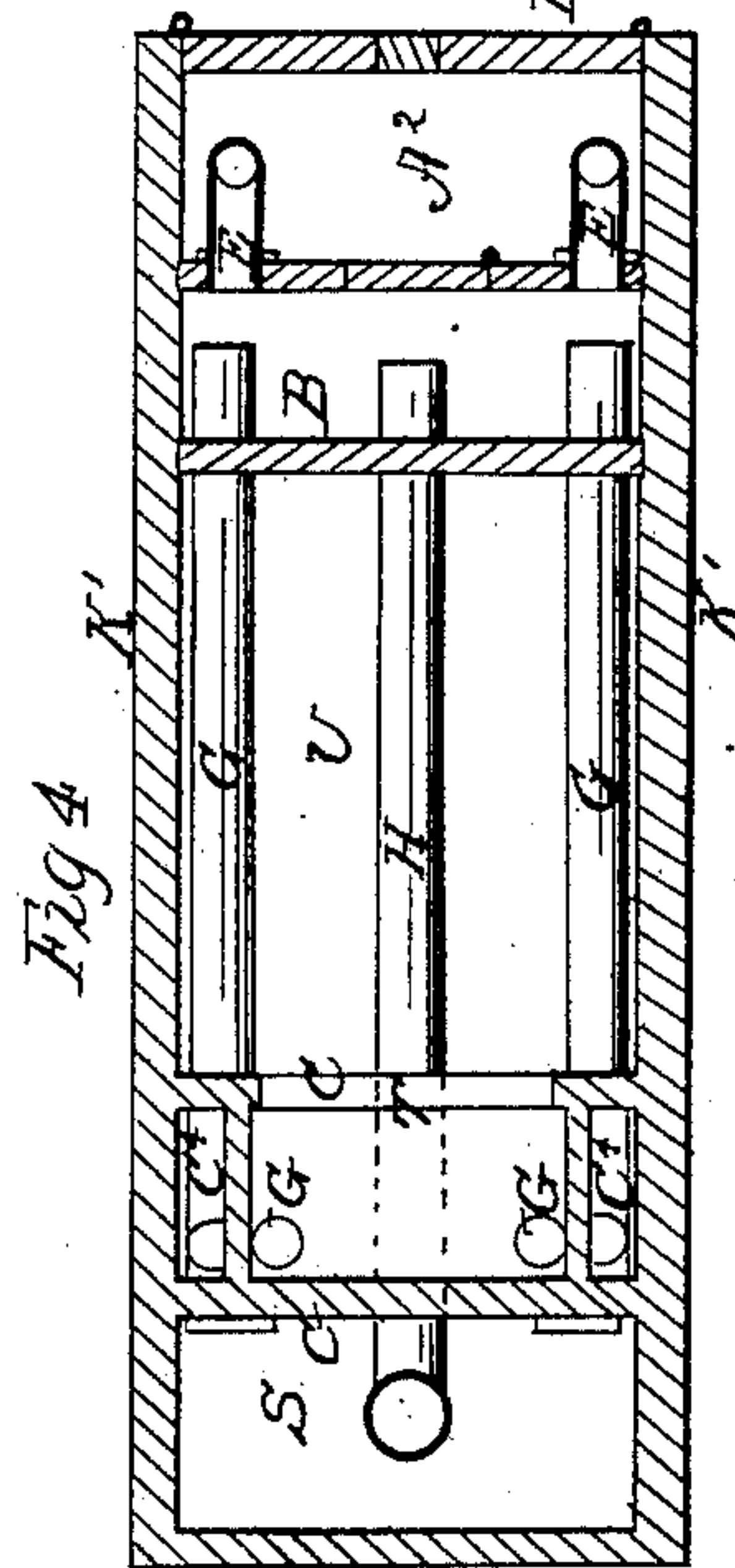
