

H. I. SNELL.
AIR-HEATING APPARATUS.

No. 172,791.

Patented Jan. 25, 1876.

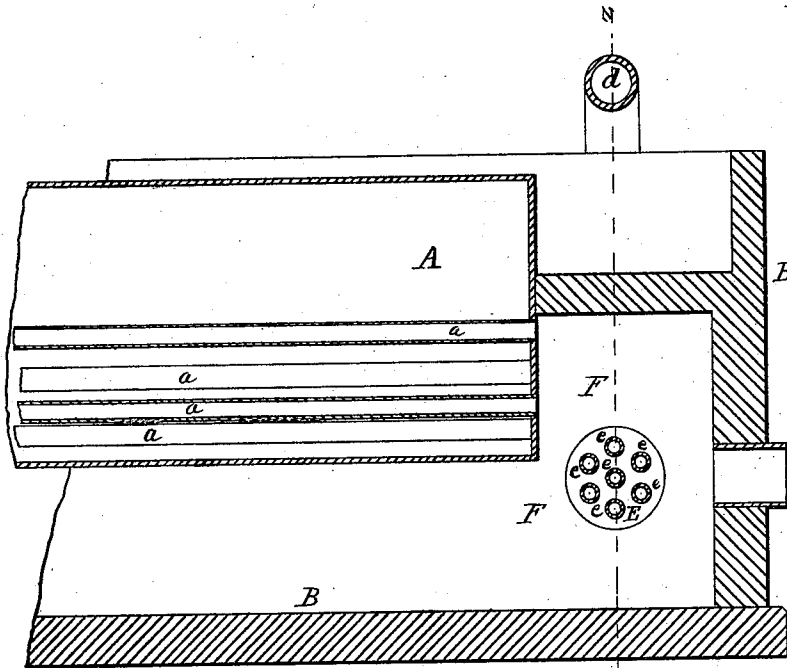


FIG. 2.

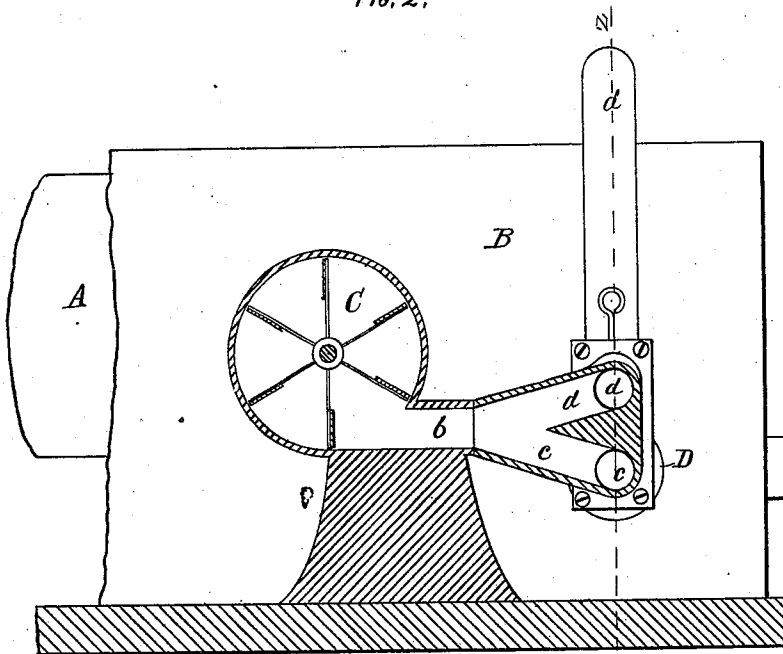


FIG. 1.

WITNESSES,
Wm. B. Edwards
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INVENTOR,
Henry I. Snell,

H. I. SNELL.

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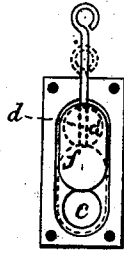


FIG. 4.

