

(No Model.)

G. H. RANDOLPH.  
FURNACE GRATE BAR.

No. 524,468.

Patented Aug. 14, 1894.

FIG. 1.

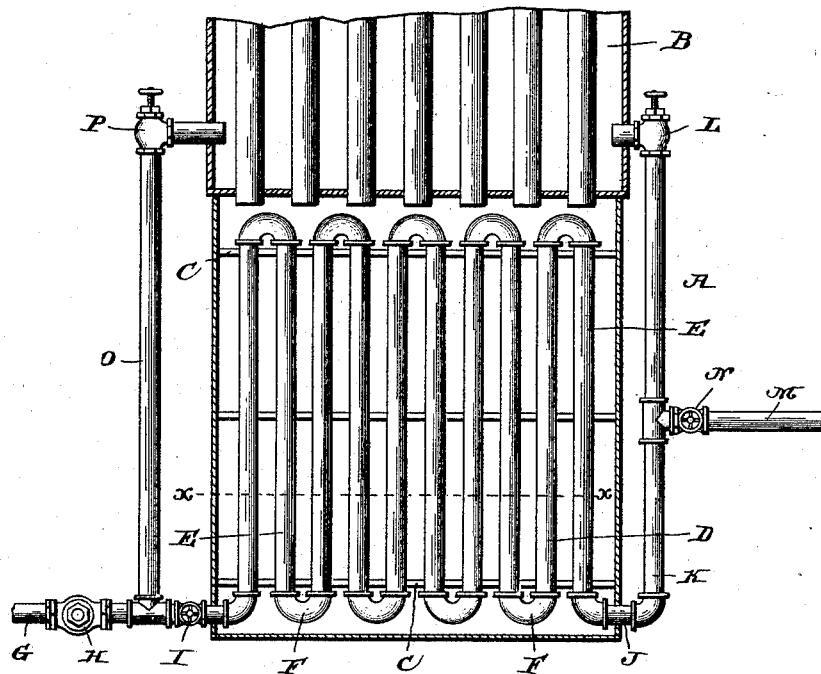
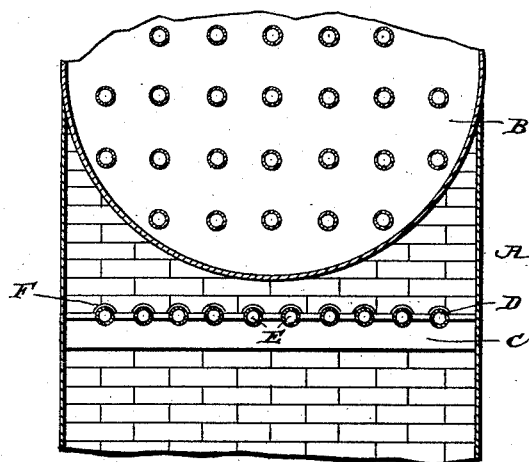


FIG. 2.



Inventor

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Witnesses

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# UNITED STATES PATENT OFFICE.

GEORGE H. RANDOLPH, OF COLORADO, ILLINOIS.

## FURNACE GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 524,468, dated August 14, 1894.

Application filed October 23, 1893. Serial No. 488,936. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE H. RANDOLPH, a citizen of the United States, residing at Colorado, in the county of Pope and State of Illinois, have invented a new and useful Furnace Grate-Bar, of which the following is a specification.

This invention relates to furnace grate bars; and it has for its object to provide certain improvements in hollow grate bars for steam boiler furnaces whereby simple and efficient means shall be provided for not only heating up the feed water pumped into the boiler, but at the same time provide for a constant circulation of water through the grate bars and thereby greatly increase the life thereof.

To this end the main and primary object of the present invention is to construct certain improvements in feed water heating grates to render grates of this character much more efficient in their use, while at the same time easier of manipulation.

With these and other objects in view which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a horizontal sectional view of the fire box end of a steam boiler furnace, showing my improved grate bars and the connections thereof properly arranged in position. Fig. 2 is a sectional view on the line *x—x* of Fig. 1.

Referring to the accompanying drawings, A represents the fire-box end of a steam boiler furnace of the ordinary construction and having mounted therein the ordinary boiler B, a portion of which is illustrated in the drawings.

