

No. 750,275.

PATENTED JAN. 26, 1904.

E. U. GIBBS.
STEAM BOILER.

APPLICATION FILED APR. 29, 1903.

NO MODEL.

3 SHEETS—SHEET 1.

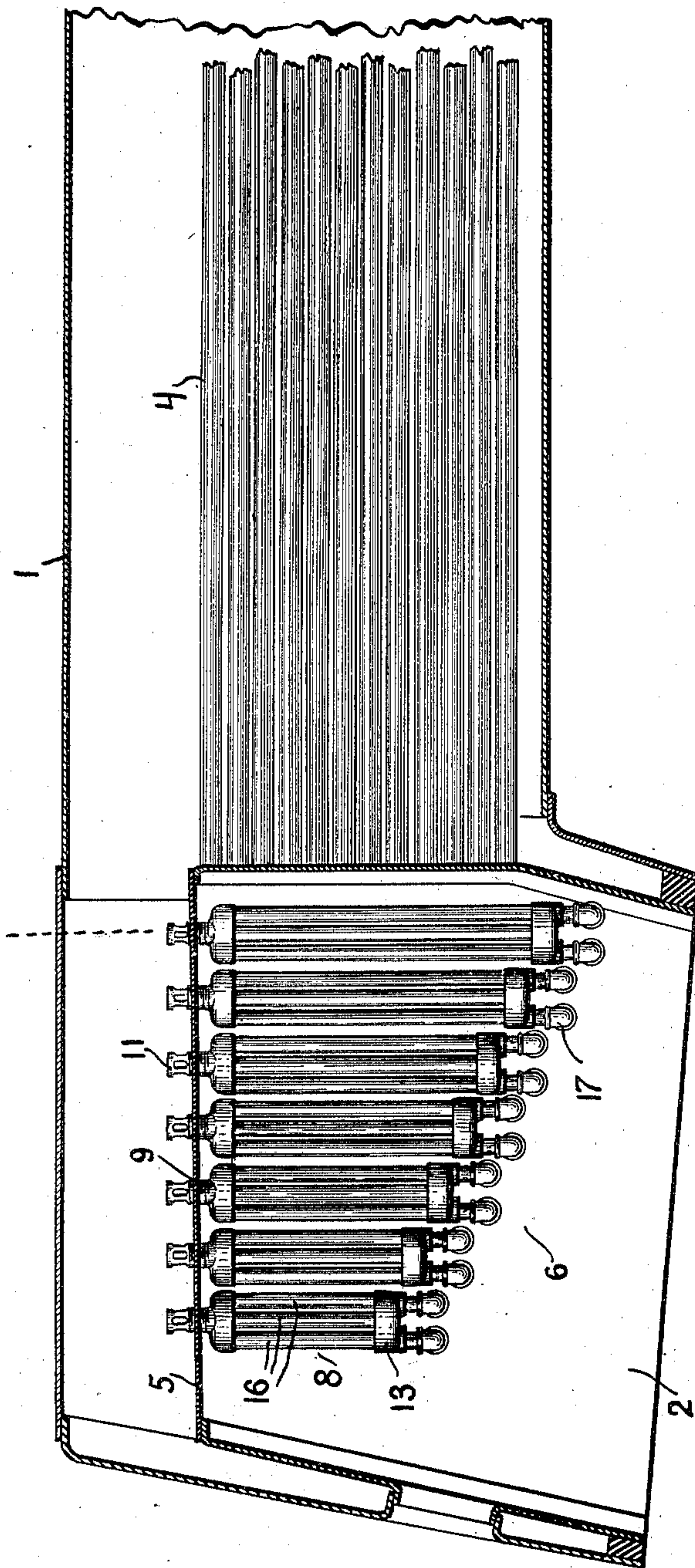


Fig. 1.

Witnesses:
Elmer R. Shipley.
M. S. Belden

Eugene U. Gibbs

Inventor
by James W. See
Attorney

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3 SHEETS—SHEET 2.

