

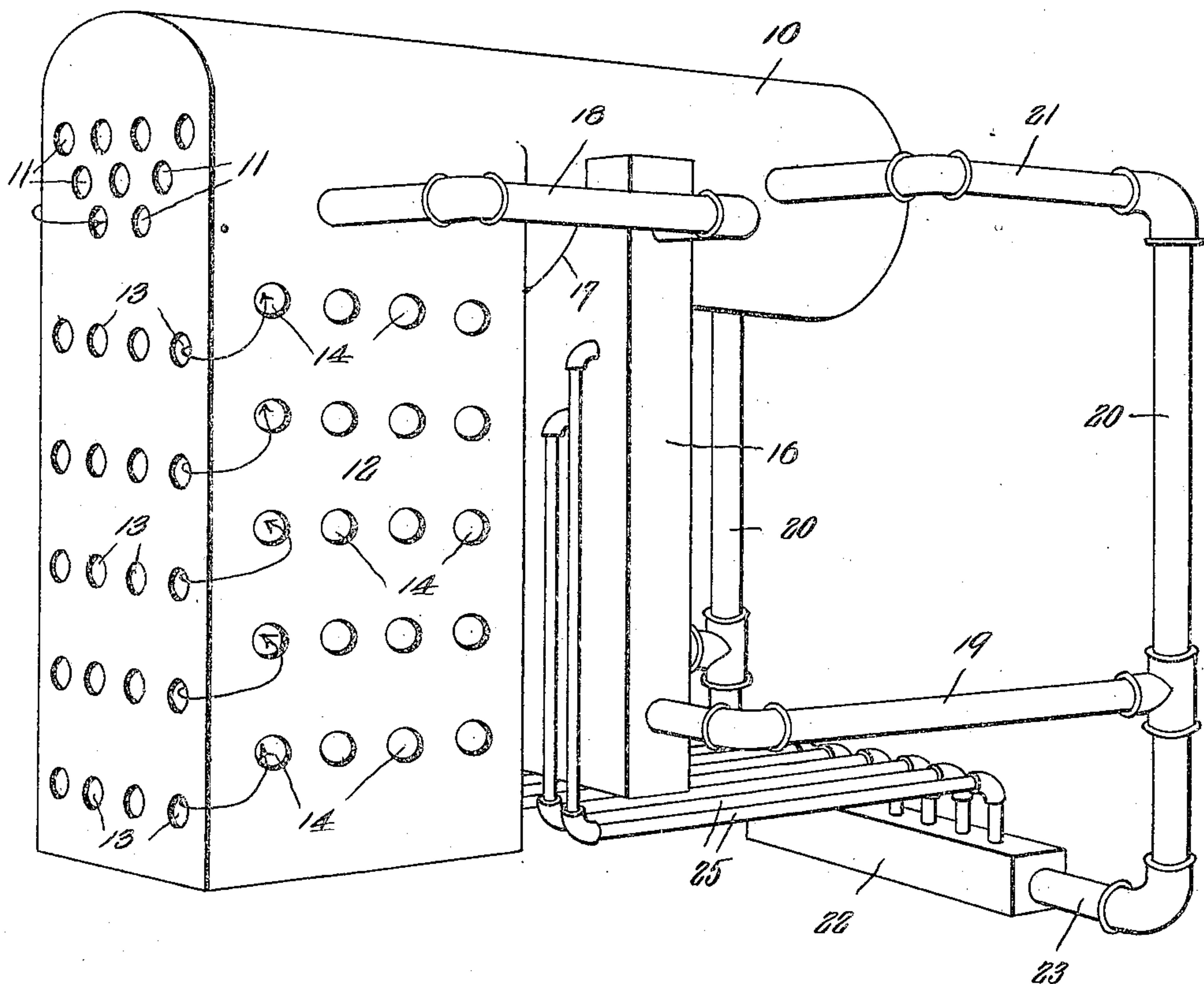
No. 812,908

PATENTED FEB. 20, 1906.

D. WIGERT.
STEAM BOILER.
APPLICATION FILED MAR. 22, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses
E. J. Stewart
John E. Parker

David Wigert,
Inventor.
by *C. A. Snow*
Attorneys

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2 SHEETS—SHEET 2.

Fig. 2.

