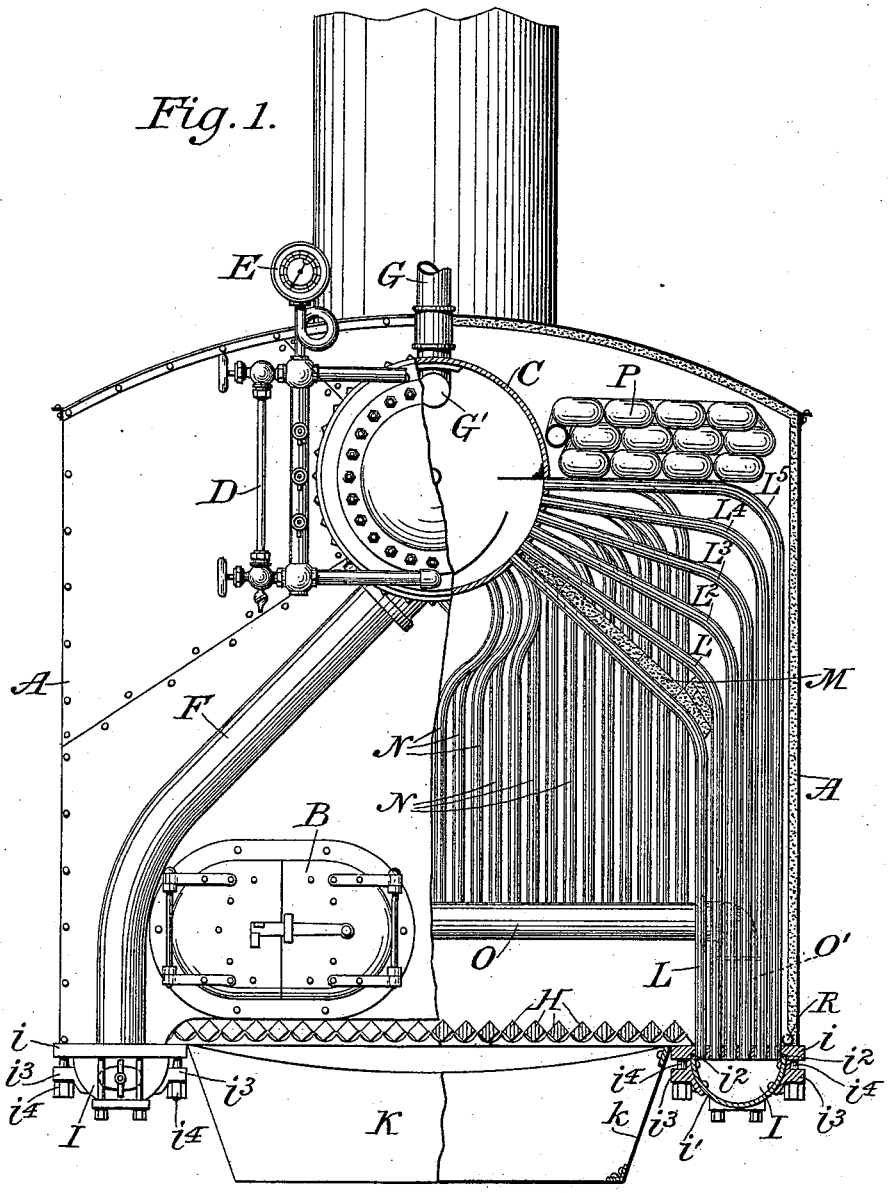
(No Model.) 2 Sheets—Sheet 1.

# C. L. SEABURY.

## BOILER.

No. 523,489. Patented July 24, 1894.

*Fig. 1.*




Attest:
D. Webster Palmer
A. N. Jesbera.

Inventor:
Charles L. Seabury
by William B. Greeley
Atty.

