

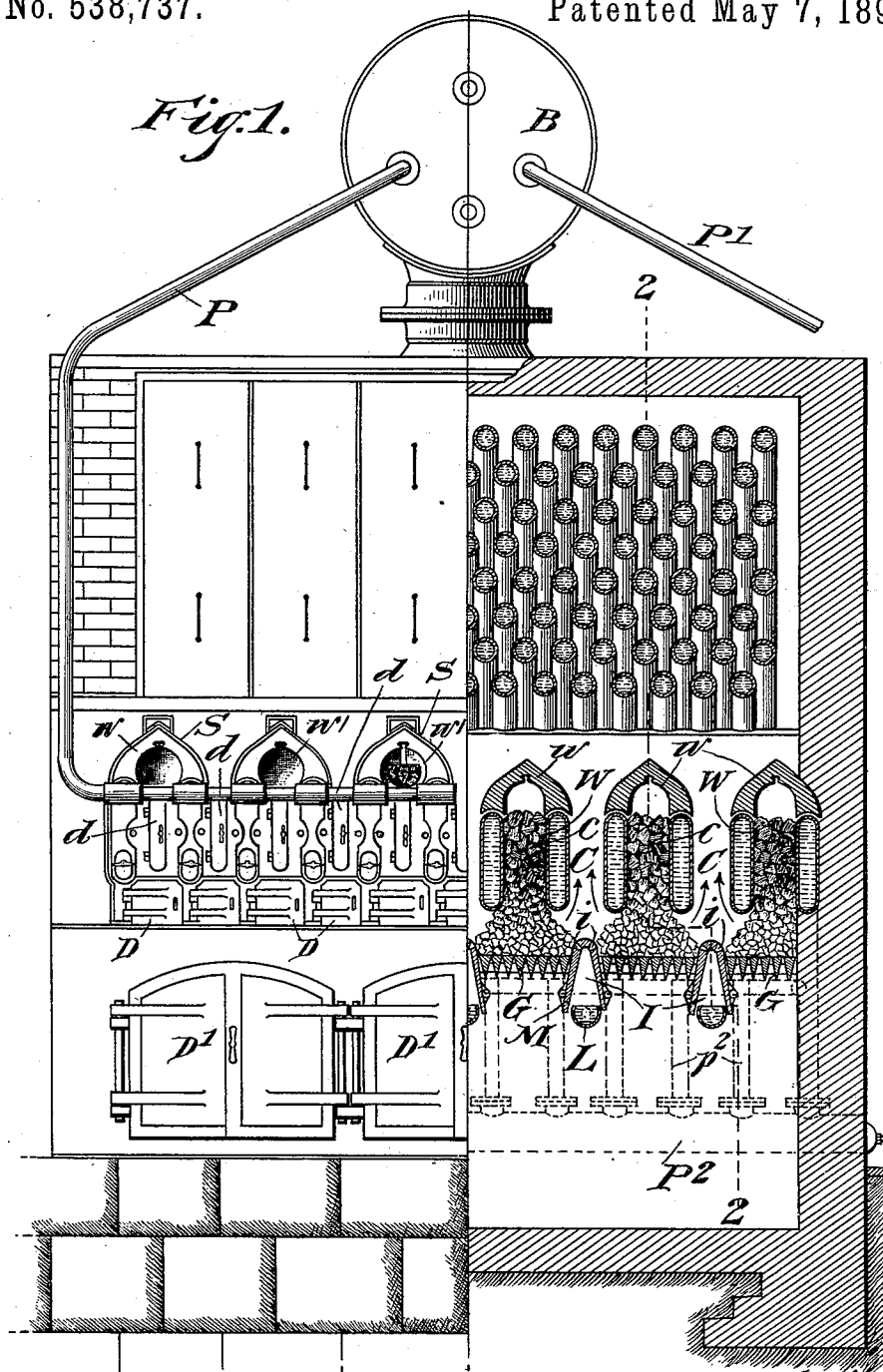
(No Model.)

