

No. 736,922.

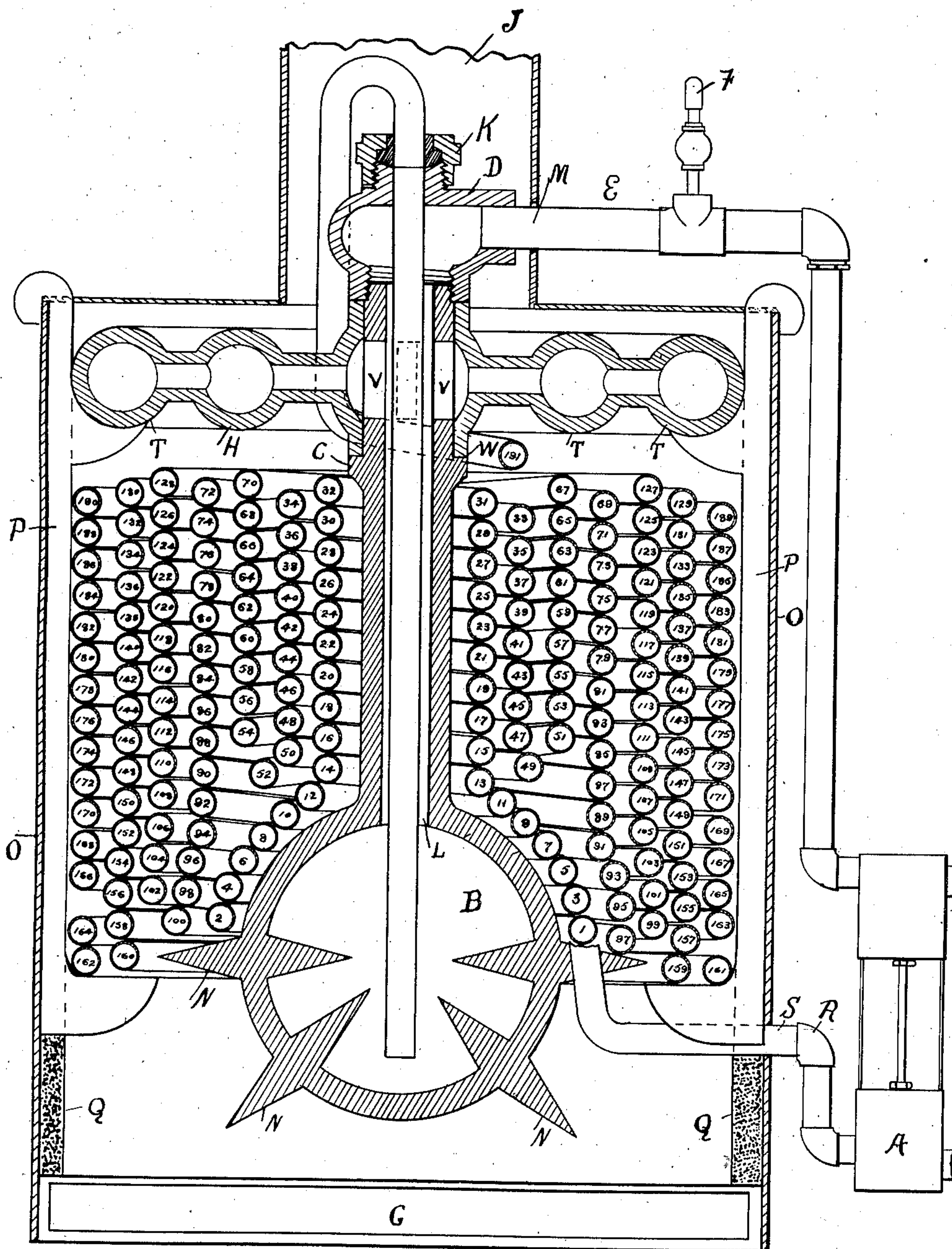
PATENTED AUG. 25, 1903.

F. M. ASHLEY.  
STEAM GENERATOR.

APPLICATION FILED DEC. 13, 1901.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses  
Joseph F. Radner  
Hugh D. Mier

Fig. 1.

