(No Model.) 2 Sheets—Sheet 1.

M. S. REXFORD.

STEAM BOILER.

No. 384,716. Patented June 19, 1888.

Fig. 2.

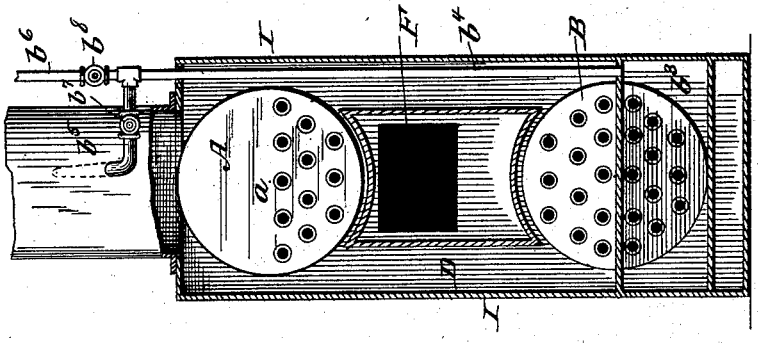
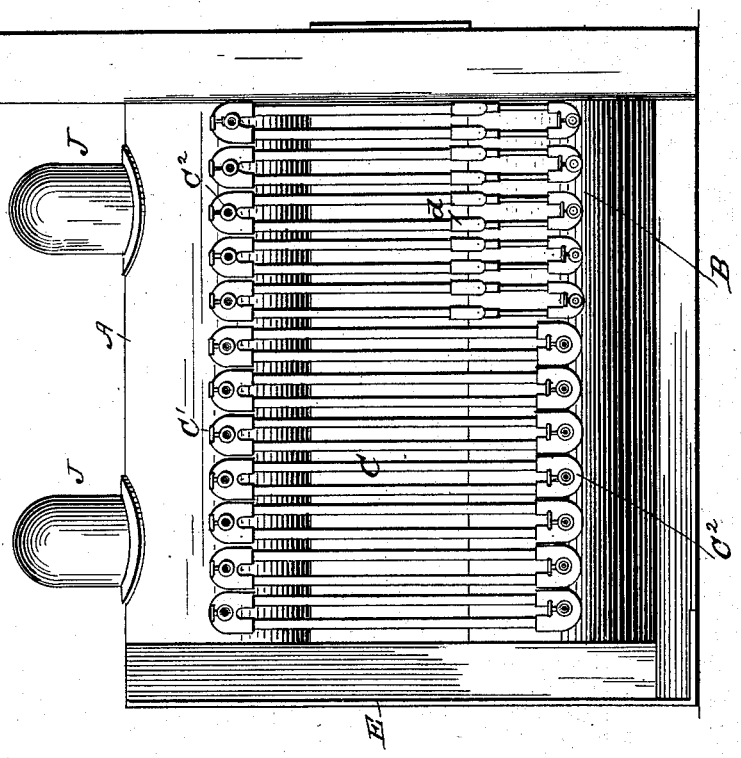


Fig. 1.



WITNESSES:
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Edw. W. Byrn.

INVENTOR:
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BY Munn & Co
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(No Model.) 2 Sheets—Sheet 2.

M. S. REXFORD.

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Fig. 4.

