

W. S. SALISBURY.
Coil Steam-Boiler.

No. 219,311.

Patented Sept. 2, 1879.

Fig. 1.

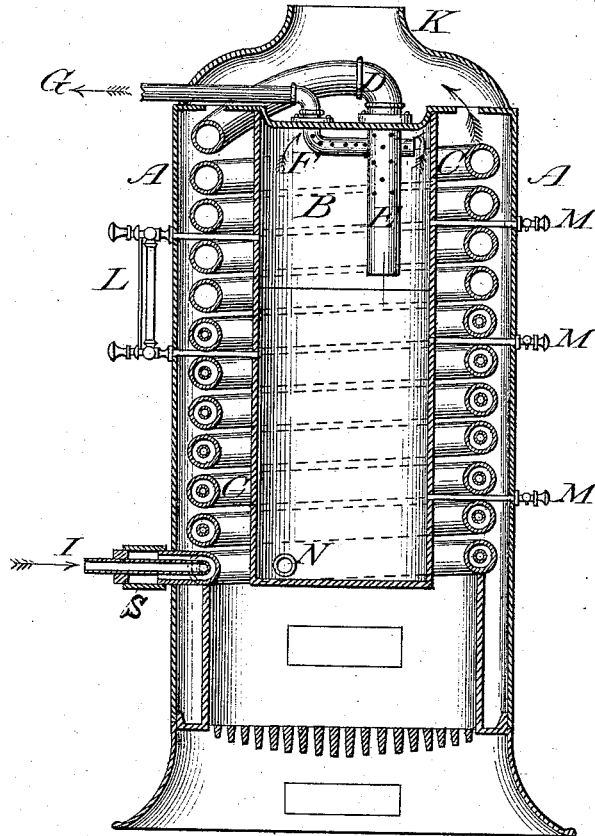
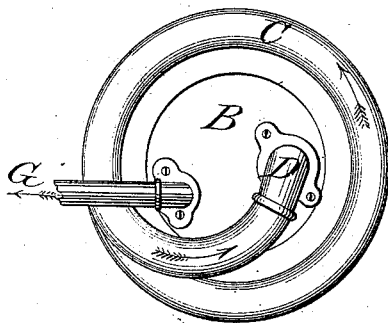


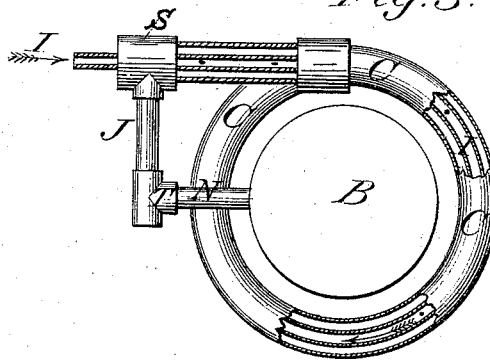
Fig. 2.



Attest:

H. M. Birdsall
Geo. H. Lucke.

Fig. 3.



Inventor.

Wilber S. Salisbury

UNITED STATES PATENT OFFICE.

WILBER S. SALISBURY, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN COIL STEAM-BOILERS.

Specification forming part of Letters Patent No. **219,311**, dated September 2, 1879; application filed February 17, 1879.

To all whom it may concern:

Be it known that I, WILBER S. SALISBURY, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Coil Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification, and, with the accompanying detailed description, set forth what I consider the best means of carrying out my invention.

Figure 1 is a central vertical section. Fig. 2 is a top view of the interior parts forming the boiler and connections. Fig. 3 is a bottom view of the interior parts forming the boiler and connections.

Similar letters of reference indicate like parts in all the figures.

B is a tank of wrought-iron, and may be constructed of lap-welded tubing for certain sizes, or of charcoal-iron boiler-plates, with wrought-iron heads welded or flanged and riveted in, and for large sizes stay-bolts extending from head to head, or flues, may be used to strengthen same. Surrounding tank B, and connected thereto, as will be hereinafter explained, is a continuous coil, C, of lap-welded or other pipe, with an interior removable small coil of pipe extending part way inside the larger coil of pipe, C, as shown, and perforated at intervals throughout its entire length.

The top of large coil C is connected to the tank B by means of the elbow D and section of pipe E, extending downward inside of tank B, substantially as shown in Fig. 1 of the drawings. Said piece of pipe E is partially perforated and open at the bottom end, the object of which will be explained farther on. Also, connected at the top of the tank B, is a section of pipe, F, bent so that when attached to the inside of the head of tank B, as shown, it will extend across and as near to the top as practicable. The end of said pipe F is closed, while on the top side are drilled sufficient holes to give the same or nearly as many inches as the area of pipe F, while on the under side, near the end, is drilled a hole for the escape

of any water of condensation that may be in the pipe. The object of arranging this pipe longitudinally or crosswise against the head of the tank is to extract or secure the driest steam at the highest point within the tank. Said pipe F is provided with a flange and elbow, and connected thereto is steam-pipe G. At the bottom of tank B is a pipe, N, and pipe J, connecting T-connections S and T on the coil C, thereby affording an open communication between the bottom of tank B and coil C, while suitable connections may be made for blowing off or filling up.

