

No. 627,321.

Patented June 20, 1899.

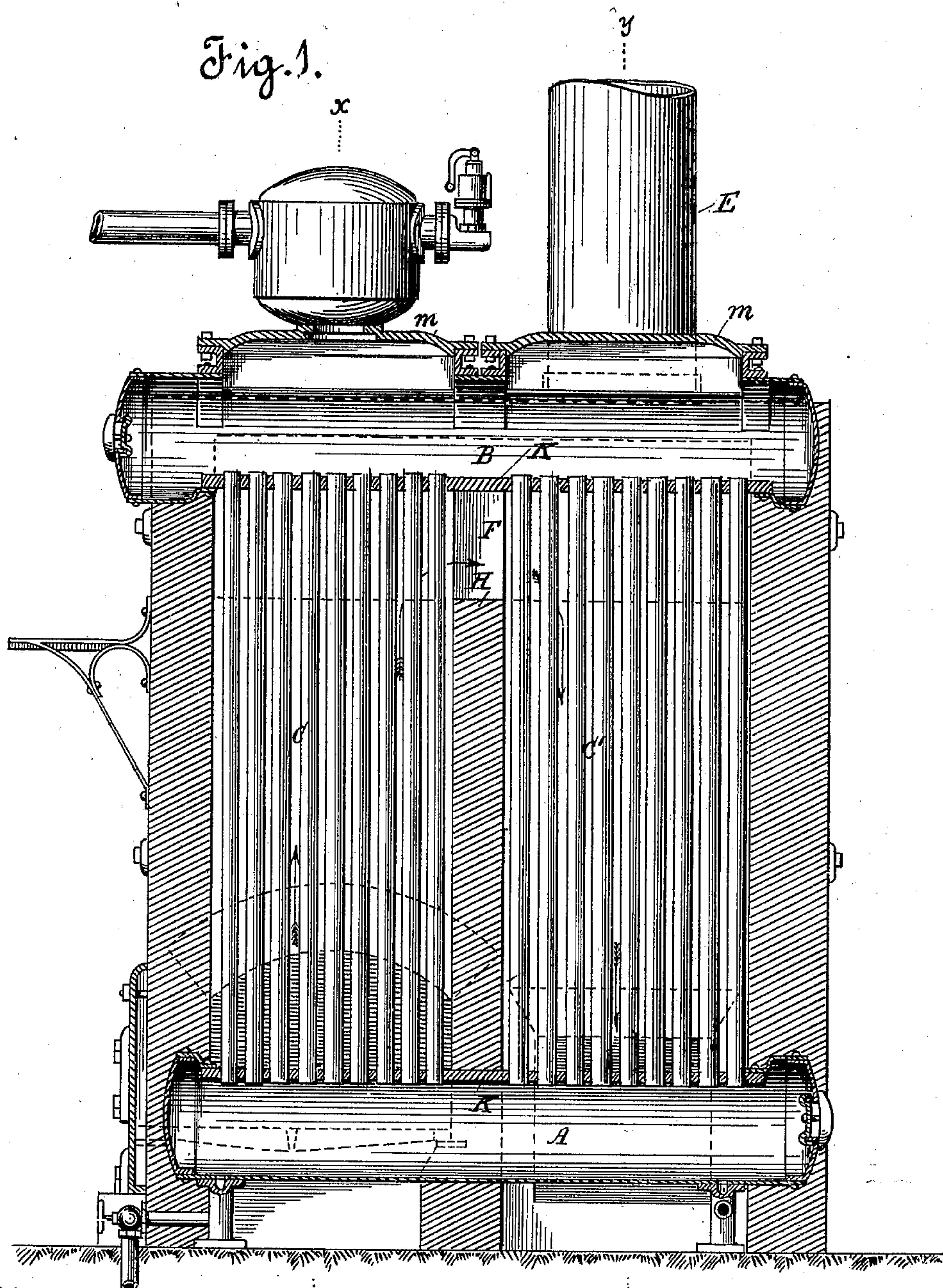
M. P. BOSS.

BOILER.

(Application filed Sept. 26, 1898.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses.

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Walter H. Overmyer

Inventor.

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by Wm. F. Booth
his Attorney.

