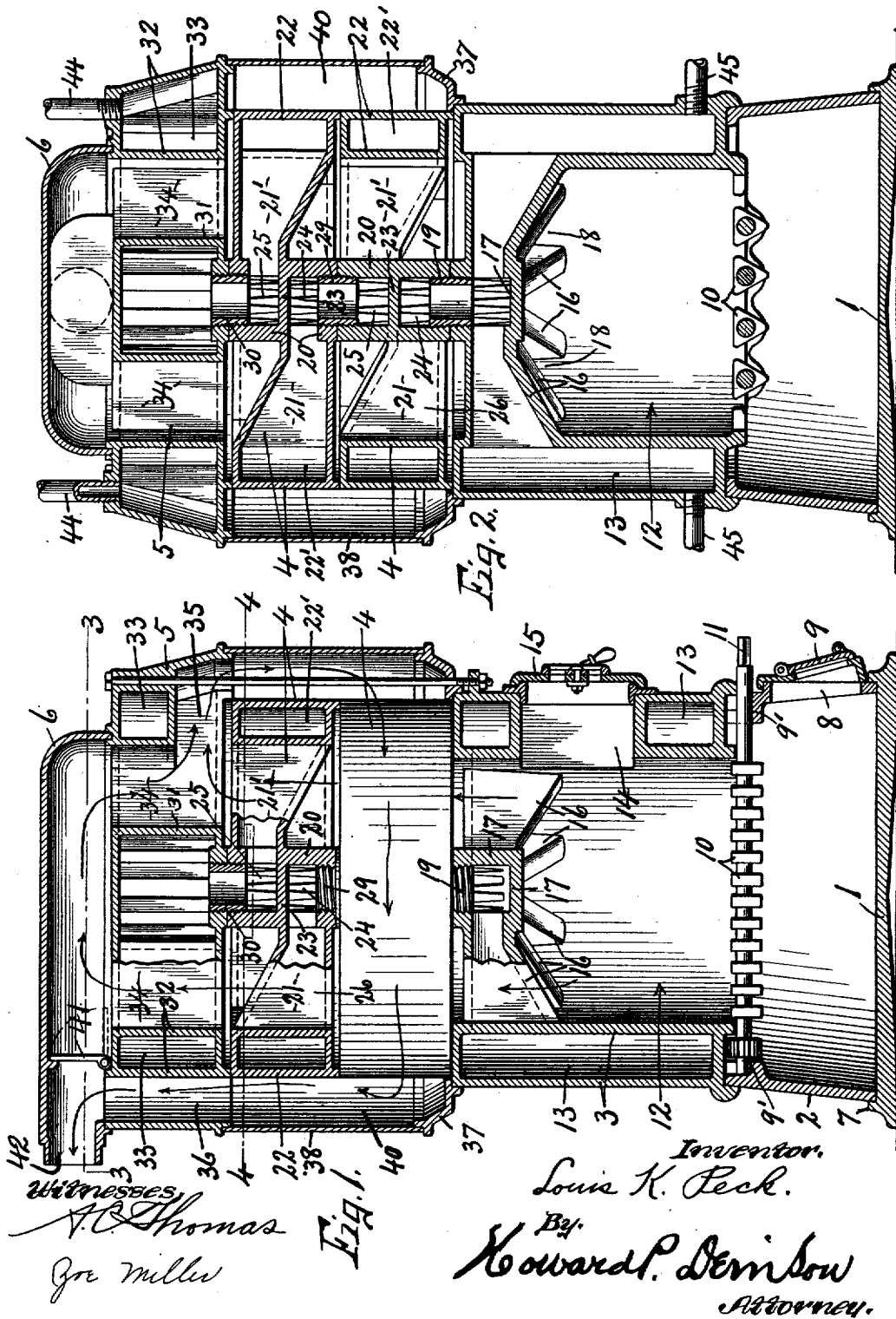


L. K. PECK.
STEAM AND HOT WATER HEATER.
APPLICATION FILED JUNE 16, 1909.

1,023,591.

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2 SHEETS—SHEET 1.



