

J. MAILER.
Fire-Box of Boilers.

3 Sheets—Sheet 1.

No. 227,278.

Patented May 4, 1880.

Fig. 1

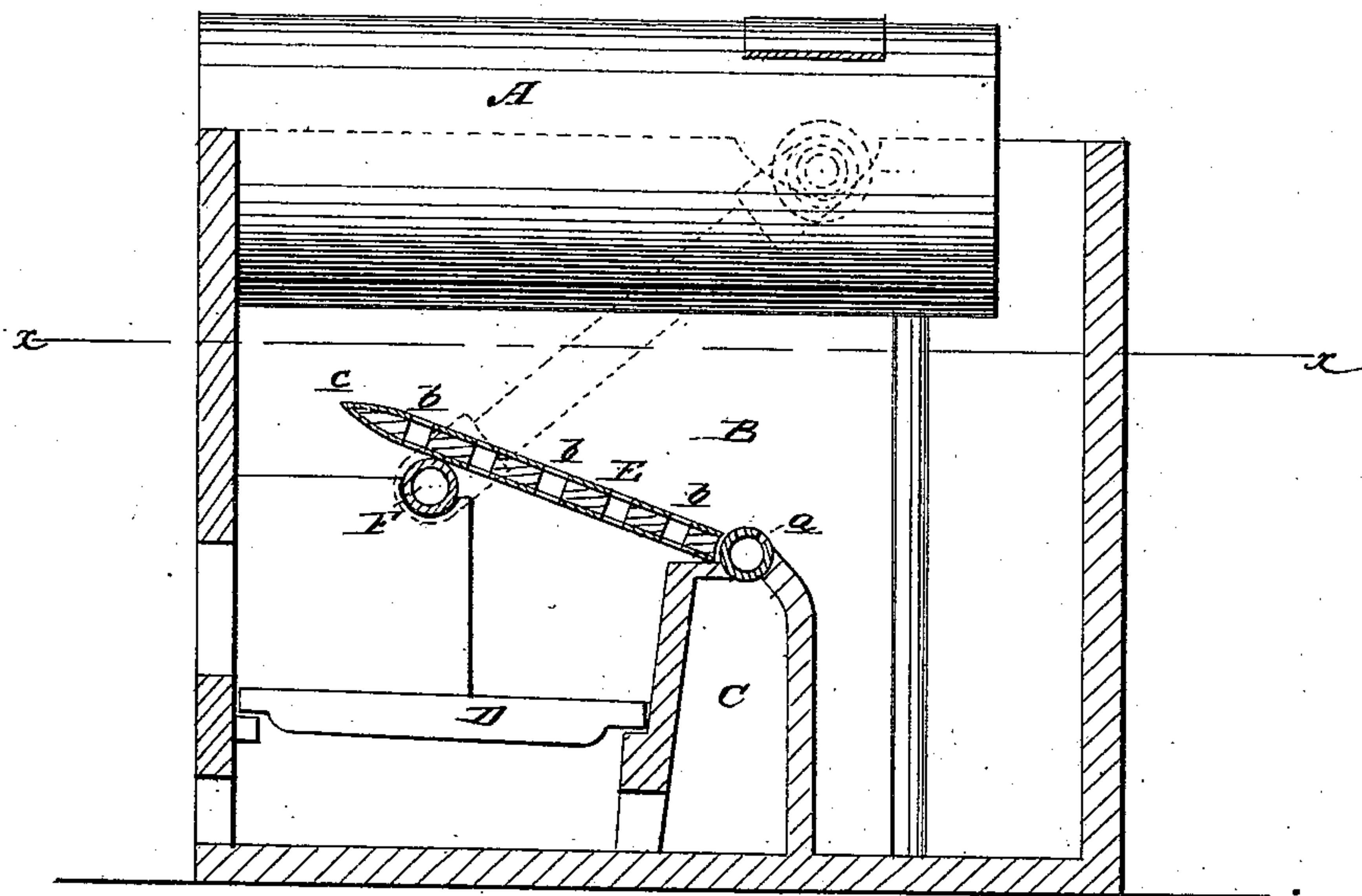
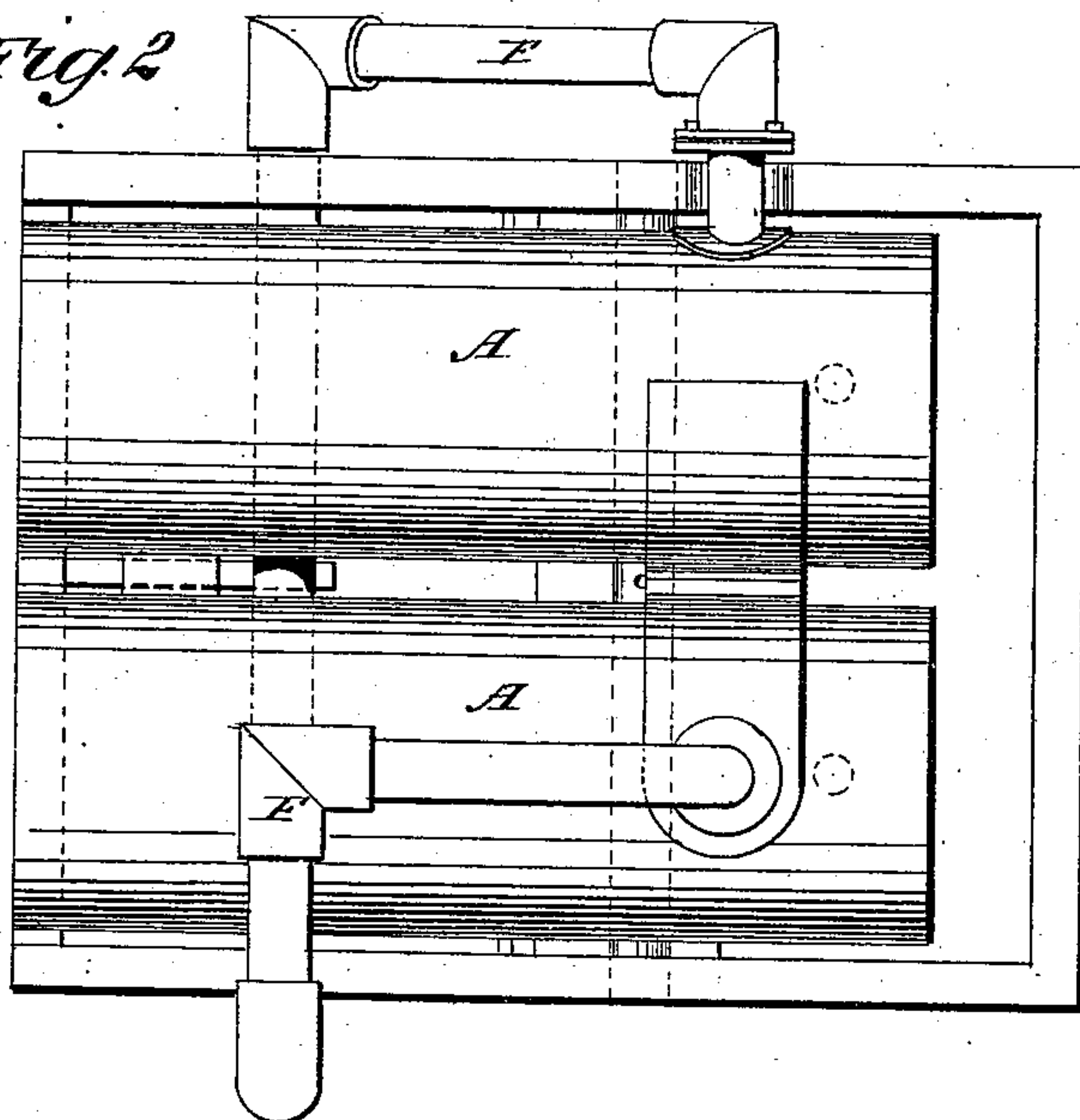