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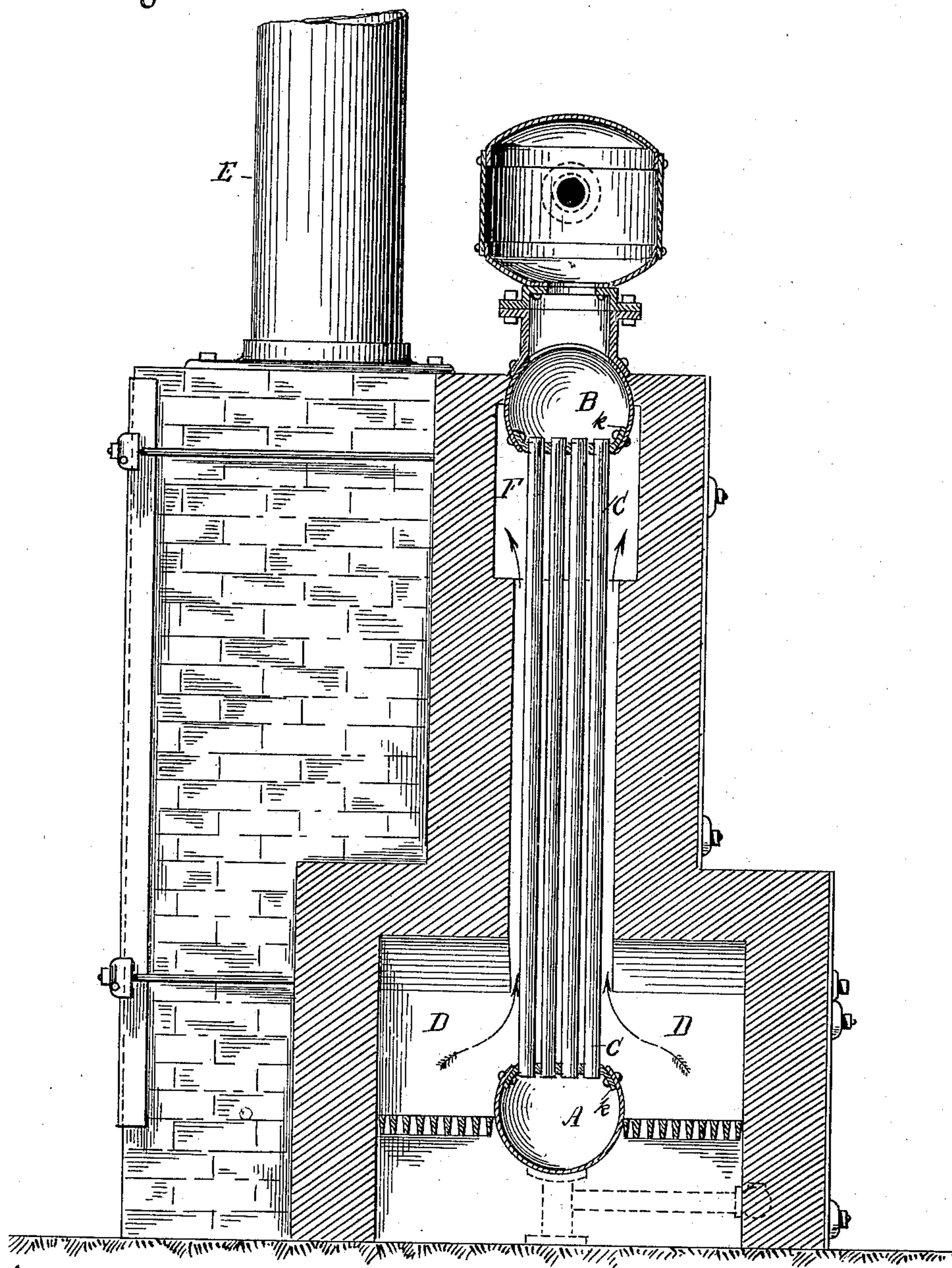
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(No Model.)

4 Sheets—Sheet 2.

Fig. 2.



Witnesses.

Steffertwerds.

