F. KRÖPELIN.

CHAIN GRATE.

APPLICATION FILED MAR. 16, 1912.

1,046,087

Patented Dec. 3, 1912.

4 SHEETS—SHEET 1.

Fig. 1.

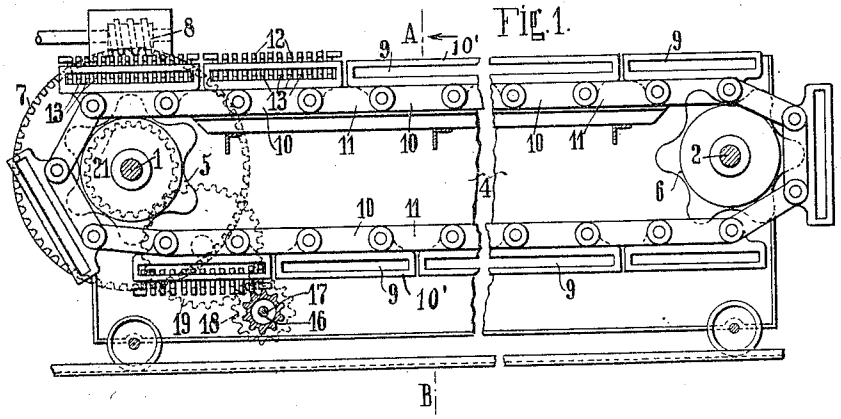


Fig. 2.

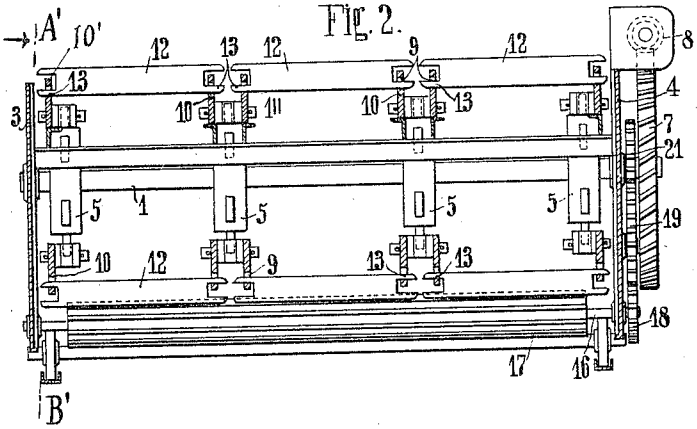


Fig. 3.

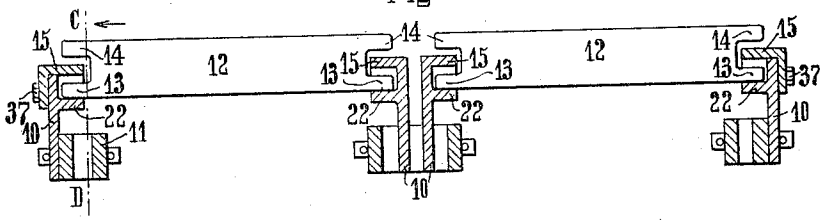
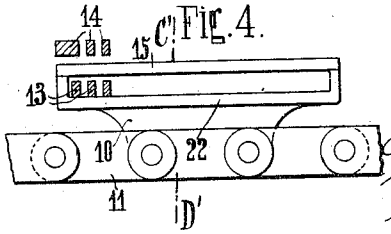


Fig. 4.



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4 SHEETS—SHEET 2.

Fig. 5.

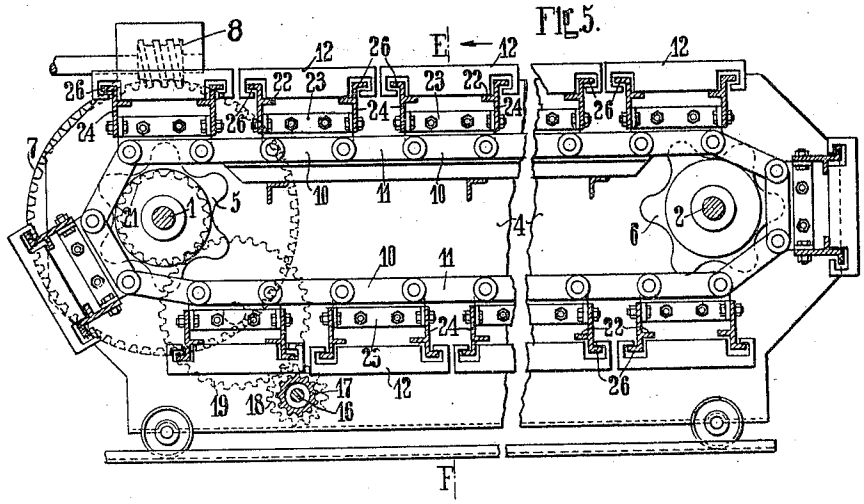


Fig. 6.

