No. 632,198. Patented Aug. 29, 1899.

W. PENMAN.

WATER TUBE BOILER.

(Application filed Sept. 27, 1898.)

(No Model.) 2 Sheets—Sheet 1.

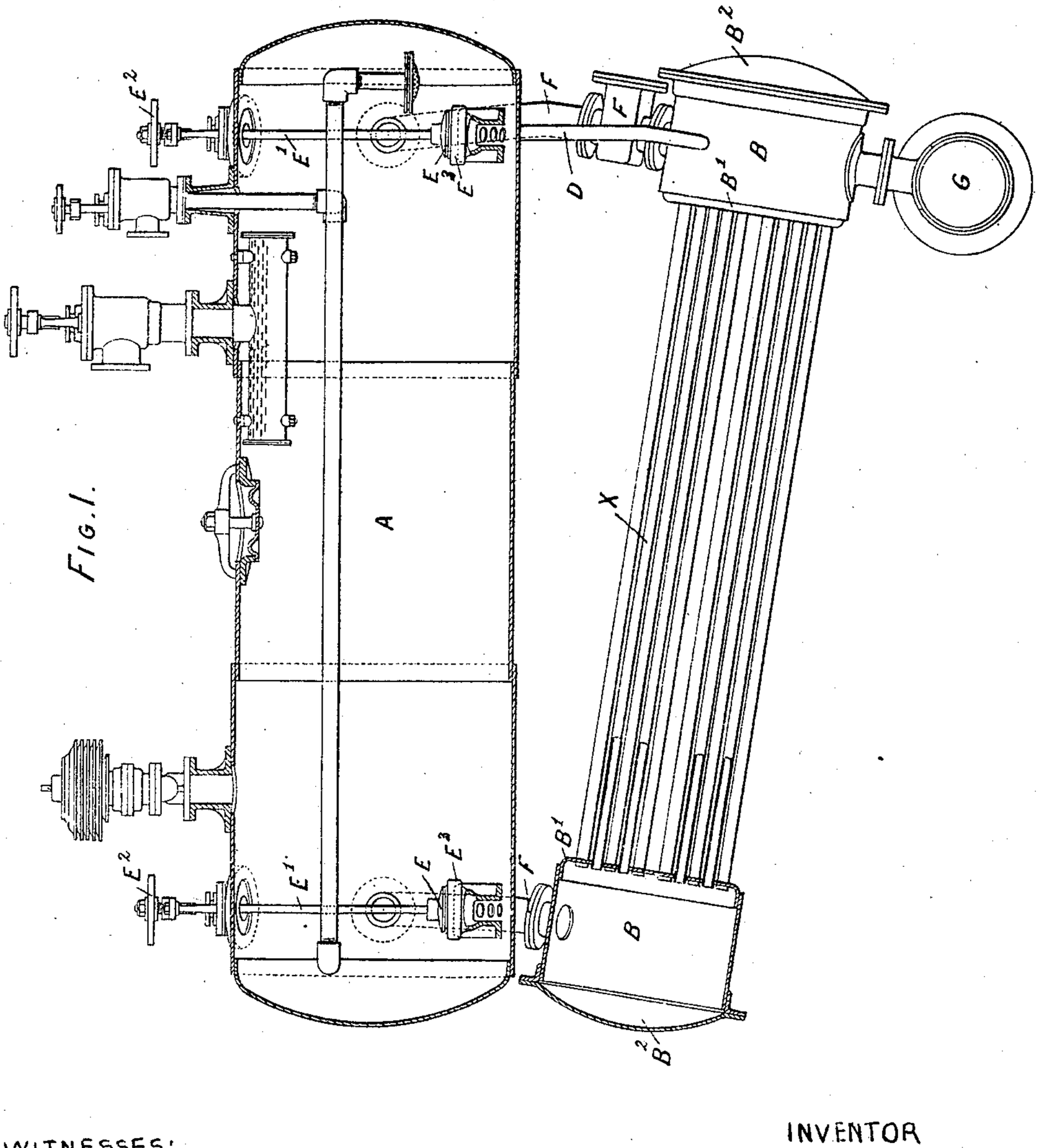

FIG. 1.

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FIG. 3.

