

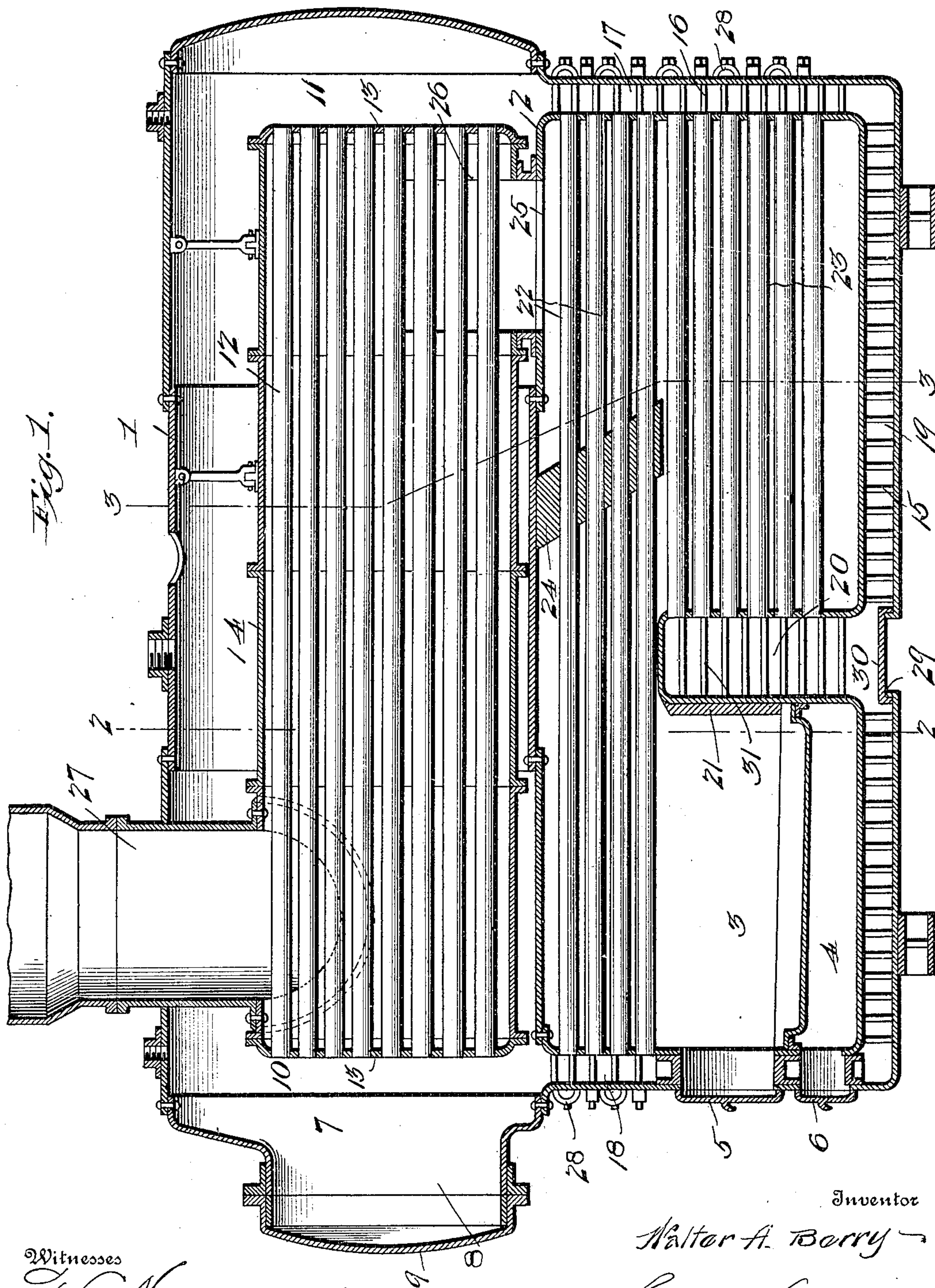
No. 825,696.

