

No. 713,400.

Patented Nov. 11, 1902.

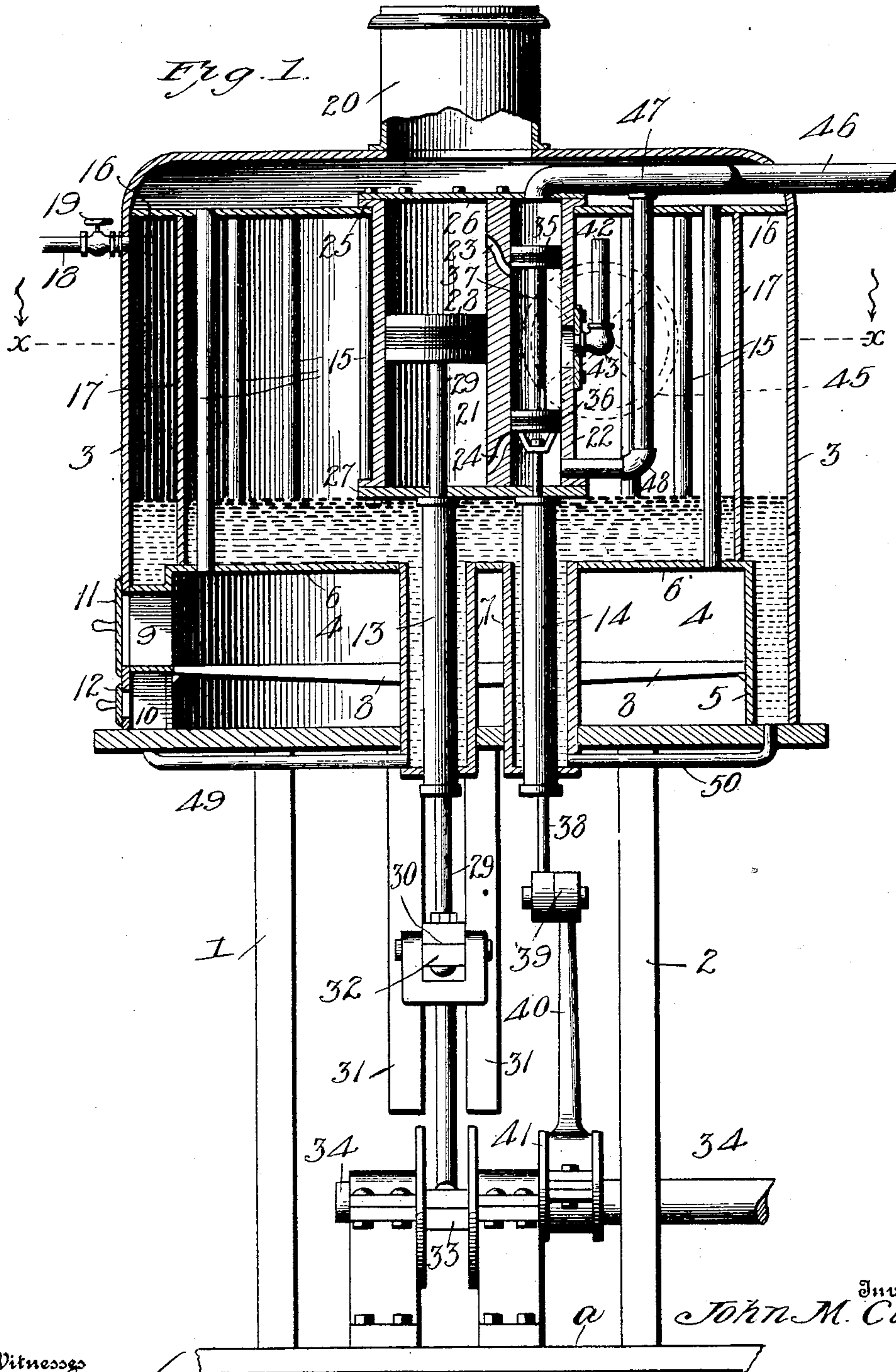
J. M. CLARK.

STEAM ENGINE.

