

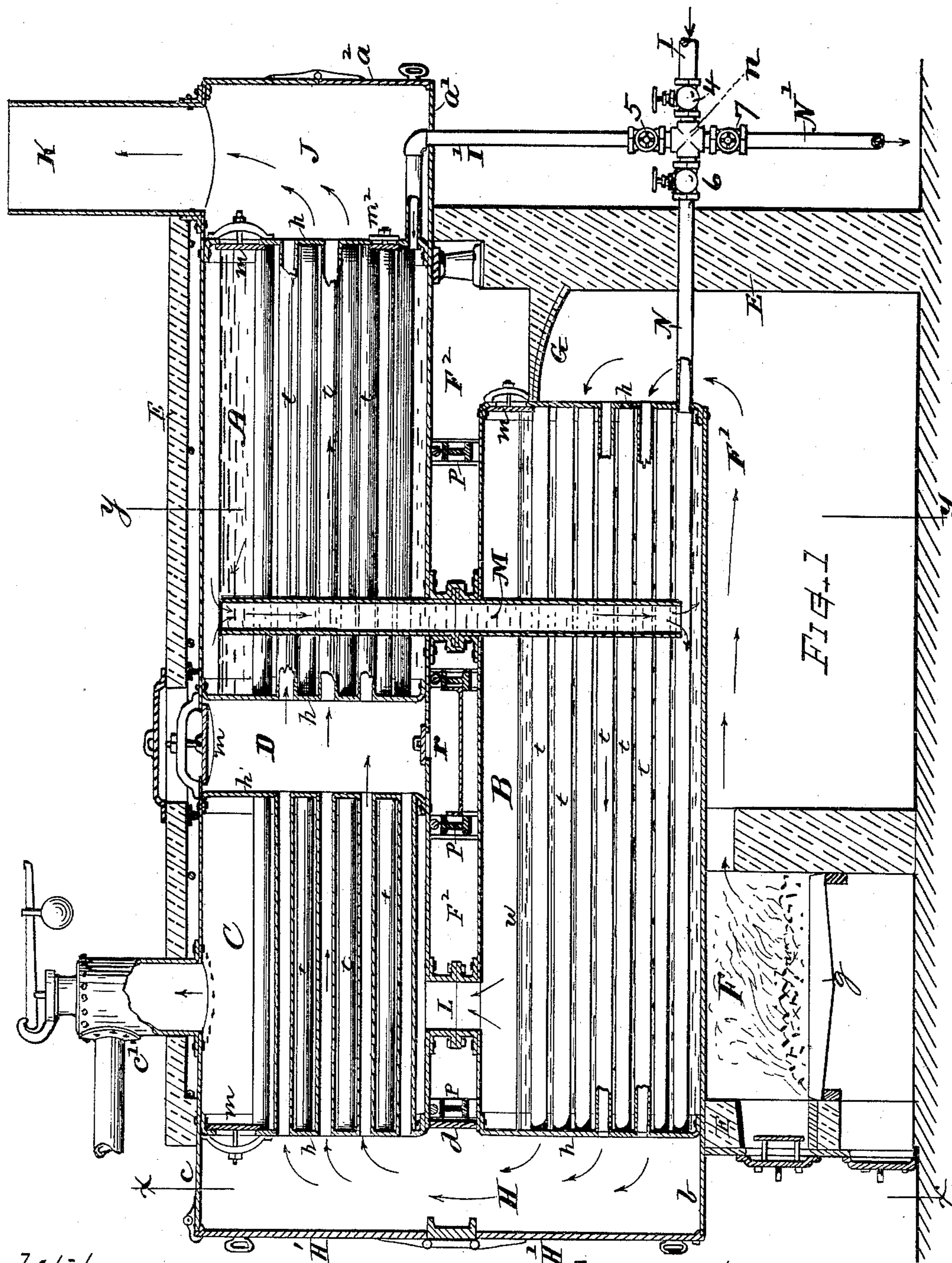
(No Model.)

2 Sheets—Sheet 1.

J. H. HOADLEY.
STEAM GENERATOR.

No. 474,385.

Patented May 10, 1892.



WITNESSES.

