(No Model.) 2 Sheets—Sheet 1.

S. SMITH.

HEATING APPARATUS.

No. 307,499. Patented Nov. 4, 1884.

Fig. 1.

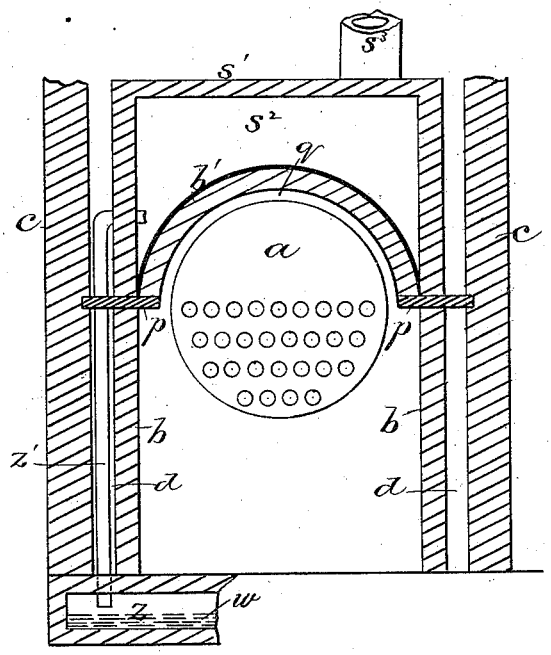
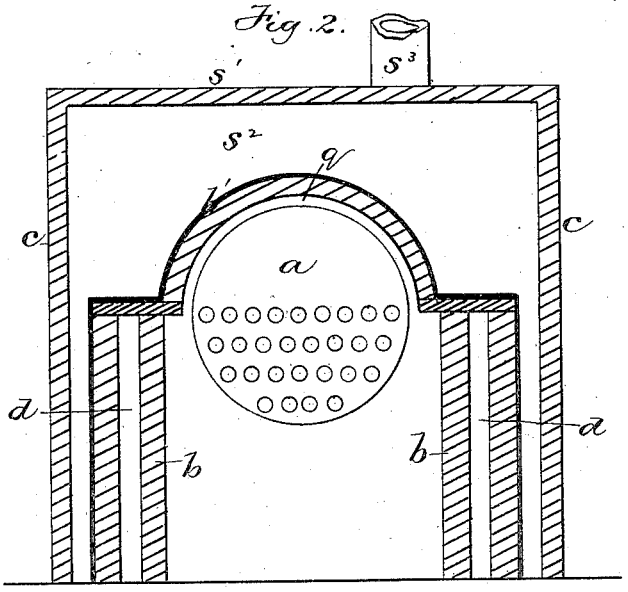


Fig. 2.



Witnesses.
A. L. White
John M. Tuohey

Inventor
Sidney Smith
by Wright Brown
Attys.

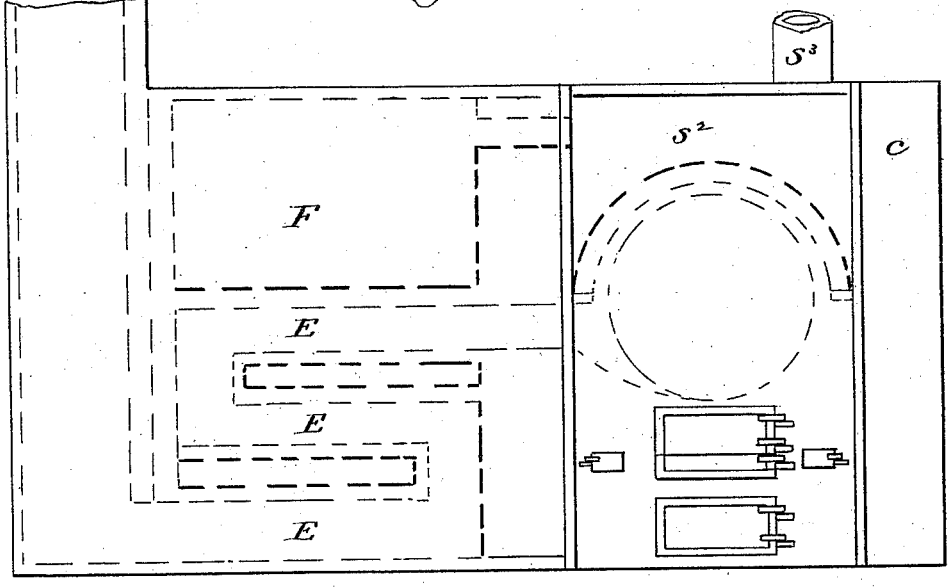
(No Model.) 2 Sheets—Sheet 2.

S. SMITH.

HEATING APPARATUS.

No. 307,499. Patented Nov. 4, 1884.

Fig. 3.



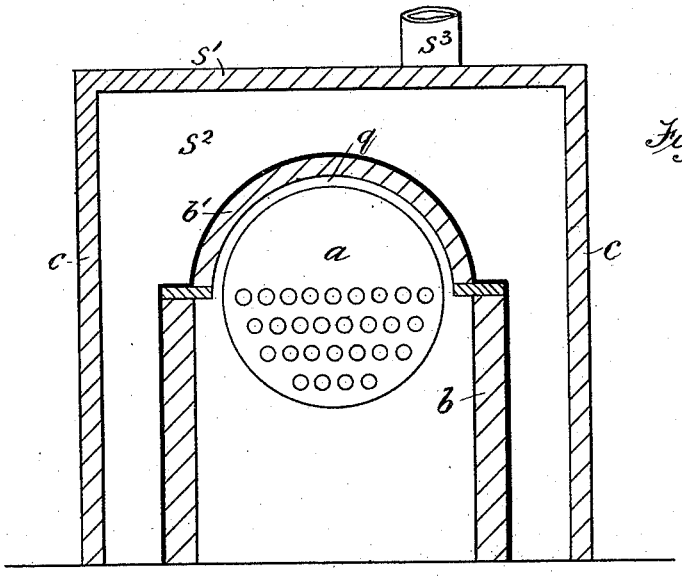


Fig. 4.