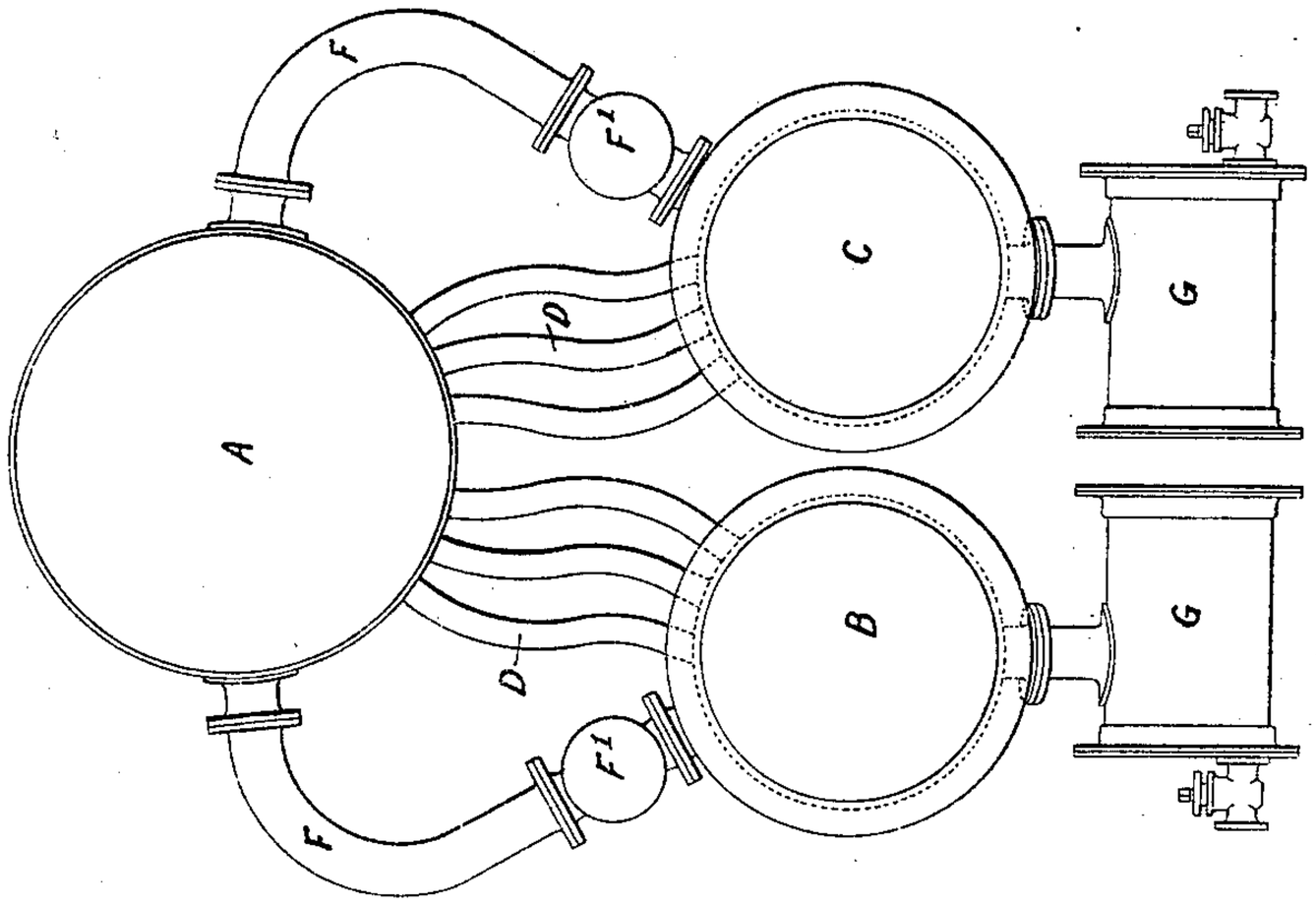
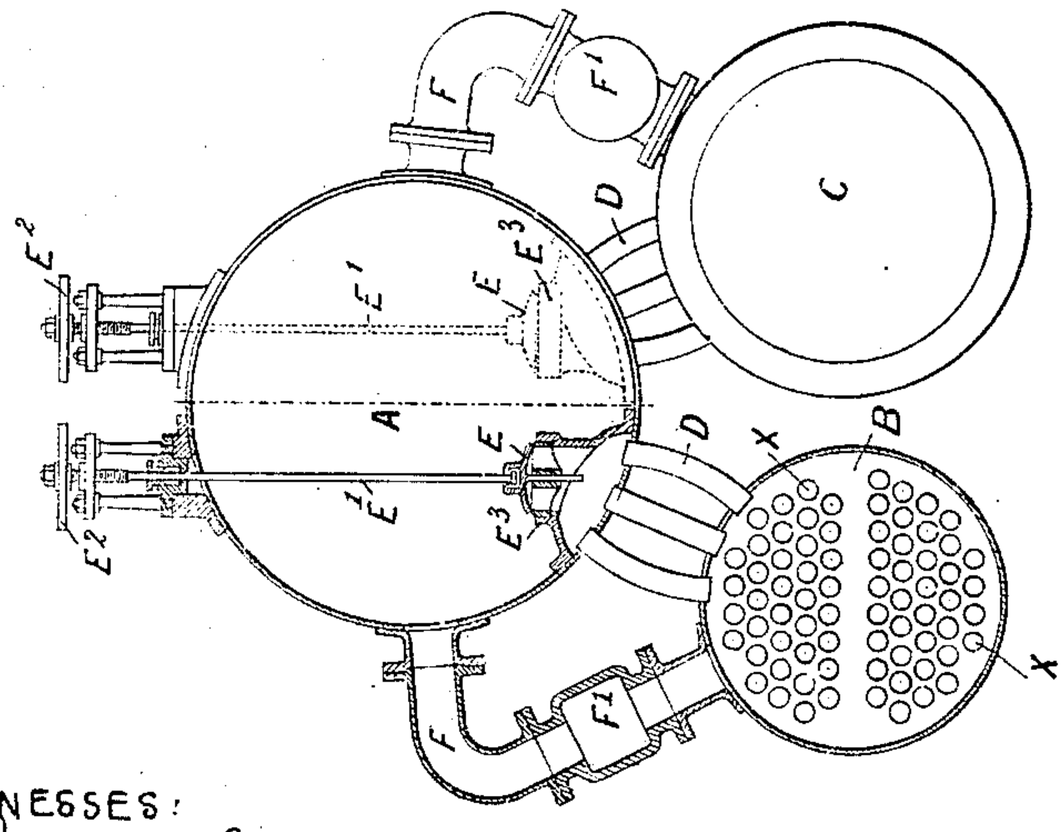


