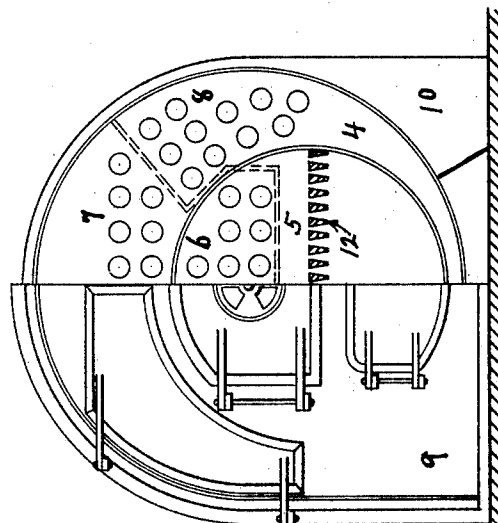
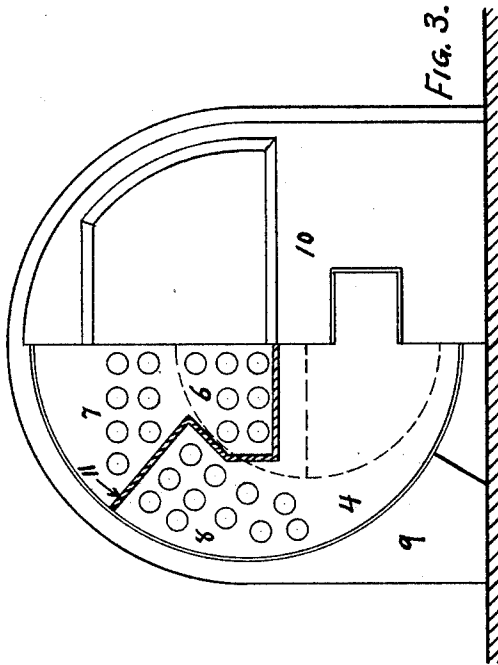
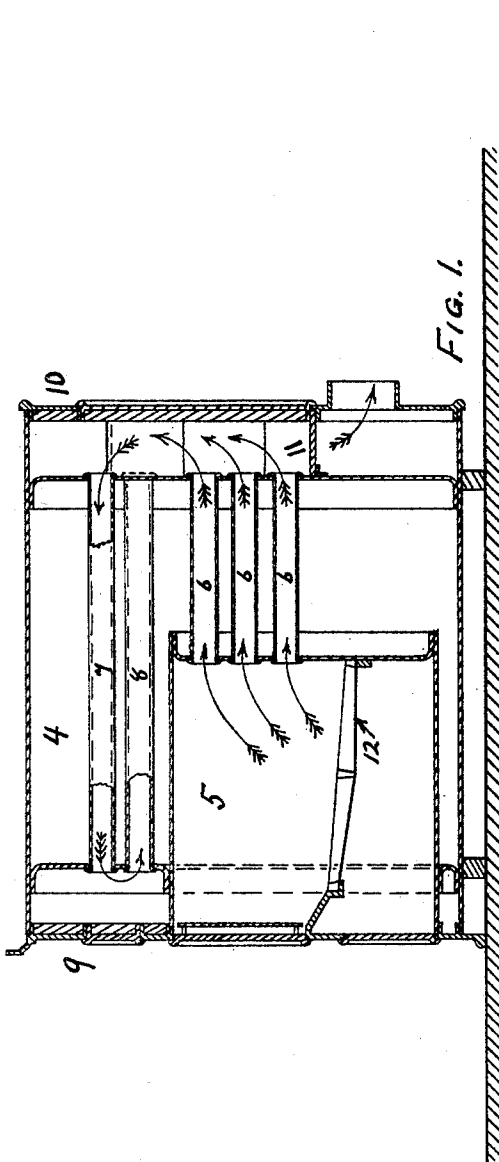


(No Model.)

J. A. PALMER.
STEAM BOILER.

No. 595,071.

Patented Dec. 7, 1897.



WITNESSES.

Jasper W. Lynch.
Charles E. Hood.

INVENTOR.

