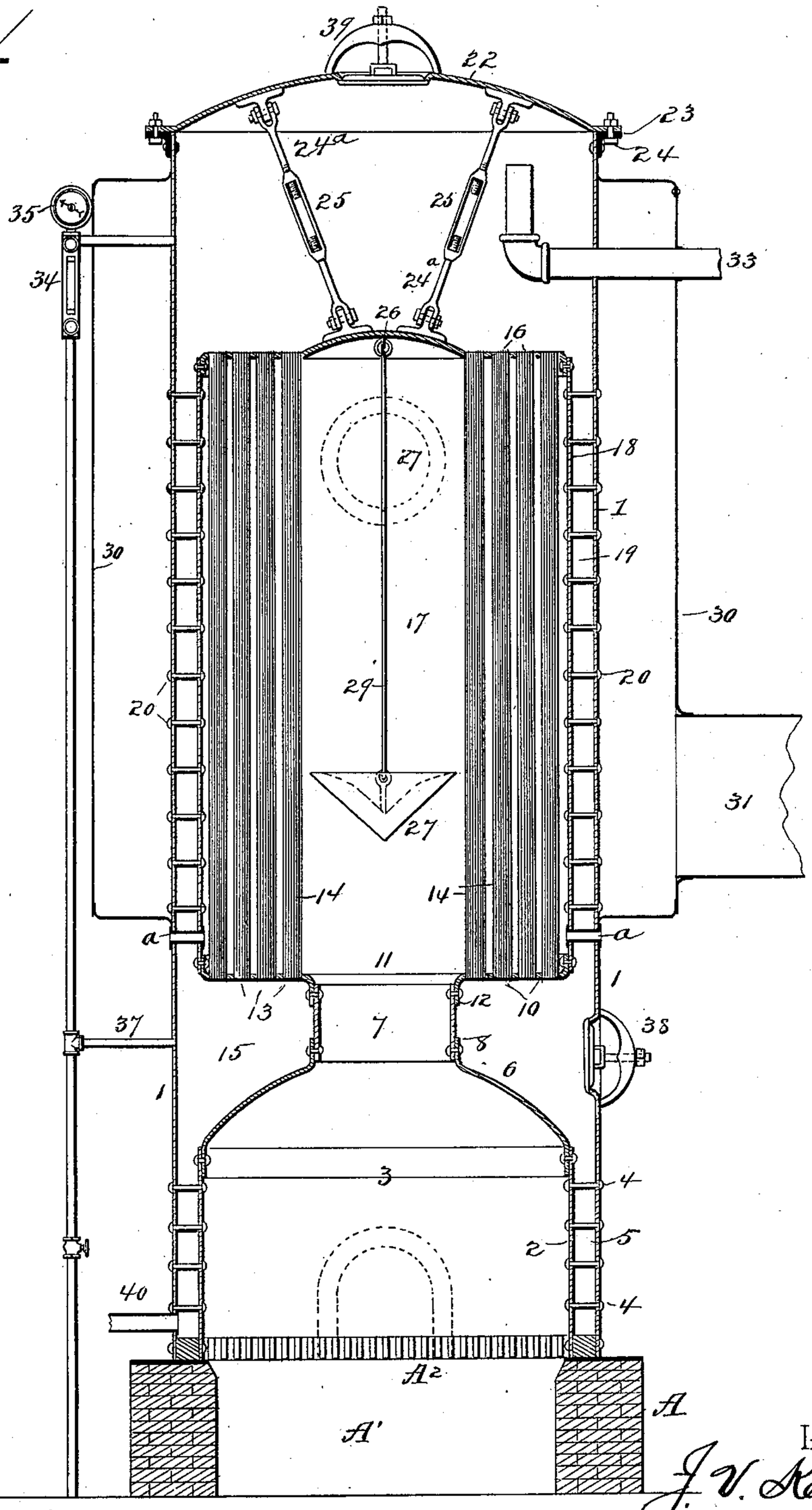
(No Model.) 2 Sheets—Sheet 1.

J. V. KENNY.

STEAM BOILER FURNACE.

