Aug. 4, 1931. T. GOEBEL 1,817,484

GRATE

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Fig. 1.

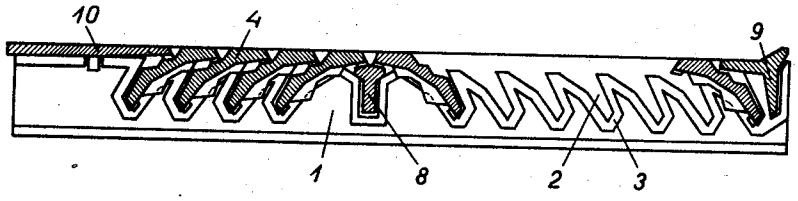


Fig. 2.

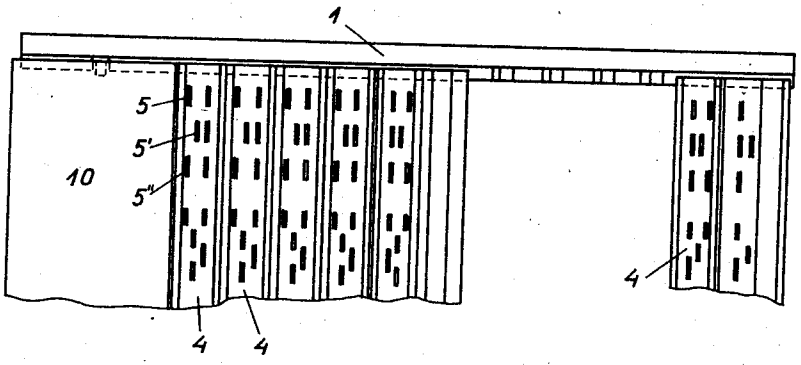


Fig. 3.

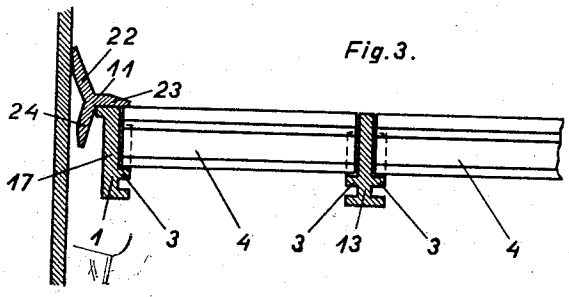


Fig. 4.

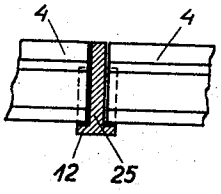


Fig. 5.

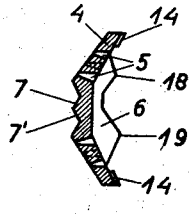
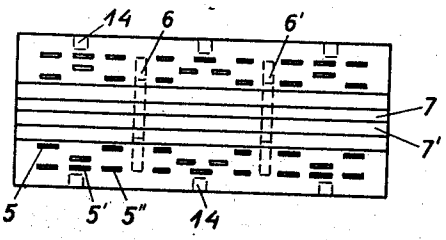


Fig. 6.



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Fig.7.

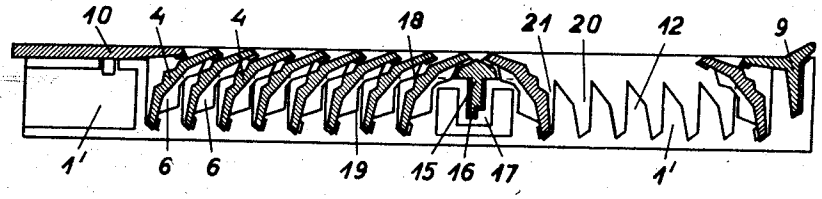


Fig. 9.

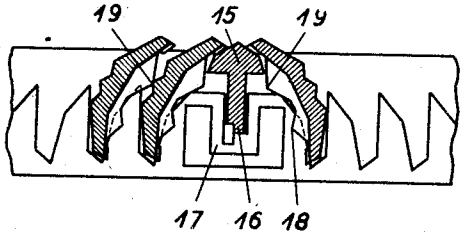


Fig. 8.

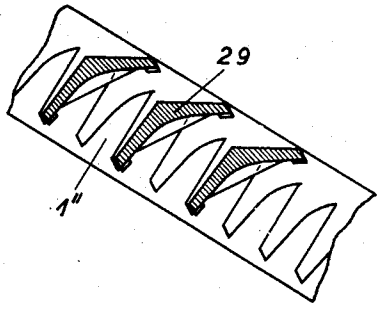


Fig.10.

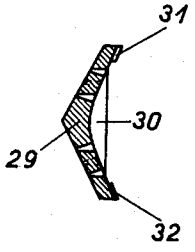
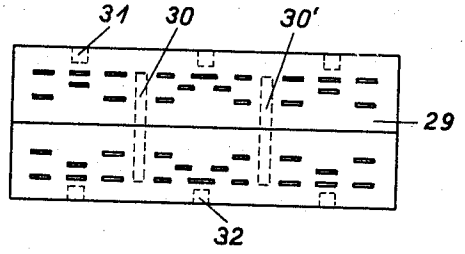


Fig.11.