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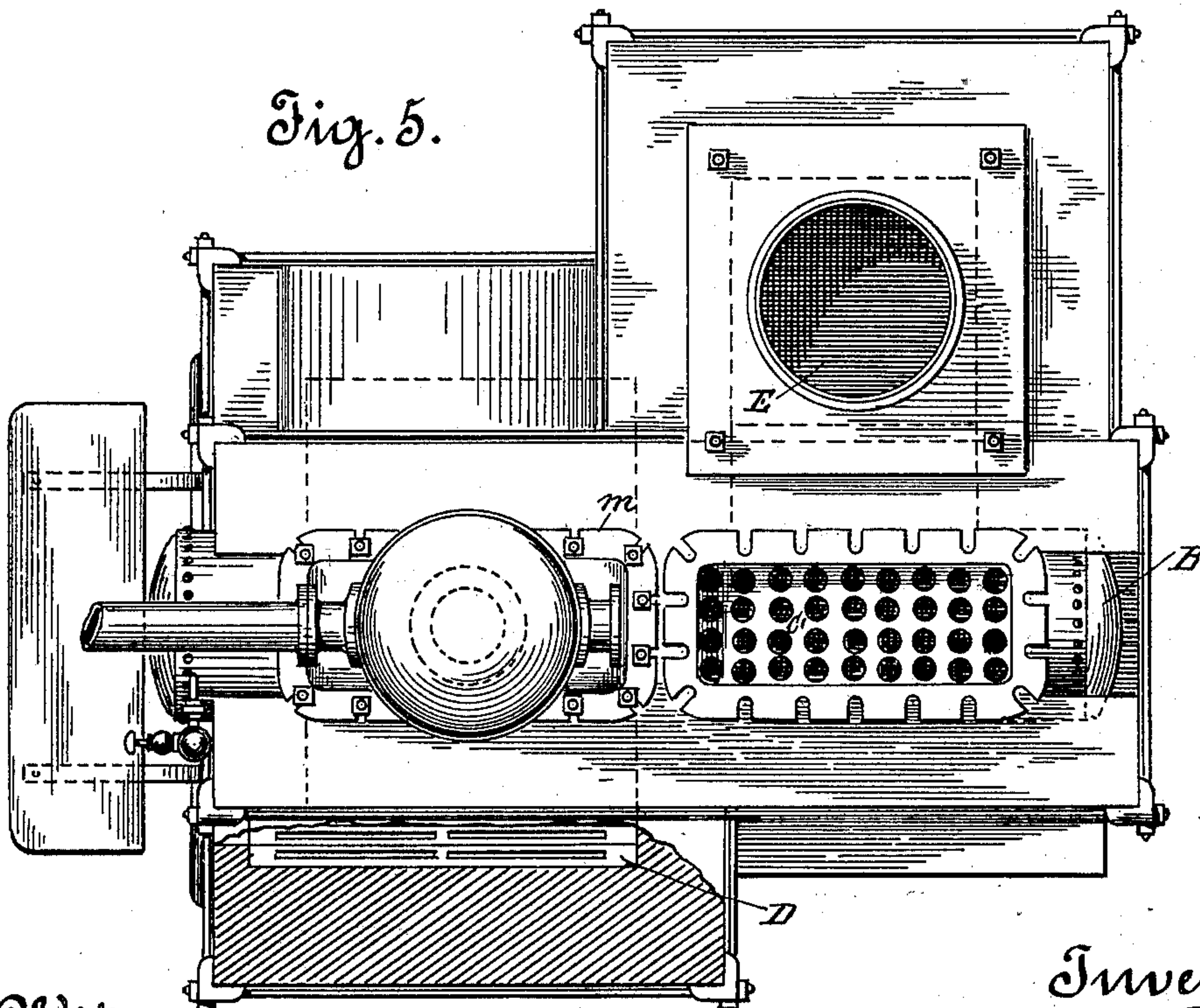
