

(No Model.)

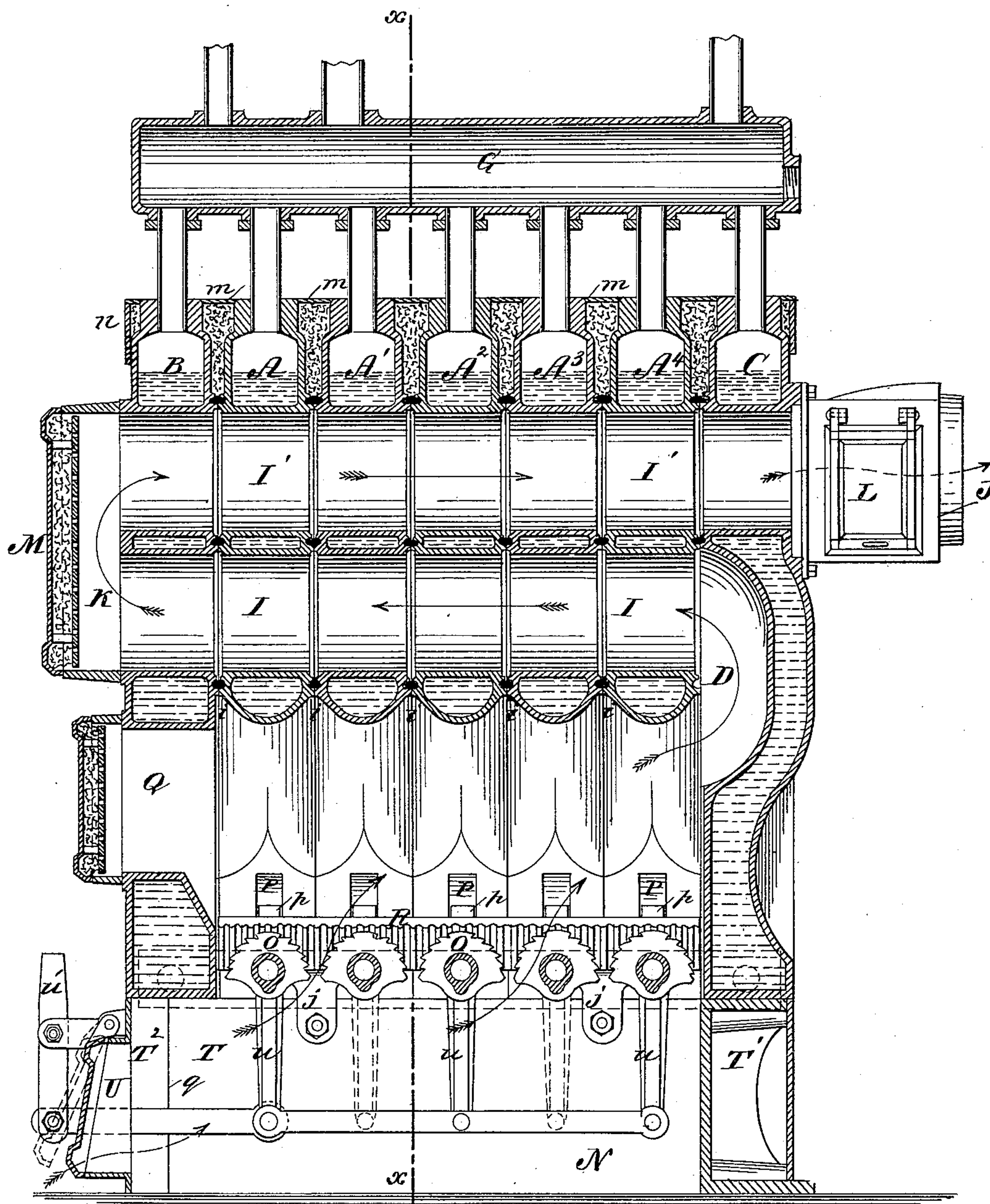
3 Sheets—Sheet 1.