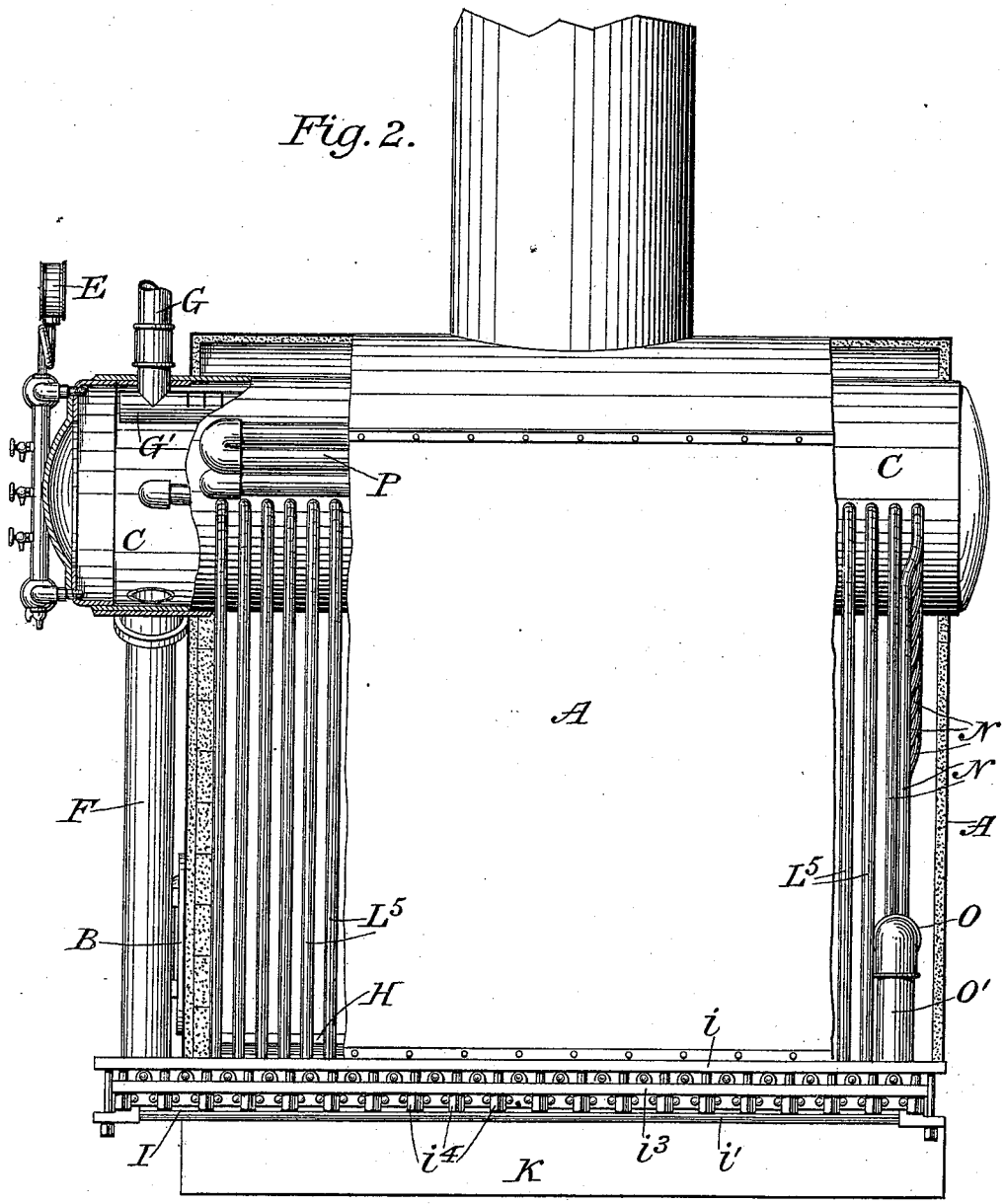
(No Model.) 2 Sheets—Sheet 2.

# C. L. SEABURY.

## BOILER.

No. 523,489. Patented July 24, 1894.

*Fig. 2.*




Attest:
S. Sepi-Palmedy.
A. N. Jastram.

Inventor:
Charles L. Seabury
by William B. Greeley
Atty.

# UNITED STATES PATENT OFFICE.

CHARLES L. SEABURY, OF NYACK, NEW YORK.

