(No Model.)

3 Sheets—Sheet 1.

H. E. FRAUZ.

STEAM GENERATOR.

No. 540,612. Patented June 4, 1895.

Fig. 1.

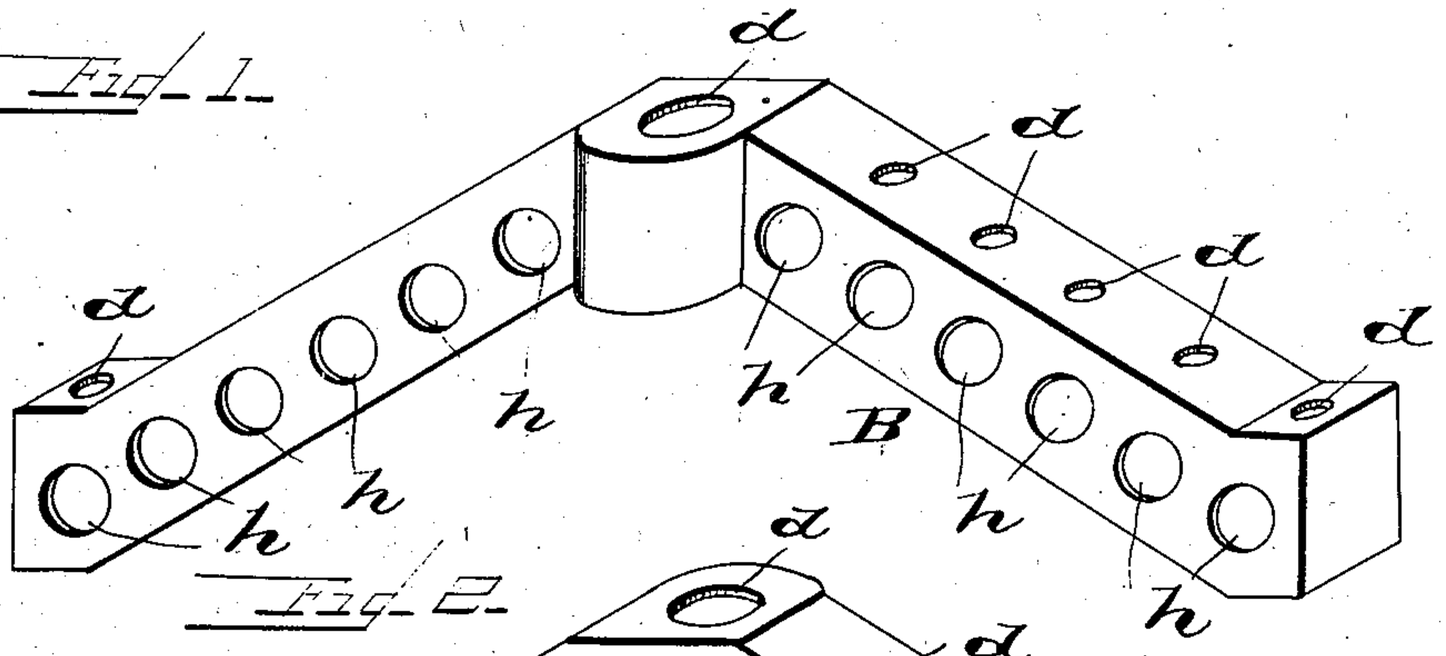


Fig. 2.