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UNITED STATES PATENT OFFICE

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GRATE

Application filed December 3, 1928, Serial No. 323,406, and in Germany December 12, 1927.

The present invention relates to grates for furnaces and the like.

The principal object of the invention is to provide a universal furnace grate which may be adapted with very little alteration for the burning of all kinds of solid fuels from coal dust and saw dust to large coal and which may also be constructed as a hollow grate, a stepped grate, or a travelling grate and which furthermore is exceptionally simple and inexpensive.

With this and other objects in view, the principal novel feature of the invention resides in the particular construction and shape of the grate bars which consist of plates of obtuse angular cross section which may, for instance, be symmetrical and which are provided with projecting ribs and coned air openings and have lateral projections cast on them. The grate bars or plates constructed in this manner are arranged in serrated lateral projections on the longitudinal supporting members, which projections form pockets, the longitudinal supporting members being so shaped that the upper surfaces of the grate bars form as a whole the fuel supporting surface of the grate, whilst the lower arms correspond to the cooling ribs of ordinary grate bars.

According to the invention the grate bars or plates are preferably arranged in two sections, the constituent grate bars of which are oppositely inclined, the two medial oppositely inclined fire bars being supported on a common transverse supporting member.

The lateral serrated projections of the longitudinal supporting members are, according to the invention, so shaped, and the said transverse supporting member is at such a height, that each of the grate bars, which are arranged side by side, rests with its lateral projections on the inclined surfaces of the adjacent grate bar, said inclined surfaces being provided near the central part of the grate bar. In this manner a grate is provided which has a surface which only exhibits small air openings and interstices and which, for example, is suitable for small fuel such as coal dust. If the transverse supporting member is provided with a stepped foot which fits into correspondingly stepped lateral projections on the longitudinal supporting member, then it is possible by making the projections in the longitudinal supporting member of suitable shape to obtain a higher or lower position of the transverse supporting member by altering the position of the foot of the said transverse supporting member, with the result that the grate bars assume a position of greater or less inclination. By this means a grate suitable for large or small fuel is formed as desired. The grates according to the invention are preferably manufactured with standard longitudinal and transverse dimensions. In order to be able to employ grates of this kind in any desired fire boxes, for instance, those of boilers or furnaces, the intermediary spaces which remain free between the surface of the grate and the wall of the furnace must be covered up. For this purpose according to the invention it is preferable to employ cast or rolled members extending longitudinally of the grate and provided with three lateral ribs of unequal width spaced at peripheral angles of about 120° apart from one another. According to the breadth of the intermediary space, these covering members are arranged with one or the other of the said ribs on the longitudinal or transverse edge of the grate, whilst one of the other rays rests on the wall of the furnace.

The method of adapting the universal grate for use as a stepped grate or as a travelling grate will be hereinafter described.

Some preferred constructional forms according to the invention are illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is an elevation partly in longitudinal section of a grate according to the invention, as adapted for small fuel,

Fig. 2 is a plan of Fig. 1,

Fig. 3 is a transverse section of a grate bar supporting structure showing one grate bar in place,

Fig. 4 is a cross section showing a modified construction of the projections on the longitudinal supporting members,

Figs. 5 and 6 show a grate bar in cross section and in plan,

Fig. 7 is a longitudinal section through a grate adjusted for large fuel,

Fig. 8 is a longitudinal section through a part of a grate showing the arrangement for forming a stepped grate,

Fig. 9 is a longitudinal section through a part of a grate adjusted for very large fuel,

Figs. 10 and 11 show a grate bar of a different shape in cross section and in plan.

On the longitudinal supporting members 1 which are provided with pockets 2 formed by lateral serrated projections 3, the grate bars 4, are laid in such a manner that they mutually cover one another. The projections 3, are shaped in such a manner that in the resulting inclined position of the grate bars 4, the upper limbs or webs of the latter form a flat grate surface, whilst the lower limbs or webs serve as cooling ribs. Each grate bar (Figs. 5 and 6) consists of a casting 4 exhibiting in cross section two limbs or webs arranged at an obtuse angle, which casting is provided with ribs 6, 6′ of special shape, with lateral projections 14, and with coned holes 5, 5′, 5″ intended for the passage of air. Near the line of intersection of the limbs forming the obtuse angle, incisions 7, 7′ are provided and the said ribs 6, 6′ are provided with projections 18, 19 of unequal size, the purpose of which will be hereinafter made clear. The furnace is rendered air tight with regard to the furnace door by means of a cover plate 10, whilst the member 9 serves as a fire bridge. In the case of broad grates intermediary longitudinal supporting members 13 (Fig. 3) may be provided which are likewise furnished with projections 3.

