

March 7, 1939.

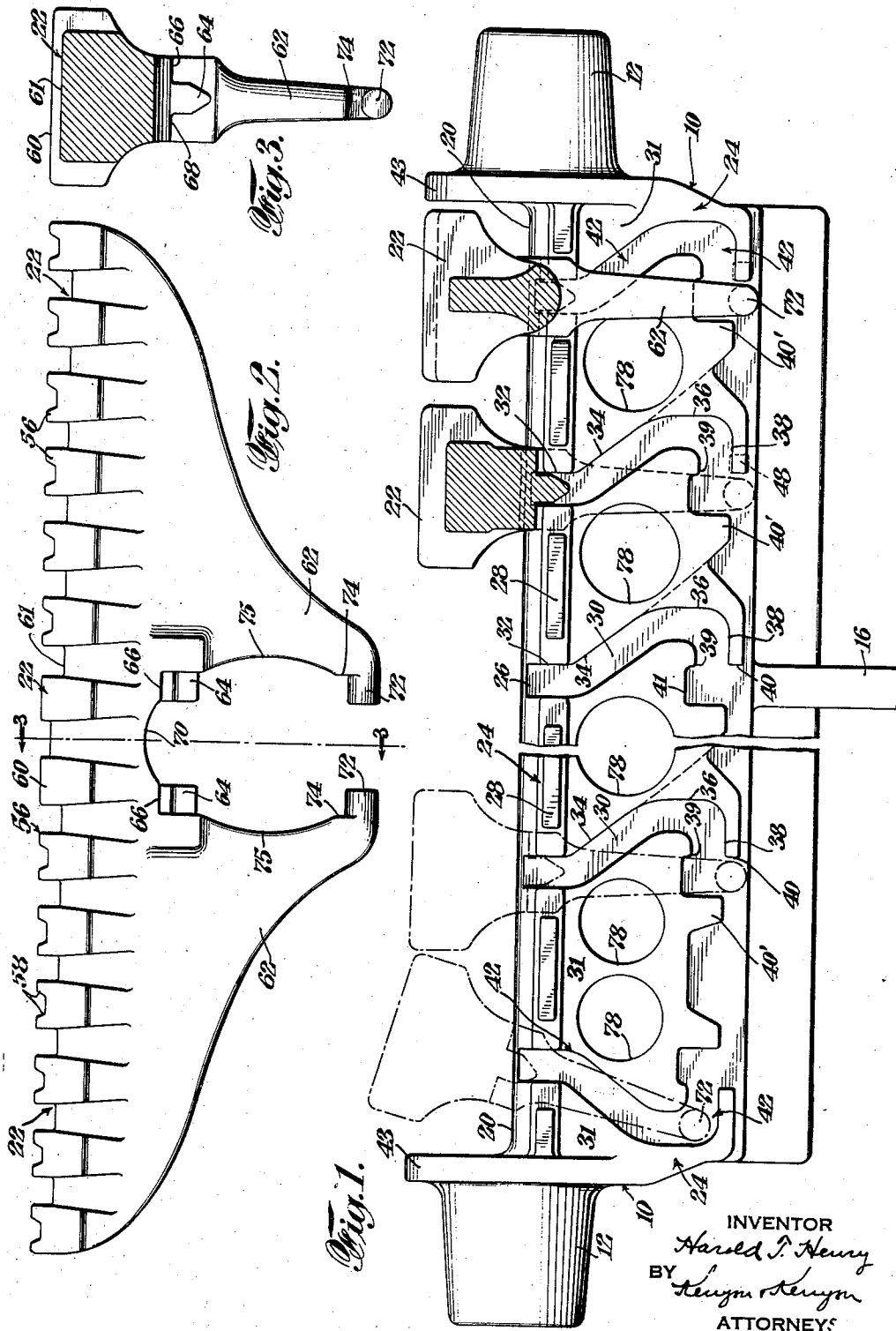
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GRATE CONSTRUCTION

