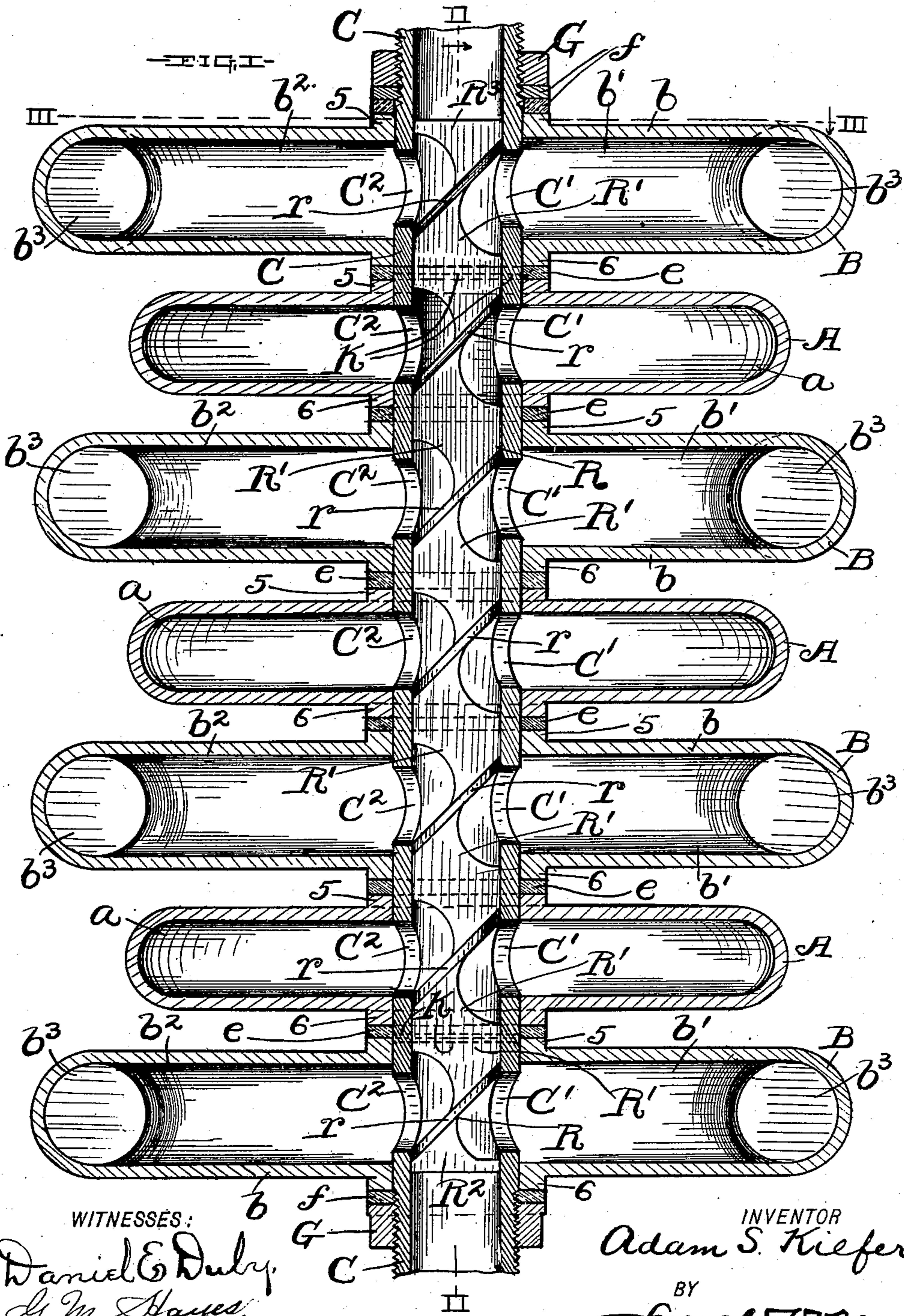


A. S. KIEFER.
STEAM GENERATOR.

APPLICATION FILED AUG. 18, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



WITNESSES:

Daniel E. Duly,
G. M. Hayes.