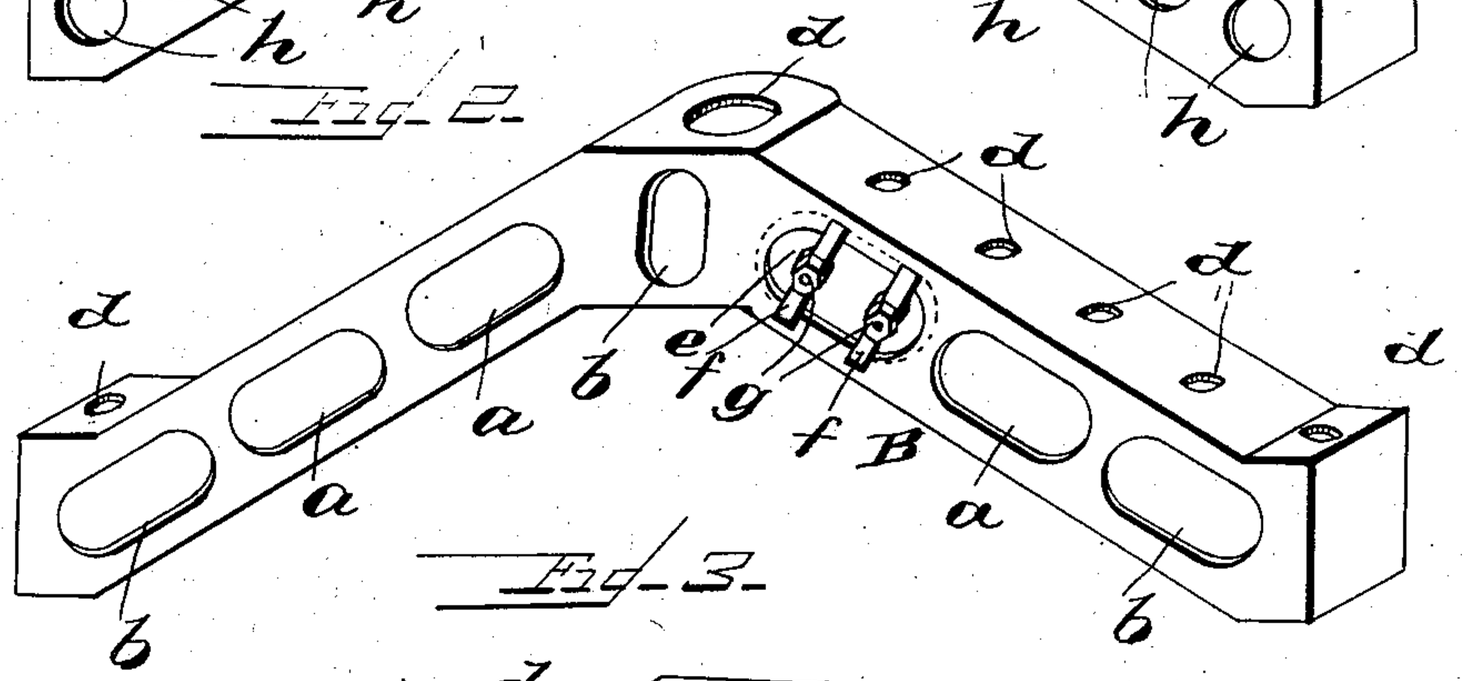


Fig. 3.

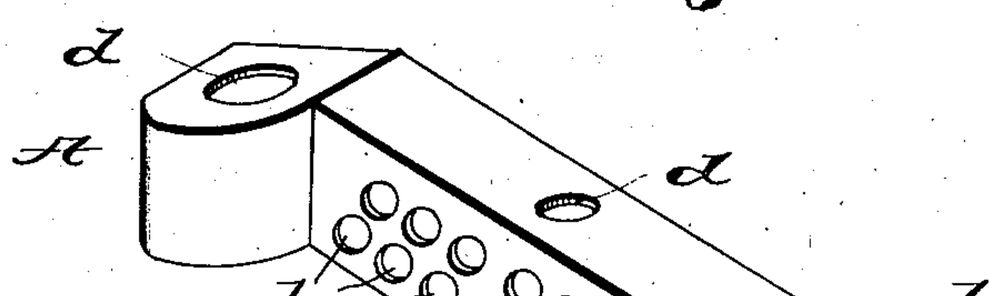


Fig. 4.

