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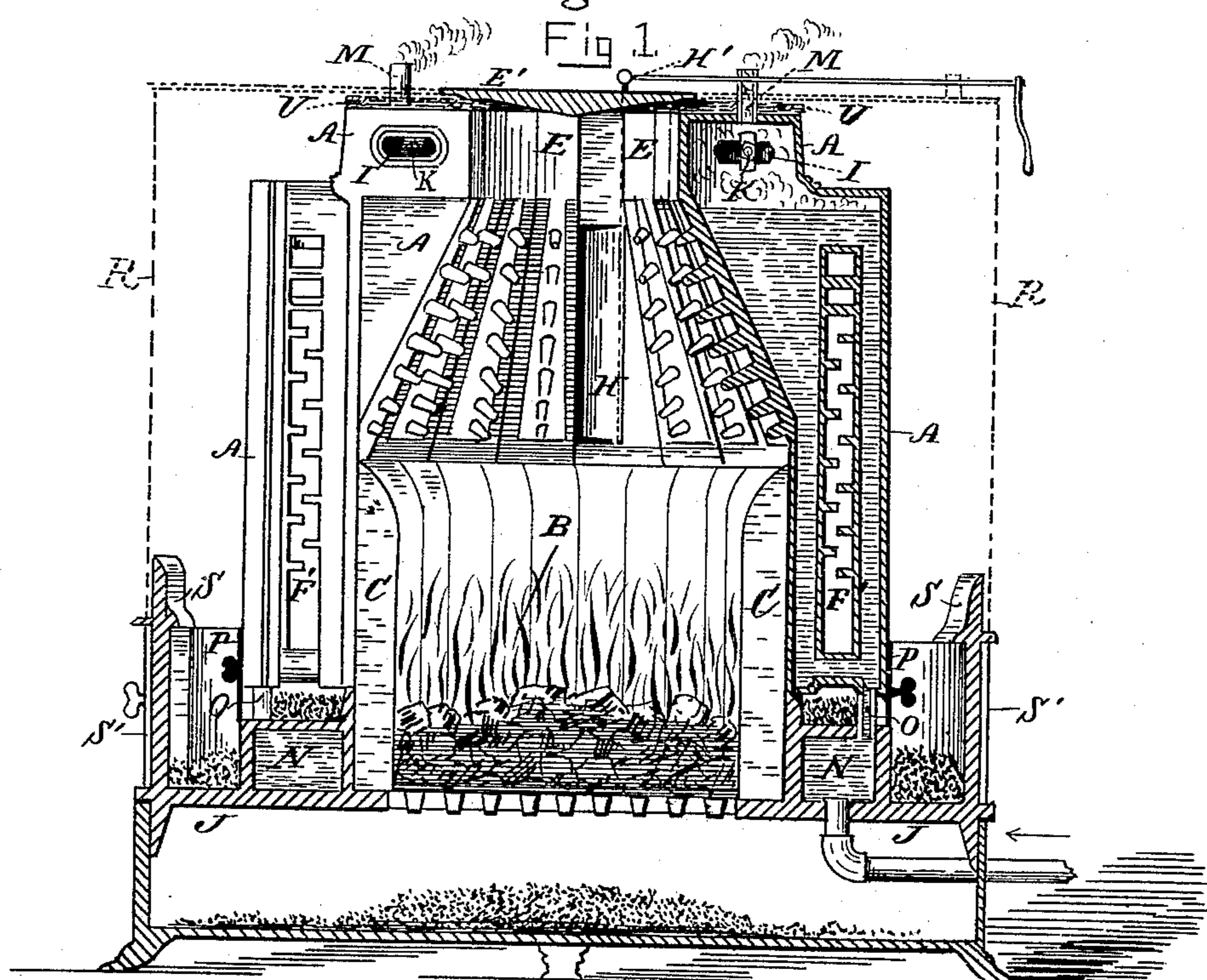