2 Sheets—Sheet 1.

R. MÜLLER.
FURNACE.

No. 538,737.

Patented May 7, 1895.



Witnesses:
B. S. Ober
Henry Ott

Inventor:
Rudolph Müller
By Henry Ott
Atty

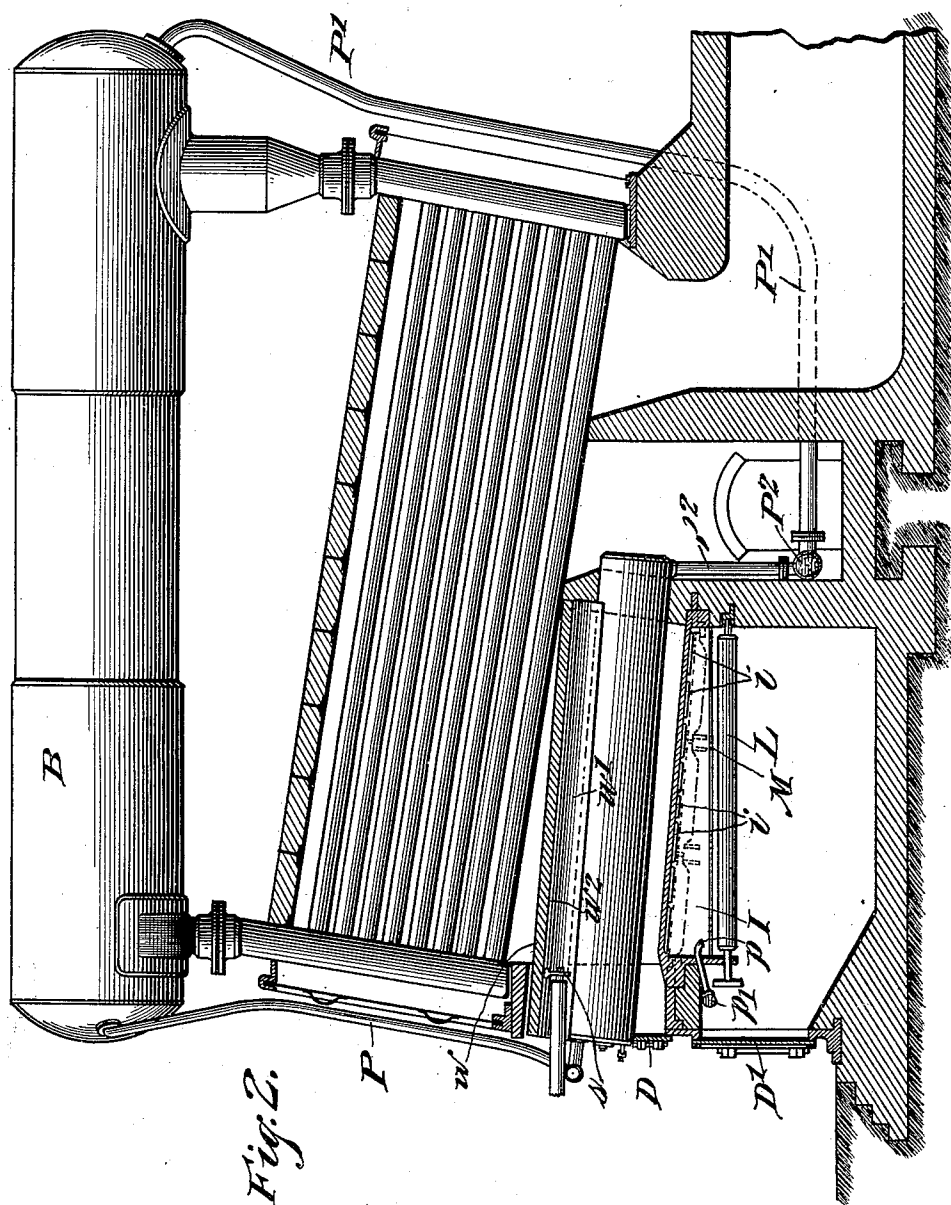
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UNITED STATES PATENT OFFICE.