W. B. Barton.
Simon E. King.

Inventor

Joseph H. Houdley
By Chas. H. Durlough
Attorney

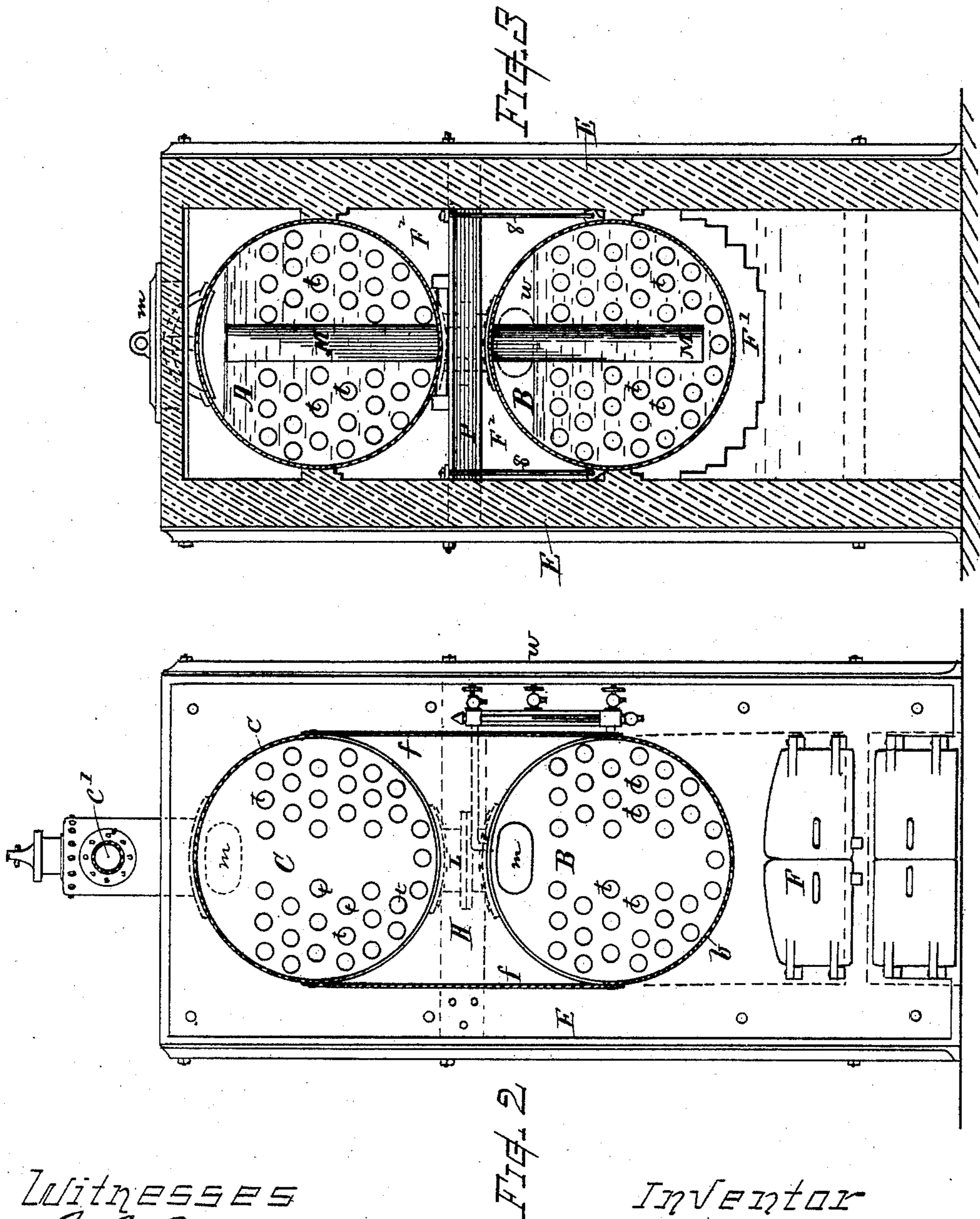
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Samuel C. King

Inventor
Joseph H. Hoadley
By Charles H. Burleigh
Attorney

UNITED STATES PATENT OFFICE.

JOSEPH H. HOADLEY, OF SAN FRANCISCO, CALIFORNIA.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 474,385, dated May 10, 1892.

