

No. 654,691.

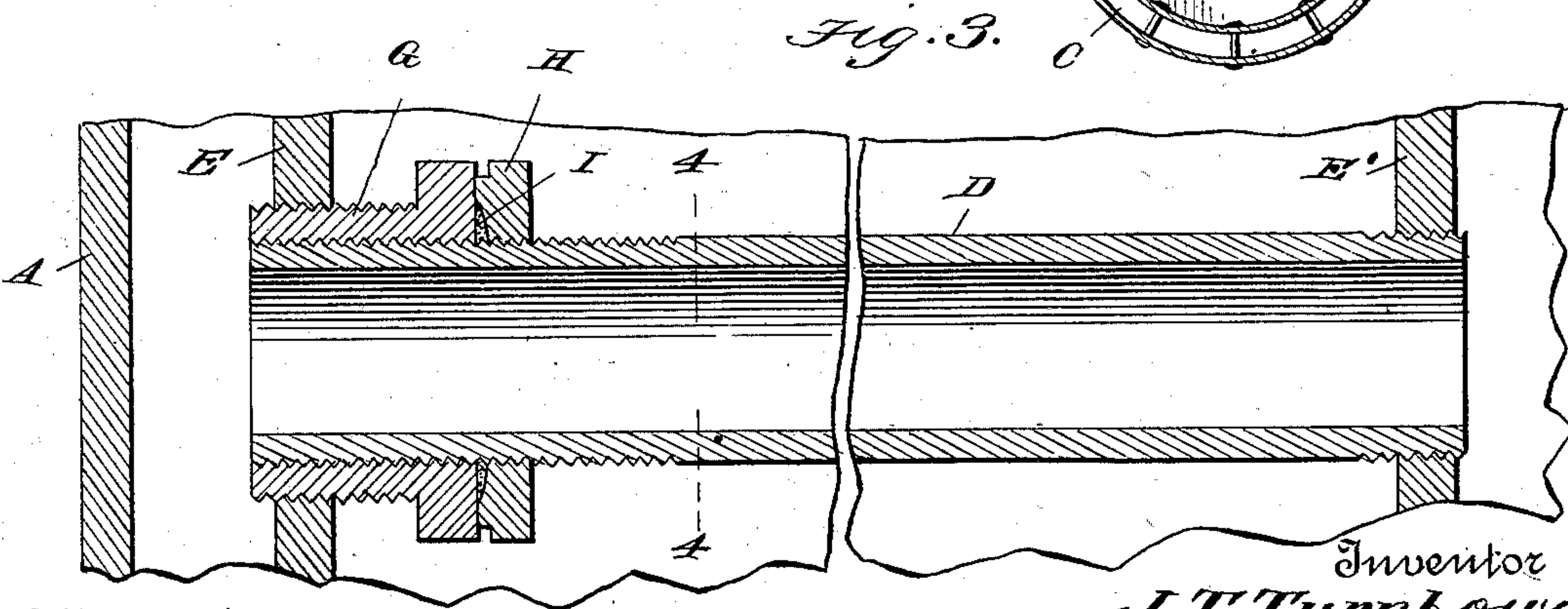
