No. 696,240. Patented Mar. 25, 1902.

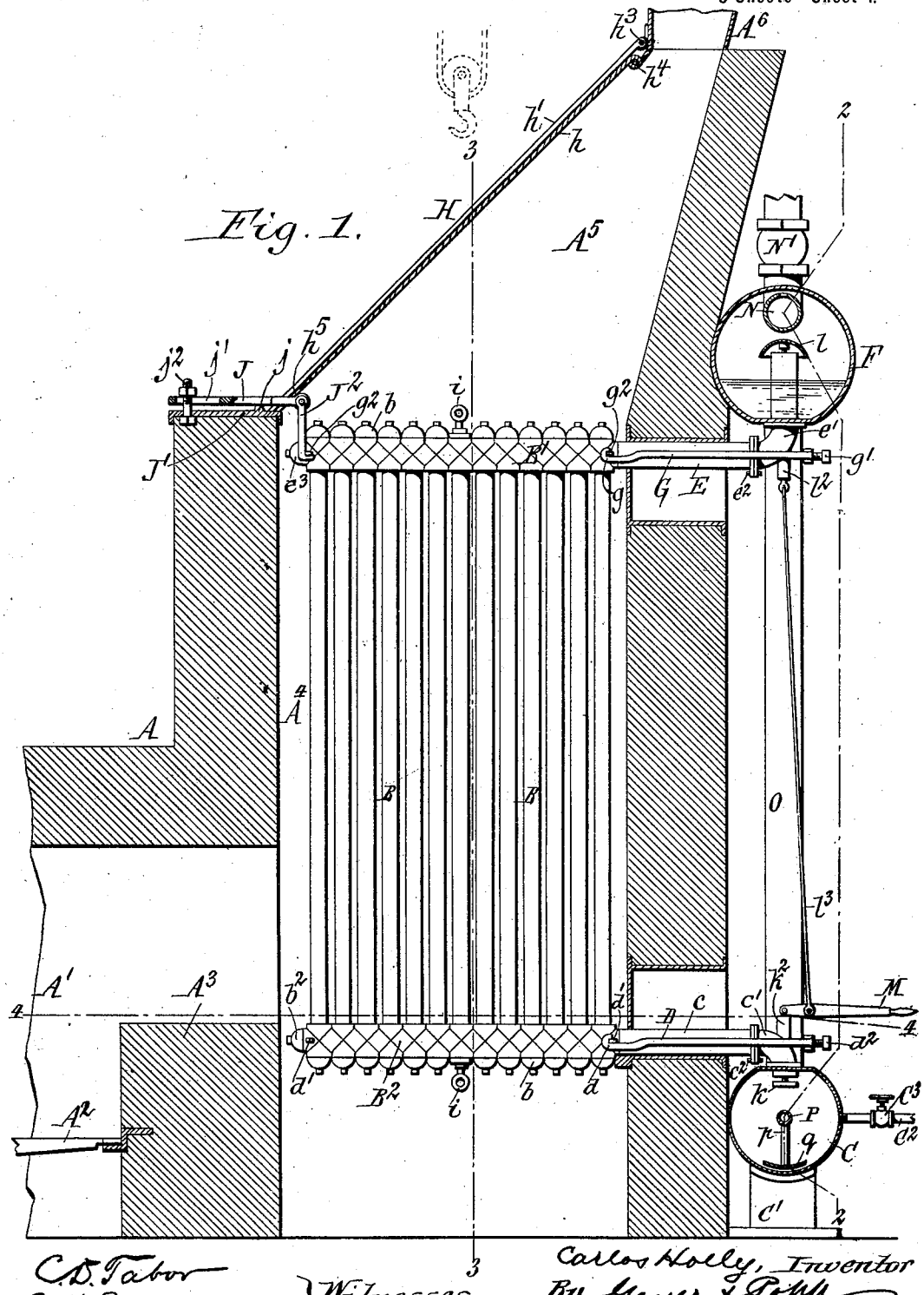
C. HOLLY.

STEAM BOILER.

(Application filed Apr. 11, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



Witnesses.
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Fig. 2.