Filed March 1, 1937

2 Sheets-Sheet 1



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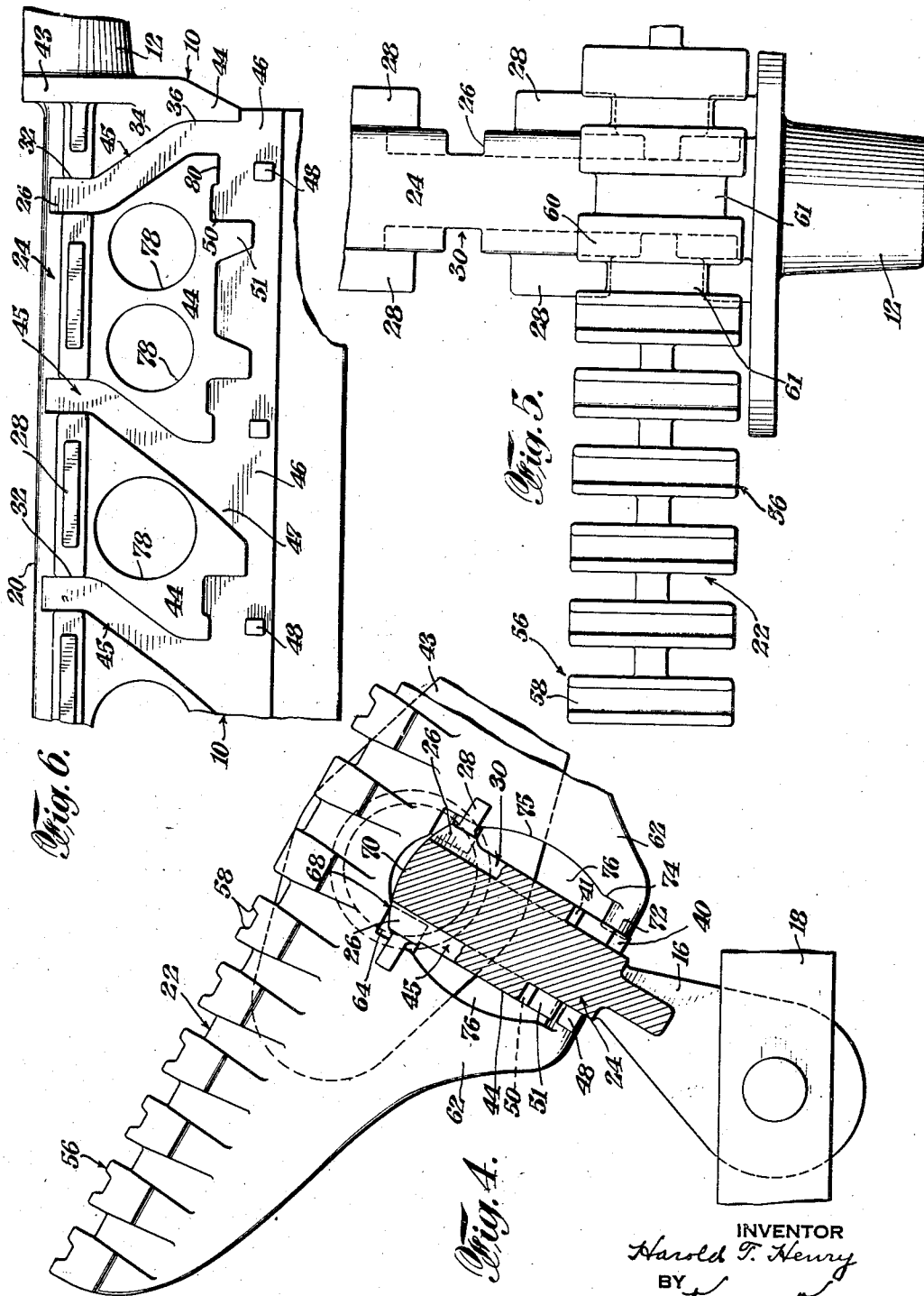
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GRATE CONSTRUCTION

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12 Claims. (Cl. 126—168)

This invention relates to improvements in grate constructions adapted for use in connection with stationary or locomotive fire boxes burning anthracite, bituminous or other similar fuels.

My invention comprises a carrier bar upon which finger grates or grate units are removably mounted. The carrier bar according to my invention is provided with guide grooves and stops which cooperate with lugs formed on the grate units so that each individual grate unit is removable from the carrier bar independently of the rest of the grate units, and a new grate unit can be substituted independently of the rest of the grate units. In this way any grate unit which is burned may be replaced without disturbing the rest of the grate units. The guide grooves may be provided in one or both faces of the carrier bar or duplicate sets of grooves may be provided on both faces of the carrier bar.