No. 598,997. Patented Feb. 15, 1898.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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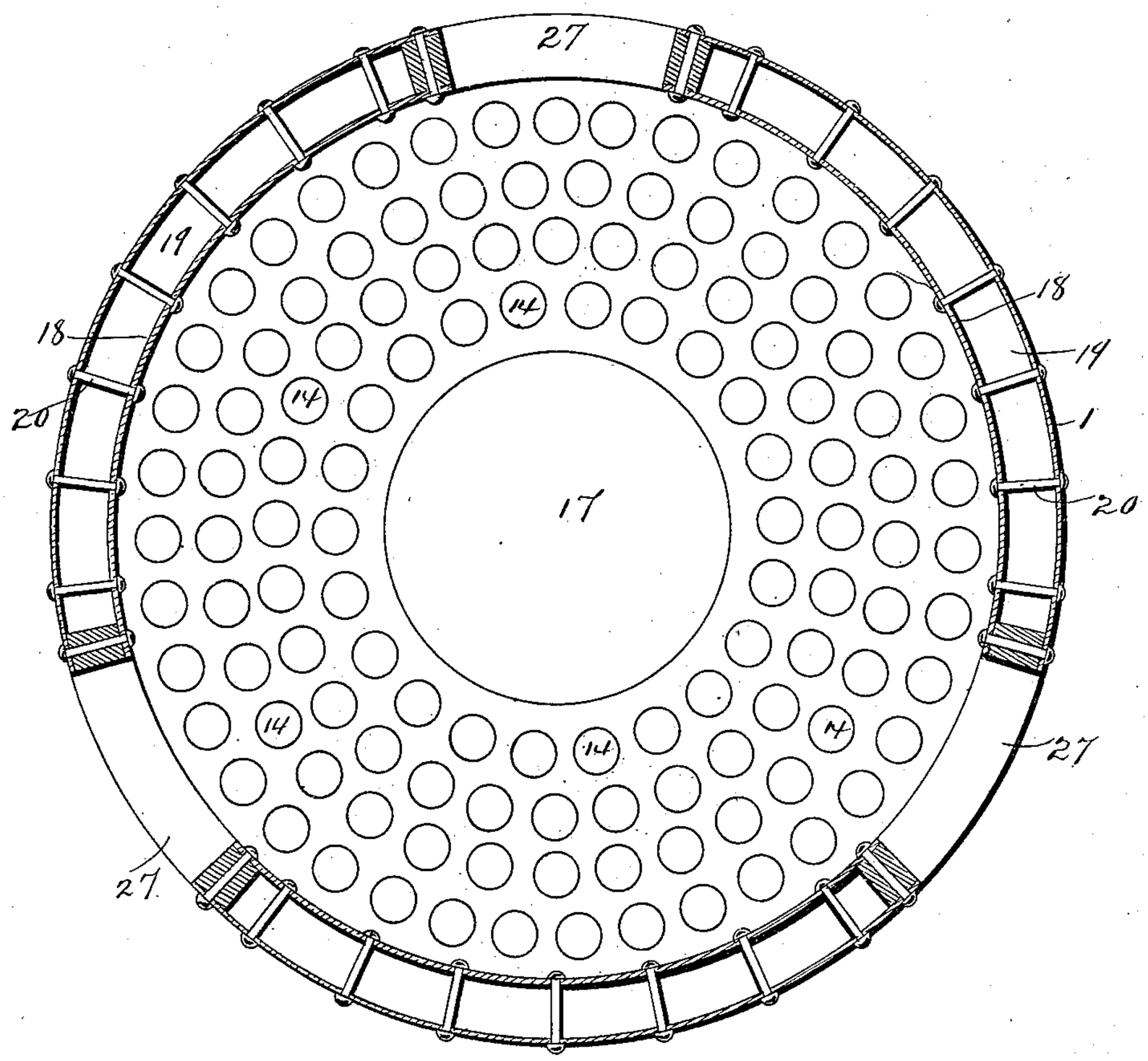
Fig. 2.



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UNITED STATES PATENT OFFICE.

JAMES V. KENNY, OF LINCOLN, NEBRASKA.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 598,997, dated February 15, 1898.

Application filed May 22, 1897. Serial No. 637,756. (No model.)

To all whom it may concern:

Be it known that I, JAMES V. KENNY, a resident of Lincoln, in the county of Lancaster and State of Nebraska, have invented certain new and useful Improvements in Steam-Boiler Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in steam-boiler furnaces, and more particularly to such as employ water-tubes, the object of the invention being to provide a vertical water-tube-boiler furnace which shall be self-contained and in which the tubes and water-space shall be so arranged as to result in an entirely free and uninterrupted circulation, and to so arrange the apparatus as to provide a large area of steam-space surrounded by a superheater.

With this object in view the invention consists in certain novel features of construction and combinations and arrangements of parts, as hereinafter set forth, and pointed out in the claim.

In the accompanying drawings, Figure 1 is a vertical cross-section of a steam-boiler furnace embodying my improvements. Fig. 2 is a horizontal cross-section.

A represents a suitable base on which my improved boiler-furnace is located, said base constituting also an ash-pit A′, over which the grate A^2 of the fire-chamber is located.