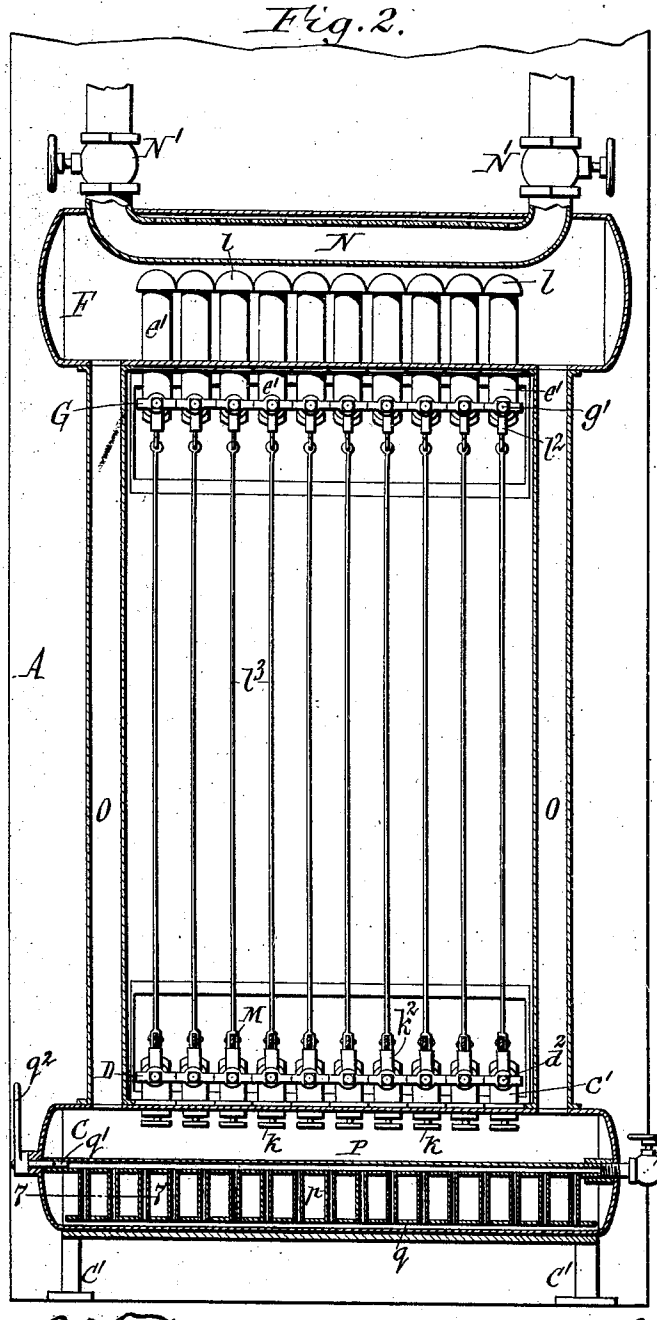
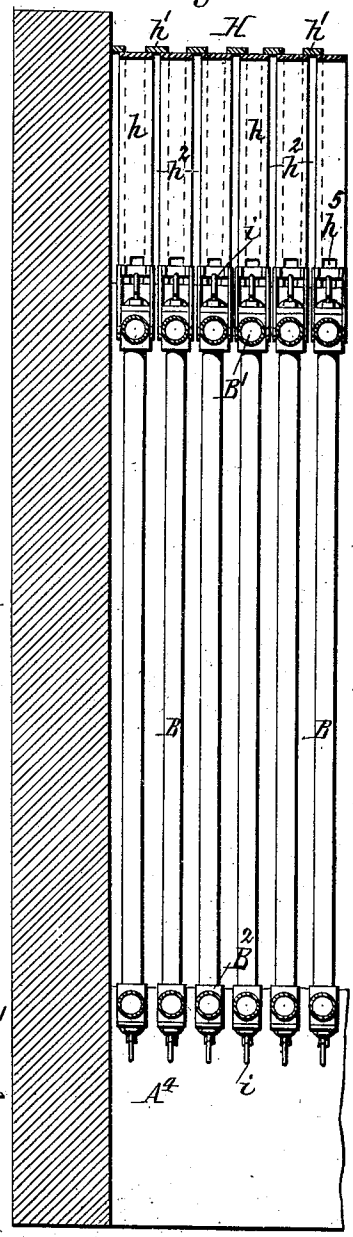


Fig. 3.



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Fig. 4.