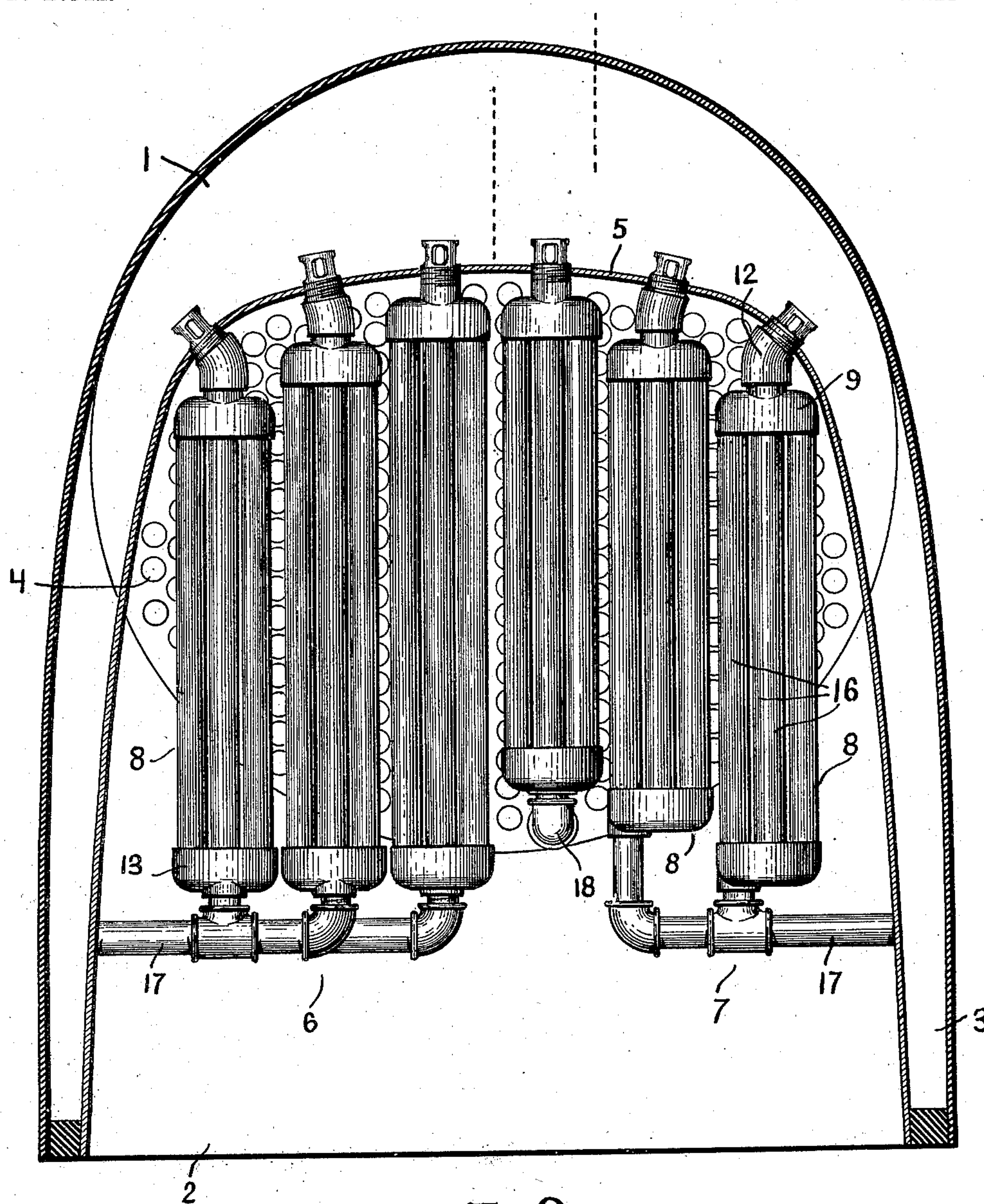


Fig. 2.

Witnesses:
Elmer R. Shipley.
M. S. Belden

Eugene W. Gibbs
Inventor
by James W. See
Attorney

No. 750,275.