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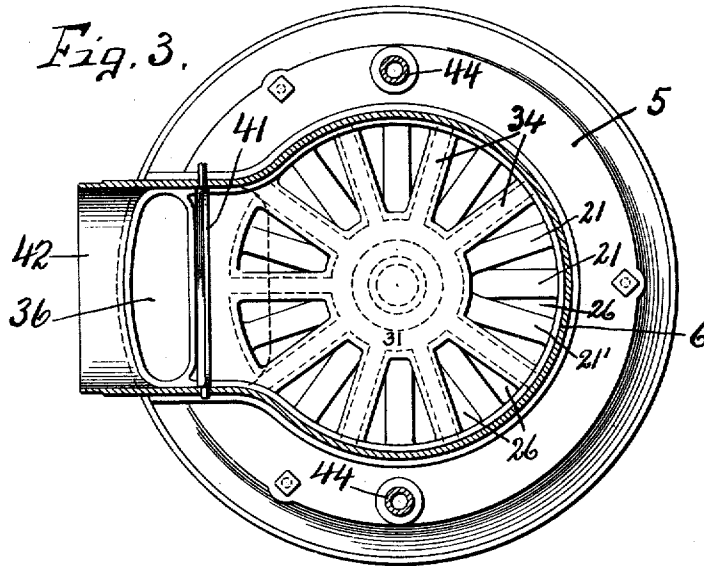


Fig. 5.

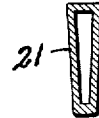
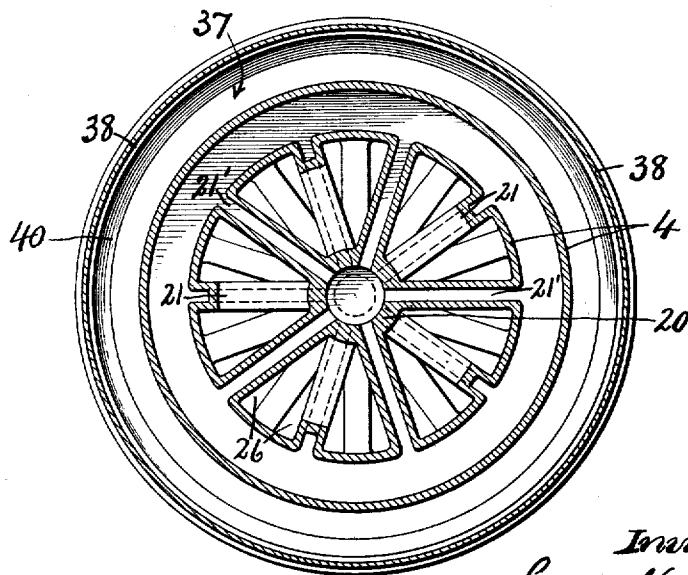


Fig. 4.



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UNITED STATES PATENT OFFICE.

LOUIS K. PECK, OF SYRACUSE, NEW YORK.

STEAM AND HOT-WATER HEATER.

1,023,591.

Specification of Letters Patent.

Patented Apr. 16, 1912.

Application filed June 16, 1909. Serial No. 502,537.

To all whom it may concern:

Be it known that I, LOUIS K. PECK, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Steam and Hot-Water Heaters, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

10 This invention relates to certain improvements in steam and hot water heaters comprising a plurality of horizontal sections arranged end to end one upon the other and capped by a suitable dome or smoke chamber having a damper for direct or indirect
15 passage of the products of combustion to the smoke flue not shown.

My main object is to produce a low priced combined steam and hot water heater capable of being installed at a comparatively
20 small cost, and in which some of the horizontal sections are duplicated so that the capacity of the boiler may be readily increased or diminished by simply adding or
25 reducing the number of like sections.

Another object is to construct and arrange the sections of the boiler in such manner that the cooler water which is admitted into the section surrounding the combustion chamber is caused to flow progressively upwardly and radially to and from the center of the superposed sections through comparatively shallow channels staggered with each other and lying in the path of the upwardly escaping products of combustion, thereby producing a rapid heating of the water or conversion of such water into steam without seriously retarding its free circulation upwardly through the distributing pipes. In
30 other words, one of the important objects of my invention is to construct each of the main water heating sections in the form of a wheel disposed horizontally and provided with a hollow rim and hollow hub, and hollow spokes connecting the hub with the rim, and to provide the hub with a horizontal partition dividing its interior into upper and lower compartments with which alternate spokes communicate so that the up-
45 flowing water will pass first from the lower compartment of the hub directly to the hollow rim and thence backwardly through other spokes to the upper compartment where it continues to flow in the same manner through a similar superposed section or

sections until it finally reaches the distributing drum where it is either converted into steam or allowed to circulate through the distributing pipes as may be desired.

