W. NORRIS.

HEATER.

APPLICATION FILED MAY 25, 1910.

998,114.

Patented July 18, 1911.

3 SHEETS—SHEET 1.

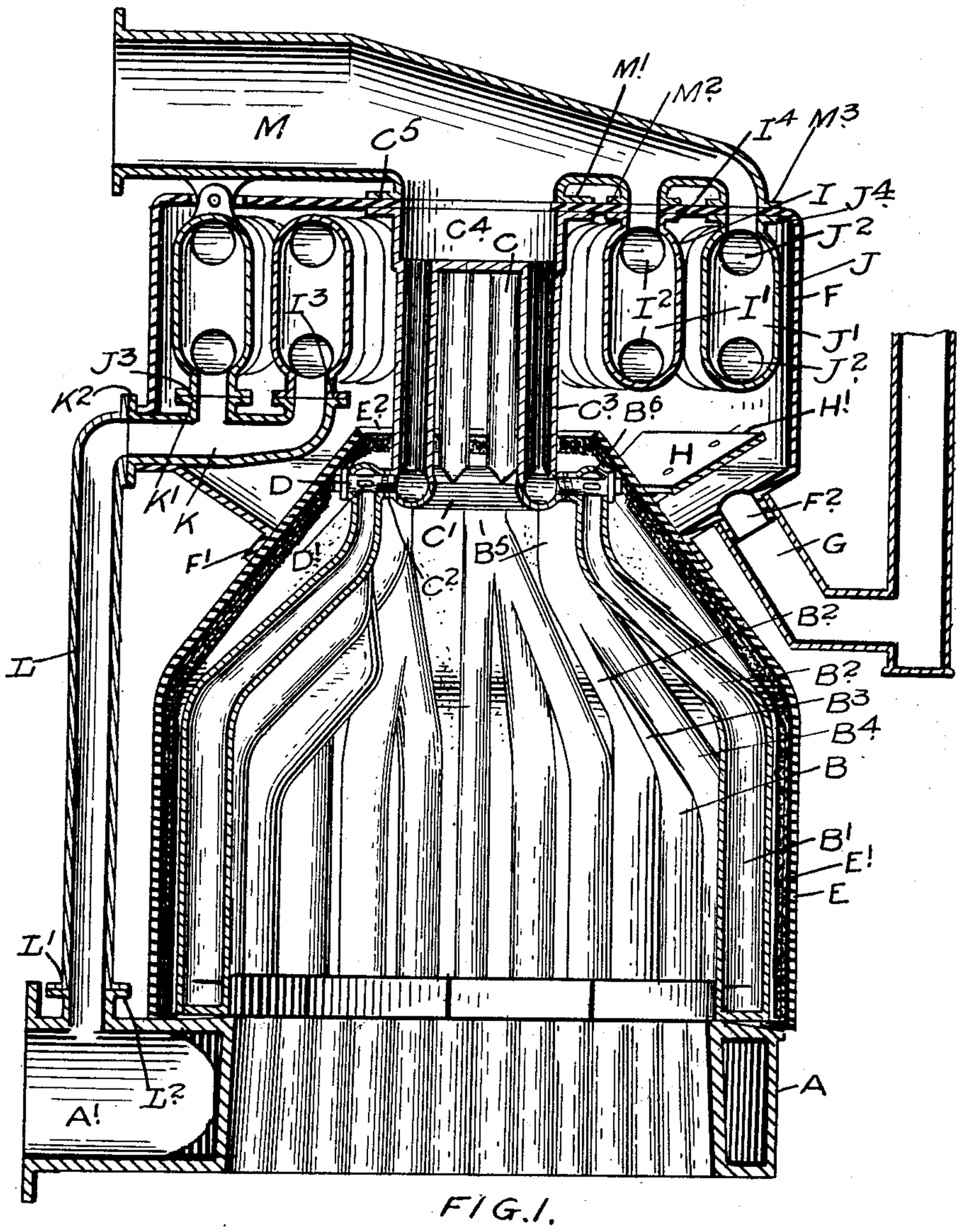

FIG. 1.

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3 SHEETS—SHEET 2.

