

K. T. HENLEY & W. A. WHITESIDE.

STEAM GENERATOR.

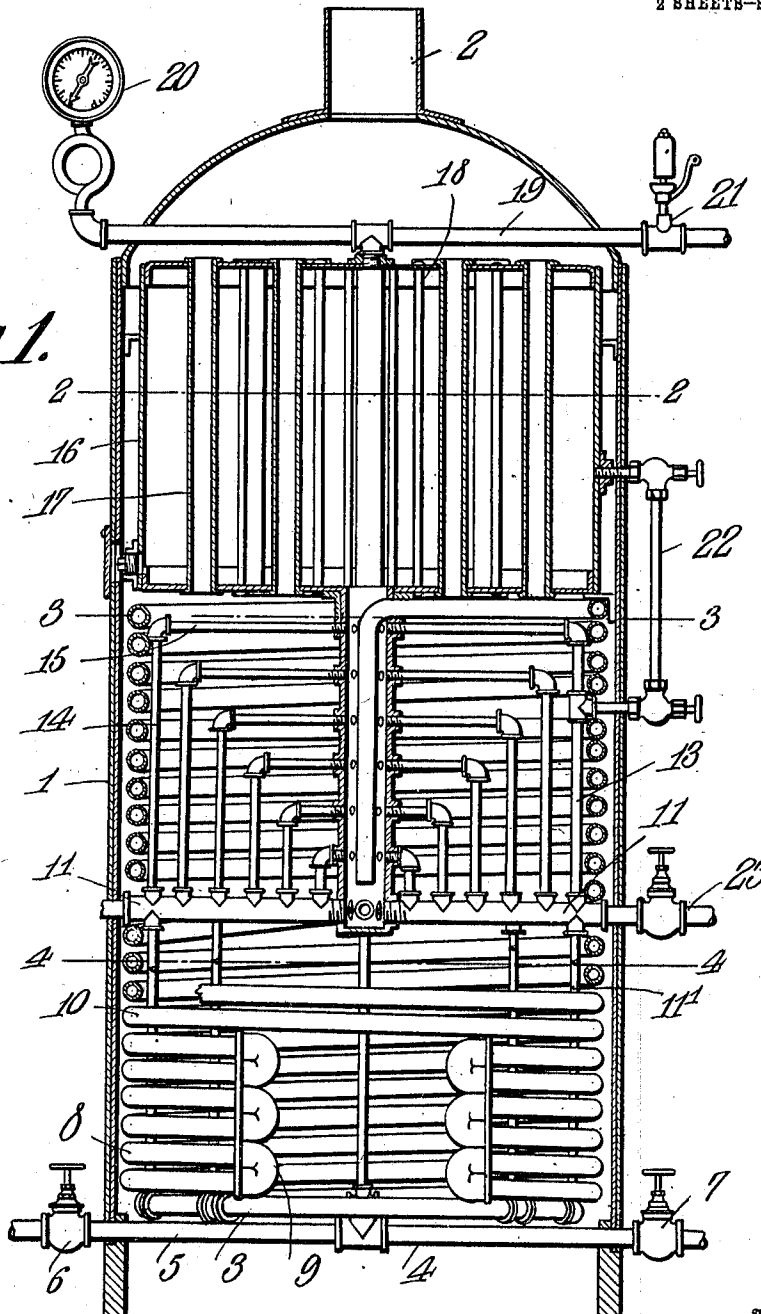
APPLICATION FILED MAY 24, 1909.

993,165.

Patented May 23, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

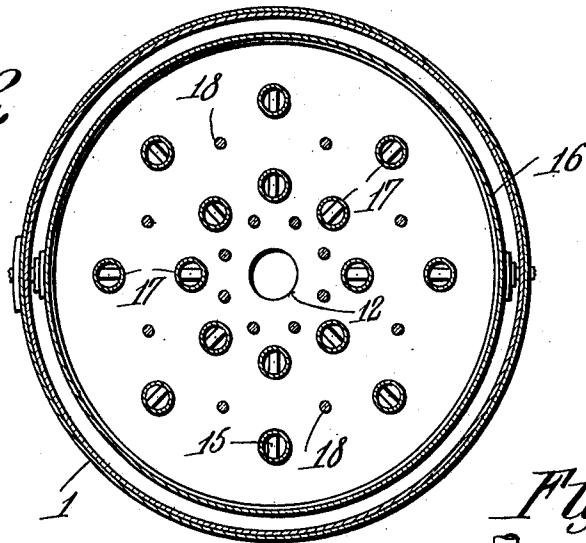


Fig. 3.