Other objects and uses relating to specific parts of the boiler will be brought out in the following description.

In the drawings—Figures 1 and 2 are vertical sectional views of a horizontal sectional boiler embodying the various features
65 of my invention, said views being taken at right angles to each other, and one of the water sections in Fig. 1 being shown in elevation. Figs. 3 and 4 are horizontal sectional views taken respectively on lines 3—3 and 4—4, Fig. 1. Fig. 5 is a transverse sectional view through one of the spokes of one of the wheel sections.

This boiler comprises a base section —1—, an ash pit section —2—, a water base section —3—, one or more intermediate water sections —4—, a steam drum or distributing section —5—, and a top or smoke section —6—, the sections 1, 2, 3, 4 and 5 being preferably circular in top plan and of nearly
80 the same diameter, although the ash pit section —2— is somewhat flaring downwardly.

The base section —1—, which is adapted to rest upon the floor or other available support, is provided with the usual annular
85 flange —7— into which is fitted the lower end of the ash pit section —2—, the latter being provided with a suitable cleanout opening —8— and door —9— which may also serve as a draft door.

The front and rear sides of the upper end of the ash pit section are provided with suitable bearings —9'— which open at the top for receiving and supporting grate bars —10—, the latter having their front ends
95 projecting through some distance beyond the front side of the ash pit section above the door opening —8— and are provided with angular extremities —11— adapted to be engaged by a suitable shaker.

The water base —3— is fitted and rests upon the upper end of the ash pit section —2— and is provided with a central combustion chamber —12— and a water chamber —13— surrounding the combustion
105 chamber. The front side of this water base is provided with a fuel inlet opening —14— partitioned off from the water chamber —13— and provided with a suitable door —15—, said fuel opening —14— leading
110

to the combustion chamber and being disposed substantially midway between the lower and upper ends of the water base. This water base is preferably made of cast iron and is provided at its upper end with a series of hollow radial spokes —16— spaced equidistant apart around the axis of section —3— and connected to a central hollow hub —17— to form a series of radial conduits leading from the chamber —13— to the interior of the hub. The vertical depth of this hub is somewhat less than the vertical length of the outer ends of the spokes, which flare downwardly from the hub to permit a free upward and inward flow of the heated water from the chamber —13— to the interior of the hub —17—, as best seen in Figs. 1 and 2. Each of the spokes —16— is also flaring transversely and upwardly; that is, each spoke is of greater width at the top than at the bottom so as to overhang more or less the intervening fire passages, as —18—, between the spokes, thereby causing the upwardly passing products of combustion to impinge against the sides, as well as the bottom, of the spokes. It is now clear that the bottom of the hub —17— and spokes —16— constitute the crown sheet for the combustion chamber and that as the water is heated in the chamber —13— by radiation through the sides of the combustion chamber, such heated water is immediately deflected inwardly from all sides toward the center or into the hub —17— directly over the point of greatest heat in the combustion chamber where it is additionally and quickly heated to a high degree.

The upper end of the hub —17— is provided with a central opening into which is screwed an upflow pipe nipple —19— having its upper end protruding some distance beyond the upper end of the hub —17— and upon which is screwed the lower end of the central hub of the superposed water section —4—. In Figs. 1 and 2 I have shown two of these water sections —4—, each being circular in top plan and comprising a hollow central hub —20—, hollow spokes —21— and —21'— radiating from the hub, and a hollow rim —22— connected to and communicating with the outer ends of the spokes. The interior of the hub —20— is divided substantially midway between its ends by a horizontal partition —23— into lower and upper compartments —24— and —25— so that each compartment is substantially one half of the vertical height of the rim —22—. The outer ends of the spokes —21— and —21'— are of substantially the same vertical height as the rim —22— but their inner ends are substantially the same vertical height as the corresponding compartments —24— and —25— with which they communicate, so