INVENTOR

Adam S. Kiefer

BY

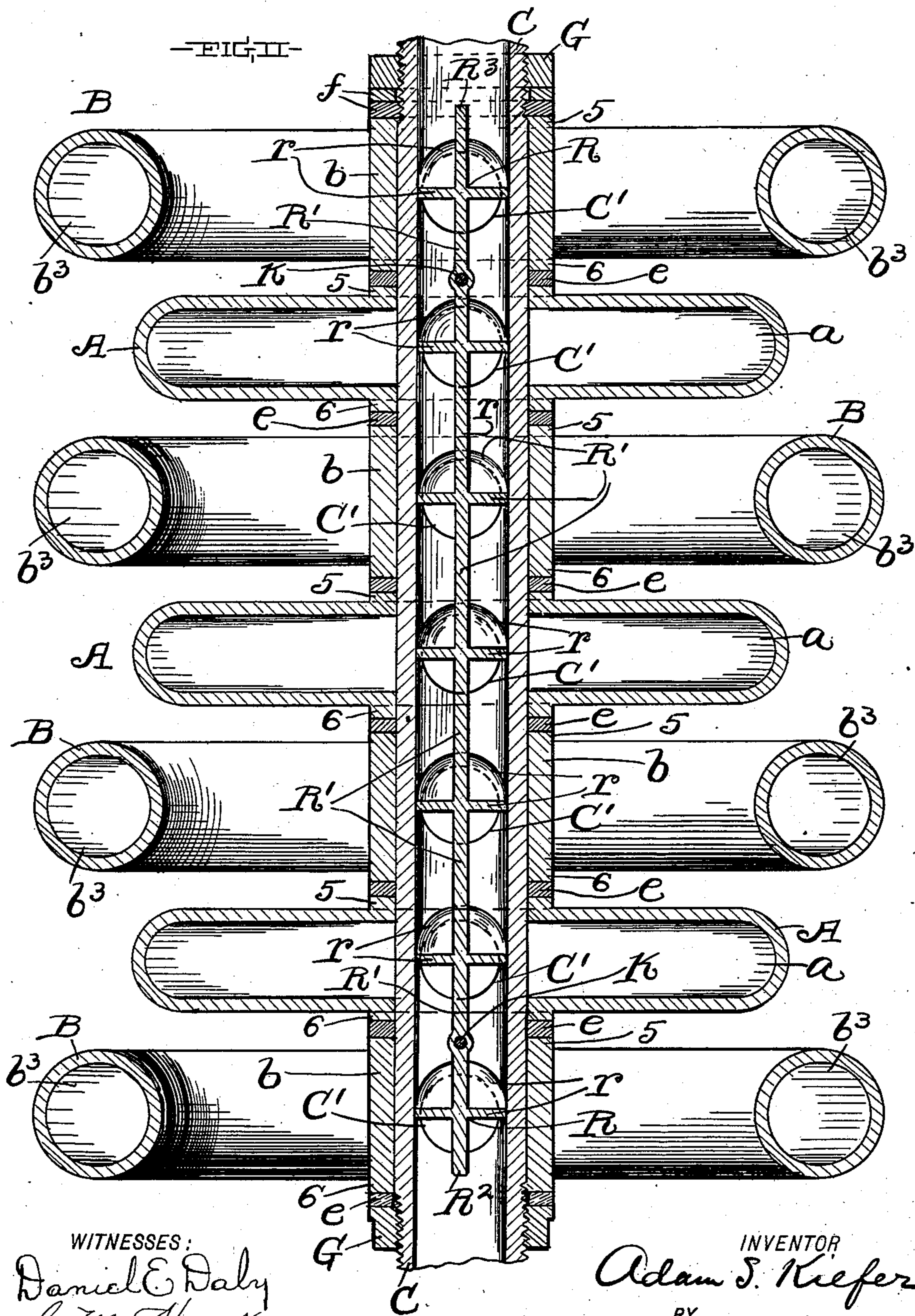
Spencer & Vore
his ATTORNEYS

A. S. KIEFER.
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APPLICATION FILED AUG. 18, 1902.

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3 SHEETS—SHEET 2.



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No. 722,717.

PATENTED MAR. 17, 1903.

