

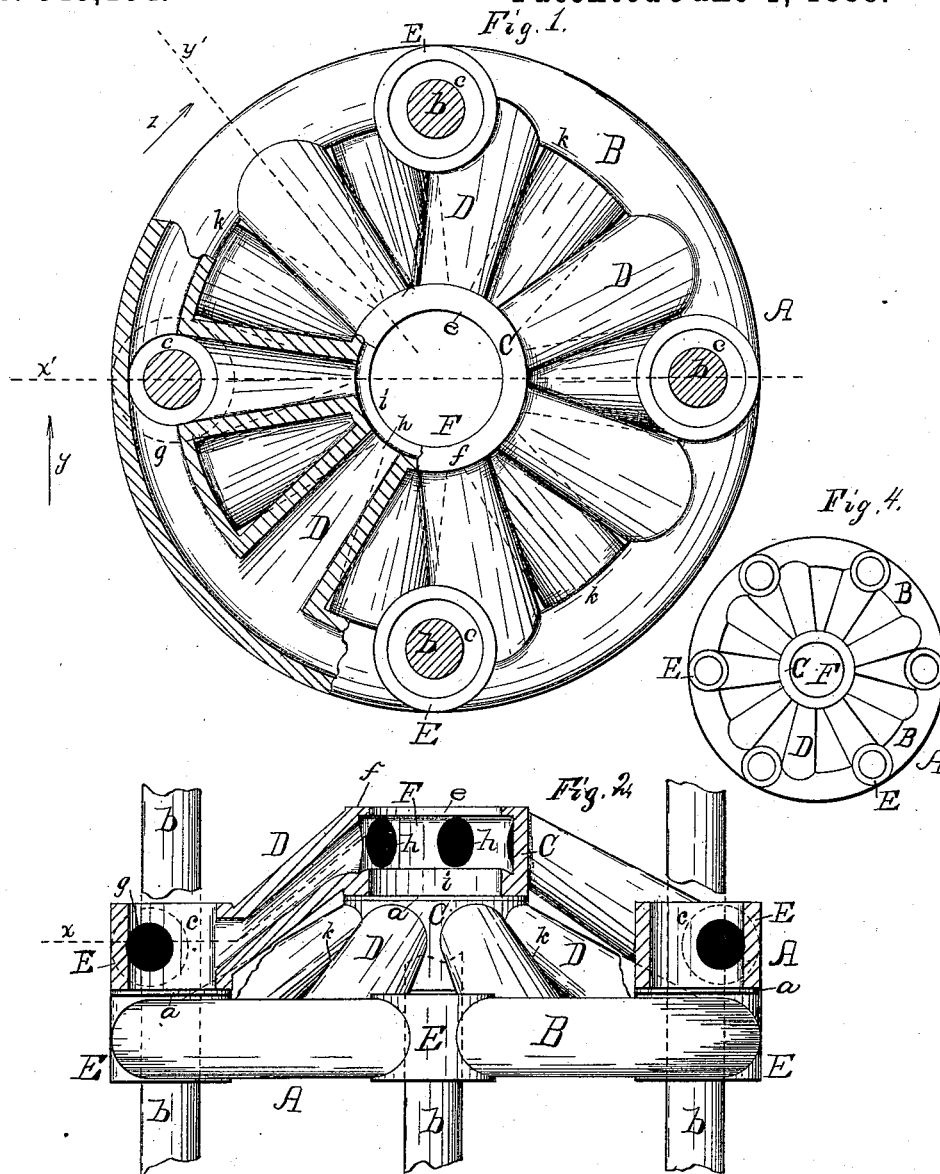
(No Model.)

E. R. BRYANT.

SECTION FOR STEAM GENERATORS.

No. 343,104.

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Attest:
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UNITED STATES PATENT OFFICE.

EDWIN R. BRYANT, OF ROCHESTER, NEW YORK, ASSIGNOR TO THE
ROCHESTER MACHINE TOOL WORKS, (LIMITED,) OF SAME PLACE.

SECTION FOR STEAM-GENERATORS.

SPECIFICATION forming part of Letters Patent No. 343,104, dated June 1, 1886.

Application filed January 27, 1886. Serial No. 149,889. (No model.)

