

March 5, 1929.

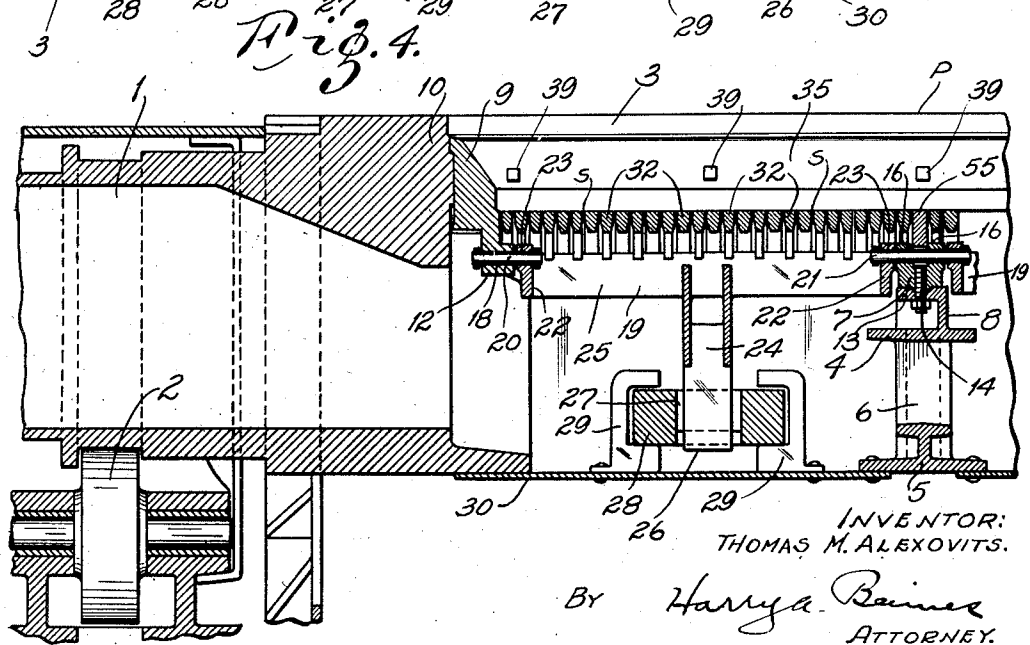
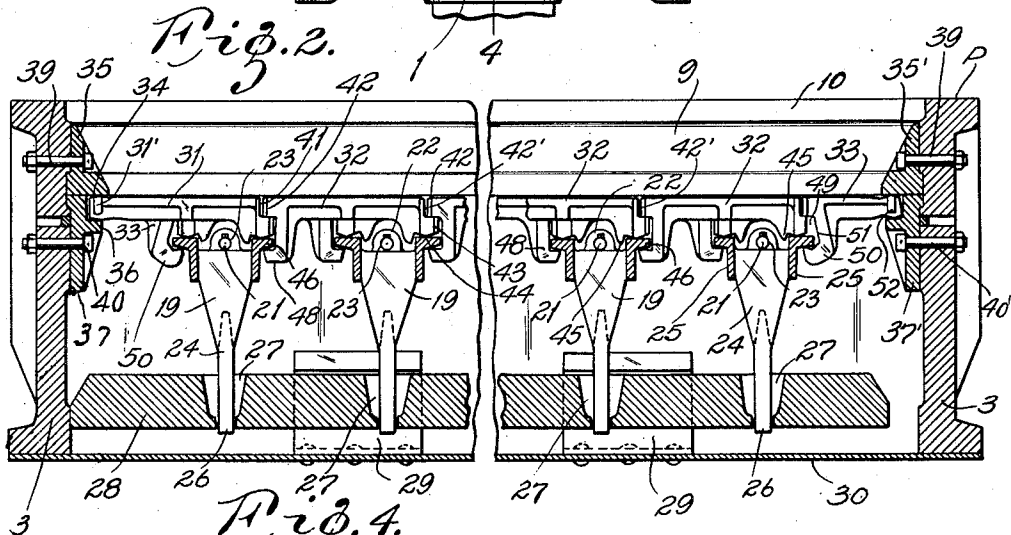
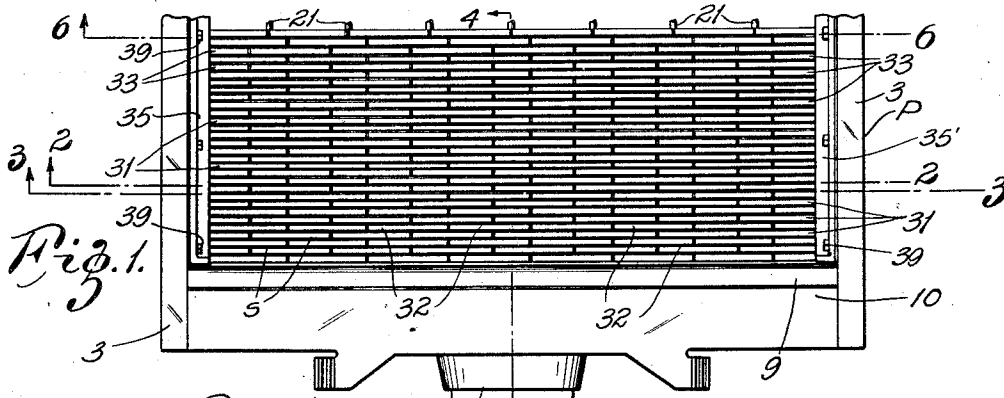
T. M. ALEXOVITS

