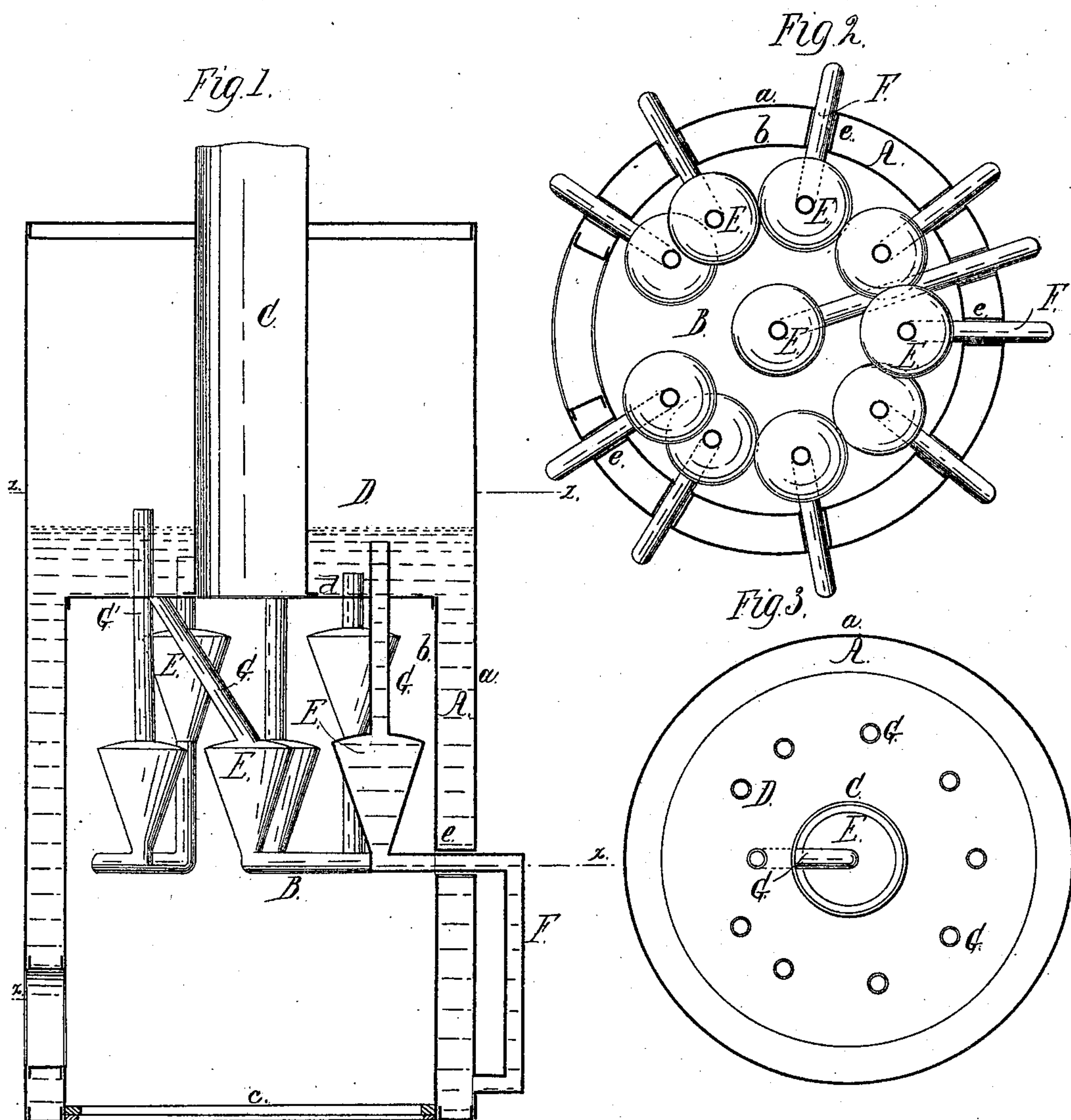


Symmes & Hayes,
Steam-Boiler Water-Tube.
N^o 64,593. *Patented May 7, 1867.*



Witnesses;
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GARDNER SYMMES AND TIMOTHY W. HAYES, OF BROOKLYN, NEW YORK.

