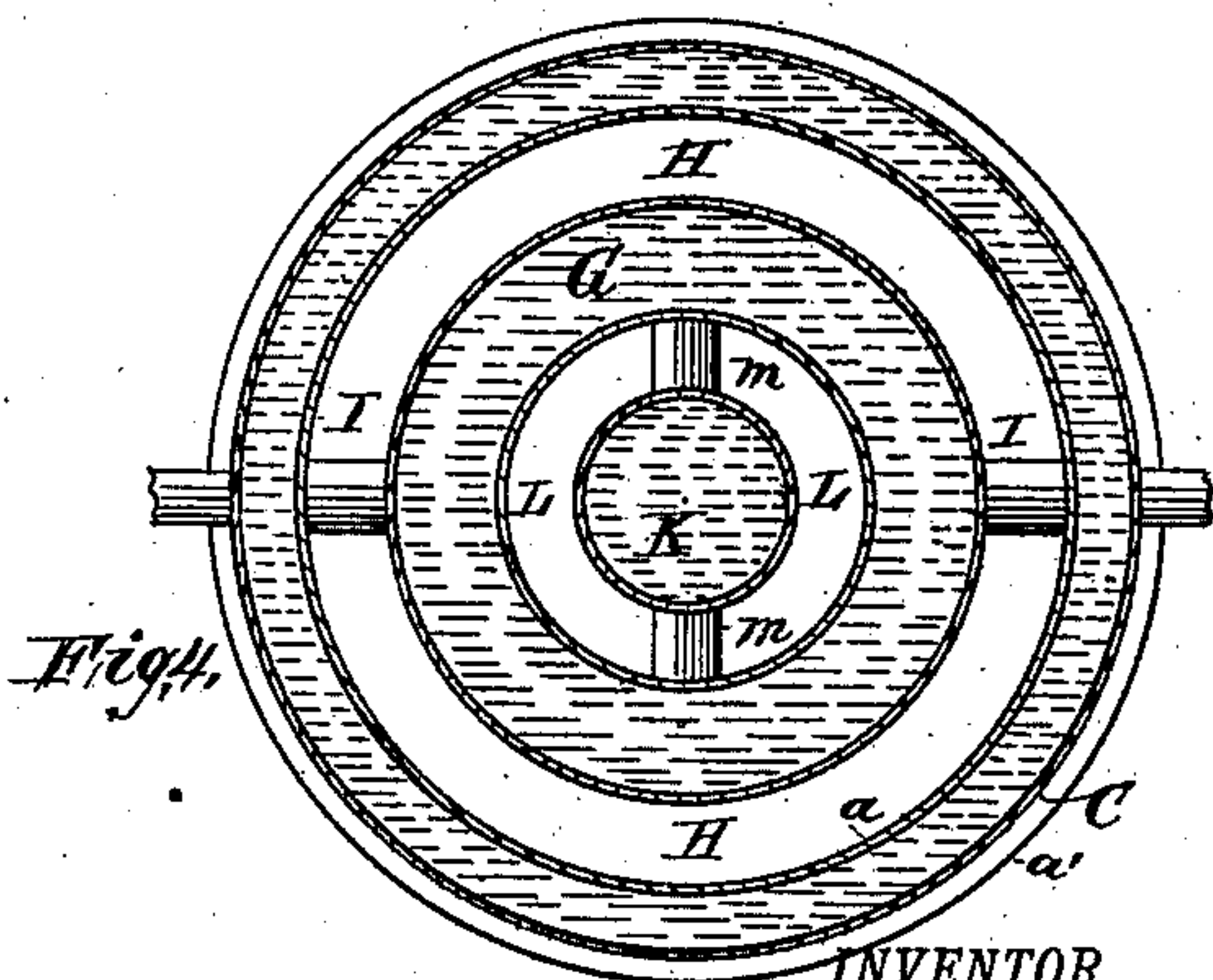