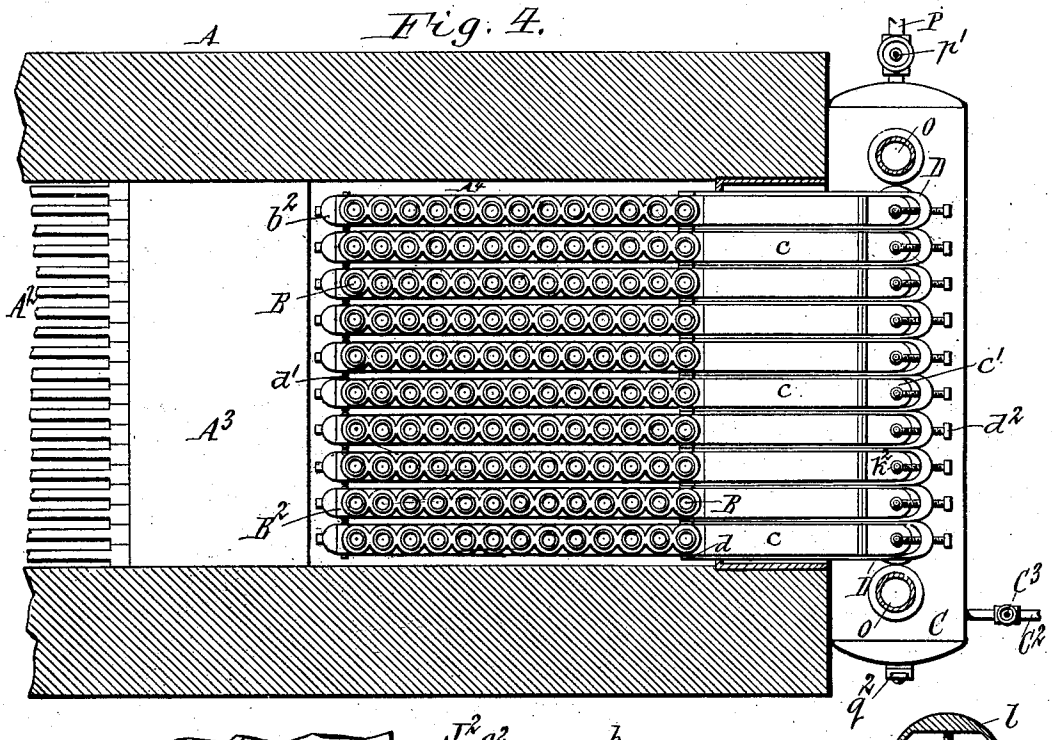


Fig. 5.

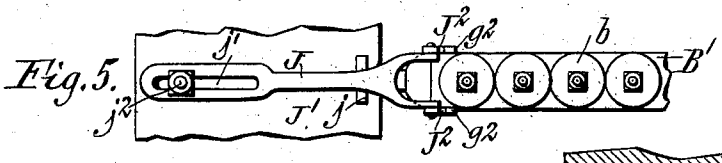
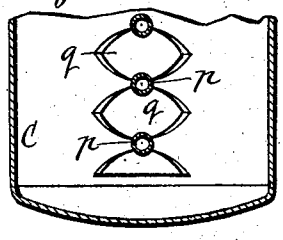


Fig. 6.

Fig. 7.



Witnesses:
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CARLOS HOLLY, OF LOCKPORT, NEW YORK.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 696,240, dated March 25, 1902.

Application filed April 11, 1901. Serial No. 55,359. (No model.)

To all whom it may concern:

Be it known that I, CARLOS HOLLY, a citizen of the United States, residing at Lockport, in the county of Niagara and State of New York, have invented new and useful Improvements in Steam-Boilers, of which the following is a specification.

This invention relates to sectional water-tube boilers.

The principal object of my invention is to so construct the sections and so connect the same with the water-inlet and the steam-outlet that one or more sections can be conveniently and expeditiously removed for cleaning, repairing, or renewing the same without disturbing any of the other sections or their connections, permitting the boiler to remain in uninterrupted use, if desired, while cleaning the same or making repairs.

Another object of my invention is to removably attach the sections to their water and steam connections in such a manner that they can be reversed or interchanged from time to time for bringing different portions of their tubes opposite the fireplace, thus utilizing the entire tube area of the boiler to the best advantage and lengthening its life in a corresponding measure.

In the accompanying drawings, consisting of three sheets, Figure 1 is a fragmentary vertical longitudinal section of a steam-boiler embodying my invention. Figs. 2 and 3 are transverse vertical sections thereof in lines 2 2 and 3 3, Fig. 1. Fig. 4 is a horizontal section in line 4 4, Fig. 1. Fig. 5 is a fragmentary top plan view, on an enlarged scale, of one of the tube-sections and the adjustable hanger which supports its front end. Fig. 6 is a contracted fragmentary vertical section, on an enlarged scale, taken through one of the tube-sections, showing the valves applied to the inlet and outlet of each section. Fig. 7 is an enlarged horizontal section in line 7 7, Fig. 2.

Like letters of reference refer to like parts in the several figures.

A is the boiler-furnace, of masonry or other suitable material; A′, the fireplace; A^2, the grate; A^3, the bridge-wall, and A^4 the heating-chamber, arranged in rear of the fireplace and containing the boiler-tubes, and A^5 the contracted upper portion of the furnace with which the smoke-pipe A^6 is connected.