(Application filed Oct. 23, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

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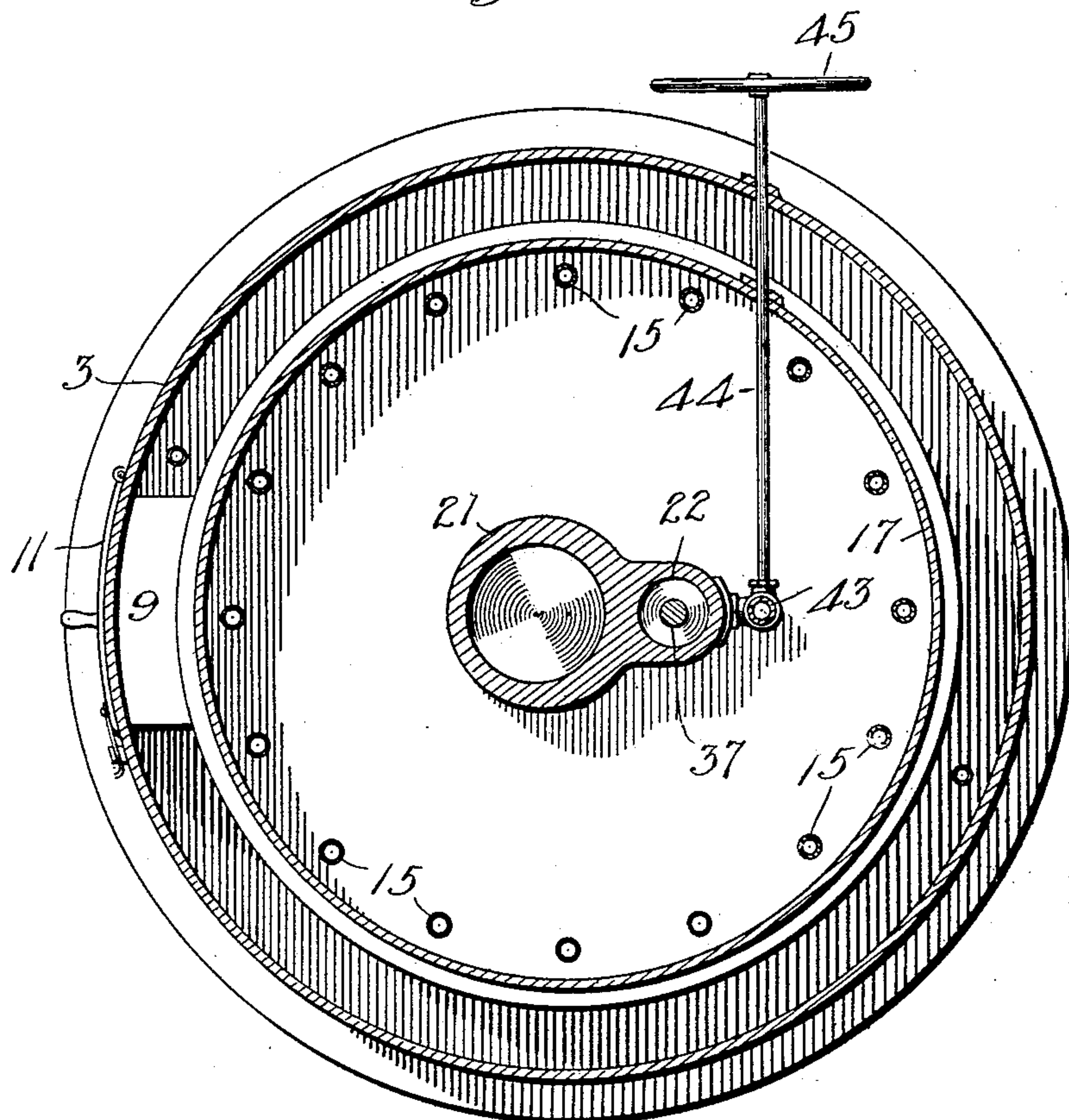
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2 Sheets—Sheet 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHN M. CLARK, OF WHITESTONE, NEW YORK.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 713,400, dated November 11, 1902.

Application filed October 23, 1901. Serial No. 79,732. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. CLARK, a citizen of the United States, residing at Whitestone, Long Island, in the county of Queens and State of New York, have invented certain new and useful Improvements in Steam-Engines; 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 improvements in steam-engines; and the object is to provide a combined engine and boiler arranged in a neat and compact form and arrangement whereby the device or apparatus will be adapted for marine propulsion and for similar locations where space must be economized. Other objects will be hereinafter specified in detail and the novelty particularly pointed out and distinctly claimed.

I have fully and clearly illustrated my invention in the accompanying drawings, to be taken as a part hereof, and wherein—

Figure 1 is a view in central vertical section through the boiler, steam-cylinders, and furnaces and showing the interior adjuncts and elements in elevation. Fig. 2 is a horizontal section through the device, taken on the line *xx* of Fig. 1.

Referring to the drawings, 1 2 designate two standards, mounted on a suitable base-piece *a* and constituting the supports for the boiler-casing 3. In the boiler is arranged a circular fire-box 4, set on the bottom of the boiler and made up of an outer wall 5, spaced from the boiler-casing, as shown, a cover or top plate 6, and central vertical water-tubes 7, wherein the tubular sleeves 13 14 are arranged, through which the piston-rods of the cylinders extend. Wherever exposed to the ingress of the water in the boiler, the seams of the fire-box are sealed to prevent it. In the fire-box are secured grate-bars 8, the space below them forming the ash-pit. Neck-pieces 9 10 open into the fire-box and ash-pit and are closed by suitable doors 11 12.

