

(No Model.)

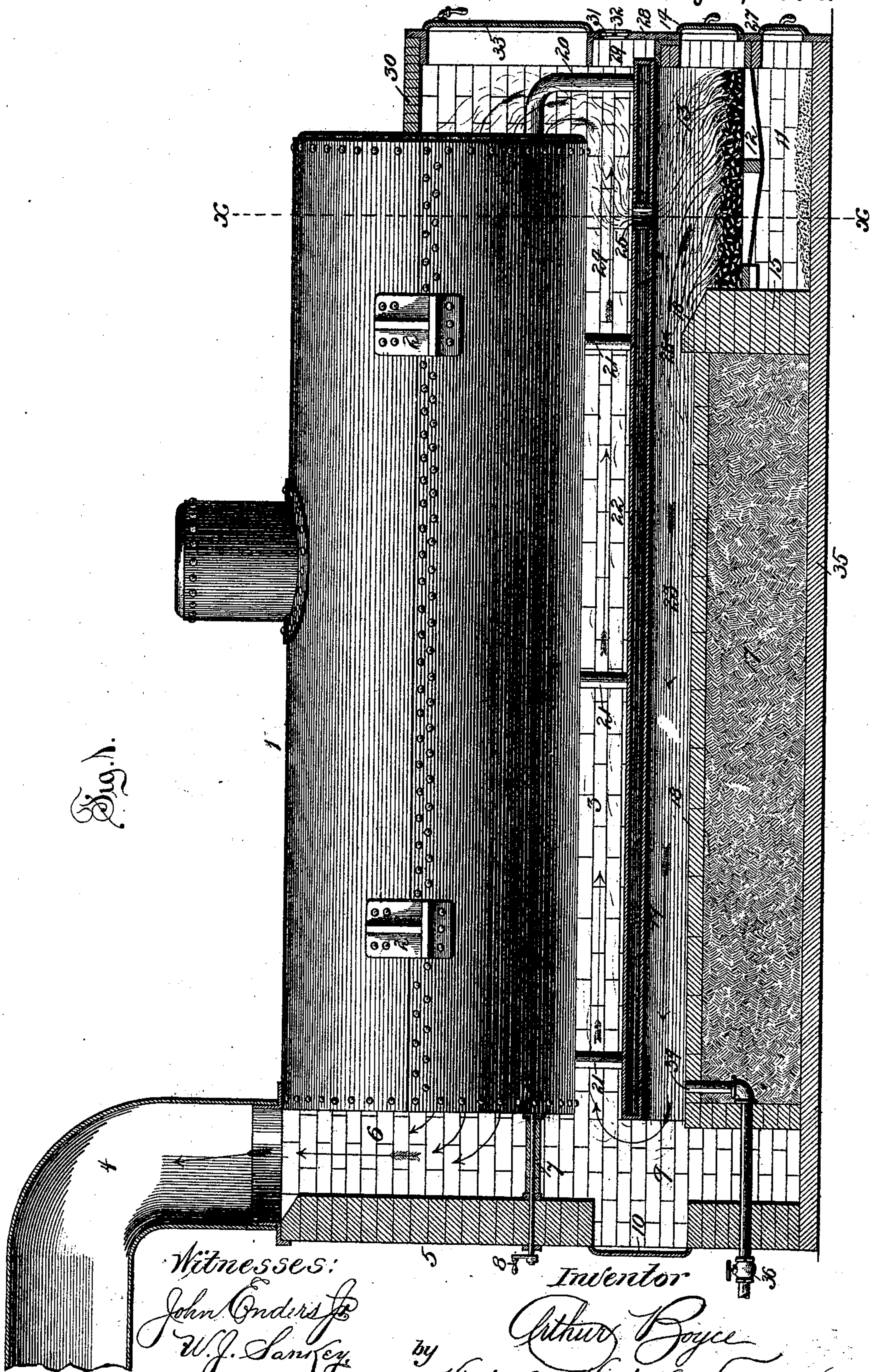
2 Sheets—Sheet 1.