that the inner ends of the hollow spokes are of considerably less vertical height than the outer ends and said spokes, therefore, flare longitudinally and outwardly. One set of spokes, as —21—, which alternate with the other set, as —21'— connect the lower compartment —24— of the hub —20— with the chamber, as —22'— of the rim —22—, while the other set of spokes, as —21'— connect the upper compartment —25— with said chamber, so that the upflowing water from the water base —13— through the pipe connection —19— is retarded in its further upflow through the hub —20— by the partition —23— thereby causing such water to pass laterally and radially through the spokes —21— and into the hollow rim —22— and thence returning radially through the spokes —21'— to the upper compartment —25— above the partition —23—. As previously intimated, these spokes are spaced some distance apart forming intervening fire passages —26—, said spokes —21— and —21'— flaring upwardly in transverse section, as shown in Fig. 5, so as to be wider at the top than at the bottom, similar to the spokes —16— of the water base section —3—, thereby causing the heated products of combustion to impinge against the sides as well as the bottom of such spokes.

Both of the water sections or rings —4— are identical in construction but when two or more of these sections are used their spokes are arranged in staggered relation; *i. e.*, the spokes of each superposed section are arranged directly over the fire passages between the spokes of the next lower section, but in all of these rings the transverse width of the spokes is less than the transverse width of the intervening fire passages.

The meeting ends of the hubs of the sections —4— are connected together by pipe nipples —29— of substantially the same construction as the nipples —19— previously described, and it is clearly evident that as the heated water returns from the rim —22— to the upper compartment —25— of the hub —20—, such water continues to flow upwardly through the central pipe nipple —29— and radial arms —21— of the upper water section —4—, thence through the rim of said section and back radially to the upper compartment —25— where it passes through a pipe nipple —30— into a central hub —31— of the distributing head or section —5—. This section —5— is fitted upon and secured by the nipple —30— to the upper water section —4— and is provided with a hollow rim —32— forming a water chamber —33— which is connected to the hub —31— by radial spokes —34—, as best seen in Fig. 3. The spokes —34— are, however, of substantially the same vertical width throughout their

lengths from the hub —31— to the rim —32— which allows the upper portion of the head to be used for a steam chamber if desired. This distributing head or section —5— is of somewhat greater diameter than the underlying ring sections —4— so as to project radially some distance beyond the periphery of the water rings —4— thereby enlarging the capacity of the hollow rim —32— except at the front and rear, the lower portion of the front of the rim —32— being cut away and partitioned off from the superposed water chamber —33— to form a fire passage —35— which communicates with the fire passage between the spokes —34— and extends some distance forwardly beyond the periphery of the water rings —4—. The rear portion of the hollow rim —32— is also partitioned off from the chamber —33— to form a fire and smoke passage —36— extending from top to bottom of the section —5—.

Seated upon the upper end of the water base —3— is a radially projecting annular flange —37— of substantially the same diameter as the distributing head or section —5—, and between the flange —37— and lower end of the head —5— is interposed a metal jacket —38— which surrounds the water rings —4— some distance therefrom and forms a suitable smoke chamber —40— closed at the bottom by the flange —37— and communicating at its upper end with the smoke passages —35— and —36—, as best seen in Fig. 1.

The cap or hood —6— is seated upon the upper end of the distributing head —5— and covers the upper ends of all the adjacent fire passages, and, therefore, communicates with the passages —35— and —36—. A damper —41— is located in this cap —6— just at the rear of the fire passages between the spokes —34— of the distributing head —5— and just in front of the fire passage —36—, and is, therefore, adapted, when closed, to cut off direct communication between the upper ends of the smoke passages between the spokes of the several sections and main outlet, as —42—, thereby causing the products of combustion to pass forwardly and downwardly through the passage —35— and around the outside of the water rings —4— and thence rearwardly and upwardly and outwardly at the rear of the chamber, as shown by the arrows in Fig. 1. When the damper —41— is open for direct draft, the products of combustion may pass directly from the smoke passages between the spokes of the several water sections upwardly into the smoke cap —6— and thence rearwardly through the outlet —42—, said chamber being usually opened when starting the fire.