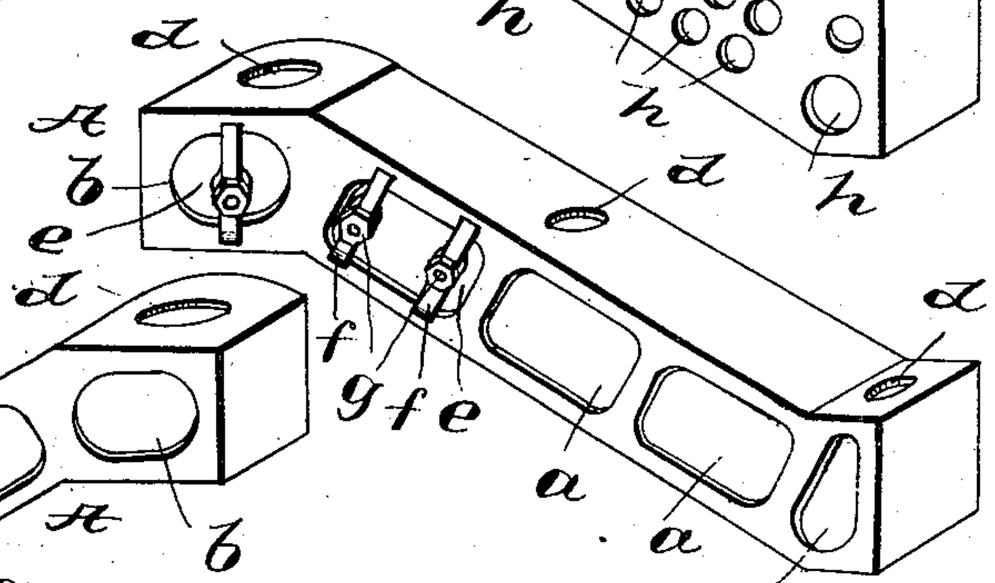
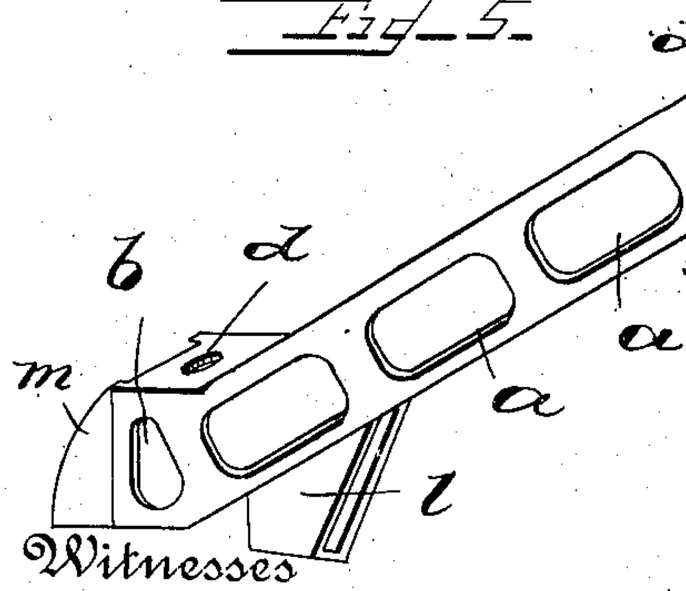


Fig. 5.



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(No Model.) 3 Sheets—Sheet 2.