A. BOYCE.

BOILER FURNACE AND STEAM GENERATOR.

No. 519,419.

Patented May 8, 1894.



Witnesses:

John Anders Jr.
W. J. Sankley

Inventor

Arthur Boyce

by

Higdon & Higdon & Morgan
Att'ys.

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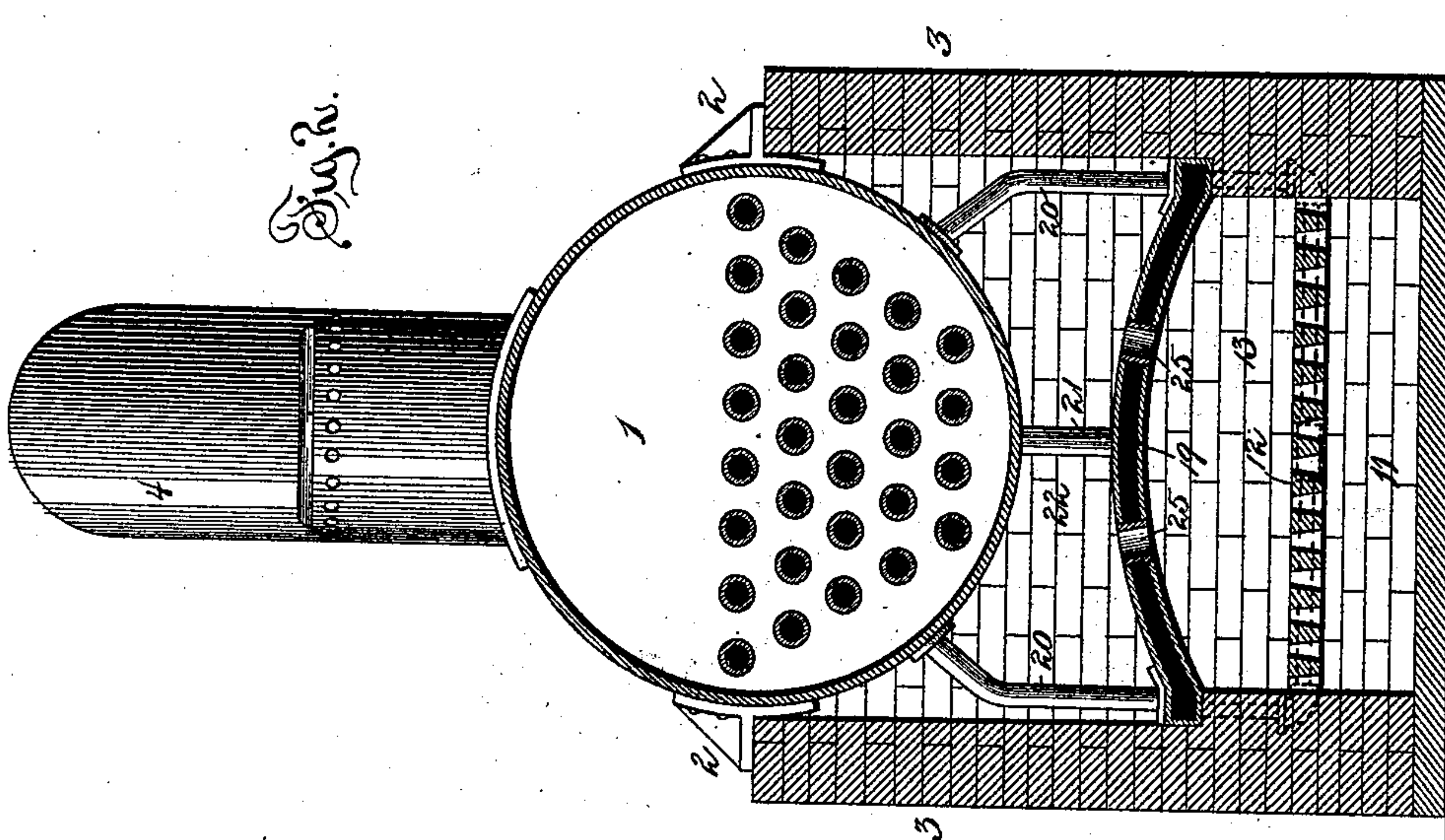
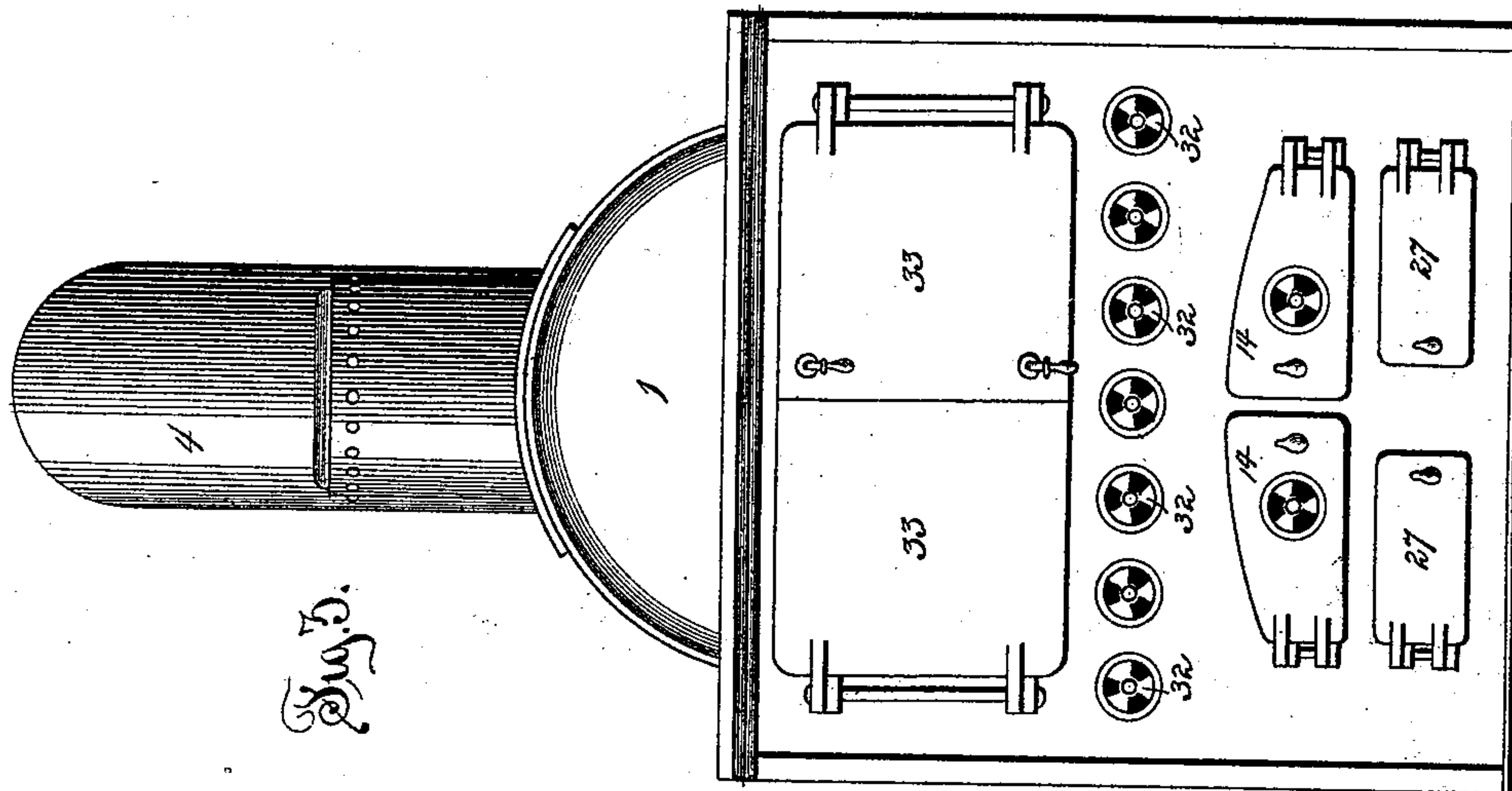
2 Sheets—Sheet 2.

