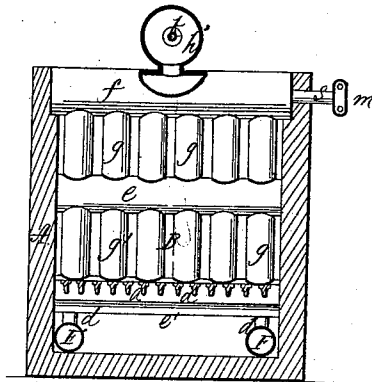
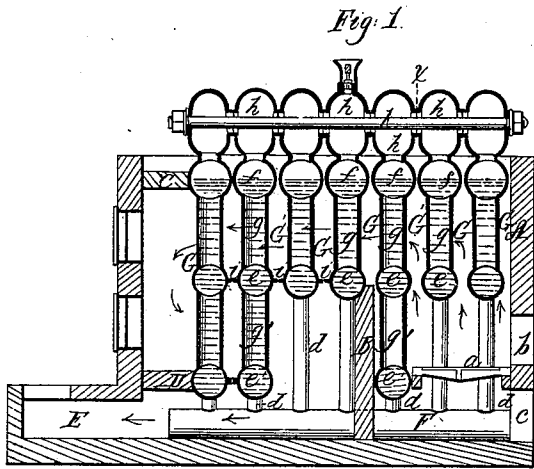
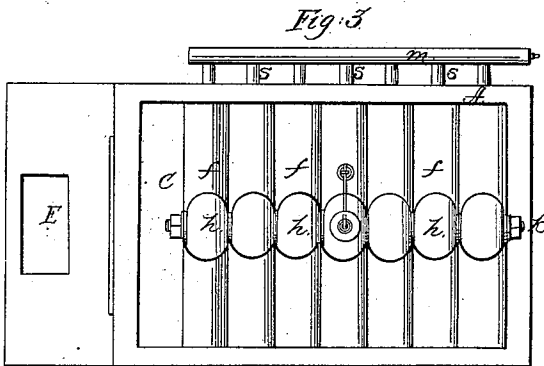


*C. T. Boardman,*  
*Sectional Steam Boiler.*  
*No 67,255.                      Patented July 30, 1867.*



*Fig. 2.*



*Witnesses:*  
*McCombs*  
*G. W. Reed*

*Inventor:*  
*C. T. Boardman.*

# United States Patent Office.

CHARLES T. BOARDMAN, OF PAWTUCKET, RHODE ISLAND.

Letters Patent No. 67,255, dated July 30, 1867.

## IMPROVEMENT IN STEAM-GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, CHARLES T. BOARDMAN, of Pawtucket, in the county of Providence, and State of Rhode Island, have invented a new and useful Improvement on Steam-Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification, and in which—

Figure 1 represents a vertical longitudinal section of a steam-boiler constructed according to my improvement.

Figure 2, a vertical transverse section of the same taken as denoted by the line *x x* in fig. 1; and

Figure 3 a plan of the same.

Similar letters of reference indicate corresponding parts.

My improvement, which is applicable alike to boilers for generating steam for driving engines and to heating and other purposes generally, relates to boilers of a sectional construction, and in which the sections are preferably made up of cast iron. The nature of my invention, in this connection, consists of a novel combination or arrangement of sections constituting separate water and steam-chambers or spaces, made up of vertical and horizontal tubes mounted by steam-chambers and connecting with water feed pipes below, certain of such sections being formed of a single and others of a double series of pipes or tubes, and so set or arranged relatively to each other and to bridges or partitions forming part of the setting, as to present, within a contracted space or compass, an extended heating surface, with every necessary provision for expansion and cleaning or renewing of any one or more of the sections, and whereby the whole boiler may be got up cheap and be readily put together or taken apart. Though not restricting myself to any particular material, it will suffice here to describe the sections as made of cast iron.

Referring to the accompanying drawing, A represents the outer brick-work of the setting; *a*, the grate-bars; *b*, the fire-door opening, and *c* the opening to the ash-pit. B is a bridge in rear of the fire-place, and C D partitions controlling or directing the draught in its course to the chimney-flue E. F F are water feed pipes to the several boiler sections, the same being arranged below the level of the fire-grate, and connecting by pipes *d* with said sections. These sections are of a single and double order, the single sections G, two or more of which are situated immediately over the fire, being made of horizontal tubes or cylinders *e f* arranged transversely to the draught, and connected by a series of vertical tubes, *g*, situated at a slight distance apart for the passage of the flame or heated gases between them, the upper horizontal tubes *f* being both steam and water spaces, and having mounted on them steam-chambers *h*. The double sections G', one of which may be arranged in rear of the fire and in front of the bridge B, to form a water-back to the fire, are of similar construction, so far as regards the tubes *e f* and steam-chambers *h*, but in addition are furnished with a lower series of vertical tubes, *g'*, and lower transverse horizontal tubes *e'*. Immediately in rear of the bridge B are, say, two or more of the single sections G, and in rear of these again two or more double sections G'. These several sections, to the number of which, both single and double, I do not restrict myself, are situated in close proximity to each other, uniting strips or projections *i* being interposed where necessary to perfect the draught, and the steam-chambers *h* having communication, the one with the other, round say a tie-bolt, *k*, while the tubes *f* may separately connect, by branches *s*, with an outside pipe, *m*, to which the usual gauge-cocks may be attached.

Water being supplied, the boiler and fire kindled on the grate, the flame and heated gases act on, around, and between the front single sections G, and against and between the double section G', adjacent to them, along through between and around the single sections in rear of the first double section, and through and around the upper series of vertical tubes of what are here represented as the rearmost double sections; from thence through and around, in a reverse direction, the lower series of vertical tubes to the last-named double sections, and from there, after giving out the greater portion of the remaining heat to the sections lying in rear, though above the level of the bridge B, out under, in a reverse direction, lower horizontal tubes of the rearmost double sections to the chimney-flue E, all as represented by arrows in fig. 1 of the drawing. Of course the alternate or successive arrangement of the single and double sections G G' may be extended or duplicated, according to the size or character of the boiler or description of fuel designed to be used.

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

The arrangement, substantially as herein shown and described, of the single and double sections G G', constructed of horizontal and vertical tubes with steam spaces or chambers, and set for passage of the draught in reverse and return directions relatively to them, as herein set forth.

C. T. BOARDMAN.

Witnesses:

J. W. COOMBS,

G. W. REED.