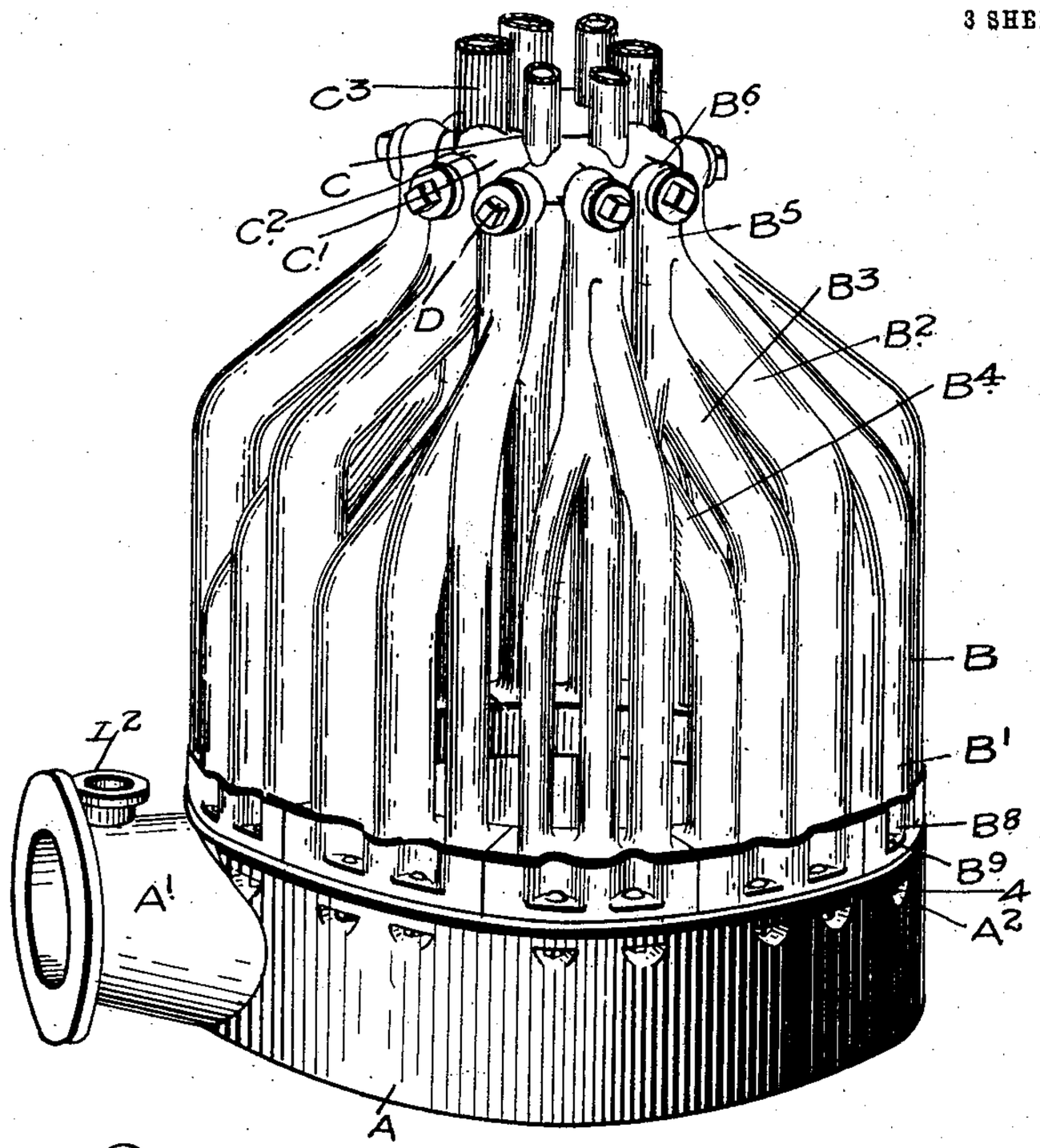

FIG. 2.