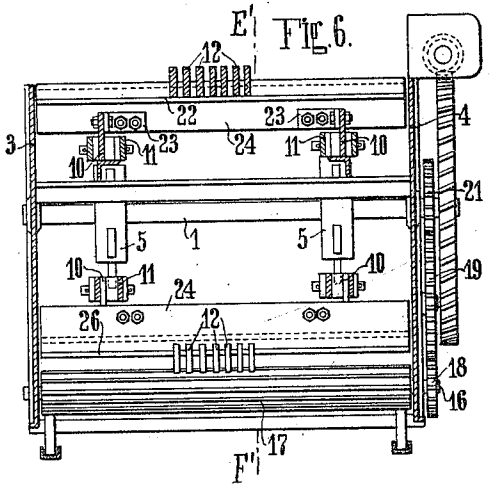
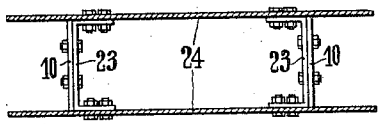


Fig. 7.



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4 SHEETS—SHEET 3.

Fig. 8.

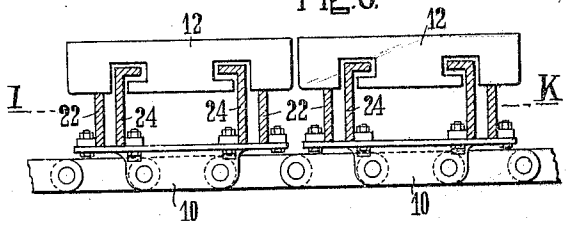


Fig. 9.

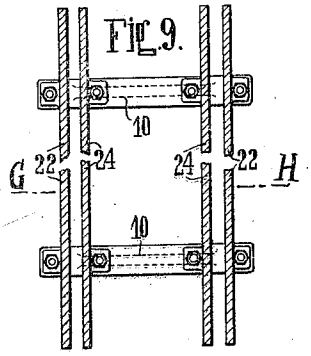


Fig. 10.

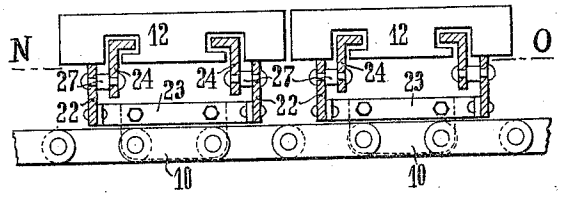


Fig. 11.

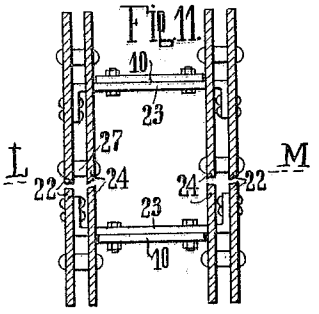


Fig. 12.

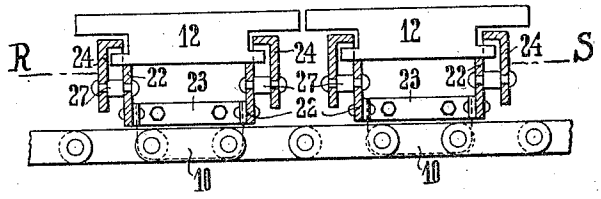
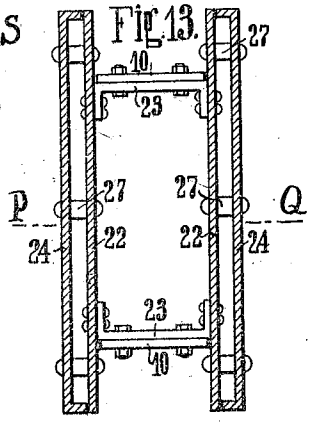


Fig. 13.



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4 SHEETS—SHEET 4.

Fig. 15.

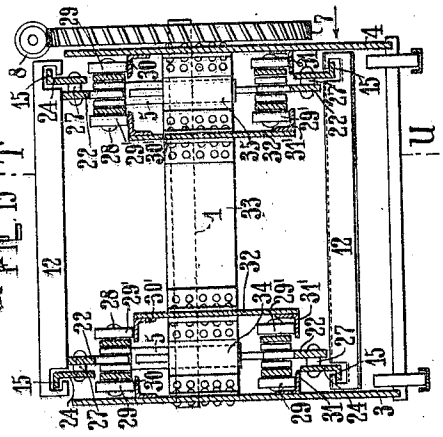


Fig. 18.

