

No. 711,783.

Patented Oct. 21, 1902.

D. P. McQUEEN.
STEAM BOILER.

(Application filed May 19, 1902.)

(No Model.)

2 Sheets—Sheet 1.

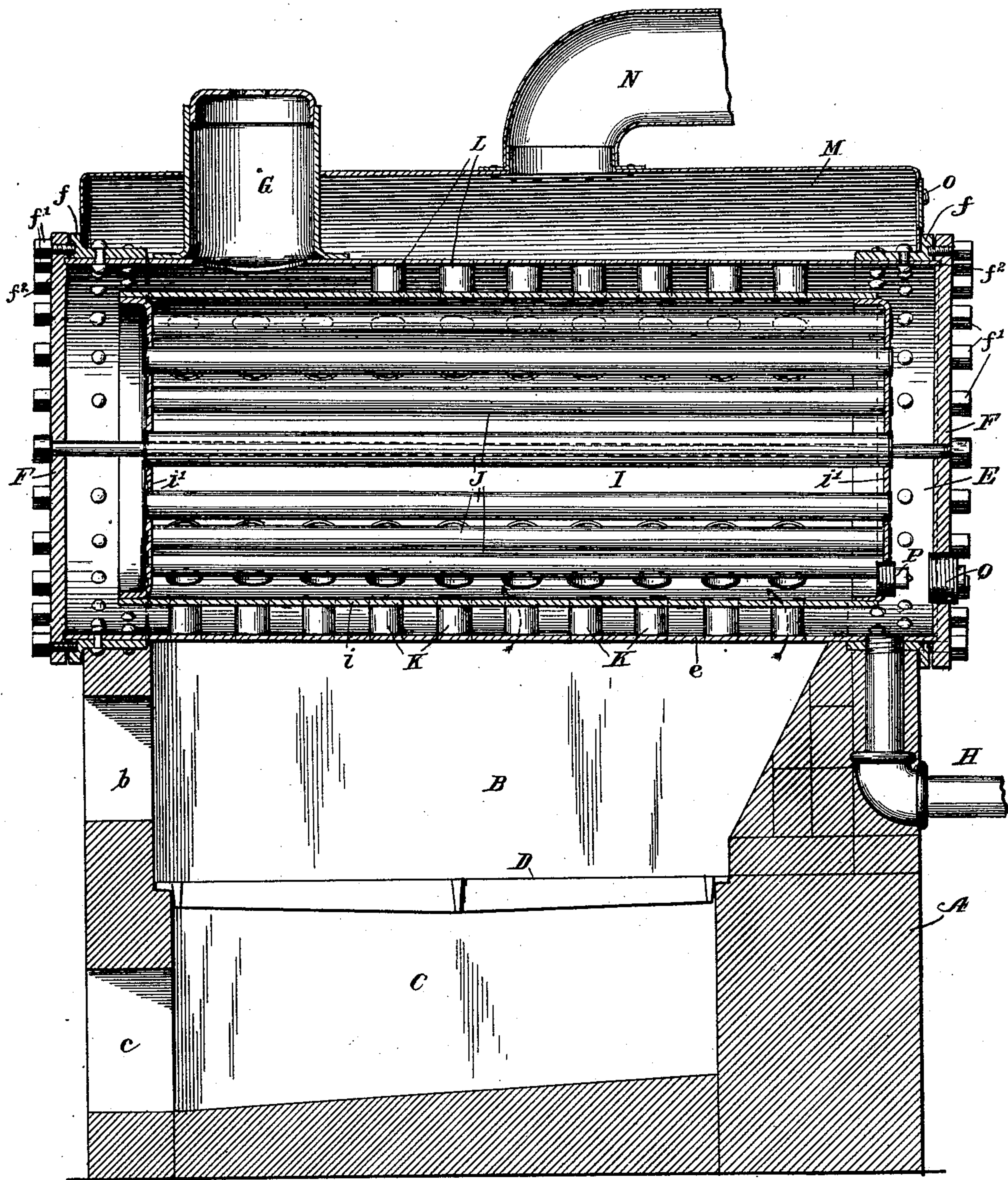


Fig. 1.

