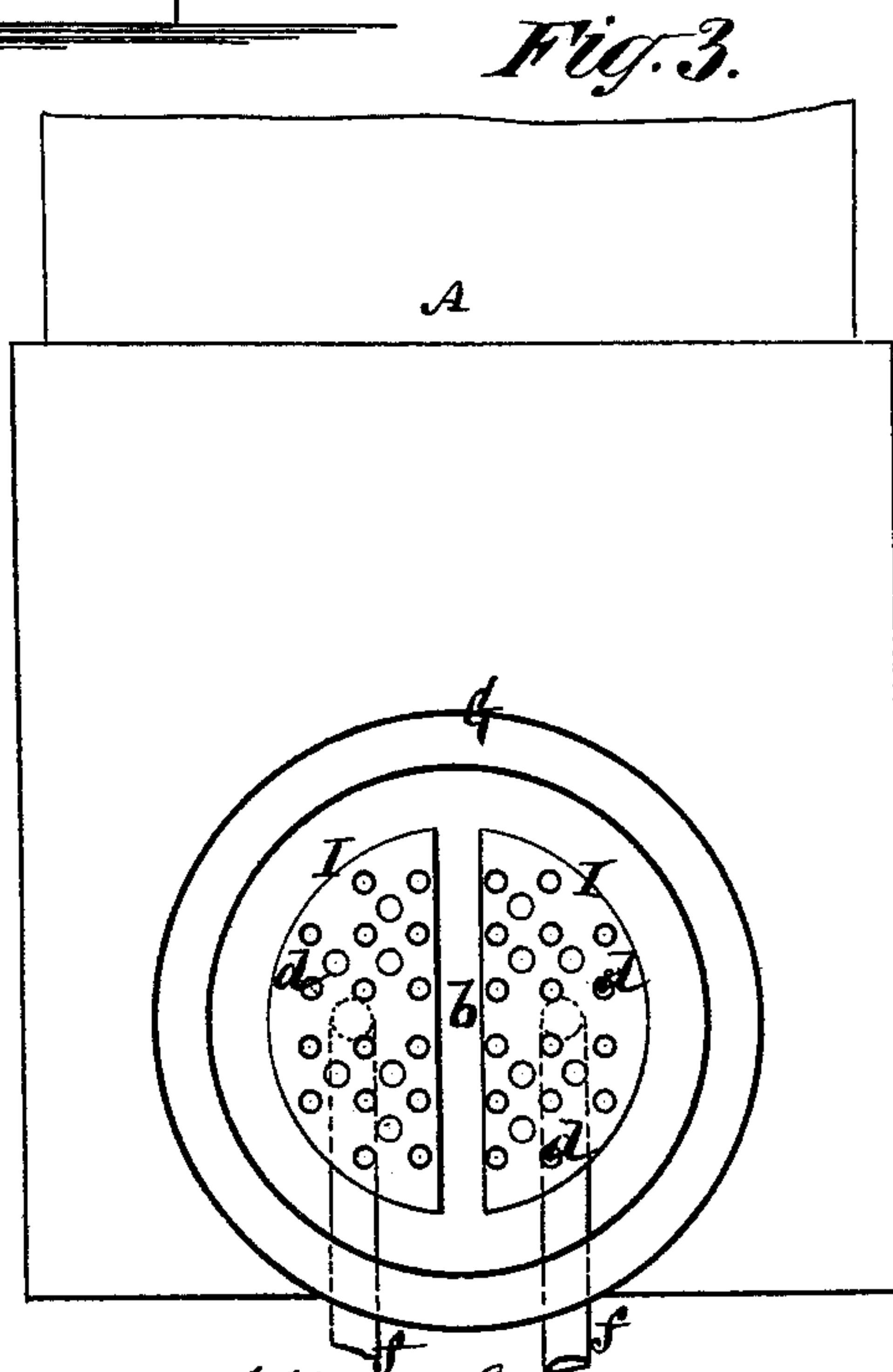
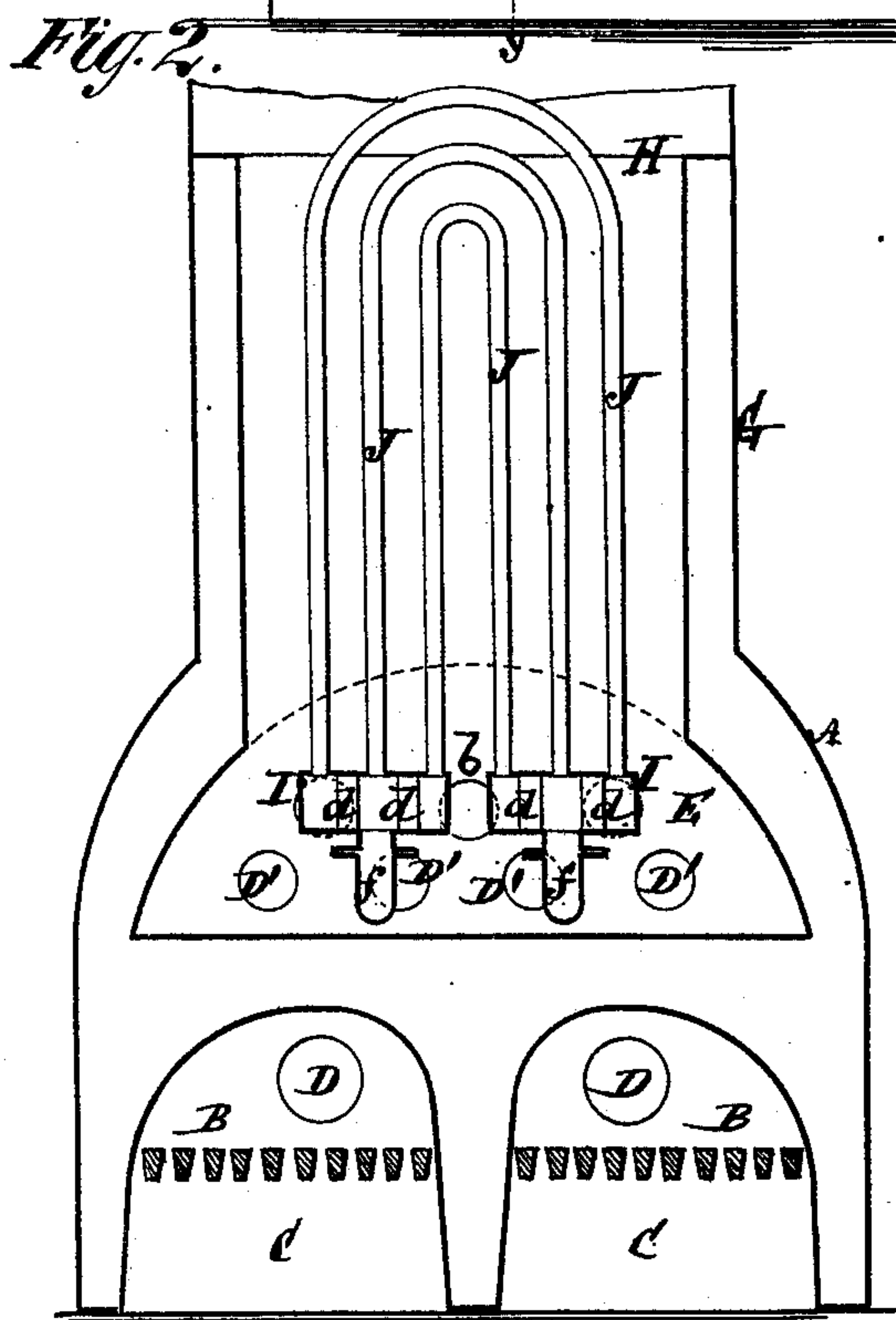