Witnesses.
A. L. White
John M. Loskay

Inventor
Sidney Smith
by Wright & Brown
Attys.

UNITED STATES PATENT OFFICE.

SIDNEY SMITH, OF CAMBRIDGE, MASSACHUSETTS.

HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 307,499, dated November 4, 1884.

Application filed November 6, 1883. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY SMITH, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Heating Apparatus, of which the following is a specification.

This invention has for its object, first, to provide improved means for utilizing for heating purposes the waste heat from a boiler-furnace used for generating steam; secondly, to provide improved means for imparting moisture to air heated by a boiler-furnace; and, thirdly, to provide improved means for utilizing the heat escaping from a furnace with the products of combustion to the chimney.

To these ends my invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a transverse section of a steam-boiler and its setting or casing, the latter being provided with my improvements. Fig. 2 represents a modification, and Fig. 3 represents an end view of the casing, showing the means for utilizing the heat escaping to the chimney. Fig. 4 represents another modification of the arrangement shown in Fig. 1.

The same letters of reference indicate the same parts in all the figures.

In the drawings, *a* represents a boiler, which may be of the ordinary horizontal tubular kind, and *c* represents the inclosing wall or casing, which is preferably separated from the boiler and fire-chamber by an inner wall, *b*, between which and the outer wall is an air-space, *d*, as shown in my application for Letters Patent for boiler-settings, filed July 9, 1883.

b' represents an arch supported by plates *p*, built into the walls *b c*, said arch extending over the top or steam-chamber of the boiler, and separated from the latter by a narrow space or air-chamber, *q*, which communicates with the fire-space below the plates *p*, as also shown in my above-named application.

In carrying out my present invention I build a partition, *s'*, over the arch *b'*, thus forming an air-chamber, s^2, heated from the furnace and boiler. If desired, said air-chamber may be extended downwardly, as shown in Fig. 2, outside of the air-space *d*, which supplies heated air to the Argand burner in the bridge-wall of the furnace, as described in my above-named application; or, if said air-space is not employed, the chamber s^2 may be extended downwardly in direct contact with the outer surfaces of the walls of the fire-chamber, as shown in Fig. 4. By thus extending the air-chamber s^2 I am enabled to use the side walls of the fire-chamber for heating air in the space *d* for combustion, and the walls outside of the air-space *d*, together with the top of the arch or inclosure over the boiler, for heating air to be conveyed to apartments; or when the space *d* is not employed the side walls of the fire-chamber may be directly utilized for heating air in the chamber s^2. A suitable pipe, s^3, conducts the hot air from the chamber s^2 to an apartment or apartments to be heated. The hot air thus supplied may be furnished with moisture from a tank or basin, *z*, made preferably of brick, and placed at any suitable part of the casing, where it will be sufficiently heated to cause suitable evaporation of the water *w*, and connected with the chamber s^2 by a flue, *z'*, which conducts the moisture-laden air to said chamber. (See Fig. 1.) The walls or surfaces forming the chamber s^2 are coated with soluble glass, as indicated by the heavy line in the drawings, and are thus rendered impervious to gases from the furnace.

If desired, waste heat and products of combustion, after passing through the flues of the boiler, may be conducted to the chimney through flues E, extending back and forth through an air-chamber, F, the latter having a suitable opening at its lower portion for the admission of cold air, and communicating at its upper portion with the chamber s^2. The cold air entering the chamber F becomes heated by contact with the flues E. The heat is thus utilized to a very full extent.

The air-chamber or annex F may be employed in connection with other furnaces than those used with steam-boilers, said annex having communication with the air chamber or space heated directly by the furnace.

It will be seen that the application of a coating of soluble glass (silicate of soda) to the walls of an air-chamber heated by a furnace enables a comparatively cheap material

not of itself impervious to gases—such as fire-brick—to be used for building such walls, the soluble-glass coating rendering said material as effective in preventing the passage of gases as soapstone or other comparatively expensive material, which is naturally impervious to gases.

I do not limit myself to the use of a coating of soluble glass to the walls of an air-chamber which is arranged over a boiler and furnace, it being obvious that the same expedient may be adopted in heating apparatus in which the air-chamber is heated only by a furnace.

I know that rooms have been heated by stoves formed of a frame-work of iron and covered with various compositions, and that Letters Patent have been granted to Oertly and Fendrich, No. 81,197, dated August 18, 1868, for a portable stove constructed in such manner. I do not claim anything they describe or show in their specification or drawings; but

What I do claim, and desire to secure by Letters Patent, is—

1. In combination with a boiler and its casing, the hot-air chamber s^2, (adapted to be heated by waste heat given off by the boiler and its casing,) with its interior walls coated with soluble glass, so that the gases in the waste heat may not mix with the hot air in the chamber, substantially as described and shown.

2. The combination, with the furnace, of an air-chamber adapted to be heated by the furnace and separated from the latter by walls coated with soluble glass, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 29th day of October, 1883.

SIDNEY SMITH.

Witnesses:
C. F. BROWN,
A. L. WHITE.