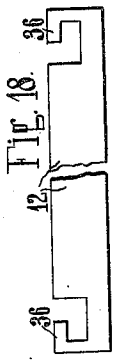


Fig. 19.

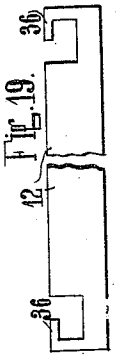


Fig. 17.

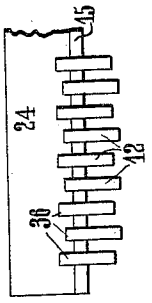


Fig. 14.

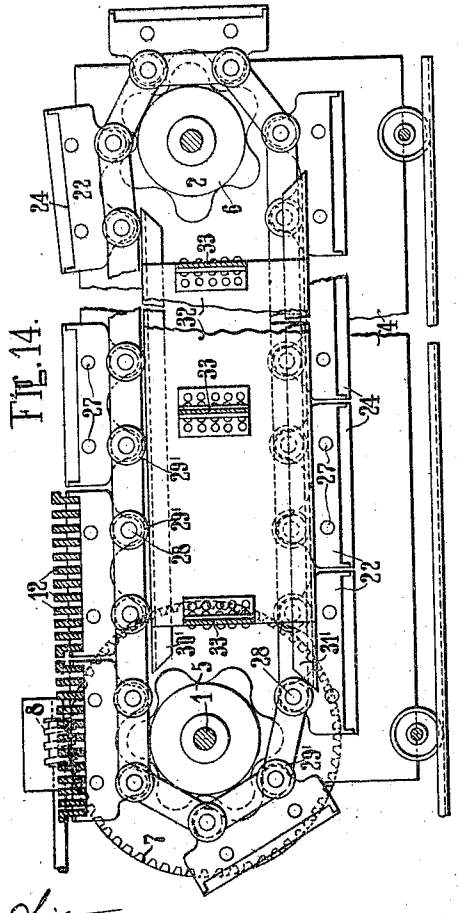
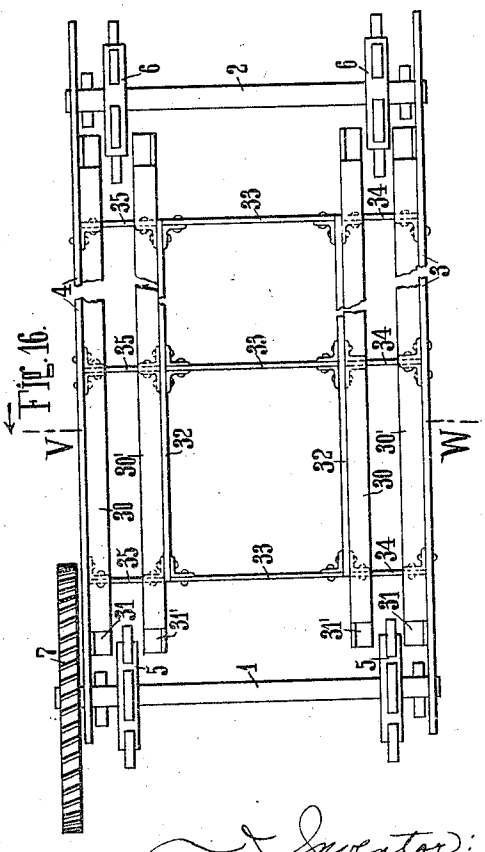


Fig. 16.



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UNITED STATES PATENT OFFICE.

FRANZ KRÖPELIN, OF DÜREN, GERMANY.

CHAIN GRATE.

1,046,087. Specification of Letters Patent. Patented Dec. 3, 1912.

Application filed March 16, 1912. Serial No. 684,172.

To all whom it may concern:

Be it known that I, FRANZ KRÖPELIN, a citizen of the Empire of Germany, and residing at Düren, Rhineland, Germany, have invented certain new and useful Improvements in Chain Grates, of which the following is a specification.

My invention relates to chain-grates comprising fire-bars each resting on a pair of bearers and engaging said bearers.

The novel feature of my invention resides in the fact that the upper portions of the fire-bars do not rest upon the bearers, but the fire-bars are disposed about the guide-bars of the bearers with a clearance between said fire-bars and these guide-bars while the lower portions of the fire-bars are directly supported by the bearers.

The advantage gained by this improved construction is that the portions of the fire-bars engaging the bearers are effectively cooled by the air streaming through into the furnace and are consequently protected from being burnt.