1,704,027

GRATE FOR SINTERING PANS

Filed Feb. 25, 1928

4 Sheets-Sheet 1



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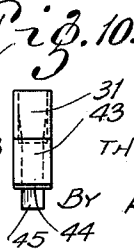
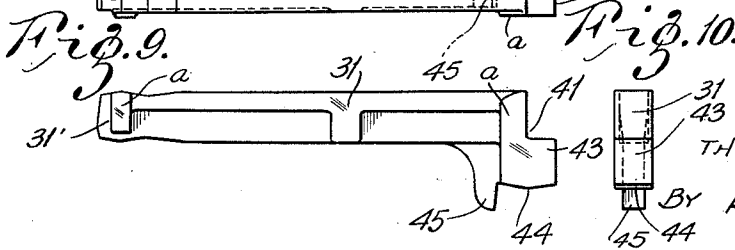
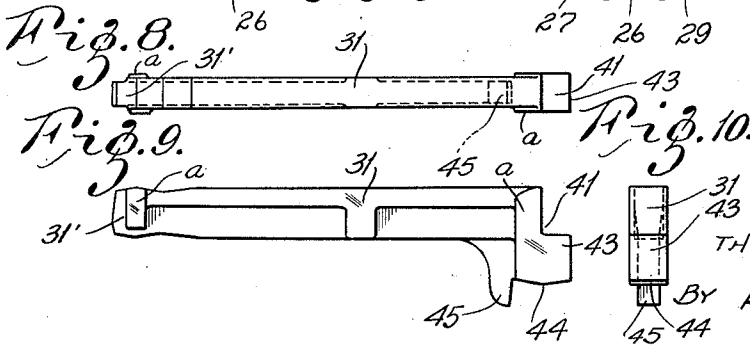
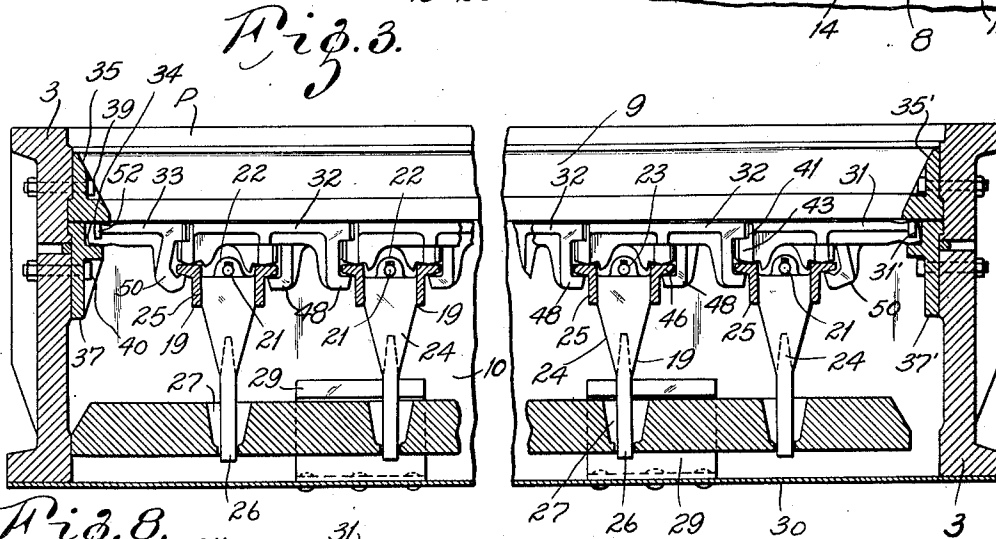
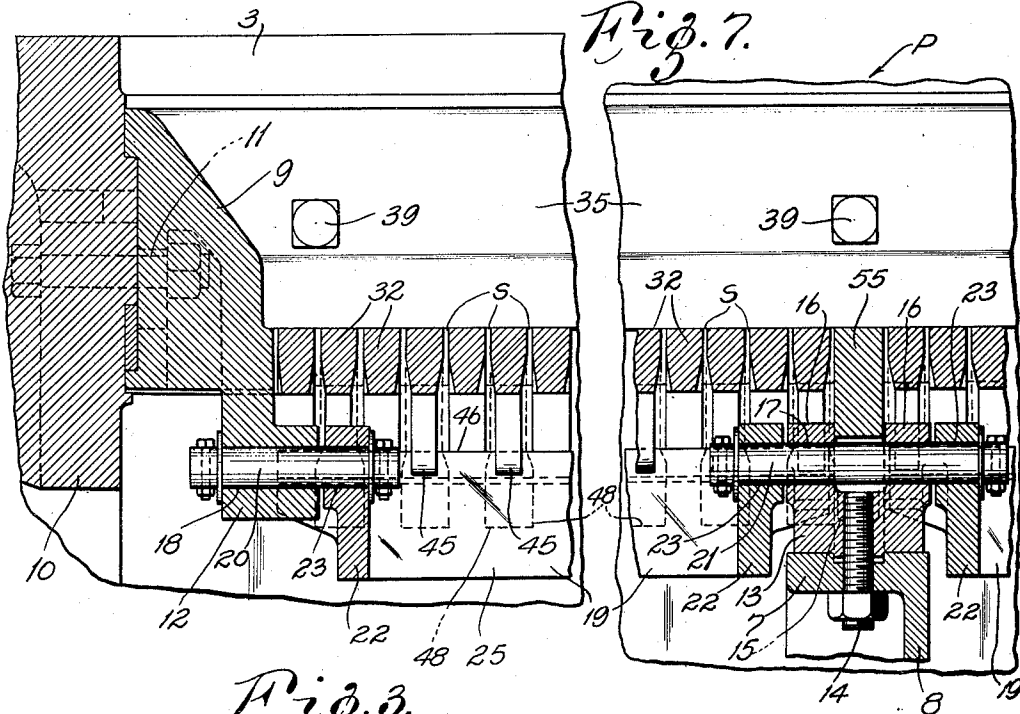
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GRATE FOR SINTERING PANS

