

(No Model.)

J. RODIE.  
STEAM BOILER.

No. 302,033.  $\kappa$

Patented July 15, 1884.

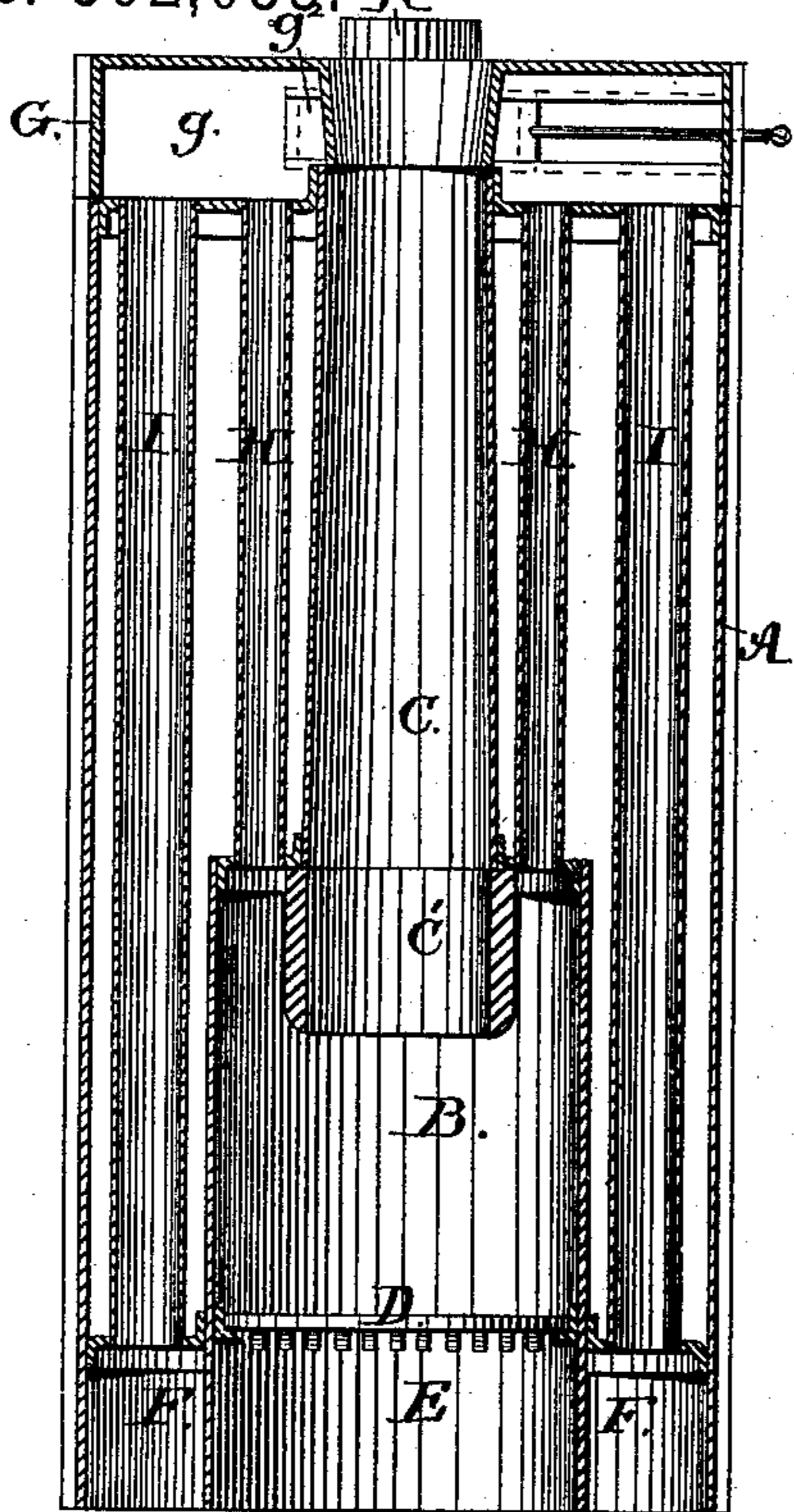


FIG. 1.