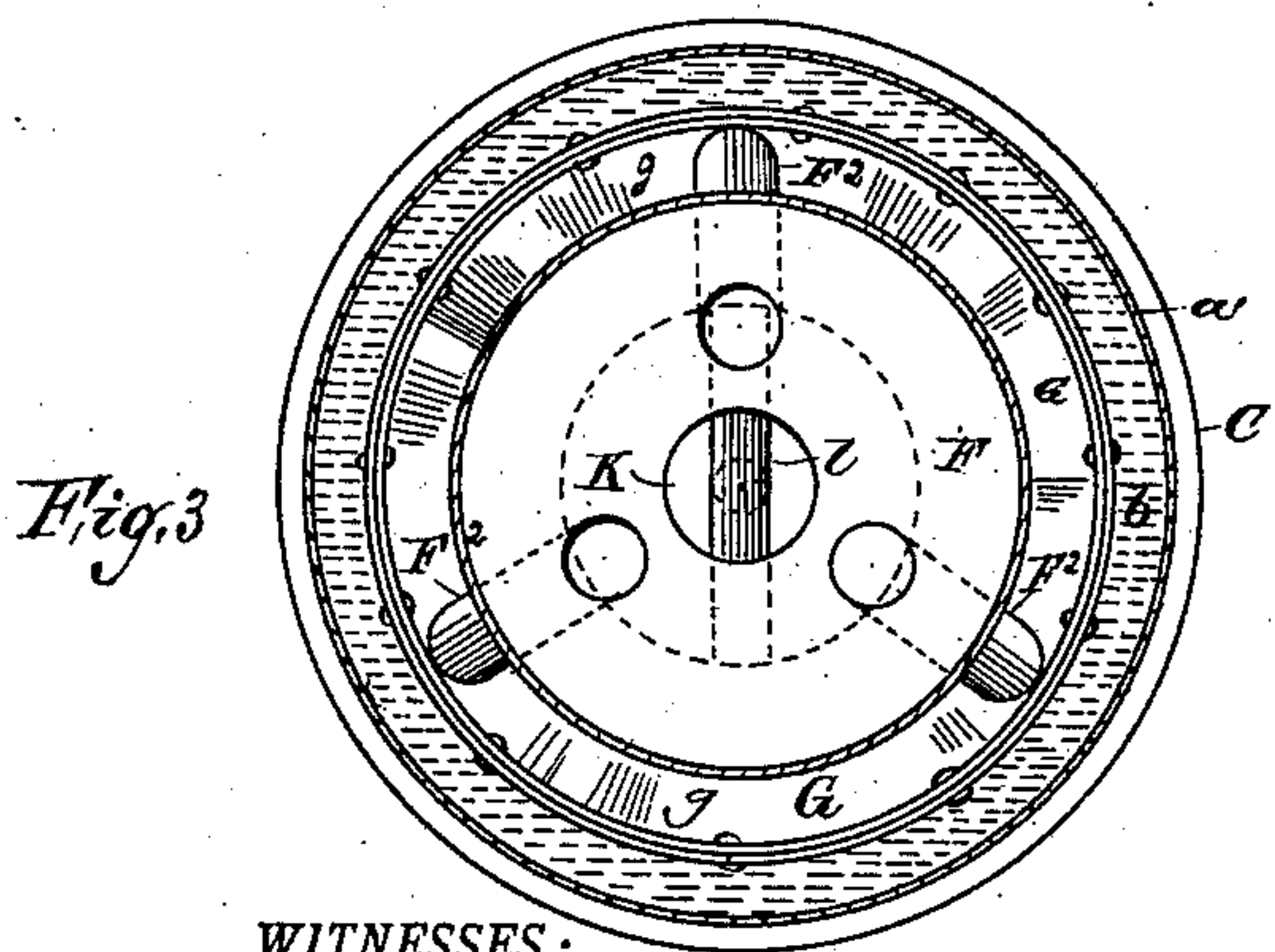
