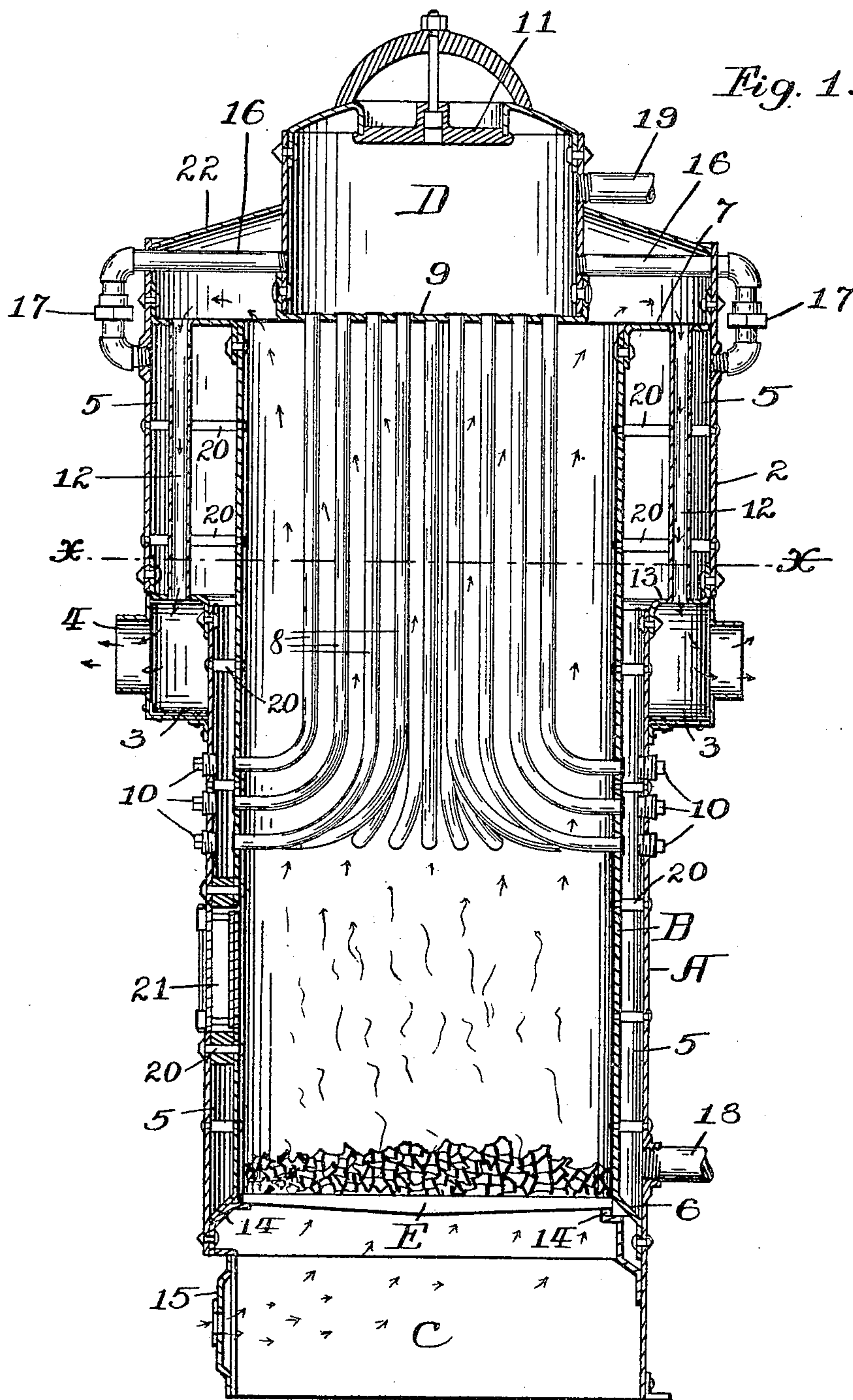


J. H. LAMBRIX.

BOILER.

APPLICATION FILED MAR. 24, 1905.