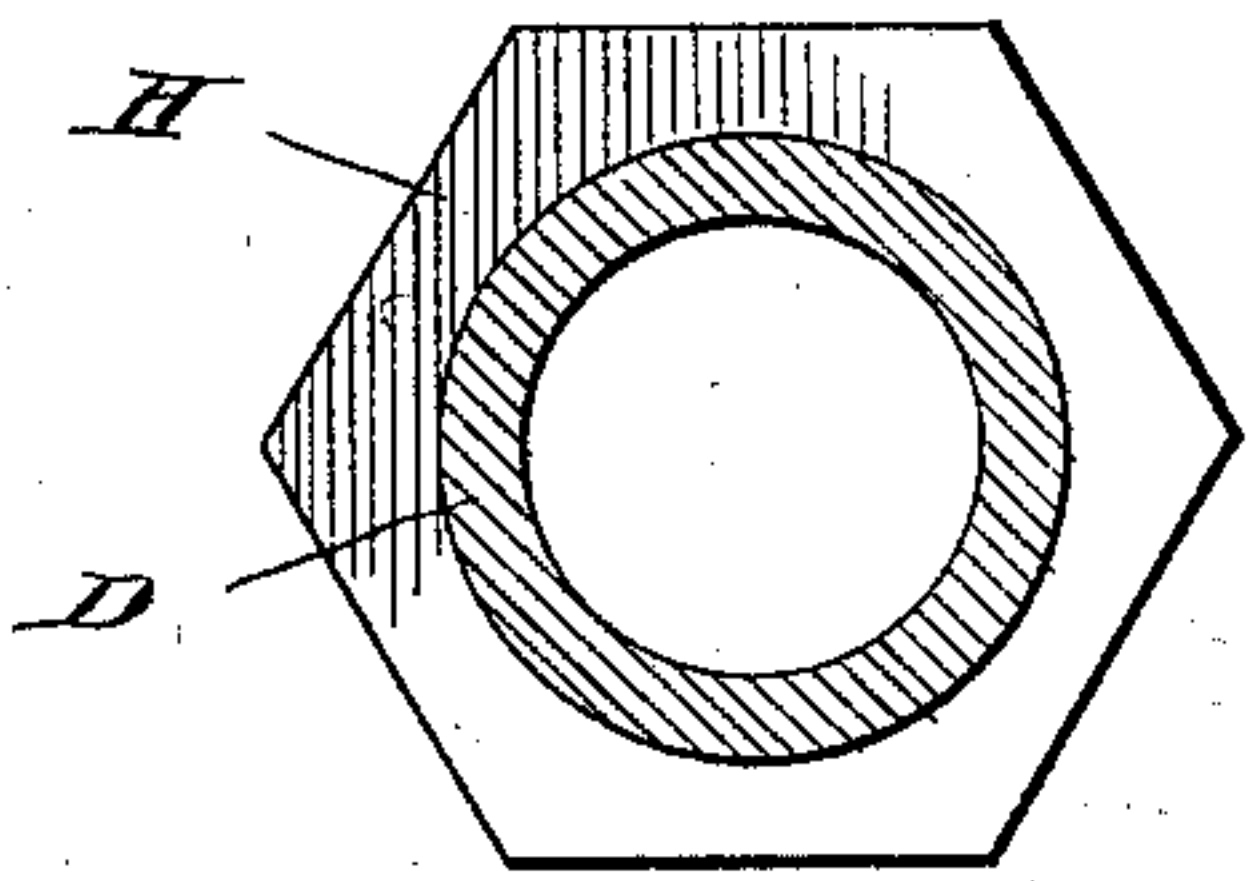
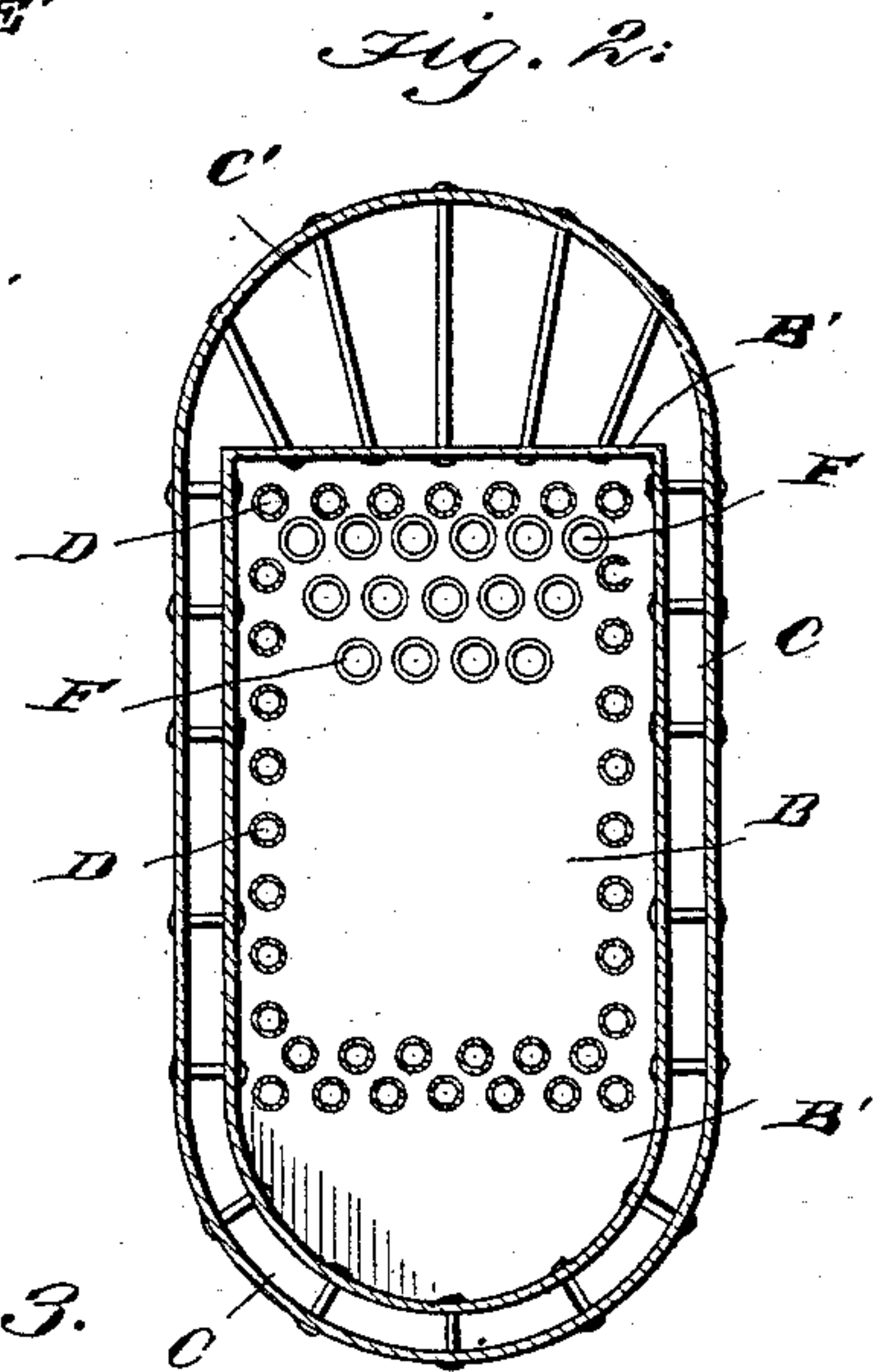