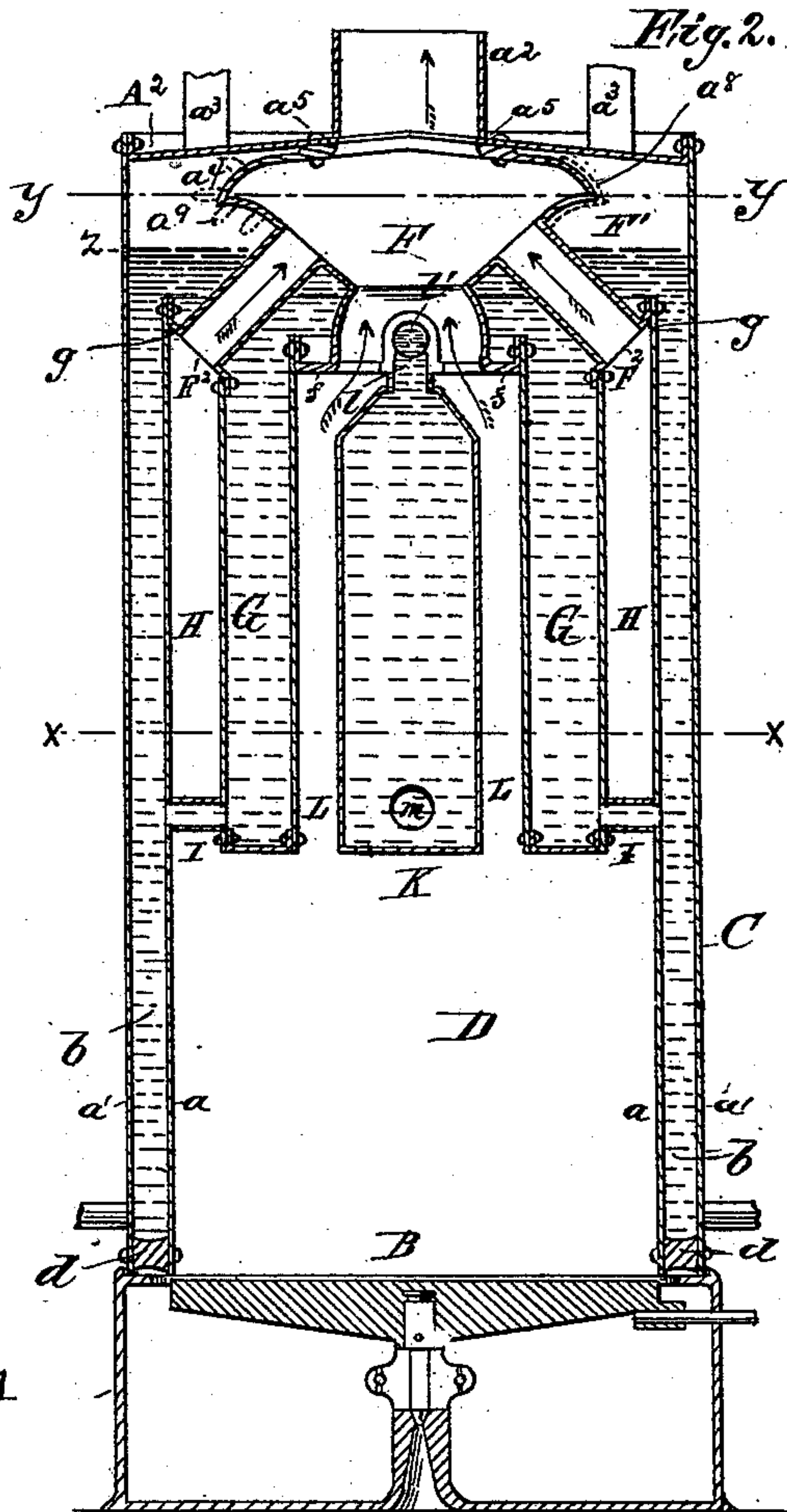
