

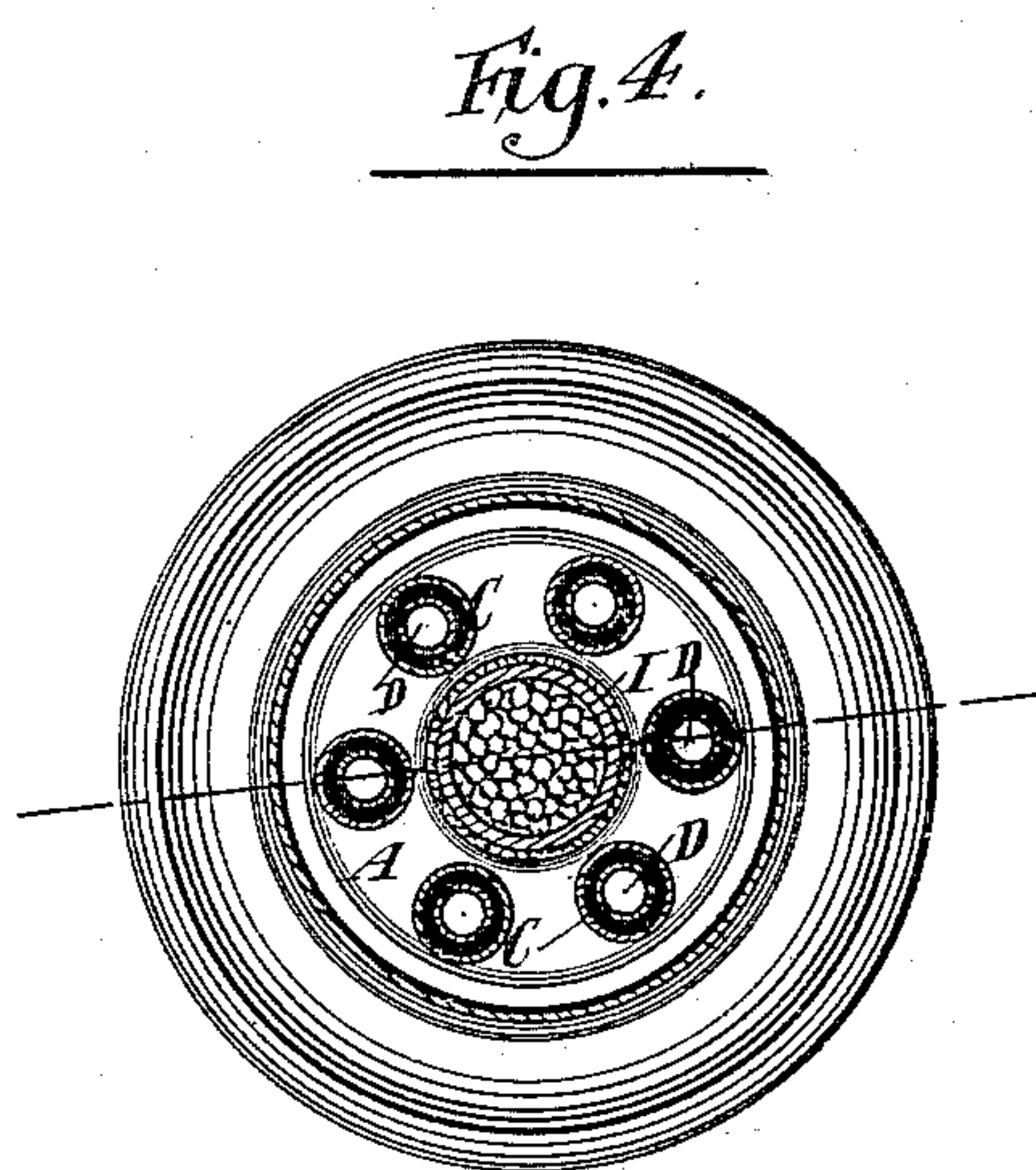
