

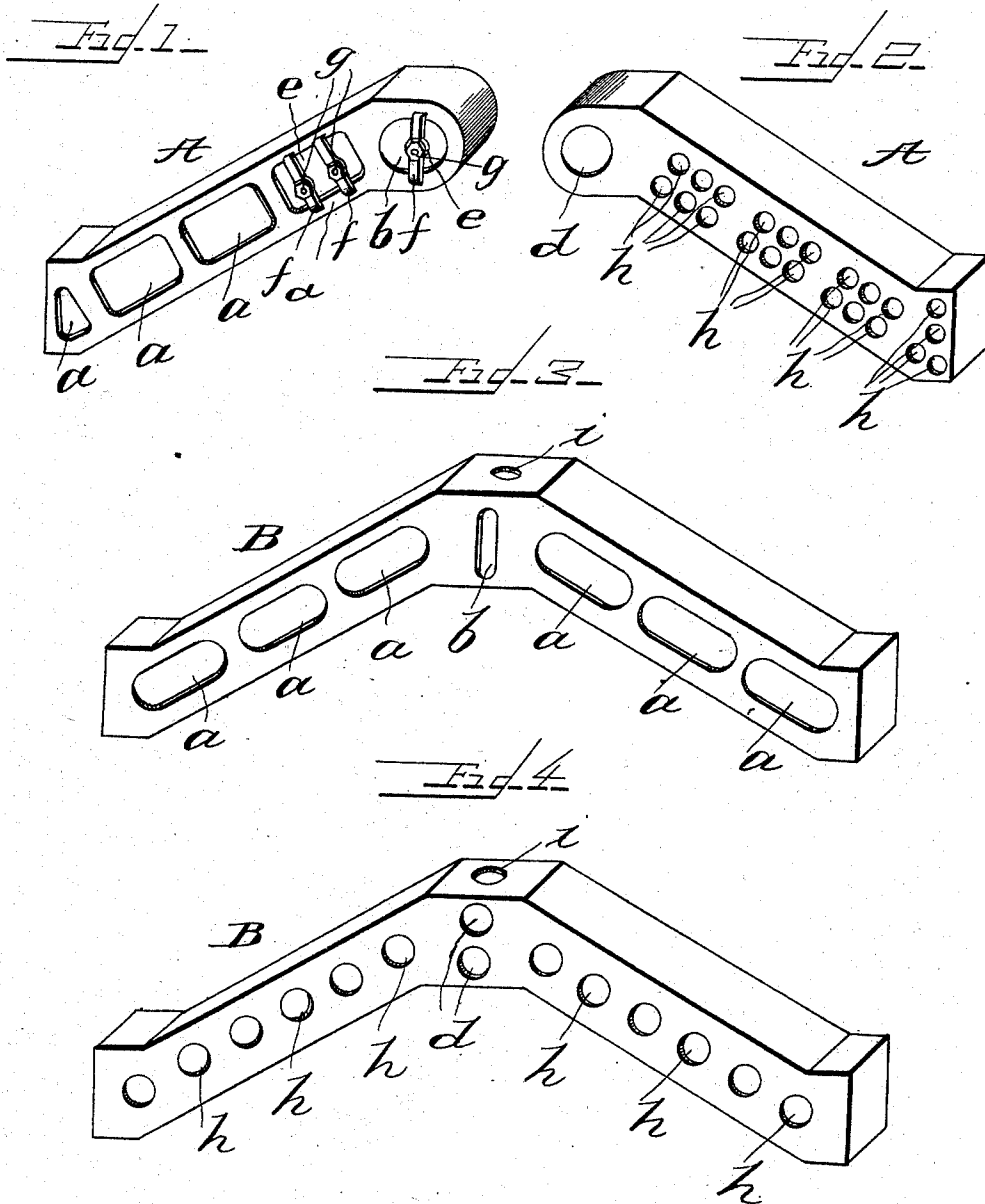
(No Model.)

H. E. FRANZ.
STEAM GENERATOR.

3 Sheets—Sheet 1.

No. 527,526.

Patented Oct. 16, 1894.



Witnesses
J. A. Taubenschmidt.
D. W. Reinohl.

