2 Sheets--Sheet 1.

C. D. SMITH.

Steam Boiler Furnace.

No. 165,690. Patented July 20, 1875.

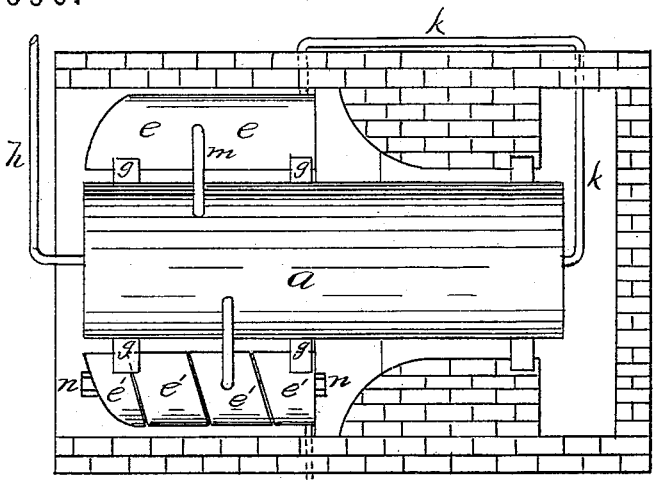

Fig. 1.

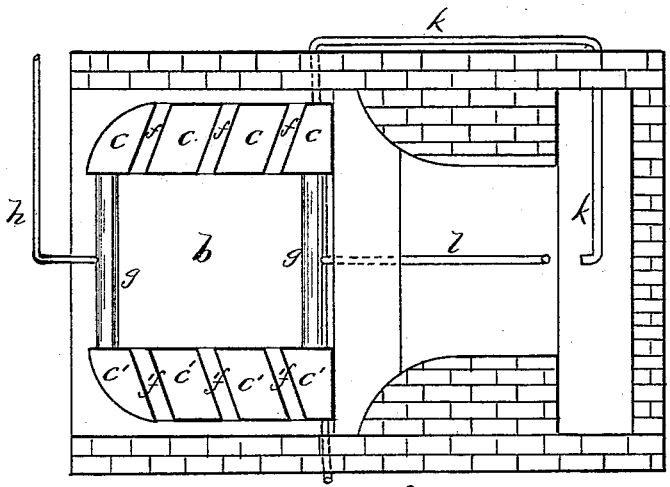

Fig. 2.

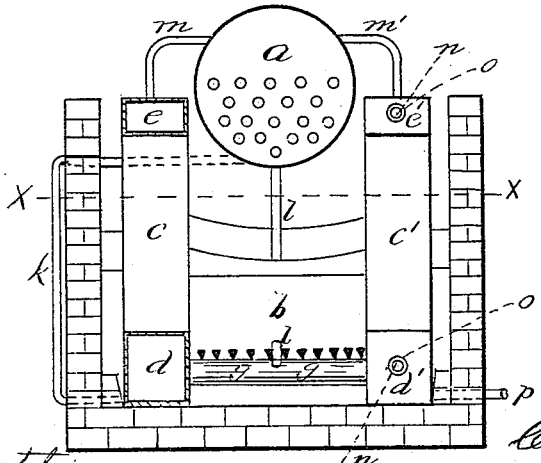

Fig. 3.

WITNESSES

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2 Sheets--Sheet 2.

C. D. SMITH.

Steam Boiler-Furnace.

No. 165,690. Patented July 20, 1875.

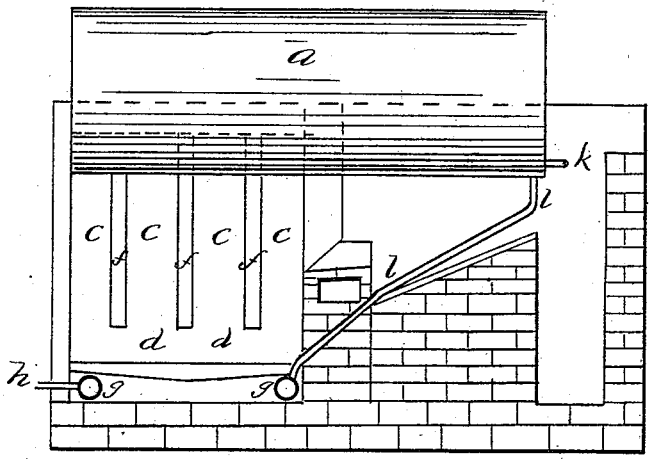

Fig. 4.

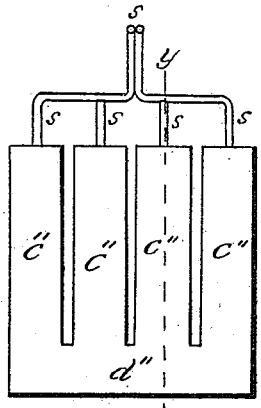

Fig. 5.

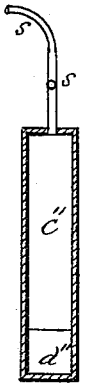

Fig. 6

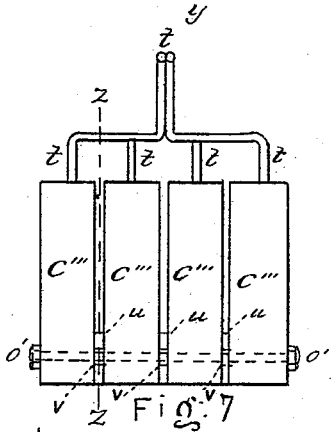

Fig. 7

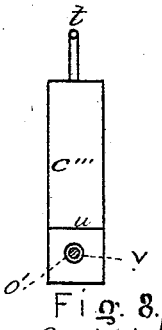

Fig. 8.