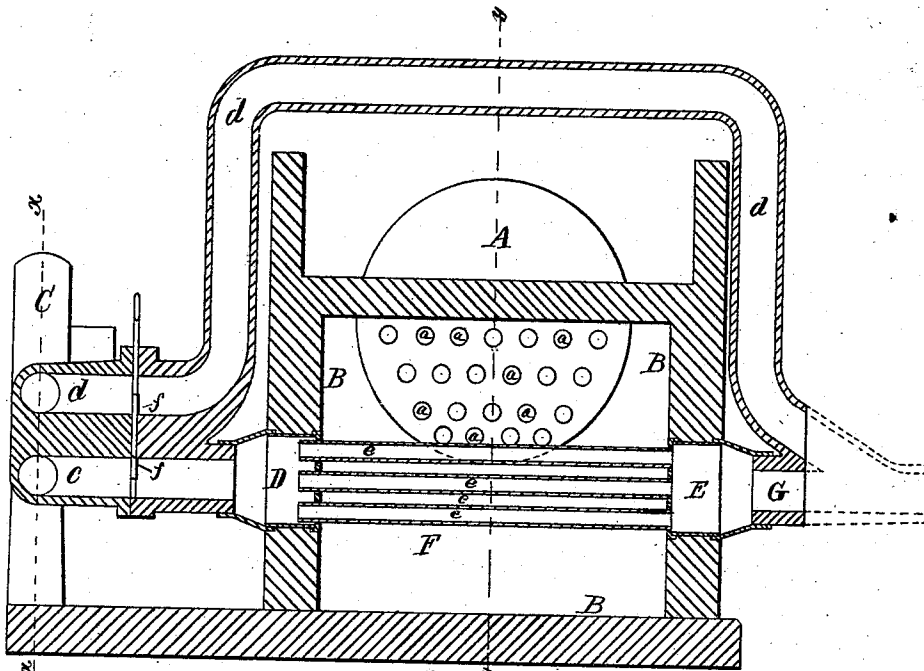


FIG. 3.

WITNESSES,

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UNITED STATES PATENT OFFICE.

HENRY I. SNELL, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN AIR-HEATING APPARATUS.

Specification forming part of Letters Patent No. 172,791, dated January 25, 1876; application filed March 19, 1875.

To all whom it may concern:

Be it known that I, HENRY I. SNELL, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Air-Heating Apparatus, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to an apparatus for heating dry-houses and other rooms by utilizing the heat from steam-boilers; and it consists, first, in the combination, with a steam-generator, of a suitably-constructed heater composed of a series or cluster of small air-pipes placed in a position to be exposed to the action of the hot gases or products of combustion during their passage from the fire-box to the open air, either in one of the horizontal passages, in the rear smoke-box, in the front smoke-box or uptake, (in the case of a boiler having its chimney or the passage leading thereto at the front end of the boiler,) or in the chimney, and a blower connected by suitable pipes to one end or side of said heater, and suitable pipes or pipe leading from said heater to the room, building, or other place to be heated, all so arranged that a current of air may be constantly kept moving through said heater and discharged into the place to be heated.

My invention further consists in constructing the heater of a series of tubes extending across the flue or passage for the products of combustion, one end of said tubes being set in a fixed position in the inner head of a chamber set in the brick-work of the boiler-setting, while the other ends of said tubes are fitted loosely to holes in the inner head of a similar chamber, set in like manner in the opposite wall of the setting, all so arranged as to allow of a free movement of said tubes in one of said chamber-heads, to compensate for expansion.

My invention further consists in the combination, with a steam-generator provided with a heater, composed of a series or cluster of small pipes or tubes, placed in a position to be exposed to the hot gases in their passage from the fire-box to the open air, and a blower connected with said heater by a suitable pipe, so that a constant current of air may be kept moving through said heater, of a supplement-

ary or branch pipe leading from the pipe that connects the blower and heater, at some point between said blower and heater, and passing over or around the boiler and connecting with the discharge-pipe of the heater leading to the room to be heated, and a sliding plate or disk-valve, arranged to slide in a suitable casing therefor across the line of said pipes, and to cover one of said pipes and reach to the inner circumference of the other pipe, so that a movement of said valve equal to the diameter of said pipes will close the open pipe and open the closed one, or, by moving the valve a less distance, a portion of both pipes will be open and the other portion closed, and, by moving said valve a greater or less distance, the amount of cold or hot air blown into the room to be heated may be perfectly controlled.

Another advantage of the use of said valve is that, when constructed, as shown, with semicircular ends, and used in combination with circular openings, the aggregate opening for the passage of air may be increased or diminished at will.

Figure 1 of the drawing is a section of the blower and the pipes leading therefrom, taken on line *xx* on Fig. 3, and showing a portion of a steam-boiler of the horizontal tubular kind, in brick setting, in elevation. Fig. 2 is a longitudinal section of the boiler on line *yy* on Fig. 3. Fig. 3 is a transverse section on line *zz* on Fig. 1; and Fig. 4 is an elevation of the valve and one portion of its casing, with the other portion removed.

In the drawings, A represents the rear portion of a cylinder-boiler provided with the fire-tubes *a a*, and set in the ordinary brick setting B, all constructed in a well-known manner.

C is a fan-blower, of any suitable construction, and provided with a single outlet-pipe, *b*, which connects with and discharges into the two pipes *c* and *d*, which diverge from each other, as seen in Fig. 1.