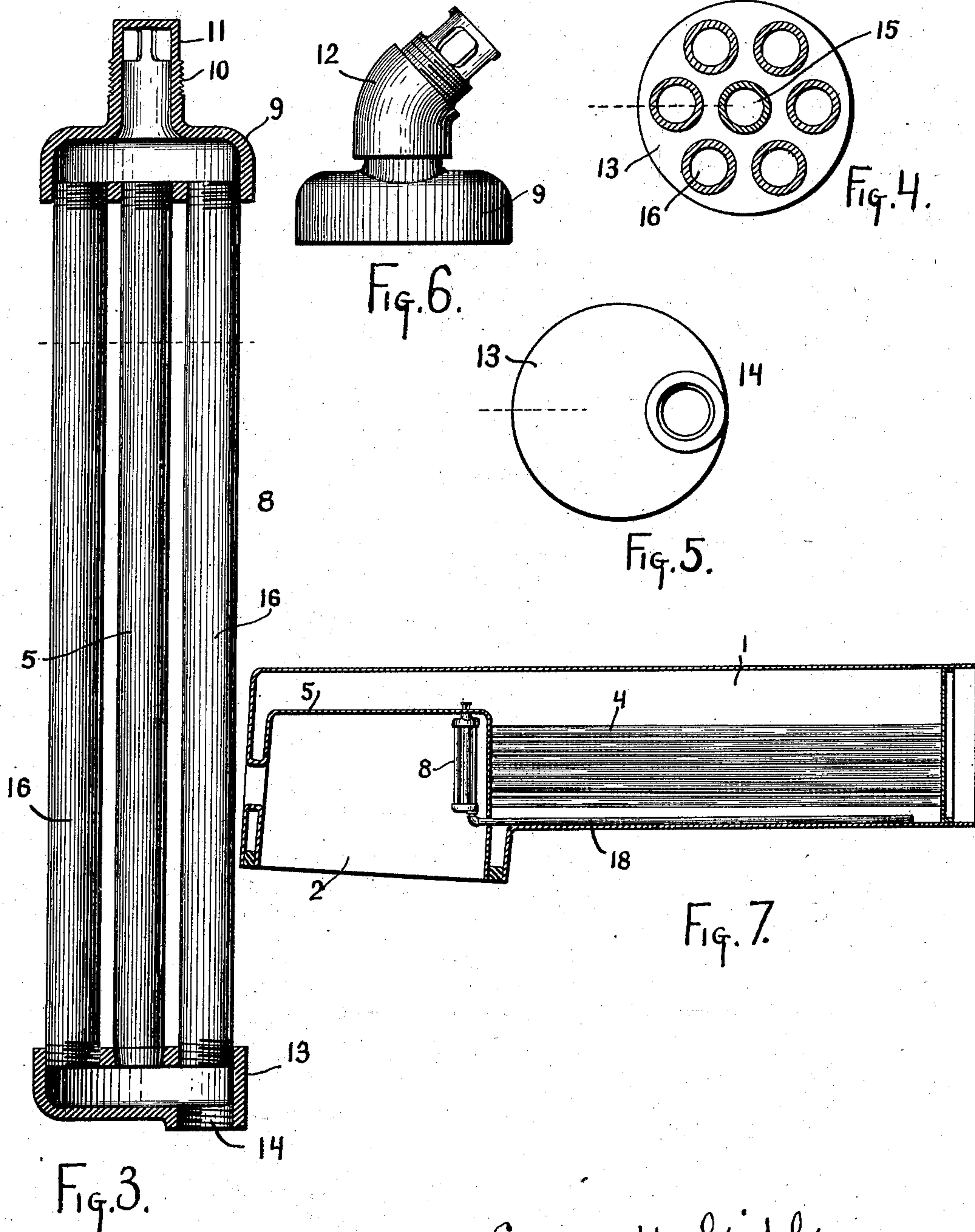
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3 SHEETS—SHEET 3.



Eugene U. Gibbs

Witnesses:
Elmer R. Shipley.
M. S. Belden.

Inventor
by James W. See
Attorney

UNITED STATES PATENT OFFICE.

EUGENE U. GIBBS, OF PETERBORO, CANADA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 750,275, dated January 26, 1904.

Application filed April 29, 1903. Serial No. 154,776. (No model.)

To all whom it may concern:

Be it known that I, EUGENE U. GIBBS, a citizen of the United States, residing in Peterboro, Ontario, Canada, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

This invention pertaining to improvements in steam-boilers will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of a boiler of locomotive type embodying my invention; Fig. 2, a vertical transverse section of the same; Fig. 3, a vertical longitudinal section of one of the auxiliary units; Fig. 4, a horizontal section of the same; Fig. 5, a bottom view of the same; Fig. 6, a side elevation of the head of one of the units provided with an angular nozzle, and Fig. 7 a vertical longitudinal section of the boiler in a vertical plane to expose the circulation-pipe 18.