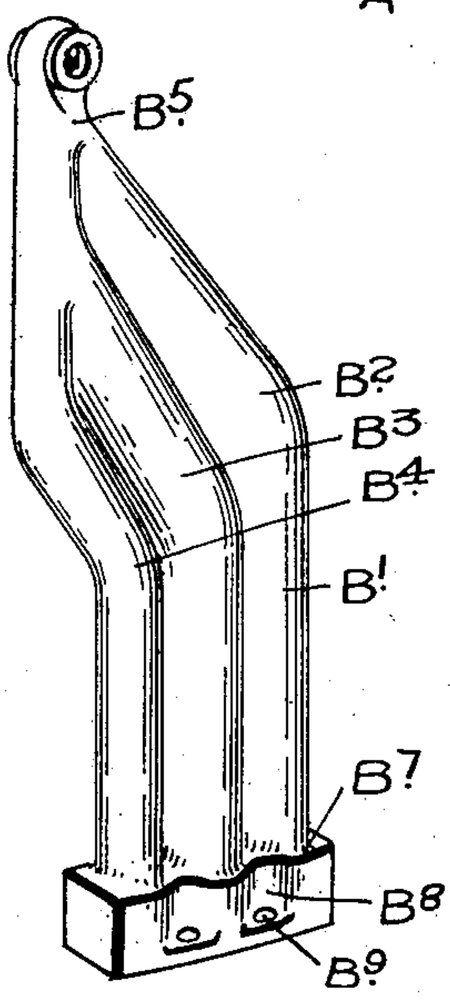

FIG. 3.

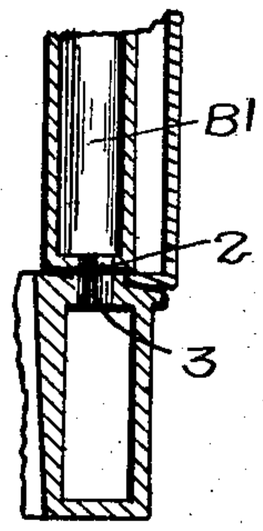

FIG. 4.

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HEATER.

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3 SHEETS—SHEET 3.

