Sept. 30, 1941. K. GRETHE 2,257,416

TRAVELING GRATE

Filed Dec. 28, 1938

Fig. 1

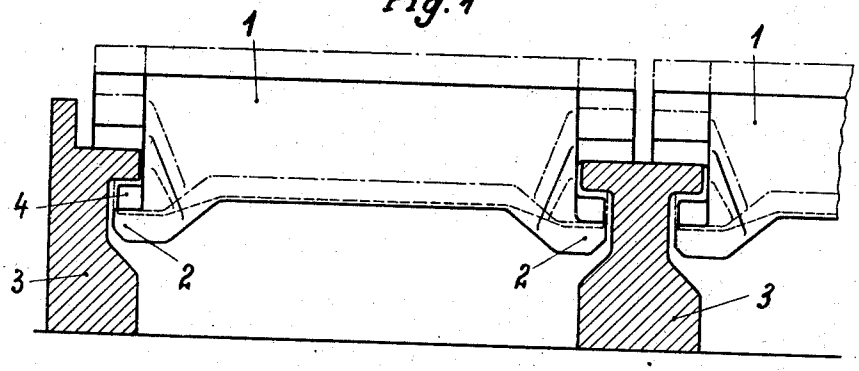


Fig. 2

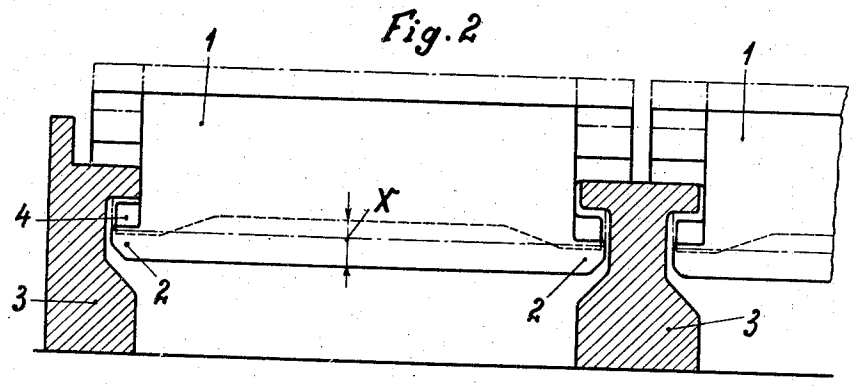


Fig. 3

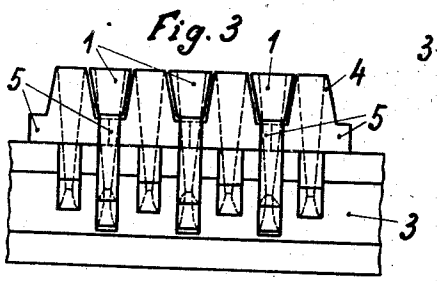


Fig. 4

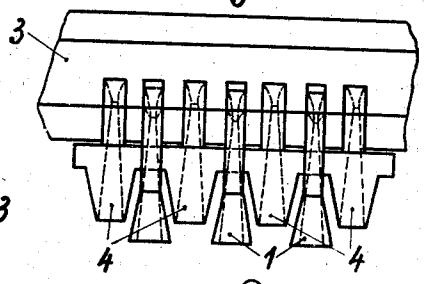
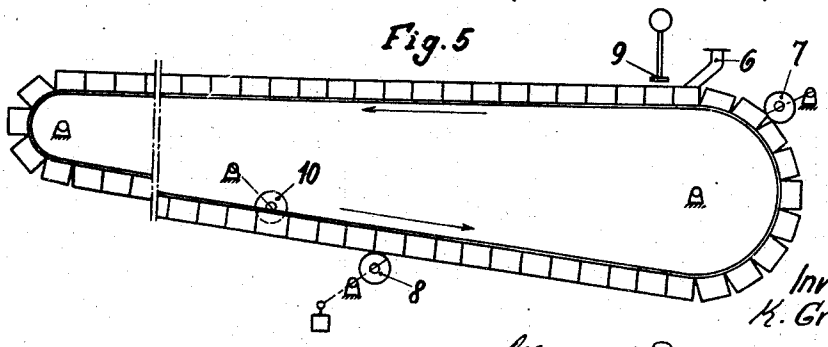


Fig. 5



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TRAVELING GRATE

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In Germany August 27, 1937

3 Claims. (Cl. 110—40)

An objection which frequently occurs in the known traveling grates for induced draught roasting and sintering or similar plants is that small lumps of the charge become tightly wedged between the grate bars and do not drop when the grate carriers are downwardly directed. Thus, the air-space between the bars is considerably reduced so that the vacuum under the grate increases and causes not only an extra load on the fans but also a considerable reduction in the efficiency of the plant. It has been endeavoured to overcome this objection by removing the wedged charge material from the grate slots by knocking on the grate bars with a tool, for which purpose stopping of the band is often unavoidable. However, the bars suffer considerably under this method of cleaning. Furthermore, the success is only of short duration as the spaces between the grate bars are mostly again filled after the band has performed a circulation.

