

No. 671,665.

Patented Apr. 9, 1901.

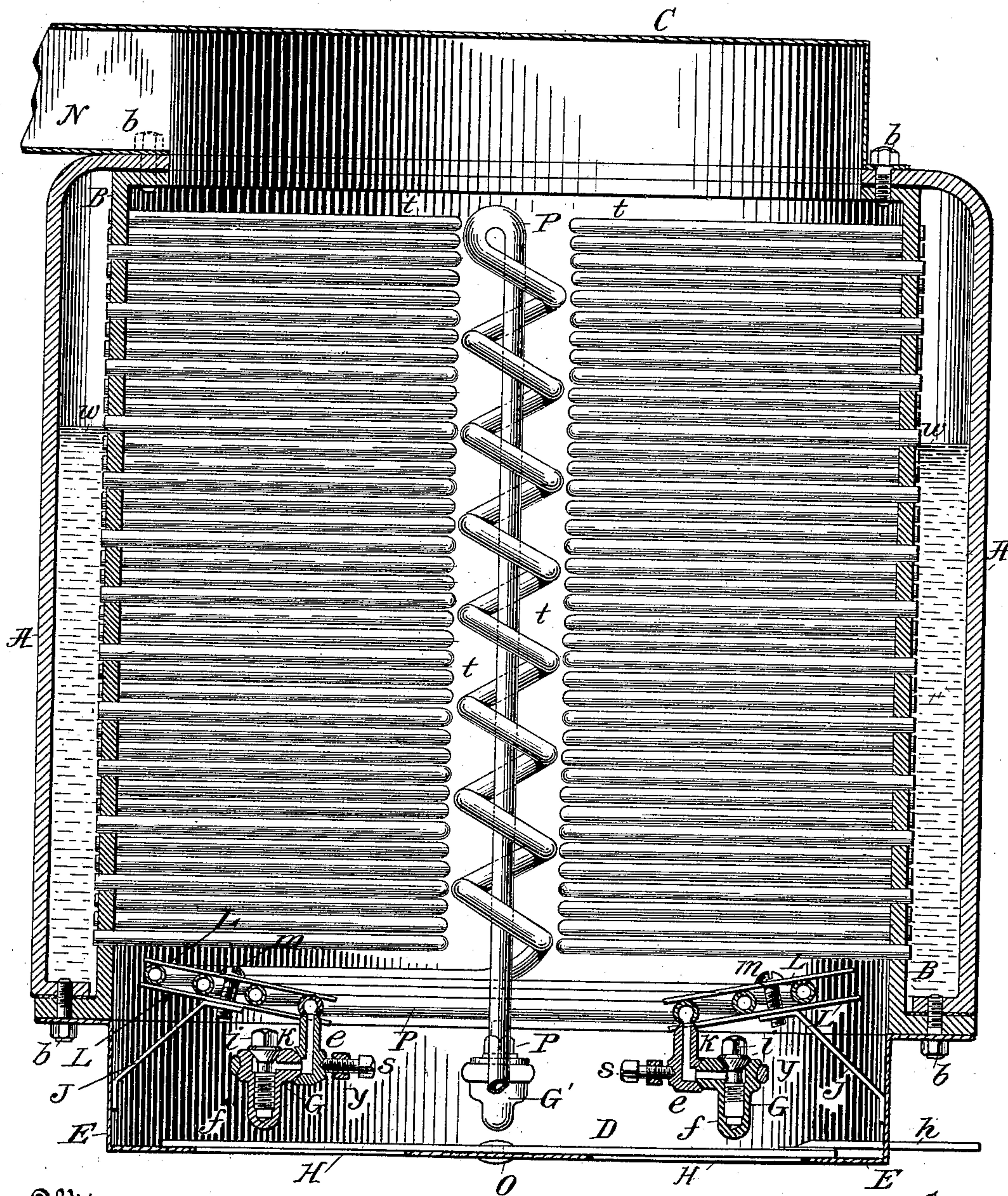
W. E. DICKEY.
STEAM BOILER.

Application filed Nov. 17, 1900.

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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2 Sheets—Sheet 2.

Fig. 2.