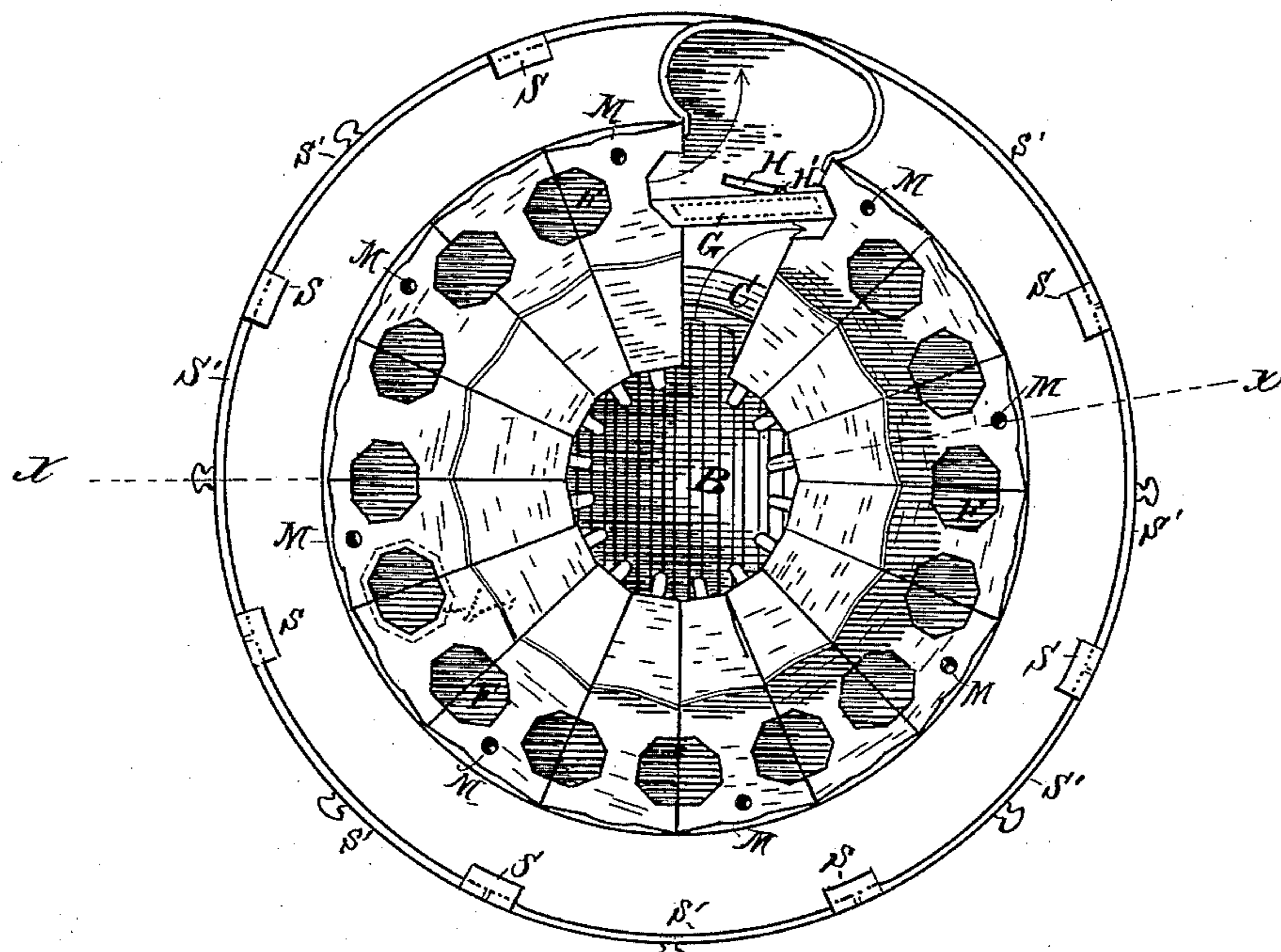
2 Sheets—Sheet 1.