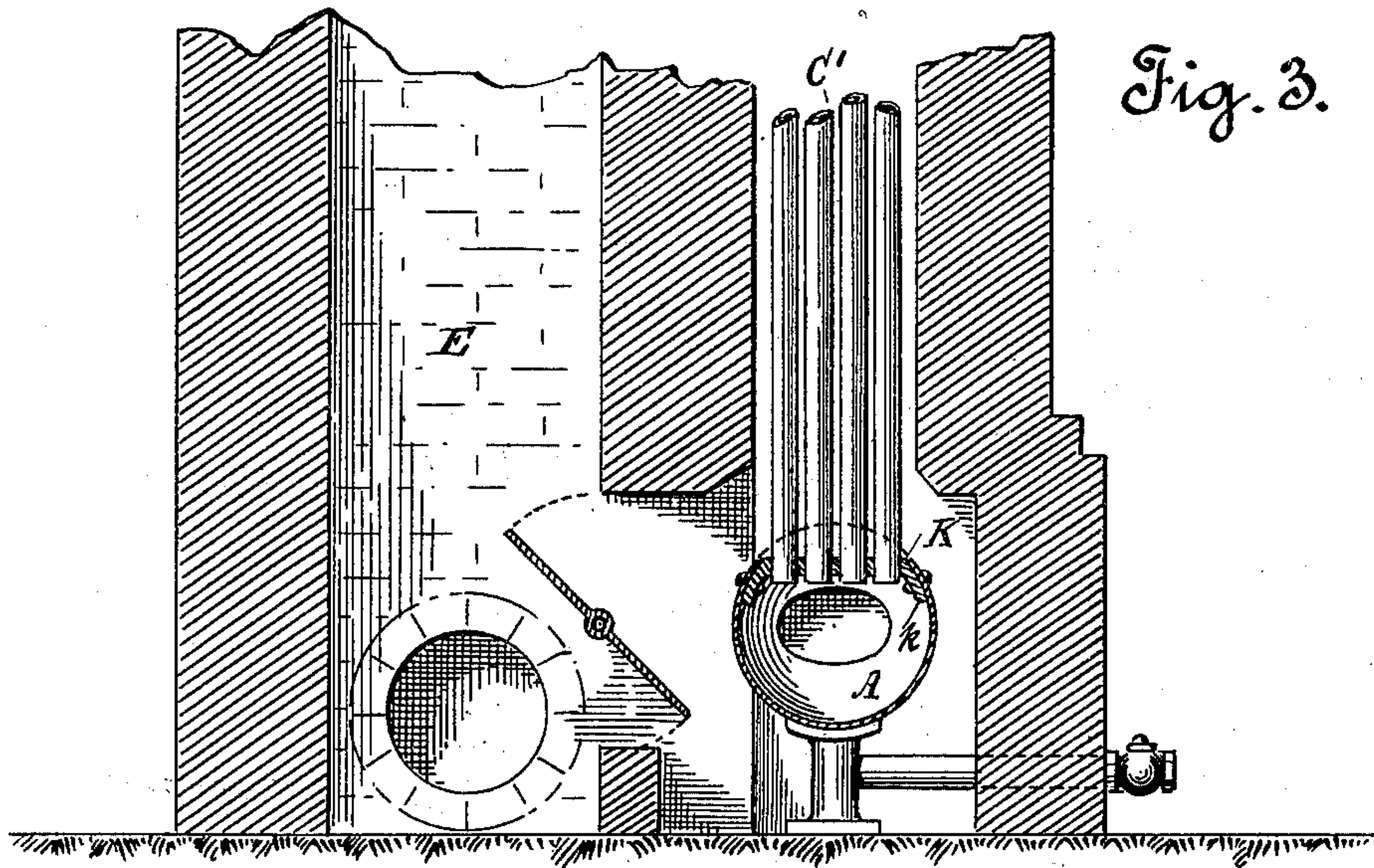
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(Application filed Sept. 26, 1898.)

