Nov. 22, 1932. J. W. HEGELER ET AL 1,888,348

GRATE

Filed April 8, 1930 2 Sheets-Sheet 1

Fig. 1

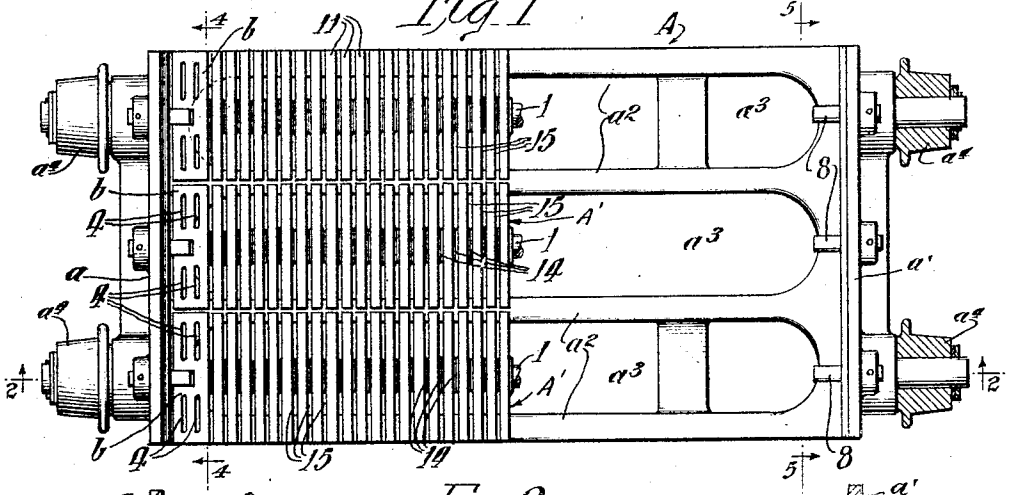


Fig. 2

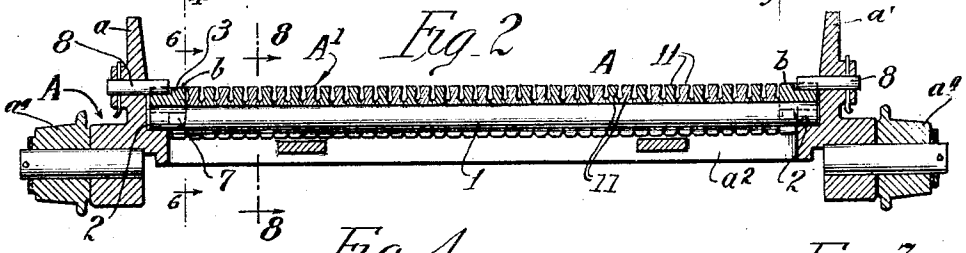


Fig. 4

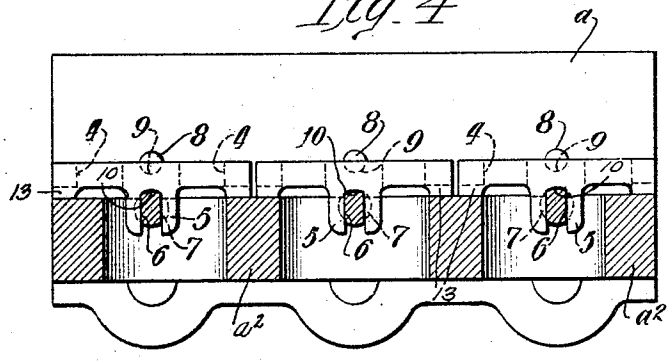


Fig. 3

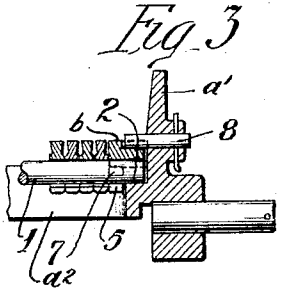


Fig. 5

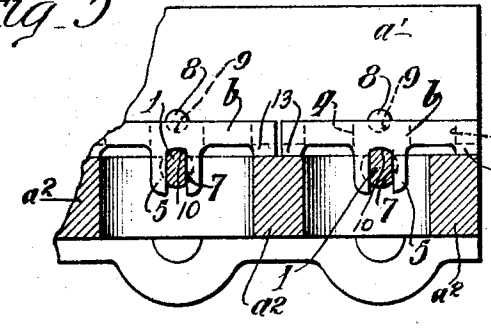
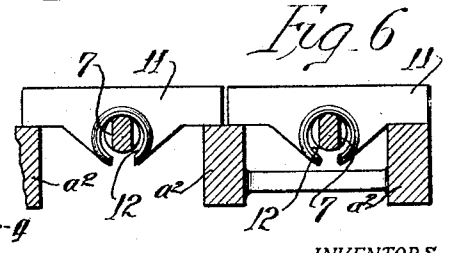