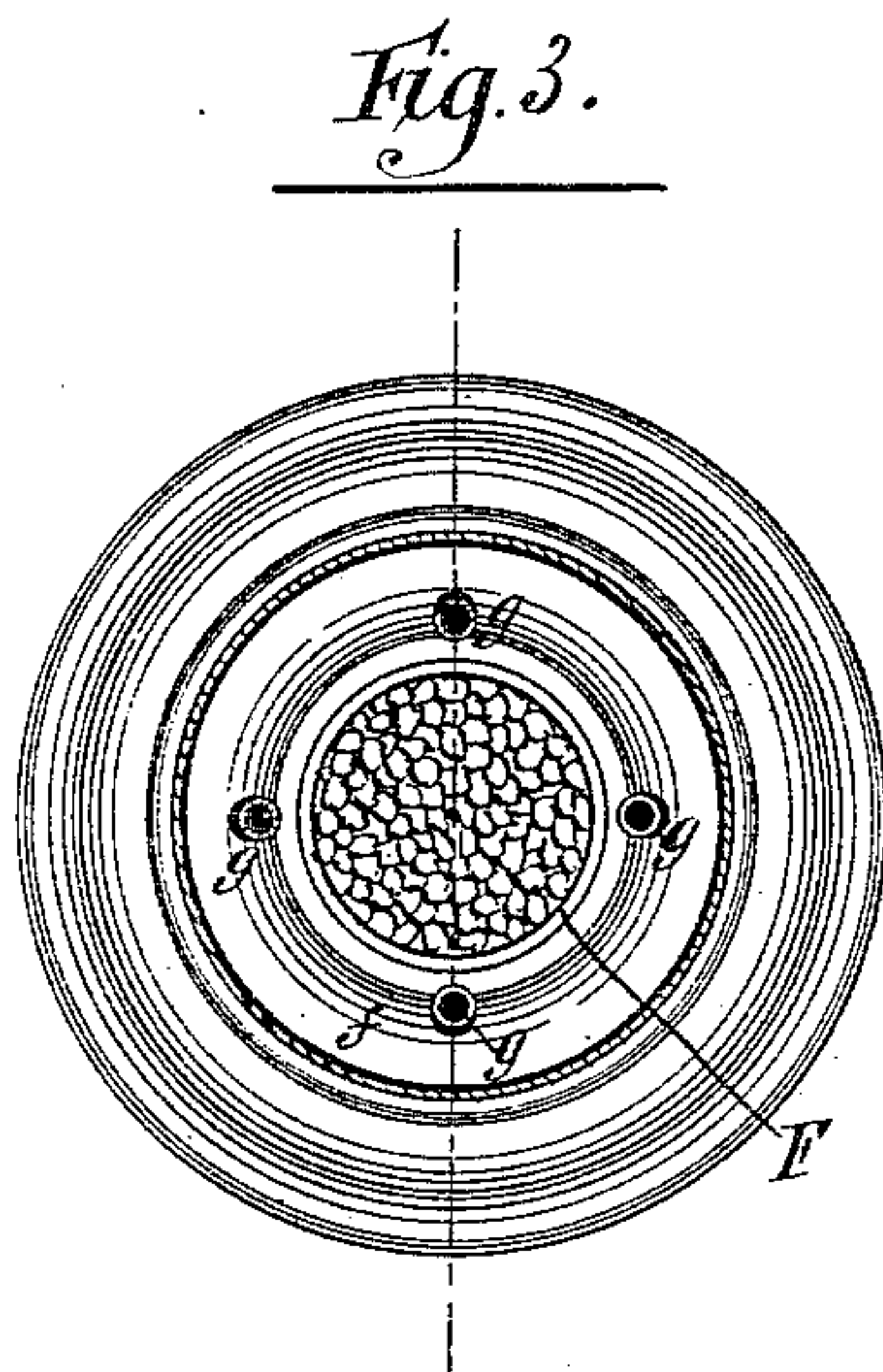
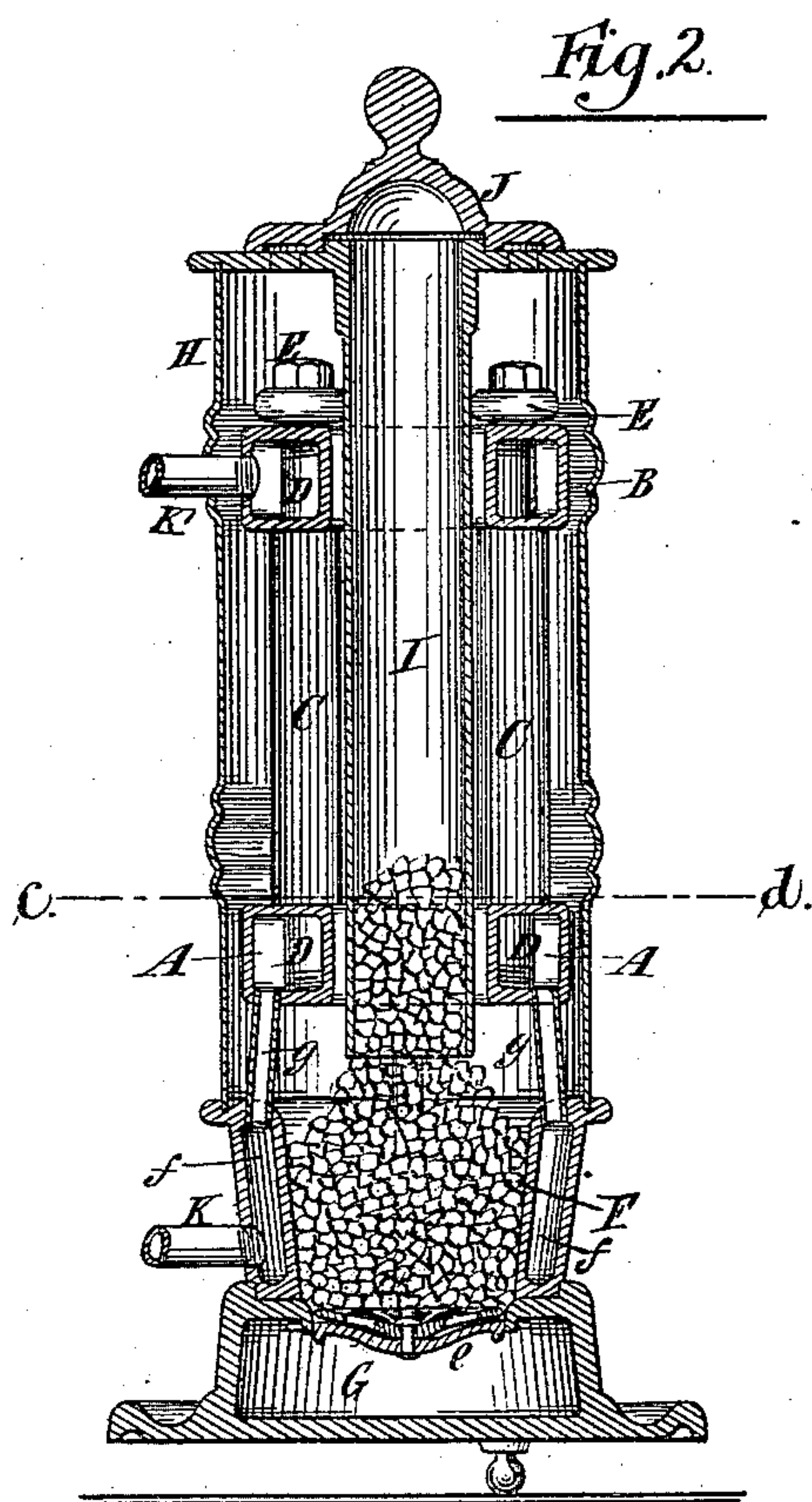