Fig. 2



WITNESSES:

Francis McArdle.
C. Seagwick

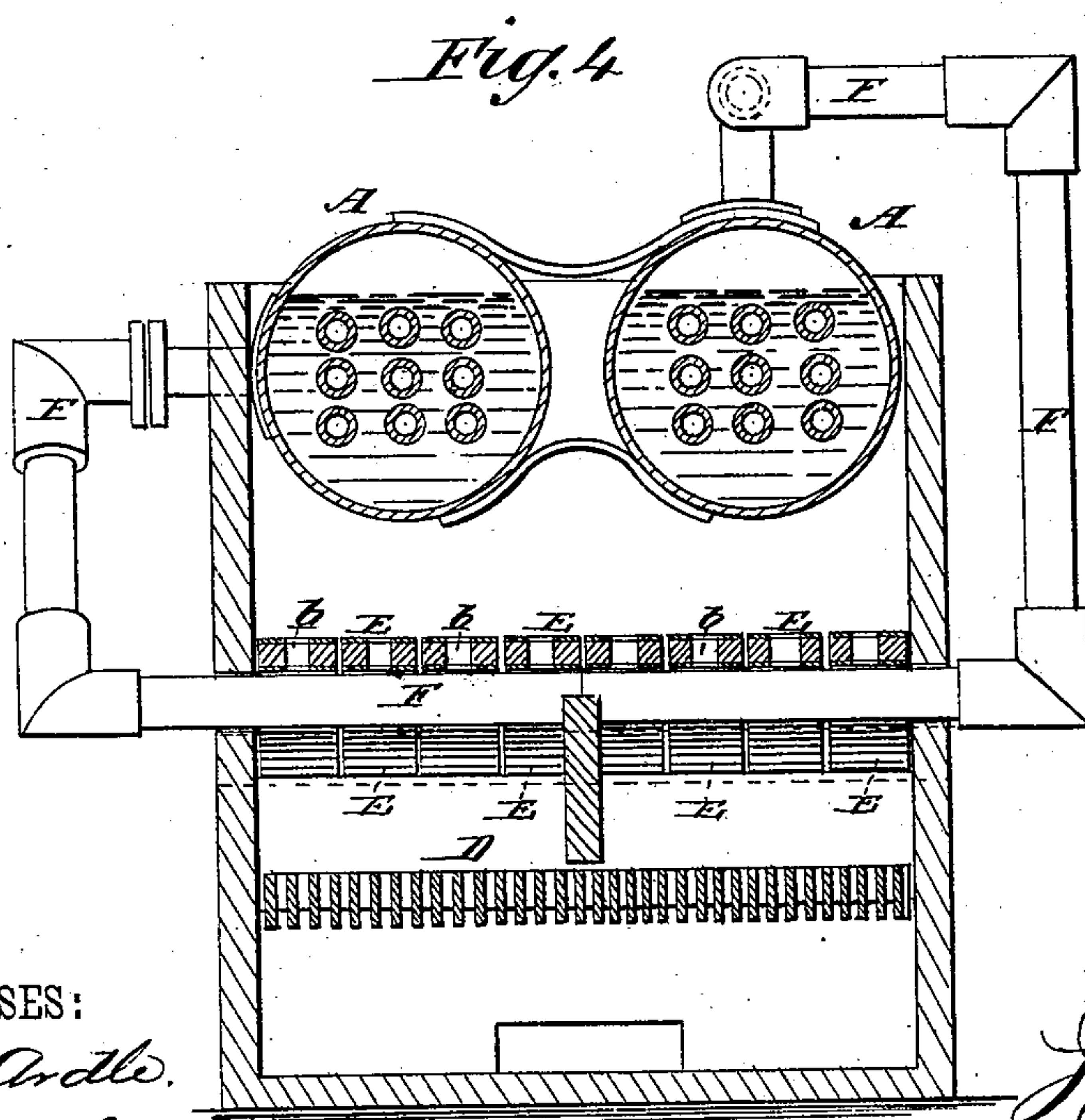
