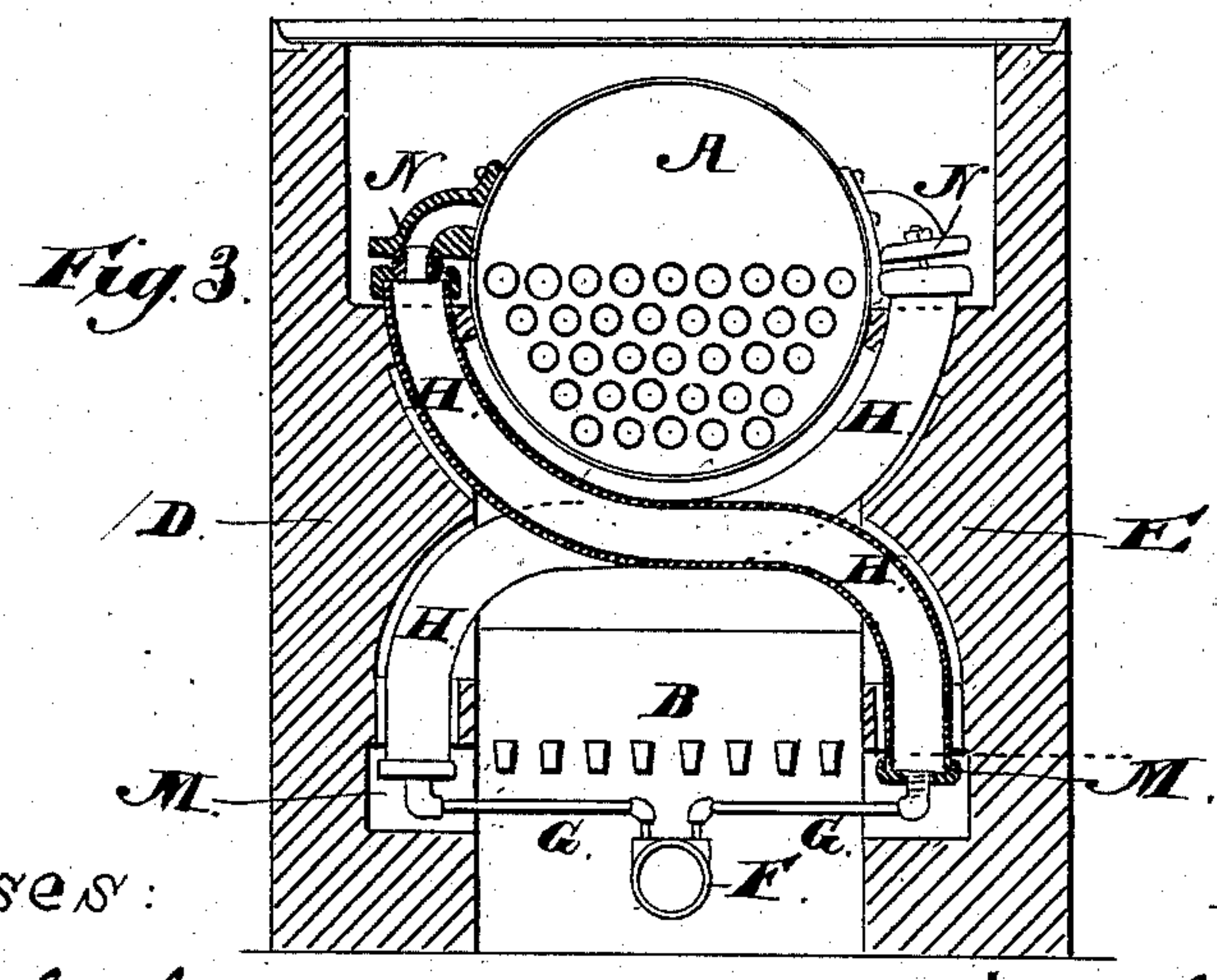
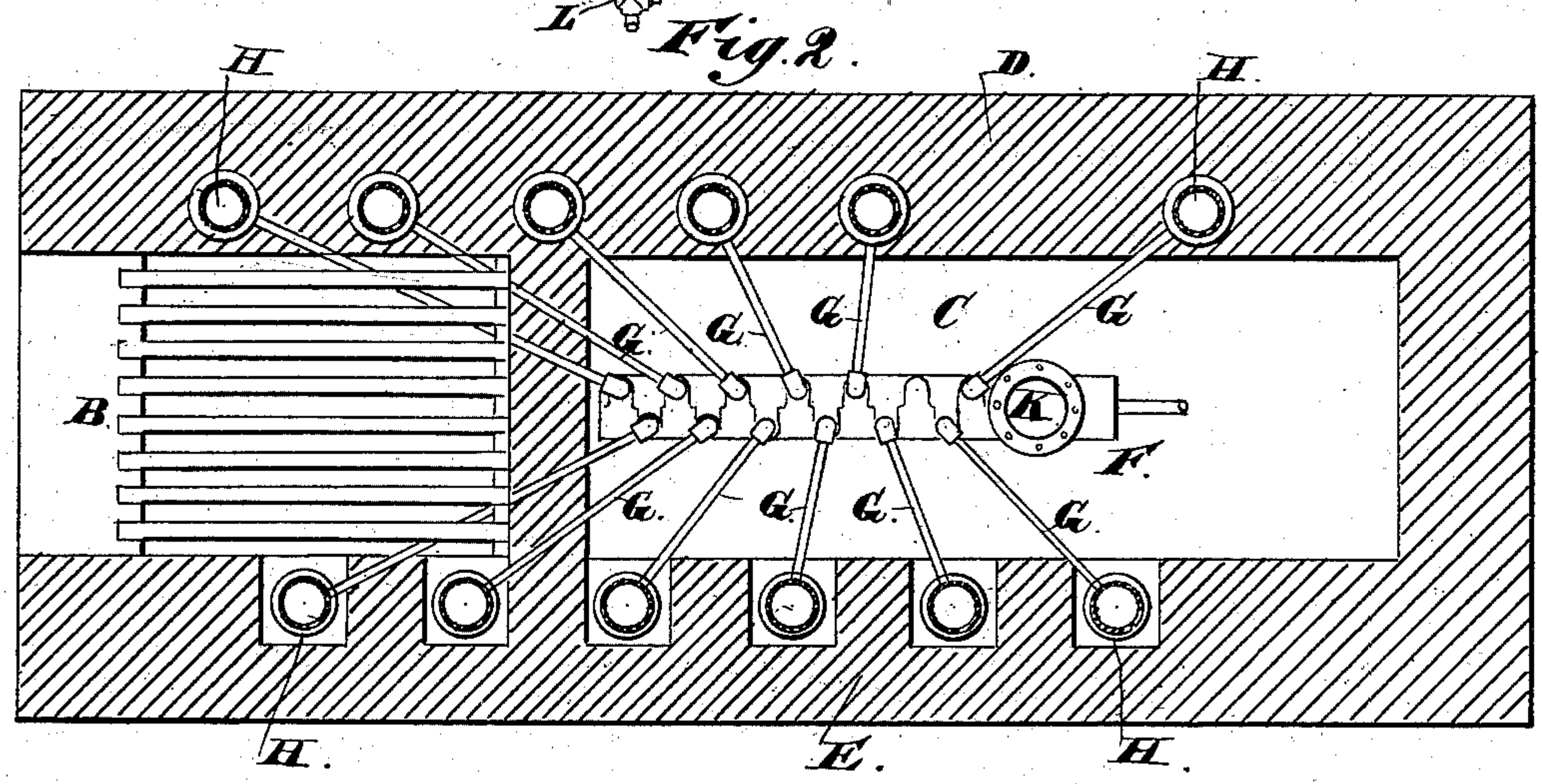