Filed Feb. 25, 1928

4 Sheets-Sheet 2



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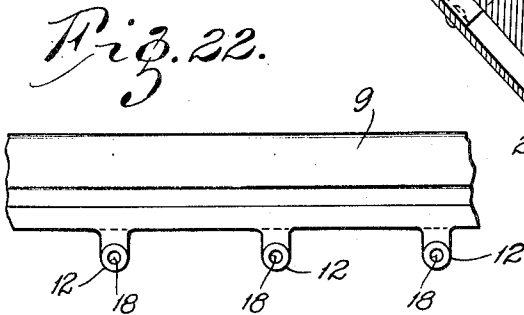
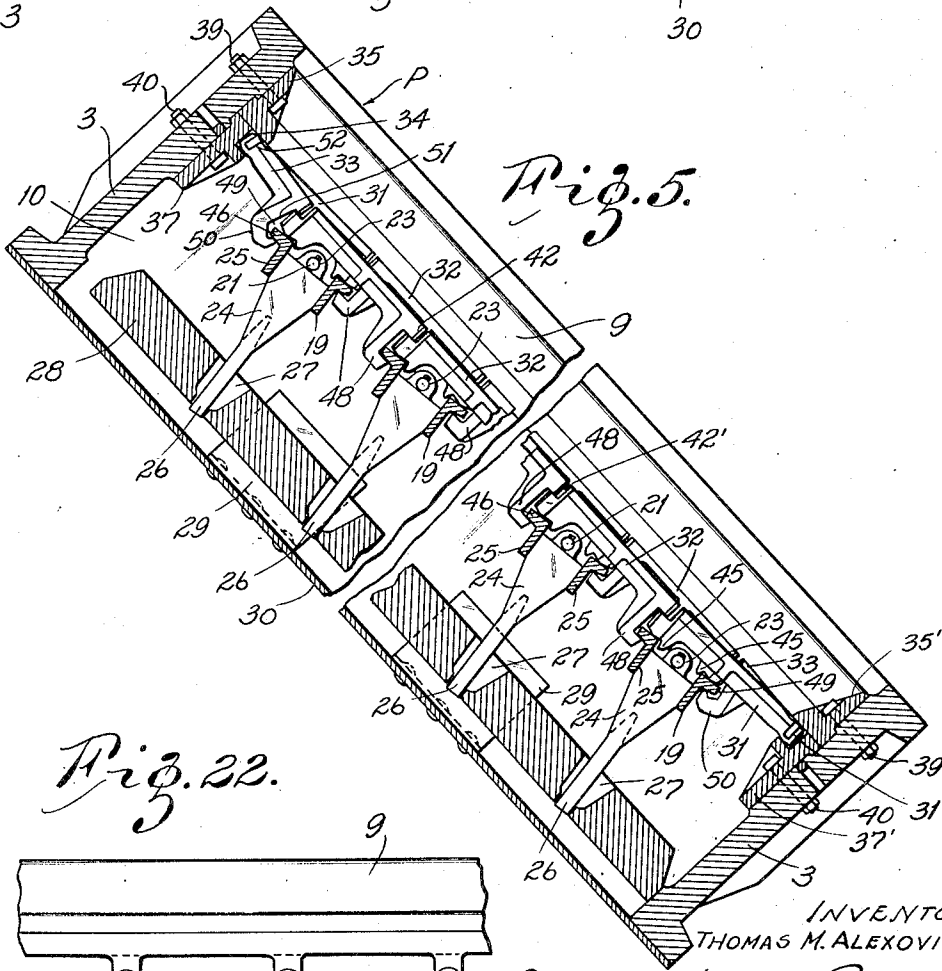
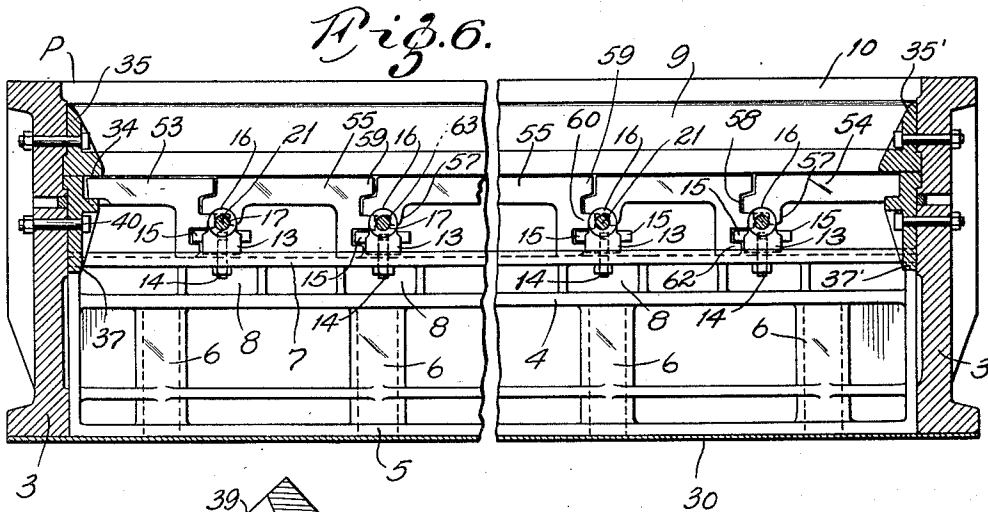
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GRATE FOR SINTERING PANS

Filed Feb. 25, 1928

4 Sheets-Sheet 3



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GRATE FOR SINTERING PANS

Filed Feb. 25, 1928

4 Sheets-Sheet 4

Fig. 11.

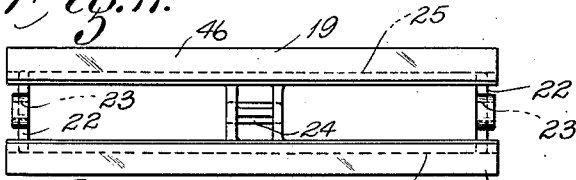


Fig. 12.