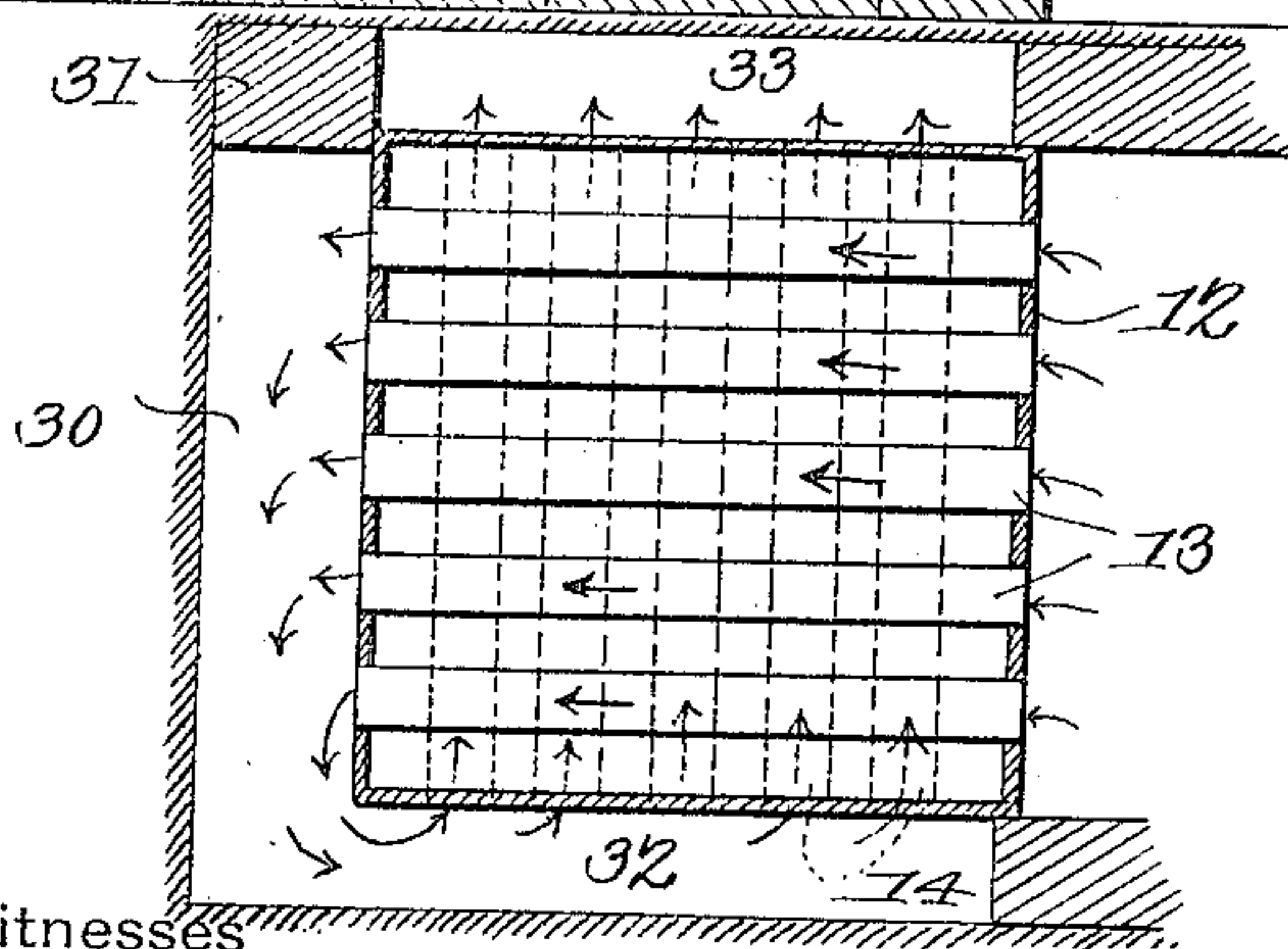
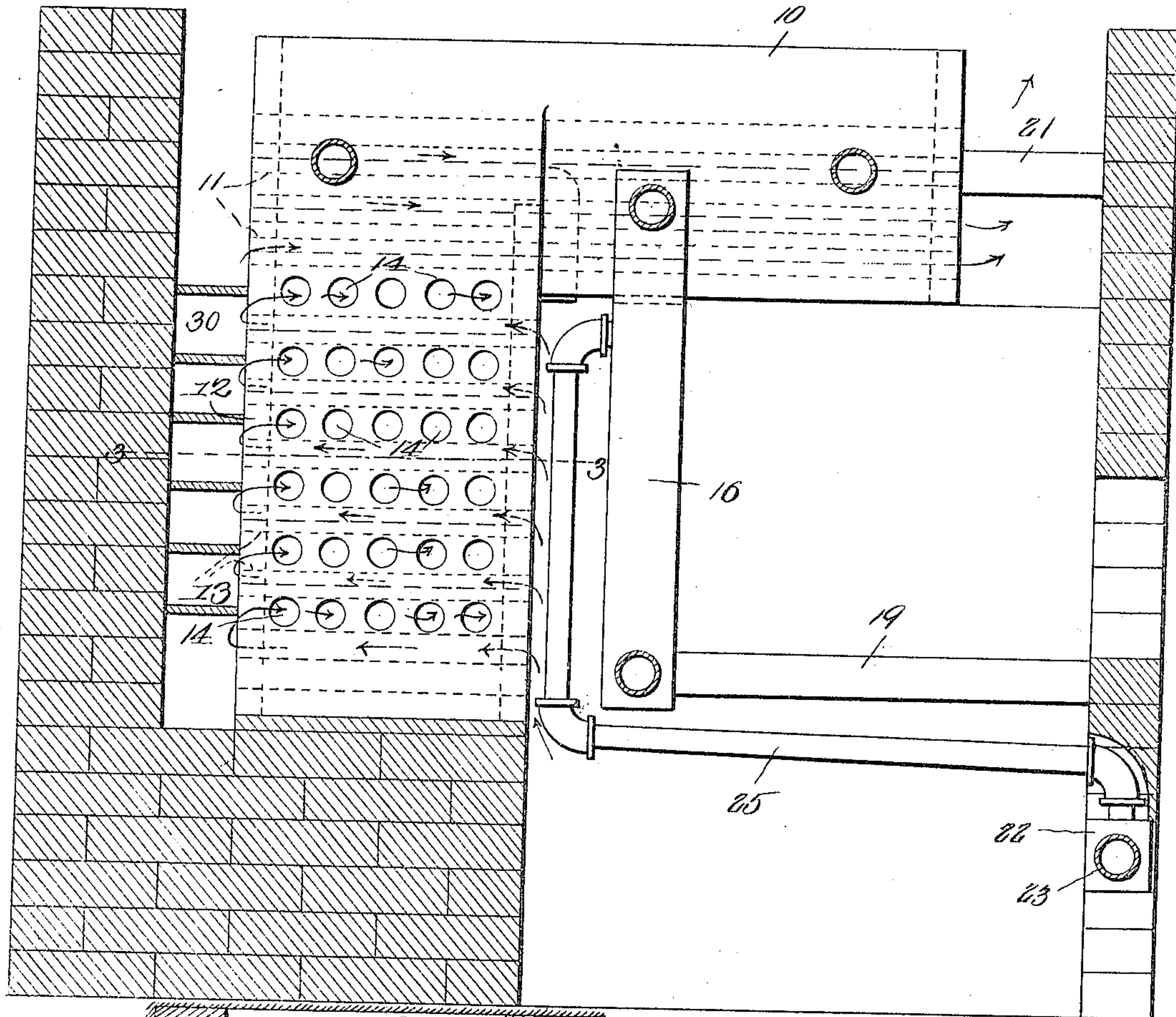