In the drawings, 1 indicates the barrel of the boiler; 2, the fire-box; 3, water-legs thereof; 4, the tubes; 5, the crown-sheet, the parts thus far referred to presenting no features of novelty; 6, a group of auxiliary generating units suspended within the fire-box from the crown-sheet at one side of the center of width of the same, the construction of these units to be later explained; 7, a corresponding group of units at the other side of the center of the fire-box; 8, any individual one of the units of the groups, which unit will now be described in the singular; 9, a circular hollow head for the unit provided in its lower wall with a central aperture and a surrounding circular series of apertures; 10, a nozzle projecting centrally from the upper wall of the head and threaded exteriorly; 11, a roofed side-ported upper extremity of said nozzle; 12, a curved coupling threaded below to screw upon the threaded nozzle 10 and having an upper extremity exteriorly threaded and roofed and ported as in the case of the nozzle 10; 13, a circular hollow base having in its upper wall a circular aperture and a surrounding circular series of apertures in correspondence with those in the lower wall of the head 9; 14, an inlet connection through the lower wall of the

base 13, the same being eccentrically disposed; 15, a tube engaging its ends with the central openings in the head 9 and base 13, one end of this central tube being tapered into the opening which it engages, as seen at the lower end of the tube in Fig. 3, the opposite end of the tube being preferably screwed into the opening which it there engages; 16, a circular series of tubes surrounding central tube 15 and screwing by right and left hand threads into the circular series of apertures in head 9 and base 13; 17, pipes connected at their outer ends with the water-legs of the boiler, their inner ends being connected with the inlets 14 of the units, and 18 (see Fig. 7) a pipe connected with the inlet of one of the units and extending forward to a point of connection with the interior of the barrel of the boiler at its end farthest from the fire-box.

The parts of the unit, as seen in Fig. 3, are assembled by turning all of the exterior tubes 16, which tubes have right and left hand threads. The central tube 15 is not accessible for turning, being too completely inclosed within the surrounding circle of tubes, and provision is made for connection of this tube with the head and base by omitting the thread from at least one of its ends and substituting a taper joint, which becomes tight when the head and base are drawn together by the action of the surrounding tubes. One end at least of the central tube is thus tapered, and it is preferable that the opposite end be screwed into the aperture which it engages, so that the first step in assembling the parts of the unit is to screw the central tube permanently into one of the end members of the unit, its opposite tapered end being then loosely seated in the tapered aperture which it engages, after which the surrounding tubes are placed and by substantially simultaneous treatment screwed home. The completed unit is put in place in the fire-box by screwing its threaded nozzle 10 up into a threaded aperture in the crown-sheet, providing the crown-sheet is sufficiently level to satisfactorily permit of this, while if the downward curvature of the crown-sheet is such as to preclude a direct attachment then an angular nozzle 12 is screwed into the crown-sheet, so as to present a vertical socket, into

which the nozzle of the unit may be screwed. Units are arranged in the fire-box in transverse ranks and fore and aft rows, and the base of each unit has connection with the most contiguous water-leg of the boiler by means of the pipes 17. In Fig. 2 it will be seen that there are six units in a rank, three at one side and three at the other side of the center of width of the fire-box. The three units of a half-rank may, if desired, connect with the water-leg through a single pipe 17, or each unit may have its individual pipe 17, or one unit may have an individual pipe and others a pipe in common. At the left of Fig. 2 and illustrated also in Fig. 1 the inner unit of the left-hand half-rank has its individual pipe to the water-leg, while the other two have a pipe in common. The eccentric disposition of the inlet connection 14 in the base of the unit permits by the turning of the unit upon its vertical axis of the inlet being brought to an extreme rear position or to an extreme forward position or to a central position or to intermediate positions, so as to suit and accommodate either the individual or joint pipe system of connection with the water-leg. The fore and aft rows of units are preferably arranged as seen in Fig. 1, the lengths of the units increasing from rear to front, the fire-box end of the boiler being assumed as the rear end. This arrangement facilitates dealing with the fire. As seen in Fig. 2, the units of the half-rank at the left have their bases on a common level, and the corresponding half-rank at the right may, if desired, have the bases arranged at the same level—in other words, with all the bases of the units of a given rank at a common level; but in some cases it may be desirable to have more head-room at the center of width of the fire-box, and in that case the units may be arranged as indicated at the right in Fig. 2, where the bases of the more central units are elevated, thus making room for stoking appliances. It will be observed in Fig. 1 that the heads of all the units of a fore and aft row are at a common level, while, as seen in Fig. 2, those of the transverse ranks increase in height toward the center of the fire-box. By disconnecting the appropriate inlet pipe or pipes any given unit may be removed from the system, and by removing the transverse rank nearest the fire-box tube-sheet access is given to the fire-box ends of the boiler-tubes.