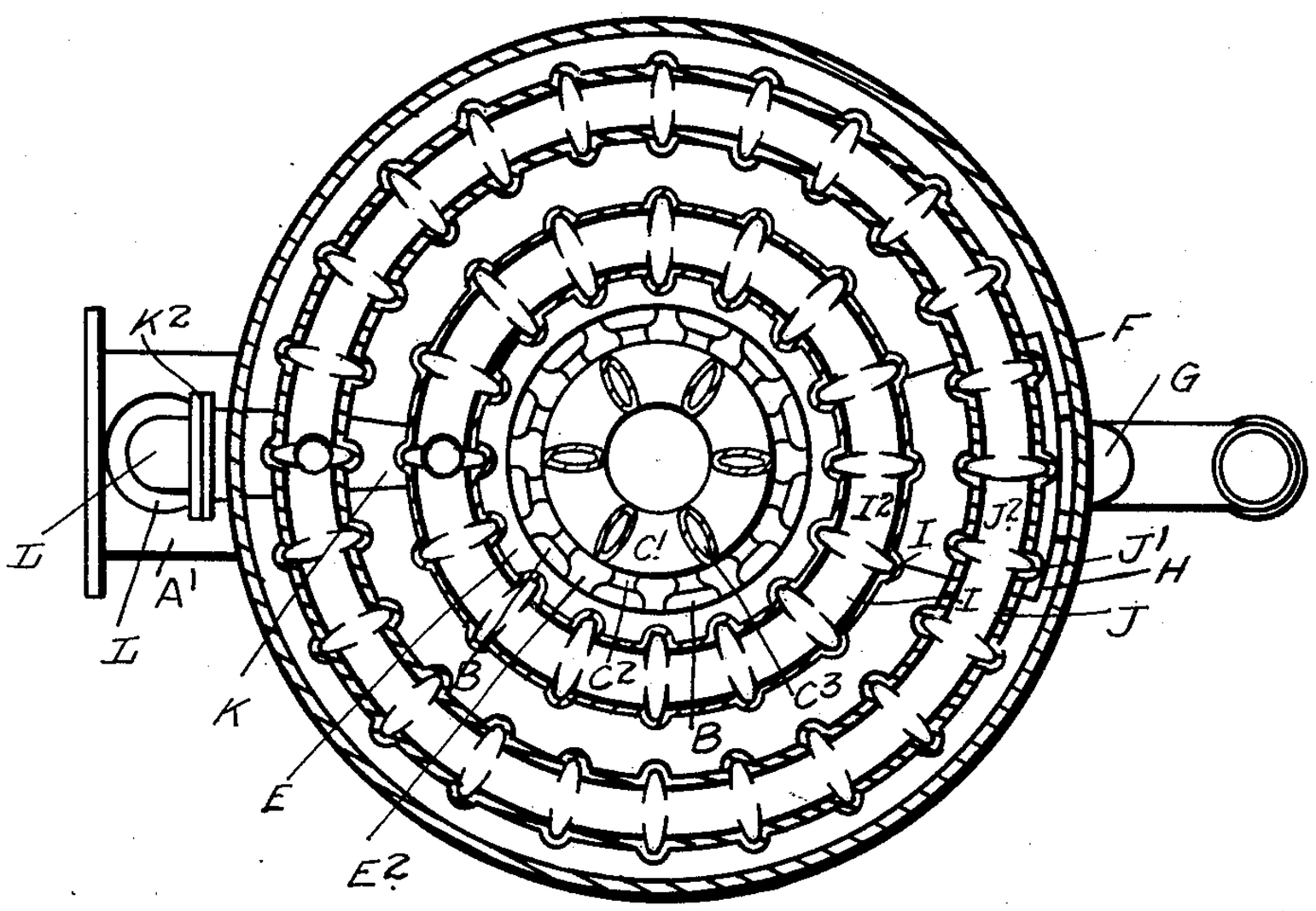
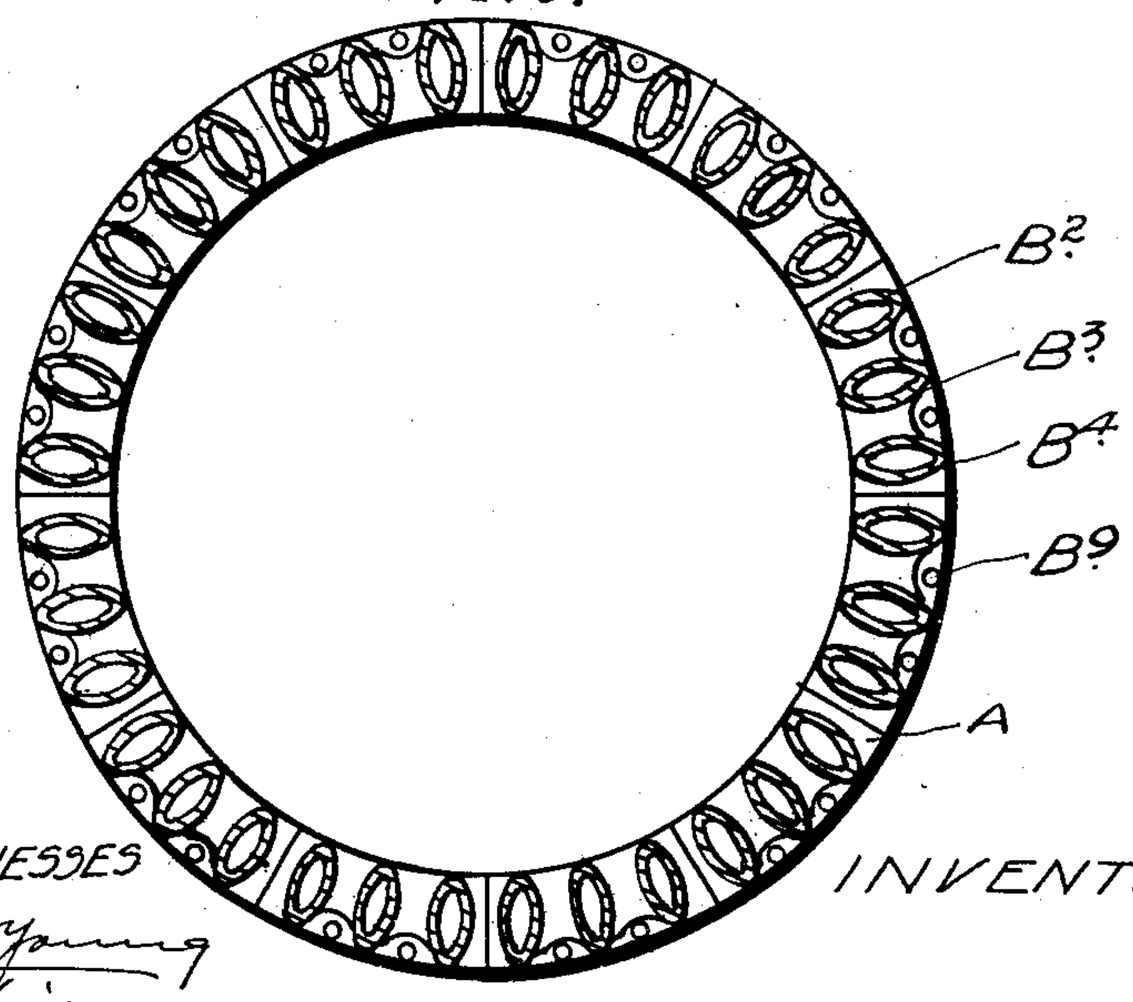