Fig. 6



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GRATE

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Fig. 7

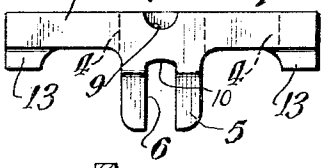


Fig. 8

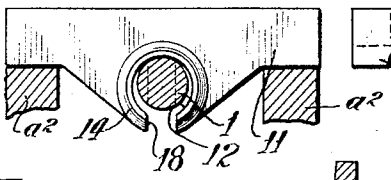


Fig. 9

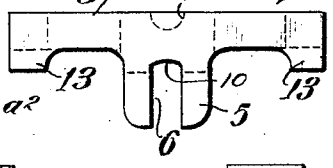


Fig. 10

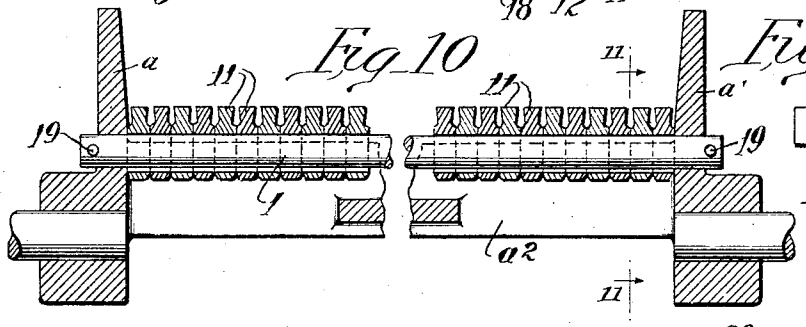


Fig. 11

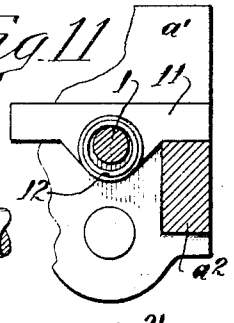


Fig. 12

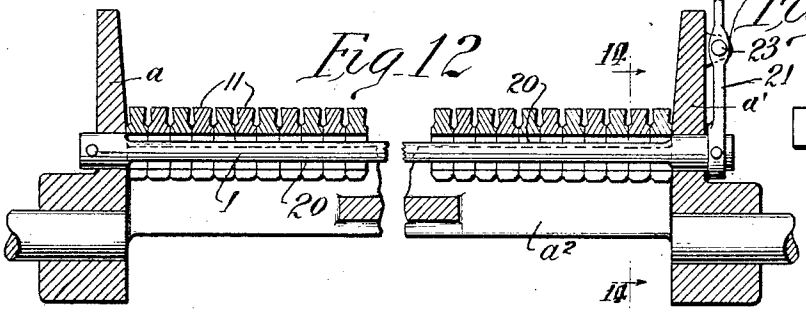


Fig. 14

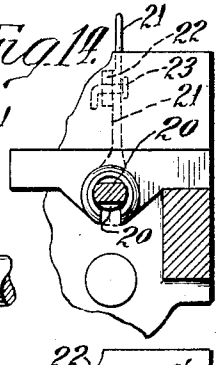


Fig. 15

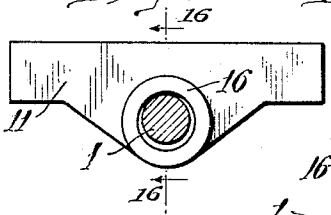


Fig. 16

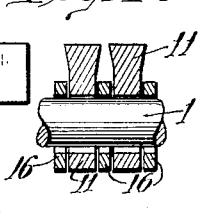


Fig. 13

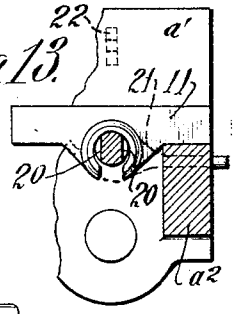


Fig. 18

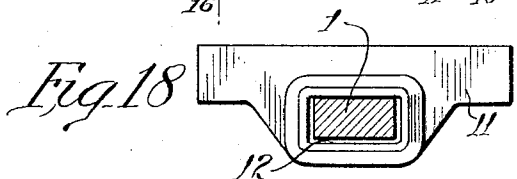


Fig. 19

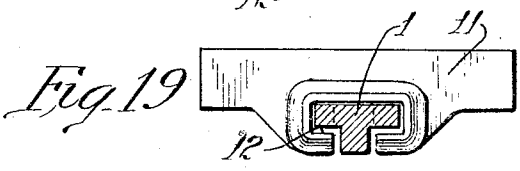
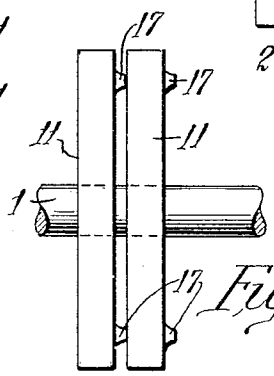


Fig. 17



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Patented Nov. 22, 1932 1,888,348

UNITED STATES PATENT OFFICE

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GRATE

Application filed April 8, 1930. Serial No. 442,502.

This invention relates to grates and relates particularly to grates for ore sintering machines.

Stated broadly, objects of the invention are, to provide an improved grate which will be simple in construction, strong, durable, relatively inexpensive to manufacture and effective in operation.

A further object of the invention is to provide a grate for the purpose specified, in which the parts of the grate which are particularly subject to wear and failure, may quickly and conveniently be removed and replaced, thus renewing and restoring the grate and extending the life thereof almost indefinitely, and also obviating the necessity of scrapping the entire grate in case of breakage, as is the case at present with grates consisting of a single integral piece, of which there are many now in common use.

Still a further object of the invention is to provide a grate, the supporting surface of which is formed by a multiplicity of members supported so as to be capable of and to which relative movement or play will be imparted, in operation, sufficient to prevent fragments of ore from lodging in the air passages of the grate, thereby clogging the same and preventing, or seriously impairing designed operation of the grate.

Specifically, a further object of the invention is to provide a grate embodying our invention and improvements, which is particularly designed and especially adapted for use in ore sintering machines.

To effect the objects thereof, a grate embodying our invention and improvements comprises the various features, combinations of features and details of construction hereinafter described and claimed.

