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The invention relates to a grate for furnaces, with lengthwise movable and mutually partially overlapping grate stages, made of individual grate bars longitudinally movable relative to one another, which rest against one another with lateral contact surfaces on their grate bar flanks, which project at least partially with respect to downwards projecting external ribs of the grate bar.

During stoking of the grate, resistant, in particular fine metal particles can drift between the individual grate bars and become lodged between them. This causes cracks between the grate bars, through which to an increased degree the air from the downdraft zone passes, causing not only uneven consumption on the grate but also, in the case of hollow grate bars with a forced air flow, the cooling of the grate bars. This can lead to overheating, and to increased wear of the grate bars. Moreover these parts can also, if they do not wear despite the relative movement of adjacent bars, cause blocking of the mutual mobility of adjacent bars by increasing the cracks.

A grate for furnaces is known from DE-C-136 644, wherein the individual grate bars have prongs tapering downwards, which create both a fixed bearing surface with appropriate air passages and a high resistance to deflection. To avoid penetration of slag into the prong interstices, a bar projecting above the prongs is provided on the top side of the grate bar, starting from this surface, which bar also projects into the interstices between the prongs and above them. A crack nevertheless remains, into which smaller slag particles can penetrate, giving rise to the disadvantages already explained above.

The object of the invention is to provide a grate or the requisite grate bars whereby the damage caused by the penetration between the grate bars is avoided, i.e. to design the grate so that the particles penetrating between the grate bars can be rapidly conducted downwards between the grate bar flanks, so that they are able to give rise neither to blocking of the adjacent

grate bars nor to an increase in the distance between adjacent grate bars. In particular with grate bars of hollow design the cavity cooling of the grate bar should not be affected to any degree.

This object is achieved by means of the features listed in Claim 1. By means of this development of the grate bar flanks, saw-tooth-like contact surfaces are created, the flanks whereof form cutting edges, which act along with the corresponding cutting edges of the adjacent grate bar on the particles which have penetrated, like the cooperating cutting edges of a cutter bar on the cutting material. As the cutting edges are at an angle on account of the saw-tooth-like design, a dynamic effect is exercised on the particles as a result of the relative movement of adjacent grate bars, which effect is directed downwards, i.e. starting from the grate bar back towards the grate bar underside. The recesses in the flanks thus form relief niches, out of which the particles can fall freely as soon as they arrive in one such relief niche as a result of the mutual movement.

A particularly favourable exhaust effect on the penetrated particles is achieved if the flanks of the teeth remaining between the recesses are at an angle to the grate bar back surface of between 20 and 50°, in particular of 35°.

This exhaust effect is also considerably improved if in a further embodiment of the invention the saw-tooth-like recesses of adjacent grate bars are longitudinally offset with respect to each other by half a tooth pitch, which ensures that the relative setting of adjacent cutting edges can be achieved wherein the minimum possible overlap of the saw-tooth-like flanks occurs, and thus the largest possible relief niches are created.

If according to a further embodiment of the invention the tooth pitch corresponds essentially to twice the relative movement of adjacent grate bars, this ensures that with a complete stroke the

cutting edges move against one another over their entire length, whereby particles which penetrate into the recesses are also in fact captured and conveyed downwards.

If the grate bar flank remaining above the recesses has a height equivalent to about one third to one quarter of the overall height of the grate bar flank, and is thus equivalent to only a small part of the grate bar flank height, this ensures that particles which have penetrated reach a recess very rapidly and there are pressed out downwards by the saw-tooth-like grate bar flanks.

The invention also relates to a grate bar which is characterised in Claim 6. Embodiments of this grate bar are described in the subclaims 7 and 8.

The invention is represented by way of example in the drawing, wherein

Fig. 1 shows a view from above onto a grate stage of a furnace grate created by a number of grate bars movable relative to one another ;

Fig. 2 shows a section according to line II-II in Fig. 1.

Fig. 3. shows a section according to line III-III in Fig. 2.

As is clear from Fig. 1, a grate stage of a furnace grate is formed from a number of grate bars 1 resting against each other, which are movable relative to one another, as indicated by the offset position in Figs 1 and 2. As shown in Figs 2 and 3, each grate bar 1 has a grate bar back 2 and grate bar flanks 3, which project laterally with respect to external ribs 4 projecting downwards.

