

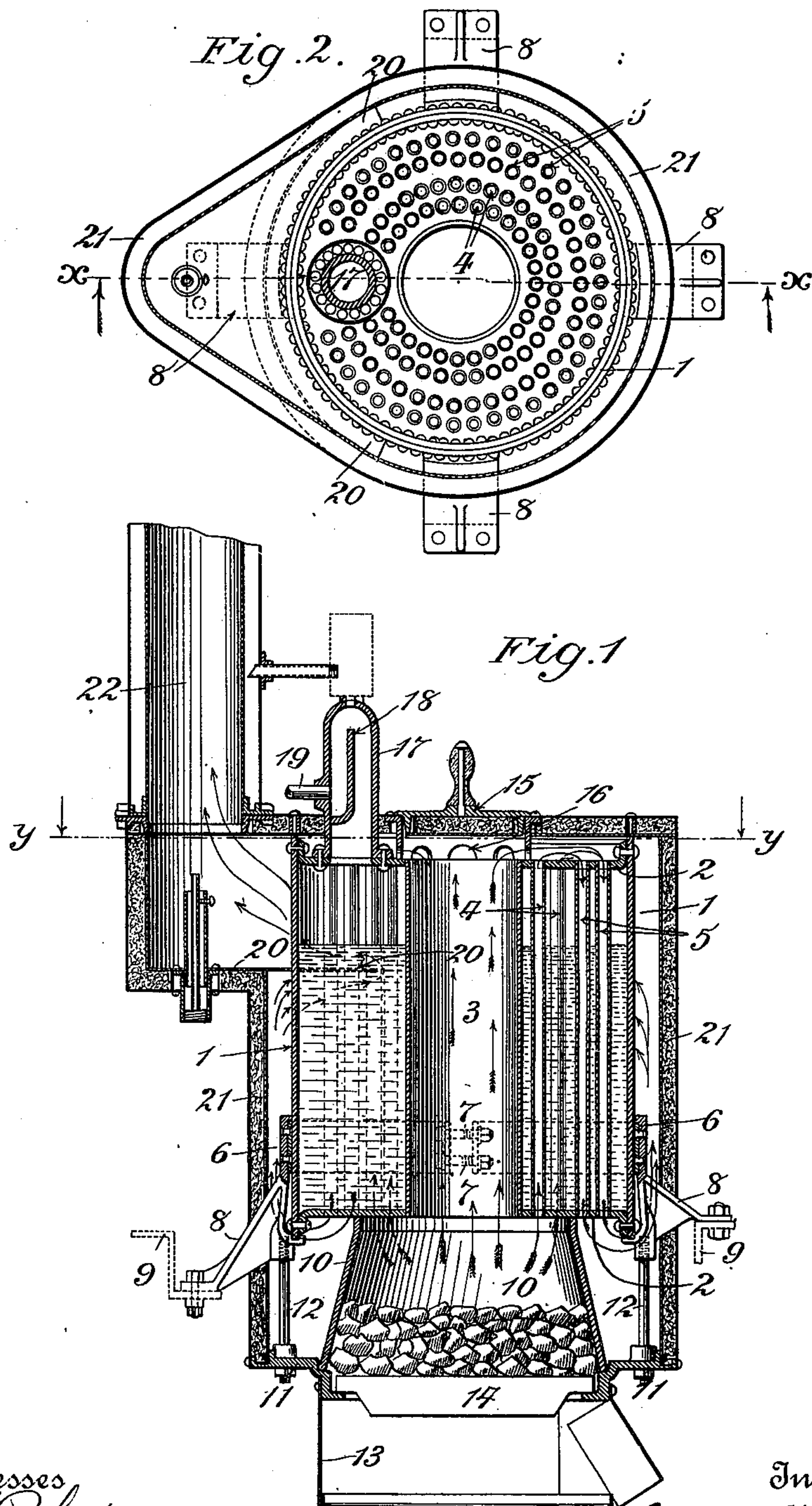
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Patented Apr. 9, 1901.