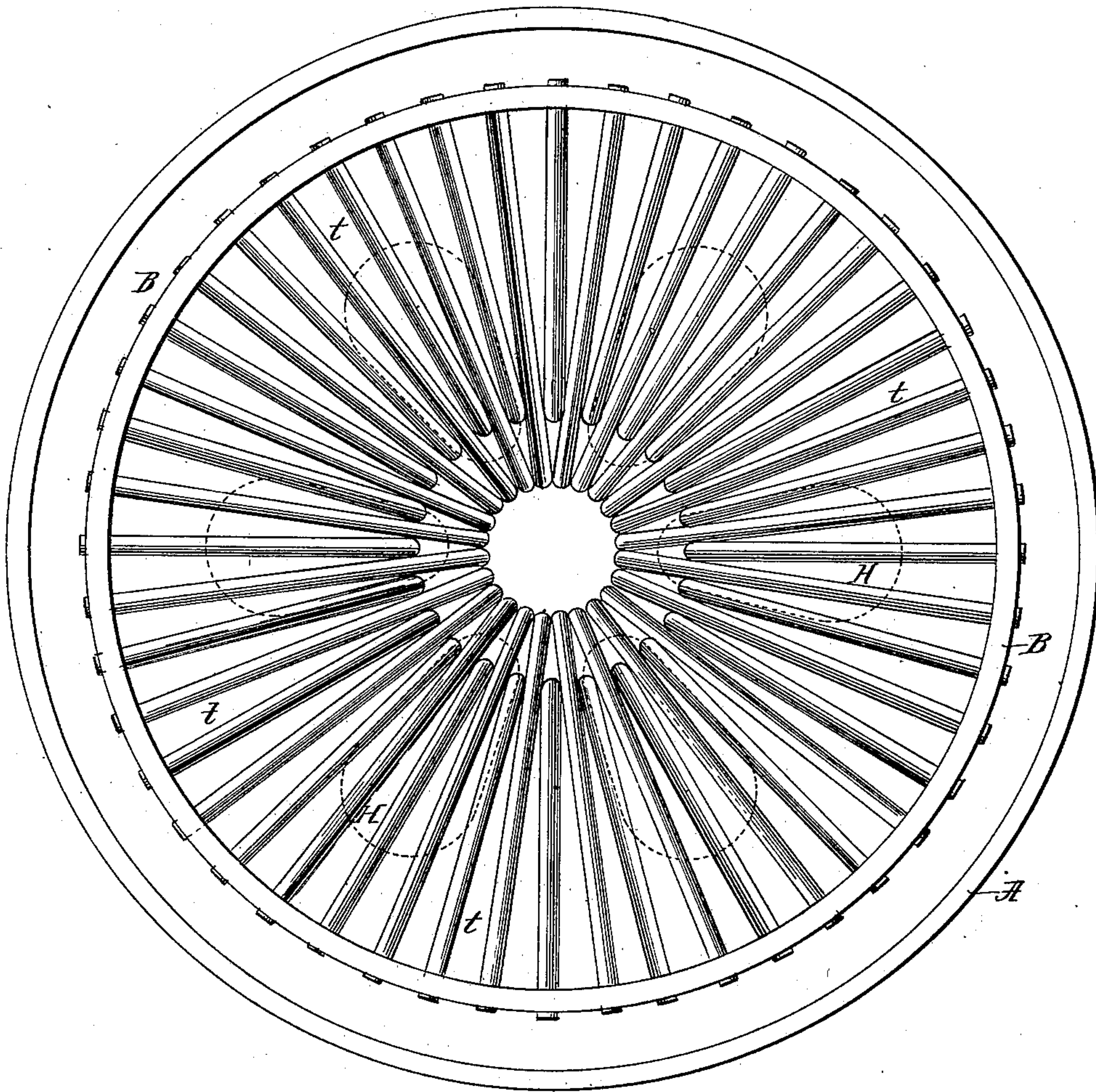
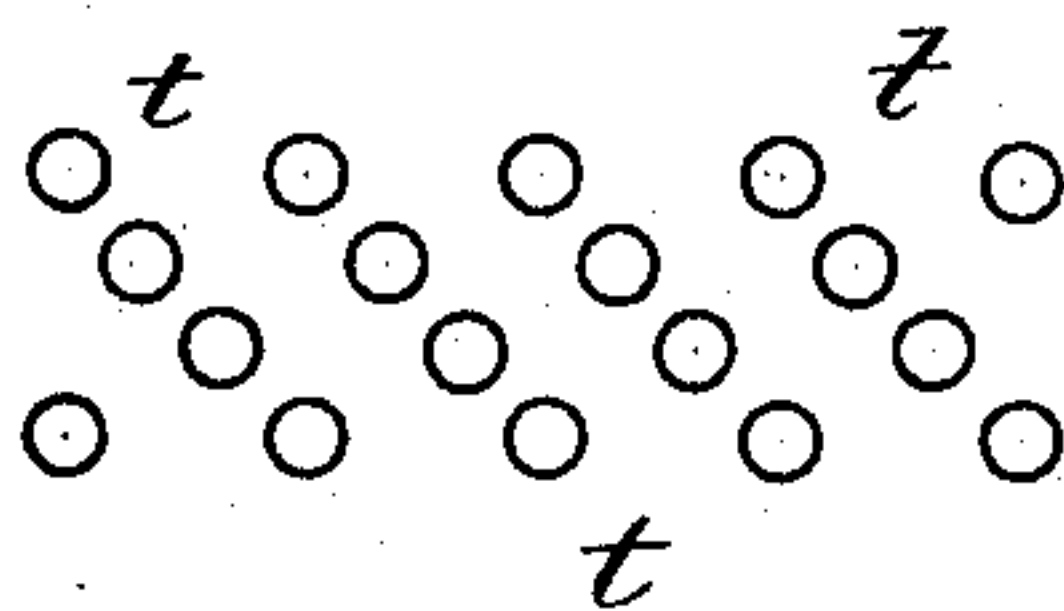


