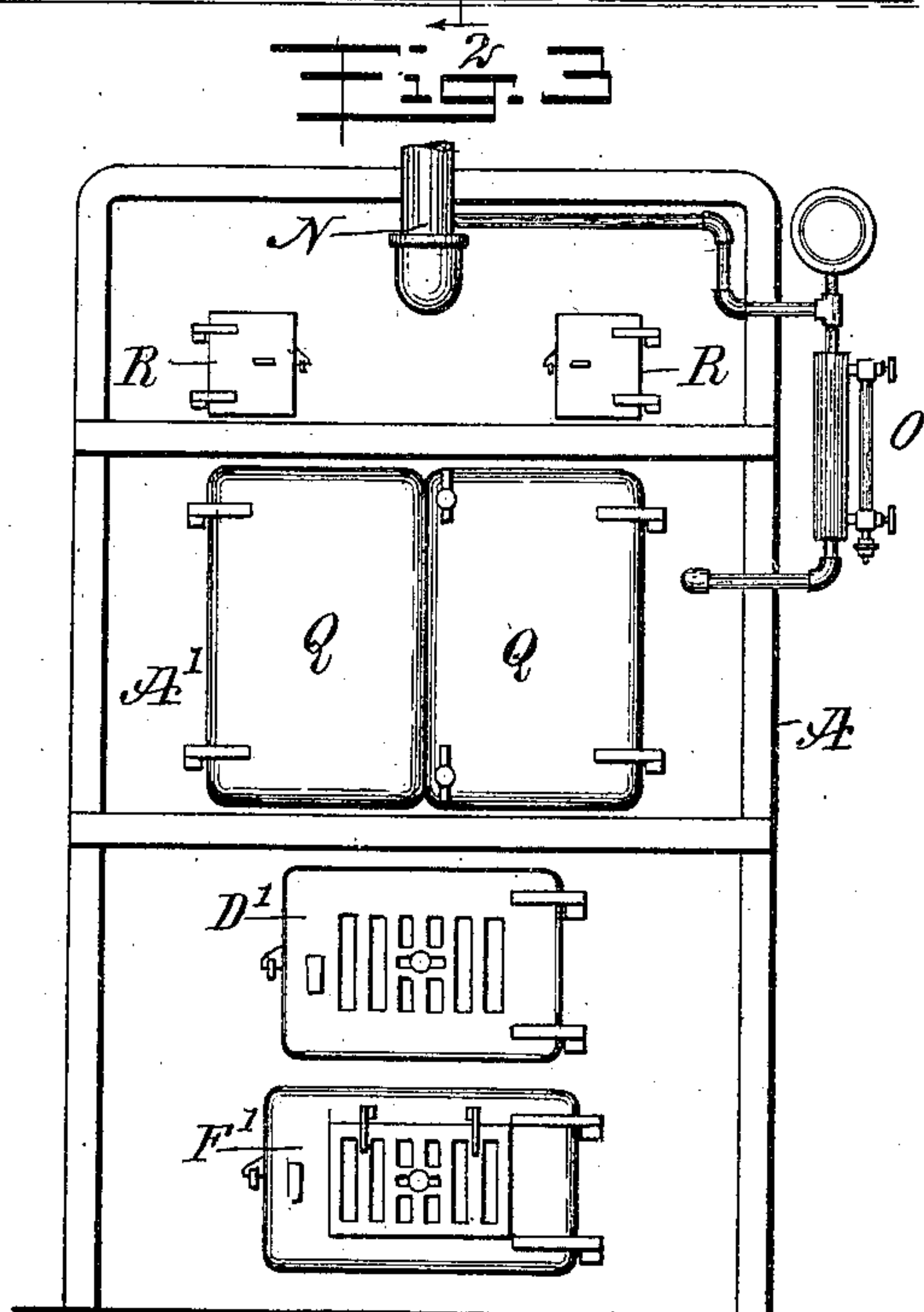