Fig. 3.

Witnesses

E. J. Stewart
J. M. Parker

David Wigert
Inventor.
by *C. A. Snow & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

DAVID WIGERT, OF GREENBUSH, ILLINOIS.

STEAM-BOILER.

No. 812,908.

Specification of Letters Patent.

Patented Feb. 20, 1906.

Application filed March 22, 1905. Serial No. 251,483.

To all whom it may concern:

Be it known that I, DAVID WIGERT, a citizen of the United States, residing at Greenbush, in the county of Warren and State of Illinois, have invented a new and useful Steam-Boiler, of which the following is a specification.

This invention relates to flue-boilers, and has for its principal object to provide a boiler and fire-box in which the heat from the products of combustion may be utilized to a much greater extent than is possible with boilers of the ordinary construction.

A further object of the invention is to provide an improved form of boiler and fire-box in which the construction is such as to practically insure the combustion of all smoke and carbon, and, further, to provide a construction of boiler in which the products of combustion will be directed into intimate and long-continued contact with water-heating surfaces either in the forms of flues or tubes.

A still further object of the invention is to provide a structure of this class in which only the lower portion of the mass of coal or other fuel will be in active combustion, the draft being downward through the fuel and through the grate-bars, so that the latter will be subjected to the direct action of heat.

A still further object is to provide a novel form of boiler and fire-box in which the grate-bars are tubular in form and are connected to the boiler to permit free circulation of the water therethrough, the tubes being so mounted as to permit of free and independent contraction and expansion without danger of rupture.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts herein-after fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a perspective view of a boiler constructed in accordance with the invention, the brick or other housing being removed. Fig. 2 is a longitudinal sectional elevation of the boiler.

Fig. 3 is a sectional plan view of the rear portion of the boiler.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The upper portion of the boiler proper is cylindrical in form, as indicated at 10, and is provided with longitudinal flues 11 of the usual type, the latter discharging into a stack at the front end of the boiler. The rear end of the boiler is provided with an enlarged rectangular portion 12, the four sides of which each form flue-sheets, and extending through this portion of the boiler are two sets of flues 13 and 14, the sets alternating, as shown more clearly in Fig. 1. The flues 13 extend in a direction parallel with the upper flues 11, while the flues 14 extending transversely of the casing 12 or at a right angle to the flues 11 and 13, thus affording numerous passages for the products of combustion before the latter finally enter the rear ends of the upper flues 11.

