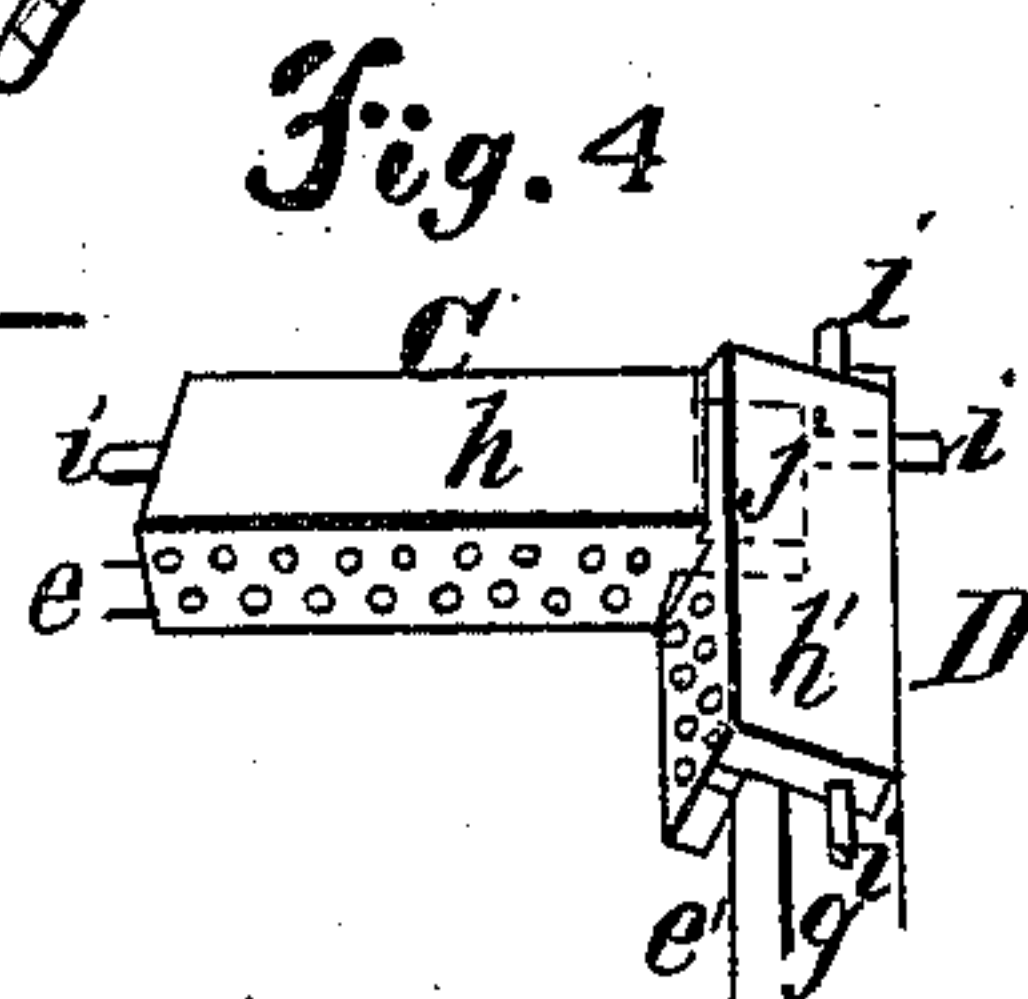