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM E. DICKEY, OF NEW YORK, N. Y., ASSIGNOR OF ONE-THIRD TO
ROSA DICKEY, OF SAME PLACE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 671,665, dated April 9, 1901.

Application filed November 17, 1900. Serial No. 36,818. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. DICKEY, a citizen of the United States, residing at New York, borough of Manhattan, county and State of New York, have made a new and useful Invention in Steam-Boilers, of which the following is a specification.

My invention is directed particularly to improvements in steam-boilers of the water-tube type; and it has for its objects, first, to so construct such a boiler that the tubes may be readily cleaned or repaired; second, to so arrange the tubes within the body of the boiler above the combustion-chamber that the best possible heating effects are had from the products of combustion as they ascend there-through, and, third, to provide a novel form of burner and to so combine the same with a tubular boiler of the type named that the best heating effects are had.

For a full and clear understanding of the invention, such as will enable others skilled in the art to construct and use the same, reference is had to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view taken through the body of a steam-boiler embodying my improvements, the water-tubes of the boiler and a part of the heating apparatus therefor being shown in elevational view. Fig. 2 is a transverse sectional view taken through Fig. 1 just below the upper head of the boiler and as seen looking from the top toward the bottom of the drawing, the heating apparatus being removed in this view of the drawing and the damper-openings at the bottom of the combustion-chamber being shown in dotted lines. Fig. 3 is a detail sectional view of a number of the water-tubes in the interior of the boiler, illustrating the preferred manner of grouping them so as to insure the best heating effects from the ascending products of combustion.

My improved boiler is designed especially for use in connection with automobiles or light vehicles or in places where it is often required to generate steam in a short space of time and also where economy of space and weight is a matter of importance. To this end I construct the body of the boiler proper of two metallic shells A and B, the interior shell B

having an outwardly-extending flange at its bottom and an inwardly-extending flange at its top, while the detachable exterior surrounding shell A is provided with internally-extending flanges at both ends adapted to fit closely against the before-mentioned flanges at the opposite ends of the shell B, said shells being secured together by a series of bolts *bbb*.

ttt are the water-tubes, secured in any preferred manner at their open ends in drilled holes extending through the interior shell B, their closed ends being grouped together in the manner shown in Fig. 2, so that the tubes of greatest length form a central vertical passage at the axial center of the boiler, as shown, while the inner ends of the tubes of shorter length are located between the before-mentioned tubes. These tubes are preferably located diagonally in banks of four with relation to each other, as clearly illustrated in Fig. 3 of the drawings, for the purpose of causing the products of combustion as they ascend to give the best heating effects.

C represents a light metal cover for the boiler, from one side of which the uptake N conveys the products of combustion to any desired point, and E is a combustion-chamber at the lower end of the boiler, provided with draft-openings H and a damper D, secured at its center by a pivot-pin O, and having an operating-handle *h*. The cover C and combustion-chamber are attached to the boiler by the same bolts *b b* which secure the two shells A and B together.

P represents a combined gas-generating and heating apparatus, consisting of a pipe adapted to convey fuel, preferably petroleum, naphtha, or equivalent vaporizable liquids, to a series of burners G G, preferably four or more, radially located, said pipe P extending first vertically upward to the upper end of the boiler and through the central vertical passage between the closed inner ends of the tubes *t t* and spirally wound thence downward around this upward extension to the lower end of the boiler, finally arranged, as shown, in large coils of receding diameter beneath the greater portion of the lengths of the tubes *t*, the burners G being attached to the inner coil, as shown, and the entire structure supported upon brackets, three or more, consist-

ing of arms J, with their lower ends secured to the inner surface of the combustion-chamber and their upper ends to detachable cross-arms L L by screws *m m*, which parts grip or
5 hold the several coils and the attached burners, as shown, all constituting when thus arranged the heating apparatus for the boiler.

