

May 9, 1950

C. E. AGNEW
SINTERING MACHINE

2,506,569

Filed March 20, 1947

2 Sheets-Sheet 1

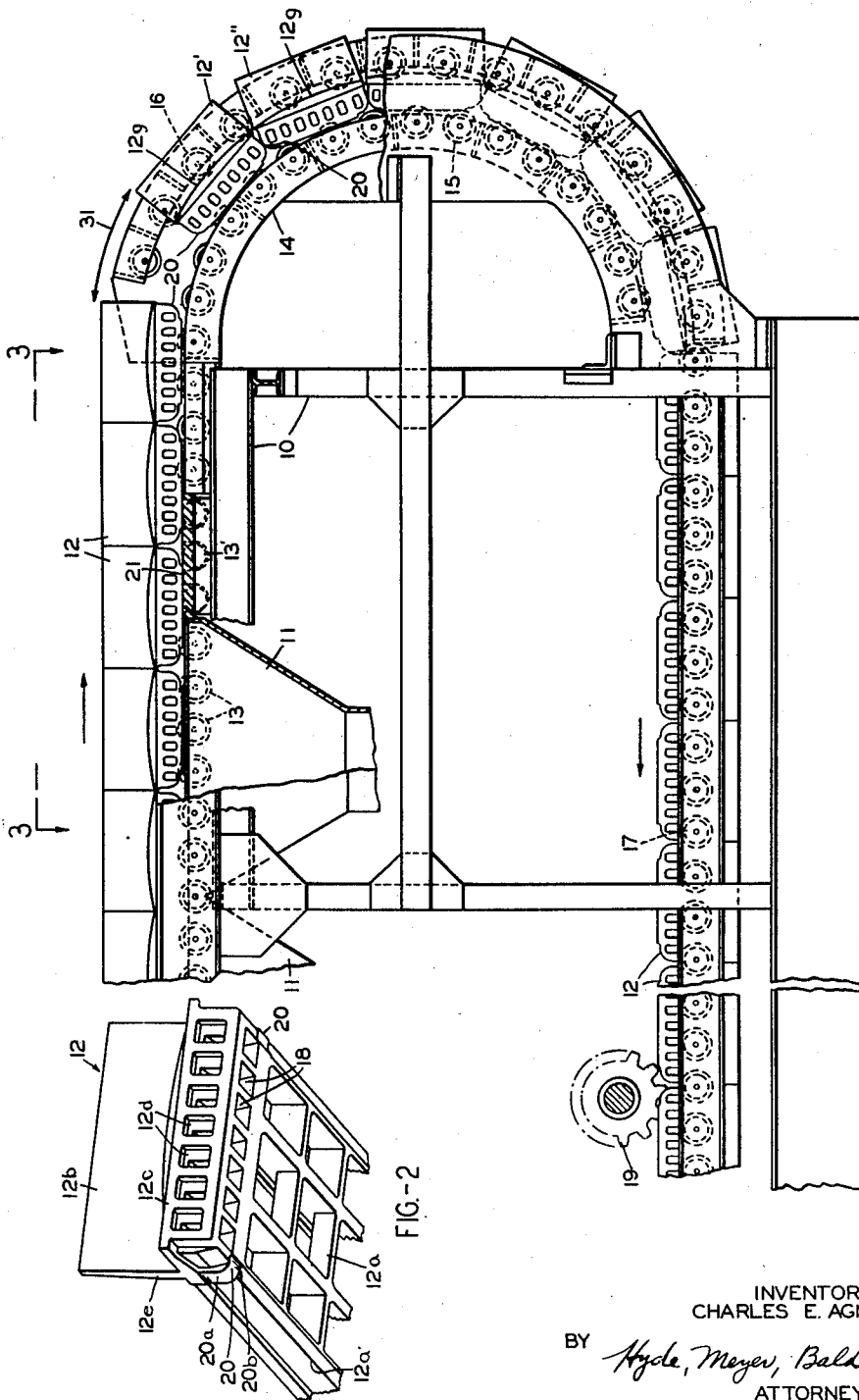


FIG-1

FIG-2

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2 Sheets-Sheet 2

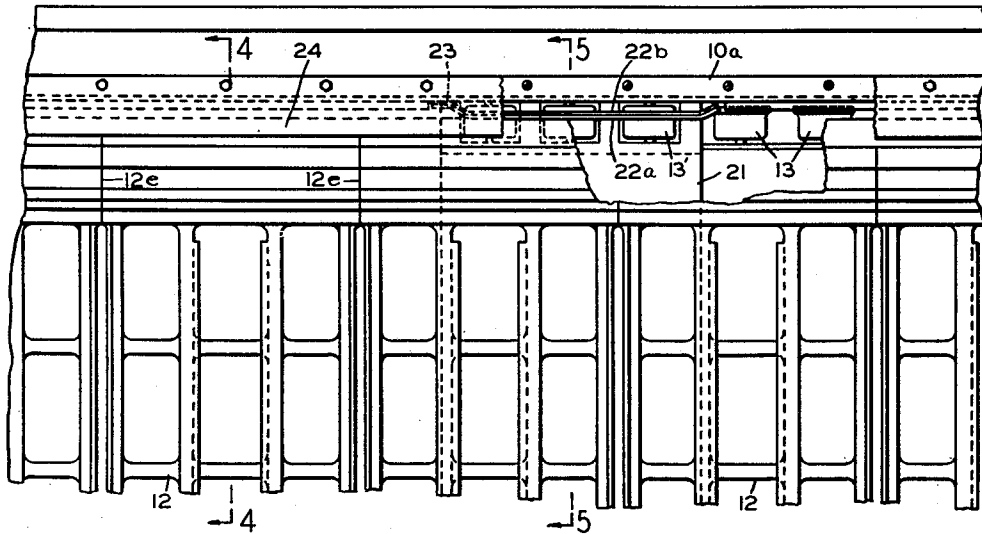


FIG.-3

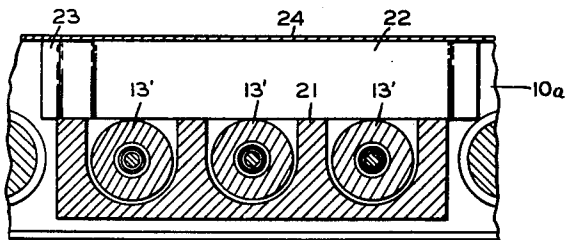


FIG.-6

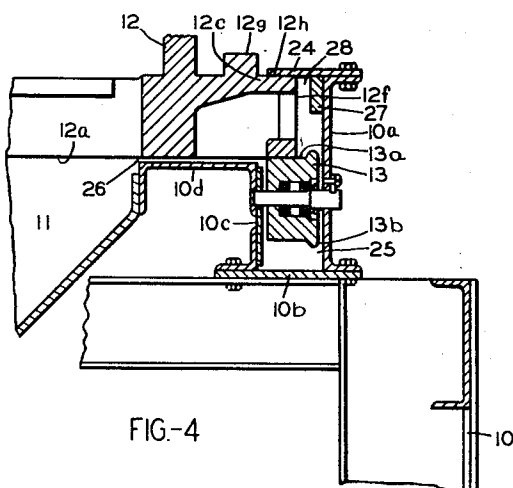


FIG.-4

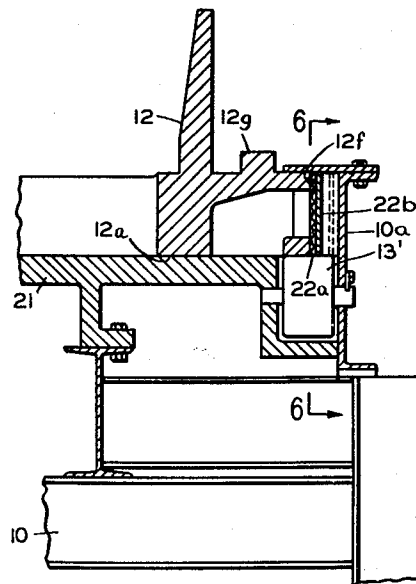


FIG.-5

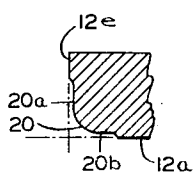


FIG.-7

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2,506,569

SINTERING MACHINE

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5 Claims. (Cl. 266—21)

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This invention relates to improvements in sintering machines for sintering finely divided ore or other fine metal bearing material to convert it into agglomerated masses suitable for charging into a blast furnace.

