March 24, 1931. A. G. CRIPPS 1,797,756

HEATING BOILER

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FIG. 1.

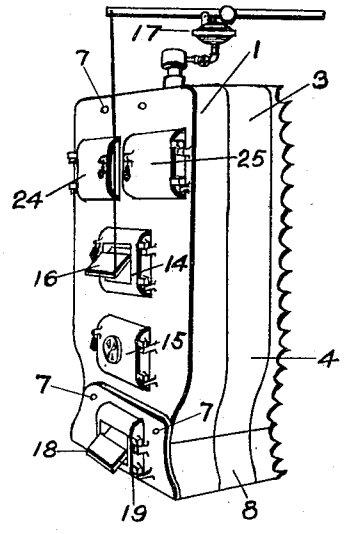
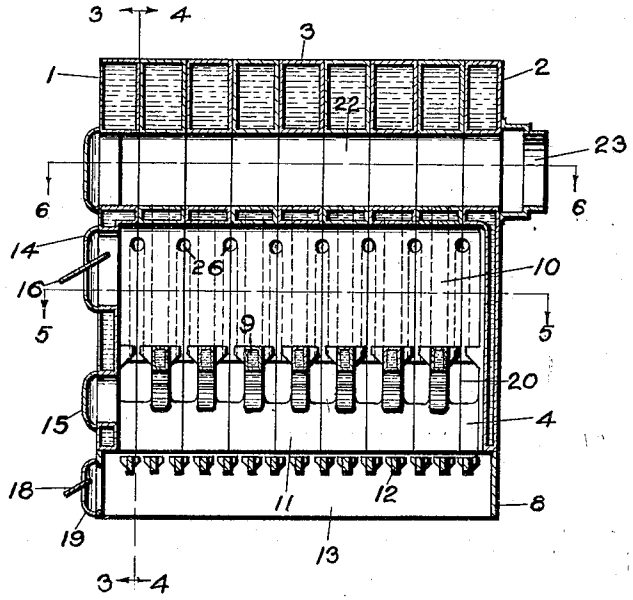


FIG. 2.



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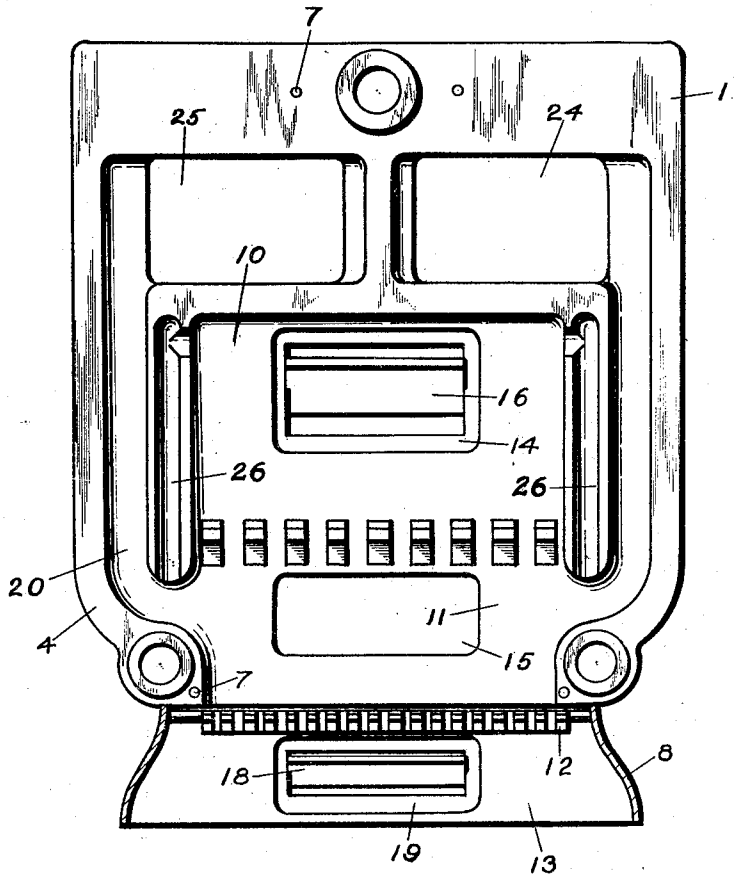
Attorney

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HEATING BOILER

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FIG. 3.



