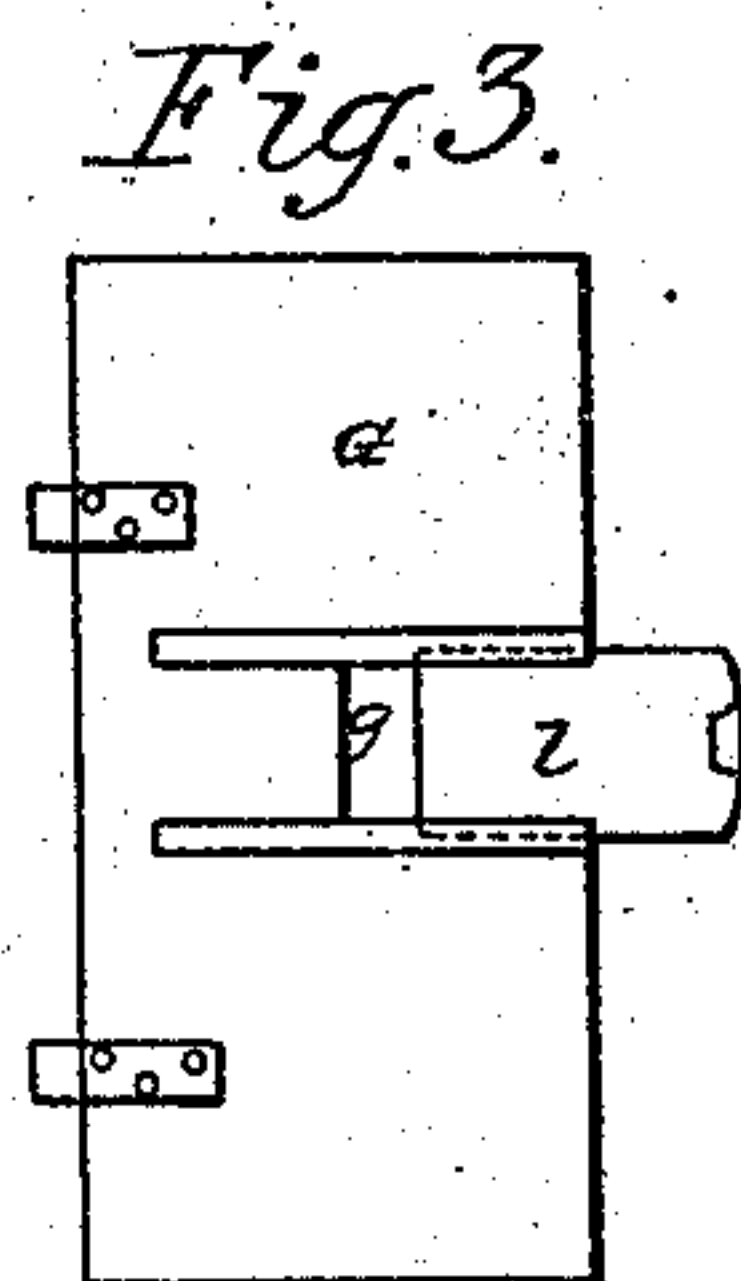
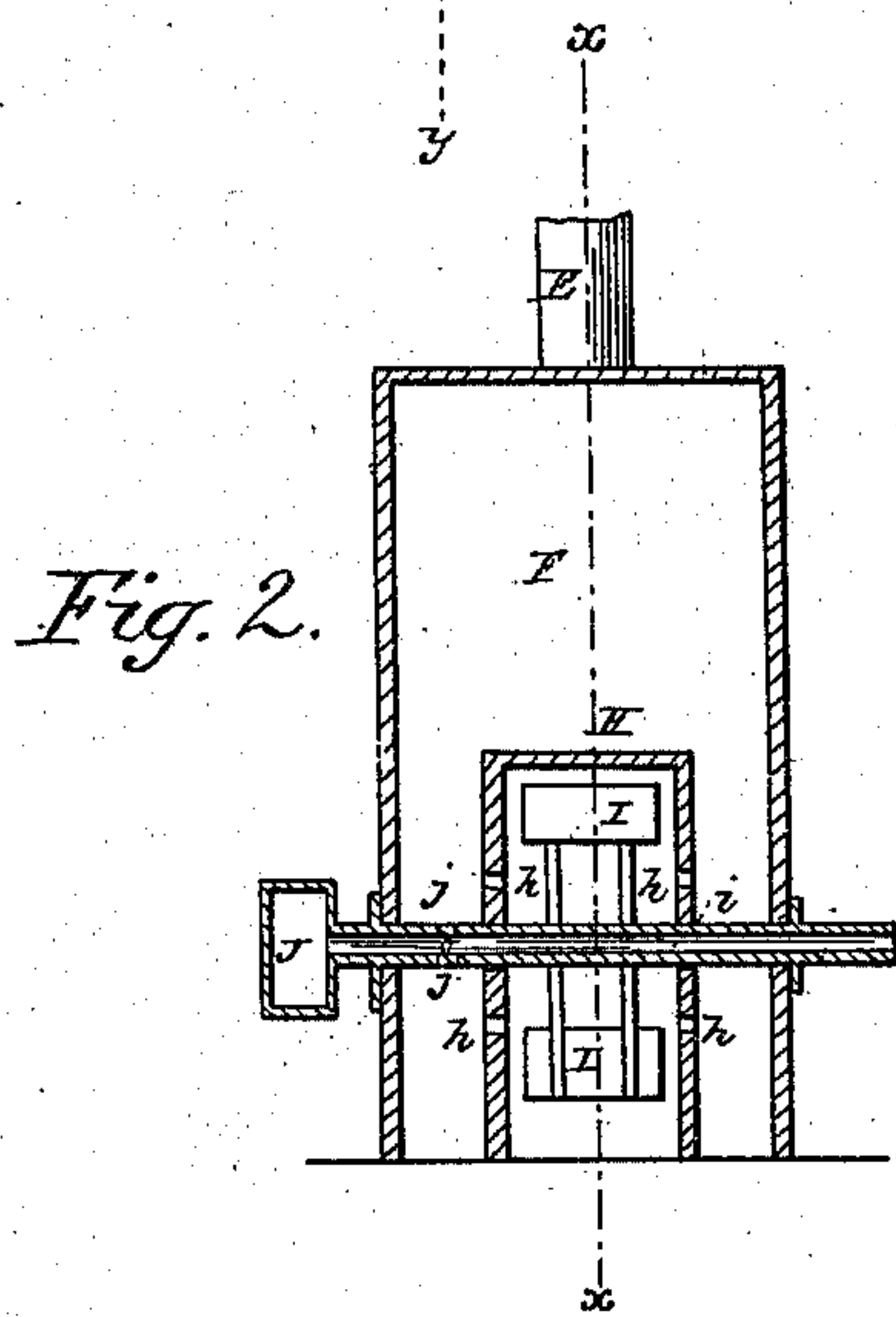