In the accompanying drawings, in which our invention is fully illustrated,

Fig. 1 is a detached top plan view, partly broken away to disclose underlying parts, showing a grate embodying our invention as embodied in a pallet and grate mechanism for an ore sintering furnace.

Fig. 2 is a sectional view thereof on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged fragmentary view.

Fig. 4 is an enlarged sectional side view on the line 4—4 of Fig. 1 looking in the direction indicated by the arrows.

Fig. 5 is an enlarged fragmentary side view substantially on the line 5—5 of Fig. 1.

Fig. 6 is an enlarged fragmentary side view on the line 6—6 of Fig. 2, looking in the direction indicated by the arrows.

Fig. 7 is an enlarged, detached, end view of one of the grate sections.

Fig. 8 is an enlarged, fragmentary, sectional side view on the line 8—8 of Fig. 2.

Fig. 9 is a view similar to Fig. 7 of the opposite end of a detached grate bar section.

Fig. 10 is a view substantially similar to Fig. 2, illustrating a modified construction.

Fig. 11 is a sectional side view on the line 11—11 of Fig. 10.

Fig. 12 is a view substantially similar to Fig. 10, illustrating another modification.

Figs. 13 and 14 are similar sectional side views, taken substantially on the line 13—13 of Fig. 12, showing the lock bar for the grate bars in different positions.

Fig. 15 is a view substantially similar to Fig. 8, illustrating modified means for spacing the grate bars.

Fig. 16 is a fragmentary, sectional view on the line 16—16 of Fig. 15.

Fig. 17 is a fragmentary, top-plan view of one of the grate sections, illustrating modified means for spacing the grate bars.

Fig. 18 is a view substantially similar to Fig. 8, illustrating a modified form of lock bar for the grate bars; and

Fig. 19 is a view substantially similar to Fig. 18, showing still another modified form of lock bar.

In the accompanying drawings, we have, for purposes of clear and definite illustration, shown grates embodying our invention and improvements as applied in use in a grate and pallet mechanism for ore sintering machines. Many of the features of our improved grate, however, are adapted for general use in connection with different types of traveling grate structures and we do not, therefore, desire to limit ourselves to the particular application or adaptation shown, but desire to extend the protection of the

patent to any grate structure which comes within the scope of the appended claims.