E. T. BIRDSALL.
STEAM BOILER.

(Application filed June 13, 1900.)

(No Model.)



Witnesses
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UNITED STATES PATENT OFFICE.

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STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 671,937, dated April 9, 1901.

Application filed June 13, 1900. Serial No. 20,112. (No model.)

To all whom it may concern:

Be it known that I, EDWARD T. BIRDSALL, a citizen of the United States, residing at New Rochelle, in the county of Westchester and State of New York, have made a new and useful Invention in Steam-Boilers, of which the following is a specification.

My invention relates particularly to improvements in what are known in the art as "fire-tube" steam-boilers; and it has for its object to devise a boiler of this type which is especially adapted for use in connection with "automobile," so called, or motor vehicles and to so arrange the entire structure that the best available results may be obtained in the smallest possible space.

My invention will be fully understood by referring to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view taken through the entire structure on the line $x x$, Fig. 2, and as seen looking thereat from the bottom toward the top of the drawings in the direction of the arrows; and Fig. 2 is a transverse sectional view taken through Fig. 1 on the line $y y$ and as seen looking thereat from the top toward the bottom of the drawings in the direction of the arrows.

In the use of automobiles propelled by steam it is extremely desirable that a minimum amount of space be utilized by the boiler and also that it may be so located that the fuel may be supplied thereto with as little inconvenience as possible and so that the best possible results shall be obtained from a minimum supply thereof. My improvement is designed to accomplish these especially-enumerated points of utility and will be fully understood by referring to the drawings in detail, in all of which like numerals of reference represent like parts wherever used.

1 represents the body of the boiler proper, which is of annular form, having heads 2 2 and a central main fire-tube 3, around which are arranged radially two or more groups or rows of small fire-tubes extending through the body of the boiler, the lower ends of the inner group 4 being located directly above the fire-box 10 and the upper ends of both groups connected with a draft-chamber between the upper end of the boiler and the

upper end of a surrounding double heat-retaining metallic jacket 21, filled with asbestos or equivalent non-heat-radiating material, said jacket being secured at its upper end by screws to the outer rim of the boiler, as shown. The lower ends of the outer group of tubes 5 all have connection with the annular space between the outer surface of the boiler and its surrounding heat-retaining casing, which space in turn is connected directly to the uptake of usual form running to the smoke-stack.

The fire-box 10 is preferably conical in shape, its smaller upper end resting against the lower end of the boiler and its lower end sustained by a ring-shaped metal bottom 11, provided with an internally-extending flange for sustaining the grate-bars 14, 13 being an ash-pan, secured to the lower side of the metal bottom 11 and provided with a door, as shown. The bottom 11 is sustained by bolts 12, extending upwardly into four or more radially-disposed supporting metal legs 8, having inwardly-projecting lugs adapted to sustain the boiler proper, the upper ends of said legs being secured in turn by rivets to two flexible metallic bands 6, which are held together at their opposite ends by screw-bolts 7 7, the entire arrangement being such that the boiler may be slipped into place between the two-part metallic bands 6, so that it rests upon the inner ends of the legs 8 and is firmly held in position by the metallic bands 6 and bolts 7. The legs 8 are in turn secured by bolts, as shown, to supporting-beams or angle-irons 9 in the carriage or wherever the boiler is designed to be used.

The lower end of the heat-retaining jacket 21 rests upon and is secured by screws to the metallic bottom 11 and in turn supports at its upper end an uptake 22 for carrying away the products of combustion to the smoke-stack. (Not shown.)

