

4 Sheets—Sheet 1.

No. 544,811.

Patented Aug. 20, 1895.

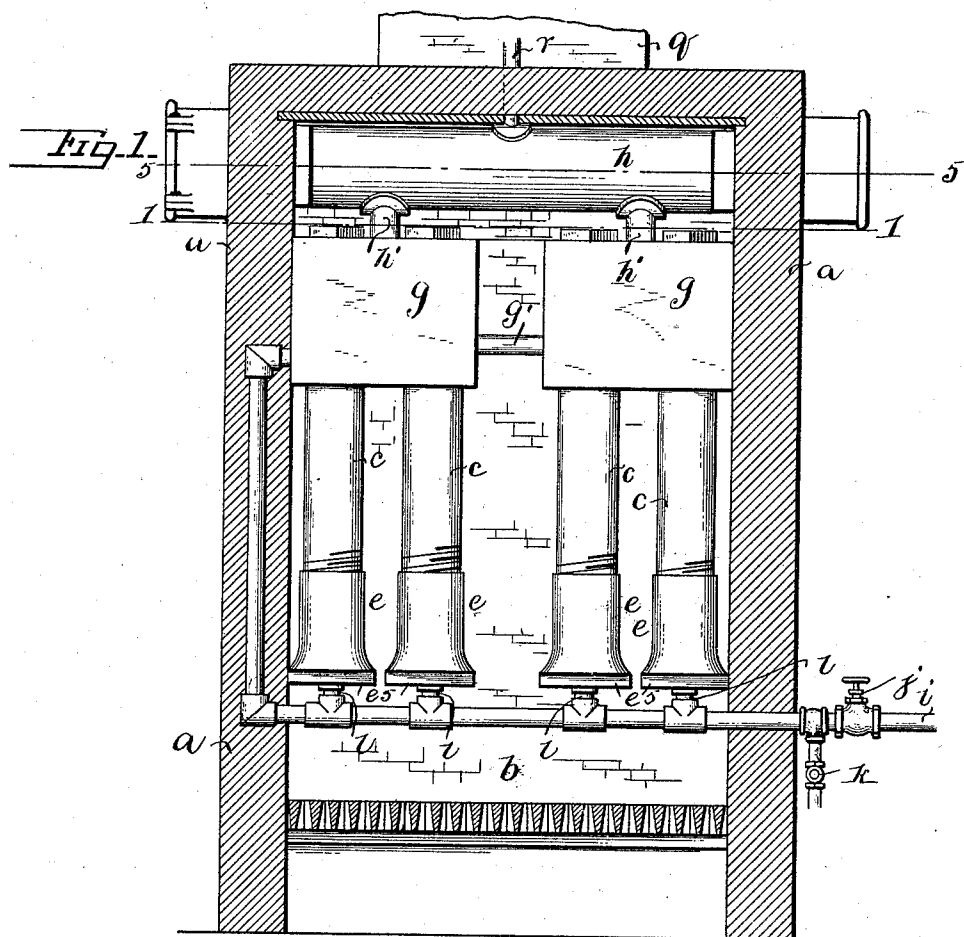


Fig. 6.

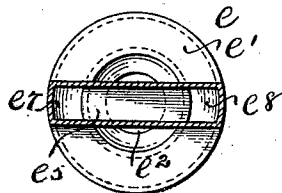


Fig. 4.

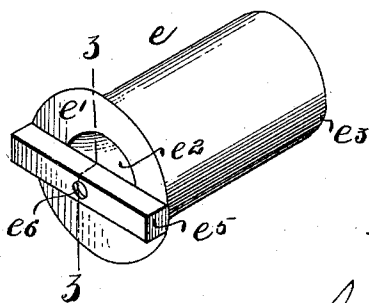
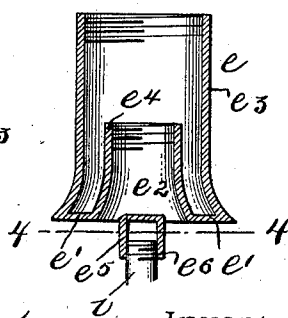


Fig. 5.



Witnesses.

Jesse B. Heller,  
J. E. Shaw.

Inventor.