PATENTED JULY 10, 1906.

W. A. BERRY.
STEAM BOILER.

APPLICATION FILED MAR. 20, 1906.

3 SHEETS—SHEET 1.



Witnesses

T. D. Mockner
James F. Crown

By

Inventor

Walter A. Berry

Geo. S. Carlson

Attorney

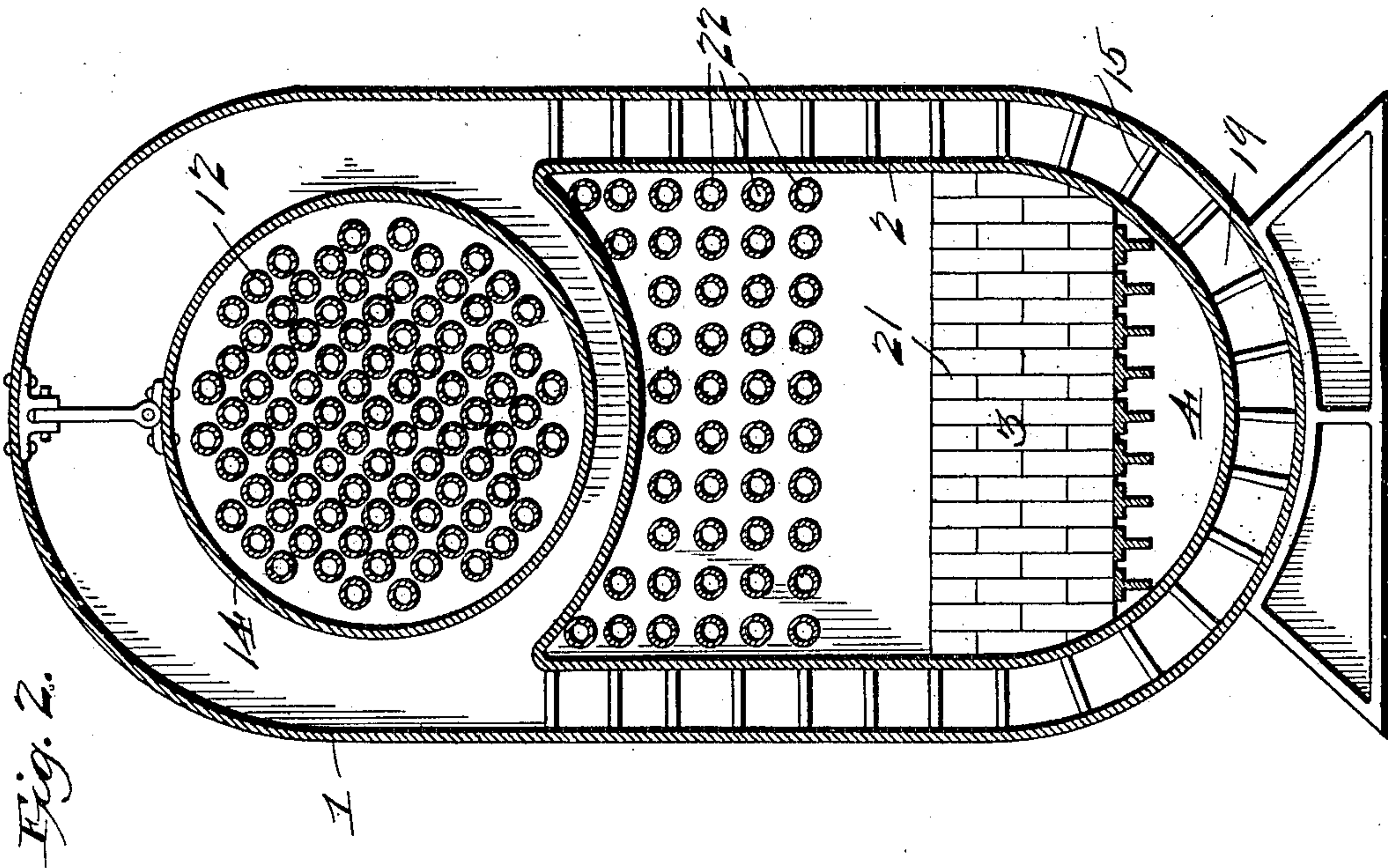
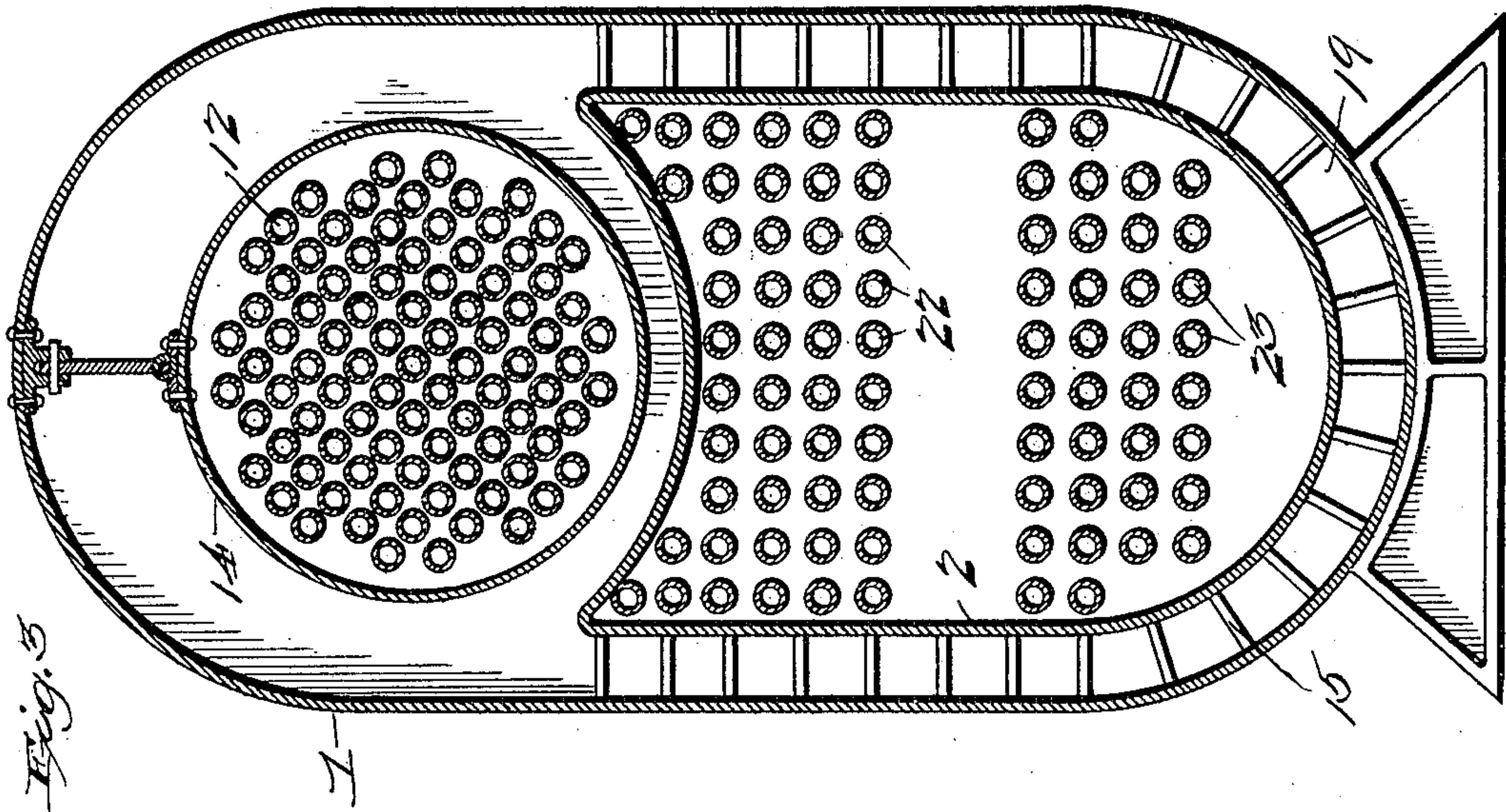
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3 SHEETS—SHEET 2.