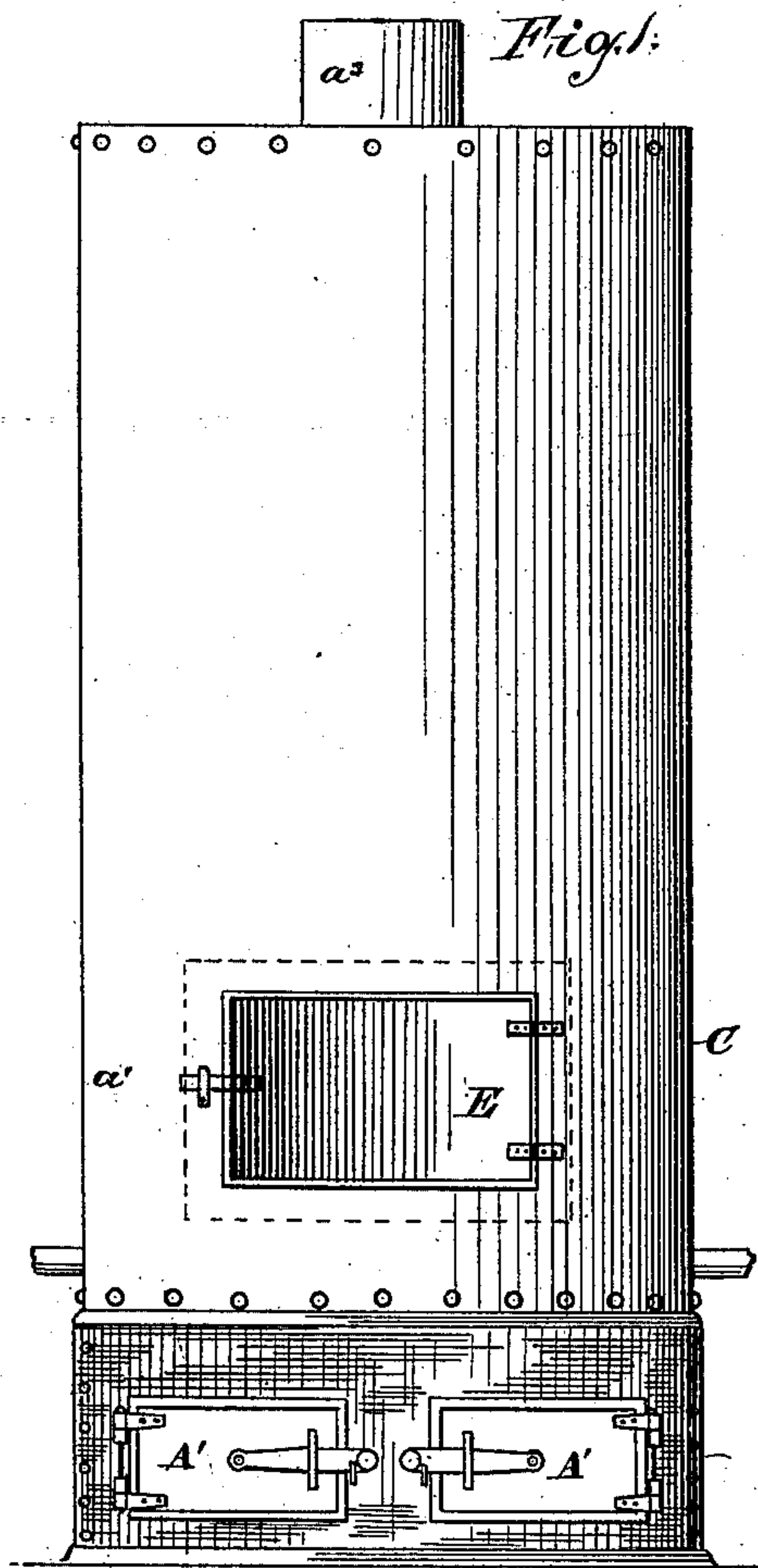