An object of the present invention is to provide a stationary roller track together with wheelless flat bottom pallets and wherein the rollers of the track have cylindrical bearing surfaces which are tangential to the flat bottom of the pallets so that the pallets are free to expand laterally under the influence of heat without changing the horizontal position of the pallets and the cooperation of the pallets with the sealing means by which the infiltration of excess and undesirable air is prevented.

Another object of the present invention is to provide rounded bottom corners on the pallets of a novel character adapted to provide a rolling contact with similar surfaces of adjoining pallets as the pallet train passes around the curved sections of the roller trackway.

Another object of the present invention is to provide machined vertical surfaces at the meeting edges of the pallets along the sintering run of the trackway so as to prevent the leakage of air at these points together with rounded bottom corners of the pallets recessed back from the plane of the meeting vertical surfaces so that as the pallets bump each other at the discharge end of the machine any burs formed on the bumping surfaces will not interfere with a perfect fit between the machined vertical meeting faces of the pallets.

Another object of the present invention is to provide improved means for preventing infiltration of excess air at the dead plate where the pallets on the sintering run of the conveyor pass into or out of communication with the windboxes. By providing horizontal machined surfaces on the dead plate and on the coating bottom of each pallet I am enabled to maintain a very tight joint at these locations. By recessing the bumping corners of the pallets away from the plane of the horizontal bottom of the pallet, I provide that burs formed on the bumping corners do not interfere with or score the dead plate seal. The seal at these zones is further improved by providing flat side faces on each pallet together with a flat sealing strip pressing against the side faces.

Other objects and advantages of the present invention will be apparent from the accompanying drawings and description and the essential

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features thereof will be set forth in the appended claims.

In the drawings,

Fig. 1 is a fragmental side elevational view of the discharge end of a sintering machine embodying my invention;

Fig. 2 is a fragmental perspective view showing a portion of the bottom and of one end and one side complete of one of the pallets of Fig. 1;

Fig. 3 is a fragmental top plan view taken from the position of the line 3—3 of Fig. 1, and with the parts enlarged;

Figs. 4 and 5 are fragmental sectional views taken along similarly numbered lines of Fig. 3;

Fig. 6 is a fragmental sectional view taken along the line 6—6 of Fig. 5; while

Fig. 7 is an enlarged view of a corner of one of the pallets shown in Figs. 1 and 2.

This invention is an improvement over the sintering machine disclosed in my Patent No. 2,273,821, granted February 24, 1942, to which reference may be had for the explanation of general features not specifically mentioned herein.

The sintering machine comprises a structural framework 10 supporting a plurality of windboxes 11 each of which is connected with a suction system comprising a suitable fan or blower and dust catchers and the like. An endless series of pallets 12 are supported by a set of rollers 13 as they pass along the top horizontal run of the endless track while the sintering process is taking place. Along the curved discharge end of the track, indicated at 14, the pallets are supported by two sets of rollers, namely 15 and 16, so as to guide them to the bottom horizontal run of the conveyor where the pallets return idle to the feed end of the machine supported by another set of rollers 17. It will be understood by those skilled in this art that the opposite end of the stationary track is similar to the curved end 14 and other sets of rollers like those shown at 15 and 16 guide the empty pallets so that they finally return to the upper run again resting upon the rollers 13. The pallets travel in the direction of the arrow of Fig. 1 and means not shown is provided at the left end of the upper run of the machine as viewed in Fig. 1 to load the pallets with the fine ore or other fine metal bearing material together with the proper percentage of fuel such as coke dust or the like after which a burner is provided to ignite the material which burns in the well known manner from the upper zone downwardly, the air for combustion being drawn downwardly through the pallets by means of the windboxes 11.

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My improved pallet will be more clearly understood from Fig. 2 of the drawings. The bottom of the pallet is provided with any suitable grate bar construction supported on the top of the ribbed bottom 12a. Parallel side walls 12b are provided to support the material for sintering. The bottom extends laterally outward beyond the side walls 12b providing the shoulders 12c which are utilized for roller bearing surfaces and for cooperation with sealing means later described. The side shoulders may be cored out as indicated at 12d to save weight. These thickened side portions have formed therein parallel racks 18 which coact with pinions 19 driven by any suitable means so as to impel the pallets 12 along the idle run of the conveyor and upwardly around the curved end of the stationary track at the feed end of the machine. The entire pallet may be a simple casting on which I provide certain machine surfaces for preventing infiltration of air into the air exhaust system as will presently appear.