The pipe *c* leads directly to and opens into the chamber D, which is set in a suitable opening in the setting B, as shown in Fig. 3.

E is another chamber, similar to D, set, in like manner, in the wall of the setting, upon the opposite side of the boiler. The chambers

D and E are connected together by a series of tubes, *e e*, extending across the smoke-flue F, one end of said tubes being permanently attached to the inner wall of the chamber E by being screwed therein, or by being expanded in the same manner that boiler-tubes are set in the tube-sheet, so as to make a tight joint. The opposite ends of the tubes *e e* extend through the inner wall of the chamber D with a slip-joint, so that they are perfectly free to expand as they become heated.

It is very essential that the slip-joint should be in the chamber D, nearest to the blower, as, when arranged in that manner, no damage can occur from or on account of said loose joints, except, perhaps, the loss of a small portion of the air passing through the chamber D, which may escape around the tubes *e e* into the smoke-flue; but instead of being lost it will serve to increase the draft in the flue, while, if the slip-joints were made in the chamber E, the escape of air from the ends of the tubes *e e* would tend to draw the smoke and hot gases, and possibly sparks, from the smoke-flue into the chamber E, and blow the same into the room to be heated.

By the use of a heater composed of a number of small tubes, as above described, placed in the uptake or other smoke-passage of a steam-boiler, in a position to be acted upon by the hot gases, and a fan or other mechanical blower adapted to force a blast of air through said tubes, I am enabled to much more completely heat the air in its passage through the boiler than if a single tube or pipe were used as a heater, and also to raise the temperature sufficiently high for use in dry-houses without detracting at all from the capacity of the boiler for making steam.

G is a pipe leading from the chamber E to the room to be heated.

The pipe *d*, branching from *c*, near the blower, passes over or around the boiler, and may connect with the pipe G, as shown in dotted lines in Fig. 3, or it may lead directly to the room to be heated independently of the pipe G.

Between the blower and the chamber D, at some convenient point where the pipe *c* and *d* are near each other, a sliding disk or plate valve, *f*, is fitted to a suitable chamber formed for the purpose in one of the end faces of said pipes where they are jointed together, by the use of which valve the blast of air from the blower may be made to pass through the pipe *c*, and heater-tubes *e e*, and thence to the room to be heated; or the whole blast may be made to pass through the pipe *d*, and enter the room without being heated; or a part may pass through the heater and a part through the pipe *d*, and the two currents of air, one heated and the other not heated, may be united in the room to be heated, or in the pipe G before arriving at the room, thus enabling the operator to control the temperature of the room to be heated, at will, by a simple movement of the valve *f*.

It is obvious that other kinds of valves may be used with a like result; as, for instance, a plug-cock might be used, having two holes through the plug corresponding to the pipes *c* and *d*, and at right angles to each other; or separate cocks or valves may be used for each pipe; but I prefer a single valve, for the reason that it is more readily operated than two separate valves.

The slide-valve shown in the drawings has semicircular ends; and it will be seen that a given movement of said valve less than one-half of its whole movement uncovers more of the round pipe covered thereby than it covers of the pipe that is open, by which means the aggregate area of the two passages may be considerably varied, and thereby the velocity of the air moving through said pipes be increased or retarded.

What I claim as new, and desire to secure by Letters Patent of the United States, is as follows:

1. In combination with a heater placed in the flue of a combustion-chamber, in a position to be acted upon by the products of combustion in their passage from the combustion-chamber to the open air, and a blower connected therewith by a suitable pipe, and adapted to force a current of air through said heater, and thence through a suitable pipe to the compartments to be heated, I claim a supplementary pipe leading from the blower over or around the heating apparatus, and connecting with the discharge-pipe of the heater, and one or more suitable valves placed in said pipes between the blower and heater, all arranged to operate substantially as described.

2. In combination with a steam-boiler and a blower, a heater composed of the chambers D and E, connected together by the tubes *e e*, attached permanently to one of said chambers, and passing loosely through openings into the other chamber, substantially as described.

3. A heater composed of the chambers D and E, connected together by a series of small tubes, *e e*, attached permanently to one of said chambers, and passing loosely through openings into the other chamber, substantially as described.

4. In combination with two circular pipes or passages, *c* and *d*, a sliding disk or plate valve, *f*, having semicircular ends, and adapted to open one passage while it closes the other, and also adapted to vary the aggregate openings of the two pipes, substantially as described.

Executed at Boston this 15th day of March, 1875.

HENRY I. SNELL.

Witnesses:

WM. P. EDWARDS,
E. A. HEMMENWAY.