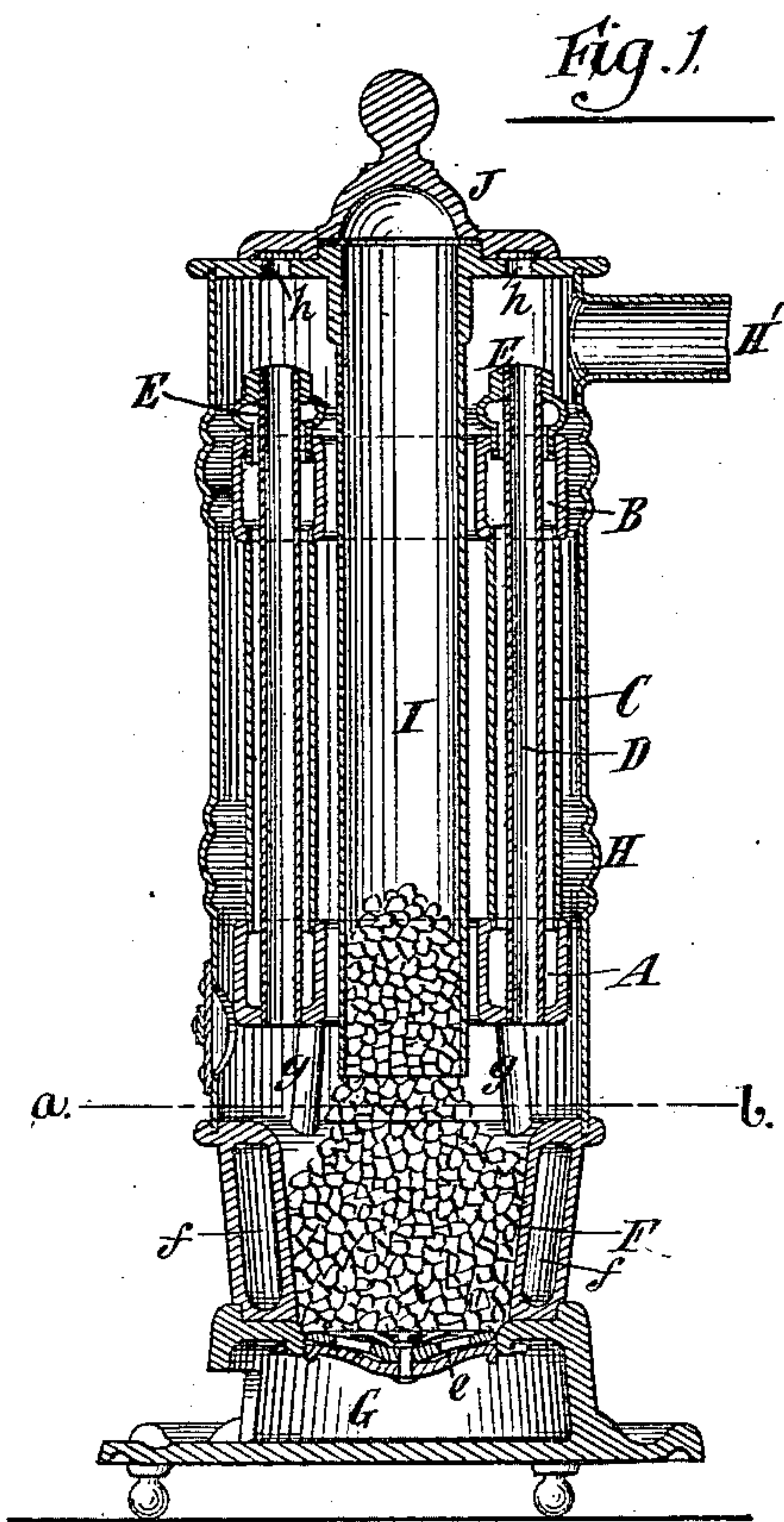
(No Model.)