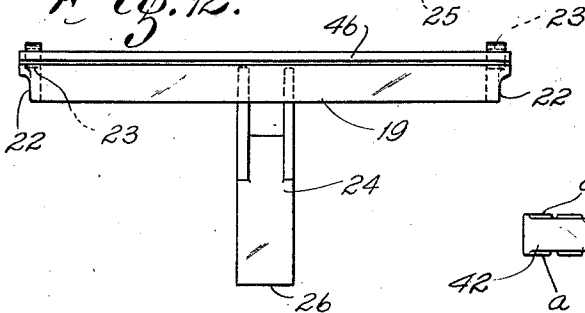


Fig. 13.

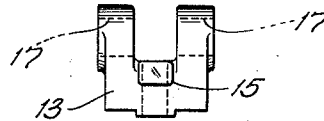


Fig. 14.

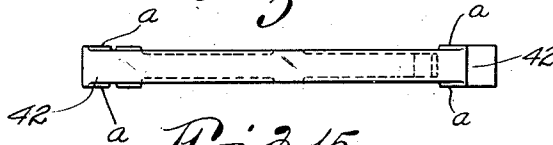


Fig. 15.

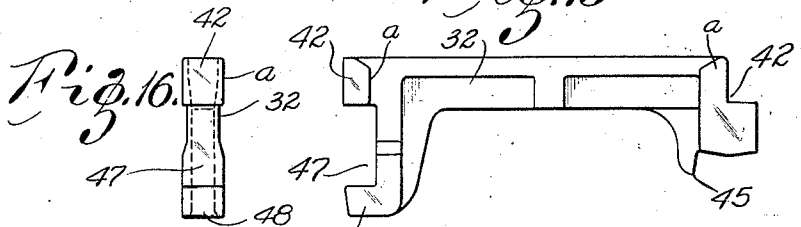


Fig. 16.

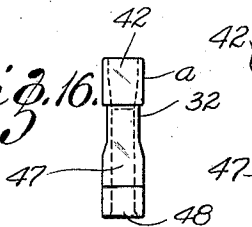


Fig. 17.

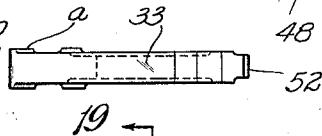


Fig. 18.

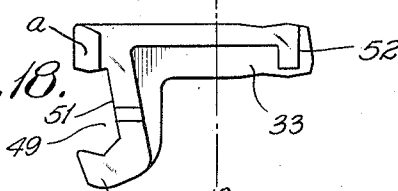


Fig. 20.

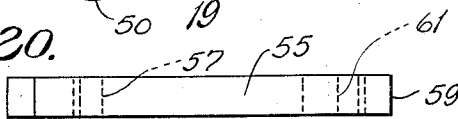


Fig. 19.



Fig. 23.

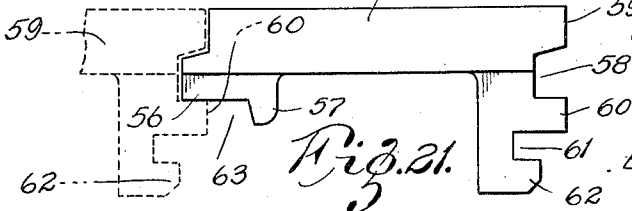
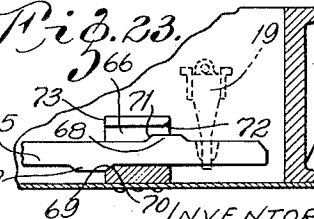


Fig. 21.

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UNITED STATES PATENT OFFICE.

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GRATE FOR SINTERING PANS.

Application filed February 25, 1928. Serial No. 257,089.

The present invention has relation to improvements in grates for sintering pans and consists in the novel features of construction more fully set forth in the specification and pointed out in the claims.

The grate forming the subject of the present application is a specific improvement over that described in the copending application of John E. Greenawalt, Serial No. 175,815, filed March 16, 1927, and is similarly adapted for use in sintering pans or similar apparatus for the metallurgical treatment of ores, from which the treated material is discharged or dumped by rotating or tilting the pan. While the grate may be advantageously used in connection with apparatus other than sintering apparatus, I will confine myself in the present description to its use in sintering pans because the grate is adapted to assist the discharge of the pan, and particularly, by virtue of a relative movement between the bars constituting the grate, to clean itself.