By providing the distributing head —5— with the indirect passage —35— located as

described, it is evident that when the damper —41— is closed the products of combustion will pass upwardly through or within the water rings and distributing head and then downwardly and around the outside of said water rings, thereby enveloping practically the entire series of rings in the heated products of combustion and producing a rapid heating of the water or conversion of such water into steam when steam heat is desired. The heated water or steam passes upwardly through suitable upflow pipes —44— and returns through somewhat smaller backflow pipes —45—, the object of making the return pipes smaller than the upflow pipes being to prevent excessive suction in the upflow pipes by the weight of the cooler return flow water, it being understood that the expansion of the upflow water is greater than that of the return flow.

One of the most important advantages of this construction of boiler is that the heated products of combustion have a direct but short travel upwardly from the combustion chamber to the cap —6—, while the water travel is comparatively long from the base section to the top section or distributing chamber, so that the heat is most excessive at the top or surrounding the upper distributing chamber, and when the chamber —41— is closed the heated products of combustion are returned downwardly and around the water rings before escaping through the smoke flue —42—. By thus establishing a comparatively short or direct upward passage of the fire or heated products of combustion from the combustion chamber to the top of the boiler and passing the water back and forth from the center to the rim and return, the water passage is, therefore, of considerable length and surrounded by the upwardly passing heated products of combustion thereby producing an excessive heating of the top where the surface water is expanded or converted into steam more rapidly than would be the case if the excessive heat were concentrated at the lower water ring.

What I claim is—

1. In a steam and hot water heater, a horizontally disposed water section comprising a hollow central hub having a horizontal partition dividing the interior of the hub into lower and upper compartments, a hollow rim surrounding the hub some distance therefrom and having its interior of considerably greater vertical depth than that of either of the compartments, a set of hollow spokes connecting the lower compartment with the interior of the rim, and an additional set of similar hollow spokes connecting the upper compartment with the interior of the same rim.

2. In a steam or hot water heater, a horizontally disposed water section comprising

a central hollow hub, a hollow circular rim concentric with and spaced apart some distance from the hub, said hub having a horizontal partition dividing its interior into lower and upper compartments each of less vertical depth than the interior of the rim, and hollow radial spokes connecting the hub and rim, alternate spokes connecting the interior of the lower compartment with the interior of the rim and the remaining spokes connecting the upper compartment with the interior of the same rim.

3. In a steam or hot water heater, a horizontally disposed water ring comprising a central hollow hub having a horizontal partition dividing its interior into lower and upper compartments, a hollow rim surrounding the hub some distance therefrom, and outwardly flaring hollow spokes connecting the hub and rim and spaced apart forming intervening fire passages, some of the spokes having their inner ends communicating with the lower compartment and the remaining spokes having their inner ends communicating with the upper compartment, the outer ends of the spokes being of greater vertical depth interiorly than the compartment with which they are connected.

4. In a steam or hot water heater, a horizontally disposed water section comprising a central hollow hub, a hollow rim surrounding, and spaced some distance from, the hub, a set of hollow spokes having their inner ends reduced in vertical depth and communicating with the interior of the lower end of the hub, and an additional set of hollow spokes alternating with the first named spokes and having their inner ends reduced in vertical depth and communicating with the interior of the upper portion of the hub, said spokes having their outer ends communicating with the interior of the hollow rim.

5. In a steam or hot water heater, a horizontally disposed water ring comprising a central hollow hub, a hollow circular rim concentric with and spaced apart some distance from the hub, said rim and hub being of substantially the same vertical height, a partition substantially midway between the ends of the hub and dividing its interior into lower and upper compartments, sets of alternating hollow spokes having their outer ends of substantially the same vertical depth as the hollow rim and communicating with the interior thereof and their inner ends reduced in vertical depth, the inner ends of one set of spokes communicating with the lower compartment and the inner ends of the other set communicating with the upper compartment.

6. In a steam or hot water heater, a horizontally disposed water ring having a hollow hub and a hollow rim, and hollow radial

spokes connecting the interior of the hub with the interior of the rim, said spokes being wider at the top than at the bottom.

