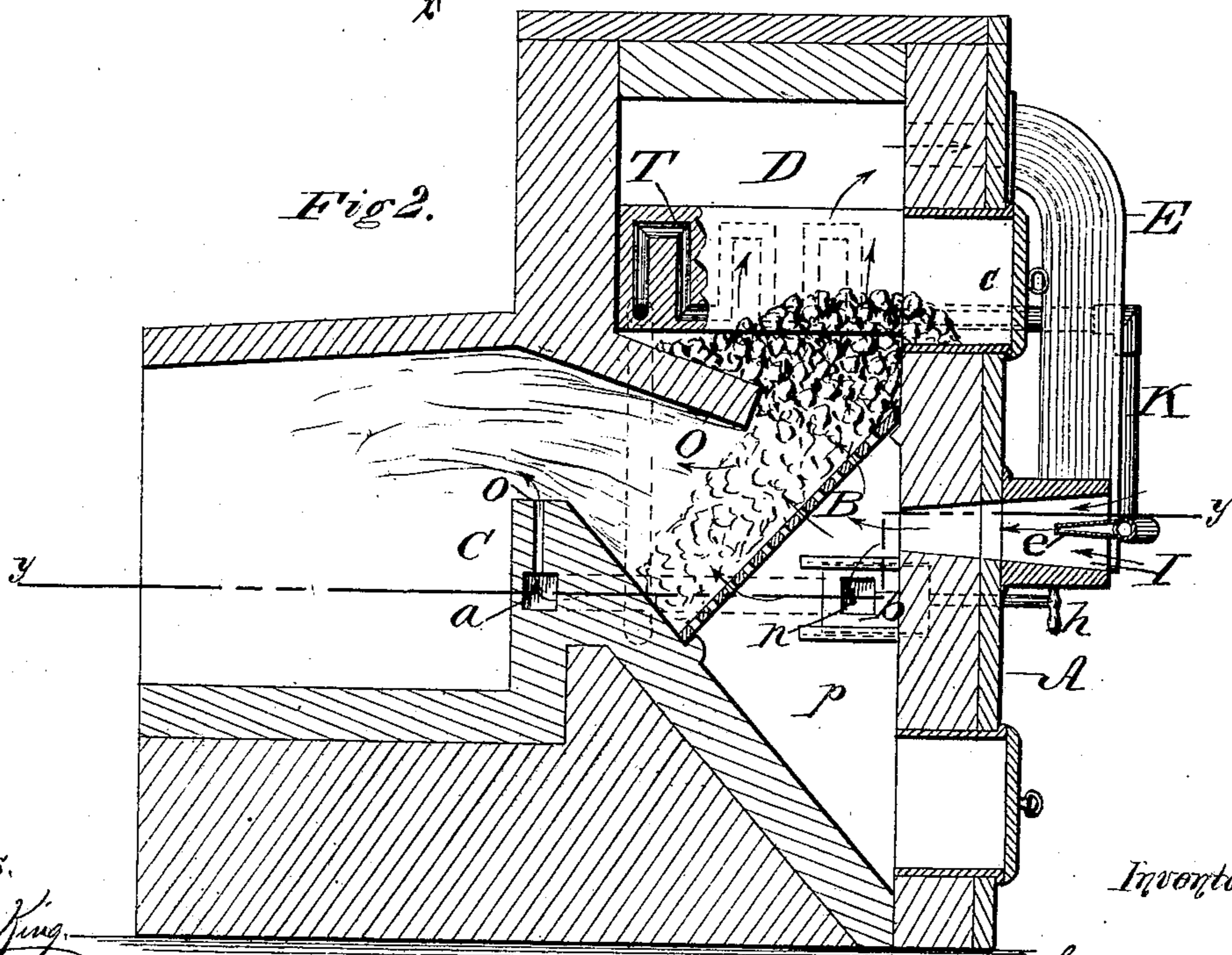