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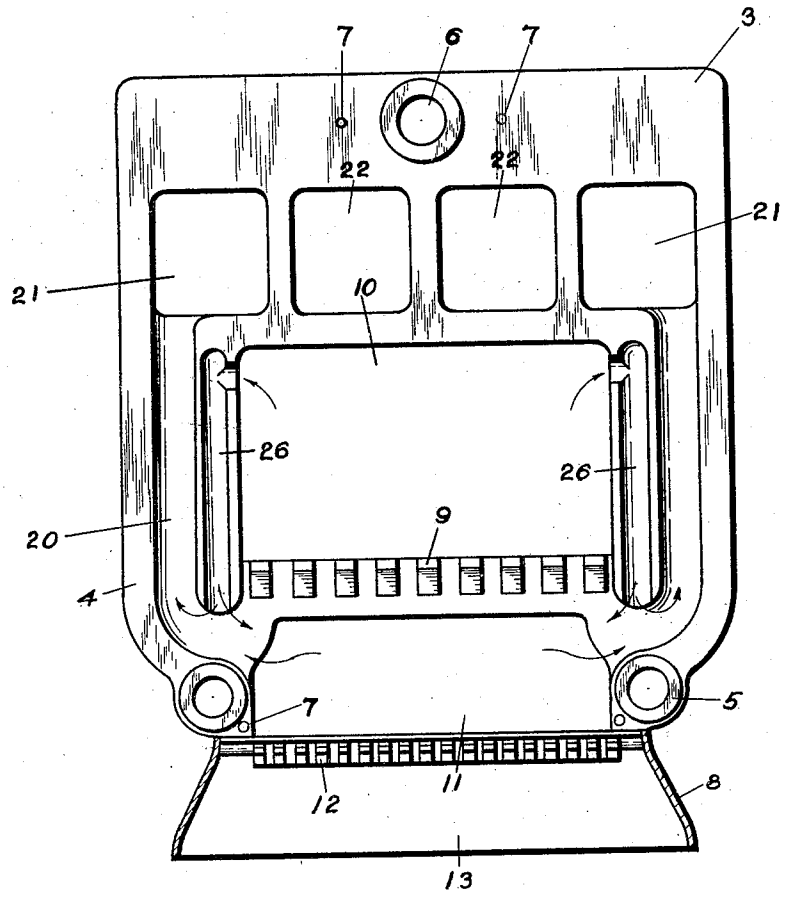
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HEATING BOILER

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FIG. 4.



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HEATING BOILER

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FIG. 5.

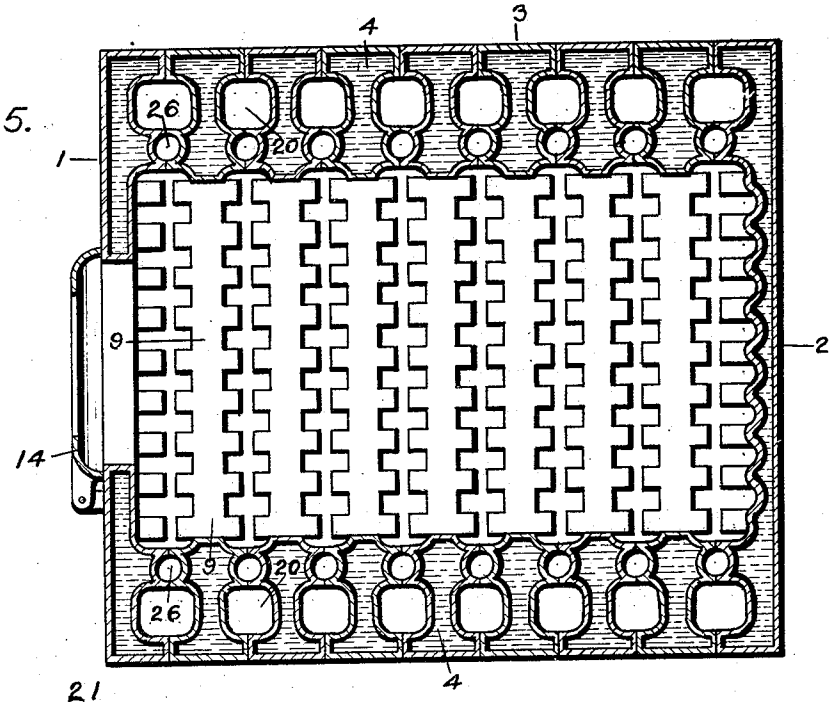
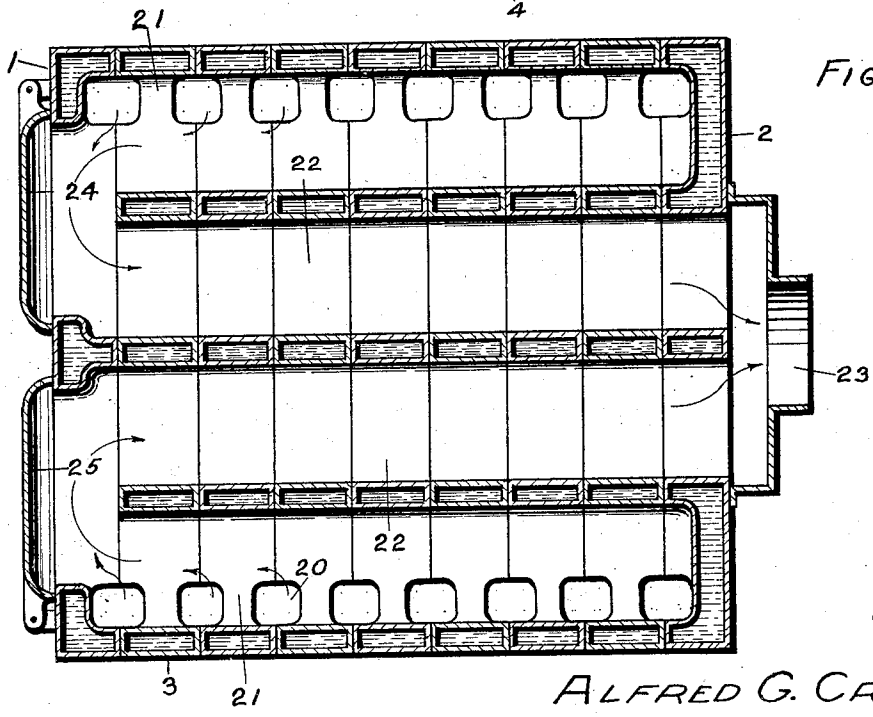