Application filed December 9, 1891. Serial No. 414,459. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH H. HOADLEY, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented a new and useful Improved Steam-Generator, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

The object of my present invention is to provide an efficient and economical steam-generator arranged for the entry of the water, when it is at its lowest temperature, at the coldest part of the boiler and to have that water continue in its course, approaching the hottest part of the boiler on its way to the steam-chamber, so that when the water reaches the fire-sheets it will be nearly at steam temperature, thus providing conditions for maximum efficiency in steaming qualities and obviating excessive expansion and contraction of the plates over the fire with the injurious effects incident thereto; also, to afford a boiler having a reservoir of hot water always ready to go into the lower compartment or boiler in case the water-lines should become low, thereby avoiding the danger of turning cold water into a hot boiler and insuring the quick recovery of the water-level in the main boiler by gravity-pressure should any deficiency occur.

Another object is to provide a steam-generator comprising two separated water-compartments and an intermediate steam-compartment, through each of which the heated gases or products of combustion are passed on their way from the furnace to the stack, the several compartments disposed and connected in a manner to facilitate the manufacture and practical efficiency of the apparatus; also, to afford an interval or chamber between the overlying compartments, and means of communication from the exterior thereinto for permitting convenient access to the tube-sheets or inner heads of said compartments, as more fully hereinafter set forth. Another object is to afford efficient facilities to dry the steam without loss of heat. These objects I attain by mechanism the nature and

operation of which are explained in the following description, and illustrated by the accompanying drawings, wherein—

Figure 1 is a longitudinal sectional view of a steam-generator embodying my invention. Fig. 2 is a front view, with the projecting flue-chamber in section at line $x x$, Fig. 1; and Fig. 3 is a transverse vertical section through the water-compartments at line $y y$, Fig. 1.

My improved steam-generator comprises a primary boiler or water-compartment A, a main compartment or boiler B, and a steam-compartment or drying-chamber C. These compartments or boiler-sections are preferably made of similar diameter and structure and formed each of a cylindrical shell with transverse heads h , and a series of longitudinal tubes t , extending from end to end and secured in the heads in a manner similar to those generally employed in stationary tubular boilers.

The three shells or boiler-compartments A, B, and C are disposed within the brick-work or setting E of the furnace, between the upright inclosing walls, in horizontal position, the main boiler B being suspended immediately over the furnace F and fire-chamber F', while the steam-compartment C and water-compartment A are disposed above and overlying this main boiler B, the two parts A and C being placed end to end axially in line with each other and with an interval or manhole-space D of about two feet (more or less) between their adjacent ends. The front ends of the upper and lower shell are connected by a close partition at d , and their upper and lower half-cylinder sheets b and c are extended forward and joined by side plates f and inclosing doors H', as indicated, forming a flue-chamber H, that connects the lower and upper series of tubes. The shell of the compartment A is provided with a rearward extension a' and door a^2 , forming a smoke-chamber J, from which the chimney flue or stack K rises.

The rear wall of the furnace is carried forward at G against the end of the boiler B, separating the combustion-chamber F' from the space F², which surrounds the upper sections of the boiler, so that the gases or products of combustion pass backward along the under

side of the main boiler, then forward through the tubes of the compartment B, then up through chamber H, thence backward through the tubes of the steam-compartment or dry-
 5 heater C into the space D, and thence through the tubes of the water-compartment or boiler A into the chamber J and up the stack K.

The steam-compartment C and main boiler B are connected by a large open neck, as at
 10 L, to permit free passage of the steam into said steam-chamber as fast as it is generated, and the steam is delivered for use from the dome or pipe *c'*.

The water-compartment A is connected with
 15 the boiler-compartment B by a stand-pipe or open trunk M, extending from the lower part of the compartment B nearly to the top of the compartment A, the arrangement being such that when the primary compartment A
 20 is full the water will overflow through the trunk M into the boiler-chamber B.

I indicates the water-supply pipe, and I' the feed-water pipe leading into the primary water-compartment A and for normally supply-
 25 ing the generator with water.

N indicates a pipe leading into the second compartment B, and N' indicates the blow-off or escape pipe. These pipes preferably all connect with a cross-fitting at *n* and are sever-
 30 ally provided with valves or stop-cocks 4, 5, 6, and 7 for controlling the flow of water, as may be desired. When valves 4 and 5 are opened and valves 6 and 7 closed, the water is fed into the compartment A, from which,
 35 when filled, it flows through pipe M into the compartment B, wherein the water is maintained at the normal level indicated at *w*. By opening the valves 5 and 6, when the valves 4 and 7 are closed, the hot water from the com-
 40 partment A can be quickly flowed into the compartment B for supplying any deficiency therein, thus avoiding the necessity of injecting cold water thereinto. By opening valves 6 and 7, with valves 4 and 5 closed, blow-off
 45 of the boiler B is effected, and by opening valves 5 and 7, with valves 4 and 6 closed, blow-off of the compartment A is effected.

