D. RENSHAW.

Steam-Generator.

No. 168,923. Patented Oct. 19, 1875.

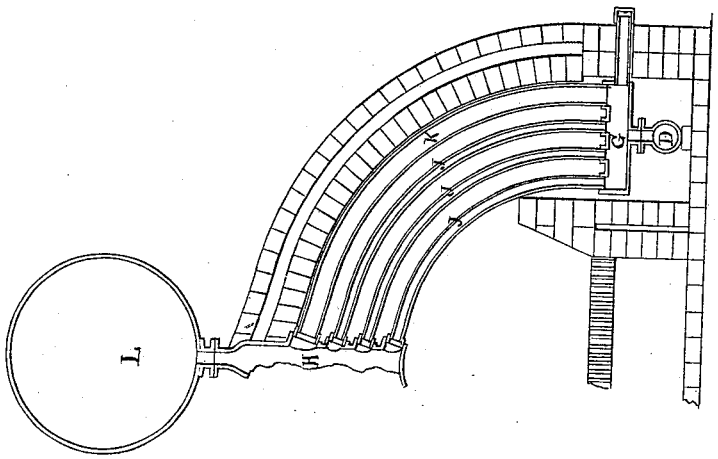

Fig. 3.

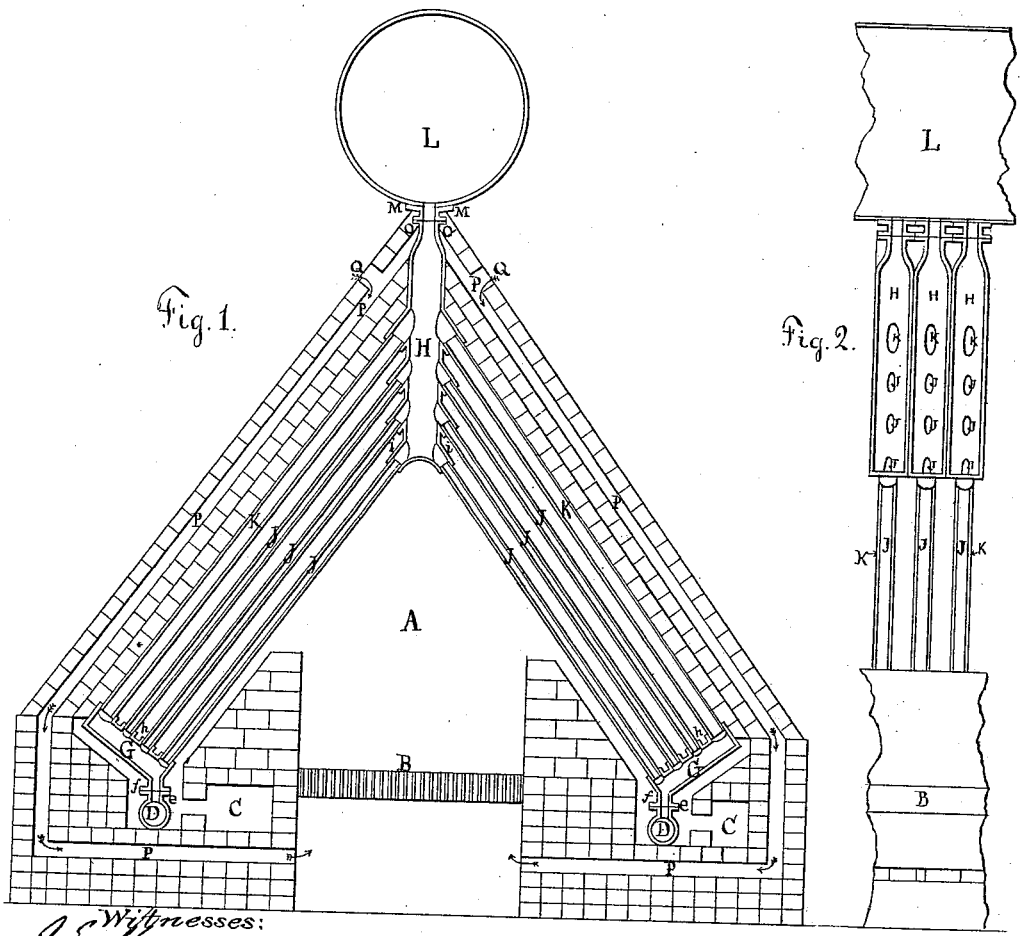

Fig. 1.

Fig. 2.

Witnesses:

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DAVID RENSHAW, OF COHASSET, MASSACHUSETTS.

IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. **168,923**, dated October 19, 1875; application filed March 9, 1875.

To all whom it may concern:

Be it known that I, DAVID RENSHAW, of Cohasset, in the county of Norfolk and State of Massachusetts, have invented certain Improvements in Steam-Generators, of which the following is a specification:

This invention is designed to reduce expense in the construction of steam-generators, to secure economy of space occupied, and produce most efficient and economical generation of steam; and consists in certain combinations of a reverberatory furnace, a steam-drum, an upper water-body, two lower water-bodies, connecting-pipes, and mud-drum or feed-water heater, hereinafter described and more fully set forth.

Figure 1 is a front view of my improved generator in section. Fig. 2 is a longitudinal section on the line *x x*, Fig. 1.

A is a reverberatory furnace, provided with a grate, B, and drop-flues C. The bottom of these flues are made a solid and good foundation to support the longitudinal tube, pipe, or cylinder D. This pipe D I prefer to cast in a single piece, with flanged risers *e* to receive the flanged projections or risers *f*, which start from and form a part of the pipe G. This pipe G I also prefer to cast in a single piece. On this pipe G I cast bosses *h*, which are tapped for the proper reception of a screw-thread. The vertical pipes H are also of cast metal, with projections *i* from each side of them. These pipes H may be drawn in somewhat above the water-line, so giving more surface to the flanges *o*. Into the projections *i* of the pipes H are screwed wrought-iron pipes or lap-welded boiler-tubes J and K, which pipes are, at their other extremity, connected with pipes G by means of a lock-nut (union) coupling, or by any other of the usual modes. These pipes J and K may be curved, instead of straight, as shown in Fig. 3. This is the more common form of reverberatory furnaces; but the expense of curving of them is saved in the form shown in the other figures. The steam-drum L is made of wrought-iron, the projections M being cast and bolted or riveted to it by means of flanges, in the usual way practiced in such constructions. The longitudinal pipes D are connected at either front or rear, or at both, by a pipe, N, flanged to the pipes D. By means of this pipe N the boiler is fed and blown off. P is a passage-way between the walls of the furnace A to the ash-pit, having an inlet, Q, near the crown of the furnace. By this means the air necessary for the support of combustion and the furnace is drawn from the upper part of the boiler-room, which is thus kept at a lower temperature, less heat is radiated from the furnace-walls to the room, and a comparatively hot draft will be furnished to the fire, the boiler, of course, being run with the ash-pit door shut.

There is a gradual increase of heat from above the fire-line to the apex of this furnace; therefore steam is generated most rapidly from the upper portions of the boiler. For this reason this boiler can be made with very small pipes or wator-bodies, and still will not lift water under any conditions.

Circulation is caused by difference of temperature; so I construct these boilers in such way that the cubical contents of all the pipes J in one section are about equal to the cubical contents of pipe K in same section, or as nearly so as can practically be attained. By this means the water receives most heat in its passage upward through the pipes J, and hence its downward passage in pipe K. The cubical contents of pipes J and pipes K being equal is guarantee that the entire water of the boiler is in motion.

All the surfaces of this boiler are downwardly inclined. Sediment is heavier than the water in which it is formed, and hence by its own density is carried from each section to the bottom of the pipes D, which are so located that such sediment cannot be burned fast to them. Hence this boiler is surpassed by none for cleaning facilities.

It will be noticed the sections are tied together by, and have their foundation, as it were, on, the pipes D; and further, it will be seen by reference to the drawing that the brick-work is not allowed to come in contact with the lower side of pipes G. Therefore, it will be obvious that the facilities for expansion are unlimited, and in such direction as to offer no injury to the brick-work of the furnace.

Further, the construction of this furnace is such as to guarantee equal heats longitudinally and transversely.

It is obvious that the operation will be the same, whether the pipes H and G be separate pipes, as shown, or whether a flattened tube extending longitudinally along the crown of the furnace be substituted for the pipes H, and two such tubes, one on each side of the furnace, be substituted for the pipes G, thus making the upper water-body continuous, and also the two lower water-bodies.

I claim as my invention—

1. A section for a sectional boiler, consisting of an upper pipe, H, opening into the steam-drum, two lower pipes, G, the pipe H arranged above, and at the same distance from, each of the pipes G, and connected to each of the pipes G by a series of pipes, J and K, substantially as described.

2. A boiler consisting of an upper water-body, H H, and the steam-drum L, the upper water-body opening into the steam-drum, and two lower water-bodies, G G, the upper water-body being connected to each of the lower water-bodies by a series of pipes, J and K, substantially as described.

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Witnesses:
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