

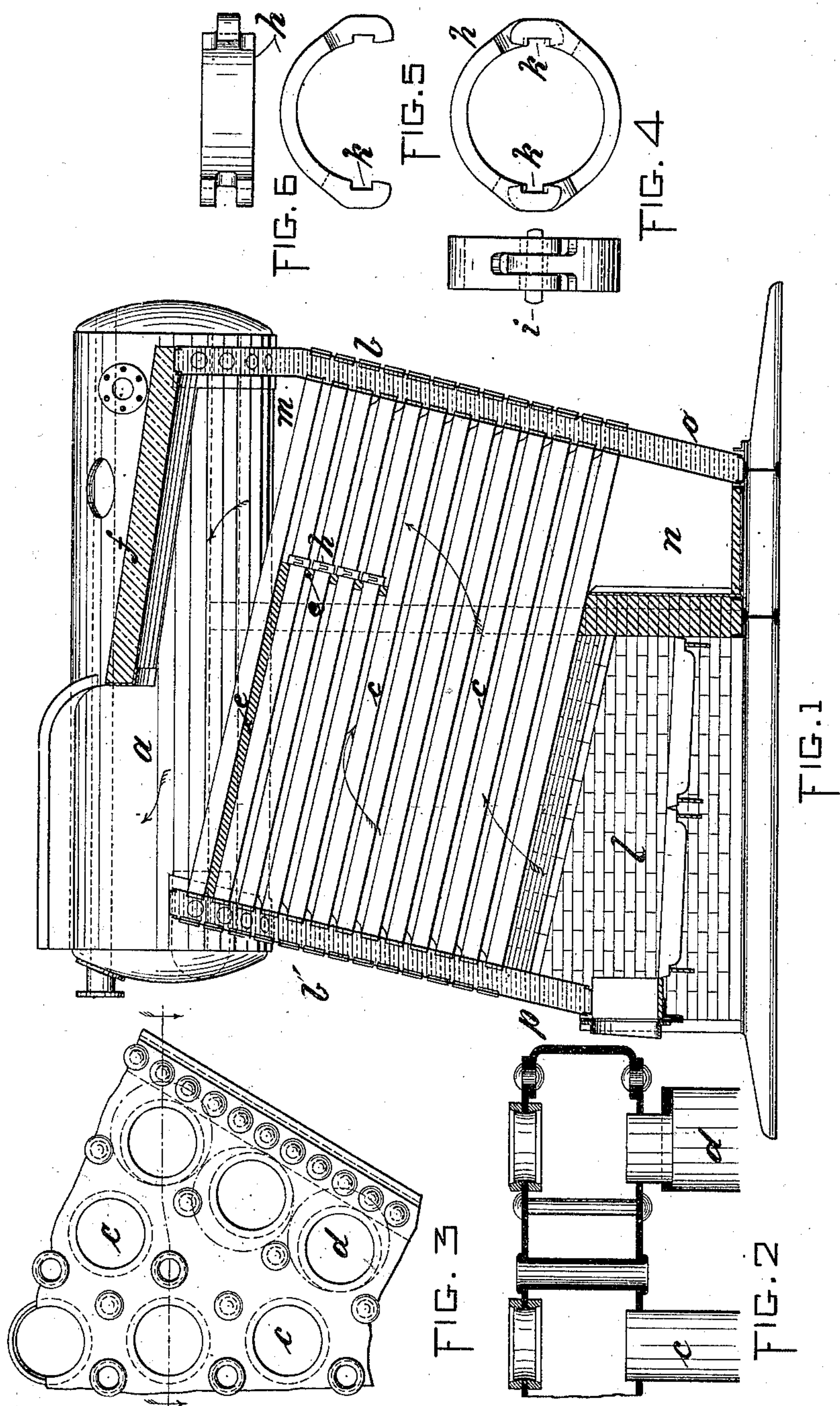
(No Model.)

2 Sheets—Sheet 1.

N. W. PRATT.
STEAM GENERATOR.

No. 311,446.

Patented Jan. 27, 1885.



