

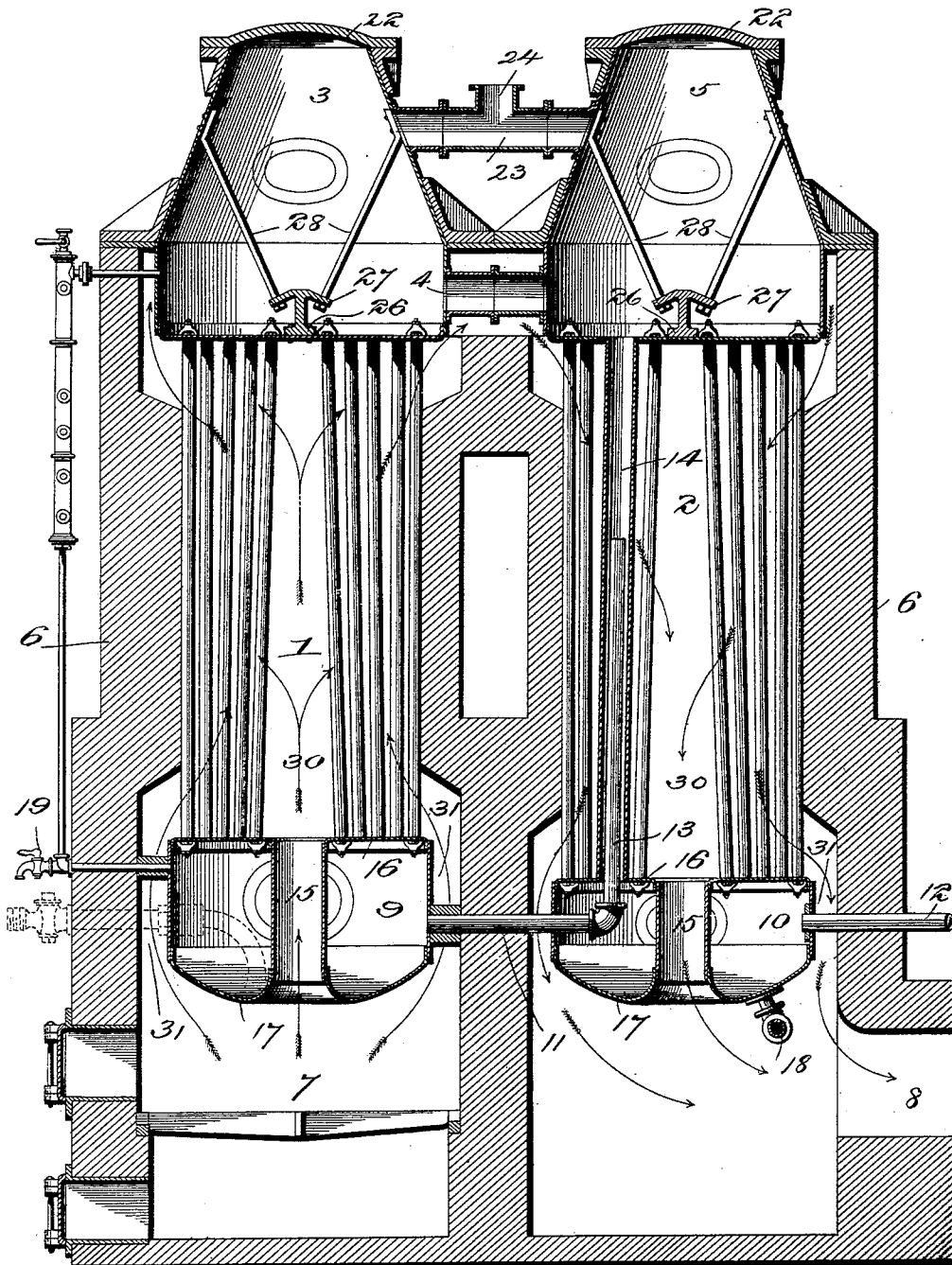
(No Model.)

W. WRIGHT.
STEAM BOILER.

2 Sheets—Sheet 1.

No. 569,314.

Patented Oct. 13, 1896.



Witnesses
W. H. Gidden.
Geo. R. Hamlin.