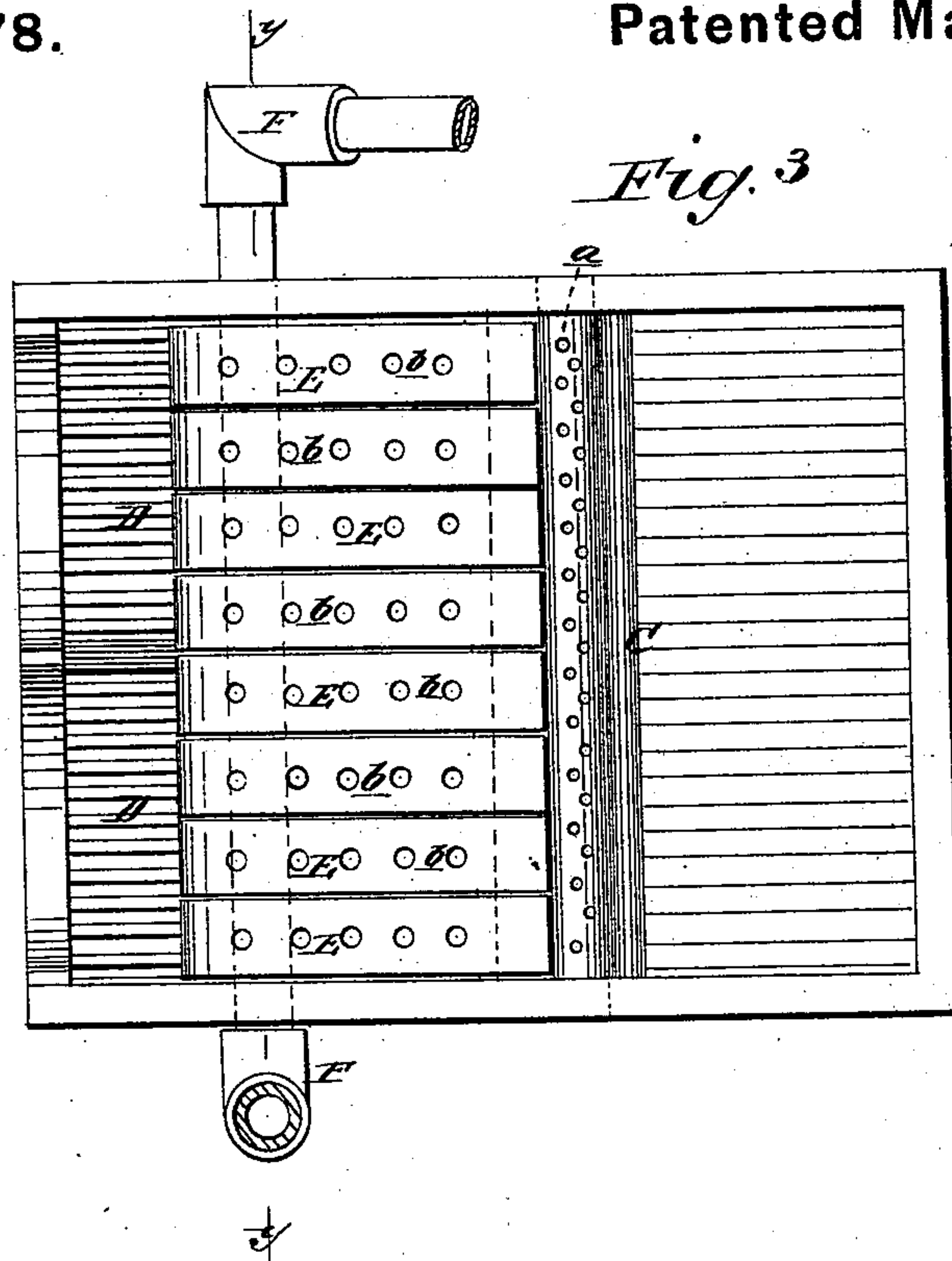
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