## BOILER.

SPECIFICATION forming part of Letters Patent No. 523,489, dated July 24, 1894.

Application filed April 7, 1894. Serial No. 506,773. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES L. SEABURY, of Nyack, in the county of Rockland and State of New York, have invented certain new and useful Improvements in Boilers; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

This invention relates to water-tube steam-boilers of the general character of the boiler represented in United States Letters Patent, No. 497,432, issued May 16, 1893, and the main object is to improve the boiler therein shown in certain particulars and to remedy certain objections which have developed in the practical use of such a boiler. In the boiler shown in said patent the low bends of some of the water-tubes gave opportunity for the accumulation around them of ashes and unless care was taken to remove such accumulations they might under some circumstances become more or less moist and so promote corrosion of the tubes from the outside.

In the present boiler the water-tubes and manifolds are so arranged as to make it very easy to keep them clean on the outside and to keep dry such accumulations as may be allowed to remain by a careless or inefficient engineer, thereby removing a possible cause of corrosion from the outside. In the old boiler, moreover, the arrangement of the water-tubes and drums is such that in order to secure a radial entrance of the water-tubes into the upper and lower drums the tubes themselves were so bent as to make it difficult to clean them interiorly. In the present boiler the tubes and manifolds are so arranged that the water-tubes enter the upper drum radially and at the same time have but a single bend, which is a right or obtuse angle, whereby it is not only easy to clean the tubes interiorly but it becomes possible to inspect them by inserting a small electric light in one arm of the tube and applying the eye to the other end of the tube. At the same time the tubes are so arranged as to make it very easy to clean and paint them exteriorly almost throughout their entire length whenever necessary, as when the boiler is out of use for an extended period.

Other features of improvement relate to the construction of the manifolds themselves and to the construction and arrangement of the water-back.

In the accompanying drawings: Figure 1 is a front view of the improved boiler, partly in elevation and partly in transverse section. Fig. 2 is a side elevation of the same partly in longitudinal section and partly in elevation.

A suitable shell or casing A, A, substantially rectangular and having vertical side walls incloses and protects the boiler and is provided with suitable doors, one of which is shown at B. The steam drum and separator C, projects through the end walls of such casing and is provided at its front end with the water-gage D, pressure-gage E, and blow-offs in the usual manner. The water-legs or down-carrying tubes F, F, are connected to the end of the drum C outside of the front wall of the casing and diverge to the side manifolds. The steam main G is also connected through the outer end of the drum C to the steam receiver G′ within the drum.

Parallel with the drum C and about at the level of the grate H are placed the lower or side manifolds I, I, which are respectively connected at their front ends with the water-legs F, F. Each manifold consists of a substantially flat tube-plate $i$ and a curved or half-round bottom plate $i'$, the upper edges of which enter longitudinal grooves $i^2$ in the under side of the plate $i$ to form a rabbet joint, a suitable packing being employed. This construction enables a tight joint to be maintained notwithstanding high pressure, for the packing cannot be blown out as it very often happens when it is placed between two flat surfaces, such as the under side of the tube-plate $i$ and the upper surface of a flange turned over on the edge of the bottom plate $i'$.

For the purpose of securing the bottom plate in position lugs $i^3$ are preferably riveted to the plate $i'$ and are secured by bolts $i^4$ to the plate $i$. If desired, however, the lugs $i^3$, $i^3$, on opposite sides might be united to form a band and the lower plate thereby be held

to the upper without requiring lugs to be riveted thereto. By these means the bottom part of each manifold can be taken off whenever required, the side plate *k* of the ash-pan K being removably secured in place in order to allow the workman to get at the manifold readily.

The water-tubes L, L′, L², &c., are secured to the tube-plate *i* of the respective manifolds in the usual manner and are carried up straight until they can be bent at a right or obtuse angle in such a manner as to permit the bent arms to enter the drum C radially and to be secured thereto in the usual manner. Being thus formed they are not only readily secured in position to the manifolds and to the drum C but they can be inspected interiorly by introducing a small electric light into one arm or the other and applying the eye to the other end so that any possible obstruction or defect can be easily discovered.