RUDOLPH MÜLLER, OF CHRISTIANIA, NORWAY.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 538,737, dated May 7, 1895.

Application filed January 14, 1895. Serial No. 534,890. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH MÜLLER, a subject of the King of Sweden and Norway, residing at Christiania, Norway, have invented new and useful Improvements in Furnaces, of which the following is a specification.

This invention relates to furnaces, and it has for its object structural features whereby the efficiency of the furnace is materially enhanced and a substantially perfect or smokeless combustion of fuel attained with a corresponding economy of the latter, as will now be fully described.

In the accompanying drawings I have illustrated my invention in its application to steam boilers, but I desire it understood that my said invention is applicable to furnaces adapted for use for other purposes, and in said drawings—

Figure 1 is a half front elevation and half vertical cross-section, and Fig. 2 a longitudinal vertical section on the line 2 2 of Fig. 1, of a water-tube steam-boiler provided with my improved furnace, a portion of the mechanical stoker being broken away in said Fig. 2.

The steam boiler illustrated in the drawings above described is of a well-known type, and will therefore not require a detailed description.

The furnace grate, or more properly the grates G for the furnace may be of any ordinary or preferred construction, the grate area being divided into sections by means of air flues I, preferably of a conical form in cross section and having a concave bottom L adapted to hold a body of water, said flues having their inlet below the grate sections and their outlet above the same, the outlet ports *i* in the apex of the cone being divergent so as to direct the air flowing through the flues in opposite directions into the combustion chamber C. The flues, I, extend the full length of the grate sections G and their side walls are constructed in sections longitudinally, the lower sections M being hinged to the upper sections and performing the functions of dampers, suitable means, not shown, being provided to adjust said dampers. Water from any suitable source is supplied to the flues I, as may be required through pipe *p* and suit-

able branch pipes *p'* so that air or air and vapor can be supplied to the combustion chamber *c* through the medium of said flues and the volume of such air regulated by means of the dampers M.

Within the combustion chamber C I arrange a series of open bottomed fuel chambers *c*, one above each grate section G, the vertical walls W of the chambers being hollow. These fuel chambers extend the full length of the grate sections. They are arched over so as to form a flue *w* below and along the arch, that is normally open to the atmosphere at one end and serves the two fold purpose of air and charging flue. The fuel chambers proper *c* are closed at opposite ends, the front end being closed by a door *d* so as to obtain ready access to said chambers for any purpose. In the roof of the air flue *w* I provide a guide groove *w'* that is T-shaped in section for the reception of correspondingly shaped hangers *s* (of which I have shown one in Fig. 1) in which the mechanical stoker S is journaled, said stoker consisting of a semi-cylindrical trough adapted to slide in and out of the flue *w*, and when filled with coal and pushed into said space it can be emptied by giving it a half turn on its hangers or supports *s* as will be readily understood from an inspection of the drawings.

The object of providing an air flue above the fuel chambers *c* is to afford a down draft through the fuel for the purpose of entraining the gases evolved from the fuel into the combustion chamber C. The arrangement provides self-feeding hoppers, the fuel subsiding gradually as combustion proceeds, and as said fuel is thoroughly heated before reaching the zone of combustion, it will give up its volatile constituents and become more or less coked before it passes into said zone of combustion, and if the supply of air or air and vapor through the grate and through the flues I is properly regulated, a substantially perfect or smokeless combustion is obtained. In fact, it will be evident that the described construction is equivalent to the subdivision of the furnace into a number of self-feeding furnaces in which the adjacent combustion chambers communicate with each other.

