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MEANS FOR PREVENTING WASTE PREFERENTIAL AIR FLOW
AT SIDE WALLS OF SINTERING MACHINE PALLETS
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2,981,532

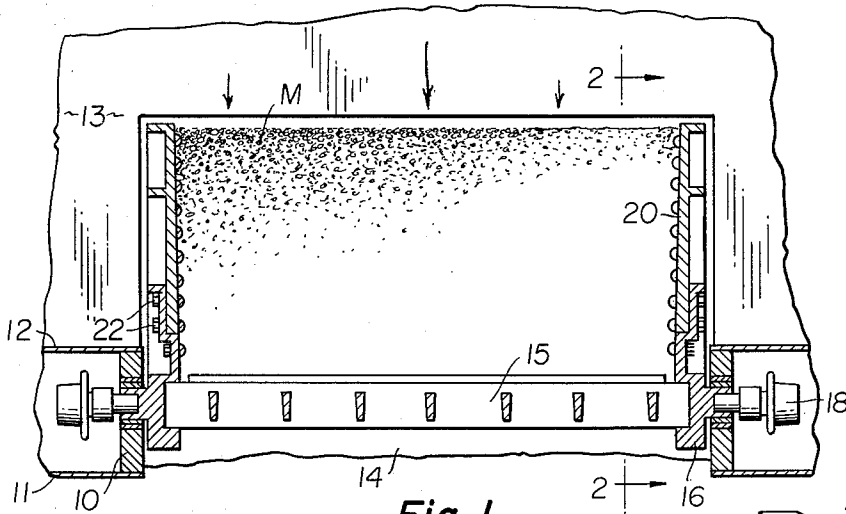


Fig. 1

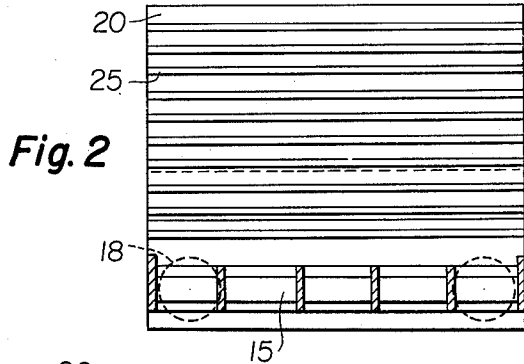


Fig. 2

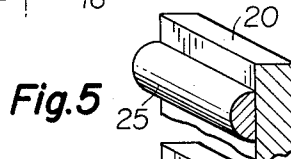


Fig. 5

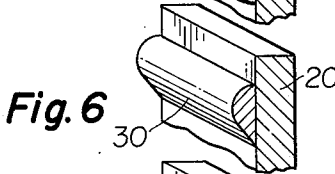


Fig. 6

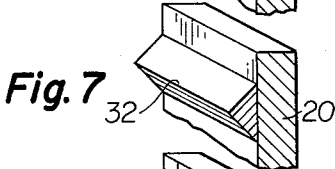


Fig. 7

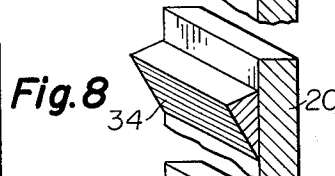


Fig. 8



Fig. 9

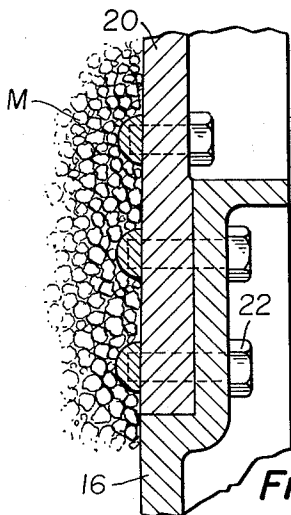


Fig. 3

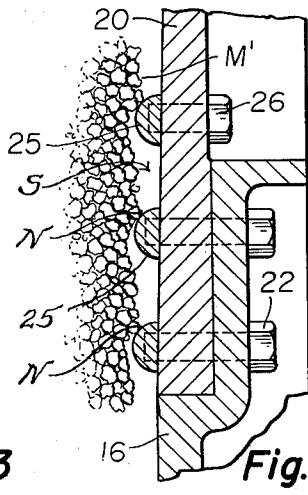


Fig. 4

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1

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MEANS FOR PREVENTING WASTE PREFERENTIAL AIR FLOW AT SIDE WALLS OF SINTERING MACHINE PALLETS

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1 Claim. (Cl. 266—21)

The present invention relates to means for preventing detrimental, preferential draft or leakage flow along the vertical side walls of sintering machine pallets.

In other words, this invention relates to a sintering machine having horizontal grate bars and vertical side walls on aligned, moving pallet units subjected to confined flow of air or gas streams, either upwardly or downwardly, or both, while effecting the burning or heating of the sintering operation.