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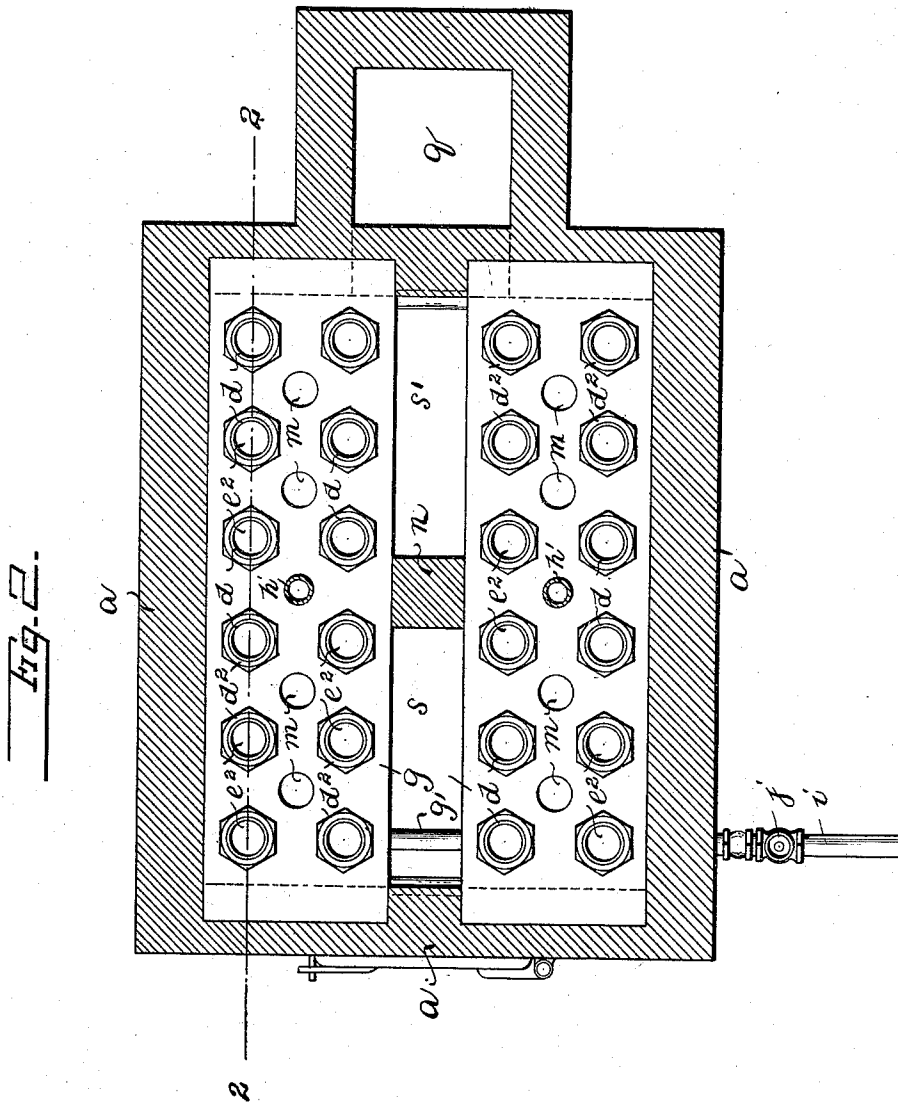
(No Model.)

4 Sheets—Sheet 2.

O. KELSEY.  
STEAM GENERATOR.

No. 544,811.

Patented Aug. 20, 1895.



Witnesses.

Jesse B. Heller.  
J. E. Shaw.

Inventor.