WITNESSES:
John S. Caldwell,
John Reynolds Brown

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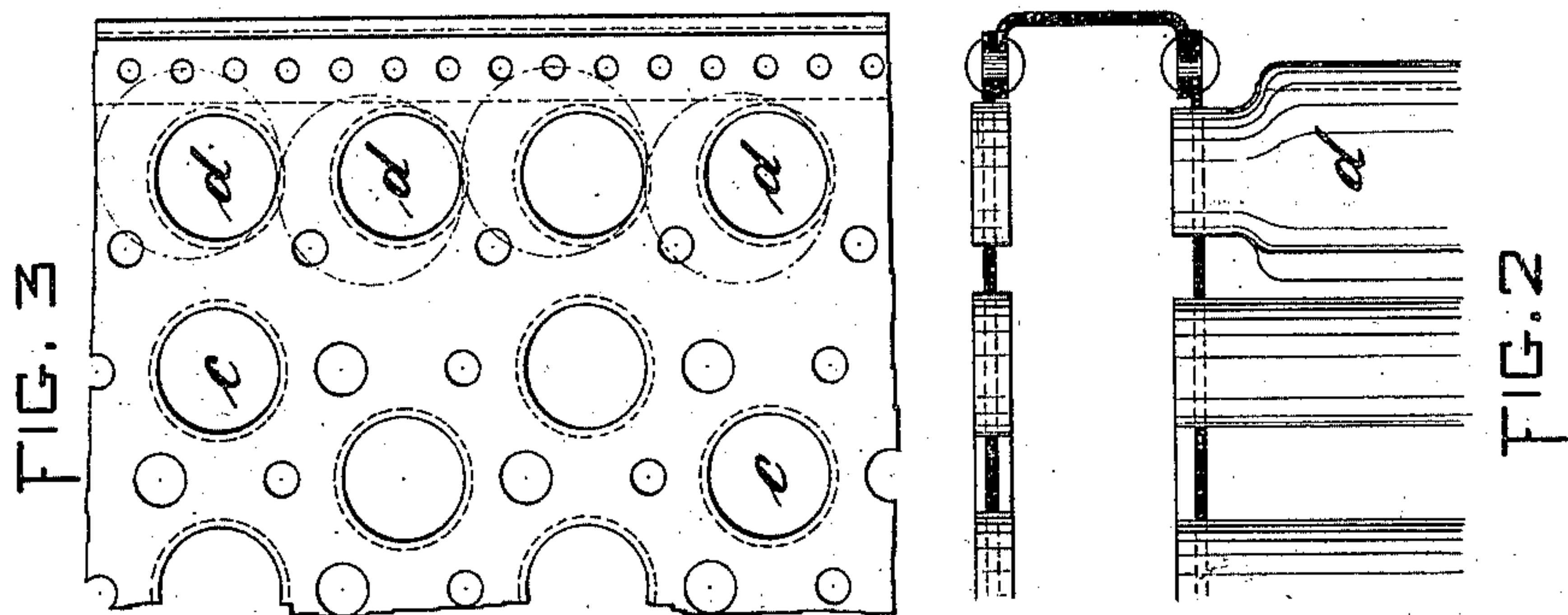