I have stated that the vertical walls W of the fuel chambers or hoppers *c* are preferably

made hollow, the object being to utilize the same as water legs, the chambers thus formed being connected at their opposite ends with the water space of the boiler B by means of pipes P and P' respectively, and suitable branch pipes p^2 .

On a line with the grate sections G in the front wall of the furnace I provide suitable doors D, so that ready access can be had to the grates, and through the doors d to the fuel chambers or hoppers c, the ash pit being also provided with doors D', as usual. I further provide a sediment chamber or collector in the form of a pipe P² to which is connected the boiler pipe P' and the branch pipes p^2 connected to the rear end of chambered hopper wall W, see Fig. 1, a perfect circulation being thus established between the boiler and the chambers in said walls.

The described construction of furnace may of course be modified in its details, and will necessarily require modification to adapt the same to the special uses made of it, or as the service may require, and I do not desire to limit myself to the exact construction shown and described.

Having thus described my invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a furnace, the combination with the combustion chamber and its grate, and air flues dividing the said grate into sections and having their inlets and outlets respectively above and below the grate sections, of a fuel magazine for each grate section, said fuel magazines arranged within the combustion chamber to form circulating flues between each other and the chamber walls, whereby the heat and products of combustion are distributed and caused to circulate around the magazines before leaving the combustion chamber, for the purpose set forth.

2. In a furnace, the combination with the combustion chamber, its grate, and air flues dividing said grate into sections and having their inlets and outlets respectively below and above the grate sections, of a fuel magazine for each grate section having hollow vertical walls, said magazines arranged within the combustion chamber to form circulating flues between each other and the chamber walls, and means for circulating water through the magazine walls, for the purpose set forth.

3. In a furnace, the combination with the combustion chamber, its grate, and air flues dividing said grate into sections and having their inlets and outlets respectively below and above the grate sections, of a fuel magazine for each grate section arranged within the combustion chamber to form circulating flues parallel with the aforesaid air flues, for the purpose set forth.

4. In a furnace, the combination with the grate, of air flues adapted to contain water dividing said grate into sections and having

their inlets and outlets respectively below and above the grate sections, and means for controlling the flow of air through said flues, for the purpose set forth.

5. In a furnace, the combination with the grate, air flues adapted to contain water dividing said grate into sections and having their inlets and outlets respectively below and above said grate sections, of a fuel magazine for each grate section, said magazines of less diameter than their respective grate sections, substantially as and for the purpose set forth.

6. In a furnace, the combination with the grate, of air flues of conoidal form in cross section provided with a concave bottom adapted to hold water, said flues extending the full length of and dividing said grate into sections, and having their inlets and outlets respectively above and below said grate sections, and means for controlling the flow of air through said flues, for the purpose set forth.

7. In a water-tube boiler, the combination with the water tubes, a combustion chamber below the same, its grate, and air flues dividing said grate into sections and having their inlets and outlets respectively above and below the grate sections, of a fuel magazine for each grate section arranged within the combustion chamber to form circulating and distributing flues between each other and the chamber walls, substantially as and for the purpose set forth.

8. In a water tube boiler, the combination with the boiler, the water tubes, a combustion chamber below the same, a grate in said chamber, air flues dividing the grate into sections and having their inlets and diverging outlets respectively below and above the grate sections, of a fuel magazine for each grate section provided with hollow walls, said magazines arranged within the combustion chamber to form circulating and distributing flues between each other and the chamber walls, and pipe connections connecting the magazine walls with the water space of the boiler, substantially as and for the purpose set forth.

9. In a furnace, the combination with the grate, air flues dividing the grate into sections and having their inlet and outlets respectively below and above the grate, means for supplying water to the flues and means for controlling the flow of air therethrough, of a fuel magazine for each grate section constructed with hollow walls, said magazines of less diameter than their respective grate sections, a water supply pipe, and branch pipes connecting the supply pipe with the magazine walls, substantially as and for the purpose set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

RUDOLPH MÜLLER.

Witnesses:

ALFRED J. BRYR,
JOB VAALER.