(No Model.) 2 Sheets—Sheet 1.

F. V. RIVIERE.

WATER TUBE BOILER.

No. 553,425. Patented Jan. 21, 1896.

Fig. 2.

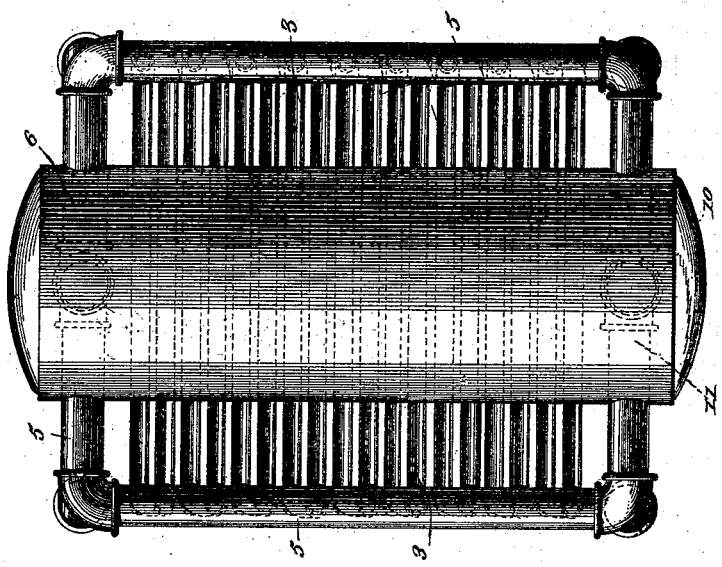
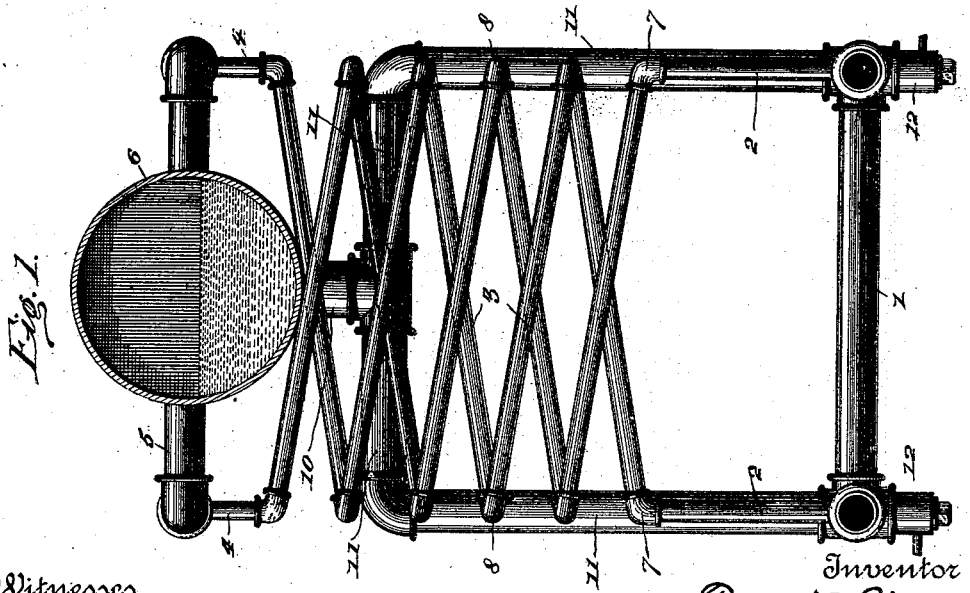


Fig. 1.