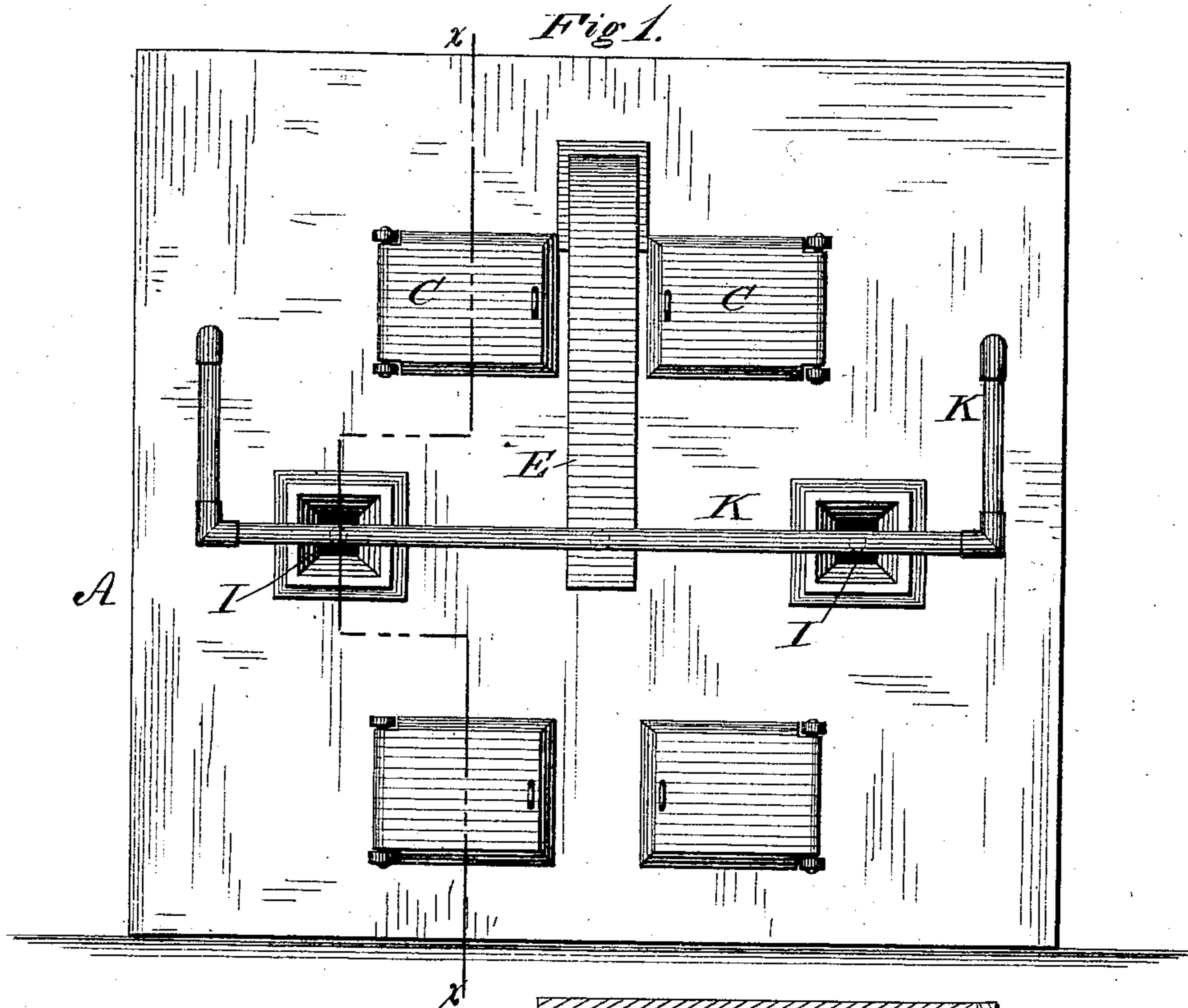


