

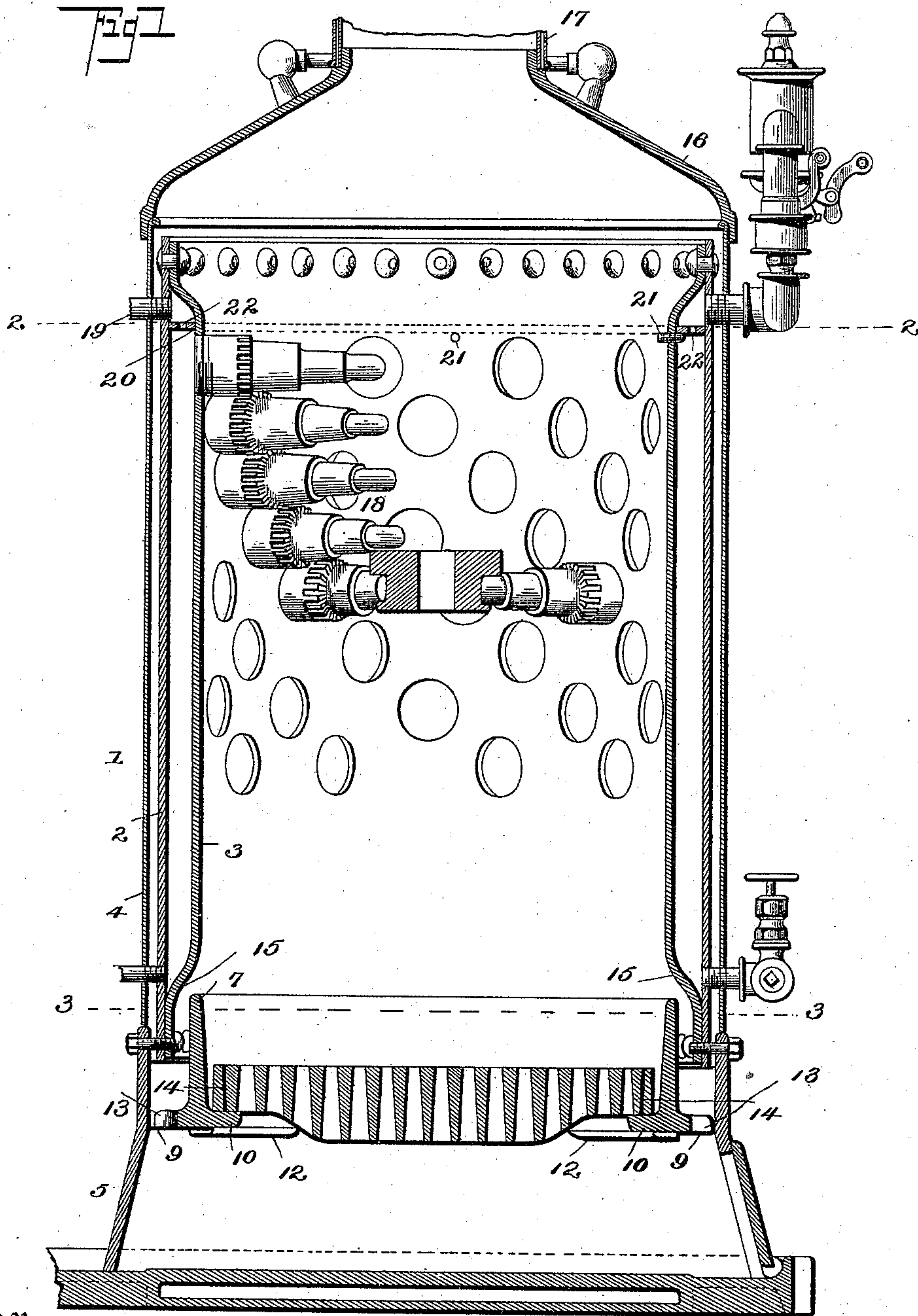
(No Model.)

2 Sheets—Sheet 1.

E. G. SHORTT.
STEAM BOILER.

No. 470,631.