Witnesses

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

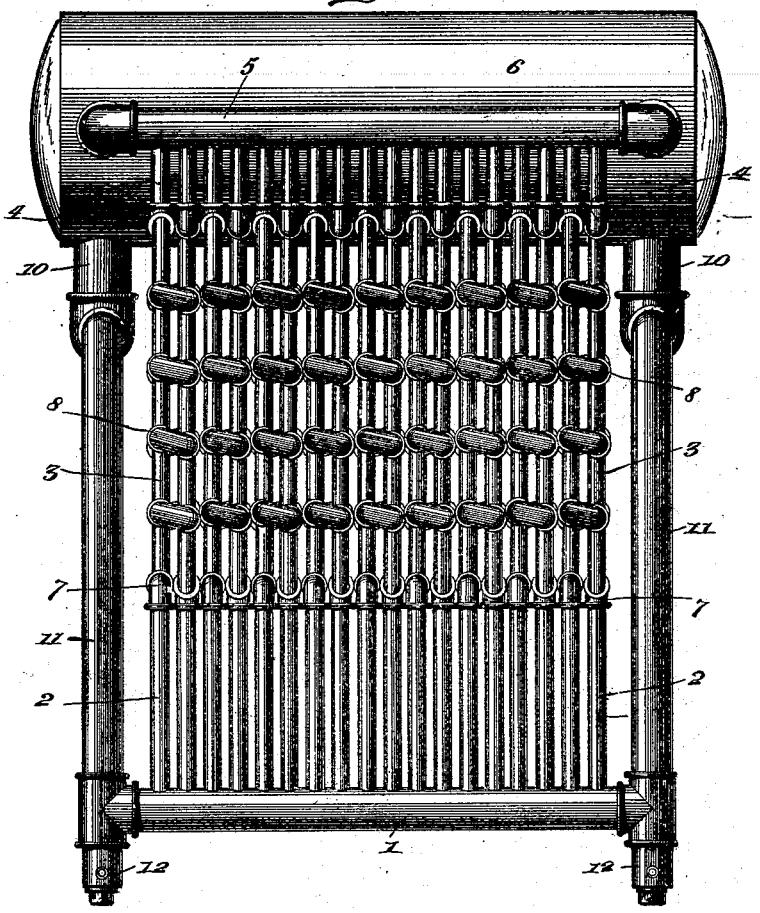

Fig. 4.

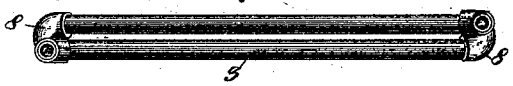

Fig. 5.

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UNITED STATES PATENT OFFICE.

FELIX VINCENT RIVIERE, OF ZANESVILLE, OHIO.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 553,425, dated January 21, 1896.

Application filed May 27, 1895. Serial No. 550,816. (No model.)

To all whom it may concern:

Be it known that I, FELIX VINCENT RIVIERE, a citizen of the United States, residing at Zanesville, in the county of Muskingum and State of Ohio, have invented certain new and useful Improvements in Water-Tube Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in water-tube boilers especially adapted for marine use, the object of the same being to provide a boiler of this character so constructed that space is economized in the location of the upflow-pipes, the upflow-pipes being set at an angle of inclination, so that at no time they cross the boiler parallel to the grate, and to provide a steam and water drum with suitable discharge-outlets for dirt and scale, which is led downwardly to mud-pockets, and the provision of means whereby the steam and water are separated before entering the steam and water drum.

The invention consists of two parallel pipes of large diameter extending longitudinally throughout the whole length of the boiler at the bottom thereof, a series of sets of double-crossed upflow-pipes detachably connected therewith, said upflow-pipes crossing and recrossing the boiler and locking themselves in pairs, the couplings between the parts of the pipe in each series having a bend substantially horizontal, so that the spaces between the pipes in each series are separated by the thickness of this coupling alone. These upflow-pipes are connected at their upper ends to a pair of parallel horizontal separating-pipes extending the length of the boiler, one on each side of the steam and water drum, said separating-pipes being connected at each end to the said drum by short pipes. Leading from each end of this drum, which extends throughout the entire length of the boiler, are downflow-pipes for the discharge of dirt and scale, which are connected to a horizontal pipe leading outwardly therefrom and then downwardly, depositing the dirt and scale in suitable pockets and the water in the lower pair of parallel pipes to be refed to the upflow-pipes.

The invention also consists in other details of construction and combinations of parts, which will be hereinafter described and claimed.