E. F. GORDON & H. HOBBS.

STEAM GENERATOR.

No. 271,329.

Patented Jan. 30, 1883.



Witnesses,  
Lewis M. Harston  
E. A. Phelps.

Fig. 2.

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their attorney

(No Model.)

2 Sheets—Sheet 2

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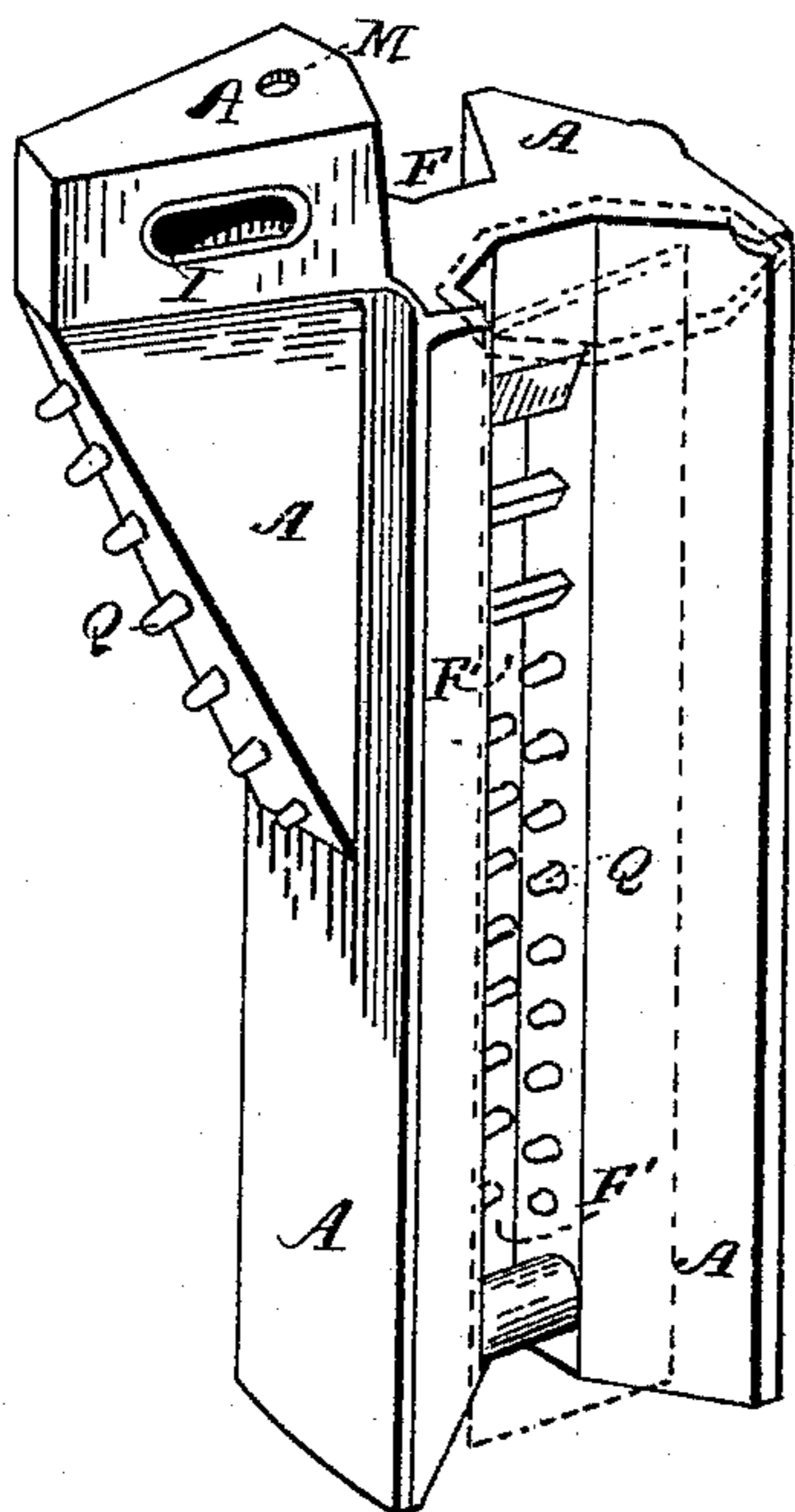


Fig. 3.