Several embodiments of my invention are represented by way of example in the accompanying drawings, wherein;—

Figures 1 and 2, showing the first form of chain-grate, are longitudinal section on the line A′—B′ in Fig. 2 and vertical section on the line A—B in Fig. 1, respectively; Figs. 3 and 4 show the second form, Fig. 3 being a vertical section on the line C′—D′ in Fig. 4 and Fig. 4 a longitudinal section taken on the line C—D in Fig. 3 as seen in the direction of the arrow, respectively; Figs. 5 to 7 show the third form, Fig. 5 being a longitudinal section on the line E′—F′ in Fig. 6; Fig. 6 a cross-section taken on the line E—F in Fig. 5, and Fig. 7 a detail view showing the connection of the transverse bearers with the links of the chain; Figs. 8 and 9 show the fourth form, Fig. 8 being a longitudinal section on the line G—H in Fig. 9 and Fig. 9 a horizontal section on the line J—K in Fig. 8; Figs. 10 and 11 show the fifth form, Fig. 10 being a longitudinal section on the line L—M in Fig. 11, and Fig. 11 a horizontal section on the line N—O in Fig. 10; Figs. 12 and 13 show the sixth form, Fig. 12 being a longitudinal section on the line P—Q in Fig. 13, and Fig. 13 a horizontal section R—S in Fig. 12; and Figs. 14 to 19 show the seventh form, Fig. 14 being a longitudinal section on the line T—U in Fig. 15, Fig. 15 a cross-section on the line V—W in Fig. 16, Fig. 16 a plan of the grate after the removal of the chains, Fig. 17 a side elevation of part of the chain on the lower runway as seen in the direction of the arrow in Fig. 15, and Figs. 18 and 19 side elevations of two adjacent fire-bars.

Referring firstly to Figs. 1 and 2, the numerals 1, 2 designate the shafts carried by the two side plates 3, 4 of the frame, and driven in well-known manner by means of a worm 8 engaging the worm-wheel 7 securely mounted on the shaft 1. The chain-wheels 5, 6, respectively fast on the shafts 1, 2, carry the chain constituted by the bearers 10, forming links, and the connecting links 11. The bearers are each provided with a slot 9, which serves to carry the fire-bars 12 having forked ends. The lower prongs 13 of these forked ends enter into the slots 9 in the bearers, thus are under the guide-bars 10′ formed by said slots, and rest on the bottom part of the bearers. On the other hand, the upper prongs are a certain distance away from the top of these guide-bars, so that the air for combustion in passing toward the furnace may come in contact with both the guide-bars as well as the upper prongs of the fire-bars. In this manner these upper prongs are kept cool and protected from being burnt. When the fire-bars are made reversible and when the upper surfaces have become burnt, the bars can be reversed as the upper prongs will be sufficiently preserved to take the place of the lower and be inserted into the slots 9 in the bearers. The side plates 3, 4 of the frame also carry the shaft 16 fast on which is mounted the grooved roller 17 as well as the pinion 18. The latter meshes with a spur-gear 19 journaled on the side 4 of the frame and meshing with the gear-wheel 21 fast on the shaft 1. Motion is thus transmitted from the shaft 1, by means of the wheels 21, 19 and 18 to the shaft 16 and the roller 17, and the ribs on this roller act upon the fire-bars in succession and impart to each in turn a vertical movement, whereby a kind of shaking motion is given to them.

The second form of chain-grate shown in Figs. 3 and 4 chiefly differs from that just described in that the bearers 10 are not provided with slots through them, but with seatings or ledges 22, by which the lower prongs 13 of the fire-bars 12 are supported. The forked ends of the fire-bars clasp the

guide-bars 15 of the bearers with play. These guide-bars 15 may be integral with their bearers or be formed as independent members detachably mounted on their bearers by means of screws 37. The latter arrangement has the advantage that the fire-bars 12 may be removed from one side of the grate by taking out the screws 37 and taking off the guide-bar, whereupon the fire-bars can be readily drawn out.

Referring to Figs. 5 to 7, the shafts 1, 2 are again journaled in the two side-plates 3, 4 of the frame, and are rotated by means of the worm 8 meshing with the worm wheel 7 fast on the shaft 1. Over the chain-wheels 5, 6, fast on the shafts 1, 2, respectively, there runs in this instance also the chain comprising bearer members 10 and intermediate links 11. Onto the bearer members 10 are bolted the U-brackets 23, and on the latter are bolted the bearers 24, 24. These bearers have on their inner sides the seatings or ledges 22 for supporting the fire-bars 12, while the guide-bars 26 clasped with play by the fire-bars project outwardly from the bearers. The side plates 3, 4 of the frame also carry the shaft 16, fast on which are the ribbed roller 17 and the pinion 18. The latter meshes with the spur-gear 19 journaled in the side plate 4 of the frame, and gearing with the gear-wheel 21 fast on the shaft 1. The roller 17 being thus rotated by the shaft 1, the fire-bars 12 are acted upon in succession by said roller and are given a certain vertical movement whereby they are shaken in a manner similar to that in the form of grate according to Figs. 1 and 2.