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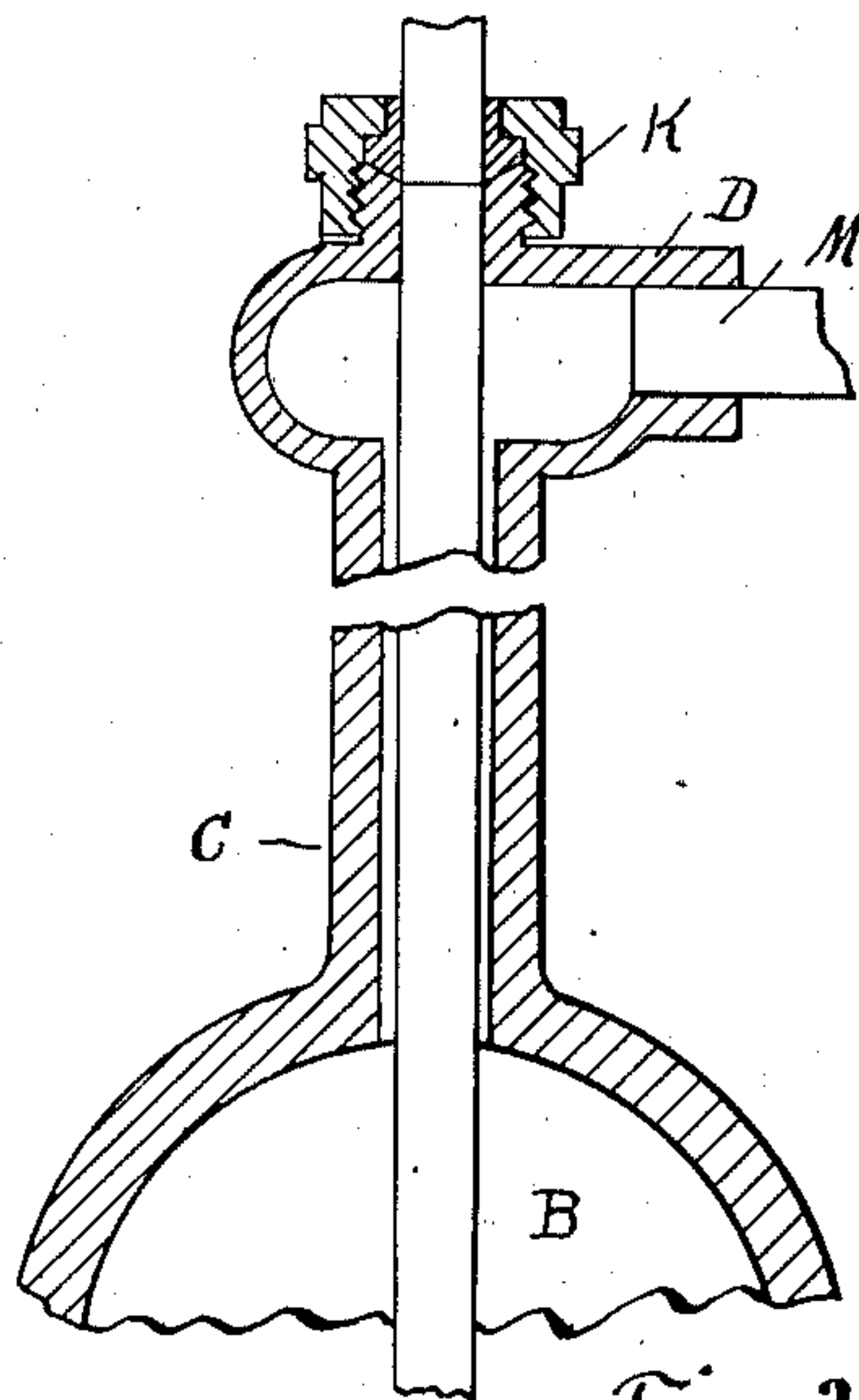