Witnesses
J. L. Mockman
James F. Crown

By

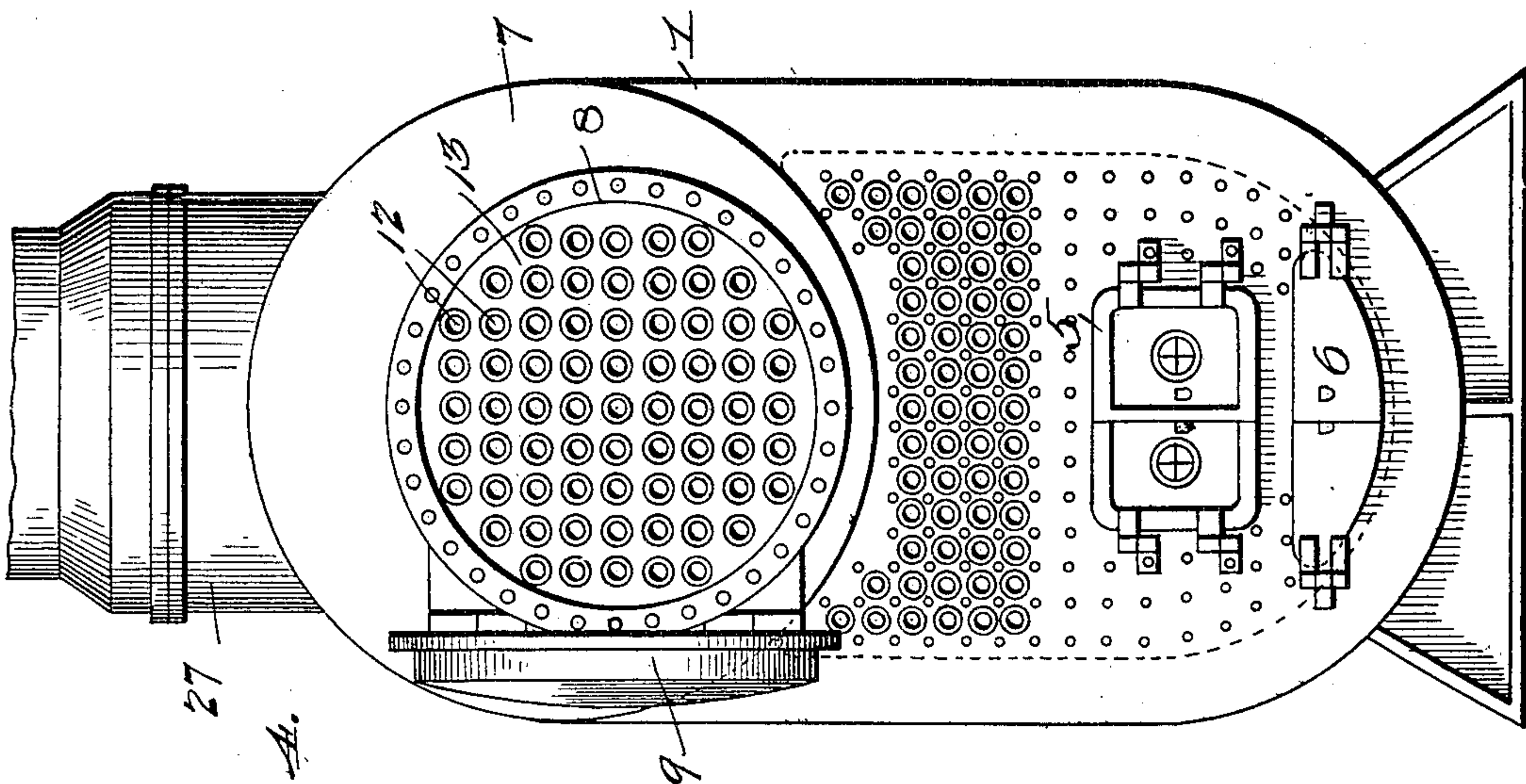