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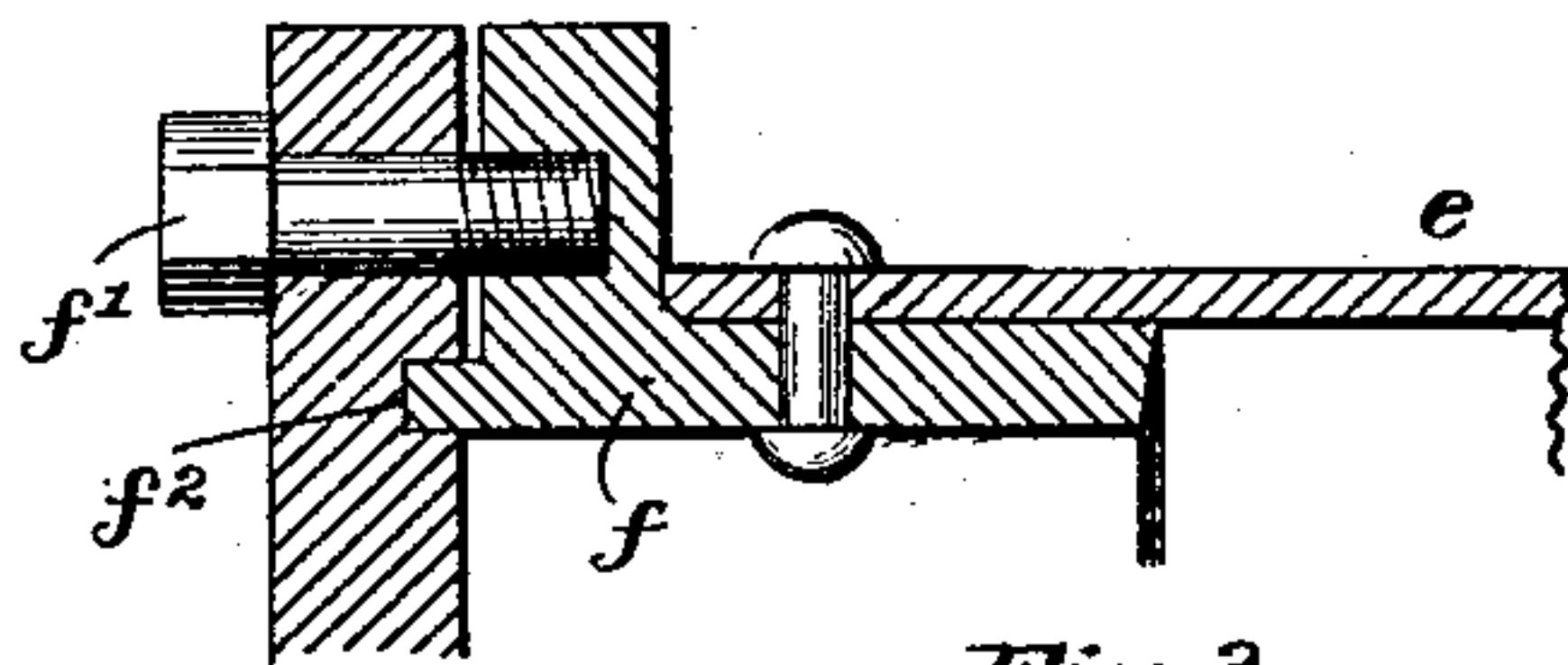
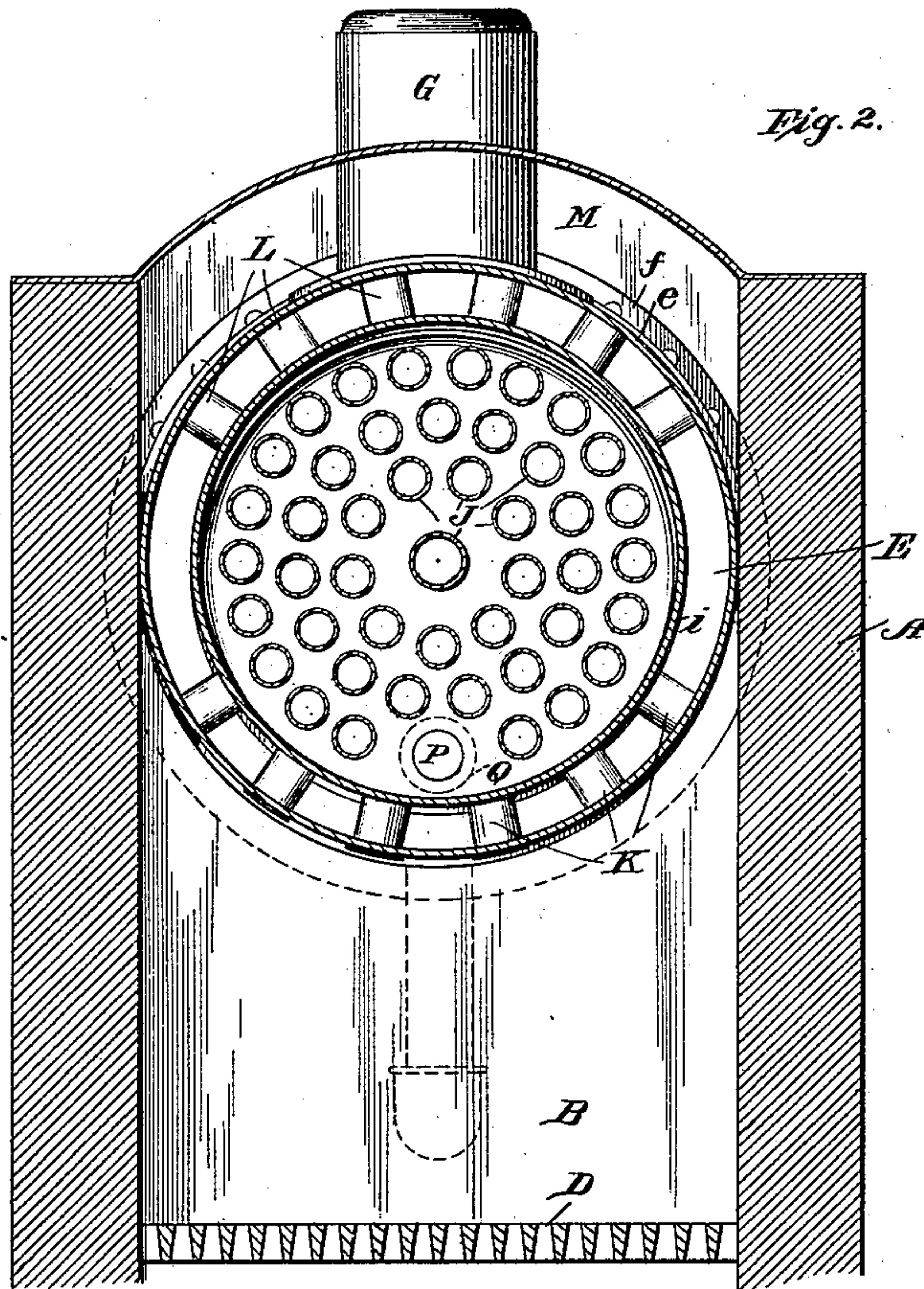
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UNITED STATES PATENT OFFICE.