Inventor:
Fig. 1. William Wright
per Charles E. Davis
Attorney

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

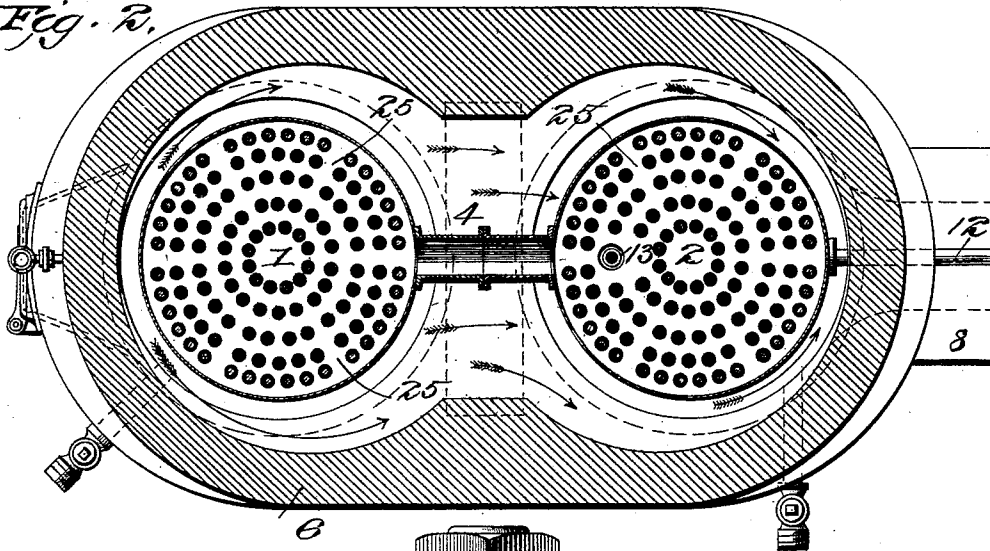


Fig. 3.

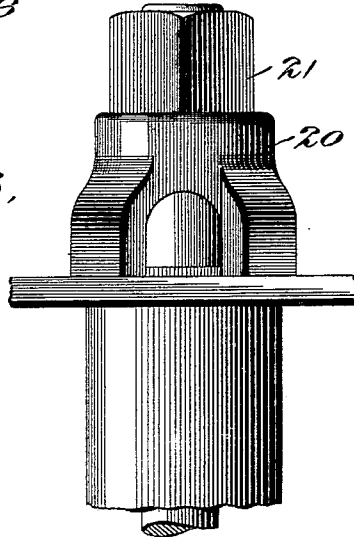
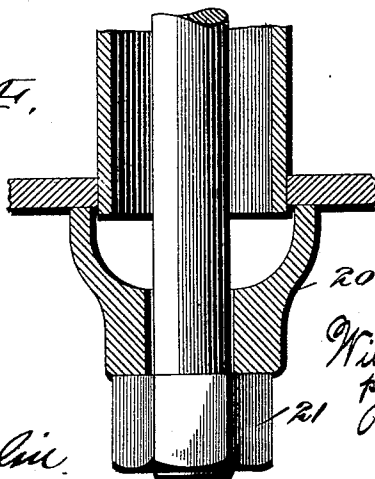


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM WRIGHT, OF NEWBURG, NEW YORK, ASSIGNOR TO MARY
E. WRIGHT, OF SAME PLACE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 569,314, dated October 13, 1896.

Application filed January 24, 1896. Serial No. 576,718. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WRIGHT, a citizen of the United States, residing at Newburg, in the county of Orange and State of New York, have invented certain new and useful Improvements in Steam-Boilers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

The purpose of my device is primarily to economize heat, and secondarily to provide a more simple, strong, cheap, and durable structure which will be readily accessible for repairs and cleaning.

Heretofore steam-generators have been constructed with a primary and secondary water-tube boiler, the primary boiler being placed directly above the furnace and the secondary boiler in the path of the heat which passes from the primary boiler, so that the heat is used over again to generate more steam before going to waste.

My invention consists in utilizing this principle in a vertical steam-boiler of the water-tube type, so that the tubes and tube-sheets will be arranged, protected, and held in a peculiar manner and to the best advantage for obtaining the most heat from a given amount of fuel.

My invention further consists in certain novel features in the construction of the steam-domes, feed-water pipes, and their immediate connections, all of which will be more fully described hereinafter, and pointed out in the claims.

In the accompanying drawings, Figure 1 represents a vertical section of my complete improvements; Fig. 2, a horizontal section, and Figs. 3 and 4 enlarged detail views of the flues and their connections.

The reference-numeral 1 denotes the primary boiler, and 2 the secondary boiler, both of which are placed side by side in a vertical position and have steam communication with each other at the top through the medium of steam chamber or dome 3, pipe 4,

and dome 5. These boilers are suspended in brick setting 6. The tube-space of the primary boiler is located directly over a fire-box or furnace 7, and the products of combustion pass between the flues of both boilers in their outward course, as denoted by the arrows, escaping through the exit 8 at the right-hand side of the pit of the secondary boiler. The lower ends of the tubes in both boilers are protected by and connected to water-chambers 9 and 10, which chambers communicate with each other through a horizontal pipe 11. The secondary boiler extends lower than the primary boiler for the purpose of using as much heat as possible. Water is fed to the boilers through a pipe 12, which passes through the side of the chamber 10, and in order to heat it before it goes to the primary boiler a vertical pipe 13 is provided. This pipe is a continuation of the pipe 11 and extends up into an enlarged tube 14 of the secondary boiler a sufficient distance, preferably two-thirds the height of the boiler, to force the incoming water to rise that far within the latter before flowing down and into the primary boiler.