Describing the invention with particular reference to the drawings and referring particularly, in the first instance, to Figs. 1 to 9, inclusive, A designates, as a whole, a pallet for an ore sintering machine, and A′ designates as a whole, grate sections mounted on said pallet in accordance with our invention.

The pallet A is of a usual type, comprising side walls a, a', which are rigidly connected by bars a^2 which define holes or openings a^3 in the bottom or bed portion of said pallet.

In use, the pallet A is movably supported upon wheels a^4 mounted to rotate on fixed studs secured in the side walls of the pallet and which, in operation, run on tracks provided for the purpose, not shown. As regards its usual features and excepting as may hereinafter be particularly described and pointed out, the pallet A may be of any usual or approved construction and will readily be understood by persons familiar with the art from an examination of the drawings, without a further description thereof in detail.

In accordance with out invention, the grate sections A′ consists of what, appropriately, may be designated grate locking bars 1 adapted to be secured to the side walls of the pallet, and which extend parallel with the pallet bars a^2 and are positioned substantially centrally of the openings a^3 defined by said bars.

In the preferable construction shown, the lock bars 1 are confined in recesses 2 formed in the side walls a, a' of the pallet and are secured in engagement with said recesses and thus to the pallet A, by means of angle plates designated as a whole, b, see particularly Figs. 7 and 9, each of which comprises a top plate 3, the top surface of which, when said angle plate is installed for use, is disposed substantially in the plane of the grate and forms a part of the grate surface, being provided with slots or passage-ways 4 to permit the passage of air downwardly therethrough into the wind box of the machine, not shown.

Said angle plates b also comprise depending flanges 5, the lower ends of which are forked, as shown at 6, and are adapted to engage slots 7 formed in the lock bars 1, preferably adjacent to both ends thereof.

As assembled for use, the angle plates b are secured in position by means of pins 8 secured in the side walls of the pallet and which project inwardly therefrom and engage recesses 9 formed in the upper surfaces of said plates.

In the preferable construction shown, also, the top plates 3 of the angle plate b are relatively thick at their centers, see Figs. 7 and 9, and are provided in their undersides with grooves 10 which form lateral extensions of the closed inner ends of the slots 6 in the depending flanges thereof, adapted to fit loosely over the tops of the lock bars 1, when positioned in the machine, to prevent turning thereof.

In accordance with our invention, the grate sections A′ of the machine are formed by a plurality of separate grate bars 11, each of which comprises a web portion formed in which is a hole or opening 12 which, in use, is adjusted over a lock bar 1. The grate bars 11 extend substantially at right angles to the lock bars 1 and are of such length that their opposite ends will extend over the adjacent pallet bars a^2, between which they are mounted. Also, in what we now consider the preferable embodiment of the invention, the openings 12 in the grate bars 11 are loosely fitted to the lock bars 1, a desirable relation for most purposes being such that said holes or openings are one-eighth of an inch larger than said lock bars. Obviously, however, this relation may be varied as desired.

In what we now consider to be the preferable relation, also, see Figs. 6 and 8, the lock bars 1, when assembled in the machine, will extend substantially tangent to the top sides of the openings 12 in the grate bars when the ends of said grate bars rest upon the pallet bars a^2 with which they are associated in operation.

With the construction and relation described, it is obvious that the grate bars 11 will be loosely confined by the lock bars 1 and will be free to move on said lock bars and also relative to the pallet bars a^2, it being found that, in operation, relative play or movement of said bars will be produced which operates to prevent lodgement of ore and fuel fragments between the grate bars, which might seriously impair the operation and effectiveness of the machine.

In like manner, the tops of the forked openings 6 in the depending flanges of the angle plates b are so positioned that the top sides of said openings will fit the ends of said lock bars to which they are adjusted with only slight clearance, thus confining said lock bars in substantially fixed position on the pallet with provision for only very slight play.

In the preferable construction shown, also, the lateral sides of the top plates 3 of the angle bar b extend over and are adapted to rest upon the pallet bars a^2 between which they are positioned, respectively.

Where, as shown, the top plates 3 of the angle plates b are thinner than the corresponding dimension of the grate bars 11, contact of the ends thereof with the corresponding pallet bars a^2 is effected by means of downwardly extending lugs 13 formed on the undersides of said angle plates in proper position, see Figs. 7 and 9.