DANIEL P. McQUEEN, OF SARATOGA SPRINGS, NEW YORK.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 711,783, dated October 21, 1902.

Application filed May 19, 1902. Serial No. 107,946. (No model.)

To all whom it may concern:

Be it known that I, DANIEL P. McQUEEN, a citizen of the United States, residing at Saratoga Springs, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

The object of my invention is to provide a steam-boiler of large heating-surface in which water-tubes are combined with fire-tubes and in which the parts may be easily reached for cleaning or repair.

In carrying out my invention I provide a casing of masonry built with a combustion-chamber and a fire-pit, and directly above the combustion-chamber I arrange a water-chamber. A heating-chamber is arranged within the outer one and is fitted with longitudinal tubes which extend through it and open into the interior of the outer chamber at opposite ends. Short vertical tubes lead the products of combustion from the combustion-chamber into the heating-chamber and thence into a smoke-box above the boiler. The water-chamber is provided with a steam-dome and with removable heads at each end. Means are provided for blowing out dust, &c., from the fire-flues and for cleaning the heating-chamber from any deposit which may collect within it.

In the accompanying drawings, Figure 1 shows a vertical central section of a steam-boiler constructed in accordance with my invention. Fig. 2 shows a transverse section of the same. Fig. 3 is a detail view showing a modified way of securing the boiler-heads in place.

The casing A may be of masonry, as usual, formed with a combustion-chamber B and an ash-pit C.

D indicates the grate-bars, and *b c* indicate the door-openings to the combustion-chamber and the ash-pit, respectively.