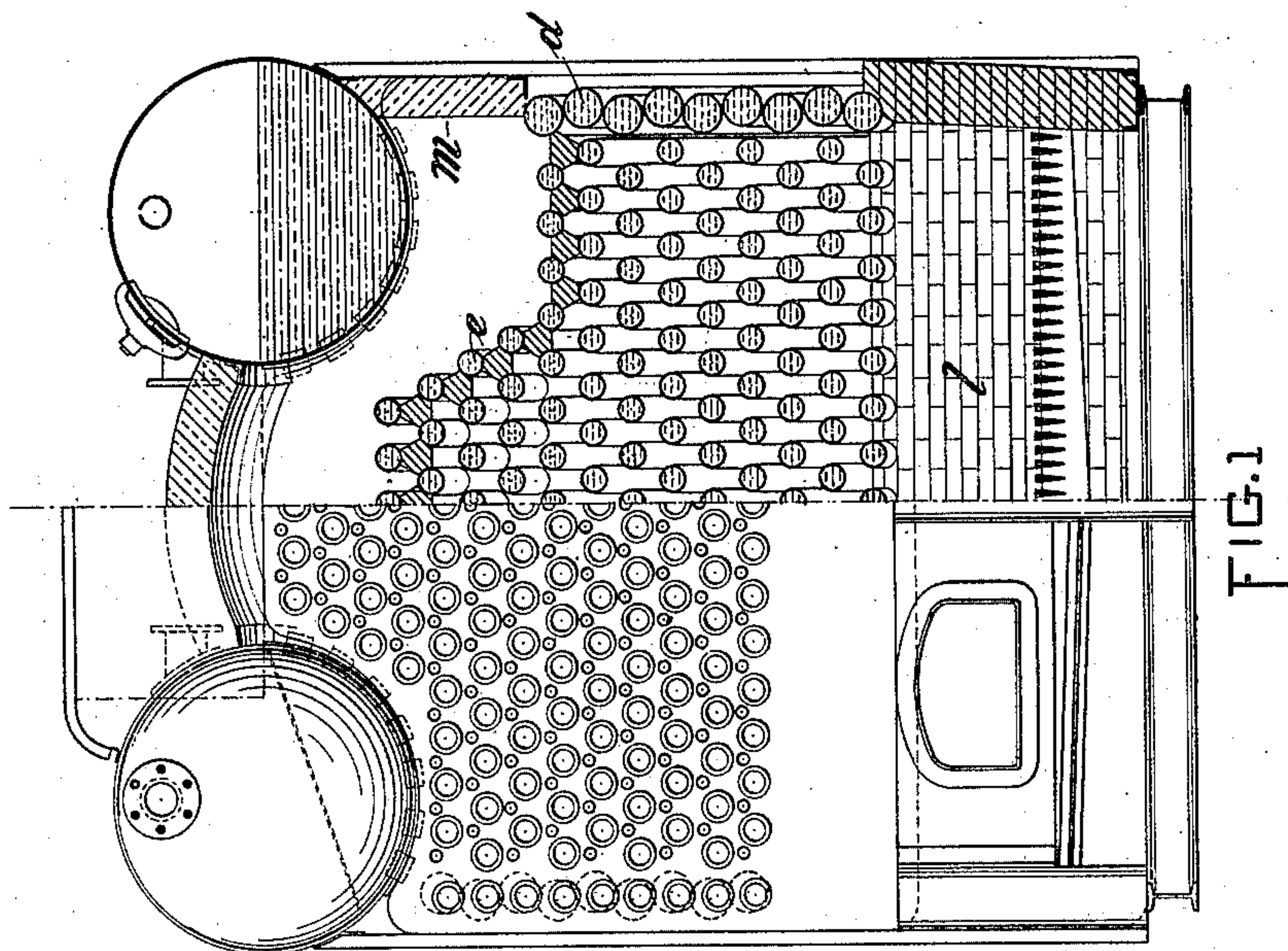
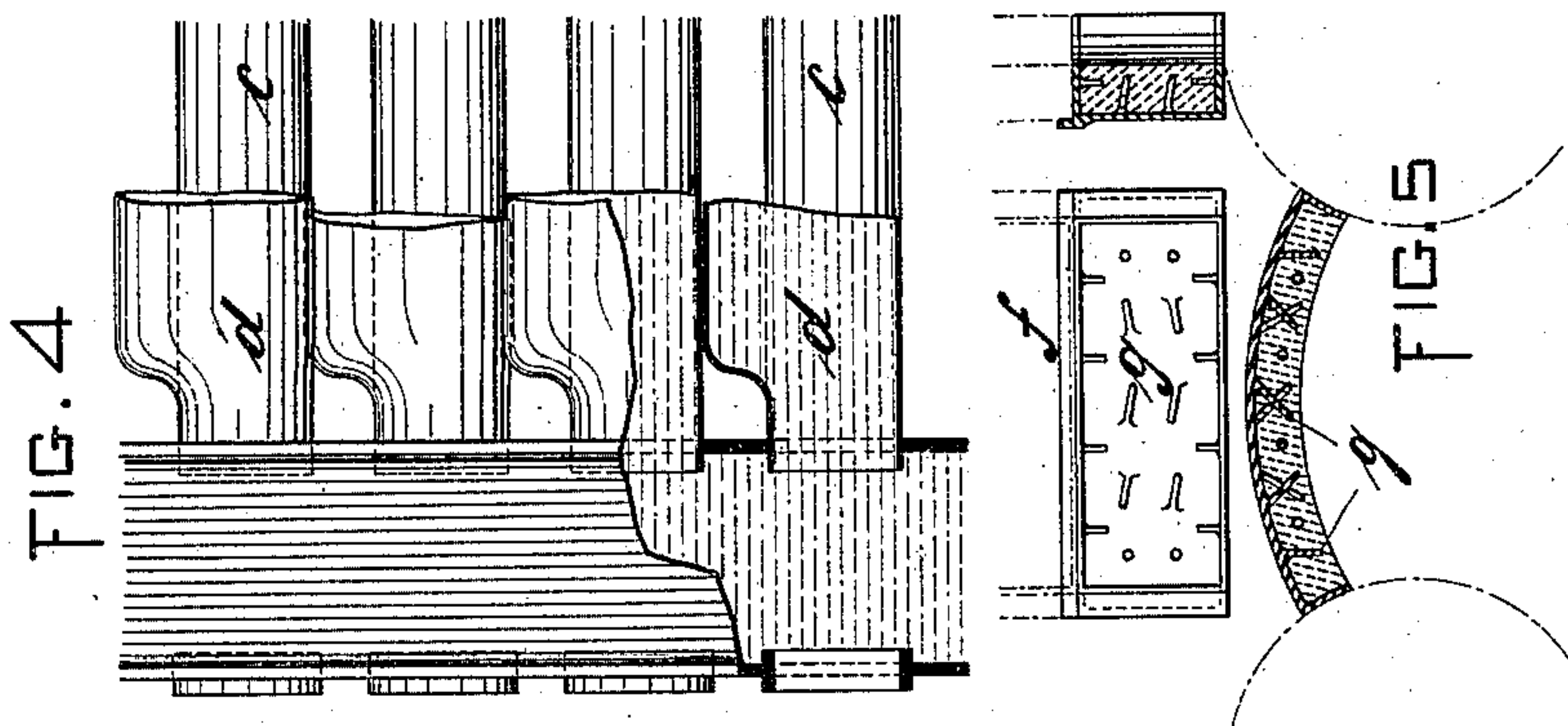
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

