L. A. CHERRY.

BOILER.

APPLICATION FILED FEB. 24, 1916.

**1,283,668.**

Patented Nov. 5, 1918.

2 SHEETS—SHEET 1.

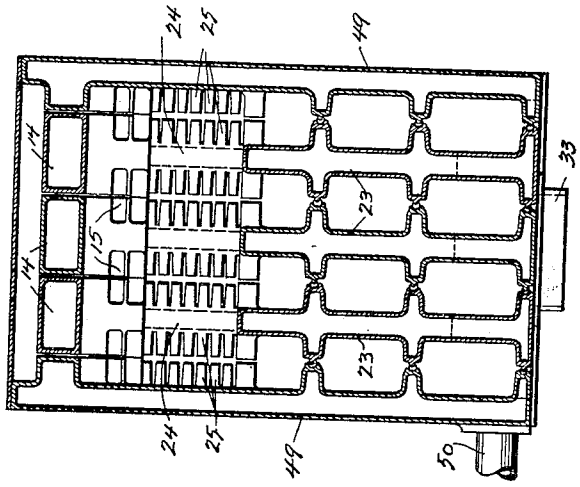


Fig. 2.

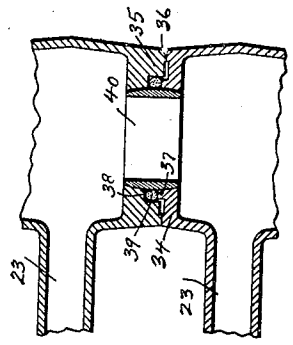


Fig. 5.

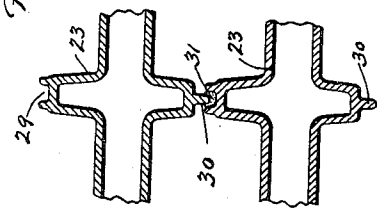


Fig. 4.

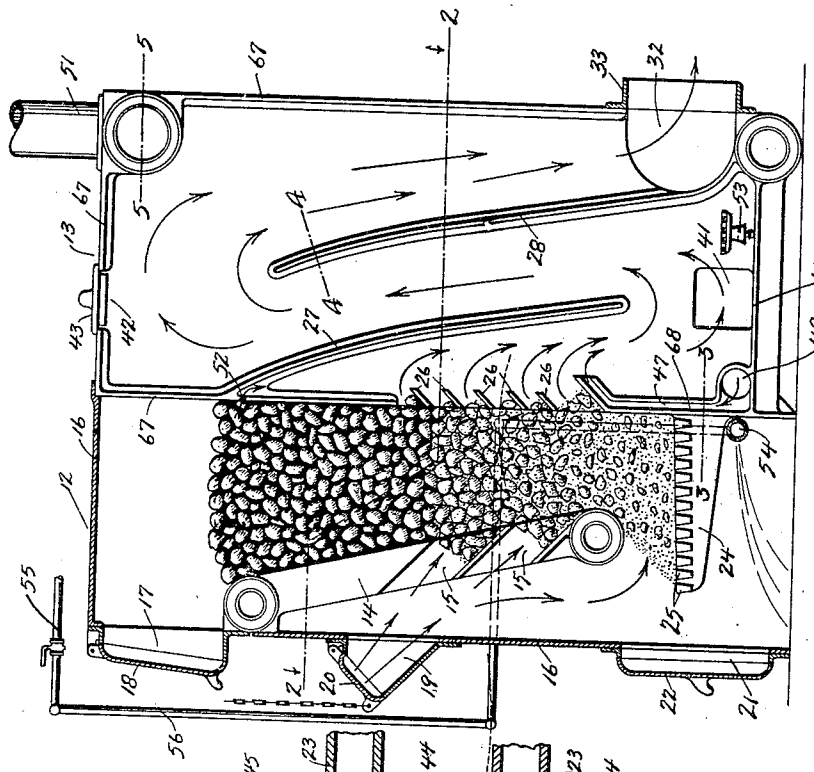


Fig. 1.