A. S. KIEFER.

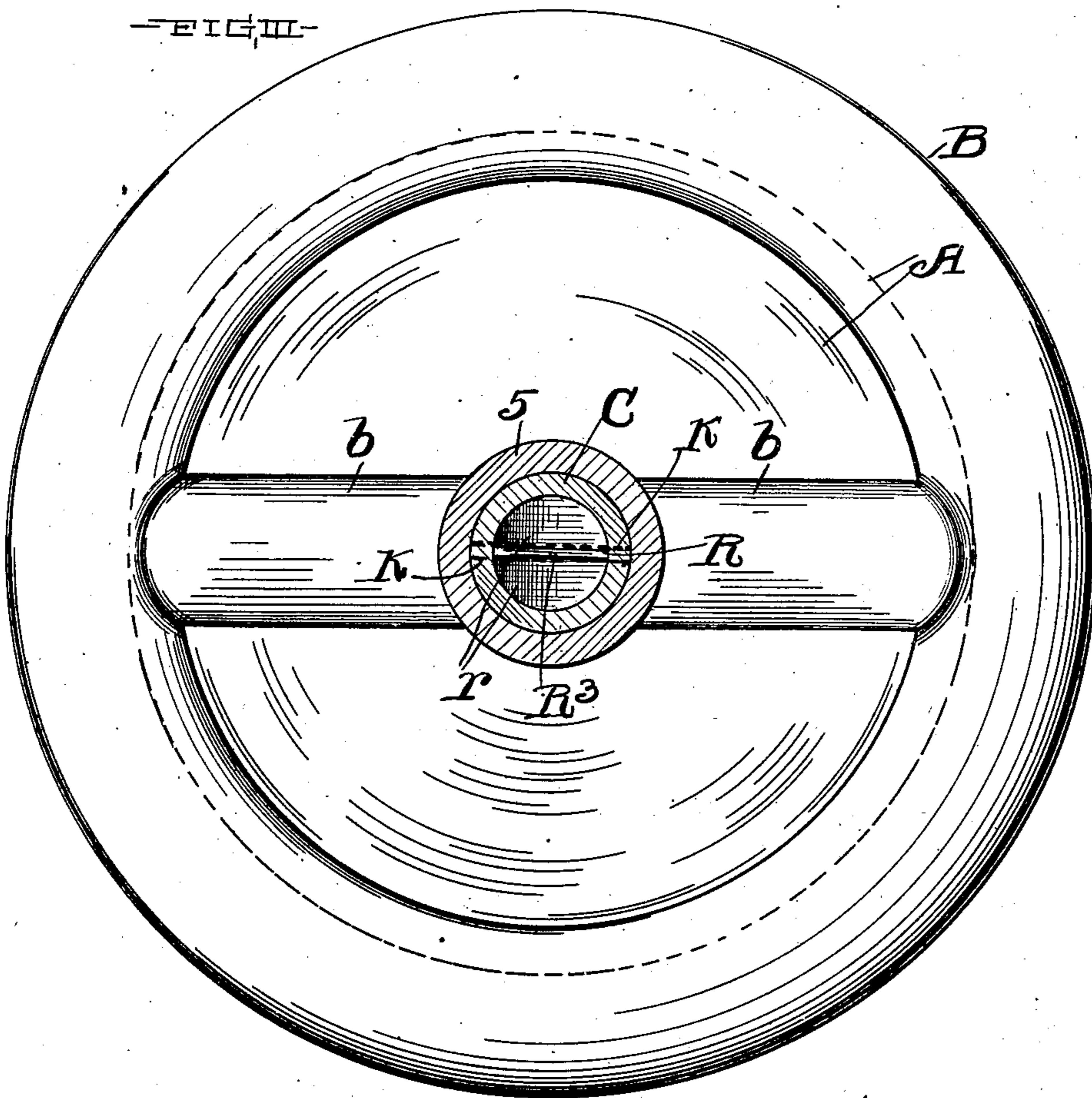
STEAM GENERATOR.

APPLICATION FILED AUG. 18, 1902.

NO MODEL.

3 SHEETS—SHEET 3.

FIG. III.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ADAM S. KIEFER, OF CLEVELAND, OHIO.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 722,717, dated March 17, 1903.