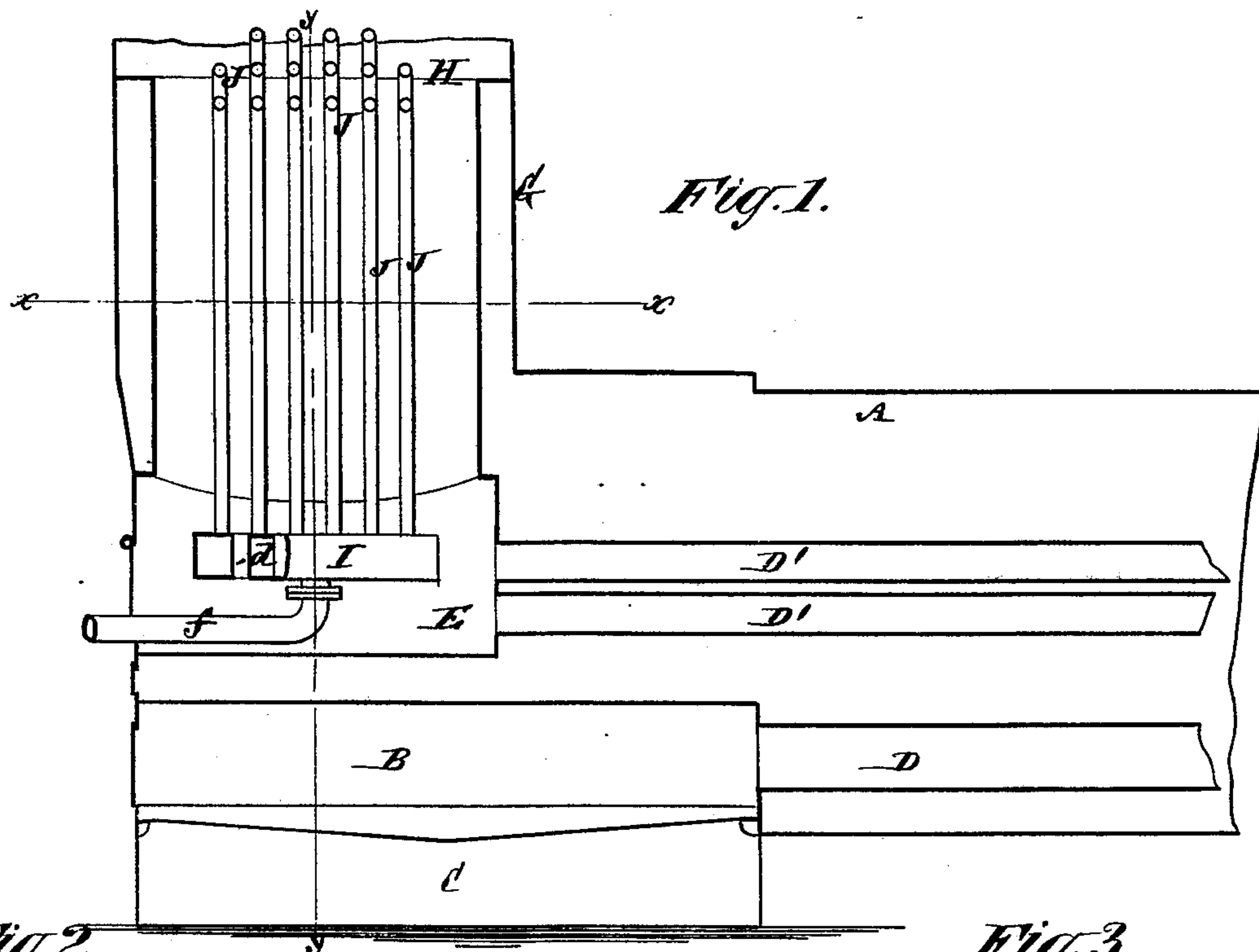