L. STEVENS.
Boiler-Furnaces.

No. 153,128.

Patented July 14, 1874.



Witnesses.
Harry King.
H. H. Dodge.

Inventor.
Levi Stevens.
by Dodge & Son.
Atty's.

L. STEVENS.
Boiler-Furnaces.

No. 153,128.

Patented July 14, 1874.

Fig 3.

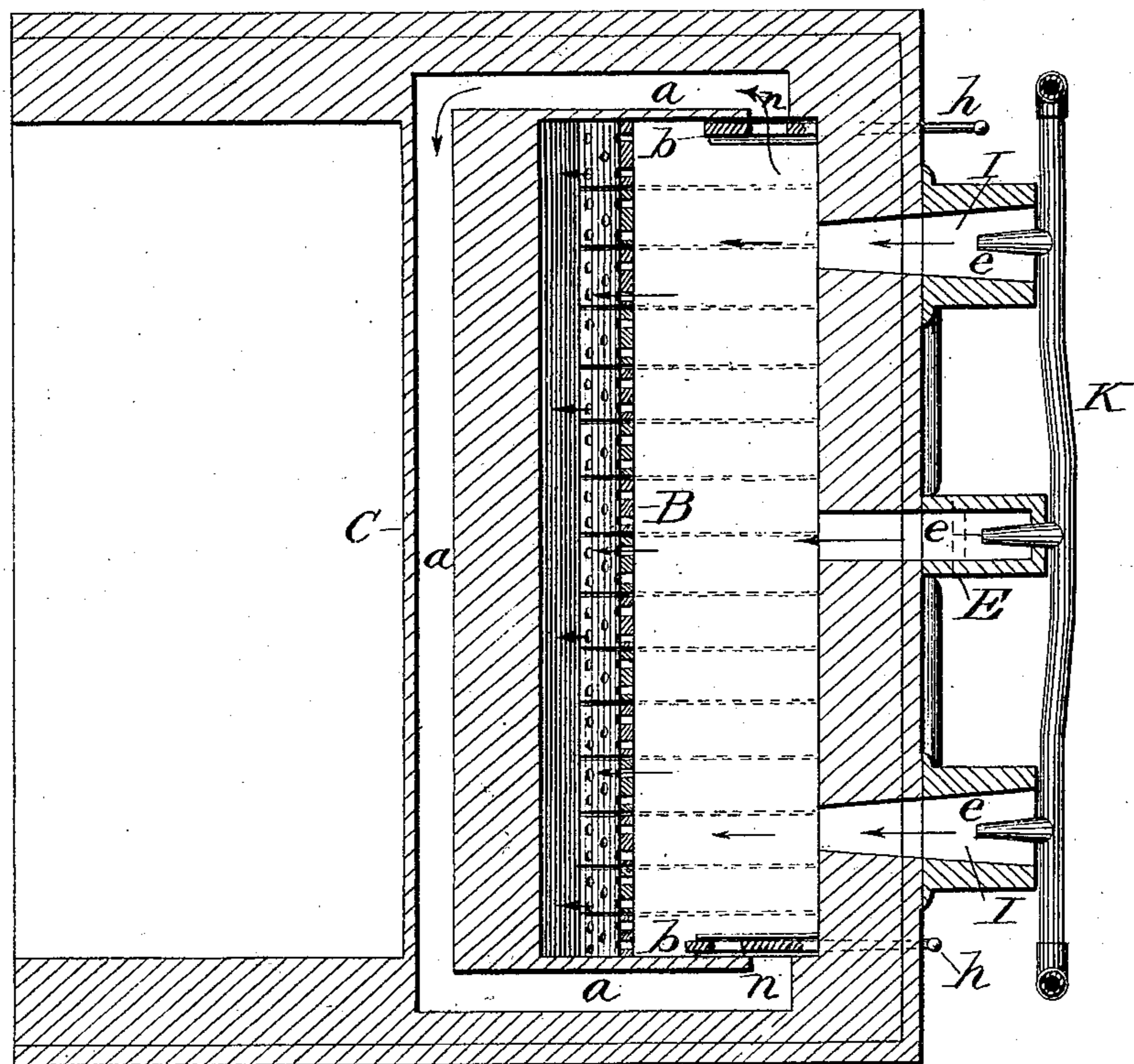
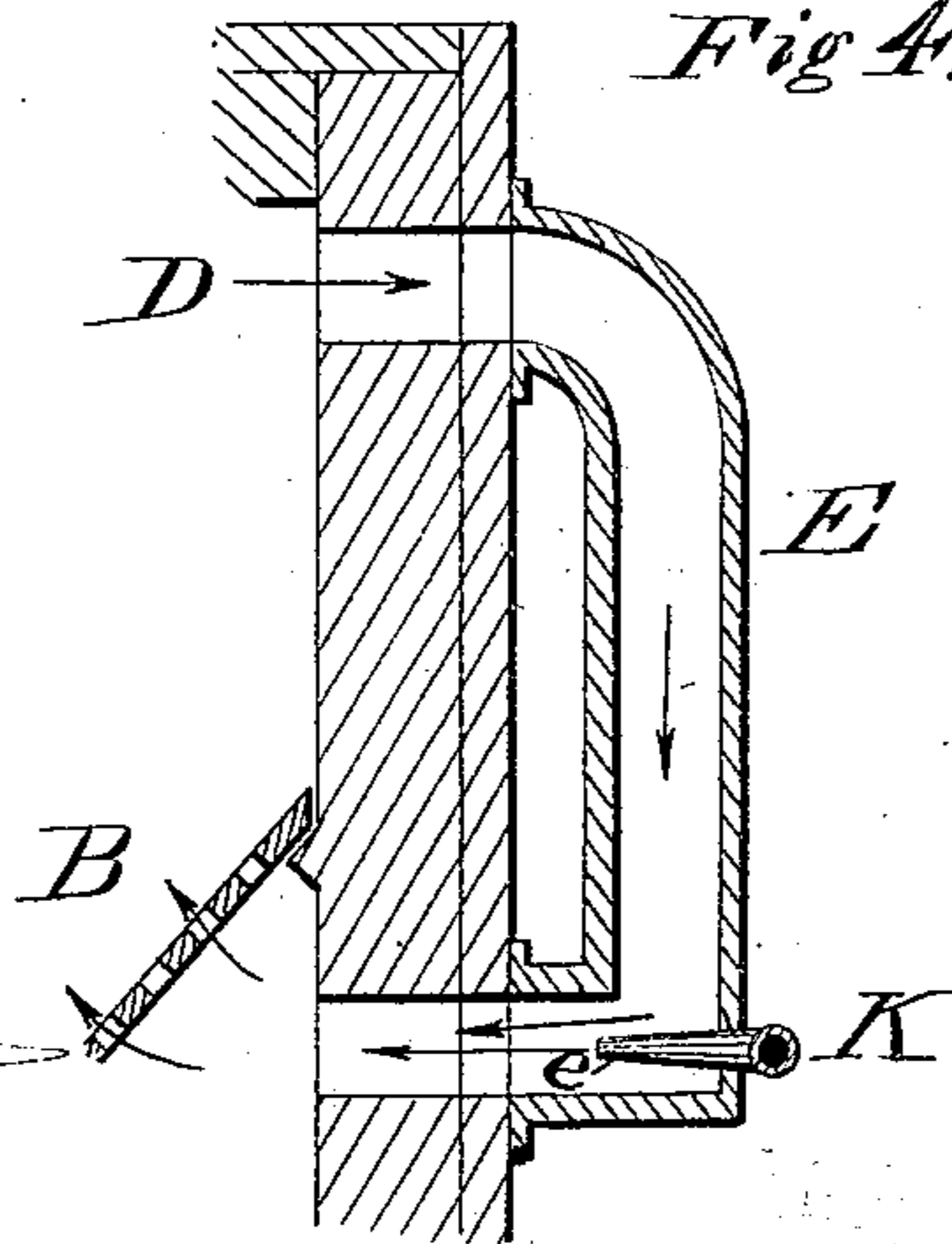