In the application above referred to, some of the grate bars were rotatable while others were moved bodily away from the normal supporting plane of the grate. In the present application all of the bars except the partition bars, are moved bodily away from said normal supporting plane.

The principal object of the invention is to impart a positive movement to the grate bars for the purpose of dislodging, by a shearing action, any material that may have become fused to the bars or lodged in the openings, by means of a comparatively simple structure. Obviously, the nature of the apparatus is such that the grate could not consistently operate if complicated, or if it involved delicate parts, and I have, therefore, sought in the present invention to simplify the construction of the grate bars without sacrificing any degree of positiveness in operation. It is also the object of the present invention to simplify the arrangement of the bars as well as the means for securing them in place with respect to removal for replacement in the event that a bar becomes burnt out in use. Further and other advantages will be better apparent from a detailed description of the invention in connection with the accompanying drawings, in which:

Figure 1 is a plan view of a portion of a

sintering pan showing one complete section 55 of the grate; Fig. 2 is a vertical cross-section through the pan taken on the line 2—2 of Fig. 1; Fig. 3 is a cross section similar to Fig. 2 taken on the line 3—3 of Fig. 1 to show the construction of the bars in the row adjacent to the row of bars shown in Fig. 2; Fig. 4 is a vertical longitudinal section taken on the line 4—4 of Fig. 1; Fig. 5 is a cross section taken on the same line as Fig. 3 except that the sintering pan is tilted or rotated for dumping; Fig. 6 60 is a cross section taken on the line 6—6 of Fig. 1 to show the row of immovable or partition bars; Fig. 7 is a section similar to that of Fig. 4 but on an enlarged scale however; Figs. 8, 9, and 10 are respectively top plan, side elevation, and end views of one of the end movable grate bars; Figs. 11 and 12 are respectively top plan and side elevation of a grate bar supporting frame; 75 Fig. 13 is a side elevation of one of the bearings in which the rocking grate bar frames are mounted; Figs. 14, 15, and 16 are respectively top plan, side elevation and end views of one of the intermediate movable grate bars; Figs. 17 and 18 are respectively top plan and side elevation of one of the short movable end grate bars; Fig. 19 is a cross section through the last mentioned bar taken on the line 19—19 of 85 Fig. 18; Figs. 20 and 21 are respectively top plan and side elevation of one of the stationary partition bars; Fig. 22 is a side view of a fragment of the end dead plate, and Fig. 23 is a fragmentary detail showing a modified form of bar weight for actuating the grate bar frames.

Referring to the drawings, P represents a sintering pan adapted to be rotated on its trunnions, only one of which is shown and 95 indicated by the numeral 1, said trunnions being mounted on roller bearings 2. The specific mechanism for rotating the pan forms no part of the subject of the present invention and need not be further described. 100

Formed integrally with the sintering pan and extending from one side wall 3 to the other are a series of ribs 4 spaced from beams 5 to which the ribs are connected through the perpendicular reinforcing 105 struts 6. The rib 4 is provided with a flange 7 connected in spaced relation to the rib by means of a web 8. It will be under-

stood that there are a series of ribs 4 together with the associated parts just described arranged in spaced relation lengthwise of the pan, but for lack of space, only one of said ribs is shown in the drawings (see Figs. 4 and 7). At each end of the pan (although one end only is shown) is a dead plate 9 bolted to end wall 10 by a bolt 11, said dead plate having a plurality of dependent bearings 12 (as shown in Fig. 22).

A plurality of bearing blocks 13 are mounted in spaced relation on flange 4 to which each block is secured by a stud 14, each of said blocks being bifurcated and provided with oppositely disposed lateral lugs 15, 15 (Fig. 13). Both forks 16, 16 of block 13 are provided with alining openings 17, 17, said openings also being in line with opening 18 in the opposite bearing 12 on the dead plate 9 and a grate bar frame 19 is pivotally mounted in oppositely disposed bearings 12 and 13 by means of pins 20, 21, the former traversing opening 18 in bearing 12 and the latter traversing openings 17, 17 in bearing 13. The ends 22, 22 of frame 19 are provided with openings 23, 23 to receive pins 20 and 21, said openings being of the size to permit the frame 19 to rock freely on pins 20 and 21. Pin 21 extends beyond both sides of bearing 13, so that it may support the contiguous ends of adjacent frames 19, 19. A lever arm 24 projects downwardly from the sides 25, 25 of each frame 19 and has its lower end 26 adapted for operation in the upwardly flaring slot 27 traversing a bar weight 28 slidably mounted in raceways or guides 29, 29 secured to bottom plate 30 of the sintering pan. There is, of course, a slot 27 to receive each one of the dependent ends 26 of each rocking frame 19.