Immediately in front of the rectangular portion 12 of the boiler is an auxiliary water-heater 16, that is of a generally rectangular form and is provided at its upper edge with a semicircular recess 17, that fits around the lower surface of the tubular portion 10 of the boiler, but does not make contact therewith, so that there will be no interference with expansion and contraction, and a small space is formed through which a portion of the products of combustion may pass along under the curved lower surface of the portion 10 of the boiler in the direction of the escape flue or stack. The upper end of the water-heating chamber 16 and the rear portion of the boiler are connected by two circulating-pipes 18, and the opposite edges of the lower portions of said chamber are connected by pipes 19 to vertical pipes 20, which in turn are connected by pipes 21 to the forward portion of the cylindrical boiler 10, thus forming a complete circulating system.

Arranged in front of the fire-box and generally supported by the brick or other housing of the boiler is a rectangular or cylindrical water-box 22, the opposite ends of which are connected by pipes 23 to the lower ends of vertical pipes 20. This box serves, in connection with the rear portion of the chamber 16, for the support of the members 25. Each grate member is in the form of a tube 25, bent at a right angle or formed of a number of

pipe-sections connected by elbows in the usual manner. The front end of each grate-tube is connected to the box 22, and the rear end extends upwardly between the rectangular portion 12 of the boiler and the auxiliary water-heating chamber 16 and is coupled to the latter at a point some distance below the cylindrical portion 10 of the boiler.

When fuel is placed in the fire-box and the fire started, the draft will be in the direction indicated by the arrow and only the fuel directly supported by the grate or directly in contact with the grate will be in a state of active combustion, while the gas evolved by the partial coking process of the fuel above will be drawn down with the air and consumed. The products of combustion will pass downwardly between the tubes which form the grate and thence upwardly between the water-heating chamber 16 and the rectangular portion 12 of the boiler, following closely the vertical portions of the grate-tubes, and thence passing through the flues 13 to the rear of the boiler.

The rectangular portion of the boiler is bricked in in such manner as to form a plurality of horizontal partitions 30 at the rear of the boiler, these being disposed in horizontal alinement with the laterally-extending tubes 14, and the passages formed between said partitions are blocked at one end by a vertical wall 31 and at the opposite end communicate with horizontal passages formed by partitions 32, arranged at one side of the vertical portion of the boiler, said partitions being in horizontal alinement with the tubes 13. The products of combustion, therefore, after passing through the tubes 13 are directed into the horizontal passages between the partitions 30 and thence to the horizontal passages between the partitions 32 at the side of the boiler, and as these latter passages are in communication with the laterally-extending tubes 14 the products of combustion must pass through such tubes 14 to a vertical passage 33, the upper portion of which communicates with the space to the rear of the tube 11, the products of combustion thence passing through such tubes 11 toward the escape-stack at the front of the boiler. The general course of the products of combustion is clearly indicated by the arrows in Fig. 1.

With a device constructed in accordance with this invention the heat of the products of combustion is more fully utilized than in

boilers of ordinary type, and owing to the combustion-space formed between the boiler-section 12 and the auxiliary heater the smoke and combustible gases will be almost wholly consumed.

By arranging the grate bars or tubes in the manner described said tubes are free for independent expansion and contraction without danger of rupture and will last for a considerable period of time. When burned out, these tubes may be readily renewed without interfering with the remaining portion of the boiler.

Having thus described the invention, what is claimed is—

1. A boiler having an approximately vertical portion provided with a series of sets of flues extending therethrough, each set comprising two rows of flues, one disposed above the other, and at a right angle thereto, all of the flues of one row of each set communicating with the combustion-chamber and arranged for the direct passage of the products of combustion, and flue members or partitions for directing the products of combustion from one row of each set to the second row of each set of flues.

2. The combination with a boiler, of an auxiliary water-heating chamber having a circulating connection with the boiler, said auxiliary chamber forming the rear wall of the fire-box and spaced from the front face of the main boiler to form a vertical passage or combustion-chamber through which the products of combustion must pass to the main boiler-flue.

3. The combination with a steam-boiler, of an auxiliary chamber arranged in front of the main boiler and forming the rear wall of the fire-box, a water-box arranged at the front of the boiler and having a circulating connection therewith, and a water-grate formed of tubes connected at their front edge to the water-box, the rear ends of said tubes extending upward within the combustion-space formed between the auxiliary chamber and the main boiler, and their upper ends being connected to said auxiliary chamber.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

DAVID WIGERT.

Witnesses:

JOHN F. YOUNG,
LEANDER DARNEILLE.