J. MASON.

BOILER FOR HEATING PURPOSES.

No. 259,566.

Patented June 13, 1882.



Witnesses:-

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Geo. Haysner.

Inventor:-

John A. Mason
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UNITED STATES PATENT OFFICE.

JOSHUA MASON, OF PATERSON, NEW JERSEY.

BOILER FOR HEATING PURPOSES.

SPECIFICATION forming part of Letters Patent No. 259,566, dated June 13, 1882.

Application filed February 20, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOSHUA MASON, of Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Boilers for Heating Purposes, of which the following is a specification.

My invention relates more especially to boilers which are used in connection with hot-water heating apparatus; and my principal object is to provide a boiler in which only a small quantity of water is in contact with a heating-surface of comparatively great area, and is kept in very rapid circulation.

To this end my invention consists in the combination, in a boiler, of an upper and a lower hollow annular chamber or head, a series of water-tubes connecting and forming separate communications between said chambers or heads, a series of fire-tubes extending one through each of said water-tubes and through both of said chambers or heads, and forming the inner surfaces of annular water-spaces in the several water-tubes, and a fire-pot, the products of combustion from which pass upward around the water chambers or heads and outer or water-tubes and through the inner or fire tubes, whereby a great area of heating-surface is produced. I also preferably combine with the above a fire-pot having double vertical walls, forming a water-space between them, which is connected by tubes with the lower water chamber or head.

In the accompanying drawings, Figure 1 represents a central vertical section of a boiler embodying my invention, showing the inner and outer tubes in section. Fig. 2 is a similar section in which said tubes are not sectioned. Fig. 3 represents a transverse section upon the dotted line *a b*, Fig. 1; and Fig. 4 is a similar section upon the dotted line *c d*, Fig. 2.