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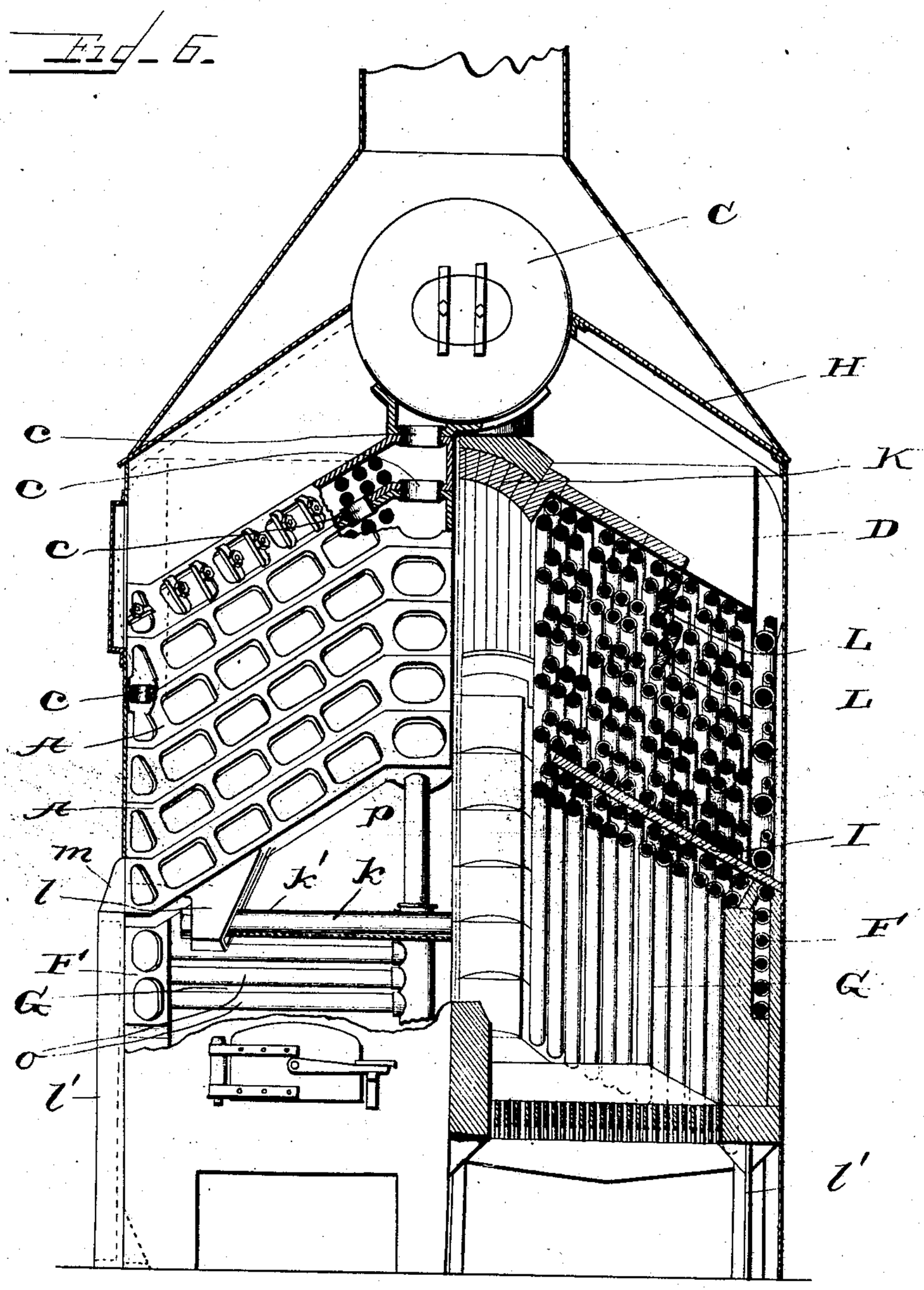
STEAM GENERATOR.

No. 540,612. Patented June 4, 1895.

Fig. 6.



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(No Model.) 3 Sheets—Sheet 3.

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STEAM GENERATOR.

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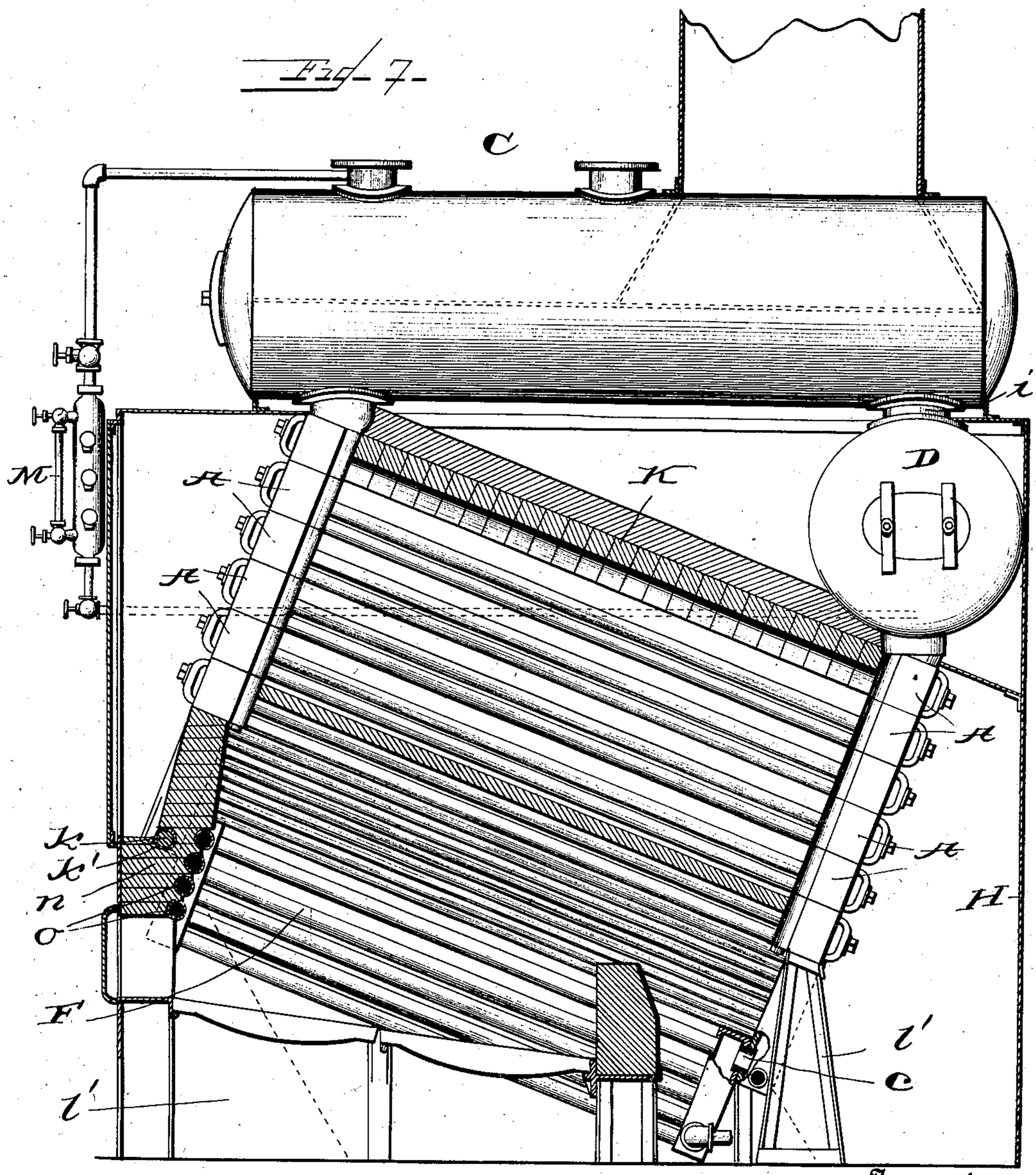
Fig. 7.