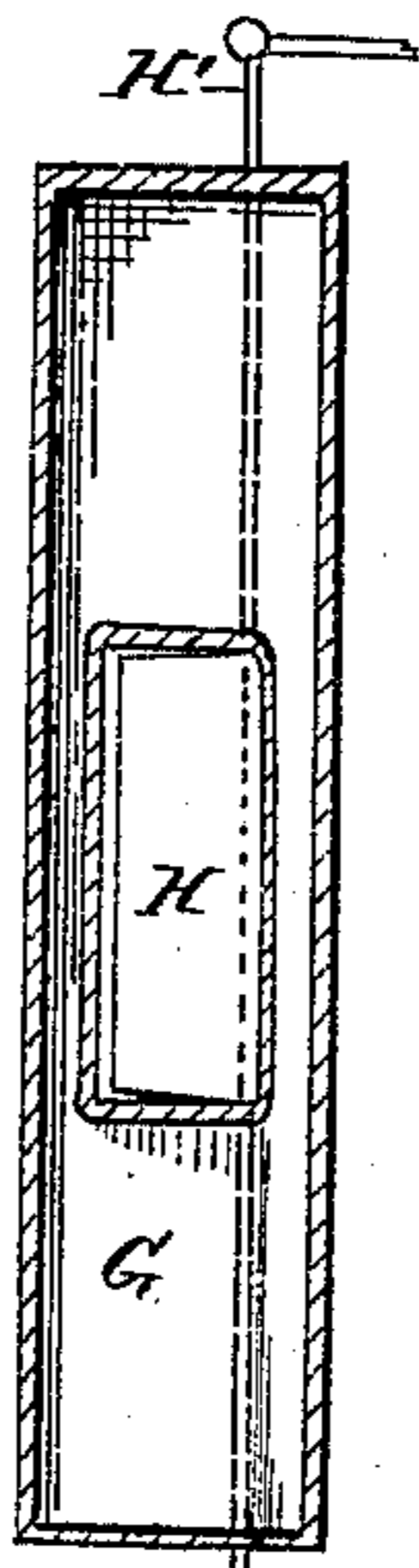


Fig. 4.

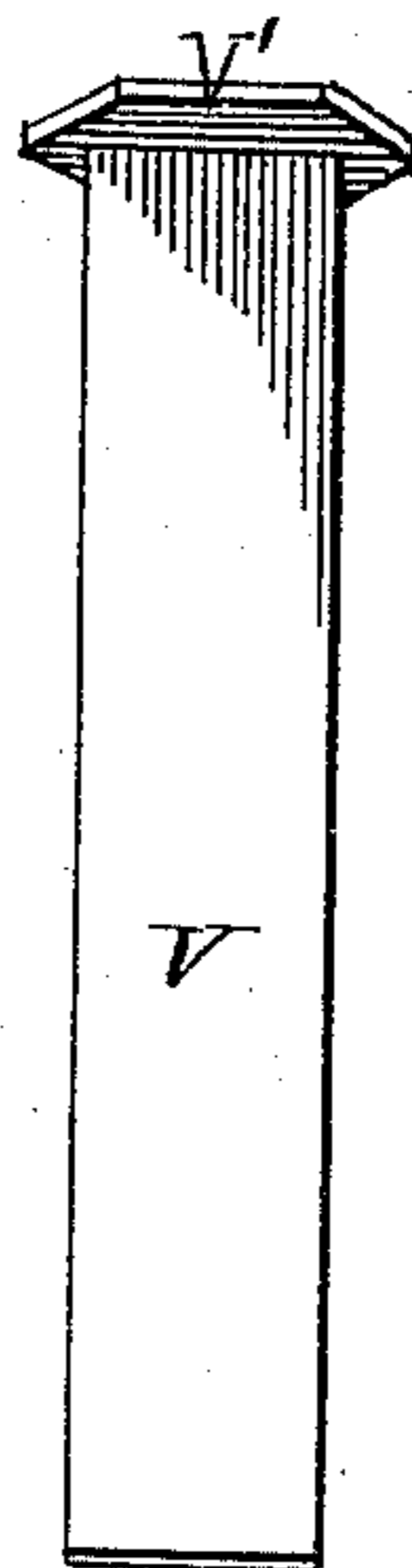


Fig. 5.