Patented Mar. 8, 1892.



Witnesses

John D. Minnie
J. A. Rutherford.

Inventor

Edward G. Shortt.

By his Attorney

James L. Norris.

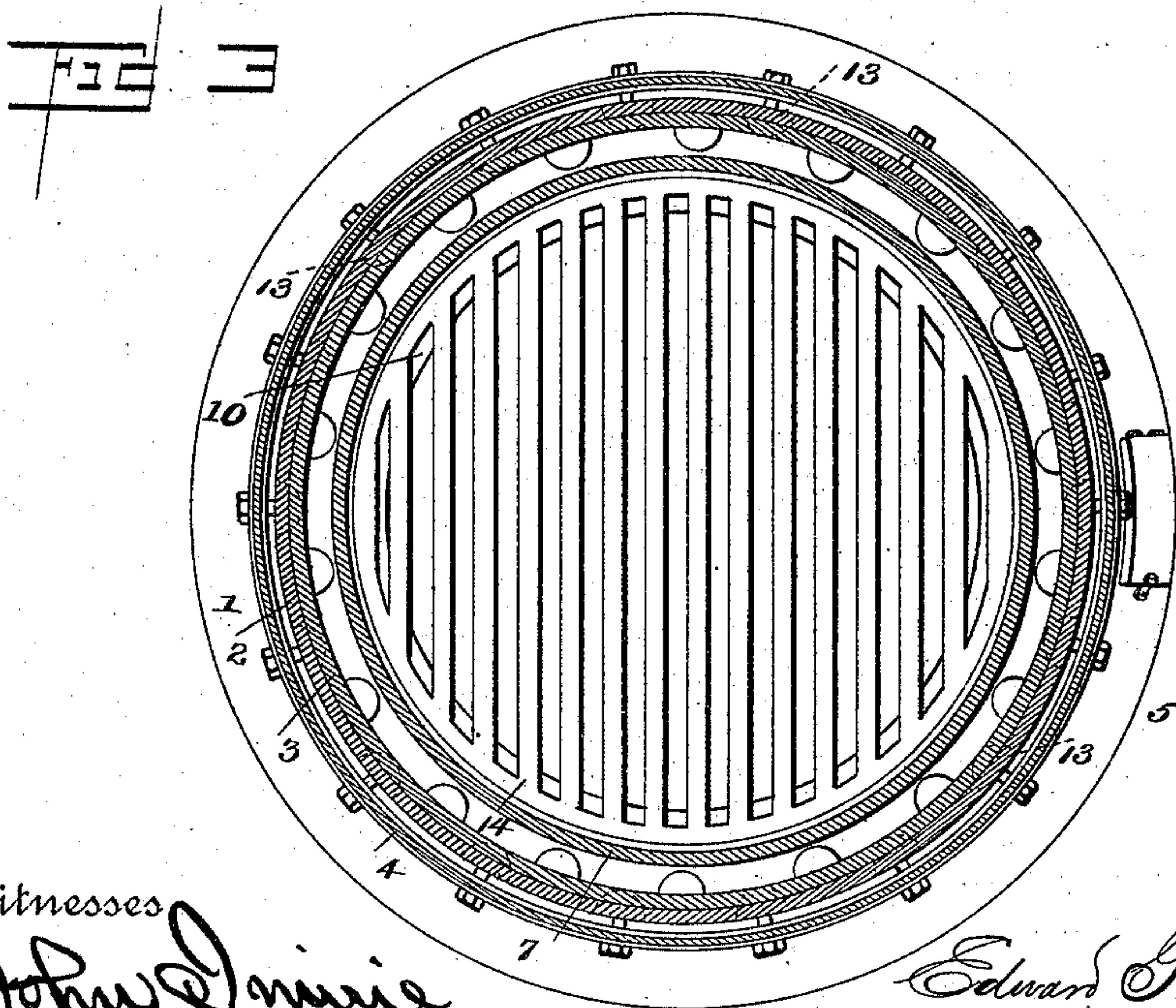
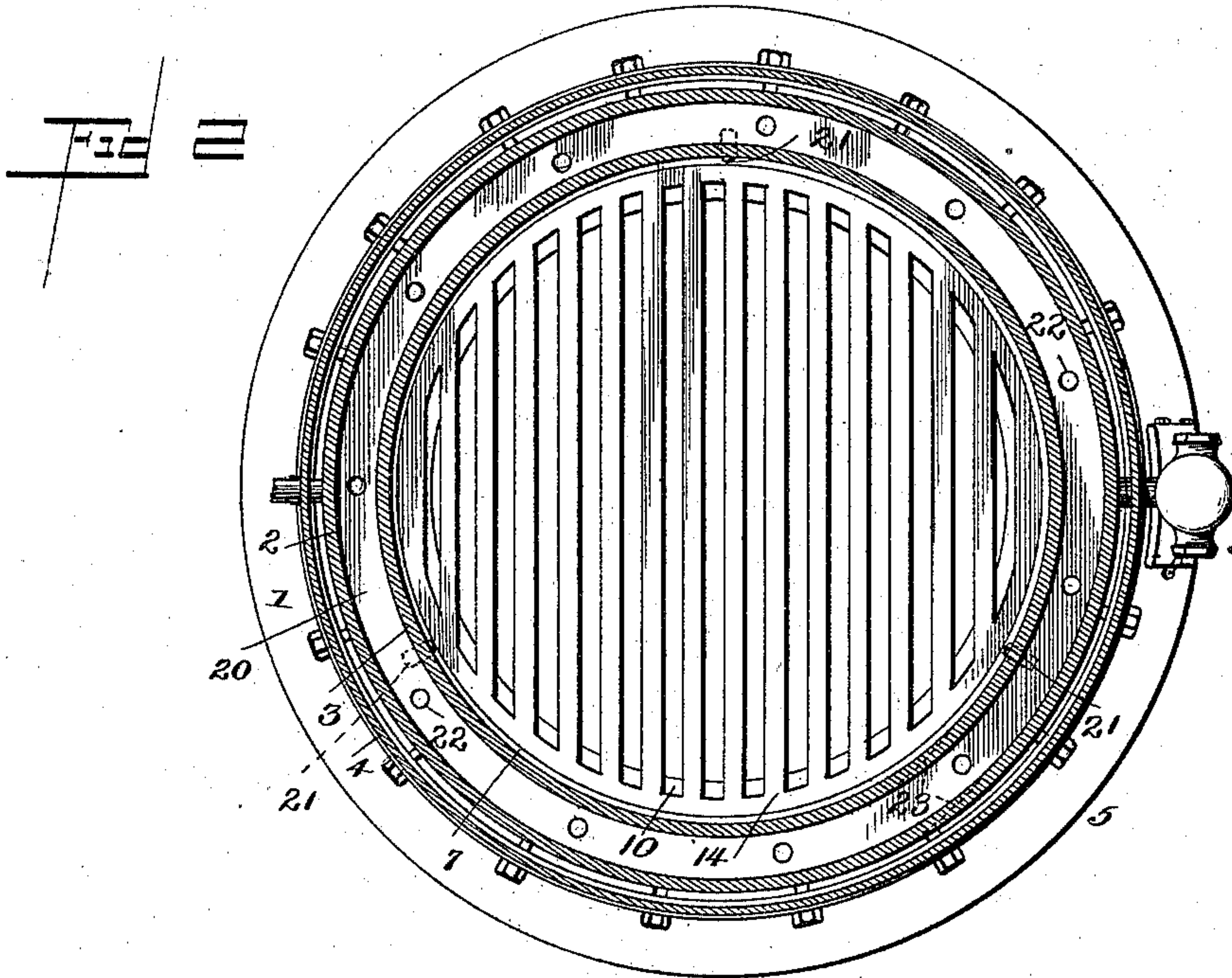
(No Model.)

2 Sheets—Sheet 2.

E. G. SHORTT.
STEAM BOILER.

No. 470,631.