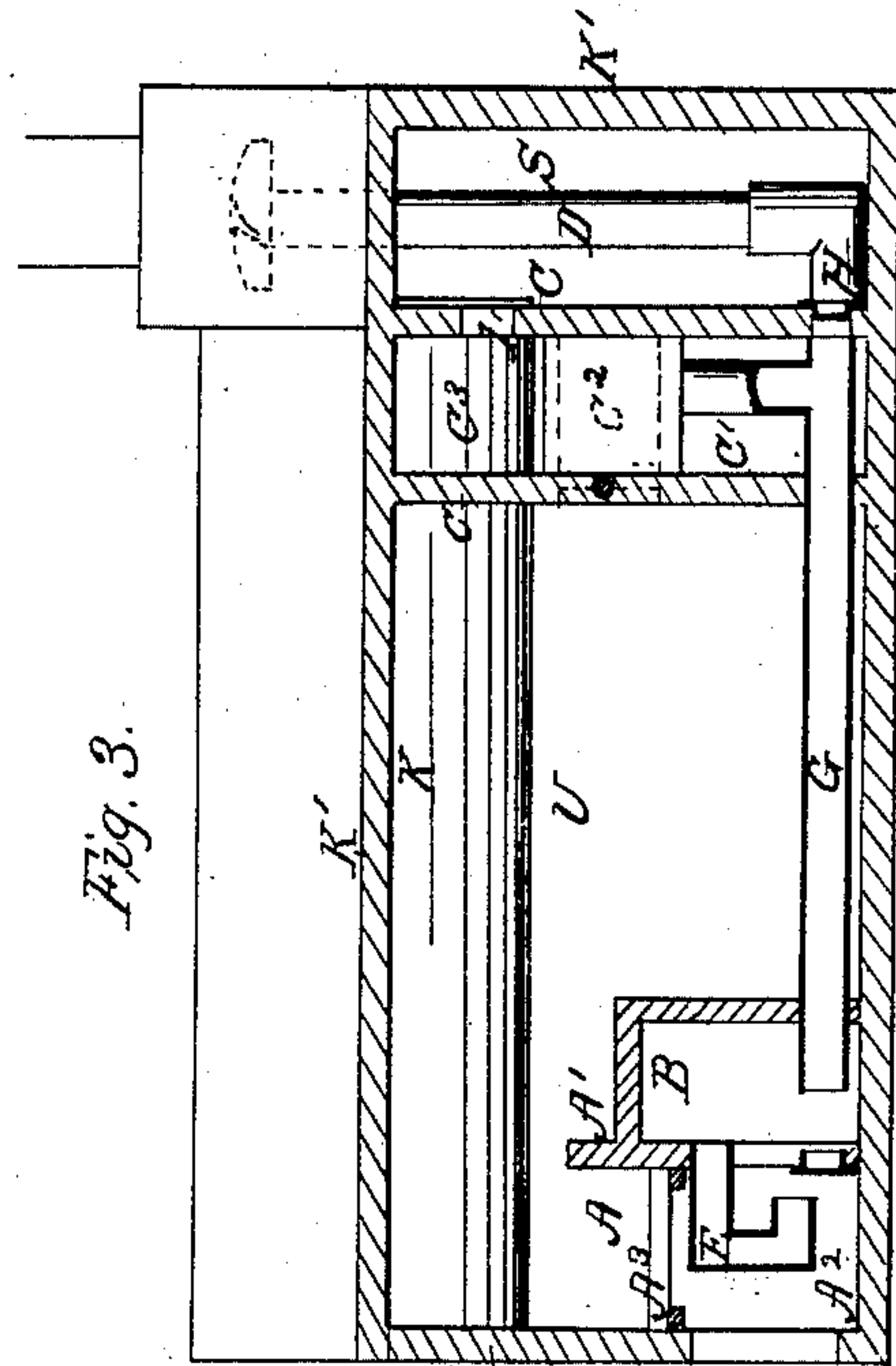