In the drawings:—

Figure 1 represents a side elevation of a carrier bar made according to my invention with parts broken away and with grate units in position, one grate unit being shown in dot and dash lines to illustrate the manner of removal or insertion of the grate units;

Figure 2 represents a side elevation of one of the grate units made according to my invention;

Figure 3 represents a vertical cross section taken substantially on line 3—3 of Figure 2;

Figure 4 represents a portion of a grate unit and a section of a carrier bar and a portion of a rod for oscillating the carrier bar;

Figure 5 represents a top plan view of a portion of a grate unit and a portion of a carrier bar in assembled relation; and

Figure 6 represents a partial side elevation of the other side of the carrier bar showing different groove formation.

Referring now to the drawings, the reference character 10 designates a carrier bar having trunnions 12 at its ends whereby it is mounted for oscillation in a fire box. It is to be understood that a plurality of such carrier bars is used and near the center and lower end of each bar an arm 16 is provided which is pivoted to a reciprocable rod 18 for mechanically rocking the carrier bars in unison. Only a portion of the rod 18 is shown as the rod is of the usual construction. Each carrier bar has its upper portion cut away as at 20 to receive the grate units 22 later to be described, the supporting body portion 24 thus formed preferably being co-axial with respect to the trunnions. It is provided with a plurality of notches 26 and projecting flanges or shelves 28

arranged in alternation for the length of the supporting portion of the carrier bar. The notches 26 form the initial part of grooves or guideways for guiding the lugs on the grate units, as described later.

The grooves 30 on one side 31 of the carrier bar shown in Fig. 1 are of generally curved conformation resembling the lower half of the letter S. The grooves each begin with the notch 26 which forms the entrance to the vertically extending portion 32 merging into the curved portion 34 which in turn runs into the lower vertically extending portion 36. Then the groove makes a sharp turn to form a horizontally extending portion with a bottom wall 38 and an upper wall 39. The bottom wall 38 terminates in an abutment or shoulder 40, while the upper wall 39 extends to the notch or depression 41, the far wall of which extends downwardly along one side of the shoulder or abutment 40'. This shoulder or abutment 40' is spaced laterally from abutment 40 and limits the horizontal movement of the lug on a grate unit 22 and causes it to fall between abutments 40 and 40'. This depression 41 is adapted to receive the lug on the lower end of the grate unit when the carrier bar is inverted and functions to hold the grate unit on the carrier bar and prevent its falling off the carrier bar.

It will be seen from the drawings that the grooves are generally parallel and duplicated except for the end grooves 42 which are oppositely disposed with relation to each other. The reason for this construction is to permit insertion and removal of the end grate units 22 without interfering with end faces 43 adjacent the trunnions 12 (see Figure 1).

The other side 44 of the body portion 24 (see Fig. 6) of the carrier bar has grooves 45 which are similar in their upper portions to the grooves 30 on side 31 of the body portion and parallel thereto but the lower portions are differently formed, terminating in an open space 46. Furthermore, the grooves 45 intermediate the end grooves on side 44 are quite different from the grooves on side 31, as the curved portions 34 extend into the open spaces or areas 47. The end grooves 45 on side 44 have the lower vertical portion 36, but these are the only grooves on side 44 having this construction. A projection 48 is provided in the space or area 47 which is similar to the abutment 40, shown in Figure 1 on the side 31 of the body portion. A depression or notch 50 is also provided similar to depression 41 described above. The provision of the space or area 47 facilitates assembly and removal of the grate unit from the

carrier bar. Vertical abutment 51 which functions to direct the prong on the grate unit behind abutment 48 corresponds to abutment 40' on side 31. Either of these abutments may be omitted, it only being necessary to have one to act as a guide for the prong on the grate unit.

The grooves 45 on side 44 can be entirely omitted and only grooves 30 used on side 31 of the carrier bar and the side 44 can then be flat and the side of the grate unit can also be flat to rest against the flat side of the carrier bar, allowing enough space to permit a slight tipping motion to be given to the grate units. Or the grooves 30 on side 31 can be entirely omitted and grooves 45 used on side 44, in which event the side 30 would be flat as above described in connection with side 44. Or I can use grooves 30 on both sides of the carrier bar or grooves 45 on both sides of the bar. In other words, I can have identical groove formations on both sides of the carrier bar without going beyond the spirit of my invention. But the preferred form of my invention is of the form shown in the drawings.