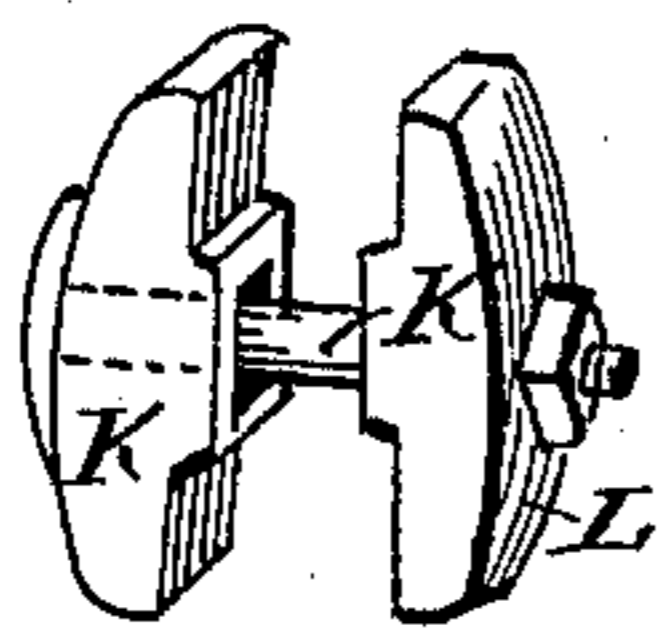


Fig. 6.