2 SHEETS—SHEET 1.



Witnesses:

E. M. Bessel.  
A. H. Hansen.

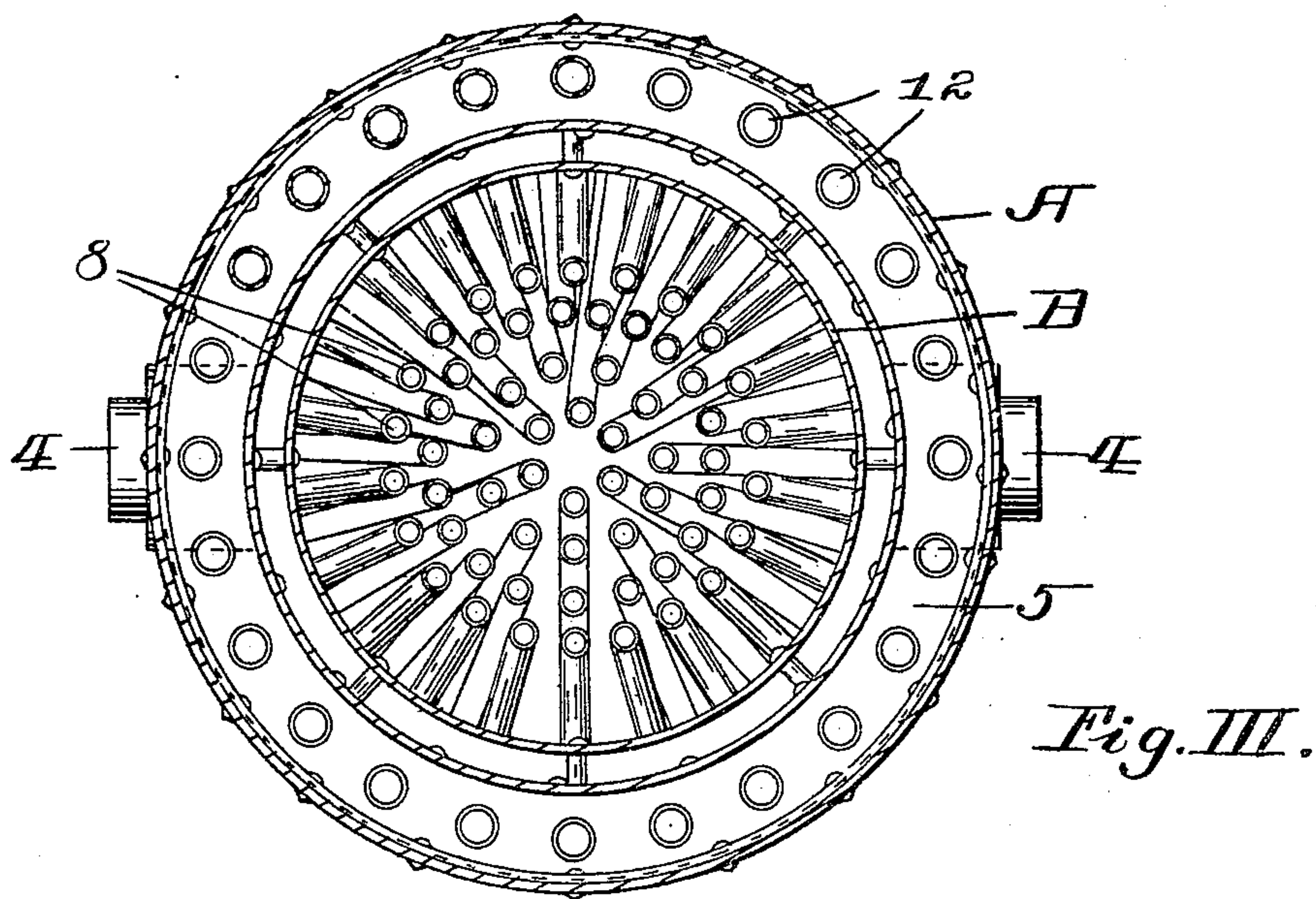
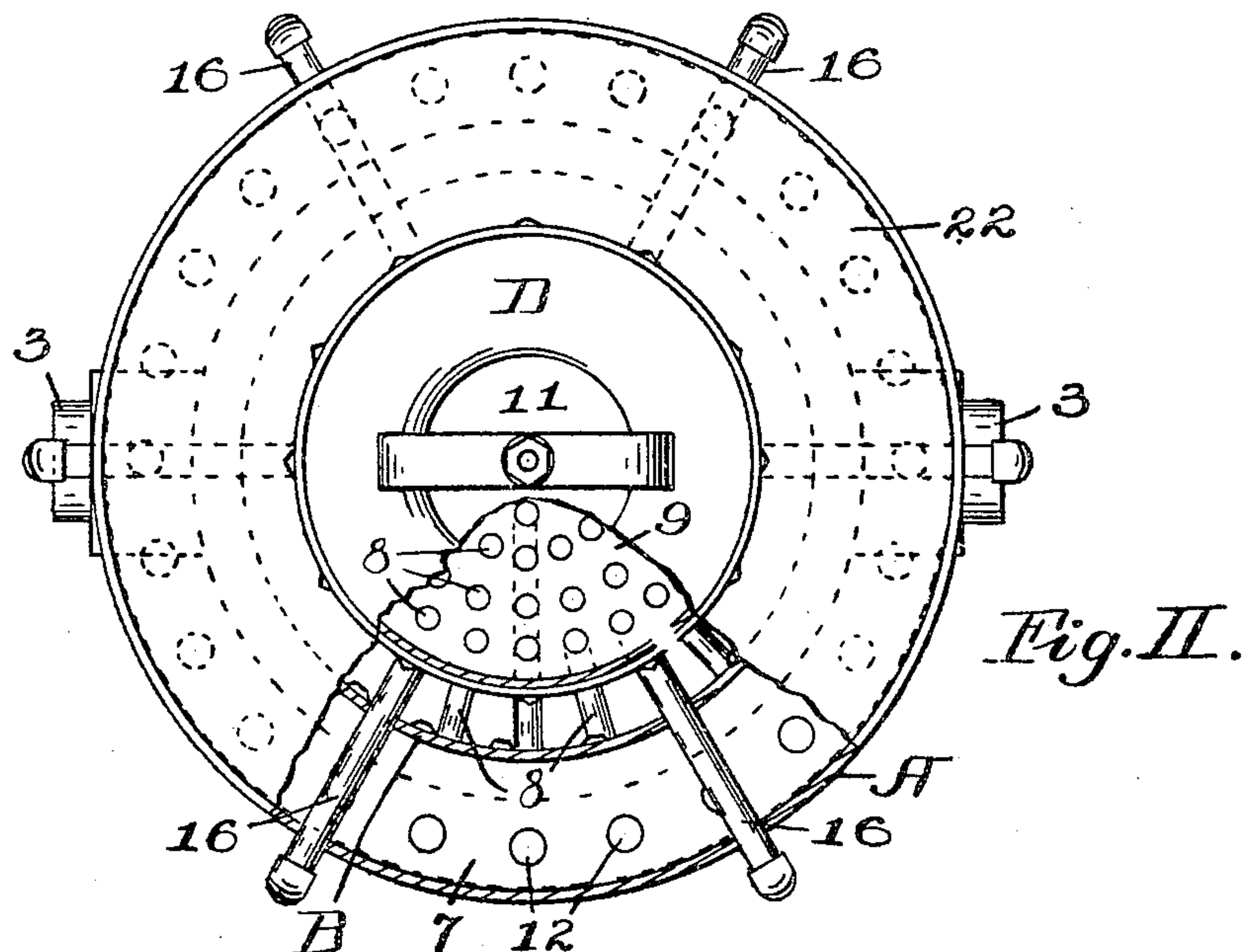
Inventor:

