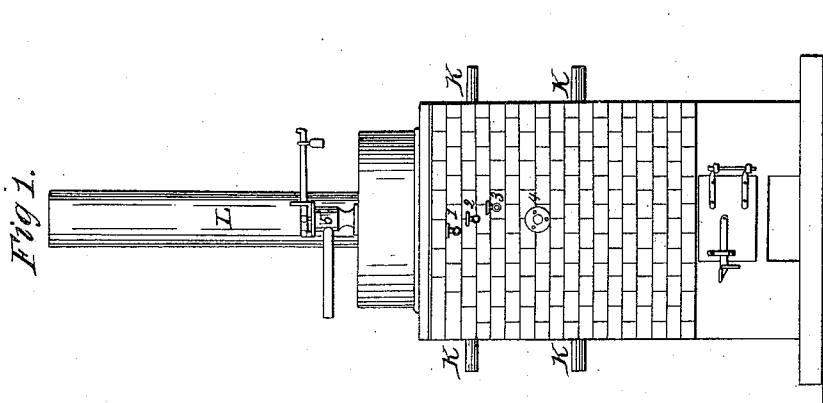
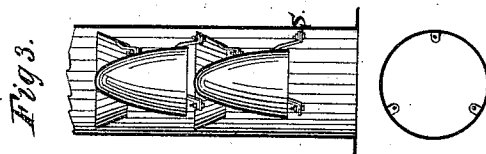
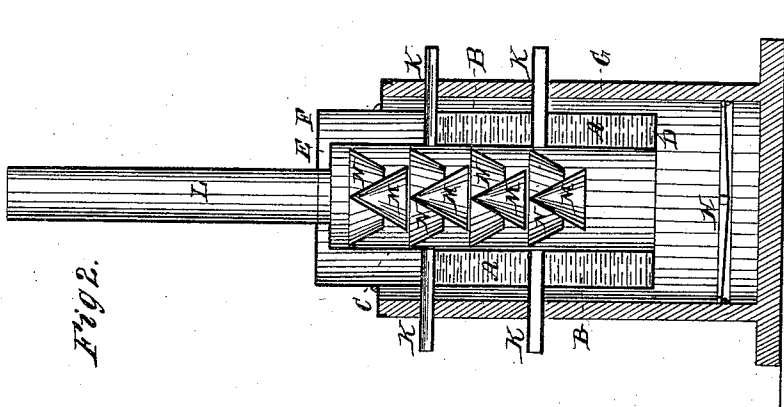


J. HAFFER.
STEAM GENERATOR.

No. 62,953.

Patented Mar. 19, 1867.



Witnesses.

Therese Lang
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Inventor:

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by his attys
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United States Patent Office.

JOHN HAFFER, OF BEDFORD, PENNSYLVANIA.

Letters Patent No. 62,953, dated March 19, 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, JOHN HAFFER, of Bedford, in the county of Bedford, and State of Pennsylvania, have invented a new and useful Improvement in Steam Boilers, of which the following is a full, clear, and exact description, reference being had to the annexed drawings, making part of this specification, and in which—

Figure 1 represents, in front elevation, a furnace with a vertical boiler in place.

Figure 2 represents a central vertical section through the same; and

Figure 3 represents a modification of my invention.

My invention has relation to that class of steam boilers which are made to surround the products of combustion, and has for its object the diffusion of the heated products of the fuel over a large surface within the centre of the boiler, in directions which shall cause the flame to impinge against many points on the interior of the boiler; to which end my invention consists in placing within the boiler and over the furnace an alternate series of cones and flanges, with spaces between them which shall allow the products of combustion to pass in a tortuous direction from the furnace to the smoke-stack, and so arranging the cones and flanges that they shall act both as radiators to impart the heat to the boiler, and as deflectors to change the course of the flame, and cause it to impinge in many places directly against the interior walls of the boiler.

A boiler, A, consisting of two cylinders, B and C, united by a plate, D, at the bottom, and by plates, E and F, at the top, is suitably placed in a furnace, G, over the grate-bars H; and the boiler is provided with gauge-cocks, 1, 2, and 3, a supply pipe, 4, and a safety-valve, 5, with a blow-off cock near the bottom, all arranged in the usual manner. Air-tubes, K K K and K, are passed through the boiler and furnace, and may be provided with stop-cocks on the outside of the furnace. The smoke-stack L may rise from the centre of the boiler, passing through the plates E and F, or, if preferred, it can be taken from and through the side of the boiler. Within the boiler, and directly over the grate-bars H, I place, and support in any suitable manner, a series of cast or sheet-iron cones, M, so that the apex of each of the lower cones shall successively rest centrally within the lower edge of the base of the one immediately above. These cones may be suspended on a chain, supported on an iron rod, or attached by straps to the side of the cylinder C. To the inner side of the cylinder C I also attach projecting flanges, N, which may be made to approach the cones M on any part of their sides, or the flanges N may project below the edges of the cones, care being had to always leave ample space between the edges of the flanges and the cones to permit the full volume of the products of combustion to pass from the grate-bars to the smoke-stack, the force of the current, or the draught, being under the control of proper and suitably-placed dampers.

I do not limit myself to any particular angle on which to form the cones, or at which to place the flanges, although those angles for each will be found effective as given in the drawings. I have shown my invention in this example applied to a vertical boiler, but it is manifestly applicable to one placed in a horizontal position. It is also manifest that the cones and flanges may be united together, as shown in fig. 3, when, of course, they can be removed bodily from the boiler for cleaning or repair; the whole series resting, when in place, on their edges in a horizontal boiler, and on the flanges or projections attached to the sides of a vertical boiler.

In operation the products of combustion rise from the grate-bars, impinge against and pass round the edge of the lower cone, strike against the interior of the boiler, reverberate around the edges of the lower flange, pass into the second cone around its edge, again striking the boiler, and so on to all the cones and flanges in succession, when both cones and flanges become highly heated, and steam is rapidly generated with marked economy, the combustion being not only active from the furnace, but greatly augmented from the currents of atmospheric air entering the pipes K, which supply an ample amount of oxygen, and enhance the draught. It is obvious that under such conditions, if there should be any, as will prevent the natural flow of atmospheric air through the tubes K in sufficient quantity, an artificial blast may be used without departing from the spirit of my invention, the supply of air in either mode being under the regulation of stop-cocks in the pipes K; and it is further obvious that pipes K may be used in any number or of any capacity to supply the amount of air required for the most effective results.

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

1. The combination of the cones and flanges with a steam boiler, arranged and operating substantially as and for the purpose set forth.

2. The combination of the cones and flanges with a steam boiler, and with the tubes K, arranged and operating substantially in the manner and for the purpose set forth.

In testimony whereof I have hereunto subscribed my name.

JOHN HAFFER.

Witnesses:

J. K. BOWLES,

WM. DILERT.