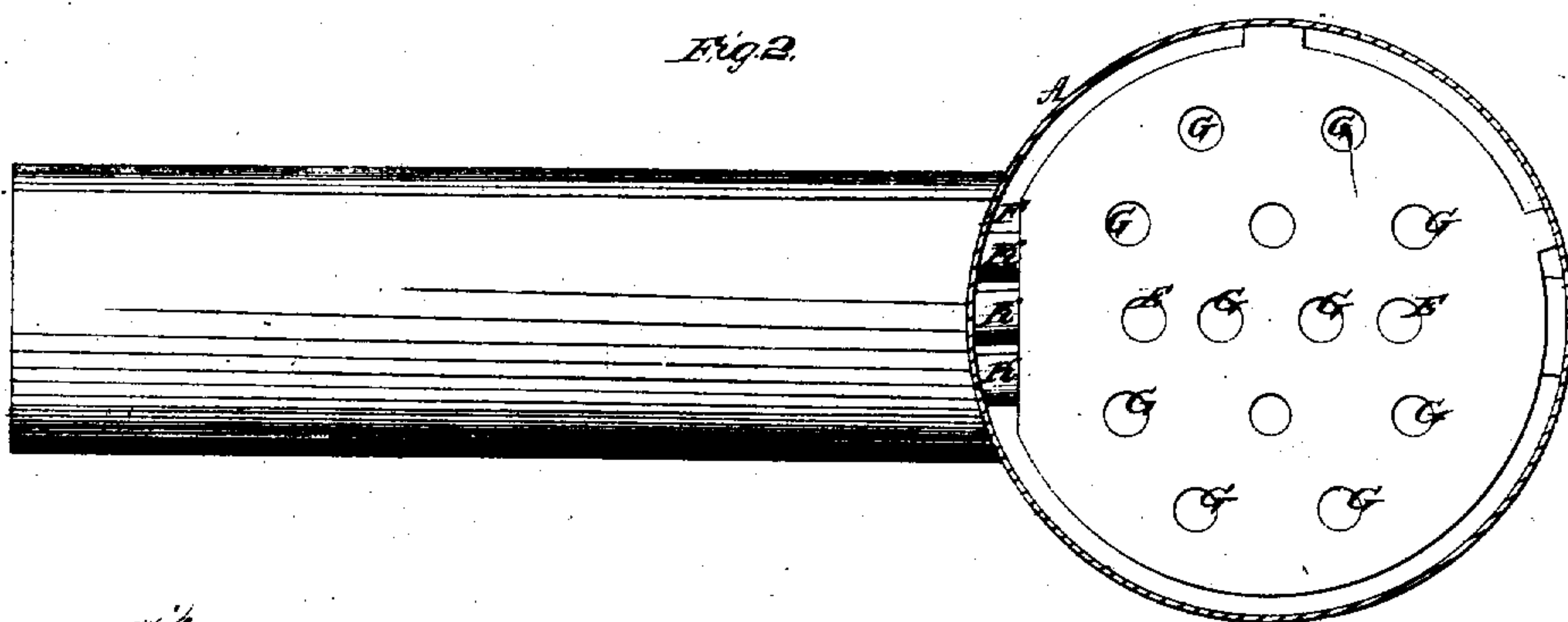
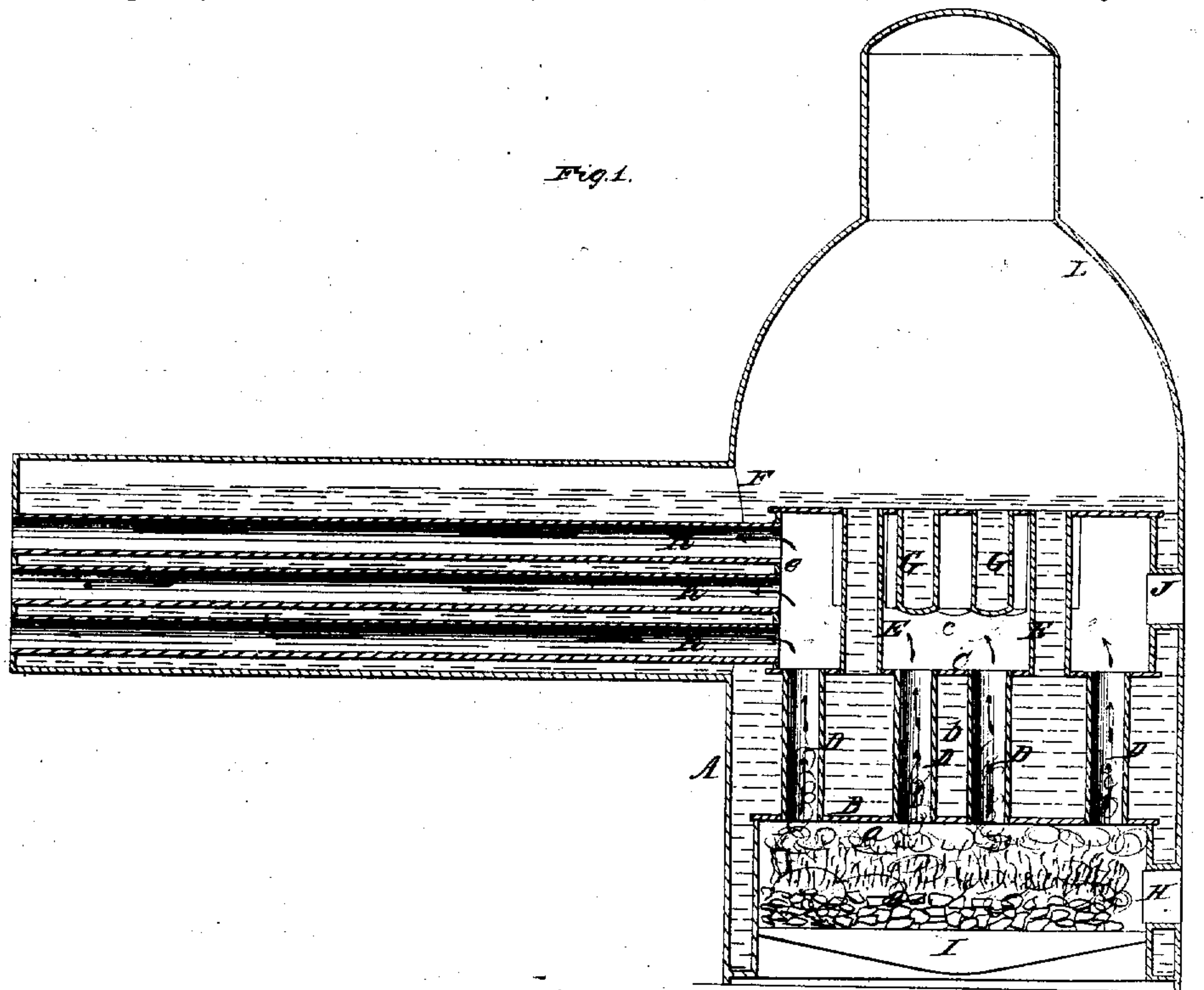