Application filed August 18, 1902. Serial No. 120,122. (No model.)

To all whom it may concern:

Be it known that I, ADAM S. KIEFER, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Steam-Generators or Water-Heaters; and I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in steam-generators or water-heaters.

This invention pertains more especially to a generator or heater of the character indicated, which comprises a centrally-located vertically-arranged pipe; circular fluid-circulating sections surrounding the said pipe and arranged at different elevations, respectively; washers embracing the said pipe and snugly interposed between the adjacent fluid-circulating sections; two apertures formed in opposite sides, respectively, of the said pipe centrally of each fluid-circulating section and forming the fluid-inlet and the fluid-outlet, respectively, of the said section, and a bar arranged within and extending longitudinally of the said pipe from the bottom of the lowermost fluid-circulating section to the top of the uppermost fluid-circulating section and provided between the fluid-inlet and the fluid-outlet of each fluid-circulating section with a partition-forming member which extends diagonally of the interior of the said pipe from the bottom of the said outlet to the top of the said inlet and snugly fits within the said pipe and obstructs direct communication between the said inlet and the said outlet and causes any water or fluid which passes upwardly within the pipe below the said partition to impinge against the under side of the said partition and be directed by the partition to the inlet of the said fluid-circulating section through which the fluid circulates and passes through the outlet of the said section up the upper side of the said partition toward the fluid-inlet of any fluid-circulating section arranged next above.

The object of this invention is to improve the circulation of the hot water or steam through the heater and to cause the fluid to be uniformly distributed in the passage-ways or chambers formed in or by the fluid-circulating sections of the heater during the pas-

sage of the fluid through the heater, so as to more thoroughly cleanse the said chambers or passage-ways and maintain the heater in a clean condition internally.

With this object in view, and to the end of constructing the heater advantageously so far as concerns simplicity and durability and convenience in the assemblage of the parts, my invention consists in certain features of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure I is a side elevation, mostly in section, of the fluid-circulating portion of a steam-generator or water-heater embodying my invention. Fig. II is a central vertical section on line II-II, Fig. I, looking in the direction indicated by the arrow. Fig. III is a top plan in section on line III-III, Fig. I.

The water-circulating portion of a steam-generator or water-heater embodying my invention is composed of a series of circular cast-metal sections compactly arranged, respectively, in a horizontal plane at different elevations, respectively, and in line vertically, and the heater illustrated has seven fluid-circulating sections—three sections formed, respectively, by an interiorly-chambered or hollow and horizontally-arranged circular plate A and four sections alternating with the sections A and respectively comprising a horizontally-arranged circular chamber B, which has a central hollow transversely-arranged web *b*.

A vertically-arranged pipe C extends centrally through the sections A and through the webs *b* of the sections B, centrally between the ends of the said webs. The pipe C extends, therefore, centrally through the chambers *a* of the sections A and divides the interior of the web *b* of each section B into two passage-ways *b'* and *b''*, formed by and within opposite end portions, respectively, of the said web and arranged at opposite sides, respectively, of the said pipe, which passage-ways communicate directly with the chamber or passage-way *b''*, formed by and within the chamber having the said web.

The pipe C interiorly of each fluid-circulating section is provided with two lateral holes or apertures C' and C'', which are arranged directly opposite each other, and, as will hereinafter appear, the said aperture C' forms a fluid-inlet of the said section and the

said aperture C^2 constitutes the fluid-outlet of the said section. The apertures C' and C^2 interiorly of each section B communicate with the passage-ways b' and b^2 , respectively, formed interiorly of the web b of the said section.

The fluid-inlet-forming apertures C' for all of the fluid-circulating sections A and B are arranged in line vertically at one side of the pipe C, and the fluid-outlet-forming apertures C^2 for the said sections A and B are arranged in line vertically at the opposite side of the said pipe.

The pipe C is adapted to be connected at its lower end with the water-supply pipe, (not shown,) and consequently the said end of the said pipe forms the water-receiving end of the pipe.

The upper end of the pipe C is adapted to be connected with a fluid-distributing-pipe system, (not shown,) and consequently the said upper end of the said pipe constitutes the fluid-outlet of the pipe.