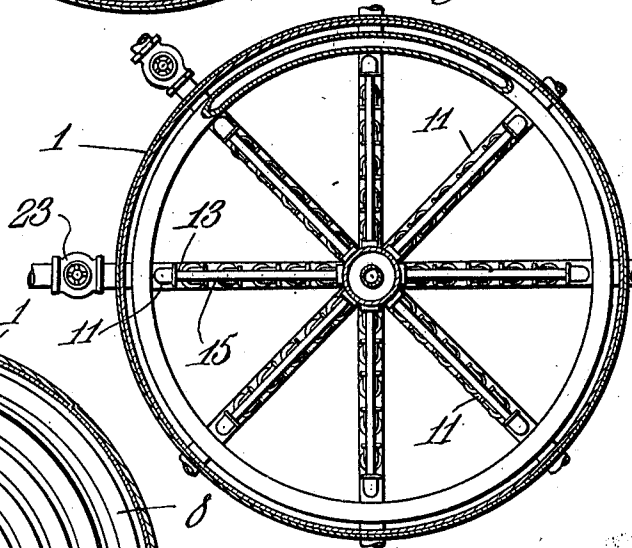
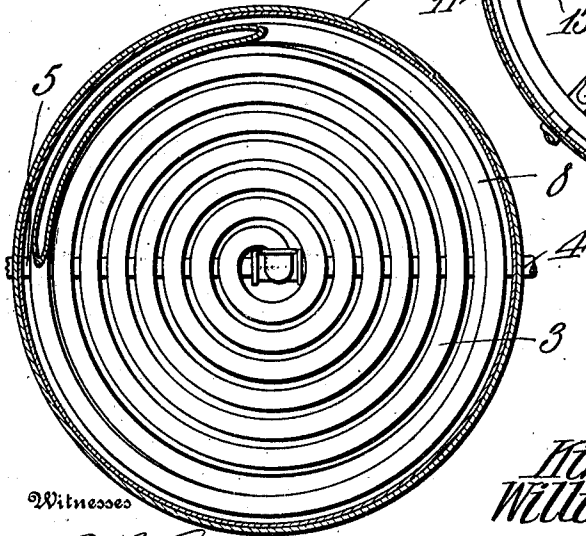


Fig. 4.



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UNITED STATES PATENT OFFICE.

KINTCHEN T. HENLEY AND WILLIAM A. WHITESIDE, OF GOLCONDA, ILLINOIS, ASSIGNORS OF ONE-THIRD TO GUY AUSTIN, OF GOLCONDA, ILLINOIS.

STEAM-GENERATOR.

993,165.

Specification of Letters Patent.

Patented May 23, 1911.

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To all whom it may concern:

Be it known that we, KINTCHEN T. HENLEY and WILLIAM A. WHITESIDE, citizens of the United States, residing at Golconda, in the county of Pope, State of Illinois, have invented a new and useful Steam-Generator, of which the following is a specification.

This invention has relation to steam generators, and it consists in the novel construction and arrangement of its parts as hereinafter shown and described.

The object of the invention is to provide a generator in which water is introduced and maintained in a moving column or a series of dividend columns during the process of transition from liquid to gaseous or vaporous state. That is to say, that the water is maintained in motion under the influence of the means which ejects the same into the generator and is not permitted to remain in a state of rest, thereby forming columns of inactive water in which scales may form.

A further object of the invention is to provide in a generator as indicated a structure comprising approximately three distinct zones in which the process of conversion from one state to the other takes place. That is to say, a primary zone is provided in which the water is preheated and then passes to a secondary zone in which steam is formed and from which zone it is passed into a final zone, at which point it is superheated. The pipe at the primary zone is arranged about the outer boundaries of a fire-containing compartment and extends upward in a coil and then enters a jacket and is carried down near the bottom thereof, while the other pipes in the steam-forming zone are arranged in series of sets or gangs, each set or gang having vertical flights and horizontal runs which communicate with said jacket. The superheating zone includes a drum having heat flues passing therethrough and suitable stay-bolts. The heat flues are in alinement with the horizontal runs of pipe in the steam-forming zone.

In the accompanying drawing:—Figure 1 is a vertical sectional view of the steam generator. Fig. 2 is a horizontal sectional view, cut on the line 2—2 of Fig. 1. Fig. 3 is a horizontal sectional view of the generator, cut on the line 3—3 of Fig. 1. Fig.

4 is a horizontal sectional view of the generator, cut on the line 4—4 of Fig. 1.