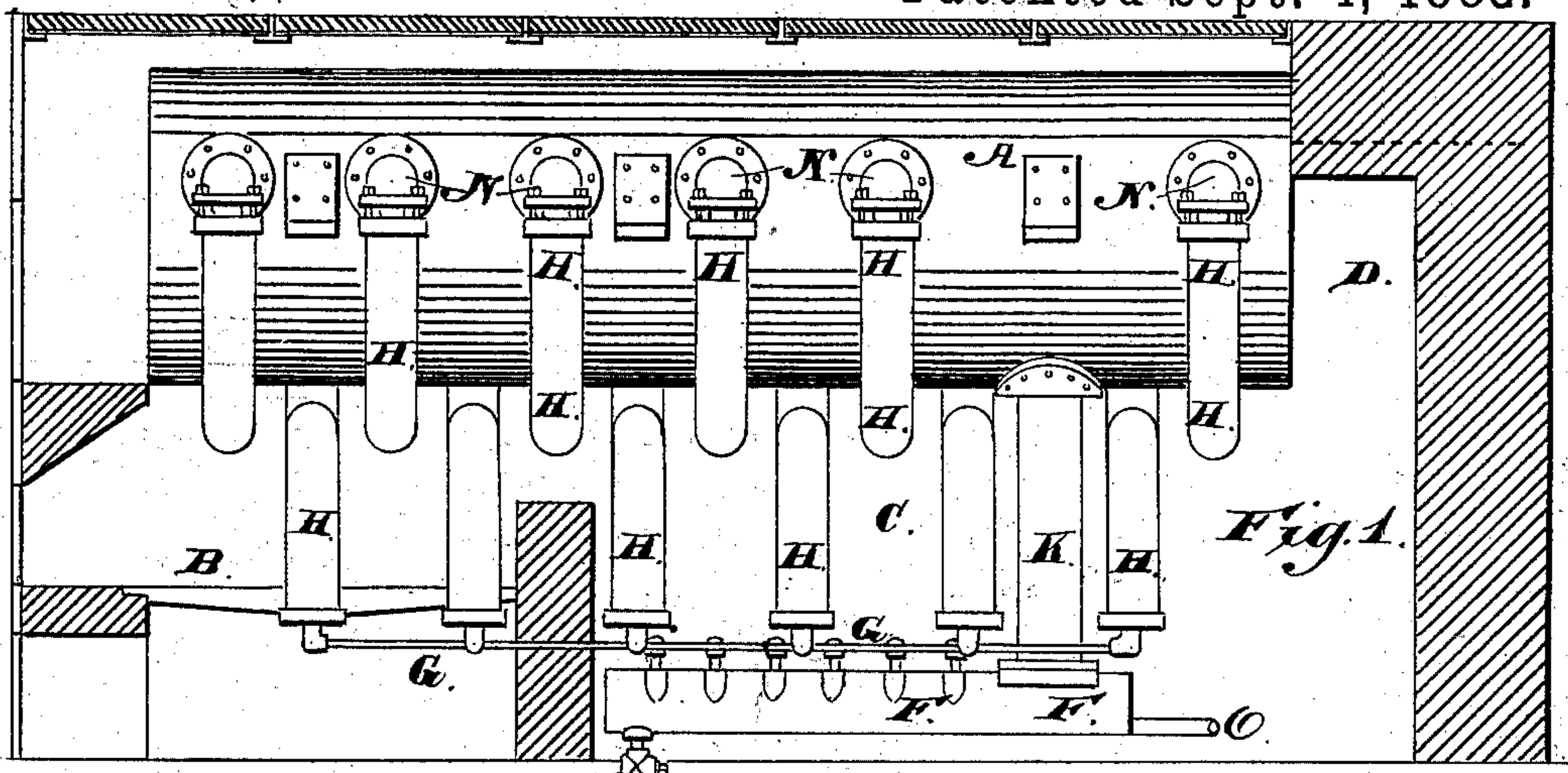


