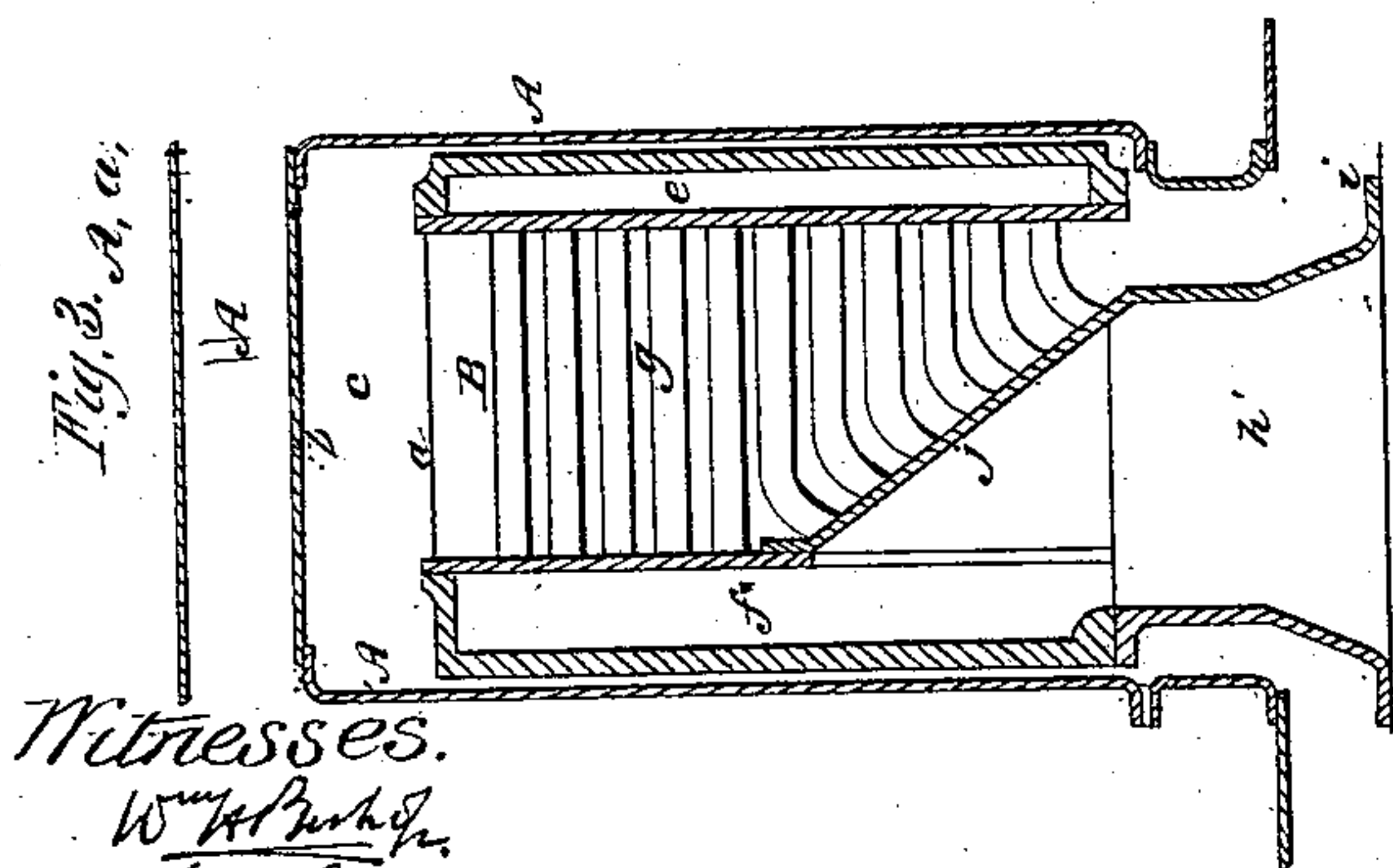
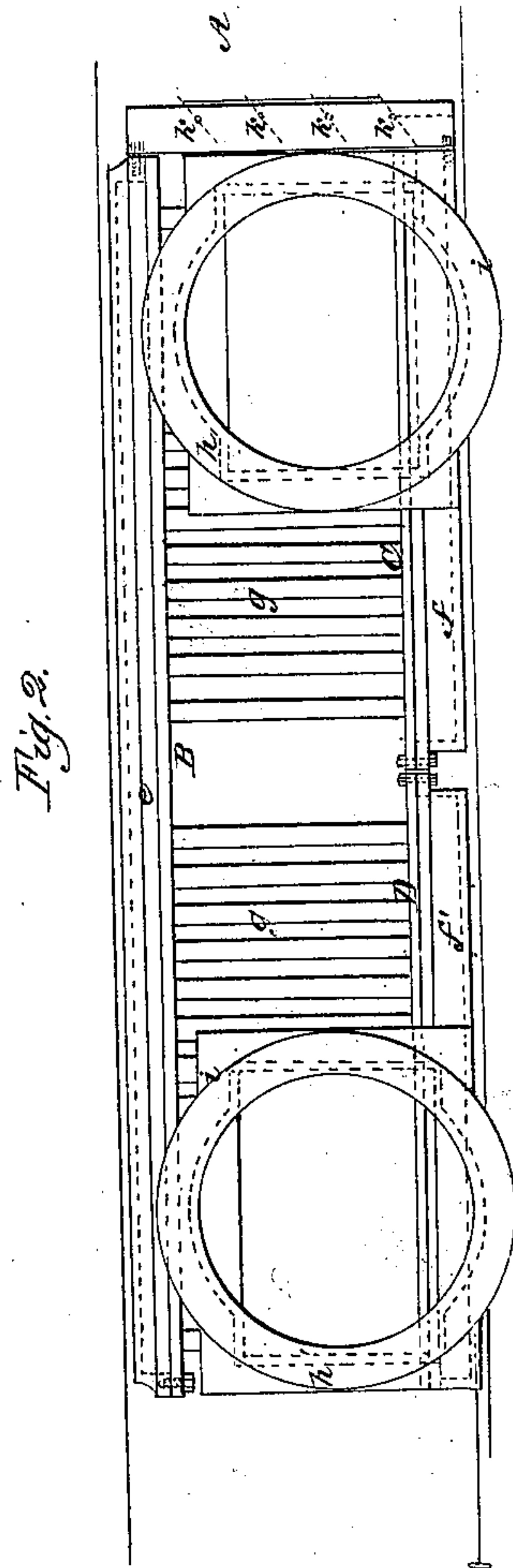