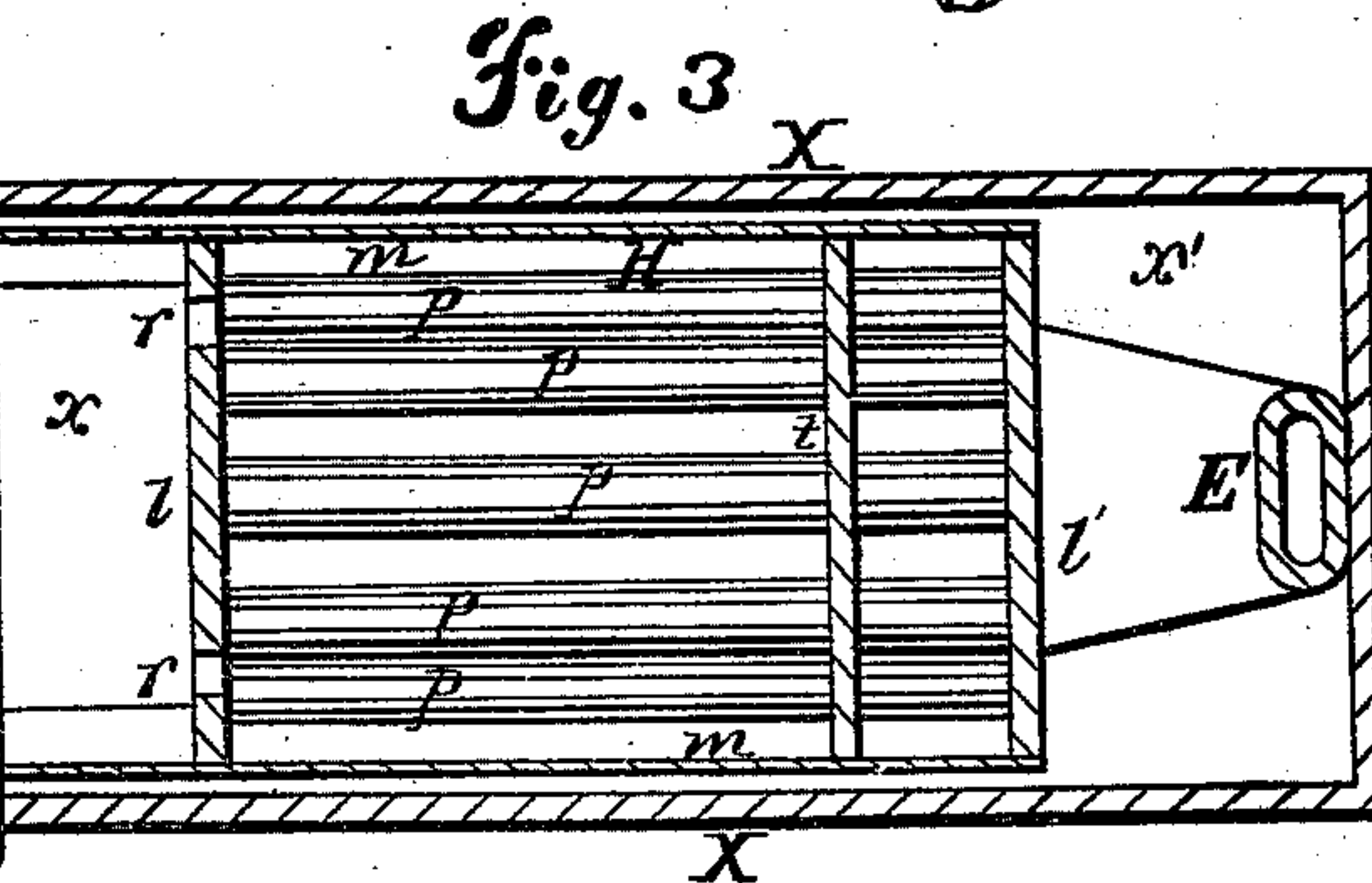
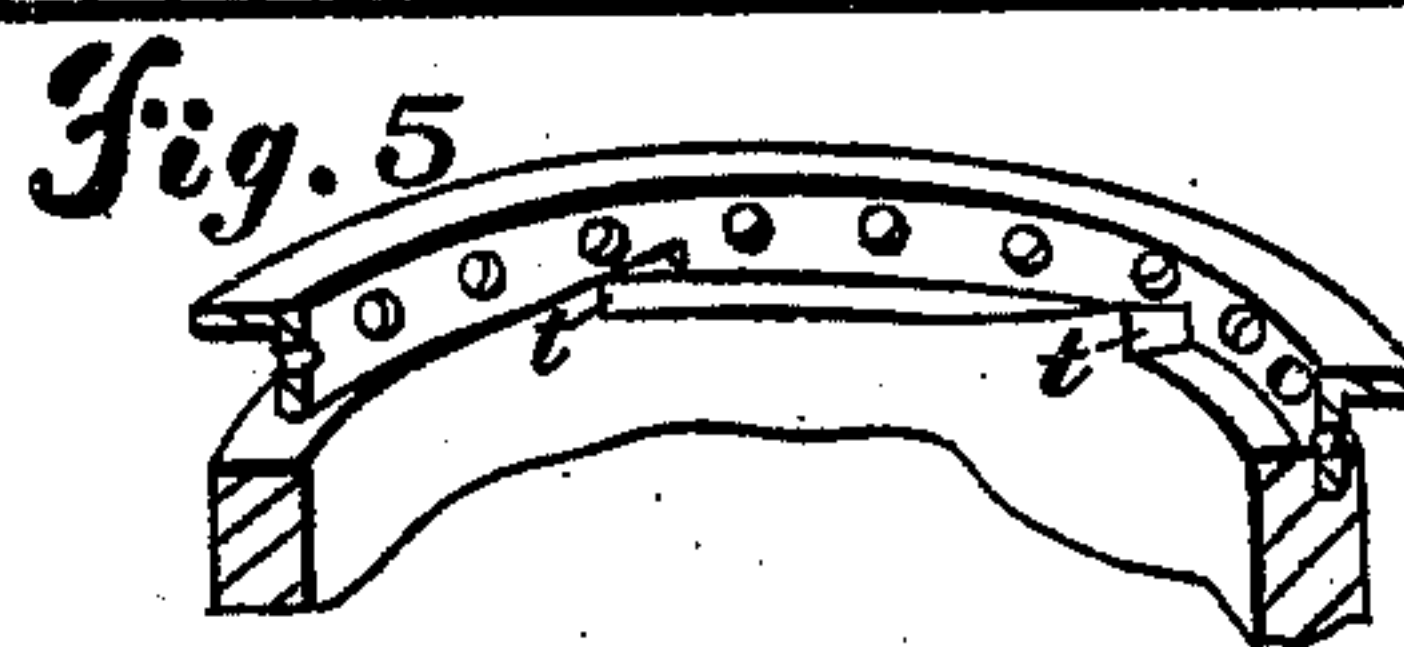