(No Model.)

S. L. HILL.  
STEAM GENERATOR.

No. 284,204.

Patented Sept. 4, 1883.



Witnesses:  
*J. A. Rutherford*  
*Charles H. Rutherford*

Inventor  
*Samuel L. Hill*  
By *Boyd Eliot* atty



# UNITED STATES PATENT OFFICE.

SAMUEL L. HILL, OF BROOKLYN, NEW YORK.

## STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 284,204, dated September 4, 1883.

Application filed February 13, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL L. HILL, of the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Steam Generators or Boilers, of which the following is a specification.

This invention pertains to the class of steam-boilers or steam-generators that is provided with transverse tubes for dividing the water and conducting it to and fro over the grates and heating-surfaces, and for which in certain forms two patents, Nos. 250,146 and 261,348, have already been issued to me.

This invention consists in certain additional improvements upon the inventions therein set forth; and the chief features of invention in this application for a patent consist in providing a single cylinder or drum for supplying the feed-water to the alternating and transverse tubes, and locating said cylinder below the level of the grates and to the rear of the bridge-wall, and below the boiler proper, so that it serves as a receiver for the mud or insoluble matters, and from which they may be blown off, as will hereinafter appear.

In the drawings, Figure 1 is a side elevation of the apparatus and section of the front and bridge wall. Fig. 2 is a plan of the parts below the boiler proper. Fig. 3 is a transverse section through one of the transverse feed-tubes of the boiler.