Arranged transversely within the fire-box of the furnace are a series of grate supporting bars C, upon which is arranged the horizontal hollow grate coil D. The grate coil D, which is thus supported horizontally in position within the fire-box of a steam boiler furnace, comprises a series of parallel hollow grate bars or pipes E, connected at their ends by the return bends F, so that there is a free and uninterrupted circulation throughout the several pipes of the grate coil, and one of the side pipes of the hollow grate coil has connected thereto the water supply pipe G.

The said water supply pipe G is connected to the ordinary feed pump employed for pumping feed water into a steam boiler, and the same is provided with a check valve H, to prevent the return flow of water from the grate coil, and at a point between such check valve and the grate coil with a globe valve I, of the ordinary construction.

A nipple connection J, is connected to the end of the grate coil D, opposite the connection of the supply pipe G, therewith, and such nipple connection connects to such coil the boiler feed pipe K, which leads to and is connected with the steam boiler B, at one side thereof, and said boiler feed pipe K, is provided at a point near its connection with the boiler with a valve L, which is designed to control the admission of water into the boiler from the pipe K. At a point intermediate of the connection of the pipe K, with the boiler and with the grate coil, a blow-off pipe M, is connected thereto and is provided with a valve N, by means of which the said blow-off pipe may be controlled for blowing out the hollow grate coil or for leading the heated water to any desired point of use, when the boiler is not being fed.

An auxiliary supply pipe O, is connected at one end to the supply pipe G, between the valves H and I, and is connected at its other end to one side of the boiler B, opposite the connection of the pipe K, and said auxiliary pipe O, is provided at a point near its connection with the boiler with a valve P, whereby circulation through said pipe may be regulated as desired. The pipe O, is intended to provide means for maintaining a continuous circulation of water through the grate coils when the boiler is not being fed, or to serve in the capacity of a feed or supply pipe in case the grate coil should happen to leak and repairs were necessary.

When water is being pumped into the steam boiler in the ordinary manner, the valves I, and L, are the only valves which are open, so that, as the pump continues to operate, the water is forced through the supply pipe G, and is caused to circulate throughout the several pipes of the hollow grate coil, thereby providing means for heating up the feed water to a very high degree before it enters the boiler through the pipe K, and consequently

causing a saving in the fuel necessary to run the furnace. In case water is not being pumped into the boiler, the valve P is opened in addition to the valves I, and L, in order  
5 to provide for a continuous circulation of water from the boiler through the grate coil, which not only assists in the generation of steam, but necessarily preserves the grate bars from being destroyed. An important  
10 point of advantage relative to the pipe O, is to be observed in that in case any of the hollow grate bars should leak, the valves I and L, can be closed to cut off any circulation through the grate coil, and the valve P opened  
15 so that the supply of water can flow directly into the boiler without interrupting the same and stopping to repair the coil.

When it is desired to blow out the hollow grate bars, the valve L, is closed and the  
20 valves P, I, and N, opened.

It will of course be understood that any necessary auxiliaries may be used in connection with the apparatus described to render the same effective, such for instance as the employment of drain cocks or valves which may  
25 be connected to either end of the grate coil for the purpose of draining the same from the water and sediment therein when so desired, and I will have it also understood that  
30 other changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

35 Having thus described the invention, what

is claimed, and desired to be secured by Letters Patent, is—

The combination with a steam boiler furnace; of a suitably supported horizontal grate coil adapted to be arranged in the furnace  
40 fire-box and comprising a series of parallel hollow grate bars or pipes connected at their ends by return bends, a water supply pipe connected to one end of said coil and provided with a check and a globe valve the latter valve being located next to the grate coils,  
45 a boiler feed pipe connected at one end to the grate coil and at its other end to one side of the boiler in the furnace, said boiler feed pipe being provided with a valve, a valved blow-off pipe connected to the boiler feed pipe intermediate of its ends, and an auxiliary water supply and circulating pipe O connected at one end to the main supply pipe between its valves and at its other end to one side of the  
55 boiler, said auxiliary pipe being also provided with a valve and being adapted, in conjunction with the globe valve of the main supply pipe, to provide means for a continuous circulation from the boiler through the coil, and  
60 also for the direct supply of water to the boiler in the event of impairment of the coil, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in  
65 the presence of two witnesses.

GEORGE H. RANDOLPH.

Witnesses:

W. R. STALIONS,  
JOHN A. STALIONS.