Each grate unit 22 is provided with a grate or fuel supporting portion 56 comprising parallel grooved fingers 58. The central grate portions 60 are not grooved and the neck portions 61 between the portions 60 and the grate are thicker and wider than the others to cooperate with shelves 28 on the carrier bar to prevent slag from running under the grate portions between the grate portions and the carrier bar and also strengthen the grate unit at this place. Each grate unit has depending spaced arms 62 which are adapted to straddle the carrier bar. Pointed or edged projections 64 are provided on the inside edge of the arms near the top and extend laterally into the space between the arms. These projections are adapted to be received in notches 26 when the grate unit is in position on the carrier bar, the pointed or beveled edges of the projections assisting in directing the grate unit into position. The projections 64 are spaced apart a distance slightly greater than the width of the body of the carrier bar at notches 26 to provide proper clearance for fire box practice. The projections 64 prevent any substantial longitudinal movement of the grate units with respect to the carrier bar and also prevent any substantial lateral movement of the grate units on the carrier bar. That is, the projections 64 hold the grate units spaced and in their own territory to allow air spaces between the grate units and prevent crowding of the grate units at one end and a hole at the other end or other place in the fire box. The grate units are evenly distributed and held in such position by the projections 64 fitting in notches 26. As shown in Fig. 3, these projections 64 are positioned substantially centrally of the unit and have shoulders 66 extending laterally on either side thereof. The inner portions or corners 68 of these shoulders which are adjacent the inner ends of the projections 64 form bearing means for the grate unit. See Fig. 4 where the grate unit is shown tilted and the bearing surfaces 68 at one side contact and rest upon the top of the carrier bar. When the grate unit is in horizontal position it will have four bearing places on the top of the carrier bar. The underside of the carrier bar near the projections 64 is cut out as at 70 to leave a space between the carrier bar and grate unit when the parts are in assembled relation. Space 70 acts as an insulator to prevent direct transfer of heat from the fire surface into the carrier bar of the grate.

Each arm 62 of the grate unit has at its lower end an inwardly directed lug 72 and a vertical shoulder 74 adjacent thereto. The distance between the spaced lugs 72 on each grate unit is only slightly greater than the thickness of the carrier bar at the grooves 30 and 45, as shown in Fig. 4, so as to assist in holding the fingers on the grate units in correct position and to permit a slight rocking of the grate units. The grate units are allowed a small rocking motion by the construction so that when a locomotive or the like, provided with these grate units, is in operation, the vibration causes the grate units to chop and constantly knead the fire, thus sifting down the ash constantly and reducing the accumulation of clinkers and a clean fire is assured at all times.

The arms 62 have curved intermediate portions 75 to leave an air space 76 between the sides of the carrier bar and each grate unit. These lugs 72 fit into and are guided by the grooves 30 and 45 during assembly. When the grate unit is in place, the lug 72 abuts against the shoulder 40 on one side and lug or projection 48 on the other side of the carrier bar whereby the grate units are held in proper position. The carrier bars may have openings 78 to reduce the weight thereof.

In assembling a grate unit 22 on a carrier bar 10 the parts are positioned so that the prongs 72 on the grate unit extend into notches 26 on the carrier bar. Then the grate unit is moved downwardly relatively to the carrier bar for a short distance while the prongs are guided by vertical portions 32 of the grooves 30 and 45. In further relative downward movement, the grate unit will have to be tilted as the prongs follow the inclined portions 34 of the grooves 30 and 45, and then vertically downward again as the prongs follow lower vertical portions 36 of the grooves 30. Then, the grate unit must be tilted back to original position as the prong 72 follows horizontal portion 38 of groove 30 on the side 31 of the carrier bar and the other prong 72 of the carrier bar passes between projection 48 and portion 80 on the other side 44 of the carrier bar. When the prongs pass abutment 40 and projection 48, the prong 72 on side 44 of the carrier bar strikes vertical abutment 51 and prong 72 on side 31 strikes abutment 40' and the prongs drop behind projection 48 on side 44 and behind abutment 40 on side 31 to hold the grate unit in position. When an end grate unit is being placed on the carrier bar, one prong 72 will be additionally guided by the parallel vertical portion 36 of grooves 45 on side 44 of the carrier bar.

When the prongs 72 rest behind the abutments 40 and 48, the pointed or edged projections 64 are received in notches 26 and each grate unit is properly held in position as above described. The beveled edges of the projections 64 assist in directing the projections into notches 26. The entire number of grate units is assembled on the carrier bar as above set forth. Of course, if desired, any grate unit can be removed by reversing the movement of the grate unit above given.