The boiler consists of independent sections arranged side by side in the heating-chamber and each composed of a row of vertical tubes B, a horizontal steam-manifold B′ connecting the tubes at their upper ends and a horizontal water-supply manifold B^2 connecting the tubes at their lower ends. To afford access to the tubes for cleaning them, the manifolds B′ B^2 are provided opposite the tubes with holes, admitting a suitable cleaner, which holes are closed by removable caps *b*.

The water-manifolds of the several boiler-sections are provided in their rear ends with inlet-passages *b*′, which register, respectively, with the front ends of horizontal water-supply pipes or conduits *c*, extending through the rear wall of the furnace. These supply-pipes are connected at their rear ends with a horizontal mud-drum or main supply-manifold C, arranged on the rear side of the furnace and supported by standards C′ or other means, as shown in Figs. 1 and 2. The water-manifolds are preferably not coupled to the supply-pipes *c*, but simply bear against the same, and each of these pipes is provided with an elbow *c*′, which enters the top of the mud-drum and is secured to the rear end of the pipe by a single bolt c^2, passing through the abutting flanges of the parts, as shown in Fig. 6.

C^3 is the main water-supply pipe, connected with the mud-drum and having a valve C^3.

D represents horizontal yokes or clamps by which the water-manifolds B^2 are clamped against the adjacent ends of the supply-pipes *c* for forming a tight joint between the same and the pipes and at the same time holding the manifolds in place. The yokes D straddle the supply-pipes *c* and are provided at their front ends with hooks *d*, which engage with lugs or pins *d*′, projecting from opposite sides of the water-manifolds and at their rear ends with clamping screws or bolts d^2, which bear against the rear sides of the pipe-elbows *c*′. Upon tightening these clamping-bolts the water-manifolds are drawn firmly against the ends of the supply-pipes *c*.

E represents horizontal steam-exit pipes or

conduits arranged to register with passages e, formed in the rear ends of the steam-manifolds B′, respectively, and extending through the rear wall of the furnace. These exit-pipes abut against the rear ends of the steam-manifolds and are provided at their outer ends with elbows e', which enter the bottom of a steam-drum F, arranged transversely on the rear side of the furnace. The elbows e' are preferably connected with the exit-pipes E by a single bolt e^2, similar to the elbows of the water-supply pipes c, and the steam-manifolds are clamped to said exit-pipes by yokes or clamps G, having hooks g and clamping-screws g', similar to the yokes D of the water-manifolds B^2. The hooks of these upper yokes engage with lugs or pins g^2, projecting from opposite sides of the steam-manifolds.

The bolts c^2 and e^2 serve simply to retain the water-pipes c and steam-pipes E in alinement with their elbows c' and e'. These inlet-pipes c are preferably provided at their inner ends with a packing of copper or other suitable material. By the construction above described these inlet-pipes are rendered readily removable, so that in case the packing of a pipe becomes injured or unserviceable the pipe can be easily removed and replaced by a new one.

The inlet-passages b' of the water-manifolds and the exit-passages e of the steam-manifolds are duplicated at the front ends of the manifolds and normally closed by removable caps or plugs b^2 and e^3, and the pins d' g^2 are likewise duplicated, so that upon removing the caps of a section and detaching the section from the supply and exit pipes c and E it may be reversed either fore and aft or end for end and reattached to said pipes, the removed caps being applied to the passages at the front ends of the reversed manifolds.

In order to reverse the boiler-sections, it is necessary to withdraw them from the furnace after detaching the same from their supply and exit pipes. For this purpose the furnace is provided in its contracted top with a door H, which is preferably hinged at its upper end and rests at its lower end upon the front wall of the heating-chamber A^4, as seen in Fig. 1. Each boiler-section may be provided at its upper and lower ends with eye-bolts i for the attachment of a suitable hoisting-tackle.

The boiler-sections are preferably sustained at their upper front corners by hangers of any suitable construction. The hangers shown in the drawings each consist of a horizontal lever J, loosely fulcrumed between its ends on a cap-plate J′, applied to the top of the front wall of the heating-chamber A^4, and a pair of depending hooks J^2, pivoted by a transverse pin to the overhanging inner end of said lever and engaging with the front pins g^2 of the steam-manifold B′, as shown in Fig. 1. The lever J is free to slide lengthwise on a fulcrum-rib j, formed on the cap-plate J′, and its front arm is provided with a longitudinal slot j' for the passage of a clamping-bolt j^2, which passes vertically through said cap-plate. By this construction the hanger-hooks J^2 can be raised to bear against the pins g^2 by screwing the nut of the clamping-bolt downwardly, while upon unscrewing this nut the hooks are released and the lever can be slid forwardly to withdraw the hooks from the pins preparatory to removing or reversing the corresponding boiler-section. If desired, the pivoted hooks may be folded against the upper side of the lever J before removing a section.

