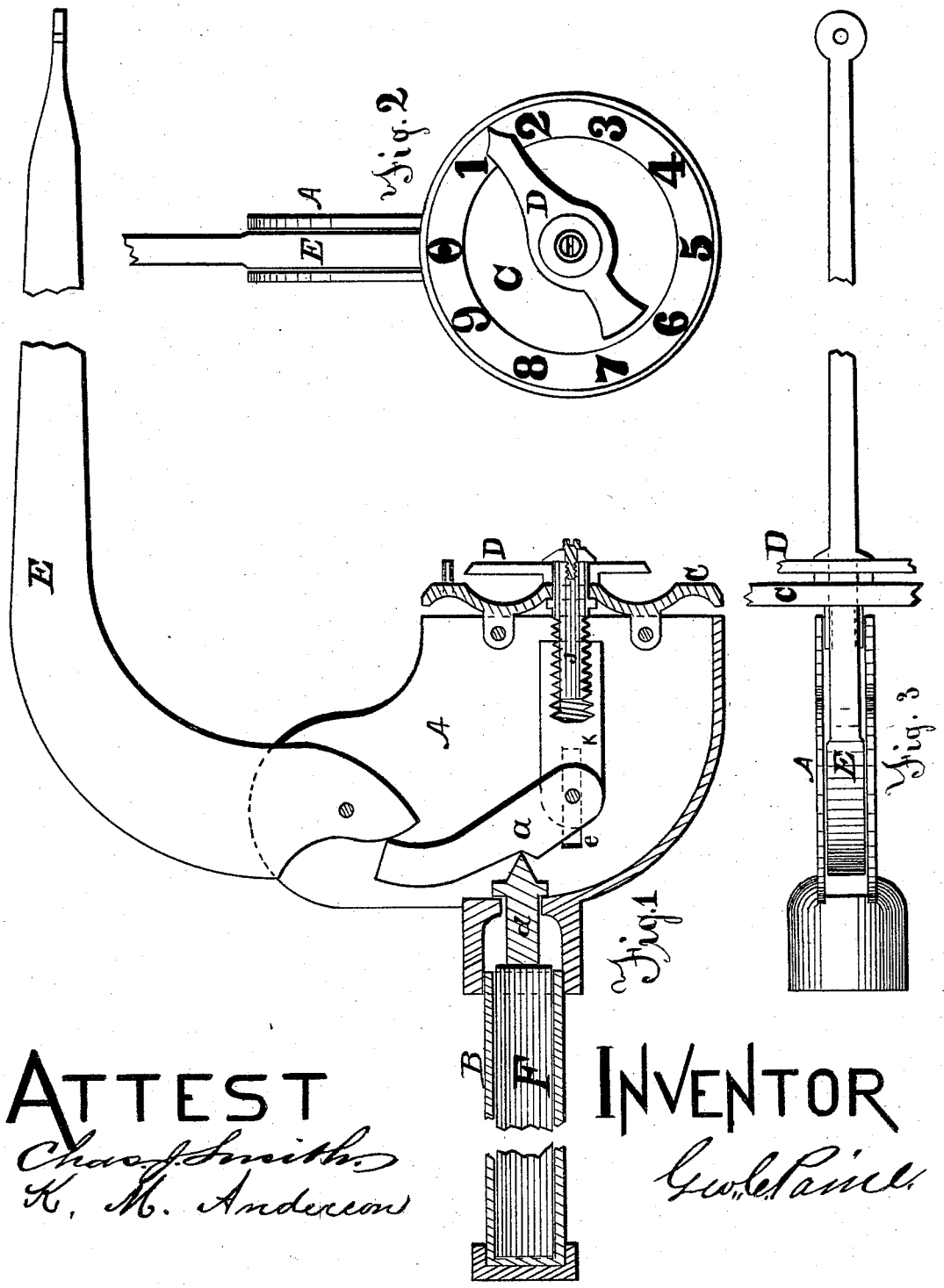
2 Sheets—Sheet 1.

G. C. PAINE.

REGULATORS FOR HOT-AIR FURNACES.

No. 182,769. Patented Oct. 3, 1876.



ATTEST

Chas. J. Smith
K. M. Anderson

INVENTOR

Geo. C. Paine

2 Sheets—Sheet 2.

G. C. PAINE.

REGULATORS FOR HOT-AIR FURNACES.

No. 182,769. Patented Oct. 3, 1876.