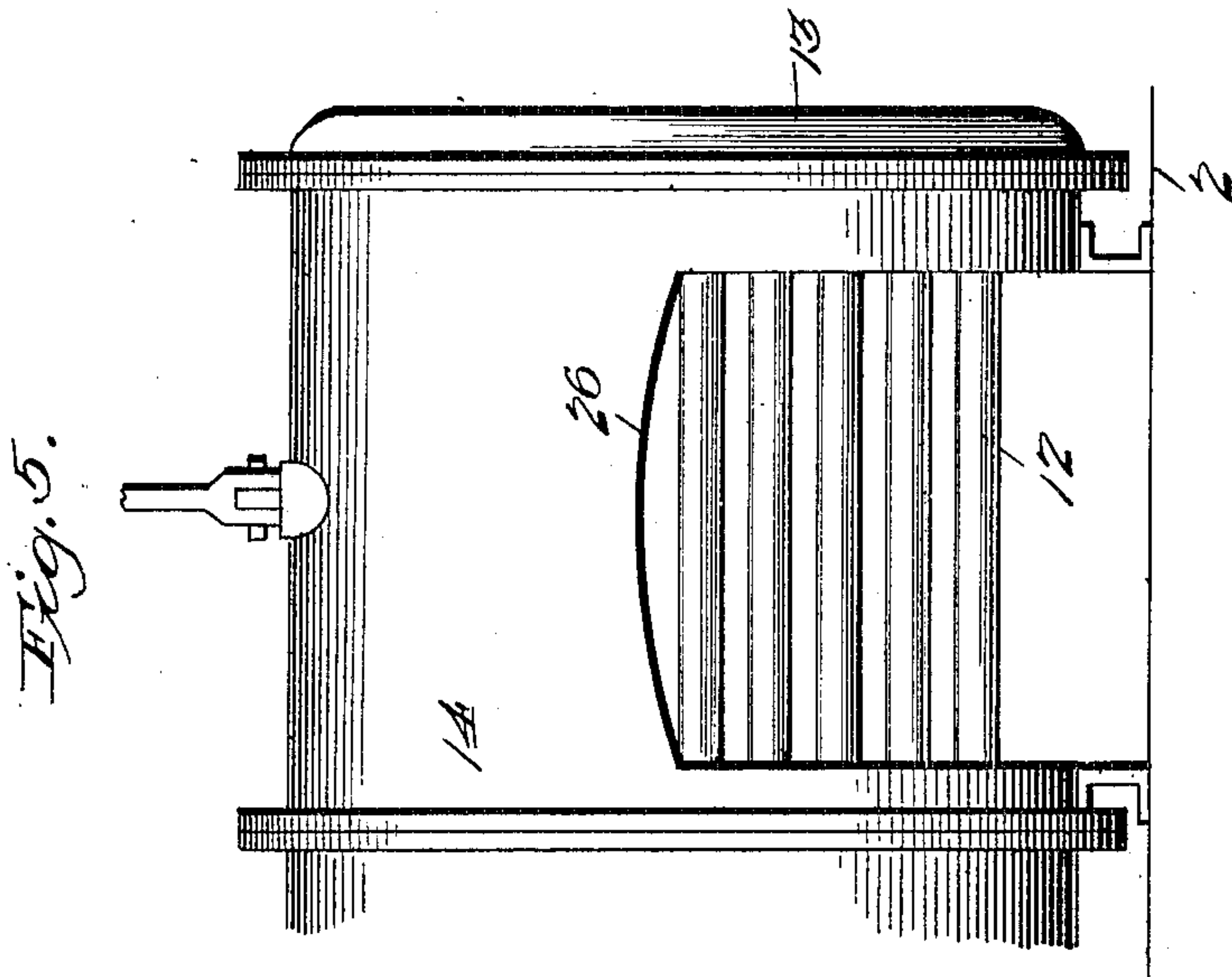
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3 SHEETS—SHEET 3.