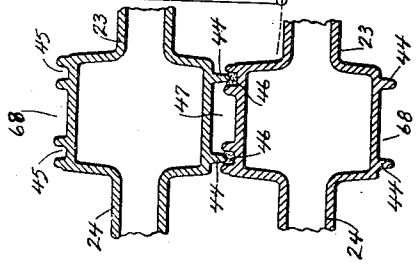


Fig. 3.

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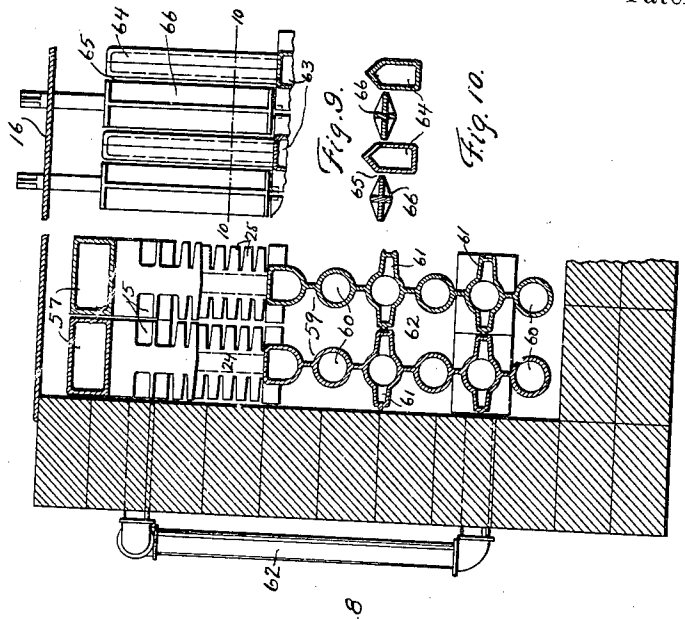


Fig. 8.

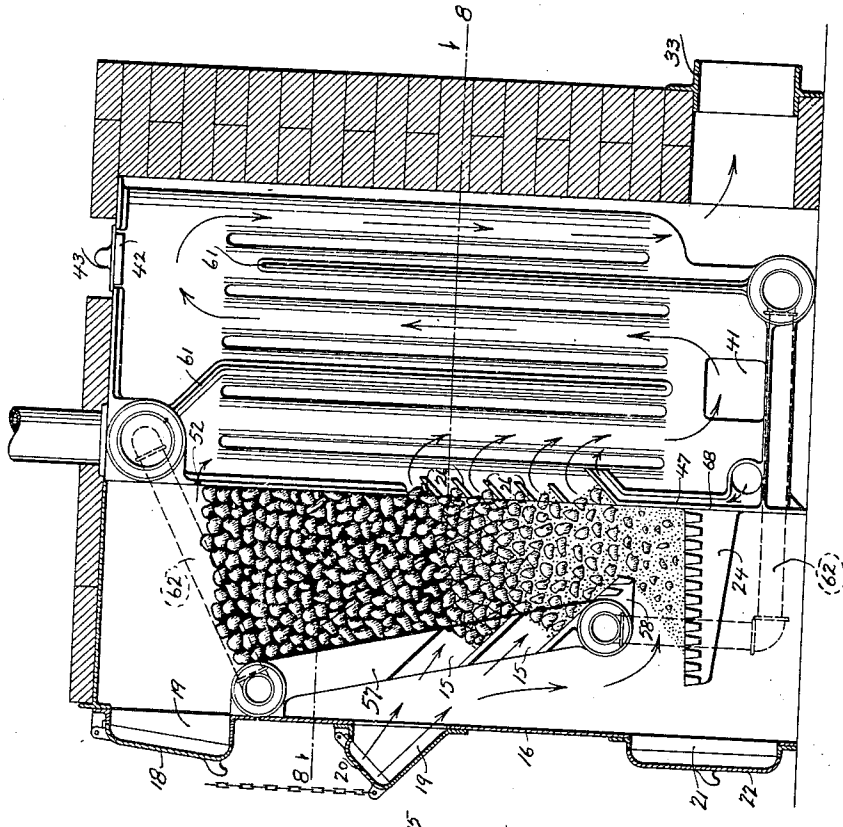


Fig. 7.