As shown in Figs. 1, 2, and 6, the supply-pipe c and the exit-pipe E of each boiler-section are provided with cut-off valves k and l, respectively, so that when a section is temporarily removed the passage of water and steam through the corresponding supply and exit pipes may be shut off until the section is replaced, thereby preventing the water in the mud-drum C from being expelled through said supply-pipe and the steam in the steam-drum F from escaping through said exit-pipe. These cut-off valves are preferably applied to the ends of the upright pipe branches within the mud and steam drums. The valve k of each water-pipe c is arranged to close upwardly, and its stem k' slides vertically in a bearing k^2, arranged on the elbow c', as shown in Fig. 6, while the valve l of each exit-pipe is arranged to close downwardly, and its stem l' is guided in a similar bearing l^2 on the elbow e'. The two cut-off valves of each boiler-section are connected with a hand-lever M in such manner that both valves are simultaneously opened and closed by the movement of the lever. In the arrangement shown in the drawings these hand-levers are arranged in a horizontal row on the rear side of the furnace and at a convenient height, and the stems of the supply-pipe valves k are pivoted directly to the inner ends of the hand-levers, while the stems of the exit-pipe valves l are connected with the levers by rods l^3, pivoted to the levers between the ends of the latter. The valves k and l are held in their closed position by the pressure in the mud and steam drums C and F; but, if desired, the levers M may be positively held in position by any suitable means.

N is the usual dry-pipe, arranged lengthwise in the upper portion of the steam-drum and provided in its upper side with perforations through which the steam enters the same. The ends of this dry-pipe pass through the top of the steam-drum and are provided outside thereof with the customary hand-valves N′. The dry-pipe is arranged directly over the cut-off valves l of the steam-exit pipes E, and these valves are preferably convex or dome-shaped, as shown, and constructed to overhang the upper ends of said pipes. By this construction each of these valves in conjunction with the upper end of the corresponding exit-pipe performs the additional

function of a steam-separator, the valve intercepting the water of condensation, which latter collects in the bottom of the steam-drum. This water flows into the mud-drum C through vertical pipes or columns *o*, which connect the bottom of the steam-drum with the top of the mud-drum and are arranged at or near opposite ends of the drums.

The upright branches of the steam-exit pipes E preferably extend above the water-level in the steam-drum F, as shown. By this arrangement the steam does not pass through this water and become saturated, but the same is discharged above the water-level, laden only with the water carried over from the water-tubes. Agitation of the water in the steam-drum by the incoming steam is thus avoided, and as the water carried over into the drum by the steam is separated therefrom by the combined valve and separator *l* the steam is discharged from the drum in a practically dry state.

P is a blow-off pipe arranged axially in the mud-drum for draining or expelling the sediment therefrom. This pipe is provided within the drum with a series of depending delivery pipes or nozzles *p*, extending throughout the length of the drum and terminating near the bottom thereof. Outside of the drum this blow-off pipe is provided with a hand-valve *p'*, which is normally closed. When it is desired to blow off the sediment, this valve is opened, whereupon the pressure in the boiler-section expels a portion of the water in the mud-drum through the delivery-nozzles *p* and the blow-off pipe P, carrying off the sediment. The portion of the blow-off pipe within the mud-drum is preferably capable of a rocking movement, and its nozzles *p* are provided at their lower ends with plows or stirrers *q*, which loosen and agitate the mud collected in the bottom of the drum upon rocking the blow-off pipe. In the construction shown in the drawings this pipe turns at one end in a bearing secured to the adjacent head of the mud-drum and is secured at its other closed end to a trunnion *q*, which extends through the adjacent head of the drum and is provided outside thereof with a rock-lever q^2. The plows *q* are curved concentrically with the drum and are preferably tapered toward both ends and pointed, while the delivery-nozzles are arranged centrally between adjacent plows, as shown in Fig. 7. By this construction and arrangement the inwardly-converging edges of the adjoining plows direct the mud toward the mouths of the nozzles *p* as the plows are oscillated, gathering the mud around the nozzles and effectually and completely expelling it.