7. In a steam or hot water heater, a water heating section comprising a central upright tubular hub having a transverse horizontal partition dividing it into upper and lower compartments, a hollow ring surrounding the hub some distance apart therefrom, and of greater interior vertical depth than either of the compartments, a set of inwardly tapering hollow spokes having their small ends connected to the lower compartment and their larger ends connected to the rim, and a separate set of inwardly tapering spokes having their smaller ends connected to the upper compartment and their larger ends connected to the rim.

8. A steam or hot water heating section for boilers comprising a hollow hub, a hollow rim surrounding the hub, hollow spokes connecting the rim to the hub, and spaced apart forming intervening fire passages, a portion of the hollow rim at one side being of less vertical height than the remaining portions of the rim forming a branch fire and smoke passage communicating with the adjacent vertical fire passage, said rim having an extension formed with a separate smoke passage, in combination with a cap section covering the upper ends of the vertical smoke and fire passages, and means within the cap for cutting off direct communication between the branch fire passage and said separate vertical passage.

9. In a steam or hot water heater, a water base having a central combustion chamber and a water chamber surrounding the combustion chamber, the upper end of said water base being provided with a central hollow hub closed at the bottom and open at the top, and hollow radial spokes connecting the water chamber with the interior of the hub, said spokes being wider at the top than at the bottom and spaced apart forming intervening fire passages.

10. In a steam or hot water heater, a base having a combustion chamber and a water chamber surrounding the combustion chamber and provided with a central tubular hub closed at the bottom and open at the top, inwardly tapering hollow spokes connecting the water chamber to the interior of the hub, additional superposed tubular hubs connected to each other and to the lower hub, separate hollow rims, each surrounding one of the additional hubs, partitions dividing the interiors of the additional hubs into lower and upper compartments, inwardly tapering spokes connecting the outer rings to the lower compartments, additional inwardly tapering spokes connecting the hollow rims to the upper compartments, a steam drum having vertical fire passages communicating with the com-

bustion chamber, said drum having a lateral branch passage communicating with one of the vertical passages, a separate vertical smoke passage communicating with the branch passage around the outside of said hollow rims, a cap covering the upper ends of the vertical smoke passages, and means within the cap for opening and closing direct communication between the first named vertical smoke passage and the separate vertical passage.

11. In a boiler, a water ring comprising a hollow rim and a hollow hub of substantially the same vertical depth as the rim, said hub having a horizontal partition dividing it into upper and lower compartments, a series of hollow spokes connecting the lower compartment to the rim and a separate series of hollow spokes connecting the upper compartment to said rim.

12. In a boiler, in combination with a combustion chamber, a water section disposed horizontally above the combustion chamber, a hollow rim and a hollow hub, said hub having a horizontal partition dividing it into lower and upper compartments, a series of hollow spokes connecting the lower compartment to the rim and gradually increasing in vertical depth from the hub to the said rim, and a separate series of hollow spokes connecting the upper compartment to said rim and gradually increasing in vertical depth from the hub to the rim.

13. In a boiler, a water ring comprising a hollow rim and a central hollow hub hav-

ing a horizontal partition dividing it into upper and lower compartments, a series of hollow spokes connecting the lower compartment to the rim and having their lower sides substantially horizontal and their upper sides inclined from the hub toward the rim, and a separate series of hollow spokes connecting the upper compartment to the rim and having their upper sides substantially horizontal and their lower sides inclined upwardly from the rim toward the hub.

14. In a boiler, a water base having a combustion chamber, a water ring resting upon said base and comprising a hollow rim and a central hollow hub of substantially the same vertical depth as the rim, said hub being provided with a horizontal partition dividing it into upper and lower compartments, a series of hollow spokes connecting the lower compartment with the rim and gradually increasing in vertical depth from the hub toward said rim and a separate series of hollow spokes connecting the upper compartment with the rim and gradually increasing in vertical depth from the hub toward the rim, connections between the lower compartment and the water base and an upflow nipple leading from the upper compartment.

In witness whereof I have hereunto set my hand this 8th day of June, 1909.

LOUIS K. PECK.

Witnesses:

H. E. CHASE,
J. M. HOES.