NATHANIEL W. PRATT, OF BROOKLYN, ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF NEW YORK, N. Y.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 311,446, dated January 27, 1885.

Application filed May 17, 1884. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL W. PRATT, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification, reference being had to the accompanying drawings, forming a part of the same, in which—

Figure 1, Sheet 1, is a central vertical section; Fig. 1, Sheet 2, a front view in half-section; Figs. 2 and 3, Sheet 1, and Figs. 2, 3, and 4, Sheet 2, partial and enlarged views of the front and rear water-slabs and connected tubes; Figs. 4, 5, and 6, Sheet 1, detailed views of detachable tube-collars; and Fig. 5, Sheet 2, views in detail of the arch between the drums, all embodying certain features of my invention.

Similar letters of reference indicate corresponding parts in the several figures.

The invention relates to certain improvements in steam-generators that contain a series of tubes and spaces through which the water circulates and about which the heated products of combustion pass from the furnace to the stack.

The special type of generator shown, and embodying my improvements, contains a series of water-tubes arranged longitudinally in an inclined position over the furnace and extending beyond its bridge-wall, said tubes being secured to and communicating with water-slabs that form the front and rear walls of the chamber through which the heated products of combustion pass, the water-slabs being also connected with one or more water and steam drums located above the tubes.

The invention consists in such a relative arrangement of curtains or partitions within the tube-chamber that the course of the heated gases is directed to such points and periods on the heating-surfaces as to obtain the best effects, and also by increasing the distance through which the gases travel, whereby all their available heat may be taken up.

The invention further consists in certain details of construction that will be hereinafter particularly referred to, and the novel features subsequently pointed out in the claims.

Referring to the drawings, Sheet 1, Fig. 1,

a is the steam and water drum; *b b*, the front and rear water-slabs; *c*, the main water-tubes, and *d*, Fig. 3, the wall-tubes, all communicating and forming the steam and water spaces.

e e are flame bridge-walls, and *f* an arch wall or plate (shown in section, Fig. 5, Sheet 2) that determines the course of the gases from the furnace *l* across the heating-surfaces to the stack.

