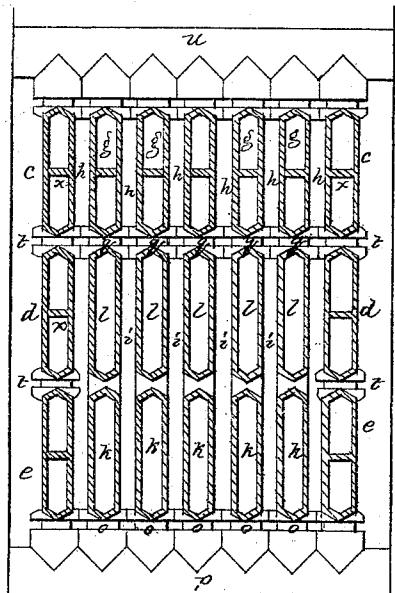
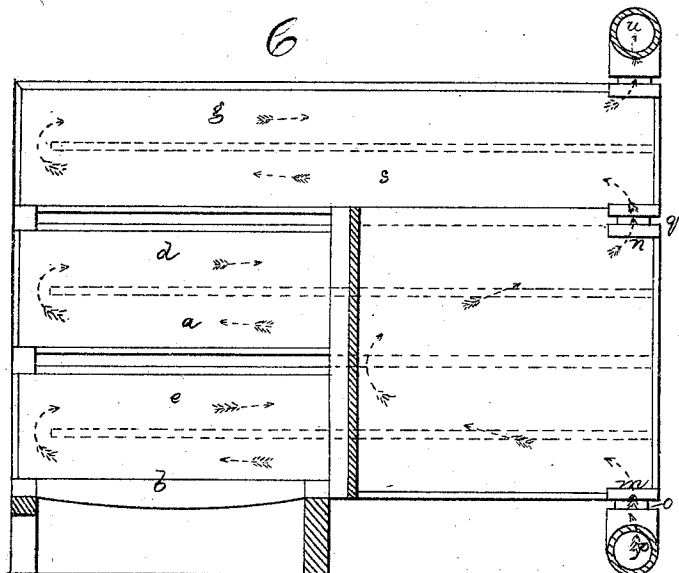
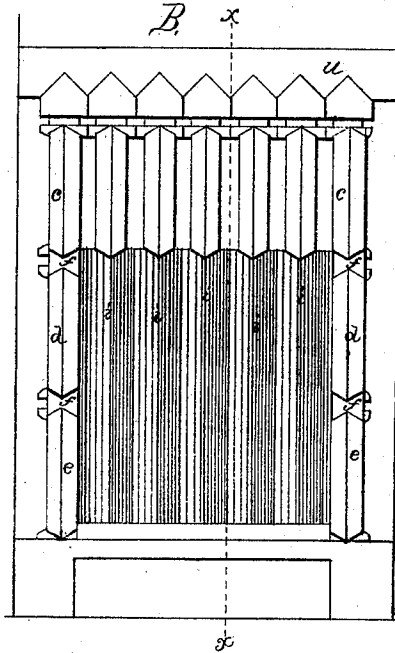
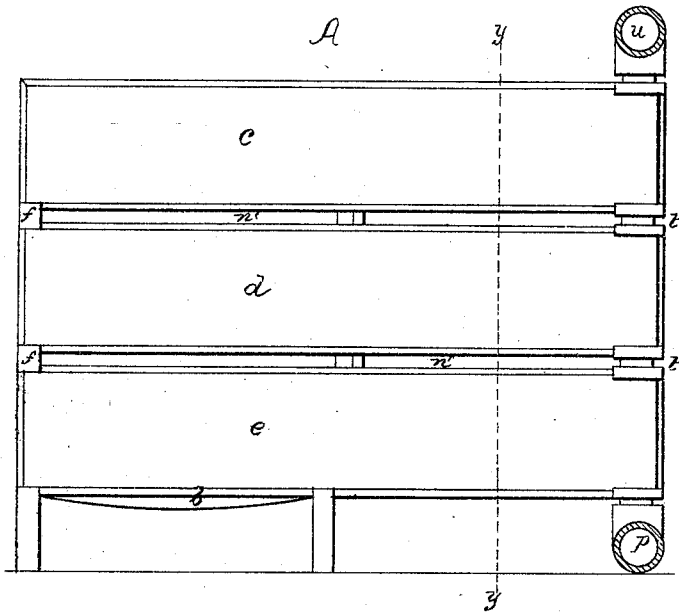


EDWARD C. CLAY.

Hot Water Heating Apparatus.

No. 123,153.

Patented Jan. 30, 1872.



Witnesses.
 Mr. W. Frothingham.
 L. H. L. atiner.