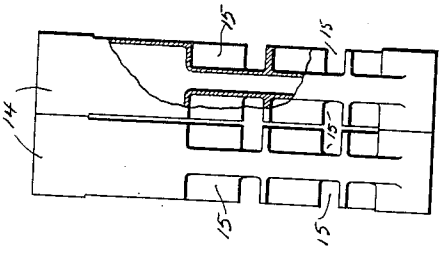


Fig. 6.



Fig. 9.



Fig. 10.

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# UNITED STATES PATENT OFFICE.

LESTER A. CHERRY, OF BUFFALO, NEW YORK, ASSIGNOR TO THOMPSON HEATER CORPORATION, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

## BOILER.

1,283,668. Specification of Letters Patent. Patented Nov. 5, 1918.

Application filed February 24, 1916. Serial No. 80,181.

*To all whom it may concern:*

Be it known that I, LESTER A. CHERRY, a citizen of the United States of America, and a resident of the city of Buffalo, county of Erie, and State of New York, have invented certain new and useful Improvements in Boilers, of which the following is a full, clear, and exact description.

My invention relates generally to boilers, and more particularly to a boiler which has a plurality of vertically arranged sections with flues provided therebetween.

It is well known to those skilled in the art that if a boiler is designed for an eight hour firing period and the user desires to increase the burning period to, say, twelve hours, it is, of course, necessary for him to get a boiler whose furnace will hold fifty per cent. more fuel. The boiler and furnace being inseparable, he must make the boiler also fifty per cent. larger, thus entailing unnecessary expense. Furthermore, the furnaces of the boilers of the present art are so designed that each one will burn but one type of coal. For instance, in one designed for using coarse coal it will be arranged for a unit burning period to have a thick coal bed. Should the user desire to use fine coal, it will be impossible to charge the furnace with the amount of coal necessary to burn for this unit burning period. With the finer coal it will be necessary for him to charge more frequently and to have a thinner bed. If the furnace were charged with the full amount of fine coal, the resistance of the fuel bed to the passage of air would be so great that the chimney would not be able to furnish the necessary draft. On the other hand, if the furnace is designed for a thin bed of coal of fine quality and a coarser coal were used, the passage of air through the coarse fire bed would be excessive, and there would be a large quantity of heat lost up the chimney and a comparatively small quantity utilized in the boiler.

In constructing my boiler, I have sought to overcome these disadvantages and to provide a device wherein the boiler proper shall be separate from the furnace. This construction makes it possible for the user to increase the size of his furnace so as to give him a greater burning period without having to increase the size of the boiler beyond his requirements.

Another object has been to provide a furnace having a vertically arranged fire, and vertically arranged grate members which may be changed in position so as to provide a thin or thick fuel bed. By this construction it is possible to change from one type of coal to another without having to change the size or proportion of the boiler part, and without having the disadvantages above mentioned.

It is well known that when burning soft coal the volatile gases are distilled at the top of the fire where the coal is at low heat, and in order to utilize these gases it is necessary that they be raised to the temperature of ignition. In my device this is accomplished by arranging the flues so that all of the gases coming from the coal are obliged to pass downwardly and thus be mixed with the highly heated gases coming from the incandescent coal. Furthermore, by this construction the formation of smoke is substantially prevented. In boilers of the type where the gases pass upwardly, immediately after leaving the fire, the volatile gases coming off from the top of the fire pass directly through the flues and out of the chimney without being ignited and burned, which results not only in waste, but in the production of smoke.