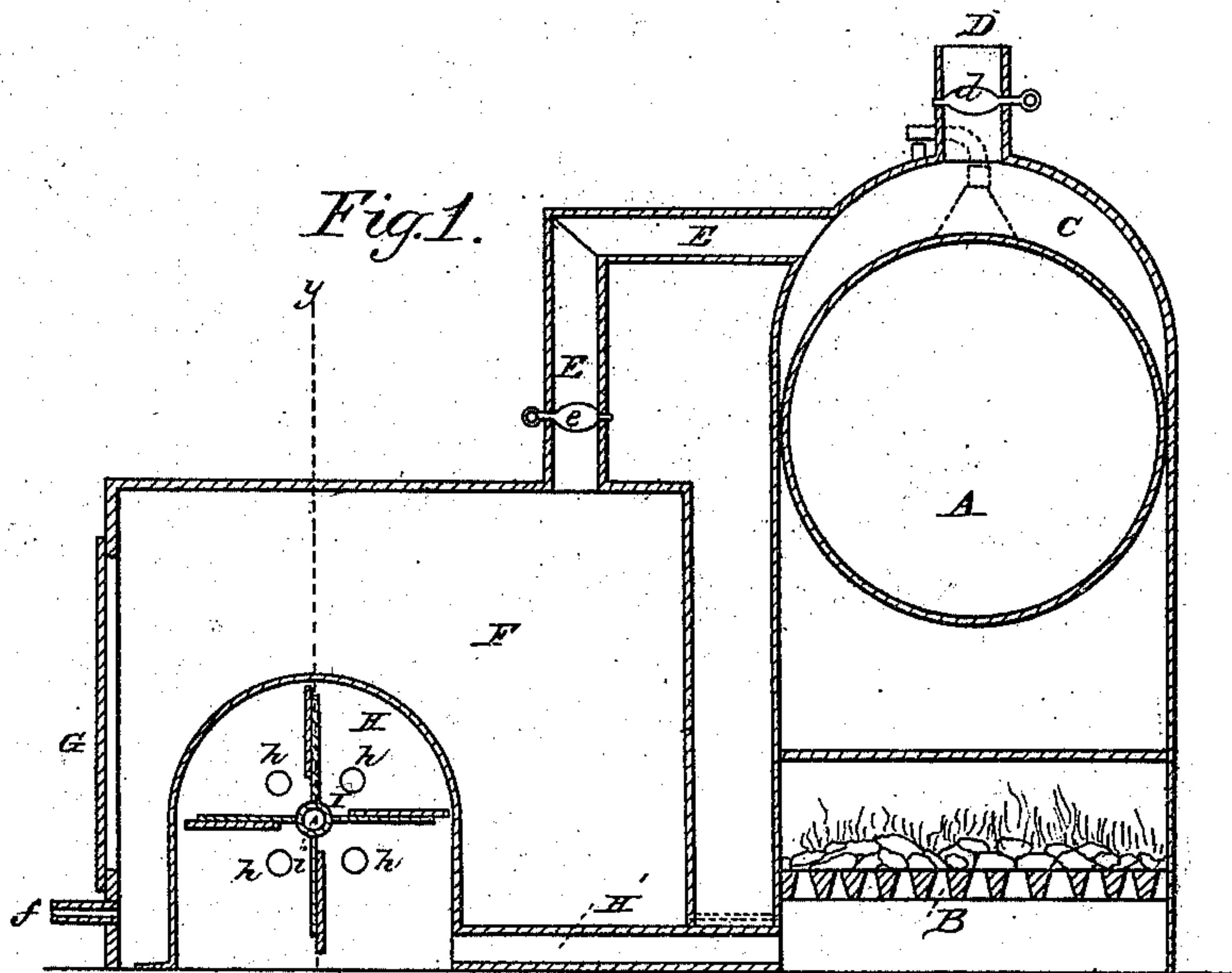