The door H, through which the boiler-sections are removed, is preferably composed of hinged parallel main leaves or sections *h* and hinged auxiliary leaves or sections *h'*, which cover the joints between the main leaves. The latter are about as wide as the manifolds B' and B^2 of the boiler-sections and arranged in line therewith and are separated by spaces h^2, which register with the spaces between the boiler-sections and through which a cleaner for the water-tubes may be passed. The auxiliary leaves *h'* close the spaces h^2, and the hinge h^3 of these leaves is located at a point above the hinge h^4 of the main leaves, as shown in Fig. 1. The main leaves are provided at their lower ends with recesses h^5 for the passage of the hanger-levers J, as shown in Figs. 1 and 3. By this sectional construction of the door H the auxiliary leaves thereof may be opened one at a time for cleaning the exterior of the water-tubes while the boiler is in use, leaving the remaining auxiliary leaves and all of the main leaves *h* closed, but a slight loss of heat is thus incurred, the draft of the furnace is not materially affected, and the attendant is exposed to the heat as little as possible. In removing a boiler-section it is only necessary to open the main leaf *h* in line therewith and the two auxiliary leaves *h'* resting thereon.

When my improved steam-boiler is in use, the cut-off valves *k l* of the water-supply pipes *c* and steam-exit pipes E are open, the blow-off valve *p'* is closed, and the valve of the main water-supply pipe C^2 is open, feeding water continuously into the boiler. The incoming water passes from the mud-drum C through the several supply-pipes *c* into the water-manifolds B^2 of the boiler-sections and thence rises in the tubes. The steam generated in the tubes and the steam-manifolds B' passes through the steam-exit pipes E into the steam-drum F, when it passes through the dry-pipe N.

When it is desired to remove a boiler-section, the cut-off valves *k* and *l* of its water-supply and steam-exit pipes *c* and E are simultaneously closed by depressing the corresponding hand-lever M. After attaching a suitable hoisting-tackle to the section the latter is detached from its supply and exit pipes *c* and E by loosening the clamping-screws d^2 *g'* of the yokes D G sufficiently to disengage the hooks thereof from the pins *d* g^2 of the section, and the corresponding hanger-lever J is then released by loosening its clamping-bolt j^2 and slid forwardly to disengage the hangers J^2 from the adjacent pins of the section. The section being now wholly detached, the leaves *h h'* of the sectional door located in line with the section which has been previously opened permit the section to be removed through the opening. If the removed section is to be replaced in a reversed position to bring a different portion thereof nearest the fire-chamber, the caps b^2 e^3, which close the duplicate supply and exit passages of the section, are removed and applied to the corresponding open passages at the opposite side of the section. The section is then reversed, either fore and aft or end for end, as desired, and replaced in the furnace with its uncapped supply and exit passages in register with the

corresponding supply and exit pipes *c* and E, after which the yokes D and G are coupled to the section and tightened, the hangers J^2 engaged with the sections and tightened, and the open leaves of the sectional door H are closed.

One or more extra boiler-sections are preferably furnished with the boiler for convenience in cleaning, repairing, and interchanging the sections. After the boiler has been in use for a time the section at one end of the series may be removed and one of the extra sections put in its place. After another suitable interval the second section is removed and the first-removed section, which has been cleaned in the meantime, is substituted for it, this cleaned section being reversed from its former position either fore and aft or endwise before replacing it. After a further interval the third section is replaced by the removed second section, which has been previously cleaned, and so on throughout the series. All of the sections are in this manner shifted or rotated throughout the series periodically and progressively, whereby each section is located in different portions of the furnace at different times and all portions thereof are brought nearest the fireplace in the course of its cycle.

In case a water-tube should burst the attendant not knowing which tube is defective closes the cut-off valves *k l* of all of the boiler-sections. The pressure in the intact sections will open the corresponding cut-off valves as soon as their hand-levers are released; but owing to the reduction of pressure in the leaking section its cut-off valves will remain closed, indicating that that is the defective section. After shutting the valves *k l* of a section preparatory to removing it the same is liable to be burned before it can be removed. To prevent this, the inlet-pipe *c* of each section is provided with a valved by-pass or pipe *r*, which extends from the mud-drum C to the portion of the inlet-pipe outside of the drum and through which water passes from the mud-drum into the section upon opening the valve of the by-pass. When the sections are in their normal condition, the valves of these by-passes may be closed.

In order to prevent burning of a removed section when the same is replaced while the boiler is in use, the inlet-passage *b'* of the section is temporarily closed by a plug or diaphragm *s* of frangible or soluble material, such as paper-board, and a quantity of water is then placed in the section. Upon attaching the section to its inlet and outlet pipes *c* E and opening its cut-off valves *k l* the pressure in the boiler or the water ruptures or otherwise destroys said diaphragm, establishing communication between the mud-drum and the section.