Each of the water-chambers 9 and 10 is provided with a central vertical manhole 15, consisting of a large tube or cylinder connecting the flue-sheet 16 (which constitutes the top of the water-chamber) with the bottom 17 of the chamber. This manhole-tube also serves to greatly strengthen the top and bottom of the chamber against outward pressure and it directs the heat up through the central opening 30 in the boiler. The chamber 10 is provided with a mud-pipe 18 and the chamber 9 with a blow-off 19.

The water-tubes of the primary boiler are secured by being expanded in the sheets by a flue-expander in the usual way, but in order to strengthen the connection between the sheets of the chambers and domes the outer and inner circle of flues are provided with longitudinal bolts which pass centrally through them and are held in place by open washers 20 and nuts 21. In this way the water and steam completely envelop the bolts to prevent them from burning out. In the inner circle of tubes every other tube is provided with a bolt. It will also be seen that

these tubes, as well as several of the adjoining circles of tubes, lean toward the center of the top sheet for the purpose of reducing the unsupported area of the latter to make it stronger.

The steam-domes 3 and 5 are substantially frusto-conical in shape in order to allow as small a cap 22 as possible to be used. A horizontal pipe 23 connects these two domes with a common steam-exit 24.

The tubes in each boiler are arranged in separate groups, each having the shape of the frustum of a cone with base outward when seen in horizontal section, and each group being separated by equidistant radial spaces 25, as will be more clearly shown in Fig. 2. This construction permits the heat and products of combustion to more freely pass through the boiler than if the tubes were disposed in a solid mass in the boiler. As a means of still further strengthening the tube sheet or head, I provide a casting of steel having top and bottom flanges 26 and 27. This casting is made round and of a size that will fill the vacant space in the center of the head surrounded by the inner circle of tubes. The lower flange 26 is securely riveted to the tube-sheet. Six radial braces 28 are secured at their lower ends by nuts to the upper flange 27, and their upper ends are riveted to the inside of the dome. These braces are placed directly over the radial spaces 25, so that they will not be in the way when it becomes necessary to repair the tubes.

A surrounding space 31 is left between the sides of the water-chambers 9 and 10 and the surrounding setting in order to direct the heat around the chambers as well as through the middle.

The construction of my invention having been set forth, I will now describe its operation in a general way.

Water being introduced into the water-chamber 10 of the secondary boiler 2, it enters the former and rises in the tubes until it reaches the top of the pipe 13 in the enlarged tube 14. It then overflows into the former and passes out at the bottom through water-chamber 10 and pipe 11, after having received its first heat, to the water-chamber 9 of the primary boiler, where it is heated a second time, and thence it passes to the tubes of the latter. By thus forcing the feed-water up into the secondary boiler it is warmed before entering the primary boiler, thus receiving its first heat. Thus the secondary boiler serves not only as a steam-generator, but as a feed-water heater for the primary boiler,

the feed-water being heated therein in its upward and downward movement. Passing in at the bottom and thence up into the primary boiler, the water is heated a second time and converted into steam, which passes up into the steam-dome 3 and out through the horizontal pipe 24 to the engine. The heat of the furnace will first pass through and around the water-chamber 9 of the primary boiler, as denoted by the arrows, then between the tubes, thence escaping laterally around the upper end of the tube-space, around the base of the first dome, and thence to the secondary boiler, where its downward course is utilized to generate steam in the secondary boiler. The elongation of the secondary boiler prolongs or extends the influence of the heat upon the water in its outward passage.

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

1. In a steam-boiler, the combination with a suitable setting containing a vertical chamber, of a steam-dome suspended therein, a set of water-tubes suspended from the dome, a water-chamber suspended from the lower ends of the tubes, longitudinal rods passing through the tubes, and open washers connecting the opposite ends of the rods with the dome above, and water-chamber below, respectively substantially as described.

2. In a steam-boiler of the character described, the combination with an outer shell, of a steam-dome suspended in the upper part of the shell, and having a fire-passage around its lower portion, a water-chamber surrounding the lower flue-sheet, and having a fire-space around it, and an opening through it, and water-tubes connecting both chambers, in the manner and for the purpose set forth.

3. In a steam-boiler, the combination with a suitable setting provided with a pair of vertical fire-chambers, of a primary and secondary boiler a set of vertical water-tubes suspended from a pair of communicating steam-domes, a pair of water-chambers suspended from the tubes, and a feed-water connection entering the secondary water-chamber, and delivering therefrom to the primary water-chamber, substantially as described.

In witness whereof I affix my signature in presence of two witnesses.

WILLIAM WRIGHT.

Witnesses:

WALTER C. ANTHONY,
WILLARD M. TERPENING.