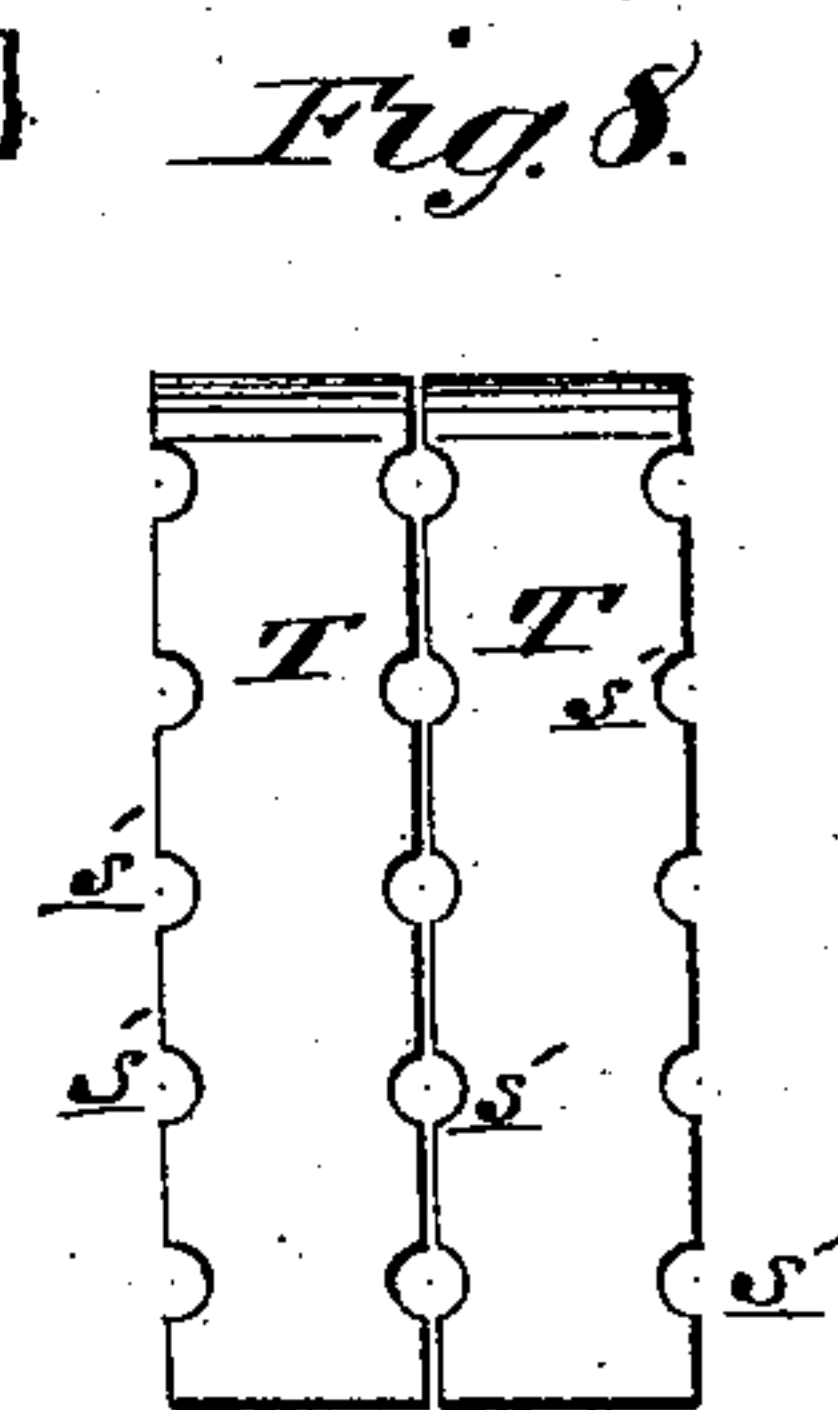
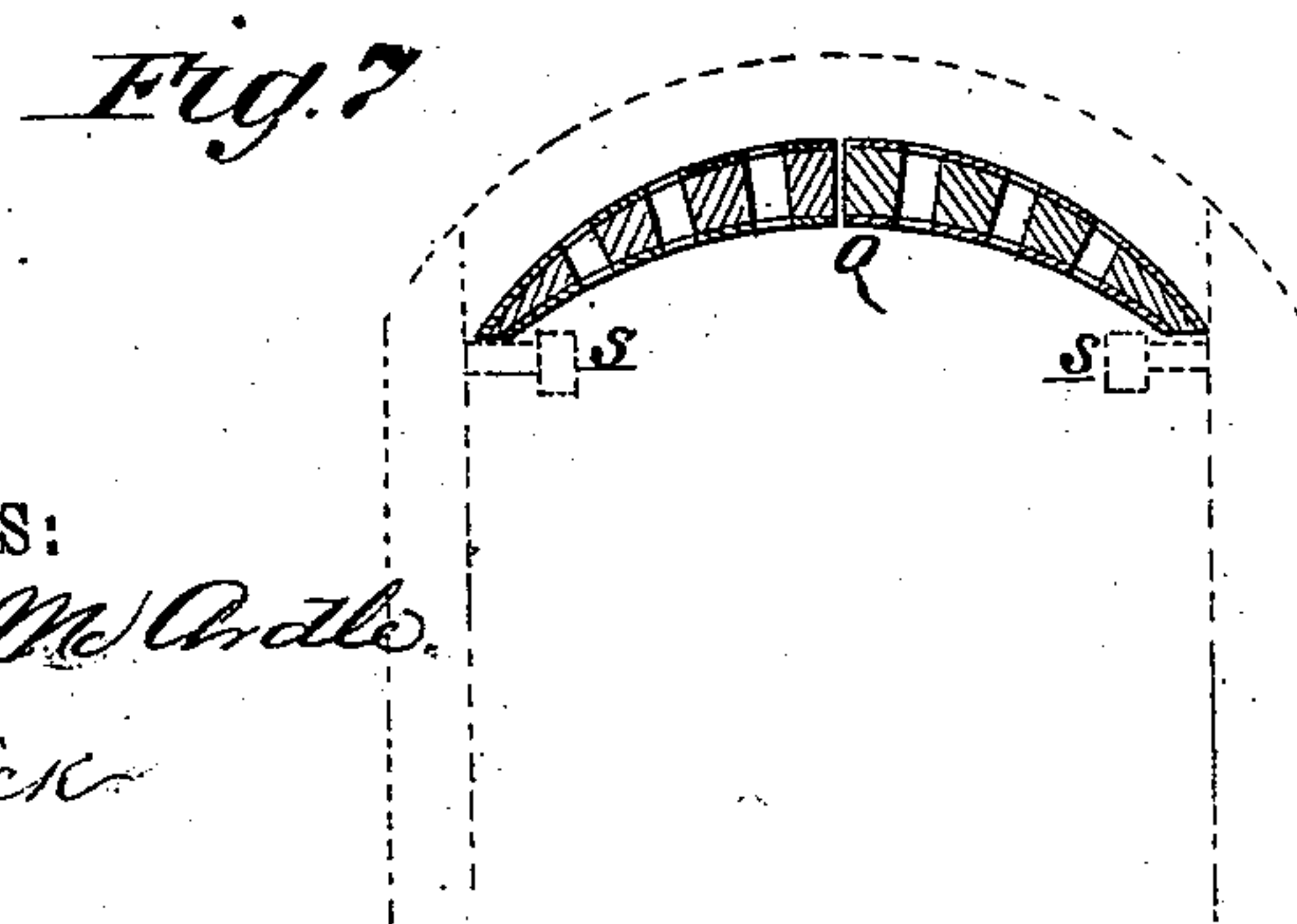
