(No Model.)

O. F. KNAPP.

STEAM GENERATOR.

No. 366,223. Patented July 12, 1887.

Fig. 1.

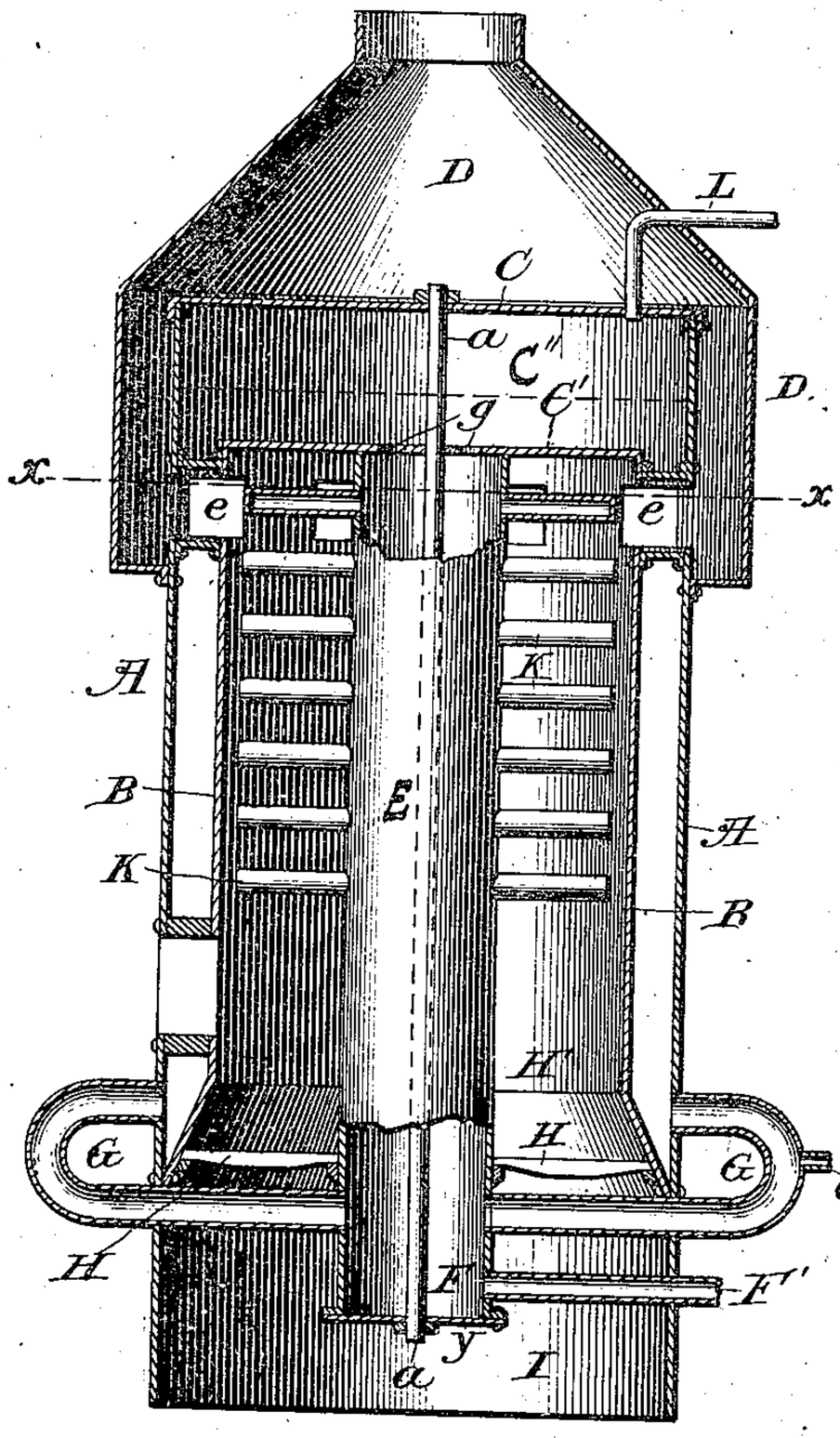
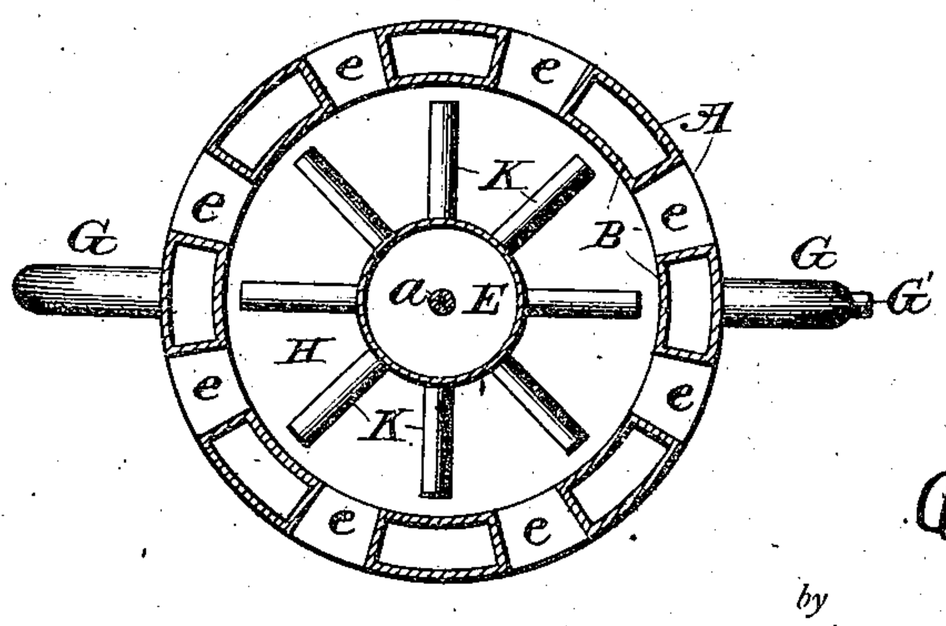


Fig. 2.