To all whom it may concern:

Be it known that I, EDWIN R. BRYANT, of Rochester, in the county of Monroe and State of New York, have invented a new and useful
5 Improvement in Sections for Steam-Generators, which improvement is fully set forth in the following specification and shown in the accompanying drawings.

The object of my invention is to produce an
10 improved section for a steam-generator in which the water is divided into small volumes, each of which volumes is surrounded by fire-space, for the purpose of effecting rapid steaming. These sections are of novel construction,
15 and are designed to be placed one above another in building up a steam-generator, said sections being alternated by being turned one-half around in a horizontal plane as they are put together, the whole being firmly bound
20 by bolts or ties.

Referring to the drawings, Figure 1 shows a plan of the boiler-section, a part of the peripheral tube, and two of the hollow arms being broken away and sectioned, as upon the
25 dotted line *x* in Fig. 2, the clamping-bolts being also sectioned by a horizontal plane, there being shown the arms of a similar section beneath, alternate with those of the upper section; Fig. 2, a view of the same, seen as indicated by arrow *y* in Fig. 1, the upper section
30 being centrally and vertically sectioned, as upon the dotted line *x'* in Fig. 1, drawn to show more fully the open interior of the section, the under section being shown in elevation, with portions of the tie-bolts for the sections; Fig. 3, a longitudinal section of one of the hollow radial arms of the boiler-section,
35 taken upon the dotted line *y'* in Fig. 1, and viewed as indicated by arrow *z*, pointed thereon, the figure being drawn to more clearly
40 show a cross-section of the peripheral tube and longitudinal section of one of the arms not broken or reduced in length by a peripheral ring; and Fig. 4, an outlined plan of the section drawn to a scale one-third of that to which
45 the other figures are drawn, showing a different numbering of the arms and rings.

Referring to the parts, A is the boiler-section, composed of a peripheral tube, B, joined
50 to a central ring or cylinder, C, by radial hollow arms D. E are vertical cylindrical rings

or parts formed to cut across the peripheral tube, opening into the interior of said tube, there being, by preference, four in number, equally spaced around the section. The axes
55 of these respective rings E are vertical to the plane of the boiler-section, parallel with each other and with the axis of the central ring, C, said rings E being formed to receive tie-bolts *b*, to hold the steam-generating sections together
60 when the same are joined to form a steam-generator. The hollow arms D each open at their respective ends into the interior of the peripheral tube B and the cavity F of the central ring, C, so that a free opening is formed
65 around through all of said parts, the same being the water and steam space of the section, while the heated air and flame encounter the arms and pass through the sectoral openings *k*, between the same. I make these sections
70 crowning—that is to say, form the central ring higher than the peripheral tube or above the plane thereof—and when put together to form a steam-generator, as above stated, place the sections so the crowning part of either comes
75 within the concavity of the next section above it, as shown in Fig. 2, there being thin packing-rings *a* placed between adjacent center rings, C, and the respective adjacent outer rings, E. The axial length of the central ring, C, and outer rings, E, are all equal, and the latter all made in the same plane, on account
80 of which, when a number of these sections are put together, the faces of the rings all fairly meet each other, save as to the thin disks of packing separating them, as stated. By making the center of the section higher than its periphery, said section is perfectly drained, the water from condensed steam or from other sources collecting in the section readily flow-
85 ing down the hollow arms into the peripheral tube, thence down through the various openings *c* within the rings E.

The ring C is formed with an inwardly-projecting flange, *e*, at its upper surface, and a
95 similar inwardly-projecting flange or ring, *i*, at its lower surface to give greater breadth of bearing or packing surface at *f*. The upper surface of the flange *i* is not level or in a plane at right angles with its axis, but is made con-
100 ical, the inclination being in a direction from the center toward the inner surface of the ring

C. The interiors of the respective arms open into the interior of the center ring at *h*, and the upper surface of the flange *i* is formed about on a level with the lower part of said openings, so that water that may condense upon the inner wall of the ring C will be conducted into the arms, thence down the openings *e*, as stated.

There may be but three openings, *e*, in the peripheral tube through which to pass tie-bolts; but I prefer four or more, depending upon the diameter of the section. The diameter from outside to outside of the section here shown, and as I manufacture it, is twelve inches for one size, and four bolts serve to hold these sections rigidly and firmly together, so that no leaking occurs at the joints. I also make an odd number of arms, preferably equally spaced within the peripheral tube, and an even number of bolt-openings *e*, also equally spaced around at the periphery.