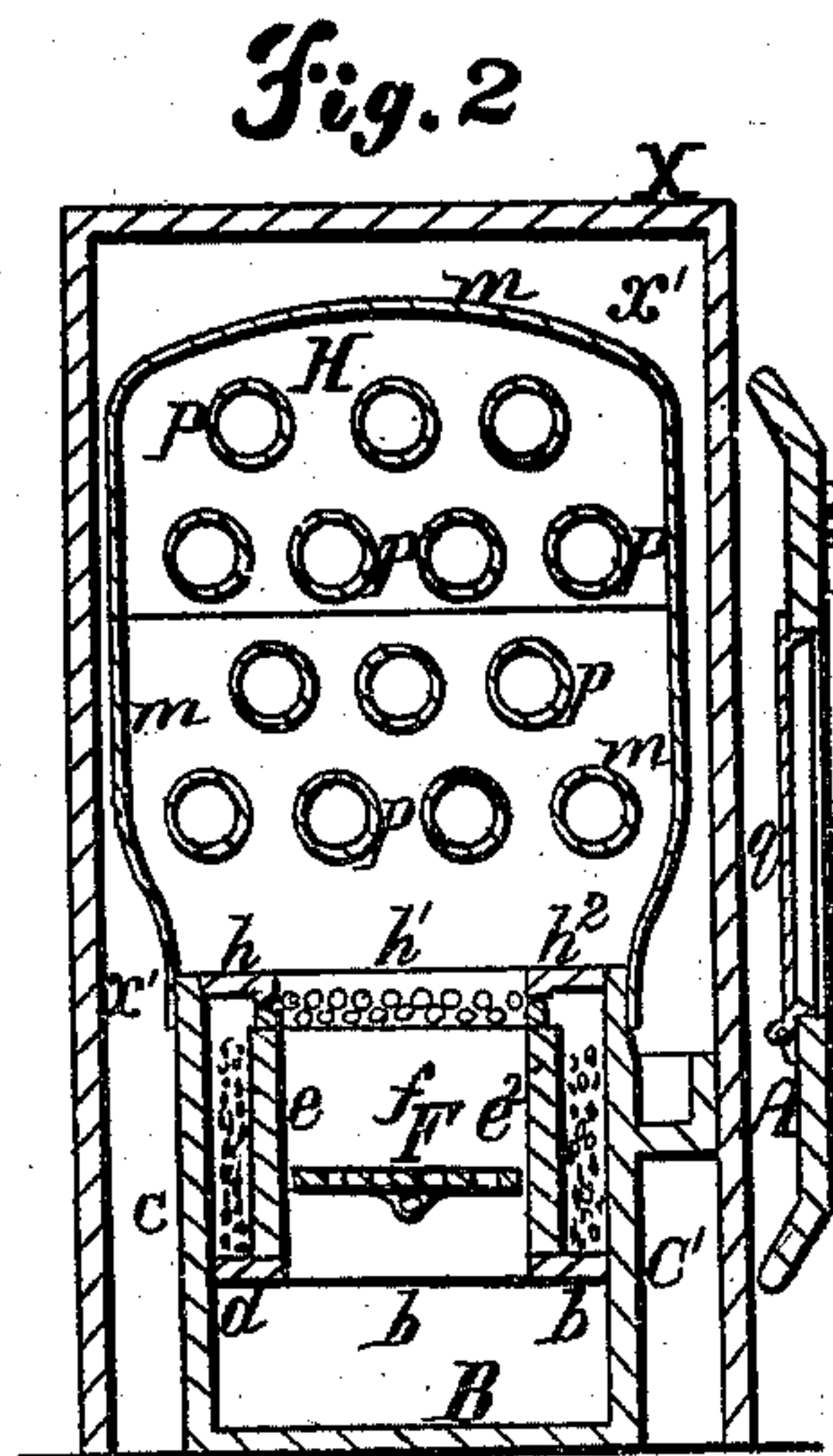