It is known, to so construct the grate carriers for firing plants that at the reversing of the carrier on to the lower side of the band every second grate bar swings out about a hinge point located at one end of the bar with the result that a cleaning of the grate slots is attained. This type of grate bar cannot, however, be used in induced draught roasting and sintering plants because the grate carriers do not run on rollers as in boiler firing installations but are moved along guide rails to avoid the lateral penetration of dead air. The hingedly mounted bars require very heavy construction so that their use in sintering plants would result in increased wear of the guide rails. Furthermore the provision of turning joints in traveling grates for induced draught roasting and sintering is impracticable because the bars are heated by the waste gases sucked therethrough to a much higher temperature than in the case of firing grates which are constantly cooled by the air for combustion.

Furthermore, grate fittings are known for traveling grates in which the individual grate bars, or groups thereof, are coupled with clearance both to anchoring grate bars and also the one to the other by means of pins and sleeves arranged in the middle of the bars so that they carry out a relative oscillating movement during the reversing movement of the grate band. Such grate fittings are open to the objection that the spaces between the bars only change slightly during the reversing movement of the grate on to the under side of the grate band, so that relatively large lumps of the charge which jam between the bars owing to the induced draught, are not loosened, with the result that the grate becomes clogged after being in service only a short time. Moreover, owing to the exceptionally high heating to which the grate bars are subjected, the pins and sleeves serving for coupling the grate bars are subject to increased scale formation and seize with the result that the bars can no longer perform their oscillating movement and must be renewed, this being open to the additional objection that, when a single bar becomes defective, a whole group of grate bars is rendered inoperative resulting in a stoppage of the whole sintering band. Such grate fittings therefore cannot be used for induced draught roasting and sintering.

According to the invention a traveling grate is proposed for induced draught roasting and sintering or similar plants which is equipped with relatively movable grate bars, whereby the objections of the known traveling grates are overcome. The grate is constructed in such a way that every second bar, as the grate travels on to the under side of the band, is moved downwards out of the plane of the grate in vertical direction with limited clearance, with the result that the gaps between the bars become wider along their entire length and the wedged lumps of the charge can drop out. At the same time it is advisable, in order to ensure a dropping out of the loose grate bars during the traveling of the grate, to make the loose grate bars higher than the fixed grate bars by such an amount that the loose grate bars after having dropped during the traveling of the grate, are flush with the edges of the fixed grate bars. A cylinder arranged in the interior of the grate engages the projecting portions of the loose bars during the return travel of the grate so that the loose bars, if they have not dropped by gravity, are positively forced out by the cylinder as they pass this cylinder. The contacting faces of the bars are constructed so that they cannot bind, for example they are of wedge-shape, with the result that the dropping of the bars is particularly facilitated.

To ensure that the movable grate bars are properly re-ordered as the grate carriers return into the operative position, a device, for example a cylinder, is arranged prior to the charge feed, which device presses into their original position any bars which may project so that the bars are uniform and smooth when the charge is fed thereon.

To prevent lateral displacement or inclining of the grate bars, they are held in position for example by the provision of projections on the feet of the fixed bars, which projections embrace the movable bars between them and support one another.

The removal of the small lumps of charge from the gaps between the grate bars is assisted by arranging a device, for example a cylinder, on the under side of the grate band, which device lifts the projecting loose bars and then allows them to drop again, with the result that the last remnants of the charge which are burnt on to

the bars are removed. A device may also be provided which effects an additional cleaning of the bars by scraping them.

As compared with the known plants of this type the traveling grate with the movable grate bars according to the invention possesses the great advantage that the grate slots are subjected to a continual automatic cleaning with the result that the efficiency of the plant is considerably improved. Moreover, the grate bars are constructed so that they can be fitted into any existing grate carriage without considerable expense and without increasing the weight, so that the guide rails are not subjected to extra wear. Furthermore, the new grate bars have a longer life because they are no longer subjected to the action of percussion tools as heretofore.