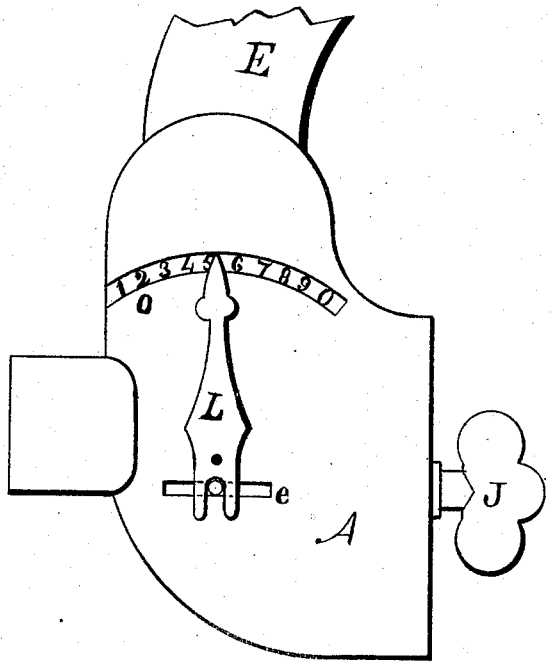


Fig. 4

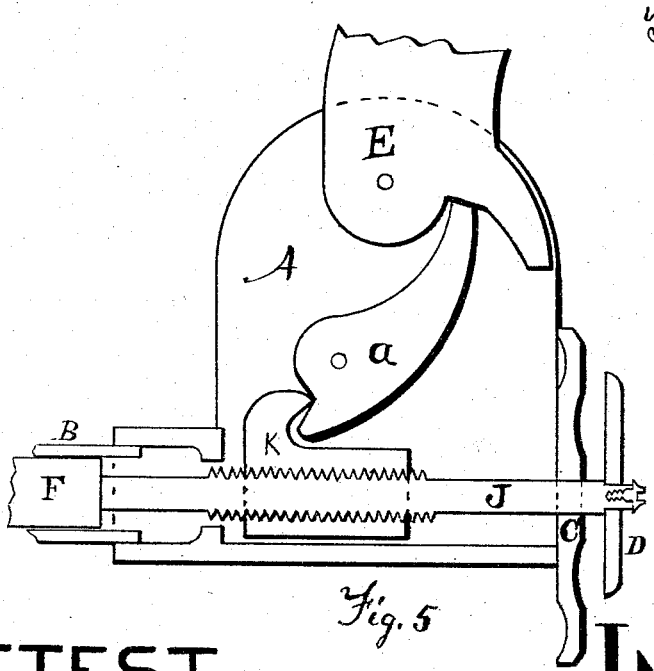


Fig. 5

ATTEST

Chas. J. Smith.

K. M. Anderson.

INVENTOR

Geo. C. Paine.

UNITED STATES PATENT OFFICE.

GEORGE C. PAINE, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN REGULATORS FOR HOT-AIR FURNACES.

Specification forming part of Letters Patent No. **182,769**, dated October 3, 1876; application filed March 4, 1876.

To all whom it may concern:

Be it known that I, GEORGE C. PAINE, of Boston, in the county of Suffolk, and State of Massachusetts, have invented a new and Improved Automatic Regulator for Hot-Air Furnaces, of which the following is a specification:

This invention consists of a head embracing a dial-plate, indicator-hand or pointer, adjusting-screw, and levers or cams arranged in combination with a metallic pipe or tube, which contains a core or stuffing of some material possessed of less expansive property than the material of the pipe or tube, and all of which is hereafter explained more in detail.

Figure 1 represents a longitudinal vertical section of my invention. Fig. 2 represents a front view. Fig. 3 represents a top view. Figs. 4 and 5 represent modifications of my invention.

A represents the head, within which is pivoted the lever E. At the front of the head A is secured a dial-plate, C, through the center of which passes an adjusting-screw, J, which is fitted to operate the link or nut K within the head. A short lever, *a*, is pivoted to the opposite end of the link K, which is bifurcated to receive it, and the pivot of which passes through, and is guided by, the slot *e* in the head. The opposite or upper end of the lever *a* rests against the lower end of the lever E.

Near the pivotal point, and against the lever *a*, rests the pointed plate *d*, the opposite end of which rests against the non-expansible rod or filling F, which is contained within the expansible tube B. One end of the expansible tube B is rigidly secured to the rear of the head A, the opposite end being permanently closed.

The instrument being constructed substantially as described, the tube B is introduced within the hot-air chamber of a furnace, the lever E having previously been fixed at the proper elevation (which is about in the horizontal line) by the adjusting-screw J. As the heat acts upon the tube B, the expansion thus caused moves the head forward, releasing the pressure between the pointed plate *d* and short lever *a*, and thus permitting the outer end of the lever E to fall, thus closing the damper, to which it is attached by wires, or similar well-known appliances, the lever E being sufficiently weighted to overcome the resistance necessary to operate the damper.

The draft being thus shut, and it being desirable to obtain more heat, the pointer D is turned, by which means, through the medium of the adjusting-screw to which it is attached, the short lever *a* is forced against the plate *d*, while the upper end of the lever presses against the lever E, by which means the outer end of the lever is raised, and the draft opened again, thus requiring great expansion of the tube B, which implies greater heat before the draft is again closed. The position of the pointer on the dial indicates the degree of adjustment, which may be readily observed.

Fig. 4 represents a side elevation of a device substantially like the one already described, except that the dial is left off, and in place of it an index, O, is fixed upon the side of the head, upon which the degree of adjustment is indicated by the pointer L, which is pivoted upon the side of the head, the lower end of the pointer being slotted to receive the end of the pivot upon which the short lever *a* works, and which by its backward and forward movement, through the medium of the adjusting-screw, causes the upper end of the pointer L to describe the arc of a circle, and thus indicate the degree of adjustment.

Fig. 5 is a sectional view of a modification of my invention, in which the plate *d* is dispensed with, and the adjusting-screw J passes entirely through the nut K, and abuts against the non-expansible core.

The nut K is provided with a hooked projection at its upper side, which engages with the short lever *a*, and, through it, operating the large lever E, both of which are slightly changed in shape and position from the ones described in Fig. 1, all of which, however, is clearly shown in the drawing.

The dial and indicator-hand remain substantially the same as in Fig. 1.

This regulator may also be applied to steam-boilers—particularly that class used for heat-

ing purposes—with the same objects and the same results as upon a furnace.

I claim—

1. The combination of the head A, levers E and *a*, adjusting-screw J, nut K, dial C, and pointer D, in the manner and for the purpose substantially as shown.

2. The head A, levers E and *a*, adjusting-screw J, nut K, dial C, and pointer D, in combination with the tube B, and non-expansible rod or core F, all arranged in the manner substantially as and for the purposes set forth.

GEO. C. PAINE.

Witnesses:

D. S. ZURNHAM,

C. LANGMAID.