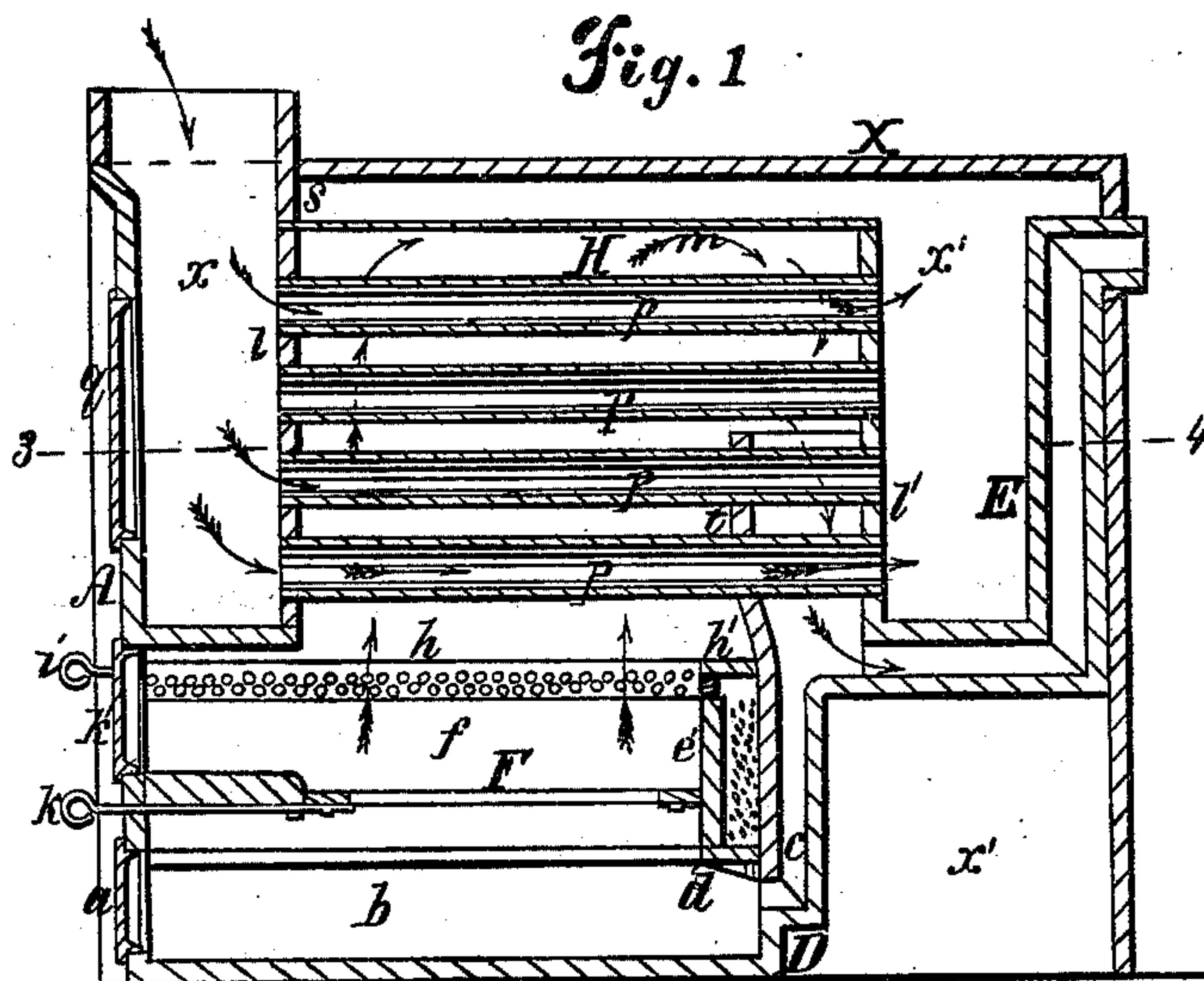