A. MERCER.
SECTIONAL STEAM BOILER.

No. 377,265.

Patented Jan. 31, 1888.

Fig. 1.



WITNESSES:

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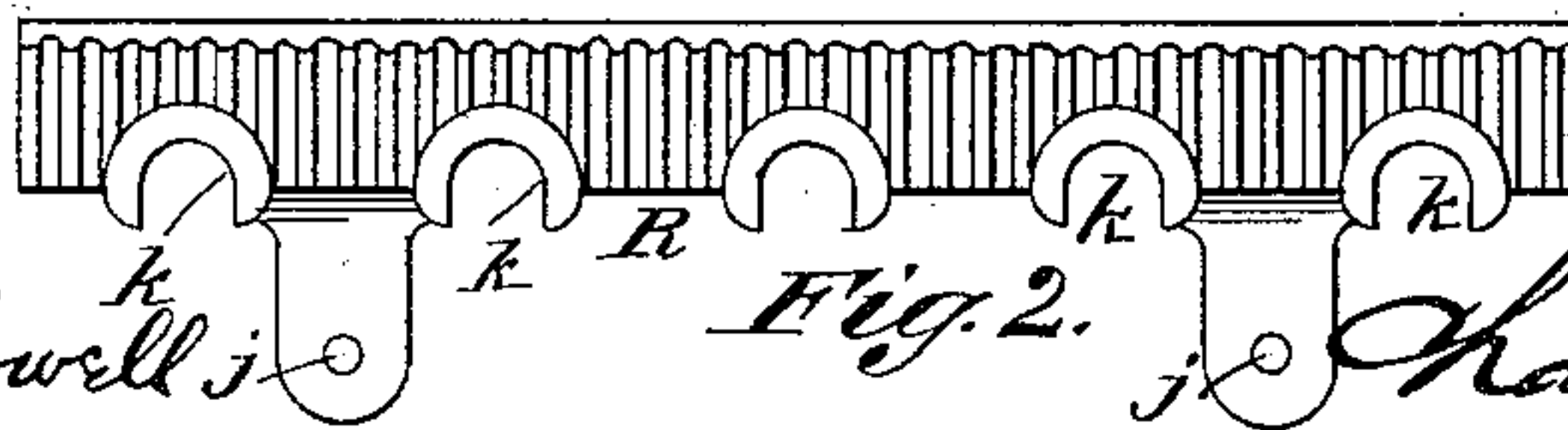


Fig. 2.

