

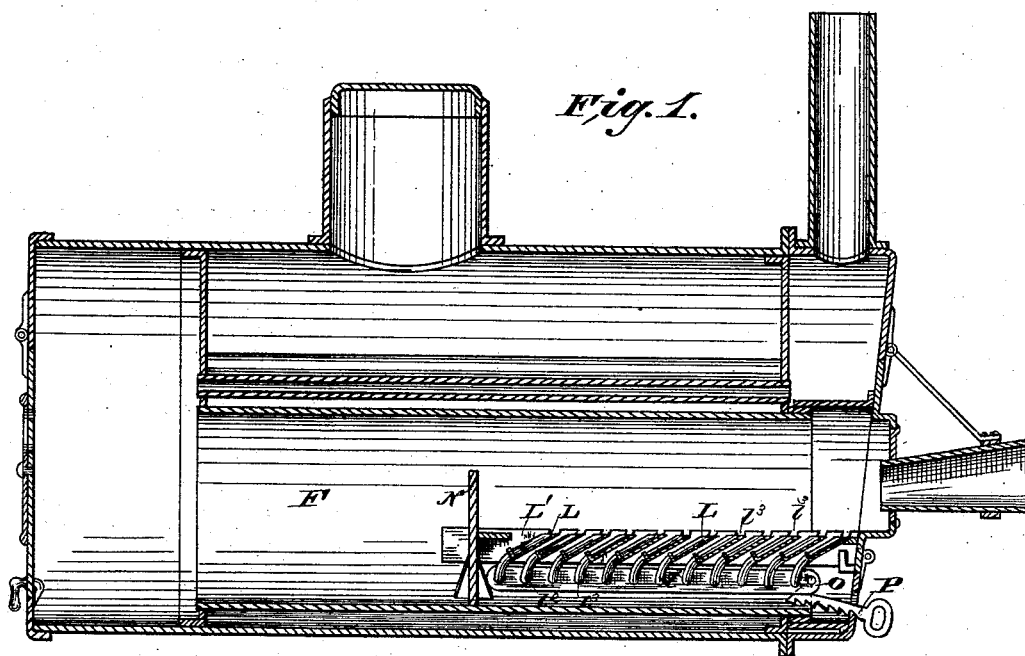
(No Model.)

2 Sheets—Sheet 1.

J. WALRATH.  
FURNACE GRATE.

No. 347,214.

Patented Aug. 10, 1886.



Witnesses:  
*E. A. Walker*  
*Wm. C. Woodward*

Inventor.  
*Josef Walrath*  
by his attorney  
*Ed. E. Eick*

(No Model.)

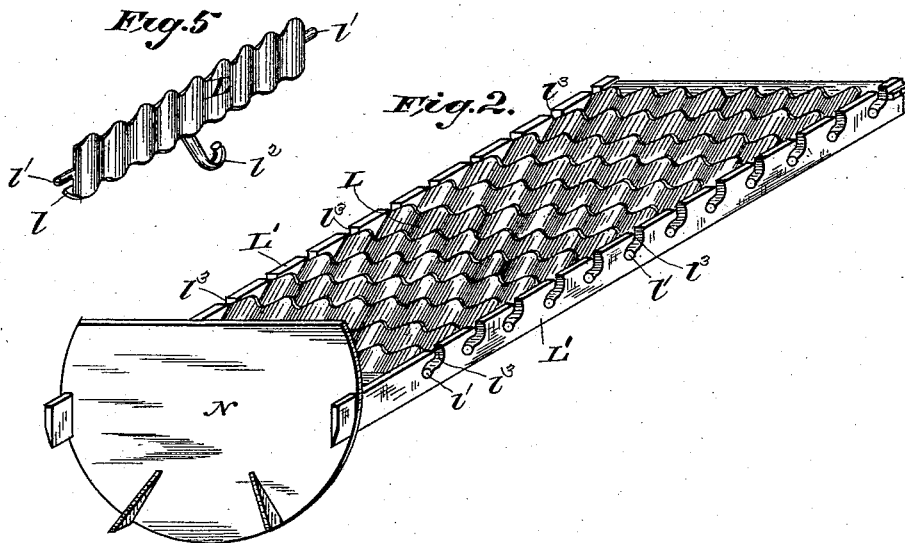
2 Sheets—Sheet 2.

J. WALRATH.

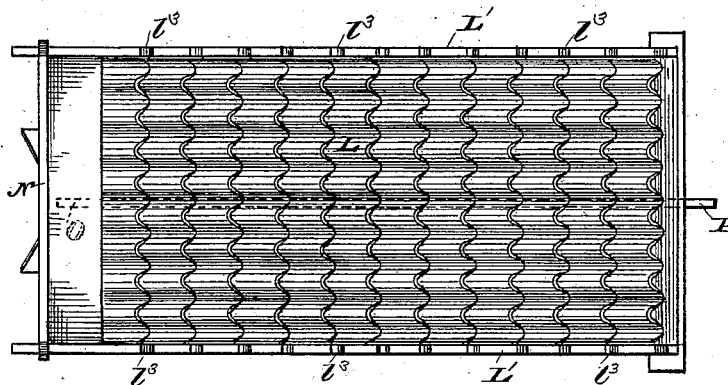
FURNACE GRATE.

No. 347,214.

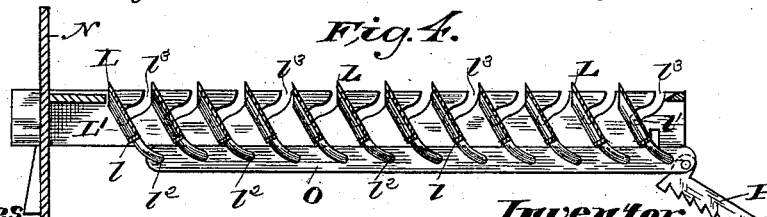
Patented Aug. 10, 1886.