C. B. GREGORY.

Hot-Air Furnace.

No. 81,492.

Patented April 25, 1868.



Witnesses,
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C. B. GREGORY, OF BEVERLY, NEW JERSEY.

Letters Patent No. 81,492, dated August 25, 1868.

IMPROVEMENT IN HOT-AIR FURNACES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, C. B. GREGORY, of Beverly, Burlington county, New Jersey, have invented certain Improvements in Heating-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention consists, firstly, of a chamber, arranged above the fireplace of a furnace, and having tubes open at each end, and extending across it, for the passage of the air to be heated, as fully described hereafter; secondly, of perforated gas-plates, so arranged that they may be raised simultaneously above the fireplace, and thus afford a more extended opening for the passage of air to the interior of the same.

In order to enable others skilled in the art to make and apply my invention, I will now proceed to describe its construction and operation, reference being had to the accompanying drawing, which forms a part of this specification, and in which—

Figure 1 is a longitudinal sectional view of my improved heating-furnace.

Figure 2, a transverse vertical section of the same, on the line 1 2, fig. 1.

Figure 3, a sectional plan view, on the line 3 4, fig. 1.

Figure 4, a detached view, illustrating a portion of my invention; and

Figure 5 a view representing a modification of part of my invention.

Similar letters refer to similar parts throughout the several views.

A is the front plate, B the bottom, C C' the opposite sides, and D the back of the furnace.

At the bottom of the front plate A is a door, adapted to the opening of the ash-pit *b*, and at the rear end of the latter is the usual dust-flue *c*, communicating with the main flue E of the furnace.

On each of the opposite sides and back, D, of the furnace, and near to the upper end of the ash-pit, is a flange, *d*, upon which rest the clay walls, *e*, *e*¹, and *e*², of the fireplace *f*.

The grate F is hung to and operated by a rod, *k*, which projects through the front wall of the furnace, and in the latter is the usual fire-door *k'*.

A space or chamber, *g*, which extends along the back and both sides of the furnace, intervenes between the same and the fire-clay walls *e e*, and the said space may be filled with gravel or other granulated material, as described in the patent granted to me on the third day of March, 1868.

Above the chamber *g*, and almost in contact with the wall *e* and side, C, of the furnace, is an angular plate, *h*, perforated with a number of small holes, and hung on pins or trunnions *i i*, the bearings of which are in the side walls C, one of the pins being prolonged to form a handle, *i'*.

At the back of the fireplace is a similar plate, *h*¹, which is turned by means of a projection, *j*, of the plate *h*, shown in dotted lines, fig. 4, when the latter is operated by its rod *i*. A third plate, *h*², is hung above the wall *e*², and is operated in a similar manner by the plate *h*¹, the three plates moving simultaneously on turning the rod *i*, as will be explained hereafter.

In the upper part of the furnace, and communicating with the fireplace, *f*, is a chamber, H, having, in the present instance, cast-iron ends, *l l'*, and a rounded top and sides, *m*, of thin sheet metal, secured to the ends *l*, and to the front and side plates of the furnace.