The type of sintering machine particularly suitable for illustration of the use of the present invention is the Dwight-Lloyd machine, which may be provided with downdraft wind boxes below the moving train of abutting pallets, as well as with a hood or hoods above the same.

In the sintering operation, material to be sintered is placed on the grates to a depth rising substantially as high as the side walls, forming a bed which may be sintered, calcined, roasted, dried, baked, or the like. It is well understood that various materials may be so treated, and that in the course of the sintering operation, a substantially quiescent bed forms a somewhat porous mass which shrinks both transversely and vertically.

As the bed becomes progressively sintered throughout its depth, it shrinks away from the side walls a measurable amount, depending on the material, the nature of the sintering treatment, and, of course, the width and depth of the bed. Such pallets are several feet wide, and the shrinkage may be one-fourth inch to one-half inch, or more, away from each side wall, obviously permitting a relatively free flow of air and gases either upwardly or downwardly from the grate to the top of the bed, or vice versa, along the space formed between the shrunken mass of the bed and the inner surface of the side walls. This results in a very substantial loss of pressure and of air or gas flow desired to be effected through the bed of material being treated.

An object of the present invention is to provide a means for preventing such preferential leakage flow resulting from the shrinkage described.

One of the difficulties presented is that the sintered mass must be discharged or dumped from the sintering machine as the successive grates tip forwardly over the finishing end of the machine, and any projections intended for preventing the air or gas flow loss by bridging the space, must be such as to permit the sintered cake to fall out of the pallets. In other words, the sinter cake must not be locked or held in the pallets when the pallets are turned to dumping position.

Another difficulty encountered is that as the sintered bed shrinks downwardly, rigid members may leave spaces which, although not permitting a straight, hollow space along the side wall, would nevertheless permit the leakage flow desired to be prevented.

An object, therefore, of the present invention is to avoid the difficulties and provide a means for effectively preventing a leakage flow at the sides of the shrinking sinter cake and along the walls of the pallet, while per-

2

mitting the finished sinter cake to be discharged in the usual manner, and which means shall be effective throughout the sintering operation.

To accomplish the foregoing purposes, I provide a plurality of longitudinal projections in the form of ribs having a size and space relationship such that they may remain effective in bridging the gap formed by the shrinking of the sinter cake bed, and yet which at the finish of the sintering operation, shall have such comparatively slight projection into the mass that the cake may fall from the pallets as they turn over their return sprockets at the discharge end. It is understood that the pallets, moving in a straight, substantially horizontal path to the end of the sintering operation, are then tipped forwardly, breaking a portion of the mass with each pallet from the bed behind, and as the tipping continues, a broken-off cake falls from between the side walls of the pallet.

In carrying out my invention, I provide special ribs or cleats arranged in a plurality of spaced positions extending horizontally, preferably substantially parallel with the plane of the grate of each pallet, and normally in longitudinal alignment with the path of movement.

The manner of securing such elements, and the preferred forms thereof are illustrated in the accompanying drawings, and the functioning thereof will become apparent in the following specification.

Fig. 1 is a vertical sectional view through a sintering machine, pallet grate, and side walls, showing associated parts in elevation and taken transversely to the path of the pallets;

Fig. 2 is a side elevation of the inner face of one wall of a pallet showing the flow-preventing elements, and showing the grate frame in longitudinal section;

Fig. 3 is an enlarged transverse section of a portion of the side wall air and gas flow preventing elements and contiguous portion of the sinter bed before firing;

Fig. 4 is a similar, enlarged section showing the relation of the sintered bed after shrinking, and indicating the elements still in flow-preventing contact therewith; and

Figs. 5 to 9, inclusive, are fragmentary views in perspective, illustrating different cross-sectional configurations of the flow-preventing elements.

For convenient illustration of the association of the pallets and adjacent parts of the sintering machine, the functions of which warrant the use of the present invention, reference may be had to a patent granted March 4, 1958, to Harold E. Rowen, No. 2,825,550, for "Wind Box Sealing Construction for Sintering Machines." There, a succession of moving pallets are supported during sintering by a sliding seal bar arrangement, and longitudinally extending sealing tunnel structures form airtight chambers along the sintering zone of the moving pallets and around wheels which support the pallets on the return trackway.

In the present structure, the supporting and sealing means such as just referred to are indicated generally at 10, and 11 and 12 indicate wall member portions of the sealing tunnels, while end walls of the hood and of the wind box are indicated at 13 and 14, respectively.

As here shown, the horizontal supporting grate frame of the pallet is indicated at 15. Hub portions of the side walls, at 16, have parallel ribs fitting the seal bars, and the usual supporting wheels 18 project outwardly therefrom within the tunnel sealing spaces.

The hub portions have upwardly rising offset sections, to which may be fitted the upwardly rising side wall plate-like members 20 secured thereto in any suitable manner, as by bolts 22.

