

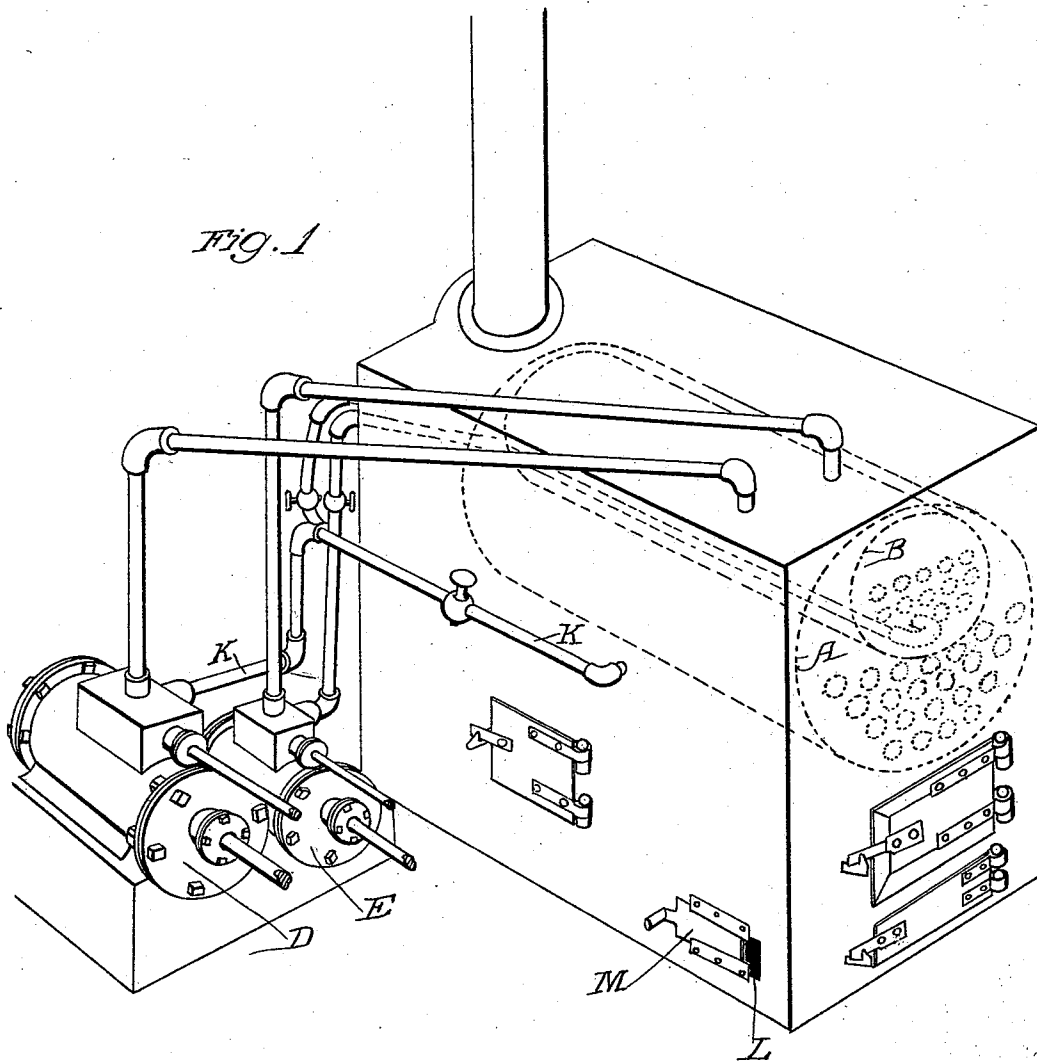
(No Model.)

2 Sheets—Sheet 1.

E. SHYDECKER.  
STEAM BOILER.

No. 527,624.

Patented Oct. 16, 1894.



Witnesses,  
*J. A. House*  
*J. A. Bayless*

Inventor,  
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*By Duway & Co. attys*

