

Aug. 30, 1932.

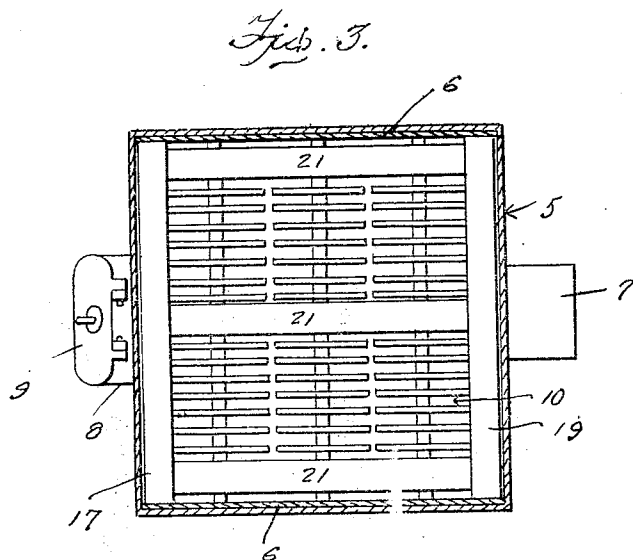
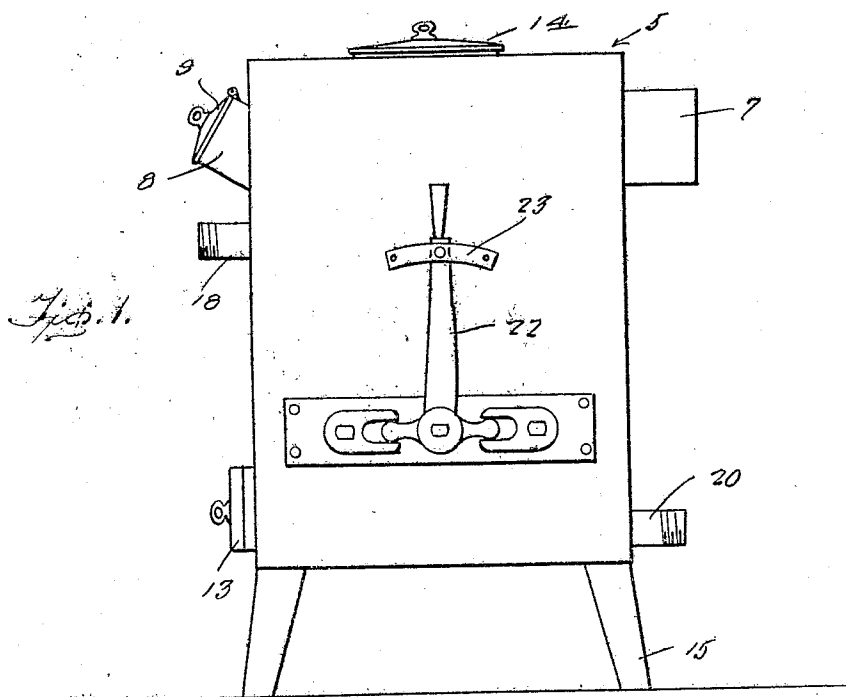
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1,874,602