Referring to Fig. 2, it will be observed that the row of grate bars comprises from left to right a long terminal bar 31 and a plurality of intermediate bars 32, 32 etc., and a short terminal bar 33. Terminal bar 31 has its outer end 31' disposed in a recess 34 formed between the bottom of a side dead plate 35 and a flange 36 projecting from a confining plate 37. The dead plate 35 is secured to the side wall 3 of the pan by bolts 39, and confining plate 37 is secured to said pan wall by bolts 40. The inner end of bar 31 is provided with a recess or notch 41 to receive the cooperating end 42 of bar 32, the opposite end of bar 32 having a notch 42' similar to notch 41 in bar 31 for the purpose of receiving the adjacent end 42 of the next bar in line. It will be observed that the projection or ledge 43 which results from the formation of the notch 41 has its bottom surface 44 crowned, and a lug 45 extends below the surface 44 and inwardly therefrom. The ledge 43 is adapted to rest

on the right hand flange 46 projecting outwardly from side 25 of frame 19, and both ledge 43 and flange 46 are received in recess 47 formed between the end 42 of bar 32 and depending flange 48 spaced therefrom. Corresponding ends of succeeding bars 32 are similarly formed so that each bar in the row has cooperative engagement with that bar immediately adjacent, and the right hand end of bar 31 and each bar 32 are supported directly by flanges 46, and the left hand ends of bars 32 and 33 are supported by the ledge 43 of the adjacent bar. The depending flanges 48 of the bars, as we shall see later, prevent the bars from falling out of the pan when the grate is inverted for dumping. The marginal bar 33 has a recess 49 corresponding with recesses 47 of the other bars, and a flange 50 corresponding with flange 48 of the other bars, but the bottom face of recess 49 is somewhat inclined to provide sufficient clearance for the flange 46 reposing in the recess when the frame 19 is rocked. This additional clearance is necessary because bar 33 has its outer end 52 confined between dead plate 35' and confining plate 37', and of necessity tilts upwardly when the right hand frame 19 is rocked. Bar 31 also tilts upwardly but the arc of rotation of bar 32 is approximately half the length of the arc of rotation of bar 31.

By referring to Fig. 3 it will be observed that the bars 31, 32 etc., and 33 in the row adjacent to those shown in Fig. 2, are reversed with respect to the position of the corresponding bars in Fig. 2. Consequently when the pan P is rotated in dumping position and the frames 19 rocked, the bars shown in Fig. 3 will be depressed while those shown in Fig. 2 will be elevated. This must be so since the bars in Fig. 3 are supported on the descending side of frame 19 while the bars shown in Fig. 2 are supported on the ascending side of frame 19. The respective movement of the bars when the pan is tilted is clearly shown in Fig. 5 where the frames 19 have been rocked by movement of the bar weight 28. When the pan P has been completely inverted, the bars are held in place by the flanges 48.

Referring now to Fig. 6, it will be seen that the end bars 53 and 54 have their outer ends confined between dead plates 35, 35' and confining plates 37, 37', respectively, while their inner ends are in cooperative engagement with the adjacent ends of intermediate bars 55, each intermediate bar 55 having a projecting flange 56 at its left hand end, adjacent to which is a depending lug 57. At the right hand end of each bar 55 is a recess 58 formed between the projecting end 59 and flange 60, and recess 61 between flange 60 and a depending flange 62. The function of recess 58 is to receive the end 56 of the adjacent bar, and the function of recess 61 is

to receive the lug 15 projecting from bearing 13. It will be observed that the lug 57 forms with flange 60 of the next adjacent bar a recess 63 to receive pin 21. Thus, the bars 53, 54 and 55 are all securely held in place, the end bars by dead plates 35, 35' and confining plates 37, 37', and the intermediate bars by the flanges received in recesses 61.

juxtaposition on said member, and means for actuating said member to elevate some of the bars and depress other bars.

4. A grate comprising a supporting member, a plurality of juxtaposed grate bars arranged to be movably held by said supporting member, and means for rocking said member to move alternate bars in opposite directions.

5. A grate comprising a supporting frame, a plurality of juxtaposed grate bars mounted for movement in said frame, and means arranged below said frame for imparting movement thereto, the movement of the frame being effective on the bars to depress alternate bars and elevate the others.