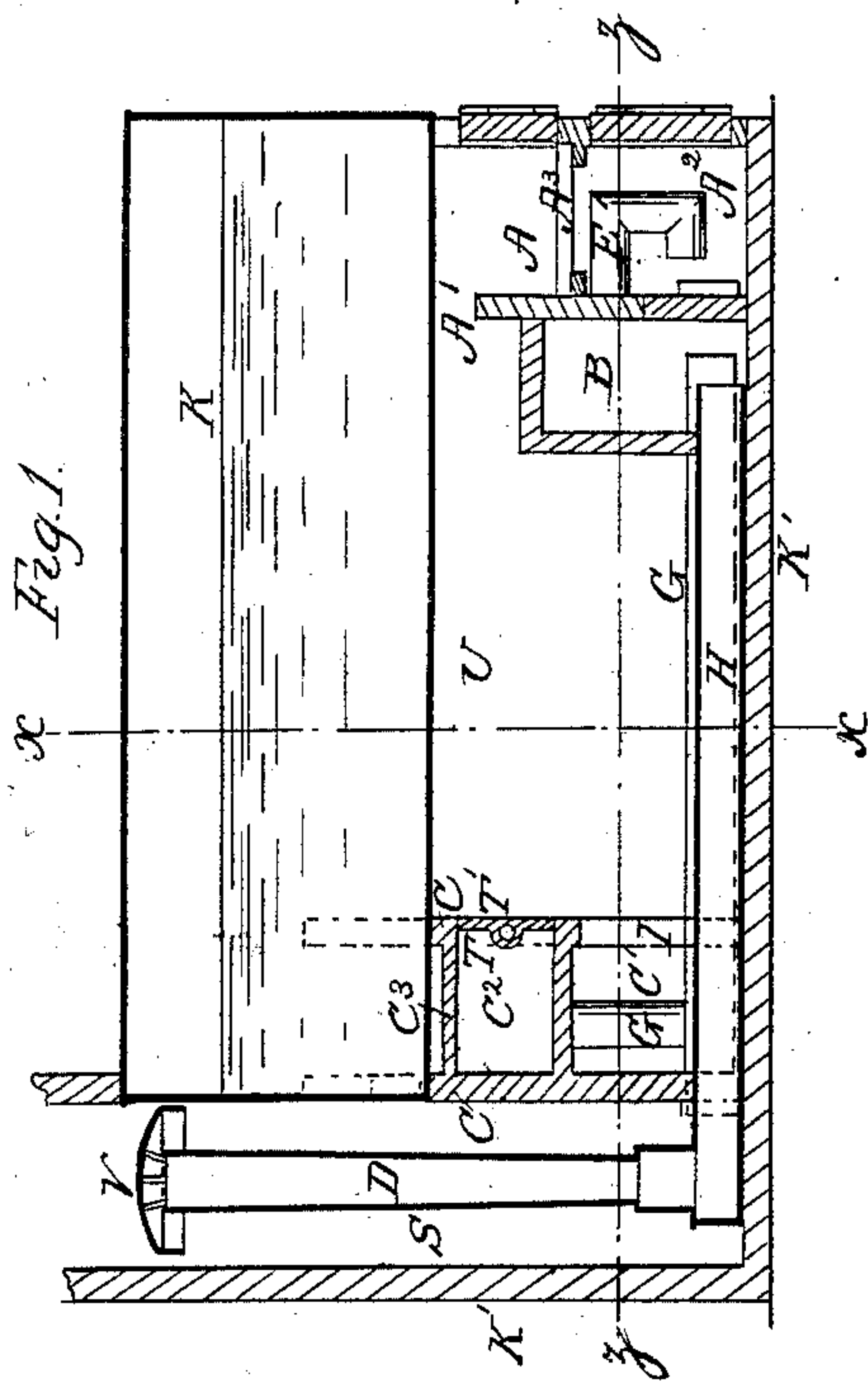