It is the purpose of the water-tubes 7, in conjunction with the tubular sleeves 13 14, to protect the piston-rods of the cylinder and the valves against the effects of the heat of the fire-box.

15 designates the vertical tubular flues opening from the cover of the fire-box and having their upper ends opening through a plate 16, fitted steam-tight below the dome or top plate of the boiler-shell. The tubular flues 15 are arranged in circular series, as shown the better in Fig. 2 of the drawings, and are inclosed by a cylindrical shell 17, extending vertically between the cover of the fire-box and the plate 16, as shown. The shell 17 being of smaller diameter than the shell 3 a water-space is formed between them. A water-inlet pipe 18 is provided, through which the water is let into the boiler, a valve 19 being inserted in the pipe to open and close the passage.

A stack 20 opens from the top of the outer boiler-shell, as shown in the drawings.

21 designates the piston-cylinder, and 22 the steam-chest and valve-chamber, arranged in parallel relation side by side. They may be cast integral and have their interiors bored to true cylinders. In the partition between the cylinders are formed the usual steam-ports 23 24, communicating with both cylinders. The upper end of the cylinder is let through the plate 16 and is supported thereon by a rim-flange 25, suitably sealed to the plate. A strong head-plate 26 is suitably bolted to the flange 25. The lower end of the cylinders sets upon and is suitably secured to a plate 27, which is provided with apertures through which the piston-rods pass, and the plate rests upon and seals the upper end of the sleeves 13 14. In the cylinder 21 is disposed the piston-head 28, the rod 29 of which extends through the lower head or plate 27 of the cylinder and through the sleeve 13 and has its lower end secured in a cross-head 30, sliding on guides 31. The yoke 32 of the cross-head is connected to a crank-piece 33 on the engine-shaft 34.

In the steam-chest and valve-chamber 22 are two piston-heads 35 36, fixed rigidly on the respective ends of a rod 37, the heads constituting the valves which open and close the steam-passages leading into the steam-cylinder. The lower valve 36 has connected to it a rod 38, which passes through the protecting-sleeve 14 and has its lower end jointed at 39 to an eccentric-rod 40, mounted on an eccentric 41 on the engine-shaft 34.

42 designates the steam-inlet pipe, standing vertically in the steam-space of the inner boiler-shell and opens into the steam-chest or valve-chamber at its lower end, substantially as shown. In the lower end of the steam-pipe 42 is mounted the throttle-valve 43, the stem 44 of which extends through the boiler-shells and is provided with a hand-wheel 45, by which the valve is opened and closed.

46 designates the exhaust-pipe opening from the upper end of the steam-chest, and is formed with a coil 47 for reheating the exhaust. To take the exhaust from the lower end of the steam-chest, an exhaust-pipe 48 is provided, which extends to and opens into the upper or main exhaust-pipe, substantially as seen in the drawings.

The water-space between the boiler-shells has communication with the water-space in the inner boiler-shell by means of pipes 49 50, leading from the outer water-space into the base of the water-tubes in the fire-box.

The operation of the engine is manifest to any one conversant with the art. The throttle-valve being turned to let steam in the steam-chest and the valves being in the position shown in Fig. 1 of the drawings, the steam is forced through the upper steam-port 23 in the chamber of the piston-cylinder above the piston-head, which is forced down in the cylinder and turns the engine-shaft, which at a determined position through the eccentric connections draws the valves down so that the lower one moves below the port 24 to let steam behind the piston and the upper valve below the port 23, leaving that in communication with the upper exhaust-pipe, so that when the piston makes its re-

turn stroke the exhaust-steam escapes through port 23 out through the exhaust and the live steam passes through the port 24 into the piston-cylinders, and thus in alternation during the action of the engine.

Having described my invention, what I claim is—

1. In a combined engine and boiler, the combination with the boiler, the piston-cylinder and piston therein, the steam-chest and valve therein, of a fire-box located within the base of the boiler, vertical water-tubes in the fire-box, vertical sleeves arranged in the water-tubes, the piston-rod extending through one of said sleeves, and the valve-rod extending through the other.

2. A combined engine and boiler comprising an outer boiler-shell, an inner boiler-shell closed at each end, a fire-box located within the boiler and supporting the inner shell of the boiler, vertical water-tubes in the fire-box, pipes leading from the outer water-space into the water-tubes, vertical sleeves in the water-tubes, a piston-cylinder having steam-ports, a piston in said cylinder having its rod projected through one of said sleeves, a steam-chest having communication with the piston-cylinder and provided with exhaust-ports, valves in the steam-chest having their stem passed through the other of said sleeves, and fire-tubes extending vertically through the inner boiler-shell.

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

JOHN M. CLARK.

Witnesses:

CLINTON T. ROE,
A. G. PAULY.