In the drawings, Figure 1 represents a vertical central section through the end of my boiler. Fig. 2 is a plan view of the same. Fig. 3 is a side elevation of the same. Fig. 4 is a detail view in horizontal section of one of the upflow-pipe coils, and Fig. 5 is a detail perspective view of one of the couplings between two sections of pipe constituting the upflow-pipe.

Like reference-numerals indicate like parts in the various views.

In the drawings, 1 1 represent a pair of parallel horizontal pipes located near the bottom of the boiler, to which are connected, by means of nipples or short pipes 2 2, the lower ends of a series of double-crossed upflow-pipes 3 3, which cross and recross the boiler at an upward angle of inclination and finally discharge from their upper ends through short pipes or nipples 4 into a pair of parallel horizontal separating-pipes 5 5, located one on each side of the steam and water drum 6, which extends throughout the entire length of the boiler, as clearly shown. The upflow-pipes 3 are arranged in interlocking pairs, the lower ends of each pair connecting with the pipes or nipples 2 by suitable coupling-pieces 7. From the point of connection with the nipples 2 these pipes 3 extend across the boiler and back again and at no time are parallel with the grate.

The connections between the separate sections of pipe 3 are through coupling-pieces 8 8, which are of twisted form, as clearly shown in Fig. 5, the bend or cross therein being set substantially horizontally, and the two threaded portions thereof being so arranged relatively to one another that one will receive the pipe from below and the other the one from above, at the proper angle to which said pipes are intended to be set. They are also so arranged at the opposite end of each double set of pipes that they will permit the locking of these pipes with a space between them just equal to the thickness of said coupling. This construction is provided for the purpose of economizing space in the boiler, so that in a boiler of certain height more bends or turns of the upflow-

pipes will be permitted, and at the same time the different sets of double upflow-pipes contained in the boiler may be located in close relation one to the other, as clearly shown in Fig. 2. These pipes set in their angular position receiving the impact of the flames from the furnace, cause an upward impulse to be given to the water and steam generated, which acts in the nature of a siphon to draw water from the supply-pipes 1 1.

At each end of the steam and water drum 6 are discharge-outlets 9 for the dirt and scale, from which lead downflow-pipes 10 10, connected at their lower ends to horizontal extensions 11, which lead outwardly and then downwardly, discharging into the pipes 1 and depositing the scale or dirt from the boiler in the pockets 12 12, from which the dirt may be blown off in any suitable manner. The area of the downflow-pipes 11 is exactly equal to the combined area of the upflow-pipes 3, so that the water at all times is kept at the same level in the steam and water drum 6, and complete circulation is provided. The steam and water passing through the separating-pipes 5 from the upflow-pipes 3 are separated before their admission into the steam and water drum 6, and by the provision of these pipes priming of the boiler is in a measure prevented, no matter how bad the water. This is especially the case with water containing grease, upon which ordinarily foam or suds form.

The pipes or nipples 2 are provided with right-hand threads at their lower ends, which screw into the pipes 1, and with left-hand threads screwing into the coupling 7 at the lower end of each section. A similar connection is provided between the upflow-pipe coupling 8 and the separating-pipes 5. By this means any double-crossed upflow-section of pipe may be readily detached and removed for the purpose of cleaning or repairing without disturbing the other sections in the boiler. One or more sections may be permanently removed if desired and not affect the operation of the boiler, the openings in which the nipples 2 and 4 connect through the pipes 1 and 5 being stopped by a suitable plug.

Having thus described the invention, what is claimed as new is—

In a water-tube boiler, the combination with the steam and water drum located at the top thereof, supply-pipes located at the bottom thereof, of a series of double-crossed up-flow pipes angularly arranged across the boiler, connected at their lower ends to said supply pipes and at their upper ends to said drum, the pipes in each section being locked with each other, couplings for said pipes formed and arranged so as to receive the lower and the upper pipes at different angles relative thereto, and suitable down-flow pipes connecting the ends of said drum with the main supply pipes and with mud pockets, in the manner and for the purposes described.

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

FELIX VINCENT RIVIERE.

Witnesses:

PERRY SMITH, JR.,

HARRY C. SHEPHERD.