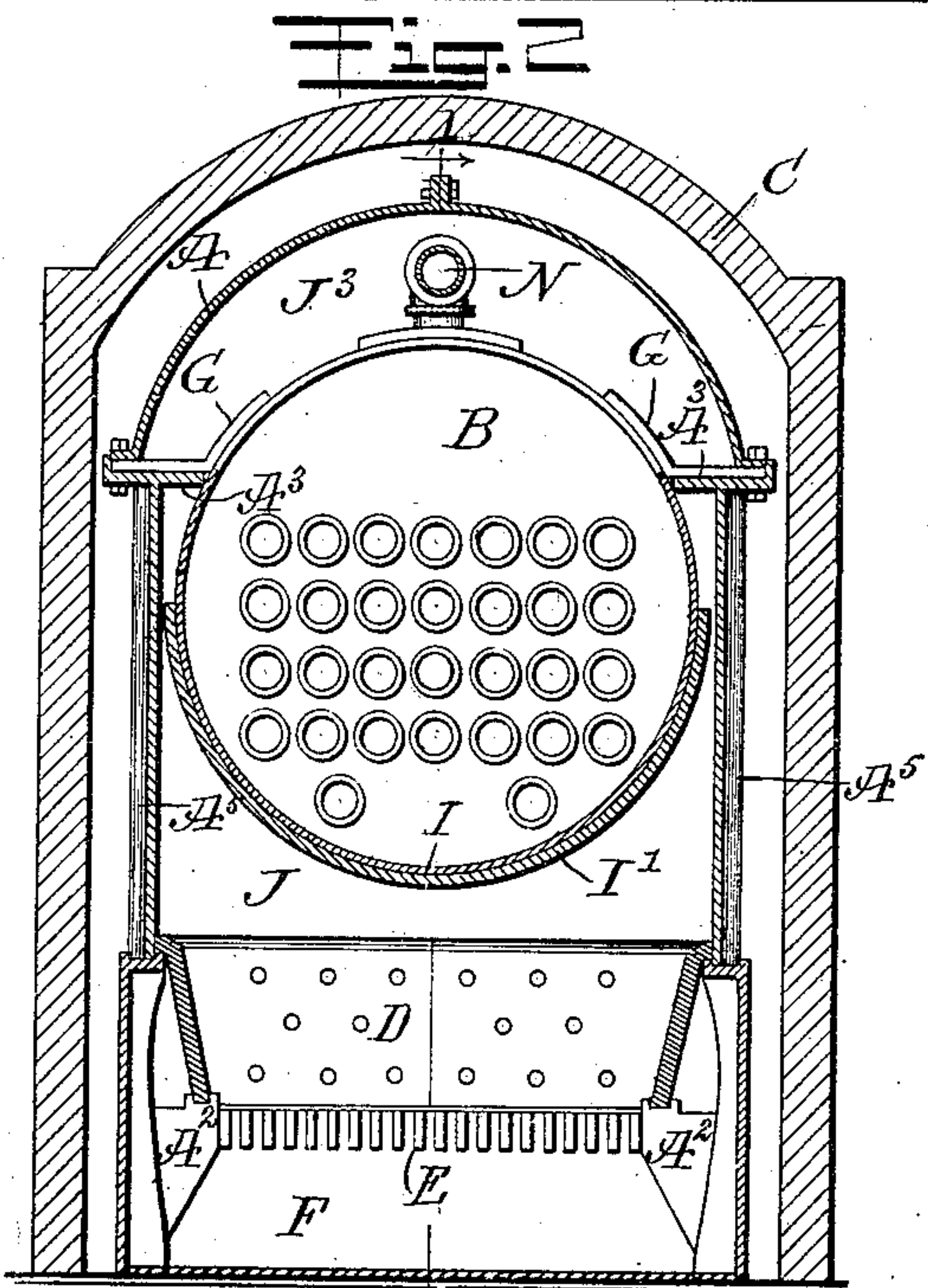