The circulation in the units is in the practice found to be very rapid, the water coming at comparatively low temperature from the water-leg and rising rapidly and discharging above the crown-sheet. As the circulation at the fire-box end of the boiler is thus rendered extraordinarily rapid, one or more of the units may be availed of to increase the rapidity of circulation of the water in the barrel of the boiler, as illustrated in Fig. 7, showing one unit thus availed of. For this purpose circu-

lation-pipe 18, as seen in Fig. 7, is provided and connected with the base of one of the units, preferably with one most contiguous to the fire-box tube-sheet. The inlet end of this pipe 18 draws water from the end of the boiler farthest from the fire-box. It is immaterial what course the pipe 18 takes in passing from its inlet-point to its connection with the unit; but it is preferable that it be extended through the fire-box tube-sheet and directly into the barrel of the boiler, as shown in Fig. 7.

I claim as my invention—

1. In a steam-boiler, the combination, substantially as set forth, of a hollow head having an outlet connection and having in its lower wall a central and a surrounding series of apertures, a hollow base having an inlet connection and having in its upper wall a central and a surrounding series of apertures a tube engaging the central aperture of one of said members and having a tapering fit in the central aperture of the other member, and tubes having right and left hand thread engagement with the surrounding apertures of the two members.

2. In a steam-boiler, the combination, substantially as set forth, of a hollow head having an outlet connection and having in its lower wall a central and a surrounding series of apertures, a hollow base having an inlet connection and having in its upper wall a central and a surrounding series of apertures a tube screwed into the central aperture of one of said members and having a tapering fit in the central aperture of the other member, and tubes having right and left hand thread engagement with the surrounding apertures of the two members.

3. In a steam-boiler, the combination, substantially as set forth, of a barrel, horizontal boiler-tubes therein, a tube-sheet in which the end of said tubes are secured, a rank of independent units disposed parallel with and near said tube-sheet at one side of the horizontal center of width of the tube-sheet, a rank of independent units similarly disposed to the other side of the horizontal center of width of the tube-sheet, each of said units being formed of a group of vertical tubes with a chamber at each end of the group, water connections from the lower chambers of the units to the interior of the boiler, and steam connections independent of each other from the upper chambers of all the units to the interior of the boiler.

4. In a steam-boiler, the combination, substantially as set forth, of a barrel, horizontal boiler-tubes therein, a tube-sheet in which the end of said tubes are secured, a rank of independent units disposed parallel with and near said tube-sheet at one side of the horizontal center of width of the tube-sheet, a rank of independent units similarly disposed to the other side of the horizontal center of width of the tube-sheet, an additional pair of ranks

of independent units disposed near the first-mentioned ranks but farther from the tube-sheet, each of said units being formed of a group of vertical tubes with a chamber at each
5 end of the group, water connections from the lower chambers of the units to the interior of the boiler, and steam connections independent of each other from the upper chambers of all the units to the interior of the boiler.

10 5. In a steam-boiler, the combination, substantially as set forth, of a barrel, horizontal boiler-tubes therein, a tube-sheet in which the end of said tubes are secured, a rank of independent units disposed parallel with and near
15 said tube-sheet at one side of the horizontal center of width of the tube-sheet, a rank of independent units similarly disposed to the other side of the horizontal center of width of the tube-sheet, each of said units being
20 formed of a group of vertical tubes with a chamber at each end of the group, water connections from the lower chambers of the units to the interior of the boiler, and steam connections independent of each other from the
25 upper chambers of all the units through the crown-sheet to the interior of the boiler.

6. In a steam-boiler, the combination, substantially as set forth, of a barrel, a fire-box, fire-box tube-sheet, horizontal boiler-tubes, a
30 rank of independent units each formed of a group of vertical tubes with a chamber at each

end of the group, disposed parallel with and near said tube-sheet, connections from the upper chambers of the units through the crown-sheet of the fire-box to the interior of the
35 boiler, and connections from the lower chambers of the units through the side sheets of the fire-box to the water-legs of the boiler the units composing the half-rank at one side of the center of width of the fire-box having their
40 lower ends at levels increasing in height toward the center of width of the fire-box.

7. In a steam-boiler, the combination, substantially as set forth, of a barrel, a fire-box, fire-box tube-sheet, horizontal boiler-tubes, a
45 rank of independent units each formed of a group of vertical tubes with a chamber at each end of the group, disposed parallel with and near said tube-sheet, connections from the upper chambers of the units through the crown-
50 sheet of the fire-box to the interior of the boiler, and connections from the lower chambers of the units through the side sheets of the fire-box to the water-legs of the boiler the units composing the half-rank at one side of
55 the center of width of the fire-box having their upper ends at levels increasing in height toward the center of width of the fire-box.

EUGENE U. GIBBS.

Witnesses:

E. B. EDWARDS,
M. ALEXANDER.