FIG. 6.



WITNESSES

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FIG. 5

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UNITED STATES PATENT OFFICE.

WILLIAM NORRIS, OF TORONTO, ONTARIO, CANADA.

HEATER.

998,114. Specification of Letters Patent. **Patented July 18, 1911.**

Application filed May 25, 1910. Serial No. 563,368.

To all whom it may concern:

Be it known that I, WILLIAM NORRIS, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Heaters, of which the following is the specification.

My invention relates to improvements in heaters, and the object of the invention is to devise a heater in which the body of water to be heated will be reduced to a minimum.

A further object is to so construct the heater as to improve the circulation and consequently the heating capacity.

Another object is to provide for a free flow of water from and to the heater.

An object also is to provide a larger space in the fire pot and throughout the heater for burning the gases and thereby avoid the wasting of the calorific values in the gases.

A still further object is to so construct the sections of the heater that a small fire may be utilized economically by acting on part of the sections and the water therein.

To effect these objects I have constructed and arranged my invention as hereinafter more particularly explained.

Figure 1, is a sectional elevation of my improved heater. Fig. 2, is a perspective view of the main fire-box portions of the heater. Fig. 3, is a detail of one of the sections of the main fire-box portions. Fig. 4, is a vertical section showing the communicating passage-way between the fire pot ring section and the upper sections of the main fire-box portions. Fig. 5 is a horizontal cross-section through the vertical portions of the fire box sections, and Fig. 6 is a cross section through the ring section showing the major portion of the heater in plan.

In the drawings like letters of reference indicate corresponding parts in each figure.

A is the fire pot water section, which is provided with a return branch A′ forming part of the same.

B′ are a series of sections, which together make up the main fire-box portions B. Each section B′ comprises three legs B^2 B^3 and B^4, which taper toward the top, being bent inwardly as indicated to an apex B^5, which is formed with a hollow boss B^6 horizontally disposed.

B^7 is a hollow base, which extends below the lower vertical portion of the legs. The base B^7 is provided with recessed outer portions B^8 through which extend bolt holes B^9. 2 are openings, which extend and register with smaller openings 3 made in the top of the fire pot water section.

The fire pot water section A is provided with recesses A^2 and bolts 4, which extend through the holes B^9 into the recesses A^2, and thus secure the fire-box portions B in position.

As will be seen the sections besides each converging at the top all combined converge at the top toward a water section C, which is formed at the bottom with a hollow ring C′ having peripheral hollow bosses C^2 and vertical pipes C^3 extending upwardly into the chamber C^4. The upper ends of each section B′ are connected to the section C by the hollow screw plugs D having lateral openings D′ therein in order to permit of the passage of the water freely therethrough, that is from the top of the sections B′ into the ring C′.

E is the lower casing of the heater, which is provided with a suitable fire clay lining E′. The upper portion of the casing E converges toward the water section C, so as to leave an opening E^2 around the same.

F is an upper casing, which converges or tapers at the bottom being secured by suitable flanges F′ to the converging portion of the casing E.

G is the smoke pipe, which is connected to a thimble F^2 on the downwardly converging portion of the upper casing F. The smoke pipe G extends downwardly at an incline and horizontally and upwardly as indicated.

H is a deflecting plate, which is secured in position on a bridge H′ extending from the casing F to the casing E. The deflecting plate H is designed to prevent the products of combustion from passing through the smoke pipe too directly, and thus enable me to procure for my furnace the greatest amount of value from the products of combustion.

I and J are the inner and outer ring sections each of which comprises the vertical legs I′ and J′ respectively, which are connected together by communicating passage-ways I^2 and J^2 respectively.