The bed of material being treated is indicated at M in Figs. 1 and 3. It is understood that sealing means at

3

the entrance and exit to and from the hood and wind box portions may be provided in accordance with any of the well-known arrangements. Thus, it may be assumed that the bed M of material, having been ignited, is passing through a zone of pronounced differential pressure, which may be upwardly or downwardly, depending on the treatment, nature of material, etc.

The material having been ignited, the hot zone may thus pass upwardly or downwardly through the bed of material as the pallets are moved along the machine and are subjected to the forcible differential pressure of air or gas.

The sides of the pallets being sealed, as indicated, and the hood and wind box being airtightly connected therewith as described, obviously, the most effective use of the flowing stream of gas or air is to cause it to be passed through the material of the bed on the contiguous succession of moving grates without any free flow at either side of it.

In practice, as above indicated, there is also a shrinkage transversely of the bed as it is being sintered, whereby it tends to draw away from and leave a space at each side, between it and the inner faces of the side walls 20 of the pallets.

The amount of this shrinkage varies, of course, but under given conditions it may be such as illustrated by the space S, in Fig. 4, between the side wall 20 and the side of the shrunken sinter bed, indicated at M'.

Such a space permits a large amount of the air or gas to pass upwardly along the side walls, forming a passage for what may be termed a preferential draft flow, reducing the desired flow through the body of the bed, and resulting in irregular non-uniform combustion therein.

To prevent this, longitudinal ribs or cleats 25 are secured to the inner faces of the side walls projecting inwardly, as indicated particularly in Figs. 3 and 4. These may be held by bolts, tack-welding, or otherwise, and are preferably of such a shape and size as to correspond approximately to the amount of shrinkage, wherefore, the completely sintered bed having drawn away from the side wall surfaces and having shrunk downwardly, still maintains contacts, as indicated at N—N in Fig. 4.

Here, it will be noted that as the material has shrunk downwardly, it has gradually formed something of the elongated grooves, leaving a portion of the material in contact with the cleats so that even after the settling or shrinking downwardly, as well as the drawing away from the side walls has been completed, there is still sufficient contact between the plurality of cleats 25 and the partially sintered or fully sintered bed to prevent free flow of air along this vertical space between the bed and side wall surface.

It will also be noted that we have found that the longitudinally projecting portions remaining at the sides of the bed of material, while being sufficient to substantially prevent draft leakage, nevertheless, are insufficient to prevent the material from being discharged when the pallet is tipped and turned at the discharge end of the machine. The nature of the sintered bed is, of course, somewhat friable, and whereas, if the interlocking relationship were still that between the bed and cleats, illustrated in Fig. 3, the discharge would be difficult, if not prevented, except by breaking sinter cake into relatively

4

small pieces. The very slight interlocking engagement with the upper portions of each irregular channel formed by the downward and inward shrinking along the faces of the cleats provides substantially no actual interlocking, and these are not sufficient to prevent the relatively heavy mass of material from falling away from the grate and side walls at the proper position and time.

The shape of the cleats shown in Figs. 1 to 5 is such that each may constitute a substantially half-round rod, secured, as described, to the inner face of the wall 20.

In Fig. 6, the cleat 30 is indicated as having its upper portion rounded, while its lower portion is sloped, which may facilitate the discharge, as square or triangular pieces such as 32 may be positioned as indicated in Fig. 7.

The lower slope of the cleats may be more gradual, as in the form shown at 34 in Fig. 8. For simplification, and for some sintered materials, a rectangular bar substantially of the shape indicated at 36 may be satisfactory.

From the foregoing description it will be seen that the cleats form longitudinal parallel spaced barriers projecting from the surfaces of the side walls and into the bed of material, maintaining a plurality of barriers against upward or downward flow along the side walls. This leakage flow is still precluded even after the shrinkage of the sintered bed has occurred.

It will further be seen that the provision of such flow-preventing elements is simple, inexpensive, and that they may be effective and durable in use.

Having thus described our invention, what we claim is:

A sintering machine comprising a succession of aligned moving contacting pallets, a wind box in sealed relation to a plurality of the pallets, the pallets having grates and spaced apart substantially vertical side walls each having a height adapted to retain the sides of a deep bed of material to be sintered, and which material is subject to shrinkage transversely and vertically during the sintering operation forming sintered cake thereof, thus leaving spaces between the side walls and the sides of the bed of material, and means for preventing leakage flow of gas or air between the sinter bed material and the vertical faces of the side walls and comprising a plurality of inwardly projecting longitudinally extending rib-elements that are arranged in vertically spaced relation on each pallet side wall parallel to the grates and to the direction of movement of the pallets and in mutually aligned relationship on successive pallets, said rib-elements adapted to extend into the bed of material a distance substantially equal to the distance of the withdrawal of the bed material away from the side walls resulting from shrinkage of the bed as the sintering progresses.

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