Another object of my invention has been to provide a construction which shall separate or divide the functions of the ordinary horizontally arranged grate so as to overcome the disadvantages resulting from this construction. It is well known that in the ordinary grate, after the fire has been burning for some time, it becomes covered with ashes and thereby shut off the draft of air which should pass up through the same. I have provided in my device vertically disposed grate members, which are arranged at some point above the coal supporting members, upon which the ashes are formed. These grate members are, therefore, never clogged with ashes, but are always free to supply the fire with the necessary amount of air.

Another object has been to provide a boiler which may be used effectively with either coal or gas and to so arrange the parts that the gas burner may be permanently located in a position where it will not be injured by the heat coming from the coal furnace. In my arrangement, gas or coal may be used either separately or jointly, as desired.

Moreover, my device is so constructed that the unburned volatile gases, the heated gases and the auxiliary supply of air furnishing additional oxygen, all unite and combine at the hottest point of the furnace, thus utilizing, as far as possible, the available heat in the fuel.

Heretofore in boiler construction it has been impossible to effectively and permanently pack the joints between the ribs on the sections forming the flues. In my device, I provide a packing between the sections for the ribs forming the flues, as well as around the edge of the sections, which shall be effective in sealing these joints, as well as being permanent and resilient. By this construction it is not necessary, in any wise, to finish the faces of the sections where they come together, as my packing means is such that it takes care of the inequalities in the sections resulting from inaccuracies when being cast.

Another object has been to provide an improved nipple joint between the sections. It is well known that, at present, tapered nipples are placed in correspondingly tapered apertures in each section and the sections drawn together by means of pressure. In order that the sections may be drawn to a predetermined center, some nipples are drawn up tighter than others, thus causing an undue strain in this part of the boiler. Should a strain from casting occur at this point, it is likely that when the boiler is in use this part will give way. In making the joint between my sections there is no strain produced in these parts, and a resilient packing is used which effectively packs the joint. The construction is such that the resilient packing is not subjected to the pressure of the water or steam contained in the boiler.

The above objects and advantages have been accomplished by the device shown in the accompanying drawings, forming a part of this application. In the drawings:

Figure 1 shows a vertical, sectional elevation of my boiler.

Fig. 2 is a sectional, plan view of Fig. 1, taken on line 2—2 thereof.

Fig. 3 is a fragmentary, sectional view, taken on line 3—3 of Fig. 1, showing the auxiliary air passage.

Fig. 4 is a fragmentary, sectional view taken on line 4—4 of Fig. 1, showing the joint between two sections and the resilient packing.

Fig. 5 is a fragmentary, sectional view taken on line 5—5 of Fig. 1, showing one of the nipple joints between the boiler sections.

Fig. 6 is a front elevation of two of the grate bar members, showing one partly in section.

Fig. 7 is a vertical, sectional elevation of a modified form of my boiler.

Fig. 8 is a fragmentary, sectional plan view of the form shown in Fig. 7, and is taken on line 8—8 thereof.

Fig. 9 is a fragmentary view of a modified form of coal support provided with movable grates.

Fig. 10 is a sectional view taken on line 10—10 of Fig. 9.

Referring now more particularly to Figs. 1 to 6, inclusive, 12 is the furnace part of my device and 13 the boiler part thereof. These parts are formed separately and are fastened together by any suitable and well known means. The furnace part is provided across its front portion with a plurality of water carrying grate members 14. These members are preferably arranged at a slight angle with the vertical line, but may, if desired, be arranged vertically or inclined in a direction opposite to that shown. These grate members are connected together at their ends by a nipple joint shown in Fig. 5 to be described hereafter. The members 14 are provided near their lower ends with recesses or indentations 15 in their sides so that when two members are placed together a plurality of air openings will be provided through which the air for combustion is supplied. The furnace part of my device is surrounded by a suitable casing 16, which is provided on its upper side with a charging opening 17, having a door 18. An opening 19 extends across the front of the furnace casing, preferably near the center thereof, through which the air is supplied for the fire. This opening is provided with a door 20, which is controlled by suitable means, thereby governing the amount of air which passes through the opening 19 to the fire. This opening is so arranged that a bar may be passed down through the recesses 15 in the grate members for the purpose of cleaning the fire. A suitable ash opening 21 and door 22 are provided. Through the ash opening 21 the ashes and clinkers may be drawn into the ash pit. This casing 16 of the furnace is placed against the front of the boiler part 13 of my device, and the coal magazine and fire bed are thus formed between the front of the boiler part 13 and the grate members 14.

