W. J. TOWNE.

Hot-Air Furnace.

No. 213,791. Patented April 1, 1879.

Fig. 1

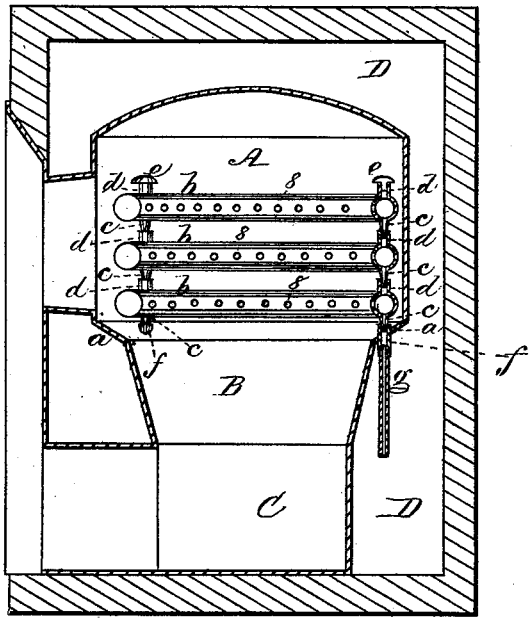
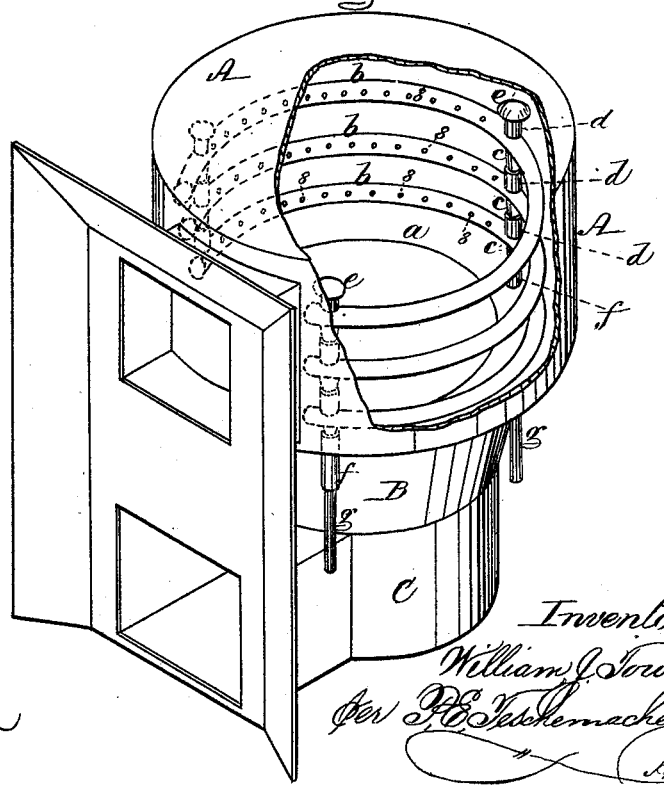


Fig. 2



Witnesses;
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UNITED STATES PATENT OFFICE.

WILLIAM J. TOWNE, OF NEWTON, MASSACHUSETTS.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. **213,791**, dated April 1, 1879; application filed December 5, 1878.

To all whom it may concern:

Be it known that I, WILLIAM J. TOWNE, of Newton, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Hot-Air and other Furnaces and Stoves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a vertical section through a hot-air furnace constructed in accordance with my invention. Fig. 2 is a perspective view of the same, with the outer casing removed, a portion of the dome being broken away to show the interior construction.

My invention has for its object to cause the smoke and products of combustion in a furnace or stove to be more thoroughly and perfectly consumed than heretofore; and consists in a series of perforated air-pipes, arranged one above the other within and around the dome or combustion-chamber of a furnace or stove, and communicating with the outer air, by which arrangement the air, in fine streams, is caused to impinge upon the smoke and gases in a series of strata. The first pipe throws a stratum of air into the ignited gases just above the fire-pot. This furnishes oxygen for further combustion till the products of combustion reach the next stratum of outside air, opposite the pipe next above, which accelerates the combustion until the gases reach the next pipe above, and, in turn, the air from this pipe accelerates the combustion, and so on up through the series of pipes, whereby a general ignition and combustion of all, or nearly all, of the smoke and gases within the combustion-chamber is insured, with much better results than have heretofore been attained.

My invention also consists in a novel method of connecting the perforated air-pipes, which are arranged within the dome or combustion-chamber, by means of nipples and sockets fitting each other, which construction avoids the use of bolts and screw-connections, and admits of the pipes being readily connected and disconnected to facilitate their removal for repairs or cleaning.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawings, A represents the dome or combustion-chamber of a hot-air furnace; B, the fire-pot; C, the ash-pit, and D the hot-air chamber.

