April 5, 1932. J. T. TAWLKS 1,852,492

GRATE BAR

Filed Jan. 2, 1929

Fig. 1

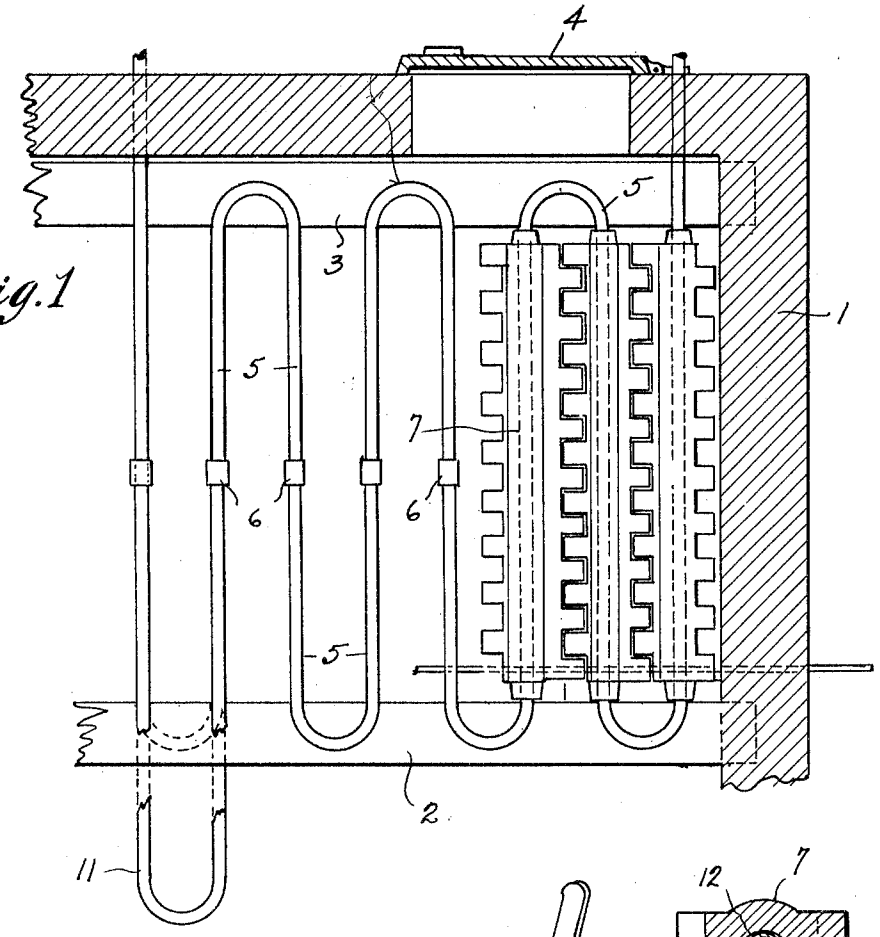


Fig. 2

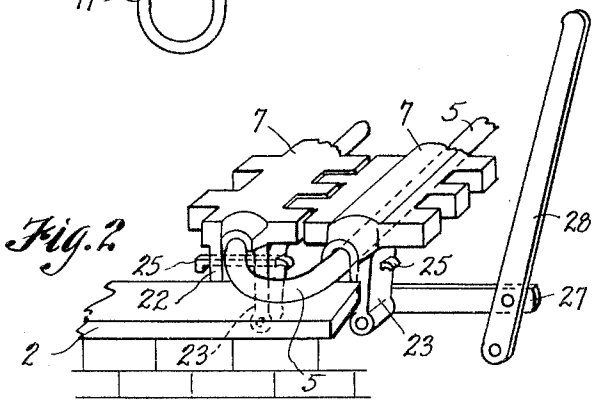
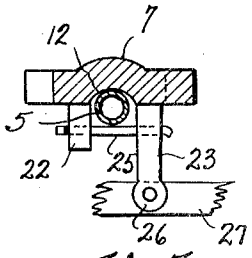


Fig. 3



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UNITED STATES PATENT OFFICE

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GRATE BAR

Application filed January 2, 1929. Serial No. 329,735.

This invention relates to grate bars for furnaces and particularly to demountable, water cooled grate bars; this being in the nature of an improvement on the bar described in an application for Letters Patent filed May 25, 1927 and bearing Serial Number 194,108.

