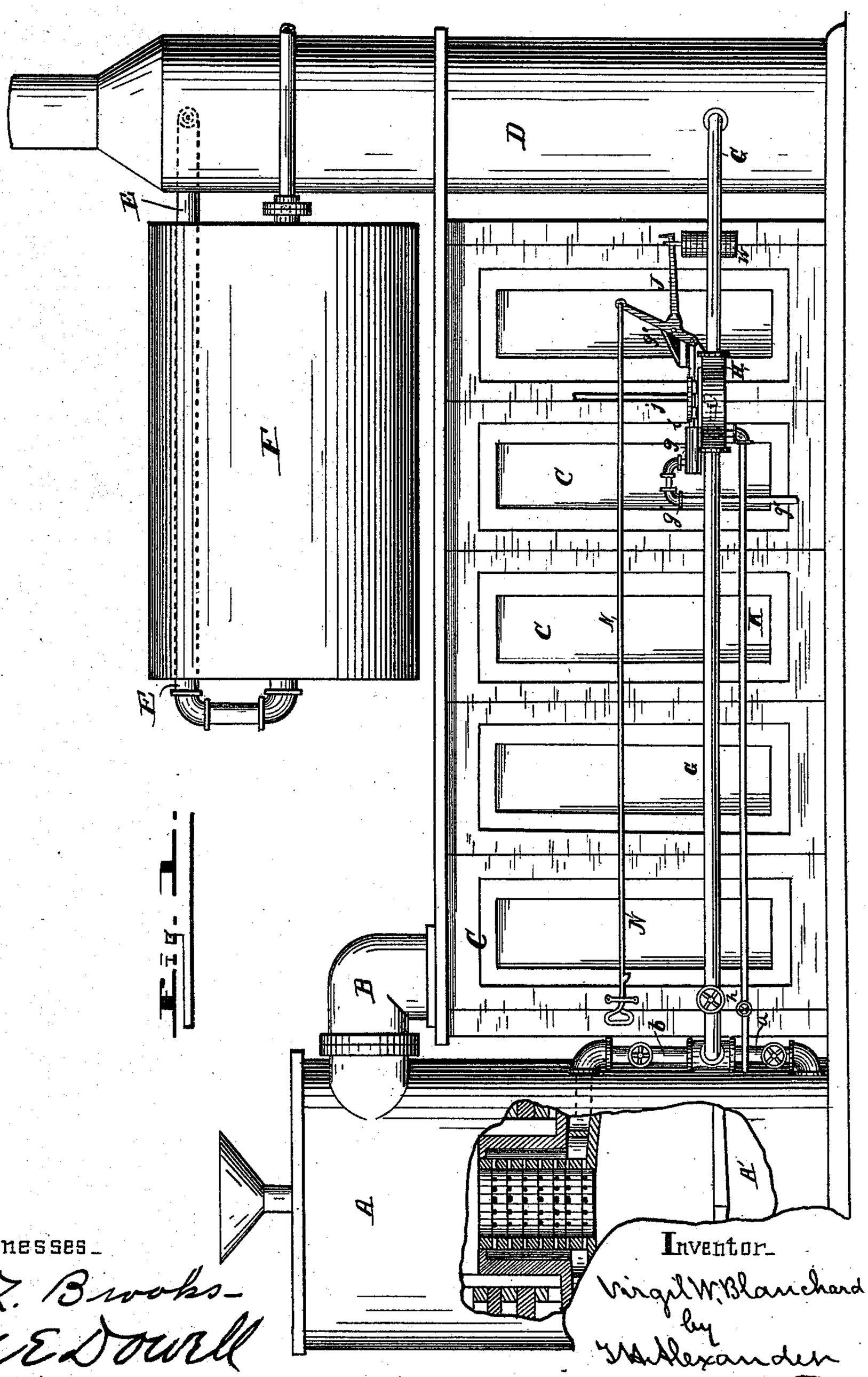
(No Model.) 2 Sheets—Sheet 1.