The end faces 12e of each pallet are vertically disposed along the upper or sintering run of the stationary track. I prefer to machine these faces so as to prevent as much as possible of the infiltration of air at these points during the sintering process. I provide novel means for insuring a good fit between the faces 12e of adjoining pallets throughout the life of the equipment. Looking at the right-hand end of Fig. 1, it will be noted that the pallet 12' has just bumped the pallet 12'' at the point 20. The gap 31 shown between pallets at the end of the sintering run permits the pallet 12' to run a short distance around the curved end of the track bumping into the pallet 12'' so as to dislodge the material which is sintered. A discharge chute, not shown, is provided at this point to conduct the sintered material away. Since each of the pallets with its load may weigh three thousand to four thousand pounds it will be understood that there is considerable blow delivered at the point 20. This blow causes a burring at the point where the surfaces strike and I have provided a novel construction so that this does not interfere with the seal between the vertical faces 12e. As shown in Figs. 1 and 2, and as emphasized in Fig. 7, a recessed construction is provided at the point 20 near each of the four bottom corners of the pallet. Along the face 20a the metal is recessed back from the plane of the face 12e. Preferably also, the face 20b is recessed back from the plane of the flat bottom 12a for a purpose later described. At the point 20 I provide an arcuate surface so as to give rolling contact between adjacent pallets as they pass around the curved end of the roller track like the end shown at 14. As will be noted in Fig. 2, the bumping corners 20 extend outwardly beyond the end rib 12a' to protect it from damage.

Referring now to Figs. 1, 3 and 5, it will be noted that dead plates 21 are provided at opposite ends of the row of windboxes so as to prevent infiltration of excess air into the windboxes at the points where the sintering run of the conveyor enters and leaves the zone of the windboxes. It will be noted that the dead plate extends laterally outside the line of windboxes to the outside structural member 10a of the supporting framework. Countersunk in the dead plate along each side thereof is one or more rollers 13', three being shown in Fig. 6. As shown in the various views, and particularly in Fig. 5, the upper surface of the dead plate 21 is ma-

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chined so as to fit against the flat horizontal machined bottom 12a of the pallet 12. While these surfaces are shown as meeting in Fig. 5, actually there is a clearance of a few thousandths of an inch which is provided by having the cylindrical surfaces of the rollers 13' extend slightly above the top surfaces of the dead plate 21. The rollers 13' may be made adjustable for this purpose, if desired, or in any case, the clearance between 12a and 21 may be taken care of by controlling the wearing surface of the roll 13'. The vertical side edges 12f of the pallet shoulders 12c are also sealed against leakage at the point where the pallets pass over the dead plate. As clearly shown in Figs. 3, 5 and 6, at each side of the conveyor, I provide a flexible sealing strip 22 which may consist of a strip 22a of flexible asbestos or the like backed by a strip 22b of spring steel or the like suitably secured to the side frame member 10a at the point 23 and providing a flat vertical sealing surface bearing against the vertical face 12f of the pallet.

It will be noted that the recessed portion 20b at each of the four bottom corners of each pallet prevent any burs formed by bumping from coming into engagement with the flat upper surface of the dead plate 21 so that the flat meeting surfaces between 12a and 21 are always preserved.

Referring now to Figs. 3, 4 and 6, it will be noted that I have provided a continuous sealing strip 24 along each of the side edges of the upper run of the conveyor. The strip 24 thus closes the only opening in a chamber 25 which is otherwise closed by the frame members 10a, 10b, 10c and 10d. The chamber 25 is subject to suction from the windbox 11 through the opening 26. My invention makes it possible to hold this opening to a very narrow space because of the machined flat bottom 12a on each pallet and because the recessed surface 20b at the bottom corners of the pallet insures that the surface 12a remains absolutely flat. Preferably, but not necessarily, I provide a strip 27 along the entire side of the frame member 10a so as to reduce the width of the opening 28 necessary to be sealed by the member 24.