The generator comprises a shell or body 1, having at its upper end an outlet 2. A spiral section of pipe 3 forms a bottom or grate for the shell 1 and is located in the vicinity of the lower end thereof in a horizontal plane. A feed-water pipe 4 communicates with the spiral pipe section 3 at the center of the shell 1. The pipe 4 is located below the plane occupied by the coil 3. A pipe 5 is also located below the coil 3 and communicates with the same. The pipe 5 is provided with a valve 6, while the pipe 4 is provided with a valve 7. The valves 6 and 7 are located beyond the outer sides of the shell 1. Above the section 3 is located several sections of pipe 8, which are doubled back upon themselves as at 9, and are approximately in cylindrical formation above the spiral pipe section 3, and the upper pipe section 8 merges into a coiled pipe section 10 which extends up through the steaming zone of the generator. The space between the doubled back end portions 9 of the sections 8 afford sufficient room for the introduction of fuel within the cylindrical formation of the said pipe sections and upon the upper side of the spiral pipe section 3. The pipe sections 3, 8 and 10 approximately form a fire-box or chamber, and inasmuch as the adjacent portions of the spiral sections 3 are spaced from each other, sufficient room is afforded between the adjacent portions of the section 3 to permit ashes to fall below the said fire-box and sufficient space is afforded between the opposite sides of the upper portion of the coil section 10 to permit smoke and products of combustion to pass up into the upper portion of the shell 1. The zone occupied by the pipe sections 3, 8 and the lower part of the coil 10 is that which has heretofore been referred to as the preheating zone, while the zone immediately above the said preheating zone and embraced within the upper portion of the coil 10 is that heretofore referred to as the steaming zone. A jacket 12 is concentrically arranged in the steaming zone and the upper end of the pipe forming the coil 10 enters the jacket 12 and extends down within the same and terminates near the lower end thereof.

Several sets or gangs of pipe sections 13

are located in the steaming zone, and each pipe section includes a rise 14, and a run 15. The rises are connected at their lower ends with the pipe section 11, while the runs are connected at their inner ends with the jacket 12. Thus it will be seen that the rises 14 gradually diminish in height from the outer toward the inner ends of the pipe section 11, and in a similar manner the runs 15 gradually diminish in length. The inner ends of the pipe sections 11 connect with the lower end of the jacket 12. Pipes 11' connect the outer end portions of the pipe sections 11 with the outer portion of the spiral pipe section 3.

A drum 16 is located in the upper portion of the shell 1 and is provided with a series of vertically disposed flues 17, which are in alinement with planes passing vertically through the runs 15 of the pipe sections 13. The said drum 16 is further provided with a series of stay-bolts 18, and the arrangement and number of the flues 17 and the bolts 18 is such as to effectually brace the drum structure and provide sufficient passageway through the same to permit the products of combustion to pass freely from the steaming zone through the steam superheating zone, (which is inclosed within the drum 16) and out through the outlet at the upper end of the shell 1. The upper end of the jacket 12 communicates with the lower end of the drum 16. A live steam-pipe 19 communicates with the upper end of the drum 16, and at a point beyond the sides of the shell 1 is provided with the usual steam-gage 20 and safety-valve 21 or its equivalent. A water-gage 22 communicates with the sections of pipe located in the steaming zone, and with the interior of the drum 16, and the pipes 11 are provided with valves 23 whereby the said pipes 11 may be used for blow-off purposes.

From the above description it is obvious that as water is permitted to enter the generator through the pipe 4, the said water is preheated as it passes through the pipe sections 3, 8, 10, and at the lower end of jacket 12 the column of water is divided into a series of smaller columns, which continue to move through the pipes 11 and 13, and, in doing so, absorb heat from the prod-

ucts of combustion passing through the steaming zone, and thus the water is converted into steam which passes through the horizontal runs 15 and enters the jacket 12. From the jacket the steam passes up into the drum 16, where it is superheated by heat and products of combustion passing through the flues 17. By such an arrangement it will be seen that during the entire time that water is passing through the several coils of pipe it is kept in motion as the consequence of the pressure which introduces it into the generator and therefore no pockets or still columns of water are permitted to exist in which scale or sediment can collect. When it is desired to free the generator of such sedimentary matter as may be held in suspension in the moving column of water, this material may be blown off through the blow-off pipes 5 and 11 in the usual manner.

What is claimed is:—

A steam generator comprising a preheating and steaming zone, a coil of pipe extending approximately from the bottom of the preheating zone to the top of the steaming zone and having a water inlet at its lower end, a jacket located in the steaming zone, the upper end of the said pipe entering the upper portion of the jacket and extending down in the same and terminating above the bottom thereof, radially disposed pipes connected at their inner ends with the lower end of the jacket, angle pipe connections joined at their lower ends with the radially disposed pipes at different distances from the jacket and at their upper ends with the jacket at different elevations and vertically disposed pipes connected at their upper ends with the outer portions of the radially disposed pipes and at their lower ends with the lower portion of said coil.

In testimony that we claim the foregoing as our own, we have hereto affixed our signatures in the presence of two witnesses.

KINTCHEN T. HENLEY.
WILLIAM A. WHITESIDE.

Witnesses:

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