K is a double elbow, which has connecting flanges K′ by which it is secured to the flanges I^3 and J^3 formed at the bottom of the sections I and J. The outer end of the elbow extends through the casing F and is provided with a flange K^2 by which it is connected to the down pipe L, which is connect-

ed at the bottom by a flange L′ to the flanged hollow boss L^2 communicating with the return branch A′.

Preferably diametrically opposite to the hollow boss flanges I^3 and J^3 are located at the upper end of the sections I and J the hollow boss flanges I^4 and J^4. The upper end of the water section C^4 is also provided with flanges C^5.

M is the head, which is connected by the flanges of the hollow bosses M′ M^2 and M^3 to the flanges C^5 of the hot water section C and the flanges of the hollow bosses I^4 and J^4.

Having now described the principal parts involved in my invention I shall briefly describe the utility of my heater.

The products of combustion within the fire pot section A and the hottest gases pass upwardly within the main fire-box portions or circulating section B affecting all the pipes and as there is a maximum surface exposed producing the heat in the fire-box portions very rapidly. The products of combustion pass upwardly within the section C and outwardly through the opening E^2 as well as through the openings between the legs C^3. The products of combustion also pass upwardly around between the ring sections I and J, which are corrugated or more properly formed with separate legs as hereinbefore described in order to give a maximum surface to be acted upon by the products of combustion. The products of combustion it will thus be seen have practically all their calorific value extracted from them before they pass downwardly into the smoke pipe G. When there is a small fire, the water, or steam if it be a steam boiler, may be heated only in the main sections A B and C and yet the circulation of the water will be assured as it would pass outwardly and upwardly through the chamber C^4 and head M and return through the branch A′. When a greater heat is required the products of combustion of a much larger fire, which would then be necessary will affect the ring sections I and J to a greater extent and the heated water from them will pass outwardly through the head M and return through the branch A′. The pipe L communicating with the sections will serve to keep the circulation even throughout the heater. The sections I and J are practically constructed very much the same as a circular fire-box portion with openings between all the legs, whereby the products of combustion may pass therein. Again on account of the unitary castings B′ it will be seen that I am enabled to use such castings for different diameters of heaters and thereby save material in the cost of patterns as such unitary castings can be utilized for practically all sizes of boilers it is necessary to make. Besides being thus standard in case of repairs these can be readily effected. Again the ring sections I and J may be adapted for different sizes of boilers as, of course, in small boilers only one ring would be needed while in large boilers two or more rings would be necessary the size depending upon the diameter of the boiler. The inner section C may be also used for different sizes of boilers as the bosses formed on the ring C would be made separately and longer or shorter bosses utilized in accordance with the diameter required. It will thus be understood that a number of sized boilers can be made at but a minimum expense particularly as to patterns. The fitting is also reduced to a minimum.

Although I have described my invention particularly as to hot water heaters it will, of course, be understood that a dome may be readily superimposed upon the hot water section C and the head otherwise constructed for steam boilers as may be found most conducive to the proper development of my invention.

What I claim as my invention is:

1. In a hot water heater, the combination with the annular fire pot section having a series of orifices at the top and a branch to form the return, of a main fire-box portion comprising a series of unitary castings each formed with a plurality of legs, the lower portion being vertically disposed and provided with bottom orifices registering with the orifices in the annular fire pot section and the upper portion converging to an apex and all combined converging inwardly as and for the purpose specified.

2. In a hot water heater, the combination with the annular fire pot section having a series of orifices at the top and a branch to form the return, of a main fire-box portion comprising a series of unitary castings each formed with a plurality of legs, the lower portion being vertically disposed and provided with bottom orifices registering with the orifices in the annular fire pot section and the upper portion converging to an apex and all combined converging inwardly, a superimposed hot water section having a hollow ring at the bottom, water legs extending upwardly therefrom and a top chamber and means of communication between the apexes of the unitary section and the hollow ring as and for the purpose specified.

3. In a hot water heater, the combination with the annular fire pot section having a series of orifices at the top and a branch to form the return, of a main fire-box portion comprising a series of unitary castings each formed with a plurality of legs, the lower portion being vertically disposed and provided with bottom orifices registering with the orifices in the annular fire pot section and the upper portion converging to an apex

and all combined converging inwardly, inwardly extending hollow bosses formed on the apexes, a superimposed hot water section having a hollow ring at the bottom provided with outwardly extending bosses, water legs extending upwardly therefrom and a top chamber, and hollow screw plugs provided with orifices extending through the bosses of the apexes and hollow bottom ring as and for the purpose specified.