James A. Palmer
by his atty Robt. S. Heming

UNITED STATES PATENT OFFICE.

JAMES A. PALMER, OF PHILADELPHIA, PENNSYLVANIA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 595,071, dated December 7, 1897.

Application filed March 1, 1897. Renewed November 10, 1897. Serial No. 658,086. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. PALMER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Steam-Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical longitudinal section, Fig. 2 is a vertical front elevation, and Fig. 3 is a vertical rear elevation, of my improved boiler.

My invention relates to internally-fired fire-tube boilers and is designed to simplify, cheapen, and improve their construction and to provide an efficient and compact steam-generator.

To that end it consists in a steam and water drum, a water-jacketed fire box or boxes, a series of banks or groups of heating-surface tubes, front and rear inclosing walls, and a partition-wall, severally constructed and arranged to cause an efficient abstraction of heat by the water contained in the boiler from the combustion of the fuel on the grate in the furnace of the boiler.

In the drawings, 4 represents the steam and water drum.

5 is the fire box or furnace of the boiler and is suspended to the one end and inside of said steam and water drum and is located so as to be wholly submerged or be below the working water-level of the boiler. Said steam and water drum, as also said fire-box, may be of any suitable form and construction; but I prefer the same to be of the horizontal cylindrical type, as shown in the drawings herewith.

6 is a bank or group of the heating-surface tubes attached to the rear end of said fire-box at their one ends and to the rear head of said steam and water drum by their other ends, respectively, and comprise the first of the series of banks or groups of tubes through which the furnace-gases are made to pass on their way from the furnace to the atmosphere.

7 and 8, respectively, are the second and third banks or groups of the heating-surface tubes and are attached their one ends to the rear head of said steam and water drum and

their other or opposite ends to the front head of said steam and water drum, respectively, and comprise the second and third of the series of banks or groups of tubes through which the furnace-gases are made to pass on their way from the furnace to the atmosphere.

9 and 10 are respectively the front and rear inclosing walls of the boiler and consist of any construction suitable for the purpose of a conduit for the passage of the furnace-gases from one bank or group of the heating-surface tubes to that of another. These inclosing walls are provided with door-openings to admit of access to the several tubes for the purpose of cleaning, inspection, and repair. I prefer to construct these walls of cast-iron and line the same on the inside with fire-brick tile, especially where the highest temperatures occur in the passage along them of the furnace-gases.

11 is the partition-wall, separating the first and second banks or groups of tubes from those of the third bank at the rear or exit ends of the latter-mentioned bank or group for the purpose of directing the flow of furnace-gases from the first to the second group or bank of tubes and is constructed of any suitable material, such as cast-iron or fire-brick tile. It is obvious that this partition-wall can be modified so as to direct the furnace-gases through the groups or banks of tubes differently in its order of passage through them than by the arrangement just described. For instance, the second pass of the gases can be made to occur through the tubes comprising the banks or groups 8 and returning rearward through the bank or group 7 without departing from the essence of my invention; but I prefer the arrangement of the same as herein shown and described.

12 is the fire-grate, which may be of any type or kind suitable for boiler-furnaces.

The arrows shown on the drawings indicate the path and direction of flow of the furnace-gases from the furnace to the atmosphere.

The advantages of the invention are apparent, the arrangement of the parts being simple, compact, and highly effective.

I claim—

In a fire-tube steam-boiler of the internally-fired type, the combination with a plain cylindrical shell fire-box provided with a grate,

and having a plain circular tube-sheet at-
tached to the chimney end of said shell; heat-
ing-surface tubes, suitably arranged for three
passes of the furnace-gases in series between
5 the furnace and chimney, and submerged be-
low the water-surface line; front and rear
fire-gas chambers, of which the rear one is
provided with a partition, for separating said
heating-surface tubes into groups; with a

plain cylindrical shell steam and water drum, 10
provided with circular tube-sheets, and inclos-
ing end walls, attached to the front and rear
ends of said shell; all substantially as shown
and described.

JAMES A. PALMER.

Witnesses:

ROBT. D. KINNEY,
M. E. ASHENTELTER.