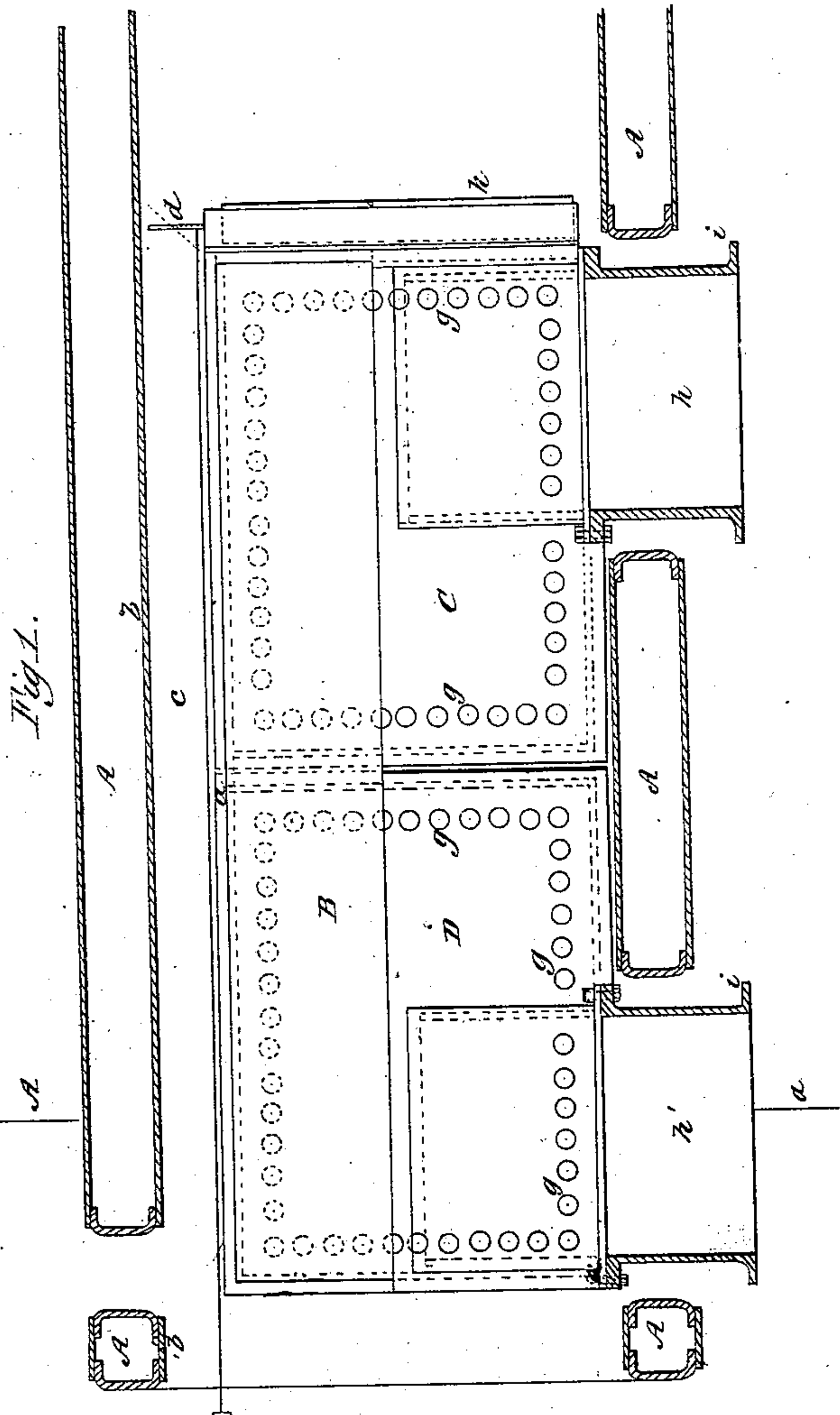