As the grate bars 4 are manufactured in standard lengths, larger or smaller intermediary spaces will remain between the longitudinal members (and in some cases between the transverse members) and the walls of the furnace, which spaces have to be covered up. For this purpose according to the invention cast or rolled members 11 each provided with three lateral ribs of unequal width spaced at peripheral angles of about 120° apart from one another are provided. The member 11 is so arranged that one rib (for instance 23 in Fig. 3) rests on the edge of the grate, whilst another ray or arm (for instance 22) rests against the wall of the furnace. The positioning of the arms with regard to the grate and the furnace wall will depend upon the distance of the edge of the grate from the furnace wall. The arrangement shown in Figs. 1 and 2 represents a grate for coal dust or small coal. The upper arms of the grate bars lie quite flat and the projections 14 of the grate bar ribs 6 rest in the incisions 7. The grate bars are arranged in two sections which are inclined in opposite directions. The medial oppositely inclined adjacent grate bars rest on a transverse supporting member 8, the ends of which rest in corresponding pockets formed by projections on the longitudinal supporting members 1, 13. By raising the transverse supporting member the grate bars can be set to a greater angle of inclination with the horizontal.

In order to obtain a grate for larger fuel, the longitudinal supporting members 1′ are so turned that their projections 12 (Figs. 7 and 4) come into use which latter are provided with serrated pockets 20. The breadth of the pockets is greater than the thickness of the grate bars 4, so that intermediate spaces 21 remain between the said grate bars and the pockets. The transverse supporting member 15 is provided in this case with a stepped foot 16 which, as shown in Fig. 7, fits into a correspondingly shaped stepped pocket 17. In this position, all the grate bars 4 lie at a somewhat greater angle of inclination with the horizontal and the small ribbed projections 18 rest in each case on the middle peaks of the grate bars adjacent to them. In this manner a grate suitable for larger coal is obtained.

If the grate is to be employed for burning large coal, then all the grate bars 4 are turned, as shown in Fig. 9, in such manner that the larger ribbed projections 19 are uppermost and the smaller projections 18 are below them. The middle transverse supporting member 15 is then likewise turned in such manner that the step 16 rests on the projection 17 whereby a higher position of the transverse member 15 is obtained. With this arrangement the grate bars take up the inclined position shown in Fig. 9, in which the projections 19 rest in each case on the middle peaks of the adjacent grate bars.

For the construction of stepped grates or the like grate bars 29 of simpler form, for instance of symmetrical form (Figs. 10 and 11) may be employed. These are provided with flat surfaces without incisions and are also furnished with air openings, simple ribs 30, 30′ and cast projections 31, 32. The application of such grate bars for stepped grates is clearly shown in Fig. 8 from which it will be seen that the fire bars 29 rest in the alternate pockets of the inclined longitudinal supporting members 1″, whereby the characteristic form of the stepped grate is obtained.

It will, of course, be understood that the scope of the invention is not limited to the constructional examples illustrated.

I claim:

1. A furnace grate comprising in combination, a plurality of transversely arranged grate bars, each consisting of an upright web and an inclined web extending throughout the length of the bar, arranged at an obtuse angle to each other and provided with air passages; each bar being provided with transverse ribs having projections contacting with adjacent bars; supporting mem-

bers extending longitudinally of the grate and provided with pockets opening laterally and upward, and adapted to receive the ends of said upright webs for supporting the bars and formed to permit a limited rocking motion of the bars therein; the bars being arranged so that their inclined webs form a fuel supporting surface; a vertically adjustable member extending transversely of the grate adjacent one of said bars and engaging the inclined web thereof, and means for supporting said member in different vertical positions, thereby to hold the grate bars with their inclined webs at different inclinations.

2. A furnace grate as specified in claim 1, wherein the grate bars are divided into two sections, the inclined webs of the constituent grate bars of the one section being inclined to the horizontal in the opposite direction to the direction of inclination to the horizontal of the inclined webs of the constituent grate bars of the other section.

3. A furnace grate comprising in combination, a plurality of transversely arranged grate bars, each consisting of an upright web and an inclined web extending throughout the length of the bar, arranged at an obtuse angle to each other and provided with air passages; each bar being provided with transverse ribs having projections contacting with adjacent bars; supporting members extending longitudinally of the grate and provided with pockets opening laterally and upward, and adapted to receive the ends of said upright webs for supporting the bars and formed to permit a limited rocking motion of the bars therein; the bars being arranged so that their inclined webs form a fuel supporting surface; a vertically adjustable member extending transversely of the grate adjacent one of said bars and engaging the inclined web thereof; a stepped foot on said vertically adjustable member; and steps on said supporting members into which said stepped foot fits for supporting said vertically adjustable member in different vertical positions, thereby to hold the grate bars with their inclined webs at different inclinations.

4. A furnace grate as specified in claim 1, in further combination with: a member extending longitudinally of the grate; three lateral ribs of unequal width on said member spaced at peripheral angles of about 120° apart from one another, said member being located so as to cover up the intermediate space between the fuel supporting surface and the furnace wall, and one of said ribs resting on the edge of the fuel supporting surface and the other on the furnace wall.

Signed at Warsaw, Republic of Poland this fourteenth day of November, 1928.

ING. TADEUSZ GOEBEL.