T. S. Speakman

Steam Generator

N^o 90,033.

Patented May 11, 1869.



Witnesses.
Newton Leonard.
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THOMAS S. SPEAKMAN, OF CAMDEN, NEW JERSEY.

Letters Patent No. 90,033, dated May 11, 1869.

IMPROVEMENT IN STEAM-GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, THOMAS S. SPEAKMAN, of the city and county of Camden, and State of New Jersey, have invented a new and useful Improvement in Fan-Attachments to Steam-Generators; and I do hereby declare the following to be a full and correct description of the same, sufficient to enable others skilled in the art to which my invention appertains to fully understand and apply the same, reference being had to the accompanying drawings, which make part of this specification, and in which—

Figure 1 is a vertical cross-section of my improvement, in line *x x*, fig. 2;

Figure 2 is a vertical cross-section, in line *y y*, fig. 1; and

Figure 3 is a detached view of the door of the fan-chamber.

Like letters of reference indicate like parts in the several figures.

The nature of my invention consists in the arrangement of a fan in such relation to the steam-boiler and fire-grate of an engine that the products of combustion, instead of passing off through the smoke-stack or chimney, are repassed continually under and through the fire, so that a perfect combustion, and consequent saving of fuel and heat, is attained; or the fan may be used merely to draw off the products of combustion, and, by forcing them under water, to condense them, so that they may be drawn off in any suitable manner, so as to prevent the excessive smoke of many engines and the inconvenience of removing the deposits of the products of combustion from the engine, especially in manufacturing districts.

A, in the drawings, represents a common boiler; and

B, its fire-grate.