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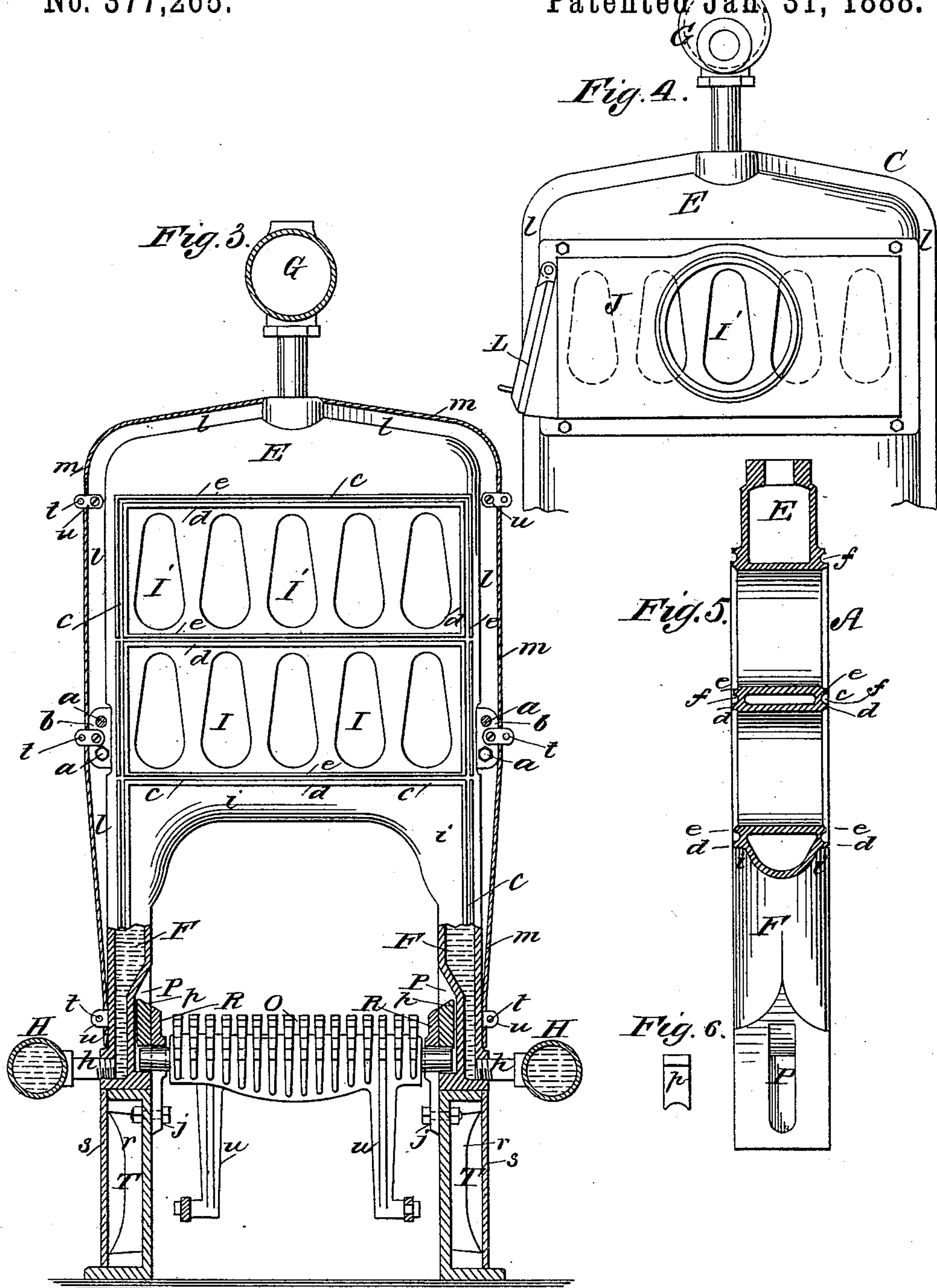
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Fig. 7.