A. BOYCE.

BOILER FURNACE AND STEAM GENERATOR.

No. 519,419.

Patented May 8, 1894.



Witnesses:

John Anders Jr.
W. J. Sankey

Inventor

Arthur Boyce

by

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UNITED STATES PATENT OFFICE.

ARTHUR BOYCE, OF ST. LOUIS, MISSOURI.

BOILER-FURNACE AND STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 519,419, dated May 8, 1894.

Application filed July 10, 1893. Serial No. 479,984. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR BOYCE, of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in a Combined Smokeless Boiler-Furnace and Steam-Generator, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

10 My invention relates to combined smokeless boiler furnaces and steam generators, and consists in the novel arrangement and combination of parts, as will be more fully hereinafter described.

15 In the drawings: Figure 1 is a longitudinal vertical section taken to one side of the boiler. Fig. 2 is a vertical transverse section taken on the line $x-x$ of Fig. 1. Fig. 3 is a front end elevation.

20 My invention has for its object the saving of fuel and also increasing the heating capacity of the boiler, as well as the successful burning of the smoke and gases generated therein, the same being attended with no greater expense of construction than the ordinary class of boiler furnaces.

I will give a further description of the advantages of my invention in connection with a mechanical description thereof.

30 Referring to the drawings: 1 indicates a boiler of the ordinary construction, as provided with flanges or side plates 2 which rest on brick walls 3 for supporting the same.

4 indicates a smoke passage through which all the smoke and products of combustion and gases which are not consumed, in a manner as will be more fully hereinafter described, find exit to the atmosphere.

5 indicates an end brick wall which is located to the rear end of the boiler 1 and a distance therefrom whereby the smoke-passage 6 is formed. Located in this smoke-passage 6 is a brick-damper 7 the same being pivotally mounted as illustrated in the drawings and adapted to be operated by a handle 8. By this damper a direct draft can be formed or a circumlocutory draft, as will be more fully hereinafter described.

50 Located below the brick wall 5 is a soot-chamber 9 the same being provided with a soot-door 10 as is illustrated in Fig. 1.

11 indicates an ash-pit which is located be-

low the grate bars 12 which are of the usual construction.

13 indicates a fire box in which the fuel is placed and 14 indicates the door thereof. 55

15 indicates a bridge wall which is located in the rear of the ash-pit 11 and the fire-box 13, the same being provided with an inclined surface 16. 60

17 indicates a stratum of dirt which is provided on its top surface with a layer of brick 18.

Located below the boiler 1 is a water receptacle 19 which is curvilinear in cross-section. (See Fig. 2 for illustration.) Said receptacle 19 is comparatively thin as relates to its length and width, the same being preferably greater in length than the boiler 1 and of greater width than the diameter of the boiler. (See Figs. 1 and 2 for illustration.) Said receptacle 19 is constructed of boiler metal, cast iron, or any suitable material, and one object is to increase the heating surface of the boiler and another is to act as a means for consuming the smoke as will be more fully hereinafter described. 65 70 75

20 indicates water legs, the lower ends of which are in communication with the receptacle 19 and the upper ends with the boiler 1 at the side thereof as can be seen in Fig. 2. Said water legs are secured to the boiler 1 and receptacle 19 in any suitable and mechanical manner. 80

21 indicates one or a series of water legs which are in communication with the receptacle 19 and are secured directly beneath the boiler 1 and are in communication therewith. Said legs have an additional function of conveying mud or sediment which accumulates in the boiler 1 into the the receptacle 19. 85 90

The receptacle 19 as before stated, is located beneath the boiler 1 leaving a smoke passage 22 between said boiler and receptacle, and furthermore said receptacle 19 is located above the layer of brick 18, thus leaving a smoke passage 23 between said receptacle and said layer of brick. 95

24 indicates an igniting chamber which is located above the fire box 13 and is in communication therewith through one or a series of openings 25. 100

The receptacle 19 is also located above the bridge wall 15 thus forming a passage or

throat 26 for the passage of the smoke from the fire box 13 into the channel opening 23.