*Fig. 3.*



*Fig. 4.*



Witnesses:

E. P. Walker  
Wm. C. Woodward.

Inventor:

Jesse Walrath  
by his attorney  
C. F. Kibb

# UNITED STATES PATENT OFFICE.

JESSE WALRATH, OF RACINE, WISCONSIN, ASSIGNOR TO THE J. I. CASE  
THRASHING MACHINE COMPANY, OF SAME PLACE.

## FURNACE-GRATE.

SPECIFICATION forming part of Letters Patent No. 347,214, dated August 10, 1886.

Application filed August 5, 1885. Serial No. 173,621. (No model.)

*To all whom it may concern:*

Be it known that I, JESSE WALRATH, a citizen of the United States, residing at Racine, in the county of Racine and State of Wisconsin, have invented certain new and useful Improvements in Furnace-Grates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the type of steam-boilers designed more especially for burning straw and other light fuels.

My improvement consists of a grate, the individual bars of which are longitudinally-undulated plates provided with end journals by which they are hung on a suitable frame or on girders, so that they may be turned either for adjustment or for raking the fire. The grate-bars have other peculiarities of construction which will be fully set forth in the ensuing description, and clearly pointed out by distinct claims.

In order that my invention may be clearly understood, I have illustrated in the annexed drawings, and will proceed to describe, a practical form thereof.

Figure 1 represents a longitudinal section of a steam-boiler embodying my improved grate. Fig. 2 represents a perspective view of the grate and bridge-plate. Fig. 3 represents a plan view thereof. Fig. 4 represents a longitudinal section of the same. Fig. 5 represents a perspective view of one of the grate-bars.

The same letters of reference indicate identical parts in all the figures.

The boiler shown is constructed with a large direct flue, which at one end contains my improved grate, and issues at the other end into a combustion-chamber from which the products of combustion are conducted by small return-flues to the smoke-box to reach the uptake. The grate shown was constructed with the view of adapting it more especially for the burning of straw, although other light fuels and wood can be successfully burned upon it. The grate-bars L have an undulating contour in longitudinal section, so as to give them a transversely-corrugated appear-

ance and form. At their lower edge a narrow flange, *l*, is formed at the rear side, while their upper edge is scalloped longitudinally. They are constructed with short journals, *l'*, at their ends and on about the center line, and with a hook, *l''*, at the lower edge and at about mid-length. The grate-bars thus constructed are arranged transversely across flue F, upon a pair of longitudinal girders, *L'*, in undercut notches *l''*, of which the journals *l'* of the bars rest and turn. It will be observed that in turning the grate-bars on their journals to an inclination, they will fold upon one another more or less. The girders are supported at their respective ends on the bridge-plate N and on the furnace front in any suitable manner.

All the grate-bars are coupled together by a coupling-bar, O, hooked on the hooks of the bars. The front end of the coupling-bar carries a shifter-rod, P, which projects through a slot in the ash-pit front, and has a serrated lower edge, so that it may engage the edge of the slot and hold the coupling-bar and grate-bars in any desired position.

In burning dry straw the grate-bars should stand at about the inclination shown in Fig. 1, so that the draft through them will be obstructed by the constriction of the air-passage due to the folding of the grate-bars upon one another as far or nearly as far as the flange *l* will admit, as well as by the forwardly-inclined position of these passages. The main purpose of said flanges is to prevent too close folding of the grate-bars. In burning less inflammable fuel the grate-bars should be turned to a more upright position, or even to a somewhat rearwardly-inclined position, as shown in Fig. 4.

It will be observed that in all positions of the grate-bars they present, by reason of their scalloped upper edges, a roughened grate-surface which prevents the too easy movement of light fuel over it, and also aids in cleaning the fire when the grate-bars are rocked for that purpose by the rod P. The forwardly-inclined position of the grate-bars also tends to check the rearward motion of the fuel by the mechanical obstruction offered by the edges of the grate-bars, as well as by the deflection in the draft. Burned out or damaged grate-bars

can be readily removed by unlocking them from the coupling-bar and lifting them up to withdraw their journals from the notches of the girders, and can be as easily replaced by

5 new ones.

While I prefer to construct the grate-bars with flanges, and to scallop their upper edges, yet these features are not essential primarily, and may be omitted. The shifter-rod may

10 also be replaced by other means for adjusting and rocking the grate-bars.

It will be observed that by hanging the grate-bars on journals located on about their center lines the bars have considerable lifting

15 and raking action on the fuel when they are rocked to clean the fire.

I claim as my invention—

1. A grate composed of a series of grate-bars supported by journals on about their

20 center lines, each bar having the form of a longitudinally-undulated plate, substantially as before set forth.

2. A grate-bar having the form of a longitudinally-undulated plate, provided with journals at its ends on about the center line, sub-

25 stantially as before set forth.

3. A grate composed of a supporting-structure and grate-bars supported by journals on about their center lines in said structure, each bar having the form of a longitudinally-undulated plate and scalloped along its upper edge, substantially as before set forth. 30

4. A grate-bar having the form of a longitudinally-undulated plate provided with end journals, and with a flange at the rear side along the lower edge, substantially as before set forth. 35

5. The combination, with a supporting-structure, of a series of grate-bars, each consisting of an undulated plate provided with a flange at its rear side along the lower edge, and pivoted in said supporting-structure at about their center line, substantially as described. 40

In testimony whereof I affix my signature in presence of two witnesses. 45

JESSE WALRATH.

Witnesses:

CHARLES H. LEE,  
GEO. L. EDDY.