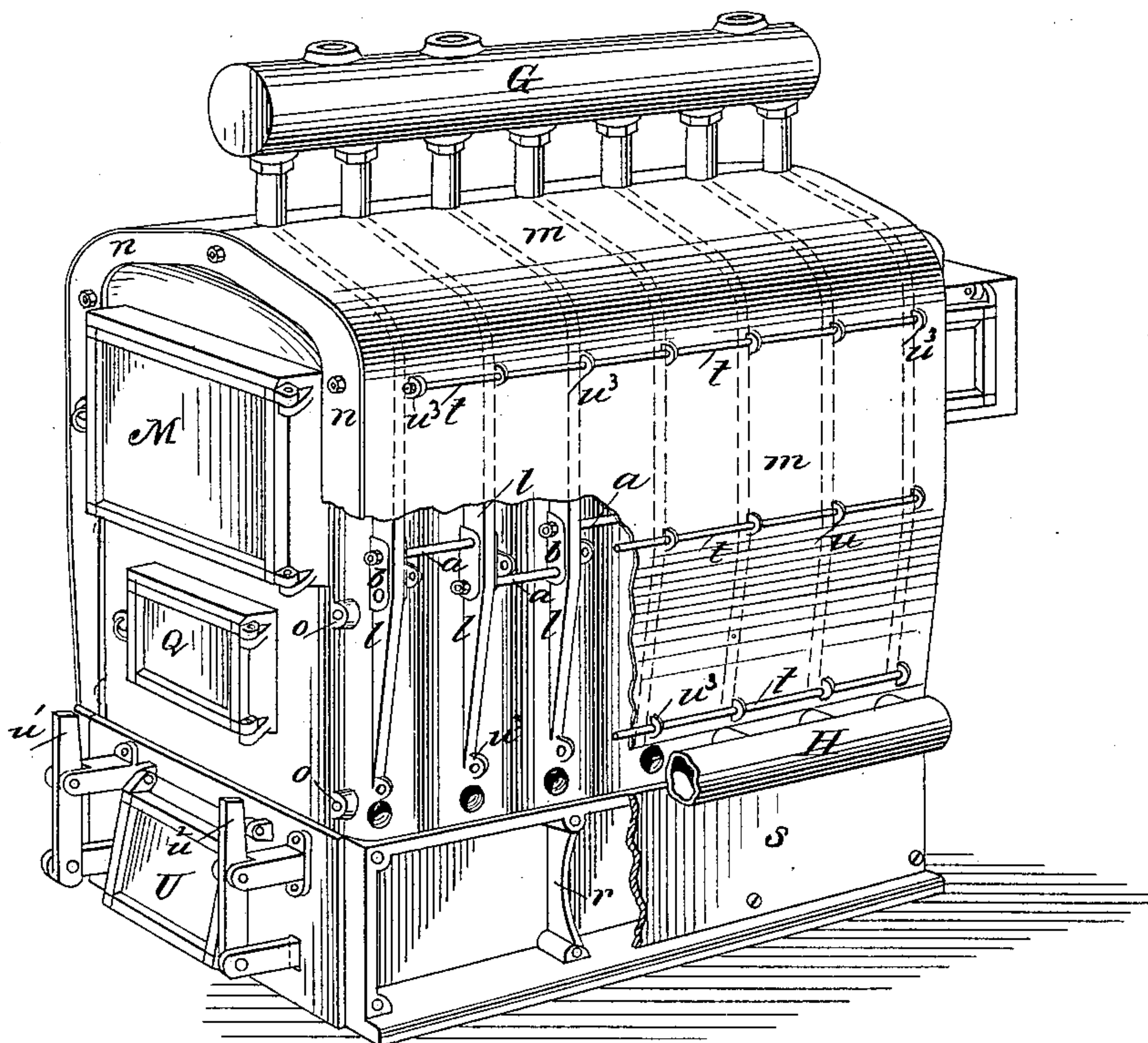
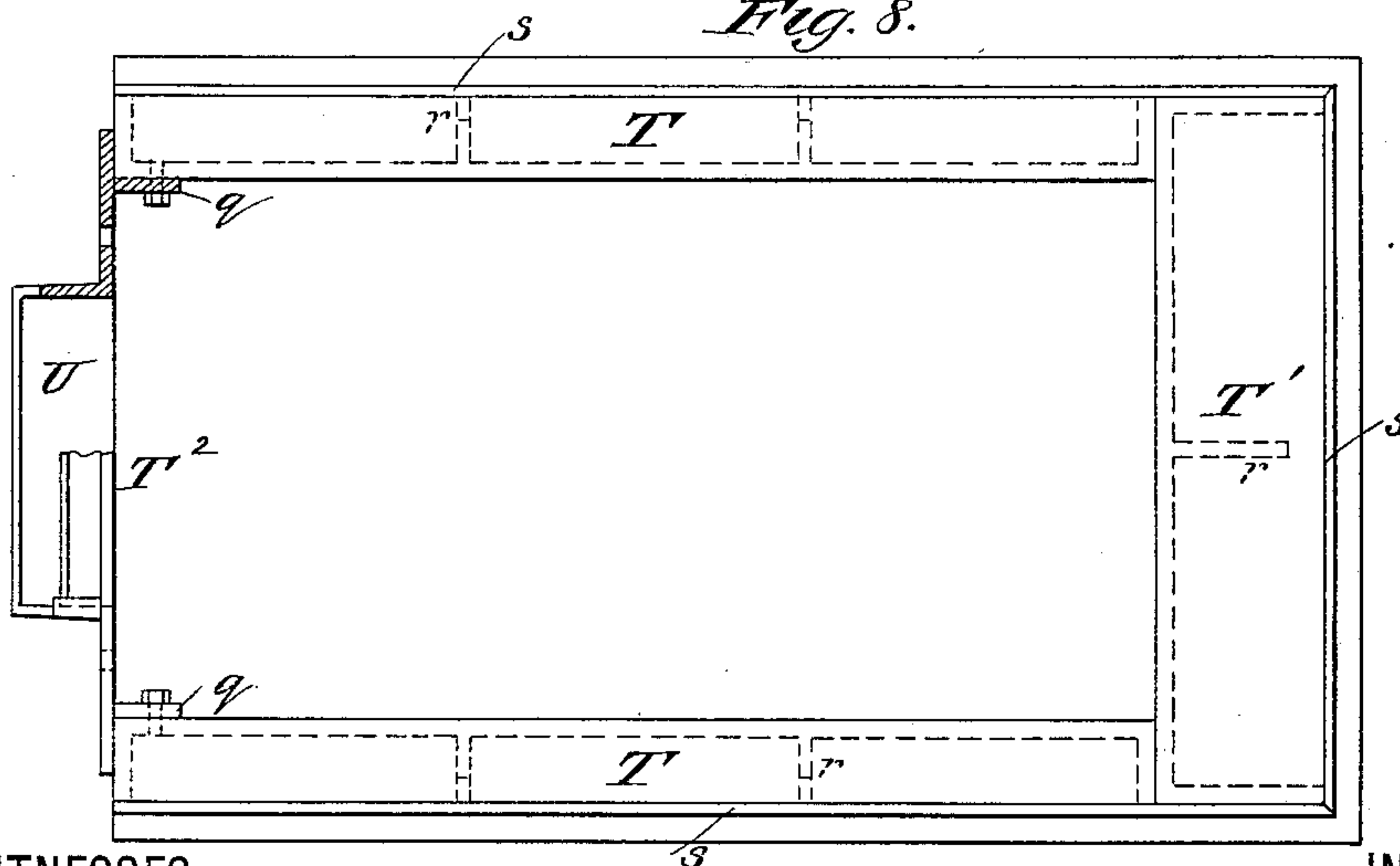