The boiler part 13 of my device comprises a plurality of boiler section 23. Each of these sections is provided with an outwardly projecting coal supporting member 24, which is preferably cast integral with the section and provided with a water way. Each of the members 24 is preferably provided with a plurality of laterally extending fingers 25. At the front of each boiler section 23 is provided a plurality of louvers 26, which are arranged to come opposite the burning zone and are angularly disposed so that openings will be provided for the draft and at the same time prevent coal from falling into the boiler flues.

A downwardly extending rib 27 is provided on each section, starting from a point near the upper part of the front portion of the section and extending down to a point near the bottom of the boiler. In the front wall of each section, immediately beneath the point where the rib 27 meets it has an opening 52, through which any gases, which may collect in the upper part of the magazine, may escape and thence be deflected downwardly by the rib 27. Another rib 28 extends from the lower rear portion of each section upwardly toward the top of the boiler. These ribs are formed on opposite sides of each section; one is provided with a groove 29 (see Fig. 4) and the one on the opposite side with a ridge 30. When assembled, the ridge 30 on one section will engage with the groove 29 on the other section. Before assembling, a resilient packing 31 is placed within each groove 29 with which the ridges 30 engage when the sections are drawn into place. The outer edges 67 of each boiler section 23 is also provided with the ridge and groove packing means shown in Fig. 4.

The lower front edge portion 68 of each boiler section is provided with a plurality of similar ridges 44 on one side and a like plurality of registering grooves 45 on the opposite side. Resilient packing 46 is placed in these grooves, thus packing these joints and providing a passage 47 between adjacent boiler sections. This passage 47 connects, at the bottom of each section, with an opening 48, which acts as a header to supply additional air to each of the passages. These passages extend upwardly and inwardly and discharge at a point where the gases coming from the fire are the hottest. The air thus supplied mixes with the heated gases and at the same time assists in mixing the burning and unburned gases from the fire. At the rear of the sections is a lateral flue 32, which connects all of the flues formed between the sections, and conveys the gases to the smoke outlet collar 33.

Each of the boiler sections is connected together by a nipple joint like that hereinbefore referred to and clearly seen in Fig. 5. A hub 34 is provided on the boiler section which is at one side of the joint, and a hub 35 is provided on the adjacent boiler section which is on the opposite side of the joint. The surfaces 36 of the hubs 34 and 35 are machined and the hub 34 is provided with a short annular rib 37, which engages with an annular groove 38 formed in the hub 35. Within the groove 38 is placed a strip of resilient packing 39 and after the nipple 40 is placed within the tapered openings, through the hubs 34 and 35, the sections are drawn up in place. In my device I do not depend solely upon a tight fit between the nipple and the openings, this nipple acting more as guide for registering the sections. The packing 39 serves to securely pack the joint against leakage, and after use the nipple 40 will become rusted and tightly fitted into position. It will be seen that this joint is so designed that the packing 39 is protected from the boiler pressure, which would tend to blow it out.

Near the bottom of each of the boiler sections is arranged an opening 41, which provides means for cleaning the lower portion of the flues. Another clean out opening 42 is provided at the top of each section, and is closed by means of a cover 43.