To provide suitable air passages in the grate surface, our invention contemplates the use of means for spacing the grate bars apart

when assembled for use. Simple means for this purpose consists of hub portions 14 formed on opposite sides thereof which will operate, in an obvious manner, to maintain said grate bars in spaced relation, providing air passage-ways 15 between adjacent bars, through which air and other gases may pass downwardly through the grate sections A' into the wind box, not shown. The hubs 14 are preferably, though not necessarily, tapered. Also, as the full equivalent of the hubs 14, our invention contemplates the use of washers inserted over the lock bars 1 between adjacent grate bars, the thickness of said washers being proportioned to provide air spaces of desired width in the grate surface.

An advantage of this construction is that it provides simple means for varying the width of the air spaces 15, if desired, to meet different operating conditions.

This modification is shown in Figs. 15 and 16, in which the lock bar and grate bar are designated, respectively, 1 and 11, as in the preferred form of the device shown in Figs. 1 to 9, and the spacing washers are designated 16.

As a further modification, we contemplate spacing the grate bars 11 apart by means of lugs formed thereon, respectively, in position to contact with a part of the adjacent grate bar.

This modification is shown in Fig. 17 in which the reference numerals 1 and 11 designate the lock bars and the grate bars, respectively, and the numeral 17 the spacing lugs.

In accordance with what we now consider the preferable embodiment of the invention, the holes or openings 12 in the grate bars 11 are cut away at their undersides, as shown at 18, the width of said openings being greater than the dimension of the lock bar 1 between the bottoms of the slots 7 therein, but less than the full dimension of said lock bars. With this construction, it is obvious, that the grate bars 11 may be assembled in position on the lock bars 1 either by adjusting them over an end thereof before said lock bars are assembled in the machine or, after said lock bars have been assembled in the machine, said grate bars may be adjusted thereto by inserting the ends of the openings 18 through the slots 7 to effect register of the openings 12 in the grate bars with the lock bars 1 and then moving said grate bars endwise on the bar 1, this being continued until a contemplated number of grate bars have been adjusted to said lock bars. Obviously, where the grate bars are adjusted to the lock bars after said lock bars have been assembled in the machine, this can only be done before the angle plates *b* are secured in position.

In like manner, if a grate bar 11 should be broken during the operation of the machine, it can quickly and conveniently be replaced by merely removing the angle plate *b* at the end of the machine nearest the broken bar, removing the grate bars from the lock bar to and including the broken bar, and in then replacing said grate bars on the lock bar, including a new bar to replace the broken bar. After said bars have been replaced, the detached angle plate *b* is again secured in position and the grate is again in condition for operation, such replacement requiring very little time and effort and involving shutting down the machine for very short intervals only.

As a modification of the means for mounting the lock bars 1 on the pallet and the grate bars 11 on the lock bars, we contemplate a construction in which the ends of the lock bars are secured in holes formed directly in the side walls *a*, *a'* of the pallet, thus dispensing entirely with the plates *b* as means for securing the lock bars to the pallet.

This modification is shown in Figs. 10 and 11 of the drawings in which, as in the preferred form of the device, *a*, *a'* designate the side walls of the pallet, 1 the lock bar which, as shown, is circular in cross-section and the ends of which are secured in holes formed directly in the side walls of the pallet.

As shown, also, the holes 12 in the grate bars, instead of being open at their undersides, are entirely closed, the grate bars being adjusted to the lock bar either before said lock bar is mounted in the machine or with one end of the bar in engagement with its bearing in the pallet and the other end being withdrawn from such engagement, thereby permitting the grate bars to be adjusted over the withdrawn end of said lock bar.

Obviously, however, the grate bars may be provided with openings in their undersides and the lock bars provided with slots for permitting the grate bars to be adjusted to the lock bars in the same manner as in Figs. 1 to 9, if desired.

The lock bars 1 may be secured in designed engagement with the holes formed in the side walls of the pallet to receive them by any suitable means, as by cotter pins 19.

For the most part, the same reference characters are used for designating the parts in Figs. 10 and 11 as in Figs. 1 to 9, inclusive.

As still a further modification of the preferred embodiment of the invention, shown in Figs. 1 to 9, we contemplate a construction as shown in Figs. 12 to 14, inclusive, in which the ends of the lock bars 1 are mounted in holes formed directly in the side walls *a*, *a'* of the pallet and are rotatable therein, the sides of the portions of the lock bars which, when installed, are exposed between the side walls of the pallet, being flattened, as shown at 20, and the holes in the grate bars which engage the lock bars being cut away at their undersides as in the form of the device shown in Figs. 1 to 9.