With the grate units on the carrier bar, if the bar is turned upside down, the prongs 72 on the grate units will fall into depressions 41 and 50 and the grate units will be prevented from dropping out or becoming dislocated and when the carrier bar is again turned right side up, the grate units will fall into their correct positions.

By having a series of removable grate units, it is only necessary to replace those burned or broken without interfering with the rest of the

grate units on the carrier bar and this effects a great saving in time and expense.

I claim:

1. An apparatus of the character described, including, in combination, a carrier bar, a plurality of grate units mounted on said carrier bar, each grate unit having arms straddling said carrier bar, and means for permitting independent removal of each of said grate units, said means including guideways on said carrier bar and lugs on said arms co-operating with said guideways, said guideways having curved portions whereby any one of said grate units may be removed by moving said grate unit vertically and then tilting it laterally.

2. An apparatus of the character described, including, in combination, a carrier bar, a plurality of grate units removably mounted on said carrier bar, each grate unit having arms straddling said carrier bar, said carrier bar in one face thereof having a plurality of curved grooves, one of said arms of each grate unit having a lug adapted to be received and guided in one of said grooves, whereby a grate unit may be removed or mounted on said carrier bar by moving such grate unit vertically and tilting it laterally.

3. An apparatus of the character described, including, in combination, a carrier bar having a body portion provided with curved grooves in opposite faces thereof, a grate unit mounted on said carrier bar and having arms straddling said body portion, lugs on said arms adapted to be guided by said grooves during assembly or disassembly and abutments on said carrier bar for contacting said lugs and holding said grate unit in correct position on said carrier bar.

4. An apparatus of the character described, including, in combination, a carrier bar having a body portion provided with notches and curved grooves in opposite faces thereof, a grate unit mounted on said carrier bar and having spaced arms straddling said body portion, said grate unit having projections received in said notches, and lugs on the lower ends of said arms adapted to be guided by said grooves during assembly or disassembly.

5. An apparatus of the character described, including, in combination, a carrier bar having a body portion provided with sets of grooves in opposite faces thereof, a plurality of grate units mounted on said bar, each grate unit having arms straddling the body portion of said carrier bar, each of said arms having lugs adapted to be received and guided by one set of grooves, whereby a grate unit may be removed or mounted on said carrier bar, said carrier bar having shelves between said grate units to prevent slag from running into said grooves during use.

6. An apparatus of the character described, including, in combination, a carrier bar having

a body portion provided with sets of grooves in opposite faces thereof, a plurality of grate units mounted on said bar, each grate unit having arms straddling the body portion of said carrier bar, each of said arms having lugs adapted to be received and guided by one set of grooves, whereby a grate unit may be removed or mounted on said carrier bar, said grate units being provided with means for preventing slag from running into said grooves during use.

7. A carrier bar adapted to carry a plurality of removable grate units and having a plurality of curved grooves in a face thereof, each groove being adapted to receive and guide a lug on a grate unit during assembly or disassembly.

8. A carrier bar adapted to carry a plurality of removable grate units and having a plurality of grooves in one face thereof adapted to guide lugs on grate units during assembly and to prevent accidental removal of the grate units, each of said grooves having a vertical portion merging with an inclined portion which merges with a vertical portion merging with a horizontal portion.

9. A carrier bar adapted to carry a plurality of removable grate units and having a plurality of grooves in one face thereof adapted to guide lugs on grate units during assembly and to prevent accidental removal of the grate units, each of said grooves having a vertical portion merging with an inclined portion which merges with a vertical portion merging with a horizontal portion and an abutment at the end of said horizontal portion against which a lug abuts in assembled position.

10. A grate unit having fuel receiving portions and spaced symmetrically shaped arms extending from the bottom thereof, said grate unit having projections near the upper ends of said arms and adapted to fit in notches in a carrier bar, bearing surfaces near said projections, and lugs on the lower ends of said arms, said lugs being directed toward each other.

11. A grate unit having fuel receiving portions and spaced symmetrically shaped arms extending from the bottom thereof, said grate unit having projections near the upper ends of said arms and adapted to fit in notches in a carrier bar, and lugs on the lower ends of said arms, said lugs being directed toward each other.

12. A grate unit of the character described having fuel receiving portions and spaced symmetrically shaped arms extending from the bottom thereof, said grate unit having pointed projections near the upper ends of said arms and adapted to fit in notches in a carrier bar, bearing surfaces above said projections, and inwardly directed lugs on the lower ends of said arms.

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