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UNITED STATES PATENT OFFICE.

HERMAN E. FRAUZ, OF BALTIMORE, MARYLAND.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 540,612, dated June 4, 1895.

Application filed November 26, 1894. Serial No. 530,007. (No model.)

To all whom it may concern:

Be it known that I, HERMAN E. FRAUZ, a citizen of the United States, residing in the city of Baltimore and State of Maryland, have invented certain new and useful Improvements in Steam-Generators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to steam-generators, has especial reference to that class of water tube generators of pipe construction in which a number of tubes constituting the chief heating surface are connected to headers which afford the means of conducting the water and the steam from the tubes, as well as supplying the tubes with water from which steam is generated, and has for its object improvements in the construction shown in Letters Patent of the United States numbered 527,526, granted to me on the 16th of October, A. D. 1894, which improvements will be fully disclosed in the following specification and claims.

In the accompanying drawings, which form part of this specification, Figure 1 is a perspective of a double header, showing the rear thereof; Fig. 2, a like view showing the front of said header; Fig. 3, a like view of a single header, showing the rear thereof; Fig. 4, a like view showing the front of said header; Fig. 5, a like view of a lower single header, showing the front thereof, and all of these figures show the headers on an enlarged scale compared with the remaining figures of the drawings. Fig. 6 represents a front elevation, partly in section, of a steam-generator of my improved construction, showing the headers in position on one side of the vertical transverse center of the generator and the headers removed on the opposite side of said center, and Fig. 7 a vertical longitudinal section showing the separator in side elevation and the water-drum in end elevation.

Reference being had to the drawings and the letters thereon, A indicates a single header which is rectangular in form and inclined toward the vertical transverse center of the generator and is provided in its front side with hand-holes *a* through which the tubes and some of the connecting nipples are expanded and cleaned, with hand holes *b b* through the nipples *c* which connect the headers at their ends and are expanded in the holes *d* in the headers and with suitable hand-hole covers *e* secured by dogs *f* and bolts *g* in the usual manner; and in the rear side with holes *h* to receive water tubes and which holes and tubes are arranged in groups preferably of six as shown in Figs. 3, 6, and 7.

By grouping a number of small tubes a greater area of heating surface is obtained within the same mean area than when large tubes are used.

The holes *d* for the reception of the nipples *c* are in the upper and lower sides of all the headers except the upper and lower ones of the series, in which two the hole *d* occurs on the upper and lower side of the header at the inner end of the upper one only, by which the upper header is connected to the separator in front and to the water drum in the rear of the generator.