Similar letters of reference designate corresponding parts in all the figures.

A designates the lower, and B the upper, of two hollow annular water chambers or heads, placed one above the other at some distance apart, and made of malleable cast-iron, steel, or other suitable material. These water chambers or heads are connected by a series of outer vertical water-tubes, C, and a series of fire-tubes, D, arranged concentrically within

the said outer tubes. The outer tubes, C, connect the upper and lower water chambers or heads, A and B, their ends being secured in the upper side of the lower chamber, A, and in the lower side of the upper chamber, B, in any suitable manner, preferably by being forced into holes prepared for them, so as to make a water-tight connection. The inner tubes, D, are secured in any suitable manner in the lower side of the lower water-chamber, A, and thence extend upward through said chamber, the outer pipes, C, and the upper water-chamber, they being secured in the upper side of said upper-chamber. The means preferably employed for securing the inner tubes at their upper ends in the upper side of the upper water chamber or head, B, consists of nuts E, into which the ends of said inner tubes are forced or screwed, and which are themselves screw-threaded externally to fit holes in the water-chamber head. The kind of nuts which I prefer to employ, and which are here represented, have a thin corrugated portion between the two ends, as claimed by me in Letters Patent No. 153,776, granted to me August 4, 1874, for thereby any slight difference in longitudinal expansion between the outer tubes, C, and the inner tubes, D, will be compensated for and leakage prevented. The inner or fire tubes, D, form the inner surfaces of the annular water-spaces between the tubes D and the water-tubes C, which surround them, and these spaces form separate communications between the upper and lower water chambers or heads, and provide for a circulation between said chambers or heads.

F designates a fire-pot provided with a grate, *e*, and having below it an ash-pit, G. The fire-pot F, in order to increase the effective heating-surface of the boiler, is constructed with double walls, forming a water-space, *f*, between them, which, by means of tubes *g*, is in constant and uninterrupted communication with the lower water chamber or head, A.

H designates an inclosing casing, having at the top a flue, H', for the escape of the products of combustion, and having depending from its top a magazine tube or cylinder, I, through which the fuel is introduced, and which is adapted to retain a large supply for self feeding, as shown clearly in Figs. 1 and 2.

The said magazine passes through the central openings in the annular water chambers or heads A B, and at the top of the casing is a cap or cover, J, which may be removed for the purpose of introducing fuel or for cleaning out the inner tubes, D, it being observed that the top of the casing H is provided with holes or openings *h* opposite the said inner tubes, as seen in Fig. 1.

10 K K' designate pipes extending respectively from the water-space *f* in the fire-pot F and from the upper water chamber or head, B. These pipes provide for the circulation of hot water from the boiler to and through a radiator or system of radiators and thence back to the boiler. The water chambers or heads and the spaces between the inner and outer tubes being filled with water, the products of combustion from the fuel in the fire-pot pass upward around the two annular water chambers or heads, around the exterior of the outer tubes, and through the inner tubes, thus producing a large area of heating-surface relatively to the amount of water contained in the boiler, and a consequently rapid circulation through the radiator or radiators which are in connection with the boiler.

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

30 1. The combination, in a boiler, of an upper and a lower hollow annular water chamber or head, a series of water-tubes connecting and

forming separate communications between said chambers or heads, a series of fire-tubes extending one through each of said water-tubes and through both of said chambers or heads, and forming the inner surfaces of annular water-spaces in the said water-tubes, and a fire-pot arranged below said lower chamber or head, and from which the products of combustion may pass upward around the chambers or heads and said water-tubes, and also through the said fire-tubes, substantially as and for the purpose specified.

2. The combination, in a boiler, of an upper and a lower hollow annular chamber or head, a series of water-tubes connecting said chambers or heads, a series of fire-tubes extending through said water-tubes and through both chambers or heads, and a fire-pot having double vertical walls, and an intervening water-space arranged below the lower chamber or head and in communication therewith, substantially as specified.

3. The combination of the water chambers or heads A B, the outer and inner tubes, C D, the fire-pot F, having water-spaces *f*, the tubes *g*, the casing H, and the magazine or cylinder I, all substantially as specified.

JOSHUA MASON.

Witnesses:

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