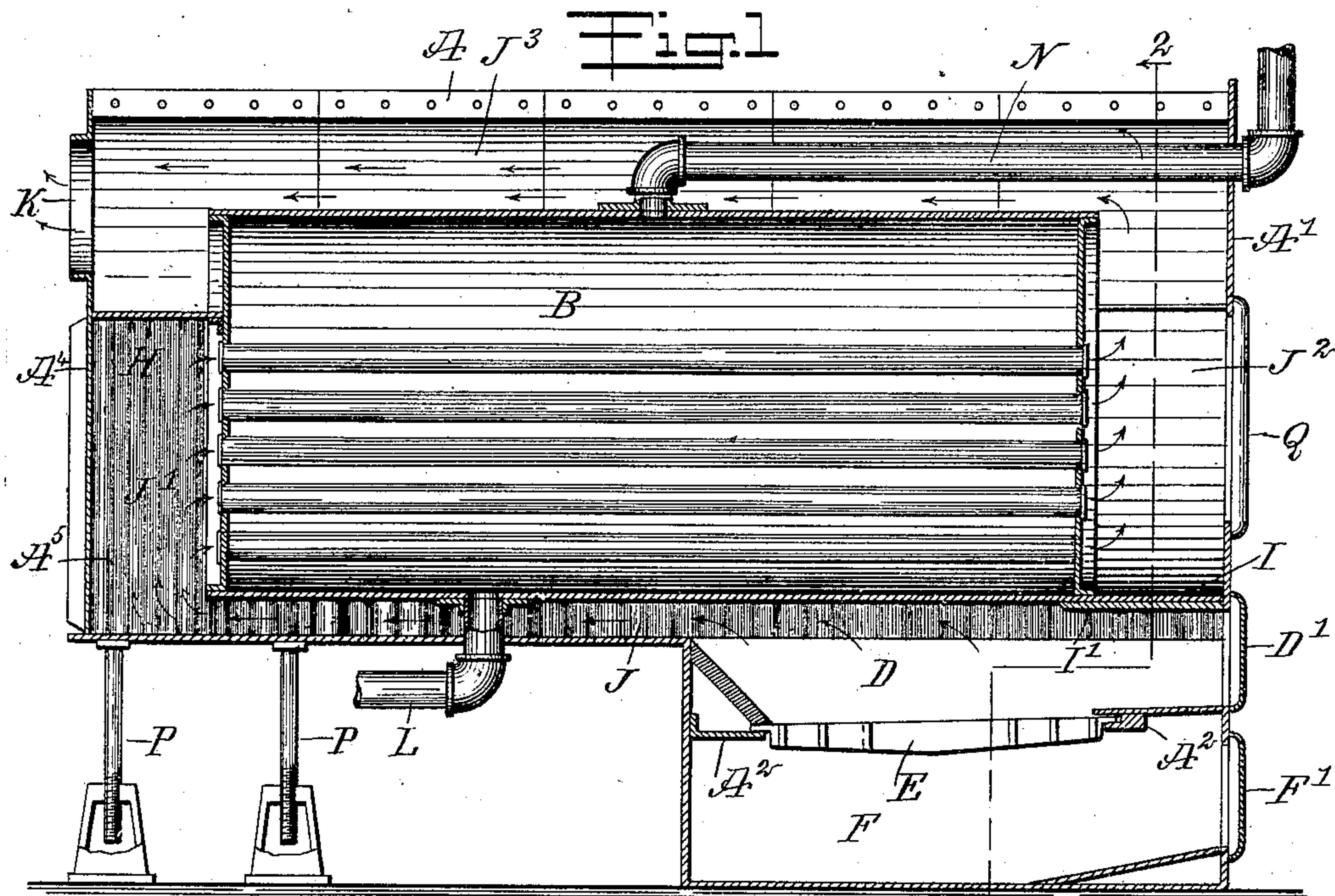