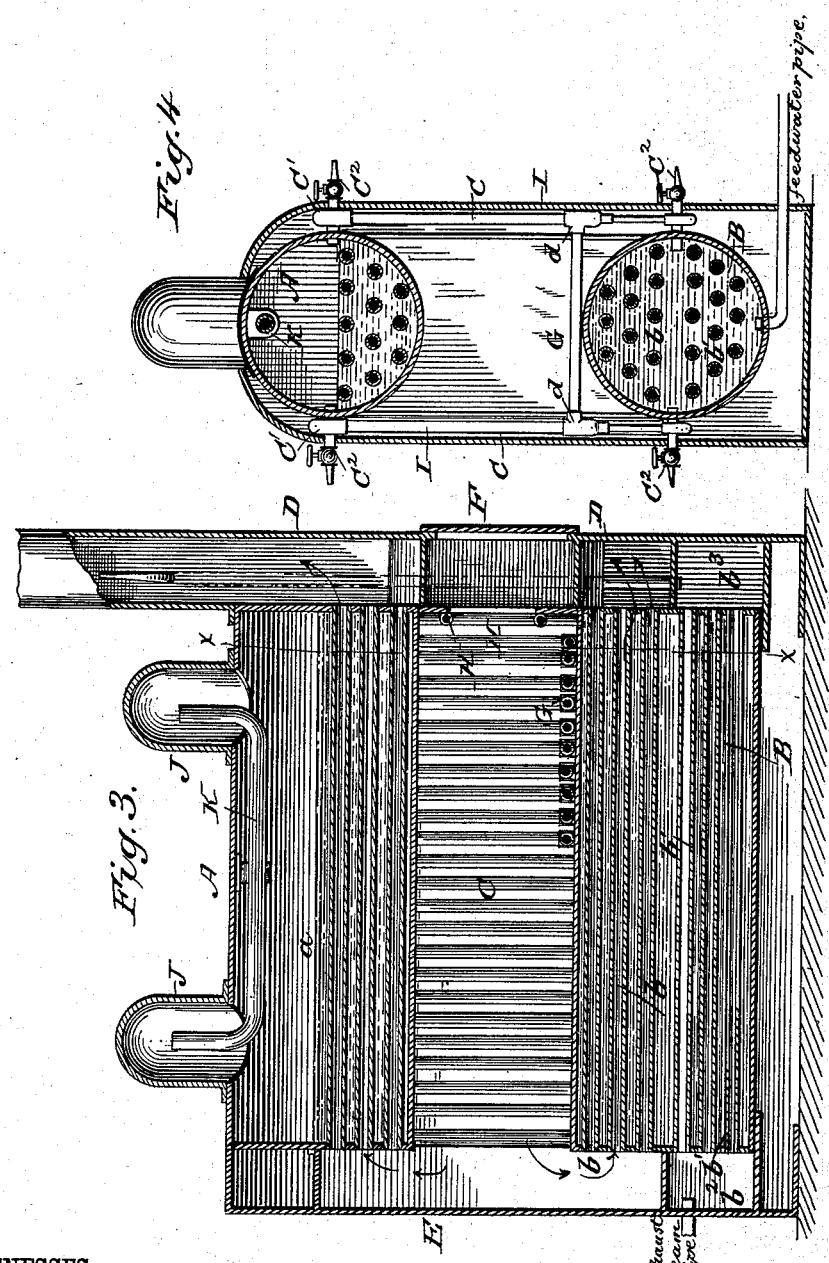

Fig. 3.

WITNESSES:

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UNITED STATES PATENT OFFICE.

MORTIMER S. REXFORD, OF NORMAN, DAKOTA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 384,716, dated June 19, 1888.

Application filed August 15, 1887. Renewed May 19, 1888. Serial No. 274,373. (No model.)

To all whom it may concern:

Be it known that I, MORTIMER S. REXFORD, residing in Norman, in the county of Cass, Dakota Territory, have invented a new and useful Improvement in Steam-Boilers, of which the following is a specification.

The object of my invention is to provide a safe and rapid generator for steam, which, while occupying but little room, shall have large fire-space, and which shall also include the advantages of a feed-water heater.

To this end it consists in the peculiar construction and arrangement of a twin cylindrical boiler having one cylinder above the other and connected by circulating-pipes at the sides, and having the grate and fire-chamber between them, as will be hereinafter fully described.

Figure 1 is a side elevation with the outer casing removed. Fig. 2 is a front elevation with the outer casing removed. Fig. 3 is a vertical longitudinal section, and Fig. 4 is a vertical transverse section, through the line x x of Fig. 3.

In the drawings, A B represent the two cylindrical boilers, which are disposed horizontally one above the other with space enough between them for the fire-box, grate, and combustion-chamber. These two boilers are connected together on both sides by a series of vertical circulating-pipes, through which constant open communication is had. These pipes are made of a series of groups, consisting of two or more vertical pipes, C, which are connected at the top to a coupling, C′, that has a lateral inlet into the boiler and a lateral outlet controlled by valves C^2, through which the boiler may be blown off, either at the top or bottom.