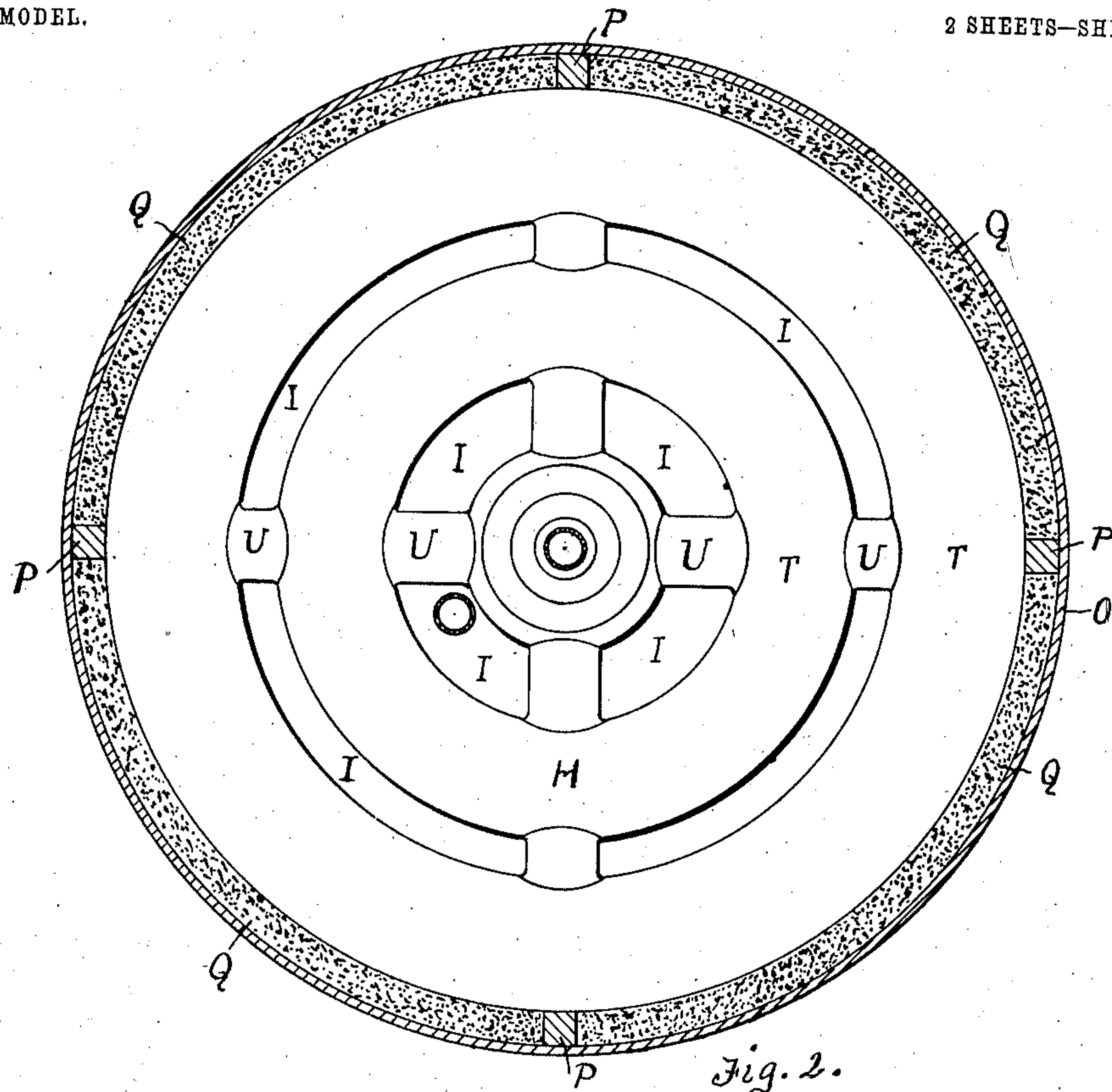
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Joseph A. Raiders  
Hugh D. Murr.