No. 862,067.

PATENTED JULY 30, 1907.

N. FROST.  
COMBINATION BOILER AND FURNACE.  
APPLICATION FILED APR. 22, 1907.



WITNESSES  
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# UNITED STATES PATENT OFFICE.

NATHANIEL FROST, OF BLOOMINGTON, ILLINOIS.

## COMBINATION BOILER AND FURNACE.

No. 862,067.

Specification of Letters Patent.

Patented July 30, 1907.

Application filed April 22, 1907. Serial No. 369,549.

*To all whom it may concern:*

Be it known that I, NATHANIEL FROST, a citizen of the United States, and a resident of Bloomington, in the county of McLean and State of Illinois, have invented a new and Improved Combination Boiler and Furnace, of which the following is a full, clear, and exact description.

The invention relates to heating apparatus having a steam boiler arranged within a furnace and both located within a warm air chamber, thus utilizing the generated heat for hot air heating and ventilating purposes as well as for direct or indirect steam heating purposes.

The object of the invention is to provide a new and improved combination boiler and furnace, which is simple and durable in construction, very effective in operation and arranged to utilize the heat generated by the burning fuel to the fullest advantage.

The invention consists of novel features and parts and combinations of the same, which will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a longitudinal sectional elevation of the furnace and boiler, the section being on the line 1—1 of Fig. 2; Fig. 2 is a transverse section of the same on the line 2—2 of Fig. 1 and showing the furnace and boiler within the hot air chamber, and Fig. 3 is a front elevation of the furnace and boiler.

As illustrated in Fig. 2, the metallic furnace casing A containing the return flue boiler B, is arranged within a suitable air chamber C of brick, metal or other material, and in which air for heating or ventilating purposes is heated by the heat radiating from the furnace casing A. Within the front lower portion of the furnace casing A is arranged a fire-box D having a grate E, below which is the ash pit F, suitable doors D' and F' being provided at the front A' of the furnace casing, to permit of gaining access to the fire-box D and the ash pit F for the introduction of fuel and the removal of ashes, respectively.

As indicated in Figs. 1 and 2 the pot of the fire-box D as well as the grate E are supported on suitable brackets A<sup>2</sup>, arranged in the furnace casing A. The upper portion of the furnace casing A is provided at the sides with longitudinally extending shelves A<sup>3</sup> forming with the sides of the boiler B a tight joint, especially upon calking the adjacent surfaces of the shelves A<sup>3</sup> and the boiler B. Supporting brackets G attached to the shell of the boiler B rest on the shelves A<sup>3</sup>, so as to suspend the return flue boiler B within the casing A, as plainly indicated in Figs. 1 and 2. A transverse partition H extends between the rear end A<sup>4</sup> of the furnace casing

A and the rear head of the boiler B a distance above the return flues thereof, and a partition I extends between the front A' of the furnace casing A and the lower portion of the return flue boiler B, the said partition I being preferably a continuation of the lower portion of the shell of the boiler B, and the said partition I is preferably provided at the under side with a protecting covering I', so as to protect the partition I from the heat emanating from the burning fuel in the fire-box D located immediately below the partition I.

Now by the arrangement described, the return flue boiler B is suspended in such a manner within the furnace casing A that the lower portion of the boiler is a distance above the bottom of the furnace casing A, to form a combustion chamber J, connecting at the front end with the fire-box D and at the rear end with a chamber J' formed by the partition H and portions of the rear ends of the furnace casing A and the boiler B, so that the smoke and gases passing from the combustion chamber J into the rear chamber J' are directed into the boiler flues, to travel forward therein and to pass into the front chamber J<sup>2</sup> formed by the partition I, a portion of the front A' and the front of the boiler B, as plainly indicated in Fig. 1. The open top of the chamber J<sup>2</sup> connects with the top chamber J<sup>3</sup> extending above the boiler B and formed by the shelves A<sup>3</sup>, the top of the boiler B and the top of the furnace casing A, and the rear end of this top chamber J<sup>3</sup> leads to an outlet K connected with the chimney, so as to conduct the smoke and gases from the top chamber J<sup>3</sup> to the chimney.

The feed water pipe L leads into the bottom of the boiler B, as plainly indicated in Fig. 1, and from the top of the boiler B and from near the middle thereof extends the steam pipe N in a forward direction, and passing through the front A' of the boiler, to be then connected with machinery or heating apparatus to be fed with live steam. The outer end of the steam pipe N is connected with the usual water gage and steam gage device O, as illustrated in Fig. 3.

The rear lower portion of the furnace casing A is supported by suitable jack screws P to hold the furnace casing and the boiler B therein in a level position.