V. W. BLANCHARD.

AUTOMATIC APPARATUS FOR SUPPLYING AIR TO FURNACES.

No. 413,921. Patented Oct. 29, 1889.

Fig. 1.



Witnesses—
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A. E. Dowell

Inventor—
Virgil W. Blanchard
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(No Model.) 2 Sheets—Sheet 2.

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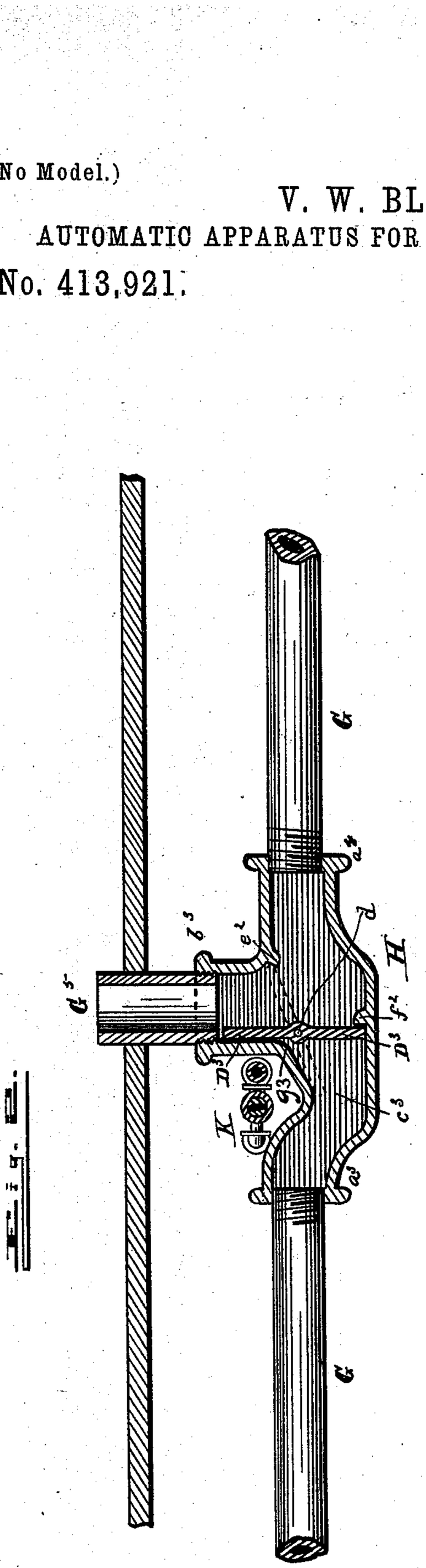

Fig. 1.