Extending longitudinally through the chamber H, and secured to the ends *l l'* of the same, are a number of tubes, *p*, open at each end, as shown in fig. 1, and in front of the furnace, opposite to these tubes, is a door, *g*, and in the end, *l*, of the chamber, two openings, *r r*, for a purpose described hereafter, (see fig. 4.)

The furnace above described is contained within an outer casing, X, of brick-work, shown by red lines, and between this casing and the furnace intervenes a space which is divided by a partition, *s*, into two compartments or chambers, *x* and *x'*, the former of which is open at the top, as shown in fig. 1.

When a fire is ignited upon the grate F, cold air is admitted at one or more points in the front of the furnace to the space *g*, which surrounds the fireplace, and passes through the perforations of the plates *h h*¹ *h*², to aid in the combustion of the gases which rise from the burning fuel.

When soft coal or other fuel is used, that requires a greater quantity of air than can pass through the

perforated plates, the latter are turned upon their rods *i*, by operating the handle *i'*, and thus raised, as shown in fig. 4, in order to allow a sufficient volume of air to pass beneath them into the fireplace.

By means of the above arrangement, the plates *h* can be turned and adjusted to the proper position to admit the quantity of air required.

The heated products of combustion from the fireplace do not pass directly into the flue *E*, but are directed upwards by the bridge-wall *t*, fig. 1, into the chamber *H*, where, after freely circulating among the tubes *p*, they pass downwards over the bridge-wall, as indicated by the arrows, and thence into the flue *E*.

The cold air to be heated is admitted into the compartment *x*, of the outer casing of the furnace, passes downwards into the space between the front plate *A* and end *l* of the heating-chamber, and enters the open ends of the tubes *p*, as shown by the arrows, fig. 1.

The air, in passing through these tubes, is exposed to the direct action of the heated products of combustion, circulating through the chamber *H*, so that by the time it passes from the rear end of the tubes into the compartment *x'* of the outer casing of the furnace, it is in a highly heated state.

The air circulates in this latter compartment, and is exposed to the heated surfaces of the top and sides of the chamber *H* and of the flue *E*, and finally passing off through the usual flues to the rooms of the building to be heated.

By causing the air that is to be heated to enter at the top of the furnace, as above described, the coldest air passes to the bottom of the compartment *x*, and through the lowest row of tubes *p*, being thereby more directly exposed to the action of the fire, and as effectually heated as the air which passes through the upper tubes.

To facilitate the passage of air through the tubes *p*, the latter may, if desired, be slightly elevated at their rear ends, or their diameter may be gradually increased towards this point.

In either case, the air, in passing through tubes which are horizontal, or nearly so, will be retarded in its flow, and consequently will be more effectually heated than when it passes through vertical tubes.

The tubes *p* are so secured to the ends *l l'* of the gas-chamber, that when injured or worn out, they may be detached from the same, and removed through the door *q*, and as readily replaced.

The interior of the tubes can be readily cleaned by a brush or other instrument, inserted through the door *q*, and when a quantity of dust settles upon the exterior of the tubes, within the gas-chamber, it may be removed by a brush inserted through the openings *r r*, (see fig. 3.)

The modification of my invention, shown in fig. 5, represents a plan of raising the gas-ring above the cylindrical fire-pot, in an ordinary heating-stove. In this case, the fire-pot is provided on its upper edge with projections, *t*, having inclined faces, and adapted to corresponding recesses on the under edge of the gas-ring, so that the latter may either rest upon the fire-pot, or may be raised above the same, on slightly turning it, as shown.

In the above furnace, a thorough consumption of the fuel is insured; the air is exposed to an extended heating-surface, and the various parts of the furnace can be readily reached when it is necessary to repair or clean them.

I claim as my invention, and desire to secure by Letters Patent—

1. The arrangement of the fireplace, chamber *H*, with its tubes *p*, chamber *x'*, and the flue *E*, as and for the purpose specified.

2. Perforated plates, arranged above the sides of a fire-pot, so that their lower edges may be raised from contact with the fire-pot, for the purpose set forth.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

C. B. GREGORY.

Witnesses:

JOHN WHITE,

C. B. PRICE.