G' represents a primary burner located directly below the upward extension of the pipe
10 P, its function being to generate the gases in said upward extension after the manner of ordinary vapor-burners. The several burners G G' are of novel construction and consist of two parts *k* and *f*, the part *k* being
15 secured directly to the pipe P in any preferred manner and having at its lower end *e* a beveled female part adapted to receive a correspondingly-beveled male part at one side of the detachable part *f*, said detachable part
20 having a downwardly-extending neck screw-threaded interiorly for receiving the lower screw-threaded end of a flame-regulating valve *i*, the arrangement being such that the amount of gas escaping is regulated by a
25 wrench upon turning the valve *i* in either direction at will.

y represents a steel yoke adapted to fit in a groove at one side of the detachable part *f* and entirely around the two parts of the burner, *s*
30 being a set-screw extending through the yoke *y*, with its pointed end bearing in an opening in the outer face of the part *k*, the arrangement being such that when the set-screw is withdrawn the burner may be taken apart
35 and cleaned or repaired at will, and when turned to the position shown in the drawings it securely locks the two parts of the burner together.

The operation of the improvement is obvious, it being apparent that after the starting-gas is generated in the burner by heating the pipe P, through the agency of the primary burner G', in the usual manner of starting vapor-burners, the gas is turned on by regulating the valves *i* and then igniting the same.
45 Owing to the peculiar arrangement of the tubes *t* the ascending products of combustion will be forced to pass completely around all parts of the inwardly-projecting tubes *t t* and
50 generate steam therein, such of the tubes as are located above the water-level *w* acting in the nature of superheaters for the purpose of generating dry steam for actual use. When it is desired to clean the boiler or repair any
55 of the tubes, the bolts *b* are all withdrawn and the cover C, combustion-chamber E, and exterior shell A detached, thus making it possible to clean the tubes by the insertion of well-known devices for cleaning tubular boilers.

I do not limit my invention to the particular details of construction herein shown and described. I believe it is broadly new with
60 me to devise a water-tube boiler in which the tubes of different lengths are radially arranged with their closed ends extending toward the axis of the boiler and to surround the same with a detachable shell, the inner

ends of the tubes being so grouped as to give comparatively large heating effect. I believe
70 it is also broadly new with me to combine with a water-tube steam-boiler a heating apparatus so arranged that the gas-generating portion thereof extends through the body of the boiler, while the steam-generating portion thereof is located beneath the water-tubes in
75 such manner that the products of combustion pass upward and around all of the tubes before passing to the uptake.

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

1. A water-tube boiler having an interior and an exterior shell and a series of water-tubes of different lengths radially arranged within the interior shell, substantially as described.
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2. A water-tube boiler having an interior and an exterior shell provided with flanges at their opposite ends and detachably secured together by bolts in combination with a series
90 of tubes of different lengths radially arranged within the interior shell, substantially as described.

3. A water-tube steam-boiler having an interior and an exterior shell detachably secured together by flanges and bolts at the opposite ends thereof; in combination with water-tubes of different lengths having their open ends secured in openings extending through the interior shell, substantially as
95 described.

4. A water-tube steam-boiler having an interior and an exterior shell detachably secured together; in combination with water-tubes of different lengths having their open
105 ends secured in openings extending through the interior shell and their closed ends grouped together so that the products of combustion circulate around all of the tubes, substantially as described.
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5. A water-tube steam-boiler embracing two flanged shells, a cover and a combustion-chamber all detachably secured together by bolts extending through the flanges; in combination with radially-disposed water-tubes
115 extending through the interior shell, substantially as described.

6. A water-tube steam-boiler embracing two flanged shells, one of which surrounds the other; a cover and a combustion-chamber all held together by bolts extending through the flanges; in combination with water-tubes radially arranged inside the interior shell and having connection with the chamber between the shells, their closed ends being so arranged as to constitute a central vertical passage, substantially as described.
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7. A water-tube steam-boiler having an interior and an exterior shell, the interior shell having an inwardly-projecting flange at its upper end and an outwardly-projecting flange at its lower end, the outer shell being provided with inwardly-projecting flanges at the opposite ends, adapted to fit against the upper faces
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of the flanges of the first-named shell; in combination with bolts for securing the same together, and horizontally-disposed tubes located within the inner shell, so arranged that
5 the water circulates in the tubes and the chamber between the two shells, substantially as described.

8. A water-tube steam-boiler having a series of water-tubes radially arranged with a
10 central vertical passage between the inner ends; in combination with a combined gas-generating and heating apparatus, one portion of which extends upward through the central vertical passage, the other part thereof
15 of being located beneath the entire series of tubes, substantially as described.

9. A steam-boiler having a series of water-tubes and a combined gas-generating and heating apparatus therefor, consisting of a pipe extending axially through the boiler and
20 returning to the bottom thereof and finally coiled beneath the water-tubes; in combination with burners connected to the coils at the bottom of the boiler, substantially as described.
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In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WM. E. DICKEY.

Witnesses:

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M. F. KEATING.