Inventor
Herman E. Franz,
By D. C. Reinohl.
Attorney

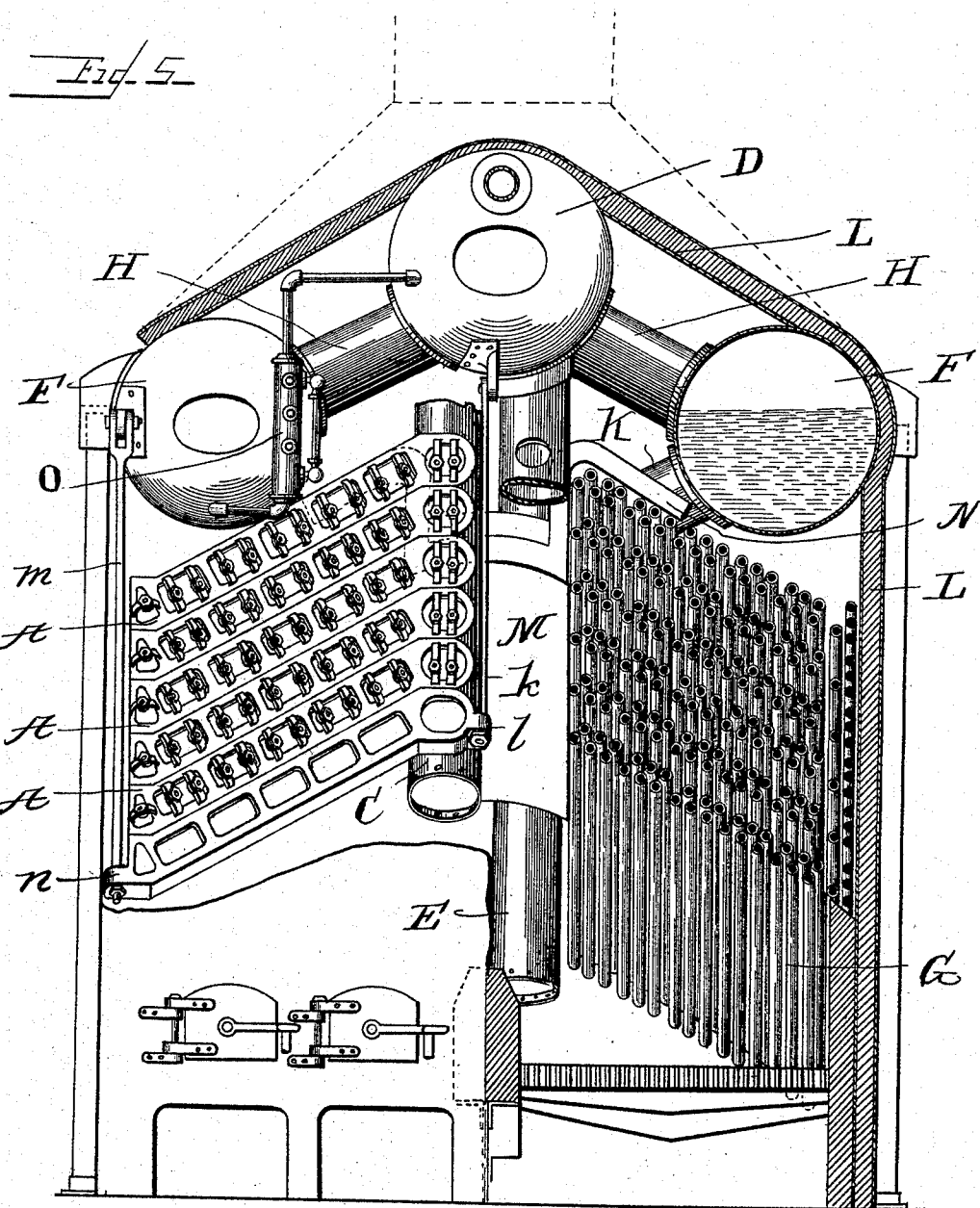
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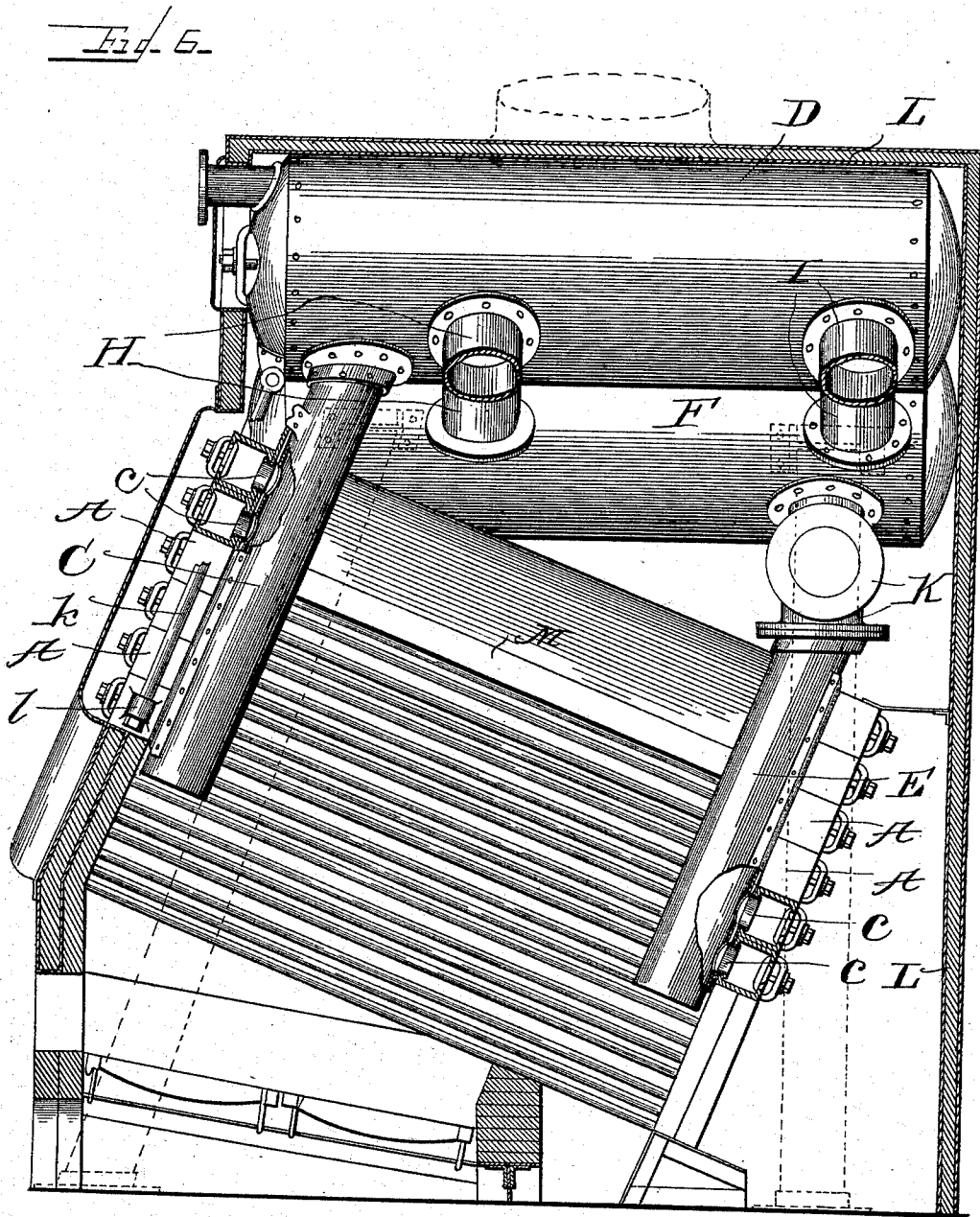
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H. E. FRANZ.
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UNITED STATES PATENT OFFICE.