A. CARPENTER.
FEED-WATER HEATER.

No. 185,893.

Patented Jan. 2, 1877.



Witnesses.
John Becker
Fred Warner

Alvan Carpenter.
by his Attorneys
Brown & Allen

UNITED STATES PATENT OFFICE

ALLAN CARPENTER, OF NEW YORK, N. Y.

IMPROVEMENT IN FEED-WATER HEATERS.

Specification forming part of Letters Patent No. 185,893, dated January 2, 1877; application filed December 8, 1876.

To all whom it may concern:

Be it known that I, ALLAN CARPENTER, of the city, county, and State of New York, have invented a new and useful Improvement in Feed-Water Heaters for Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

This invention consists in a feed-water heater for steam-boilers, composed of a hollow water-base, which is divided by a space or passage into separate boxes, and is constructed with ducts or tubes up through the latter, and with upper arched or bent water-tubes, connecting at their lower ends, respectively, with said boxes, inlet, and outlet pipes in communication with said boxes, and a steam-dome and smoke-stack within which and the smoke-box connected therewith the water-base and water circulating tubes mounted on it are arranged, substantially as hereinafter described.

Figure 1 represents a vertical longitudinal section of a marine-boiler, in part, having my improved feed-water heater applied thereto. Fig. 2 is a transverse vertical section of the same on the line *y y*, and Fig. 3 a horizontal section thereof on the line *x x*.

A is the body of the boiler; B, its furnace; C, the ash-pit, and D D' smoke flues connecting the furnace B with a forward smoke-box, E. G is the steam-dome, and H the smoke-stack, within which latter or steam-dome portion thereof and smoke-box E the remaining portions of the feed-water heater are arranged. These consist in part of a hollow water-base, which may be of circular form, and is intersected or bisected vertically by means of a

passage, *b*, to form independent boxes I I. This passage *b* serves to provide for the circulation of the smoke and products of combustion through the water-base as well as around it, and said independent boxes I I are furthermore provided with ducts or tubes *d d* through them for the same purpose. Mounted on the hollow water-base are a series of upper arched or bent water-circulating pipes or tubes, J J, the lower ends of which communicate, respectively, with the boxes I I of the base, which latter, by its tubular and divided or separated construction, as provided for by the passage *b* and tubes *d*, not only exposes an extended heating-area, but facilitate or promote the circulation of the smoke and products of combustion between or among and around the bent tubes J J. The independent boxes I I of the water-base have connected with them, respectively, inlet and outlet pipes *f*, for the water to and from the heater.

A water-heater for steam-boilers, as described, combines a large and efficient heating-surface with simplicity and ready accessibility in case of necessary repair.

I claim—

The hollow water-base composed of independent boxes I I, divided by a space or passage, *b*, and provided with tubes or ducts *d*, arranged to pass up through said boxes, in combination with the arched or bent water-tubes J, the inlet and outlet pipes *f f*, the steam-dome G, the smoke-box E, and smoke-stack H, the whole being arranged substantially as described.

ALLAN CARPENTER.

Witnesses:

BENJAMIN W. HOFFMAN,
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