Witnesses

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Fig. 4.

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UNITED STATES PATENT OFFICE

WALTER AUTHER BERRY, OF CHATTANOOGA, TENNESSEE.

STEAM-BOILER.

No. 825,696.

Specification of Letters Patent.

Patented July 10, 1906.

Application filed March 20, 1906. Serial No. 307,136.

To all whom it may concern:

Be it known that I, WALTER AUTHER BERRY, a citizen of the United States, residing at Chattanooga, in the county of Hamilton and State of Tennessee, have invented new and useful Improvements in Steam-Boilers, of which the following is a specification.

This invention relates to boilers for marine or other engines; and the primary object of the same is to increase the water-heating capacity of devices of this class by materially increasing the number of water-tubes used in ordinary boilers and derive therefrom the greatest benefits possible with a minimized amount of fuel and an increase in horsepower within reduced boiler proportions.

A further object of the invention is to provide a strong and durable boiler having the water-tubes and water-legs so arranged therein as to obviate burning out or other injury to the tubes and various parts of the furnace and at the same time obtain the benefits also from the increase of water area which will be practically influenced by the heat of the furnace.

With these and other objects in view the invention consists in the construction and arrangement of the several parts, which will be more fully hereinafter set forth.

In the drawings, Figure 1 is a longitudinal vertical section of a boiler embodying the features of the invention. Fig. 2 is a transverse vertical section on line 2 2 of Fig. 1. Fig. 3 is a transverse vertical section on line 3 3 of Fig. 1. Fig. 4 is a front end elevation. Fig. 5 is a side elevation of a part of the boiler.

Similar numerals of reference are employed to indicate corresponding parts in the several views.

The numeral 1 designates the main surrounding shell; 2, an inner shell; 3, the furnace, having the usual ash-pit 4, and 5 and 6 doors leading to the furnace and ash-pit. The head 7 is projected at the front of the boiler and provided with the hand-hole 8, covered by a removable cap 9, which will be of a strong and durable metal and so applied over the hand-hole as to prevent leakage or escape of the water. Water-legs 10 and 11 are formed at the front and rear ends of the boiler with relation to the main water-tubes 12, which are terminally held by tube-heads 13, forming portions of the tube-inclosing shell 14. The shell 14 rests on and is supported by the shell 2, and the latter has stiffening means and brace devices 15 and 16.

Water-legs 17 and 18 are formed at the front and rear portions of the shell 2 and between the ends of the latter and the adjacent end portions of the main shell 2. The water-legs 17 and 18 have full communication with the legs 11 and 10, and said legs 17 and 18 also fully communicate with the lower water-space 19, extending fully under the shell 2 and under the furnace 3 and in rear of the said furnace. Communicating with the space 19 is a water leg or column 20, which may be properly termed an "intermediate" water-leg, having its front wall shielded from the direct influence of the fire of the furnace 3 by fire-brick 21.

Within the shell 2 are auxiliary water-tubes 22 and 23, the water-tubes 22 extending full length of the inner auxiliary shell 2 and the water-tubes 23 extending from the rear end of said shell to the rear wall of the intermediate water-leg 20. At an intermediate point and in rear of the intermediate water-leg 20 is a downwardly-projecting bridge-wall or deflector 24, which is inclined toward the rear end of the shell 2 and is penetrated by the water-tubes 22, the lower end of the said bridge-wall or deflector being below the top wall of the intermediate water-leg. The intermediate water-leg may be said to form a hollow main bridge-wall regularly supplied with water, with advantages not only in heating the water to produce steam, but also in preventing burning out of the walls thereof, and the deflector 24 may be properly termed an "auxiliary" bridge-wall, which operates to throw the heat-currents and products of combustion downwardly through or between the tubes 23. The top of the rear extremity of the shell 2 has an opening 25 therein, and the inclosure for the tubes 12 is cut away at opposite sides, as at 26, directly over the said opening to establish communication between the shell 2 and the inclosure for the tubes 12 to permit the heat-currents and products of combustion after being directed downwardly by the deflector 24 to pass upwardly through the opening 25 and into the said inclosure for the tubes 12. The heat-currents and products of combustion entering the inclosure for the tubes 12 flow forwardly and pass out through a stack 27.