HERMAN E. FRANZ, OF BALTIMORE, MARYLAND.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 527,526, dated October 16, 1894.

Application filed April 20, 1894. Serial No. 508,269. (No model.)

To all whom it may concern:

Be it known that I, HERMAN E. FRANZ, a citizen of the United States, residing at the city of Baltimore, in the 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.

This invention relates to steam generators and 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 steam from the tubes, as well as supplying the tubes with water from which steam is generated, the headers in turn being connected together by a receiver or other means into which they discharge. The freedom of the circulation of the water depends in a great measure upon the form of the headers and the disposition of the tubes which connect them. The prevailing construction is to have the tubes disposed in horizontal rows across the generator and the furnace, with a descending inclination of the tubes from the front to the rear. In such constructions it is difficult to make a generator of this description self contained so that it can be employed for marine purposes.

The object of this invention is to provide the means to make a water tube steam generator that will be self contained, that will be compact, of medium weight, contain ample heating surface, afford free circulation of the water, be easy of access for cleaning or repairing, simple in construction, of great strength, combining therewith a separator and be economical in first cost, in operation and in maintenance. To accomplish these important desiderata a sinuous header is devised, having an ascending inclination from the sides of the generator to the transverse center thereof or vice versa. The header may be single or double, according to the size of the generator. For large generators a single header is preferable. For small generators a

double header is preferable, and in either construction steel castings are preferred for the headers.