FIG. 6.



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Patented Mar. 24, 1931 1,797,756

UNITED STATES PATENT OFFICE

ALFRED G. CRIPPS, OF INDIANAPOLIS, INDIANA

HEATING BOILER

Application filed March 21, 1929. Serial No. 348,927.

This invention relates to sectional heating boilers for heating liquids and it is a feature of this invention to provide a boiler structure having an upper and lower combustion chamber, with means for conducting air into said boiler above the fuel in the upper combustion chamber and below the fuel in the lower combustion chamber, together with means for conducting a supply of air from the upper combustion chamber, between the walls of the boiler sections, and into contact with the products of combustion issuing from the lower combustion chamber.

Other objects and advantages will be hereinafter more fully set forth and pointed out in the accompanying specification.

In the accompanying drawings which are made a part of this application,

Figure 1 is a fragmentary perspective view of a boiler structure showing the air regulating means therefor.

Figure 2 is a vertical longitudinal sectional view through the boiler structure.

Figure 3 is an elevational view of one section of the boiler structure as seen from line 3—3, Fig. 2.

Figure 4 is a similar view of another section of the boiler as seen from line 4—4, Fig. 2.

Figure 5 is a horizontal sectional view through the boiler as seen from line 5—5, Fig. 2, and,

Figure 6 is a similar view as seen along line 6—6, Fig. 2.

Referring to the drawings in which similar reference numerals designate corresponding parts throughout the several views, the numerals 1 and 2 designate the front and rear sections of a boiler structure and 3 the intermediate sections, all of which, when combined, form a complete boiler structure.

Each boiler section has a pair of hollow legs 4 through which liquid is adapted to circulate, the various sections having registering nipple openings 5 and 6 so that a uniform circulation and pressure will be maintained throughout the extent of the boiler structure. The several sections constituting the boiler are connected together, face to face, in any suitable manner, as by means of tie rods 7 and when so assembled, they are rested on a supporting base member 8, which forms an ash pit for the boiler.

Extending transversely of the sections 3 of the boiler structure and between the leg portions 4 thereof and preferably integral therewith, are hollow grate forming bars 9, which are less in width than the width of the water legs 4 so that partially consumed chunks of coal will pass between the grate bars upon agitation of the bed of coals resting thereon, said grate bars 9 separating the hollow space between the water legs into an upper or primary combustion chamber 10 and a lower or secondary combustion chamber 11.

The particles of coal descending between the grate bars 9 are caught by grate bars 12 positioned at the lower extremity of the secondary chamber 11, said bars being supported at the upper edge of the base member 8, said bars 12 being arranged in close proximity to each other so as to retain the finer particles of coal descending thereon until such particles have been consumed and converted into ashes, any suitable means (not shown) being provided for rocking the grate bars 12 for depositing the ashes and any unconsumed particles into the ash pit 13.