Patented Mar. 8, 1892.



Witnesses

John D. Davis
J. A. Rutledge

Inventor

Edward G. Shortt.

By his Attorney

Samuel L. Norris.

UNITED STATES PATENT OFFICE.

EDWARD G. SHORTT, OF CARTHAGE, ASSIGNOR OF ONE-HALF TO CHARLES G. EMERY, OF BROOKLYN, NEW YORK.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 470,631, dated March 8, 1892.

Application filed October 21, 1891. Serial No. 409,400. (No model.)

To all whom it may concern:

Be it known that I, EDWARD G. SHORTT, a citizen of the United States, residing at Carthage, in the county of Jefferson and State of New York, have invented new and useful Improvements in Steam-Boilers, of which the following is a specification.

My invention is designed to supply certain improvements in steam-boilers, whereby a more perfect combustion shall be obtained within the furnace and whereby, also, the wall of the fire-pot shall be prevented from burning, and a perfect or nearly-perfect consumption of the products of combustion effected to increase the heat, economize the fuel, and render the furnace as nearly smokeless as possible.

To these ends my invention involves the features of construction and the combination or arrangement of devices hereinafter described and claimed.

To enable others skilled in the art to understand and to make, construct, and use my said invention, I will describe the same in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a central vertical section of an upright boiler having my invention incorporated. Fig. 2 is a horizontal section on the line 2 2, Fig. 1. Fig. 3 is a horizontal section upon the line 3 3, Fig. 1.

In the said drawings the reference-numeral 1 denotes the steam-boiler and furnace, which in this instance are united in one structure, the steam-boiler consisting of an outer and inner sheet 2 and 3 inclosing a water and steam space, which is annular in horizontal section. The inner sheet 3 is bent outwardly at its upper and lower ends to unite with the outer sheet, which is cylindrical throughout, and to afford the annular water-space between the two. The boiler is inclosed by a jacket 4 to prevent loss of heat by radiation and conduction, and the space between the outer sheet 2 and jacket 4 is filled with an asbestos packing. The boiler is supported upon a base 5 of any suitable construction, and within this base is arranged the fire-pot, which is composed of an open ring 7, having upon its lower edge an inner and outer flange 9 and 10, respectively, the outer flange resting on

bracket-lugs 12, projecting from the base, and being provided with openings 13 for air to sustain combustion. The inner flange 10 supports the grate 14. An air-space for draft is allowed extending entirely around the fire-pot between the outwardly-deflected lower end of the inner sheet 3 of the boiler and the outer face and upper edge of the ring 7. The air entering by way of said space impinges upon the inclined annular surface 15 of the inner sheet 3, which overhangs the ring 7, and will be somewhat deflected thereby toward the center of the combustion-chamber, which lies above the fire-pot and is bounded or inclosed by the boiler. A cap 16 surmounts the latter and conducts the products of combustion to the stack 17. By constructing the inner shell 3 with the annular outwardly curved or bent portion 15 at its lower end portion to overhang the upper edge of the grate-ring 7 the ascending air-currents are deflected inwardly, so that the heat is concentrated and intensified at the center, where it strikes the lowermost water-tubes 18. The portions 15 also prevent the air-currents rising perpendicularly along the inner sheet, which would tend to cool the boiler, while by throwing the air-currents laterally they at once mingle with the products of combustion and greatly intensify the heat where it strikes the lower water-tubes.

The heating and water space of the boiler is largely increased by means of water-tubes 18, projecting laterally from the inner sheet of the boiler toward the center of the combustion-chamber. These tubes are usually arranged in spiral order to give the most advantageous contact to the ascending heated gases, though I may use any construction adapted to accomplish the same end. These tubes are of the construction shown, described, and claimed in the Letters Patent granted to me the 24th day of February, 1891, No. 447,209.