H. Hoffman,
Flue and Tubular Boiler.
N^o 31,542. Patented Feb. 26, 1861.



Witness:
E. H. Conant
James Land
— " —

Inventor:
Harry Hoffman

UNITED STATES PATENT OFFICE.

HENRY HOFFMAN, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. 31,542, dated February 26, 1861.

To all whom it may concern:

Be it known that I, HENRY HOFFMAN, of the city, county, and State of New York, have invented a new and Improved Steam-Boiler; 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, forming a part of this specification, in which—

Figure 1 represents a longitudinal vertical section of my invention; Fig. 2, a horizontal section of the same.

Similar letters of reference indicate corresponding parts in both figures.

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

My invention relates particularly to that class of boilers in which a series of horizontal tubes conduct the products of combustion from the fire-box through the water to the smoke-chamber. With ordinary boilers of this class the heat from the fire is allowed to pass into the horizontal tubes without obstruction, and the water which surrounds the fire-box, and which is generally supposed to be exposed to the highest heat, is heated comparatively little, and much of the heating-surface of the boiler is lost. To avoid these defects, I have placed in the fire-box A of my boiler two horizontal partitions, B C, thereby forming three compartments—the fire-space or furnace *a*, the water-space *b*, and the combustion-chamber *c*. The fire-space *a* communicates with the combustion-chamber *c* by a series of vertical flues, D, which are secured in the partitions or tube-sheets B C, as clearly shown in Fig. 1 in the drawings. The water-space *b* communicates, by means of tubes E, with the water-space F of the boiler, and a series of water-legs, G, are inserted into the top plate, *d*, of the fire-box, extending down into the combustion-chamber *c*, as shown in Fig. 1. The tubes E form the braces between the top plate of the fire-box and the tube-sheet C, and the water circulates freely from the water-space *b* through the tubes E to the water-space F of the boiler.

A door, H, in the side of the fire-box, admits of introducing the fuel to the grate I, and another door, J, gives access to the combustion-chamber *c* for the purpose of cleaning the same. The horizontal tubes or flues K extend from the side of the combustion-chamber to the end of the boiler, being inserted into the tube-sheet *e* in the ordinary manner, and a dome, L, which forms the steam-space, rises above the fire-box.

The fire is built on the grate I, and on being lighted the products of combustion pass up through the vertical flues D into the combustion-chamber *c* and through the horizontal flues K to the smoke-stack or chimney. Those portions of my boiler which are exposed to the strongest heat—viz., the partition-plate or tube-sheet B and the vertical flues D—are under all circumstances covered or surrounded by water, there being no danger that the water will ever get low enough to expose any of said parts, and the heating-surface is further increased by the vertical tubes E and the water-legs G, all of which are exposed from all sides to the direct action of the heat. By turning the heat from the combustion-chamber off into the horizontal flues K it is retained in said chamber sufficiently long to exert its influence on the surrounding water, and still the draft is not impaired, and the whole body of water contained in the boiler is thoroughly heated. By these means an extended heating-surface is obtained in a boiler of comparatively small dimensions, and a small quantity of fuel is sufficient to evaporate a large quantity of water and to produce steam enough for a comparatively large engine.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The particular arrangement of the legs G G, combustion-chamber *c*, and tubes E, with the tube-sheets B C and flues D K, in the manner herein shown and described.

HENRY HOFFMAN.

Witnesses:

C. W. COUTAU,
JAMES LAIRD.