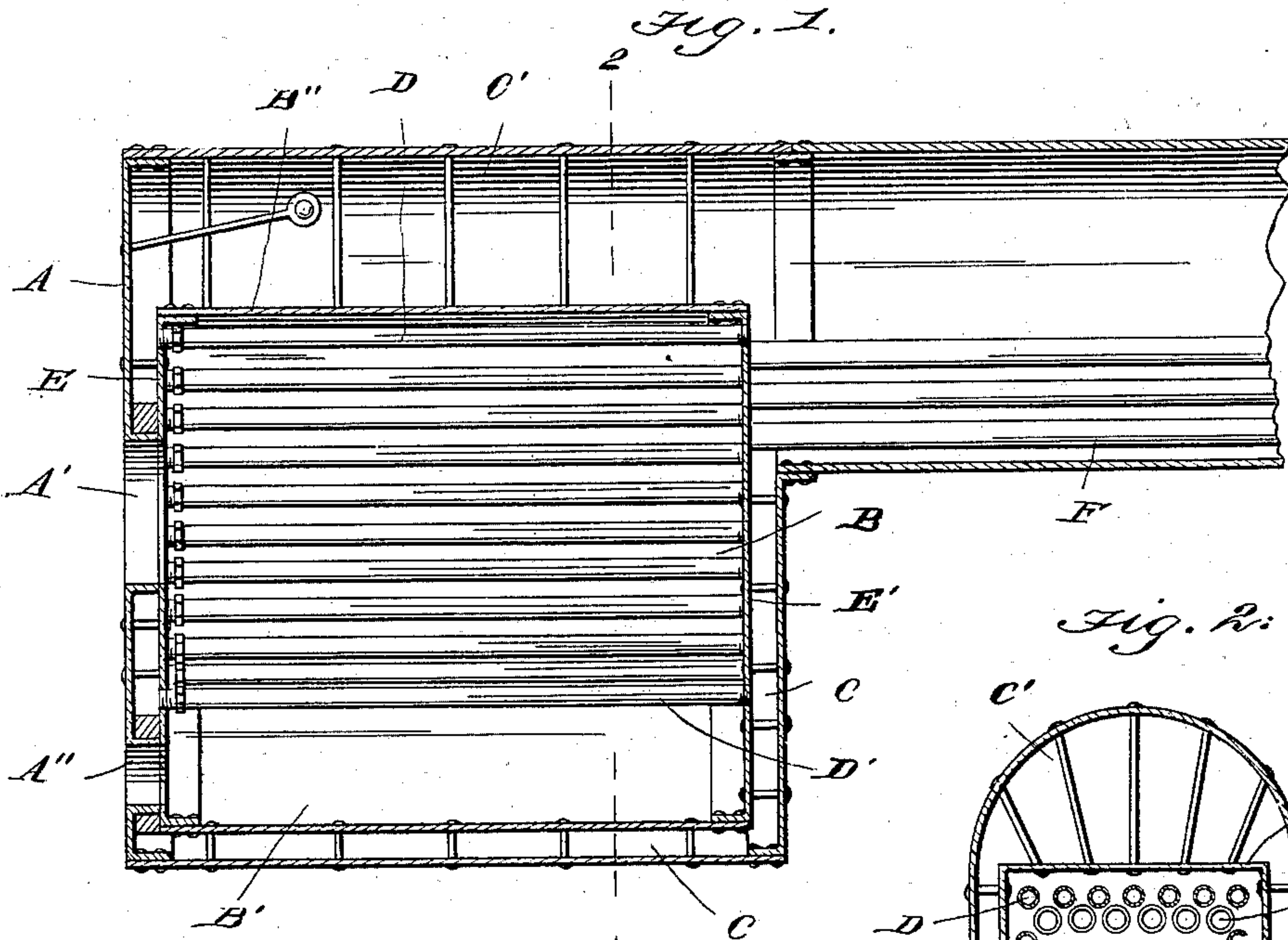
Patented July 31, 1900.