Fig 4.



Witnesses.

Harry King.
H. H. Dodge.

Inventor.

Levi Stevens.
by Dodge & Son
Atty.

UNITED STATES PATENT OFFICE.

LEVI STEVENS, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN BOILER-FURNACES.

Specification forming part of Letters Patent No. **153,128**, dated July 14, 1874; application filed December 3, 1873.

CASE A.

To all whom it may concern:

Be it known that I, LEVI STEVENS, of Washington, in the county of Washington and District of Columbia, have invented certain Improvements in Boiler-Furnaces, of which the following is a specification:

My invention relates to an improved arrangement of gas and combustion chambers for puddling, heating, and smelting furnaces; and it consists in a novel construction of the same, together with an arrangement of superheaters and pipes.

Figure 1 is a front elevation of my improved furnace; Fig. 2, a vertical longitudinal section on the line *x x* of Fig. 1; Fig. 3, a transverse horizontal section on the line *y y* of Fig. 2; and Fig. 4 a vertical section of a portion shown in detail.

I construct the walls A of any suitable size, and at the front extend them sufficiently high above the grate to form an upper chamber, D, as represented in Fig. 2, there being at the rear of this chamber a projecting horizontal wall or shelf, O, which inclines slightly toward the front, and forms a partial separation between the chamber D and the combustion-chamber below.

The grate consists of a perforated plate, or it may be of bars set at an inclination, as shown in Fig. 2, the front edge being nearly on a line with the projection O, and its rear end resting against a wall inclined in the opposite direction, the rear or upper portion of which forms the bridge-wall C, in which there is a transverse passage, *a*, with a series of vertical perforations, *o*, opening out through the top of the bridge-wall, as shown in Fig. 2. This passage *a*, as shown in Fig. 3, extends along the walls on each side of the grate, and terminate with holes *n* which open into the space under the grate, and which are provided with slides *b*, the handles *h* of which project out through the front wall, as shown in Figs. 2 and 3, and by which the holes *n* can be opened or closed at will. Air is supplied to these passages *a* by openings I at the front, as shown in Figs. 1 and 2, these being arranged one near each side, and opening into the space directly in front of the inclined grate B. The

coal is fed into the upper chamber D through one or more doors, *c*, and where it rests upon the shelf O and the grate B, and from whence it is fed gradually down upon the grate as it is consumed, it thus operating on the principle of a base-burner to some extent. Within the chamber D, at each side, is arranged a superheater, T, which has in it a series of abrupt turns at short distances, through which steam passes from the boiler. These superheaters connect with a pipe, K, which extends along outside of the front wall, and at each of the openings I is provided with a nozzle, *e*, projecting into said openings, as shown in Figs. 2 and 3. Near the top of the chamber D an opening is made through the wall, from which a tube, E, extends downward, and terminates in a hole through the wall into the space under the grate, as shown in Figs. 1, 2, and 4, and into the lower part or mouth of this tube E there also fits a nozzle, *e*, from the steam-pipe K, as represented in Figs. 3 and 4.

With a furnace thus constructed the coal is fed into the chamber D, and as it passes down upon the grate it is there burned, the burning of the coal upon the grate heating and partially roasting the mass of coal above it, the gases from which ascend into the chamber D, from whence they are drawn off through the tube E by means of the steam-jet at its lower end, and from whence this gas, mingled with the superheated steam, passes through the grate, in contact with the burning coal thereon, where these mingled gases are effectually consumed. At the same time a large volume of air is forced by the jets *e* in through the openings I, which, mingling with the other gases, keeps up an ample supply of oxygen, a portion of this, when desired, being passed through the side openings *n* into the passage *a*, from whence it issues through the perforations *o* in the bridge-wall, where it mingles with the gases and smoke from the grate, and thereby effects a most thorough combustion of all the gases. By means of the slides *b* more or less of the mingled gases and air may be fed out through the bridge-wall; and, when desired, the passage *a* may be shut off entirely, and all the incoming gas from the chamber D,

together with superheated steam from the jets *e*, and the air from the passages *I*, may all be fed through the fire on the grate, though this will seldom or never be done.

I do not in this application claim, broadly, the method of utilizing fuel by combining the hot gases from the fire-chamber with steam, whether superheated or not, and with or without air, and injecting them into the fire-chamber, as that is fully set forth in my application filed July 15, 1873, this being an improvement in the apparatus for more perfectly applying or carrying out the said method.

Having thus described my invention, what I claim is—

1. A furnace provided with the inclined

grate *B* and the projection *O*, constructed and arranged to operate substantially as and for the purposes set forth.

2. In combination with the chamber *D*, the tube *E*, steam-jets *e*, and air-passages or openings *I*, all constructed and arranged to operate substantially as described.

3. The passage *a*, with the perforations *o* in the bridge-wall, and the passages *n* with the slides *b*, all constructed and arranged to operate as set forth.

LEVI STEVENS.

Witnesses:

W. C. DODGE,

JOS. T. K. PLANT.