I form one opening *e* so that its axis shall cross the axis of one of the arms, as shown at the left in Fig. 1, and on account of there being an odd number of arms the opening *e* opposite to the one just mentioned will pass midway between two adjacent arms, as shown, the two remaining openings cutting into the sides of other arms. This construction, it will be understood, is important in the matter of putting the sections together to form a steam-generator. This section is simply multiplied in making up a generator, there being no different kind or form of section required to alternate with the one shown. In placing these sections together each one is turned half-way around in a horizontal plane from the position occupied by the one next beneath it, on account of which the openings *e* all register, the rings E all falling in vertical lines, forming four vertical rows along the outer surface of the generator. The ring E, which crosses the axis of the arm of one section, being placed over the opposite ring E of another section brings the arm D of the first section crossing the first-mentioned ring between the two arms inclosing the opposite ring, on account of which all the arms of the upper section fall over the respective spaces between the arms of the lower section, and this alternation of the arms is continued from the bottom to the top of the generator. On this account the ascending hot air and flame are caused to follow a zigzag course as they move upward through the meshes of the arms, impinging at every turn against the different arms and rapidly delivering their heat thereto.

The upper and lower surfaces of the respective rings C and E are each cut true to gages, on account of which and the arrangement of the arms and outer rings a steam-generator may be conveniently built up. These sections are cast of metal in a single piece, the whole being cast from a single pattern or patterns exactly alike in form and dimensions.

The flanges *e* and *i* of the ring C, to give breadth of packing-surface and strengthen the

rim, are formed to project inwardly, for if they projected outwardly so as to overhang the exterior surface of the ring they would soon burn off from the intense heat employed to produce steam. These sections are more particularly adapted to form parts of small steam-generators heated by hydrocarbon flame, such as atomized oil.

An even number of arms and an odd number of bolt-openings might answer the purpose of alternating the arms in building up a generator from these sections, as above stated; or a larger even number of said openings than that shown with a greater odd number of arms would answer the same purpose.

What I claim as my invention is—

1. A section for a steam-generator, formed with a peripheral tube or chamber, hollow central ring, and hollow arms joining said tube and ring, the cavities of said arms communicating, respectively, with the interiors of said tube and ring, said central ring being formed above the plane of the axial line of said tube or chamber, substantially as described.

2. A section for a steam-generator, formed with a peripheral tube or chamber, hollow central ring, and hollow arms joining said tube and ring, other rings being formed across said section at right angles to the plane of the latter, the interiors of said respective rings communicating with the interior of said tube, the axes of said rings being substantially parallel with the axis of said central ring, and the length of said rings crossing said section and said central ring measured in lines at right angles to the plane of said tube being equal, substantially as and for the purpose set forth.

3. A section for a steam-generator, formed with a peripheral tube or chamber, hollow central ring, and hollow arms or spokes joining said tube and ring, other rings being formed across said section at right angles to the plane of the latter, the interiors of said respective rings communicating with the interior of said tube, the axes of said rings being substantially parallel with the axis of said central ring, the plane of the upper surface of said central ring being above the plane of the upper surfaces of said rings crossing the section, substantially as shown.

4. A section for a steam-generator, formed with a peripheral tube or chamber, hollow central ring, and hollow arms joining said tube and ring, other rings being formed across said section at right angles to the plane of the latter, the numbers of said latter rings and said hollow arms being one odd and the other even, substantially as and for the purpose set forth.

5. A section for a steam-generator, formed with a peripheral tube or chamber, hollow central ring, and hollow arms or spokes joining said tube and ring, other rings being formed across said section at right angles to the plane of the latter, the numbers of said rings or openings and said hollow arms being one odd and the other even, one of said rings or openings being formed to cut across the axis of one of

said arms, substantially as shown and described.

6. A section for a steam-generator, formed with a peripheral tube and central ring, with
5 hollow arms communicating between the respective interiors of said tube and ring, said ring being formed with inwardly-projecting flanges, substantially as shown.

7. A section for a steam-generator, formed
10 with a peripheral tube and central ring, with

hollow arms or spokes communicating between the respective interiors of said tube and ring, said ring being formed with inward-projecting flanges at its respective ends, the lower one of said flanges being formed conical, substantially as and for the purpose set forth. 15

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Witnesses:

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