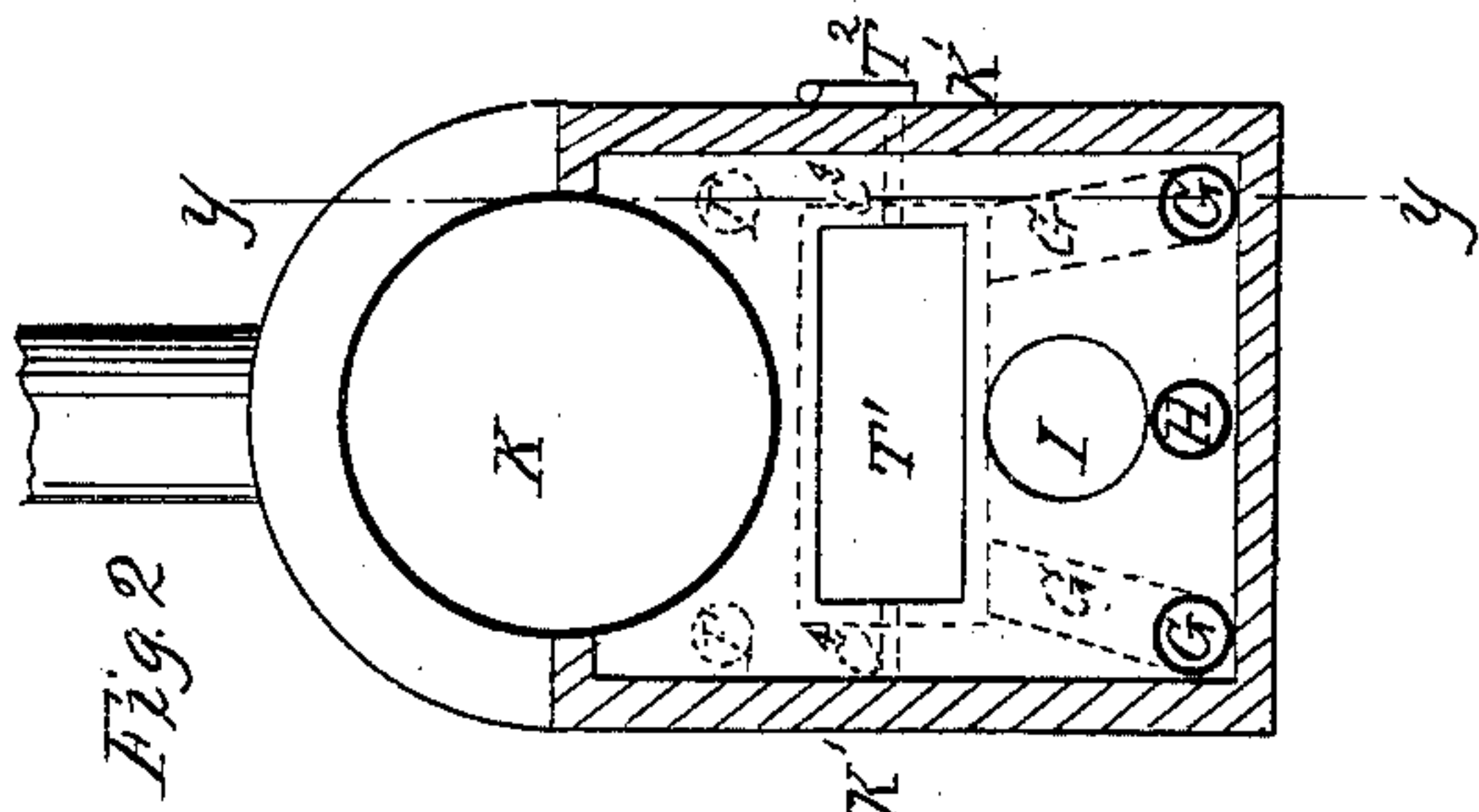