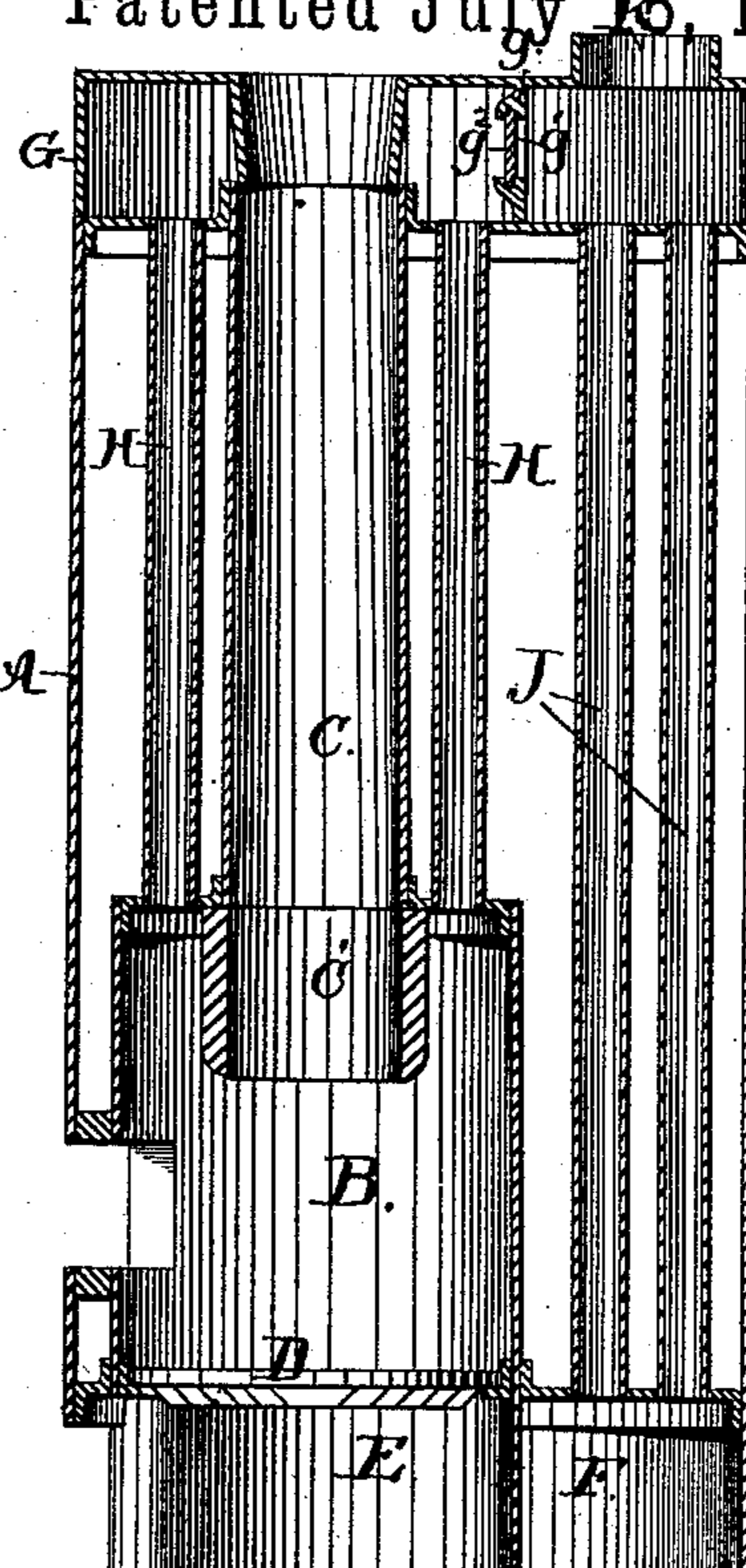


FIG. 2.