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OSCAR F. KNAPP, OF OSCEOLA MILLS, WISCONSIN.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 366,223, dated July 12, 1887.

Application filed April 5, 1887. Serial No. 233,799. (No model.)

To all whom it may concern:

Be it known that I, OSCAR F. KNAPP, a citizen of the United States, residing at Osceola Mills, in the county of Polk and State of Wisconsin, have invented a new and useful Improvement in Steam-Generators, of which the following is a specification.

My invention relates to steam-generators in which a central cylinder provided with radiating sprocket-tubes is surrounded by a water jacket or boiler, the same being connected with the inner cylinder by means of return-tubes at the bottom communicating below the grate-bars with the outer shell of the boiler, the object being to secure the greatest amount of heating-surface and establish a perfect circulation. I attain these objects by means of the device shown in the accompanying drawings, in which—

Figure 1 is a vertical section of my steam-generator, showing the arrangement of the sprocket-tubes and the return-tube. Fig. 2 is a horizontal section of my steam generator, showing a plan view of the sprocket-tubes and the smoke-flues.

Similar letters refer to similar parts throughout the several views.

I make an outer shell or casing of a cylindrical form, as A. Within this shell A, I make a second shell, B, also of a cylindrical form, and between the two shells A and B is a water-space. Above the body of the boiler, attached to the outer shell, A, at a convenient distance, I make a hood or smoke-jacket, D, which is cylindrical in front, running up to a line level with the top of the outer shell, A, where it narrows in a cone to the stack. Upon the top of the outer shell, A, I make a crown-sheet, C, and at a convenient distance below the crown-sheet C, I make a diaphragm, C′, perforated at *g*. Between the diaphragm C′ and the crown-sheet C is a space partially filled with water and steam, the water-level being indicated by the dotted line. From the diaphragm C′, I make a shell inside of the shell A, as B, which shell I make of a convenient thickness and leave a space for the water between the outer and inner shells near the upper part of the boiler. At a proper distance from the crown-sheet C are made perforations *e*, which communicate with the smoke-jacket D. The lower crown-sheet, C′, I perforate near the center by holes *g*, which communicate with the central drum, E, of the boiler. From this central drum, E, at convenient points are radial tubes K branching out from the drum. These tubes K are closed at the outer end by being welded together, while the inner ends screw into the drum E. The lower end of the drum E, at a convenient distance from the bottom, is provided with circulation-tubes G, which communicate beneath the grate-bars H with the outer shell, A, of the boiler and allow of a free circulation of water between the outer shell of the boiler and the inner shell or drum, E, through the tube G and the holes *g* in the lower sheet, C′. At the extreme lower end of the drum E, below the openings of tube G, I make a mud-drum, F, from which, passing through the outer shell of the boiler, is a blow-off pipe, F′, which passes through the ash-pit I. On the end of the drum E and mud drum F is a man-hole plate, Y. To the circulation-tube G, at a convenient point, I make the pipe G′, for supplying the feed-water. The inner shell, B, of the boiler near the bottom I flare outward, so as to expand the inner chamber of the boiler and increase the fire-box H′, which is provided with grate bars H. Having provided the boiler with a steam-pipe, L, from the drum of the boiler, and carrying a stay-bolt through the crown-sheet C down through the drum E, mud-drum F, and man-hole plate Y, the device is complete.

Having thus described the parts of my invention, I now proceed to explain the method of operating the same. I fill the boiler up to the dotted line indicated between the crown-sheets C and C′ and fire the boiler in the fire-box H′. The heat rises and surrounds the pipes K and the drum E, passing out through the openings *e*, passes around the steam-dome C″ and out of the smoke-hood D. The water, being heated in the pipes K and drum E, rises and flows into the steam-dome C″, where, imparting its heat to the steam, it becomes cooled and flows down to the bottom of the boiler between the inner shell, B, and the outer shell, A, passing around and under the grate-bars H through the flues G, thence to the drum E, establishing a perfect circulation.

What I claim, therefore, and desire to secure by Letters Patent, is—

1. In a steam-generator, the combination of the smoke-jacket D, outer shell, A, steam and water dome C″, flues *e*, cylinder E, sprocket-tubes K, and inner shell, B, combined with the circulating-tubes G and circular fire-box and grate-bars H, all arranged and operating substantially as set forth.

2. In a steam-generator, the combination of the smoke-jacket D, outer shell, A, steam and water dome C″, flues *e*, cylinder E, sprocket-tube K, inner shell, B, circulating-tube G, circular fire-box and grate-bars H, combined with the mud-drum F, blow-off pipe F′, and bolt *d*, all arranged and operating substantially as set forth.

3. The new article of manufacture, consisting of a steam-generator composed of the component parts, a smoke-jacket, D, outer shell, A, inner shell, B, steam and water dome C″, flues *e*, cylinder E, sprocket-tube K, steam-pipe L, circulating-tube G, inlet-pipe G′, circular fire-box and grate-bars H, mud-drum F, blow-off pipe F′, man-head Y, and ash-pit I, with the bolt *d*, all arranged and operating substantially as set forth and described.

OSCAR F. KNAPP.

In presence of—
H. HAUPT, Jr.,
J. W. TAYLOR.