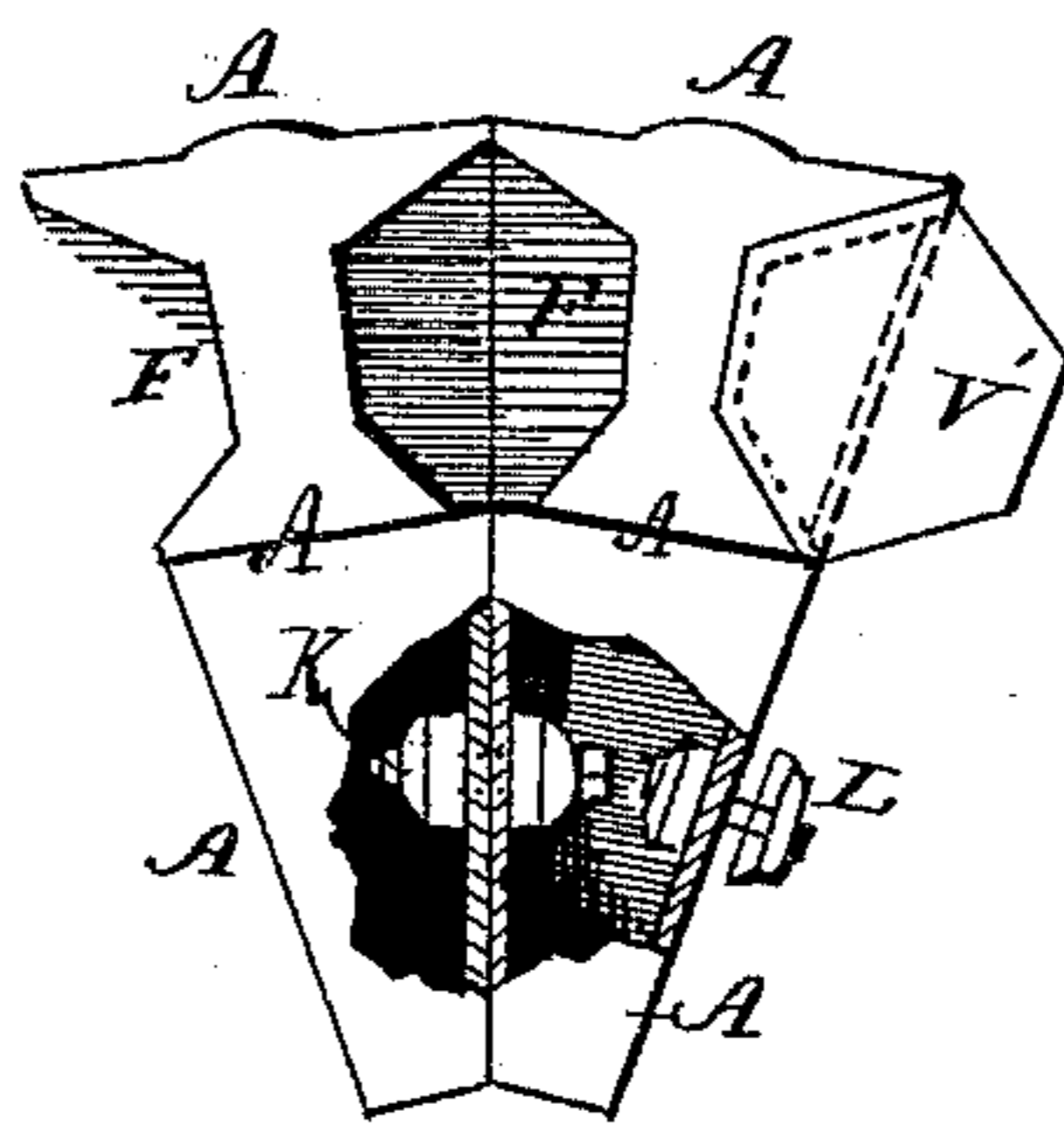


Fig. 7.

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# UNITED STATES PATENT OFFICE.

EDWARD F. GORDON AND HORATIO HOBBS, OF CONCORD, NEW HAMPSHIRE.

## STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 271,329, dated January 30, 1883.

Application filed May 23, 1882. (No model.)

*To all whom it may concern:*

Be it known that we, EDWARD F. GORDON and HORATIO HOBBS, citizens of the United States, residing at Concord, in the county of Merrimac and State of New Hampshire, have jointly invented certain new and useful Improvements in Steam-Generators; and we do hereby declare that the same are fully described in the following specification and illustrated in the accompanying drawings.

The object of this invention is to provide simpler and more efficient means than those heretofore used for the purpose of generating steam, and to so arrange the parts of the apparatus as to utilize to the utmost the heat employed, as well as to provide for readily cleaning the flues, even while in use.

Our invention is primarily a sectional boiler composed of a series of connected cast-metal hollow sections, each having within itself a flue-opening, around which the water contained in said section circulates while being heated, and each connecting with the steam-space above and preferably with a water-supply below, common to all. These units or sections of the boiler are original in form, construction, arrangement, and means of connection, and the apparatus formed by their union, as hereinafter described, contains novel features, which will be recited in the appended claims.

In the drawings, Figure 1 is a top view or plan of the generator formed by the connected sections, showing the drum removed. Fig. 2 is a vertical sectional view of the same at  $x x$ . Fig. 3 represents in perspective one of the sections detached. Fig. 4 shows a section employed as a deflector and having a damper for opening a direct draft. Fig. 5 illustrates a pendent partition employed in the spaces between the several sections to throw the caloric-current against the walls of said sections; and Figs. 6 and 7 indicate the means and mode of connecting the sections, hereinafter referred to.

The form of the sections A A will be clear from Fig. 3, and their arrangement relatively to each other and the fire-pot from Figs. 1, 2, and 7. The fire-pot B is central, and the series of sections or units surround it in a circle, being kept from immediate contact with the incandescent fuel by the fire-brick C. Above the fire-brick the sections project inwardly on

an oblique line, so that a dome is formed over the fire, with a vertical central aperture, E, leading thereto from above for feeding in the fuel. (See Figs. 1 and 2.) The aperture E is provided with a cover, E'. The sections A are at their upper ends approximately wedge-shaped in horizontal section—that is, their vertical sides taper toward each other as they approach the center of the fire-pot and fit into their places in the circle. This wedge form is not complete, even at the upper end, since the point of each is cut away sufficiently to leave the feed-aperture E, and the sides are beveled or recessed so as to form between each two adjacent sections a vertical space, F, substantially hexagonal in form. These spaces form parts of an annular flue, as will be described, and are utilized also for the purpose of inserting a brush vertically at intervals to clean out said flue. The other parts of said flue are indicated in Figs. 2 and 4, and are formed by the central apertures, F', through each casting or section A. When the sections are secured in position side by side it is obvious that a continuous horizontal annular flue will be formed by the several connected spaces. The caloric-current is deflected except when starting the fire, and is caused to make the circuit of this flue F F' by any suitable means, preferably by a flat and hollow section, G, substituted for one of the sections A, and set obliquely, so that such heated current will enter the flue F F' in front of said section G, and after making the circuit will emerge in rear of said section and pass off through the smoke-pipe and chimney.