By my improved construction each boiler-section is wholly distinct and independent of all of the other sections, and any section can be readily removed for cleaning, repairing, or reversing it and as readily replaced without necessitating interruptions in the use of the boiler, while the manifold reversibility of the sections permits their capacity for wear and durability to be utilized to the maximum degree, prolonging the life of the boiler to the utmost extent. The hangers J^2 and the inlet and outlet pipes *c* E are also ready of access and removal, as well as the boiler-sections, enabling any of the parts to be removed for cleaning, repairing, or renewing them without disturbing the other parts and permitting the boiler to remain in continuous use.

As the masonry is wholly independent of the boiler-sections, it can be completed independently of the same, and no part thereof is disturbed or requires rebuilding in removing, repairing, or renewing the sections.

The feature of the independent boiler-sections, each having its own water-inlet and steam-outlet pipes, which are provided with cut-off valves, is obviously applicable to a boiler having sections which are permanently secured in the furnace, and I do not therefore wish to be limited to the use of that improvement as applied to removable boiler-sections only.

I claim as my invention—

1. The combination of a boiler furnace or casing, a number of individually-removable boiler-sections arranged in the furnace, each of said sections forming a separate closed water-chamber disconnected at its sides from the adjoining sections and having an inlet and an outlet passage, inlet and outlet pipes or conduits arranged to connect with the inlet and outlet passages of the boiler-sections, and means for removably attaching each boiler-section to said inlet and outlet pipes, substantially as set forth.

2. The combination of a boiler furnace or casing, a number of individually-removable boiler-sections arranged in the furnace, each of said sections forming a separate closed water-chamber disconnected at its sides from the adjoining sections and having an inlet and an outlet passage independent of the corresponding passages of the remaining sections, a pair of inlet and outlet pipes for each boiler-section arranged externally of the section and in register with its inlet and outlet passages, and means for detachably securing each boiler-section to its inlet and outlet pipes, substantially as set forth.

3. The combination of a boiler furnace or casing, a number of individually-removable boiler-sections arranged in the furnace and each having an inlet and an outlet passage independent of those of the remaining sections and both located at the same side of the section, and a separate pair of inlet and outlet pipes for each boiler-section extending through the wall of the furnace, said pipes being arranged side by side and in register with the companion passages of the sections and detachably connected with the sections, substantially as set forth.

4. The combination of a boiler furnace or casing, a number of independent reversible boiler-sections arranged in the furnace, each of said sections forming a separate closed water-chamber disconnected from the adjoining sections and having inlet and outlet passages which are duplicated at directly opposite sides of the section, removable caps or closures applied to the set of inlet and outlet passages at one side of the section, and a pair of inlet and outlet pipes for each boiler-section arranged to register with the uncapped inlet and outlet passages at the opposite side of the section and detachably connected with the section, substantially as set forth.

5. The combination with a boiler furnace or casing, of a number of independent, removable boiler-sections arranged in the heating-chamber of the furnace and each having inlet and outlet passages and attaching pins or projections, a pair of inlet and outlet pipes for each boiler-section arranged to register with the inlet and outlet passages thereof, and clamping-yokes straddling said inlet and outlet pipes and each provided at its inner end with hooks which engage with the pins of the corresponding boiler-section and at its outer end with a clamping-bolt, substantially as set forth.

6. The combination with a boiler furnace or casing, of a number of independent, reversible boiler-sections arranged in the heating-chamber of the furnace and each having inlet and outlet passages and attaching-pins, which passages and pins are duplicated at opposite sides of the section, removable caps or closures applied to the pair of inlet and outlet passages at one side of each section, a pair of inlet and outlet pipes for each boiler-section arranged to register with the inlet and outlet passages thereof, and clamping-yokes straddling said inlet and outlet pipes and each provided at its inner end with hooks which engage with the adjacent pins of the corresponding boiler-section and at its outer end with a clamping-bolt, substantially as set forth.

7. The combination with a boiler-furnace, of a removable boiler-section arranged therein and provided at one side with inlet and outlet passages, inlet and outlet pipes arranged to register with said passages, means for removably attaching the boiler-section to said pipes, and a retractable hanger connected with the top of the boiler-section at the side opposite its inlet and outlet passages, substantially as set forth.

8. The combination with a boiler-furnace, of a removable boiler-section arranged therein and provided at one side with inlet and outlet passages, inlet and outlet pipes arranged to register with said passages, means for removably attaching the boiler-section to said pipes, a hanger detachably connected with the top of the boiler-section at the side opposite its inlet and outlet passages, a lever carrying said hanger at its inner end and capable of sliding on its fulcrum toward and from the boiler-section, and a clamping-bolt applied to the outer arm of the lever, substantially as set forth.