(No Model.)

S. FISKE.
STEAM GENERATOR.

No. 361,216.

Patented Apr. 12, 1887.



WITNESSES:

Chas. Benjamin,
Herbert R. Benthine

INVENTOR

Samuel Fiske,

BY

Laurel J. Storer,
his ATTORNEY

UNITED STATES PATENT OFFICE.

SAMUEL FISKE, OF NEW YORK, N. Y.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 361,216, dated April 12, 1887.

Application filed January 4, 1887. Serial No. 223,357. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL FISKE, of New York, county of New York, and State of New York, have invented certain new and useful

Improvements in Steam-Generators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention is designed as an improvement on the steam-generator for which Letters Patent of the United States, No. 326,552, were issued to me September 22, 1885.

The objects of this invention are to secure greater economy and convenience of construction, more extended heating-surface in a given space, and economy in fuel.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a front elevation of the improved steam-generator. Fig. 2 is a sectional elevation thereof. Fig. 3 is a plan on line *yy*, Fig. 2. Fig. 4 is a plan on line *xx*, Fig. 2.

In the drawings, A represents the generator-base, whose front, provided with doors A', is secured in place by screws, as shown, and is removable, so that the grate B may be readily set in place or removed through the opening.

The grate B herein shown is centrally supported by a spindle that is held in a standard which projects upward from the base bottom; but a grate of any suitable form may be used.

The main portion of the boiler C, supported on the base A, has, for most of its height, a double shell, *a a'*, inclosing a water-space, *b*, which at the sides surrounds the combustion-chamber D, and at the top extends over it, the inner shell, *a*, being of less height than the outer shell, *a'*. The bottom of this annular water-space *b* is closed by a ring, *d*, to which the lower edges of said shells are riveted. A door, E, in one side of the boiler affords access to the combustion-chamber for feeding fuel thereto.

The boiler-cover is a plate, A², suitably secured to the upper edge of the outer boiler-shell, *a'*, and over a central opening in said cover A² is fixed the smoke-pipe *a*², which coincides with the opening in the enlarged conical smoke-box F beneath the boiler-cover.

Steam-pipes *a*³ are secured over corresponding openings in the boiler-cover to conduct the steam for heating purposes from the steam-chamber F'.

The smoke-box F, which may conveniently be made of cast metal, is of cylindrical form, fully open at the bottom, and having a central opening in the top corresponding with the smoke-pipe *a*². Around the bottom of this smoke-box is an annular flange, *f*, with edge turned at right angles. From this flange the cylindrical body of the smoke-box curves inward at the sides a short distance up in the boiler water-space, and then flares outward, as shown, to form inclined planes for the easy introduction and connection therewith of the inclined smoke and hot-air flues F². (Shown best in Fig. 2.) Through these flues F² the products of combustion pass from the annular flue H, hereinafter described, into the said smoke-box.

The top of the smoke-box F is partly closed by an annular cover, *a*⁴, which is an integral part thereof, and rivets *a*⁵, passed through the boiler-cover and the edge of this cover *a*⁴, secure the smoke-box in place.

The outer radiating surface of the smoke-box may be extended or increased by projecting ribs *a*⁸ or studs *a*⁹ cast or secured thereon, as shown in dotted lines in Fig. 2, and the device itself be thereby very considerably strengthened.

A large annular double-shelled water-drum, G, suitably secured by the inclined top flange, *g*, of its outer shell to the inner shell, *a*, of the main portion of the boiler and by the upper edge of its inner shell to the annular flange *f* of the smoke-box F, projects down into the combustion-chamber D in such a manner that an annular flue, H, for the upward passage of the products of combustion, is formed between it and the main body of the boiler, and this flue H is connected with the smoke-box F by means of the several shorter flues F², which pass angularly through the upper water-space, each of the flues F² having one end expanded or otherwise secured in the inclined flange *g*, and at right angles thereto, of the outer shell of the drum G, as shown in Fig. 2. This drum G, being open at the top below the water-line, communicates there with the water-space of the main body of the boiler, and also by means of two or more tubes, I, which extend

laterally from the lower part of said drum to the water-space *b*. Within the space inclosed by the inner shell of this drum *G* is a smaller water-cylinder, *K*, which preferably extends
 5 down into the combustion-chamber as far as does the drum *G*, and so forms an annular flue, *L*, between it and the said drum *G*. The top of this cylinder *K* is made conical, to increase the area of the flue *L*, at the upper part
 10 thereof, in order to give the products of combustion freer passage into the smoke-box *F*.