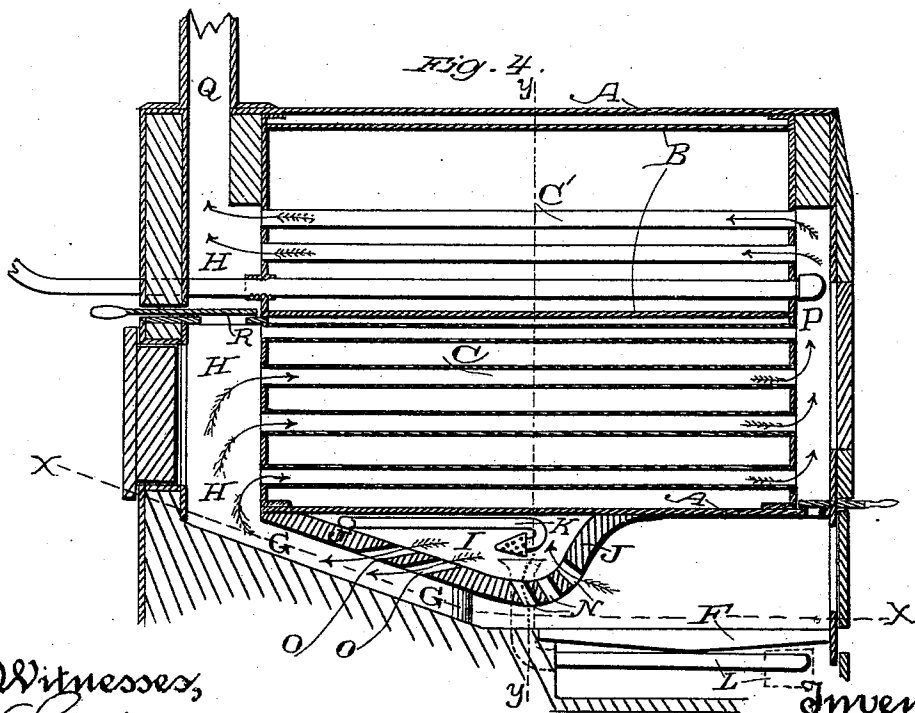
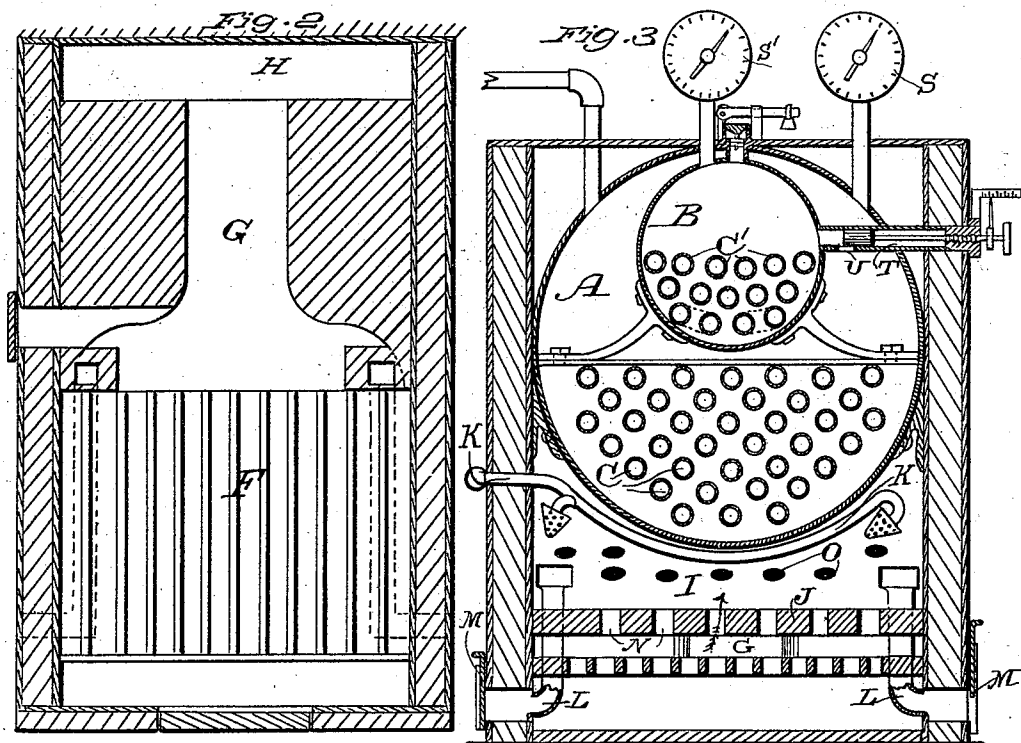
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2 Sheets—Sheet 2.

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STEAM BOILER.

No. 527,624.

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Witnesses,  
J. A. Bayless

Inventor,  
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# UNITED STATES PATENT OFFICE.

EUGENE SHYDECKER, OF SAN FRANCISCO, ASSIGNOR OF FOUR-FIFTHS TO JOHN H. MOORE AND CHARLES F. BAILEY, OF SAN JOSÉ, CALIFORNIA.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 527,624, dated October 16, 1894.

Application filed February 27, 1894. Serial No. 501,664. (No model.)

*To all whom it may concern:*

Be it known that I, EUGENE SHYDECKER, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Steam-Boilers; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in steam boilers and their furnaces.

It consists in certain details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is an exterior perspective view of the apparatus. Fig. 2 is a horizontal section taken through  $x-x$  of Fig. 4. Fig. 3 is a vertical section taken through  $y-y$  of Fig. 4. Fig. 4 is a vertical central section through the boilers, grate, and connecting chambers and passages.