Referring to Fig. 4, it will be noted that the cylindrical surface 13a of each of the rollers 13 is tangential to the bottom 12a of each pallet. A flange 13b on the outside edge of each roller serves to maintain the pallets centered. It will be noted that there is room on the roller surface 13a for expansion of the pallet laterally due to heat. In my earlier granted patent, mentioned previously, such lateral expansion caused the pallet to ride up on the inclined rollers so as to increase the gap pointed out at 26 in Fig. 4. Utilizing my present construction this gap is always maintained at a very narrow dimension because the free lateral expansion is permitted as above described.

It will be understood by those skilled in this art that the arcuate surfaces 12g engage the supporting rollers 16 while the flat surfaces 12h engage the rollers 17 on the bottom run of the stationary track.

It should be understood that certain features of my invention are useful in a conveyor for fine materials where the end faces 12e should always fit tightly together. In such cases the pallets might be material carriers and the bumping surfaces 20 might be arranged as taught above so that burs would never interfere with the fit of the end faces of adjacent carriers.

What I claim is:

1. In a sintering machine having parallel track portions carrying rollers defining an endless path and having a windbox between said track portions, a plurality of pallets engaging said rollers and adapted to follow a straight path over said windbox during a sintering operation and a curved path during a discharge operation, each pallet having a hearth level above which the sintered material lies, end portions of each pallet extending below said level, said end portions of adjacent pallets being adapted to bump each other during said discharge operation, a dead plate in said path at the end of said windbox, said dead plate having a flat planar upper horizontal surface, some of said first mentioned rollers being positioned with cylindrical surfaces substantially tangent to said dead plate each of said pallets having a flat planar lower horizontal surface extending across said path, said plate and pallets being so constructed and arranged that said horizontal surfaces substantially meet, each of said pallets having flat planar vertical end faces at and above said hearth level, and said bumping end portions being recessed into said pallets out of the plane of said vertical end faces and out of the plane of said lower horizontal surface of said pallet.

2. In a sintering machine having parallel track portions carrying rollers defining an endless path and having a windbox between said track portions and having dead plates at opposite ends of said windbox, a plurality of pallets engaging said rollers and adapted to follow a straight path over said windbox during a sintering operation and a curved path during a discharge operation, each pallet having a hearth level above which the sintered material lies, end portions of each pallet extending below said level, said end portions of adjacent pallets being adapted to bump each other during said discharge operation, said dead plates having flat planar upper horizontal surfaces, said rollers at the zone of each dead plate being cylindrical and substantially tangent with the upper surface of said dead plate to permit pallets to pass over, while substantially in sealing engagement with said dead plate, each of said pallets having a flat planar lower horizontal surface extending across said path, and said plate and pallets and rollers being so constructed and arranged that said horizontal surfaces substantially meet.

3. The combination of claim 2 wherein said bumping end portions are recessed into said pallets out of the plane of said lower horizontal surface of said pallet.

4. In a sintering machine having parallel track portions carrying rollers defining an endless path and having a windbox between said track portions and having dead plates at opposite ends of said windbox, a plurality of pallets engaging said rollers and adapted to follow a straight path over said windbox during a sintering operation, said pallets meeting end to end to form a continuous conveyor, said pallets having vertical side faces parallel to said path, an imperforate continuous frame member parallel to said path and laterally outside said side faces and laterally outside said dead plates, generally horizontal sealing means between said frame member and said pallets, and generally vertical sealing means at one of said dead plates between said frame member and said vertical side face of a pallet passing over said dead plate, said sealing means extending from said dead plate to said horizontal sealing means.

5. In a sintering machine having parallel track portions carrying rollers defining an endless path and having a windbox between said track portions and having dead plates at opposite ends of said windbox, a plurality of pallets engaging said rollers and adapted to follow a straight path over said windbox during a sintering operation, said pallets meeting end to end to form a continuous conveyor, said pallets having vertical side faces parallel to said path, an imperforate continuous frame member parallel to said path and laterally outside said side faces and laterally outside said dead plates, generally horizontal sealing means between said frame member and said pallets, and a flat vertical sealing strip extending from said dead plate to said horizontal sealing means and secured to said frame member and engaging said vertical side face of a pallet passing over said dead plate.

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The following references are of record in the file of this patent:

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