The principal object of this invention is to provide grate bars that are adapted to be removably supported on pipes through which water or other cooling medium may be circulated; the pipes being so arranged that they can be erected on the furnace plates or supports so as to serve as a base or foundation for the grate bars, but entirely independent thereof, and the bars are of such construction that they may be placed in or removed from the furnace without disrupting or disconnecting the pipe system.

Another object of the invention is to provide an arrangement of pipes for the cooling medium, permitting expansion, contraction and incidental movement of the bars and pipes together with the least number of connections, thus reducing to a minimum the liability of leakage as well as the cost of installation.

Other objects of the invention reside in the various details of construction and in the combination of parts as is hereinafter described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Figure 1 is a horizontal sectional view of a portion of a furnace equipped with grate bars and cooling pipes in accordance with the present invention, some of the grate bars being removed for better illustration.

Figure 2 is a perspective view of end portions of adjacent grate bars illustrating the mounting and rocking mechanism therefor.

Figure 3 is a cross section of one of the bars.

Referring more in detail to the drawings—

1 designates a side wall of a furnace fire box supporting ends of the cross beams 2 and 3, which, respectively, serve as front and rear supports for a section of grate bars and cooling pipes; the furnace door being designated at 4. Disposed on the beams 2 and 3, which are substantially in the same horizontal plane, is a pipe system composed of a plurality of U-shaped sections 5 joined end to end by sleeves, unions, or the like, 6, forming a continuous pipe that leads back and forth between the supports to provide a grid-like support for a plurality of grate bars as designated at 7. The cooling medium, which preferably would be water, enters the pipe system at one end and flows back and forth through the coils, and passes out at the other end; the intake and outlet being through the front or side wall of the furnace as found convenient. The pipe coils may be limited to the length of a single bar or they may extend beyond the beam 2, as indiacted at 11, the full length of two or more sections of bars placed end to end.

Each bar 7 is an integral piece as shown in Figure 1, is formed on the under surface with a shallow groove 12 extending the full length thereof for receiving a pipe 5 and which permits relative movement of the pipes and bars incident to expansion and contraction of these parts, or, if it is preferred, the grooves may be omitted and the bar rested flatly upon the pipe.

The bars 7 are mounted pivotally, or rotatably, on the pipes and are provided at opposite ends with downwardly extending arms 22 and 23 spaced apart and these are slotted to receive the keys 25 which extend beneath the pipes to hold the parts in assembled relation. Each of the bars is also provided with a depending lever 26 for connection at their lower ends with a rod 27 which, in turn, connects with a lever 28, by means of which shaking of the grates may be effected. Many attempts have heretofore been made to keep the temperature of grate bars below the fusing point as a means of preventing the adhesion of slag and consequent clogging of the circulation vents and burning out of bars, but as a general thing, owing to the intense furnace heat and the different rates of expansion between the super-heated bars and the water cooled pipes, such water

cooling systems have broken down through leakage. The system herein described overcomes the liability of leakage, has withstood the severest service tests and by reason of the fact that the piping is in intimate contact with the grate bars and all lie in the same plane with sleeve joints only, is subject to no twisting or pulling strains. The piping arrangement offers the minimum of resistance to the water flow, thus facilitating drainage and reducing the amount of water required. In case of any stoppage of the cooling system, the bar being of the conventional type, will function in the usual manner and without injury to the piping until the stoppage can be remedied.

Another advantage of the above described construction resides in the fact that the coils resting directly on the supports 2 and 3, will tend to reduce the disintegrating effect of the heat thereon, thus tending to keep the surface level and the bars in better alinement. One of the greatest advantages over other types of bars is that this bar can be punched out of ordinary boiler plate metal; the webs being formed as shown in Figure 2, thus avoiding the use of patterns, molds and castings, and making the manufacture of the grate bars possible in machine shops instead of foundries as heretofore.

It is further apparent that by arranging the legs of the pipe sections in parallel relation and all equally spaced, this will permit interchangeable use of one piece grate bars which are easily and quickly replaceable thereon.

Having thus described my invention, what I claim as new therein and desire to secure by Letters Patent, is:

A grate construction comprising horizontal supports, a pipe section resting thereon formed of a series of back and forth loops of regular spacing arranged in the same plane, a series of grate bars supported rotatably thereon and having solid portions directly overlying the pipes as a protection thereto, each bar having U-shaped and slotted rocking arms extending downwardly to embrace the pipe on which it is supported, a key inserted through the arm slots to hold bar and pipe in contacted relation, rods connecting the rocking arms and means for oscillating the same.

Signed at Everett, Washington, this 23rd day of November, 1928.

JOHN T. TAWLKS.