The front and rear extremities of the boiler at regular intervals are provided with suitable hand-holes and covers or caps 28, and the intermediate water-leg 20 is rendered ac-

cessible by a manhole 29, having a removable plate or cover 30. The intermediate leg 20 is also reinforced by longitudinal stay-bolts 31, and the boiler structure in other
 5 particulars will be reinforced and strengthened wherever found necessary by any of the approved methods.

It will be seen that the forward extremities of the water-tubes 22 are directly exposed to the heat of the furnace 3, over which they extend, with material advantages in the production of steam and utilization of heat to the best advantage. Another important feature is the disposition of the water-space under the furnace. In fact, water is permitted to flow completely around the inner auxiliary shell 2, as well as around the ends, bottom, and top of the inclosure for the water-tubes 12, and every portion of surface
 15 that may become heated is utilized for close contact with the water. By reason of this increased area of water exposure the production of steam is materially increased by the use of a minimized amount of fuel or with
 20 the same amount of fuel that is ordinarily employed in boilers with a much lower steam production. By the increase in steam production the horse-power of the boiler is necessarily augmented with advantages in
 30 steam engineering, particularly in marine engines where economy in space with the greatest power obtainable is desirable.

What I claim is—

1. In a boiler of the class set forth the
 35 combination of an outer main shell, an inner auxiliary shell, upper water-tubes having an inclosure, a furnace at the forward extremity of the auxiliary shell, water-tubes extending through the upper part of the auxiliary shell
 40 forwardly over and directly exposed with respect to the furnace, an intermediate water-leg at the rear of the furnace and shorter tubes between the water-leg and the rear of the auxiliary shell.

45 2. In a boiler of the class set forth, the combination of an outer main shell, an inner auxiliary shell, upper water-tubes having an inclosure, a furnace at the forward extremity

of the auxiliary shell, water-tubes extending through the upper part of the auxiliary shell
 50 forwardly over and directly exposed with respect to the furnace, an intermediate water-leg forming the backing for the furnace, and tubes extending between the water-leg and the rear of the auxiliary shell.

3. In a boiler of the class set forth the combination of a main inclosing shell having a furnace at the lower front portion thereof, a lower auxiliary shell having an intermediate water-leg formed therein and water-spaces
 60 around the lower portion and at the ends thereof, the water-leg and the front and lower water-spaces inclosing the furnace, tubes connected to the intermediate and rear water-legs, other longer tubes connecting the
 65 front and rear water-legs and partially exposed directly over the furnace, and an upper series of tubes and front and rear water-legs with which they communicate, the upper series of tubes being held within an inclosure
 70 having openings therein to permit the heat-currents and products of combustion to pass thereinto.

4. A steam-boiler of the class set forth having an upper group of water-tubes with an
 75 inclosure provided with rear openings, a furnace and lower set of water-tubes which partially extend over and are directly exposed to the furnace, an intermediate water-leg forming the backing for the furnace, a downwardly-
 80 extending deflector in rear of the said intermediate water-leg to throw the heat-currents and products of combustion from the furnace downwardly between the rear portions of the lower set of water-tubes, an outlet-
 85 stack connected to the forward extremity of the inclosure of the upper set of water-tubes, and a group of shorter tubes extending from the water-leg to the rear of the furnace.

In testimony whereof I affix my signature
 90 in presence of two witnesses.

WALTER AUTHER BERRY.

Witnesses:

M. P. WHITTEN,
 J. H. McLEAN.