The main boiler is shown at A, consisting of a large horizontal cylinder suspended by brackets on the furnace-wall, and provided with flue-tubes in the form of the ordinary tubular boiler, one end of which extends over the grate at B, and the rear end over the heating-chamber C, between the furnace-walls D and E, in the usual manner.

In the last one of my previous patents the feed-water was supplied to two small cylinders located in recesses in the side walls of the furnace, and extending lengthwise along the inside, and upon these the transverse supply and heating conduits were connected; but in my present construction these longitudinal cylinders are dispensed with and a single cylinder, F, is located in the space between the side walls and in rear of the bridge-wall and directly under the boiler proper, and from

this small feed-pipes G lead to the lower ends of the transverse and alternating pipes or tubes H, and the feed-water in this case is supplied to the rear end of the cylinder F, which is the coldest point in the structure, and is thence forced forward to supply the several sections H through said small tubes G, already mentioned. There is also a large stand-pipe, K, extending down directly from near the rear end of the boiler proper to the feed-cylinder F, which not only serves as a means for circulating the water between the boiler and the drum F, but permits the mud or insoluble matter to settle down into the said drum, and from which they may be blown or drawn off at the cock L in the usual manner.

In this improvement I prefer to make the transverse conduits H of tubular form and S-shaped in the direction of their length, so that their upper ends will partially surround the boiler proper, and then extend downward and transversely in nearly a horizontal position over the grates and heating-chamber, and then curve down in a vertical direction to connect with shoes at M, and which serve as connections for the small feed-tubes G, leading from the drum F. The upper ends of these curved tubes H are suspended to elbows N, that are fastened upon the sides of the boiler-cylinder A, and I prefer to use the swivel-connections shown in my last patent, as they easily compensate for any expansion and contraction of the various parts; but as all the transverse and alternating tubes H are suspended from the main boiler, plain joints or connections may be used.

The feed-water is supplied to the drum F through the pipe O at the coldest end of the drum, and as it is forced forward to supply the several tubes G will tend to carry the insoluble matters toward the blow-off cock at L, and as the water rises in the several S-shaped steam-generators H a rapid circulation will be produced, which will cause the mud, &c., to descend easily down the vertical pipe K, and then again through the drum or cylinder F.

Instead of the S-shaped tubes H, straight tubes may be suspended vertically from the elbows on the sides of the boiler, and these may be connected by transverse tubes or pipes slightly inclined over the grates and furnace-



space; but the form shown is preferred as likely to give the best circulation.

One of the chief advantages of such a construction of boilers or steam-generators is that  
5 all the insoluble substances will easily collect in the lower cylinder and be thence easily blown off; and a second important feature is that the feed-water is greatly distributed through the heating-space before it enters the  
10 boiler proper; hence great economy in fuel; and, third, the arrangement of the several parts permits the freest expansion and contraction without danger of leaking.

I am aware that a steam-generator has been  
15 composed of upper and lower cylinders connected along their length by a series of alternating transverse tubes, and at one end by a pipe for producing circulation, and such, therefore, I do not broadly claim; but

20 What I do claim as my invention is—

1. In a steam-generator, the feed-water cylinder F, located below the level of the grate-bars in rear of the bridge-wall, and provided at its rear end with a pipe, O, for connecting  
25 with the feed-water supply, combined with the boiler A, the series of alternating transverse tubes H, suspended from the boiler, and pipes G, connecting the feed-water cylinder with the lower ends of said tubes, substantially as de-  
30 scribed.

2. In a steam-generator, the feed-water cylinder F, located below the level of the grate-bars in rear of the bridge-wall, and provided at its rear end with a pipe, O, for connecting with the feed-water supply, combined with the  
35 boiler A, the stand-pipe K, extending from near the rear end of the boiler to the cylinder, the transverse alternating tubes H, suspended from the boiler, and the pipes G, connecting the lower ends of the tubes with the cylinder, 40 substantially as described.

3. In a steam-generator, the feed-water cylinder F, located below the level of the grate-bars in rear of the bridge-wall, and provided with the blow-off cock L, and a pipe, O, at its  
45 rear end for connecting with the feed-water supply, combined with the boiler A, the stand-pipe K, extending from the rear portion of the boiler to the cylinder, the transverse alternating tubes H, suspended from the boiler, some 50 of which cross over the grate-bars, and pipes G, connecting the lower ends of the tubes with the cylinder, substantially as described.

Witness my hand and seal in the presence of two subscribing witnesses.

SAMUEL L. HILL. [L. S.]

Witnesses:

EUGENE N. ELIOT,  
HARRY EDWARDS.