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# UNITED STATES PATENT OFFICE.

FRANK M. ASHLEY, OF BROOKLYN, NEW YORK.

## STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 736,922, dated August 25, 1903.

Application filed December 13, 1901. Serial No. 85,803. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK M. ASHLEY, a citizen of the United States, residing at the city of New York, in the borough of Brooklyn and State of New York, have invented certain new and useful Improvements in Boilers, of which the following is a full, clear, and exact description.

This invention relates particularly to that class known as "flash-generators," and the object is to provide a construction which will utilize as far as possible the heat from the burner and to superheat the steam to the highest degree just before it goes to the steam device.

A further object is to prevent any water from being carried through the coils to the steam device and to provide means whereby its principal parts may be easily separated and reunited without injury. In this type of boiler a small quantity is injected and rapidly transformed into steam, which in turn is highly superheated, so that a small quantity of water can be converted into a large volume of steam, whereby only a small amount of water need be carried to produce a given power, especially when used with portable engines, such as are used with automobiles.

The invention will be described with reference to the accompanying drawings, in which—

Figure 1 is a central vertical section of the generator, and Fig. 2 is a cross-section of the same on a line taken just above the dome H. Fig. 3 shows a broken vertical section of the superheater and center pipe, representing its construction when no dome is used.

Referring to Fig. 1, in which similar letters of reference indicate similar parts, A represents a pump which forces water into the steam-generating coil at No. 1, where it passes through the coil until converted into steam and is gradually superheated as it passes through the successive coils, the ends of which are represented by the small numbers starting with 1 and ending with 191 and passing thence through the steam-dome H to the coupling D and by the short separate pipe to within the superheater B. The steam then passes through the center pipe C to the coup-

ling D and thence to the conduit E and to the steam device F after having passed through the boiler-outlet at M.

It is well known that a joint between two metal parts subjected to extreme heat is liable to give out, and it will be noted that there are no expanded joints in this boiler and that the superheater B and center pipe C are made integral and no joints are subject to the direct action of the fire, and it will be also noted that the heat from the burner G must pass over the coils, and the coils being of successively-increasing diameters the distances between the coils act as conduits for the hot gases, and all the gases must pass through the dome H, which is made in the form of hollow concentric rings, joined by tubular connections U, forming spaces I between them, which serve as passages for the hot gases on their way to the stack J. This arrangement for the gases insures each coil a contact with the hot gases without obstructing their flow sufficiently to obstruct the draft. It will also be noticed that the coil on the superheater B, beginning at 1, extends upward to the upper end of the generator and then reverses its direction to the superheater and then again upward, thus forming a trap effect, which traps any water that may be carried along with the steam, and as the coils are on a gradual incline the water will be separated from the steam, the water flowing along the bottom of the tube forming the coil, and the steam going to the upper side of the said tube has a free passage to pass the trapped water and continue its way to the superheater, where it is highly charged with heat and passes thence directly to the dome or steam device by way of the center pipe C.

The superheater B and dome H are connected by an elbow-coupling D, which screws on the end of the center pipe C and draws them together until the shoulder W, formed on the pipe C, engages the dome and makes a secure joint, which is easily separable. The coupling D is arranged in such a manner that the end of the generating-coil can be joined to it by a union-joint K, and a short piece of the tube is brazed in the same and projects into the superheater, thus making an annular space L be-



tween the said tube and pipe C, which serves as a conduit between the superheater B and dome and outlet M.

On the superheater B, which is preferably of spherical form, are spurs N, which act as heat-conductors and also serve to support the generating-coil. Suspended from the top of the casing O are a number of iron supports P, which are so formed that the generating parts are entirely supported by them, and between the supports is a lining material of asbestos or other suitable material Q, which prevents the casing O from becoming too hot and also prevents the loss of heat from radiation. The iron supports P are made a definite width and the sheets of asbestos or lining material are made of such a width that when the supports and lining material are placed in the casing they wedge against each other and are thus held in place against the casing. The lower ends of the lining material are also extended to the burner and rest thereon, which assists in keeping them in their proper position. It will be noted that by this arrangement there are no parts which cannot be lifted free from the casing. The only thing necessary is to remove the elbow R at the water-inlet and spring the short end of the tube S through the casing O, remove the cover and stack J, and lift the entire coil, superheater, and dome free from the casing O.