The reference-numeral 19 indicates the live-steam pipe of the boiler, which enters the steam-space immediately beneath the line of union of the inner and outer sheets at the upper end of the boiler. Beneath this pipe is inserted an annular water-baffle or baffling-plate 20, which extends entirely around through the steam-space and has its edges abutting against the inner faces of the sheets inclosing said

space. This ring is supported upon pins 21, which are either tapped or driven through openings in one of the boiler-sheets and project into the steam-space. Perforations 22 are provided in the baffling-plate at suitable intervals to allow the free passage of steam, but of such size and frequency as to practically cut off the passage of any material quantity of water which may be dashed against the plate by the violent ebullition within the boiler.

The construction of the boiler and the form and arrangement of the several parts may be considerably varied without departing from my invention. It is evident, also, that the baffling-plate may be used in other types of steam-boiler and may be of other than annular form. Besides preventing the water from being dashed over the mouth of the steam-pipe 19 and driven into it by the flow of steam, this plate drafts the steam from all parts of the steam-space below it with substantial uniformity and aids in preserving it at a point somewhat above saturation.

The inner and outer sheets of the boiler, which are in the present instance substantially cylindrical and concentric, are formed of steel, and each sheet is lap-welded throughout the entire height of the boiler, the weld being so formed that there is no perceptible difference in thickness or in the homogeneity of the metal as compared with other parts. I have indicated this weld in the horizontal section, Fig. 1, by a dotted line at 23; but it will be understood of course that in practice the only means of detecting the weld is by the entire absence of rivets, there being no external indication thereof. I thus obtain a boiler which is of uniform strength in every part. Instead of cutting away a very considerable part of the metal to admit the line of the rivets usually employed, I preserve the boiler-sheets intact and am able to employ high pressures without the danger so well known in riveted boilers of the sheet tearing along the line of rivets.

By combining the external draft between the boiler and fire-pot with the draft passing directly through the grate I am able to effect a complete consumption of the products of combustion and produce a very intense heat, beside utilizing all the heating capacity of the fuel, and thus insuring the utmost practical economy. In burning soft coal, for example, the interior draft or that passing through the grate and inside the fire-pot is wholly insufficient to sustain perfect combustion above the grate. The quantity of carbonic-acid gas given off and the absorption and consumption of oxygen in effecting the primary combustion causes the evolution of a dense smoke in great volumes contain-

ing the most valuable constituents of the fuel. The external draft, which is slightly deflected inward, mingles with these products of the primary combustion and furnishes sufficient oxygen to maintain complete consumption and produce an intense heat, giving an extremely rapid steam generation. The air entering between the fire-pot and boiler not only prevents the fire-pot from burning, but the air itself is heated sufficiently by surface contact with the lower end of the boiler to sustain the secondary combustion perfectly and avoid chilling the inflammable gases.

I am aware that heretofore a furnace has been used having a draft-space external to the fire-pot, and I do not claim such an invention.

I am also aware that boiler-plates have been built up or composed of fractional parts welded to each other, the plate thus formed being united to other plates by rivets.

What I claim is—

1. The combination, with an upright steam-boiler having its inner sheet formed with an annular outwardly-curved portion at the lower end, of the grate-ring 7, having its lower edge formed with an inner grate-supporting flange 10 and an outer perforated flange 9 for the upward passage of air, and a grate resting upon the grate-supporting flange, substantially as described.

2. The combination of a base 5, having brackets or lugs 12, and a boiler supported by the base and having an annular outwardly-curved portion 15 at its lower end, of a grate-supporting ring 7, located under the annular curved portion and formed at its base with an inner grate-supporting flange 10 and an outer perforated flange 9 for the upward passage of air, and a grate resting upon the grate-supporting flange, substantially as described.

3. The combination, with a base 5, of a boiler having its inner sheet 3 provided with laterally-projecting water-tubes 18 and formed at its lower end with an annular outwardly-curved portion 15, a grate-ring 7, arranged under the outwardly-curved portion and formed at its base with an inner grate-supporting flange 10 and an outer perforated ring 9 for the upward passage of air, and a grate resting on the grate-supporting-flange, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

EDWARD G. SHORTT. [L. S.]

Witnesses:

GEO. E. OWEN,
H. B. EDMONDS.