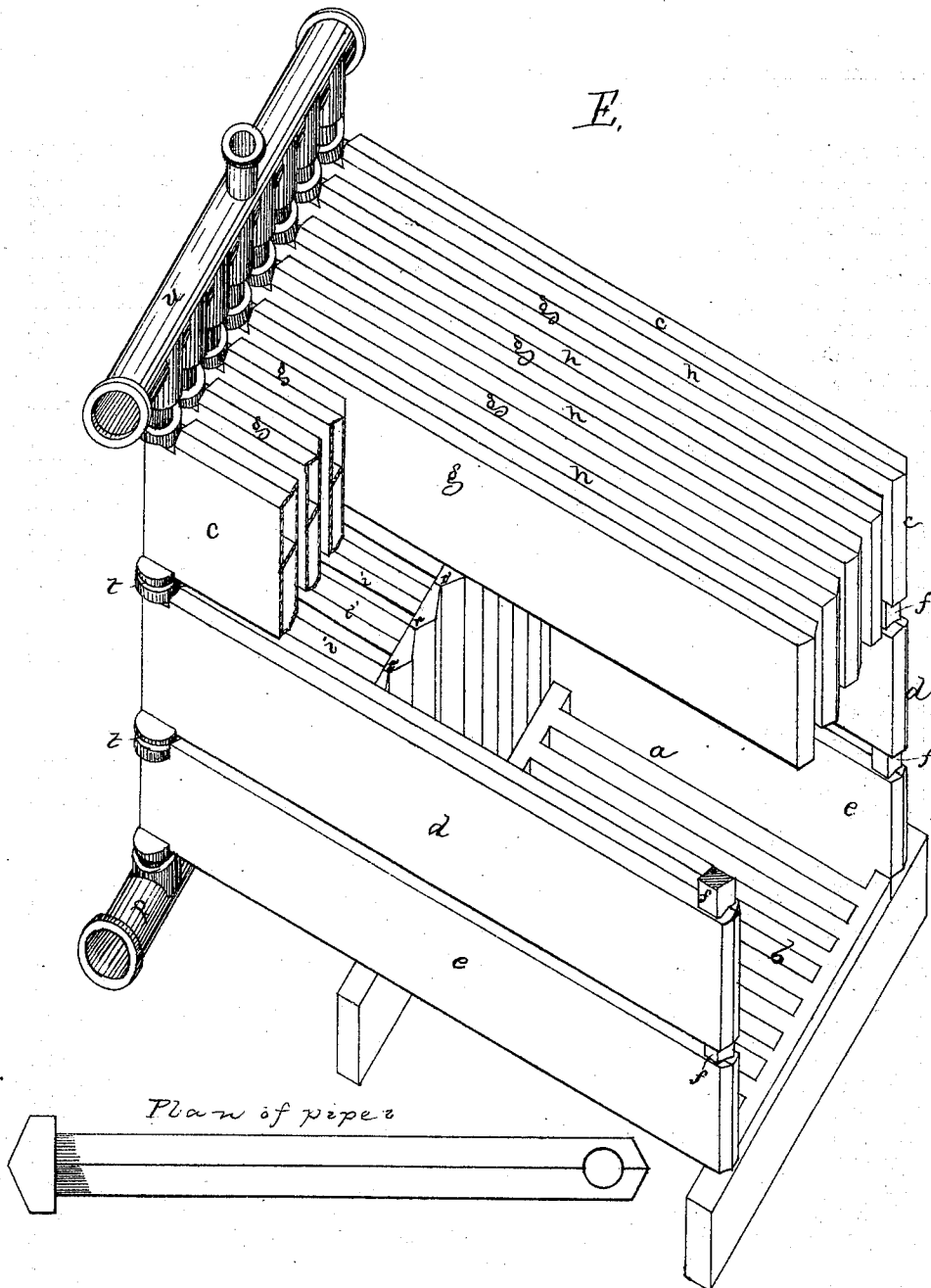
Edward C. Clay
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UNITED STATES PATENT OFFICE.

EDWARD C. CLAY, OF MALDEN, MASSACHUSETTS.

IMPROVEMENT IN HOT-WATER HEATING APPARATUS.

Specification forming part of Letters Patent No. 123,153, dated January 30, 1872.

To all whom it may concern:

Be it known that I, EDWARD C. CLAY, of Malden, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Hot-Water Heating Apparatus; and I do hereby declare that the following taken in connection with the drawing which accompanies and forms part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

My invention relates to the construction and arrangement of a sectional boiler for heating water for the supply of radiators in buildings heated by hot water. In my invention, I construct or form the furnace or fire-pot walls and roof with sections of boiler-pipes or water-chests, having diaphragms or partitions or compartments, which insure circulation of the water, the inner sides of one set of such chests constituting the vertical side wall on one side of the fire-pot, the inner sides of an opposite set the other vertical side wall, the bottoms of another series forming the roof, and the ends of another the back, leaving the bottom for the grate, and the front for the furnace entrance; the system of water-chests or chambers and furnace-pipes being, of course, located in a suitable chamber of masonry. The invention consists in the peculiar construction or relative arrangement of the sections of water-pipes, chests, or chambers placed directly around the fire-pot space, and so that the flames, &c., impinge directly against and circulate around such chambers in all directions, except at the bottom of the furnace.