J. T. TURNBOW.

STEAM BOILER.

(Application filed July 8, 1899.)

(No Model.)



Witnesses

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# UNITED STATES PATENT OFFICE.

JOHN T. TURNBOW, OF CROSSLAND, KENTUCKY.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 654,691, dated July 31, 1900.

Application filed July 8, 1899. Serial No. 723,177. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN T. TURNBOW, a citizen of the United States, residing at Crossland, in the county of Calloway and State of Kentucky, have invented a new and useful Steam-Boiler, of which the following is a specification.

My invention relates to steam-boilers, and has for its primary object the production of a boiler combining in one structure all the principles of the water-tube boiler and the fire or smoke flue boiler. In carrying out this primary object my invention has for a secondary object the improved construction of such a combination boiler.

With this object in view my invention consists in the improved construction, arrangement, and combination of parts hereinafter fully described and afterward specifically pointed out in the appended claim.

In order to enable others skilled in the art to which my invention most nearly appertains to make and use the same, I will now proceed to describe its construction and operation, reference being had to the accompanying drawings, forming part hereof, in which—

Figure 1 is a longitudinal vertical sectional view of a boiler constructed in accordance with my invention, the rear end being broken away. Fig. 2 is a transverse vertical sectional view on the plane indicated by the broken line 2 2 of Fig. 1. Fig. 3 is a longitudinal sectional view through one of the water-tubes, illustrating the means for securing it in and removing it from the heads, the middle portion being broken away to shorten the figure. Fig. 4 is a transverse sectional view on the plane indicated by the broken line 4 4 of Fig. 3.

Like letters of reference mark the same parts in all the figures of the drawings.

Referring to the drawings by letters, A indicates the front head of the boiler, in which are openings for door A' of the fire-box B and A'' of the ash-pit B'. The fire-box and ash-pit are both built entirely within the water-space of the boiler, being surrounded by a water-jacket C and main upper water-space C' above the crown-sheet B''.