The invention 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 single header and showing the front thereof; Fig. 2, a like view showing the rear of said header; Fig. 3, a like view of a double header showing the front with all the hand-hole covers removed; Fig. 4, a like view of a double header showing the rear of said header and all of these figures show the headers on an enlarged scale compared with the remaining figures of the drawings. Fig. 5 represents a front elevation 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, the water-drum in section and the front receiving pipe broken off to expose the crown of the furnace or combustion chamber, and Fig. 6 a vertical longitudinal section showing the separator and one water-drum in side 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 are expanded and cleaned, with a hand-hole *b* through which the nipple *c* which connects the header to the water conveyer is expanded in the hole *d* in the header, and with suitable hand-hole covers *e* secured by dogs *f* and bolts *g* of the usual construction; 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. 2, 5 and 6, and with a hole *d* to receive the nipple *c*. By grouping a number of small tubes a greater area of heating surface is obtained within the same area than when large tubes are used.

B indicates a double header which is of the same general form as the header A, is

provided on its front side with hand-holes *a* and *b*, and in its rear side with holes *d d* for nipples to connect the header with a conveyer, holes *h* to receive water tubes and with hole *i* in the center to connect with a circulating pipe (not shown) between the headers.

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 the front headers are connected to a receiver or uptake pipe *C* by the nipple *c* as shown in Figs. 5 and 6, and the receiver communicates with the front end of the separator *D* which is located at the top and in the transverse center of the generator. Each rear header is similarly connected to a corresponding receiver or down-take *E* communicating with a water drum *F* located above the headers and on one side of the separator *D*. The rear headers are arranged on a lower plane than the front headers to provide the proper inclination of the water tubes *G* which connect the front and the rear headers.

The separator *D* communicates with the water-drums *F* by means of pipes *H, H*, in front of the longitudinal center of the separator, and by pipes *I, I*, in the rear of said center, and said pipes are so connected to the water-drums that the water flowing from the separator to the drums enters the latter about the water line, as shown in Fig. 5, and the water-drums *F* are connected to the receivers or down-take pipes *E* by pipes *K*, which communicate with the drums near the bottom thereof.

By the system of pipe connections described perfect and free circulation of the water in the generator is maintained and the separator is contained within the casing *L* of the generator.

It will be observed that the water-drums and the steam drum and separator are all 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 *G*, a crown *M* is interposed in the upper part of the combustion chamber and between the tubes connecting the upper headers, and from the crown extends a flange *N* on each side to direct the gases outward

through the spaces between the tubes and upward around the drums *F*.

The front headers are suspended at their inner ends from the separator *D*, by rods *k* which engage lugs *l* on the lower headers, and at their outer ends from the drum *F* by rods *m* which engage lugs *n*, as shown in Figs. 5 and 6.

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, and good results may be obtained from such constructions.

An ordinary steam and water gage *O* may be attached to the separator and one of the drums as shown in Fig. 5.

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

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 for water circulating tubes and an opening to connect with a water conveyer on the side toward the longitudinal center of the generator and with hand-holes opposite said openings.

2. A header inclined inwardly from both sides of and toward the center of a generator and provided with holes in one of its walls for the reception of tubes, hand-holes in the opposite walls, and an opening in the upper wall to communicate with a circulating pipe.

3. The combination of a plurality of headers inclined toward the center of a generator and connected at their inner ends to a receiver or up-take pipe, a separator with which said receiver communicates, and a water drum communicating with the rear header.

4. The combination of a plurality of headers inclined toward the center of a generator and arranged one above the other, the front headers connected to a receiver or up-take pipe communicating with a separator, a pair of water drums below and on each side of the separator and connected by pipes communicating with the lower part of the separator, and a receiver or down-take communicating with the rear end of said drums and with the rear headers.

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

HERMAN E. FRANZ.

Witnesses:

D. C. REINOHLE,
D. W. REINOHLE.

Correction in Letters Patent No. 527,526.

Affidavit having been filed showing that the name of the patentee in Letters Patent No. 527,526, granted October 16, 1894, for an improvement in "Steam-Generators," should have been written and printed *Herman E. Frauz* instead of "Herman E. Franz," it is hereby certified that the proper correction has been made in the files and records pertaining to the case in the Patent Office, and should be read in the Letters Patent so that the same may conform thereto.

Signed, countersigned, and sealed this 23d day of October, A. D. 1894.

[SEAL.]

JNO. M. REYNOLDS,
Assistant Secretary of the Interior.

Countersigned:

JOHN S. SEYMOUR,
Commissioner of Patents.