WITNESSES

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UNITED STATES PATENT OFFICE.

CHARLES D. SMITH, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN STEAM-BOILER FURNACES.

Specification forming part of Letters Patent No. **165,690**, dated July 20, 1875; application filed June 4, 1875.

To all whom it may concern:

Be it known that I, CHARLES D. SMITH, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and valuable Improvement in Steam-Boiler Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object of this invention is to utilize the fuel in the fire-box by placing heaters at the sides of the boiler, fire-box, and combustion-chamber, by means of which the water is heated to a high degree of temperature before it enters the boiler.

The advantage of the heaters is obvious, being that the water entering the boiler is already heated, thus saving fuel and adding power to the boiler. These heaters are made in columns, in this respect differing, in my opinion, from any other heaters or steam-generators ever invented.

The nature of my invention in detail is below described.

In the accompanying illustration, Figure 1 is a plan view of a steam-boiler furnace embodying my invention. Fig. 2 is a horizontal section of the same upon the line *x x*, Fig. 3. Fig. 3 is a transverse vertical section cut through the spaces *f f'* between the columns. Fig. 4 is a longitudinal vertical section of the same. (In Fig. 2 the boiler is omitted.) Fig. 5 is a variation of my heater, adapted especially to a nest of boilers. Fig. 6 is a section upon the line *y y*, Fig. 5. Fig. 7 is a variation adapted for the same purpose as that shown in Fig. 5. Fig. 8 is a section through line *z z* of the columns represented in Fig. 7.

Similar letters of reference indicate corresponding parts.

a represents the boiler, and *b* the fire-box. *c d e* is a heater, placed at the side of the fire-box *a*, and flanking the boiler. This heater is all made in one piece, and is divided into columns *c*, *d* being the base, and *e* the upper portion. It may extend for a portion or the whole of the length of the boiler, and heaters are placed upon both sides. *f f* are spaces between the columns, thus affording a large extent of heating-surface. These spaces are made to slant backward, in order to increase the draft, and to guide the heat and flames between the columns *c c*. The front columns *c* are provided with round corners for the same general purpose—viz., to increase the draft around them without detracting from the main fire. *g g* are pipes, connecting the heater *c d e* at its base *d* with the heater upon the opposite side, in order that the water may be at the same level in each heater. *h* is a pipe, through which water may be forced into the pipe *g*, and thence into the heaters, and eventually reaching the boiler; or, if desired, the pipe *h* may be used as a "blow-off," and some other pipe be used or provided for a "feed-pipe." *k* is a pipe leading from the heater *c d e* to the boiler, and conducting hot water thereto. *l* is a similar pipe, leading from the rear pipe *g*, through the combustion-chamber, into the boiler, carrying hot water. *m* is a pipe leading from the top of the heater *c d e* to the boiler above the level of the water, so that whatever steam may be generated in the heater may pass into the boiler above the level of the water in it. The water in the boiler and heater will, in practice, be at the same level. *c' d' e'* represent a sectional heater, each section being composed of a base, *d'*, column *c'*, and top *e'*. A pipe, *m'*, connects the upper portion with the boiler, and is similar in form and purpose to the pipe *m*. By means of openings *o*, which may be found in each section, the water circulates through all sections as freely as in the heater *c d e*, made in one piece. The sections are held together by rods *n*, which pass through but do not fill the openings *o*. Of course suitable packing is applied around the openings *o*. *p* represents a pipe, which may be used as a feed or blow-off, as desired. The position of feed-pipes, &c., may be varied, as deemed expedient. *f' f'* are slanting spaces similar to *f*, above described. *c'' d''* represent a variation of my heater, being composed of columns *c''*, solid, with a base, *d''*. The advantage of this method of constructing the heaters is, that the columns may expand as much as they will without fear of warping or cracking any upper portion or connection, such as shown by *e*. The pipes *s* connect with the boiler, as do pipes *m m'*. The spaces between the columns *c''* are made at right angles with the columns, so that

the heater may be placed in a nest of boilers, or between two boilers. c''' c''' represent columns, having neither bases d nor tops e, provided with pipes t, leading into the boiler, fastened together by the rod o', having openings v, similar to the openings o, and packing u.

It will readily be seen that in case any one of the columns c''' should become broken or worthless for any cause, the rod o' could be withdrawn, and the column removed, and a new one put into its place at a much less expense than it would be to remove a whole side of heaters.

The spaces between columns c''' c''' are similar to those in Fig. 5, for the same reason.

Having thus fully described my invention, I do not claim, broadly, a steam-generator or heater applied to a boiler-furnace; but

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

The combination of two or more angular water stand-pipes or water-receptacles, each connected with a horizontal boiler by means of steam-pipes, with the fire-box of a furnace, the columns having angular passages through them from the fire-box to a space formed between the outer surfaces of the water-columns and the inner side of the wall of the furnace, substantially as and for the purpose set forth.

CHAS. D. SMITH.

Witnesses:
JOHN Q. ADAMS,
HENRY W. WILLIAMS.