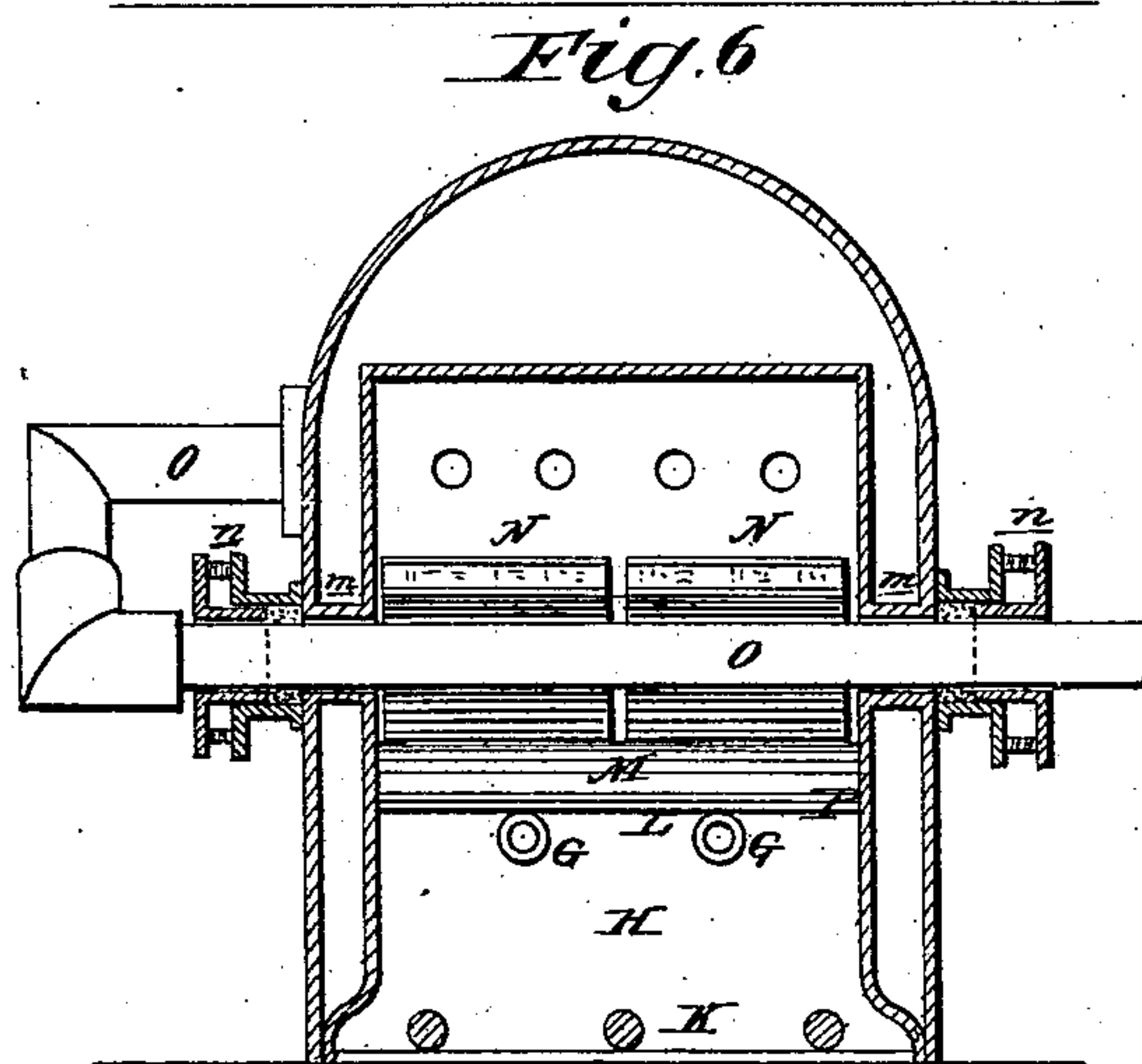
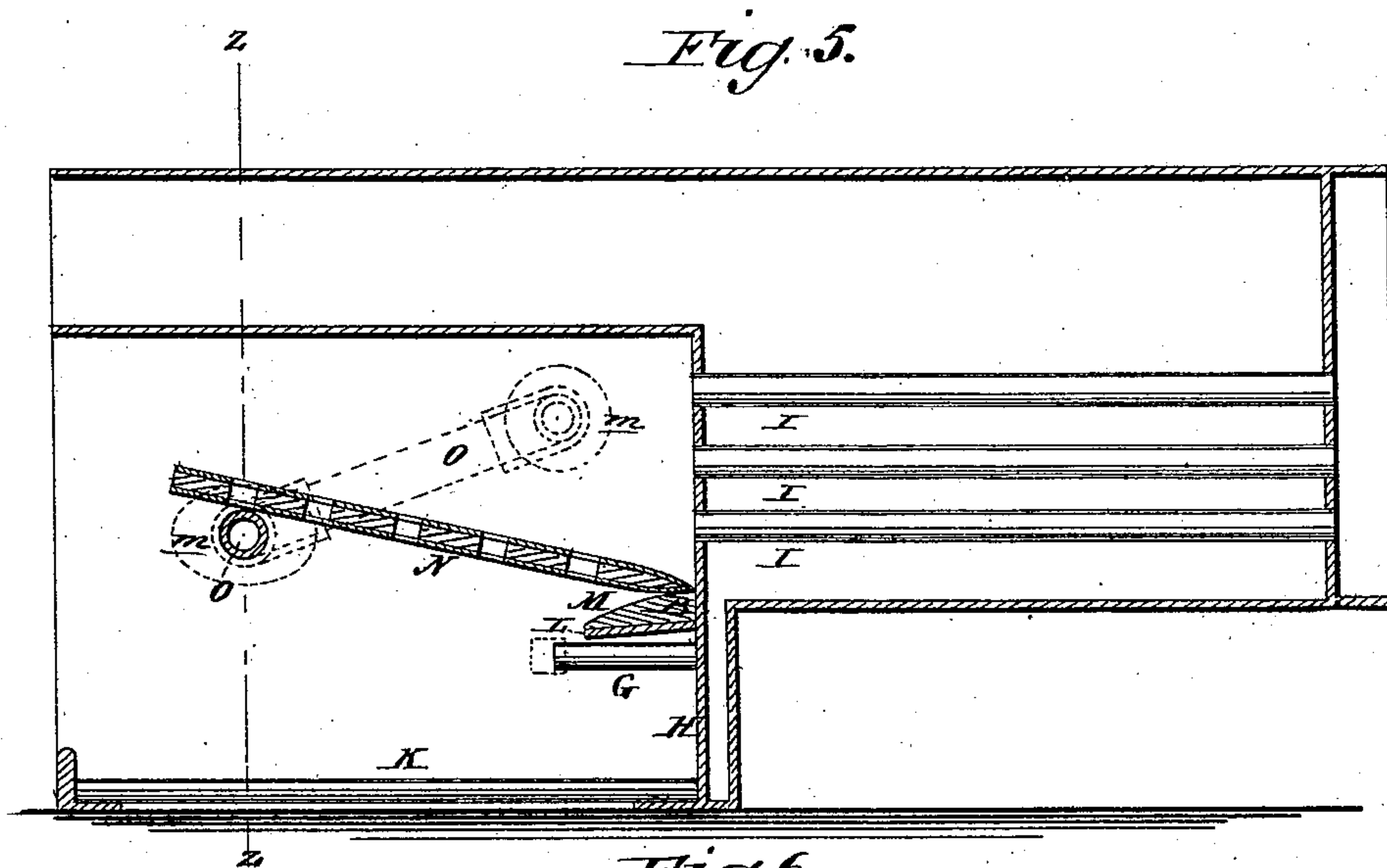
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Patented May 4, 1880.