4. In a hot water heater, the combination with the annular fire pot section having a series of orifices at the top and a branch to form the return, of a main fire-box portion comprising a series of unitary castings each formed with a plurality of legs, the lower portion being vertically disposed and provided with bottom orifices registering with the orifices in the annular fire pot section and the upper portion converging to an apex and all combined converging inwardly, a superimposed hot water section having a hollow ring at the bottom, water legs extending upwardly therefrom and a top chamber, means of communication between the apexes of the unitary castings and the hollow ring, and a bottom casing converging at the top around the converging main fire-box portions and provided with a suitable heat non-conducting lining as and for the purpose specified.

5. In a hot water heater, the combination with the annular fire pot section having a series of orifices at the top and a branch to form the return, of a main fire-box portion comprising a series of unitary castings each formed with a plurality of legs, the lower portion being vertically disposed and provided with bottom orifices registering with the orifices in the annular fire pot section and the upper portion converging to an apex and all combined converging inwardly, a superimposed hot water section having a hollow ring at the bottom, water legs extending upwardly therefrom and a top chamber, means of communication between the apexes of the unitary castings and the hollow ring, a bottom casing converging at the top around the converging main fire-box portions and provided with a suitable heat non-conducting lining, and a top casing converging at the bottom and secured to the converging portion of the bottom section as and for the purpose specified.

6. In a hot water heater, the combination with the annular fire pot section having a series of orifices at the top and a branch to form the return, of a main fire-box portion comprising a series of unitary castings each formed with a plurality of legs, the lower portion being vertically disposed and provided with bottom orifices registering with the orifices in the annular fire pot section and the upper portion converging to an apex and all combined converging inwardly, a superimposed hot water section having a hollow ring at the bottom, water legs extending upwardly therefrom and a top chamber, means of communication between the apexes of the unitary castings and the hollow ring, a bottom casing converging at the top around the converging main fire-box portions and provided with a suitable heat-non-conducting lining and having a smoke pipe extending from the converging portion and a suitable deflecting plate located over the entrance to the smoke pipe as and for the purpose specified.

7. In a hot water heater, the combination with the annular fire pot section having a series of orifices at the top and a branch to form the return, of a main fire-box portion comprising a series of unitary castings each formed with a plurality of legs, the lower portion being vertically disposed and provided with bottom orifices registering with the orifices in the annular fire pot section and the upper portion converging to an apex and all combined converging inwardly, a superimposed hot water section having a hollow ring at the bottom, water legs extending upwardly therefrom and a top chamber, means of communication between the apexes of the unitary castings and the hollow ring, a bottom casing converging at the top around the converging main fire-box portions and provided with a suitable heat non-conducting lining and a top casing converging at the bottom and secured to the converging portion of the bottom section and a suitable head extending from the superimposed hot water section of substantially equal cross sectional area to the return branch as and for the purpose specified.

8. In a hot water heater, the combination with the annular fire pot section having a series of orifices at the top and a branch to form the return, of a main fire-box portion comprising a series of unitary castings each formed with a plurality of legs, the lower portion being vertically disposed and provided with bottom orifices registering with the orifices in the annular fire pot section and the upper portion converging to an apex and all combined converging inwardly, a superimposed hot water section having a hollow ring at the bottom water legs extending upwardly therefrom and a top chamber, means of communication between the apexes of the unitary castings and the hollow ring, the bottom casing converging at the top around the converging main fire-box portions and provided with a suitable heat non-conducting lining, and a top casing converging at the bottom and secured to the converging portion of the bottom section, a ring section having vertical legs with openings between and communicating passage-ways, a water leg extending from the

bottom of the ring section to the main return, a head provided with hollow bosses communicating with the top of the superimposed hot water section and the ring section as and for the purpose specified.

9. In a heater, a unitary casting designed to be made up to form the lower radiating or heating portion comprising a plurality of legs converging at the top and having a hollow boss and provided with a base at the bottom having orifices therein to communicate with the fire pot ring section as and for the purpose specified.

WILLIAM NORRIS.

Witnesses:
B. Boyd,
H. Preston.