Joseph H. Lambrix,

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2 SHEETS—SHEET 2.



Witnesses:

E. M. Bouché.  
K. A. Hansen.

Inventor:

Joseph H. Lambrix,

by: J. H. Radbury.

Attorney.



# UNITED STATES PATENT OFFICE.

JOSEPH H. LAMBRIX, OF MINNEAPOLIS, MINNESOTA.

## BOILER.

No. 801,022.

Specification of Letters Patent.

Patented Oct. 3, 1905.

Application filed March 24, 1905. Serial No. 251,734.

*To all whom it may concern:*

Be it known that I, JOSEPH H. LAMBRIX, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented a new and useful Boiler, of which the following is a specification.

My invention relates to improvements in boilers, and more particularly to that class called "upright water-tube" or "steam" boilers.

The object of this invention is a boiler having means for permitting ready access to all of its parts, so that repairs are reduced to a minimum.

Among other objects are to provide free circulation of heat in the boiler, to permit the tubes being removed without taking the boiler apart, to utilize a maximum amount of heat from the fuel, and to reduce the waste-heat radiation to a minimum.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical sectional view of my invention. Fig. 2 is a plan view, shown partly in section; and Fig. 3 is a section of Fig. 1, taken on the line X X.

In the drawings let A represent an outer shell with the upper portion 2 larger than the lower portion for the purposes hereinafter described. A smoke-chamber 3 passes around the smaller part of the shell immediately below its upper portion and is formed with two or more smoke-outlets 4. An inner shell B or fire-box is substantially a hollow cylinder spaced throughout its length from the outer shell and forming a water-jacket 5. The inner shell is flanged out at or near its lower end, as indicated at 6, so as to leave an ash-pit C below. The upper end of the inner shell is fastened to a flanged plate 7, which connects with the outer shell. A circular dome D, having a steam or hot-water outlet 19, is supported above and is less in diameter than the inner shell to permit the draft to pass between them. In the lower end 9 of the steam-dome are connected a number of water-tubes 8, which are substantially vertical and near their lower ends curved outward and connected to the side of the fire-box shell. The ends of these water-tubes are expanded, rolled, and beaded down to form tight joints.

Coincident with the lower curved ends of the water-tubes and in the outer shell are screw-plugs 10, which when removed provide access for cleaning the water-tubes or repairing their lower ends. The top of the dome

has a manhole-plate 11, (of ordinary construction,) which is usually large enough to allow a man to pass through for making repairs and cleaning said tubes. The shape and position of the water-tubes and the screw-plugs and steam-dome allow a defective tube to be removed without molesting any of the other tubes.

Running downward in the water jacket or space between the upper ends of the inner and outer shells are a number of vertical fire-flues 12, which are connected to the flanged plate 7 and the shoulder 13 by expanding, rolling, and beading down their ends. These fire-flues are arranged in a circle, as shown in Fig. 3, around the fire-box. The lower ends of the fire-flues thus connect with the space above the fire-box and the smoke-chamber 3. A fire-grate E is supported at or near the lower end of the fire-box B by means of brackets 14, and draft is admitted below the fire-grate through the ash-pit door 15. This draft passes upward, circulates around the water-tubes, passes over the upper end of the fire-box, down the flues 12, and out through the smoke-chamber.

A number of water-circulating pipes 16 radiate from the steam-dome, pass through the upper end of the outer shell, and connect with the water-space 5 immediately below the flanged plate 7. These pipes are provided with unions 17 outside of the boiler for the purpose of allowing the parts to be easily taken apart and removed.

Water is fed into the boiler through a pipe 18, which is connected with the water-jacket 5 near the lower end of the fire-box and is free to circulate up the water-tubes, through the steam-dome and radiating pipes 16, and down the water-space 5 around the flues 12.

The inner and outer shells are supported and braced by means of stay-bolts 20, and fuel is passed onto the grate E through the doorway, as shown. The upper end of the outer shell is provided with a cover 22, which rests upon the radiating pipes 16 and inclines upward and closely fits the outer surface of the steam-dome. By removing this cover the fire-flues may be cleaned or their upper ends repaired.

It is obvious that the heat-radiating surface of the water-tubes and the combined cross-sectional area of the fire-flues and smoke-chamber are calculated to cause the proper draft and a maximum amount of heat radiation through the tubes in a given sized boiler



and that the details of construction shown may be modified without departing from the spirit of this invention, and I do not wish to confine myself to the exact construction described.

5 Having described my invention, what I claim as new, and desire to protect by Letters Patent is—

1. A boiler consisting of an outer shell, having its upper portion larger than its lower  
10 portion, a smoke-chamber below said upper portion and around said outer shell, an inner shell spaced from and connected at its upper and lower ends with said outer shell to form a fire-box within, a water-jacket and an ash-pit near the bottom of the boiler, a steam-dome supported above said inner shell and having a steam or hot-water outlet, a manhole-plate in said steam-dome, a plurality of water-tubes in the fire-box and connected at their  
20 upper ends with said steam-dome and curved out and connected at their lower ends with the water-jacket, removable plugs in the outer shell coincident with the lower ends of said water-tubes, a plurality of vertical fire-flues arranged in a circle in the upper portion of the water-jacket and communicating with the smoke-chamber, a plurality of water-circulating pipes radiating from the steam-dome, passing out of the boiler and connected with  
30 the upper portion of the water-jacket, unions in said circulating-pipes outside of said boiler, means for feeding water into the lower portion of said jacket, a fire-grate near the lower portion of the fire-box, means for bracing said inner and outer shells, and a cover on the upper end of said outer shell and around said steam-dome.

2. A boiler comprising, in combination, an outer shell having its upper portion larger  
40 than its lower portion, an inner shell spaced from and connected at its upper and lower ends with said outer shell to form a water-jacket and fire-box, a steam-dome having an outlet and supported above said inner shell, a plurality of water-tubes in said fire-box and connected at their upper ends with said steam-dome and at their lower ends with said water-jacket, a plurality of vertical fire-flues in the upper portion of the water-jacket, a smoke-chamber below the lower ends of said fire-flues, a plurality of water-circulating pipes leading from said steam-dome and connected with the upper portion of the water-jacket, and means for feeding water into the lower  
50 portion of said jacket.