In Fig. 1 are represented, surrounding coils and tank, a sheet-iron shell supplied with a cast-iron top, cast-iron base and grate, said coil and tank resting upon fire-brick or cast-iron supports, as may be desired. Passing through the outside shell are pipes leading to the tank B for water-gage L and try-cocks M M M. Said tanks and coils can be set up in brick-work where desired.

In the construction, said tank B is placed in the center of coil C, with sufficient space between to give the products of combustion free escape in their ascent. Also, a suitable space should be allowed between the outside of coil C and the shell, while the convolutions composing the coil C should be open sufficiently to allow the gases to pass through, and the same should be placed above the grate far enough for good combustion of the fuel.

In operation, the larger coil, C, is supplied with water through the small interior pipe, I, at the bottom, (not dissimilar to the plan as shown in Patent No. 200,938, dated March 5, 1878, allowed me,) by the means of a pump or other suitable device for feeding steam-boilers while water and vapor from coil C are carried over into tank B through elbow D and pipe E. The vapor escapes by means of the small holes drilled through the upper part of pipe E, and finally passes into the top of bent pipe F, and finds exit, through pipe G, to engine.

Thus it will be seen that as the water and steam, commingled, pass over into the tank from the coils the water will descend and have a return passage through the coil of pipes. I obtain the circulation from the bottom of the tank (whether pump is at work or not) to the coil by the connected means shown in Fig. 3

of the drawings, whereby a circulation is kept up, promoting rapid generation of steam.

By the use of the reservoir or tank B, of uniform shape, arranged in the center of coil, and leaving an equal, or nearly so, space between tank and coil the full length, the products of combustion and the gases, as they strike the bottom of tank, are caused to spread, and in their ascent to impinge and pass through and between the convolutions, thereby becoming more completely absorbed by the coil and tank.

In the mode of circulation, at whatever height the water may stand in the tank, it will be equally so in the coils by virtue of the connection at the bottom of tank and large coil, and in consequence of using smaller-sized coil, and as soon as the heat becomes intense enough to generate steam in the coil—as it always does first—it seeks its escape upward, thereby starting a current from the tank; and then, as the heat becomes more intense, it more completely dries the steam in coil at the top and the upper portion of the tank.

By means of the pipe E being perforated it helps to liberate the steam, and the water discharging from coil upon the top of water inside the tank or reservoir aids in preventing the foaming of boiler.

By virtue of the coils absorbing the heat or hot gases more readily arising from combustion steam is generated more rapidly in same, and the result is, a portion of the water not being all evaporated is carried upward by the steam and pours over into the tank, and the greater body of water in tank will be also repelled from the bottom upward; but, owing to the outlet-pipes N J and coupling S, a natural action is produced by the law of repulsion and gravity, aided by heat, and the result is a circulation; and when the force of the pump is added, through the medium of the feed-pipe and perforations therein, the rapidity of the circulation is aided.

By the use of the feed-pipe inside of large coil I have a much better circulation than could be procured in any other manner, as is apparent when the pump is working to force in the feed-water, and owing to the many small

streams in the larger coil produced by the perforations in the feed-pipe, a continuous rapid withdrawing of the heated water from the tank B is also going on.

Besides, in the above operation, as described, I more fully prevent priming, or the liability is lessened in carrying water out while the engine is working.

The pipe E and the bent pipe F may be inserted through the head of tank B by means of a reducing-bushing, which I sometimes use instead of a plate, as shown.

Having thus fully described my invention, I claim—

1. In a steam-boiler, the combination, substantially as described, of a centrally-suspended tank or reservoir surrounded vertically by a coil of pipes, and connected at its base by a pipe forming a communication with a double coil, the inner-arranged coil being perforated and extending upwardly about half the length of the tank, and the outer coil connected at the top of the tank, substantially as shown, and for the purposes set forth.

2. The combination, with a reservoir or tank centrally located within the furnace, of the coils C and I, the coil I being perforated and arranged within the coil C, the upper end of the said coil C terminating in a perforated pipe located within the tank, and the lower end connected with the bottom of the tank, substantially as and for the purpose set forth.

3. In a steam-boiler, the combination of a centrally-suspended reservoir or tank, the coils C and I, the coil I being perforated and arranged within the coil C, the pipe N at the bottom of the tank, and the pipe J with couplings S and T, forming a connection with the lower portion of the coils, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I have hereto signed my name in the presence of two subscribing witnesses.

WILBER S. SALISBURY.

Attest:

H. M. BIRDSALL,
GEO. H. LUCKE.