The form of grate according to Figs. 8 and 9 differs from that according to Figs. 5 to 7 in that the seatings or ledges 22 for supporting the fire-bars are formed as plates and have a space between themselves and the bearers, which admits of air passing through between them, by which means the supported portions of the fire-bars are kept cool. The bearers 24 and the seating-plates 22 set at a certain distance from one another are both supported below by the bearers or links 10.

In the form of a grate according to Figs. 10 and 11 the bearers 22 are connected to the brackets 23 and the latter are connected with two opposite links 10 of the endless chains. Moreover, the guide bars 24, engaging the fire-bars 12, do not directly rest upon the links 10, 10, but are rigidly connected with the bearers 22, 22 by means of stay bolts 27 or the like.

In the form of grate according to Figs. 12 and 13 the bearers 22 are connected with the brackets 23 and the latter with the opposite links 10 of the endless chains in a similar way as in the form of grate according to Figs. 9 and 10. The guide bars 24 however, engaging the fire bars 12 are not arranged at the inner side but at the outer side of the bearers 22. In this case also stay bolts 27 are used to rigidly connect the guide bars and the bearers.

In the form of grate according to Figs. 14 to 19, the shafts 1, 2 are again journaled in the sides 3, 4 of the frame and together with the sprocket-wheels 5, 6 are rotated by means of the worm-gear 8. The fire-bars 12 here rest upon the seating-plates 22, (Fig. 15) rigidly attached to the bearers 24 by stay bolts. The seating-plates 22 rest on the link-pins 28 of the chain. Each of these link-pins carries two rollers 29, 29′ which run on rails 30, 30′. Underneath these rails are mounted the rails 31, 31′, which support the rollers 29, 29′ when the chain is in its lower runway. The rails 30, 31 are respectively mounted on the side plates 3, 4 of the frame, while the rails 30′, 31′ are mounted on the inner plates 32, the latter being suitably supported by the side plates 1, 2 of the frame by means of transverse carriers 33, 34, 35. Owing to the chain running with the rollers 29, 29′ on the rails 30, 30′ or 31, 31′, the chains and chain-wheels are not subjected to such great stresses, as otherwise the power required to drive the chain becomes appreciably less, as principally frictional resistances have to be overcome. In two adjacent fire-bars 12 the prongs 36 which are under the guide-bars are made of different depths. The consequence is that these prongs when in the lower runway rest upon the guide-bars 15 formed on the bearers 24 and the fire-bars are at different levels (Fig. 17), whereby the removal of clinker is materially facilitated.

I claim:—

1. In a chain grate the combination of two bearers each having a supporting member and a guiding member and fire bars having ends resting upon the supporting members and extending with their upper portions over the guiding members without being in contact therewith.

2. In a chain grate the combination of two bearers, each having a supporting member and a guiding member and fire bars, being supported on parts of the supporting member situated below its upper surface, the portions of said fire bars which extend over the guiding members are not in contact therewith.

3. In a chain-grate, the combination of a frame, two axles, each carrying chain-wheels (5, 6) journaled therein and parallel endless chains movable around said chain-wheels, a plurality of pairs of bearers carried by the chains, guide bars rigidly connected with the bearers, and a plurality of fire-bars removably supported by their lower head-portions on each pair of the bearers and extending with their upper portions

over the guide-bars without being in contact therewith.

4. In a chain-grate, the combination of a frame, two axles each carrying chain-wheels journaled therein, and parallel endless chains movable around said wheels, a plurality of pairs of bearers carried by the chains, guide-bars rigidly connected with the bearers and located at a distance from the same, and a plurality of fire-bars removably supported with their lower head-portions by each pair of the bearers and extending with their upper portions over the guide-bars without being in contact therewith.

5. In a chain-grate, the combination of a frame, two axles, each carrying chain-wheels, journaled therein, and parallel endless chains movable around said chain-wheels, a plurality of bearers carried by the chains, said bearers being parallel with the links of the chains and fire bars with their ends resting on said bearers transverse to said chains.

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

FRANZ KRÖPELIN.

Witnesses:
HENRY CRADPICY,
ELISE KALBUSCH.