Fig. 8.



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UNITED STATES PATENT OFFICE.

ANDREW MERCER, OF BROOKLYN, NEW YORK.

SECTIONAL STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 377,265, dated January 31, 1888.

Application filed June 16, 1887. Serial No. 241,504. (No model.)

To all whom it may concern:

Be it known that I, ANDREW MERCER, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Sectional Steam-Boilers, of which the following is a specification.

This invention relates to sectional boilers adapted for carrying low pressure and moderate fire for steam or water heating purposes, the boiler being composed of separate cast sections having a form which combines in each section independent water, steam, and fire spaces, and sections of flues, the several boiler-sections being separable for increasing or diminishing the size and capacity of the boiler.

The object of the invention is primarily to adapt this class of boilers for the use of wood or bituminous as well as anthracite coal, to render the apparatus semi-portable, and adapt the construction of the same so as to dispense with the use of brick-work, and thereby facilitate setting up and transportation; and the invention has for its object, furthermore, to simplify the general structure of the various parts in detail, as will hereinafter appear.

In order to enable others skilled in the art to which my invention appertains to understand and use said invention, I will proceed to describe the details of its construction, set forth the advantages derived from the same, and point out in the appended claims its novel characteristics.

In the accompanying drawings, in which like letters of reference indicate corresponding parts throughout the several views, Figure 1 is a longitudinal central section; Fig. 2, a detailed view of the grate-bearings; Fig. 3, a transverse section on the line *xx* of Fig. 1; Fig. 4, a partial rear elevation; Fig. 5, a detailed view of one of the separable sections detached; Fig. 6, a detail of one of the grate-trunnion blocks; Fig. 7, a general perspective view of the apparatus; and Fig. 8, a plan view of the base, the boiler being removed.