The front A' of the furnace casing A is provided with doors Q, for gaining access to the front chamber J<sup>2</sup> and the smoke flues of the boiler B, for cleaning the same whenever it is desired to do so, and small doors R are arranged in the front A' of the furnace casing A opposite the top chamber J<sup>3</sup> for gaining access to the latter and to the top of the boiler B.

The sides A<sup>5</sup> of the furnace casing A are preferably corrugated, as indicated in Fig. 2, to give the desired strength to the furnace casing and to provide a large heating surface, and to compensate for expansion and contraction.

The heater shown and described is very simple and



5 durable in construction, and is arranged to utilize the heat generated by the burning fuel in the fire-box D to the fullest advantage by circulating the heat in the manner described, so as to generate steam and to heat the air contained in the space between the furnace casing A and the walls of the air chamber C, so that this heated air can be readily used for heating and ventilating purposes.

10 Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A heater comprising a furnace casing provided on its sides with longitudinally extending shelves, a return flue boiler forming with its sides a tight joint with the said shelves, to divide the casing into an upper and lower smoke chamber, the said boiler terminating at its ends a distance from the ends of the said shell, means for supporting the boiler from the shelves, and front and rear transverse partitions, of which the front partition extends from the front lower portion of the boiler to the front of the furnace casing, and the rear partition extends from the rear end of the furnace casing to the rear end of the boiler at a point above the boiler flues.

2. A heater comprising a furnace casing provided on its sides with longitudinally extending shelves, a return flue boiler forming with its sides a tight joint with the said shelves, to divide the casing into an upper and lower smoke chamber, the said boiler terminating at its ends a distance from the ends of the said shell, means for supporting the boiler from the shelves, front and rear transverse partitions, of which the front partition extends from the front lower portion of the boiler to the front of the furnace casing, and the rear partition extends from the rear end of the boiler at a point above the boiler flues, and a protecting covering on the underside of the said front partition.

3. A heater comprising a furnace casing provided on its sides with longitudinally extending shelves, a return flue boiler forming with its sides a tight joint with the shelves, to divide the casing into an upper and lower smoke chamber, the said boiler terminating at its ends a distance from the ends of the said shell, means for supporting the boiler from the shelves, and front and rear transverse partitions, of which the front partition extends from the front lower portion of the boiler to the front of the furnace

casing, and the rear partition extends from the rear end of the furnace casing to the rear end of the boiler at a point above the boiler flues, the said front partition forming an integral extension of the boiler shell and terminating at its sides at the said shelves.

4. The combination of an air chamber, a furnace entirely within the air chamber, a return flue boiler entirely within the furnace, and with an outlet steam pipe taken off of the top of the boiler at about its center and passing forward and coming out through the furnace front; the hot gases and smoke traveling from the point of generation to the rear of the furnace, thence forward entirely through the boiler tubes, and then over the top of the boiler but within the top covering of the furnace to the rear of the same, substantially as set forth.

5. The combination of an air chamber containing therein a furnace with metallic fire-box sides with inwardly projecting shelf with supporting brackets used as bearings supporting a tubular boiler arranged entirely within the furnace, said furnace having an arched metallic top covering, and all so arranged that the smoke and hot gases may travel to the rear of the furnace, then forward to the front of the furnace and then over the top of the boiler and within the furnace to the rear of the furnace, substantially as set forth.

6. The combination of an air chamber, containing therein a furnace within which is a horizontal return flue boiler enough shorter than the furnace to form a chamber at each end when it is suspended over the fire, and being hung by brackets attached to the boiler and having bearings on a shelf, which shelf and supporting brackets are integral with the corrugated sectional fire-box sides, which shelf so projects inwardly, that the inner edge of the shelf may so nearly touch the sides of the boiler that by calking a tight joint may be made, said boiler having at its forward end a front flange extending forward to the furnace front, and describing so much of a circle as is required to reach the inner edge of the shelf on each side, thus dividing the interior of the furnace into a lower chamber and an upper chamber with connecting chambers at each end substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NATHANIEL FROST.

Witnesses:

GUY W. HALEY,  
LEROY G. WHITMER.