The drawing represents a system of pipes or water-containing chests or chambers constructed and arranged around a fire-pot in accordance with my invention.

A shows the system in side elevation. B is a front view of the same. C is a vertical section on the line *x x*. D is a vertical section on the line *y y*. E is a perspective elevation.

a denotes the fire-pot or fire-pot space; *b*, the grate. At each side of the fire-pot is a vertical series of hot-water pipes or chests, *c d e*, arranged one over the other, as seen in the drawing, each pipe being a long horizontal box, containing a diaphragm or partition, *x*, extending across it from its rear end, nearly, but not quite to its front end; said partition

dividing the space into two parts, communicating at one end, each space having an opening at its opposite end, so that water passing into one end of the pipe flows, through the passage or space on one side of the partition, up into the space on the other side thereof; thence through such space to the first-named end of the pipe, from which it escapes into the next water-section above it. To connect the water-spaces of the respective pipes of each side series *c d e*, and at the same time make the means of connection an element of support for the pipes, I make the two inlet and outlet passages of each pipe in axial line, and then arrange the inlet and outlet passages of all the pipes of the tier in axial line, so that the nipples *t* that form the connections between them also form their supports, each two adjacent pipes *c d* and *d e* having an open space, *w*, between them, the nipples *t* supporting the pipes in position at one end, and small blocks *f* being interposed between them at their opposite ends. Over the fire-pot, and between the two upper side pipes *c e*, I place a horizontal series of pipes, *g*, in a plane with and parallel to the pipes *c*, there being a space, *h*, between each two adjacent pipes. The two sets of pipes *c d e* and the top pipes *g* all extend rearward beyond the fire-pot space; and between the side pipes *d e d e*, and under the top pipes *g*, (back of the fire-pot,) is a third series of vertical pipes or water-chambers, *i*, each composed of two compartments, *k l*, communicating at their front ends, and having inlet and outlet passages *m n* in axial line; the inlet-passage *m* by a nipple or coupling, *o*, opening from the horizontal supply or return pipe *p* under the system, and the outlet-pipe *n* by a nipple or coupling, *q*, into the inlet at the bottom of the pipe *g* over it, the inlet of each bottom tube *e* of the side pipes also similarly communicating with the supply or return pipe *p*, while the outlet of each of the top tubes *c* and *g* similarly communicates with the distributing-pipe *u* over the system. The inner or front end of each pipe or water-case *i* forms a part of the rear or flame-impinging surface of the fire-pot; and, as there is a flame and smoke space between each two adjacent pipes *i*, I make the front end of each with a flange or rib, *r*, the edges of the adjacent ribs

r uniting, and thus making a solid wall at the rear of the fire-pot, the system or assemblage of series of pipes or hot-water chests or chambers thus arranged is to be inclosed at the sides by masonry, coming close to the side pipes *c d e*, and the upper pipes are to be covered by iron bars. Suitable connection being made from the distributing-pipe *u* with the various radiators, and from such radiators back to the supply and return pipe *p*, the flames, smoke, and other hot productions of combustion in the furnace or fire-pot will impinge upon the adjacent surfaces of the pipes *c d e*, and, rising, will pass between the pipes *g* over the fire-pot to the rear, and thence down between the adjacent pipes *g* and between the adjacent pipes *i*, out through flues extending from the space under the pipes *i*, in their passage impinging against all the surfaces of the pipes or hot-water chambers, through each of which the water will course as it becomes heated, passing from the rear end of each space *s* in the lower part of each side pipe to the front end thereof; thence around the diaphragm through the upper part of the pipe to the rear end thereof; thence up into the next pipe and similarly through it, up into and through the next, into the distributing-pipe. In the same manner water from the supply-pipe passes into the lower compartment of each pipe or chamber *i* to the front thereof; thence up into the upper compartment thereof and through the same, escaping at the rear and top thereof into

the pipe *g* above it, through the lower part of which it flows, around the front end of the diaphragm, into the upper part of the pipe, thence flowing back and escaping through the outlet into the distributing-pipe.

It will readily be seen that the whole system is very simple, and is capable of extension as to width without any fitting of parts other than the connection of common screw-threaded joints. It will also be observed that by the method of arranging and connecting the pipes by connections only at one end, and these in axial line, the parts can contract or expand without injuring or starting the joints, and, furthermore, that all the connections are remote from the fire and cannot be injured by the heat. The adjacent water-pipes or sections may be cast together or joined by integral connections; but generally I prefer to join the pipes or sections by the screw-threaded nipples or couplings.

I claim—

A hot-water boiler, consisting of the side and vertical series of pipes or water-chests *c d e*, the series of pipes or water-chests *g*, and the series of pipes or water-chests *i*, constructed, located, and relatively arranged and connected substantially as shown and described.

EDWARD C. CLAY.

Witnesses:

FRANCIS GOULD,

M. W. FROTHINGHAM.