9. The combination with a boiler furnace or casing, of a number of independent boiler-sections arranged in the heating-chamber of the furnace and each having inlet and outlet passages independent of those of the remaining sections, a pair of inlet and outlet pipes for each boiler-section arranged to register with the inlet and outlet passages thereof, means for attaching each boiler-section to its inlet and outlet pipes, and cut-off valves applied to the inlet and outlet pipes of each boiler-section, substantially as set forth.

10. The combination with a boiler furnace or casing, of a number of independent, removable boiler-sections arranged in the heating-chamber of the furnace and each having inlet and outlet passages independent of those of the remaining sections, a pair of inlet and outlet pipes for each boiler-section arranged to register with the inlet and outlet passages thereof, means for removably attaching each boiler-section to its inlet and outlet pipes, and cut-off valves applied to the inlet and outlet pipes of each boiler-section, substantially as set forth.

11. The combination with a boiler furnace or casing, of a number of independent, removable boiler-sections arranged in the heating-chamber of the furnace and each having inlet and outlet passages independent of those of the remaining sections, a pair of inlet and outlet pipes for each boiler-section arranged to register with the inlet and outlet passages thereof, means for removably attaching each boiler-section to its inlet and outlet pipes, cut-off valves applied to the inlet and outlet pipes of each boiler-section and connections between the cut-off valves of each pair of inlet and outlet pipes for simultaneously operating the valves, substantially as set forth.

12. The combination with a boiler furnace or casing, of a number of independent, removable boiler-sections arranged in the heating-chamber of the furnace and each having inlet and outlet passages independent of those of the remaining sections, a pair of inlet and outlet pipes for each boiler-section arranged to register with the inlet and outlet passages thereof, means for removably attaching each boiler-section to its inlet and outlet pipes, cut-off valves applied to the inlet and outlet pipes of each boiler-section, an operating-lever for each pair of said inlet and outlet valves, and connections extending from said valves to said levers whereby the same are operated simultaneously, substantially as set forth.

13. The combination with a boiler furnace or casing, of a number of independent, removable boiler-sections arranged in the heating-chamber of the furnace and each having inlet and outlet passages independent of those

of the remaining sections, a pair of inlet and outlet pipes for each boiler-section arranged to register with the inlet and outlet passages thereof, means for removably attaching each boiler-section to its inlet and outlet pipes, a main supply-chamber or mud-drum connected with all of said inlet-pipes and a steam-drum connected with all said outlet-pipes, substantially as set forth.

14. The combination with a boiler furnace or casing, of a number of independent, removable boiler-sections arranged in the heating-chamber of the furnace and each having inlet and outlet passages independent of those of the remaining sections, a pair of inlet and outlet pipes for each boiler-section arranged to register with the inlet and outlet passages thereof, means for removably attaching each boiler-section to its inlet and outlet pipes, a main supply-chamber or mud-drum connected with all of said inlet-pipes, a steam-drum connected with all of said outlet-pipes and cut-off valves applied to the inlet and outlet pipes of each boiler-section within said mud and steam drums, substantially as set forth.

15. The combination with a boiler furnace or casing, of a number of independent boiler-sections arranged in the heating-chamber of the furnace and each having inlet and outlet pipes independent of those of the remaining sections, and cut-off valves applied to the inlet and outlet pipes of each boiler-section, substantially as set forth.

16. The combination with a boiler furnace or casing, of a number of independent boiler-sections arranged in the heating-chamber of the furnace and each having inlet and outlet pipes independent of those of the remaining sections, a main water-supply chamber or mud-drum connected with all of said inlet-pipes, a steam-drum connected with all of said outlet-pipes, and cut-off valves applied to the inlet and outlet pipes of each boiler-section within said mud and steam drums, substantially as set forth.

17. The combination with a boiler furnace or casing, of a number of independent, removable boiler-sections arranged in the heating-chamber of the furnace and each having inlet and outlet passages, a pair of inlet and outlet pipes for each boiler-section, means for independently attaching each boiler-section to its inlet and outlet pipes, a mud-drum or main supply-chamber connected with the inlet-pipes of the several sections, cut-off valves applied to said inlet-pipes, and valved by-passes or pipes extending from the mud-drum to the portions of said inlet-pipes between their cut-off valves and the boiler-sections, substantially as set forth.

18. A removable boiler-section having inlet and outlet passages, and a plug or diaphragm of readily destructible material applied to its inlet-passage, substantially as set forth.

Witness my hand this 6th day of April, 1901.

CARLOS HOLLY.

Witnesses:
CARL F. GEYER,
THEO. L. POPP.