The cylinder *K* is held in place by a tube-connection, *l*, at its top with a horizontal tube, *l'*, which extends across the smoke-box *F* and
 15 through its opposite sides, as indicated in Figs. 2 and 3, and communicates with the upper water-chamber; and the water-space of said cylinder *K* communicates, also, with the water-space of the drum *G* by means of a tube or
 20 tubes, *m*, extending from the one to the other, as shown.

In a steam-generator of this style of construction an unusually extensive water-heating surface is secured. The inclined top flange
 25 of the water-drum *G*—the cover of the annular flue *H*—admits of the use of cylindrical flues *F*² of greater cross-sectional area than if said flange were a horizontal one. The smoke-box being placed in the water and steam
 30 space, receives all the products of combustion escaping from the combustion-chamber and economizes the heat in them to the greatest possible degree by radiating it from its extended surface on all sides, and the circulation
 35 of water from one division of the water-space to another is as free as can be desired, and the several parts of the generator are simple and easy of construction, are easily assembled, and can readily be renewed or repaired.

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

1. A steam-generator constructed, substantially as herein shown and described, with outer and inner shells, *a a'*, forming an annular water leg or space encircling the combustion-chamber, smoke-box *F*, fixed centrally in the
 45 upper part of the generator in the water and steam chambers, annular open-top water-drum *G*, projecting down into the combustion-chamber and forming, in connection with the shell
 50 *a*, an annular flue, *H*, open-top water-cylinder *K*, projecting down into the combustion-chamber in the space inclosed by the inner shell of the drum *G*, and forming, in connection with the
 55 shell, an annular flue, *L*, suitable flue-connections from the annular flues to the smoke-box, and suitable water-connections from one water-space to another, all constructed and arranged substantially as herein shown and described.

2. In a steam-generator, the combination, 6c with the boiler provided with annular flue *H*, of a conical smoke-box secured entirely within the water and steam chambers and constructed and arranged to receive the products of combustion passing from the combustion-chamber 65 to the smoke-pipe, and the inclined flues *F*², connecting said combustion-chamber and smoke-box, substantially as and for the purpose set forth.

3. The combination, with the shorter inner 70 shell, *a*, arranged in relation to the outer shell, *a'*, to form an annular water leg or space, *b*, of the annular water-drum *G*, secured by the inclined flanged top of its outer shell to the top of the shell *a* and by the upper edge of its inner shell to the smoke-box *F*, and projecting 75 down into the combustion-chamber, as set forth.

4. The combination, with the smoke-box *F*, set centrally in the upper part of the steam-generator, and with the open-top annular water-drum *G*, of the open top water-cylinder *K*, projecting down into the combustion-chamber within the space inclosed by the inner shell of the drum *G* and provided with water-connections 85 with the boiler water-spaces, substantially as herein shown and described.

5. In a steam-generator, the combination of an annular outer open-top water-leg, a central water-cylinder, and an intermediate conical 90 annular open-top water-leg, together forming annular flues in the upper part of the combustion-chamber, substantially as herein shown and described.

6. The combination, with annular flue *H* and 95 annular water-drum *G*, having the upper edge of its outer shell flanged or flared outward and upward on an incline, of inclined tubular flues *F*², secured at one end in said inclined flange and projecting at right angles therefrom, substantially as herein shown and described. 100

7. In a steam-generator of the character substantially as herein specified, provided with an annular flue as a means for securing space for tubular flues of large area to conduct the products of combustion from said annular flue, the top flange of the water drum *G*, fixed at a slope or inclination, as set forth. 105

In testimony that I claim the foregoing I have hereunto set my hand, in the presence of 110 two witnesses, this 31st day of December, 1886.

SAMUEL FISKE.

Witnesses:

JACOB J. STORER,
 HERBERT VALENTINE.