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Each grate bar flank has saw-tooth-like recesses 5, which are closed upwards in the direction of the grate bar back 2, and open towards the grate bar underside. This creates saw-tooth-like contact surfaces 6, whereby the individual saw teeth have flanks 7, the outside edges whereof form cutting edges 8 on the contact surfaces, which cutting edges cooperate with the cutting edges of the adjacent grate bar, whereby the overlapping of the contact surfaces 6 during a relative stroke changes continuously, so that the cutting edges 8 are moved past one another like the blades of a pair of scissors. Between the teeth flanks 7 of the teeth 9 created by the recesses 5, relief niches are created with a relative stroke, which niches are composed of the recesses of adjacent grate bars, and during the relative stroke have a volume which is constantly changing. Into these relief niches fall those particles which find their way between adjacent grate bars and are pressed downwards in the direction of the arrow 10 by the cutting edges 8 of adjacent grate bars, as a result of the wedge effect caused by the angle of the cutting edges. One such particle is designated 11.

The part of a grate bar flank remaining above the recess up to the grate bar back is designated 12, and forms the area of the grate bar flank with the lowest height. In the embodiment depicted, this area has a height equivalent to roughly one quarter of the overall height of the grate bar flank 3.

The distance between two teeth 9 of a grate bar flank is designated 13 and forms one tooth pitch of the grate bar flank. As is clear from the illustration in Fig. 2, two adjacent grate bars in each case are depicted offset against one another by half a tooth pitch, so that with a grate bar stroke equivalent to half the tooth pitch, the teeth of adjacent grate bar flanks in the front position of the movable grate bar are staggered relative to one another, whilst the teeth 9 of adjacent grate bar flanks overlap when the movable grate bar is in its rear stoking position.

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This tooth-like design of the grate bar flanks is preferably confined to the combustion path area of a grate bar, i.e. that area which is not continuously overlapped by the grate bar located above.



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Patent Claims

1. Grate for furnaces, with lengthwise movable and mutually partially overlapping grate stages made of individual grate bars longitudinally movable relative to one another, which rest against one another with lateral contact surfaces on their grate bar flanks, which project at least partially with respect to downwardly projecting external ribs of the grate bar, characterised in that the grate bar flanks (3) in the areas projecting with respect to the external ribs (4) have, at least in the combustion path area of the grate bar, saw-tooth-like recesses (5) which are closed with respect to the back of the grate bar (2) and open towards the underside of the grate bar.
2. Grate according to Claim 1, characterised in that the saw-tooth-like recesses (5) of adjacent grate bars (1) are longitudinally offset with respect to each other by half a tooth pitch (13).
3. Grate according to Claim 1 or 2, characterised in that the tooth pitch (13) substantially corresponds to twice the relative movement of adjacent grate bars (1).
4. Grate according to one of Claims 1 to 3, characterised in that the flanks (7) of the teeth (9) remaining between the recesses (5) have an angle with respect to the grate bar back surface of between 20 and 50° , in particular 35° .
5. Grate according to one of Claims 1 to 4, characterised in that the grate bar flank (12) remaining above the recesses (5) has a height equivalent to about one third to one quarter of the total height of the grate bar flank (3).
6. Grate bar for a grate for furnaces, with lengthwise movable grate stages made of individual grate bars movable relative to one another, which rest against one another with lateral contact



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surfaces on their grate bar flanks, which project at least partially with respect to external ribs projecting downwards, characterised in that the grate bar flanks (3) in the area projecting with respect to the external ribs (4) and at least in the combustion path area of the grate bar (1) have saw-tooth-like recesses (5) which are closed against the grate bar back (2) and open towards the underside of the grate bar.

7. Grate bar according to Claim 6, characterised in that the flanks (7) of the teeth (9) remaining between the recesses (5) have an angle with respect to the grate bar back surface of between 20 and 50° , in particular 35° .

8. Grate bar according to Claim 6 or 7, characterised in that the grate bar flank (12) remaining above the recesses (5) has a height equivalent to about one third to one quarter of the total height of the grate bar flank (3).