The sections A and B are clamped together and preferably each of the said sections is provided at the top with an upwardly-projecting annular flange 5, snugly embracing the pipe C, and has another annular flange 6, projecting downwardly from its bottom and snugly embracing the said pipe. A washer e embraces the pipe C between the adjacent flanges 5 and 6 of adjacent sections A and B. The pipe C above the upper flange 5 of the uppermost fluid-circulating section and below the lower flange 6 of the lowermost fluid-circulating section is screw-threaded externally, and correspondingly-threaded nuts G are mounted upon the said threaded portions of the said pipe, and washers f are interposed between the said nuts and the said fluid-circulating sections, and obviously all the sections A and B are clamped together upon tightening the said nuts.

Within the pipe C is arranged a bar R, which is preferably a metal casting and extends longitudinally of the said pipe from the bottom of the lowermost fluid-circulating section to the top of the uppermost fluid-circulating section. The bar R is shaped and arranged as required to form centrally of each fluid-circulating section a diagonally-arranged partition r , which extends from next below the fluid-outlet of the said section diagonally and interiorly of the pipe C to the top of and above the fluid-inlet of the said section and snugly fits the said pipe internally. The bar R, between adjacent partitions r , is shaped as required to form a flat web R' , which connects the upper portion of the lower of the said partitions with the lower portion of the upper of the said partitions, which web is arranged edgewise between the fluid-outlet next above the lower end of the said lower partition and the fluid-inlet next below the upper end of the said upper partition. It will be observed, therefore, that a partition r is formed upon the bar G between

the fluid-inlet C' and the fluid-outlet C^2 of each fluid-circulating section and prevents direct communication between the said outlet and the said inlet and that the said partition directs the fluid discharged through the said outlet upwardly toward the fluid-inlet of the fluid-circulating section next above and that a web arranged between the said partition and the partition next above divides the fluid passing upwardly to the last-mentioned fluid-inlet, so that the fluid discharged into each fluid-circulating section A is effectually distributed between opposite sides, respectively, of the chamber a of the said section, and the fluid discharged into the passage-way b' of each fluid-circulating section B is effectually distributed between opposite sides of the said passage-way, and is consequently distributed at the outer end of the said passage-way between opposite sides, respectively, of the chamber b^3 of the circular chamber of the said section B.

The bar R is provided at the lower side of the partition r , arranged between the fluid-inlet and the fluid-outlet of the lowermost fluid-circulating section, with a flat vertical portion R^2 , which is arranged edgewise relative to the said fluid-inlet, and consequently divides the water passing through the said inlet between the opposite sides of the passage-way b' of the said lowermost section.

The bar R is provided above the upper portion of the partition r , arranged between the fluid-inlet and the fluid-outlet of the uppermost fluid-circulating section, with a flat vertical portion R^3 , which is arranged edgewise to the said outlet and divides the fluid discharged through the said outlet between opposite sides, respectively, of the upper end of the pipe C.

It will be observed that the component parts of my improved steam-generator or water-heater are readily assembled, that the construction is simple and durable, that the fluid is uniformly distributed in its passage through the heater, that the fluid circulates rapidly through the heater, and that the said rapid circulation and the aforesaid uniform distribution of the fluid maintains the interior chambers or passage-ways of the water-circulating sections in a clean condition.

The bar R is secured in position in any approved manner, so that it cannot become displaced endwise or vertically, and preferably two pins K extend through opposite end portions, respectively, of the said bar into the pipe C, as shown in dotted lines, Figs. I and III, and in section in Fig. II.

The application of a casing surrounding the series of fluid-circulating sections A and B, the provision of a heating-burner or fire-box below the said series of sections for the purpose of heating the said sections, and the packing of joints to render them fluid-tight are too well understood by persons skilled in the art to require illustration and description in this application.