B indicates a double header which is of the same general construction and form as the header A, and is provided in its front side with hand-holes *a* and *b*, and in its upper and lower sides with holes *d d* to connect the headers together direct by nipples, and with holes *h h* to receive water tubes.

The inclination of the headers across the generator allows the tubes to be so disposed as to afford ample furnace room and a spacious combustion chamber, and at the same time protect the sides of the combustion chamber by intercepting the heat at that point, thereby reducing the amount of brick work or other refractory material necessary to protect the sides.

The headers are assembled in a generator one above another to any desired height and in any convenient number and are connected together by nipples *c* as shown in Fig. 6 by the parts broken away and to the separator C so as to form a direct passage for the steam through the headers themselves to the separator, thus dispensing with the receiver or uptake of my former construction. Each rear header is in like manner connected to its contiguous headers and the upper one of the series is connected to the water drum D and said rear headers are arranged on a lower plane than the front headers, as shown in Fig.

7 to provide the proper inclination of the water tubes E which connect the front and rear headers.

The separator is arranged in the transverse center of the generator above the headers and their connecting tubes and extends from the front to the rear of the generator, and at the rear end is connected by a pipe *i* to the water drum D which extends across the generator and above the rear headers, as shown in Fig. 7. The separator and the water-drum are joined together in the same manner as the front upper header is joined to the separator.

To utilize the heat of the furnace, sections F F are attached to the lower header A on each side of the generator and form water legs as shown in Figs. 6 and 7, the headers of the sections being connected to the lower headers by nipples *c* in like manner as the headers A are connected together; an illustration of which connection is shown at the rear end of the generator in Fig. 7.

The opposite connected headers are joined transversely of the generator by a bolt-rod *k* which may be incased in a tube *k'* and engages lugs *l* on the lower headers and by the inclination of the headers form a complete truss, and the headers thus joined rest upon a metal stand *l'* by flanges *m* at the outer end of both the lower headers.

The bolt-rod *k* is protected against heat of the furnace by masonry *n* and to support the masonry a manifold G may be attached to the lower headers on each side of the transverse center of the furnace. The tubes *o* of the manifold may connect with the headers of the sections F, F, and at the inner end of the manifold it is connected to the lower side of the header A and at the inner end thereof by a pipe *p*.

By the system of pipe connections described, perfect and free circulation of the water in the generator is maintained and part of the separator and the whole of the water-drum are contained within the casing H.

It will be observed that the water-drum and the separator are exposed to the products of combustion from the furnace, and in order to confine and direct the gases emanating from the fuel to the water tubes E, a baffle plate I is interposed above the tubes of the lower header, a crown K in the upper part of the combustion chamber and narrow vertical baffle plates L L, between the tubes of the upper two headers.

It is obvious that the headers may be inclined downward from the sides toward the center of the generator or they may be curved or sinuous without departing from the spirit of my invention so long as the headers are inclined.

An ordinary steam and water gage M may be attached to the separator C and the water-drum as shown in Fig. 1.

The furnace is no part of my present invention and any approved form of construction may be used.

The generator constructed as described is especially designed for use as a marine generator and in its construction single headers are preferred for large generators and double headers for small generators and in either instance steel castings are preferred for the headers.

Having thus fully described my invention, what I claim is—

1. A header inclined inwardly toward the transverse center of a steam generator and provided with openings in its inner side for the reception of water tubes, openings in its upper and lower sides and at both ends to connect one header directly to contiguous headers whereby circulation is maintained through the headers and hand-holes in the front of the header.

2. A header inclined inwardly toward the transverse center of a steam generator and provided with openings for the reception of tubes, hand-holes opposite said tubes and a lug on the lower side of the header to receive a bolt.

3. The combination of a plurality of headers inclined toward the center of a generator and connected directly one to the other at both ends, whereby circulation is maintained through the headers, a separator with which the front headers communicate and a water drum which communicates with the rear headers.

4. The combination of headers inclined toward the center and from opposite sides of a steam generator and provided with water circulating tubes, and a transverse tie-rod engaging the headers and forming a truss.

5. The combination of a plurality of headers inclined toward the center of a generator, and sections forming water legs on each side of the furnace between the front and rear headers and connected thereto on their inner sides.

In testimony whereof I affix my signature in presence of two witnesses.

HERMAN E. FRAUZ.

Witnesses:
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D. W. REINOHL.