Above the combustion-chamber is located a water-chamber E, which extends from one end of the casing A to the opposite end thereof. The shell *e* of the casing E is preferably cylindrical, and it is provided at its opposite ends with removable heads F, and at the top near one end it is provided with a steam-dome G. In Fig. 1 the heads are shown as being secured to flanged rings *f*, riveted to

the outside of the shell *e* and receiving screw-bolts *f'*, carried by the heads, each head being formed with an annular groove *f*², into which the opposite ends of the shell, which project slightly beyond the ring, extend. In Fig. 3 the ring *f* is riveted to the inside of the shell. The manner of securing the heads in place is not, however, essential. Any suitable means may be adopted which will insure a water-tight and steam-tight connection, suitable packing being employed when required. Water is admitted to the chamber E by means of a pipe H.

I indicates an inner chamber, through which the water-tubes J extend and through which the products of combustion pass. This inner chamber has a cylindrical shell-casing *i*, closed tightly by heads *i'*. The shell and heads are arranged centrally within the chamber E, with a space between them on all sides for containing water and steam, thus providing an annular water-chamber around the chamber I and water-chambers at opposite ends thereof. In other words, the central heating-chamber I is entirely surrounded by water.

K indicates short tubes extending from the combustion-chamber B to the heating-chamber I and adapted to carry the products of combustion into the chamber I. Any suitable number of these tubes may be employed. They are preferably arranged as indicated in the drawings. Similar tubes L connect the chamber I with a smoke-box or smoke-chamber M, provided with a smoke-flue N. The tubes J may be secured in place in the inner cylinder before it is placed in the chamber E. The tubes K and L may be expanded at opposite ends or secured to the shells *e* and *i* by well-known devices working from the outside of the shell *e* after the inner cylinder has been placed in position. By this arrangement the products of combustion are subdivided and are made to come in close contact with the water over an extended surface, the heated tubes K and L heating the water in the annular space surrounding the inner chamber I, while the products of combustion within the heating-chamber I pass from the tubes K to the tubes L, heating the water in the tubes J. All of the tubes may be very easily cleaned or repaired when required.

By removing one or both heads F the tubes may be cleaned very quickly, inasmuch as they are straight and longitudinal and open at opposite ends. The tubes K and L and the heating-chamber may be cleared of dust by applying a compressed-air pump or other suitable apparatus at the point marked O in Fig. 1, in which case the dust, &c., will be blown into the combustion-chamber B. If sediment collects on the bottom of the inner chamber I, it may be readily removed by a suitable tool inserted through the openings shown closed in Fig. 1 by the screw-plugs P Q. The inner cylinder may be held in its central position by the tubes K and L; but other braces may be employed, if desired. The entire water-space is exposed when the heads F F are removed and cleaning of the entire water-space is easily effected. It will be observed that no part of the fastenings for the heads F are exposed to the fire, and hence are not subjected to such variations in temperature as would be apt to cause them to loosen. All recesses can be packed with asbestos or other suitable packing. The tubes may be of any desired area. The boiler-heads may be braced by rods passing through the tubes J in the manner indicated in Fig. 1, and it is obvious that the boiler may be set at any desired angle.

The tubes K and L are quite short and are in a sense merely rings. They serve not only to carry the products of combustion through water-space in the water-chamber and heat the water therein by radiation, but they also independently serve the purpose of conveying the products of combustion to the inner or heating chamber, where the water is heated in the tubes J, that pass through this chamber.

I claim as my invention—

1. A steam-boiler comprising a water-chamber, a heating-chamber arranged wholly within the water-chamber, water-tubes extending through the heating-chamber and connected to horizontal water-spaces at opposite ends of the water-chamber, a series of short vertical fire-tubes extending through water-space below the heating-chamber and connecting the heating-chamber with the combustion-chamber and discharging the products of combustion in a direction transverse to the longitudinal axes of the water-tubes, and another series of fire-tubes extending through the water-space above the heating-chamber and connecting the heating-chamber with the smoke-box.

2. A steam-boiler comprising a water-chamber, a heating-chamber arranged wholly within the water-chamber, multiple water-tubes extending horizontally through the heating-chamber and connected with water-space at opposite ends of the water-chamber, a series of rows of fire-tubes extending through water-space below the heating-chamber and connecting the heating-chamber with the combustion-chamber and which are arranged in an arc around the heating-chamber and longitudinally from end to end thereof, and similar fire-tubes extending through the water-space above the heating-chamber and connecting the heating-chamber with the smoke-box.

In testimony whereof I have hereunto subscribed my name.

DANIEL P. McQUEEN.

Witnesses:

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JOHN L. HENNING, Jr.