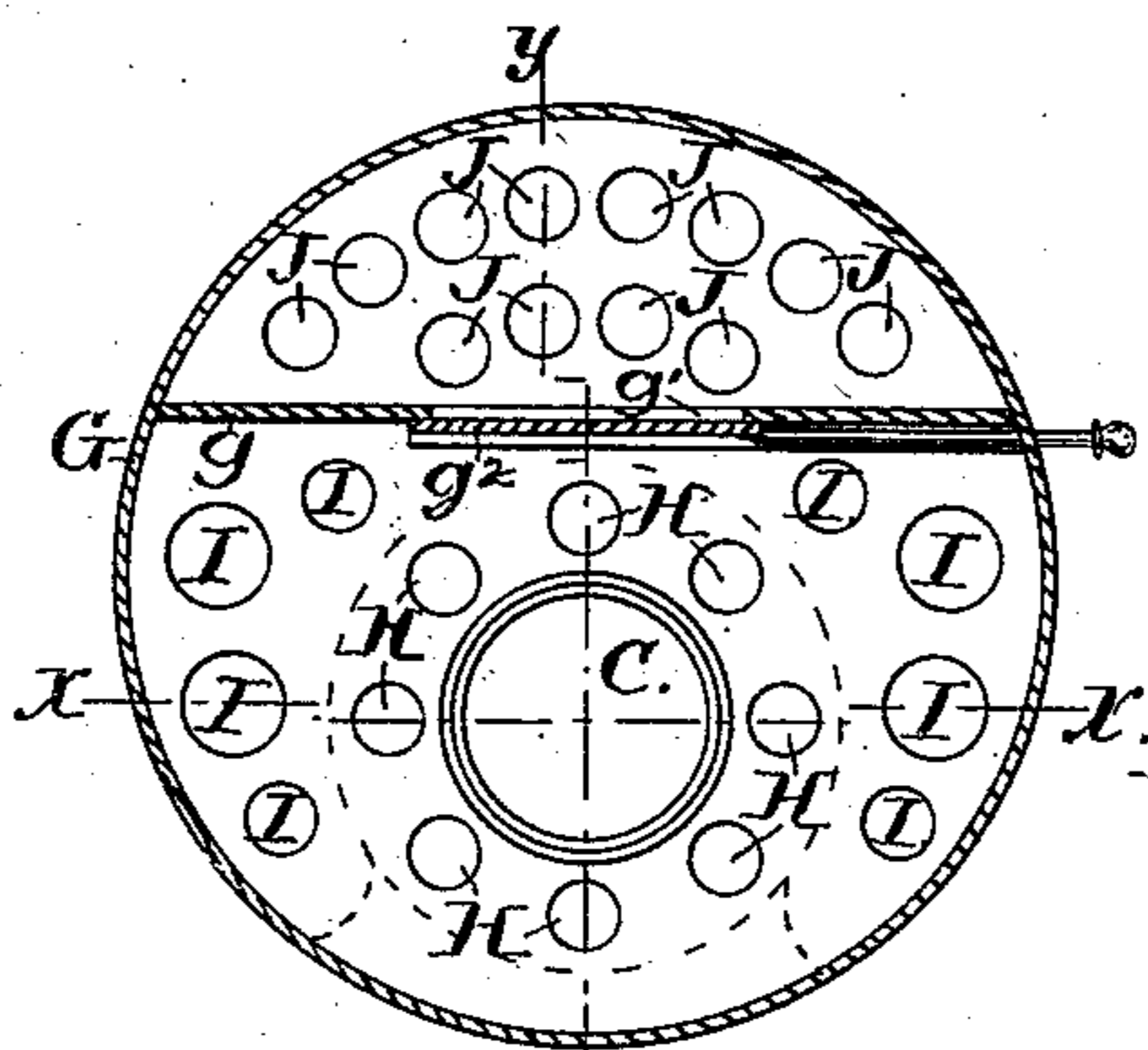


FIG. 3.

Witnesses.

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# UNITED STATES PATENT OFFICE.

JAMES RODIE, OF RONDOUT, NEW YORK.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 302,033, dated July 15, 1884.

Application filed March 1, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES RODIE, of Rondout, in the county of Ulster and State of New York, have invented certain new and useful  
5 Improvements in Steam-Boilers, of which the following is a specification.

My invention relates to improvements in upright tubular steam-boilers; and the objects of my improvements are, first, to adapt the  
10 boiler to contain a fuel-magazine wherefrom fresh fuel will be continuously and automatically fed to the fire as fast as it is required by reason of the wastage therein; second, to afford proper facilities for utilizing more perfectly the heated products of combustion of the fuel; and, third, to provide a direct-draft opening for the escape of the draft-currents while the fire is being kindled or started up from a sluggish condition. These objects I  
15 attain by means of the construction shown in the accompanying drawings, which form part of this specification, and in which—

Figure 1 is a vertical section at the line  $x x$  on Fig. 3 of a boiler containing my improvements; Fig. 2, a vertical section of the same at the line  $y y$  on Fig. 3; and Fig. 3, a plan view of the same with the top of the smoke-bonnet removed.