Letters Patent No. 64,593, dated May 7, 1867; antedated April 26, 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 we, GARDNER SYMMES and T. W. HAYES, both of Brooklyn, in the county of Kings, and State of New York, have invented a certain new and useful Improvement in Steam Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, which forms part of this specification, and in which—

Figure 1 is a vertical section of a steam boiler constructed according to our improvement.

Figure 2, an inverted transverse section thereof, taken as denoted by the lines *x x* in fig. 1; and

Figure 3, a transverse section through the line *z z* in fig. 1.

Like letters refer to like parts in all the figures.

Our improvement has reference to that description of steam boilers which are constructed, for at least a portion of their length or height, of a water-jacket or shell, while their interior has arranged within, so as to intercept the fire and heated gases in their passage to the smoke-stack, a series of water vessels or chambers, preferably made of cast iron, and constituting of themselves, though acting in concert with the surrounding jacket and body generally of the boiler, separate and distinct steam generators; and our invention consists, firstly, in the use within the fire-box of a series of inverted cones, preferably made of cast iron, to act as steam generators; and, secondly, in the use of such cones or other suitable generators within the fire-chamber, separately, united with the water-jacket by pipes arranged to pass through said jacket and connected with it near the bottom, while they are made to communicate with the water and steam-space above or beyond them by pipes passing through the crown-sheet of the fire-box.

For the information of others whom it may concern, we will now proceed to describe our invention with reference to the accompanying drawing, which represents a vertical steam boiler constructed according to our improvement, applicable to stationary work, but which may be modified for locomotive or other purposes, and still be within the limits of our improvement.

In said drawing, *a* represents the outer and *b* the inner shell, constituting a water-jacket, *A*, surrounding the fire-chamber *B*, to which *c* is the grate, *d* the crown-sheet, and *C* the smoke-stack run up through the steam and water-space *D*, above, which latter is or may be formed by capping or covering an extension of the outer shell *a*. Within the fire-chamber *B*, at a suitable height above the grate, and below the crown-sheet, is arranged a series, or it may be two or more series, one above the level of the other, of inverted hollow cast-iron cones or generators, sufficiently close to intercept the fire and heated gases in their passage to the smoke-stack without destroying the draught. These cones are separate and detached, and are connected at their bottom with the lower portion of the water-jacket *A* by elbow-formed pipes *F* arranged to pass through sleeves or connecting-pipes *e* in said jacket, and dipping downwards outside the shell *a*, while such cones are connected at their top with the steam and water-chamber *D* by vertical or other pipes *G* passing upwards through the crown-sheet *d*, and which may either terminate below the water line in said chamber, or in the steam-space above, or part of said pipes below and part above such water level, to prevent foaming.

From this description it will be seen that by the disposition and shape of the generators *E* catching in a gradual manner the action of the flame and gases as they pass to the smoke-stack, first giving a wide and easy passage to the flame, as it strikes them, and an abrupt relief to it at their tops, which prevents choking, a most effective steam-generating surface is obtained. Furthermore, and irrespective of their precise shape, by employing generators so arranged, and connecting them by pipes *F*, extending outwardly, not only is the fire-box below said generators kept free and the water drawn, for the supply of said generators, from the lowest and coldest portions of the boiler, and conveyed over the fire where it is hot, but by such attachment of the generators to the outer shell or case below, while they are supported above through their upper pipes *G* by the crown-sheet, said generators are most effectually and securely stayed and held to their place. In making them, too, with their pipes separate and detached the one from the other, not only is there safety, but greater facility and convenience afforded for putting the boiler together, and, in case of necessary repair to any one or more of such generators, taking them apart.

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

1. The arrangement, within the fire-box or chamber, of one or more series of inverted cones forming steam generators, and communicating with the body of the boiler, substantially as specified.
2. The arrangement of generators in the fire-box or chamber, separately connected with the water-space above, or body of the boiler, by pipes passing through the crown-sheet of said chamber, and with the lower portion of the water-jacket surrounding said fire-box, by pipes running through the jacket and down or round the outside thereof, essentially as shown and described.

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