HOT WATER CIRCULATING UNIT

Filed Jan. 31, 1931

2 Sheets-Sheet 1



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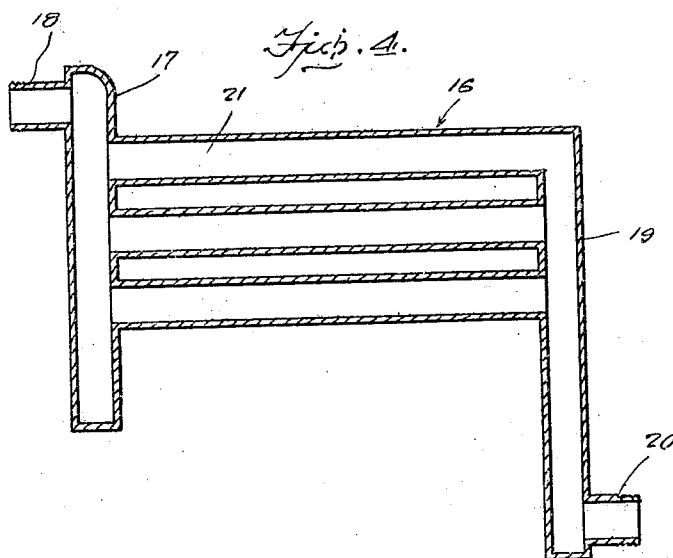
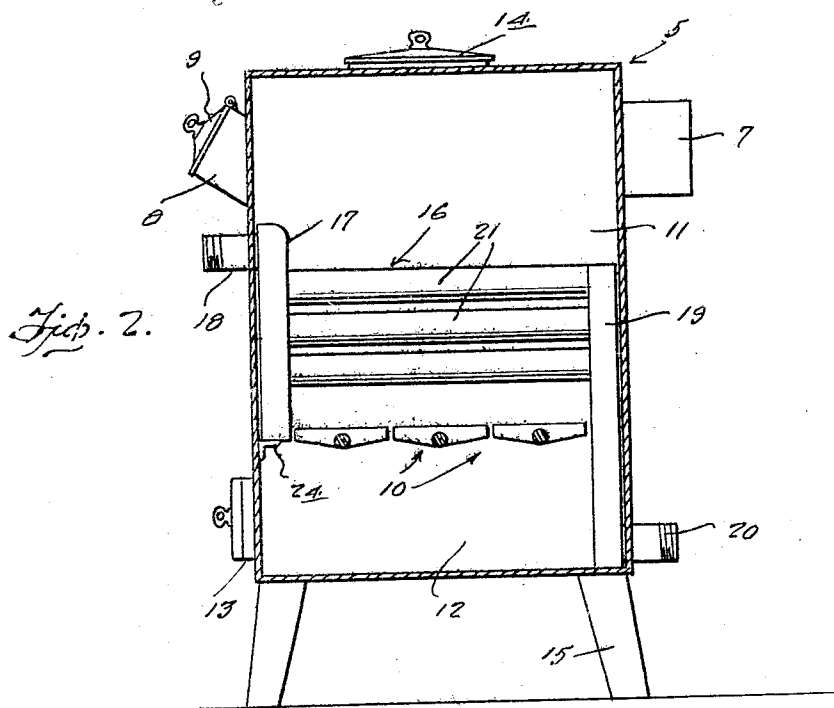
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HOT WATER CIRCULATING UNIT

Filed Jan. 31, 1931

2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

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## HOT WATER CIRCULATING UNIT

Application filed January 31, 1931. Serial No. 512,694.

This invention relates to a circulating unit which is designed to be used in connection with hot water heating systems of the type employing boilers as the principal source of heat, whether they be of the coal, wood, or oil heated type.

The invention, however, is primarily designed for use and association with a boiler employing coal, including a grate, and ash compartment beneath the grate, and a firebox above the grate.

The purpose of the invention is to provide a simple, and economical unit susceptible of expeditious installation and removal, and constructed to permit the circulating tube to be embedded directly in the bed of the fire.

More specifically stated, the invention involves the construction and provision of a bodily applicable and removable unit including end headers and circulating tubes therebetween, wherein said headers are constructed to fit in a practical way in the firebox and ash receptacle to provide for a uniform distribution of strain and stress, and to afford an appropriate circulation of the water.

In the drawings:

Figure 1 is a side elevational view of a boiler embodying the invention.

Figure 2 is a vertical sectional view thereof through with the circulating unit in elevation.

Figure 3 is a horizontal sectional view.

Figure 4 is a vertical sectional view through the unit per se.

As shown in Figure 2 for example, the boiler is generally designated by the numeral 5 and is of appropriate or suitable construction. If desired, it may include a single wall and internal lining sheets 6 as shown in Figure 3.

At the back and near the top is a smoke outlet or chimney connection 7. At the front is a hopper 8 having a suitable hinged closure 9 to facilitate insertion of fuel. The numerals 10 designate the oscillatory or rotary grates which are mounted in ensemble formation. These are disposed at a point within the interior of the boiler to define the upper combustion chamber 11 and the lower ash receptacle 12.