*J. Alcorn, Jr.,*  
*Spark Consumer,*

*No. 21,644,*

*Patented Oct. 5, 1858.*





# UNITED STATES PATENT OFFICE.

JAMES ALCORN, JR., OF CHARLESTOWN, MASSACHUSETTS.

## IMPROVEMENT IN STEAM-BOILER FURNACES.

Specification forming part of Letters Patent No. 21,644, dated October 5, 1858.

*To all whom it may concern:*

Be it known that I, JAMES ALCORN, JR., of Charlestown, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Boiler-Furnaces; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a central longitudinal vertical section of a boiler-furnace constructed according to my invention. Fig. 2 is a transverse vertical section of the same in the plane indicated by the line  $x x$ , Fig. 1. Fig. 3 is a longitudinal vertical section of the same in the plane indicated by the line  $y y$ , Fig. 2. Fig. 4 is a horizontal section of the same in the plane indicated by the line  $z z$  of Fig. 1.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists in a novel arrangement of passages for the purpose of causing the return from the back part of the furnace and from the lower part of the smoke-stack to the ash-pit of considerable portions of the smoke and inflammable matters escaping from the fire-box, and the consumption of those matters by causing them to pass through the fire on the grate with the fresh air admitted to produce the combustion of the fuel on the grate.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

K is the boiler, which may be of any construction, but is shown as a plain cylinder.

K' is the setting.

A is the fire-chamber and A<sup>3</sup> the grate, with a fire-bridge A' at the back of the grate, and B is an air-tight chamber in rear of the fire-bridge having no direct communication with the fire-chamber.

C is a false bridge-wall under the rear of the boiler, made with three separate cavities C' C<sup>2</sup> C<sup>3</sup>, the first-mentioned one C' extending all across the bottom of the setting and communicating with the last-mentioned one C<sup>3</sup>, which is close under the boiler, by means of two upright side passages C<sup>4</sup> C<sup>4</sup>, which are outside of the central cavity C<sup>2</sup>. The lowest

cavity C' has an entrance I from the main flue U, which extends from the fire-bridge A' to the false bridge C, and this entrance I, with the passages C<sup>4</sup> C<sup>4</sup> and two holes I' I' in the back of the chamber, constitute the means of direct communication from the fire-chamber to the smoke-stack S. The cavity C<sup>2</sup> has an aperture T, communicating with the main flue U, and furnished with a damper T', operated by a lever T<sup>2</sup> outside the furnace, and from the bottom of the said cavity there descend two pipes G G, which are elbowed or bent to run forward and enter the chamber B in rear of the fire-bridge. From the chamber B two pipes E E, doubly elbowed, enter the ash-pit A<sup>2</sup>.

D is an upright pipe arranged within the lower part of the smoke-stack, at the bottom of which it connects with a horizontal pipe H, which runs into the box B. This pipe D, which is open at the top, is contracted in taper form in a downward direction.

V is a cover placed over the mouth of said pipe D, but a little elevated above the said mouth, so as to leave an entrance thereinto, said cover being made of much larger diameter than said mouth, so as to leave but a small passage outside of it in the smoke-stack, and being made concave on its under side.

The operation is as follows: Fire having been made in the usual way on the grate and having got well started, there is a direct draft through the main flue U, passages I, C<sup>4</sup>, and I' into the smoke-stack, and the heavier portions of the gases take this course, while the lighter and more combustible gas (carbonic oxide) keeping in the upper part of the main flue U, escapes through the aperture T, chamber C<sup>2</sup>, and pipes G G to the chamber B, whence it is conveyed to the ash-pit A<sup>2</sup> by the pipes E E, and with the air entering the ash-pit passes up through the heated fuel on the grate and is consumed. A portion of the unconsumed gases entering the smoke-stack by the course first described is collected by the cover V of the cone-pipe D and thereby deflected into the said pipe and conveyed into the pipes G, and through it to the chamber B, whence it escapes by the pipes E E to the ash-pit to be supplied to the fire along with that passing through the pipes G G.

I do not claim returning a portion of the gaseous products of combustion to the fire, but

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

1. The arrangement of the chambers C' C<sup>2</sup> C<sup>3</sup> with their respective passages I C<sup>4</sup> C<sup>4</sup> I' I' communicating with the smoke-stack, and the passages T G G and the chamber B communicating with the ash-pit, substantially as and for the purpose set forth.

2. The arrangement of the cone pipe D with its deflecting-cover V and the pipe H, in combination with the chamber B, arranged in rear of and communicating with the ash-pit, substantially as and for the purpose described.

JAMES ALCORN, JR.

Witnesses:

GEO. P. KETTELL,  
GEO. B. THOMAS.