The tubes L. L. of the inner longitudinal series support between the drum C and the bend a baffle plate M, M, of bricks or other suitable material which may be laid directly upon the tubes themselves. As this baffle plate is inclined downwardly from the drum at an angle of about forty-five degrees, the products of combustion from the upper portion of the combustion chamber are directed downwardly and outwardly against the vertical portions of the several outer series of tubes thereby producing excellent results in economy of fuel.

The tubes are preferably arranged in transverse as well as longitudinal rows where they are secured to the manifolds in order that they may be more easily cleaned from the inside of the furnace, but at their upper ends, where they are secured to the drum C the rows may be staggered.

The rear end of the fire-box may be closed in by a water-back composed of water-tubes N, N, which at their upper ends are secured to the drum C and at their lower ends are secured to a transverse manifold O which in turn is connected by short legs O′ to the side manifolds I.

The return-bend, feed-water heater P may be supported above the horizontal arms of the outer series of tubes L⁵ above the baffle plate M to heat the water nearly to the boiling point and to discharge it into the drum C.

A steam tube R may be laid upon the tube *i* within the casing A, being perforated with holes to direct jets of steam directly across the tube plate and also upward between the tubes, whereby the dust and ashes may be blown out as often as may be required and more thorough cleaning rendered less frequently necessary.

In some cases the water-legs F, F, might be dispensed with and the outer row of tubes L⁵, being so far removed from the source of heat, might be relied upon for the return.

I claim as my invention—

1. In a water-tube steam-boiler, the combination of an inclosing shell or casing, a drum extending from end to end of said casing, two manifolds extending from end to end of said casing below said drum and parallel therewith, one at each side of the combustion chamber, diverging water-legs connecting said drum to said manifolds, and a plurality of longitudinal series of water-tubes extending from end to end of the drum, said water-tubes being carried straight up from said manifolds and then bent at a right or obtuse angle, the bent arms entering said drum radially, and a baffle-plate supported by the bent arms of the inner series of water-tubes and extending from end to end of the shell or casing from the drum downwardly and outwardly toward the bend of said arms to direct the products of combustion downwardly and outwardly among the other tubes, a space being left between the lower edge of the baffle-plate and the shell or casing in which space the outer series of tubes stand, substantially as shown and described.

2. In a water-tube steam-boiler, the combination of a drum, two manifolds below said drum and parallel therewith, one at each side of the combustion chamber, diverging water-legs connecting said drum to said manifolds, a plurality of longitudinal series of water-tubes extending from end to end of the drum carried straight up from said manifolds and then bent at a right or obtuse angle, the bent arms entering said drum radially, a baffle plate supported by the bent arms of the inner series of water-tubes and extending from the drum downwardly and outwardly toward the bend of said arms to direct the products of combustion downwardly and outwardly among the other tubes, and a feed-water heater supported above the horizontal arms of the outer series of tubes and above the baffle plate N, substantially as shown and described.

3. In a water-tube steam-boiler, a manifold composed of a flattened tube-plate having longitudinal grooves in its under side a curved under plate the edges of which enter the longitudinal grooves in said tube-plate, lugs secured to said under plate, and bolts engaging said lugs to secure said under plate to said tube-plate, substantially as shown and described.

4. In a water-tube steam-boiler, the combination of a drum, a manifold having a flat tube-plate, water-tubes connecting said drum and manifold, and a perforated steam pipe laid upon said tube-plate and parallel with the series of water-tubes, substantially as shown and described.

5. In a water-tube steam-boiler, the combination of an inclosing shell or casing a drum, side manifolds, water-legs connecting said drum with said side manifolds, water-tubes connecting said drum with said side manifolds, a rear transverse manifold extending

substantially from side to side of the casing connected to the rear ends of said side manifolds, and a series of water-tubes connecting said drum and said rear manifold and arranged to form a water-back for the combustion chamber, substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES L. SEABURY.

Witnesses:
A. N. JESBERA,
A. WIDDER.