The casing of the boiler is composed of wrought-iron sheets riveted together and made air and gas tight, the furnace and other particular spaces being lined with fire-brick. A portion of the sides of the boiler is protected by a series of water-tubes, *d*, as shown in Figs. 1, 2, 3, and 4, Sheet 2, the triangular space above said tubes, as shown at *m*, Fig. 1, Sheet 2, being closed with fire-brick or other heat-resisting material, and also the space *n* in rear of the furnace. The space intermediate of the wall-tubes and casings may be filled, if desired, with non-conducting material. The rear water-slab *b* is extended below the line of the tubes *c*, as shown at *o*, Fig. 1, Sheet 1, and forms a sediment-chamber, this being the lowest and less agitated part of the water-space, and also farthest removed from the action of the fire. The lower portion of the front water-slab *b* may also be extended below the tubes *c* to the top of the furnace-doors, as shown at *p*, Fig. 1, Sheet 1. The heated gases from the furnace *l* pass directly to the highest part of the tubes *c*, then under the bridge-walls or curtains *e e* to the rear of the chamber, and thence under and around the drums *a* to the front end, where they are discharged into the stack, the course being indicated by the arrows in Fig. 1, Sheet 1. In this construction the hot gases are first directed to the comparatively coolest portion of the tubes, the distance traveled is greatly increased, the gases are longer retained in contact and reach every part of the effective heating-surface. The water-circulation begins in rising through the inclined tubes and front water-slab to the water-drums, where the steam separates, the water-circulation being continued downward through the rear water-slab and again through the tubes. Between each three adjacent tubes tubular stays may be placed, as shown in Figs. 2 and 3, Sheet 1, ex-

tending through each water-slab, for the introduction of a jet of steam to clear the ashes from the exterior of the heating-tubes, the same being closed with plugs when not in use.

5 Having described the main essential parts and action of the generator, I will now refer to certain improvements in details of construction. The water-tubes *d*, forming a portion of the side walls, are made in a peculiar way, being provided with a short neck at each end, of reduced diameter, arranged eccentrically, the object of this construction being to make a tight water-wall. These tubes are secured to the water-slabs at the necks, and at a distance 10 apart slightly less than their greatest diameter, so that when inserted and turned around before fastening the adjacent surfaces are brought in longitudinal contact throughout the whole length and crowded together to form a tight water-wall. The necks of the tubes *d* are preferably drawn to the reduced diameter, as shown in Figs. 2 and 4, Sheet 2; but may be produced, as shown in Fig. 2, Sheet 1, by means of expansible nipples. The flame bridges or 25 curtains *e e* extend from the front end of the tubes a certain portion of their lengths, and also in the form of a drop-partition perpendicular thereto, as shown in Fig. 1, Sheet 1. These curtains are made up of shaped fire-brick and retained in position upon the tubes by means of detachable collars *h*, placed around the tubes at the rear side, so as to prevent them from sliding back upon the inclined surfaces. The collars *h* (shown detached in detail in Figs. 4, 5, and 6, Sheet 1) are made in 35 interlocking sections held together and fast-

ened to the tubes by keys *i*, driven on each side of the tube through the recesses *k*, which forces the sections of the collars and key itself in intimate contact with the tubes, whereby the water that flows through the tubes may take up the heat to which the collars are exposed and prevent them from burning out. 40

The arch wall or crown *f* may be built of arch-brick abutting against angle-iron riveted to the drum in the ordinary manner, or may be constructed of separate cast-iron plates of an arched form, having projecting spuds *g* placed in an angular position, and the space filled up with fire-clay or other non-conducting material, as shown in the detailed views, Fig. 5. 50

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

1. A series of cylindrical tubes constructed with eccentric ends, said tubes being arranged in opposite tube-sheets parallel with each other at such distance apart that the adjacent surfaces will be brought in longitudinal contact and crowded together to form a tight joint by revolving said tubes on their eccentric bearings previous to securing the same, as set forth. 55 60

2. A boiler arch or crown composed of a series of separated cast-iron plates having projecting spuds or spikes distributed upon their interior surfaces at an acute angle therewith, the surrounding space being filled with fire-clay or other heat-resisting material. 65

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Witnesses:

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