The steam-superheater *c* and water-compartment A may be reversed in position in re-
 50 lation to the main boiler B in case it is desired to have the products of combustion return through the space F².

The fire-chamber F and grate *g* may be of any suitable or well-known kind.

55 The several compartments of the generator are best provided with manholes *m*, and a hand-hole *m*² is formed in the end of the water-compartment A to facilitate removal of sediment. A soot-drop *r* at the bottom of the
 60 space D affords means for readily cleaning out said space.

The means for mounting the boilers within their setting can be, as herein shown, by trans-
 65 versely-disposed beams P, upon which the upper sections rest, (with or without bearing-rollers), and from which beams the lower boiler-section is suspended by suitable hangers 8,

or, if preferred, other forms of supports can be used for sustaining the several boiler-sections in the relative positions indicated. 70

By the arrangement of the several compartments of the generator, as shown, the steam-drying chamber C is at an intermediate position, so that the gases passing through the same are utilized for superheating the
 75 steam while at sufficiently high temperature to give efficient practical results. Then by the subsequent passing of the gases through the boiler-section A, which contains the water at minimum temperature, a comparatively large
 80 percentage of the heat of the gases is transferred to the water contained in this primary heating-compartment, and the gases as they escape into the stack are at comparatively
 85 low temperature, thus avoiding waste of heat, while at the same time the water, being heated near or quite to the boiling-point within the compartment A and then overflowing through
 pipe M into the main compartment B, gives no chilling effect as it meets the hot plates
 90 over the fire-chamber, but is readily expanded into steam, which passes up into the compartment C, and is there subjected to the higher temperature, rendering it dry or superheated, the apparatus thus effecting its
 95 work in a very efficient, practical, and economical manner.

In another application for Letters Patent, Serial No. 413,161, I have described and claimed certain means for quickly delivering
 100 the heated water from an upper to a lower compartment in cases of emergency in a boiler of other structure from that herein shown. It will therefore be understood that
 105 in this present application the claims refer to this subject-matter as an element of the special combination herein illustrated and defined.

I claim as my invention herein, to be secured by Letters Patent—

1. The combination, with a horizontal boiler and its furnace, of the overlying boiler-compartment having tubes or passages through which the products of combustion after passing the first boiler are carried and consisting
 110 of a steam-compartment, a water-compartment, and an interval-chamber or manhole-space located within the cylinder between the adjacent inner ends of said compartments and having a manhole from the exterior
 115 thereinto, substantially as and for the purpose set forth.

2. The combination, with the horizontal tubular steam-boiler, of the horizontal tubular water-compartment disposed for receiving
 120 the heat of the escaping gases and products of combustion, and the open stand-pipe disposed within the interior of the boiler through the coupling-neck and connecting the upper part of said water-compartment with said
 125 boiler for delivering water therefrom by overflow-feed into said boiler, substantially as set forth.

3. A steam-generator comprising two tubu-

lar water-compartments, through which the products of combustion are passed on their way from the fire-chamber to the chimney, connected by a trunk through which the water overflows from the upper to the lower compartment, in combination with a tubular steam-compartment, through which the products of combustion are passed intermediate to said two water-compartments, and a low-down supplemental pipe or way provided with a valve or stop-cock for transferring the contents of the upper water-compartment to the lower compartment, substantially as set forth.

4. The combination, with the main boiler B and heating-compartment A, of the feed-pipes I, I', and N, the escape-pipe N', joined in the common cross-fitting *n*, and their cocks or valves 4, 5, 6, and 7, as and for the purpose shown and described.

5. The combination, substantially as described, of the furnace F, with the inclosing walls E, the horizontal tubular boiler B, immediately over said furnace, the upper boiler-sections comprising the tubular steam-compartment C, tubular water-compartment A, and intermediate inclosed space D, the connecting-neck L, and stand-pipe M, the front flue, chamber H, having doors H', the rear extension *a'*, with door *a''*, inclosing the smoke-chamber J, and the chimney K, for the purposes set forth.

Witness my hand this 5th day of December, A. D. 1891.

JOSEPH H. HOADLEY.

Witnesses:

F. C. PEARSON,
CHAS. S. PECK.