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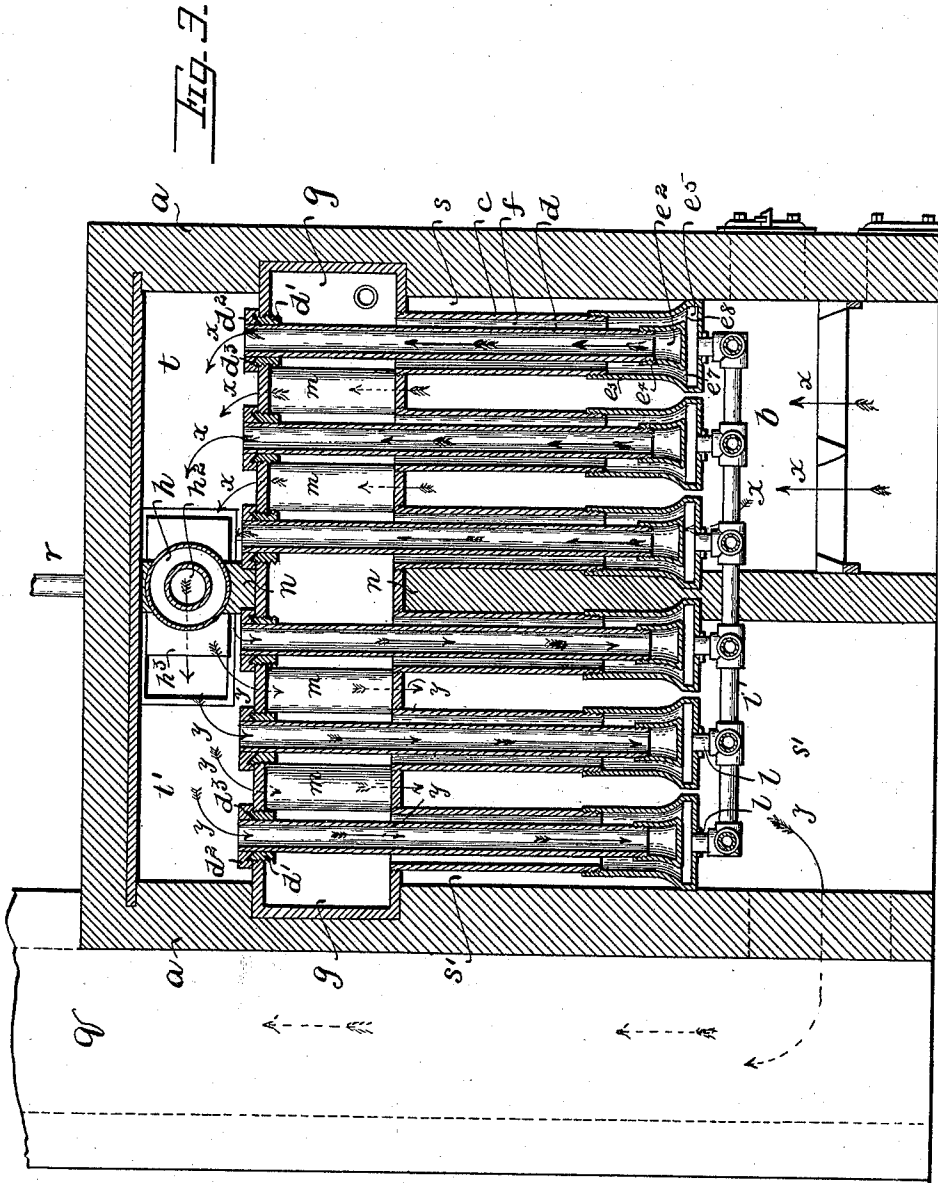
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Jesse B. Heller,  
J. E. Shaw.

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(No Model.)

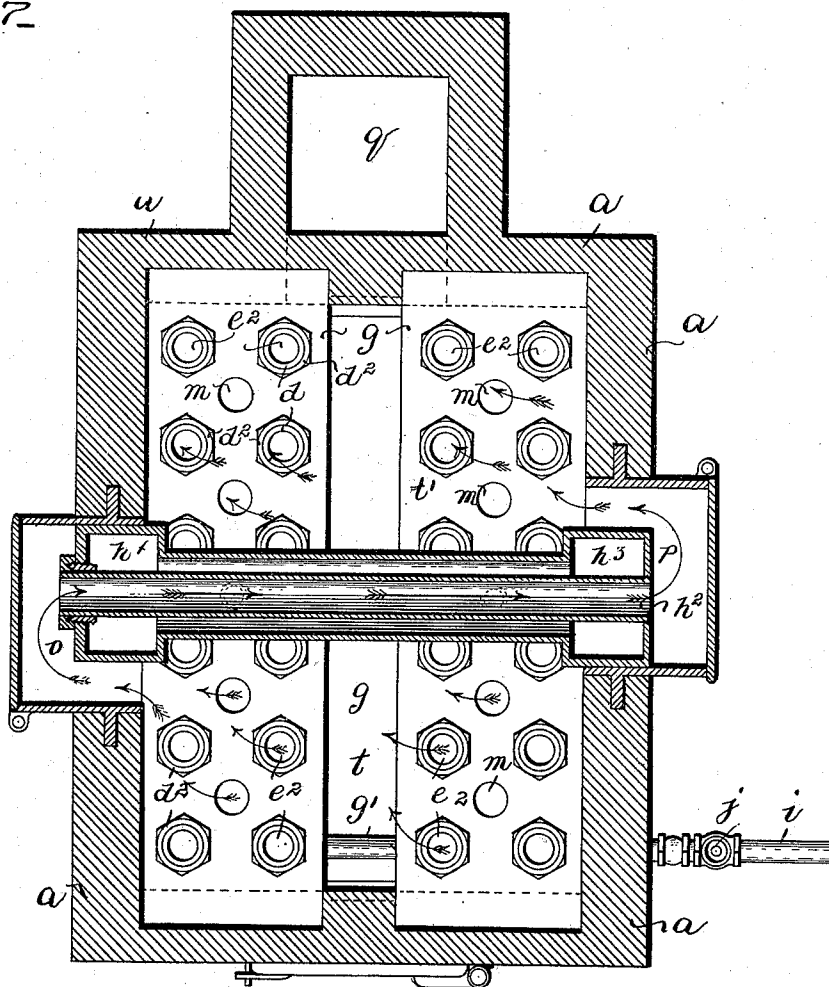
4 Sheets—Sheet 4.