What I claim is—

1. A heater of the character indicated, comprising several interiorly-chambered or hollow fluid-circulating sections arranged in horizontal planes at different elevations, respectively; an upright pipe extending centrally through the said sections and provided, centrally of each section, with two lateral holes or apertures which form the fluid-inlet and the fluid-outlet, respectively, of the said section, and a bar arranged within and extending longitudinally of the pipe and shaped and arranged as required to form, centrally of each section, a partition which extends from the bottom of the fluid-outlet of the said section to the top of the fluid-inlet of the said section and obstructs direct communication between the said inlet and the said outlet.

2. A heater of the character indicated, comprising several interiorly-chambered or hollow fluid-circulating sections arranged in horizontal planes at different elevations, respectively; an upright pipe extending centrally through the said sections and provided, centrally of each section, with two lateral holes or apertures which form the fluid-inlet and the fluid-outlet, respectively, of the said section; a bar arranged within and extending longitudinally of the said pipe from the bottom of the lowermost fluid-circulating section to the top of the uppermost fluid-circulating section and shaped and arranged as required to form, centrally of each section, a diagonally-arranged partition which extends from the bottom of the fluid-outlet of the said section to the top of the fluid-inlet of the said section and obstructs direct communication between the said inlet and the said outlet, and means attaching the said bar to the said pipe so as to prevent endwise displacement of the bar.

3. A heater of the character indicated, comprising several interiorly-chambered or hollow fluid-circulating sections arranged in horizontal planes at different elevations, respectively; an upright pipe extending centrally through the said sections and provided, centrally of each section, with two lateral holes or apertures which form the fluid-inlet and the fluid-outlet, respectively, of the said section, and a bar arranged within and extending longitudinally of the said pipe and shaped and arranged as required to form, centrally of each section, a partition which extends from the bottom of the fluid-outlet of the said section to the top of the fluid-inlet of the said section and obstructs direct communication between the said inlet and the said outlet, which bar is shaped, between adjacent partitions, to form a flat web which connects the lower of the said partitions with the upper of the said partitions and is arranged edgewise between the fluid-outlet next above the lower end of the said lower partition, and the fluid-inlet next below the upper end of the said upper partition.

4. A heater of the character indicated, com-

prising a plurality of interiorly-chambered or hollow fluid-circulating sections arranged at different elevations, respectively; an upright pipe extending through the said sections and provided within each section, with two lateral holes or apertures which form the fluid-inlet and the fluid-outlet, respectively, of the said section, and a partition within the said pipe and arranged to obstruct direct communication between the said inlet and the said outlet.

5. A heater of the character indicated, comprising a plurality of interiorly-chambered or hollow fluid-circulating sections arranged at different elevations, respectively; an upright pipe extending centrally through the said sections and provided, centrally of each section, with two lateral holes or apertures which form the fluid-inlet and the fluid-outlet, respectively, of the said section, and a partition centrally of each section and extending from the bottom of the fluid-outlet of the said section to the top of the fluid-inlet of the said section and obstructing direct communication between the said inlet and the said outlet.

6. A heater of the character indicated, comprising a plurality of interiorly-chambered or hollow fluid-circulating sections arranged at different elevations, respectively; an upright pipe extending through the said sections and provided within each section, with two lateral holes or apertures which form the fluid-inlet and the fluid-outlet, respectively, of the said section; a bar arranged within and extending longitudinally of the said pipe and shaped and arranged as required to form, centrally of each of the said sections, a partition which extends from the bottom of the fluid-outlet of the said section to the top of the fluid-inlet of the said section and obstructs direct communication between the said inlet and the said outlet.

7. A heater of the character indicated, comprising a plurality of interiorly-chambered or hollow fluid-circulating sections arranged at different elevations, respectively; an upright pipe extending centrally through the said sections and provided, centrally of each section, with two lateral holes or apertures which form the fluid-inlet and the fluid-outlet, respectively, of the said section; washers around the said pipe between the fluid-circulating sections; means for clamping the series of fluid-circulating sections and washers together; and a partition placed centrally of each section and extending from the bottom of the fluid-outlet of the said section to the top of the fluid-inlet of the said section and obstructing direct communication between the said inlet and the said outlet.

In testimony whereof I sign the foregoing specification, in the presence of two witnesses, this 19th day of July, 1902, at Cleveland, Ohio.

ADAM S. KIEFER.

Witnesses:

C. H. DORER,
G. M. HAYES.