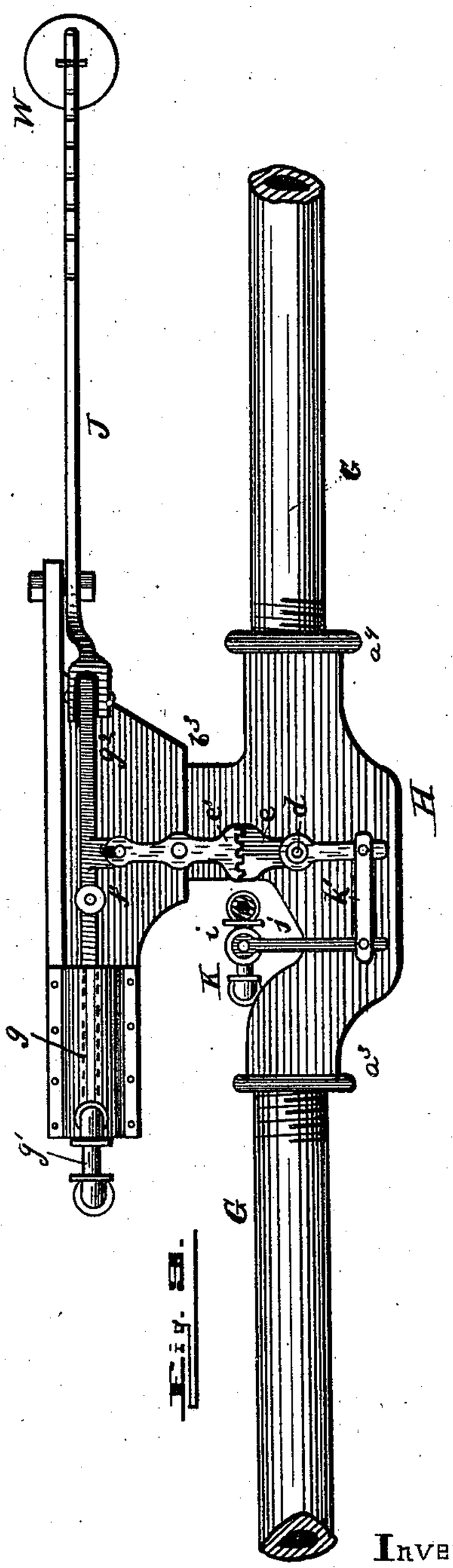

Fig. 2.

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UNITED STATES PATENT OFFICE.

VIRGIL W. BLANCHARD, OF NEW YORK, N. Y., ASSIGNOR TO JOSEPH A. DAVIS, OF SAME PLACE.

AUTOMATIC APPARATUS FOR SUPPLYING AIR TO FURNACES.

SPECIFICATION forming part of Letters Patent No. 413,921, dated October 29, 1889.

Application filed April 13, 1889. Serial No. 307,156. (No model.)

To all whom it may concern:

Be it known that I, VIRGIL W. BLANCHARD, of New York, in the county and State of New York, have invented certain new and useful Improvements in Automatic Apparatus for Supplying Air, &c., to Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 is a side elevation showing my improved mechanism for feeding air to a furnace, which latter is partly in section. Fig. 2 is a horizontal section in detail of the balanced valve applied to the air-pipe, showing also part of the casing. Fig. 3 is top view in detail of the balanced valve.

This invention relates to means for supplying air under pressure and steam to furnaces wherein an intense degree of heat is generated; and it consists, essentially, in certain novel means whereby air under pressure and steam can be supplied automatically to a furnace, as will be hereinafter fully understood from the following description, when taken in connection with the annexed drawings.

The furnace A may be constructed as described and shown in my Letters Patent No. 289,963, issued on the 11th day of December, 1883, wherein air can be introduced both below and above the bed of fuel.

B designates an outlet from the furnace leading into a casing C, containing a steam-generator of vertical construction. The casing communicates with a chimney D, in which I shall arrange a series of air-heaters, the highest one of which communicates with an air-forcing engine by means of a pipe E, which may communicate with a surface condenser F. The lowest one of the air-heaters in the chimney D has a pipe G leading from it to the furnace A, one branch a of which communicates with the ash-pit A′, and the other branch b communicates with a combustion-chamber above the grate. Both of the branch pipes are provided with regulating-valves.

H designates the valve-box, which is constructed with three ways or branches a^3, a^4, and b^3, the ends of which may be tapped to receive the main pipe-sections G G and the branch pipe-section G^5, which latter is represented in the drawings at right angles to the main pipe-section. The valve-box when seen in a side view is straight, but when viewed from above it is curved, so as to form a passage c^3, deflected from the straight course of the main pipe-sections G G. At the points e^2 f^2, I form seats for a valve D^3, although for many purposes seats will not be necessary. The valve is flat, and at the middle of its length and rigid with it is a valve-stem d, which is at the angle g^3 of the valve-box. The stem d of valve D has keyed on it a toothed lever e, which engages with another toothed lever e', that is pivotally connected to a link f. One end of the link f is connected to a piston which works in a small cylinder g, communicating, by means of a pipe g', with the steam-boiler. The other end of the link f is pivotally connected to a slide g^2, to which a bifurcated lever J is pivoted. One arm of the lever J has suspended from it a number of weights W, and the other arm has attached to it a pull-rod N, which extends to a point near the furnace and is provided with a handle, as shown in Fig. 1.