O. KELSEY.  
STEAM GENERATOR.

No. 544,811.

Patented Aug. 20, 1895.

Fig. 7.



Witnesses.

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# UNITED STATES PATENT OFFICE.

ORLANDO KELSEY, OF BLACKWOOD, NEW JERSEY.

## STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 544,811, dated August 20, 1895.

Application filed October 9, 1894. Serial No. 525,426. (No model.)

*To all whom it may concern:*

Be it known that I, ORLANDO KELSEY, a citizen of the United States, residing in Blackwood, Camden county, New Jersey, have invented a new and useful Improvement in Steam-Generators, of which invention the following is a specification.

The object of my invention is to construct a sectional steam-generator which shall utilize to a very great degree the heat arising from the furnace; and this object I effect chiefly by causing the hot products of combustion arising from the furnace to pass by a flue directly through each individual water-tube or section, as well as around the outside of each such tube or section, substantially as below specified.

In the annexed drawings, Figure 1 is a front view of the generator comprising several individual sections with the front and rear walls removed; Fig. 2, a sectional plan of the same on the line 1 1 of Fig. 1; Fig. 3, a vertical longitudinal section on the line 2 2 of Fig. 2. Fig. 4 is a perspective view of one of the compound caps; Fig. 5, a section of the same on line 3 3 of Fig. 4, and Fig. 6 a sectional plan of the same on the line 4 4 of Fig. 5. Fig. 7 is a sectional plan of the generator on the line 5 5 of Fig. 1, showing the steam-drum as provided with a flue which passes through it from end to end.

Similar letters of reference denote similar parts in the several figures.

*a* represents inclosing-walls of masonry or iron; *b*, the furnace. The generator proper—*i. e.*, the generator exclusive of adjuncts which may be in various forms arranged in various ways—may consist of a single section or of several individual sections, each section consisting of an exterior tube *c*, which is rigidly attached to the wall of head *g*, an interior tube or flue *d*, which passes longitudinally through tube *c* and continuing on through the water and steam space of head *g* passes by an expansion-joint out through the wall of head *g*, and a compound cap *e*. The annular space *f* between said tubes constitutes the water-cell, which is closed at its lower end and which opens into the water and steam space of head *g*.

The expansion-joint above mentioned is formed by using a smooth-bored exteriorly-

threaded thimble *d'*, which is screwed through the wall of head *g*.

*d*<sup>2</sup> is a nut screwed on thimble *d'*, packing *d*<sup>3</sup> being inserted between the nut and thimble to tighten the joint.

The head *g* is shown to be made in two parts connected by a pipe *g'*. The head may, however, consist of a single chamber.

*h* represents the steam-drum, connected by pipes *h'* with head *g*. The drum *h* is provided with an interior flue *h*<sup>2</sup> and with enlarged chambers *h*<sup>3</sup> and *h*<sup>4</sup>. One end of flue *h*<sup>2</sup> is screwed through the wall of chamber *h*<sup>3</sup>, or otherwise rigidly attached thereto, and the other end of this flue passes by an expansion-joint through the wall of chamber *h*<sup>4</sup>. This joint is formed by means of a thimble, nut, and interposed packing, as in the case of the other expansion-joint above described.

The compound cap *e* (see Figs. 4, 5, and 6) is preferably made as a single casting, consisting of a solid annular or discus-shaped base *e'*, provided with an aperture *e*<sup>2</sup> and with an exterior-threaded shell *e*<sup>3</sup>, an interior flue-shell *e*<sup>4</sup>, and a hollow bar or chamber *e*<sup>5</sup>, which bar crosses the aperture *e*<sup>2</sup>, and which is provided with an aperture *e*<sup>6</sup>, to admit water from the feed-pipe, and with apertures *e*<sup>7</sup> and *e*<sup>8</sup>, whereby this water passes into the annular water-cell *f*, between tubes *c* and *d*.