WITNESSES:
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UNITED STATES PATENT OFFICE.

JOHN MAILER, OF SAN FRANCISCO, CALIFORNIA.

FIRE-BOX OF BOILERS.

SPECIFICATION forming part of Letters Patent No. 227,278, dated May 4, 1880.

Application filed December 22, 1879.

To all whom it may concern:

Be it known that I, JOHN MAILER, of San Francisco, in the county of San Francisco and State of California, have invented a new and useful Improvement in Fire-Boxes of Boilers, &c., of which the following is a specification.

Figure 1 is a sectional side elevation representing the device applied to a pair of stationary steam-boilers. Fig. 2 is a plan of the same. Fig. 3 is a transverse sectional view on line *x x*, Fig. 1. Fig. 4 is a sectional end elevation of the same on line *y y*, Fig. 3. Fig. 5 is a sectional side elevation of the device applied to a boiler of the locomotive type. Fig. 6 is a sectional front elevation of the same on line *z z*, Fig. 5. Fig. 7 is a sectional front elevation, showing the manner in which the device may be applied to a marine boiler. Fig. 8 is a plan view of slabs having grooved edges.

Similar letters of reference indicate corresponding parts.

The object of this invention is to provide a device for assuring a more perfect combustion than is usual in the fire-boxes of steam-boilers, evaporators, &c.

The invention is an improvement upon the device for which Letters Patent No. 219,283 were granted to me September 2, 1879.

In the drawings, A represents a pair of stationary cylindrical boilers; B, the fire-box; C, the bridge-wall, which may be hollow and provided with perforations along the top for the passage of air, or which may have laid along on its top a perforated pipe, *a*, as shown, into which air passes from outside of the fire-box.