The ash door is indicated at 13. The

cleanout cover is represented at 14 on the top. The boiler may be provided with or without supporting legs 15. The improved boiler tube circulating unit is generally designated by the numeral 16 and as before stated, the primary or major part thereof is confined within the compartment or firebox 11 and is spaced above the grate 10 and submerged within the burning coals (not shown) of the fire bed.

The numeral 17 designates the front header having a circulating pipe connection or nipple at 18. Arranged in parallelism to this and spaced therefrom is a rear header 19 having at its bottom a similar pipe connection 20. The horizontal tubes are distinguished by the numeral 21 and are arranged in vertically spaced superposed relationship with the grate in a plurality of vertical rows as shown in Figure 3 to provide space to accommodate the fuel therebetween and obtain the greatest extent of heating contact by the fuel.

It will be observed that a portion of the header 19 extends below the lower-most tube and depends into the ash pit 12 and rests on the bottom of the boiler. This is for support and distribution of strain and stress. The bottom of the front header 17 rests on a ledge or supporting bracket 22 and terminates on a plane substantially even with the grate 10.

The numeral 22 merely designates the shaker lever and 23 the retaining segment or fixture therefor. The grate and operating construction however constitutes no part of the novelty of the invention, except in combination with the circulating unit.

As before stated, the gist of the invention is in providing a circulatory device 16 characterized by front and rear spaced parallel hollow headers joining together the vertical rows of tubes 21 in proper spaced relation above the grate 10 and providing that the lower portion of the header 19 rests on the floor or bottom of the boiler casing and further providing that the front header 17 be supported on the bracket 24, so as to be positioned outwardly of the adjacent rotatable grate element and between this element and the front wall of the boiler casing.

The feature of the invention is this: the rows of tubes 21 are in vertically superposed and spaced relationship with respect to each other, the individual rows being laterally spaced from each other so that there is provided receptacles or pockets between the rows to receive portions of the fuel deposited on the grate and to provide that the tubes themselves will be submerged in the burning fuel when it is ignited, so as to obtain the full benefit of heat thereof by direct contact with the fire.

In carrying the invention into practice, I have evolved and produced a simple and economical arrangement which is susceptible of easy application and removal and which, it is believed, fulfills the requirements of a device of this class in a highly satisfactory manner, promotes free circulation, and more efficient and constant heating of the circulating water.

It may be observed that the upper end portion of the header 17 is extended slightly above the uppermost tube 21, whereas the corresponding end portion of the rear header 19 terminates in a plane substantially even with said tube. This is to promote free circulation of fluid.

It is thought that the description taken in connection with the drawings will enable a clear understanding of the invention to be had. Therefore, a more lengthy description is thought unnecessary.

While the preferred embodiment of the invention has been shown and described, it is to be understood that minor changes coming within the field of invention claimed may be resorted to if desired.

I claim:

1. In a structure of the class described, in combination, a boiler comprising a casing, fire grates supported in said casing and defining an underlying ash pit, and an overlying fuel compartment or firebox, a water circulating unit comprising front and rear vertical headers, and horizontal vertically spaced circulating tubes in communication with said headers, the lower portion of the rear header projecting down into said ash pit and resting on the bottom of the casing and provided with a pipe connection, the front header being supported so as to have its lower end substantially on a level with said grate and provided at its top with a pipe connection, and means for introducing fuel into said casing arranged at a point above the front header.

2. A structure of the class described, comprising a boiler, comprising a hollow casing, a plurality of rockably mounted grates in the casing, operating means for the grates, the grates being arranged in the casing so as to define a fire box and an ash receptacle thereunder, means permitting access to the said ash receptacle, a smoke-stack connection on the casing communicating with the fire box; a

bracket on the interior of the casing on a level with the grates, a fluid circulating unit carried on the bracket, said unit comprising a vertical front header having its lower end rested on the bracket, a pipe connection with the upper end of the front header and projecting through and exteriorly of the casing, a vertical rear header, a depending portion on the said rear header located between the grates and the rear wall of the casing, and extending into said ash receptacle so as to rest its lower end upon the bottom of the ash receptacle, a plurality of vertically spaced water circulating tubes connected with said headers in vertically superposed spaced relationship, so as to provide fuel spaces therebetween, and means in the casing above the front header for introducing fuel into the fire box and about said circulating tubes.

In testimony whereof I affix my signature.  
HENRY MORTON OWEN.

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