*i* represents the manifold feed-water pipe provided with a stop-cock *j* and a blow-off cock *k*.

*l* represents a branch feed-water pipe connecting the manifold *i*, through aperture *e*<sup>6</sup>, with the chamber *e*<sup>5</sup>.

*m* represents flue-pipes passing through head *g* and connecting the fire-space *s* below the head with the space *t* above the head; *n*, a partition-wall; *o* and *p*, flues through which pass the hot products of combustion as they enter and leave the drum-flue *h*<sup>2</sup>; *q*, the chimney; *r*, a pipe for drawing off steam from the drum as required.

In assembling the parts of the individual sections the interior tube *d* is first screwed into the shell *e*<sup>4</sup> of the compound cap *e*. The exterior tube *c* is next screwed into the shell *e*<sup>3</sup> of cap *e*. The tube *c* is then rigidly connected with head *g* by being screwed through the bottom wall of the head, the interior flue-tube *d* being at the same time passed through

the thimble  $d'$ . The packing  $d^3$  is then applied and the nut  $d^2$  screwed on the thimble  $d'$ , thus completing the individual section.

A portion of the hot products of combustion arising from furnace  $b$  into space  $s$  passes through the several interior flue-tubes  $d$  of the several individual sections arranged in space  $s$  up into space  $t$  above the head, said hot products being thus brought into direct contact with the interior surfaces of the annular water-cells  $f$ . The other portion of said hot products after circulating below the head in space  $s$  in contact with the exterior surfaces of said annular water-cells passes up by way of flues  $m$  through head  $g$  into said space  $t$ , all as indicated by arrows  $x$ , Fig. 3, said hot products thence entering by flue  $o$ , pass through the drum-flue  $h^2$ , superheating the steam in the drum, and passing out by flue  $p$  into the empty space  $t'$  on the other side of partition  $n$  above the head, a portion of them thence passing down through the several interior flues  $d$  of the several individual sections arranged in space  $s'$  below the head, the other portion of said hot products passing from space  $t'$  down by way of the several flues  $m$  through head  $g$  into the said space  $s'$ , where they come in contact with the exterior surfaces of the annular water-cells of the several individual sections in space  $s'$ , and from space  $s'$  said products of combustion pass out into chimney  $q$ , all as indicated by arrows  $y$ , Fig. 3.

Instead of dividing the fire-space above the furnace by a partition and passing the hot products of combustion up through the sections arranged on one side of such partition and afterward down through the sections arranged on the other side of the partition, as above set forth, the partition may be dispensed with and all the several sections employed may be arranged directly over the furnace. In this case the hot products of combustion after passing through the interior flue of the steam-drum pass directly into the chimney.

Instead of using a steam-drum provided with an interior flue for superheating the steam, as above specified, an ordinary steam-drum may be employed, if desired. In such case the individual sections employed are wholly arranged over the furnace, partition-walls dividing the fire-space, as specified, being omitted, and the hot products of combustion pass from the space surrounding the steam-drum above the head directly into the chimney.

I claim—

1. In a sectional steam generator a steam drum and the water and steam head  $g$  in combination with the exterior tube  $c$  rigidly attached to the bottom wall of head  $g$ ; the interior flue  $d$  passing through an expansion joint in the top wall of head  $g$ ; the expansion joint consisting of the exteriorly threaded thimble  $d'$ , the nut  $d^2$  and the interposed packing  $d^3$ ; the compound cap  $e$  consisting of the annular base  $e'$ , the threaded exterior shell  $e^3$ , the threaded interior shell  $e^4$ , and the hollow bar  $e^5$  provided with apertures  $e^6$ ,  $e^7$  and  $e^8$ ; and the flues  $m$  substantially as set forth.

2. In a sectional steam generator the steam drum  $h$  provided with the interior flue  $h^2$  and with the chambers  $h^3$ , and  $h^4$  and the water and steam head  $g$  in combination with the exterior tube  $c$  rigidly attached to the bottom wall of head  $g$ ; the interior flue  $d$  passing through an expansion joint in the top wall of head  $g$ ; the expansion joint consisting of the exteriorly threaded thimble  $d'$ , the nut  $d^2$  and the interposed packing  $d^3$ ; the compound cap  $e$  consisting of the annular base  $e'$ , the threaded exterior shell  $e^3$ , the threaded interior shell  $e^4$  and the hollow bar  $e^5$  provided with apertures  $e^6$ ,  $e^7$  and  $e^8$  and the flues  $m$ , substantially as set forth.

ORLANDO KELSEY.

Witnesses:

J. E. SHAW,  
JOS. B. WILLITS.