(No Model.)

4 Sheets—Sheet 3.



Witnesses.

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Patented June 20, 1899.

M. P. BOSS.

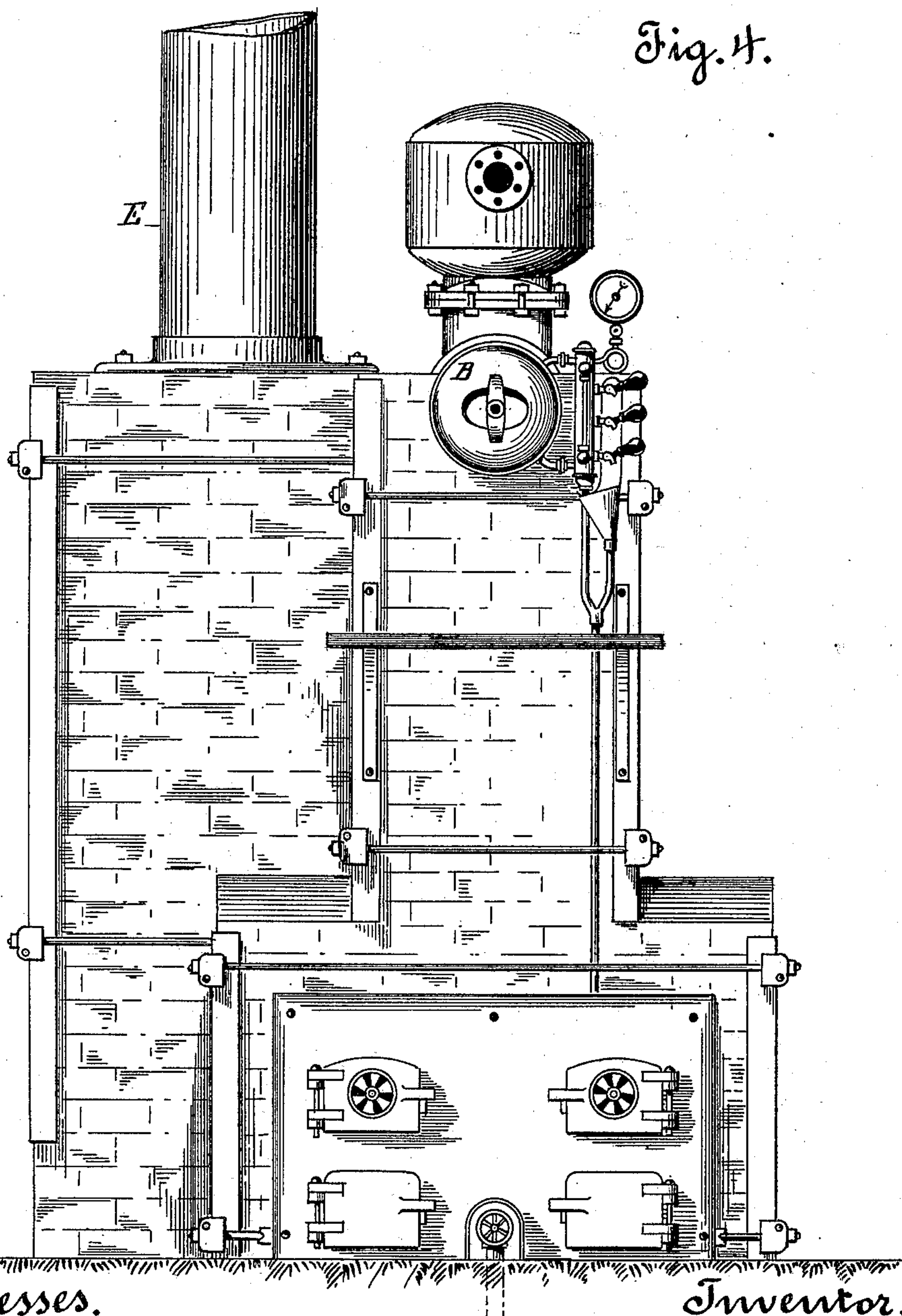
BOILER.

(Application filed Sept. 26, 1898.)

(No Model.)

4 Sheets—Sheet 4.

Fig. 4.



Witnesses.

H. H. H. H. H.

Walter H. Lane

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UNITED STATES PATENT OFFICE.

MARTIN P. BOSS, OF SAN FRANCISCO, CALIFORNIA.

BOILER.

SPECIFICATION forming part of Letters Patent No. 627,321, dated June 20, 1899.

Application filed September 26, 1898. Serial No. 691,932. (No model.)

To all whom it may concern:

Be it known that I, MARTIN P. BOSS, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Boilers; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of boilers having water-tubes connecting two water-cylinders which are exposed to the fire only from the outside.