D represents the grate-bars. E E are the perforated fire-brick slabs, provided with perforations *b*, and one or both ends beveled, as shown at *c*. These slabs or bricks E are placed within the fire-box B with their blunt ends (in this instance) resting on the fire-bridge C against the pipe *a*, and with their beveled ends inclining upward and resting on the pipe F, that passes transversely through the fire-box B near its front, as shown. This bearing-pipe F, that affords a bearing to the ends of the slabs or bricks E, is connected at one end with one of the boilers A below the water-line of said boiler, and is then inclined downward and through the fire-box B, and then upward to connect with the top of the other boiler A,

in order that water may always be present in that portion of the pipe which is within the fire-box, and that the steam generated in it may pass into the steam-space of the second boiler.

For ordinary boilers these slabs or bricks E E are usually from three to four feet long, a foot wide, and five inches thick, with five two-inch holes made along their longitudinal axes. Placed in the position shown, with their forward ends within a few inches of the crown-sheet of the boiler, they quickly become heated and radiate heat upon the smoke and gases arising from the fuel on the grate, thus increasing their temperature to such a degree that they more readily combine with the entering air, and become thereby converted into carbonic acid. In a fire-box containing these perforated bricks or slabs E, as shown, a portion of the products of combustion will pass up through the perforations *b b*, while the rest will move toward the boiler-front and turn around the beveled ends of the said slabs or bricks, and thence between the slabs and the crown-sheet of the boiler, to meet the warm air that may be introduced or issuing through the perforated pipe *a* on the fire-bridge.

This same device is applied to boilers of the locomotive type in the manner shown in Figs. 5 and 6, or in some other convenient way. In Figs. 5 and 6 a row of pipes, G, is inserted into the tube-sheet H between the flues I and grate K, so as to extend into the fire-box, and the outer ends of the said pipes G are plugged or capped, as indicated by dotted lines, Fig. 5. Upon these pipes G is placed a plate, L, of iron, fire-brick, or other refractory substance, covered with fire-clay M, and on this support or bridge-wall P rest the lower ends of the perforated fire bricks or slabs N. The upper and front ends of these slabs or bricks N rest on a pipe, O, that passes transversely through the fire-box of the boiler, and where this pipe O passes through the sides of the fire-box suitable thimbles, sleeves, or bushings *m* and stuffing-boxes *n*, packed with asbestos or other suitable substance, are fixed to prevent leaks of any kind, and the ends of the said pipe O may be connected on one side with the steam-space and on the other with the water-space of the boiler, or both ends may connect with

either the steam or water space. The effect produced in a locomotive-boiler fire-box by these perforated slabs or bricks is the same as that produced by them in the fire-boxes of stationary boilers.

In Fig. 8 is shown a device equivalent to the perforated fire-brick slabs, and adapted equally with them to the fire-boxes of stationary and locomotive boilers. It consists of slabs of fire-brick T T, with edges provided with grooves s' s', so that when two or more slabs are set together edgewise the corresponding grooves s' s' will form perforations or apertures in the structure, through which perforations or apertures the smoke and flame from the boiler-fire will pass. I find slabs of this construction to be of advantage, as being less liable to fracture or distortion in fire-boxes where an intense heat is usually maintained. These perforated or grooved slabs, being placed diagonally in front of the tube-sheet, prevent the direct impingement of particles of coal upon the said sheet and the tube beadings or flanges, so that they will endure longer service than usual.

In boilers of the marine type the half-arched perforated slabs or fire-brick Q may be advantageously used, as shown in Fig. 7, the lower edges of the said slabs Q being made to rest on hollow capped plugs or pipes (represented by s) that connect with the water-space of the boiler.

In all these instances the object is to interpose a perforated and comparatively non-conducting surface between the fire on the grate and the crown-sheet or flues of the boiler, in

order to increase the temperature in the fire-box to assure a more complete intermingling of air with the smoke and gases, and consequently a more complete combustion.

The perforated slabs or fire-brick may be constructed in whatever shape may be most suitable for the boiler to which they are to be applied, and may be supported in the fire-box in either of the ways shown, or in some other convenient way that may be determined by the shape of the fire-box and character of the boiler. They are constructed in easily-handled sections, so that any one that becomes damaged or broken may be readily removed and replaced by a new one.

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

1. In a boiler fire-box, the bearing-pipe F, passing transversely through the fire-box near its front, and having its ends connected with the water and steam spaces of the boilers, in combination with the perforated fire-brick slabs E and the boilers A A, substantially as and for purpose set forth.

2. The combination of the bridge-wall C, provided with the perforated pipe a, the perforated fire-brick slabs E, and the bearing-pipe F, with the fire-box B and the boilers A A, substantially as and for the purpose set forth.

JOHN MAILER.

Witnesses:

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IRVING M. SCOTT.