The boiler is composed of the several like sections, A, A', and A'', &c., the end sections, BC, constituting the boiler-front and fire-back, respectively. The sections are bolted together by the separate bolts, *a*, Figs. 3 and 7, which bind on the lugs *b* so as to clamp together each of the adjacent sections independently, per-

mitting one or more to be removed, substituted, or added without disturbing the remainder. The separate water and steam spaces of the sections are connected at the top and bottom, at the steam-space E and water-legs F, Fig. 3, to the common steam-drum, G, and water-drums H, respectively, by nipples or tubes *h*, the said drums having communication to one another through circulating-pipes, in the usual manner, so as to return any condensed portions of steam to the bottom of the boiler. The ribbed joints *c* between the sections consist of double parallel ribs *d e*, which are more clearly shown in Fig. 5. The rib *e* is cast lower than the finished surface of the faced rib *d*, so that when the sections are united, as in Fig. 1, a space or slot is left open at one side of the groove *f* for the insertion of the calking material therein, rendering the joints tight against the leakage of escaping gases or ingress of air to the fire spaces or flues.

The rear section C is provided with a chamber or passage, D, which extends transversely the entire breadth of the back of the furnace, and by the bulging form given to the said section the communication from the furnace to the flues is established by the formation of the single casting which constitutes the fire-back. The depressions *i* in the walls of the furnace, extending as far as the rib *c*, are formed by the bulging contour given to the interior of the section and its water-legs F, presenting a maximum heating-surface having a corrugated form.

The flues I I' are arranged so as to give a return bend or additional exposure of the water-spaces to heat through the upper series of flues, I', before the event of draft delivery, the upper and lower series being connected by the chamber K and the current directed through the smoke-box J to the smoke-pipe. Furthermore, the said flues are herein made of enlarged pattern, so as to avoid clogging or choking of the same in the combustion of soft coal and like fuel, and also to permit the easy removal of such accumulations as may result. The large capacity given to the flues is adapted to extend the limit to which the enlargement of the sectional boiler by the addition of sections may be carried, the said flues being of adequate area to convey the gases produced by the maximum possible furnace capacity.

As shown by Fig. 3, the flues are given an upwardly-converging form as viewed in cross-section, narrowing at the top, which construction gives the draft a downward tendency during its passage through the flues, and throws the heated gases to the lower as well as the upper surfaces of the same, to which they naturally tend, and renders the effective heating-surface as uniformly distributed as possible over the enlarged area of flue-surface. Again, the broadened bottoms of the flues will receive the deposit of combustion without materially obstructing the passage of draft.

The smoke-box J is shown in side elevation in Fig. 1 and end elevation in Fig. 4, and extends below the level of the flues I', so as to serve as a receptacle for the deposits removed from the flues during the cleaning operation, and from whence they are subsequently removed through the door L. The flue-brush is introduced through the front cleaning-door, M, whereby the deposits may be removed from both series of flues, that of the lower series being discharged through the passage D at the rear, from whence they pass through the grate into the ash-pit N. The grates O are of the rocking-grate pattern heretofore known and used, and the construction and operation of the same will therefore not require specific description here; but an improved feature of my invention consists in the manner of hanging the trunnions of said grates in recesses cast in the water-legs F of the boiler-sections.

As will be seen in Figs. 3 and 5, the recesses P in the boiler-legs are of a breadth to fit the diameter of the trunnions, and are elongated upward, so as to permit the easy introduction or removal of the grates through the fire-door Q. The trunnions are protected from heat or clogging by the blocks p, Fig. 6, inserted above them in the recesses P, and also by means of the castings R, which retain the said blocks p in place, and are bolted to the walls of the ash-pit at j. The castings R serve to retain the rocking sections O of the grate in place and prevent their riding up out of the sockets P in case of any clinker clogging or tendency to rise during the shaking operation, the bearing-surfaces k being provided in the castings R for this purpose, as more clearly shown in Fig. 2.