The ash pit 11 is provided with a door 27.

28 indicates the front plate of the furnace, the same being lined on its interior surface with a course of fire brick 29 and superposed upon said plate 28 is a horizontal fire brick wall 30 which extends from said front plate 28 to the end of the boiler 1. The front plate 28 is provided with a series of openings 31 which are provided with dampers 32; said openings 31 act as air passages for the admission of air into the igniting chamber 24.

33 indicates flue doors, which are of the ordinary construction, through which admission may be effected to the flues of the boiler.

The operation of the furnace is as follows: The fuel is placed in the fire box 13 and when ignited by the operator the smoke and products of combustion pass backward beneath the receptacle 19 through the throat 26 and channel 23 as indicated by arrows and if the damper 7 is closed the said smoke and products of combustion is diverted and passes backward in an opposite direction through the passage or channel 22 located above the receptacle 19 and when the same gets to the igniting chamber 24 lying above the fire box 13 it is presumed that the flame passing upwardly through the openings 25 will consume or partially consume said smoke and products of combustion. The remaining smoke and products of combustion will pass through the flues of the boiler and out through the smoke passage 4. When it is desired to create a straight draft the operator opens the valve or the damper 7 and the smoke or products of combustion will pass directly through the passage or channel 23 up through the smoke passage 6 and out at the smoke passage 4. As before stated the legs 21 act as a conductor or conveyer for the mud and sediment which may accumulate in the boiler 1. The mud and sediment which passes into the receptacle 19 will gravitate toward the edges of the same, for the reason that said receptacle inclines downwardly from the center as illustrated in Fig. 2 and said mud and sediment may be discharged through the discharge pipe 34 provided with a valve 36 which is secured to the under side of the receptacle 19 and in communication therewith as illustrated in Fig. 1.

The object of filling in the dirt 17 is to completely fill up all the unnecessary space so

that all the heat may be utilized. By employing the receptacle 19 it can be readily perceived that the heating surface of the boiler is very much increased.

35 indicates a stone foundation or base of which the hereinbefore described mechanism is preferably constructed and superposed.

From the foregoing description it can be readily perceived that a furnace of the above construction consumes or partially consumes the smoke and products of combustion, that the same may be very cheaply constructed, a large percentage of the heat generated is utilized, and the heating surface of the boiler is materially increased.

Having fully described my invention, what I claim is—

1. A smokeless boiler furnace, comprising a boiler, a water receptacle located beneath the boiler and having communication therewith and provided with a passage, a fire-box or chamber located below the passage in the water receptacle, an igniting chamber located above the passage in the water receptacle, an air passage located below the water receptacle and providing communication for the smoke and products of combustion from the fire-box to the igniting chamber, a damper located in the rear of the fire-box whereby the flow of smoke and products of combustion is deflected and directed, and a mud exhaust pipe located in the rear of the receptacle, arranged and combined in the manner set forth for the purposes stated.

2. A smokeless boiler furnace consisting of a boiler such as 1, a receptacle such as 19 curvilinear in cross section, water legs such as 20 and 21 for affording communication between said boiler and receptacle, a fire chamber located beneath said receptacle, an igniting chamber located above the same, a passage formed in said receptacle for affording communication between said igniting chamber and fire chamber, a mud exhaust pipe 34 secured to the rear of said receptacle, a damper 7, a front plate 28 provided with a series of air passages 31 and dampers 32, substantially as set forth.

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

ARTHUR BOYCE.

Witnesses:

EDWARD EVERETT LONGAN,
JNO. C. HIGDON.