D D' indicate the water-tubes secured in the inner front and rear heads E E' of the

fire-box, said tubes opening at front and rear in the water-jacket C, which communicates freely with the main water-space C'. The water-tubes D are located at the sides and top of the fire-box and the water-tubes D' at the bottom, the latter forming the grate and separating the fire-box from the ash-pit.

F indicates the fire or smoke tubes or flues set in the rear head E' of the fire-box and in the rear head (not shown) of the boiler, discharging in the usual manner into the uptake or stack. (Not shown.) In this illustration the grate-tubes D' are shown in a double row and alternating or staggered; but it must be understood that there may be only a single row, or if a double row the tubes of one row may be directly under the other. I desire it to be further understood that the water-jacket may be made to surround the fire-box only, leaving the ash-pit open, or with a water-jacket, if so desired.

In Figs. 3 and 4 I have illustrated the manner of securing the water-tubes in position, so that any of them may be removed and replaced without displacing any other tube. In these figures it will be seen that the openings in the heads E E' of the fire-box are threaded, and in the latter (the rear head) the opening is of the proper size to receive the threaded rear end of the tube D, while the opening in head E is larger and also threaded. G indicates a sleeve or elongated nut having an interior thread to fit on the threaded front end of tube D and an exterior to fit the threaded opening in front head E of the fire-box. To place the tube in position, the sleeve G is turned onto the forward threaded end to a considerable distance beyond its position when secured. The projecting threaded end of the tube is then projected outward through the opening in head E, brought into line with threaded opening in head E', and screwed into place in said opening. The sleeve is now turned outward upon the tube and into the threaded opening in head E and a lock-nut H (previously threaded upon the tube inside the sleeve) turned up against the sleeve, securing it in position. An asbestos packing I is located in a concavity in the front face of the lock-nut H and is compressed against the sleeve by the lock-nut, thus securing the joint against leakage.



By locating a single row of tubes on the interior of the fire-box ready access can be had to any one of the tubes. For removing or replacing it a wrench can be applied to the sleeve and lock-nut to turn them back far enough to permit of the opposite end being removed from or placed in the hole in the head E'. With that end of the tube out of said hole the tube can be turned at a sufficient angle to the other plate to let that end of the tube be removed from the larger opening, through which it projects. Owing to the fact that the head of the sleeve and the lock-nut are intermediate the ends of the tube it is absolutely impossible to insert or remove the tube without sufficient space in which to put it at an angle to the plates, thereby rendering the use of the means of fastening the tubes peculiarly adaptable to a construction in which there is only a single row of tubes instead of a nest of them.

From the foregoing it will be seen that the water in the tubes D D' will be intensely and rapidly heated, causing a rapid circulation of water through them, so that the heat thus communicated to the water, in addition to the usual heating by the fire tubes or flues F, will cause steam to be generated much more rapidly than in either a water-tube or a flue boiler, thus effecting a great saving in fuel.

It may sometimes be deemed advisable to place several rows of water-tubes in the grate or on the sides or on top or in all of these positions, and the water-tubes might be otherwise secured in position. The water-tubes above the fire or smoke tubes might be connected with the wall or crown-sheet by elbows or crooked connections to give more room for the fire or smoke tube, especially in applying

the invention to boilers already in use. The addition of the water-tubes will permit of making a boiler smaller than would be possible without them, thus economizing space, sometimes extremely valuable.

While I have thus fully illustrated and described what I consider to be the best means now known to me for carrying out my invention, I do not wish to be understood as restricting myself to the exact forms of construction shown, as many slight changes therein or variations therefrom might suggest themselves to the ordinary mechanic, all of which would be clearly included within the limit and scope of my invention.

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

In a boiler, the combination, with the front and rear heads of the fire-box, each of which is provided with a row of screw-threaded holes around each side and the top edges thereof and across near the bottom, the holes in one end being larger than in the other, of a series of tubes, each tube being of a greater length than the distance said heads are apart, and having each end screw-threaded, the threads at one end extending farther from the end than the other, the end having the shorter threads fitting in the smaller holes, an interiorly and exteriorly screw-threaded sleeve and a lock-nut on the longer threads, the head of the sleeve being inward, and a packing between said head and the lock-nut.

JOHN T. TURNBOW.

Witnesses:

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