J. E. Neill

Steam-Boiler Superheater.

N^o 44,213.

Patented Sep. 13, 1864.



Witnesses.
Wm. H. Burdick
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UNITED STATES PATENT OFFICE.

JOHN E. NEILL, OF BROOKLYN, NEW YORK.

IMPROVED APPARATUS FOR SUPERHEATING STEAM.

Specification forming part of Letters Patent No. 44,213, dated September 13, 1864.

To all whom it may concern:

Be it known that I, JOHN E. NEILL, of Brooklyn, Kings county, and State of New York, have invented certain new and useful Improvements in Apparatus for Superheating Steam in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference be had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan of my improved apparatus, representing certain parts in section; Fig. 2, a side elevation, and Fig. 3 a vertical cross-section taken at the line A *a* of Fig. 1.

The same letters indicate like parts in all the figures.

My said invention relates to an apparatus for superheating steam in steam-boilers, and the leading object of my said invention is to superheat the steam within the flue-space of the boiler in which it is generated.

My said invention was originally designed to be applied to what is known as the "Martin tubular boiler," and I will so describe it, without intending, however, to limit my claim of invention to such application, as it will be obvious that it is applicable to other boilers, whether of the tubular or flue class.

In applying my said invention to a Martin tubular boiler, I omit the water-tubes from a portion of one or more of the tube-boxes to a sufficient extent to receive the superheating apparatus, to be hereinafter described. That portion of one of the water-tube boxes of a Martin boiler is represented in section at A in Figs. 1 and 2. The superheating apparatus B is placed and properly secured within this space, leaving on one side and between the side plate, *a*, of the superheater and the inside of the water-space *b* of the tube-box of the boiler a flue-space, *c*, provided with a damper, *d*, at one end, by means of which the products of combustion from the furnace can be permitted to pass through the said flue space *c* or shut off. The superheating apparatus B is divided into two compartments, C and D, and each compartment consists of an upper steam-chamber, *e*, and a lower steam-chamber, *f f'*, connected by means of vertical steam-tubes *g*, some of them being curved at their lower ends, for a reason to be presently described.