In constructing my improved furnace I employ an outer shell 1, within the lower portion of which and removed a short distance therefrom a comparatively short shell 2 is located and constitutes the vertical wall of the combustion-chamber 3, said shells 1 and 2 being connected by means of bolts 4 and the space 5 between them constituting a water compartment or jacket. A crown plate or dome 6 is secured at its lower peripheral edge to the upper end of the shell 2 and is made with a central opening 7, surrounded by an annular flange 8, to which the lower end of a short flue 9 is securely riveted. A flue-plate 10 is disposed above the short flue 9 and provided with a central opening 11, surrounded by a depending annular flange 12, to which the upper end of the short flue 9 is secured. The flue-plate 10 is also made with a number of holes 13 for the accommodation of the lower ends of the boiler-tubes 14, which latter are arranged in annular form, as most clearly shown in Fig. 2. The lower ends of the tubes 14 communicate with the space between the flue-plate 10 and the crown plate or dome 6, which space constitutes a water-chamber 15, communicating at its lower end with the annular water-space 5, surrounding the combustion-chamber. The upper ends of the tubes 14 communicate with holes in an upper flue-plate 16, the latter being adapted to close the upper end of the vertical flue 17, formed by the annular series of water-tubes 14.

The annular series of tubes 14 is surrounded by a shell 18, the upper and lower ends of which are secured to the respective flue-plates. The shell 18 is disposed a short distance from the outer shell 1, so as to form a water space or jacket 19, and said shells are maintained in fixed positions relatively to each other by means of suitable bolts or rivets 20. The annular water-space 19 communicates at its lower end with the water-chamber 15 over the combustion-chamber and at its upper end with the steam-dome 21. The steam-dome is quite large and closed at its top by means of a cover 22, securely fixed at its periphery to the upper end of the outer shell 1 by means of an angle-iron ring 23 and bolts 24. The top or cover of the steam-dome is also suitably braced by means of adjustable tie-rods 24^a, constructed in sections connected together by means of turnbuckles 25, one end of each tie-rod being secured to the cover 22 and the other end to the central portion 26 of the upper flue-plate 16. Holes or openings 27 are made in the shells 1 18 at several points (three being shown in Fig. 2) near the upper end of the water-jacket formed between said shells, and within the central space or flue 17, at a point some distance below the openings or outlets 27, a deflector 28 is located and supported by means of a rod 29, attached at its upper end to the upper flue-plate 16, said deflector being adapted to cause the heat and products of combustion arising through the short flue 9 from the combustion-chamber to be directed among the water-tubes 14 to heat them. After circulating among the water-tubes and in contact with the inner shell 18 the products

of combustion will escape through the openings or outlets 27 into a smoke-jacket 30, which surrounds the steam-dome and also that portion of the boiler containing the water-tubes. After circulating through the smoke-jacket the products of combustion will finally find their way to the outlet-pipe 31 and then to the stack.

The products of combustion while passing through the smoke-jacket will act as a superheater for the steam in the steam-dome and also for the water contained in the boiler, especially the water contained in the space between the shells 1 and 18. I prefer also to provide holes *a* below the smoke-jacket and communicating with the space occupied by the tubes, whereby to permit soot and ashes which might become lodged between the tubes and on the lower tube-plate to be blown off.

A suitable steam-pipe 33 is made to communicate with the steam-dome, and a suitable water-gage 34 and a steam-gage 35 will also be provided, and the pipe with which the steam-gage communicates may be also made to communicate with the water space or chamber 15, as shown at 37. The shell 1 will be provided with a normally-closed manhole 38, whereby access may be readily had to the water space or chamber 15, and a manhole 39 will be provided for the same purpose in the cover of the steam-dome.

The lower end of the water space or chamber 5, which surrounds the combustion-chamber, will be provided with a blow-off pipe 40.

My improved boiler is self-contained, and the tubes and water-spaces are so arranged as to afford an entirely free and uninterrupted circulation. By my improved arrangement a large area of steam-space is provided, surrounded by a smoke-jacket, which acts as a superheater and results in the formation of dry steam. My improved construction is particularly adapted for high pressure, will operate to effect the quick formation of steam, and the parts are readily accessible for the purpose of cleaning, &c.

My improvements are simple in construction and effectual in all respects in the performance of its functions.

Various slight changes might be made in the details of construction of my invention without departing from the spirit thereof or limiting its scope, and hence I do not wish to limit myself to the precise details herein set forth.

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

In a steam-boiler furnace, the combination with a combustion-chamber at one end and a steam-dome at the other, of a series of water-tubes disposed between the combustion-chamber and the steam-dome, a communication between the space occupied by the water-tubes and the combustion-chamber, a smoke-jacket surrounding the steam-dome and the water-tubes, and having an outlet at its lower end, said smoke-jacket communicating with the space occupied by the water-tubes, at the upper end thereof and inlets communicating with said space occupied by the water-tubes, at points below the smoke-jacket, substantially as set forth.

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

JAMES V. KENNY.

Witnesses:
FRANK PARKS,
G. O. SMITH, Jr.