FIG. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM PENMAN, OF GLASGOW, SCOTLAND.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 632,198, dated August 29, 1899.

Application filed September 27, 1898. Serial No. 692,023. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM PENMAN, boiler-maker, a subject of the Queen of Great Britain and Ireland, and a resident of Glasgow, Scotland, have invented certain new and useful Improvements in and Relating to Water-Tube Boilers, of which the following is a specification.

This invention has reference to improvements in and relating to water-tube boilers and comprises a method of isolating the boiler in sections and an improved combination of parts, and in order that others skilled in the art to which my invention relates may understand how same may be carried into practice I have hereunto appended explanatory drawings, in which—

Figure 1 is a longitudinal section of a water-tube boiler as fitted with my improvements, while Figs. 2 and 3 represent transverse sections of same as looking at the left and right hand ends, respectively.

Referring to the drawings, according to my improvements I use three drums—an upper steam-generating drum A and two parallel lower drums B C—with dished-out ends. The tubes X, connecting the lower drums B B and C C, thus constituting separate water-tube sections, are preferably set at an angle and expanded into tube-plates, such as B′, in chambers at their ends, and portable doors, such as B^2, are fitted on both chambers for easy access of removing and renewing tubes. The top and bottom drums are connected by a series of short preferably-curved tubes D expanded into these drums, and a number of which may be stay-tubes, or these drums may be joined together by riveted steel tubes, as desired. In the larger class of boilers the back end of lower drums B C may have a manhole-door, so as to get access through it to expand the tubes instead of requiring to remove the main door. The tubes may be put in from front of boiler, and in the event of any of the tubes giving way they can easily be replaced, or in the event of any section giving out the tubes in that section can be stopped by means of an inside-valve arrangement, such as a lift-valve E in a seat-chamber E^3 covering all the top ends of tubes D in upper drum A and operated by a spindle E′ and hand-wheel E^2 from outside of drum, thus allowing the other section of the boiler to remain at work while repairs are being executed in the defective section. A tube if not required to be replaced can be plugged or stopped after the usual marine style. There are also two outside circulating or stiffening larger tubes F on each section and each fitted with a valve at F′. With this arrangement the boiler can be repaired without removing the casing or the brickwork. The connecting-tubes, if desired, can be expanded in place by any handy man or without the need of skilled labor. A mud-drum G will be fixed at the lower end of each back chamber of the sections B C. The boiler can be shipped in pieces and so will be easy for transport. In the event of being confined for space one of the lower drums B or C only need be fitted up and used and still the arrangement of the boiler would be similar.

I claim as my invention—

1. A water-tube boiler having a steam-drum and water-tube sections beneath the steam-drum, connections between the drum and tubes and valves in said drum adapted to close communication at both ends between the drum and tubes and means exterior to the drum to operate said valve, all arranged above the fire, substantially as described.

2. A water-tube boiler having a steam-drum, two or more sets of water-tubes constituting water-tube sections, chambers in which said tubes terminate, tubes connecting the chambers with the steam-drum and valves in the steam-drum adapted to close communication between the drum and any set of water-tubes desired, substantially as described.

3. A water-tube boiler having a steam-drum, water-tubes, chambers in which said tubes terminate, tubes connecting the chambers with the steam-drum, valves in the steam-drum adapted to close communication between the connecting-tubes and drum, a circulating-tube and valve in the latter, substantially as set forth.

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

WILLIAM PENMAN.

Witnesses:

JOHN SIME,

THOS. COULTER.