The dome A is of somewhat larger diameter than the fire-pot, forming an offset or shoulder, *a*, directly over which is placed a series of perforated air-pipes, *b*, arranged, one above the other, within and around the interior of the dome or combustion-chamber A, the pipes *b* being thus removed out of the direct range of the fire, and thereby prevented from being rapidly burned out, as would be the case if they were arranged directly over the fire. The pipes *b* are all constructed alike, so as to be interchangeable, each pipe being provided on its under side with conical nipples *c*, and on its upper side with short vertical pipes or sockets *d*, the nipples and sockets fitting each other and affording a ready and convenient means of connecting the air-pipes together without the use of bolts or screw-connections, it being merely necessary to drop the nipples of one pipe *b* into the corresponding sockets of the pipe *b* below, and apply caps *e* to the sockets *d* of the upper pipe *b* of the whole series, the nipples of the lower pipe fitting into short pipes *f*, passing up through the shoulder *a*, which serve to support the whole series of air-pipes *b* in their proper positions.

The above-described method of connecting the pipes *b* is simple and effective, and admits of their being readily connected and disconnected, thereby greatly facilitating their removal for repairs or cleansing, and, as one pipe can be used in place of another, no particular skill or care is required in replacing them within the combustion-chamber.

To the lower ends of the pipes *f* are secured pipes *g*, which extend down into the hot-air chamber D, from which a supply of air passes through the pipes *g f* to the pipes *b*, issuing from the perforations 8 thereof in fine streams, and impinging upon and commingling with the smoke and products of combustion as they rise from the fire below.

By arranging the pipes *b* one above the other, as shown, the air issuing from the low-

est pipe of the series first impinges upon the smoke and gases contiguous to the fuel, producing their ignition at this point, and causing the smoke and gases in the vicinity of the next pipe *b* above to be heated sufficiently to insure their ignition when mixed with the air issuing from this pipe, and so on throughout the series; and by thus causing the streams of air to be discharged at different levels within the combustion chamber all, or nearly all, of the smoke and gases therein are ignited and consumed, resulting in an increase of heat with a given quantity of fuel.

The coal is never intended to reach the level of the lower pipe *b*, and consequently its air-apertures are less liable to become filled with dust or ashes, while the force of the jets of air issuing from the perforations 8 of the pipes also tends to keep them free and clear.

My invention may be applied to stoves as well as hot-air furnaces, and also to steam-boiler and other furnaces, and a series of any desired number of perforated air-pipes *b* may be employed; but I have found three to answer well and produce good results.

The air for the supply of the pipes *b* may be taken from the hot-air chamber D, as shown in the drawings, or from the outside of the casing, through a suitable passage or passages; but in a hot-air furnace I prefer to take the air from the hot-air chamber, as the upward currents through the pipes *g* tend to draw or attract the air from remote portions of the chamber into contact with the fire-pot and dome, and create a circulation of the air over and around them, causing it to be more rapidly heated, and thereby increasing the heating capacities of the furnace. In a stove or furnace where there is no hot-air chamber the perforated pipes *b* would be supplied with air directly from the outside of the casing through a suitable pipe or pipes.

The gas from the combustion-chamber of the furnace will not enter the pipes *b* and descend into the hot-air chamber through the pipes *g*, for the reason that the upward currents of air are sufficiently strong to overcome any tendency of the gas to pass down.

I am aware that stoves have heretofore been constructed with orifices in and around their fire-boxes to discharge streams of the outer air into the fire-pot to accelerate combustion; hence I do not broadly claim discharging the small streams of outer air into the stove to aid complete combustion.

I am also aware that drums have been located within a stove above the fire-pot, said drums communicating with the outer air, and having perforations in their lower faces to discharge streams of air downwardly toward the fire-box; but,

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

1. A series of perforated pipes, *b*, communicating with the air, and arranged, one above the other, within and around the dome or combustion-chamber of a furnace or stove, and independent of and above the fire-pot, whereby air is caused to be discharged in fine streams, so as to commingle with the smoke and gaseous products of combustion at different levels, substantially in the manner and for the purpose described.

2. In combination with a series of perforated air-pipes, *b*, arranged within and around the dome or combustion-chamber of a hot-air furnace, one or more supply-pipes, *g*, extending down into the hot-air chamber, to create an upward draft and cause the air to circulate over and around the outside of the fire-pot and dome, substantially as set forth.

3. In a furnace or stove, the interchangeable perforated air-pipes *b*, arranged, one above the other, within and around the dome or combustion-chamber, and connected together by means of nipples and sockets *c d*, adapted to fit each other, substantially in the manner and for the purpose described.

Witness my hand this 2d day of December, A. D. 1878.

WM. J. TOWNE.

In presence of—
P. E. TESCHEMACHER,
W. J. CAMBRIDGE.