My invention consists of a plurality of series or groups of water-tubes connecting two cylinders, each series or group of tubes being so segregated and inclosed that the space around and between the tubes shall form a flue, except that the base of the first series of tubes may spring from the midst or at one side of the fire-chamber.

My invention also consists of other details of construction and arrangement, all of which I shall hereinafter fully describe.

The general object of my invention is to provide a simple and efficient water-tube boiler with maximum heating-surface, good water circulation, deposit of sediment below fire-level, and accessibility and convenience for cleaning and repairs, and also free expansion and contraction.

Referring to the accompanying drawings, Figure 1 is a longitudinal section through the boiler, which in this case shows but two series of tubes. Fig. 2 is a transverse section on line *xx* of Fig. 1 through fire-chamber and first series of tubes. Fig. 3 is a transverse section on line *yy* of Fig. 1 through the last series of tubes and the base of the chimney. Fig. 4 is a front elevation of the complete boiler. Fig. 5 is a plan.

A and B are the two cylinders connected by the separated series or groups of tubes C and C'.

D is the fire-chamber, and E the base of the chimney.

The group of tubes C and C', it will be seen, are separated by a wall H, and the spaces inclosing the tubes form flues through which the heat-currents pass. At the upper portion these flues are widened out, as shown in Fig. 2, to form a flue F in proximity to the upper cylinder B, said widened flue F extend-

ing across the two series or groups of tubes, thus providing ample capacity for the heat-currents to pass from series C to series C'. 55

If the flue were not widened at F, the division-wall H could not be carried so high without restricting the heat-currents, and the upper end of the tubes farthest from the division-wall H would be wholly without the heat-currents, and therefore less effective. 60

In operation the flame passes from fire-chamber D vertically through flue containing group C and horizontally through flue F, thence downward through flue of group C', and out at a side opening into the chimney E. 65

To enable the connecting of the straight vertical tubes to the water-cylinders A and B and to keep them all parallel throughout, I interpose into a side of each cylinder a flat plate K sufficiently thick to withstand without bulging the great pressure within the cylinder. This plate is flanged at the sides, as shown at *k*, Fig. 2, to conform to the curvature of the cylinder in order to facilitate the riveting of it into the cylinder. The form of this plate is such that it may be rolled, as bar-iron, (at a rolling-mill,) of any desired length. 75

To enable the removal or the replacing of a tube, I put into upper cylinder B a removable plate *m* opposite to each series of tubes, through which opening any tube may be removed by first removing the plate. 80

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is— 85

1. The combination with a furnace having a plurality of flues for the products of combustion communicating to give alternate currents in opposite directions, of a lower water-cylinder extending from one flue into the next flue, an upper cylinder extending from one flue into the next, and a group or nest of vertical water-tubes in each flue connecting the upper and lower cylinders, substantially as described. 90 95

2. The combination with a furnace having a plurality of flues communicating to give alternate currents in opposite directions, of a lower water-cylinder extending from one flue into the next flue, an upper cylinder extending from one flue into the next, a group or nest of water-tubes in each flue connecting 100

the upper and lower cylinders, the first nest of tubes and first flue being directly above the furnace combustion-chamber, substantially as described.

5 3. The combination with a furnace having a plurality of flues communicating to give alternate currents in opposite directions, said flues being enlarged at their upper and lower parts, of an upper and lower water-cylinder
10 each extending from the enlarged part of one flue into the enlarged part of the next flue, and a group or nest of water-tubes in each flue connecting said upper and lower water-cylinders, substantially as described.

15 4. In a water-tube boiler having water-cylinders connected by a group or nest of water-tubes, a removable plate or cover in one of

said cylinders opposite said tubes, whereby upon removing said plate or cover any tube of said group may be withdrawn through the
20 plate-opening.

5. The combination with a furnace having a double fire-chamber, and a central vertical flue, of a boiler comprising a mud-drum located to form the dividing bridge-wall of said
25 double fire-chamber, a steam-drum in the upper part of said vertical flue and vertical water-tubes in said flue connecting said drums, substantially as described.

In witness whereof I hereunto set my hand.
30 MARTIN P. BOSS.

Witnesses:

C. F. PATTON,
F. E. VETRANO.