The forward section 1 is provided with doors 14 and 15 through which access may be had to the interior of the combustion chambers 10 and 11 respectively, the door 14 to be opened for introducing fuel into the chamber 10 and the door 15 to be opened for introducing fuel into the chamber 11 when and if found necessary. In order to cause a draft to pass downwardly through the fuel on the grate bars 9 and into the chamber 11, a draft damper 16 is provided in the door 14, the opening and closing of which is preferably controlled by means of regulator 17. By introducing the air to the chamber 10 above the fuel, a down draft is provided for the chamber 10, while by placing a damper 18 in the door 19 for the ash pit 13, an up draft will be formed through the chamber 11.

The products of combustion are conveyed from the combustion chamber 11 to the upper portion of the boiler structure through flues

20, which are formed by providing companion registering recesses in the meeting faces of the various sections of the boiler, the lower ends of the flues communicating with the chamber 11 at a point immediately below the grate bars 9 and at the upper extremity of the chamber 11, while the upper ends thereof communicate with registering openings in the upper portions and at the outer edges of the boiler sections, which, when the sections are united, form ducts 21.

The ducts 21 are closed at the rear end of the boiler structure so that the products of combustion are compelled to travel to the forward end of the boiler where they pass into intermediate ducts 22, which communicate with a flue opening 23 at the rear end of the boiler construction. As the ducts 21 and 22 extend to the front face of the forward section 3, a connecting passage between the ducts 21 and 22 is formed by hinging concave doors 24 and 25 to the front face of the section 1, one door forming a connection between one set of the ducts 21 and 22 and the other door forming a connection between the other set of ducts 21 and 22. These doors also provide means for gaining access to any of the ducts for cleaning or other purposes.

As a volume of smoke, containing unconsumed products of combustion, would under ordinary conditions be carried out through the various flues and ducts, with a consequent result of emitting dense smoke as well as loosing the heating units thus wasted, means is provided for re-supplying the products of combustion with oxygen, comprising ports 26 which are formed by providing registering recesses in the meeting faces of the various boiler sections, said ports extending from the upper portion of the chamber 10 to the flues 20 substantially at the point of entrance of the flues into the chamber 11. It will thus be seen that a portion of the air admitted through the damper 16 in the door 14 will enter the ports 26 and pass downwardly and discharge into the escaping products of combustion at the instance of its entering the lower ends of the flues 20, thus causing the unconsumed particles to be again ignited and be burned as they pass upwardly through the flues and into the ducts.

This not only consumes the particles of combustible material which would be otherwise lost, but gives added heating qualities as well as consuming the most of the smoke producing products, thus permitting the use of bituminous and cheaper grades of coal without the resultant disagreeable effects.

What I claim is:

1. In a heating boiler, a plurality of water receiving sections joined together, water receiving leg portions associated with said sections, means for dividing the space between said leg portions into an upper and lower combustion chamber, flues for conducting the products of combustion from the lower combustion chamber, upwardly between said sections, means for admitting air to the upper combustion chamber and above the fuel therein, and means for directing a portion of said air downwardly between said sections and discharge the same into the products of combustion as they leave the lower combustion chamber.

2. In a heating boiler, a plurality of hollow water receiving sections, legs depending therefrom, grate bars between said leg portions dividing the space therebetween into an upper and a lower combustion chamber, means for admitting air to the upper combustion chamber for causing a down draft through the fuel, means for conveying the products of combustion from the lower combustion chamber, and means for conveying air from the upper portion of the upper combustion chamber between the walls of said leg portions and into contact with the products of combustion emitting from the lower combustion chamber.

3. In a heating boiler, a plurality of hollow water receiving sections, hollow water receiving leg portions depending therefrom, grate forming bars extending transversely between the leg portions forming an upper and a lower combustion chamber, means for conducting air into the upper chamber above the fuel therein and causing a down draft through such fuel, means for admitting air below the lower combustion chamber for causing an upward draft through the fuel therein, and means for conducting heated air from the upper portion of said upper combustion chamber between the walls of said leg portions and commingling the same with the products of combustion emitting from the lower combustion chamber.

4. In a heating boiler, a plurality of sections secured together face to face, said sections having depending leg portions forming a space, grate bars for dividing said space into an upper and lower combustion chamber, said sections and leg portions having flues formed in their meeting faces for conveying products of combustion from the lower combustion chamber, ports extending from the upper portion of the upper combustion chamber to and in communication with the flues substantially at their point of connection with the lower combustion chamber, and means for admitting air to the upper combustion chamber at a point above the fuel therein.

In testimony whereof I have signed my name to this specification.

ALFRED G. CRIPPS.