With this construction, it is obvious that

the grate bars may quickly and conveniently be adjusted to the lock bars after said lock bars have been mounted in the machine by first turning said lock bars so that the flattened sides thereof will be disposed substantially vertically, as shown in Fig. 13, inserting the open sides of the holes in the grate bars over the flattened sides of said lock bars and, after all of the grate bars have been adjusted to the lock bar, turning it so that the flattened sides of said lock bar will be out of register with the open sides of the grate bars when their ends rest upon the pallet bars a^2, as shown in Fig. 14.

In said Figs. 12 to 14, the same or corresponding parts are designated by the same reference characters as in Figs. 1 to 9.

With the construction shown in Figs. 12 to 14, it is obvious that any broken grate bar may be quickly removed and replaced without disturbing any other grate bars by merely turning the lock bar on which the broken grate bar is secured, replacing it with a new grate bar and again turning the lock bar 1 to bring the flattened sides thereof out of register with the opening in the grate bar.

To provide for quickly and conveniently turning the lock bars 1 into position for adjusting the grate bars 11 thereto, shown in Fig. 13, and to lock said grate bars thereon, as shown in Fig. 14, cranks 21 are secured to projecting ends of the lock bars 1 and means are provided for securing said cranks in positions corresponding to locking positions of said lock bar by any suitable means securely connecting the outer ends of the cranks 21 to the adjacent side wall of the pallet.

Simple means for this purpose consists of lugs 22 formed on the outer side of the adjacent side wall of the pallet positioned in the path of movement of the cranks 21 and in such relation that contact of said cranks therewith will define full locking engagement of the lock bars 1 with the holes or openings in the grate bars. As installed for use, the cranks 21 are secured to the lugs 22. While our invention contemplates any suitable means for this purpose, we prefer the means shown, consisting of bendable pins 23 inserted through aligned holes in said cranks and lugs and secured therein by bending the ends of said pins against the sides of said cranks and lugs.

As still a further modification of our invention, instead of lock bars of the cross-section shown in Figs. 1 to 17, and heretofore described, our invention contemplates equally the use of lock bars 1 which are either rectangular in cross-section, as shown in Fig. 18, or which are T-shaped as shown in Fig. 19.

Also, the holes or openings 12 in the grate bars shown in Figs. 18 and 19, may either be closed, as shown in Fig. 18, or open-sided as shown in Fig. 19.

We claim:

1. In a pallet and grate mechanism for machines of the class specified, the combination of a pallet consisting of side walls, spaced bars which rigidly connect said side walls and which define openings in said pallet, grates supported on said pallet above each of the openings therein, each of which consists of a lock bar secured to opposite side walls of the pallet, and series of separate grate bars provided with holes loosely fitted to said lock bar, the ends of said grate bars extending over and resting upon adjacent pallet bars.

2. A pallet and grate mechanism as specified in claim 10, in which as assembled for operation with the ends of the grate bars resting on the pallet bars, the centers of the lock bars are above the centers of the holes in the grate bars adjusted thereto, thereby providing for limited play of the grate bars relative to the pallet bars in operation.

3. A pallet and grate mechanism as specified in claim 1, in which the means for securing the lock bars to the side walls of the pallet consists of angle plates comprising depending flanges provided, respectively, with openings adjusted to said lock bars, and which also comprises means for securing said angle plates to the side walls of the pallet.

4. A pallet and grate mechanism as specified in claim 1, in which the means for securing the lock bars to the side walls of the pallet consists of angle plates comprising depending flanges provided, respectively, with openings adjusted to said lock bars, the side walls of the pallet being provided with recesses adapted to receive said lock bars, and which also comprises means for securing said angle plates to the side walls of the pallet.

5. A pallet and grate mechanism as specified in claim 1, in which the means for securing the lock bars to the side walls of the pallet consists of angle plates comprising depending flanges provided, respectively, with openings adjusted to said lock bars and the side walls of the pallet being provided with recesses adapted to receive said lock bars, and which also comprises pins secured in the side walls of the pallet which extend inwardly and interlock with rigid parts of said angle plates.

In witness that we claim the foregoing as our invention, we affix our signatures this 5 day of April, 1930.

JULIUS W. HEGELER.
HAL E. ERCANBRACK.

CERTIFICATE OF CORRECTION.

Patent No. 1,888,348. November 22, 1932.

JULIUS W. HEGELER ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, line 80, claim 2, for claim "10" read claim "1"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 24th day of January, A. D. 1933.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.