3. A boiler comprising, in combination, an outer shell having its upper portion larger than its lower portion, an inner shell spaced from and connected at its upper and lower  
60 ends with said outer shell to form a water-jacket and fire-box and having a water-feed inlet, a dome having an outlet and supported above said inner shell, a plurality of water-tubes in said fire-box and connected at their upper ends with said dome and at their lower

ends with said jacket, removable plugs in said outer shell coincident with the lower ends of said water-tubes, a plurality of fire-flues passing through the upper portion of said water-jacket, means for conveying smoke  
70 and gases from the lower ends of said fire-flues, and a plurality of water connections between said dome and the upper end of said jacket.

4. A boiler comprising, in combination, 75 outer and inner shells connected together at or near their upper and lower ends to form a water-jacket and having a water-supply inlet, said outer shell being larger at its upper end than at its lower end to form an enlarged  
80 space within, fire-flues passing through said enlarged space, a dome near the upper end of said inner shell and having a steam or hot-water outlet, a connection between said outer shell and dome to close the space intervening, 85 a smoke-outlet connected with said flues, and a plurality of water-tubes in said inner shell having their ends connected with said dome and water-jacket.

5. A boiler comprising outer and inner 90 shells connected together at or near their ends to form a water-jacket and a fire-box within said inner shell, said outer shell being larger at its upper end than at its lower end to form an enlarged space within, fire-flues passing  
95 vertically through said enlarged space in said water-jacket, a smoke-chamber below the lower ends of said fire-flues having an outlet, a dome above said fire-box and connected to said outer shell to form a draft communication 100 between said fire-box and fire-flues, water-tubes connected with said dome and water-jacket, and a communication between said dome and the upper end of said jacket.

6. A boiler comprising, in combination, 105 outer and inner shells set apart and connected together near their ends to form a water-jacket and a fire-box within said inner shell, said outer shell being larger at its upper end than at its lower end to form an enlarged space  
110 within, fire-flues passing vertically through said enlarged space in said water-jacket, a smoke-chamber below the lower ends of said fire-flues, having an outlet, a dome above said fire-box, a cover above said inner shell and spaced therefrom to form a draft communication between said fire-box and fire-flues in said  
115 fire-box and connected with said dome and water-jacket, water-circulating pipes passing through the space between said cover and the upper end of said inner shell and connected with said dome and the enlarged space in said water-jacket, and unions in said water-circulating pipes outside of said boiler. 120

7. A boiler comprising, in combination, 125 outer and inner shells connected together near their ends to form a water-jacket and a fire-box within said inner shell, said outer shell being larger at its upper end than at its lower end to form an enlarged space within said 130



jacket, fire-flues passing vertically through said enlarged space in said water-jacket, a smoke-chamber below the lower ends of said fire-flues having an outlet, a plurality of water-  
5 tubes in said fire-box having their lower ends connected near the lower portion of said water-jacket, means for connecting the upper ends of said fire-flues with the enlarged portion of said water-jacket, and inlet and outlet con-  
10 nections to be coupled with an external heating system, for the purposes specified.

8. A boiler comprising, in combination, outer and inner shells A and B, spaced apart and connected at or near their upper and lower  
15 ends to form a water-jacket within and having an inlet passage-way 18, said inner shell having an enlarged upper portion 2, a plurality of fire-flues 12 passing vertically through the space between said enlarged up-  
20 per portion of said outer shell and said inner shell, a smoke-chamber 3 having outlets and connected with the lower ends of said fire-flues, a dome D above said inner shell and hav-

ing an outlet passage-way 19, a plurality of water-tubes 8 connected with said dome and  
25 with said jacket below its enlarged portion, removable plugs 10 in the outer shell coincident with the lower ends of said water-tubes, stay-bolts 20 between said outer and inner shells, a plurality of water-circulating pipes con-  
30 nected with said dome, passing through said outer shell and connected with the enlarged portion of said jacket, unions 17 connected with said water-circulating pipes outside of said boiler, a removable cover 22 on the up-  
35 per end of said outer shell and closely fitting around said dome, and a fire-grate E near the lower end of said inner shell, for the purposes specified.

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

JOSEPH H. LAMBRIX.

Witnesses:

E. M. BOESEL,

F. G. BRADBURY.