The upper cylinder, A, is provided with longitudinal tubes or fire-flues a, that open through both ends of the boiler, and the lower cylinder, B, is provided with longitudinal tubes or flues b b'. The upper portions, b, of these tubes are fire-flues, and the lower portions, b', are exhaust-steam tubes. The tubes a of the upper cylinder open at the front end into the casing or breeching D and at the back end into the casing or breeching E. The upper tubes, b, of the lower cylinder also open in a similar manner into these two casings or breechings. The rear casing extends vertically from one cylinder to the other and opens into the fire-space or combustion-chamber between them, and the front casing incloses the front ends of the cylindrical boiler and extends around the furnace-door F, and at the upper end communicates with the smoke-stack. The lower tubes, b', of the lower cylinder connect at the front and back ends with chambers b^2 and b^3, located, respectively, in the bottom portion of the front and rear casings.

Into the rear chamber, b^2, is admitted the exhaust-steam of the engine, which passes thence through the lower tubes, b', heating the cooler water fed in at the bottom of the boiler, and then passes into the chamber b^3. From this point a pipe, b^4, leads up and terminates in two branches, b^5 b^6, one of which, b^5, opens into the smoke-pipe and the other, b^6, outside of the same, into either of which the exhaust-steam may be directed by a valve, b^7 and b^8, it being directed into the branch b^5 in the smoke-stack when it is needed to increase the draft, and into the outside pipe when not required for this purpose.

The fire-box is formed between the two cylinders by the side pipes, C, and grate, which latter is constructed of tubes G, extending across from the pipes C on one side to those on the other and connected for a free circulation of water through them. There are also pipes H H′, connecting the upper cylinder to the lower one at the front end and just inside the furnace-door.

The boiler is inclosed on its sides by casing I. At the point where the grate-bar tubes G join the side tubes T couplings d are employed, with "reducer" ends at their bottom, which permit smaller side pipes below the grate-bars. The object of this is to leave more space between the side pipes, so that the ashes and cinders may readily pass down into the ash-pit below the lower cylinder, whence they may be removed through suitable doors at the sides or ends.

Upon the upper boiler is mounted two steam-domes, J J, which are connected by a pipe, K, in the boiler, and from one of which domes dry steam is taken through an eduction-pipe. The object in making two steam-domes is to give plenty of space for dry steam and to permit the water to be evaporated into steam along the surface of the water in the upper boiler instead of concentrating this action at

one point, which is apt to produce "foaming" in the boiler.

The operation of the boiler is as follows: The fire being made in the fire-box between the front ends of the boiler, the heat and products of combustion are distributed along the upper surface of the lower cylinder, the lower surface of the upper cylinder, and the side tubes, and the hot currents, dividing at the rear end of the boiler, pass through the rear casing, part into the tubes of the upper cylinder and part into the tubes of the lower cylinder, to the front casing, where they reunite and pass out the smoke-stack. It will thus be seen that I secure a great steaming surface and a very efficient boiler within a small compass, possessing all the practiced advantages of the boilers already in use.

I do not claim, broadly, the two cylinders placed one above the other and connected by pipes; but,

Having thus described my invention, what I claim as new is—

1. A steam-boiler consisting of the combination of an upper and lower cylinder with fire-flues through the same, side pipes connecting the boilers, a grate and fire-box placed between the cylinders, a casing or breeching connecting the rear ends of the fire-flues of the two cylinders with the combustion-chamber, and a casing or breeching connecting the fire-flues at the front end of the boiler with the smoke-stack, substantially as shown and described.

2. A steam-boiler consisting of the combination of an upper cylinder having fire-flues *a*, a lower cylinder having fire-flue *b* and exhaust-steam flue *b'*, side pipes connecting the cylinders, a grate and fire-box placed between the cylinders, and the end casings connecting the fire-flues and having chambers b^2 b^3, communicating with the exhaust-steam pipes of the lower cylinder, substantially as and for the purpose described.

3. The combination, with the upper and lower cylinders, of side pipes C, connecting the two cylindrical boilers and having blow-off cocks or valves C^2 at top and bottom, as shown and described.

4. The combination, with the upper and lower cylinders, of the side pipes, C, connecting the same, hollow-grate bars connecting the side pipes to form the fire-box, and reducer-couplings at the junction of the grate-bars and side pipes, as and for the purpose described.

The above specification of my invention signed by me in the presence of two subscribing witnesses.

MORTIMER S. REXFORD.

Witnesses:

EDW. W. BYRN,

SOLON C. KEMON.