The boiler A is surmounted by a jacket, C, having a short exit-pipe, or stack, D, near the front end of the boiler.

From the jacket C, near the pipe D, a pipe, E, leads to a chamber, or compartment, F, provided with a door, G.

In this compartment, in a suitable position, is situated a fan-case, H, in which a fan, I, moves in suitable bearings.

The case H extends rearwardly, in shape of a pipe, H', through the wall of chamber F, to a suitable position under the fire-grate B.

The shaft *i* of the fan I is made hollow, and ends on one side, outside of the wall of chamber F, in a hollow belt-wheel, J, and is provided, between the wall of chamber F and case H nearest to belt-wheel J, with an opening or openings, *j*.

The case H is provided with openings *h*, in a line above the discharge-pipe *f*, leading out of the chamber F.

The door G of this chamber is provided with an opening, *g*, covered by a slide, *l*.

The stack D and pipe E are each provided with a damper, *d* and *e*.

With the products of combustion escaping from the

smoke-stack or chimney of an engine, which might be again passed through the fire, a large percentage of heat is lost, which, by my invention, is utilized.

In starting the fire, the damper *e* is closed, and the damper *d* opened. Thus a draught is created, which starts the fire. When the fire is well under way, the damper *d* is closed, and the damper *e* opened.

Motion having been imparted to belt-wheel J from any suitable motor, the fan is rotated in the direction of the arrow, fig. 1, and creates a partial vacuum in the chamber F, which allows the products of combustion to pass from jacket C, through pipe E, into the chamber, and through openings *h*, into the case H, whence they are forced, by the fan, through the pipe H', to, under, and through the fire, where they are more thoroughly consumed, passing up through and adding heat to the fire. In this manner, the products of combustion are continually circulated, and cannot escape.

To supply the necessary amount of atmospheric air, in order to obtain a better combustion, the opening, *g*, in door G of chamber F is made, and the supply regulated by slide *l*.

The continual and steady passage of the products of combustion and heat through chamber H' very quickly heats the same, and all contained in it, and would melt or destroy the fan, were it not for the admission of a stream of cold water, to prevent this. The end of shaft *i* not provided with the belt-wheel may run in a box, and be connected, by a pipe, to a hydrant or any other head of water, which flows through shaft *i*, into belt-wheel, J, and is forced out through openings *j*, into chamber F, filling the same to a line even with the discharge-pipe *f*, which latter prevents the chamber from filling as high as the openings *h* of case H, but high enough to cover the pipe H'.

The rear wall of chamber F may, at the bottom, connect with the wall supporting the boiler, so as to allow the water to cover the pipe H' to the point where it passes in under the grate.

In certain classes of engines, this circulation of the products of combustion could not be suitably applied, and still the necessity exists of preventing the smoke from escaping through the stack, and being carried by the air to all surrounding objects. In this case, instead of carrying the pipe H' under the fire-box, it may be led to a tank or any other suitable reservoir of water, and under the surface of the latter, so that the products of combustion are condensed, and made to float on the surface. And if a constant flow of water through such tank or reservoir is kept up, the products of combustion will be carried off with it continually.

In steamboats or floating engines, the pipe H' may be carried through the side of the vessel directly into the water, without the use of an intermediate tank.

I may employ water, impregnated with lime, or its equivalent, in sufficient quantity, as necessity may require, to facilitate the absorption of the carbonic acid generated by the combustion of the fuel.

Having thus described my invention,

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

1. The construction and arrangement of the hollow shaft *i*, provided with openings *j*, fan I, and hollow belt-wheel J, as set forth.

2. The arrangement of the discharge-pipe *f* below the line of the openings *h* of fan-case H, substantially as described.

3. The combination, with the boiler A and jacket C, of the chamber F, dampers *d e*, fan-case H, pipe

H', discharge-pipe *f*, and fan I, substantially as set forth.

4. The arrangement of chamber F, fan-case H, and connecting-pipe H', whereby to surround the fan-case and pipe with water, so as to cool the same, and at the same time absorb the carbonic acid of the products of combustion, substantially as described.

Witnesses: THOMAS S. SPEAKMAN.

ALEX'R A. C. KLAUCKE.

WM. C. MCINTIRE.