The object of my invention is to provide for a more perfect combustion of fuel used in the grates of steam boiler furnaces, the utilization of the heat produced thereby to generate steam and partially super-heat the same, and the employment of the exhaust steam from the engine cylinders in conjunction therewith.

In carrying out my invention I employ two boilers A and B, the smaller one B being situated in the upper part within the steam space of the boiler A. Each of these boilers is provided with tubes C through which the heat from the furnace may pass. By fixing the smaller boiler within the larger, I am enabled to apply the heat of the steam generated in the smaller boiler, and at the same time to serve as a jacket thereto having a temperature as much higher than that of boiling water as would be due to the amount of pressure carried in the larger boiler. The steam from these two boilers is carried respectively to two engines D and E, the first named being proportionately larger than the second as it takes its steam from the larger boiler and greater supply; or, if desired, the steam of both boilers may be led into one common steam chest of one single engine.

F are the grate bars within the furnace, upon which the fuel is burned.

G is a passage leading from this part of the furnace to the rear of the boilers and through this passage a large proportion of the heat from the furnace passes. This passage is narrow just behind the grate bars, as shown in Fig. 2, and extends to the rear combustion chamber H before it again expands, thus assisting to produce a stronger draft from the furnace by the concentration of the products of combustion in the narrow passage. Above this passage G is a chamber I formed by a masonry or other wall J which curves downwardly over the rear portion of the furnace, and thence extends upwardly at an incline, forming the upper wall or roof of the passage G. The chamber I above this roof, formed by the peculiar shape of the wall J, serves to receive a jet of steam which is delivered into it from the engine D through a pipe K, and it is discharged through an enlarged perforated end forming a sort of jet nozzle so that the steam is distributed throughout the chamber.

Air is admitted into the same chamber from a point beneath the grates or from other suitable point through a pipe or pipes L. These pipes extend to the outer air and upon each side of the ash-pit, and the supply of air to them is controlled by valves or dampers M.

Through the wall J openings or passages N are made which lead from the furnace proper into this chamber I, and the heat thus admitted to this chamber raises the temperature of the air, and at the same time super-heats the steam which had been admitted into the chamber.

Other passages O lead out through the inclined roof of the passage G and connect the chamber I with the passage G so that the heated air and super-heated steam are admitted into the passage and mingle with the products of combustion which have passed into the passage from the furnace, thus supplying a fresh amount of oxygen for the combustion of these products, besides the addition of the super-heated steam which has been found useful under such conditions.

From the rear chamber H, the products of

combustion first pass through the flues C of the larger boiler and thence pass up through a front chamber P and are returned through the flues C' of the smaller boiler, being delivered thence into the chimney Q.

A partition or diaphragm is made across the chamber H between the lower part of the boiler B and the space below it, and this is controlled by a valve R. When this valve is closed, the products of combustion pass through the flues C as described, and when it is opened the products of combustion pass straight up the chimney without passing through these flues or entering the flues C' of the smaller boiler. By thus controlling the current of the heat, I am enabled to regulate in a large measure the rapidity with which steam is produced in the boilers.

By reason of the inclosure of the smaller boiler in the steam space of the larger one it is perfectly jacketed as before described, and in addition to this jacket of hot steam, I apply the direct heat passing through the flues so that I am enabled to produce steam in the small boiler independently of that produced in the larger boiler.

The steam from the two boilers may be delivered, as before described, to one, or to two separate engines which may connect with the same crank shaft and which should be properly proportioned to each other with reference to the proportionate size of the two boilers.

Exhaust steam from the engine or engines may, if desired, be delivered through the lowermost of the flues C' in the smaller boiler, and passing through these flues will part with whatever heat it may contain before escaping into the chimney.

A pressure gage S is connected with the larger boiler and another S' with the smaller

one, and both boilers may have the usual safety valves and similar well known appliances.

T is a pipe leading from the smaller boiler through the side of the larger boiler, and in this pipe is a valve controlled opening at U through which, if desired, any surplus pressure of steam in either of the boilers may be admitted into the other so as to equalize the pressure in the two boilers if it be found desirable.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steam generator, the combination of two boilers, one inclosed within the steam space of the other, each having flues for the passage of heat, and front and rear combustion chambers with which said passages connect and a fire-place, substantially as herein described.

2. In a steam generator, the two boilers one contained within the steam space of the other, flues extending through the two boilers for the passage of heat and communicating with front and rear combustion chambers at opposite ends of the boilers, a horizontal partition situated above the line of flues of the larger boiler, whereby the heat is diverted through said flues into the front combustion chamber and thence through the upper boiler flues, and a controlling damper in said partition whereby the heat may be delivered directly to the chimney without passing through the flues, substantially as herein described.

In witness whereof I have hereunto set my hand.

EUGENE SHYDECKER.

Witnesses:

S. H. NOURSE,  
H. F. ASCHECK.