Two embodiments of the invention are illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a section through a traveling grate taken longitudinally to the direction of movement and with loose and fixed grate bars of the same height,

Fig. 2 is a similar view to Fig. 1 of a traveling grate with loose and fixed grate bars of different heights,

Fig. 3 shows a portion of the upper side of the grate band viewed in elevation transversely to the direction of movement and without front cross bar,

Fig. 4 shows a portion of the lower side of the grate band viewed in elevation transversely to the direction of movement and without front cross bars,

Fig. 5 shows a complete grate band in side elevation.

In the construction illustrated in Fig. 1 the movable grate bars are designated by 1. These bars have projections 2 which engage in grooves in the cross bars 3 of the grate carriage. The bars have so much clearance in the grooves, that they can drop into the position indicated in dot-dash lines (Fig. 1) as the carriage travels on to under side of the band. The fixed bars 4 engage with slight clearance in grooves in the cross bars 3 and are so constructed that their projections 5 maintain their mutual spacing in that they extend under the movable bars located between them. The heads of the grate bars 1 and 4 have alternating wedge-shaped bearing faces and they form, in operative position, a level grate surface (Fig. 3). As the band reverses on to the lower side, the grate slots widen to an extent determined by the pitch of the wedge shaped bearing faces and the amount of clearance of the movable bars (Fig. 4). With the object of reducing weight the middle section of the bars may taper towards the lower edge. The grate band travels in the direction indicated by the arrows shown in Fig. 5. The charging of the material to be roasted or sintered takes place at 6. 7 designates the levelling device and 8 the device for additional cleaning, 9 is an arrangement for uniformly spreading the charge on the grate band.

The construction illustrated in Fig. 2 is similar to that shown in Fig. 1 with the exception that in this construction the loose grate bars are higher than the fixed grate bars and project a distance x over the fixed bars. A cylinder 10 (Fig. 5) arranged within the grate engages the projecting lower ends of the loose grate bars 1 during the return movement of the grate in such a manner that these loose bars 1 are positively pressed outwards by the cylinder 10 as the band passes the same, if these bars have not already dropped by gravity before they reach the cylinder 10.

Attention is directed to the fact that the cross bars 3 travel in the same direction as the grate band as is shown in Fig. 5. It is submitted that the cross bars 3 constitute a part of a grate carriage and that the movable grate bars 1 engage with their projections 2 in grooves of the cross bars 3 of the grate carriage.

As shown in Figures 1 to 5, the individual grate bars are mounted and arranged in the direction of travel of the grate band while the cross bars 3, which hold the grate bars in position, are arranged transversely to the direction of travel of the grate band. The roller or cylinder 10 is mounted on a swingable support and rolls off the under side of the grate band and is forced by gravity onto the lower surfaces of the movable grate bars 1 whereby these bars fall out.

It is believed in view of the foregoing that a further detailed description of the operation of the invention is entirely unnecessary. Likewise it is believed that the advantages of the invention will be readily apparent.

I claim:

1. A traveling grate especially for induced draught roasting and sintering or similar plants comprising an endless circulating grate band including a plurality of cross bars arranged transversely to the direction of travel of the band and provided with grooves, a series of fixed longitudinal bars forming the surface of the grate band arranged with slight clearance in the grooves of the cross bars, a series of movable longitudinal grate bars arranged alternately between the fixed bars with their ends engaged in the grooves of the cross bars so that only a limited amount of vertical play out of the plane of the grate bars is allowed, heads on both the fixed and movable grate bars having alternately wedge-shaped engaging surfaces, projections on opposite sides and at the inner ends of each of the heads on the fixed grate bars for engaging the correspoding projections on the adjacent fixed bars so that the fixed bars are mutually supported, said projections also constituting seats for the inner ends of the heads of the movable bars and means for widening the gaps between said bars along their entire length at the reversal of the grate on to the under side of the band.

2. A traveling grate especially for induced draught roasting and sintering or similar plants comprising an endless circulating grate band including a plurality of cross bars arranged transversely to the direction of travel of the band and provided with grooves, a series of alternately fixed and movable longitudinally extending grate bars positioned between said cross bars and engaging with a small amount of play in grooves of the cross bars, heads on both the fixed and movable grate bars having alternately wedge-shaped engaging surfaces, projections on opposite sides and at the inner ends of each of the heads on the fixed grate bars for engaging the corresponding projections on the adjacent fixed bars so that all of the fixed bars are mutually supported, and said projections also constituting seats for the inner ends of the heads on the movable bars.

3. A traveling grate as claimed in claim 2, in which the heads on the fixed grate bars taper toward their outer ends while the heads on the movable bars are flared at their outer ends and tapered toward the inner ends.

KURT GRETHE.