In speaking of the "inlet" in the claims I refer to the beginning of the generating-coil, as at S, and of the "outlet" I refer to the outlet from the coupling, as at M.

Referring to Fig. 2, the dome H acts as a reservoir to supply any sudden demand for an extra supply of steam, but in many cases it is found unnecessary to use this dome, and in that case I dispense with it and make the superheater B and center pipe C as shown in Fig. 3 and dispense with the openings V between the pipe C and dome H, as shown in Fig. 1.

It will be noticed that the superheater B is of sufficient size to hold a large volume of steam; so it acts as a reservoir as well as a superheater, and its form is such that the hot gases will flow over its top in full contact with the heating-coils, and it does not act like a flat plate would and has not the action of a baffle-plate, but its form allows the heat to envelop it perfectly and allows the heat to reach the coils directly above it without unduly obstructing the flow of same. The spherical form is also much stronger and it is not so liable to rupture from expansion and contraction. It will be noticed that all the parts of the boiler can expand and contract without bringing any strains on the parts, as they are all free to expand or contract without damaging or liability of damaging the parts.

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

1. In a steam-generator, the combination of

a burner and a superheater located directly above the burner with a coil of pipe also located above the burner, one end of which coil is adapted to be connected to the water-supply and the other end terminating within said superheater, an outlet and a direct passage from said superheater to the outlet, substantially as described.

2. In a steam-generator a burner, a superheater located directly above the burner, a coil of pipe, one end of which is adapted to receive the fluid to be heated and the other end terminating within said superheater, a dome located above said superheater and coil, an outlet and tubular direct communication from said superheater to said dome and outlet, substantially as described.

3. In a steam-generator, a burner, a superheater located directly above the burner, an outlet, a dome, a pipe connecting said superheater, outlet and dome, a coil of pipe one end of which is adapted to receive fluid to be heated and the other end extending through said first-named pipe and ending in said superheater, and a passage for fluid to said outlet, substantially as described.

4. In a steam-generator, a superheater, a coil of pipe surrounding said superheater, one end of which projects within the same, a steam-dome, a pipe extending to said dome and separably connected to same, and an outlet adapted to be connected to a steam device, substantially as described.

5. In a steam-generator, the combination of a burner, a coil of pipes located above said burner adapted to permit of the generation of steam therein, a superheater located directly above said burner and connected with said coil, a dome, and a pipe extending from said superheater to said dome and separably connected thereto, substantially as described.

6. In a steam-generator, a superheater and a pipe leading directly from said superheater to the upper part of the generator, an outlet, a tube arranged in coils surrounding said pipe, one end of said tube being the inlet for fluid and the other end extending through said pipe to the superheater, forming thereby a passage which leads to the outlet, substantially as described.

7. In a steam-generator, an outlet, a superheater located directly above the source of heat and a pipe leading directly from said superheater to the outlet, a tube arranged in coils surrounding said pipe, one end of said tube being the inlet for fluid and the other end extending through said pipe to the superheater, substantially as described.

8. In a steam-generator, a tube arranged in coils of successively-increasing diameters, a superheater into which one end of the said tube projects, an outlet and a pipe communicating with said superheater and leading to the outlet, substantially as described.

9. In a steam-generator, the combination of a coil of generating-pipes, a casing inclosing



said coil and supports for said coil removably suspended from the top of said casing and adapted to constitute the sole support for said coil, substantially as described.

5 10. In a steam-generator, the combination of a casing, a coil of generating-pipes within said casing, a superheater and a dome, said superheater, dome and coil being supported solely from the top of said casing, substantially as described.

10 11. In a steam-generator, a generating-coil, supports suspended from the casing and sup-

porting said coil and a lining material surrounding the coil and held in position by the coil-supports, substantially as, and for the 15 purpose, described.

Signed at New York, in the county of New York and State of New York, this 11th day of December, A. D. 1901.

FRANK M. ASHLEY.

Witnesses:

HUGH D. MEIER,

JOSEPH F. RADERS.