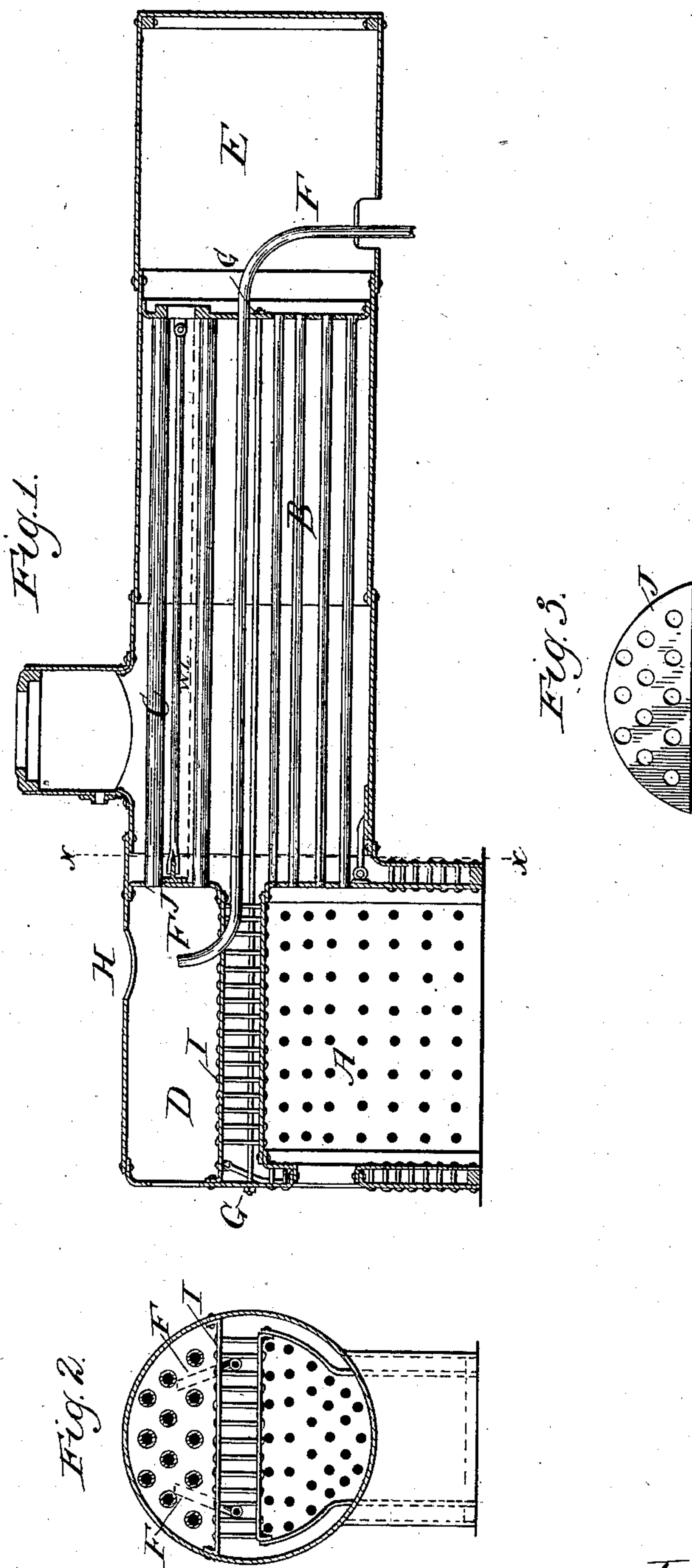


(No Model.)

C. B. COVENTRY.  
LOCOMOTIVE BOILER.

No. 316,947.

Patented May 5, 1885.



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# UNITED STATES PATENT OFFICE.

CHARLES B. COVENTRY, OF CHICAGO, ILLINOIS.

## LOCOMOTIVE-BOILER.

SPECIFICATION forming part of Letters Patent No. 316,947, dated May 5, 1885.

Application filed June 13, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES B. COVENTRY, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Locomotive-Boilers, of which the following is a specification.

My improvements are intended to relate more particularly to locomotive-boilers which are provided with both heating and superheating flues, and in which the products of combustion are intended to twice traverse the boiler, as shown and described in Letters Patent to Alvan Ford and myself, No. 272,225, of February 13, 1883; to myself, No. 287,505, of October 30, 1883, and to myself, No. 290,542, of December 18, 1883.

In the drawings, Figure 1 shows a longitudinal vertical sectional view of my improved locomotive-boiler; Fig. 2, a sectional view of the same, taken on line *x x*; and Fig. 3 shows a segment or section of the flue-sheet through which the return or superheating flues of the boiler open into the smoke-chamber immediately under the smoke-stack.

In the drawings, A represents the fire-box; B, the heating-flues; C, the return or superheating flues; D, the smoke-chamber; E, the smoke or combustion chamber at the front of the locomotive; F, the exhaust-pipes leading from the cylinder to the smoke-chamber D, under the smoke-stack; G, longitudinal stay-bolts running from one end of the boiler to the other and located between the heating and superheating flues; H, the opening into the smoke-stack; I, the piece of metal, whose offices are hereinafter explained; and J, the flue-sheet for the rear ends of the superheating-flues.

The same letters of reference in the drawings indicate the same parts.