The rear compartment, C, is provided with a nozzle, *h*, of a circular form, the outer end of

which is to be suitably connected with a steam-pipe to receive and conduct saturated steam from the steam-chamber of the boiler; and the front or outer compartment is in like manner connected by a similar nozzle, *h'*, with the steam-pipe for conducting off the superheated steam. From the flange *i* these nozzles *h h'* are gradually changed in form to a parallelogram at their inner end, where they are secured to the side of the lower steam-chambers, *f f'*, which, for this purpose, are extended through the side of each of the two compartments C and D, and increased to a sufficient height for this purpose by making the upper plate, *j*, of each of the said steam-chambers inclined, as represented in Fig. 3; and as some of the steam-tubes *g* are connected with these inclined plates *j j*, to facilitate such connection I deem it best to curve the lower end of such tubes. The lower steam-chambers, *f f'*, of the two compartments are separate from each other; but the upper steam-chamber, *e*, extends the whole length of the two compartments, that steam may pass through it from one compartment to the other.

The number of steam-tubes connecting the upper steam-chamber or passage, *e*, with the steam-chambers *f f'* may be varied at the pleasure of the constructor so long as sufficient space is left between them for the passage of the heated products of combustion from the furnace. The rear or inner end of the flue-space thus formed between the tubes is provided with a series of dampers, *k*, for shutting off or permitting the products of combustion to circulate through the space between the tubes to the front end, and thence to the take-up of the boiler.

The mode of operation of this apparatus will be readily understood by engineers. The superheating apparatus occupies but a portion of the space in the water-tube box or boxes, if applied to a Martin or other tubular boiler; or of the flue-space, if applied to a flue-boiler; and hence the apparatus is heated by the circulation of the heated products of combustion from the furnace before such products escape into the take-up of the boiler, and as such products of combustion can, by the operation of the dampers *k* and *d*, be caused to pass along the flue-space *c* outside of the superheating apparatus, or among the steam-tubes *g*, it follows that the engineer can cause these

tubes to be heated to any temperature desired. Saturated steam from the steam-chamber of the boiler enters the steam-chamber *f* of the compartment C, and passes up through the series of steam-tubes *g* to the upper steam chamber or passage *e*, along that passage to compartment D, down through the steam tubes *g* of this compartment to the steam chamber *f*, and thence through the nozzle and steam-pipe connected therewith to the place where it is to be used, and in passing through the two compartments and the tubes thereof it becomes superheated to any extent desired, depending upon the position of the dampers *d* and *k*. In an apparatus for this purpose, to be located as herein described, it is highly important to economize space, and as the pipes for conducting saturated steam to, and superheated steam from, such apparatus must be of considerable proportional diameter, and the nozzles forming the connections between these pipes and the steam-chambers *f f'* must, of necessity, be of the same diameter as the pipes where the connections are formed, and the steam-chambers could not be made of a height equal to the diameter of the steam-pipes without greatly reducing the capacity of the tubes *g*, or making the whole apparatus of a proportional size too great, I have been enabled to obtain the required capacity of all the parts in an apparatus of comparatively small size by gradually changing the nozzle from a circular form where they are connected with the steam pipes to a parallelogram or equivalent

form where they are connected with the steam chambers, and sloping a portion of the upper plates of the two steam-chambers.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. Placing the superheating apparatus, substantially such as herein described, within the tube-box or flue space of a steam-boiler, substantially in the manner herein described, and for the purpose specified.

2. Dividing the superheating apparatus into two compartments, each consisting of a steam-chamber and a series of circulating-tubes, and the two connected by a steam chamber or passage, substantially as and for the purpose specified.

3. The manner of forming the steam chambers and the nozzles connecting them with the pipes for supplying the saturated and conducting off the superheated steam, substantially as described and for the purpose specified.

4. Controlling the action of the heat on the superheating surfaces by means of a damper or dampers, substantially as described, in combination with a flue space or spaces through which the products of combustion may escape, thereby affording the means of controlling the heat to be applied to the superheating surfaces without the necessity of damping the fire in the furnace.

JOHN E. NEILL.

Witnesses:

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ANDREW J. TODD.