When the fire is being started and a direct draft is desired the damper H in the section G is opened by the hinge-rod H'. At such times the heated current will principally pass off without traversing the flue F F', and will so continue until the damper is closed.

The several sections are secured together laterally in any convenient manner. We have devised a convenient means of attachment, which will be readily understood by reference to Figs. 3, 6, and 7. Lateral openings I are provided in the sides of the wedge-shaped upper ends of the sections, so as to coincide and communicate with each other. A T-bolt, K, has its head inserted in one of these openings,

with its threaded end extending through the opening into the adjacent section to receive a nut which forces a sliding clamp or button, L, against the inner wall of such adjacent section, and thus holds both rigidly together. A little litharge or red lead applied between the surfaces makes the joint steam-tight, while the series of openings I I permit the free passage and commingling of the steam generated in the several sections. Proper outlet-pipes M for the steam are provided to conduct it to the steam-chamber. Each section contains water surrounding the flue-aperture F', as seen in Fig. 2, and each should connect directly or indirectly with the annular water-way N. This connection is readily made by a nipple or short tube, O, which serves at the same time to support the section upon the base J, in which the water-way N is formed. A lug or shoulder on said base adjoining the fire-brick gives further support. The vertical spaces F between the sections give ready access to the annular flue, and permit it to be brushed down and cleaned out from time to time without disturbing the fire. The soot so dislodged from the walls of the sections may be readily taken out by means of removable doors or slides P. The spaces F are provided each with a removable cover, V', and from each cover depends a deflecting-partition, V, which presents its broad side across the caloric-current in the flue F F', and causes said current to impinge against the walls of the spaces F, whereby the water within the sections is additionally heated by reason of such deflection against the walls thereof.

For the purpose of utilizing the heat to the uttermost, we provide projecting prongs Q on the exposed faces of the sections, that the heat from the fire and from the current in the flue may be conducted to the water inclosed in the sections.

The series of sections may be inclosed in a galvanized-iron or other cylinder, R, to retain the heat which would otherwise be lost by radiation. This cylinder rests on standards S, erected on the base J. Its top is preferably a series of flat plates covering the upper ends of the sections, and separated from them by a thin

layer of asbestos, U. Between the standards S are removable doors S' for the purpose of clearing out, from time to time, the accumulations of ashes and soot.

We claim as our invention—

1. A steam-generator composed of a series of connected cast-metal hollow sections arranged in a circle around the fire-pot, each section having a central opening through it, forming part of an annular horizontal flue, and all arranged as described, so that the heat, while in the fire-pot, applies primarily and directly to the inner face of the several sections, and subsequently to the central part of each section, as the caloric-current passes through the several openings forming said flue, for the purposes set forth.

2. In a steam-generator, a series of connected hollow castings surrounding the fire-pot, said sections having apertures through them, which together form a continuous channel for the products of combustion, in combination with an oblique deflector, made hollow and adapted to contain water to be heated by the current impinging on it, and provided with an opening for direct draft when desired, substantially as set forth.

3. A steam-generator having an annular horizontal flue for the passage of the heated products of combustion, and provided with a series of covered vertical apertures through said flue, and with soot-discharging doors or slides at the base of said apertures, for the purpose set forth.

4. A steam-generator formed of connected hollow sections, and having an annular horizontal flue with covered vertical apertures at intervals, in combination with pendent partitions in said flue and apertures, serving to deflect the caloric-current against the walls thereof, for the purpose set forth.

In testimony whereof we hereto affix our signatures in presence of two witnesses.

EDWARD F. GORDON.  
HORATIO HOBBS.

Witnesses:

N. H. SPENCER,  
E. A. PHELPS.