6. A grate comprising a series of supporting frames, a plurality of juxtaposed grate bars extending across and movably supported by two adjacent frames, and means for simultaneously rocking said frames to depress alternate grate bars and elevate the other bars.

7. A grate comprising a series of supporting frames, a plurality of juxtaposed grate bars extending across and movably supported by two adjacent frames, and means for simultaneously rocking said frames to move alternate grate bars to opposite sides of the normal grate supporting plane.

8. A grate comprising a series of juxtaposed frames, a plurality of grate bars each of which is adapted to be supported by corresponding sides of adjacent bars, and means for rocking said frames on an axis transverse to the plane of the bars, whereupon some of the bars will be raised and others lowered.

9. In an apparatus for treating ores comprising a holder, a grate disposed within said holder, said grate comprising a series of juxtaposed supporting frames, a plurality of grate bars movably fixed to said frames to provide a support for the ore, and means for imparting rotation to the frames with a dumping movement of the holder, said rotation of the frames operating to move the bars to opposite sides of the normal grate supporting surface.

10. In an apparatus for treating ores comprising a holder, a grate disposed within said holder, said grate comprising a series of juxtaposed supporting frames, a plurality of juxtaposed grate bars, each bar extending from the side of one frame to a corresponding side of the next adjacent frame, suitable formations on the ends of the bars for co-operating with the frames to hold the bars in place, and means for imparting rotation to the frames with a dumping movement of the holder, said rotation of the frames operating to move the bars in opposite directions with respect to the normal grate supporting surface.

10 All of the bars except the several rows of partition bars 53, 54 and 55, just described, are supported on side flanges 46, 46 of frame 19 and as these frames 19 are rocked, the bars must either rise or fall, depending on which side of the frame they repose. While all of the intermediate bars 32 rise or fall bodily, the marginal bars, as shown in Fig. 5, will tilt either upwardly or downwardly since their outer ends have tiltable confinement. Each of the bars 31, 32 and 33 is provided with bosses *a, a, a* on their side faces for the purpose of maintaining the bars in spaced relation and the slots *s* between adjacent bars a definite width.

25 In Fig. 23 I show a modification of the grate bar actuating means comprising a bar weight 65 slidable in the guides 66 (of which only one is shown), said bar weight differing from that heretofore described in that it is formed with oppositely disposed lugs 67 and 68, the former having an inclined face 69 which engages the incline face 70 of guide 66 when the bar 65 is in its normal position. The boss 68 has an inclined face 71 which engages inclined face 72 on the top guide finger 73 when the sintering pan *P* has been inverted to dumping position. The object of these engaging inclined faces is to hold the bar weight 65 against prematurely sliding to the opposite side of the pan; that is, the bar weight will not move to rock the grate bar frames until the pan has been rotated to a definite predetermined position when its weight will overcome the resistance of the engaging faces 69 and 70 and cause the weight to move with considerable force to more effectively break up and dislodge any material that may clog the spaces between the grate bars.

50 Having described my invention, I claim:

1. A grate comprising a supporting member, a plurality of grate bars mounted on said members, and means for moving some of the bars in one direction and other bars in an opposite direction.

2. A grate comprising a supporting member, a plurality of grate bars supported by said member, said bars lying normally in a common plane, and means for actuating the bars to dump the grate, said means operating to move some of the bars in one direction from the normal plane and other bars in an opposite direction from said plane.

3. A grate comprising a supporting member, a plurality of grate bars mounted in

11. A grate comprising a series of supporting frames, a plurality of juxtaposed grate bars movably supported by corresponding sides of adjacent frames, alining
5 bars of the frames having interlocking connection, and means for simultaneously rocking said frames to move alternate lines of bars in opposite directions.

12. In combination with a holder for
10 treating material, a grate mounted therein, said grate comprising a plurality of movable grate bars, means in the holder for actuating the bars on rotation of the holder, and means for restraining the action of said

actuating means until the holder has been
rotated to a predetermined position. 15

13. In combination with a holder for treating material, a grate mounted therein, said grate comprising a plurality of movable
grate bars, actuating means for moving
20 the bars with the rotation of the pan, and means for holding said actuating means inoperative until the pan has been rotated to a predetermined position.

In testimony whereof I hereunto affix my
signature. 25

THOMAS MICHAEL ALEXOVITS.