My device is provided at each end with a water casing 49, which extends over both the boiler part and the furnace part, thus forming the two ends of the fire box. Each of these casings is provided with water spaces and on their inner surfaces the necessary ridges for connecting with the ridges of the end sections, thus forming flues. Ridge portions are also provided which register with the grate members 14, and one of these casings is provided with a water inlet 50. 51 is a water or steam outlet connected with one or more of the boiler sections 23.

When manufactured, the grate members 14 of my boiler are adjustably placed in the necessary position to burn the desired kind of coal. These grate members are connected at each end with the water spaces in the water casings 49.

In Fig. 1, 53 is a gas burner, one being located within the flues between each pair of the adjacent sections of my boiler. These burners are located in a position where they will be efficient when used and yet be out of the range of the fire or hot gases coming therefrom. They are thus protected from injury and will last indefinitely.

My boiler is preferably provided with an ash sprinkler 54, which is pivotally mounted close to the boiler sections and beneath the coal supports 24. It is connected with a water supply pipe 55 by means of piping 56, which is arranged with three flexible joints so that it may be moved in and out, thus causing the sprinkler 54 to be oscillated and thereby cover the entire ash pit.

Referring now to Figs. 7 and 8, I show a modification of my boiler which is designed to have tubular sections instead of the flat sections shown in the other form. This form also embodies a construction in which the end water sections have been dispensed with and center sections only are used, the whole being surrounded at the back and sides with brick work.

The grate members 57, as shown, in this form are each preferably provided at their lower ends with an inwardly extending toe 58, which decreases the width of the throat at the bottom of the fire. The sections 59 in

this form are in the shape of tubes 60 for carrying the water. Each section is provided with ribs 61, and has grooved and ridged joints like the other form hereinbefore described. The water carrying tubes 60 in this form, are united by means of a web 62. In this form of my device, the grate members 57 are connected with the boiler sections 59 by means of piping 62.

Referring now to Figs. 9 and 10, (where I show a modified form of coal support) 63 represents the boiler sections, each of which is provided with an outwardly extending coal support 64. These supports are of such a width as to provide a space 65 therebetween. In this space is arranged a movable grate member 66 for the removal of ashes and clinkers.

If desired, the coal supports 24 may be made separate from the boiler sections, or they may be entirely dispensed with and movable grate members provided in their place.

These and other modifications of the details herein shown and described may be made without departing from the spirit of my invention or the scope of the appended claims, and I do not wish to limit myself to the exact embodiment herein shown and described.

Having thus described my invention, what I claim is:

1. The combination of a boiler comprising a plurality of vertically arranged sections, and a furnace for heating said boiler sections separably united therewith, each boiler section comprising a downwardly extending rib which starts from and connects with the front portion of the boiler section and extends toward the bottom and in front of the flue opening in the furnace portion, the ribs of adjacent sections being in contact, one with the other, to form flues for the products of combustion, whereby the products of combustion from the furnace are directed downwardly.

2. The combination of a boiler comprising a plurality of vertically arranged sections, and a furnace for heating said boiler sections separably united therewith, each boiler section comprising a downwardly extending rib which starts from and connects with the front portion of the boiler section and extends toward the bottom and in front of the flue opening in the furnace portion, and a second rib extending upwardly from the rear portion of each boiler section toward the top, the ribs of adjacent sections being in contact, one with the other, to form flues for the products of combustion, whereby the products of combustion from the furnace are directed downwardly.

3. The combination of a boiler comprising a plurality of vertically arranged sections, a furnace for heating said boiler sections separably united therewith, each boiler section comprising a downwardly extending rib which starts from and connects with the front portion of each boiler section and extends toward the bottom and in front of the flue openings in the furnace portion, the ribs of adjacent sections being in contact, one with the other, to form flues for the products of combustion, and means for introducing fresh air near the bottom of the boiler sections and directing it upwardly to a point above the lower edge of said downwardly extending rib, whence it is admitted into the flues of the boiler sections.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

LESTER A. CHERRY.

Witnesses:
J. Wm. Ellis,
Walter H. Kelley.