In constructing a locomotive-boiler with my improvements I place within the same boiler or shell a series of heating and a series of superheating or return flues. The superheating-flues may be made larger than the heating-flues or of the same size. In the drawings I have presented them as larger; but this is something which may be left to the judgment of the constructor. A partition may be used to separate the heating from the superheat-

ing flues, as in my patent of February 13, 1883, or not, as may suit the pleasure of the constructor. As all of my flues, both heating and superheating, are arranged in one boiler or shell, I employ a series of longitudinal braces or stay-bolts extending from the front flue-sheet back between the heating and superheating flues to the rear end of the boiler. These heavy bolts add greatly to the strength of the boiler and prevent the front flue-sheet, which is necessarily of greater diameter than in the ordinary locomotive, from springing or becoming strained or bent, or yielding when subjected to great heat, so as to loosen its connection with the heating and superheating flues.

Instead of extending the exhaust tubes or pipes from the cylinder along the outside of the boiler, I carry them back through the boiler between the heating and superheating flues, and carry the ends of the two pipes through the crown-sheet I, to terminate in the smoke-chamber, D, preferably directly under the opening to the smoke-stack. In this way the exhaust-steam used for creating a draft in the locomotive is prevented from becoming cool, as it must if carried back on the outside of the locomotive, so that, being hot and dry when it is discharged into the smoke-stack, it escapes with much greater rapidity and produces a much more powerful and efficient draft than when it is partially condensed and wet and heavy. The advantages of this internal arrangement of the exhaust will be apparent to practical men, and need not be further enlarged upon.

At the rear ends of the return superheating-flues I make a smoke-chamber, D, by cutting off the return-flues and terminating them in a segment of flue-sheet at substantially above the forward end of the fire-box. Of course, some variance one way or the other from this position is not material, provided a smoke-chamber of sufficient size and proportion be left to perform the offices and functions of this feature. It should be left, however, of good size, so as to allow of the accumulation and retention of the cinders and partially-consumed particles of coal that will be caught there in the usual length of run to which a locomotive in actual service is sub-



jected without rest and cleaning. I prefer that it should be about the length and breadth of the top of the furnace, as I believe in this way the best results will be secured, but, as above said, do not limit myself to this exact size in the construction of my smoke-chamber so long as it is made of sufficient capacity to afford a receptacle for the efficient collection and retention of the cinders, &c., as above described.

The crown-sheet I performs an important office in the construction of my locomotive, as I have found in the actual construction and operation of a full-sized locomotive containing my improvements. It forms a second or supplemental crown-sheet, and is attached to the lower or ordinary crown-sheet by a series of stay-bolts, by which the two crown-sheets are retained rigidly and continually in their proper relative positions, with a sufficient water-space between the two to protect the lower. It prevents, through the connection of these bolts, the lower crown-sheet from springing or becoming displaced by the intense heat of the furnace, as it, being subjected to a much milder degree of heat, always maintains its proper position, and so prevents any possible displacement or opening or warping of the lower crown-sheet. It also forms the floor or bottom of the smoke-chamber D, and affords a support or means of attachment for the segment of the crown-sheet, (lettered J in Fig. 1,) through which the superheating or return flues discharge the smoke and worn-out products of combustion into the smoke-chamber D. Without this supplemental crown-sheet I no convenient means of attaching and supporting the flue-sheet J could be secured without interfering with the internal exhaust and other features of construction.

In conclusion, I would say that my invention is intended to be limited to what are known as "single," as distinguished from "double," locomotive-boilers, or those having a centrally-located fire-box with flues extending in different directions therefrom. A boiler of this construction is shown in Fig. 17 of the drawings of English Patent No. 1,210 of 1864, to Robert F. Fairlie, and in Letters Patent of the United States No. 52,117, of January 16, 1866, to the same party. I wish to distinctly disclaim any such construction, as well as any construction in which the return or superheat-

ing flues are broken or interrupted between the front combustion-chamber and their rear terminations, as I design that these flues shall be continuous between the combustion-chamber at the front of the locomotive, into which their front ends open, and the smoke-chamber, into which their rear ends open.

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

1. In a locomotive-boiler provided with heating-flues, and with continuous return or superheating flues, which open directly and from but one direction into a smoke-chamber, D, extended over the fire-box, a supplemental crown-sheet over the fire-box, to the forward end of which crown-sheet the upper rear segment of the flue-sheet is attached or fastened, all arranged in one boiler or shell, substantially as described.

2. In a locomotive-boiler provided with heating-flues, and with continuous return or superheating flues, which open directly and from but one direction into a smoke-chamber, D, extended over the fire-box, a supplemental crown-sheet over the fire-box, to the forward end of which crown-sheet the upper rear segment of the flue-sheet is attached or fastened, with a water-space between the crown-sheet and the supplemental crown-sheet, all arranged in one boiler or shell, substantially as described.

3. In a locomotive-boiler provided with heating-flues, and with continuous return or superheating flues, which open directly and from but one direction into a smoke-chamber, D, extended over the fire-box, a supplemental crown-sheet over the fire-box, to the forward end of which crown-sheet the upper rear segment of the flue-sheet is attached or fastened, connected to the crown-sheet proper by stay-bolts, all arranged in one boiler or shell, substantially as described.

4. In a locomotive-boiler, a segment of flue-sheet located, substantially, over the front end of the fire-box, in which the rear ends of the return-flues terminate, and which forms the forward end of the smoke-chamber D, extended over the fire-box, substantially as described.

CHARLES B. COVENTRY.

Witnesses:

THOMAS A. BANNING,  
CHARLES C. LINTHICUM.