As illustrated in the drawings, A indicates  
30 the cylindrical shell of the boiler, which may be made of any required diameter and height; B, the fire-box, arranged eccentrically in respect to the shell of the boiler for the purpose of arranging the draft-tubes in the manner hereinafter set forth; C, the magazine or feeder for containing the supply of fuel. Said magazine is placed centrally over the fire-box B, and, extending upwardly through the boiler, has an exterior opening through the top of  
40 the smoke-bonnet, through which the supply of fuel is emptied into the said magazine. C' is a pendent ring, of cast-iron, fire-brick, or other suitable material, fixed at the lower end of the magazine C, and forming a downward extension of the latter into the fire-box B; D, the fire bed or grate; E, the ash-pit; F, the lower smoke-connection; G, the smoke-bonnet fixed at the top of the boiler, and provided with a partition,  $g$ , having a direct-draft opening,  $g'$ ,  
50 formed therein. Said direct-draft opening is furnished with a damper,  $g^2$ , whereby the said opening may be closed when occasion requires.

H is the upcast-tubes connecting the fire-box B with the front compartment of the smoke-bonnet G; I, the downcast-tubes connecting  
55 the front compartment of the smoke-bonnet G with the lower smoke-connection, F; J, the upcast-tubes connecting the smoke-connection F with the rear compartment of the smoke-bonnet G, and K the escape smoke-pipe. 60

It will be seen that by my improvement I utilize in steam-boilers the self-feeding and base-burning principle hitherto used in stoves and heaters, and the operation of it is as follows: In starting the fire in the fire-box B the  
65 damper  $g^2$  should be moved so as to uncover the opening  $g'$ , and thereby permit the draft-currents that rise from the fire-box B through the upcast-tubes H to pass directly out of the boiler through the escape-pipe K. When the  
70 fire becomes well kindled, the magazine C should be charged with coal, and when the latter is in a sufficiently active state of combustion the direct-draft opening  $g'$  should be closed by its damper  $g^2$ . Then the draft-currents, as indicated by the arrows in Figs. 1 and 2, will  
75 pass from the fire-box B upwardly through the upcast-tubes H into the front compartment of the smoke-bonnet G, from thence downwardly through the downcast-tubes I into the lower  
80 smoke-connection, F, and, passing through the latter, they (the draft-currents) are reverted upward through the upcast-tubes J into the rear compartment of the smoke-bonnet G, from whence the said currents escape through  
85 the pipe K. By means of the pendent ring C' the surface of the incandescent fuel is kept at a sufficient distance below the lower ends of the tubes H to permit an active combustion of the gases eliminated from the fuel to occur in  
90 the fire-box B.

By reference to Fig. 3 of the drawings it will be seen that the draft-tubes are divided into three separate and distinct series, two of the series being "upcast" and the other  
95 "downcast," and that the combined area of the openings in each series progressively increases in respect to the preceding series. By this progressive increase in the areas I not only secure a greater amount of heating-surface for absorbing the heat from the escaping  
100 heated products of combustion, but I also intensify the strength of the draft-currents through the boiler.

By arranging the fire-box B eccentrically in respect to the cylindrical shell of the boiler, I effect the separation of the draft-tubes into the requisite number of distinct series, as above described, in a much more perfect and simple manner than can be obtained with a concentrically-arranged fire-box.

I claim as my invention—

10 In an upright tubular boiler, the combination, with the fire-box contained entirely within and arranged eccentrically to the shell, and the fuel magazine or feeder C, located inside of said shell and centrally over said fire-box,

as herein described, of the downcast-tubes I and the separate series of upcast-tubes H J, 15 all of said tubes being contained inside of the shell A, and the several series of said tubes being arranged in relation to each other and to the fire-box B, smoke-chamber F, and smoke-bonnet G, having separating-damper between 20 the downcast-tubes, as herein set forth.

JAMES RODIE.

Witnesses:

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