15 is a cover located above the central fire-tube 3 and is adapted to be removed by a handle, as shown, in order that the fuel may be admitted at the upper end of the boiler. This removable cover also makes it possible to adjust the draft as desired. Below this cover 15 is arranged a metal cylindrical rim resting upon the top of the boiler and pro-

vided with draft-holes 16, said draft-holes being preferably of such proportion with relation to the central fire-tube 3 and the two groups of smaller fire-tubes 4 and 5 that the draft will cause the products of combustion to ascend through the central fire-tube 3 and also through the inner group of smaller tubes 4 4, the products of combustion uniting in the draft-chamber and thence passing into the outer group of smaller fire-tubes 5 5 downward, and finally upward outside of the boiler, between it and the jacket 21, said products all uniting ultimately and passing out through the uptake 22, 20 being a baffle-plate on the rear side of the boiler for causing such of the products of combustion as pass out of those tubes 5 5 adjacent to the uptake to be diverted again, so as to give the best heating effects to the exterior surface of the boiler before they ultimately pass upward, as shown by the arrows.

17 is a steam-dome in the upper end of the boiler, and 18 is a division-plate therein, extending upward to a point near the top thereof, 19 being a steam-pipe for conveying the dry steam to the engine, the arrangement being such that the steam is taken from the top of the dome and conveyed thence downward to a point near the surface of the boiler, thus saving space by placing the steam-pipe in this position rather than at the top of the dome, as is customary in steam-boilers. By such an arrangement I am enabled to utilize dry steam and also to economize space. This feature constitutes no part of my invention.

I am aware that heretofore a boiler has been devised of the water-tube type in which the parts are so grouped together that the products of combustion pass upward between and around the tubes and generate steam therein, the fuel being conveyed to the fire-box through an opening in the top of the boiler, and I make no claim hereinafter broad enough to include such a structure, my improvement being directed to boilers of the fire-tube type in which the products of combustion pass through the tubes, while the steam is generated in the boiler proper, my most generic claims being directed to the feature of so arranging the fire-tubes as to obtain the best steam-generating effects from the heat utilized in a minimum space and from a minimum amount of fuel.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A steam-boiler having a central main fire-tube and additional groups of smaller fire-tubes arranged therearound; together with a draft-chamber at one end of the boiler and draft-holes from the central main fire-tube into said draft-chamber, in combination with a removable cover located directly over the upper end of the central main fire-tube and

a surrounding heat-retaining jacket connected with the uptake and the smoke-stack, substantially as described.

2. A steam-boiler having a central main fire-tube and two or more groups of smaller fire-tubes arranged therearound; all of said tubes being connected with a draft-chamber at one end of the boiler, the draft-chamber being provided with a removable cover located directly above the central main fire-tube; in combination with a fire-box located beneath the other end of the boiler and a surrounding heat-retaining jacket connected with the lower ends of the smaller fire-tubes and the uptake and smoke-stack, the arrangement being such that the products of combustion pass upward through the main fire-tube and the first group of small fire-tubes, unite in the draft-chamber, pass thence again downward to the bottom of the boiler through the outer group of fire-tubes and finally outward between the outer surface of the boiler and heat-retaining jacket to the uptake and smoke-stack, substantially as described.

3. A steam-boiler having a central main fire-tube and two or more groups of smaller fire-tubes arranged therearound; all of said tubes being connected with a draft-chamber at one end of the boiler; in combination with a fire-box located beneath the other end of the boiler and a surrounding heat-retaining jacket, the arrangement and proportions of the tubes being such that the products of combustion pass upward through the main fire-tube and first group of small fire-tubes, unite in the draft-chamber and pass thence again downward to the bottom of the boiler, thence upward around the outer surface of the boiler to the smoke-stack, substantially as described.

4. A steam-boiler having a central main fire-tube and two or more groups of smaller fire-tubes arranged therearound; all of said tubes being connected with a draft-chamber at one end of the boiler; in combination with a fire-box located beneath the other end of the boiler and a removable lid or cover located above the upper end of the main fire-tube, the arrangement and proportions of the tubes being such that the fuel may be supplied at the top of the boiler, when the lid or cover is removed, and that the products of combustion will pass first upward through the main fire-tube and a part of the smaller fire-tubes, unite in the draft-chamber and pass thence downward, outward and around the outer surface of the boiler, substantially as described.

In testimony whereof I have hereunto subscribed my name this 11th day of June, 1900.

EDWARD T. BIRDSALL.

Witnesses:

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