K designates a pipe which communicates with the boiler and also with the ash-pit of the furnace A, and is provided with a regulating-valve h and a supply-valve or cut-off i, which has a lever j secured to its stem, which is connected to the toothed lever e by means of a link k'. (Shown clearly in Fig. 3.) The piston in cylinder g is held up against the pressure of steam with a force proportionate to the weight W on lever J, which weight may be increased or diminished at pleasure.

The fire is started in the furnace by opening the valve in branch a of pipe G, closing the valve in branch b, and opening the balanced valve c, so that air can be forced through pipe G into the ash-pit. When the bed of fuel is in a high state of incandescence, the valve in branch a is nearly closed and the valve in branch b is fully opened, thus admitting a full blast of air into the furnace above the fuel. The balanced valve c will be held open, as indicated in full lines, Fig. 2, and the

valve *i* in steam-pipe K will also be held open by the weight W. I thus supply air and steam to the furnace. If the pressure of steam in the cylinder *g* exceeds the pressure on the piston in this cylinder produced by the weight W, this weight will be raised and both steam and air will be cut off from the furnace, and the air will be caused to enter the boiler-casing through the short branch pipe of the valve-box H by reason of the balanced valve *c* assuming the position indicated by full lines, Fig. 2. Having thus cut off steam and air from the furnace, the temperature therein will be diminished and the pressure of steam in the boiler will be lowered until the weight W is sufficient to overcome the pressure of steam against the piston in cylinder, when the weight will fall and allow air and steam to flow through their respective pipes into the furnace. By means of the pull-rod N an attendant can conveniently operate the balanced air-valve and the steam-valve. It will be observed that in either of the two positions of the valve one of its wings will impinge flatly against the angular side of the valve-box and be firmly supported.

By means of my improved balanced valve air, water, or other fluid can be caused to flow through the valve-box from one main pipe-section to the other without materially deflecting it from its course, and when desired can be directed from one pipe-section into pipe C^5.

It is obvious that by more or less loading the arm of lever J the balanced and steam valves can be caused to operate automatically at any desired pressure of steam in the boiler.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a furnace and boiler, of an air-blast pipe having branches that enter, respectively, the ash-pit and the combustion-chamber of the furnace, provided with regulating-valves and a balanced valve actuated automatically by steam, and a loaded lever, substantially as set forth.

2. The combination, with a furnace and boiler, of the air-blast pipe having branches that enter, respectively, the ash-pit and combustion-chamber of the boiler, and a balanced valve actuated automatically by steam and a loaded lever, and a steam-supply pipe connecting the boiler with the ash-pit of the furnace and provided with a regulating-valve, as set forth.

3. The combination, with a furnace and boiler, of the air-blast pipe, the steam-supply pipe, a balanced valve operated automatically by steam and a loaded lever, and a valve in the steam-supply pipe connected by a system of levers with the stem of the balanced valve, so as to be operated automatically and simultaneously with the latter, substantially as described.

4. The combination, with a furnace and boiler, of the air-blast pipe having a balanced valve, steam-supply pipe having valve *i*, the lever *j*, link *k*, toothed levers *e e'*, link *f*, steam-cylinder *g*, link g^2, and the loaded lever J, all arranged and operating substantially as set forth.

5. The combination of the valve-box having three branches with the valve pivoted at the junction of said branches, whereby the pressure against its upper and lower ends is caused to balance said valve in whatever position it may be made to assume, substantially as and for the purpose specified.

6. The combination of a balanced valve having the stem at the middle of its length with a valve-box having three branches, said valve being pivoted to the box at one angle, formed by the junction of the lateral and main pipe branches, and the main pipe branches being in the same axial line, substantially as described.

7. The combination, with a furnace, of an air-supply pipe entering the same, a three-way-valve box applied to said pipe, and a valve in said box actuated automatically by the pressure of steam from the boiler and a loaded lever, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

VIRGIL W. BLANCHARD.

Witnesses:

ALEX. S. STEUART,

P. L. BROOKS.