In the operation of the grate herein shown the ratchet-like surfaces are caused to turn toward one another in alternate directions, the downwardly-projecting arms u shown in full lines being operated by the exterior lever, u', Fig. 7, and those in dotted lines by the lever u², such action involving a tendency to throw the trunnions up. The exposed surface of the castings R are provided with vertical corrugations for the purpose of allowing free draft between them and the adjacent end of the grates.

The material which I employ for the jacketing of the boiler is preferably asbestos packing material or cement, which is placed in

the interspaces between the steam-chambers E and about the sides of the sections between the ribs l, which are cast on each section and extend around the top and sides thereof, tapering in toward the bottom, as in Fig. 3. To these ribs l is secured the jacket-sheathing m, covering the entire top and sides of the boiler, being fastened at either end to a frame, n, bolted to the bosses o on the end sections of the boiler. The sheathing m, which may be composed of black or galvanized iron, is further secured in place by the rods t, running throughout the length of the boiler and passing through the lugs u³, cast on or bolted to the ribs l. If desired, split pins may be substituted for the rods t. The base, of which Fig. 8 is a plan, consists, essentially, of three parts, T T and T', forming the sides and back of the ash-pit and supporting the weight of the apparatus. The fourth piece, T², provided with the ash or draft door U, is secured by its flanges Q to the side casting, T. The side and back pieces are provided with stiffening-ribs r, and have covering-plates s, which give a finished appearance to the exterior. The usual accessories—such as a steam-gage, safety-valve, feed-pipe, and damper-regulators—are omitted in the accompanying drawings, such essential features being well understood and not pertaining to the invention.

The apparatus having the construction herein described is rendered readily increased or diminished in capacity by the absence of brickwork, and also by the construction of the base in separate parts, the castings T T being substituted by different lengths of the same when it is desired to alter the number of boiler-sections.

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

1. In a steam-boiler composed of cast sections containing independent water or steam spaces, the combination of an intermediate series of like sections, as shown, comprising the furnace-walls and the double series of direct sectional flues, with a front or door section containing the final sections of said flues and having a flue-chamber for connecting the same together, and a rear section comprising a draft-passage, a flue-delivery, and a fire-back in one piece.

2. In a steam-boiler composed of a series of cast sections, the combination of a double series of direct sectional flues, substantially as shown, a passage connecting the lower series at the rear with the furnace, a chamber connecting the lower with the upper series at the front thereof, and a draft-duction chamber or pipe located at the rear of the upper series, whereby a triple exposure of heated furnace-gases to the water-spaces of said boiler is obtained.

3. The combination, with the double series of direct flues, of a front cleaning-door located opposite both series, a rear receptacle or cham-

ber opposite the upper series, and a draft-passage for discharging deposits from the rear of the lower series into the furnace, for the purposes set forth.

5 4. In a steam-boiler composed of separable sections, the combination therewith of a double-ribbed joint, the same consisting of a faced rib and of a lesser packing-rib parallel to said
10 faced rib, the said joints, when placed in juxtaposition, forming an inclosed packing-space accessible from one side thereof, as specified.

5 5. The combination, with the cast sections of a sectional steam-boiler, of sockets or recesses cast in the water-legs of said sections
15 for the reception of the trunnions of the rocking grates, arranged substantially as described, the said sockets being vertically elongated to permit the introduction or removal of said
20 grates.

20 6. The combination, with the grate trun-

nion sockets, of protecting-blocks for capping said trunnions, and castings, substantially as shown, for retaining said blocks and trunnions in place, said castings having inverted bearing-sockets and provided with draft-corruga- 25
tions, as and for the purposes set forth.

7. The means herein described for securing the jacketing material upon the united boiler-sections, consisting, namely, of marginal ribs cast upon said sections, front and rear plates 30
secured, as shown, to the end sections, and sheathing supported upon said ribs and terminating at said plates, and means for binding the whole in place, (as rods extending through lugs projecting from said ribs,) as shown.

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Witnesses:

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